Headworks International Inc.
11000 Brittmoore Park Drive
Houston, TX 77041 USA
(P) +1 713-647-6667
(F) +1 713-647-0999

Transmittal Letter

Date: 7/15/2022 HW Project No. B-2021-00544

Attention: Chuck Butterfield
Company Name: Civil Engineering Consultants, Inc
Address: 4994 Lower Roswell Rd. Suite 18
City, State ZIP: Marietta, Georgia 30068
RE: Jefferson WPCP

We are sending you: ☒ Attached ☐ Under Separate Cover

☐ Change Order ☐ Comment Letter ☐ Shop Drawings
☒ Submittal Package ☐ O&M Manual
☐ Other

Quantity	Description
	Jefferson WPCP Submittal- Rev 0

Items transmitted as shown:

☒ For approval ☐ For your use
☐ For review and comment ☐ As requested
☐ Other

CIVIL ENGINEERING CONSULTANTS, INC.
MARIETTA, GEORGIA 30068

No Exceptions Taken	No Exceptions Taken With Comment	Make Corrections Noted	Rejected
	✓		

DATE *Aug 10, 2022*
BY

APPROVED FOR DESIGN ONLY.
CONTRACTOR SHALL VERIFY ALL
DIMENSIONS AND QUANTITIES.

REMARKS:

Signed: Celeste Figueroa

ESAD, LLC
Electrical Engineering

885 Woodstock Road
Suite 430-231
Roswell, GA 30075
Ph: 678-469-5196

Shop Drawing Review

REVIEW OF SUBMITTAL

REVIEWED ACCEPTED	X REVIEWED WITH COMMENT
REJECTED	RESUBMIT AS INDICATED

Review is for conformance with only the general concepts of design and information given, or noted and acknowledged as exceptions on the submittal. The contractor is responsible for compliance with all requirements of the specifications and drawings, including but not limited to, dimensions, ratings, features, methods of construction and fabrication and coordination and fit with the building and work of others as installed.

BY: David M. Zimmer, P.E.

Date: August 8, 2022

Project: Jefferson WRF

Submittal #

Submittal: Continuous Belt Screening
Headworks, Inc.

Comments:

1. Bar Screen Control Panel – Reviewed with Comment
    a. Provide auxiliary sets of contacts for bar screen fault and compactor fault. Signals will be sent back to Owner's SCADA Panel.

Jefferson WPCP

Submittal

Headworks® MS2™ Bar Screen Screwpactor™ SW220

Reference Specification Section 46 21 16
Headworks Project B-2021-00544

Dated 07/15/2022
Rev. 0

Owner:
City of Jefferson, Georgia

Ship To:
Jefferson Water Reclamation Facility
320 Kissam St.
Jefferson, GA 30549

Installing Contractor:
City of Jefferson
147 Athens Street
Jefferson, GA 30549

Manufacturer:
Headworks Inc.
11000 Brittmoore Park Drive
Houston, TX 77041
+1 713 647 6667

Manufacturer's Representative:
Kazmier and Associates, Inc.
6575-B Industrial Way
Alpharetta, GA 30004
+1 865 724 3914

DISCLAIMER

This submittal is prepared based on the information provided on the specifications. Dimensions provided shall be checked and approved by others. Headworks Inc. does not take responsibility for equipment not correctly fitting in the channel(s) in the event that the concrete and site dimensions in actuality differ from the information provided to Headworks upon which this submittal is based. The actual dimensions must be provided to Headworks Inc., prior to preparation of these submittals. Please note that in the event that changes are made to the information relating to the channel dimensions which necessitate revision of submittals already prepared and/or alter the dimensions of the equipment as quoted in our bid, these changes may result in additional charges.

This submittal and information contained within this submittal, such as drawings, cutsheets, and other data may be privileged, confidential, and protected from disclosure. If you are not the intended recipient, an employee, or agent responsible for delivering this message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender immediately and delete the original file from your computer.

11000 Brittmoore Park Drive | Houston, TX 77041 USA
[t] +1.713.647.6667 [f] +1 713.647.0999 [e] hw@headworksusa.com [w] www.headworksusa.com

Table of Contents
Jefferson WPCP

Headworks® MS2™ Bar Screen and Screwpactor™ SW220

Section 1

Scope of Supply
General Arrangement Drawings
Component Drawings
Head Loss Calculation

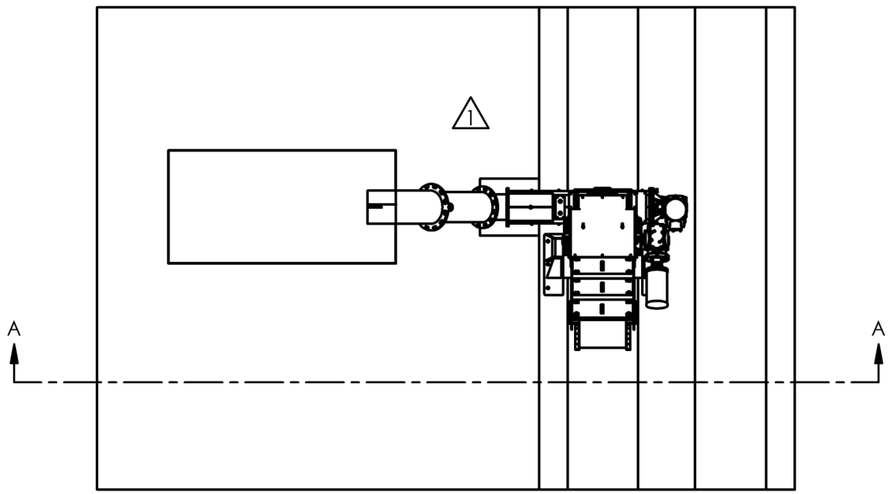
Scope of Supply

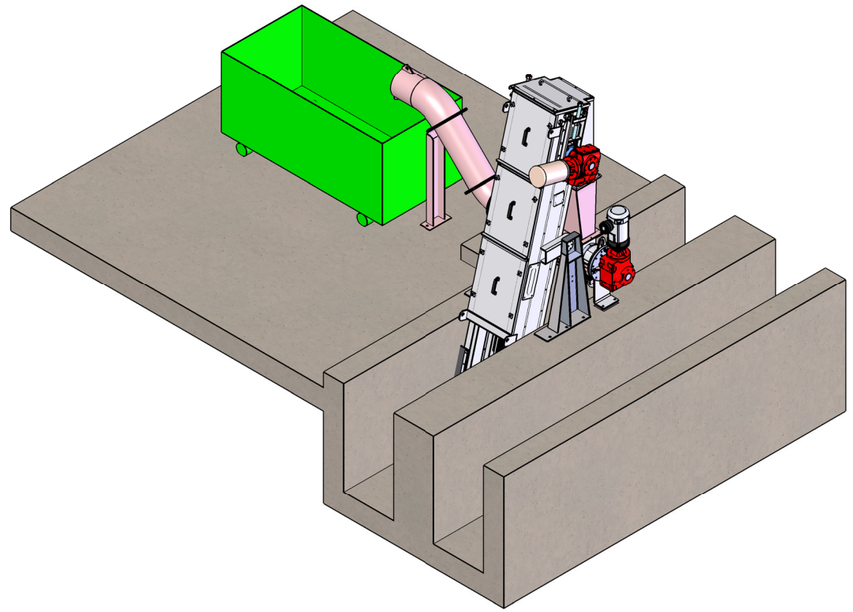
Scope of Supply for Jefferson WPCP

Items and services to be supplied are:

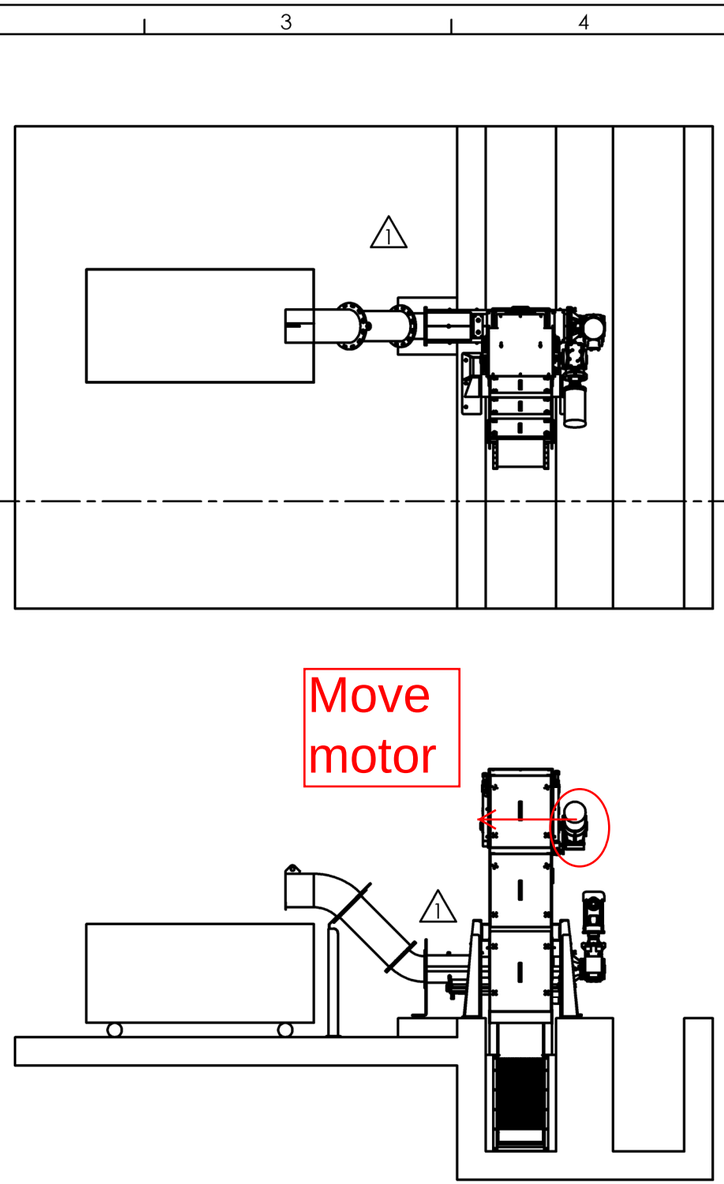
- One (1) Lot, Headworks® MS2™ Bar Screen, Pivot Type, Bar Spacing to be 0.1875 Inch. Front enclosed above the channel coping level.
- One (1) Lot, Headworks® Screwpactor™ SW220
- One (1) Lot, Spare Parts as Listed below for the Headworks® Bar Screen:
    - One (1) each, Strainer
    - One (1) lot, Set of fuses for each fuse rating
    - One (1) lot, Lamp lenses
- One (1) Lot Pivot Stands for the MS2™ Bar Screen
- One (1) each, 1” ASCO Solenoid Valve for the Screwpactor’s Wash Water
- One (1) each, ¾” ASCO Solenoid Valve for the Screwpactor’s Flush Water
- One (1) each, NEMA 7 Local Control Stations for the MS2™ Bar Screen and Screwpactor™ SW220 with Estop pushbutton
- One (1) each, NEMA 4X Main Control Panel Enclosure for the MS2™ Bar Screen and Screwpactor™ SW220
- Two (2) each, XPS- 15 Transducers
- One (1) Lot, Installation, Operation and Maintenance Training.
- One (1) Lot, Installation, Operation and Maintenance Manuals.

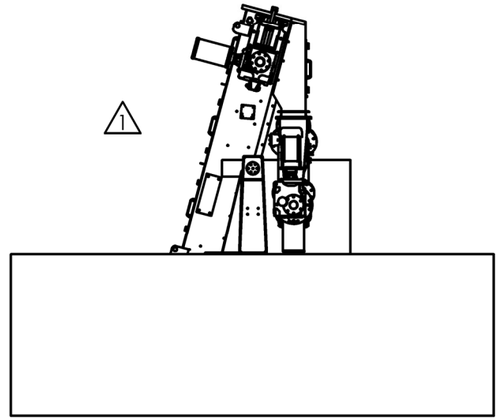
General Arrangement Drawings





Move motor





REV.	REV. BY	DESCRIPTION	REV DATE	APPROVED BY	APPROVED DATE
1	RJW	REVISED SW220 PER CUSTOMER COMMENTS	8/3/2022	JK/CF	8/3/2022

REVISIONS

APPROVAL INFORMATION	
APPROVED BY:	CF
DATE:	06/06/2022
CHECKED BY:	JK
DATE:	06/06/2022
DRAWN BY:	RJW
DATE:	06/06/2022

Headworks INTERNATIONAL
11000 Brittmoore Park. Dr.
Houston, TX 77041
www.headworksintl.com

UNLESS NOTED OTHERWISE:
DIMENSIONS ARE IN FEET & INCHES

GENERAL ARRANGEMENT

PLANT: JEFFERSON | LOCATION: GA

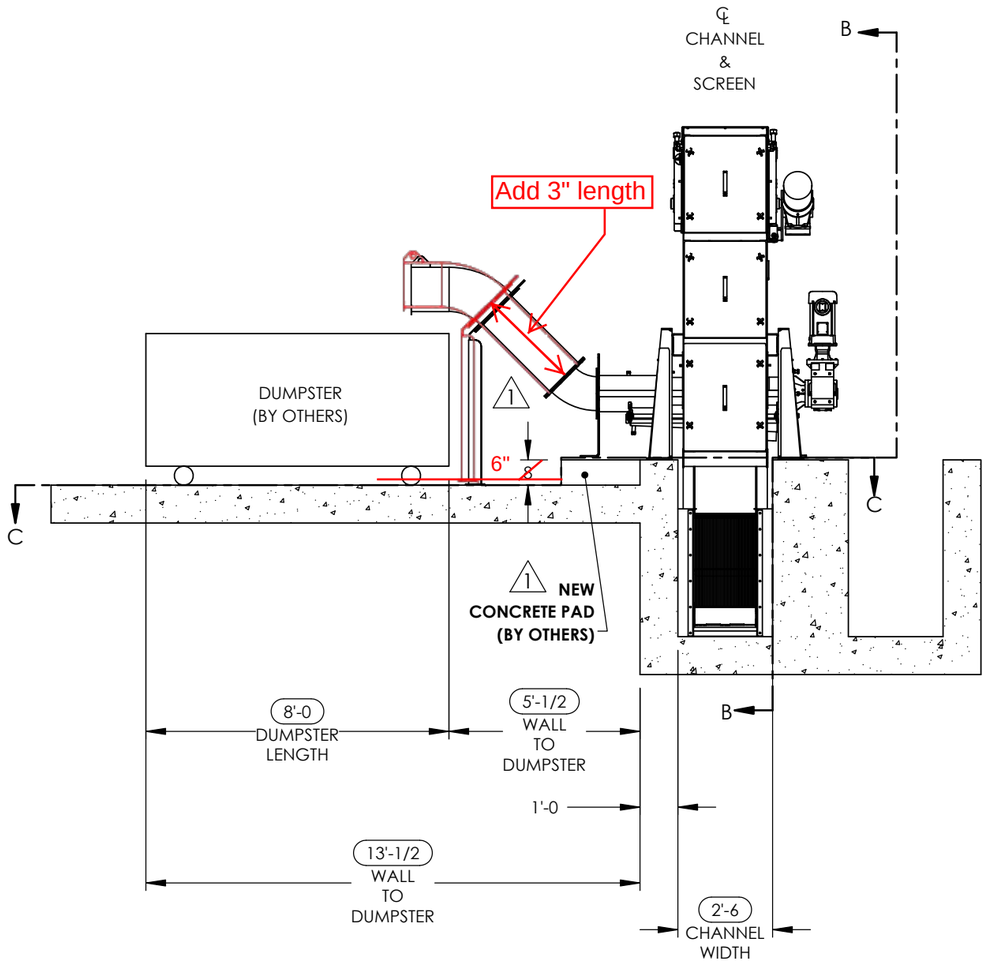
PROJECT NO: B-0000-12345

DRAWING NO: JEFA-GA

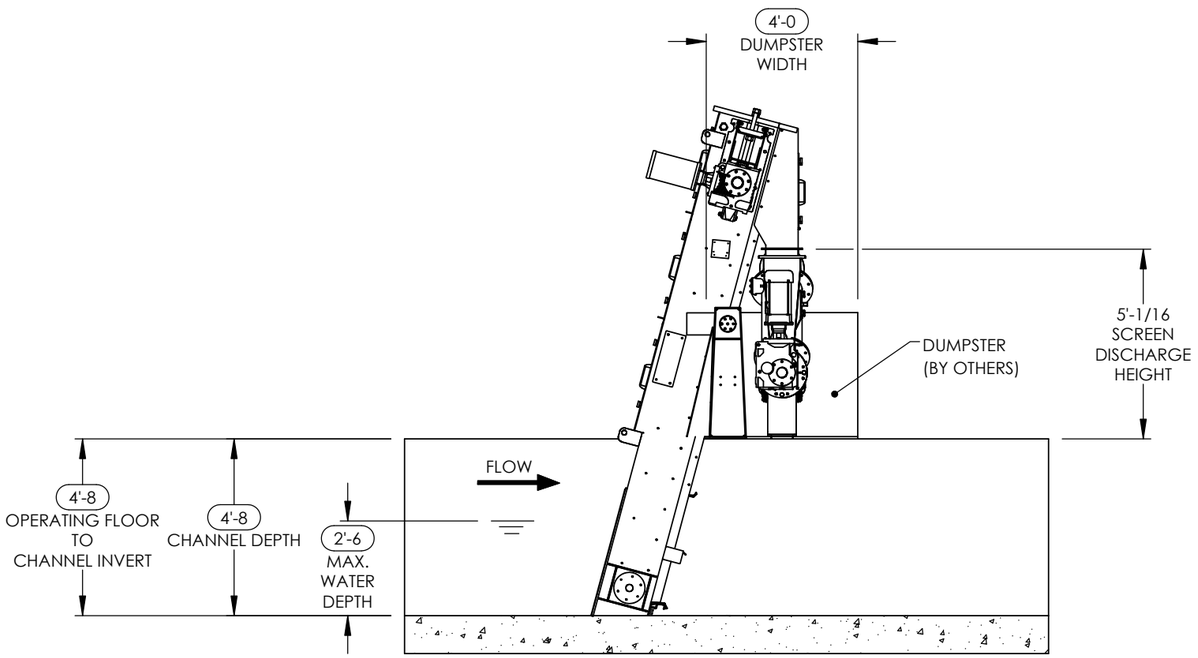
WEIGHT:	SCALE:	REV:	SHEET:
- LB	1:64	1	1 OF 7

CONTRACTOR TO FILL IN		
DESCRIPTION	**VERIFIED DIMS**	**INITIALS**
DUMPSTER WIDTH	4'-6	CKB
DUMPSTER LENGTH	6'-0	CKB
DUMPSTER HEIGHT	4'-0	CKB
CHANNEL WIDTH	2'-6	CKB
WALL TO DUMPSTER	5'-1	CKB
OPERATING FLOOR TO CHANNEL INVERT	4'-8	CKB
CHANNEL DEPTH	4'-8	CKB
MAXIMUM WATER DEPTH	~1'-6"	CKB

These dimensions are planned dimensions, can not provide field verify dimensions the structure is not constructed.
Dumpster dimensions are assumed, a fabricated dumpster to match dimensions shown can be provided if required.
Dumpster shall be arranged in opposite direction - 90 degrees from what's shown below, see construction plans.



SECTION A-A



SECTION B-B

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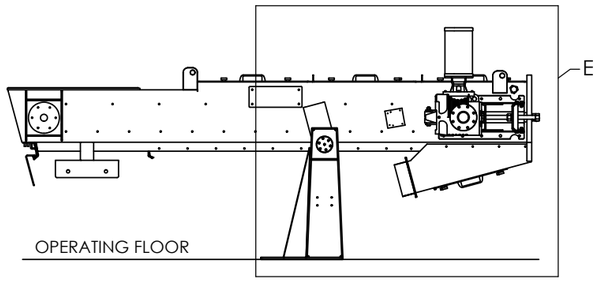
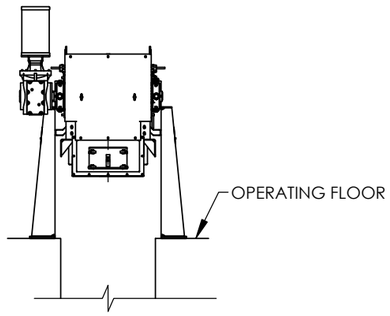
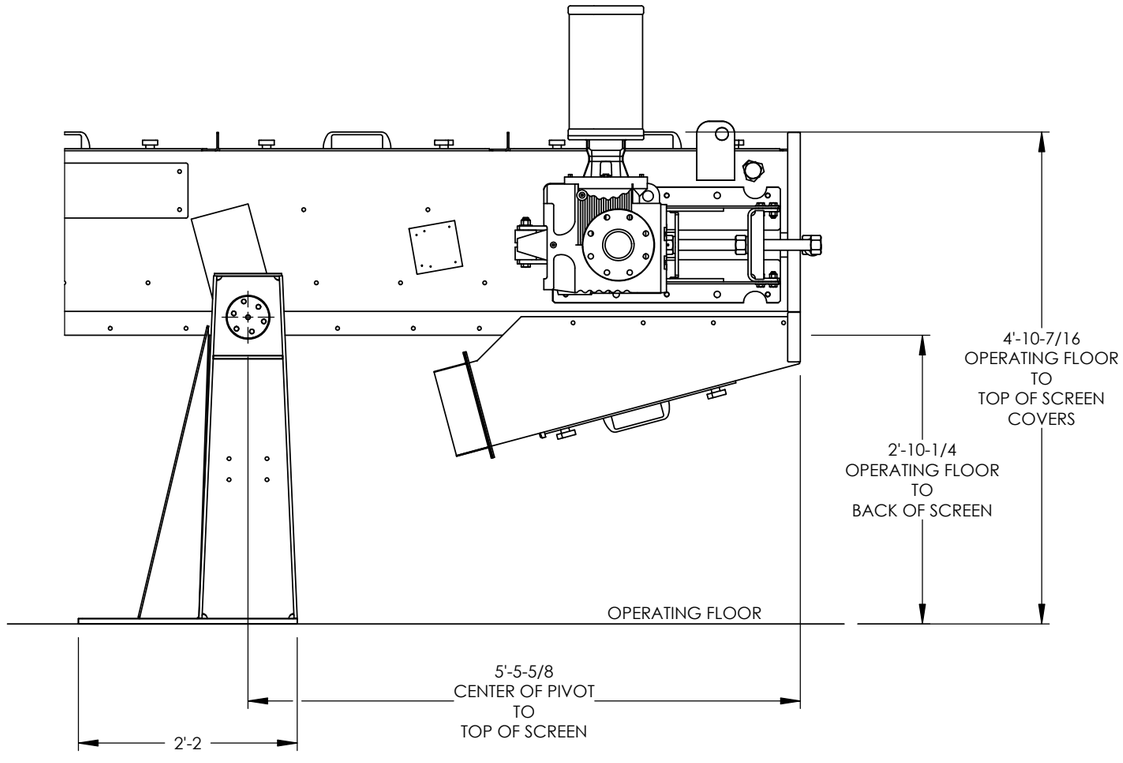
DATE:	06/06/2022		B-0000-12345	**JEFA-GA**	REV: 1 SHEET: 2 OF 7



SIDE VIEW
WITH
SCREEN PIVOTED



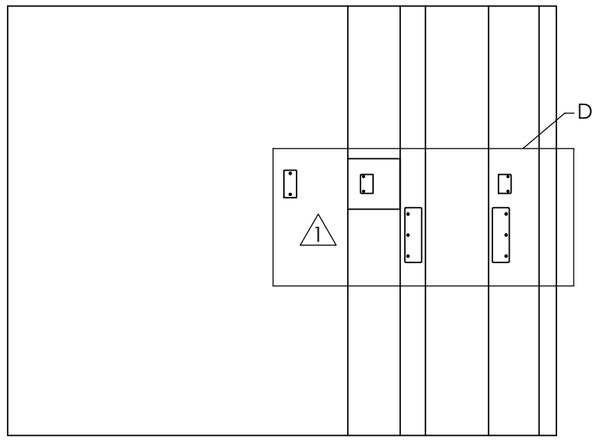
REAR VIEW
WITH
SCREEN PIVOTED



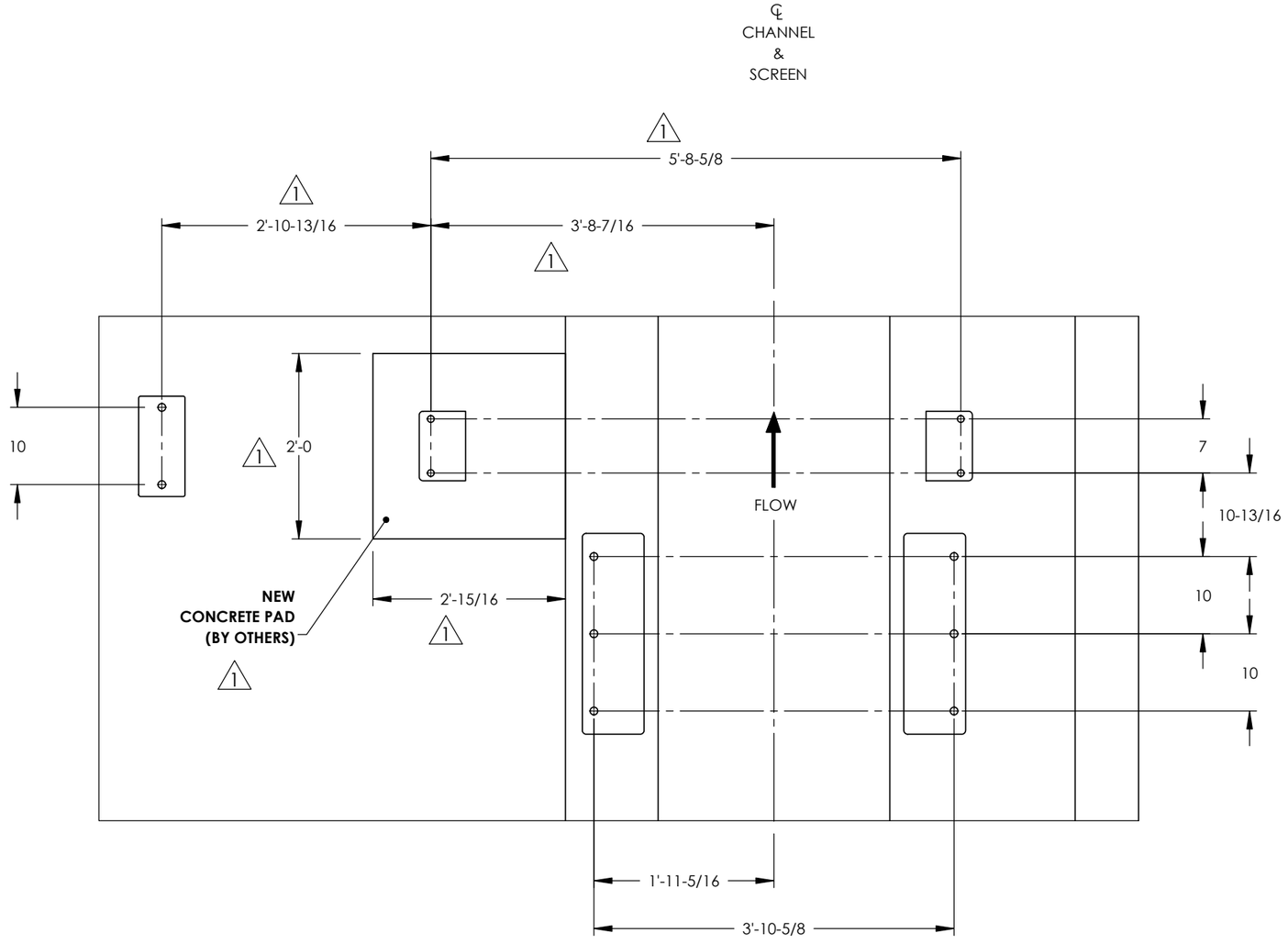
DETAIL E
SCALE 1 : 18

DRAWN BY:	RJW	Headworks BIO INTERNATIONAL	PROJECT NO:	DRAWING NO:	SCALE: -
DATE:	06/06/2022		B-0000-12345	**JEFA-GA**	REV: A / SHEET: 3 OF 7

PLAN VIEW - ANCHOR BOLTS FOR SCREENS WITH PROFILE VIEW OF MOUNTING FEET



SECTION C-C
SCALE 1 : 64



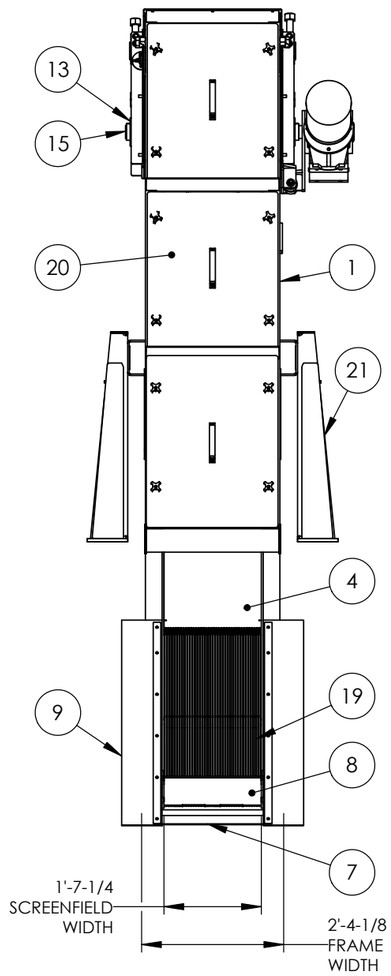
DETAIL D
SCALE 1 : 18

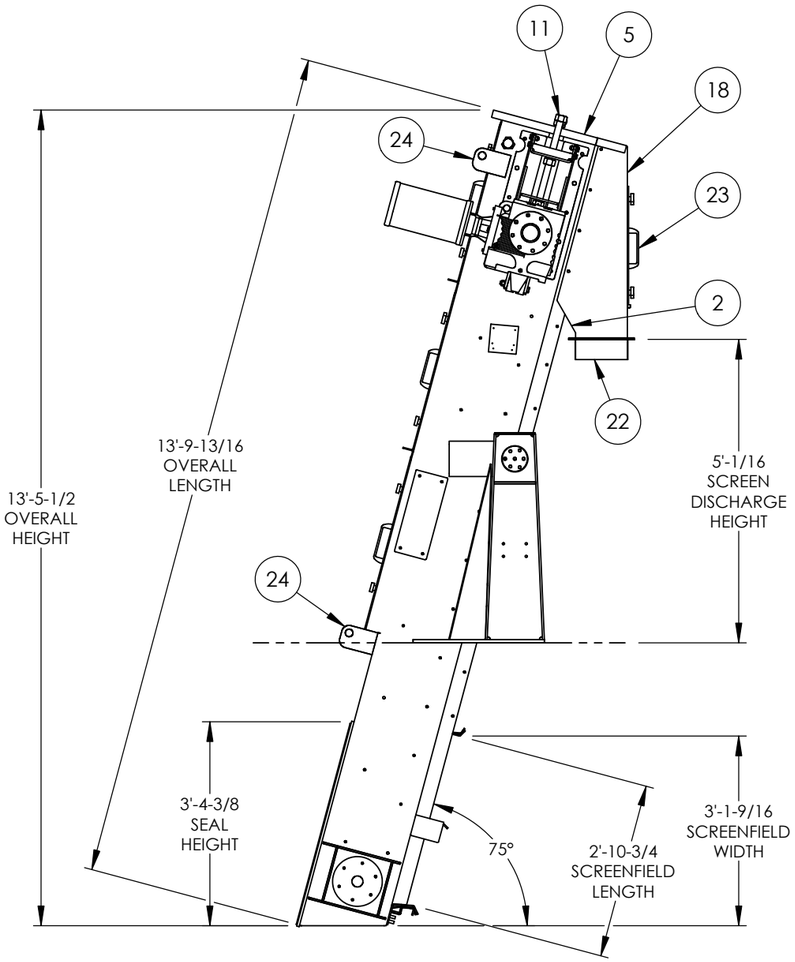
DRAWN BY:	RJW	Headworks INTERNATIONAL	PROJECT NO:	DRAWING NO:	SCALE: 1:72
DATE:	06/06/2022		B-0000-12345	**JEFA-GA**	REV: 1 / SHEET: 4 OF 7

ITEM NO.	PART	MATERIAL	SIZE/DESCRIPTION	
1	SIDE FRAME	304SS	3/16" PLATE (.19 THK)	
2	DISCHARGE CHUTE	304SS	3/16" PLATE (.19 THK)	
3	DEBRIS PLATE STIFFENERS	304SS	3/16" PLATE (.19 THK)	N.S.
4	DEBRIS PLATE	304SS	3/16" PLATE (.19 THK)	
5	TOP COVER	304SS	11 ga (.12 THK)	
6	SCREENFIELD SUPPORT	304SS	1/4" PLATE (.25 THK)	N.S.
7	SOLE PLATE	304SS	3/16" PLATE (.19 THK)	
8	RAKE BLADE	304SS	3/8" PLATE (.38 THK)	
9	CHANNEL SEAL	BUNA-N	1/2" THK	
10	SCRAPER ASSEMBLY	304SS/UHMW		N.S.
11	CHAIN ADJUSTER	18-8SS	ACME THREADED ROD	
12	CHAIN	304SS	125mm PITCH	N.S.
13	TAKE-UP BEARING	MFG. STD.	UCFX-13	
14	GEARBOX / MOTOR	MFG. STD.	SA87 / 3HP	
15	DRIVE SHAFT	304SS	Ø3"	
16	UPPER SPROCKET (DRIVE)	304SS	125mm / Ø70mm	N.S.
17	LOWER TURNAROUND	UHMW		N.S.
18	DISCHARGE ENCLOSURE	304SS	11 ga (.12 THK)	
19	TAPERED BAR	304SS	8 x 4 x 40mm, 1/4" SPACING	
20	FRONT COVERS	POLYCARBONATE	1/4" (.25 THK)	
21	PIVOT STAND ASSEMBLY	304SS	VARIES	
22	TRANSITION CHUTE	304SS	14 ga (.08 THK)	
23	DISCHARGE COVER	POLYCARBONATE	1/4" (.25 THK)	
24	LIFTING LUG	304SS	3/8" PLATE (.38 THK)	
N.S. = NOT SHOWN (FOR CLARITY)				

NOTES:

1. ALL SURFACES TO BE BLASTED TO A UNIFORM FINISH, REMOVING ALL WELD STAINS AND DISCOLORATION.
2. QUANTITY OF RAKES = 7
3. APPROXIMATE RAKE SPACING = 3.63 FT
4. ANCHOR BOLT LOCATIONS ARE +/- 1" ACCURATE.
5. ALL ANCHOR BOLTS ARE PROVIDED BY OTHERS.
6. FASTENERS SHALL BE 18-8SS.
7. APPROXIMATE WEIGHT OF SCREEN = 2,175 LB





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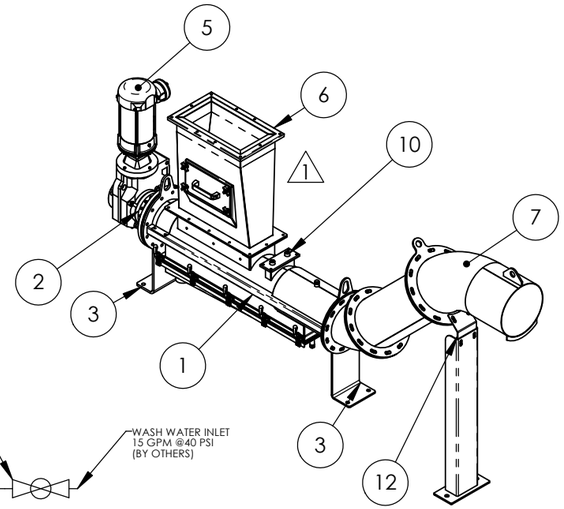
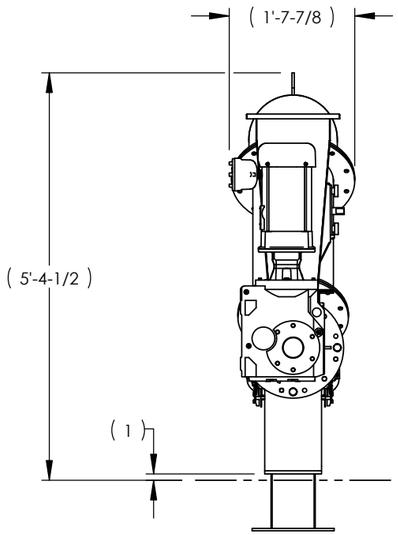
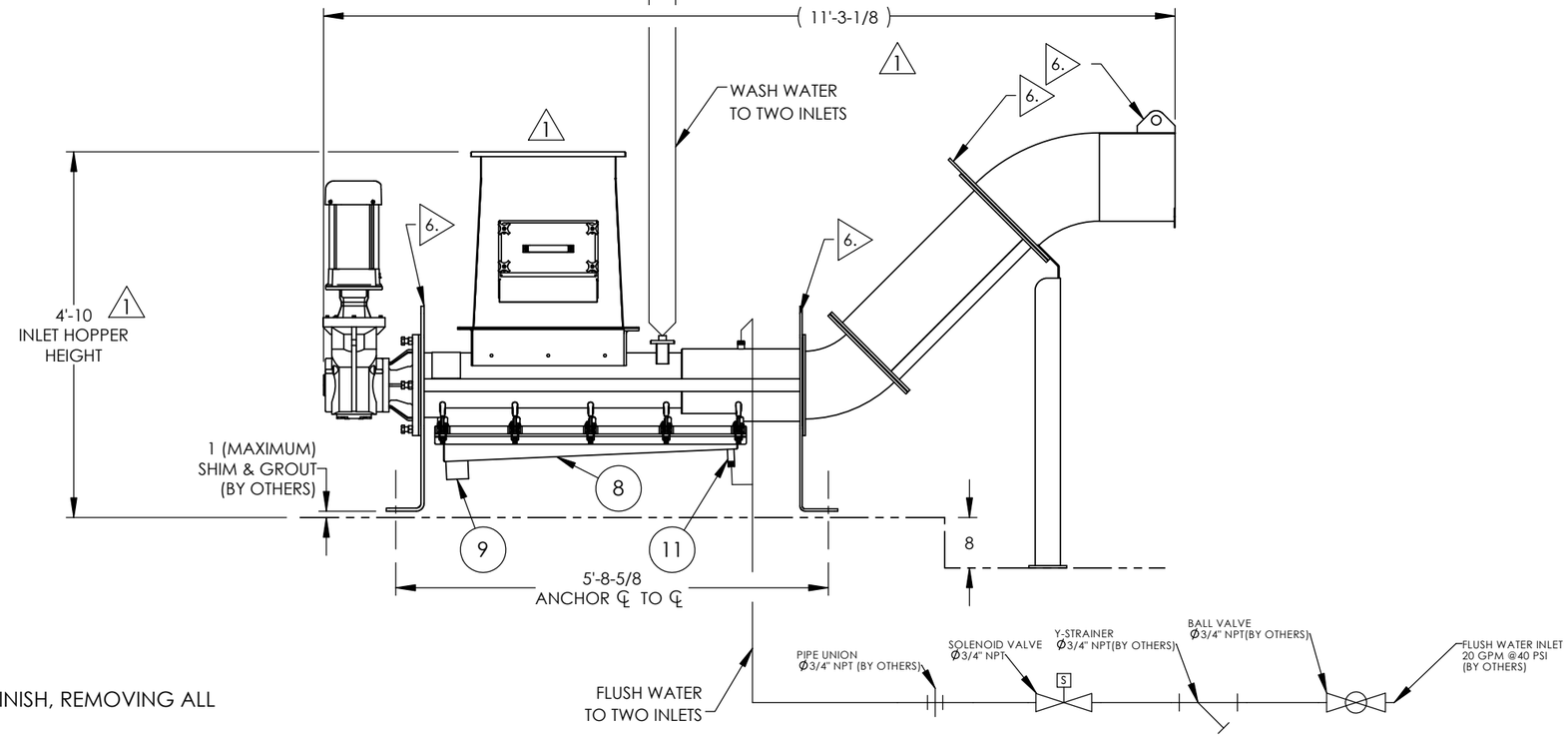
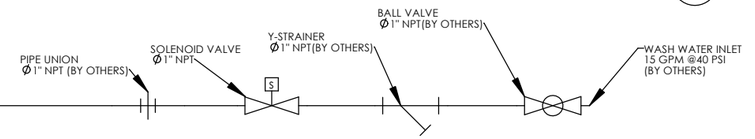
DATE:	06/06/2022		B-0000-12345	**JEFA-GA**	REV: 1 / SHEET: 5 OF 7

ITEM NO.	PART	MATERIAL	SIZE/DESCRIPTION (SW220)	
1	BODY	304SS	11GA PLATE (.12 THK)	
2	BEARING HOUSING	304SS	KA87 / 60mm	
3	SUPPORTS	304SS	1/2" PLATE (.50 THK)	
4	SPIRAL	CARBON STEEL	Ø9" OD, 3/8" THK FLIGHTS	N.S.
5	GEARBOX & MOTOR	MFG. STD.	KA87, 3HP	
6	INLET HOPPER	304SS	11GA PLATE (.12 THK)	
7	DISCHARGE TUBE	304SS	11GA PLATE (.12 THK)	
8	DRAIN PAN	304SS	11GA PLATE (.12 THK)	
9	DRAIN CONNECTION	304SS	3" SCH10	
10	WASH WATER CONNECTION	304SS	1" NPT	
11	FLUSH WATER CONNECTION	304SS	3/4" NPT	
12	DISCHARGE TUBE SUPPORT	304SS	3/16 PLATE (.19 THK)	
N.S. = NOT SHOWN (FOR CLARITY)				







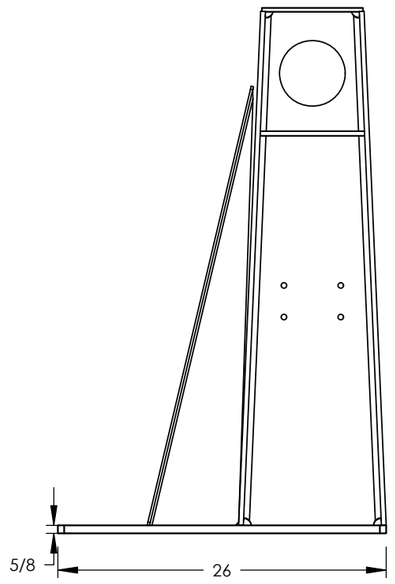


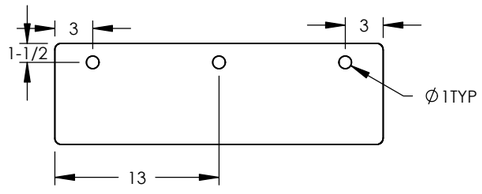
NOTES:
1. ALL SURFACES TO BE BLASTED TO A UNIFORM FINISH, REMOVING ALL WELD STAINS AND DISCOLORATION.
2. ANCHOR BOLT LOCATIONS ARE +/- 1" ACCURATE.
3. ALL ANCHOR BOLTS ARE PROVIDED BY OTHERS.
4. FASTENERS SHALL BE 304SS.
5. APPROXIMATE WEIGHT OF THE SCREWPACTOR: 1,185 LB (1)
6. LIFTING PAD EYE.

DRAWN BY:	RJW	Headworks INTERNATIONAL	PROJECT NO:	DRAWING NO:	SCALE: 1:24
DATE:	06/06/2022		B-0000-12345	**JEFA-GA**	REV: 1 / SHEET: 6 OF 7

PIVOT BASE PLATE
TYPICAL INSTALLATION

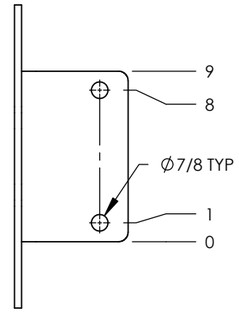
MAXIMUM TENSION: 500 LB
MAXIMUM SHEAR: 500 LB

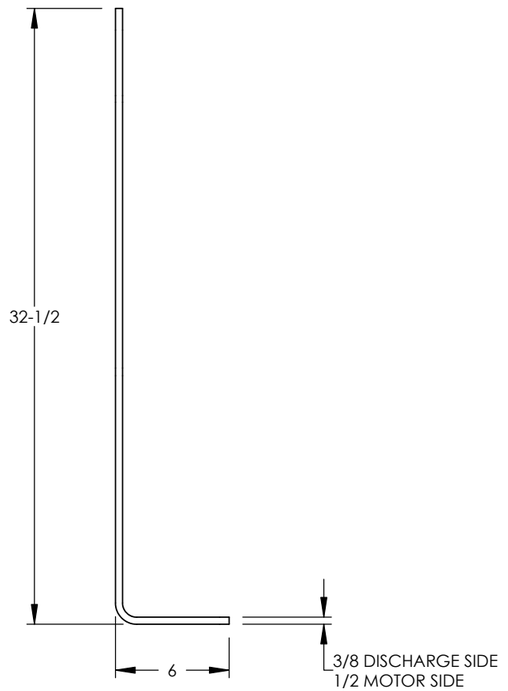




SCREWPACTOR LEG SUPOORT
TYPICAL INSTALLATION

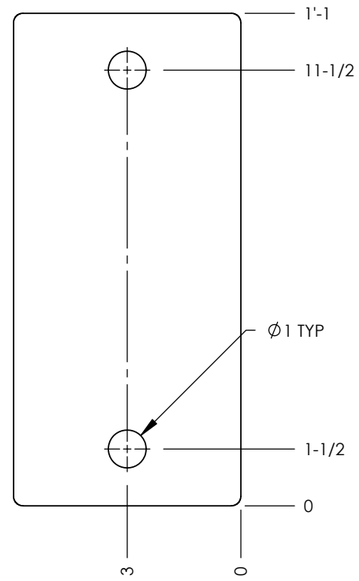
MAXIMUM TENSION: 2788 LB
MAXIMUM SHEAR: 500 LB

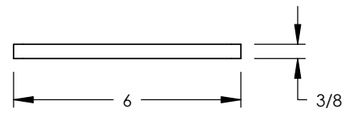




DISCHARGE TUBE SUPPORT
TYPICAL INSTALLATION

MAXIMUM TENSION: 500 LB
MAXIMUM SHEAR: 500 LB





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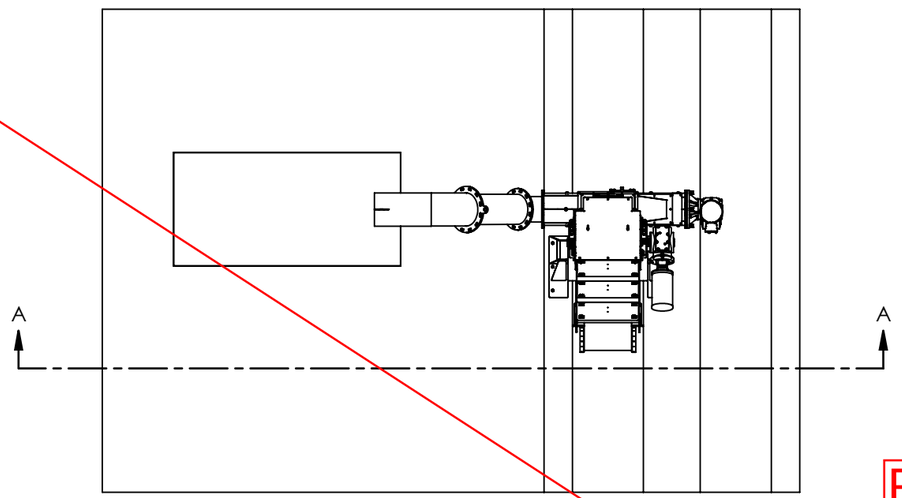
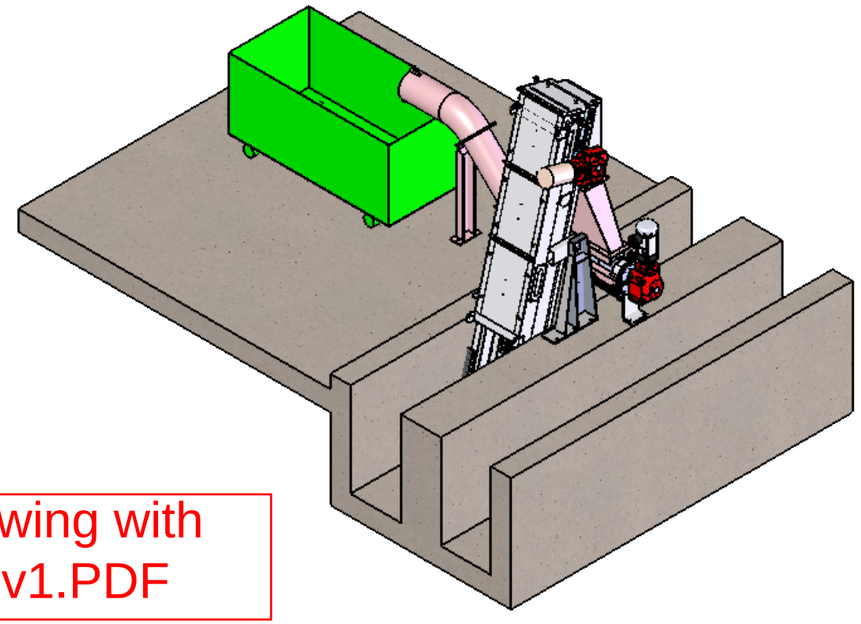
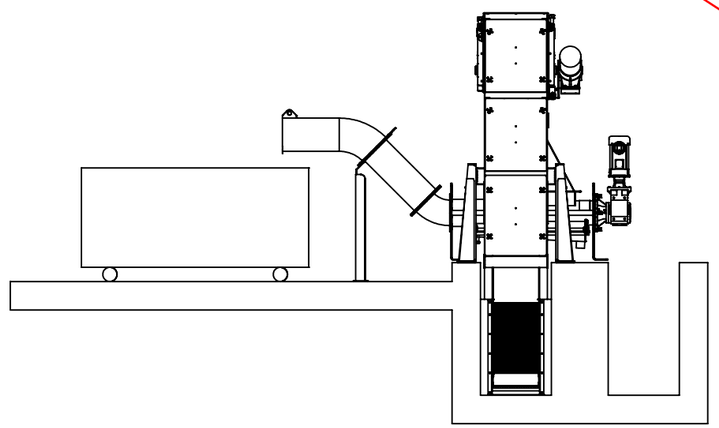
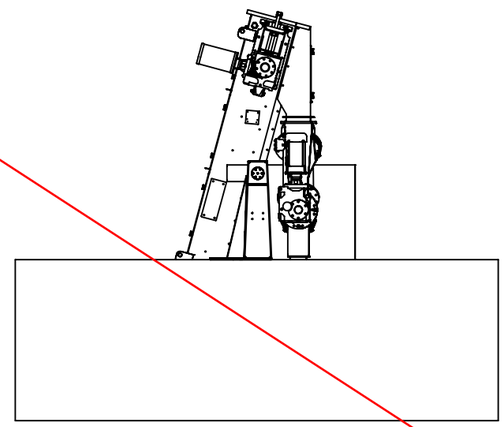
DATE:	06/06/2022		B-0000-12345	**JEFA-GA**	REV: 1 / SHEET: 7 OF 7





Replaced drawing with
JEFA-GA_Rev1.PDF





APPROVAL INFORMATION	
APPROVED BY:	CF
DATE:	06/06/2022
CHECKED BY:	JK
DATE:	06/06/2022
DRAWN BY:	RJW
DATE:	06/06/2022

Headworks

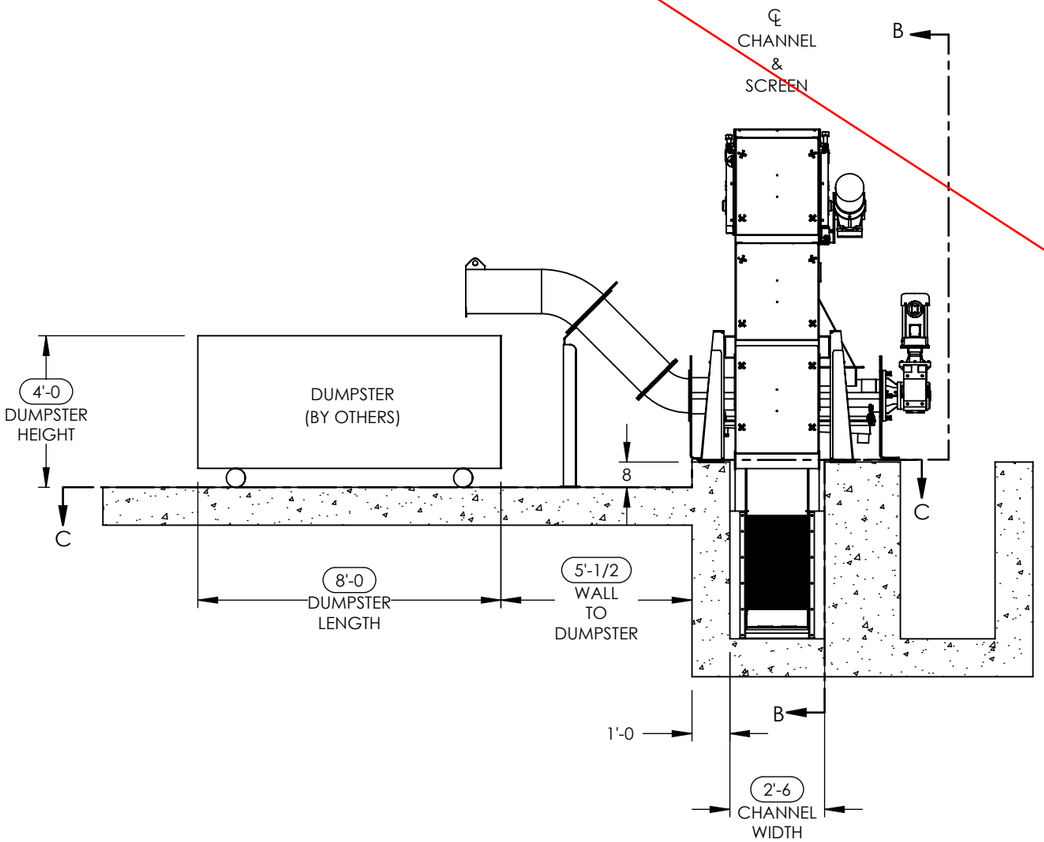
UNLESS NOTED OTHERWISE:
DIMENSIONS ARE IN FEET & INCHES

GENERAL ARRANGEMENT

PLANT: JEFFERSON	LOCATION: GA
PROJECT NO:	
DRAWING NO: JEFA-GA	

WEIGHT:	SCALE:	REV:	SHEET:
- LB	1:64	0	1 OF 7

CONTRACTOR TO FILL IN		
DESCRIPTION	**VERIFIED DIMS**	**INITIALS**
DUMPSTER WIDTH		
DUMPSTER LENGTH		
DUMPSTER HEIGHT		
CHANNEL WIDTH		
WALL TO DUMPSTER		
OPERATING FLOOR TO CHANNEL INVERT		
CHANNEL DEPTH		
MAXIMUM WATER DEPTH		



SECTION A-A

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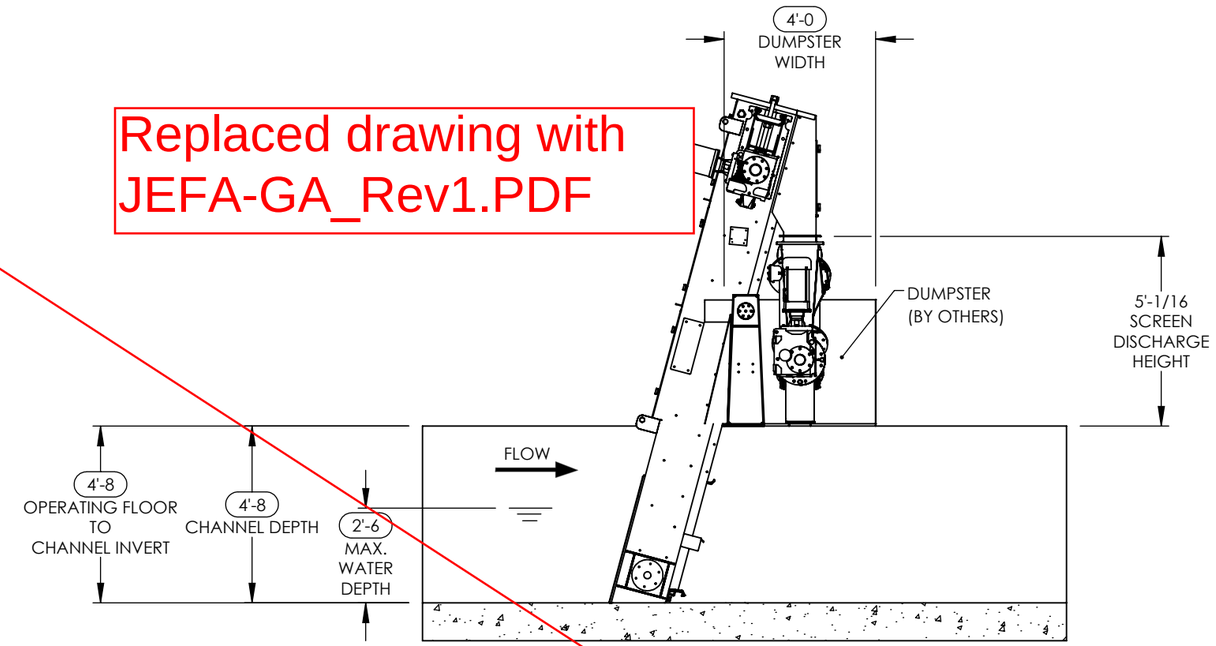
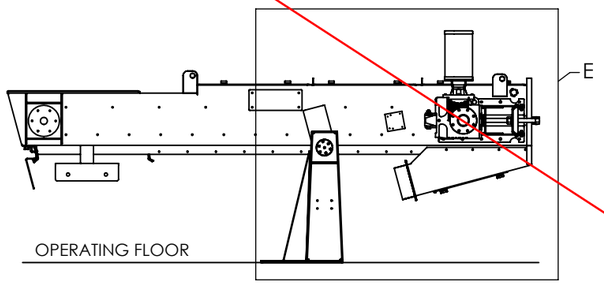
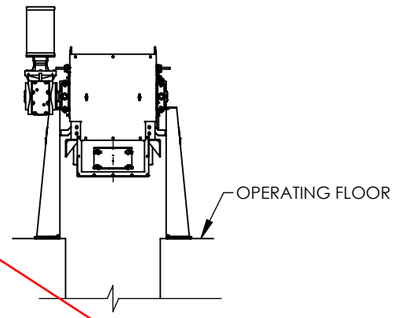


SECTION B-B

DRAWN BY:	RJW	Headworks	PROJECT NO:	DRAWING NO:	SCALE: 1:48
DATE:	06/06/2022			JEFA-GA	REV: 0 SHEET: 2 OF 7

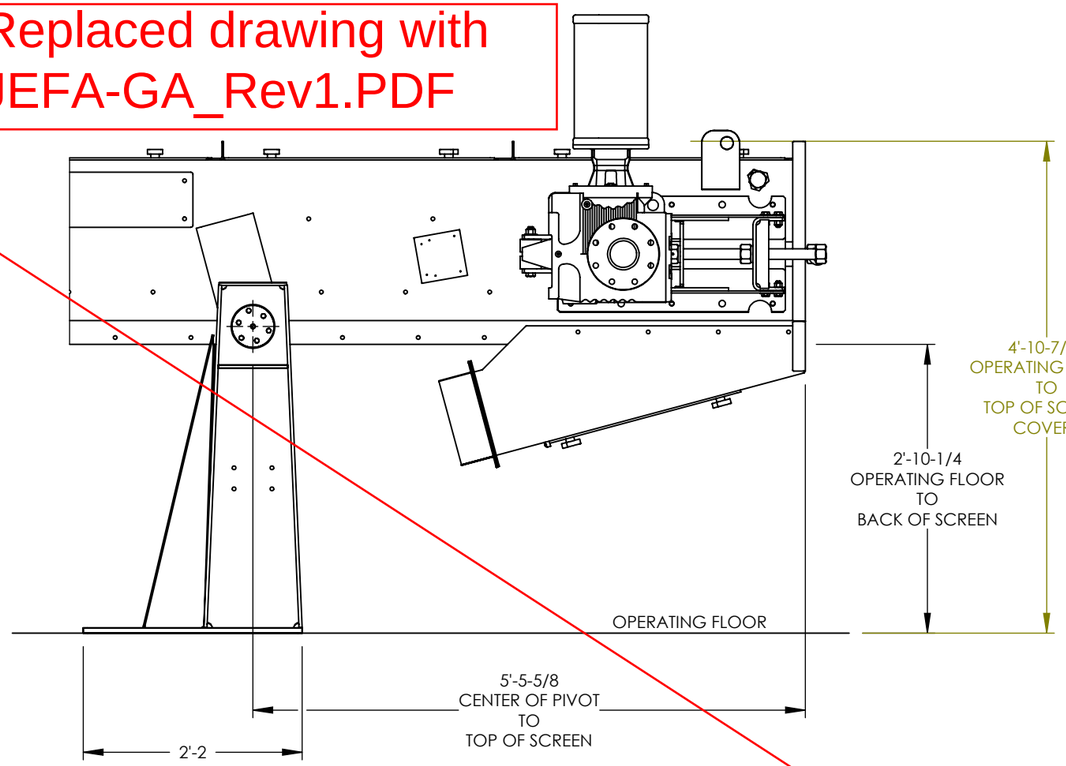


SIDE VIEW
WITH
SCREEN PIVOTED



REAR VIEW
WITH
SCREEN PIVOTED

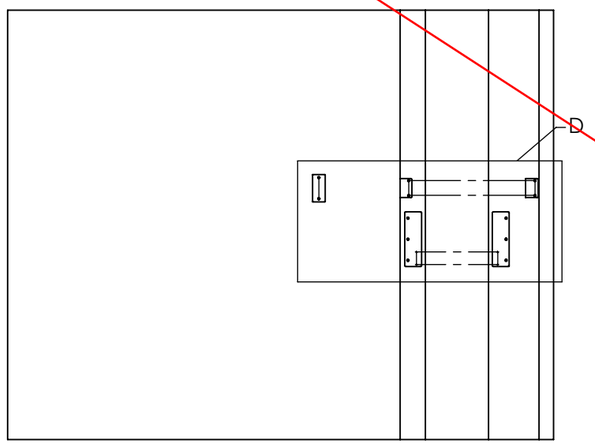
Replaced drawing with
JEFA-GA_Rev1.PDF



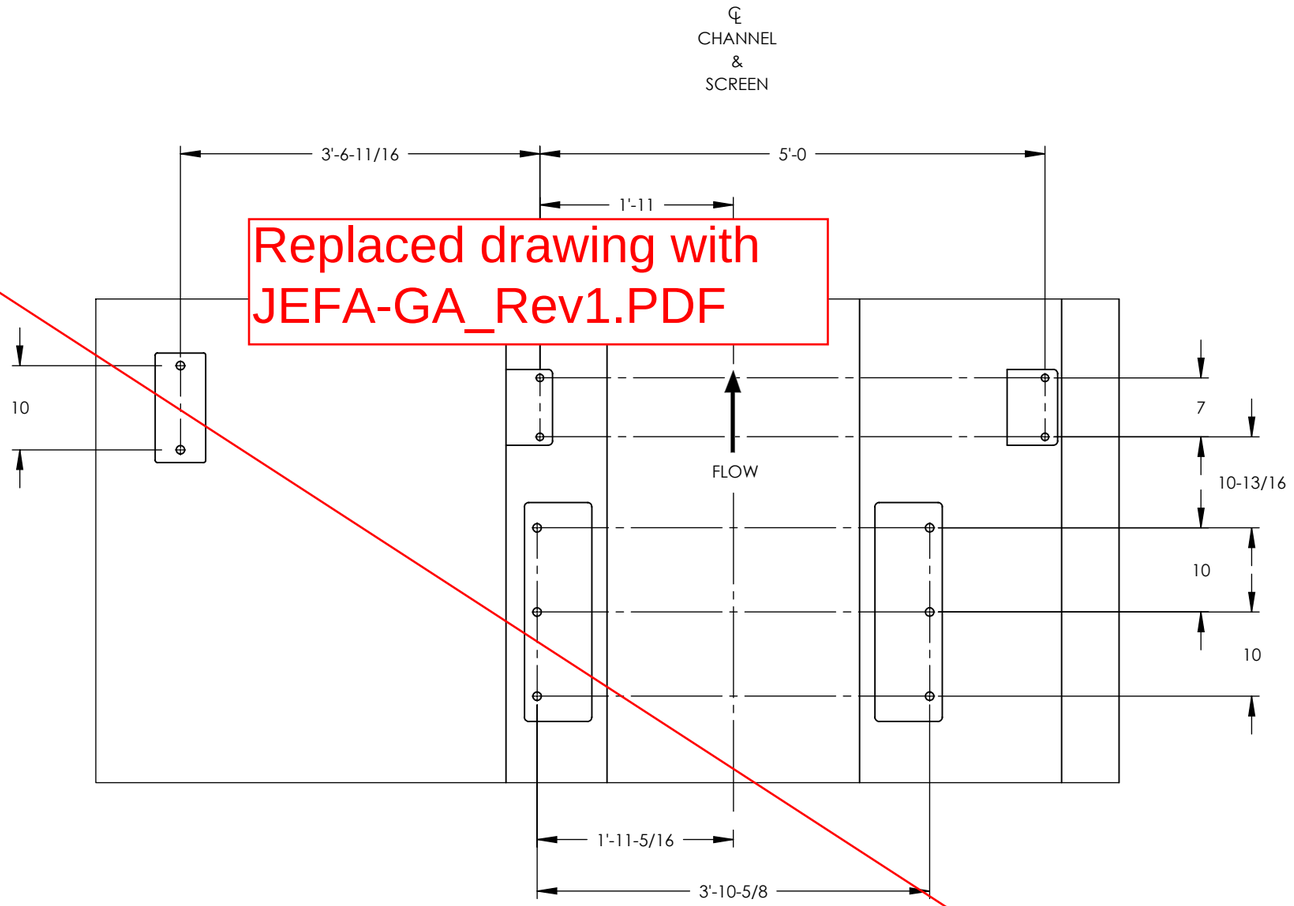
DETAIL E
SCALE 1 : 18

DRAWN BY:	RJW	Headworks INTERNATIONAL	PROJECT NO:	DRAWING NO:	SCALE: 1:48
DATE:	06/06/2022			JEFA-XXX-YYY	REV: 0 / SHEET: 3 OF 7

PLAN VIEW - ANCHOR BOLTS FOR SCREENS WITH PROFILE VIEW OF MOUNTING FEET



SECTION C-C
SCALE 1 : 64



Replaced drawing with JEFA-GA_Rev1.PDF

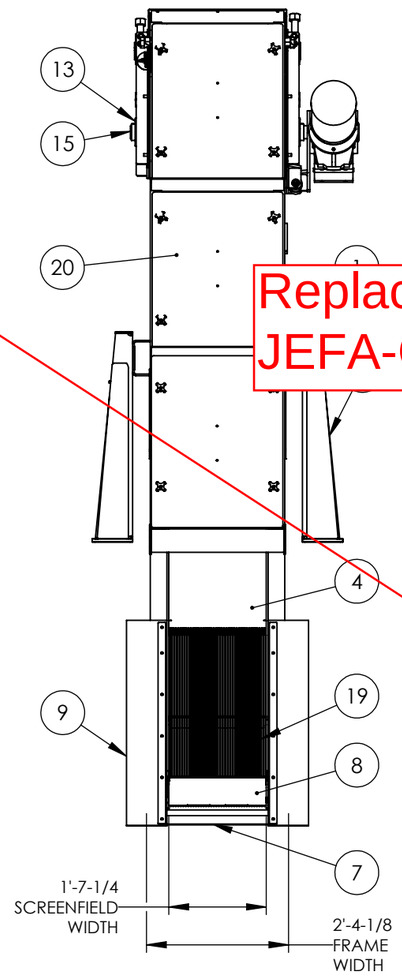
DETAIL D
SCALE 1 : 18

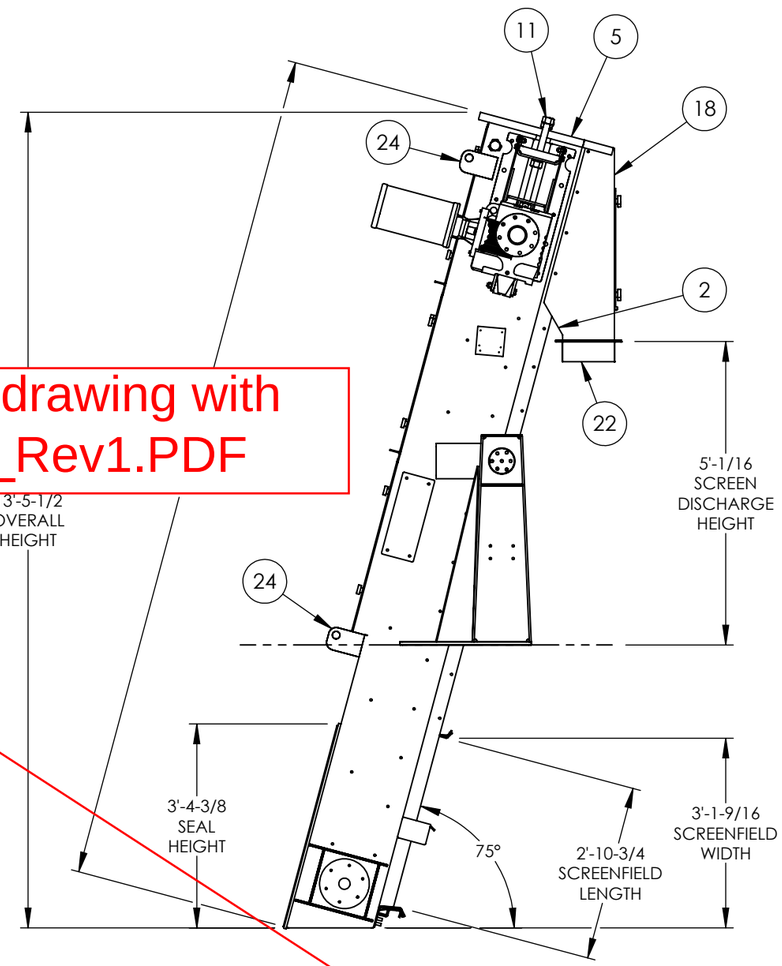
DRAWN BY:	RJW	Headworks	PROJECT NO:	DRAWING NO:	SCALE: 1:72
DATE:	06/06/2022			JEFA-GA	REV: 0 / SHEET: 4 OF 7

ITEM NO.	PART	MATERIAL	SIZE/DESCRIPTION	
1	SIDE FRAME	304SS	3/16" PLATE (.19 THK)	
2	DISCHARGE CHUTE	304SS	3/16" PLATE (.19 THK)	
3	DEBRIS PLATE STIFFENERS	304SS	3/16" PLATE (.19 THK)	N.S.
4	DEBRIS PLATE	304SS	3/16" PLATE (.19 THK)	
5	TOP COVER	304SS	11 ga (.12 THK)	
6	SCREENFIELD SUPPORT	304SS	1/4" PLATE (.25 THK)	N.S.
7	SOLE PLATE	304SS	3/16" PLATE (.19 THK)	
8	RAKE BLADE	304SS	3/8" PLATE (.38 THK)	
9	CHANNEL SEAL	BUNA-N	1/2" THK	
10	SCRAPER ASSEMBLY	304SS/UHMW		N.S.
11	CHAIN ADJUSTER	18-8SS	ACME THREADED ROD	
12	CHAIN	304SS	125mm PITCH	N.S.
13	TAKE-UP BEARING	MFG. STD.	UCFX-13	
14	GEARBOX / MOTOR	MFG. STD.	SA87 / 3HP	
15	DRIVE SHAFT	304SS	Ø3"	
16	UPPER SPROCKET (DRIVE)	304SS	125mm / Ø70mm	N.S.
17	LOWER TURNAROUND	UHMW		N.S.
18	DISCHARGE ENCLOSURE	304SS	11 ga (.12 THK)	
19	TAPERED BAR	304SS	8 x 4 x 40mm, 1/4" SPACING	
20	FRONT COVERS	POLYCARBONATE	1/4" (.25 THK)	
21	PIVOT STAND ASSEMBLY	304SS	VARIES	
22	TRANSITION CHUTE	304SS	14 ga (.08 THK)	
23	DISCHARGE COVER	POLYCARBONATE	1/4" (.25 THK)	
24	LIFTING LUG	304SS	3/8" PLATE (.38 THK)	
N.S. = NOT SHOWN (FOR CLARITY)				

NOTES:

1. ALL SURFACES TO BE BLASTED TO A UNIFORM FINISH, REMOVING ALL WELD STAINS AND DISCOLORATION.
2. QUANTITY OF RAKES = 7
3. APPROXIMATE RAKE SPACING = 3.63 FT
4. ANCHOR BOLT LOCATIONS ARE +/- 1" ACCURATE.
5. ALL ANCHOR BOLTS ARE PROVIDED BY OTHERS.
6. FASTENERS SHALL BE 18-8SS.
7. APPROXIMATE WEIGHT OF SCREEN = 2,175 LB

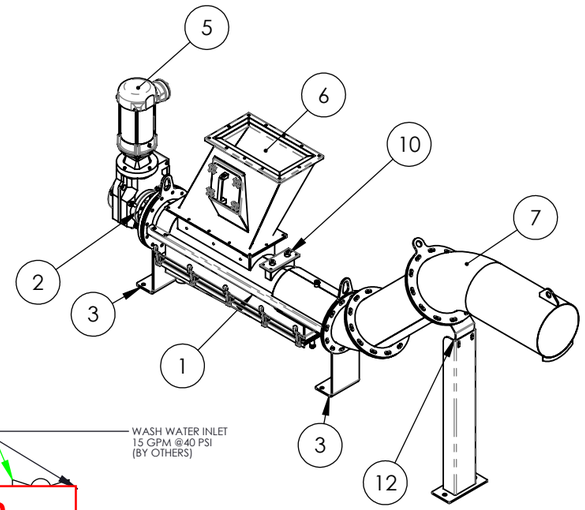




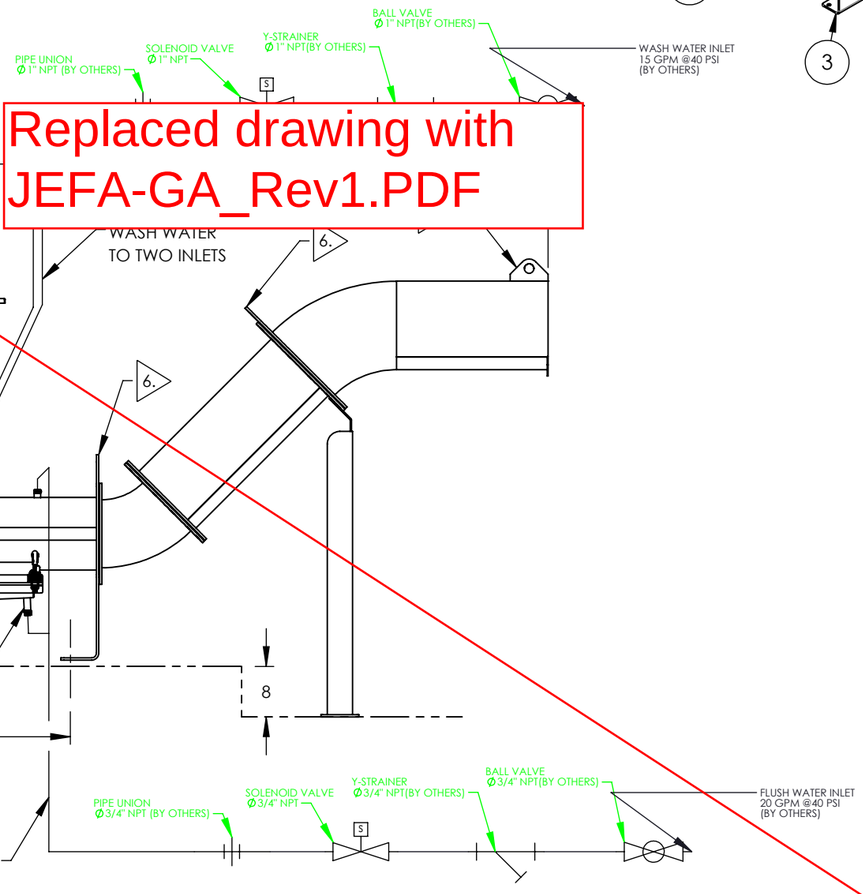
Replaced drawing with JEFA-GA_Rev1.PDF

DRAWN BY:	RJW	Headworks	PROJECT NO:	DRAWING NO:	SCALE: 1:30
DATE:	06/06/2022			JEFA-GA	REV: 0 / SHEET: 5 OF 7

ITEM NO.	PART	MATERIAL	SIZE/DESCRIPTION (SW220)	
1	BODY	304SS	11GA PLATE (.12 THK)	
2	BEARING HOUSING	304SS	KA87 / 60mm	
3	SUPPORTS	304SS	1/2" PLATE (.50 THK)	
4	SPIRAL	CARBON STEEL	Ø9" OD, 3/8" THK FLIGHTS	N.S.
5	GEARBOX & MOTOR	MFG. STD.	KA87, 3HP	
6	INLET HOPPER	304SS	11GA PLATE (.12 THK)	
7	DISCHARGE TUBE	304SS	11GA PLATE (.12 THK)	
8	DRAIN PAN	304SS	11GA PLATE (.12 THK)	
9	DRAIN CONNECTION	304SS	3" SCH10	
10	WASH WATER CONNECTION	304SS	1" NPT	
11	FLUSH WATER CONNECTION	304SS	3/4" NPT	
12	DISCHARGE TUBE SUPPORT	304SS	3/16 PLATE (.19 THK)	
N.S. = NOT SHOWN (FOR CLARITY)				



Replaced drawing with JEFA-GA_Rev1.PDF



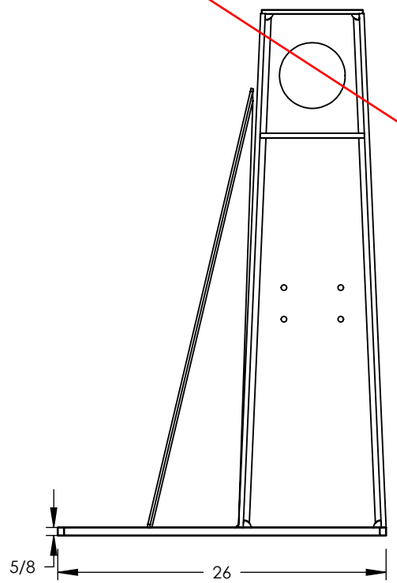
NOTES:

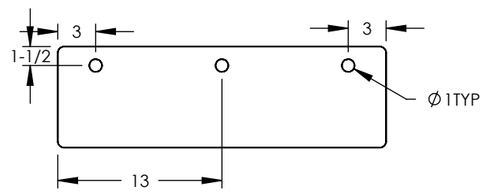
1. ALL SURFACES TO BE BLASTED TO A UNIFORM FINISH, REMOVING ALL WELD STAINS AND DISCOLORATION.
2. ANCHOR BOLT LOCATIONS ARE +/- 1" ACCURATE.
3. ALL ANCHOR BOLTS ARE PROVIDED BY OTHERS.
4. FASTENERS SHALL BE 304SS.
5. APPROXIMATE WEIGHT OF THE SCREWPACTOR: 1,175 LB
6. LIFTING PAD EYE.

DRAWN BY:	RJW	Headworks	PROJECT NO:	DRAWING NO:	SCALE: 1:24
DATE:	06/06/2022			JEFA-GA	REV: 0 / SHEET: 6 OF 7

PIVOT BASE PLATE
TYPICAL INSTALLATION

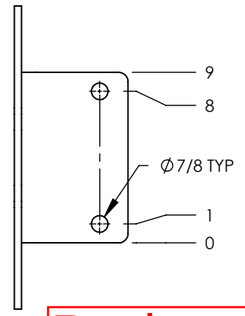
MAXIMUM TENSION: 500 LB
MAXIMUM SHEAR: 500 LB

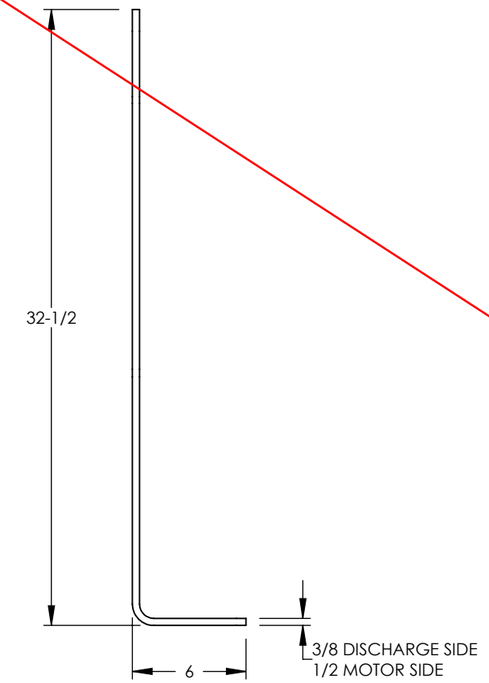




SCREWPACTOR LEG SUPOORT
TYPICAL INSTALLATION

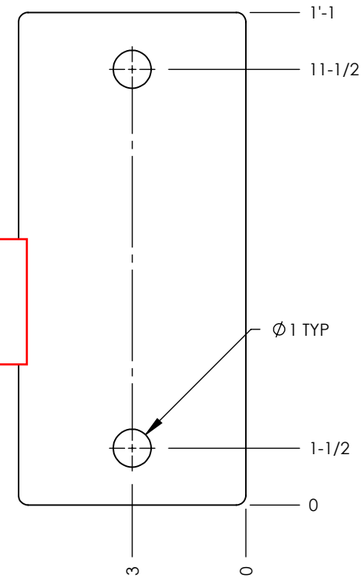
MAXIMUM TENSION: 2788 LB
MAXIMUM SHEAR: 500 LB

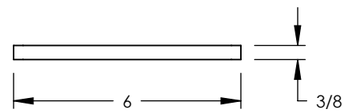




DISCHARGE TUBE SUPPORT
TYPICAL INSTALLATION

MAXIMUM TENSION: 500 LB
MAXIMUM SHEAR: 500 LB



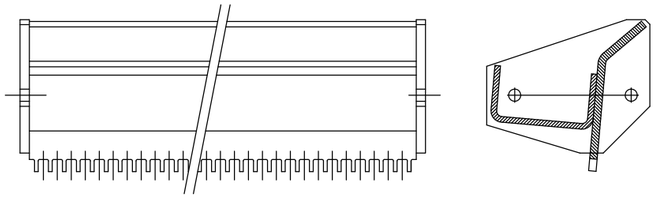


Replaced drawing with JEFA-GA_Rev1.PDF

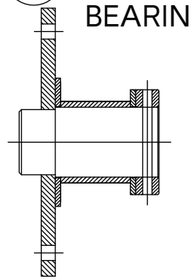
DRAWN BY:	RJW	Headworks	PROJECT NO:	DRAWING NO:	SCALE: 1:8
DATE:	06/06/2022			JEFA-GA	REV: 0 / SHEET: 7 OF 7

Component Drawings

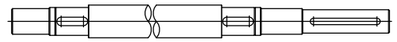
2 RAKE



6 LOWER BEARING

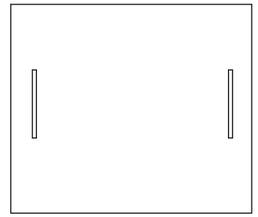


9 MAIN DRIVE SHAFT

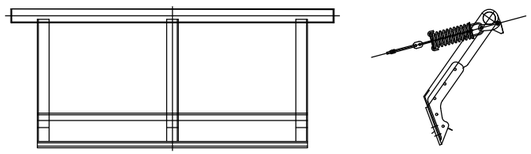


4 CHAIN

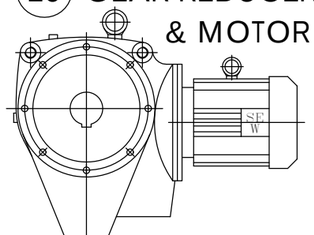
12 COVER(S) WITH HANDLES

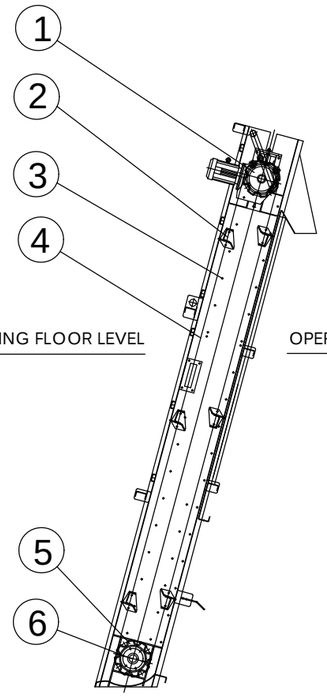


7 SCRAPER WITH SPRING(S)

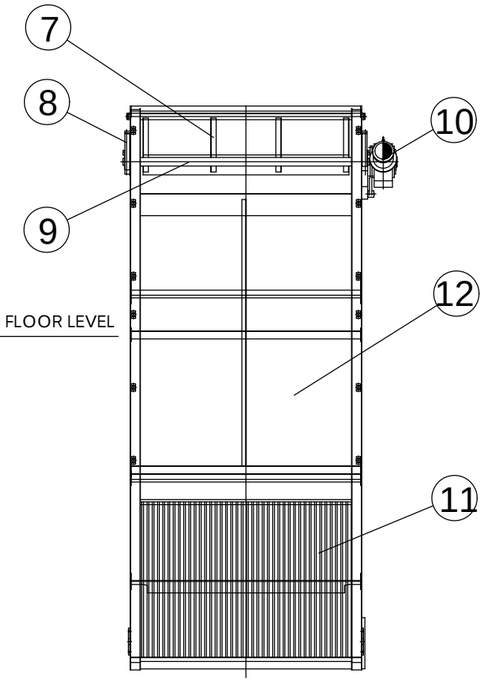


10 GEAR REDUCER & MOTOR



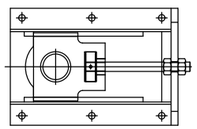


OPERATING FLOOR LEVEL

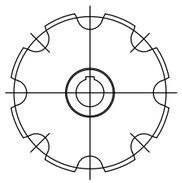


OPERATING FLOOR LEVEL

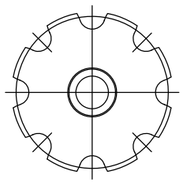
8 BEARING & TAKE-UP ASSY.



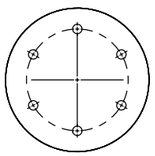
1 UPPER SPROCKET



5a LOWER SPROCKET

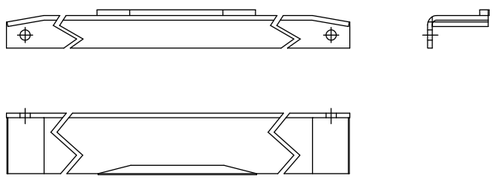


5b LOWER TURN AROUND



11 SCREENFIELD BARS

3 CHAIN GUIDE



GENERAL TOLERANCE CLASSIFICATION (UNLESS OTHERWISE NOTED)			
DESCRIPTION	FRACTIONAL	DECIMAL	ANGULAR
FABRICATED ASSEMBLIES (WELDMENTS)	±1/16" (1.6mm)	±0.03in(0.8mm)	
PIECE PARTS	±1/32"in(0.8mm)	±0.015in(0.4mm)	±0.3°
MACHINED PARTS	±1/64"(0.4mm)	±0.005in(0.13mm)	±0.25°

REV	DESCRIPTION	NAME	DATE
3	ADD LOWER TURN AROUND	DJD	06/06/17

CHECKED BY:	-	DATE:	-
DRAWN BY:	NWM	DATE:	01/19/01
PLANT: N/A		LOCATION: N/A	
SCALE: 1:64	DRAWING UNITS: IMPERIAL SYSTEM	PROJECT NO:	

HEADWORKS BARSCREEN
MAIN COMPONENTS
INCLINED INSTALLATION
STANDARD DRAWING

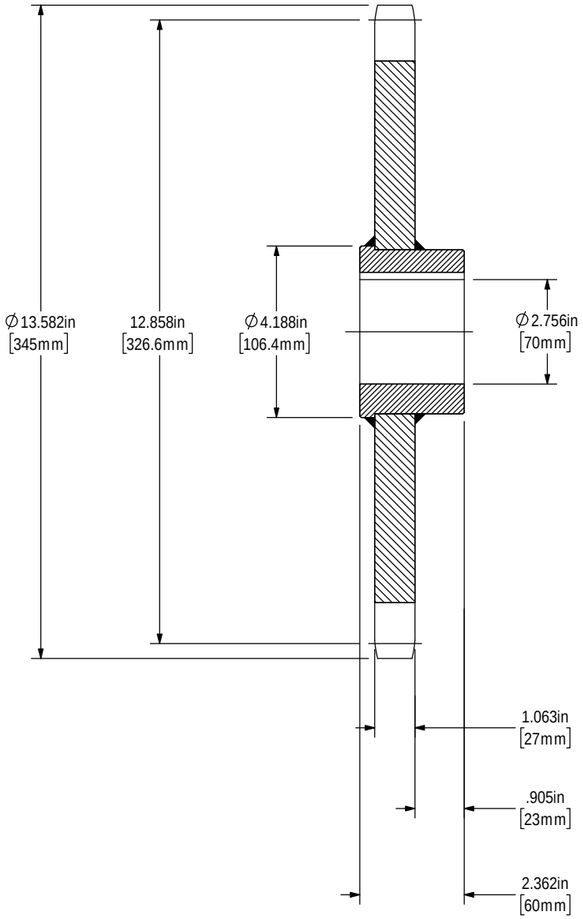
DRAWING NO: ---

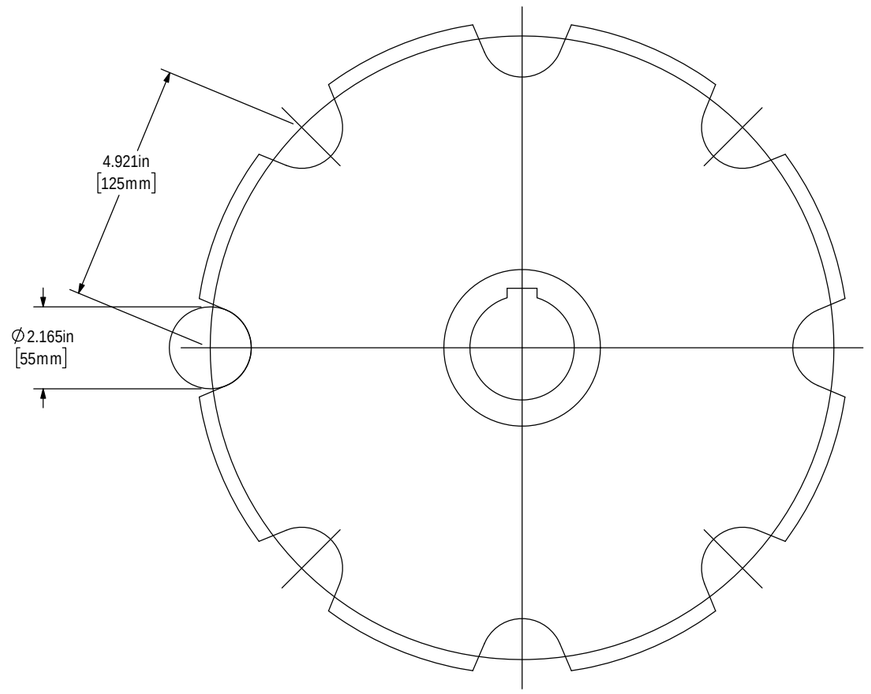
Rev: 3

Sht: 1 of 1

Headworks INTERNATIONAL
11000 Brittmoore Park. Dr.
Houston, TX 77041

ITEM NO.	NAME	DESCRIPTION	MATERIAL	QTY.
1	SPROCKET	125mm PITCH UPPER SPROCKET	304SS	1





GENERAL TOLERANCE CLASSIFICATION (UNLESS OTHERWISE NOTED)

DESCRIPTION	FRACTIONAL	DECIMAL	ANGULAR
FABRICATED ASSEMBLIES (WELDMENTS)	±1/16" (1.6mm)	±0.03in(0.8mm)	
PIECE PARTS	±1/32"in(0.8mm)	±0.015in(0.4mm)	±0.3°
MACHINED PARTS	±1/64"(0.4mm)	±0.005in(0.13mm)	±0.25°

REV	DESCRIPTION	NAME	DATE
01	UPDATE ADDRESS AND LOGO	DJD	05/17/17

DATE: -
CHECKED BY: -
DATE: 02/14/01
DRAWN BY: SC
PLANT: -
LOCATION: -
SCALE: 1:4
DRAWING UNITS: IMPERIAL SYSTEM
PROJECT NO:

HEADWORKS BARSCREEN
UPPER SPROCKET
125mm PITCH
FABRICATION DRAWING

DRAWING NO: **U125-70-304**
Rev: 01
Sht: 1 of 1

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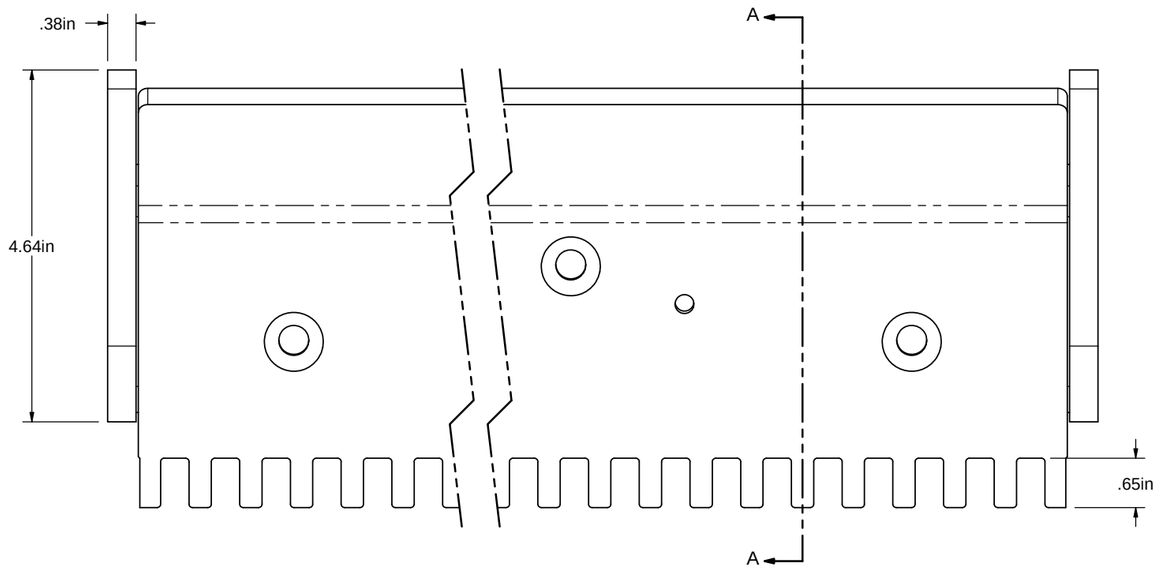
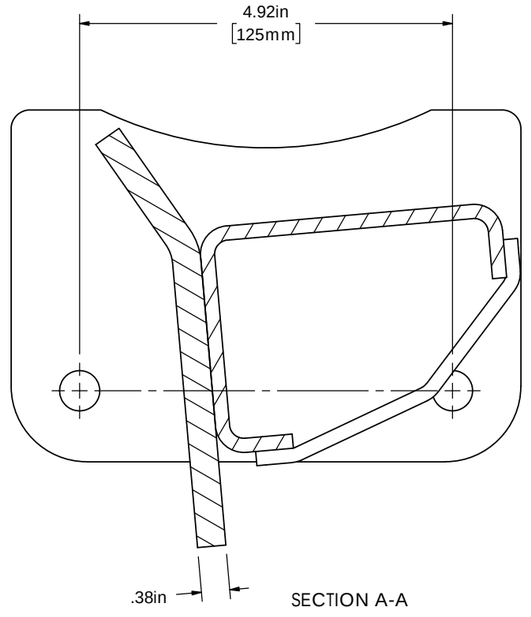
11000 Brittmoore Park. Dr.
Houston, TX 77041





SECTION A-A

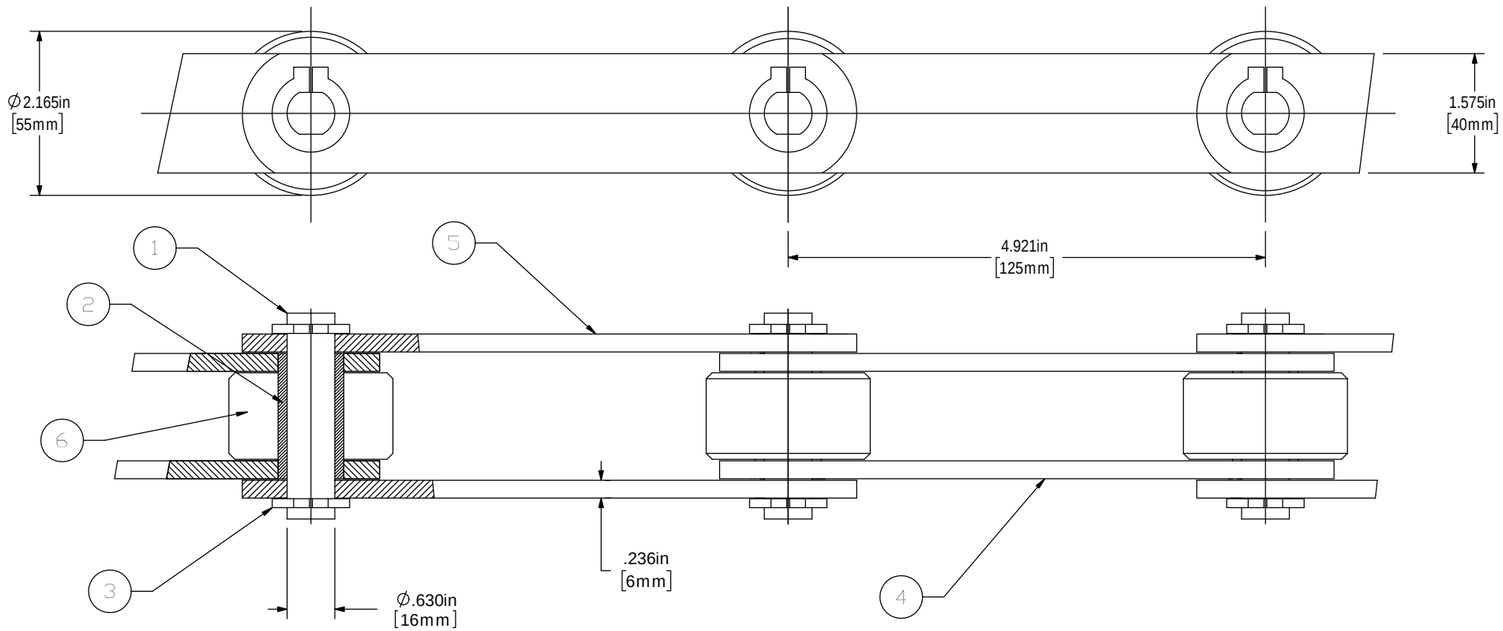
DIRECTION OF TRAVEL

AVAILABLE MATERIALS:

304SS
304LSS
316SS
316LSS

DRAWN BY:	DJD	Headworks INTERNATIONAL	HEADWORKS INTERNATIONAL 11000 BRITTMOORE PARK DR. HOUSTON, TX 77041	DESCRIPTION	SCALE:	1:2
DATE:	09/20/2018			**MS2 RAKE, 125mm PITCH**	REV: 0	SHEET: 1 OF 1

ITEM NO.	NAME	DESCRIPTION	MATERIAL	QTY.
1	PIN	F51 PIN	F51	1
2	BUSHING	INNER LINK BUSHING	304SS	1
3	CLIPS	RETAINER CLIPS	304SS	2
4	LINKS	INNER SIDE LINK BARS	304SS	2
5	LINKS	OUTER LINK BARS	304SS	2
6	ROLLER	CHAIN ROLLER, ∅55 mm	304SS	1



GENERAL TOLERANCE CLASSIFICATION (UNLESS OTHERWISE NOTED)

DESCRIPTION	FRACTIONAL	DECIMAL	ANGULAR
FABRICATED ASSEMBLIES (WELDMENTS)	±1/16" (1.6mm)	±0.03in(0.8mm)	
PIECE PARTS	±1/32"in(0.8mm)	±0.015in(0.4mm)	±0.3°
MACHINED PARTS	±1/64"(0.4mm)	±0.005in(0.13mm)	±0.25°

REV	DESCRIPTION	NAME	DATE
01	UPDATE ADDRESS AND LOGO	DJD	05/17/17

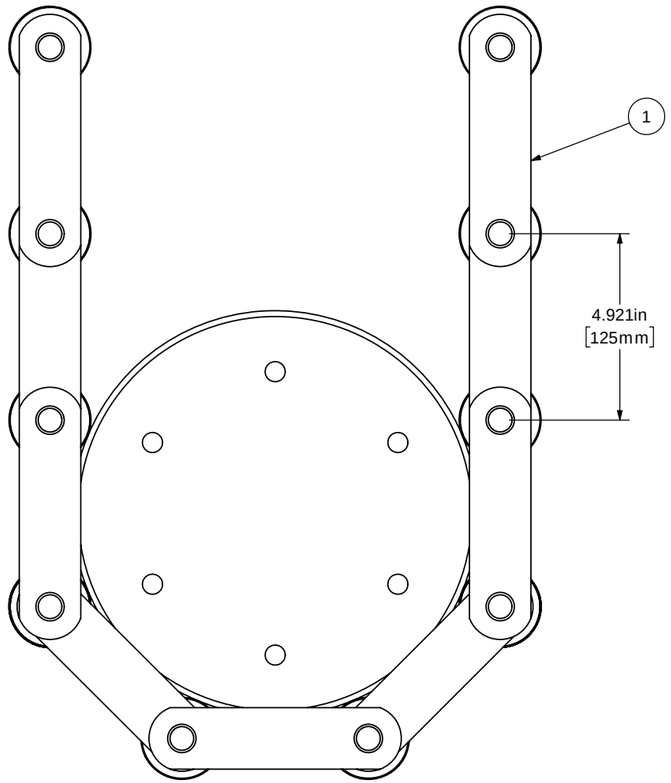
DATE: -
CHECKED BY: -
DATE: 02/14/01
DRAWN BY: SC
PLANT: -
LOCATION: -
SCALE: 1:2
DRAWING UNITS: IMPERIAL SYSTEM
PROJECT NO:

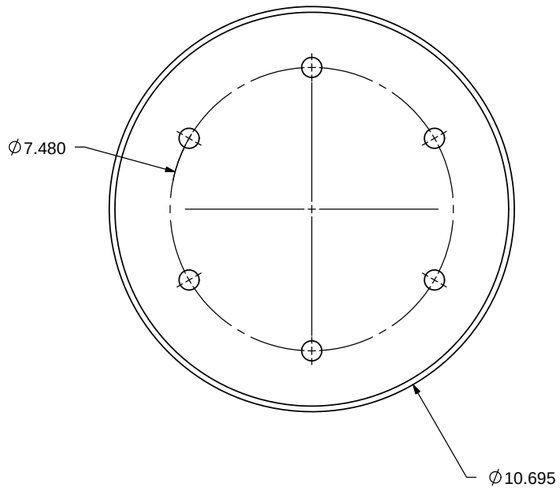
HEADWORKS BARSCREEN
ROLLER CHAIN
125mm PITCH
FABRICATION DRAWING

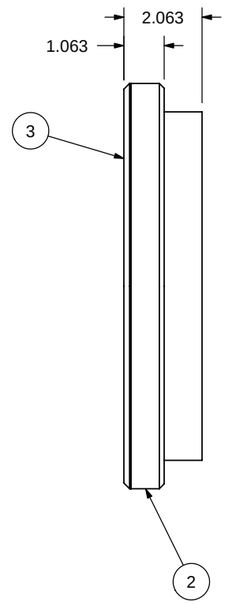
DRAWING NO: **CHAIN125304**
Rev: 01
Sht: 1 of 1

Headworks INTERNATIONAL
11000 Brittmoore Park. Dr.
Houston, TX 77041

ITEM NO.	NAME	DESCRIPTION	MATERIAL	QTY.
1	CHAIN	HEADWORKS CHAIN, 125mm	304SS	-
2	LOWER TURN AROUND	LOWER TURN AROUND (125mm CHAIN)	UHMW	1
3	COVER	LOWER TURN AROUND COVER (125mm CHAIN)	304SS	1







GENERAL TOLERANCE CLASSIFICATION (UNLESS OTHERWISE NOTED)

DESCRIPTION	FRACTIONAL	DECIMAL	ANGULAR
FABRICATED ASSEMBLIES (WELDMENTS)	±1/16"	±0.03in	±0.8mm
PIECE PARTS	±1/32"	±0.015in	±0.4mm
MACHINED PARTS	±1/64"	±0.005in	±0.13mm
			±0.3°
			±0.25°

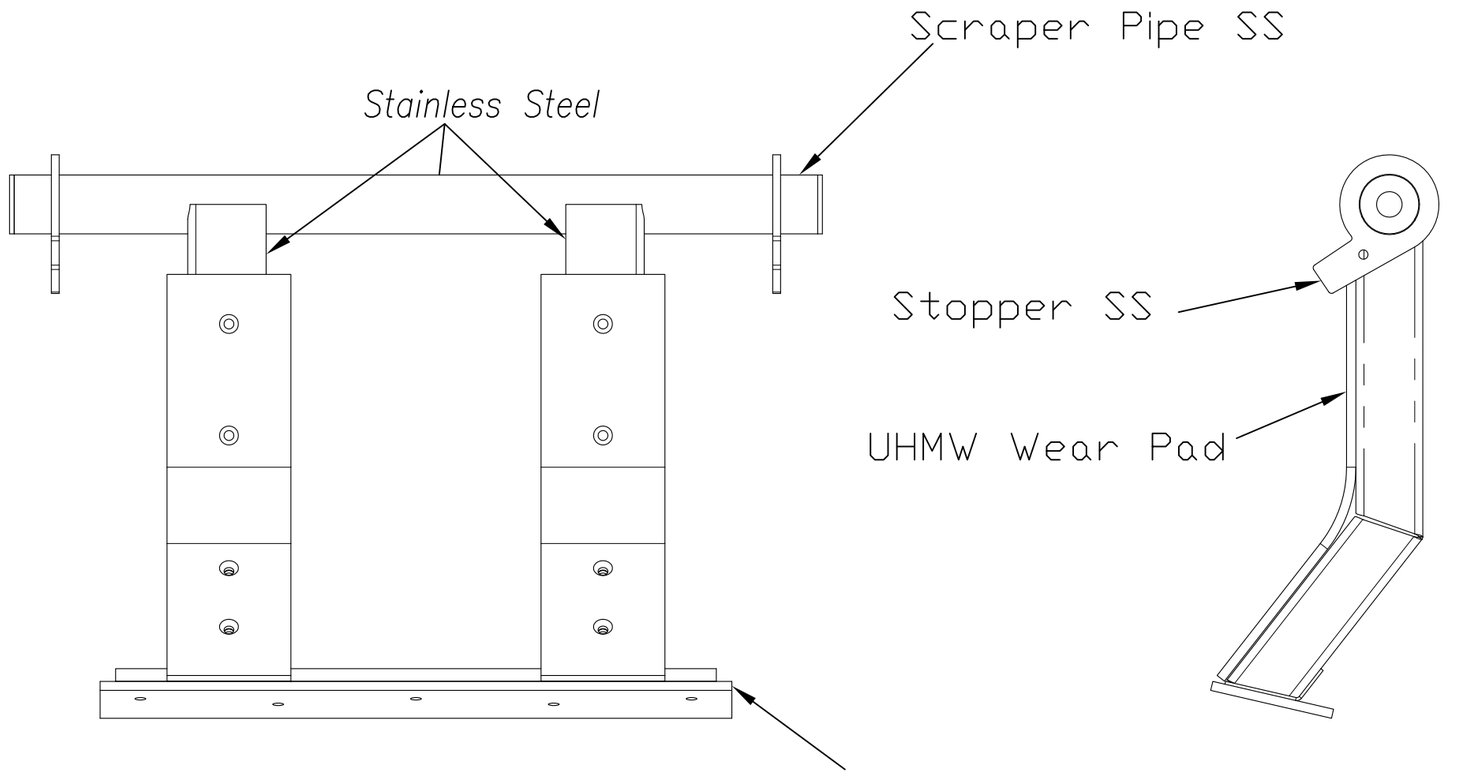
REV	DESCRIPTION	NAME	DATE
2	CHANGE TO NEW DESIGN	DJD	05/17/17

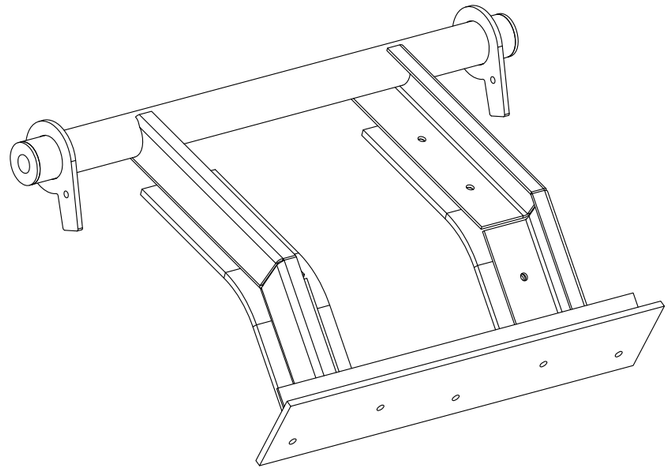
DRAWN BY: CDS — DATE: 01/18/07
CHECKED BY: - — DATE: -
SCALE: 1:4
DRAWING UNITS: IMPERIAL SYSTEM
PROJECT NO:
PLANT: -
LOCATION: -

HEADWORKS BARSCREEN
LOWER TURN AROUND ASSEMBLY
125mm PITCH
FABRICATION DRAWING

DRAWING NO: ---
Rev: 2
Sht: 1 of 1

Headworks INTERNATIONAL
11000 Brittmoore Park. Dr.
Houston, TX 77041





Headworks Inc.

Rev	DESCRIPTION		NAME	DATE	Rev	DESCRIPTION		NAME	DATE
–	–		–	–	–	–		–	–
ORIGINAL	AV	03–15–10	–	–	–	–	–	–	
	DRAWN BY:	DATE:	CHECKED BY:	DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:	

JOB NO: STANDARD	Rake Bar Scraper MS2 BAR SCREEN	SCALE: NTS
PLANT: –		ORDER NO: –
LOCATION: –		REFERENCE DWG:

Headworks Inc. 11000 Brittmoore Park Dr. Houston, Texas 77041

Mo.	Yr.		Rev:	Sht:
03	10	SCPR–N–304	0	1 of 1

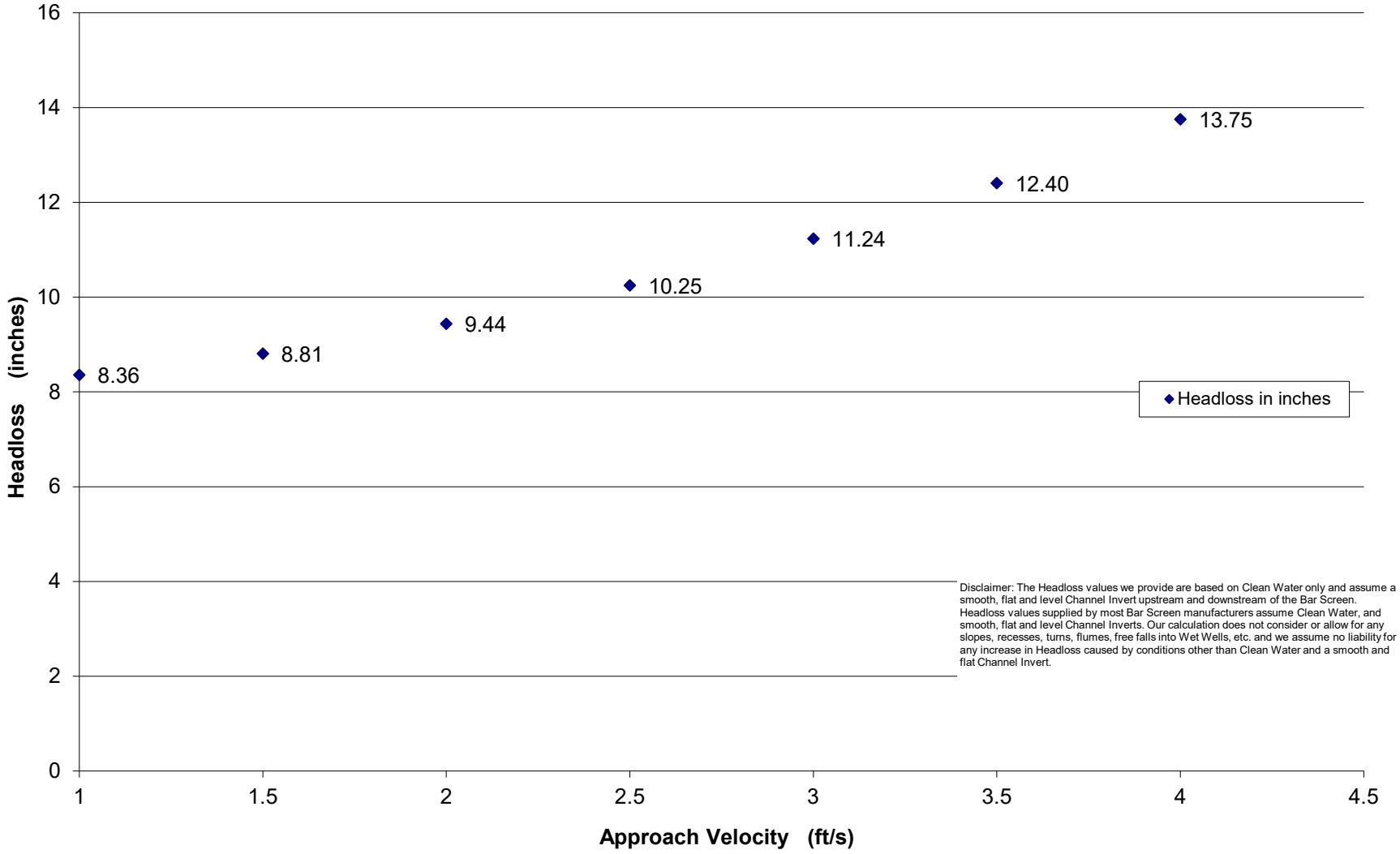
Headloss Calculations

Headloss Calculations For
Jefferson WPCP
0% blinding for 5 MGD; CW - 2.5 ft.; BS - 0.1875 in.

Approach Velocity (ft/s)	Shape Factor	Bar Spacing (inch)	Width of Bar (inch)	Screen Angle (deg)	Channel Width (ft)	Headloss (ft)	Headloss (inch)	Healoss adder for frame (inch)	Total Headloss (inch)
1	1	0.1875	0.315	75	2.5	0.029955066	0.359460797	8	8.359460797
1.5	1	0.1875	0.315	75	2.5	0.067398899	0.808786792	8	8.808786792
2	1	0.1875	0.315	75	2.5	0.119820266	1.437843186	8	9.437843186
2.5	1	0.1875	0.315	75	2.5	0.187219165	2.246629979	8	10.24662998
3	1	0.1875	0.315	75	2.5	0.269595597	3.235147169	8	11.23514717
3.5	1	0.1875	0.315	75	2.5	0.366949563	4.403394758	8	12.40339476
4	1	0.1875	0.315	75	2.5	0.479281062	5.751372746	8	13.75137275

Disclaimer: The Headloss values we provide are based on Clean Water only and assume a smooth, flat and level Channel Invert upstream and downstream of the Bar Screen. Headloss values supplied by most Bar Screen manufacturers assume Clean Water, and smooth, flat and level Channel Inverts. Our calculation does not consider or allow for any slopes, recesses, turns, flumes, free falls into Wet Wells, etc. and we assume no liability for any increase in Headloss caused by conditions other than Clean Water and a smooth and flat Channel Invert.

Headloss vs Approach Velocity

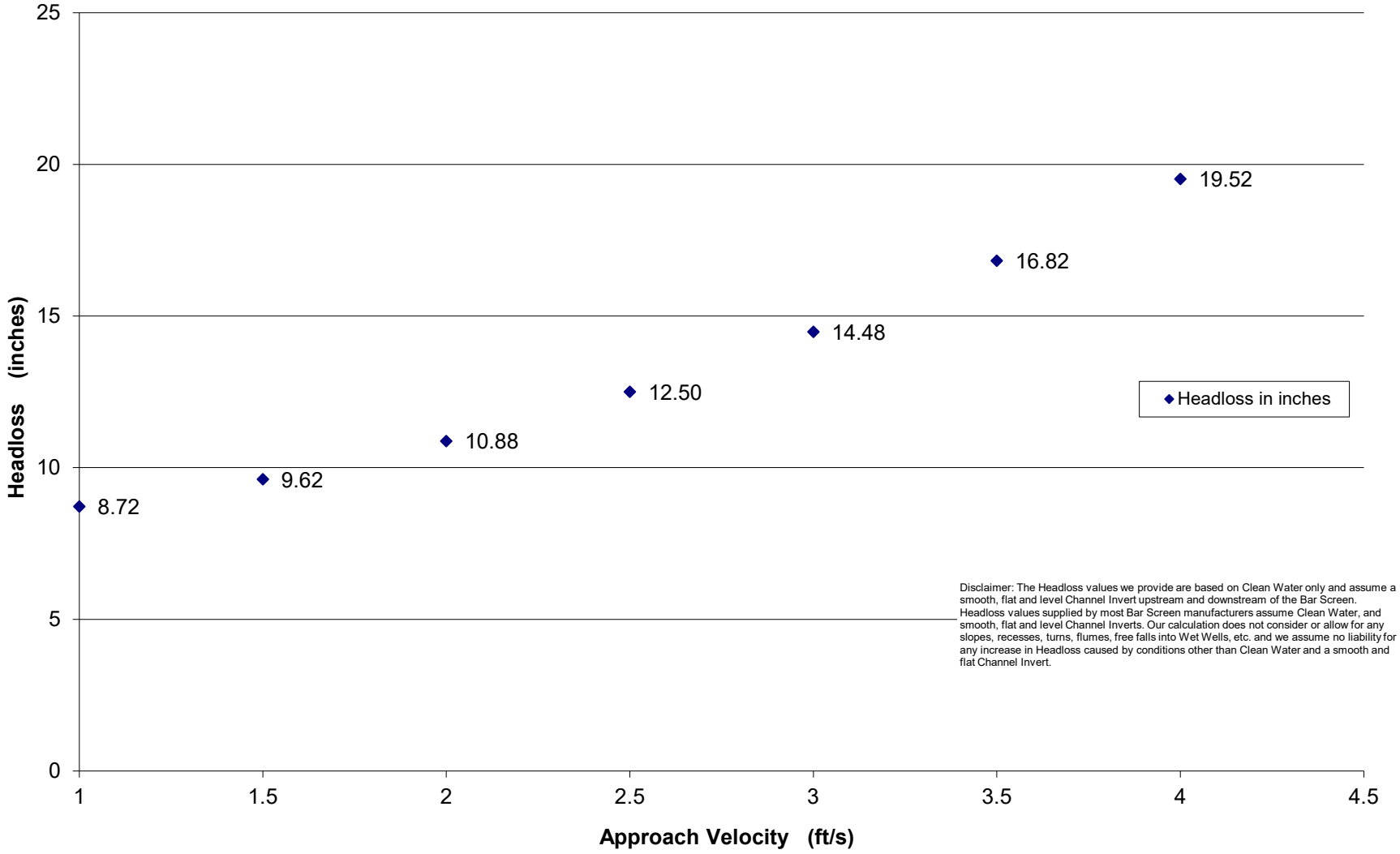


Disclaimer: The Headloss values we provide are based on Clean Water only and assume a smooth, flat and level Channel Invert upstream and downstream of the Bar Screen. Headloss values supplied by most Bar Screen manufacturers assume Clean Water, and smooth, flat and level Channel Inverts. Our calculation does not consider or allow for any slopes, recesses, turns, flumes, free falls into Wet Wells, etc. and we assume no liability for any increase in Headloss caused by conditions other than Clean Water and a smooth and flat Channel Invert.

Headloss Calculations For
Jefferson WPCP
30% blinding for 5 MGD; CW - 2.5 ft.; BS - 0.1875 in.

Approach Velocity (ft/s)	Shape Factor	Bar Spacing (inch)	Width of Bar (inch)	Screen Angle (deg)	Channel Width (ft)	Headloss (ft)	Headloss (inch)	Healoss adder for frame (inch)	Total Headloss (inch)
1	1	0.1875	0.315	75	2.5	0.059999474	0.71999369	8	8.71999369
1.5	1	0.1875	0.315	75	2.5	0.134998817	1.619985803	8	9.619985803
2	1	0.1875	0.315	75	2.5	0.239997897	2.879974761	8	10.87997476
2.5	1	0.1875	0.315	75	2.5	0.374996714	4.499960564	8	12.49996056
3	1	0.1875	0.315	75	2.5	0.539995268	6.479943212	8	14.47994321
3.5	1	0.1875	0.315	75	2.5	0.734993559	8.819922705	8	16.81992271
4	1	0.1875	0.315	75	2.5	0.959991587	11.51989904	8	19.51989904

Headloss vs Approach Velocity



Disclaimer: The Headloss values we provide are based on Clean Water only and assume a smooth, flat and level Channel Invert upstream and downstream of the Bar Screen. Headloss values supplied by most Bar Screen manufacturers assume Clean Water, and smooth, flat and level Channel Inverts. Our calculation does not consider or allow for any slopes, recesses, turns, flumes, free falls into Wet Wells, etc. and we assume no liability for any increase in Headloss caused by conditions other than Clean Water and a smooth and flat Channel Invert.

Section 2

Description for Section 2
Project Specifications (Checkmarked)
Notes, Clarifications and Exceptions
Headworks Standard Specifications

This section includes the Jefferson WPCP specifications section 46 21 19. Each item in the specifications will include a check mark (✓) indicating compliance with the item, a notation taking exception to the specified item with a proposed alternate submitted for approval, or the notes "N/A" for non-applicable items or "NTC" for specifications that are for the contractor to note. Often, project specifications can become dated to where manufacturers have changed product features and/or designs. Or the specifications could have been developed using the product feature and/or design from more than a single manufacturer. A list of any notes and/or exceptions will immediately follow the project specifications.

SECTION 46 21 19
CONTINUOUS BELT SCREENING SYSTEM

PART 1 GENERAL

1.1 SCOPE OF WORK

See Note #3

A. Furnish all labor, materials, equipment, and incidentals required to install and test one (1) complete continuous belt fine screening system (System) with all appurtenances as specified herein.

✓ B. This equipment is being pre-selected. The Contractor shall be responsible for furnishing all labor, materials, equipment, and incidentals required to install, test and commission.

✓ C. System shall include the screen and washing compactor. The screen shall mechanically remove solids from raw wastewater. The compactor shall be compatible for use with the screens from raw wastewater.

✓ D. Provide shop drawings and operation and maintenance manuals in accordance with the General Requirements section of these Specifications.

✓ E. Provide start-up and performance acceptance testing services as specified herein.

✓ F. Fit the equipment into the space allocated and allow adequate clearance for entry, installation, replacement, servicing, and maintenance.

✓ G. Verify actual and final arrangement, locations, grade, elevations.

✓ H. If adjustments and modifications are necessary, submit to the Engineer details of such adjustments and reasons for approval. Make no adjustments without Engineer's approval.

1.2 SYSTEM DESCRIPTION AND DESIGN REQUIREMENTS

See Note #4

A. System Description

1. The screen will have a continuous stainless steel belt that automatically rotates within the internal guide system of the static frame.

✓ 2. The screen will be straight through type that will present a clean screening grid to the influent flow at all times.

3. Solids will collect as a mat on the front face of the continuous belt. The belt will intermittently rotate and elevate the solids to the discharge point. Larger objects will be picked up by a series of hooks.

✓ 4. The solids will be automatically removed at the top of the screen into an internal hopper and be fed to the screening handling system.

5. The continuous belt will be directly driven by drive sprockets that shall support and rotate the grid assembly.

✓ 6. The screen will be totally enclosed with lightweight access covers for easy removal to perform maintenance.

✓ 7. The washing compactor will sit under the discharge point of the screen.

✓ 8. The washing compactor will be adequately sized to handle all the screenings and wash water that will be generated by the screen at peak flow. The system will be required to wash the screenings to reduce the organic content and compact the remaining solids into a dry plug.

✓ 9. The washing compactor will generally comprise of a screw auger rotating within the washing and drainage trough, a wash water system, a compaction zone, and an outlet chute arrangement.

✓ 10. All stainless steel (including frame, grid, and drive components) mentioned below as stainless steel shall be T304 stainless steel. All hardware shall be T316 stainless steel.

See Note #4 B. System Performance - The fine screening system will be designed to meet the following design parameters:

✓ 1.	Number of screens	1
✓ 2.	Peak flow per screen	5.0 MGD
✓ 3.	Average flow to screen	2.0 MGD
4.	Velocity through the grid	6.5 ft/s
5.	Screen grid opening	3 mm
✓ 6.	Head loss at peak flow	30 inches @ 50% blinding and 30 inches upstream water level
✓ 7.	Structural design differential of frame/grid	48 inches minimum @ 100% blinding
✓ 8.	Drive design differential (operating)	48 inches minimum
✓ 9.	Screen grid supporting drive sprockets	2 minimum – all stainless steel
✓ 10.	Channel width	30 inches
✓ 11.	Channel height	48 inches
✓ 12.	Number of Washing Compactors	1
13.	Diameter of screw	6 inches
✓ 14.	Minimum diameter of shaft	2.375 inches
15.	System wash water requirements	39 GPM @ 60 PSI

1.3 RELATED WORK

✓ A. Testing & Startup are included in Section 01 79 00.

✓ B. Manufacturer services and training included in Section 01 79 01.

✓ C. Miscellaneous metals are included in Section 05 10 00.

✓ D. Field painting is included in Section 09 91 00.

✓ E. Operation and maintenance manuals included in Section 01 78 23.

✓ F. Delivery, Storage and Handling is included in Section 01 45 34.

1.4 SUBMITTALS

✓ A. Submit to the Engineer, in accordance with Section 01 33 00, copies of all materials required to establish compliance with this Section. Submittals shall include the following:

✓ 1. Manufacturer's literature, illustrations, specifications, engineering data, connection details, and performance data. Electrical and instrumentation equipment. Schematic wiring diagrams and electrical control information.

✓ 2. Literature describing the equipment and showing all key details of construction and dimensions. Dimensions shall show overall size and space requirements including that for installation, leveling, dismantling and maintenance.

✓ 3. Cross sections and details, as to show that all components are in conformance with the intent of the specification and are satisfactory from the standpoint of design and physical arrangement.
   a. Setting plans with tolerances for anchor bolts.
   b. Supplied tools and spares.
   c. Weights and lifting points of all equipment and subassemblies.
   d. Identify any special handling requirements.

✓ 4. Weight of the equipment and its distribution on the supports.

✓ B. Operation and maintenance manuals as specified in Section 01 78 23.

✓ C. Test Reports to be Submitted:

   a. Refer to Section 01 79 00 for details.
   b. Copies of all test results, as specified in Part 3 of this Section.

✓ D. Submit the Equipment Warranty and Certification Form as specified in Section 01 33 00.

✓ E. Submit manufacturers certificate of installation per Section 01 33 00.

1.5 WARRANTY

✓ A. The manufacturer shall warrant in writing all equipment against defects in materials and workmanship for a period of 12 months from the date of acceptance. Within this 12-month period, any defective or malfunctioning equipment, component, or accessory shall be repaired or replaced upon notice at no additional cost to the Owner.

1.6 QUALITY ASSURANCE

✓ A. The equipment shall be designed and constructed in accordance with the best practices and methods of the industry and shall be installed in accordance with the manufacturer's recommendations and the Drawings. Use only new materials.

✓ B. The Contractor is responsible for proper coordination and integration of all equipment required for installation and all other associated work shown on the drawings and specified in the Contract Documents.

✓ C. Should equipment which differs from this Section be offered and determined to be the equal of that specified, such equipment will be acceptable only on the basis that any structures, piping, appurtenant equipment, electrical work, etc., required to accommodate such a substitution shall be made at no additional cost to the Owner and shall be as approved by the Engineer.

1.7 DELIVERY, HANDLING, AND STORAGE

✓ A. Equipment and materials provided under this Section shall be delivered, stored, and handled in compliance with Section 01 45 34.

1.8 ACCEPTABLE MANUFACTURERS

A. Hydro-Dyne
✓ B. Headworks
C. Or approved equal

PART 2 PRODUCTS See Note #5

2.1 CONTINUOUS SCREENING BELT

A. The screenings belt will consist of heavy duty stainless steel laced links connected in parallel and separated by Delrin spacers to maintain specified opening. Each laced link hook element shall be fabricated from 16 gauge (minimum) stainless steel. Each straight element shall be fabricated from 18 gauge (minimum) stainless steel. All elements shall be a minimum of 1-inch wide forming a slotted opening of the specified width and minimum 1- inch deep in the direction of flow. Hooks on elements shall form horizontal lifting trays or shelves for removing large solids and rags every 8 inches.

B. Links, hooks, and screening lifting members must be manufactured out of stainless steel.

C. The stainless steel laced links will be connected by heavy duty stainless steel axles to form a continuous belt that will rotate within the frame's guide system. Axle diameter shall be a minimum 5/8 inch. The axle design will allow the row of laced links to pivot. The links shall support the screening grid and bear tension loads across the entire width and length of the screen belt.

D. The axles will be extended to fix a UHMWPE guide link to the side of each row of laced link elements. These guides will interlock to create a continuous guide link system that will slide within the frame.

E. Guide links shall be precision machined from solid virgin UHMWPE.

F. The heavy duty guide links will be minimum 2- inches thick to protect against undue wear from grit and will be specially machined to form a closure seal between the rotating belt and the static frame.

G. The seal shall be continuous from grade level through the water flow forming an uninterrupted closure between the traveling screen grid and the stationary frame. The seal shall be fixed to the screen frame and be adjustable so that it will remain in contact with the rotating screen belt at all times.

H. Guide systems that use rollers.

I. Grid sealing systems that use neoprene seals.

J. The bottom of the grid shall be sealed with a replaceable front lower seal brush with a stainless steel holder and polypropylene bristles.

K. Intermittent stainless steel laced link elements that form sharp hooks will be regularly placed along the face of each row of the grid to effectively remove larger solid material.

2.2 FRAME See Note #5

A. The continuous belt will rotate within a heavy duty stainless steel static support frame. Frame angle in the channel shall be at a 75 degree angle.

✓ B. The screen will not be fixed within the channel to allow the entire machine, including screen grid, to pivot/lift out of the channel for repair or bypass. All routine maintenance will be achieved without removing the screen from the channel and shall be performed at grade level.

C. The guide link system will travel around a guide wear track that is integral to the support frame.

D. The design will ensure that the support frame meshes with the closure seal on each guide link to prevent passage of screening material and grit particles.

E. All components of the lower wear tracks shall be bolt in, field replaceable and manufactured from stainless steel.

✓ F. The frame shall accommodate stainless steel protective covers designed to prevent leakage and contain spray wash. All access covers for maintenance will be lightweight and easily removable. Screens with covers requiring neoprene, rubber or plastic seals are not acceptable.

✓ G. If required, the screen manufacturer will supply the stainless steel angled filler plates with neoprene seals to connect from the upstream corners of the support frame to the channel walls.

2.3 SCREEN DISCHARGE

See Note #6

A. A stainless steel spray wash header will be located in the head space of the screen to offload the screenings from the continuous belt.

B. The spray bar will incorporate brass nozzles at 2 inch spaces that can easily be replaced or removed for cleaning.

C. The spray bar will be positioned behind the rotating belt and will backwash the solids into a discharge hopper manufactured from stainless steel. The wash water will be used to continuously flush the screenings from this hopper directly into the Washing Compactor.

D. The addition of a mechanically rotating brush system to aid offloading will not be acceptable.

2.4 SCREEN DRIVE

See Note #3

A. Each screen will have a maximum 1 hp, inverter duty electric motor suitable for a 460/3/60 supply and rated for a Class 1 Div. 2 environment. As a minimum, the motor will be TEFC with an IP55 enclosure rating and will conform to NEMA MG-1 requirements. The motor will be located outside of the screen covers and above the top of the channel.

✓ B. The gear reducer shall be directly coupled to a heavy duty shaft machined from stainless steel.

C. The continuous belt will be supported and rotated around heavy duty stainless steel sprockets located on the drive shaft in the head space of the screen.

D. Drive sprockets will have removable bolted-on lugs that transmit torque directly from the gear reducer to notches on the underside of the UHMWPE guide links. Driving forces shall be transmitted to areas located behind the screen's grid to prevent solids from contacting drive surfaces.

2.5 WASHING COMPACTOR

See Note #7

✓ A. The main body will be the washing trough that will receive screenings and wash water directly from the discharge point of the screen.

✓ B. The washing trough will house the screw auger and provide a dedicated section to reduce organic content.

See Note #7

C. The stainless steel drainage section will be slots with 3-mm openings and be adjustable to maintain auger alignment. This drainage section shall be removable and easily replaceable in the field with no special tools. The flights of the screw may be fitted with a stiff nylon brush that will maintain contact with the drainage section, preventing blockages. The replaceable brushes will be supplied in pre-coiled lengths with stainless steel removable clamps.

✓ D. The underside of the washing trough will be a catch pan chute that will divert the water that passes through the drainage section, back to the influent flow with dual outlet plain end pipe connections. The unconnected pipe side will be capped with a rubber compression cap so that it can be removed, and the drain piping can be cleaned if necessary. The catch pan will include a flushing connection point for washing and cleaning.

✓ E. The catch pan will include a separate wash water supply to purge the area of accumulated solids. A single spray nozzle will direct water across the length of the pan toward the outlet. The frequency of cleansing cycles will be controlled through the main control panel.

F. The AR400 hardened steel screw auger will sit in the washing trough. Washing compactors with shaftless screws are not acceptable as a shaft is required to support the flight and provide necessary torque and compaction. Screw auger will be primer coated to inhibit corrosion.

G. The auger will be a varied pitch screw aligned at the compaction end by AR400 hardened steel wear and anti-rotation bars designed to prevent the compacted screening from spinning within the compaction zone.

✓ H. The screw will rotate allowing wash water and free organic/fecal material finer than trough openings to escape and return to the plant flow. The wash water will flush the separated organic material through the drainage section in solution or as small particles.

I. Washing of screenings shall be achieved through an enhanced washing module consisting of the following minimum requirements manufactured out of stainless steel:

1. Variable pitch flight for separate screening transport through the wash, dewatering and compaction zones.
2. Washing Module Zone
    a. Flanged connections and a stainless steel orifice plate or nozzle
    ✓ b. Hardened steel wear and anti-rotation bars
    ✓ c. Separately controlled high pressure washing to sheer and break-up organic and fecal material for return to the channel.
    ✓ d. Cleansing cycles moving the auger in forward and reverse direction are controlled through the main control panel and operator adjustable up to 9 cycles
3. Dewatering and Compaction Zone
    a. Stainless steel header feeding an external rinse shower

✓ b. Hardened steel wear and anti-rotation bars
c. Full circumference perforations for dewatering and extrusion of organics and fecal material.
✓ d. Attached drainage catch pan with a separate wash water supply to purge the area of accumulated solids
✓ e. Removable covers for inspection access

✓ J. The compacted screenings will be pushed through the compaction zone and pass through an elbow into an outlet chute. The outlet chute will provide for screening expansion and will elevate the dewatered screenings to discharge by gravity into a waste receptacle (by others).

✓ K. Each Washing Compactor will have a minimum 3 hp, inverter duty electric motor suitable for a 460/3/60 supply and rated for a Class 1 Div. 2 environment. As a minimum, the motor will be TEFC with an IP55 enclosure rating and will conform to NEMA MG-1 requirements.

2.6 SPARE PARTS

✓ A. At a minimum, the following spare parts shall be supplied with the equipment.

✓ a) One set of fuses, one for each fuse rating

✓ b) One set of lamp lenses

✓ c) One strainer

NTC d) Spare parts shall be stored, by the Contractor, onsite and shall be handed over to the Owner at equipment handover.

2.7 ACCESSORIES

✓ A. The manufacturer will supply the following accessories, with the equipment:
✓ a) One (1) 1.5” NEMA 4X brass body solenoid valve
✓ b) One (1) ¾” NEMA 4X brass body solenoid valve
✓ c) One (1) 2” wash water strainer
✓ d) One (1) wash water pressure gauge

2.8 CONTROLS

✓ A. The equipment manufacturer will supply one (1) UL listed main control panel and one local control station that shall automatically control the equipment.

✓ B. The Main Control Panel shall consist of a NEMA 4X stainless steel enclosure for outdoor installation. The panel shall be furnished completely pre-wired and tested.

✓ C. Each control panel shall consist of the following components for each screening system:

See Note #8 a. Main lockout/fused disconnect switch
b. Variable frequency screen drive
c. Compactor motor starter
d. Control transformer, 500 VA minimum

e. Programmable control relay with minimum of 5 cycle timers
f. Fused disconnect
g. Hour run meter
h. Fuses and breakers
i. Motor overload sensor
j. Panel power light
k. Screen run/fault lights
l. Washing compactor run/fault lights
m. Manual operator and reversing contactors for wash module operation
n. Reset pushbutton
o. Emergency stop pushbutton
p. Current monitors

D. Ancillary Control Components

✓ a. Float switch

See Note #9

b. Ultrasonic differential level system consisting of the following per screen:
   1. NEMA 4X enclosure with viewing window
   2. Milltronics Hydro-Ranger 200 controller with real-time 4-20mA output
   3. Two (2) NEMA 4X/7 transducers

✓ c. Local Control Station – NEMA 7 - Each local station shall consist of the following components:
   1. NEMA 7 enclosure
   2. Hand/Off/Auto switch for each motor
   3. Emergency stop

2.9 COATINGS

See Note #2

A. To provide a uniform finish to the stainless steel surfaces provided with the System, pickling process is required per the manufacturer standard protocol.

B. All ferrous surfaces (except stainless steel) shall be coated with a pre-primer, primer, and an exterior top coating, or fusion bonded polyester coating suitable for humid/wet environments for superior corrosion protection.

C. Motor(s) and gearbox(s) shall be surface prepared to withstand humid/wet environments for superior corrosion protection.

2.10 FACTORY TESTING

✓ A. The screening system and all components shall be factory assembled and tested prior to shipment. The equipment shall be shipped fully assembled and shall be capable of being set in place and field erected by the Contractor with minimal field assembly.

✓ B. During the factory test period the screening system shall be adjusted as required assuring proper operation on completion of the field installation. The Manufacturer shall supply a certification of the completion of the factory testing of the assembled screening system and appurtenances and shall certify as to the equipment being in satisfactory operating condition at time of shipment.

PART 3 EXECUTION

NTC 3.1 INSTALLATION

A. Contractor shall install the equipment as indicated on the contract drawings and in strict accordance with the manufacturer's recommendations.

B. The final installation must be certified by the manufacturer as complete and correct.

C. The manufacturer shall provide the Contractor with required clearances, tolerances and limitations, such as smoothness/flatness of concrete pad and shall be available to answer questions prior to and during the installation of the equipment.

D. Any special tools or materials required for this start-up / acclimation period shall be provided by the manufacturer.

3.2 START-UP TESTING

✓ A. Refer to Section 01 79 00 for Facility Testing and Start-up.

3.3 MANUFACTURER'S FIELD SERVICES

✓ A. Provide field services identified in Section 01 79 01. Include 2 days on site (1 day for training and 1 day for start-up), exclusive of travel time.

END OF SECTION

Jefferson WPCP
Specification Section 46 21 19
Notes and/or Exceptions

1. ***General:*** Anchor bolts are not included in Headworks® Inc. Scope of Supply. Headworks® Inc. does not have any knowledge of the Concrete Design, existing or future. Headworks® Inc. has included in this Submittal the Anchor bolt locations and loads in the submittal for the design and supply of Anchor Bolts by others (please refer to the General Arrangement Drawings of Section 1). No Seismic Calculations are included, if required.

2. ***General:*** All Stainless-Steel material purchased will be provided to Headworks Inc. pickled and passivated at the mill. Our offer is based on Headworks Inc. standard material finish where all stainless-steel surfaces shall be glass Bead Blasted prior to equipment assembly. The Bead Blast shall remove all weld discoloration and surface contaminants and provide for Spontaneous Passivation as recognized in ASTM A380, Cleaning, Descaling, and Passivation of Stainless-Steel Parts, Equipment, and Systems, 1. Scope, 1.1.1.1.

   All purchased components such as motors, reducers, valves, switches, etc. that are not Stainless Steel shall be supplied with the manufacturers' standard coating / finish.

3. ***Specification Section 1.1 Scope of Work and Specification Section 2.1*** *specifies to furnish (1) complete continuous belt fine screening system. Specification Section 2.1 includes details regarding a Continuous Screening Belt.* Please note Headworks has included in this Submittal a Mechanically Cleaned Bar Screen Type MS2. Headworks standard design for the MS2 Bar Screen utilizes rakes that approach the channel invert from upstream side of the screen and rake upward at the upstream face with tines between the bars. This screen will utilize a 3HP Class 1, Div 2 motor. Headworks has included in Section 2 of this submittal the Standard Specifications for the MS2 Bar Screen.

4. ***Specification Section 1.2 System Description and Design Requirements*** *specifies will be directly driven by drive sprockets that shall support and rotate the grid assembly. Screen grid opening shall be 3mm. Diameter of screw shall be 6 inches. System wash water shall require 39GPM @ 60PSI.* Please note Headworks standard design for the MS2 Bar Screen utilizes lower turnarounds in lieu of the lower sprockets. Headworks has also included in this Submittal a design for the MS2 Bar Screen that utilizes a bar spacing of 0.1875in, and a Screwpactor SW220 that utilizes a screw with a 9in diameter. Additionally, the wash water shall require 35GPM @ 40PSI A more detailed description of the

Screwpactor SW220 can be found Headworks Standard Specifications in Section 2 of the Submittal.

5. ***Specification Section 2 Products*** *includes specifications for the design and supply of a Continuous Screening Belt.* Please note Headworks has included in this Submittal a Mechanically cleaned Chain and Rake MS2 Bar Screen. Headworks has included in Section 2 of this submittal the Standard Specifications for this model.

6. ***Specification Section 2, 2.3 Screen Discharge*** *includes specifications for a spray wash header to be located in the head space of the screen.* Please note Headworks' standard design of the MS2 Bar Screen does not utilize a spray wash header and instead used a scraper arm to remove screenings from rakes.

7. ***Specification Section 2, 2.5 Washer Compactor*** *includes specifications for the material of the of the augur and wear bars.* Please note Headworks standard design for the SW220 auger is made of Carbon Steel 8620 except for the final flight which is made of AR400 material and the anti-rotation bars constructed of 3/16" thick AR200 plate steel.

8. ***Specification Section 2.8. C. a*** *specifies each control panel shall consist of a main lockout/ fused disconnect switch*. Please note Headworks has provided in this Submittal a main breaker in lieu of the fused disconnect switch.

9. ***Specification Section 2.8. D. b*** *includes specifications for the Ultrasonic differential level system.* Please note the Hydro Ranger is mounted in the main control panel, through the door so that it is viewable, rather than in a separate enclosure.

END OF NOTES

Suggested Specification for a Headworks® Bar Screen Type MS2
Revised November 2017

NOTICE: The following specification is written for Grade 304 stainless steel. Changes are required for Grade 316 stainless steel.

MECHANICALLY CLEANED HEADWORKS® BAR SCREEN TYPE MS2

PART 1 – GENERAL

1.01 DESCRIPTION

Furnish, install, and test mechanically cleaned screening equipment.

1.02 SYSTEM

a. Screen shall remove solids from raw wastewater.
b. Screenings shall be mechanically raised on screen to the debris plate and automatically discharged as indicated on the plans or specified herein.

1.03 QUALITY ASSURANCE

a. All materials shall be new, of high grade, and with properties best suited to the working environment.
b. Manufacturer shall be successful in the experience of manufacture, operation, and servicing of equipment of type, size, quality, performance, and reliability equal to that specified.

1.04 SUBMITTAL

a. The manufacturer shall submit a general arrangement drawing that illustrates the layout of the equipment and principle dimensions, and other related data including descriptive literature, electrical control drawings, and catalog cut sheets for individual components and drive motor data.
b. The manufacturer shall submit the location of the nearest permanent service headquarters of the screen and motor manufacturer for the screen and motor submitted.
c. The manufacturer shall submit operating instructions with descriptive literature indicating materials of construction, weights, principle dimensions, and other important details.

1.05 DELIVERY, STORAGE, & HANDLING

a. Shipping
    i. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations, for protection of components, or for installation requirements.
    ii. Pack spare parts in containers bearing labels which clearly designate contents and pieces of equipment for which they are intended.
b. Receiving

    Store and safeguard equipment, material, and spare parts.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

a. Screen shall be the Headworks® Bar Screen Type MS2 as manufactured by Headworks Inc. or pre-qualified equal. All pre-qualification proposals must be submitted to the owner's representative a minimum of fourteen (14) days prior to bid opening. Any pre-qualification proposal failing to meet that deadline will not be considered. Pre-qualification package shall include, but not be limited to, the following:
   i. Complete set of dimensional drawings with descriptive information
   ii. Process equipment electrical requirements with schematic diagrams
   iii. Control panel layout diagram with details on related components
   iv. Detailed list of deviations from contract documents and specifications

2.02 PROVISIONS

a. Screen shall be mechanically cleaned. Incline of bar screen shall be _____ degrees from vertical. *(The range is from zero (0°) to fifteen (15°) degrees)*
b. Rakes shall approach channel invert from upstream side of screen and rake upward at upstream face with tines between the bars.
c. The screen shall be designed to pivot out of the channel **OR** be pulled out of the channel. Rubber side seals shall seal the screen to the channel walls.
d. Screenings shall be discharged on the downstream side of the screen to _____.
e. Framework of screen shall be constructed of Grade 304 stainless steel with cross section of minimum thickness 3/16". Various parts fastened by welding, riveting, or bolting shall be braced as necessary to ensure a rigid structure. The side frames shall be minimum 3/16" formed to a channel profile. The bottom thickness shall be a minimum of 3/16". The frame shall have support beams with U-profile thickness of 3/16" on the front above the maximum water line.
f. The screen frame shall be supplied in one piece, requiring no field assembly.
   Optional. For indoor installations with height restrictions, the screen shall be supplied in flanged subassemblies complete with installed drive chains and rake bar. The flanged subassemblies shall be bolted together onsite during installation.
g. The drive mechanism for the rakes shall incorporate a solid shaft constructed of Grade 304 stainless steel.
h. Bolts and nuts shall be of Grade 304 stainless steel or other acceptable corrosion-resistant material. Anchor bolts shall be 3/4" or 5/8" Grade 304 stainless steel and furnished by the installing contractor.
i. Screen bars shall be constructed of Grade 304 stainless steel.
j. The bar rack shall consist of continuous bars. The dimensions of the bars are .31" x .15" x 1.57" (8mm x 4mm x 40mm) **OR** .47" x .23" x 1.97" (12mm x 6mm x 50mm) for bar spacing >3/8" (10mm).
k. Round or rectangular bars shall not be used.
l. Bars shall be supported from framework and be readily removable. The screen bars shall be individually replaceable without any welding or cutting. Bars that are welded to the framework or welded into sub-assemblies shall not be allowed. Replacement screen bars shall be available from the screen manufacturer.

m. Bars shall be fastened to a debris plate that extends to the point of discharge. Bars shall extend a minimum of 8" (200mm) above the maximum water level.

n. The screenfield shall be accurately constructed to give a clear opening of ____ inches (____mm) between the bars. There shall be no space wider than the opening between the bars which would permit passage of larger solids through the screen.

o. Debris plate of Grade 304 stainless steel plate (thickness is minimum 3/16") shall extend to the point of discharge. Debris plate shall be true and flat such that a close clearance between the raking tines and the plate can be maintained during the cleaning cycle. The debris plate shall be constructed to guarantee a maximum gap between rake bar and debris plate, leading to the discharge chute without interruption.

p. The screen rakes shall be designed such that screenings will not wrap around the tines or the stationary bars, and will not fall back into the sewage flow during the cleaning cycle.

q. Screenings transported to the top of the screen shall be discharged positively by means of a scraper mechanism to the discharge chute. A scraper blade made of a combination of synthetic and other material shall be provided on the scraper.

r. The raking tines shall have the tooth profile precision cut from a single continuous bar of sufficient thickness and depth to ensure adequate stiffness and strength to cope with the specified duty cycle. The rakes shall run in guides on both sides to ensure engagement and clean the bars from the upstream side of the screen. The rakes shall be fabricated from Grade 304 stainless steel. The rake material, thickness of material, and capacity of rake is similar to the entire construction. The rake material thickness shall be as follows:

Thickness of rake bar	10mm (.375" min.)
Reinforcement profile	4mm (.1575" min.)
Side plates	10mm (.375" min.)

s. The rake capacity shall be as follows:

Capacity/Rake Bar: 0.074 f^3/ft Screen Field Width (SFW)

Total Screen Capacity at approx. 10 second cleaning interval (ft^3/h)

_____ = 0.074 f^3 x SFW (ft) x 360

Total Screen Capacity at approx. 5-second cleaning interval (ft^3/h)

_____ = 0.074 f^3 x SFW (ft) x 720

t. Rakes shall have a shovel shape to prevent screenings from falling back to the channel. Flat rakes without this feature are not permitted.

u. Rake tines shall penetrate into the screen bar spacing to ensure that screenings are completely cleared during each lifting operation. Rake tines are mechanically engaged into the screen bars. During each cleaning stroke, the raking tines shall engage into the bottom of the bar screen grids at the channel invert.

v. Drive chains, chain guides, chain sprockets, bearings, and shafts shall be fully replaceable without having to remove the screen from the channel.

w. The upper sprocket shall be made of Grade 304 stainless steel. The upper sprocket shall have a 125mm pitch and a tooth width of minimum 27mm. No split sprockets shall be used.

x. Upper bearings shall be UCF Type or equal; housed bearings are grease-lubricated and mounted to the take-up frame assembly. No bearings shall be submerged in the waste stream

y. The lower turn guide shall measure:

Pitch	4.92”
Disk Width	0.875”
Outer Diameter	10.695”
Inner Diameter	9.195”

z. Chains shall be heavy duty roller type with a minimum weight of 6 lbs/ft and made of Grade 304 stainless steel of high tensile strength and resistance to corrosion. Chain rollers must be stainless steel. The average ultimate strength of the chain shall be minimum 31,000 pound-force. Chain pins shall be a stainless steel and hardened.

aa. Chain guides shall be securely fixed to the screen frame for the full height of travel and shall not protrude into the flow. The type of chain guide, thickness of material, and size is an L-profile, 2.5"/1.3125"/0.1875" (upper) and 2.687”/1.5”/0.1875” (lower), material Grade 304 stainless steel. Replaceable wear strips on chain guides located below the water level shall not be allowed.

bb. The drive motor shall be maximum 3 HP. The motor shall be an inverter duty rated motor with a 1.0 service factor, rated for continuous duty. The motor shall be controlled by a VFD (variable frequency drive), rated for continuous operation. Enclosure shall be rated applicable for the specific installation environment. The drive unit, including the reduction gearbox, shall be directly shaft mounted and shall be positioned to facilitate maintenance work.

cc. A VFD and a PLC (programmable logic controller) shall be provided. VFD shall have solid state overload integral. On meeting a blockage, the device shall be able to automatically reverse the direction of travel of the raking mechanism for an adjustable distance and revert to the forward motion to try to clear the blockage. This reversing action can occur a maximum of three times for any one obstruction. The device shall reset automatically if the blockage causing the initial overload condition is cleared; should the blockage remain upon the completion of the fourth attempt, the screen shall be tripped and an alarm generated. The reverse function shall be effective only in the low speed mode.

dd. The raking mechanism shall be capable of two cleaning speeds. Normal speed shall have an approximate ten second cleaning interval and high speed shall have an approximate five second cleaning interval. Screens which do not meet these performance criteria will not be considered.

ee. A discharge chute (thickness is minimum 3/16”) shall be provided for each screen to divert screenings discharged from the screen to a _____. The discharge chute shall be made of Grade 304 stainless steel. The discharge chute shall be mounted at an angle of 30 degrees. Panels are positioned on both sides to protect from splashing.

ff. Covers, which are easily removable, shall be provided for easy maintenance. Covers shall be constructed of clear, impact-resistant polycarbonate material (thickness is minimum 1/4") to allow for visual observation during screen operation. Polycarbonate covers shall have reinforced plastic pull handles. Polycarbonate covers shall be held in place with threaded plastic hand knobs. Stainless steel covers shall not be used.

gg. **Optional.** Top enclosed: The discharge chute and top of screen shall be fully enclosed. The top of the frame shall be covered with a minimum 11 gauge Grade 304 stainless steel cover, bolted to the front and back of the screen frame. The sides of the top cover shall

be bent to overlap the side frames. The cover shall be made of 1/4" clear, impact resistant, polycarbonate to allow for visual inspection during screen operation. The polycarbonate cover shall be held in place with threaded plastic hand knobs.

hh. **Optional.** Heat tracing: The debris plate shall be heat traced, insulated, and jacketed above the maximum water level or the base of the debris plate, whichever is higher, up to the top of the debris plate where screenings are discharged and down to the base of the discharge chute. Heat tracing shall be suitable for Class ___, Division ___ areas. Insulation shall be approximately 1" thick. Jacketing shall be of Grade 304 stainless steel material. The surface where heat tracing is installed shall be energized by a thermostat that turns on the heat tracing when the outside air temperature reaches 40 degrees Fahrenheit. Heat tape shall extend outside the pan for field termination in an enclosure provided by manufacturer that houses contactors, thermostat, terminal strips, etc., and is, in turn, wired to the main control panel for the bar screen.

ii. **Optional.** Pivot device: The screen shall be equipped with a pivot stand that allows the screen to pivot for maintenance purposes. The lifting is achieved by means of cables mounted on the lifting eyes on the lower end of the screen. The lifting device is not included in the scope of supply.

2.03 SEQUENCE OF OPERATION – Dual Speed Operation

Main Panel *On/Off*	**Local Panel** *Hand/Off/Auto* *&* *Fwd/Off/Rev*	**Result**	**Action when Blockage occurs**	**Comments**
On	*Auto* *&* *Any Position*	Screen starts in LSP when the rising water differential reaches set level (Level 1).	Screen performs cleaning shuttle up to 4 times. If unsuccessful, screen stops and initiates alarm contact.	LSP - Low Speed Mode (approx. 10-second cleaning interval)
On	*Auto* *&* *Any Position*	Screen starts in HSP when the rising water differential reaches set level (Level 2.)	Screen performs cleaning shuttle up to 4 times. If unsuccessful, screen stops and initiates alarm contact.	HSP – High Speed Mode (approx. 5 second cleaning interval)
On	*Auto* *&* *Any Position*	Exercise Cycle	Screen performs cleaning shuttle up to 4 times. If no success, screen stops and initiates alarm signal.	X min in LSP, every Y min. (X & Y are Operator adjustable)
On	*Manual* *&* *Forward*	Screen operates forward in LSP.	Screen stops immediately. No cleaning shuttle.	
On	*Manual* *&* *Reverse*	Screen operates in reverse in LSP.	Screen stops immediately. No cleaning shuttle.	
On	*E-Stop Engaged*	Screen stops immediately.	N/A	
On	*Off* *&* *Any Position*	Screen will not operate.	N/A	
On	*Hand* *&* *Off*	Screen will not operate.	N/A	
Off	*Any Position* *&* *Any Position*	Screen will not operate.	N/A	

2.04 BAR SCREEN CONTROLS

a. A bar screen main control panel shall be furnished, completely pre-wired and tested, requiring only wall mounting and connection to interconnecting wiring in the field by an electrical contractor. The control panel shall include all equipment required to control one or more bar screen(s) as specified herein. The control panel shall bear a serialized UL 508, UL 698A, or CSA label when applicable and shall be manufactured by a CSIA certified panel shop. The panel shall be located in a non-classified area where no corrosive gases are present.

b. The control panel enclosure shall be sized as required to house equipment and shall be suitable for wall mounting or mounting to strut-type supports. The enclosure shall be rated NEMA 4X Grade 304 stainless steel.

c. Each bar screen motor shall be controlled by a ABB ACS 500 Series VFD with an internal swinging choke, sized as required for bar screen motor horsepower and suitable for use with variable torque loads. VFD shall include discrete and analog input and outputs as required by control panel manufacturer. No bypass starters will be required.

d. The VFD(s) shall be controlled by an Allen Bradley MicroLogix 1400 Series PLC with necessary extended I/O. The PLC shall be used to control the VFD to operate the screen at two (2) speeds and through the automatic reversing/cleaning shuttle sequence. The PLC shall include discrete and analog inputs and outputs as required.

e. Each screen shall be controlled in synchronization with ultrasonic level sensors. Upon reaching a predetermined differential set point the screen shall begin operation in low speed and shall shut down after a predetermined time if the differential level is less than the predetermined set point. Upon reaching a second, higher predetermined differential set point, the screen shall operate in high speed.

f. When an overcurrent is detected, the screen shall automatically stop and run in reverse for a predetermined time. The screen shall then stop and return to forward. If the cause of the overload is cleared, the screen shall automatically reset to normal operation. If an overload is again detected, the reversing cycle is repeated up to four (4) times prior to initiating an alarm contact. The use of clutches, friction disks, or similar devices for overload protection are not acceptable

g. The control panel shall have an OIT (Operator Interface Terminal) to allow adjustment of counter values, timers, and level set points without connecting to the PLC. The OIT shall be rated NEMA 4X and provide fault and troubleshooting information.

h. Door mounted NEMA 4X indicating lights shall be provided to indicate running and alarm status of the bar screen. Legend plates and a door mounted alarm reset push button shall also be provided.

i. Local control station(s) shall be provided at the bar screen(s) and shall be fitted a push button emergency stop switch, a Hand-Off-Auto switch, and a Forward-Off-Reverse switch. The local control station enclosure(s) shall be rated NEMA 7.

2.05 SPARE PARTS

a. The following minimum recommended spare parts shall be provided for mechanically cleaned screens:
    i. One (1) set of wiper arm wear pads

ii. One (1) five-foot chain segment
iii. Two (2) rake bars

2.06 DESIGN DATA

a.	Quantity of Bar Screens	____ each
b.	Channel Depth	____ feet
c.	Channel Width	____ feet
d.	Discharge Height above Floor Level	____ feet
e.	Maximum Water Depth	____ feet
f.	Bar Spacing	____ inch
g.	Screen Field Width	____ feet
h.	Maximum Design Flow per Bar Screen	____ MGD
i.	Screen Incline from Vertical	____ degrees
j.	Screen shall be pivot type	yes/no
k.	Screen shall be enclosed on top	yes/no

2.07 SURFACE FINISHES AND COATINGS

a. After all fabrication and welding has been completed, all stainless steel surfaces shall be glass bead blasted prior to equipment assembly. The bead blast shall remove all weld discoloration and surface contaminants and provide for spontaneous passivation as recognized in ASTM A380-99, Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems, 1. Scope, 1.1.1.1.
b. All purchased components such as motors, reducers, valves, switches, etc. shall be supplied with the manufacturer's standard finish.

PART 3 – EXCECUTION

3.01 INSTALLATION

Equipment shall be installed in strict conformance with manufacturer's recommendations.

3.02 MANUFACTURER'S SERVICES

The equipment manufacturer shall furnish a qualified field technician on site for installation inspection, start-up, and operator training for up to three (3) consecutive days during one (1) trip to the jobsite. The number of days and trips specified shall be included in the contract price.

END OF SECTION

Suggested Specification for a Headworks® Screwpactor™
Revised March 2021

NOTICE: The following specification is written for Grade 304 stainless steel. Changes are required for Grade 316 stainless steel.

SHAFTED SPIRAL WASHER/COMPACTOR - HEADWORKS® SCREWPACTOR™

PART 1 – GENERAL

1.01 DESCRIPTION

Furnish, install, and test shafted spiral washer/compactor as indicated on the drawings or specified herein. The compactor shall be supplied complete with controls, inlet hopper(s), and discharge tubing.

1.02 QUALITY ASSURANCE

a. All materials shall be new, of high grade, and with properties best suited to the working environment.
b. Manufacturer shall be successful in the experience of manufacture, operation, and servicing of equipment of type, size, quality, performance, and reliability equal to that specified. The manufacturer shall have furnished equipment of the size and type specified.

1.03 SUBMITTAL

a. The manufacturer shall submit a general arrangement drawing that illustrates the layout of the equipment and principle dimensions, and other related data including descriptive literature, electrical control drawings, and catalog cut sheets for individual components and drive motor data.
b. The manufacturer shall submit the location of the nearest permanent service headquarters of the conveyor/compactor and motor manufacturer for the conveyor/compactor and motor submitted.
c. The manufacturer shall submit operating instructions with descriptive literature indicating materials of construction, weights, principle dimensions, and other important details.

1.04 DELIVERY, STORAGE, & HANDLING

a. Shipping
    i. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations, for protection of components, or for installation requirements.
    ii. Pack spare parts in containers bearing labels which clearly designate contents and pieces of equipment for which they are intended.
b. Receiving

    Store and safeguard equipment, material, and spare parts.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

The shafted spiral washer/compactor shall be the Screwpactor Type SW_____as manufactured by Headworks Inc. of Houston, TX. *(Type SW220 or Type SW320 or Type-SW420)*

2.02 PROVISIONS

a. The equipment supplied shall be a Qty. ( ) shafted spiral washer/compactor(s) that consist of a shafted spiral, sieve zone, wash zone**,** press zone, transport zone, discharge tube, drive system, and controls.

b. The system shall be designed to receive, positively convey, and compact screenings discharged from the_____. The screenings shall be introduced into the inlet hopper directly over the sieve zone, washed in the wash zone, conveyed through the transport zone, compacted in the press zone, and discharged from the discharge tube into a suitable receptacle (provided by others.).

c. Each shafted spiral washer/compactor shall be capable of batch washing and continuous discharge operation.

d. The shafted spiral washer/compactor shall be capable of effectively washing and dewatering not less than _____per hour. (Mo*del SW220: 69 ft^3/hr, Model SW320: 123 ft^3/hr, Model SW420: 250 ft^3/hr*

e. The shafted spiral washer/compactor shall:
   i. Reduce screenings volume by a minimum of 50%.
   ii. Produce a dry screenings content of 30-35%.

f. Exclusive of the discharge tubing and drive, the shafted spiral washer/compactor shall have a length of approximately ____ ft [m.] *(Maximum length 8 ft [2.5m])*

g. Each unit shall be designed to be installed horizontally.

h. Support legs shall be supplied as required for adequate support under operating conditions. The support legs are a fixed height.

i. Thrust Bearing
   i. An independent thrust bearing shall be mounted between the drive and press body to handle the load created during compaction and allow for reversal of the spiral.
   ii. The thrust bearing housing shall utilize a tapered roller bearing assembly, a cylindrical roller thrust bearing and two double lip seals.
   iii. The bearing assembly shall be designed to handle the load created by the spiral without the need for an end bearing. The end of the shafted spiral shall not rest on the anti-rotation bars.

j. Shafted Spiral Assembly
   i. The shafted spiral assembly shall consist of a spiral welded to mechanical tubing. The mechanical tubing shall be welded to drive hub.
   ii. The shafted spiral flighting from the sieve zone up to the press zone shall be manufactured from allow steel plate forming a continuous flight welded to the shaft.
   iii. The diameter of the shafted spiral assembly shall be_ inches [__ mm] in diameter

and shall be constant over the length of the assembly. *(Model SW220: Nominal 9 inches [230mm], Model SW320: Nominal 11.25 inches [305mm], Model SW420: Nominal 14.5 inches)*

iv. The pitch of the spiral shall have one (1) abrasive resistant brush assembly. The brush shall be nylon with a stainless steel holder and held in place by clips and tack welded at the ends of the spiral.

v. The flight thickness shall be ____. (Model SW220: 3/8", SW320: 3/4" SW420: 3/4") with a Brinell Hardness of 220.

vi. The pitch of the spiral shall reduce by 66% in the press zone area.

vii. The final pitch of the shafted spiral shall be abrasion resistant (AR) plate (minimum hardness 365 Brinell).

viii. The final pitch of the shafted spiral shall have a larger machined outside diameter to maintain and minimize the gap between the spiral flight and anti-rotation bars to prevent backflow of material.

k. Sieve Zone

i. The sieve zone shall be tubular in design with an integral collection pan and inlet hopper(s) to accept screenings from_____.

ii. The sieve zone shall be manufactured from minimum 11 gauge Grade 304 stainless steel and minimum 16 gauge slotted Grade 304 stainless steel reinforced intermittently. The slots shall be 2.5mm wide.

iii. The sieve zone shall include an inlet hopper to direct the screenings into the shafted spiral washer/compactor. The inlet hopper shall be constructed of minimum 14 gauge Grade 304 stainless steel and shall be bolted to the transport zone.

l. Transport Zone

i. The transport zone shall be tubular in design and constructed of minimum *(Model SW220: 11 Gauge, Model SW320: 3/16-inch-thick, Model SW420: 3/16-inch-thick)* Grade 304 stainless steel.

ii. The transport zone shall be fitted with anti-rotation bars constructed of minimum 3/16" thick abrasion resistant (AR) plate steel. The wear bars shall be welded to the inside of the press zone.

m. Wash Zone

i. The wash zone shall be tubular in design with an integral collection pan located directly under the zone. The wash zone shall wash screenings and reduce the organic content.

ii. The wash zone shall be manufactured from minimum *(Model SW220: 11 Gauge, Model SW320: 3/16-inch-thick, Model SW420: 3/16-inch-thick)* Grade 304 stainless steel and minimum 16 gauge slotted Grade 304 stainless steel reinforced intermittently. The slots shall be 2.5mm wide.

iii. In addition to the wash water entering through the center of the shafted spiral, the wash zone shall consist of a spray head fitted with two (2) spray nozzles to provide cleaning of screenings before compacting. The wash zone supply water shall be approximately 10 gpm at 40 psi. The wash zone shall include a solenoid valve to control the flow of water into the wash zone. The solenoid valve shall be shipped loose. All interconnecting piping, valves, etc. between the water source,

the wash zone, and the solenoid valve shall be supplied and installed by the installing contractor. If the water pressure requires the use of a Pressure Reducing Valve (PRV) it shall be supplied by and installed by the installing contractor. If the water source is a plant's final effluent, the contractor shall provide a y-strainer with mesh size 40, equivalent to 470 microns.

n. Press Zone
    i. The press zone shall be tubular in design with an integral collection pan located directly under the zone.
    ii. The press zone shall be constructed of minimum *(Model SW220: 11 Gauge, Model SW320: 3/16 inch thick, Model SW420: 3/16 inch thick)* Grade 304 stainless steel.
    iii. The press zone shall have perforations to allow water to drain and flush water to move any silts and fines into the collection pan

o. Collection Pan
    i. The collection pan shall be a u-trough design located directly under the sieve zone, wash zone, and press zone.
    ii. The collection pan shall be constructed of minimum 14 gauge Grade 304 stainless steel and attached to the compactor body with quick release clamps.
    iii. Periodically, water shall be introduced into the collection pan to flush organics and other fine particulates to the drain. The collection pan water supply shall be approximately 10 gpm at 40 psi. The flush water shall run five (5) seconds out of every twenty (20) seconds and be field adjustable. The flush water shall flow down to the base of the collection pan to the 3" pipe drain outlet.
    iv. The collection pan shall include a solenoid valve to control the flow of water into the wash zone. The solenoid valve shall be shipped loose. All interconnecting piping, valves, etc. between the water source, the wash zone, and the solenoid valve shall be supplied and installed by the installing contractor. If the water source is a plant's final effluent, the contractor shall provide a y-strainer with mesh size 40, equivalent to 470 microns.

p. Discharge Tube
    i. The discharge tube shall be cylindrical and constructed of minimum 11 gauge Grade 304 stainless steel. The discharge tube shall increase in diameter over its length to reduce the potential for plugging.
    ii. The discharge tube shall direct and discharge screenings at a clear discharge height that allows for placement of a suitable receptacle (provided by others) to collect the screenings.
    iii. **Optional.** The discharge tube shall include an integral continuous bagging system. The continuous bagging system shall consist of a plastic bag holder that shall mount on the discharge tube. The holder shall be readily removable for inspection and service.

q. Water Connections
    i. The washer/compactor shall be provided with a minimum of two separate connections for introducing spray water into the washer/compactor. One point of introduction shall be into the screenings wash zone. Another introduction point shall be into the flushing connections in the body and collection pan on

the washer/compactor. The washer/compactor shall be designed to accept potable water or plant water (also known as final plant effluent) at a pressure range of 40-60 psi. Higher pressures may require a Pressure Reducing Valve (PRV), which if necessary, shall be provided by and installed by the installing contractor. If the water source is a plant's final effluent, the contractor shall provide a y-strainer with a mesh size 40, equivalent to 470 microns.

r. Drive System
    i. The electric motor shall be maximum 5 hp, 230/460 V, 3 phase, 60 HZ, TEFC, and rated for the required electrical area classification.
    ii. The design shall utilize a shaft mounted helical bevel gear reducer driven by a direct coupled motor. The reducer shall have a cast iron housing with an output speed of 14 rpm. The service factor shall be minimum 1.0.

s. **Optional.** Heat Tracing: The washer/compactor and discharge tube shall be heat traced, insulated, and jacketed. Heat tracing shall be suitable for Class ___ , Division ___ areas. Insulation shall be approximately 1" thick. Jacketing shall be of Grade 304 stainless steel material. The surface where heat tracing is installed shall be energized by a thermostat that turns on the heat tracing when the outside air temperature reaches 40 degrees Fahrenheit. Heat tape shall extend outside the pan for field termination in an enclosure provided by manufacturer that houses contactors, thermostat, terminal strips, etc., and is, in turn, wired to the main control panel.

2.03 CONTROLS

a. The washer/compactor control panel enclosure shall be sized as required to house the required components and shall be suitable for wall mounting or mounting to strut-type supports. The enclosure shall be rated NEMA 4X. The control panel shall be pre-wired and tested, requiring only wall mounting and connection to external wiring by the electrical contractor in the field. The panel shall be located in a non-classified area where no corrosive gases are present.
b. The control panel shall be controlled in synchronization with the upstream screening equipment. The washer/compactor shall begin operation whenever the screening equipment begins operation and shall continue operation for a predetermined period of time after the upstream equipment stops.
c. The control panel shall have front panel mounted NEMA 4X pilot lights indicating power, fault, forward, and reverse.
d. The control panel shall include a disconnect, motor starter, control power transformer, adjustable timer, panel heater, elapsed time meter, and other components to allow for sequencing the system.
e. Output dry contacts shall be provided for fault, forward, and reverse.
f. The control panel shall be fitted with an adjustable current switch. Upon a fault, the equipment shall shut down and an alarm contact shall be initiated.
g. A NEMA ___ local operator station panel shall be provided. The local operator station shall include an automatic/local switch, forward/reverse switch, and an emergency stop.
h. **Optional:** An emergency pull cord and safety switch shall be provided. The pull cord shall be mounted to the compactor over its full length and be attached to the safety switch. The safety switch shall immediately stop the system when the cord is pulled, and the

switch is actuated.

i. **Optional:** A loss of rotation sensor shall be provided to detect the screw rotation. The sensor shall be mounted towards the discharge end of the compactor and away from the drive. When the sensor records zero movement of the screw, the system shall immediately stop and initiate an alarm contact.

2.04 Spare Parts

a. The following minimum recommended spare parts shall be provided for each conveyor/compactor:
    i. One (1) brush

2.05 SURFACE FINISHES AND COATINGS

a. After all fabrication and welding has been completed, all stainless steel surfaces shall be glass bead blasted prior to equipment assembly. The bead blast shall remove all weld discoloration and surface contaminants and provide for spontaneous passivation as recognized in ASTM A380, Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems, 1. Scope, 1.1.1.1.

b. All purchased components such as motors, reducers, valves, switches, etc. shall be supplied with the manufacturer's standard finish.

PART 3 – EXCECUTION

3.01 INSTALLATION

Equipment shall be installed in strict conformance with manufacturer's recommendations.

3.02 MANUFACTURER'S SERVICES

The equipment manufacturer shall furnish a qualified field technician on site for installation inspection, start-up, and operator training for up to three (3) consecutive days during one (1) trip to the jobsite. The number of days and trips specified shall be included in the contract price.

END OF SECTION

Section 3

Bar Screen Motor and Gear Reducer Data

Take-up Bearing Data Sheet

Screen Drive Data Sheet

Jefferson WPCP

Headworks® MS1 Drive System Data Sheet

GEAR REDUCER DATA:

Type:	SEW Eurodrive Model SA87AM184
Mounting:	M1, Fifteen degrees (15°) to M4
Bore:	60 mm
Speed:	14 rpm
Torque:	17,300 lb-in
Ratio:	123.48
Service Factor:	1.76
Weight:	190 lbs.

MOTOR DETAILS:

Type:	Baldor Model VDRX18344T
Motor Power:	3 HP
Service Factor:	1.0 (1.15 on Sinewave)
Enclosure Type:	XPFC
Voltage:	230/460
Full Load Amps:	8.2/4.1
Speed:	1755 rpm
Frame:	182TC
Weight:	127 lbs.

Screen Electric Motor
Screen Gear Reducer

BALDOR • RELIANCE

Customer information packet

VDRX18344T

3HP, 1755//1465RPM, 3PH, 60/50HZ, 182TC, XPFC
VARICRAFT POWER SYSTEM INC
Class - CLI GP C,D
Division - Division I

4/5/2021 12:55:06 PM

Specifications

Enclosure	XPFC
Frame	182TC
Frame Material	Iron
Frequency	50.00 Hz
	60.00 Hz
Output @ Frequency	2.000 HP @ 50 HZ
	3.000 HP @ 60 HZ
Phase	3
Synchronous Speed @ Frequency	1800 RPM @ 60 HZ
Voltage @ Frequency	230.0 V @ 60 HZ
	190.0 V @ 50 HZ
	380.0 V @ 50 HZ
	460.0 V @ 60 HZ
XP Class and Group	CLI GP C,D
XP Division	Division I
Agency Approvals	CSA EEV
	UR
	CSA
Ambient Temperature	40 °C
Auxillary Box	No Auxillary Box
Auxillary Box Lead Termination	None
Base Indicator	No Mounting
Bearing Grease Type	Polyrex EM (-20F +300F)
Blower	None
Constant Torque Speed Range	6
Current @ Voltage	8.200 A @ 230.0 V
	7.000 A @ 190.0 V
	4.100 A @ 460.0 V
	3.500 A @ 380.0 V
Design Code	B
Drip Cover	No Drip Cover
Duty Rating	CONT

Part detail

Revision	-
Type	AC
Mech. spec.	
Base	
Status	PRD/A
Elec. spec.	06WGX181
Layout	06LYG594
Eff. date	06-26-2019
CD Diagram	CD0005
Poles	04
Leads	9#16
Proprietary	False
Created date	06-20-2019

Efficiency @ 100% Load	89.5 %
Electrically Isolated Bearing	Not Electrically Isolated
Feedback Device	NO FEEDBACK
Heater Indicator	No Heater
High Voltage Full Load Amps	3.5 a
Insulation Class	F
Inverter Code	Inverter Duty
IP Rating	NONE
KVA Code	J
Lifting Lugs	Standard Lifting Lugs
Locked Bearing Indicator	Locked Bearing
Max Speed	2700 rpm
Motor Lead Termination	Flying Leads
Motor Standards	NEMA
Motor Type	0632M
Mounting Arrangement	F1
Number of Poles	4
Overall Length	18.31 IN
Power Factor	77
Product Family	General Purpose
Pulley Face Code	C-Face
Rodent Screen	None
Service Factor	1.00
Shaft Diameter	1.125 IN
Shaft Ground Indicator	No Shaft Grounding
Shaft Rotation	Reversible
Speed	1755 rpm
Speed Code	Single Speed
Starting Method	Direct on line
Thermal Device - Bearing	None
Thermal Device - Winding	Normally Closed Thermostat
Vibration Sensor Indicator	No Vibration Sensor
Winding Thermal 1	None
Winding Thermal 2	None

XP Temp Code	T3C

Nameplate

NP1401XPSLEV											
NO.					**CC**	010A					
S/N					**TEMP CODE**	T3C					
SPEC.	06-0000-0144				**INV.TYPE**	PWM					
CAT.NO.	VDRX18344T				**C HP FR**	60	**C HP TO**	90			
HP	3//2				**CT HZ FROM**	6			**CT HZ TO**	60	
VOLTS	230/460//190/380				**VT HZ FROM**	6			**VT HZ TO**	60	
AMPS	8.2/4.1//7/3.5			**MAG CUR**	4.2/2.1						
RPM	1755//1465			**MX RPM**	2700						
HZ	60//50	**PH**	3	**CL**	F	**NOM.EFF.**	89.5				
SER.F.	1.00	**DES**	B	**SL HZ**	1.5	**WK2**	0.3				
FRAME	182TC	**RATING**	40C AMB-CONT								
	55C AMB @ 1.0 SF										
	1.15 SF SINEWAVE				NEMA MG-1 PT 5,IP55						

Parts list

Part number	Description	Quantity
SA371146	SA 06-0000-0144	1.000 ea
RA360826	RA 06-0000-0144	1.000 ea
LB1115N	LABEL,LIFTING DEVICE (ON ROLLS)	1.000 ea
LB1119N	WARNING LABEL	1.000 ea
LC0145B01	CONNECTION LABEL	1.000 ea
PK3082	STYROFOAM CRADLE	1.000 ea
NP1401XPSLEV	SS XP INV UL CSA-EEV CC CL-I GP-C&D	1.000 ea
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	2.000 ea
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	4.000 ea
MN416A01	TAG-INSTAL-MAINT no wire (1200/bx) 1/21	1.000 ea
LB1081F	ALUM XP CAUTION LABEL (FS PLANT ONLY-	1.000 ea
HW3201A05	3/8-16 EYEBOLT	1.000 ea
06FH1003A06	FH, XP W/GRSR	1.000 ea
51XN1032A14	10-32 X 0.875 HX WS SL SR	4.000 ea
34FN3002A02	EXTERNAL FAN, PLASTIC, .905/.907 HUB W/	1.000 ea
51XB0818A12	8-18X3/4 HXWSSLD SERTYB	1.000 ea
MJ1000A02	GREASE, MOBIL POLYREX EM - 124047	0.050 lb
06EP1709A07	FREP XPFC 205 BRG GRP C W/DRAIN (HW4506A	1.000 ea
10XN3118K20	5/16-18 X 1 1/4 GRADE 5 STEEL ZC PLATED	4.000 ea
HW1001A31	LOCKWASHER 5/16, ZINC PLT.591 OD, .319 I	4.000 ea
HW5100A05	WVY WSHR F/205 & 304 BRGS	1.000 ea
HW4500A01	1641B(ALEMITE)400 UNIV, GREASE FITT	1.000 ea
HW4500A19	1/4-28X1/4 SLOTTED PLUG F/S	1.000 ea
HW4506A02	BREATHER/DRAIN-EXP PROOF-.125-27 NPTF AI	1.000 ea
HW3022E05	.125 DIA X .500 ROLLED SPRING PIN	1.000 ea
06EP1707A17	PUEP 182-4TC M GRP-C DRAIN(HW4506A02)	1.000 ea
HW1001A31	LOCKWASHER 5/16, ZINC PLT.591 OD, .319 I	4.000 ea
10XN3118K20	5/16-18 X 1 1/4 GRADE 5 STEEL ZC PLATED	4.000 ea
HA2071A01	SLINGER ALUM (AUTO)	1.000 ea
80XN1032A06	10-32 X 3/8 SET SC HEX SOCK	1.000 ea
51XN1032A20	10-32 X 1 1/4 HX WS SL SR	2.000 ea

HW4001A01	1/4 HX SOC PIPE PLG (F/S) ALLOY STEEL W/	2.000 ea
60XN1032A07	10-32 X .4375 TRUSS HEAD, TORX SERRATED	2.000 ea
HW4506A02	BREATHER/DRAIN-EXP PROOF-.125-27 NPTF AI	1.000 ea
HW3022E05	.125 DIA X .500 ROLLED SPRING PIN	1.000 ea
07CB1000A02	CONDUIT BOX, MODEL 306,EXP. PROOF	1.000 ea
84XN2520J16	1/4-20 X 1 SOC HD CAP SCREW	4.000 ea
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	4.000 ea
WD1000B17	T&B CX35TN OR L35P TERMINAL LUG	1.000 ea
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 ea
07CB1502A01	CONDUIT BOX LID MACH (DUCTILE IRON)	1.000 ea
84XN2520J16	1/4-20 X 1 SOC HD CAP SCREW	4.000 ea
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	4.000 ea
MG1500Y02	WILKOPON PRIMER YELLOW	0.022 ga
MG1025G29	WILKOFAST, 789.229, DARK CHARCOAL GRAY	0.022 ga
G0PA1000	PKG GRP, PRINT PK1026A06	1.000 ea
HW2501E17	.250 SQUARE X 1.875 LONG LOW CARBON STEE	1.000 ea
HA7000A02	KEY RETAINER RING, 1 1/8 DIA, 1 3/8 DIA	1.000 ea

AC Induction Motor Performance Data
Record # 72220
Typical performance - not guaranteed values

Winding: 06WGX181-R087	**Type:** 0632M	**Enclosure:** XPFC

Nameplate Data			
Rated Output (HP)			3//2
Volts			230/460//190/380
Full Load Amps			8.2/4.1//7/3.5
R.P.M.			1755//1465
Hz	60//50	**Phase**	3
NEMA Design Code	B	**KVA Code**	J
Service Factor (S.F.)			1
NEMA Nom. Eff.	89.5	**Power Factor**	77
Rating - Duty			40C AMB-CONT
S.F. Amps			

460 V, 60 Hz: High Voltage Connection	
Full Load Torque	9.08 LB-FT
Start Configuration	direct on line
Breakdown Torque	33.1 LB-FT
Pull-up Torque	18.2 LB-FT
Locked-rotor Torque	20.4 LB-FT
Starting Current	29.8 A
No-load Current	2.14 A
Line-line Res. @ 25ºC	3.93 Ω
Temp. Rise @ Rated Load	35°C
Temp. Rise @ S.F. Load	42°C
Locked-rotor Power Factor	41.4
Rotor inertia	0.298 LB-FT2

Load Characteristics 460 V, 60 Hz, 3 HP

% of Rated Load	**25**	**50**	**75**	**100**	**125**	**150**
Power Factor	38	58	70	77	81	83
Efficiency	83.5	88.9	90	89.8	89.1	87.7
Speed	1790	1779	1769	1757	1744	1730
Line amperes	2.34	2.79	3.39	4.1	4.91	5.86

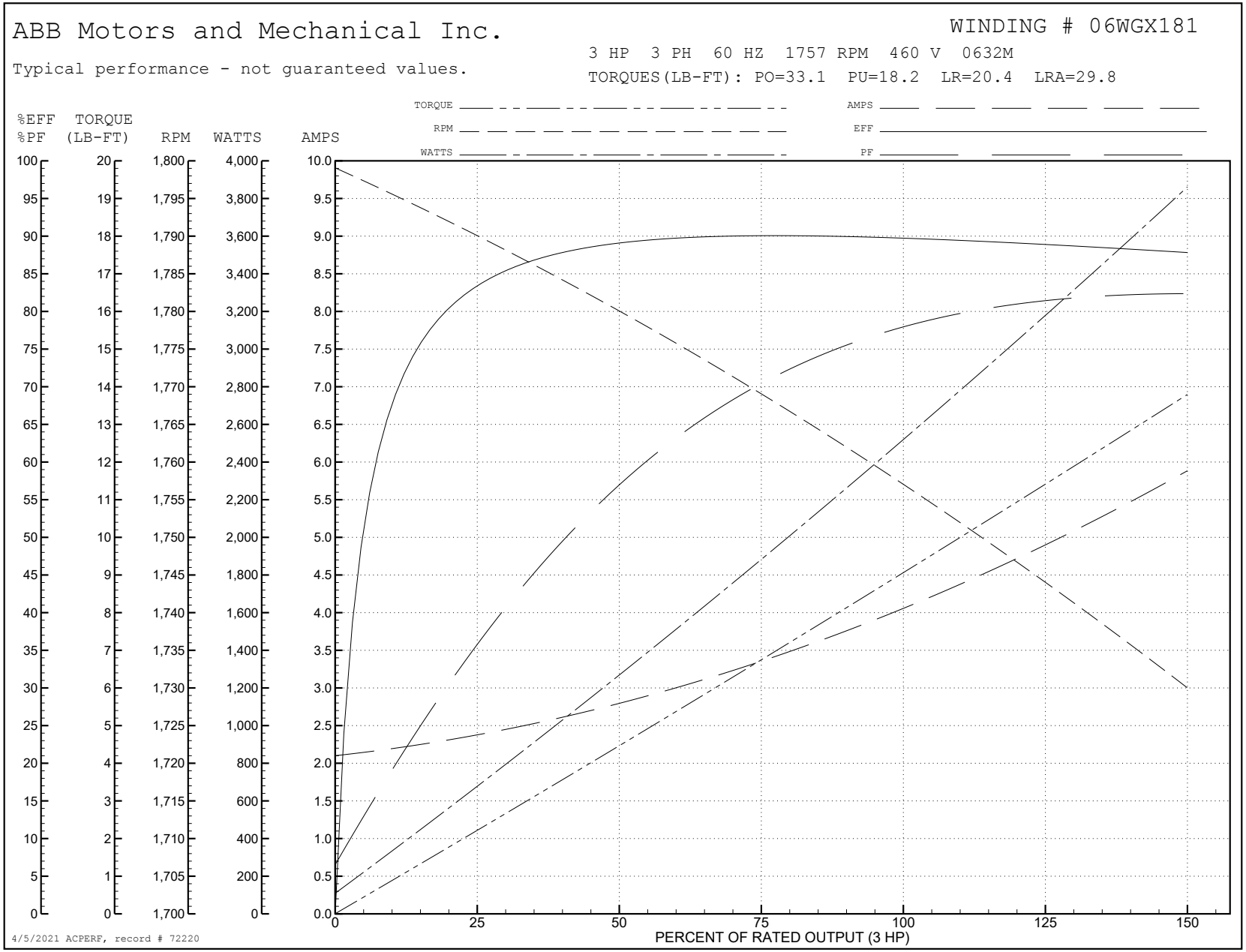


ABB Motors and Mechanical Inc.
WINDING # 06WGX181
Typical performance - not guaranteed values.
3 HP 3 PH 60 HZ 1757 RPM 460 V 0632M
TORQUES(LB-FT): PO=33.1 PU=18.2 LR=20.4 LRA=29.8
TORQUE
RPM
WATTS
AMPS
EFF
PF
%EFF %PF
TORQUE (LB-FT)
RPM
WATTS
AMPS
PERCENT OF RATED OUTPUT (3 HP)
4/5/2021 ACPERF, record # 72220

AC Induction Motor Performance Data
Record # 72221
Typical performance - not guaranteed values

Winding: 06WGX181-R087	**Type:** 0632M	**Enclosure:** XPFC

Nameplate Data				**380 V, 50 Hz: High Voltage Connection**	
Rated Output (HP)			3//2	**Full Load Torque**	7.25 LB-FT
Volts			230/460//190/380	**Start Configuration**	direct on line
Full Load Amps			8.2/4.1//7/3.5	**Breakdown Torque**	31.25 LB-FT
R.P.M.			1755//1465	**Pull-up Torque**	18.55 LB-FT
Hz	60//50	**Phase**	3	**Locked-rotor Torque**	20.79 LB-FT
NEMA Design Code	B	**KVA Code**	J	**Starting Current**	28.72 A
Service Factor (S.F.)			1	**No-load Current**	2.11 A
NEMA Nom. Eff.	89.5	**Power Factor**	77	**Line-line Res. @ 25ºC**	3.93 Ω
Rating - Duty			40C AMB-CONT	**Temp. Rise @ Rated Load**	28°C
S.F. Amps				**Temp. Rise @ S.F. Load**	32°C
				Locked-rotor Power Factor	46.1
				Rotor inertia	0.298 LB-FT2

Load Characteristics 380 V, 50 Hz, 2 HP

% of Rated Load	**25**	**50**	**75**	**100**	**125**	**150**
Power Factor	33	52	65	73	78	81
Efficiency	79.7	86.5	88.4	88.7	88.4	87.1
Speed	1491	1483	1474	1465	1455	1443
Line amperes	2.25	2.57	3.01	3.53	4.14	4.87

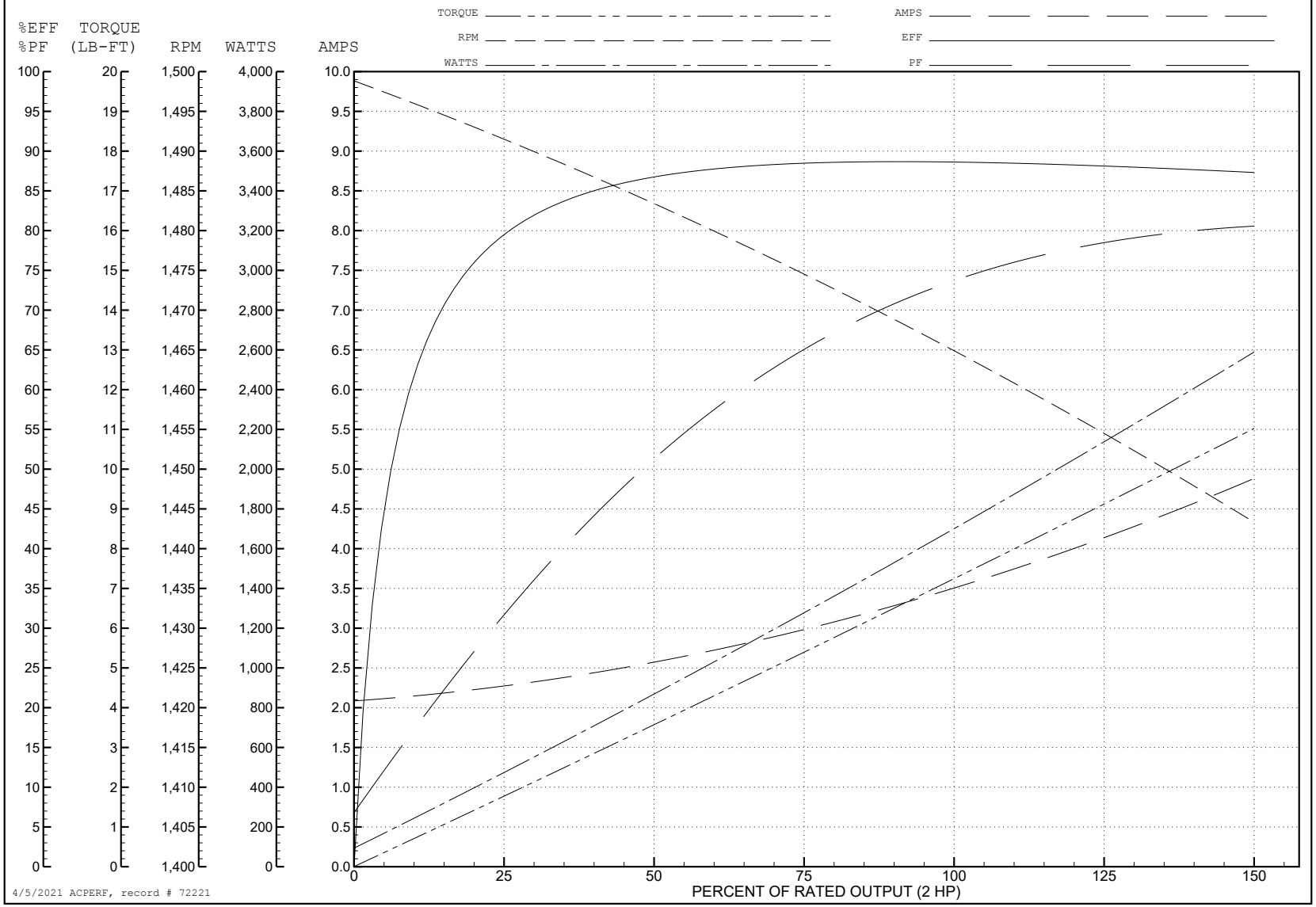
ABB Motors and Mechanical Inc.

WINDING # 06WGX181

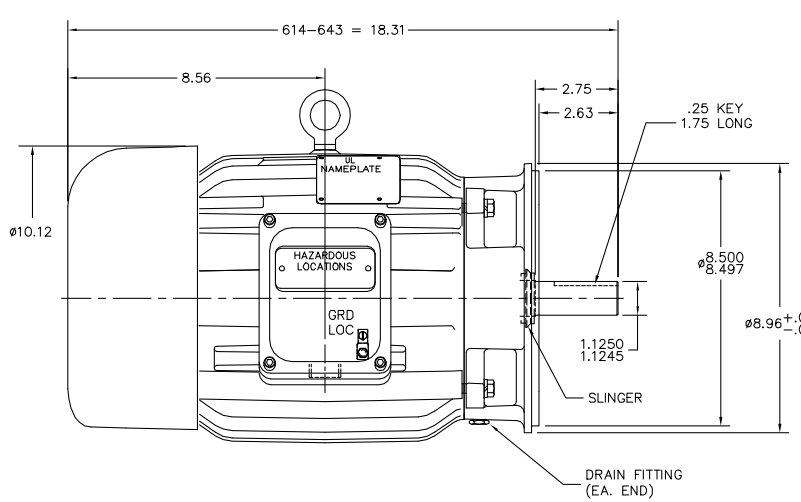
2 HP 3 PH 50 HZ 1465 RPM 380 V 0632M

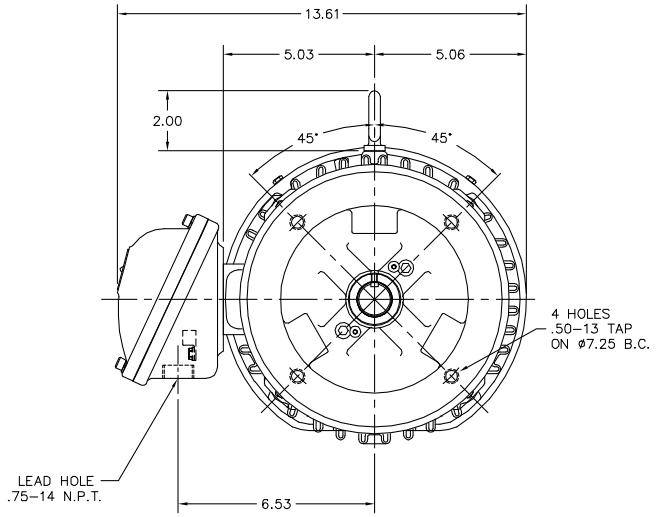
Typical performance - not guaranteed values.

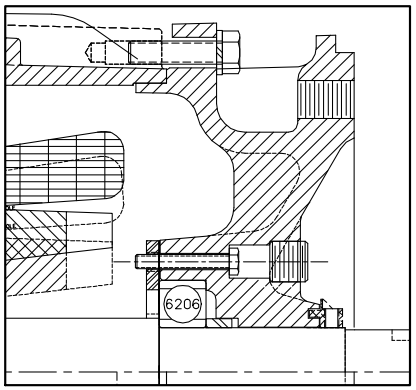
TORQUES(LB-FT): PO=31.25 PU=18.55 LR=20.79 LRA=28.72



06LYG594







PULLEY END DETAIL

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

REV. DESC: NEW		
REV. LTR: –	VERSION: 00	TDR: 000000564012
FILE: \AAA\00176\801	REVISED: 11:38:23 11/04/2010	BY: ENJOSRO
MTL: –		

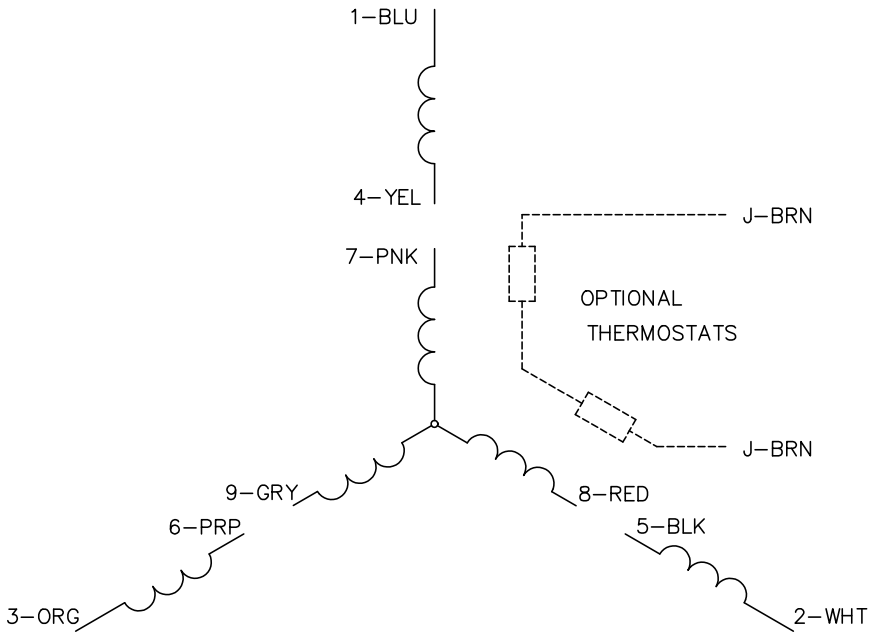
BALDOR

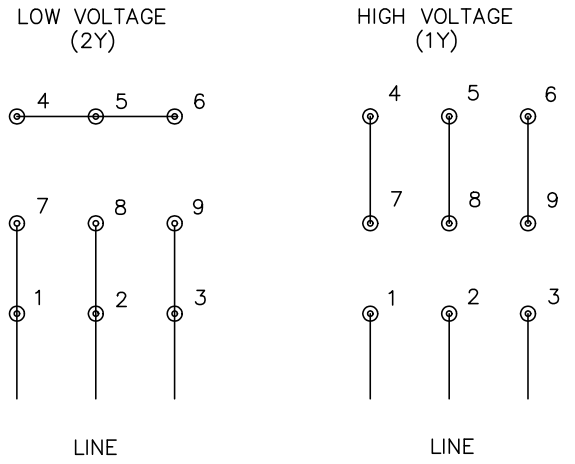
VERT 182–4TC XPFC M CL I–GP C&D, DRILL RIG

SH 1 of 1

06LYG594

CD0005





NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

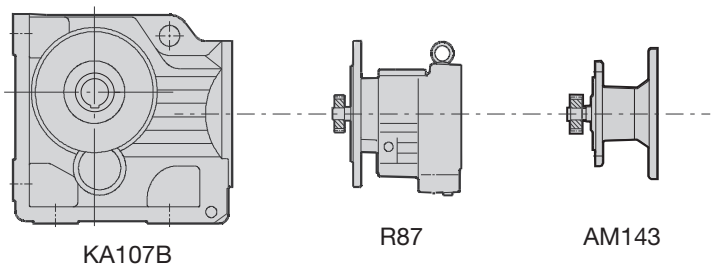
CD0005

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			BALDOR ELECTRIC Co.
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
CD0005		FILE: AAA00005140	MDL: –
		MTL: –	3PH, DV, 9 LEADS

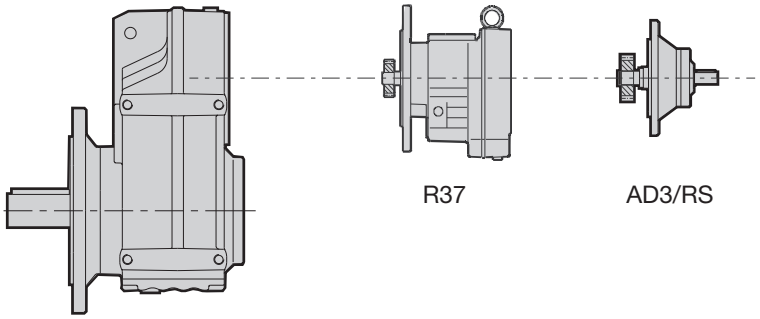
3 Nomenclature

3.1 Overview

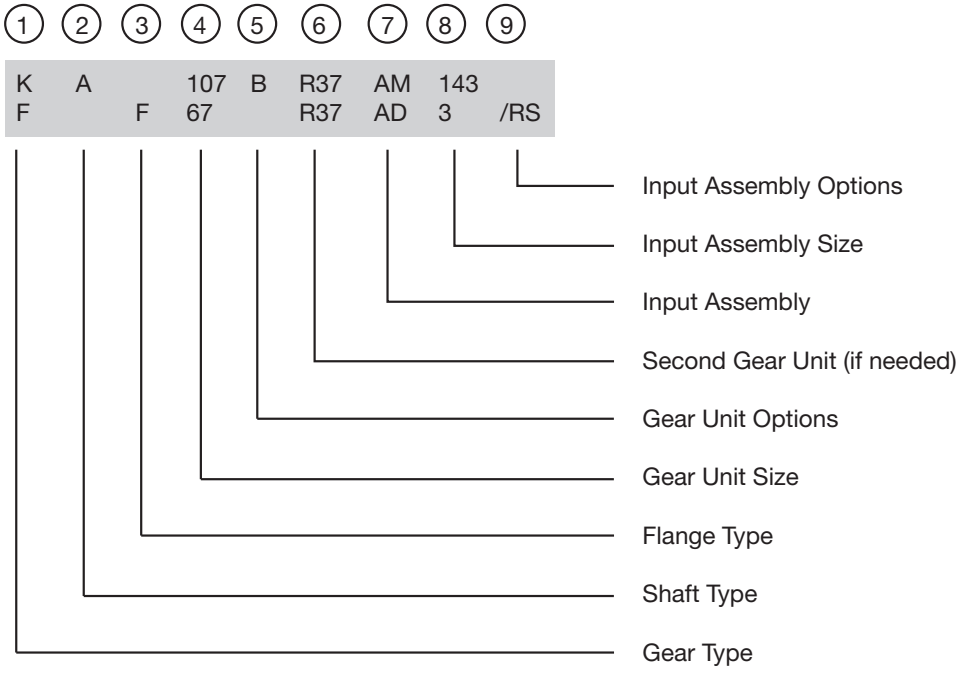
The nomenclature (model number) of a gear unit or gearmotor starts from the output shaft. For a gear unit, the nomenclature consists of nine fields, as shown in the two examples below. Detailed explanation of each field begins on the next page.



KA107B R87 AM143



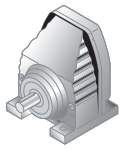
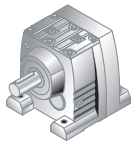
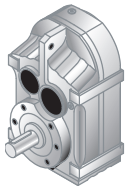
FF67 R37 AD3/RS

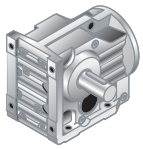
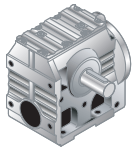
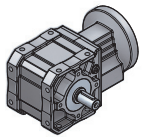


04669US

Explanation of each option field is shown below.

1 - Gear type

Nomenclature		
RX	Helical-parallel (1 stage gearing)	
R	Helical-parallel (2 or 3 stage)	
F	theSnuggler® Helical-parallel	

Nomenclature		
K	Helical-bevel right angle	
S	Helical-worm right angle	
W	SPIROPLAN® right angle	

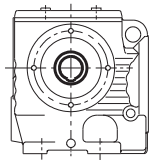
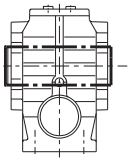
2 - Shaft type

Nomenclature	
(blank)	Solid shaft with keyway
A	Hollow shaft with key
H	Hollow shaft with keyless shrink disc
V	Hollow shaft with DIN 5480 spline
T	TorqLOC® - keyless hollow shaft with tapered-bushing

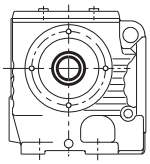
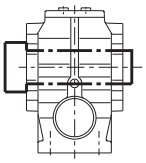
3 - Flange type

Nomenclature	Description	Availability (Gear Type)				
		R	F	K	S	W
(blank)	No flange (foot mounting)	•	•	•	•	•
F	B5 flange on **one** side with tenon and through holes	•	•	•	•	•
F[1)]	B5 flange on **two** sides with tenon and through holes			•	•	
Z	B14 flange with tenon and tapped holes	•	•	•	•	
M	B5 flange with extended bearing housing for agitators	•				

1) For flange on both sides, specify "AB" in mounting position (ex: M1AB)

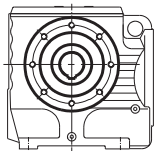
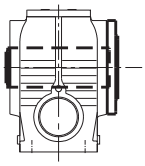



SA..
Hollow shaft with key

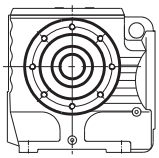
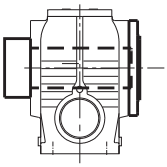



SH..
Hollow shaft with keyless shrink disc

ST..
Hollow shaft with TorqLOC® keyless tapered-bushing system

SAZ..
B14 flange-mounted + hollow shaft with key

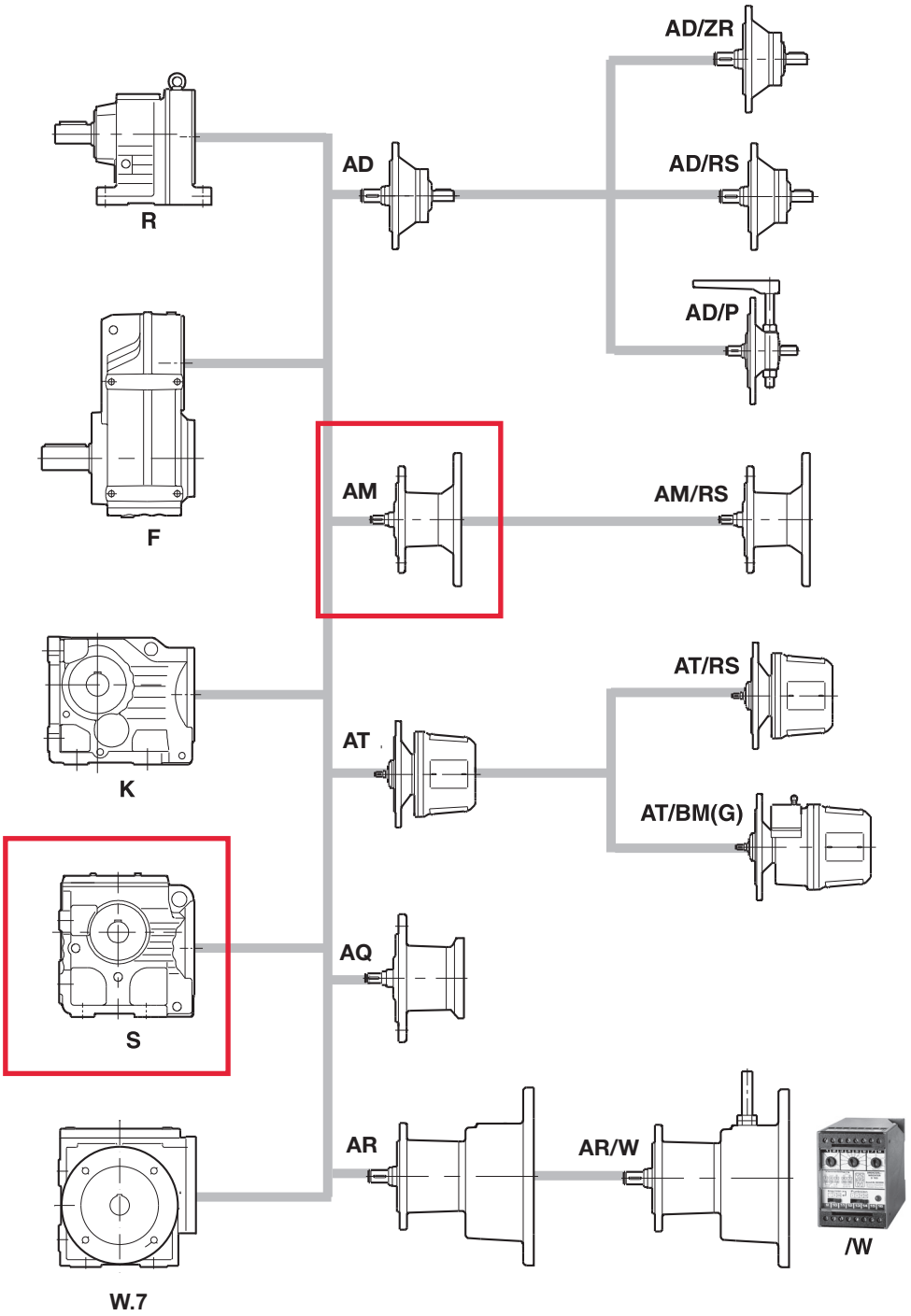
SHZ..
B14 flange-mounted + hollow shaft and keyless shrink disc

52189axx

3.3 Input assemblies

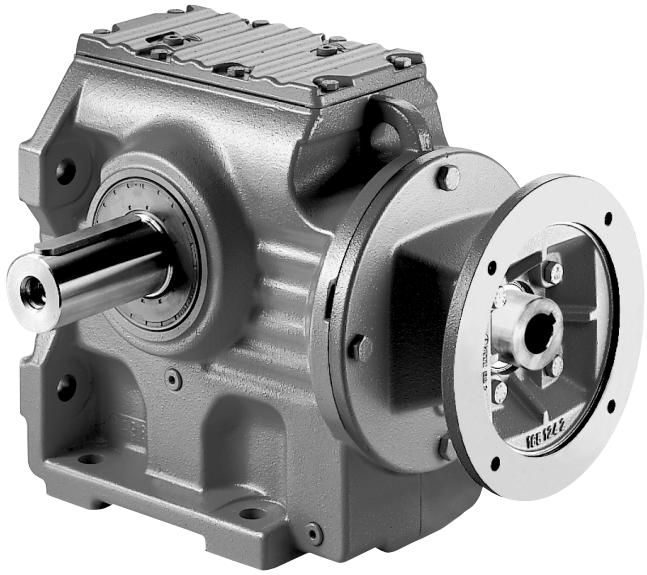
The following figure shows the available input components:

65735AUS



2.6.2 AM motor adapter - IEC or NEMA

The following figure shows a helical-worm gear unit (S-series) with AM adapter:



04588AXX

AM adapters are used for mounting motors to SEW gear units according to IEC standard or NEMA (type C or TC) .

Adapters are available for sizes 63 to 280 for IEC motors. Adapters are available for sizes 56 to 365 for NEMA motors. The designation of the adapter size corresponds to the respective IEC or NEMA motor size.

Torque is transmitted between the motor and the gear unit via a fail-safe jaw-type coupling. Vibrations and shock occurring during operation are effectively dampened by a polyurethane "spider" ring gear that fits between the two coupling halves, as shown below.

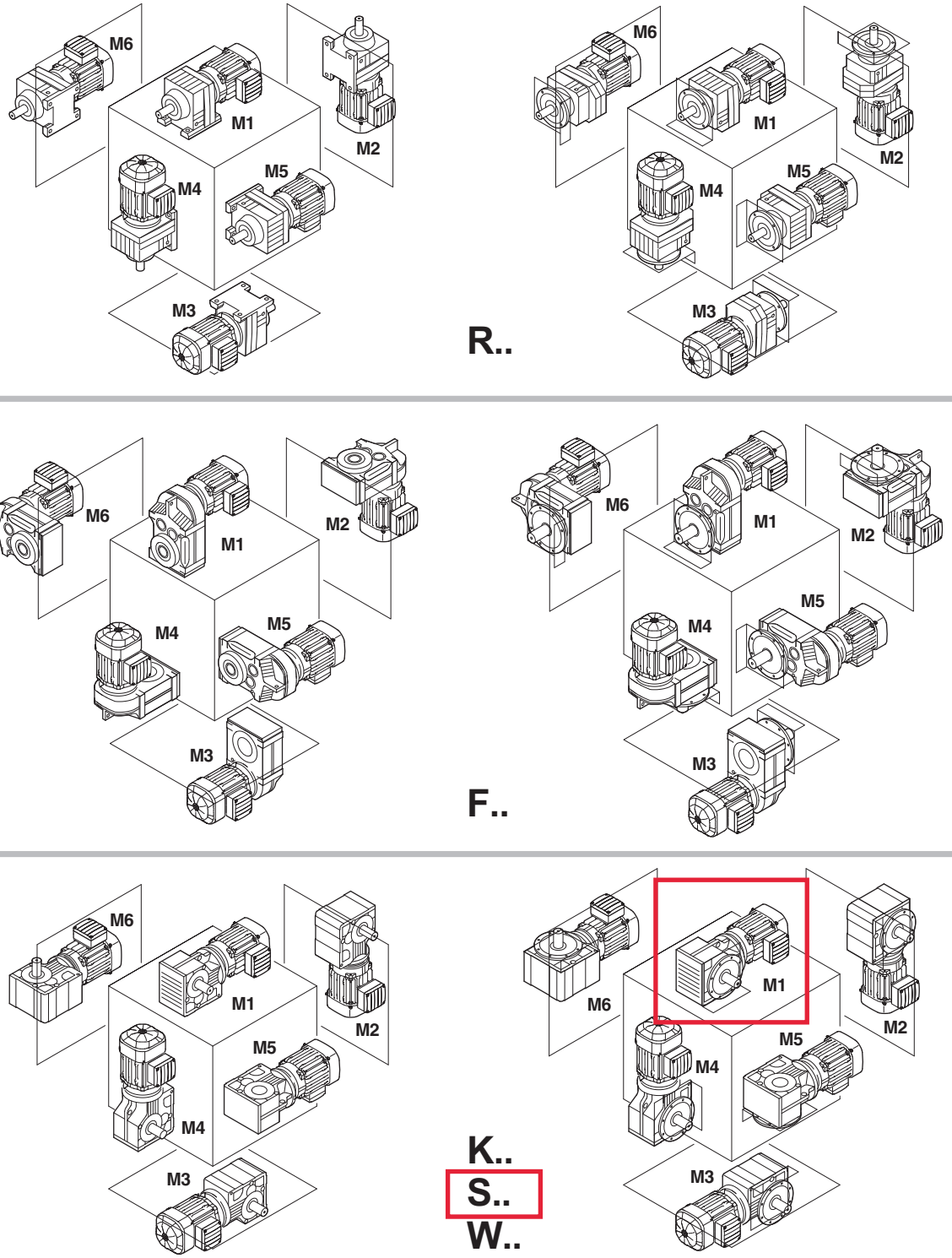
04589US

5 Mounting Positions

5.1 General information

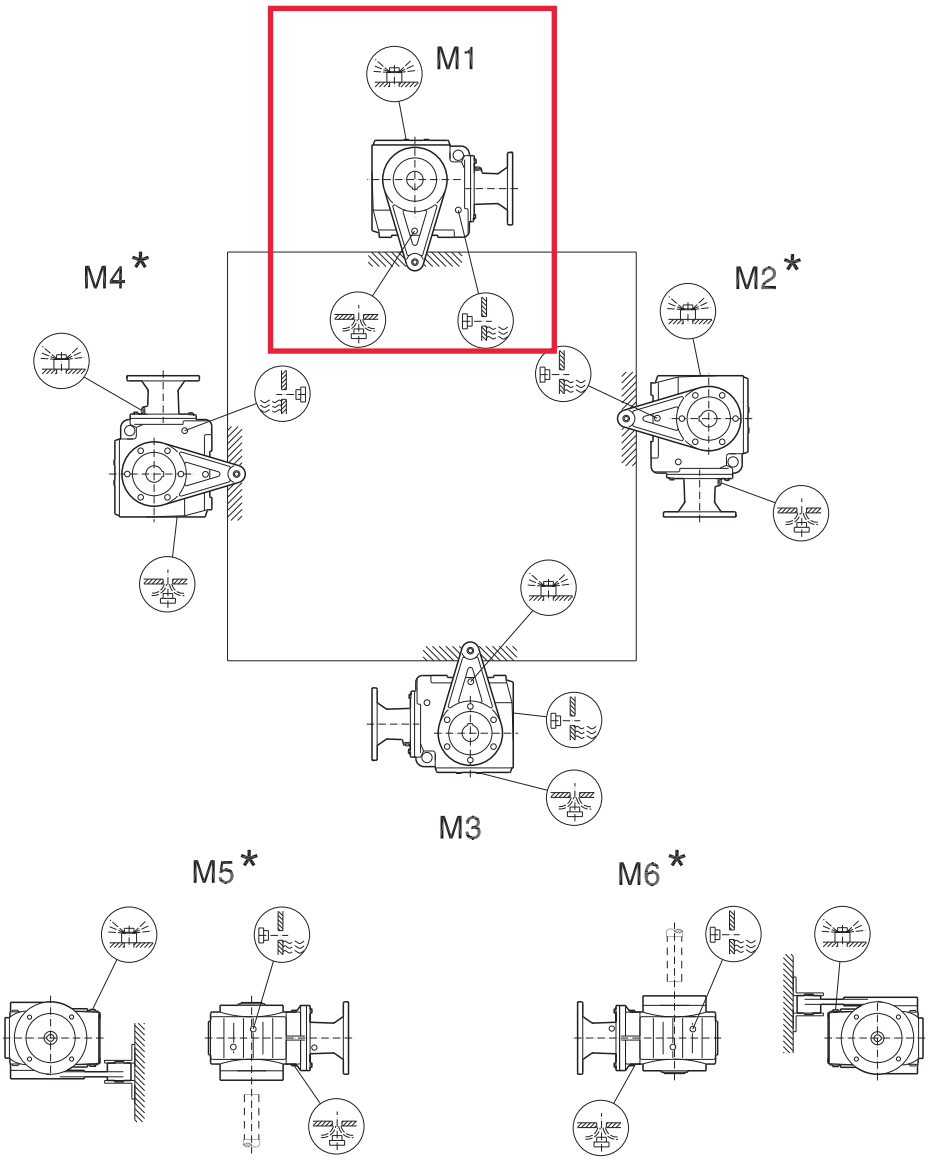
The following figure shows the position of the gear unit in mounting positions M1 to M6:

65873axx



SA/SH/ST47-97

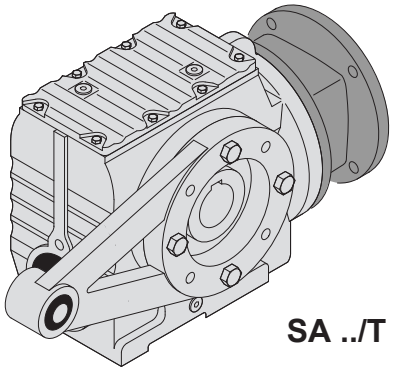
02 006 00 10



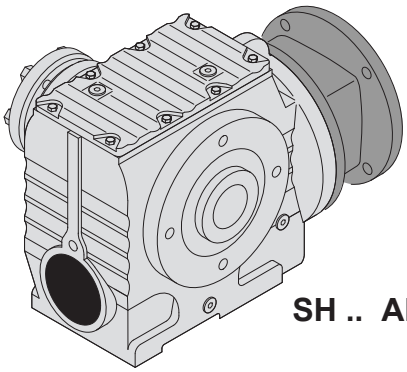
* → page 45 on thermal losses

Important:

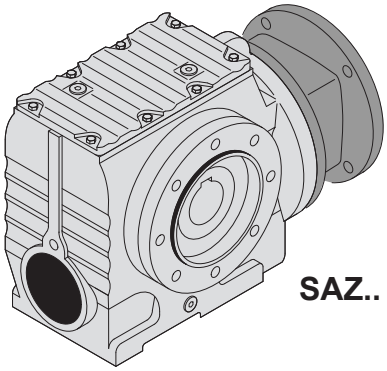
For proper torque arm mounting and design, see Technical Note **GM-021** available from www.seweurodrive.com



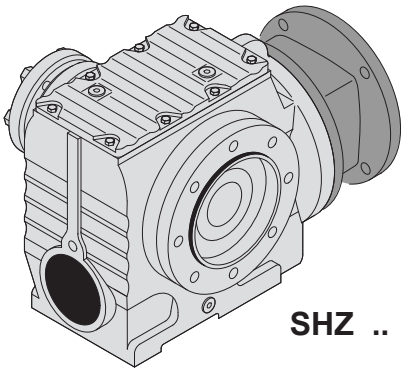
SA ../T AM..



SH .. AM..



SAZ.. AM..



SHZ .. AM..

50414axx

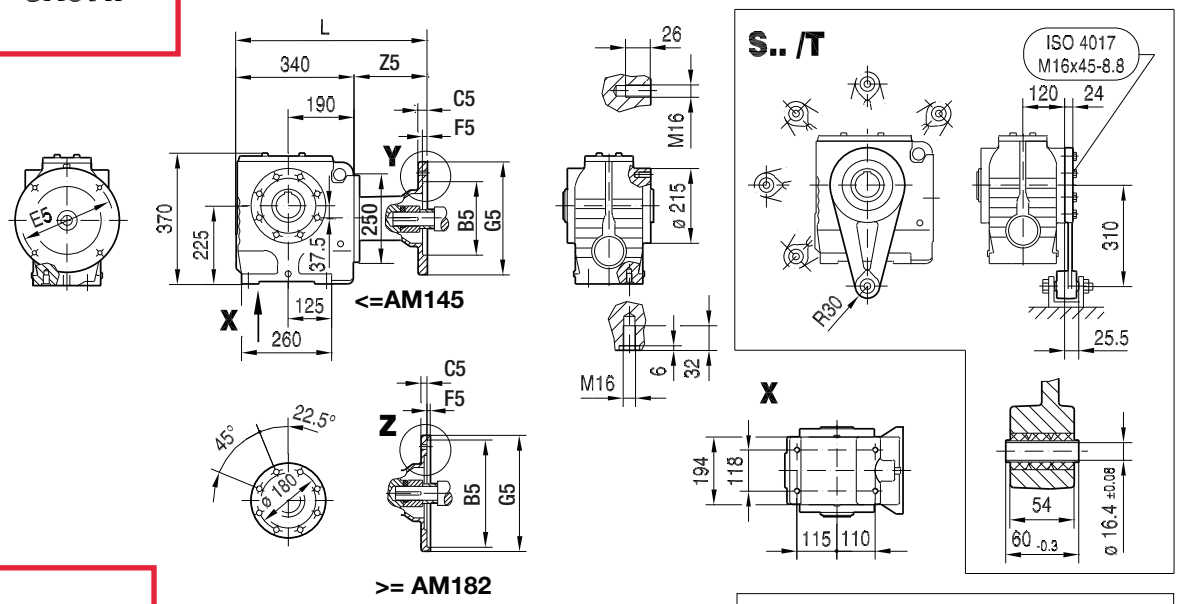
11.1.8 S87

S87, n_e = 1700 rpm												20100 lb-in
						AM						
Stages	i [ratio]	n_a [rpm]	$T_{a\,max}$ [lb-in]	F_{Ra} [lb]	$\Phi_{(/R)}$ [']	143	145	182	184	213/215	254/256	284/286
S87 2	**7.88**	216	7340	3490	-							
	9.07	187	8400	3530	-							
	10.93	156	9990	3580	-							
	12.21	139	10900	3480	-							
	14.06	121	10900	3830	-							
	15.64	109	10900	4000	-							
	17.49	97	10900	4190	-							
	19.70	86	10900	4400	-							
	20.27	84	12500	4760	-							
	21.43	79	10900	4550	-							
	24.43	70	14100	4950	-							
	25.50	67	10900	4870	-							
	27.28	62	14100	5160	-							
	31.43	54	14100	5440	-							
	34.96	49	14100	5660	-							
	39.10	43	14100	5900	-							
	44.03	39	14100	6160	-							
	47.91	35	14100	6360	-							
	57.00	30	14100	6520	-							
	64.00	27	13900	6530	-							
	64.27	26	14100	6520	-							
	70.43	24	14100	6520	-							
	77.14	22	15000	6500	-							
	81.76	21	14100	6520	-							
	86.15	20	15600	6470	-							
	91.20	19	13300	6540	-							
	99.26	17	16200	6450	-							
	110.40	15	16800	6430	-							
	123.48	14	17300	6410	-							
	139.05	12	17800	6380	-							
	151.30	11	18200	6370	-							
	180.00	9.4	18800	6340	-							
	202.96	8.4	19300	6320	-							
	222.40	7.6	19500	6310	-							
	258.18	6.6	19900	6290	-							
	288.00	5.9	20100	6280	-							

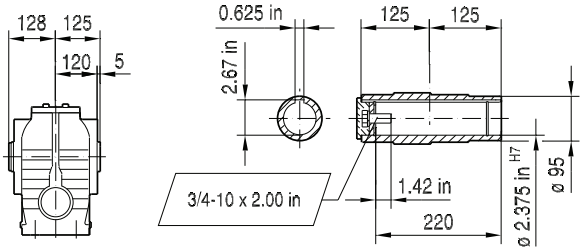
Weight [lbs]		Stages	AM						
			143	145	182	184	213/215	254/256	284/286
S87	NEMA	2	185	185	195	195	210	240	245
			80	**90**	**100**	**112**	**132S/M**	**160**	**180**
	IEC	2	185	185	200	200	215	250	250
SA87: -5.0 lbs / SAF87: +30 lbs / SF87: +48 lbs									

SA87..

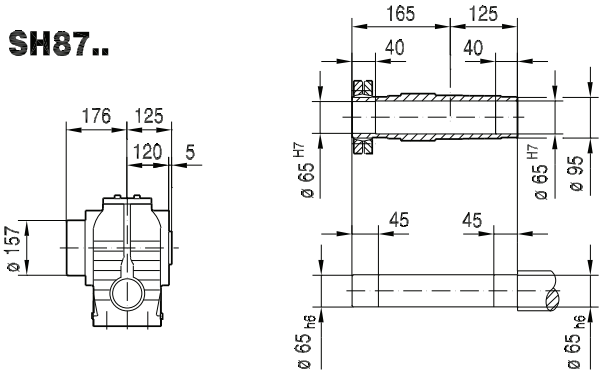
02 029 00 11

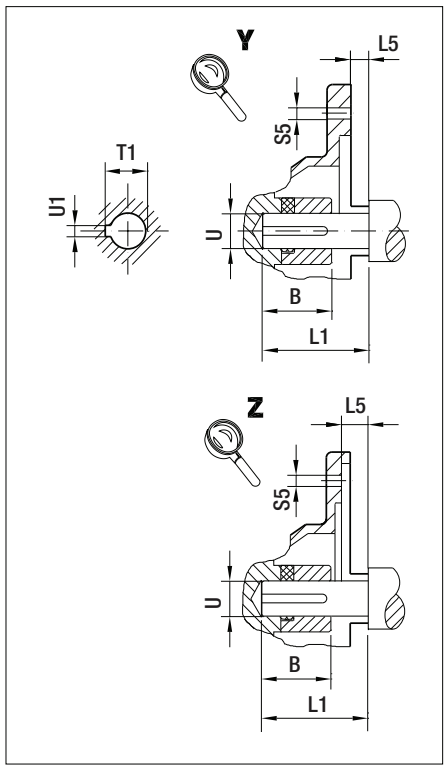


SA87..



SH87..

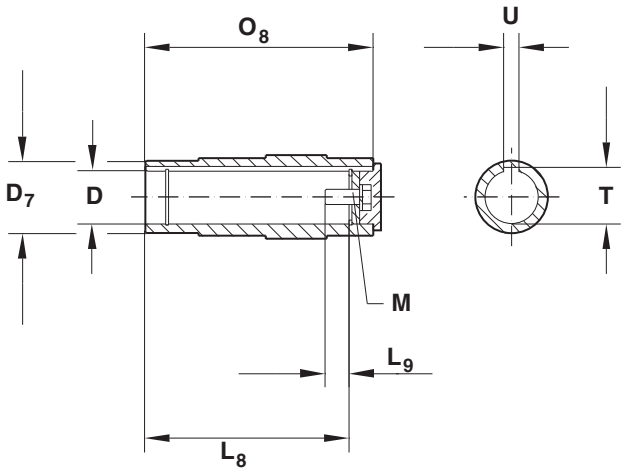




(→ 132)	B	B5	C5	E5	F5	G5	L	L1	L5	S5	T1	U	U1	Z5
AM143	1.68 in	4.50 in	12	5.875 in	4.5	170	439	2.25 in	0.13 in	10.5	0.98 in	0.875 in	0.188 in	98.5
AM145	1.68 in	4.50 in	12	5.875 in	4.5	170	439	2.25 in	0.13 in	10.5	0.98 in	0.875 in	0.188 in	98.5
AM182	2.10 in	8.50 in	10	7.25 in	5	228	475	2.75 in	0.13 in	15	1.24 in	1.125 in	0.250 in	134.5
AM184	2.10 in	8.50 in	10	7.25 in	5	228	475	2.75 in	0.13 in	15	1.24 in	1.125 in	0.250 in	134.5
AM213/215	2.76 in	8.50 in	11	7.25 in	5	228	524	3.38 in	0.25 in	15	1.52 in	1.375 in	0.312 in	183.5
AM254/256	3.65 in	8.50 in	14	7.25 in	5	228	574	4.00 in	0.25 in	15	1.80 in	1.625 in	0.375 in	234
AM284/286	4.00 in	10.50 in	15	9.00 in	5	286	581	4.62 in	0.25 in	15	2.10 in	1.875 in	0.500 in	241

Note: Dimensions in mm unless otherwise noted. For all available output shaft diameters, see page 684. For dimensions of compound gear units (ex: SA87R57) see page 648.

11.11.4 Hollow shaft - Metric



All dimensions in mm								
Model	**D**	**D_7**	**O_8**	**T**	**U**	**L_8**	**L_9**	**M**
SA..37	20	35	120	22.8	6	104	8	M6 x 16
SA..47	25	45	120	28.3	8	105	17	M10 x 25
	30	45	120	33.3	8	105	17	M10 x 25
SA..57	30	50	150	33.3	8	132	17	M10 x 25
	35	50	150	38.3	10	132	22	M12 x 30
SA..67	40	65	168	43.3	12	144	29	M16 x 40
	45	65	168	48.3	14	144	29	M16 x 40
SA..77	50	80	210	53.8	14	183	32	M16 x 45
	60	80	210	64.4	18	180	37	M20 x 50
SA..87	60	95	250	64.4	18	220	36	M20 x 50
	70	95	250	74.9	20	220	34	M20 x 50
SA..97	70	120	290	74.9	20	260	34	M20 x 50
	90	120	290	95.4	25	255	41	M24 x 60

Section 4

Screwpactor Motor and Gear Reducer Data

ASCO Solenoid Valve Cut Sheets

Screwpactor Drive Data Sheet

Jefferson WPCP

Headworks® SW Drive System Data Sheet

GEAR REDUCER DATA:

Type:	SEW Eurodrive Model KA87AM184
Mounting:	M4
Bore:	60 mm
Speed:	13 rpm
Torque:	23,900 lb-in
Ratio:	126.91
Service Factor:	1.83
Weight:	193 lbs.

MOTOR DETAILS:

Type:	Baldor Model VDRX18344T
Motor Power:	3 HP
Service Factor:	1.0(1.15 on Sinewave)
Enclosure Type:	XPFC
Voltage:	230/460
Full Load Amps:	8.2/4.1
Speed:	1755 rpm
Frame:	182TC
Weight:	127 lbs.

Screwpactor Electric Motor and Gear Reducer

BALDOR • RELIANCE

Customer information packet

VDRX18344T

3HP, 1755//1465RPM, 3PH, 60/50HZ, 182TC, XPFC
VARICRAFT POWER SYSTEM INC
Class - CLI GP C,D
Division - Division I

4/5/2021 12:55:06 PM

Specifications

Enclosure	XPFC
Frame	182TC
Frame Material	Iron
Frequency	50.00 Hz
	60.00 Hz
Output @ Frequency	2.000 HP @ 50 HZ
	3.000 HP @ 60 HZ
Phase	3
Synchronous Speed @ Frequency	1800 RPM @ 60 HZ
Voltage @ Frequency	230.0 V @ 60 HZ
	190.0 V @ 50 HZ
	380.0 V @ 50 HZ
	460.0 V @ 60 HZ
XP Class and Group	CLI GP C,D
XP Division	Division I
Agency Approvals	CSA EEV
	UR
	CSA
Ambient Temperature	40 °C
Auxillary Box	No Auxillary Box
Auxillary Box Lead Termination	None
Base Indicator	No Mounting
Bearing Grease Type	Polyrex EM (-20F +300F)
Blower	None
Constant Torque Speed Range	6
Current @ Voltage	8.200 A @ 230.0 V
	7.000 A @ 190.0 V
	4.100 A @ 460.0 V
	3.500 A @ 380.0 V
Design Code	B
Drip Cover	No Drip Cover
Duty Rating	CONT

Part detail

Revision	-
Type	AC
Mech. spec.	
Base	
Status	PRD/A
Elec. spec.	06WGX181
Layout	06LYG594
Eff. date	06-26-2019
CD Diagram	CD0005
Poles	04
Leads	9#16
Proprietary	False
Created date	06-20-2019

Efficiency @ 100% Load	89.5 %
Electrically Isolated Bearing	Not Electrically Isolated
Feedback Device	NO FEEDBACK
Heater Indicator	No Heater
High Voltage Full Load Amps	3.5 a
Insulation Class	F
Inverter Code	Inverter Duty
IP Rating	NONE
KVA Code	J
Lifting Lugs	Standard Lifting Lugs
Locked Bearing Indicator	Locked Bearing
Max Speed	2700 rpm
Motor Lead Termination	Flying Leads
Motor Standards	NEMA
Motor Type	0632M
Mounting Arrangement	F1
Number of Poles	4
Overall Length	18.31 IN
Power Factor	77
Product Family	General Purpose
Pulley Face Code	C-Face
Rodent Screen	None
Service Factor	1.00
Shaft Diameter	1.125 IN
Shaft Ground Indicator	No Shaft Grounding
Shaft Rotation	Reversible
Speed	1755 rpm
Speed Code	Single Speed
Starting Method	Direct on line
Thermal Device - Bearing	None
Thermal Device - Winding	Normally Closed Thermostat
Vibration Sensor Indicator	No Vibration Sensor
Winding Thermal 1	None
Winding Thermal 2	None

XP Temp Code	T3C

Nameplate

NP1401XPSLEV											
NO.					**CC**	010A					
S/N					**TEMP CODE**	T3C					
SPEC.	06-0000-0144				**INV.TYPE**	PWM					
CAT.NO.	VDRX18344T				**C HP FR**	60	**C HP TO**	90			
HP	3//2				**CT HZ FROM**	6			**CT HZ TO**	60	
VOLTS	230/460//190/380				**VT HZ FROM**	6			**VT HZ TO**	60	
AMPS	8.2/4.1//7/3.5			**MAG CUR**	4.2/2.1						
RPM	1755//1465			**MX RPM**	2700						
HZ	60//50	**PH**	3	**CL**	F	**NOM.EFF.**	89.5				
SER.F.	1.00	**DES**	B	**SL HZ**	1.5	**WK2**	0.3				
FRAME	182TC	**RATING**	40C AMB-CONT								
	55C AMB @ 1.0 SF										
	1.15 SF SINEWAVE				NEMA MG-1 PT 5,IP55						

Parts list

Part number	Description	Quantity
SA371146	SA 06-0000-0144	1.000 ea
RA360826	RA 06-0000-0144	1.000 ea
LB1115N	LABEL,LIFTING DEVICE (ON ROLLS)	1.000 ea
LB1119N	WARNING LABEL	1.000 ea
LC0145B01	CONNECTION LABEL	1.000 ea
PK3082	STYROFOAM CRADLE	1.000 ea
NP1401XPSLEV	SS XP INV UL CSA-EEV CC CL-I GP-C&D	1.000 ea
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	2.000 ea
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	4.000 ea
MN416A01	TAG-INSTAL-MAINT no wire (1200/bx) 1/21	1.000 ea
LB1081F	ALUM XP CAUTION LABEL (FS PLANT ONLY-	1.000 ea
HW3201A05	3/8-16 EYEBOLT	1.000 ea
06FH1003A06	FH, XP W/GRSR	1.000 ea
51XN1032A14	10-32 X 0.875 HX WS SL SR	4.000 ea
34FN3002A02	EXTERNAL FAN, PLASTIC, .905/.907 HUB W/	1.000 ea
51XB0818A12	8-18X3/4 HXWSSLD SERTYB	1.000 ea
MJ1000A02	GREASE, MOBIL POLYREX EM - 124047	0.050 lb
06EP1709A07	FREP XPFC 205 BRG GRP C W/DRAIN (HW4506A	1.000 ea
10XN3118K20	5/16-18 X 1 1/4 GRADE 5 STEEL ZC PLATED	4.000 ea
HW1001A31	LOCKWASHER 5/16, ZINC PLT.591 OD, .319 I	4.000 ea
HW5100A05	WVY WSHR F/205 & 304 BRGS	1.000 ea
HW4500A01	1641B(ALEMITE)400 UNIV, GREASE FITT	1.000 ea
HW4500A19	1/4-28X1/4 SLOTTED PLUG F/S	1.000 ea
HW4506A02	BREATHER/DRAIN-EXP PROOF-.125-27 NPTF AI	1.000 ea
HW3022E05	.125 DIA X .500 ROLLED SPRING PIN	1.000 ea
06EP1707A17	PUEP 182-4TC M GRP-C DRAIN(HW4506A02)	1.000 ea
HW1001A31	LOCKWASHER 5/16, ZINC PLT.591 OD, .319 I	4.000 ea
10XN3118K20	5/16-18 X 1 1/4 GRADE 5 STEEL ZC PLATED	4.000 ea
HA2071A01	SLINGER ALUM (AUTO)	1.000 ea
80XN1032A06	10-32 X 3/8 SET SC HEX SOCK	1.000 ea
51XN1032A20	10-32 X 1 1/4 HX WS SL SR	2.000 ea

HW4001A01	1/4 HX SOC PIPE PLG (F/S) ALLOY STEEL W/	2.000 ea
60XN1032A07	10-32 X .4375 TRUSS HEAD, TORX SERRATED	2.000 ea
HW4506A02	BREATHER/DRAIN-EXP PROOF-.125-27 NPTF AI	1.000 ea
HW3022E05	.125 DIA X .500 ROLLED SPRING PIN	1.000 ea
07CB1000A02	CONDUIT BOX, MODEL 306,EXP. PROOF	1.000 ea
84XN2520J16	1/4-20 X 1 SOC HD CAP SCREW	4.000 ea
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	4.000 ea
WD1000B17	T&B CX35TN OR L35P TERMINAL LUG	1.000 ea
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 ea
07CB1502A01	CONDUIT BOX LID MACH (DUCTILE IRON)	1.000 ea
84XN2520J16	1/4-20 X 1 SOC HD CAP SCREW	4.000 ea
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	4.000 ea
MG1500Y02	WILKOPON PRIMER YELLOW	0.022 ga
MG1025G29	WILKOFAST, 789.229, DARK CHARCOAL GRAY	0.022 ga
G0PA1000	PKG GRP, PRINT PK1026A06	1.000 ea
HW2501E17	.250 SQUARE X 1.875 LONG LOW CARBON STEE	1.000 ea
HA7000A02	KEY RETAINER RING, 1 1/8 DIA, 1 3/8 DIA	1.000 ea

AC Induction Motor Performance Data
Record # 72220
Typical performance - not guaranteed values

Winding: 06WGX181-R087	**Type:** 0632M	**Enclosure:** XPFC

Nameplate Data			
Rated Output (HP)			3//2
Volts			230/460//190/380
Full Load Amps			8.2/4.1//7/3.5
R.P.M.			1755//1465
Hz	60//50	**Phase**	3
NEMA Design Code	B	**KVA Code**	J
Service Factor (S.F.)			1
NEMA Nom. Eff.	89.5	**Power Factor**	77
Rating - Duty			40C AMB-CONT
S.F. Amps			

460 V, 60 Hz: High Voltage Connection	
Full Load Torque	9.08 LB-FT
Start Configuration	direct on line
Breakdown Torque	33.1 LB-FT
Pull-up Torque	18.2 LB-FT
Locked-rotor Torque	20.4 LB-FT
Starting Current	29.8 A
No-load Current	2.14 A
Line-line Res. @ 25ºC	3.93 Ω
Temp. Rise @ Rated Load	35°C
Temp. Rise @ S.F. Load	42°C
Locked-rotor Power Factor	41.4
Rotor inertia	0.298 LB-FT2

Load Characteristics 460 V, 60 Hz, 3 HP

% of Rated Load	**25**	**50**	**75**	**100**	**125**	**150**
Power Factor	38	58	70	77	81	83
Efficiency	83.5	88.9	90	89.8	89.1	87.7
Speed	1790	1779	1769	1757	1744	1730
Line amperes	2.34	2.79	3.39	4.1	4.91	5.86

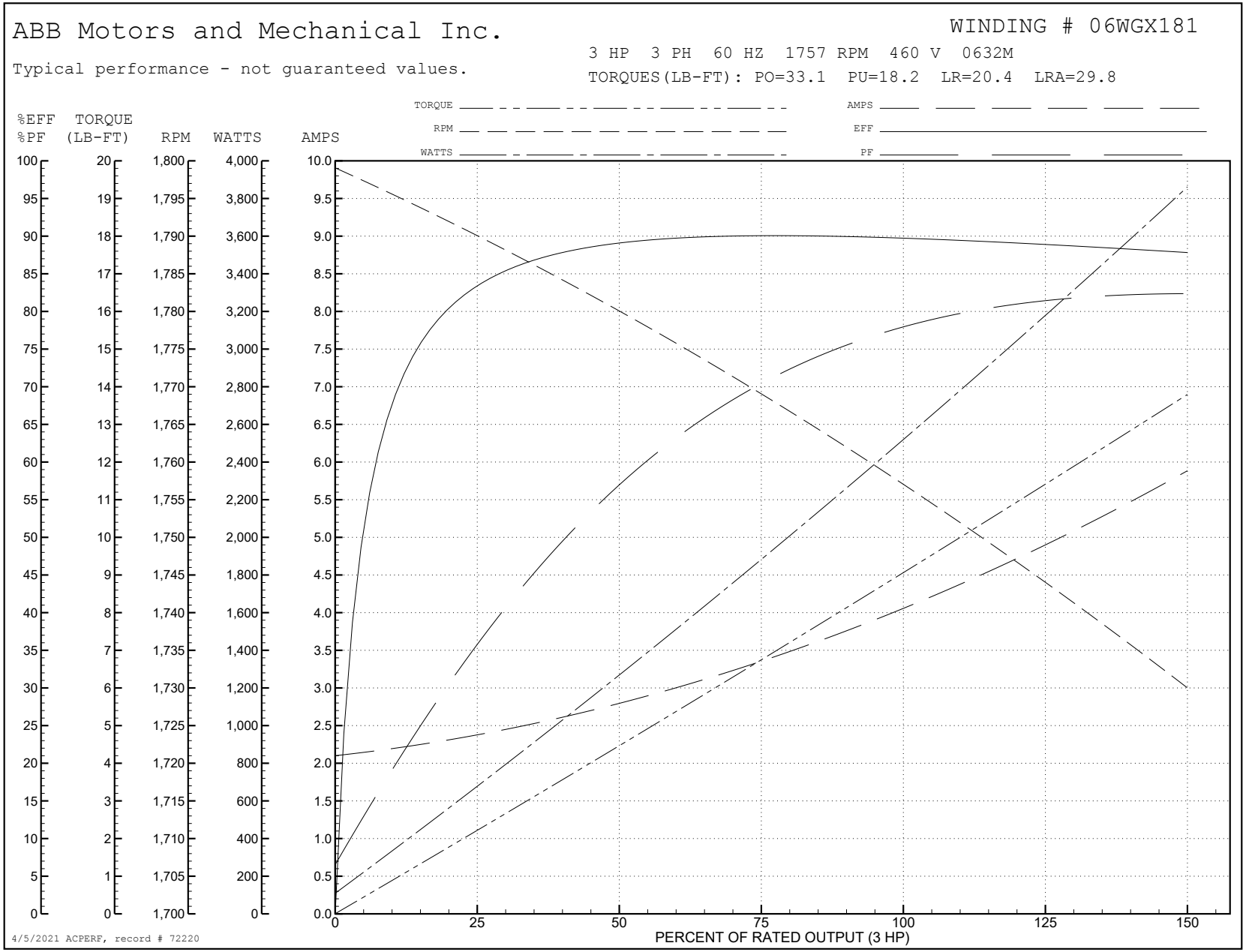


ABB Motors and Mechanical Inc.
WINDING # 06WGX181
Typical performance - not guaranteed values.
3 HP 3 PH 60 HZ 1757 RPM 460 V 0632M
TORQUES(LB-FT): PO=33.1 PU=18.2 LR=20.4 LRA=29.8
TORQUE
RPM
WATTS
AMPS
EFF
PF
%EFF %PF
TORQUE (LB-FT)
RPM
WATTS
AMPS
PERCENT OF RATED OUTPUT (3 HP)
4/5/2021 ACPERF, record # 72220

AC Induction Motor Performance Data
Record # 72221
Typical performance - not guaranteed values

Winding: 06WGX181-R087	**Type:** 0632M	**Enclosure:** XPFC

Nameplate Data				**380 V, 50 Hz: High Voltage Connection**	
Rated Output (HP)			3//2	**Full Load Torque**	7.25 LB-FT
Volts			230/460//190/380	**Start Configuration**	direct on line
Full Load Amps			8.2/4.1//7/3.5	**Breakdown Torque**	31.25 LB-FT
R.P.M.			1755//1465	**Pull-up Torque**	18.55 LB-FT
Hz	60//50	**Phase**	3	**Locked-rotor Torque**	20.79 LB-FT
NEMA Design Code	B	**KVA Code**	J	**Starting Current**	28.72 A
Service Factor (S.F.)			1	**No-load Current**	2.11 A
NEMA Nom. Eff.	89.5	**Power Factor**	77	**Line-line Res. @ 25ºC**	3.93 Ω
Rating - Duty			40C AMB-CONT	**Temp. Rise @ Rated Load**	28°C
S.F. Amps				**Temp. Rise @ S.F. Load**	32°C
				Locked-rotor Power Factor	46.1
				Rotor inertia	0.298 LB-FT2

Load Characteristics 380 V, 50 Hz, 2 HP

% of Rated Load	**25**	**50**	**75**	**100**	**125**	**150**
Power Factor	33	52	65	73	78	81
Efficiency	79.7	86.5	88.4	88.7	88.4	87.1
Speed	1491	1483	1474	1465	1455	1443
Line amperes	2.25	2.57	3.01	3.53	4.14	4.87

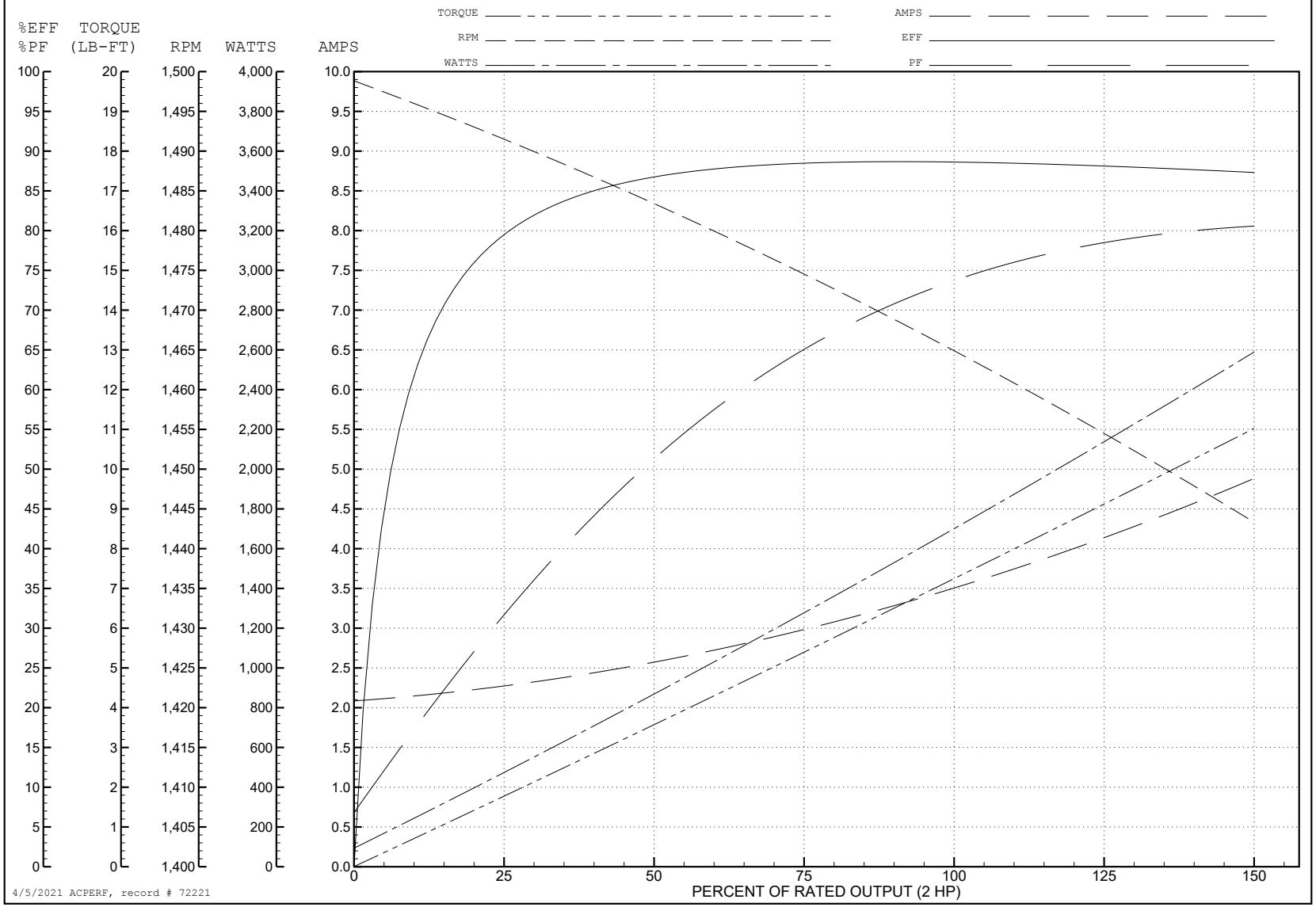
ABB Motors and Mechanical Inc.

WINDING # 06WGX181

2 HP 3 PH 50 HZ 1465 RPM 380 V 0632M

Typical performance - not guaranteed values.

TORQUES(LB-FT): PO=31.25 PU=18.55 LR=20.79 LRA=28.72



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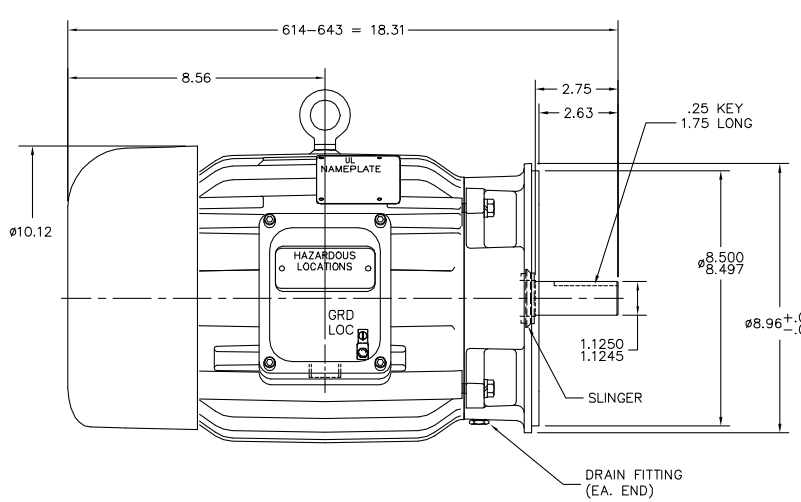
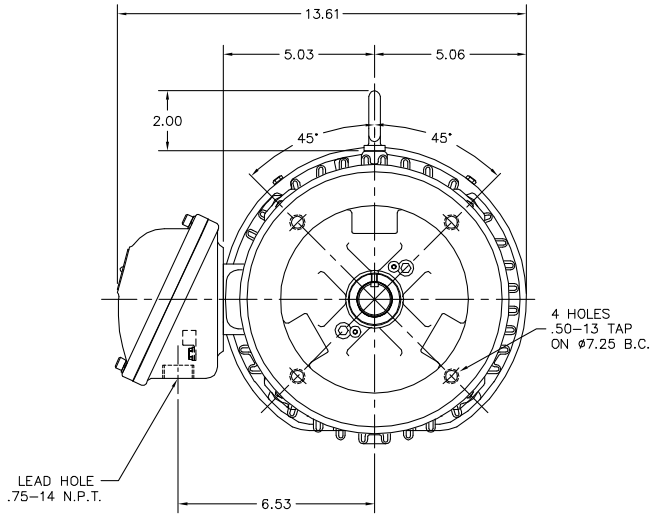
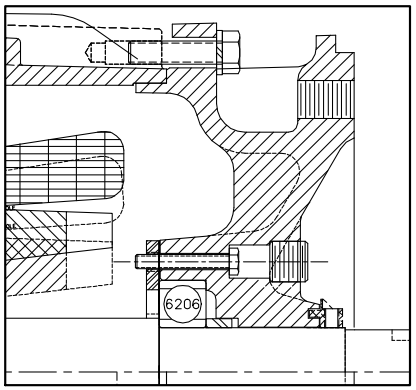






PULLEY END DETAIL

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

REV. DESC: NEW		
REV. LTR: –	VERSION: 00	TDR: 000000564012
FILE: \AAA\00176\801	REVISED: 11:38:23 11/04/2010	BY: ENJOSRO
MTL: –		

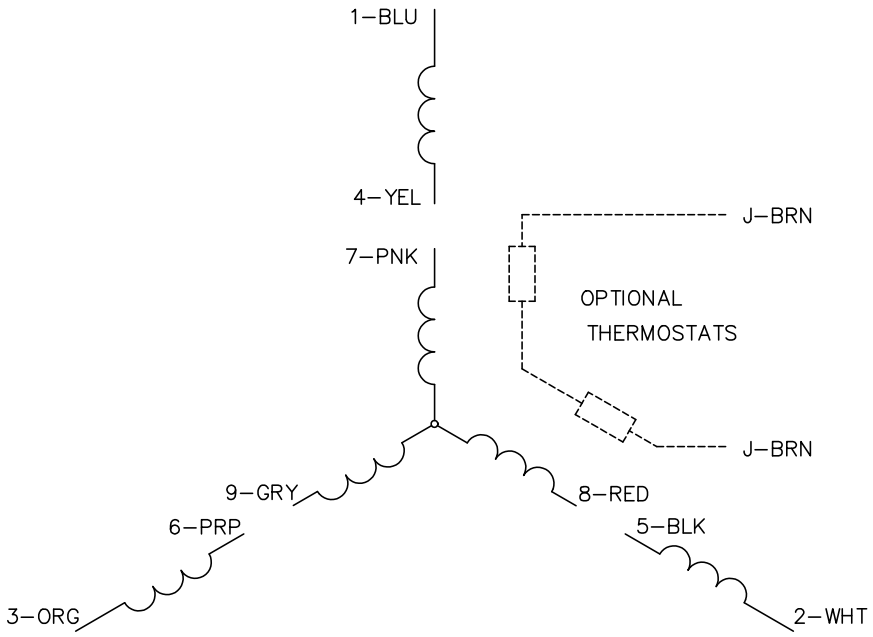
BALDOR

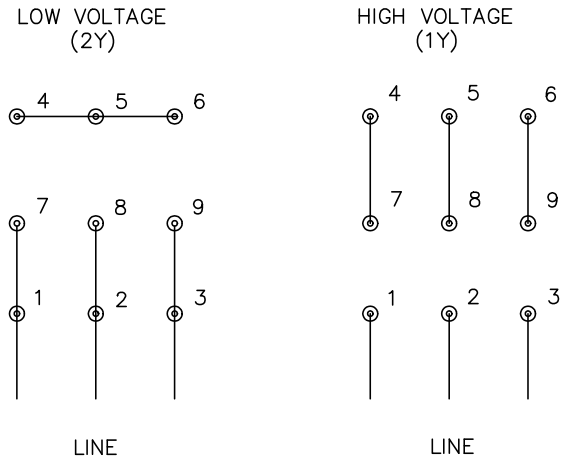
VERT 182–4TC XPFC M CL I–GP C&D, DRILL RIG

SH 1 of 1

06LYG594

CD0005





NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

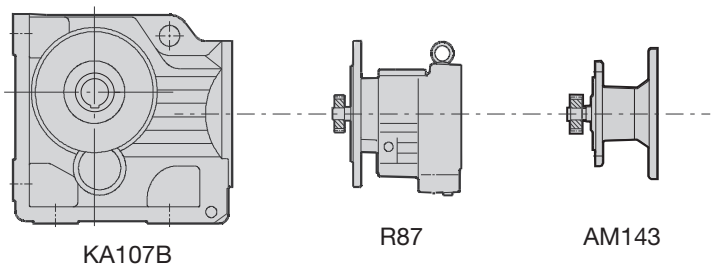
CD0005

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			BALDOR ELECTRIC Co.
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
CD0005		FILE: AAA00005140	MDL: –
		MTL: –	3PH, DV, 9 LEADS

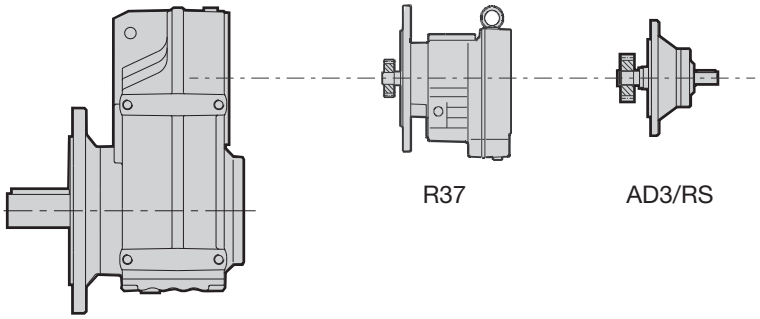
3 Nomenclature

3.1 Overview

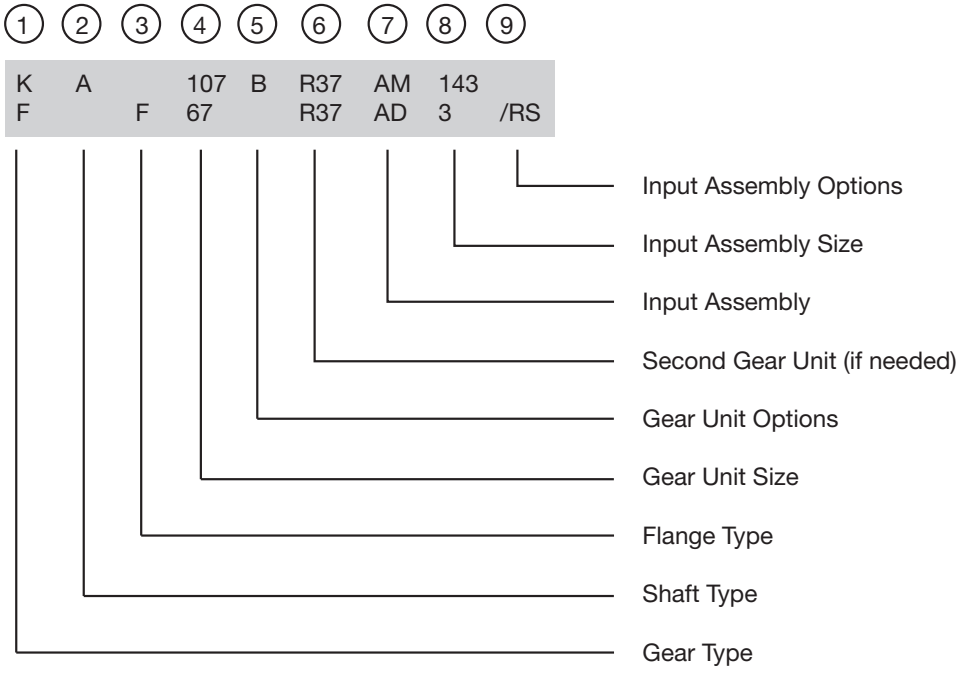
The nomenclature (model number) of a gear unit or gearmotor starts from the output shaft. For a gear unit, the nomenclature consists of nine fields, as shown in the two examples below. Detailed explanation of each field begins on the next page.



KA107B R87 AM143



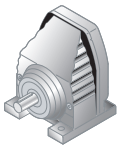
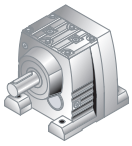
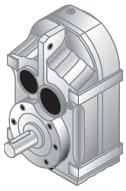
FF67 R37 AD3/RS

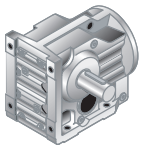
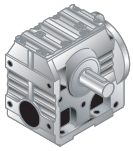
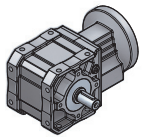


04669US

Explanation of each option field is shown below.

1 - Gear type

Nomenclature		
RX	Helical-parallel (1 stage gearing)	
R	Helical-parallel (2 or 3 stage)	
F	theSnuggler® Helical-parallel	

Nomenclature		
K	Helical-bevel right angle	
S	Helical-worm right angle	
W	SPIROPLAN® right angle	

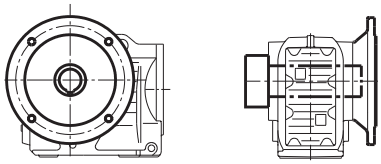
2 - Shaft type

Nomenclature	
(blank)	Solid shaft with keyway
A	Hollow shaft with key
H	Hollow shaft with keyless shrink disc
V	Hollow shaft with DIN 5480 spline
T	TorqLOC® - keyless hollow shaft with tapered-bushing

3 - Flange type

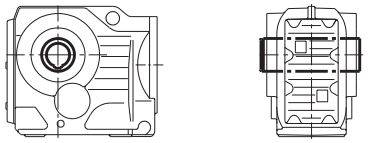
Nomenclature	Description	Availability (Gear Type)				
		R	F	K	S	W
(blank)	No flange (foot mounting)	•	•	•	•	•
F	B5 flange on **one** side with tenon and through holes	•	•	•	•	•
F[1)]	B5 flange on **two** sides with tenon and through holes			•	•	
Z	B14 flange with tenon and tapped holes	•	•	•	•	
M	B5 flange with extended bearing housing for agitators	•				

1) For flange on both sides, specify "AB" in mounting position (ex: M1AB)



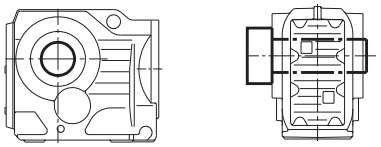
KHF..
B5 flange-mounted + hollow shaft with keyless shrink disc

KTF..
B5 flange-mounted + hollow shaft with TorqLOC® keyless tapered-bushing system



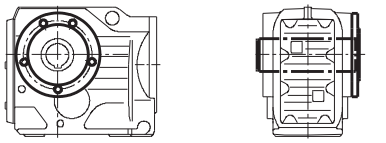
KA..
Hollow shaft with key

KV..
Hollow shaft with DIN 5480 spline



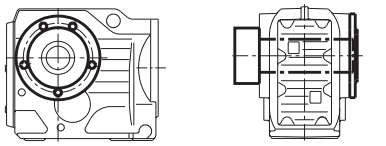
KH..
Hollow shaft with keyless shrink disc

KT..
Hollow shaft with TorqLOC® keyless tapered-bushing system



KAZ..
B14 flange-mounted + hollow shaft with key

KVZ..
B14 flange-mounted + hollow shaft with DIN 5480 spline



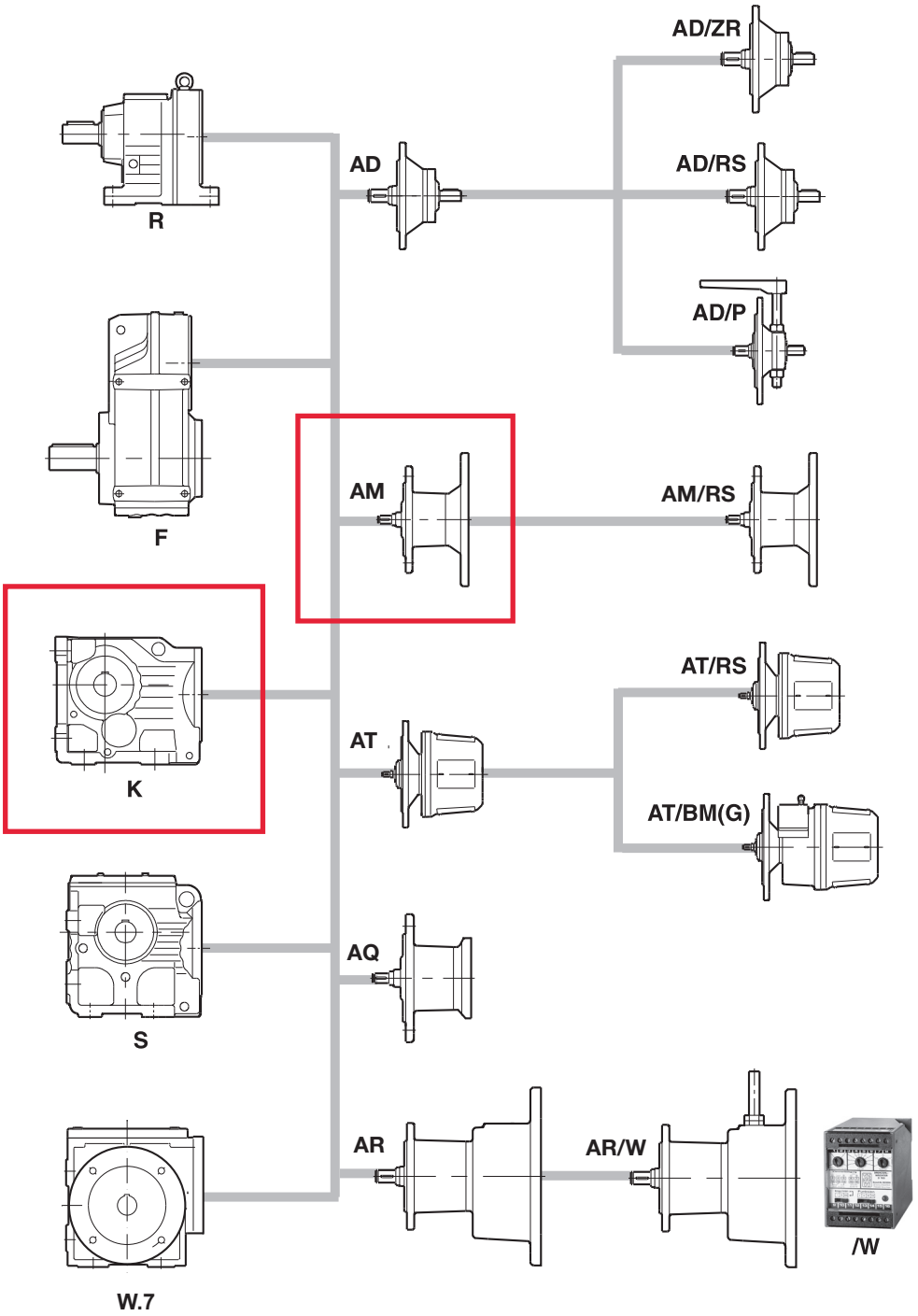
KHZ..
B14 flange-mounted + hollow shaft with keyless shrink disc

52187axx

3.3 Input assemblies

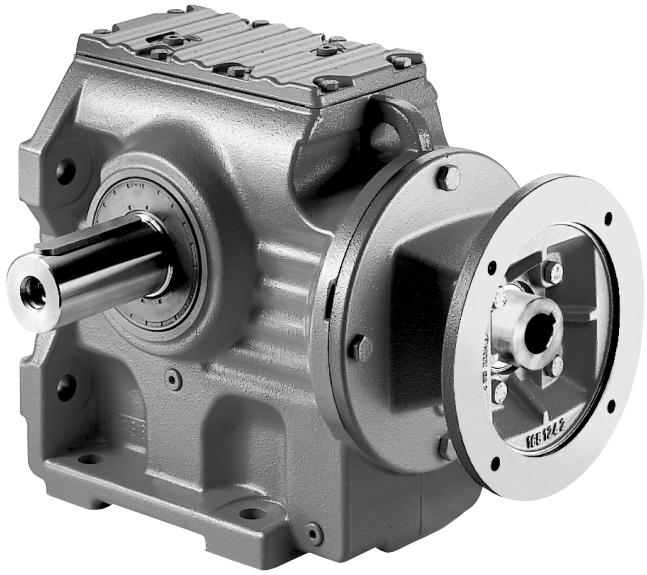
The following figure shows the available input components:

65735AUS



2.6.2 AM motor adapter - IEC or NEMA

The following figure shows a helical-worm gear unit (S-series) with AM adapter:



04588AXX

AM adapters are used for mounting motors to SEW gear units according to IEC standard or NEMA (type C or TC) .

Adapters are available for sizes 63 to 280 for IEC motors. Adapters are available for sizes 56 to 365 for NEMA motors. The designation of the adapter size corresponds to the respective IEC or NEMA motor size.

Torque is transmitted between the motor and the gear unit via a fail-safe jaw-type coupling. Vibrations and shock occurring during operation are effectively dampened by a polyurethane "spider" ring gear that fits between the two coupling halves, as shown below.

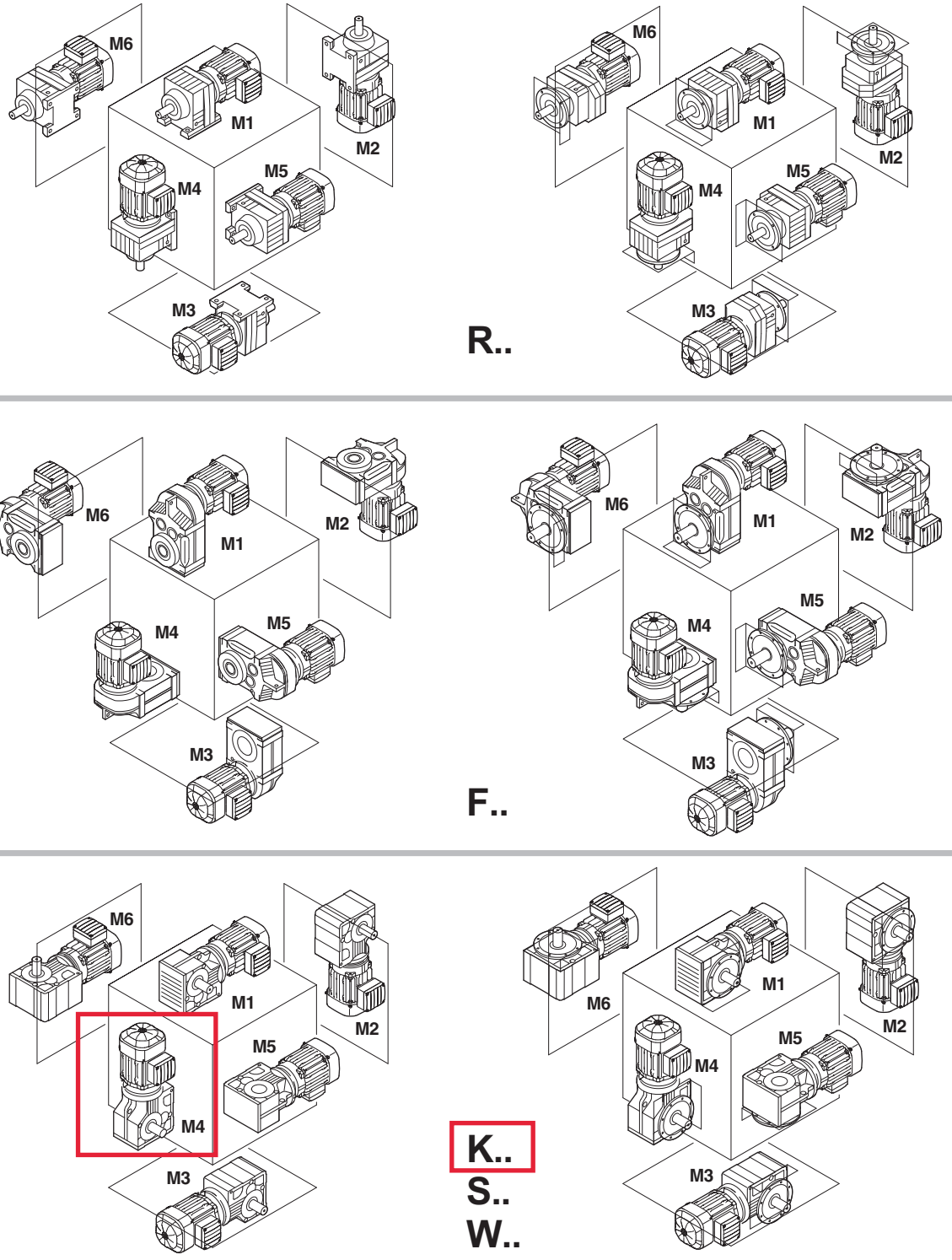
04589US

5 Mounting Positions

5.1 General information

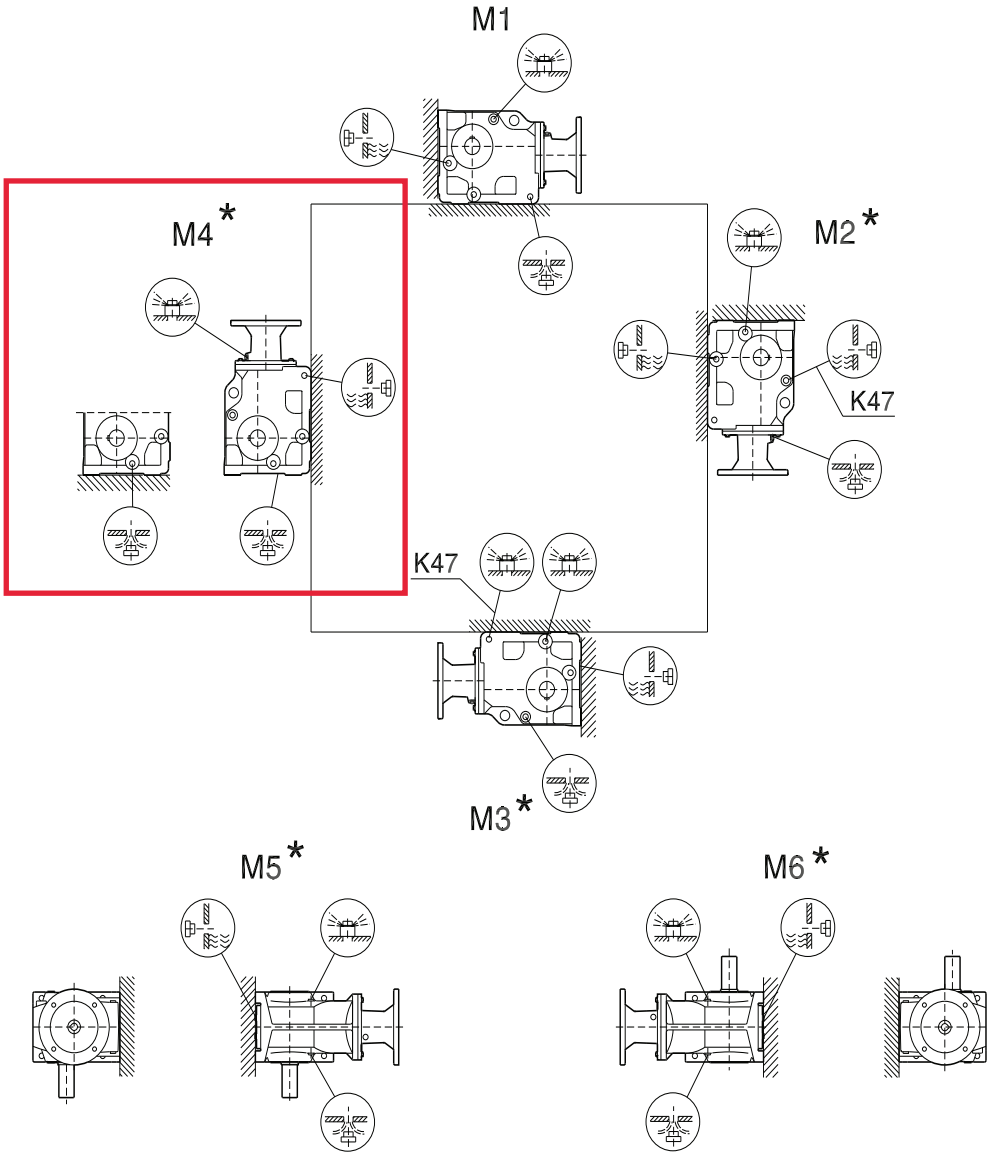
The following figure shows the position of the gear unit in mounting positions M1 to M6:

65873axx



K/KA..B/KH37B-157B, KV37B-107B

33 001 00 10



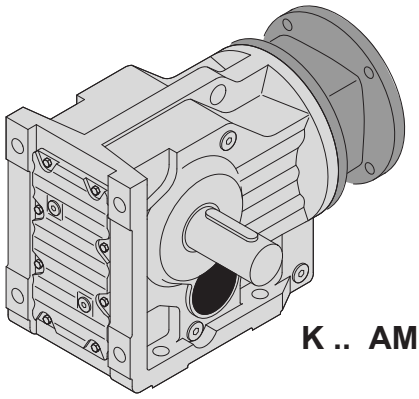
* → page 45 on thermal losses

Important:

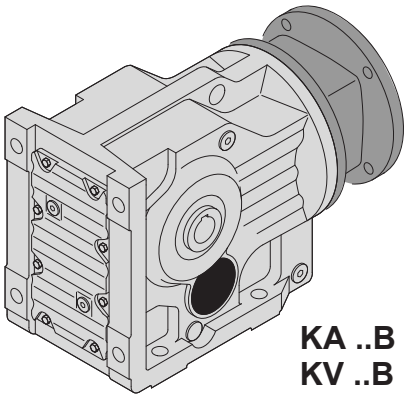
Proper alignment must be ensured when mounting a hollowshaft gear unit with feet. See Technical Note **GM-019** available from www.seweurodrive.com

10 K - Helical Bevel

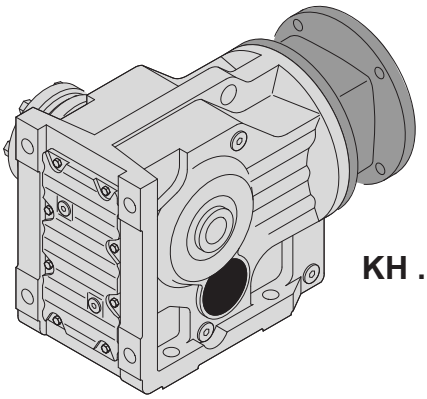
10.1 K.. AM



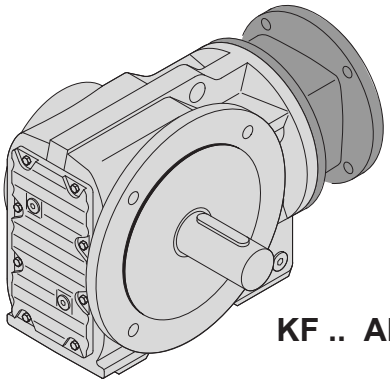
K .. AM..



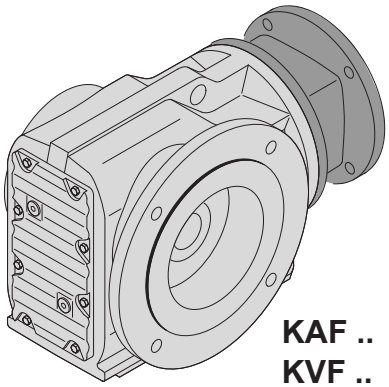
KA ..B AM..
KV ..B AM..



KH ..B AM..



KF .. AM..



KAF .. AM..
KVF .. AM ..

50405AXX

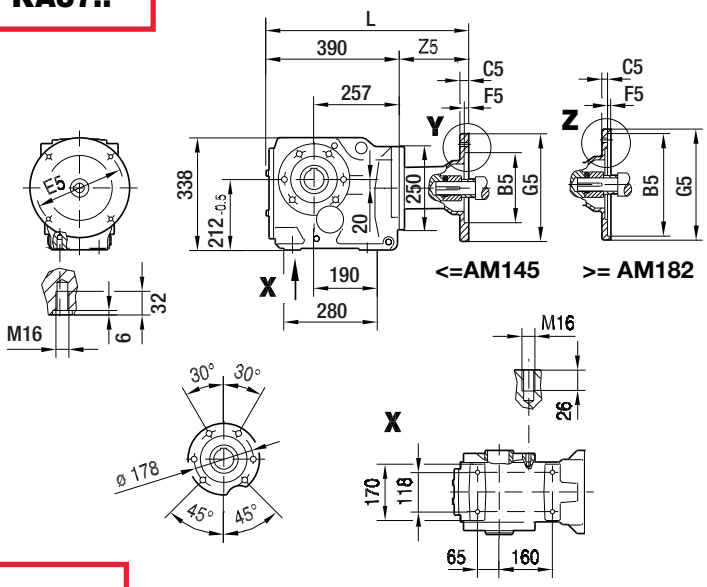
10.1.15 K87

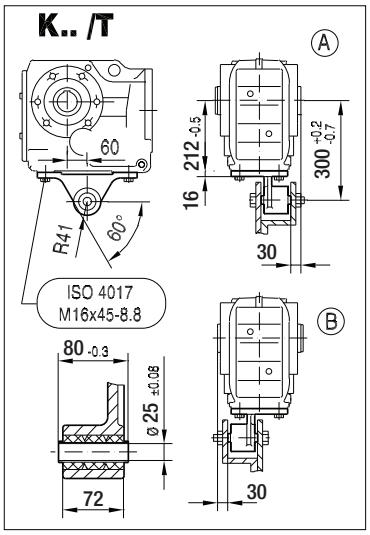
K87, n_e = 1700 rpm												23900 lb-in
	i	n_a	$T_{a\ max}$	F_{Ra}	ϕ (/R)	AM						
Stages	[ratio]	[rpm]	[lb-in]	[lb]	[']	143	145	182	184	213/215	254/256	284/286
K87 3	**7.21**	236	11500	2720	7							
	8.29	205	12300	2780	7							
	10.00	170	13200	2920	7							
	11.17	152	13200	3080	7							
	12.56	135	17600	3030	6							
	14.45	118	18500	3150	6							
	16.00	106	15900	3290	6							
	17.42	98	19400	3350	6							
	19.45	87	20300	3440	6							
	22.41	76	20300	3680	6							
	24.92	68	22100	3680	6							
	27.88	61	23000	3790	6							
	31.39	54	23900	3930	6							
	36.52	47	22100	4400	6							
	44.02	39	23000	4700	6							
	49.16	35	23900	4840	5							
	56.64	30	23900	5160	5							
	63.00	27	23900	5410	5							
	70.46	24	23900	5670	5							
	79.34	21	23900	5970	5							
	86.34	20	23900	6130	5							
	102.71	17	23900	6130	5							
	115.82	15	23900	6130	5							
	126.91	13	23900	6130	5							
	147.32	12	23900	6130	5							
	164.34	10	23900	6130	5							
	174.19	9.8	23900	6130	5							
	197.37	8.6	23900	6130	5							

Weight [lbs]		Stages	AM						
			143	145	182	184	213/215	254/256	284/286
K87	NEMA	3	210	210	220	220	235	260	265
			80	**90**	**100**	**112**	**132S/M**	**160**	**180**
	IEC	3	210	210	220	220	240	275	275
KA87: -27 lbs / KAF87: +2 lbs / KF87: +20 lbs									

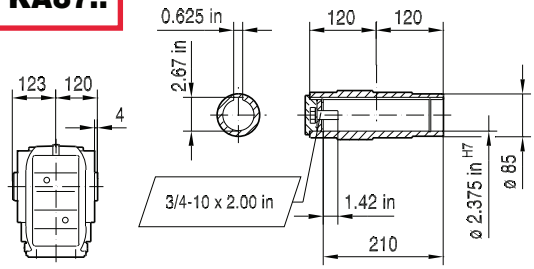
KA87..

33 035 00 11

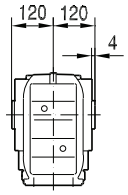


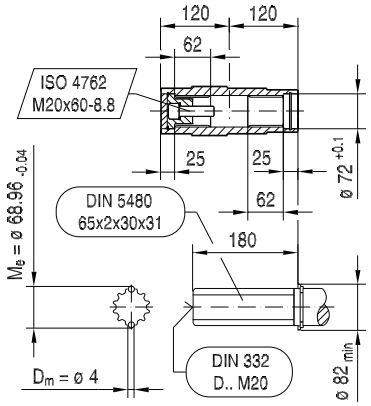


KA87..

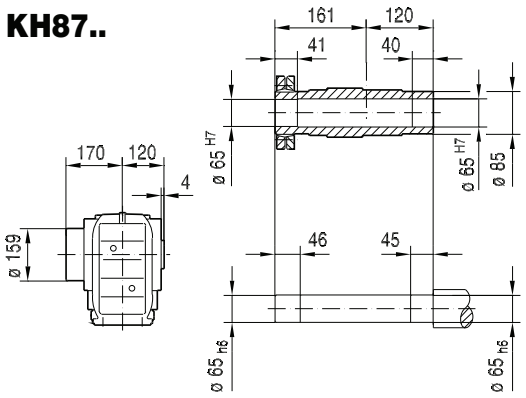


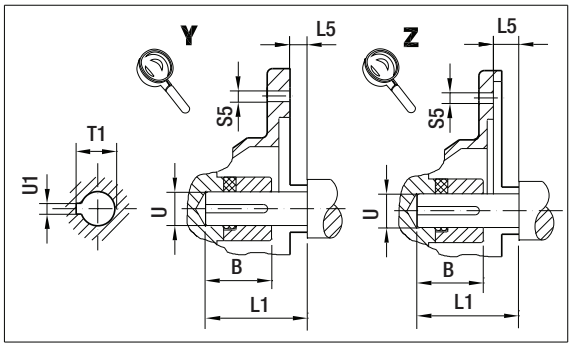
KV87..





KH87..

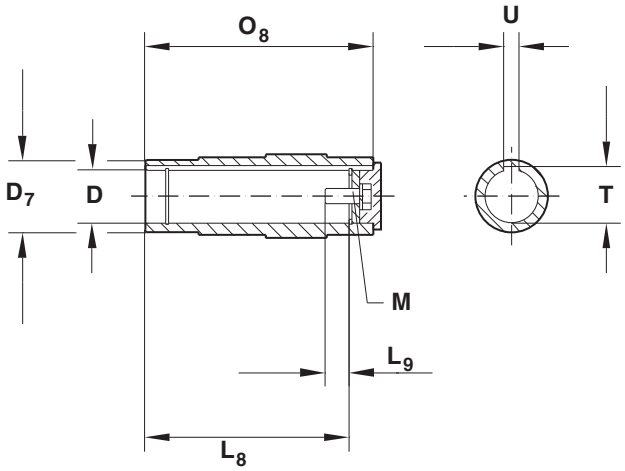




(→ 132)	B	B5	C5	E5	F5	G5	L	L1	L5	S5	T1	U	U1	Z5
AM143	1.68 in	4.50 in	12	5.875 in	4.5	170	489	2.25 in	0.13 in	10.5	0.98 in	0.875 in	0.188 in	98.5
AM145	1.68 in	4.50 in	12	5.875 in	4.5	170	489	2.25 in	0.13 in	10.5	0.98 in	0.875 in	0.188 in	98.5
AM182	2.10 in	8.50 in	10	7.25 in	5	228	525	2.75 in	0.13 in	15	1.24 in	1.125 in	0.250 in	134.5
AM184	2.10 in	8.50 in	10	7.25 in	5	228	525	2.75 in	0.13 in	15	1.24 in	1.125 in	0.250 in	134.5
AM213/215	2.76 in	8.50 in	11	7.25 in	5	228	574	3.38 in	0.25 in	15	1.52 in	1.375 in	0.312 in	183.5
AM254/256	3.65 in	8.50 in	14	7.25 in	5	228	624	4.00 in	0.25 in	15	1.80 in	1.625 in	0.375 in	234
AM284/286	4.00 in	10.50 in	15	9.00 in	5	286	631	4.62 in	0.25 in	15	2.10 in	1.875 in	0.500 in	241

Note: Dimensions in mm unless otherwise noted. For all available output shaft diameters, see page 575. For dimensions of compound gear units (ex: KA87R57) see page 565.

10.10.4 Hollow shaft - Metric



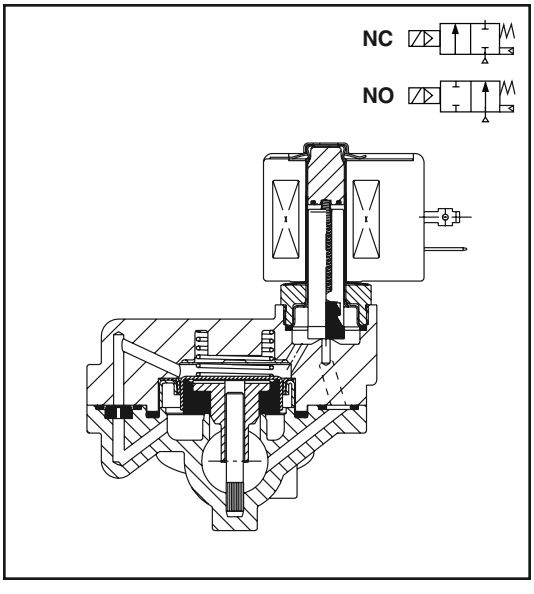
All dimensions in mm								
Model	**D**	**D_7**	**O_8**	**T**	**U**	**L_8**	**L_9**	**M**
KA..19	20	30	108	22.8	6	92	8	M6 x 16
KA..29	25	40	122	27	8	107	17	M10 x 25
KA..37	30	45	120	33.3	8	105	17	M10 x 25
KA..39	30	50	155	33.3	8	137	17	M10 x 25
	35	50	155	38.3	10	137	17	M12 x 30
KA..47	30	50	150	33.3	8	132	16	M10 x 25
	35	50	150	38.3	10	132	22	M12 x 30
KA..49	35	55	178	38.3	10	160	22	M12 x 30
	40	55	178	43.3	12	160	22	M12 x 30
KA..57	40	55	166	43.3	12	142	29	M16 x 40
KA..67	40	55	180	43.3	12	156	29	M16 x 40
KA..77	50	70	210	53.8	14	183	32	M16 x 45
KA..87	60	85	240	64.4	18	210	36	M20 x 50
KA..97	70	95	300	74.9	20	270	34	M20 x 50
KA..107	80	118	350	85.4	22	313	30	M20 x 50
	90	118	350	95.4	25	313	40	M24 x 60
KA..127	100	135	410	106.4	28	373	38	M24 x 60
KA..157	120	155	500	127.4	32	460	36	M24 x 60

ASCO Solenoid Valves

Features

- Pilot operated, normally open or normally closed
- Snubber slows disc closing speed to protect system against water hammer damage more effectively than other techniques
- Pressure spike due to water hammer is reduced to a point eliminating the need for suppressors or other controls in most water systems
- Fluid Controls Institute Inc. evaluations have classified these valves:

Pipe Sizes	FCI-82-1 Class
3/8", 1/2", 3/4"	CC
1", 1 1/4", 1 1/2", 2", 2 1/2"	BB



Construction

Valve Parts in Contact with Fluids	
Body	Brass
Disc	NBR
Seals	PTFE & NBR
Core Tube	305 Stainless Steel
Core and Plugnut	430F Stainless Steel
Springs	302 Stainless Steel
Piston	Stainless Steel or Brass
Shading Coil	Copper

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.			
		AC			General Purpose		Explosionproof	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	11.6	6.1	16	30	238210	238710	238214	238714
F	16.8	16.1	35	95	272610	97617	272614	97617
F	22.6	-	-	-	-	238710	-	238714

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages are available when required.

Solenoid Enclosures

Standard: RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; RedHat - Type I.

Optional: RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; RedHat - Explosionproof and Raintight, Types 3, 7, and 9. (To order, add prefix "EF" to catalog number.)

See Optional Features Section for other available options.

For Explosion Proof NEMA 7 solenoid valve, print "EF" before the Catalog No.

Nominal Ambient Temp. Ranges:

RedHat II/
RedHat AC: 32˚F to 125˚F (0˚C to 52˚C)
RedHat II DC: 32˚F to 104˚F (0˚C to 40˚C)
RedHat DC: 32˚F to 77˚F (0˚C to 25˚C)
(104˚F/40˚C occasionally)

Refer to Engineering Section for details.

Approvals:

CSA certified. UL listed, General Purpose Valves.
RedHat II meets applicable CE directives.

Refer to Engineering Section for details.

2/2 SERIES 8221

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)			Max. Fluid Temp. ˚F		Brass Body	Const. Ref.	Watt Rating/ Class of Coil Insulation ③	
			Min. ①	Max. AC Water ②	Max. DC Water ②	AC	DC	Catalog Number		AC	DC
NORMALLY CLOSED (Closed when de-energized)											
3/8	9/16	3	5	150	125	180	150	8221G001	1	6.1/F	11.6/F
1/2	9/16	3.5	5	150	125	180	150	8221G003	1	6.1/F	11.6/F
3/4	3/4	5.5	5	150	125	180	150	8221G005	2	6.1/F	11.6/F
1	1	11.5	5	150	125	180	150	8221G007	5	6.1/F	11.6/F
1 1/4	1 1/8	13	5	150	125	180	150	8221G009	6	6.1/F	11.6/F
1 1/2	1 1/4	24	5	150	125	180	150	8221G011			
2	1 3/4	36	5	150	125	180	150	8221G013			
2 1/2	1 3/4	38	5	150	125	180	150	8221G015			
NORMALLY OPEN (Open when de-energized)											
3/8	9/16	3	5	-	125	-	150	8221 021	15	-	16.8/F
3/8	9/16	3	5	150	-	180	-	8221G021	3	16.1/F	-
1/2	9/16	3.5	5	-	125	-	150	8221 023	15	-	16.8/F
1/2	9/16	3.5	5	150	-	180	-	8221G023	3	16.1/F	-
3/4	3/4	5.5	5	-	125	-	150	8221 025	16	-	16.8/F
3/4	3/4	5.5	5	150	-	180	-	8221G025	4	16.1/F	-
1	1	11.5	5	-	125	-	150	8221 027	17	-	16.8/F
1	1	11.5	5	150	-	180	-	8221G027	8	16.1/F	-
1 1/4	1 1/8	13	5	-	125	-	150	8221 029	18	-	16.8/F
1 1/4	1 1/8	13	5	150	-	180	-	8221G029	9	16.1/F	-
1 1/2	1 1/4	24	5	-	125	-	150	8221 031	19	-	16.8/F
1 1/2	1 1/4	24	5	150	-	180	-	8221G031	10	16.1/F	-
2	1 3/4	36	5	-	125	-	150	8221 033	20	-	16.8/F
2	1 3/4	36	5	150	-	180	-	8221G033	13	16.1/F	-
2 1/2	1 3/4	38	5	-	125	-	150	8221 035	21	-	16.8/F
2 1/2	1 3/4	38	5	150	-	180	-	8221G035	14	16.1/F	

For Explosion Proof NEMA 7 solenoid valve, print "EF" before the Catalog No.

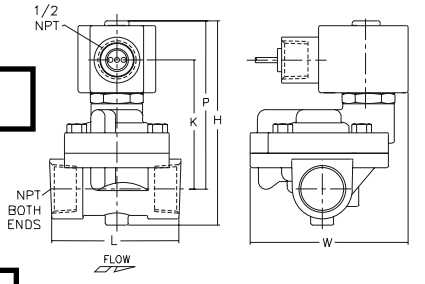
① Valves require a 5 psi Minimum Pressure Differential to open. Once open, they remain open with 3 psi differential pressure.
② Refer to Steam/Hot Water Valve Series for Hot Water constructions.
③ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.

Dimensions: inches (mm)

Const. Ref.		H	K	L	P	W
1	ins.	4.34	2.69	2.72	3.59	3.41
	mm	110	68	69	91	87
2	ins.	4.53	2.69	2.78	3.75	3.41
	mm	115	68	71	95	87
3	ins.	5.22	3.14	2.72	4.47	3.69
	mm	133	80	69	114	94
4	ins.	5.41	3.30	2.78	4.62	3.69
	mm	137	84	71	117	94
5	ins.	5.62	3.15	3.75	4.03	3.16
	mm	143	80	95	102	80
6	ins.	5.56	3.15	3.66	4.03	3.56
	mm	141	80	93	102	90
7	ins.	6.12	3.30	4.38	4.19	4.12
	mm	156	84	111	106	105
8	ins.	6.53	3.59	3.75	4.91	3.16
	mm	166	91	95	125	80
9	ins.	6.47	3.59	3.56	4.91	3.56
	mm	164	91	93	125	90
10	ins.	7.03	3.74	4.38	5.06	4.12
	mm	179	95	111	129	105
11	ins.	7.38	3.71	5.06	4.59	4.72
	mm	188	94	129	117	120
12	ins.	7.38	3.71	5.50	4.59	5.19
	mm	188	94	140	117	132
13	ins.	8.22	4.15	5.06	5.47	4.72
	mm	209	105	129	139	120
14	ins.	8.22	4.15	5.50	5.47	5.19
	mm	209	105	140	139	132
15	ins.	5.22	-	2.72	4.47	3.69
	mm	133	-	69	114	94
16	ins.	5.41	-	2.78	4.62	3.69
	mm	137	-	71	117	94
17	ins.	6.53	-	3.75	4.91	3.16
	mm	166	-	95	125	80
18	ins.	6.47	-	3.66	4.91	3.56
	mm	164	-	93	125	90
19	ins.	7.03	-	4.38	5.06	4.12
	mm	179	-	111	129	105
20	ins.	8.22	-	5.06	5.47	4.72
	mm	209	-	129	139	120
21	ins.	8.22	-	5.50	5.47	5.19
	mm	209	-	140	139	132

IMPORTANT: Valves may be mounted in any position.

Const. Ref. 1, 2



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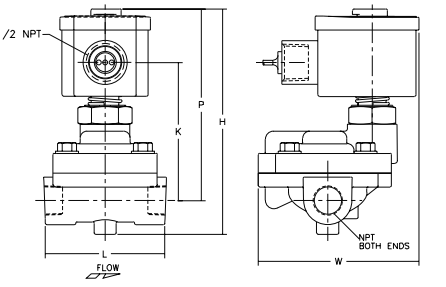

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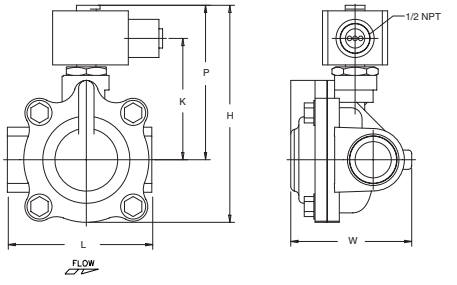

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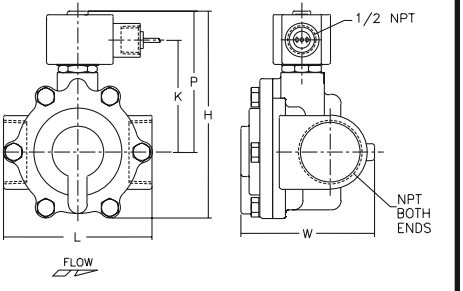

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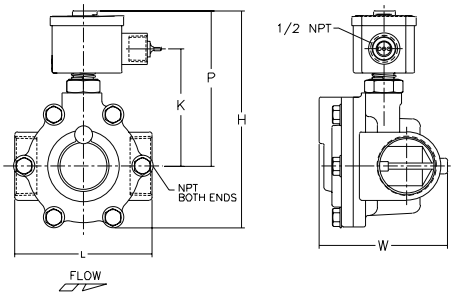

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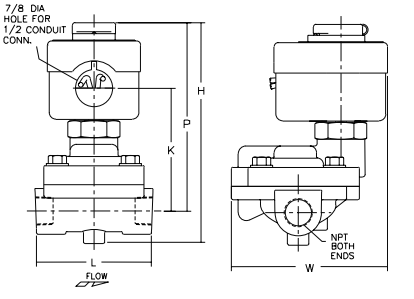
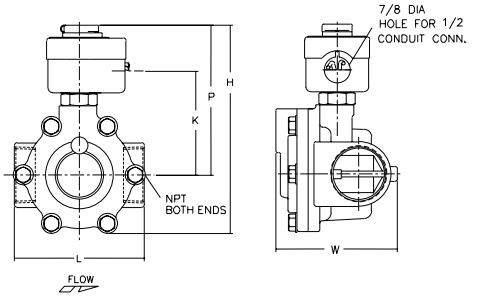


Const. Ref. 17 - 21



Section 5

Controls Submittal

Screening System
Control Panel
MGD Water Reclamation Facility
City of Jefferson, GA

Submittal

Customer:
Headworks Inc.
11000 Brittmoore Park Drive
Houston, TX 77041
P.O. No. JEF070622-1

Date:
July 7, 2022

Screening System Control Panel

CONTINUOUS HINGE WITH 3-POINT LATCH, TYPE 4X

APPLICATION

These enclosures feature Hoffman's exclusive POWERGLIDE Handle with 3-point latching, ideal for indoor or outdoor applications that require corrosion protection, convenient access, and padlocking security.

SPECIFICATIONS

- 14 gauge Type 304 or 316L stainless steel bodies and doors
- Seams continuously welded and ground smooth
- Seamless foam-in-place gasket
- Rolled lip around three sides of door
- Internal 3-point latch and Type 316L stainless steel padlocking POWERGLIDE Handle
- Remove door by pulling stainless steel continuous hinge pin
- Data pocket is high-impact thermoplastic
- Collar studs provided for mounting optional panels
- Exterior hardware on Type 316L stainless steel enclosures matches enclosure material
- Bonding provision on door; grounding stud on body

FINISH

Door, sides, top and bottom have smooth #4 brushed finish. Handle is electropolished.

ACCESSORIES

Panels for Type 3R, 4, 4X, 12 and 13 Enclosures
Steel and Stainless Steel Window Kits
H2OMIT Vent Drains, Type 4X
H2OMIT Thermoelectric Dehumidifier

MODIFICATION AND CUSTOMIZATION

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A4SW3

INDUSTRY STANDARDS

UL 508A Listed; Type 3R, 4, 4X, 12; File No. E61997
cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E61997

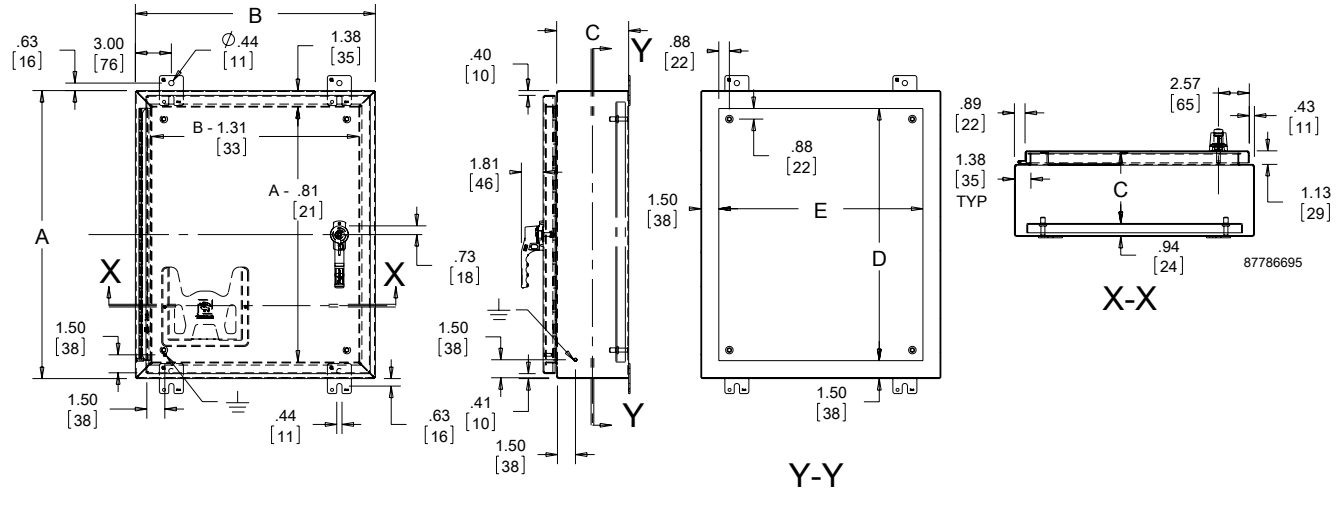
NEMA/EEMAC Type 3R, 4, 4X, 12, 13
IEC 60529, IP66
Meets NEMA Type 3RX requirements

Standard Product

Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Panel	Stainless Steel Panel	Panel Size D x E in./mm	Data Pocket
A24H2006SSLP3PT	24.00 x 20.00 x 6.00 610 x 508 x 152	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2006SS6LP3PT	24.00 x 20.00 x 6.00 610 x 508 x 152	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2008SSLP3PT	24.00 x 20.00 x 8.00 610 x 508 x 203	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2008SS6LP3PT	24.00 x 20.00 x 8.00 610 x 508 x 203	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2408SSLP3PT	24.00 x 24.00 x 8.00 610 x 610 x 203	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A24H2408SS6LP3PT	24.00 x 24.00 x 8.00 610 x 610 x 203	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A30H2408SSLP3PT	30.00 x 24.00 x 8.00 762 x 610 x 203	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A30H2408SS6LP3PT	30.00 x 24.00 x 8.00 762 x 610 x 203	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A30H3008SSLP3PT	30.00 x 30.00 x 8.00 762 x 762 x 203	304	A30P30	A30P30G	A30P30SS6	27.00 x 27.00 686 x 686	Large
A30H3008SS6LP3PT	30.00 x 30.00 x 8.00 762 x 762 x 203	316L	A30P30	A30P30G	A30P30SS6	27.00 x 27.00 686 x 686	Large
A36H2408SSLP3PT	36.00 x 24.00 x 8.00 914 x 610 x 203	304	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	Large
A36H2408SS6LP3PT	36.00 x 24.00 x 8.00 914 x 610 x 203	316L	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	Large
A36H3008SSLP3PT	36.00 x 30.00 x 8.00 914 x 762 x 203	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A36H3008SS6LP3PT	36.00 x 30.00 x 8.00 914 x 762 x 203	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A48H3608SSLP3PT	48.00 x 36.00 x 8.00 1219 x 914 x 203	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3608SS6LP3PT	48.00 x 36.00 x 8.00 1219 x 914 x 203	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A24H2010SSLP3PT	24.00 x 20.00 x 10.00 610 x 508 x 254	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small

Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Panel	Stainless Steel Panel	Panel Size D x E in./mm	Data Pocket
A24H2010SS6LP3PT	24.00 x 20.00 x 10.00 610 x 508 x 254	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A36H3010SSLP3PT	36.00 x 30.00 x 10.00 914 x 762 x 254	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A36H3010SS6LP3PT	36.00 x 30.00 x 10.00 914 x 762 x 254	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A42H3010SSLP3PT	42.00 x 30.00 x 10.00 1067 x 762 x 254	304	A42P30	A42P30G	A42P30SS6	39.00 x 27.00 991 x 686	Large
A48H3610SSLP3PT	48.00 x 36.00 x 10.00 1219 x 914 x 254	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3610SS6LP3PT	48.00 x 36.00 x 10.00 1219 x 914 x 254	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A24H2412SSLP3PT	24.00 x 24.00 x 12.00 610 x 610 x 305	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A24H2412SS6LP3PT	24.00 x 24.00 x 12.00 610 x 610 x 305	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A30H2412SSLP3PT	30.00 x 24.00 x 12.00 760 x 610 x 305	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A30H2412SS6LP3PT	30.00 x 24.00 x 12.00 762 x 610 x 305	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A36H3012SSLP3PT	36.00 x 30.00 x 12.00 914 x 762 x 305	304	A36P30	A36P30G	A36P30SS6	33.00 X 27.00 838 x 686	Large
A36H3012SS6LP3PT	36.00 x 30.00 x 12.00 914 x 762 x 305	316L	A36P30	A36P30G	A36P30SS6	33.00 X 27.00 838 x 686	Large
A36H3612SSLP3PT	36.00 x 36.00 x 12.00 914 x 914 x 305	304	A36P36	A36P36G	A36P36SS6	33.00 x 33.00 838 x 838	Large
A36H3612SS6LP3PT	36.00 x 36.00 x 12.00 914 x 914 x 305	316L	A36P36	A36P36G	A36P36SS6	33.00 x 33.00 838 x 838	Large
A42H3612SSLP3PT	42.00 x 36.00 x 12.00 1067 x 914 x 305	304	A42P36	A42P36G	A42P36SS6	39.00 x 33.00 991 x 838	Large
A48H3612SSLP3PT	48.00 x 36.00 x 12.00 1219 x 914 x 305	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3612SS6LP3PT	48.00 x 36.00 x 12.00 1219 x 914 x 305	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A60H3612SSLP3PT	60.00 x 36.00 x 12.00 1524 x 914 x 305	304	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large
A60H3612SS6LP3PT	60.00 x 36.00 x 12.00 1524 x 914 x 305	316L	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large
A48H3616SSLP3PT	48.00 x 36.00 x 16.00 1219 x 914 x 406	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3616SS6LP3PT	48.00 x 36.00 x 16.00 1219 x 914 x 406	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A60H3616SSLP3PT	60.00 x 36.00 x 16.00 1524 x 914 x 406	304	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large
A60H3616SS6LP3PT	60.00 x 36.00 x 16.00 1524 x 914 x 406	316L	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large

Purchase panels separately. Optional stainless steel, composite and aluminum panels are available for most sizes.



The PowerPact Advantage

- **Proven Performance:** Industry-leading circuit breaker innovation and protection for heavy-duty commercial and industrial applications.
- **Smart**: Integrated metering options provide a cost-effective solution to reduce energy consumption, optimize energy costs, and improve energy availablility for your facilities.
- **Flexible:** Full range of thermal-magnetic and electronic trip molded case circuit breakers from 15 to 3000 A, delivering the ratings, configurations, and operators for your unique applications.
- **Simple:** Common catalog numbers, standardized ratings, and a full range of field-installable accessories make product selection, installation and maintenance easier than ever.
- **Common Design Features:** Mounting holes, door trim, and handle accessories

B-Frame 125 A	H-Frame 150 A	J-Frame 250 A	Q-Frame 250 A	L-Frame 600 A	M-Frame 800 A	P-Frame 1200 A	R-Frame 3000 A
	 Electronic Trip Version	 Electronic Trip Version					

Table 7.46: PowerPact Interrupting Ratings

Voltage	Interrupting Rating						
	B	D	G	J	K	L	R
240 Vac	10 kA	25 kA	65 kA	100 kA	65 kA *[1]*	125 kA	200 kA
480 Vac	—	18 kA	35 kA	65 kA	65 kA *[2]*	100 kA	200 kA
600 Vac	—	14 kA	18 kA	25 kA	65 kA *[2]*	50 kA *[3]*	100 kA

Table 7.47: Common Catalog Numbering System

Frame	Rating	Termination	Poles	Voltage	Amperage*[4]*			Suffix Code		Suffix Code	
H	G	L	3	6	1	5	0	A	B	S	A

1=1Pole
2=2Pole
3=3Pole
4=4Pole

4=480 V
6=600 V

2A/2B Auxiliary Switch

110 Vac Shunt Trip

Frame Designation

B	125 A Frame
H	150 A Frame
J	250 A Frame
Q	250 A Frame
L	600 A Frame
M	800 A Frame
P	1200 A Frame
R	3000 A Frame

Interrupting Rating

	240 Vac	480 Vac	600Vac
B	10 kA	—	—
D	25 kA	18 kA	14 kA
G	65 kA	35 kA	18 kA
J	100 kA	65 kA	25 kA
K	100 kA	65 kA	65 kA
L	125 kA	100 kA	50 kA
R	200 kA	200 kA	100 kA

Terminations

A	I-Line
L	Lugs on Both Ends
F	Bus Bar (No Lugs)
M	Lugs Line Side Only
P	Lugs Load End Only
N	Plug-in
D	Drawout
S	Rear Connected Studs

For more information:

B-Frame Circuit Breakers, page 7-31
H- and J-Frame Circuit Breakers, page 7-32
Q-Frame Circuit Breakers, page 7-35
L-Frame Circuit Breakers, page 7-37
P-Frame Circuit Breakers, page 7-40
R-Frame Circuit Breakers, page 7-41
PowerPact™ H- and J-Frame Electronic Motor Circuit Protectors, page 7-47
Motor Circuit Protectors and Motor Protector Circuit Breakers, page 7-49
Automatic Switches, page 7-45
500 Vdc Circuit Breakers, page 7-44
Mission Critical Circuit Breakers, page 7-43
PowerPact™ Circuit Breaker Accessories, page 7-50
Motor Operators and Rotary Handles, page 7-51
Locks, Installation Accessories, and Rear Connections, page 7-53
Mechanical Lugs, page 7-53
Compression Lugs and Power Distribution Connectors (PDC), page 7-56
Terminal Nuts, Terminal Pads, Terminal Shields and Accessories, page 7-58
Plug-In and Drawout Mountings, page 7-59
MicroLogic™ Electronic Trip Units, page 7-60
MicroLogic™ Trip Unit Accessories, page 7-63

[1] B-frame K interrupting rating is 100 kA at 240 Vac
[2] P-frame K interrupting is 50 kA at 480 and 600 Vac.
[3] P-frame L interrupting is 25 kA at 600 Vac.
[4] For amperage of M,-, P- or R-frame circuit breakers, add a zero to the three amperage digits; for example, 120 = 1200 A.

B-Frame
Thermal-Magnetic Trip Unit

With EverLink Lug Technology

PowerPact B-Frame Molded Case Circuit Breakers (125 A)

PowerPact B-frame circuit breakers provides economical thermal-magnetic circuit protection in a compact size.

- Fixed 15-125 A thermal-magnetic protection up to 600Y/347 Vac and 250 Vdc
- 1- to 4-pole unit mount construction; 1- to 3-pole I-Line construction
- UL listed interrupting ratings from 18 kA to 65 kA at 480 Vac
- EverLink lugs, a cable connection method that helps maintain low resistance connections
- UL, CSA, NOM, IEC, CCC certified and CE marked for global acceptance

Table 7.48: PowerPact B-Frame 125 A Thermal-Magnetic Circuit Breakers (600Y/347 Vac) with EverLink Lugs

Current Rating @ 40° C	Interrupting Rating													
	D				G				J				K	
	1 Pole 347 Vac 125 Vdc	2 Pole 600Y/347 Vac 250 Vdc	3 Pole 600Y/347 Vac 250 Vdc	4 Pole 600Y/347 Vac 250 Vdc	1 Pole 347 Vac 125 Vdc	2 Pole 600Y/347 Vac 250 Vdc	3 Pole 600Y/347 Vac 250 Vdc	4 Pole 600Y/347 Vac 250 Vdc	1 Pole 347 Vac 125 Vdc	2 Pole 600Y/347 Vac 250 Vdc	3 Pole 600Y/347 Vac 250 Vdc	4 Pole 600Y/347 Vac 250 Vdc	1 Pole 347 Vac	2 Pole 600Y/347 Vac
15 A	BDL16015	BDL26015	BDL36015	BDL46015	BGL16015	BGL26015	BGL36015	BGL46015	BJL16015	BJL26015	BJL36015	BJL46015	BKL16015	BKL26015
20 A	BDL16020	BDL26020	BDL36020	BDL46020	BGL16020	BGL26020	BGL36020	BGL46020	BJL16020	BJL26020	BJL36020	BJL46020	BKL16020	BKL26020
25 A	BDL16025	BDL26025	BDL36025	BDL46025	BGL16025	BGL26025	BGL36025	BGL46025	BJL16025	BJL26025	BJL36025	BJL46025	BKL16025	BKL26025
30 A	BDL16030	BDL26030	BDL36030	BDL46030	BGL16030	BGL26030	BGL36030	BGL46030	BJL16030	BJL26030	BJL36030	BJL46030	BKL16030	BKL26030
35 A	BDL16035	BDL26035	BDL36035	BDL46035	BGL16035	BGL26035	BGL36035	BGL46035	BJL16035	BJL26035	BJL36035	BJL46035	—	—
40 A	BDL16040	BDL26040	BDL36040	BDL46040	BGL16040	BGL26040	BGL36040	BGL46040	BJL16040	BJL26040	BJL36040	BJL46040	—	—
45 A	BDL16045	BDL16045	BDL36045	BDL46045	BGL16045	BGL26045	BGL36045	BGL46045	BJL16045	BJL26045	BJL36045	BJL46045	—	—
50 A	BDL16050	BDL26050	BDL36050	BDL46050	BGL16050	BGL26050	BGL36050	BGL46050	BJL16050	BJL26050	BJL36050	BJL46050	—	—
60 A	BDL16060	BDL26060	BDL36060	BDL46060	BGL16060	BGL26060	BGL36060	BGL46060	BJL16060	BJL26060	BJL36060	BJL46060	—	—
70 A	BDL16070	BDL26070	BDL36070	BDL46070	BGL16070	BGL26070	BGL36070	BGL46070	BJL16070	BJL26070	BJL36070	BJL46070	—	—
80 A	BDL16080	BDL26080	BDL36080	BDL46080	BGL16080	BGL26080	BGL36080	BGL46080	BJL16080	BJL26080	BJL36080	BJL46080	—	—
90 A	BDL16090	BDL26090	BDL36090	BDL46090	BGL16090	BGL26090	BGL36090	BGL46090	BJL16090	BJL26090	BJL36090	BJL46090	—	—
100 A	BDL16100	BDL26100	BDL36100	BDL46100	BGL16100	BGL26100	BGL36100	BGL46100	BJL16100	BJL26100	BJL36100	BJL46100	—	—
110 A	BDL16110	BDL26110	BDL36110	BDL46110	BGL16110	BGL26110	BGL36110	BGL46110	BJL16110	BJL26110	BJL36110	BJL46110	—	—
125 A	BDL16125	BDL26125	BDL36125	BDL46125	BGL16125	BGL26125	BGL36125	BGL46125	BJL16125	BJL26125	BJL36125	BJL46125	—	—

Table 7.49: B-Frame Termination Options

Termination Letter	
A = I-Line (See Section 9, Panelboards)	B D **L** 3 6 1 0 0 For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
F = No Lugs (includes terminal nut kit on both ends)	
L =EverLink Lugs both ends	
M = Lugs ON end Terminal Nut Kit OFF end	
P = Lugs OFF end Terminal Nut Kit ON end	

Table 7.50: B-Frame Interrupting Ratings

Voltage	Interrupting Rating			
	D	G	J	K
240 Vac	25 kA	65 kA	100 kA	100 kA
480Y/277 Vac	18 kA	35 kA	65 kA	65 kA
480 Vac	18 kA	35 kA	65 kA	65 kA
600Y/347 Vac	14 kA	18 kA	25 kA	65 kA
125 Vdc	10 kA	20 kA	50 kA	—
250 Vdc	10 kA	20 kA	50 kA	—

Table 7.51: B-Frame Lug Options

Lug Option Suffix	
No Suffix = EverLink Lugs both ends	B D **L** 3 6 1 0 0 **LU** For factory-installed lug option, place suffix after the amperage in the circuit breaker catalog number.
LU = EverLink Lug with Control Wire Terminal ON end; EverLink Lug OFF end	
LV = EverLink Lug ON end; EverLink Lug with Control Wire Terminal OFF end	
LW = EverLink Lug with Control Wire Terminal both ends	
LC = Copper Mechanical Lugs both ends	
LH = Aluminum Mechanical Lugs both ends	

Table 7.52: PowerPact B-Frame 125 A Magnetic Trip Values

Current Rating @ 40° C	Fixed AC Magnetic Trip	
	Hold	Trip
15 A	400 A	600 A
20 A	400 A	600 A
25 A	480 A	720 A
30 A	480 A	720 A
35 A	480 A	720 A
40 A	480 A	720 A
45 A	480 A	720 A
50 A	480 A	720 A
60 A	640 A	960 A
70 A	800 A	1200 A
80 A	800 A	1200 A
90 A	1000 A	1500 A
100 A	1000 A	1500 A
110 A	1000 A	1500 A
125 A	1000 A	1500 A

Accessories see page 7-50
Optional Lugs see page 7-55
Dimensions see page 7-83

9421 Type L
Circuit Breaker Operating Mechanism

Type L Circuit Breaker Mechanisms

Type L door-mounted, variable depth operating mechanisms feature heavy duty, all metal construction with trip indication. All mechanisms can be padlocked in the Off position when the enclosure door is open. Further, the handle assemblies can be locked Off with up to three padlocks, which also locks the enclosure when the door is closed. (The 3 in. handle accepts one padlock.) Complete kits are rated for NEMA 1, 3R, and 12 enclosures. They include a handle assembly, operating mechanism, and shaft assembly.

Table 8.89: Complete Kits

Complete Kit Does Not Include Circuit Breaker			Includes Operating Mechanism and Handle					
Use With			Standard 6 in. Handle				Short 3 in. Handle	
			Standard Shaft Kit		Long Shaft Kit		Long Shaft Kit	
Circuit Breaker or Interrupter Type	No. of Poles	Frame Size (A)	Cat. No.	Mounting Depth *[1]*	Cat. No.	Mounting Depth *[1]*	Cat. No.	Mounting Depth *[1]*
PowerPact™ B	2–3	125	9421LB1	5.50–10.75	9421LB4	5.50–21.38	9421LB3	5.50–21.38
PowerPact H and J	2–3	250	9421LJ1	5.50–10.75	9421LJ4	5.50–21.38	9421LJ3	5.50–21.38
PowerPact L	2–3	600	9421LD1	7.25–12.06	9421LD4	7.25–22.63	3 in. handles are not recommended for use with these circuit breakers.	
PowerPact M and P *[2]*	3	1200	9421LW1 *[3]*	9.00–12.50	9421LW4 *[3]*	9.00–23.50		

Table 8.90: Component Parts

Use With			3 in. Handle Assemblies NEMA 1, 3R, 12	Standard Handle Assemblies NEMA 1, 3R, 12	Operating Mechanism Includes Lockout	Standard Shaft (Support Bracket *Not* Required)		Long Shaft (Support Bracket Required)	
Circuit Breaker or Interrupter Type	No. of Poles	Frame Size (A)	Cat. No.	Cat. No.	Cat. No.	Mounting Depth *[1]*	Cat. No.	Mounting Depth *[1]*	Cat. No.
PowerPact B	2–3	125	9421LH3 *[4]*	9421LH6 *[4]*	9421LB7	5.50–10.75	9421LS8	5.50–21.38	9421LS13
PowerPact H & J	2–3	250	9421LH3 *[4]*	9421LH6 *[4]*	[illegible]	5.50–10.25	9421LS8	5.50–21.38	[illegible]
PowerPact D & L	2–3	600	*[5]*	9421LH6 *[4]*	9421LD7	7.25–12.06	9421LS8	7.25–22.63	9421LS13
	4	1200 (300 V)	—	9421LH6 *[4]*	9421LD14	7.25–12.06	9421LS8	—	—
				9421LH6 *[4]*	9421LD44	—	—	7.25–22.63	9421LS13
				—	9421LD74	—	—	—	—
PowerPact M & P *[2]*	3	1200	*[5]*	9421LHP8 *[4]*	9421LW7	7.19–11.63	9421LS8	7.19–22.25	9421LS10

Table 8.91: NEMA 4 and 4X Handle Assemblies

Use With			Standard Handle Assemblies		Special 3 in. Version	
Circuit Breaker or Interrupter Type	No. of Poles	Frame Size (A)	NEMA 1, 3R, 4, 12 (Painted)	NEMA 1, 3R, 4, 4X, 12 (Chrome Plated)	NEMA 1, 3R, 4, 12 (Painted)	NEMA 1, 3R, 4, 4X, 12 (Chrome Plated)
			Cat. No.	Cat. No.	Cat. No.	Cat. No.
PowerPact B	2–3	125	9421LH46	9421LC46	9421LH43	9421LC43
PowerPact H and J; NSF	2–3	250	9421LH46	9421LC46	9421LH43	[illegible]
PowerPact D and L	2–3	600	9421LH46	9421LC46	3 in. handles are not recommended for use with these circuit breakers.	
PowerPact M and P	3	1200	9421LHP48	9421LCP48		

3 in. Handle Assembly

Standard Handle Assembly

Handle Mechanisms

Table 8.92: Auxiliary and Alarm Switches for PowerPact™ Circuit Breakers

Description	B-Frame	H- and J-Frame	D- and L-Frame	D- and L-Frame
1 Auxiliary Switch 1a 1b	LV26950	S29450	S29450	S29450
2 Auxiliary Switch 2a 2b	—	2 x S29450	2 x S29450	2 x S29450
3 Auxiliary Switch 3a 3b	—	—	3 x S29450	3 x S29450

NOTE: The location of the accessory in the circuit breaker determines its function.

[1] Mounting depth measured in inches from circuit breaker mounting surface (control panel) to outside of enclosure door.
[2] These circuit breaker operating mechanisms must use the 9421LHP•• or LCP•• handles only.
[3] Type LW1 and LW4 include an 8 in. handle (9421LHP8) rather than a 6 in. handle.
[4] For a red handle and yellow bezel, add suffix RY to catalog number, e.g., 9421LH6RY.
[5] 3 in. handles are not recommended for use with these circuit breakers.

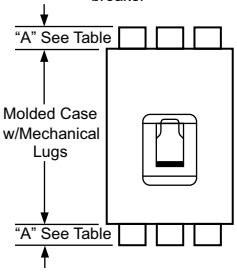
PDC6HD6

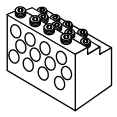
PDC6JD4

PDC3HD2

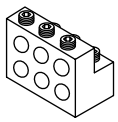
PDC3JD20

Crimp lugs or PDC connectors extension "A" past end of circuit breaker





PDC12P4



PDC6P20

Power Distribution Connectors

Power distribution connectors (PDCs) can be used for multiple load w
one circuit breaker in place of standard distribution block to save space and time.

The connectors are attached to circuit breaker terminals equipped with separately provided terminal nut connectors.*[29]*

Applications:

- For use on load end of circuit breaker only
- For use in UL 508 Industrial Control applications
- For use in UL 1995/CSA C22.2 No. 236 heating and cooling equipment
- For copper wire only

Table 7.108: Power Distribution Connectors for B-Frame, H-Frame, J-Frame and L-Frame Circuit Breakers *[30]*

Use with Circuit Breaker Type	Ampere Rating	(Wires Per Terminal) Wire Range	Dimension A (in.)	Cat. No.	Qty. Per Kit	Kit Contents
BD, BG, BJ	125 A	(3) 14 - 2 AWG	1.2	PDC3BD2	3	Mounting hardware, lugs
	125 A	(6) 14 - 6 AWG	1	PDC6BD6	3	
HD, HG, HJ, HL *[31]*	15–150 A	(6) 14–6 AWG Cu	1.0	PDC6HD6	3	Mounting hardware, lugs, special purpose label and instructions
	15–150 A	(3) 14–2 AWG Cu	1.2	PDC3HD2	3	
JD, JG, JJ, JL *[31]*	150–250 A	(6) 14–4 AWG Cu	1.0	PDC6JD4	3	
	150–250 A	(2) 14–1 AWG and (1) 3–2/0 AWG Cu	1.5	PDC3JD20	3	
LD, LG, LJ, LL *[32]*	150–600 A	(3) 14–1 AWG and (2) 3–2/0 AWG	1.28	PDC5DG20L3	3	Mounting hardware, lugs, special purpose label, Medium Terminal Shield and instructions
	150–600 A	(12) 14–4 AWG	1.31	PDC12DG4L3	3	Mounting hardware, lugs, special purpose label, Long Terminal Shield and instructions

Table 7.109: Power Distribution Connectors for M-Frame and P-Frame Circuit Breakers *[30]*

	Ampere Rating	(Wires Per Terminal) Wire Range	Cat. No.	Qty Per Kit	Kit Contents
Use for multiple load connections on one circuit breaker in place of standard distribution block to save space and time. • Use on load end of circuit breaker only • Use in UL508 Industrial Control applications only. • Use in UL1995/CSA C22.2 No. 236 heating and cooling equipment. • For Cu wire only.	250–1200 A	(6) 12–2/0 AWG Cu	PDC6P20	3	Mounting hardware, lugs, special purpose label and instructions
		(6) 12–2/0 AWG Cu	PDC6P204	4	Mounting hardware, lugs, special purpose label and instructions
	250–1200 A	(12) 10–4 AWG Cu	PDC12P4	3	Mounting hardware, lugs, special purpose label and instructions
			PDC12P44	4	Mounting hardware, lugs, special purpose label and instructions

[29] Refer to Table xxxxxx: Terminal Shields and Phase Barriers

[30] Not for use with I-Line™ circuit breakers.

[31] Special Purpose—Not for General Use. Use on ON end of the circuit breaker only when ON end is used as Load end. Use on OFF end of the circuit breaker only when OFF end is used as Load end.

[32] Kit includes long terminal shield and cover, which adds 1.65 inches to standard lug with short terminal shield.

finder
SWITCH TO THE FUTURE

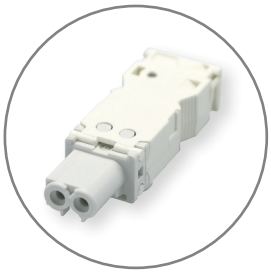
A-3

REPORT

7L Series
New LED Panel Light

NEW

Design by MINELLI | FOSSATI



Connector included

Finder's new LED light for electrical panels - with magnetic mount

- **"Two in One" mount - direct magnetic mount or through a screw-mounted metallic bracket**
- **Brightness levels: 600 or 1200 lumens**
- **Versions with: direct switching, ON/OFF switch, or motion detector**
- Power supply - Multi-voltage: (12 ... 48)V AC/DC and (110 ... 240)V AC/DC
- New design

Approvals

c UL us

finder-us.com

7L SERIES
New LED Panel Light

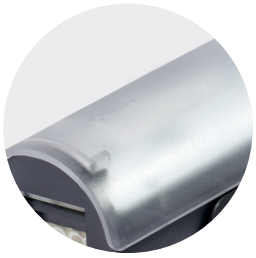
NEW

finder

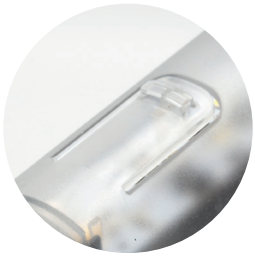
Type 7L.43 (600 lumens)
Type 7L.46 (1200 lumens)

- Direct magnetic mount or through a screw-mounted metallic bracket
- Power supply: (12 ... 48)V AC/DC and (110 ... 240)V AC/DC
- Nominal power consumption: 6 W (600 lm), 9 W (1200 lm)
- Radiation angle: 120°
- Light color: 5,000 K
- Protection category: IP20

Switching without ON/OFF switch or motion detector

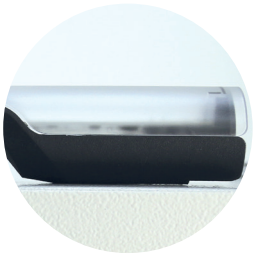


Switching via ON/OFF switch



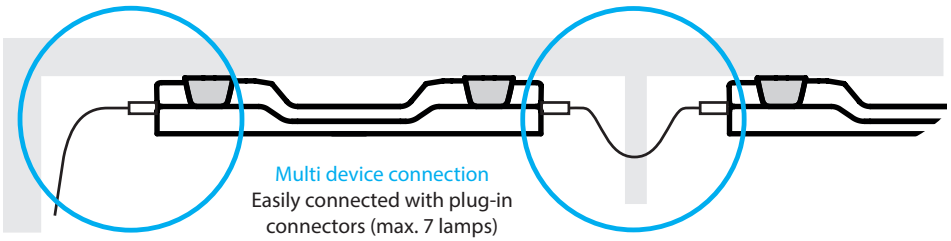
Switching via motion detector

Magnetic mount directly to metallic panel

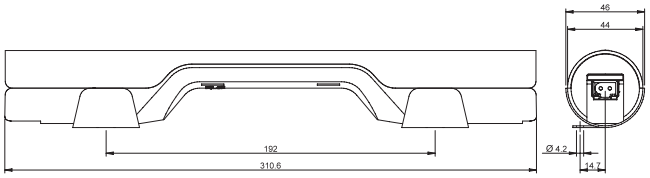


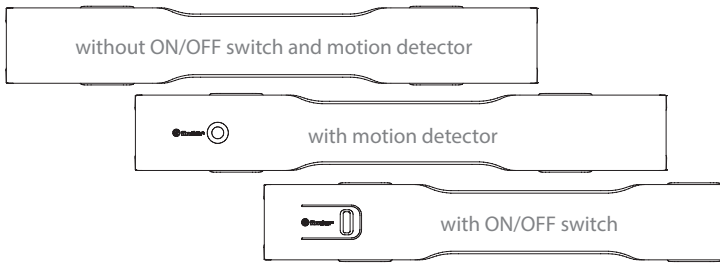
Magnetic mount via screw-mounted metallic bracket

Quick and simple wiring system via **push-in connectors** for the connection to a single unit, or via **plug-in connectors** for the connection to a single or multiple units.



Multi device connection
Easily connected with plug-in connectors (max. 7 lamps)





STOCK ITEMS

Part Number	Lumen	Supply voltage	Switching	Connections
7L.43.0.024.0100	600	(12 ... 48)V AC/DC	Without ON/OFF switch and PIR - motion detector	Push-in connection
7L.43.0.024.0200	600	(12 ... 48)V AC/DC	Without ON/OFF switch and PIR - motion detector	Plug-in connection
7L.43.0.230.0100	600	(110 ... 240)V AC/DC	Without ON/OFF switch and PIR - motion detector	Push-in connection
7L.43.0.230.0200	600	(110 ... 240)V AC/DC	Without ON/OFF switch and PIR - motion detector	Plug-in connection
7L.43.0.024.1100	**600**	**(12 ... 48)V AC/DC**	**ON/OFF switch**	**Push-in connection**
7L.43.0.024.1200	**600**	**(12 ... 48)V AC/DC**	**ON/OFF switch**	**Plug-in connection**
7L.43.0.024.2100	600	(12 ... 48)V AC/DC	PIR - motion detector	Push-in connection
7L.43.0.024.2200	600	(12 ... 48)V AC/DC	PIR - motion detector	Plug-in connection
7L.43.0.230.1100	**600**	**(110 ... 240)V AC/DC**	**ON/OFF switch**	**Push-in connection**
7L.43.0.230.1200	**600**	**(110 ... 240)V AC/DC**	**ON/OFF switch**	**Plug-in connection**
7L.43.0.230.2100	600	(110 ... 240)V AC/DC	PIR - motion detector	Push-in connection
7L.43.0.230.2200	600	(110 ... 240)V AC/DC	PIR - motion detector	Plug-in connection
7L.46.0.024.1100	1200	(12 ... 48)V AC/DC	ON/OFF switch	Push-in connection
7L.46.0.024.1200	1200	(12 ... 48)V AC/DC	ON/OFF switch	Plug-in connection
7L.46.0.024.2100	**1200**	**(12 ... 48)V AC/DC**	**PIR - motion detector**	**Push-in connection**
7L.46.0.024.2200	**1200**	**(12 ... 48)V AC/DC**	**PIR - motion detector**	**Plug-in connection**
7L.46.0.230.1100	1200	(110 ... 240)V AC/DC	ON/OFF switch	Push-in connection
7L.46.0.230.1200	1200	(110 ... 240)V AC/DC	ON/OFF switch	Plug-in connection
7L.46.0.230.2100	**1200**	**(110 ... 240)V AC/DC**	**PIR - motion detector**	**Push-in connection**
7L.46.0.230.2200	**1200**	**(110 ... 240)V AC/DC**	**PIR - motion detector**	**Plug-in connection**
07L.12	—	—	**Male connector**	—

TECHNICAL CATALOG

Low voltage AC drives

ABB general purpose drives
ACS580, 1 to 350 hp

Technical data

Mains connection	
Voltage and power range	3-phase, U_N 380 to 480 V, +10%/-15% ACS580-01: 1 to 350 hp (0.75 to 250 kW)
Frequency	from 48 to 63 Hz
Power factor	cosϕ = 0.98
Efficiency (at nominal power)	98%
Motor connection	
Voltage	0 to U_N, 3-phase
Frequency	0 to 500 Hz
Motor control	Scalar and vector control
Torque control	Torque step rise time: <10 ms with nominal torque Non-linearity: ± 5% with nominal torque
Speed control	Static accuracy: 20% of motor nominal slip Dynamic accuracy: 1% seconds with 100% torque step

Product compliance
CE Low Voltage Directive 2006/95/EC, EN 61800-5-1: 2007 Machinery Directive 2006/42/EC, EN 61800-5-2: 2007 EMC Directive 2004/108/EC, EN 61800-3: 2004 + A1: 2012 RoHS directive 2011/65/EU Quality assurance system ISO 9001 and Environmental system ISO 14001 Waste electrical and electronic equipment directive (WEEE) 2002/96/EC RoHS directive 2011/65/EU UL, EAC, RCM, UL, cUL

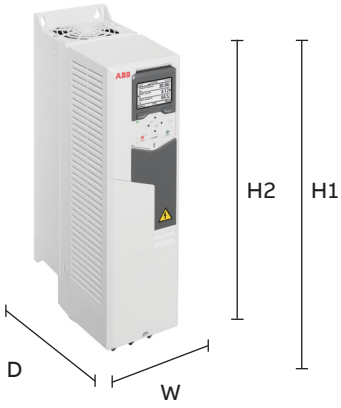
EMC according to EN 61800-3: 2004 + A1: 2012	
Frames R1 to R9 with built-in C2 category filter as standard	
Environmental limits	
Ambient temperature	
Transport **Storage**	-40 to +70 °C -40 to +70 °C
Operation area	ACS580-01: -15 to +50 °C. No frost allowed R1 to R9 from +40 to +50 °C with derating
Cooling method **Air-cooled**	Dry clean air
Altitude **0 to 1 ,000 m** **1,000 to 4,000 m**	 Without derating With derating of 1%/100 m
Relative humidity	5 to 95%, no condensation allowed
Degree of protection	ACS580-01: UL Type 1 (IP21) as standard. UL Type 12 (IP55) as option (frames R1 to R9)
Functional safety	Safe torque off (STO according EN 61800-5-2) IEC 61508 ed2: SIL 3. IEC 61511: SIL 3. IEC 62061: SIL CL 3. EN ISO 13849-1: PL e
Contamination levels	No conductive dust allowed
Storage	IEC 60721-3-1. Class 1C2 (chemical gases). Class 1S2 (solid particles)*
Operation	IEC 60721-3-3. Class 3C2 (chemical gases). Class 3S2 (solid particles)*
Transportation	IEC 60721-3-2. Class 2C2 (chemical gases) Class 2S2 (solid particles)*

*C = chemically active substances
S = mechanically active substances

Dimensions

ACS580-01 UL Type 1 (IP21)										
	Height				Width		Depth		Weight	
Frames	H1* in	mm	H2** in	mm	in	mm	in	mm	lb	kg
R1	14.7	373	13	331	4.9	125	8.8	223	10.6	4.8
R2	18.6	473	17	432	4.9	125	9	229	14.3	6.5
R3	19.3	490	---	---	8	203	9	229	26	11.8
R4	22.9	580	---	---	8	203	10.1	257	41.9	19
R5	28.8	732	23.5	596	8	203	11.6	295	62.4	28.3
R6	28.6	727	21.6	548	9.9	252	14.5	369	93.5	42.4
R7	34.6	880	23.6	600	11.2	284	14.6	370	119.1	54
R8	38	965	26.8	680	11.8	300	15.5	393	152.2	69
R9	37.6	955	26.8	680	15	380	16.5	418	213.9	97

* Front height of the drive with conduit box
** Front height of the drive without conduit box



ACS580-01 UL Type 12 (IP55) (option +B056)								
	Height*		Width		Depth		Weight	
Frames	in	(mm)	in	mm	in	mm	lb	kg
R1	15.9	403	5.6	128	9.2	233	11.25	5.1
R2	19.8	503	5.1	128	9.4	239	14.8	6.7
R3	19.3	490	8.1	206	9.3	237	28.7	13
R4	25	636	8	203	10.4	265	44.1	20
R5	28.9	732	8	203	12.6	320	64	29
R6	28.6	726	9.9	252	15	380	94.9	43
R7	34.7	880	11.2	284	15	380	123.5	56
R8	38	965	11.8	300	17.8	452	169.8	77
R9	37.6	955	15	380	18.8	380	227.1	103

* Front height of the drive with conduit box

Ratings, types and voltages

Wall-mounted drives, ACS580-01						
3-phase, U_N= 440, 460, 480 V						
		Max. output current	**Light overload use**		**Heavy-duty use**	
Type code	**Frame Size**	I_{max} **(A)**	I_{Ld} **(A)**	P_{Ld} **(hp)**	I_{Hd} **(A)**	P_{Hd} **(hp)**
ACS580-01-02A1-4	R1	2.9	2.1	1	1.6	0.75
ACS580-01-03A0-4	R1	3.8	3	1.5	2.1	1
ACS580-01-03A5-4	R1	5.4	3.5	2	3	1.5
ACS580-01-04A8-4	R1	6.1	4.8	3	3.4	2
ACS580-01-06A0-4	R1	7.2	6	3	4	3
ACS580-01-07A6-4	R1	8.6	7.6	5	4.8	3
ACS580-01-012A-4	R1	11.4	12	7.5	7.6	5
ACS580-01-014A-4	R2	19.8	14	10	11	7.5
ACS580-01-023A-4	R2	25.2	23	15	14	10
ACS580-01-027A-4	R3	37.8	27	20	21	15
ACS580-01-034A-4	R3	48.6	34	25	27	20
ACS580-01-044A-4	R3	61.2	44	30	34	25
ACS580-01-052A-4	R4	76	52	40	40	30
ACS580-01-065A-4	R4	104	65	50	52	40
ACS580-01-077A-4 ‡	*R4*	*122*	*77*	*60*	*65*	*50*
ACS580-01-078A-4	R5	122	77	60	65	50
ACS580-01-096A-4	R5	148	96	75	77	60
ACS580-01-124A-4	R6	178	124	100	96	75
ACS580-01-156A-4	R7	247	156	125	124	100
ACS580-01-180A-4	R7	287	180	150	156	125
ACS580-01-240A-4	R8	350	240	200	180	150
ACS580-01-260A-4	R8	418	260	200	240*	150
ACS580-01-302A-4 ‡	*R8*	*TBD*	*302*	*250*	*260*	*200*
ACS580-01-361A-4	R9	542	361	300	302	250
ACS580-01-414A-4	R9	542	414	350	361**	300

‡ Coming soon

Nominal ratings	
I_N	Rated current available continuously without overloadability at 40 °C.
P_N	Typical motor power in no-overload use.
Maximum output current	
I_{max}	Maximum output current. Available for 2 seconds at start, then as long as allowed by drive temperature.
Light-overload use	
I_{Ld}	Continuous current allowing 110% I_{Ld} for 1 minute every 10 minutes at 40 °C.
P_{Ld}	Typical motor power in light-overload use.
Heavy-duty use	
I_{Hd}	Continuous current allowing 150% I_{Hd} for 1 minute every 10 minutes at 40 °C. * Continuous current allowing 130% I_{Hd} for 1 minute every 10 minutes at 40 °C. ** Continuous current allowing 125% I_{Hd} for 1 minute every 10 minutes at 40 °C.
P_{Hd}	Typical motor power in heavy-duty use.

The ratings apply for the frames R1 to R9 up to +40 °C in enclosure class 21.
For derating at higher altitudes, temperatures, switching frequencies or enclosure classes, see the HW manuals, document codes: 3AXD50000018826 and 3AXD50000015497.

Control panel options

—
01 Assistant control panel is included as standard.
—
02 Optional Bluetooth panel. USB connection as standard.
—
03 By using the CDPI-01 panel adapter, the assistant control panel is able to manage up to 32 drives.

Assistant control panel
Set up the drive using the assistant control panel delivered as standard with all ACS580 drives. There is no need to know any drive parameters, as the control panel helps to set up the essential settings quickly and get the drive into action.

- Drive setup with the primary settings menu including embedded assistants
- Process monitoring with one glance at the control panel's editable home view showing you the status of the drive and process
- Drive maintenance with the help function providing context-sensitive guidance and troubleshooting instructions
- Drive diagnostics under the diagnostics menu informing the user of the root cause.

Bluetooth panel
The optional Bluetooth panel enables connection with the Drivetune mobile app. The app is available for free on the Google Play and the Apple App store.

Some of the Drivetune features are: commissioning, troubleshooting, monitoring and controlling the drive. Drivetune also has full parameter access.

— 01 — 02 — 03

—
Control panel options
Assistant control panel ACS-AP-S is included as standard in the delivery. ACS-AP-S (+J400) can be replaced by +J options below.

Option code	Description	Type designation
+J400	Assistant control panel (+J400 option automatically included)	ACS-AP-S
+J425	Industrial Assistant control panel*	ACS-AP-I
+J429	Control panel with Bluetooth interface*	ACS-AP-W
+J424	Blank control panel cover (no control panel delivered)	CDUM-01
3AXD50000004419	Panel bus adapter	CDPI-01
3AUA0000108878	Control panel mounting platform (flush mounted, requires also panel bus adapter on the drive)	DPMP-01
3AXD50000010763	Door mounting kit for the panel, surface mounted (for one drive, contains both DPMP-02 and CDPI-01)	DPMP-EXT

* Also compatible with ACS880 drives

Additional options

04 Cold configuration adapter CCA-01
—
05 Remote monitoring tool NETA-21
—
06 Drive composer PC tool

Safe configuration for unpowered drives
The CCA-01 cold configuration adapter provides a serial communication interface for unpowered ACS580 drives. With the adapter, safety isolation of both serial communication and control board power supply is possible. The power supply is taken from a PC USB port.

Remote monitoring access worldwide
The NETA-21 remote monitoring tool gives easy access to the drive via the Internet or local Ethernet network. NETA-21 comes with a built-in web server. Compatible with standard web browsers, it ensures easy access to a web-based user interface. Through the web interface, the user can configure drive parameters, and monitor drive log data, load levels, runtime, energy consumption, I/O data and bearing temperatures of the motor connected to the drive.

PC tools
The Drive composer PC tool offers fast and harmonized setup, commissioning and monitoring for all-compatible drives. The free version of the tool provides start-up and maintenance capabilities and gathers all drive information, such as parameter loggers, faults, backups and lists, into a support diagnostics file. Drive composer pro provides additional features such as custom parameter windows, graphical control diagrams of the drive's configuration, and improved monitoring and diagnostics.

—
04

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05


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06

Ordering code	Description	Type designation
3AXD50000019865	Cold configurator adapter, packed kit	CCA-01

—
Remote monitoring option

Ordering code	Description	Type designation
3AUA0000094517	2 x panel bus interface 2 x 32 = max. 64 drives 2 x Ethernet interface SD memory card USB port for WLAN/3G	NETA-21

Connectivity options

— 07 ACS580 is compatible with many fieldbus protocols
— 08 Input/output extension modules

Fieldbus adapter modules
The ACS580 general purpose drives are compatible with a wide range of fieldbus protocols. The drive comes with Modbus RTU fieldbus interface as standard. Fieldbus communication reduces wiring costs when compared to traditional hard-wired input/output connections.

—
07

Option code	Fieldbus protocol	Adapter
+K451	DeviceNet™	FDNA-01
+K454	PROFIBUS DP. DPV0/DPV1	FPBA-01
+K457	CANopen®	FCAN-01
+K458	Modbus RTU	FSCA-01
+K462	ControlNet	FCNA-01
+K469	EtherCAT®	FECA-01
+K470	POWERLINK	FEPL-02
+K473	EtherNet/IP™, Modbus TCP, PROFINET IO	FENA-11
+K475	Two port EtherNet/IP™, Modbus TCP, PROFINET IO	FENA-21

Input/output extension modules
Standard input and output can be extended by using optional analog and digital input/output extension modules. The modules are easily installed in the extension slots located on the drive.

—
08

I/O options

Option code	Description	Type designation
+L501	External 24 V AC and DC 2 x RO and 1 x DO	CMOD-01
+L523	External 24 V and isolated PTC interface	CMOD-02
+L512	115/230 V digital input 6 x DI and 2 x RO	CHDI-01
+L537	ATEX certified PTC interface and external 24V	CPTC-02

EMC – electromagnetic compatibility

Every ACS580 drive is equipped with a built-in filter to reduce high-frequency emissions. EMC product standard (EN 61800-3) category C2 is fulfilled in wall-mounted drives.

EMC standards
The EMC product standard (EN 61800-3) covers the specific EMC requirements stated for drives (tested with motor and motor cable) within the EU. EMC standards such as EN 55011 or EN 61000-6-3/4 are applicable to industrial and domestic equipment and systems, including the components inside the drive. Drive units complying with the requirements of EN 61800-3 are compliant with comparable categories in EN 55011 and EN 61000-6-3/4 but not necessarily vice versa. EN 55011 and EN 61000-6-3/4 do not specify cable length or require a motor to be connected as a load. The emission limits are comparable to EMC standards according to the table below.

Domestic environments versus public low voltage networks
The first environment includes domestic premises. It also includes establishments directly connected without an intermediate transformer to a low voltage power supply network that supplies buildings used for domestic purposes. The second environment includes all establishments directly connected to public low voltage power supply networks.

Comparison of EMC standards

EMC according to EN 61800-3 product standard	**EN 61800-3 product standard**	**EN 55011. product family standard for industrial, scientific and medical (ISM) equipment**	**EN 61000-6-4, generic emission standard for industrial environments**	**EN 61000-6-3, generic emission standard for residential, commercial and light-industrial environment**
1st environment, unrestricted distribution	Category C1	Group 1. Class B	Not applicable	Applicable
1st environment, restricted distribution	Category C2	Group 1. Class A	Applicable	Not applicable
2nd environment, unrestricted distribution	Category C3	Group 2. Class A	Not applicable	Not applicable
2nd environment, restricted distribution	Category C4	Not applicable	Not applicable	Not applicable

EMC compliance and maximum cable length of ACS580-01/07 units*

Type	**Voltage**	**Frame sizes**	**1st environment, restricted distribution, C2, grounded network (TN)**	**2nd environment, unrestricted distribution, C3, grounded network (TN)**	**2nd environment, unrestricted distribution, C3, ungrounded network (IT)**
ACS580-01	380 - 480 V	R1 - R5	Standard device, cable length 100 m	Standard device, cable length 100 m	-
ACS580-01	**380 - 480 V**	**R6 - R9**	**Standard device, cable length 150 m**	**Standard device, cable lenght 150 m**	**-**

* Motor cable operational functionality up to 300 m. See ACS580 hardware manuals 3AXD50000018826, 3AXD50000015497, 3AXD50000045815 and 3AXD50000032622 for frame specific information.

Cooling and fuses

Cooling
ACS580 drives are fitted with variable-speed cooling air fans. The cooling air must be free from corrosive materials and not exceed the maximum ambient temperature of 40°C for frames R1 to R9 (50°C with derating). The speed-controlled fans cool the drive only when needed, which reduces overall noise level and energy consumption.

Fuse connections
Standard fuses can be used with ABB general purpose drives. For input fuses, see the table below.

Wall-mounted drives, ACS580-01

Cooling air flow and recommended input protection fuses for 380 to 415 V units

Type designation	Frame size	Cooling Air Flow 380 to 480V units					Reccomended UL Input Protection fuses			
		Heat dissipation*		Air flow		Max. noise level**	I_N	Voltage rating	Bussmann type***	UL class
		W	BTU/Hr	m3/h	ft3/hr	dBA	A	V		
ACS580-01-02A1-4	R1	45	155	34	20	55	15	600	JJS-15	T
ACS580-01-03A0-4	R1	55	187	34	20	55	15	600	JJS-15	T
ACS580-01-03A5-4	R1	66	224	34	20	55	15	600	JJS-15	T
ACS580-01-04A8-4	R1	84	288	34	20	55	15	600	JJS-15	T
ACS580-01-06A0-4	R1	106	362	50	29	55	15	600	JJS-15	T
ACS580-01-07A6-4	R1	133	454	50	29	55	15	600	JJS-15	T
ACS580-01-012A-4	R1	174	593	50	29	55	15	600	JJS-15	T
ACS580-01-014A-4	R2	228	777	128	75	66	30	600	JJS-30	T
ACS580-01-023A-4	R2	322	1100	128	75	66	30	600	JJS-30	T
ACS580-01-027A-4	R3	430	1469	179	105	70	40	600	JJS-40	T
ACS580-01-034A-4	R3	525	1791	179	105	70	50	600	JJS-50	T
ACS580-01-044A-4	R3	619	2114	179	105	70	60	600	JJS-60	T
ACS580-01-052A-4	R4	835	2852	134	79	69	80	600	JJS-80	T
ACS580-01-065A-4	R4	1024	3497	134	79	69	90	600	JJS-90	T
ACS580-01-077A-4 ‡	*R4*	*1240*	*4235*	*139*	*82*	*63*	*110*	*600*	*JJS-110*	*T*
ACS580-01-078A-4	R5	1240	4235	139	82	63	110	600	JJS-110	T
ACS580-01-096A-4	R5	1510	5157	139	82	63	150	600	JJS-150	T
ACS580-01-124A-4	R6	1476	5041	435	256	67	200	600	JJS-200	T
ACS580-01-156A-4	R7	1976	6748	450	265	67	225	600	JJS-225	T
ACS580-01-180A-4	R7	2346	8012	450	265	67	300	600	JJS-300	T
ACS580-01-240A-4	R8	3336	11393	550	324	65	350	600	JJS-350	T
ACS580-01-260A-4	R8	3936	13422	550	324	65	400	600	JJS-400	T
ACS580-01-302A-4 ‡	*R8*	*4836*	*16516*	*1150*	*677*	*68*	*500*	*600*	*JJS-500*	*T*
ACS580-01-361A-4	R9	4836	16516	1150	677	68	500	600	JJS-500	T
ACS580-01-414A-4	R9	6036	20614	1150	677	68	600	600	JJS-600	T

‡ Coming soon
* Heat dissapation value is a reference for cabinet thermal design
** The maximum noise level is at full fan speed. When the drive is not operating at full load and at maximum ambient temperature the noise level is lower.
***ABB does not require Bussmann brand fuses. Fuses which meet the appropriate UL class type, current rating, and are rated at 600V, 200 kA may be used.

dv/dt filters

dv/dt filtering suppresses inverter output voltage spikes and rapid voltage changes that stress motor insulation. Additionally, dv/dt filtering reduces capacitive leakage currents and high-frequency emissions from the motor cable as well as high-frequency losses and bearing currents in the motor.

The need for dv/dt filtering depends on the motor insulation. For information on the construction of the motor insulation, consult the manufacturer. More information on the dv/dt filters can be found in the ACS580 hardware manual.

External dv/dt filter for ACS580-01

	du/dt filter type * 3 filters included, dimensions apply to one filter.		
ACS580 480 V	**Unprotected IP00**	**Protected to IP22**	**Protected to IP54**
ACS580-01-02A1-4	V1K4A00	V1K4A01	V1K4A03
ACS580-01-03A0-4	V1K4A00	V1K4A01	V1K4A03
ACS580-01-03A5-4	V1K6A00	V1K6A01	V1K6A03
ACS580-01-04A8-4	V1K6A00	V1K6A01	V1K6A03
ACS580-01-06A0-4	V1K8A00	V1K8A01	V1K8A03
ACS580-01-07A6-4	V1K12A00	V1K12A01	V1K12A03
ACS580-01-012A-4	V1K18A00	V1K18A01	V1K18A03
ACS580-01-014A-4	V1K25A00	V1K25A01	V1K25A03
ACS580-01-023A-4	V1K27A00	V1K27A01	V1K27A03
ACS580-01-027A-4	V1K35A00	V1K35A01	V1K35A03
ACS580-01-034A-4	V1K45A00	V1K45A01	V1K45A03
ACS580-01-044A-4	V1K55A00	V1K55A01	V1K55A03
ACS580-01-052A-4	V1K80A00	V1K80A01	V1K80A03
ACS580-01-065A-4	V1K80A00	V1K80A01	V1K80A03
ACS580-01-077A-4 ‡	V1K110A00	V1K110A01	V1K110A03
ACS580-01-078A-4	V1K110A00	V1K110A01	V1K110A03
ACS580-01-096A-4	V1K130A00	V1K130A01	V1K130A03
ACS580-01-124A-4	V1K160A00	V1K160A01	V1K160A03
ACS580-01-156A-4	V1K200A00	V1K200A01	V1K200A03
ACS580-01-180A-4	V1K250A00	V1K250A01	V1K250A03
ACS580-01-240A-4	V1K305A00	V1K305A01	V1K305A03
ACS580-01-260A-4	V1K305A00	V1K305A01	V1K305A03
ACS580-01-302A-4 ‡	V1K362A00	V1K362A01	V1K362A03
ACS580-01-361A-4	V1K362A00	V1K362A01	V1K362A03
ACS580-01-414A-4	V1K420A00	V1K420A01	V1K420A03

‡ *Coming soon*

Dimensions and weights of the dv/dt filters

du/dt filter	Height in	Width in	Depth in	Weight lb
V1K4A00	9	5.5	7.25	8
V1K8A00	9	5.5	7.25	8
V1K12A00	9	5.5	7.25	8
V1K18A00	9	5.5	8.25	12
V1K25A00	9	5.5	8.25	12
V1K27A00	9	5.5	8.25	14
V1K35A00	12	8	9	17
V1K45A00	12	8	9	17
V1K55A00	12	8	9	23
V1K110A00	12	8	10.25	40
V1K130A00	8.5	11	9.5	55
V1K160A00	8.5	11	10.5	60
V1K200A00	8.5	11	10.25	60
V1K250A00	8.5	11	10.25	65
V1K305A00	8.75	11	12.25	80
V1K362A00	8.5	11.75	12	80
V1K420A00	10	11.75	13.75	95
V1K4A01	9	5.5	10	11
V1K8A01	9	5.5	10	11
V1K12A01	9	5.5	10	11
V1K18A01	9	5.5	10	15
V1K25A01	9	5.5	10	15
V1K27A01	9	5.5	10	15
V1K35A01	12	8	11.5	23
V1K45A01	12	8	11.5	23
V1K55A01	12	8	11.5	23
V1K110A01	16.5	18	15	68
V1K130A01	16.5	18	15	83
V1K160A01	16.5	18	15	83
V1K200A01	16.5	18	15	93
V1K250A01	16.5	18	15	93
V1K305A01	16.5	18	30	117
V1K362A01	16.5	18	30	117
V1K420A01	16.5	18	30	132
V1K4A03	11.45	10	12	25
V1K8A03	11.45	10	12	25
V1K12A03	11.45	10	12	25
V1K18A03	11.45	10	12	25
V1K25A03	11.45	10	12	29
V1K27A03	19.18	15.62	19.5	29
V1K35A03	19.18	15.62	19.5	56
V1K45A03	19.18	15.62	19.5	56
V1K55A03	19.18	15.62	19.5	56
V1K110A03	19.18	15.62	19.5	74
V1K130A03	19.18	15.62	19.5	89
V1K160A03	19.18	15.62	19.5	99
V1K200A03	19.18	15.62	19.5	99
V1K250A03	19.18	15.62	19.5	99
V1K305A03	22.15	20.62	28.5	109
V1K362A03	22.15	20.62	28.5	109
V1K420A03	22.15	20.62	28.5	156

Technical Data1029
Effective March 2017
Supersedes December 2016
BUSSMANN SERIES

JJS Limitron™ 600Vac, 1-800A, fast-acting Class T fuses

RoHS 2011/65/EU

Catalog Symbol:

- JJS-(amp)

Description:

Eaton's Bussmann™ series Limitron™ advanced protection Class T current-limiting, fast-acting fuses.

Specifications:

Ratings

- Volts — 600 Vac
- Amps — 1-800 A
- IR — 200 kA Vac RMS Sym.

Agency Information

- UL® Listed, Std. 248-15, Class T, Guide JDDZ, File E4273
- CSA® Certified, C22.2 No. 248.15, Class 1422-02, File 53787
- CE
- RoHS complaint

Catalog numbers (amps)			
JJS-1	JJS-30	JJS-90	JJS-250
JJS-2	JJS-35	JJS-100	JJS-300
JJS-3	JJS-40	JJS-110	JJS-350
JJS-6	JJS-45	JJS-125	JJS-400
JJS-10	JJS-50	JJS-150	JJS-450
JJS-15	JJS-60	JJS-175	JJS-500
JJS-20	JJS-70	JJS-200	JJS-600
JJS-25	JJS-80	JJS-225	JJS-800

Carton quantity

Amp rating	Carton qty.
Up to 60	10
70–100	5
110–800	1

Features:

- Provides 10X better current limitation to help prevent equipment damage caused by short-circuit events.
- 200 kA Interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast-acting fuse helps prevent equipment damage caused by short-circuit events.
- Small, space-saving fuses provide a high degree of current limitation on short-circuits for excellent component protection.
- Ideal for critical industrial or commercial applications that have specific current limitation requirements.

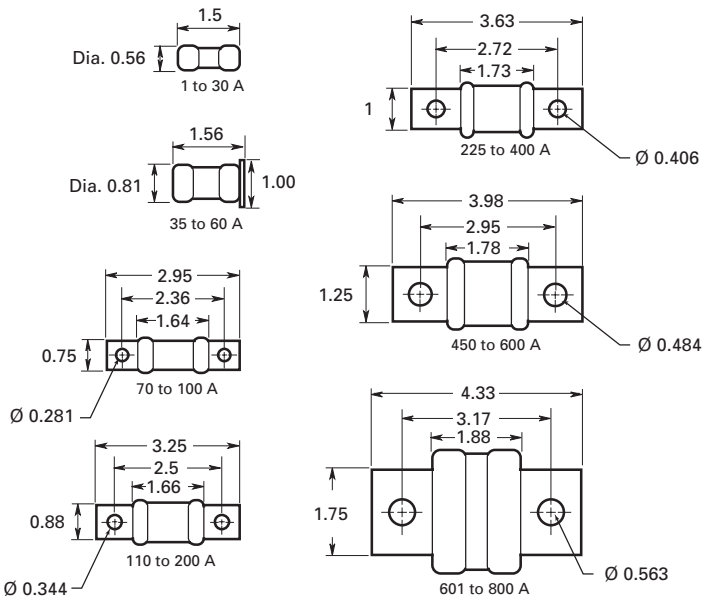
Recommended fuse blocks*

Amp rating	1-pole	2-pole	3-pole
up to 30	T60030-1_	T60030-2_	T60030-3_
35-60	T60060-1_	T60060-2_	T60060-3_
70-100	T60100-1_	T60100-2_	T60100-3_
110-200	T60200-1_	—	1B0089
225-400	T60400-1_	—	—
450-600	T60600-1_	—	—

* For additional information, see data sheet no. 1116.

Powering Business Worldwide

Dimensions – in

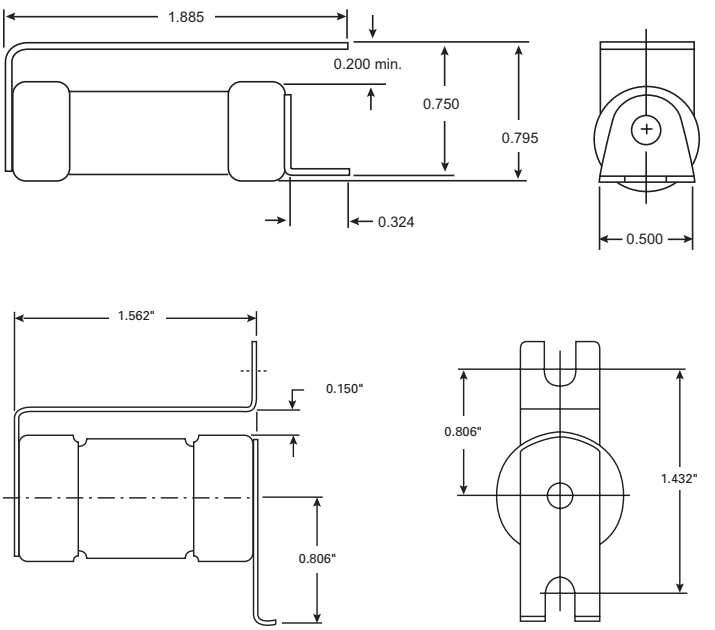


Custom designs

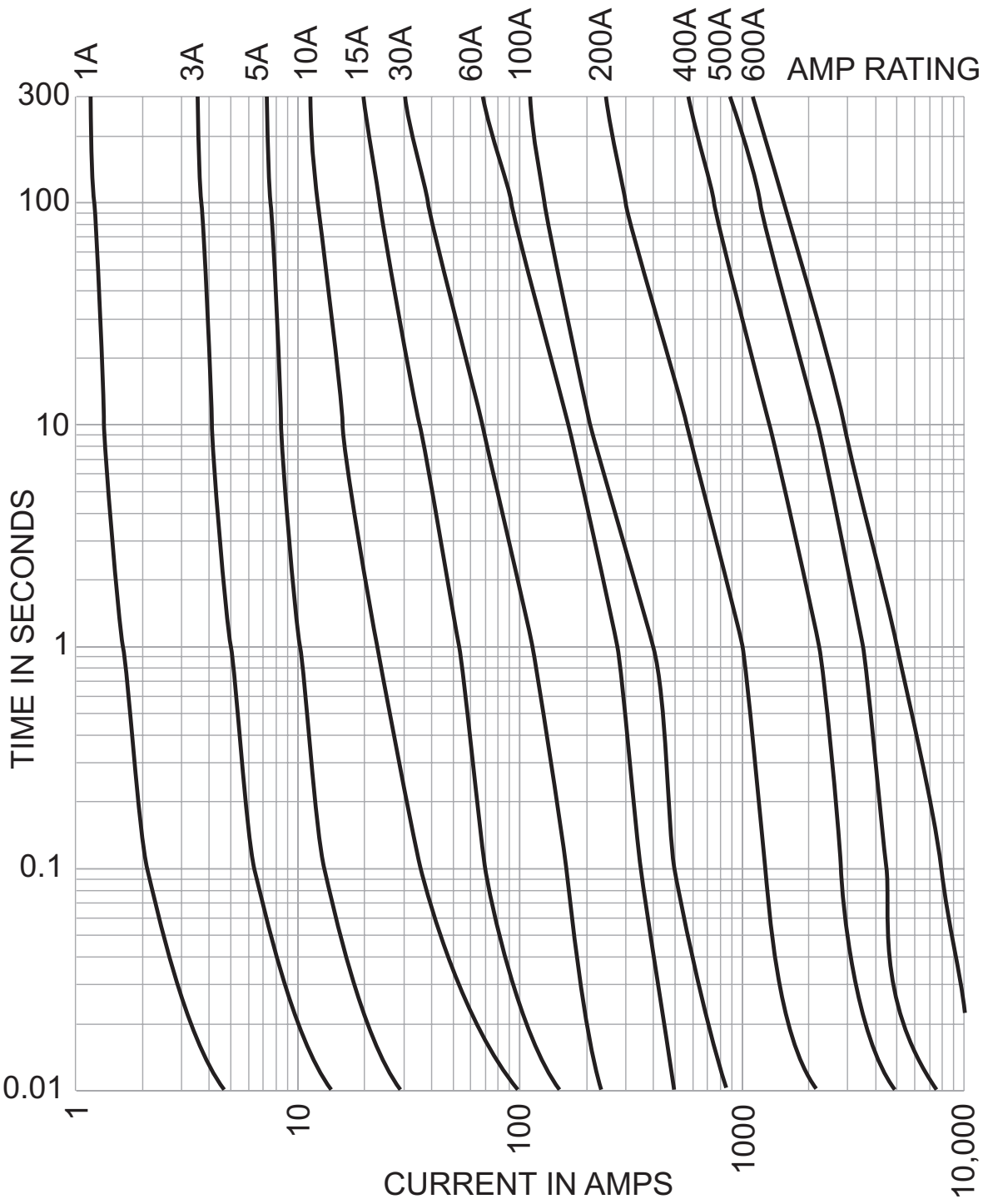
Printed circuit board versions available up to 60 amps. Consult your Bussmann series product representative for details.

UL Component Recognized, Guide JFHR2, File E56412.

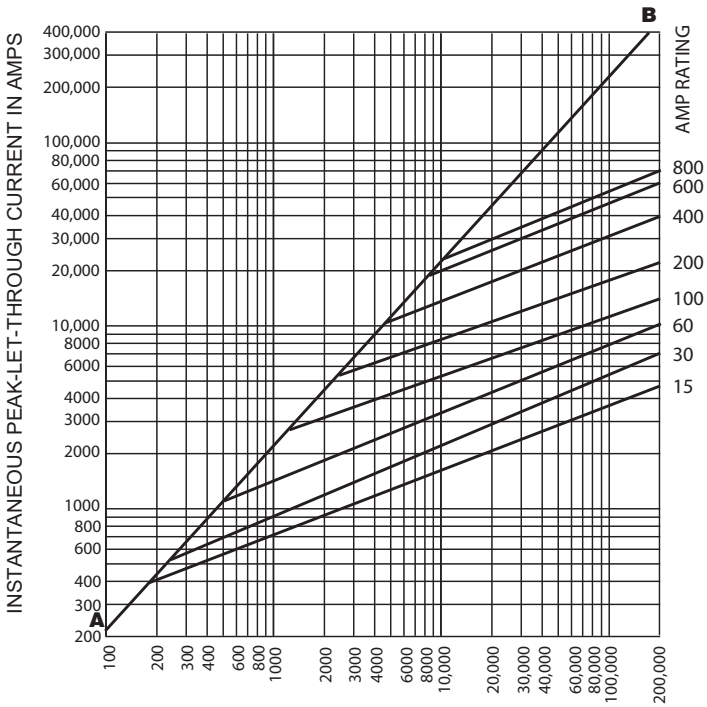
Dimensions — in



Time-current curves - average melt



Current-limitation curves



A-B = ASYMMETRICAL AVAILABLE PEAK (2.3 X SYM RMS AMPS)

Current-limiting effects

Prosp. S.C.C.	Let-through current (apparent RMS Sym. vs. fuse rating)							
—	15A	30A	60A	100A	200A	400A	600A	800A
500	1000	1000	1000	1000	1000	1000	1000	1000
1000	1000	1000	1000	1000	1000	1000	1000	1000
5000	1000	1000	1000	2000	3000	4000	5000	5000
10,000	1000	1000	1000	2000	3000	6000	8000	9000
15,000	1000	1000	2000	3000	4000	7000	10,000	11,000
20,000	1000	1000	2000	3000	4000	7000	10,000	12,000
25,000	1000	1000	2000	3000	5000	7000	11,000	13,000
30,000	1000	1000	2000	3000	5000	8000	12,000	14,000
35,000	1000	1000	2000	3000	5000	9000	13,000	15,000
40,000	1000	2000	2000	4000	5000	9000	13,000	15,000
50,000	1000	2000	2000	4000	6000	10000	14,000	17,000
60,000	1000	2000	3000	4000	6000	10000	16,000	18,000
70,000	1000	2000	3000	4000	7000	11000	17,000	19,000
80,000	1000	2000	3000	4000	7000	11000	17,000	20,000
90,000	1000	2000	3000	4000	7000	12000	18,000	21,000
100,000	2000	2000	3000	5000	7000	12,000	19,000	22,000
150,000	2000	3000	4000	6000	8000	14,000	22,000	25,000
200,000	2000	3000	4000	6000	9000	16,000	24,000	28,000

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United States
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For Eaton's Bussmann series product information, call **1-855-287-7626** or visit: **Eaton.com/bussmannseries**

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Powering Business Worldwide

LF SERIES CLASS T FUSE BLOCKS

300 V • 600 V

Description

The Littelfuse Class T fuse blocks offer many advantages such as space saving design, universal mounting holes, snap-to-release DIN rail mounts and available covers.

Features/Benefits

- Space-saving design
- Universal mounting holes for easy replacement
- One hand release from DIN rail for 30–60 A fuses
- Reinforced fuse clips are standard
- Covers available for most amperages to enhance safety

Specifications

Voltage Ratings	300 V/600 V
Ampere Ratings	0 – 600 A
Leakage Current	<0.6 mA at 600 V
Withstand Rating	200 kA RMS SYM
Flammability Rating	UL94 V-0
Approvals	UL Listed (File: E14721) CSA Certified (File: LR7316)
Environmental	RoHS Compliant, Lead (Pb) Free

Recommended Fuses

300 V JLLN
600 V JLLS

Web Resources

Sample requests, downloadable CAD drawings and other technical information:
littelfuse.com/lft
littelfuse.com/fuseblocks

Ordering Information (Class T 300 V)

AMP RATING	ORDERING NUMBER							TORQUE	WIRE RANGE	WIRE TYPE		BASE TEMP RATING	DIN RAIL MOUNT	COVER ORDERING NUMBER*
	BASE ORDERING NUMBER	POLES			TERMINAL SUFFIX									
		1	2	3	BOX LUG	PRESSURE PLATE	SCREW							
30	LFT30030	1	2	3	C	—	—	5.6 N-m (50 in-lbs) 2.8 N-m (25 in-lbs)	2-4 AWG 6-14 AWG	CU-AL	Solid/Stranded	125°C	•	LFT30030FBC
60	LFT30060	1	2	3	C	—	—	5.6 N-m (50 in-lbs) 2.8 N-m (25 in-lbs)	2-4 AWG 6-14 AWG			125°C	•	LFT30060FBC
100	LFT30100	1	—	3	CS	—	—	13.6 N-m (120 in-lbs) 4.5 N-m (40 in-lbs) 4.0 N-m (35 in-lbs)	2/0-6 AWG 8 AWG 10-14 AWG			130°C	—	LFT30100FBC
200	LFT30200	1	—	3	CS	—	—	31.1 N-m (275 in-lbs)	250 kcmil-6			130°C	—	—
400	LFT30400	1	—	3	CS	—	—	(2) 31.1 N-m (275 in-lbs)	250 kcmil-6			130°C	—	—
600	LFT30600	1	—	3	CS	—	—	(2) 42.4 N-m (375 in-lbs)	500 kcmil-6			130°C	—	—

Ordering Information (Class T 600 V)

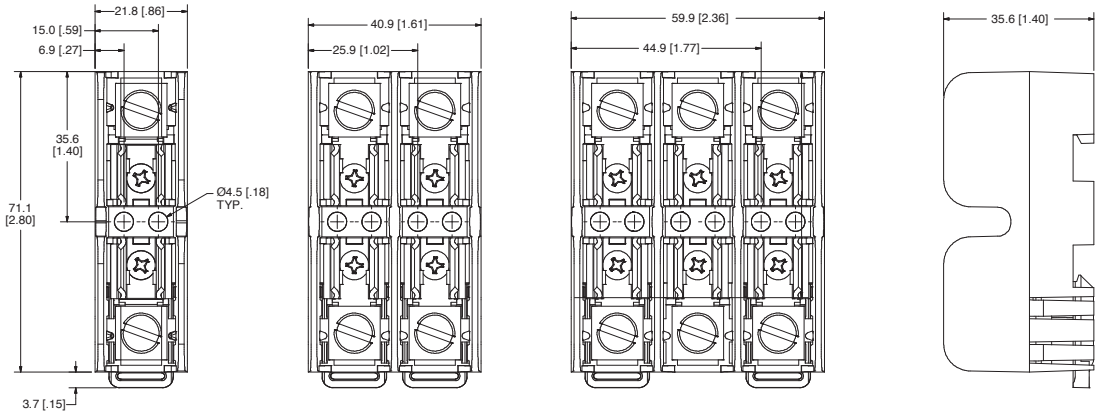
AMP RATING	ORDERING NUMBER							TORQUE	WIRE RANGE	WIRE TYPE		BASE TEMP RATING	DIN RAIL MOUNT	COVER ORDERING NUMBER*
	BASE ORDERING NUMBER	POLES			TERMINAL SUFFIX									
		1	2	3	BOX LUG	PRESSURE PLATE	SCREW							
30	LFT60030	1	2	3	C	P	S	5.6 N-m (50 in-lbs) 2.8 N-m (25 in-lbs)	2-4 AWG 6-14 AWG	† see note	Solid/Stranded	125°C	•	LFT60030FBC
60	LFT60060	1	2	3	C	—	—	5.6 N-m (50 in-lbs) 2.8 N-m (25 in-lbs)	2-4 AWG 6-14 AWG	CU-AL		125°C	•	LFT60060FBC
100	LFT60100	1	—	3	CS	—	—	13.6 N-m (120 in-lbs) 4.5 N-m (40 in-lbs) 4.0 N-m (35 in-lbs)	2/0-6 AWG 8 AWG 10-14 AWG			130°C	—	LT60100FBC
200	LFT60200	1	—	3	CS	—	—	31.1 N-m (275 in-lbs)	250 kcmil-6			130°C	—	LT60200FBC
400	LFT60400	1	—	3	CS	—	—	(2) 31.1 N-m (275 in-lbs)	250 kcmil-6			130°C	—	LT60400FBC
600	LFT60600	1	—	3	CS	—	—	(2) 42.4 N-m (375 in-lbs)	500 kcmil-6			130°C	—	LT60600FBC

** Covers sold individually. One cover needed for each pole.*
† Wire Type for Pressure Plate and Screw Terminal is CU only

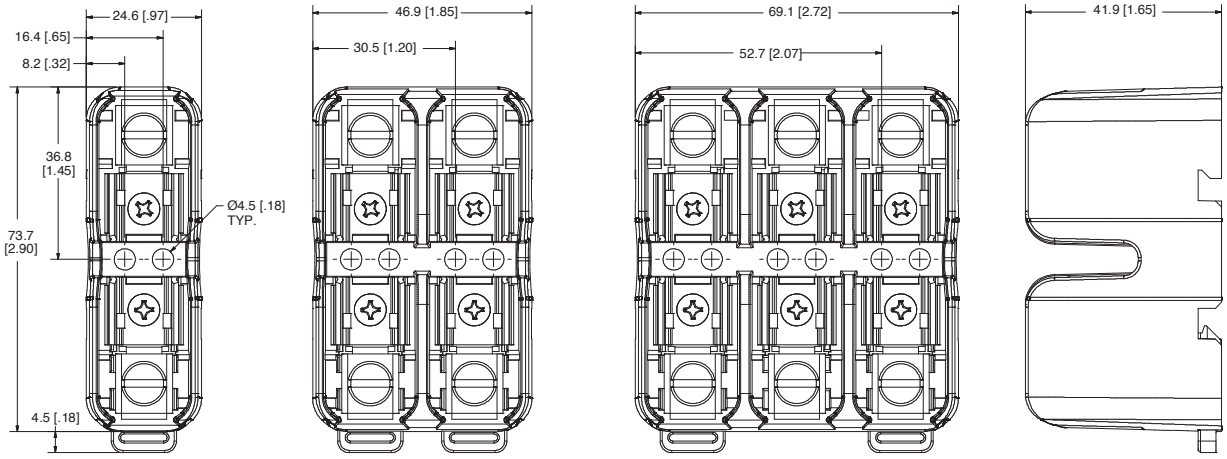
LF SERIES CLASS T FUSE BLOCKS

Dimensions mm (inches)

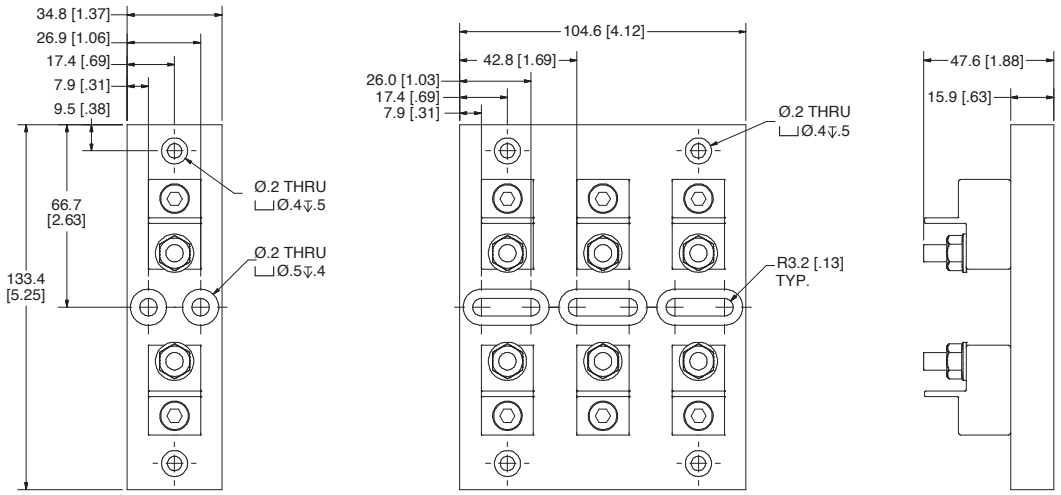
300 V 30 A



300 V 60 A



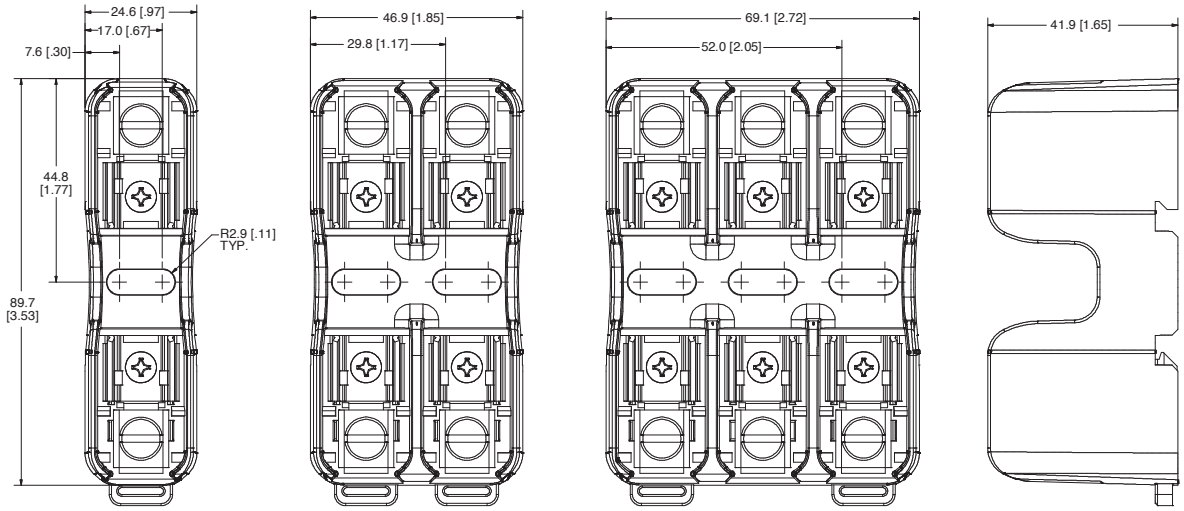
300 V 100 A



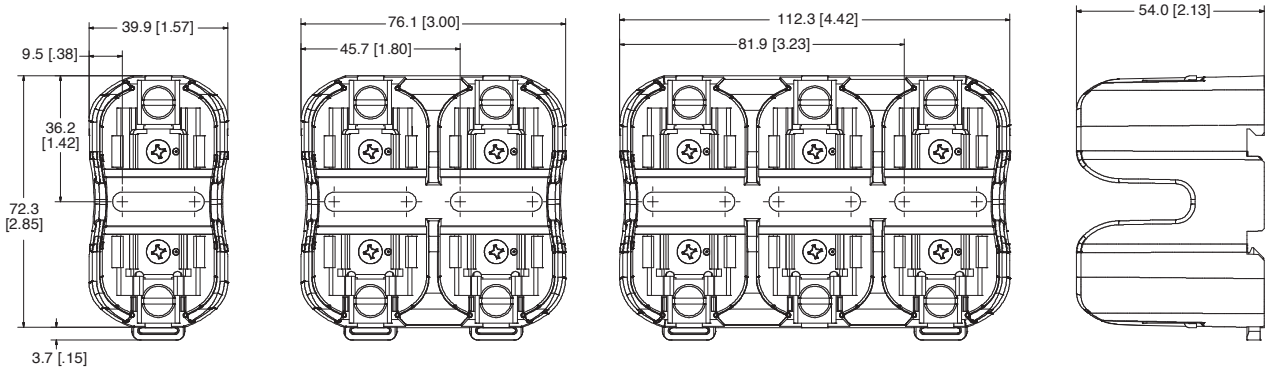
LF SERIES CLASS T FUSE BLOCKS

Dimensions mm (inches)

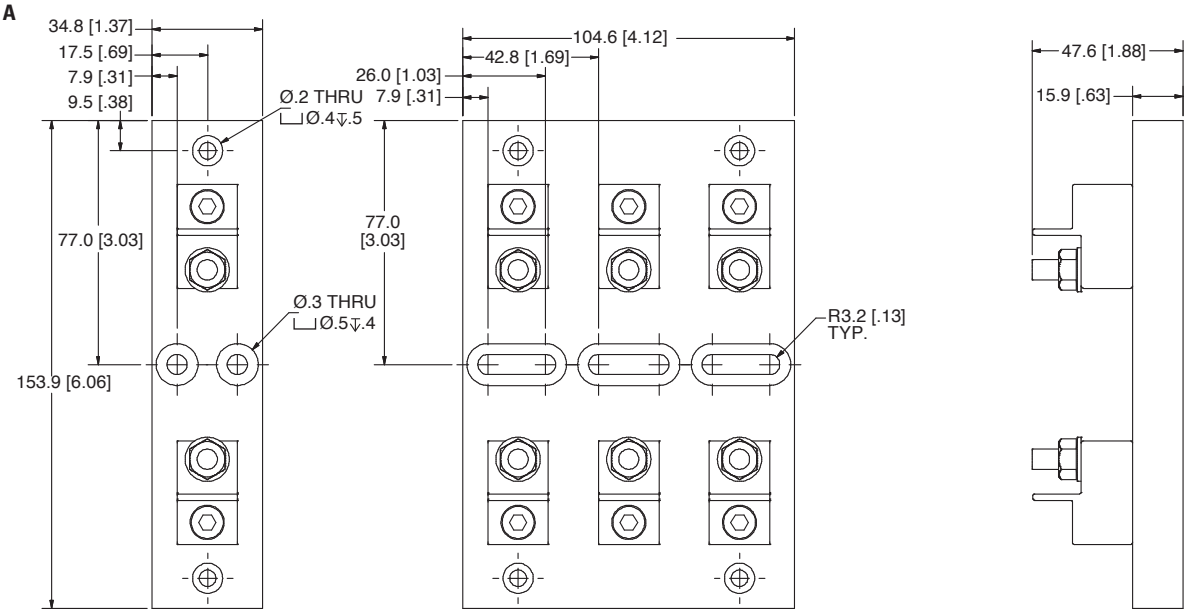
600 V 30 A



600 V 60 A



600 V 100 A



Type T and Type TF

Type T transformers are designed with low impedance windings for excellent voltage regulation and can accommodate the high inrush current associated with contactors, starters, solenoids, and relays. Type T transformers are manufactured using the most advanced insulating materials and are the best choice if size and cost are of concern.

Type TF transformers include factory-installed primary and secondary fuse blocks. Type TF transformers consist of two primary fuse blocks and one secondary fuse block. The primary includes rejection-style clips to increase the AIC ratings for the fuses. Since the fuse blocks are mounted on the top of the transformer, Type TF transformers are interchangeable with Type T transformers except for their increased height.

Selection Guide

1. Determine the inrush and sealed VA of each coil in the control circuit and the VA of all other components.
2. Total the **sealed** VA of all operating coils and the VA of all other loads. (This determines the minimum VA size required for the circuit.)
3. Total the **inrush** VA of all coils that are starting at the same time and all loads and coils that are running.
4. Locate a value in the VA column of Table 14.23 Regulation Chart for Type T, page 14-14, shown below, that is **equal to** or **greater than** the value calculated in step 2.
5. In the VA row selected in step 4, find the inrush value under the appropriate voltage regulation column of Table 14.23 Regulation Chart for Type T, page 14-14, shown below. If this value is **greater than** the calculated value from step 3, this is the correct transformer VA rating.

   If the inrush value on the selected VA row is **not greater than** the calculated value from step 3, use the next higher transformer VA rating, that is, the rating on the next row.

If your supply voltage is stable and fluctuates less than 5%, Schneider Electric recommends you use the 90% secondary voltage column. If your supply voltage is not stable and fluctuates more than 10% we recommend you use the 95% secondary voltage column. We recommend that you never use the 85% secondary voltage column since magnetic devices lose life expectancy if they are continuously started at 85% of rated voltage.

Table 14.23: Regulation Chart for Type T

VA	Inrush VA @ 20% power factor			Inrush VA @ 40% power factor		
	95% Secondary Voltage	90% Secondary Voltage	85% Secondary Voltage	95% Secondary Voltage	90% Secondary Voltage	85% Secondary Voltage
50	193	266	339	151	215	282
75	271	396	20	210	318	430
100	339	499	659	266	404	549
150	666	893	1120	529	731	942
200	588	815	1041	459	659	866
250	1416	1910	2388	1057	1494	1936
300	1634	2184	2709	1194	1681	2169
350	1894	2592	3261	1392	2005	621
500	3197	4104	4981	2374	3195	4019
750	3770	5515	7231	2887	4391	5945
1000	6587	9079	11430	4706	6886	9051
1500	19324	23983	28607	15066	19361	23756
2000	31384	38777	6161	24794	31630	38667
3000	26539	39934	52713	19355	30721	42216
5000	53111	85265	116277	39368	66309	93882

Table 14.24: 240 x 480 V Primary, 120 V Secondary; 230 x 460 V Primary, 115 V Secondary; 220 x 440 V Primary, 110 V Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D1	9070TF25D1	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D1	9070TF50D1	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D1	9070TF75D1	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D1	9070TF100D1	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D1	9070TF150D1	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D1	9070TF200D1	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D1	9070TF250D1	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D1	9070TF300D1	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D1	9070TF350D1	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D1	9070TF500D1	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D1	9070TF750D1	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D1	9070TF1000D1	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D1	9070TF1500D1	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D1	9070TF2000D1	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D1	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D1	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.25: 208 Vac Primary, 120 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D3	9070TF25D3	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D3	9070TF50D3	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D3	9070TF75D3	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D3	9070TF100D3	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D3	9070TF150D3	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D3	9070TF200D3	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D3	9070TF250D3	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D3	9070TF300D3	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D3	9070TF350D3	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D3	9070TF500D3	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D3	9070TF750D3	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D3	9070TF1000D3	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D3	9070TF1500D3	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D3	9070TF2000D3	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D3	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D3	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.26: 600 Vac Primary, 120 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D5	9070TF25D5	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D5	9070TF50D5	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D5	9070TF75D5	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D5	9070TF100D5	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D5	9070TF150D5	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D5	9070TF200D5	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D5	9070TF250D5	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D5	9070TF300D5	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D5	9070TF350D5	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D5	9070TF500D5	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D5	9070TF750D5	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D5	9070TF1000D5	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D5	9070TF1500D5	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D5	9070TF2000D5	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D5	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D5	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.27: 277 Vac Primary, 120 Vac Secondary

VA		Type T	Type TF*[1]*	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D4	—	2.5	2.58	66	—	—	3.00	76	3.09	79	FSC1
50	50	9070T50D4	—	2.5	2.58	66	—	—	3.00	76	3.09	79	FSC1
75	75	9070T75D4	—	3.8	2.89	73	—	—	3.38	86	3.34	85	FSC1
100	100	9070T100D4	—	3.8	2.89	73	—	—	3.38	86	3.34	85	FSC1
150	150	9070T150D4	—	5.5	3.20	81	—	—	3.75	95	3.59	91	FSC1
200	200	9070T200D4	—	5.5	3.20	81	—	—	3.75	95	3.59	91	FSC1
250	160	9070T250D4	—	7.1	3.20	81	—	—	3.75	95	5.30	135	FSC2
300	200	9070T300D4	—	8.5	3.84	98	—	—	4.50	114	4.74	120	FSC2
350	250	9070T350D4	—	10.5	3.84	98	—	—	4.50	114	5.11	130	FSC2
500	300	9070T500D4	—	11.9	3.84	98	—	—	4.50	114	5.49	139	FSC2
750	500	9070T750D4	—	11.0	4.51	115	—	—	5.25	133	5.61	143	FSC2
1000	630	9070T1000D4	—	20.6	4.51	115	—	—	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D4	—	34.0	6.17	157	—	—	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D4	—	47.0	6.17	157	—	—	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D4	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D4	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

[1] TF units are design for line to line voltages on the primary, 277 Vac is a line to neutral voltage.

Technical Data 2028
Effective December 2015
Supersedes April 2014
BUSSMANN SERIES

FNM 13/32″ x 1-1/2″ 250Vac time-delay supplemental fuses

RoHS

250Vac
1/10 to 30A

Catalog symbol / color code:

- FNM
  - Green (250Vac max)

Description:

Time-delay supplemental fuse.

For superior protection, Eaton recommends upgrading to Bussmann series Low-Peak™ Class CC fuses. See data sheet No. 1023.

Specifications:

Ratings

Fuse amp range	Interrupting rating at system voltage		Agency information	
	250Vac	125Vac	UL®	CSA®
1/10 to 1	35A	10kA	X	X
1-1/8 to 3-1/2	100A	10kA	X	X
4 to 10	200A	10kA	X	X
12 to 30	10kA	–	X	X

Agency information

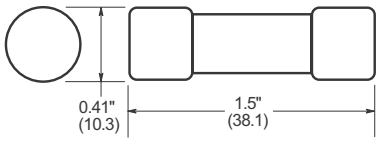
- CE
- UL Listed, Std. 248-14, Guide JDYX; File E19180
- CSA Certified, Class 1422-01, File 53787
- RoHS compliant

Catalog numbers (amps)			
FNM-1/10	FNM-8/10	FNM-2-1/2	FNM-6-1/4
FNM-1/8	FNM-1	FNM-2-8/10	FNM-7
FNM-15/100	FNM-1-1/8	FNM-3	FNM-8
FNM-2/10	FNM-1-1/4	FNM-3-2/10	FNM-9
FNM-1/4	FNM-1-4/10	FNM-3-1/2	FNM-10
FNM-3/10	FNM-1-1/2	FNM-4	FNM-12
FNM-4/10	FNM-1-6/10	FNM-4-1/2	FNM-15
FNM-1/2	FNM-1-8/10	FNM-5	FNM-20
FNM-6/10	FNM-2	FNM-5-6/10	FNM-25
FNM-3/4	FNM-2-1/4	FNM-6	FNM-30

Carton quantity

Amps	Qty.
1/10 to 30	10

Dimensions - in (mm):



Features

- Color coded green for 250Vac maximum voltage rating
- Melamine tube construction
- Nickel-plated endcaps

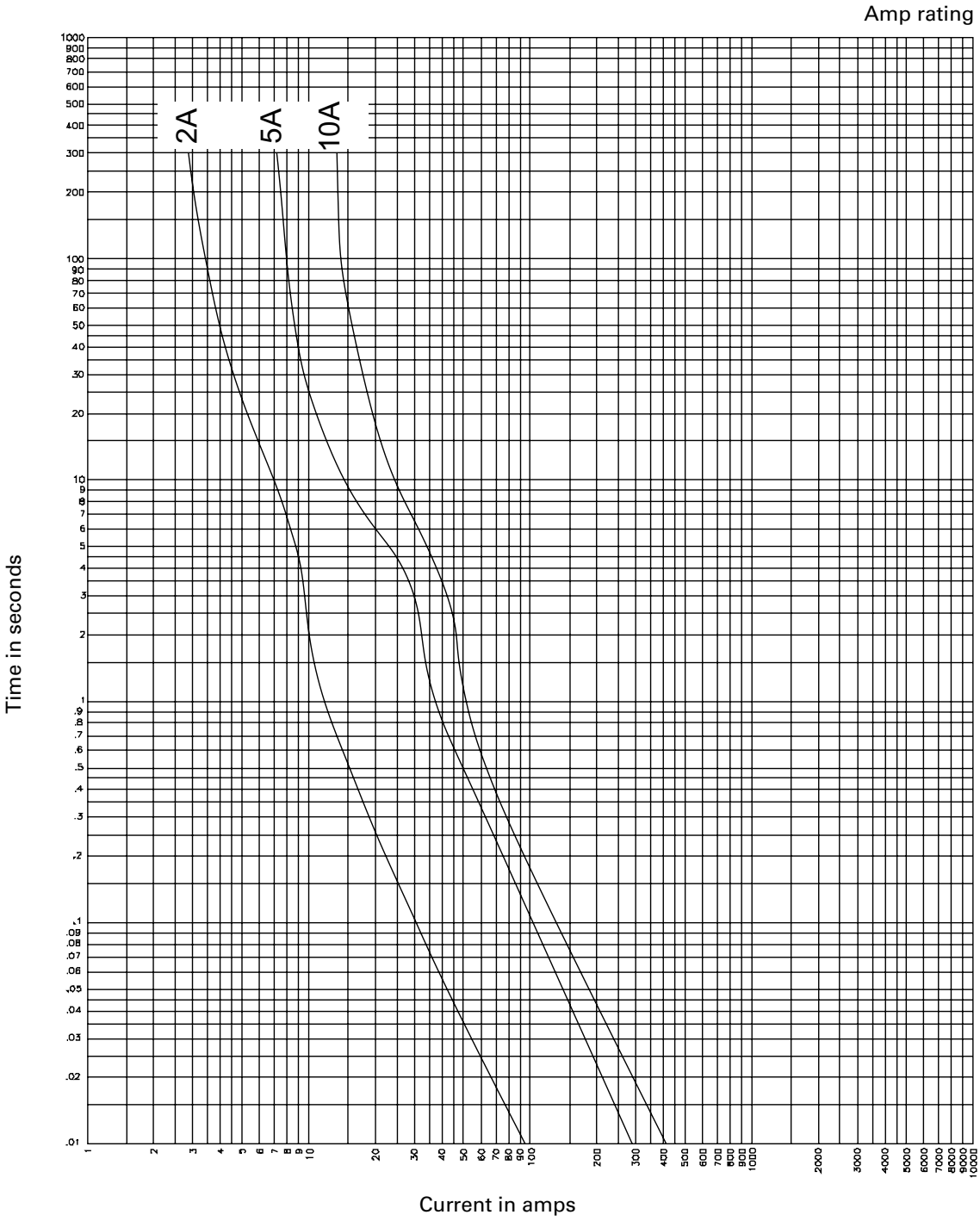
Typical applications

- Circuits with high inrush currents (motor/transformer loads)
- Supplemental protection for inductive circuits up to 250Vac.

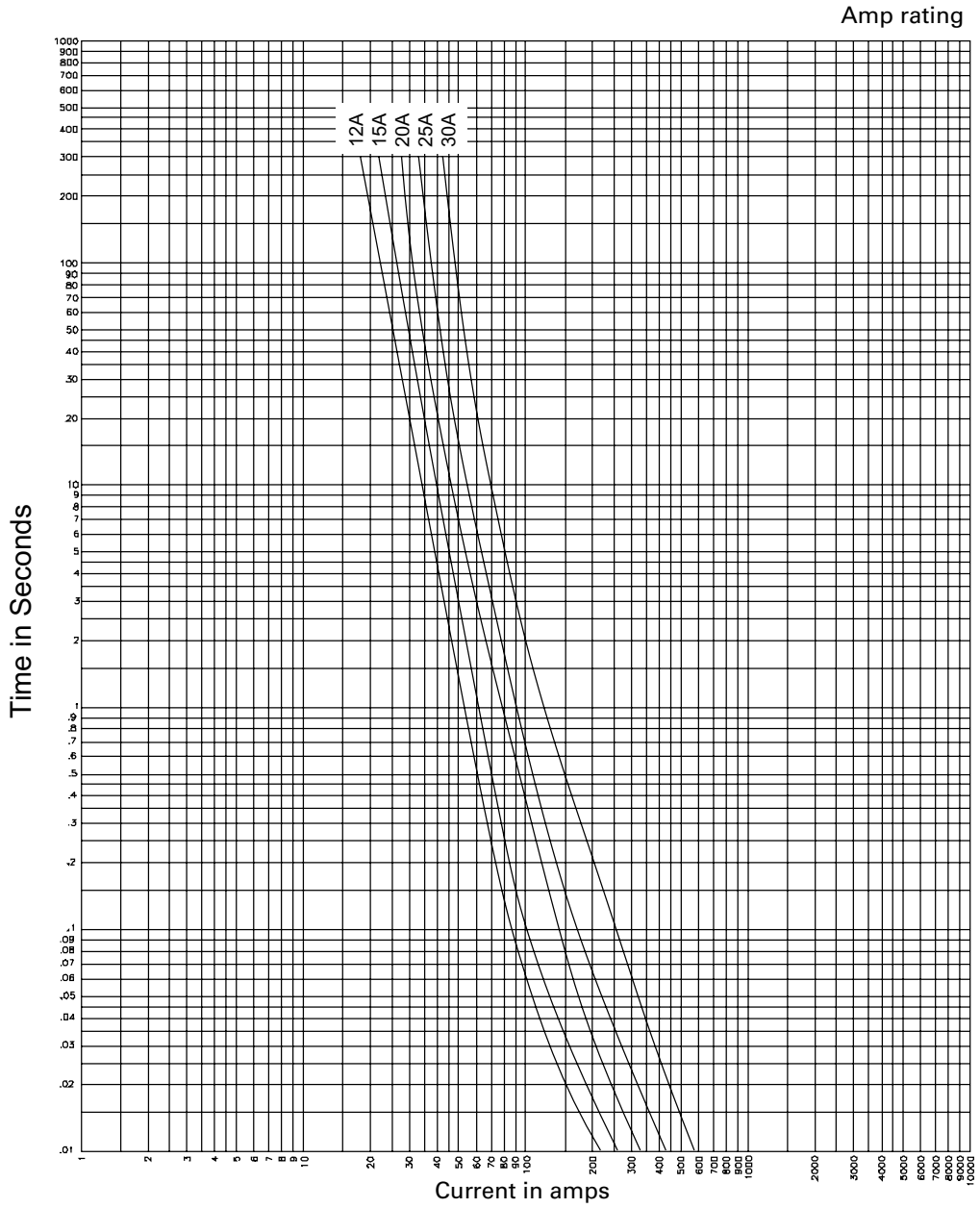
Recommended fuse blocks/fuse holders

Catalog symbol	Description	Data sheet No.
	Blocks	
BMM	1-, 2- and 3-pole modular blocks with optional covers	10235
DIN-Rail holders / switches		
CCP-_-30M	1-, 2- and 3-pole switch	1157
CHM	1-, 2- and 3-pole	3185
Optima NG	3-pole protection module	1109
Optima	3-pole holder	1102
Optima	3-pole holder + switch	1103
Panel mount holders		
HPM and HPM-D	1-pole holder	2112
HPC-D	1-pole holder	2109
HPS2	2-pole holder	2140
HPF, HPF-C and HPF-WT	1-pole holder	2114
HPS	1-pole holder	2113
HPG and HPD	1-pole holder	2108
In-line holders		
HEB	1-pole holder	2127
HEX	2-pole holder	2126
Fuseclips		
1A3400, 5956 and 5960	PCB fuseclips	2132
Fuse covers		
CVR(I)-CCM(-QC)	Finger-safe fuse cover	10235

Time-current characteristic curves – total clearing:



Time-current characteristic curves – average melt:



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Powering Business Worldwide

FNQ-R — 600Vac, ¼-30A, Time-Delay Fuses

Description: Advanced protection Class CC current-limiting, time-delay fuses.

Catalog Symbol: FNQ-R-(amp)

Ratings:

Volts — 600Vac
— 300Vdc (15 & 20A)
— 32Vdc (Self Certified)

Amps — ¼-30A

IR — 200kA Vac RMS Sym.
— 20kA Vdc (15 & 20A)

Agency Information:

CE, UL Listed, Std. 248-4, Class CC, Guide JDDZ, File E4273

CSA Certified, Class CC CSA, Class 1422-01, File 53787–HRC-MISC

RoHS Compliant*

* FNQ-R-¼ not RoHS complaint.

Catalog Numbers (amps)

FNQ-R-¼	FNQ-R-1 3/10	FNQ-R-3 3/10	FNQ-R-8
FNQ-R-3/10	FNQ-R-1 4/10	FNQ-R-3½	FNQ-R-9
FNQ-R-4/10	FNQ-R-1½	FNQ-R-4	FNQ-R-10
FNQ-R-½	FNQ-R-1 6/10	FNQ-R-4½	FNQ-R-12
FNQ-R-6/10	FNQ-R-1 8/10	FNQ-R-5	FNQ-R-15
FNQ-R-¾	FNQ-R-2	FNQ-R-5 6/10	FNQ-R-17½
FNQ-R-8/10	FNQ-R-2¼	FNQ-R-6	FNQ-R-20
FNQ-R-1	FNQ-R-2½	FNQ-R-6¼	FNQ-R-25
FNQ-R-1⅛	FNQ-R-2 8/10	FNQ-R-7	FNQ-R-30
FNQ-R-1¼	FNQ-R-3	FNQ-R-7½	

Carton Quantity and Weight

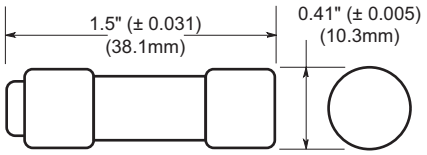
Amp Rating	Carton Qty.
¼-30	10

Maximum Acceptable Rating of Overcurrent Device†	
Rated Primary Current (Amps)	Maximum Rating of Overcurrent Protective Device Expressed As a Percent of Transformer Primary Current Rating
< 2A	500††
2A to 9A	167
> 9A	125

† UL 508A Table 42.1.

†† 300% for other than motor control applications.

Dimensions - in



Features:

- The Class CC FNQ-R Limitron fuse meets the needs of control circuit transformer protection
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents
- Rejection feature of FNQ-R fuses meets the need for a rejection type fuse in equipment where available fault current can exceed 10kA
- High inrush time-delay so control circuit transformers can experience inrush currents up to 85 times their full-load current rating.
- FNQ-R fuses can be sized according to NEC® and UL requirements and still allow the high inrush currents, with significantly more time-delay than the UL minimum value of 12 seconds at 200% for Class CC fuses
- Melamine tube
- Nickel-plated brass endcaps

Applications:

- Branch Circuits
- Small Control Transformers
- Line Protection
- Industrial Control

Recommended Fuse Blocks and Holders

Fuse Amps	1-Pole	2-Pole	3-Pole
	Open Blocks		
0-30	BC6031_	BC6032_	BC6033_
	DIN-Rail Holders		
0-30	CHCC1D_	CHCC2D_	CHCC3D_
	—	—	OPM-NG-_
	—	—	OPM-1038_
	—	—	OPM-1038_SW
	Panel Mount Holders		
0-30	HPS	—	—
	HPF	—	—
	In-Line Holders		
0-30	—	HEX	—
	HEZ	—	—

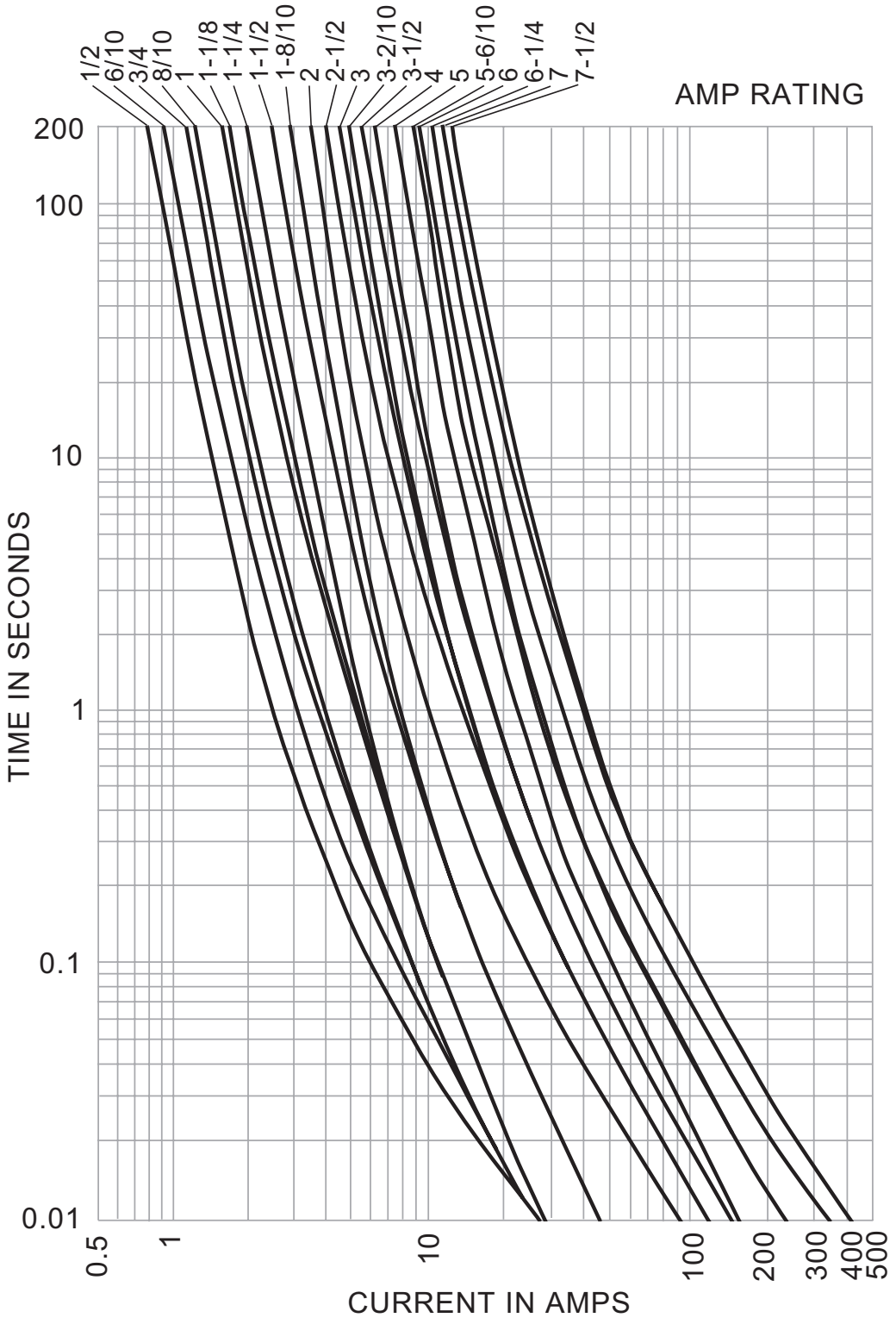
For additional information on Class CC fuse blocks and holders, see Data Sheets:

- Open Blocks # 1105 (BC Series)
- DIN-Rail Holders # 3185 (CHCC), # 1109 (OPM), # 1102 (OPM-1038), 1103 (OPM-1038_SW),
- Panel Mount Holders # 2113 (HPS), # 2114 (HPF)
- In-Line Holders # 2126 (HEX), # 2130 (HEZ)

FNQ-R — 600Vac, ¼-30A, Time-Delay Fuses

Time-Current Curves - Average Melt

½ to 7½ Amps



FNQ-R — 600Vac, ¼-30A, Time-Delay Fuses

Time-Current Curves - Average Melt

15 to 30 Amps

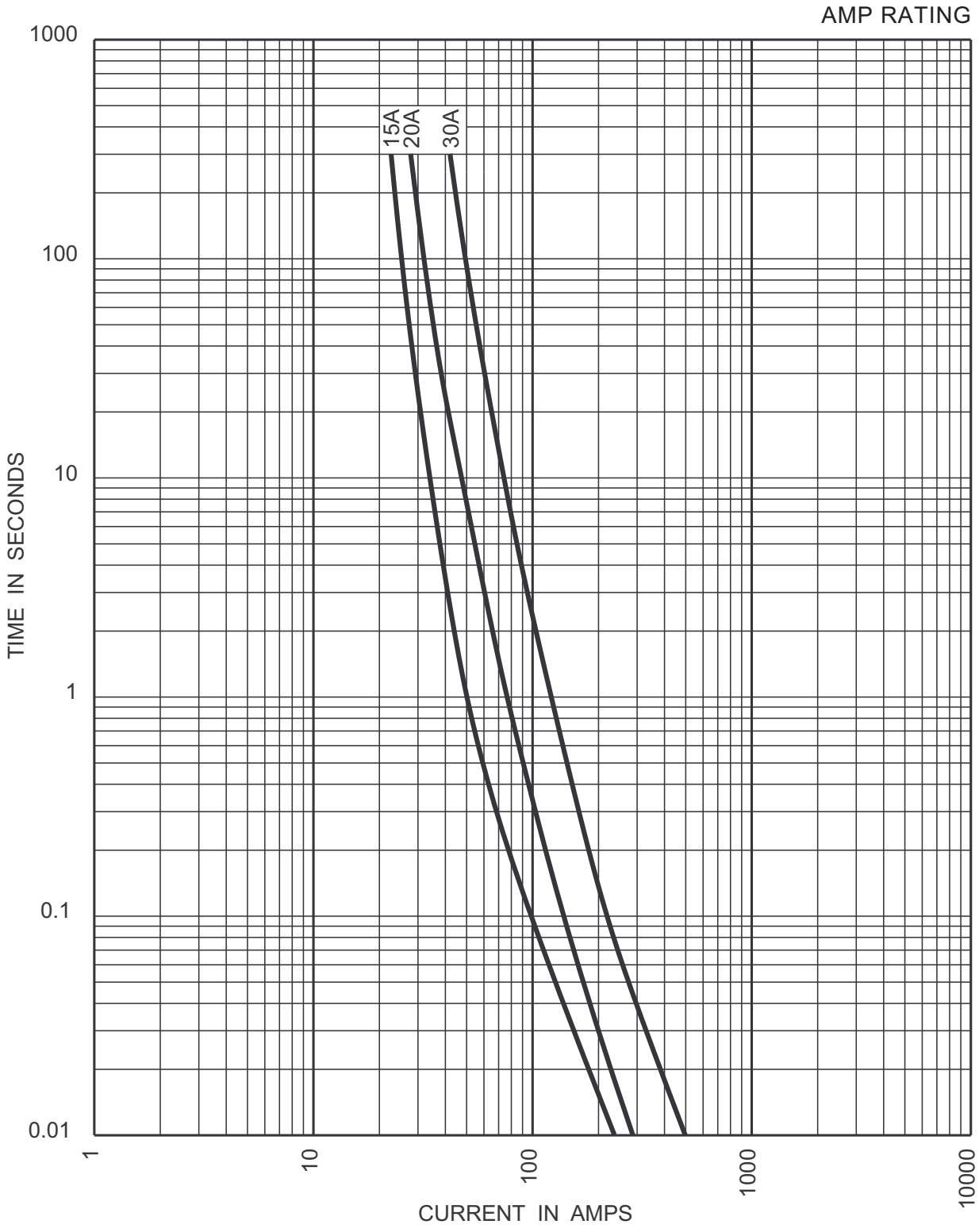


Table 14.28: 240 x 480 V Primary, 120/240 V Secondary; 230 x 460 V Primary, 115/230 V Secondary; 220 x 440 V Primary, 110/220 V Secondary

VA		Type T	Type TF[2]	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D31	9070TF25D31	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D31	9070TF50D31	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D31	9070TF75D31	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D31	9070TF100D31	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D31	9070TF150D31	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D31	9070TF200D31	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D31	9070TF250D31	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D31	9070TF300D31	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D31	9070TF350D31	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D31	9070TF500D31	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D31	9070TF750D31	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D31	9070TF1000D31	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D31	9070TF1500D31	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D31	9070TF2000D31	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D31	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D31	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.29: 600 Vac Primary, 120/240 Vac Secondary

VA		Type T	Type TF[2]	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D37	9070TF25D37	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D37	9070TF50D37	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D37	9070TF75D37	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D37	9070TF100D37	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D37	9070TF150D37	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D37	9070TF200D37	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D37	9070TF250D37	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D37	9070TF300D37	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D37	9070TF350D37	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D37	9070TF500D37	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D37	9070TF750D37	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D37	9070TF1000D37	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D37	9070TF1500D37	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D37	9070TF2000D37	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D37	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D37	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.30: 380/400/415 Vac Primary, 115/230 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Accesso-ry Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D33	9070TF25D33	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D33	9070TF50D33	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D33	9070TF75D33	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D33	9070TF100D33	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D33	9070TF150D33	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D33	9070TF200D33	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D33	9070TF250D33	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D33	9070TF300D33	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D33	9070TF350D33	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D33	9070TF500D33	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D33	9070TF750D33	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D33	9070TF1000D33	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D33	9070TF1500D33	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D33	9070TF2000D33	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D33	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D33	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Field Installed Fuse Blocks—Design for Line to Line Primary Voltages and Line to Neutral Secondary Voltages

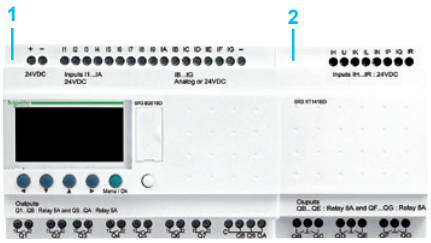
Table 14.31: Accessories

Catalog No.	Voltage Codes			Description	Order Qty
Fuse Kit					
—	D1, D2, D3, D4, D5, D13, D14,D15, D23, D31, D33, D37	D20, D32	D19, D50	—	—
9070FB3A	T25–T200	T25–T150	—	3-pole fuse block for primary and secondary fusing, accommodates 1-1/2 x 13/32 in. midget fuse (2 rejection and 1 non-rejection)	1
9070FB3B	T250–T3000	T250–T2000	T25–T2000		1
9070FB2A	T25–T200	T25–T150	—	2-pole fuse block for primary fusing, accommodates 1-1/2 x 13/32 in. midget fuse (2 rejection)	1
9070FB2B	T250–T3000	T250–T2000	T25–T2000		1
9070SF25A	T25–T200	T25–T150	—	Secondary fuse clips accommodates 1-1/4 x 1/4 in. fuse	10
9070SF25B	T250–T3000	T250–T2000	T25–T2000		10
9070SF41A	T25–T200	T25–T150	—	Secondary fuse clips accommodates 1-1/2 x 13/32 in. fuse	10
9070SF41B	T250–T3000	T250–T2000	T25–T2000		10
9070FB1A	T25–T200	T25–T150	—	Secondary fuse block accommodates 1-1/4 x 1/4 in. fuse	1
9070FB1B	T250–T3000	T250–T2000	T25–T2000		1
9070FP1	—	—	—	Fuse puller for TF and FB kits	10

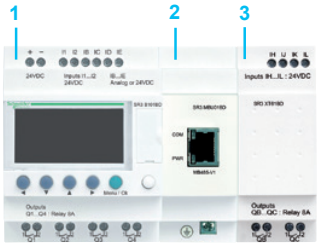
[2] TF designed for line to line primary and line to neutral secondary. If secondary connected in series, fuse block should be disconnected.

Zelio Logic compact smart relay

Combination of modular smart relays and extensions



1 Modular Zelio Logic smart relay (10 or 26 I/O)
2 Discrete (6, 10, or 14 I/O) or analog (4 I/O) I/O extension



1 Modular Zelio Logic smart relay (10 or 26 I/O)
2 Modbus serial link or Ethernet Modbus/TCP network communication extensions
3 Discrete (6, 10, or 14 I/O) or analog (4 I/O) I/O extension

⚠ *Observe the order of assembly above when using a Modbus slave or Ethernet server network communication extension and a discrete or analog I/O extension.*
An I/O extension cannot be inserted before a network communication extension.

Presentation

Zelio Logic smart relays are designed for use in small automated systems. They are used in both the industrial and commercial sectors.

■ **For industry:**
□ automation of small finishing, production, assembly, or packaging machines
□ small automated systems operating at 48 V ∿ (hoisting application, etc.)
□ decentralized automation of ancillary equipment for large and medium-sized machines (in the textile, plastics, materials processing sectors, etc.)
□ automation systems for agricultural machinery (irrigation, pumping, greenhouses, etc.)

■ **For the commercial/building sectors:**
□ automation of barriers, roller shutters, access control
□ automation of lighting systems
□ automation of compressors and air conditioning systems
□ etc.

Their compact size and ease of setup make them a competitive alternative to solutions based on cabled logic or specific cards.

■ **Programming**
Simple programming, backed up by the universal nature of the languages, meets the requirements of automation specialists and the needs of electricians.
Programming can be performed:
□ locally, using the buttons on the Zelio Logic smart relay (ladder language)
□ on a PC using “Zelio Soft 2” software
When using a PC, programming can be performed either in ladder language or in function block diagram (FBD) language (see page 10).

The LCD display unit backlight *(1)* is activated by pressing one of the 6 programming buttons on the Zelio Logic smart relay or by programming with “Zelio Soft 2” software (e.g. flashing when diagnosing a malfunction).

The clock has a lithium battery, which gives it an independent operating time of 10 years.
Data backup (preset values and current values) is provided by an EEPROM Flash memory (with the same lifetime as the smart relay).

Compact smart relays

Compact smart relays meet requirements for simple automation systems.
The number of I/O can be:
■ 12 or 20 I/O, supplied with 24 V ∿ or 12 V ⎓ power
■ 20 I/O, supplied with 48 V ∿ power
■ 10, 12, or 20 I/O, supplied with 100…240 V ∿ or 24 V ⎓ power

Modular smart relays and extensions

The number of I/O for modular smart relays can be:
■ 26 I/O, supplied with 12 V ⎓ power
■ 10 or 26 I/O, supplied with 24 V ∿, 100…240 V ∿, or 24 V ⎓ power

To improve performance and flexibility, Zelio Logic modular smart relays can take extensions to obtain a maximum of 40 I/O.
■ Modbus serial link or Ethernet Modbus/TCP network communication extensions, supplied with 24 V ⎓ power via the Zelio Logic smart relay at the same voltage
■ analog I/O extension with 4 I/O, supplied with 24 V ⎓ power via the Zelio Logic smart relay at the same voltage
■ discrete I/O extensions with 6, 10, or 14 I/O, supplied with power via the Zelio Logic smart relay at the same voltage

(1) LCD: Liquid crystal display

Connecting cable

Bluetooth interface

Memory cartridge

Modbus serial link communication extension

Ethernet Modbus/TCP communication extension

Modem communication interface

GSM/UMTS modem

HMISTO705 Small Panel

Zelio Logic compact smart relay + SR2CBL09 cable

Communication

Cabled and wireless programming tools

■ These programming tools allow the Zelio Logic smart relay to be connected to a PC running “Zelio Soft 2” software:

□ Cable connection:
- SR2USB01 cable to USB port

or
- SR2CBL01 cable to 9-way serial port

□ Wireless link:
- SR2BTC01 Bluetooth interface

■ Memory cartridge

The Zelio Logic smart relay can take a backup memory cartridge that allows the application program to be copied to another Zelio Logic smart relay (it is only possible to load and update the firmware with the SR2MEM02 memory cartridge).

The memory cartridge also enables a backup copy of the program to be saved prior to replacing the product.

When used with a smart relay without display or buttons, the copy of the program contained in the cartridge is automatically transferred to the Zelio Logic smart relay on power-up.

Modbus serial link and Ethernet Modbus/TCP communication extensions

The Modbus serial link and Ethernet Modbus/TCP network communication extension modules allow connection to automation system equipment such as display units or PLCs (see page 22).

Modem communication interface

The “modem communication interface” offer in the Zelio Logic range includes:
- an SR2COM01 modem communication interface connected between a Zelio Logic smart relay and a modem
- an SR2MOD02 GSM/UMTS *(1)* modem
- SR2SFT02 “Zelio Logic Alarm” software

This offer is designed for monitoring or remote control of machines or installations that operate without personnel.

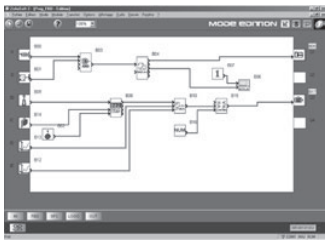
The modem communication interface, supplied with 12...24 V ⎓ power, enables messages, phone numbers, and calling conditions to be stored (see page 32).

HMI terminals

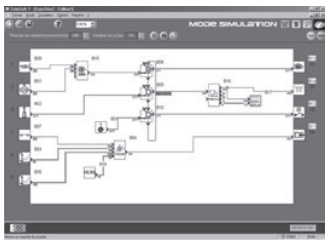
HMISTO Small Panels offer added value to the equipment by enabling the creation of eye-catching dialog screens.
They are available in monochrome (HMISTO501) or color (HMISTO705) versions.
They connect directly to the front panel of the smart relays in the memory cartridge slot via the special cable (SR2CBL09).
The terminals are configured using Vijeo Designer (HMISTO501) or Vijeo XD (HMISTO705) software. Exchanges with the smart relay are simplified using the SLIn and SLout data exchange blocks in “Zelio Soft 2” (FBD language only).
24 words can be exchanged in each direction.

(1) Global System Mobile (2G)/Universal Mobile Telecommunications System (3G)

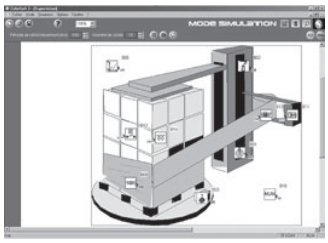
Zelio Logic - Smart relays
Compact and modular smart relays
“Zelio Soft 2” programming software



Programming in FBD language



Simulation mode



Monitoring window

“Zelio Soft 2” for PC - version 5.1 *(1)*

“Zelio Soft 2” software enables:
- programming in ladder language or function block diagram (FBD) language (see page 12)
- simulation, monitoring, and supervision
- uploading and downloading of programs
- print-out of customized files
- automatic program compilation
- online help

Consistency checks and application languages

“Zelio Soft 2” monitors applications by means of its consistency check function. An indicator turns red at the slightest input error (ladder language). The problem can be located simply by clicking the mouse.
“Zelio Soft 2” software allows users to switch between the 6 languages (English, French, German, Italian, Portuguese, and Spanish) at any time and edit the application file in the selected language.

Inputting messages for display on Zelio Logic

“Zelio Soft 2” software allows text function blocks to be configured, which can then be displayed on Zelio Logic smart relays that have a display.

Program testing

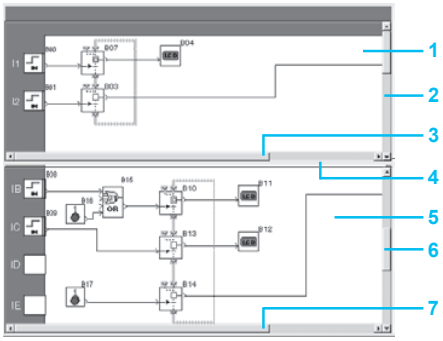
2 test modes are provided:
- The **simulation** mode in “Zelio Soft 2” is used to test a program without a Zelio Logic smart relay, i.e. to:
  - enable discrete inputs
  - display output status
  - vary the voltage of the analog inputs
  - enable the programming buttons
  - simulate the application program in real time or in accelerated time
  - display the different active program elements dynamically in red

- The **monitoring** is used to test the program executed by the smart relay, i.e. to:
  - display the program “online”
  - force inputs, outputs, auxiliary relays, and current function block values
  - adjust the date and time
  - switch from STOP mode to RUN mode and vice versa

In simulation or monitoring mode, the supervision window allows users to view the status of the smart relay I/O within the application environment (diagram or image).

(1) These functions exist for versions ≥ V 5.1.

Zelio Logic - Smart relays
Compact and modular smart relays
“Zelio Soft 2” programming software



Structure of a split wiring sheet

User interfaces

“Zelio Soft 2” software (versions ≥ 4.1) improves the ease of use of user interfaces for the following functions:

“Split wiring sheet” function (ladder and FBD language)

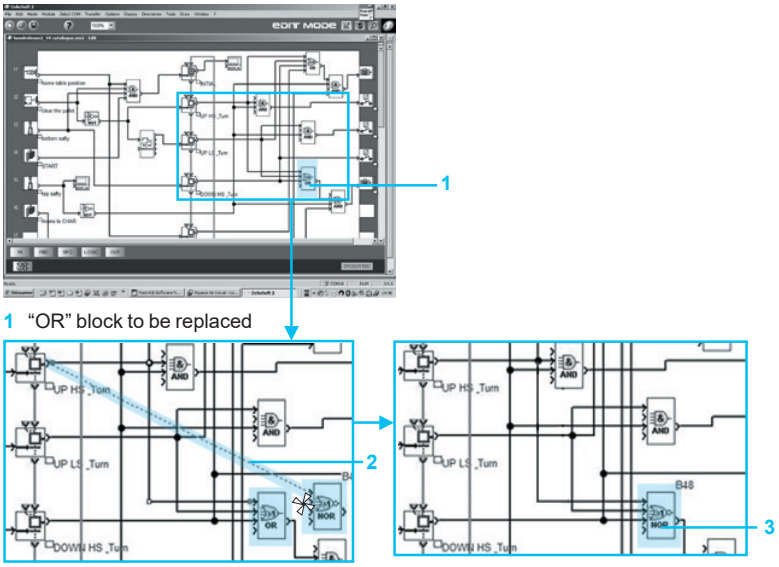
The wiring sheet can be split into 2 to allow two separate parts of the wiring sheet to be displayed on the same screen.

This can be used to:
- Display the required function blocks in the top and bottom parts of the screen
- Move the split bar as required
- Connect the function blocks between the 2 parts of the wiring sheet

The split wiring sheet is structured as follows:
1 View of top part
2 Top window vertical scroll bar
3 Top window horizontal scroll bar
4 Split bar
5 View of bottom part
6 Bottom window vertical scroll bar
7 Bottom window horizontal scroll bar

“Replace function block” function (FBD language)

This function allows a block to be replaced without losing the input and output connections.
E.g. replacing an “OR” block with a “NOR” block



1 “OR” block to be replaced

2 Move the links to the new “NOR” block

3 Delete the “OR” block and position the “NOR” block in its place

“Acceleration and simulation terminals” window

“Time Prog simulation” function (ladder and FBD languages)

Ladder or FBD program simulation mode allows the program to be debugged by simulating it on the software workshop host computer.
A function allows the time on the simulator clock to be modified by setting it to 3 s before the start of the next event .

The “Next event” button 1 is used to modify the simulator clock 2.

Zelio Logic - Smart relays
Compact and modular smart relays
“Zelio Soft 2” programming software

Ladder language

Definitions


Text function block


Timer


Up/down counter


Fast counter


Analog comparator


Clock


Auxiliary relay


Counter comparator


LCD backlight


Daylight saving time change


Output coil


Message

Ladder language enables a ladder program to be written with elementary functions, elementary function blocks, and derived function blocks, as well as with contacts, coils, and variables.
The contacts and coils can be annotated. Text can be placed freely within the graphic.

■ **Ladder diagram input modes**

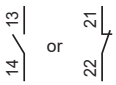
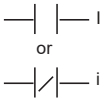
“Zelio input” mode allows users who have programmed the Zelio Logic smart relay directly on the device to achieve the same ease of use, even when using the software for the first time.
“Ladder input” mode, which is more intuitive, is very user-friendly and incorporates many additional features.
Two types of symbol can be used in ladder programming language:
- ladder symbols
- electrical symbols

“Ladder input” mode also allows the creation of mnemonics and comments associated with each program line.
Instant switching from one input mode to the other is possible at any time, simply by clicking the mouse.
Up to 240 *(1)* ladder diagram lines can be programmed, with 5 contacts and 1 coil per program line.

■ **Functions**

- 16 text function blocks
- 28 *(1)* timers, each of which can be configured from among 11 different types (from 1/10 second to 9,999 hours)
- 28 *(1)* up/down counters from 0 to 32,767
- 1 fast counter (1 kHz)
- 16 analog comparators
- 8 clocks, each with 4 channels
- 56 *(1)* auxiliary relays
- 8 counter comparators
- LCD screen with programmable backlight
- automatic daylight saving time changeover
- variety of functions: coil, latching (Set/Reset), impulse relay, contactor
- 28 message blocks (with modem communication interface, see page 32)

Functions

Function	Electrical scheme	Ladder language	Comment
Contact			I corresponds to the real state of the contact wired to the smart relay input. i corresponds to the inverse state of the contact wired to the smart relay input.
Standard coil			The coil is energized when the contacts to which it is connected are closed.
Latch coil (Set)			The coil is energized (set) when the contacts to which it is connected are closed. It remains energized even if the contacts are no longer closed.
Unlatch coil (Reset)			The coil is de-energized (reset) when the contacts to which it is connected are closed. It remains de-energized even if the contacts are no longer closed.

(1) Possible using version V5.0 and above of “Zelio Soft 2” provided that the SR2COM01 communication module is not used. If this module is used, 16 timers, 16 counters, and 32 auxiliary relays are available and the program is limited to 120 ladder diagram lines.

Function block language (FBD/Grafcet SFC/logic functions) *(1)*

Definition

FBD language allows graphical programming based on the use of predefined function blocks, and provides the use of:
- 35 preprogrammed functions for counting, time delay, timing, switching threshold definition (e.g. temperature regulation), pulse generation, time programming, multiplexing, and display
- 7 SFC functions
- 6 logic functions

Pre-programmed functions

Zelio Logic smart relays provide a high processing capacity, up to 500 *(2)* function blocks, including 35 pre-programmed functions:

TIMER AC
Timer. Function A/C (ON-delay and OFF-delay)

TIMER BH
Timer. Function BH (adjustable pulsed signal)

TIMER Li
Pulse generator (ON-delay, OFF-delay)

TIMER BW
Timer. Function BW (pulse on rising/falling edge)

TIMER AC
Timer. Function A/C with external preset adjustment (ON-delay and OFF-delay)

TIMER BH
Timer. Function BH with external preset adjustment (adjustable pulsed signal)

TIMER Li
Pulse generator with external preset adjustment (ON-delay, OFF-delay)

BISTABLE
Impulse relay function

SET- RESET
Bistable latching - Priority assigned either to SET or RESET function

BOOLEAN
Allows logic equations to be created between connected inputs

CAM
Cam programmer

PRESET COUNT
Up/down counter

UP DOWN COUNT
Up/down counter with external preset

PRESET H-METER
Hour counter (hour, minute preset)

TIME PROG
Time programmer, weekly and annual

GAIN
Allows conversion of an analog value by change of scale and offset

TRIGGER
Defines an activation zone with hysteresis

MUX
Multiplexing functions on 2 analog values

COMP IN ZONE
Zone comparison (Min. ⩽ Value ⩽ Max.)

ADD/SUB
Add and/or subtract function

MUL/DIV
Multiply and/or divide function

TEXT
Display of digital and analog data, date, time, messages for Human-Machine interface

DISPLAY
Display of digital and analog data, date, time, messages for Human-Machine interface

COM
Sending of messages with communication interface (see page 32)

COMPARE
Comparison of 2 analog values using the operands =, >, <, ⩽, ⩾, ≠

STATUS
Access to smart relay status

ARCHIVE
Storage of 2 values simultaneously

SPEED COUNT
Fast counting up to 1 kHz

CAN
Analog-to-digital converter

CNA
Digital-to-analog converter

SL In
Input of a word via serial link

SL Out
Output of a word via serial link

SUNTRACK
Tracks the sun's position

SUNRISE/SUNSET
Outputs the sunrise and sunset times

PID *(n)*
Temperature, level, flow rate, or pressure control functions

SFC functions *(3)* (GRAFCET)

RESET-INIT
Reset initial step

INIT STEP
Initial step

STEP
SFC step

DIV-OR 2
Divergence to OR

CONV-OR 2
Convergence to OR

DIV-AND 2
Divergence to AND

CONV-AND 2
Convergence to AND

Logic functions

AND
AND function

OR
OR function

NAND
NOT AND function

NOR
NOT OR function

XOR
Exclusive OR function

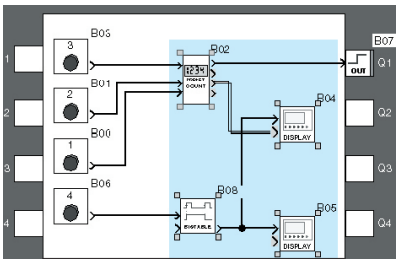
NOT
NOT function

(n) New feature for 2017

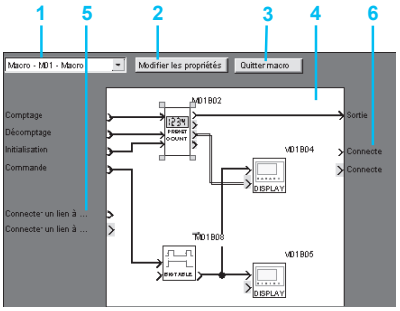
(1) Function block diagram
(2) Possible in version V5.0 or above of "Zelio Soft 2"
(3) Sequential function chart

Function block language (FBD/Grafcet SFC/logic functions) (continued)

Macro function

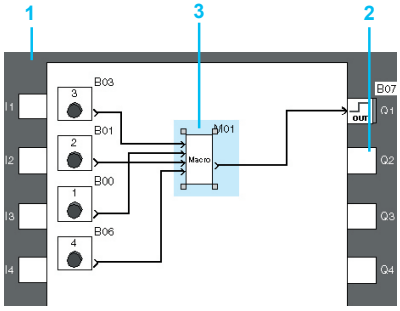


Creating a macro



Inside a macro

1 Select macro
2 Edit properties
3 Return to external view of a macro
4 Internal function block in the macro
5 Non-connected inputs
6 Non-connected outputs



External view of a macro

1 Input connections
2 Output connection
3 Macro function block

A macro is a group of function blocks. It is characterized by its number, name, links, internal function blocks (255 max.), and its I/O connections.

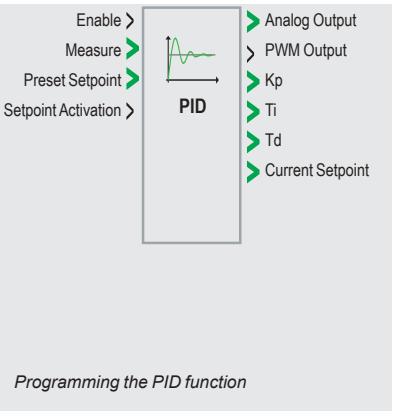
Seen from the outside, a macro behaves like a function block with inputs and/or outputs likely to be connected to links.
Once created, a macro can be manipulated like a function block.

■ Macro characteristics:
□ The maximum number of macros is 64.
□ A password dedicated to macros can be used to protect their content.
□ A macro can be edited/duplicated.
□ A macro's comments can be edited.

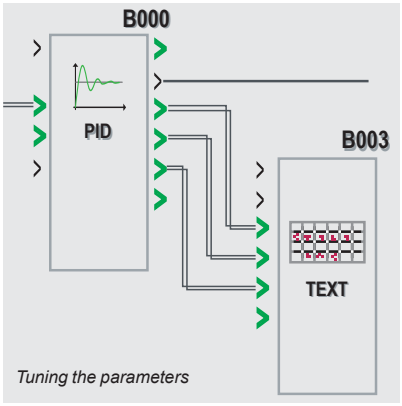
■ Macro properties:
A "Macro Properties" dialog box is used to enter or modify the properties of a macro.
The properties of a macro are as follows:
□ Macro name (optional)
□ Block symbol, which may be:
- an identifier
- an image

□ Name of inputs
□ Name of outputs

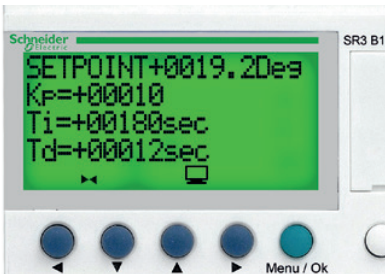
PID function



Programming the PID function



Tuning the parameters



Modifying parameters (Kp, Ti, Td) using the programming and parameter setting buttons

Presentation
The PID function block is used to program simple temperature, level, or pressure control functions.
Two types of output enable adaptation to the most common actuators available on the market:
□ Analog output, requiring the use of a modular smart relay and an analog I/O extension
□ PWM output, enabling the integrated outputs in any smart relay to be used. Depending on the period set for PWM, and to help extend service life, a smart relay equipped with transistor outputs is recommended.

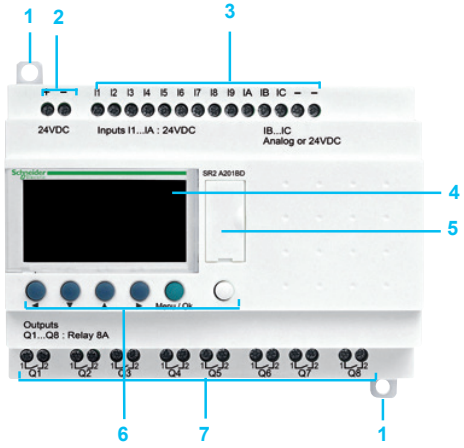
Programming
PID function blocks are available in FBD language. To help with tuning, default parameters are available for several typical applications (flow, level, pressure, temperature). These parameters can be modified.

Tuning
The TEXT and DISPLAY function blocks are used to help tune the control parameters (Kp, Ti, Td) without using Zelio Soft 2: the parameters can be modified directly using the buttons on the front of the smart relay and the display.

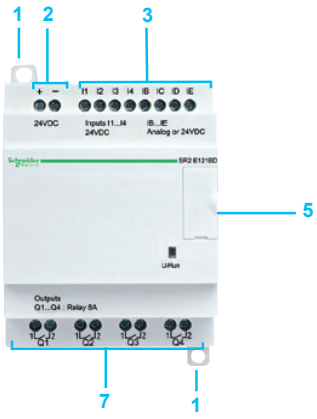
Zelio Logic - Smart relays
Compact and modular smart relays

Compact smart relays

With display - 10, 12, and 20 I/O



Without display - 10, 12, and 20 I/O

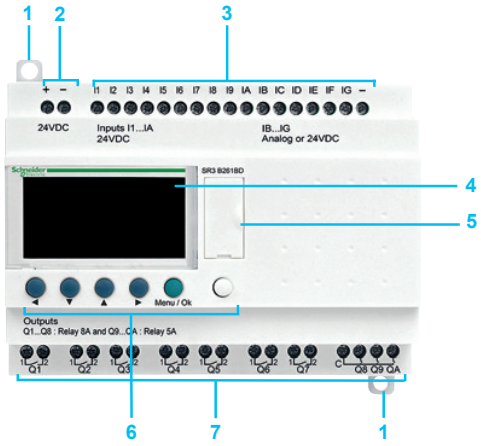


Zelio Logic compact smart relay front panels comprise:

1 Two retractable mounting feet
2 Two power supply terminals
3 Terminals for connecting the inputs
4 Backlit LCD display with 4 lines of 18 characters
5 Slot for memory cartridge or connection to PC, modem communication interface, HMI terminal (Magelis Small Panel), or Bluetooth interface
6 6 buttons for programming and parameter entry
7 Terminals for connecting the outputs

Modular smart relays

With display - 10 and 26 I/O



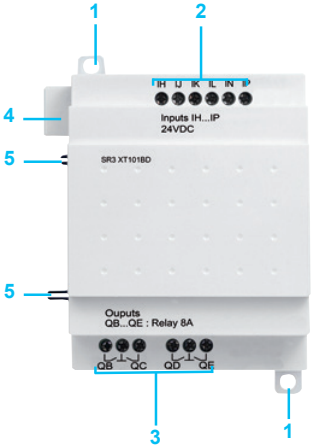
Zelio Logic modular smart relay front panels comprise:

1 Two retractable mounting feet
2 Two power supply terminals
3 Terminals for connecting the inputs
4 Backlit LCD display with 4 lines of 18 characters
5 Slot for memory cartridge or connection to PC, modem communication interface, HMI terminal (Magelis Small Panel), or Bluetooth interface
6 6 buttons for programming and parameter entry
7 Terminals for connecting the outputs

Discrete I/O extensions

6 discrete I/O

10 and 14 discrete I/O



Discrete I/O extension front panels comprise:

1 Two retractable mounting feet
2 Terminals for connecting the inputs
3 Terminals for connecting the outputs
4 Connector for connection to the Zelio Logic smart relay (powered via the Zelio Logic smart relay)
5 Locating pegs

Zelio Logic - Smart relays
Compact smart relays

SR2A201BD

SR2SFT01

SR2PACK●●●

Modem communication interface

Compact smart relays with display

Number of I/O	Discrete inputs	Including 0-10 V ⎓ analog inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg *lb*
24 V ∿ power supply							
12	8	0	4	0	Yes	**SR2B121B**	0.250 *0.551*
20	12	0	8	0	Yes	**SR2B201B**	0.380 *0.838*
48 V ∿ power supply							
20	12	0	8	0	No	**SR2A201E** *(1)*	0.380 *0.838*
100...240 V ∿ power supply							
10	6	0	4	0	No	**SR2A101FU** *(1)*	0.250 *0.551*
12	8	0	4	0	Yes	**SR2B121FU**	0.250 *0.551*
20	12	0	8	0	No	**SR2A201FU** *(1)*	0.380 *0.838*
					Yes	**SR2B201FU**	0.380 *0.838*
12 V ⎓ power supply							
12	8	4	4	0	Yes	**SR2B121JD**	0.250 *0.551*
20	12	6	8	0	Yes	**SR2B201JD**	0.380 *0.838*
24 V ⎓ power supply							
10	6	0	4	0	No	**SR2A101BD** *(1)*	0.250 *0.551*
12	8	4	4	0	Yes	**SR2B121BD**	0.250 *0.551*
			0	4	Yes	**SR2B122BD**	0.220 *0.485*
20	12	2	8	0	No	**SR2A201BD** *(1)*	0.380 *0.838*
		6	8	0	Yes	**SR2B201BD**	0.380 *0.838*
			0	8	Yes	**SR2B202BD**	0.280 *0.617*

"Zelio Soft 2" software

See page 20

Connection accessories

See page 20

Compact "discovery" packs

Pack contents:
Compact smart relay with display **SR2B●●●●●**
+ "Zelio Soft 2" programming software on CD-ROM **SR2SFT01**
+ PC connecting cable **SR2USB01**

Number of I/O	Pack contents (references)	Reference	Weight kg *lb*
100...240 V ∿ power supply			
12	**SR2B121FU** + **SR2SFT01** + **SR2USB01**	**SR2PACKFU**	0.700 *1.543*
20	**SR2B201FU** + **SR2SFT01** + **SR2USB01**	**SR2PACK2FU**	0.850 *1.874*
24 V ⎓ power supply			
12	**SR2B121BD** + **SR2SFT01** + **SR2USB01**	**SR2PACKBD**	0.700 *1.543*
20	**SR2B201BD** + **SR2SFT01** + **SR2USB01**	**SR2PACK2BD**	0.700 *1.543*

Modem communication interface

12...24 V ⎓ power supply	
Description	**Reference**
Modem communication interface	See page 32

(1) Programming in ladder language only

Zelio Logic - Smart relays
Compact smart relays

SR2E121BD

SR2SFT01

SR2USB01

Modem communication interface

Compact smart relays without display

Number of I/O	Discrete inputs	Including 0-10 V ⎓ analog inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg *lb*
24 V ∿ power supply							
12	8	0	4	0	Yes	**SR2E121B**	0.220 *0.485*
20	12	0	8	0	Yes	**SR2E201B**	0.350 *0.772*
100...240 V ∿ power supply							
10	6	0	4	0	No	**SR2D101FU** *(1)*	0.220 *0.485*
12	8	0	4	0	Yes	**SR2E121FU**	0.220 *0.485*
20	12	0	8	0	No	**SR2D201FU** *(1)*	0.350 *0.772*
					Yes	**SR2E201FU**	0.350 *0.772*
24 V ⎓ power supply							
10	6	0	4	0	No	**SR2D101BD** *(1)*	0.220 *0.485*
12	8	4	4	0	Yes	**SR2E121BD**	0.220 *0.485*
20	12	2	8	0	No	**SR2D201BD** *(1)*	0.350 *0.772*
		6	8	0	Yes	**SR2E201BD**	0.350 *0.772*

"Zelio Soft 2" software

See page 20

Accessories

See page 20

Modem communication interface

12...24 V ⎓ power supply

Description	Reference
Modem communication interface	See page 32

(1) Programming in ladder language only

Zelio Logic - Smart relays
Modular smart relays

SR3B261B

SR2SFT01

SR3PACK●●●

Modular smart relays with display

Number of I/O	Discrete inputs	Including 0-10 V ⎓ analog inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg *lb*
24 V ∿ power supply							
10	6	0	4	0	Yes	**SR3B101B**	0.250 *0.551*
26	16	0	10 *(1)*	0	Yes	**SR3B261B**	0.400 *0.882*
100...240 V ∿ power supply							
10	6	0	4	0	Yes	**SR3B101FU**	0.250 *0.551*
26	16	0	10 *(1)*	0	Yes	**SR3B261FU**	0.400 *0.882*
12 V ⎓ power supply							
26	16	6	10 *(1)*	0	Yes	**SR3B261JD**	0.400 *0.882*
24 V ⎓ power supply							
10	6	4	4	0	Yes	**SR3B101BD**	0.250 *0.551*
			0	4	Yes	**SR3B102BD**	0.220 *0.485*
26	16	6	10 *(1)*	0	Yes	**SR3B261BD**	0.400 *0.882*
			0	10	Yes	**SR3B262BD**	0.300 *0.661*

"Zelio Soft 2" software

See page 20.

Connection accessories

See page 20.

Modular "discovery" packs

Pack contents:
Modular smart relay with display **SR3B●●●●**
+ "Zelio Soft 2" programming software on CD-ROM **SR2SFT01**
+ PC connecting cable **SR2USB01**

Number of I/O	Pack contents (references)	Reference	Weight kg *lb*
100...240 V ∿ power supply			
10	**SR3B101FU** + **SR2SFT01** + **SR2USB01**	**SR3PACKFU**	0.700 *1.543*
26	**SR3B261FU** + **SR2SFT01** + **SR2USB01**	**SR3PACK2FU**	0.850 *1.874*
24 V ⎓ power supply			
10	**SR3B101BD** + **SR2SFT01** + **SR2USB01**	**SR3PACKBD**	0.700 *1.543*
26	**SR3B261BD** + **SR2SFT01** + **SR2USB01**	**SR3PACK2BD**	0.850 *1.874*

(1) Including 8 outputs at maximum current of 8 A and 2 outputs at maximum current of 5 A.
***Note**: The Zelio Logic smart relay and its associated extensions have an identical voltage to be able to operate together.*

Zelio Logic - Smart relays
Modular smart relays

Modbus serial link communication extension

Ethernet Modbus/TCP communication extension

SR3XT141JD

Modem communication interface

Communication extension *(1)*

24 V ⎓ power supply (via SR3B...BD smart relays)

For use with	Communication ports	Reference
SR3B●●1BD and SR3B●●2BD Zelio Logic modular smart relays	Modbus RS485 serial link (RJ45)	See page 22
	Ethernet Modbus/TCP (RJ45)	See page 22

Analog I/O extension *(2)*

24 V ⎓ power supply (via Zelio Logic SR3B...BD smart relay)

Number of I/O	Inputs	Including ⎓		Including Pt100	0-10 V ⎓ output	Reference
		0-10 V	0-20 mA			
4	2	2 max.	2 max.	1 max.	2	See page 30

Discrete I/O extensions

Number of I/O	Discrete inputs	Relay outputs	Reference	Weight kg *lb*
24 V ∿ power supply (via Zelio Logic SR3B●●●B smart relays)				
6	4	2	**SR3XT61B**	0.125 *0.276*
10	6	4	**SR3XT101B**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141B**	0.220 *0.485*
100-240 V ∿ power supply (via Zelio Logic SR3B●●●FU smart relays)				
6	4	2	**SR3XT61FU**	0.125 *0.276*
10	6	4	**SR3XT101FU**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141FU**	0.220 *0.485*
12 V ⎓ power (via Zelio Logic SR3B261JD smart relay)				
6	4	2	**SR3XT61JD**	0.125 *0.276*
10	6	4	**SR3XT101JD**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141JD**	0.220 *0.485*
24 V ⎓ power supply (via Zelio Logic SR3B●●●BD smart relays)				
6	4	2	**SR3XT61BD**	0.125 *0.276*
10	6	4	**SR3XT101BD**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141BD**	0.220 *0.485*

Modem communication interface *(4)*

12...24 V ⎓ power supply

Description	Reference
Modem communication interface	See page 32

(1) See page 22.
(2) See page 30.
(3) Including 4 outputs at maximum current of 8 A and 2 outputs at maximum current of 5 A.
(4)See page 32.
***Note**: The Zelio Logic smart relay and its associated extensions have an identical voltage to be able to operate together.*

SR_531_CPF-JR16068B-14108

SR2SFT01

PA577329

HMISTO501

PF153902B

HMISTO705

SR_531_CPF-JR16063

SR2USB01

SR_531_CPF-JR16062B

SR2CBL09

SR_531_CPF-JR16058B

SR2BTC01

SR_531_CPF-JR16068

SR2MEM02

Programming

Description	Use	Reference	Weight kg *lb*
"Zelio Soft 2" software			
Programming software "Zelio Soft 2", multilingual, supplied on CD-ROM *(1)*	For PC and 32-bit and 64-bit operating systems compatible with Windows 7, 8.1, and 10	**SR2SFT01**	0.200 *0.441*
HMI			
Magelis Small Panel with monochrome touch screen	3.4" monochrome screen with 3 colors (green, orange, red) 16 MB application memory capacity Programmed using Vijeo Designer ≥ V6.0	**HMISTO501**	0.200 *0.441*
Magelis Small Panel with color TFT touch screen	4.3" color screen 26 MB application memory capacity Programmed using Vijeo XD	**HMISTO705** *(2)*	0.220/ *0.485*
Connection accessories			
Connecting cables Length: 3 m *(9.84 ft.)* For use with "Zelio Soft 2"	Between the PC (9-way SUB-D connector) and the Zelio Logic smart relay (programming port connector)	**SR2CBL01**	0.150 0.331
	Between the PC (USB connector) and the Zelio Logic smart relay (programming port connector)	**SR2USB01**	0.100 *0.220*
Connecting cables Length: 2.5 m *(8.20 ft.)*	Between the Magelis XBTN, XBTR, or XBTRT Small Panel (8-way mini-DIN connector) and the Zelio Logic smart relay (programming port connector)	**SR2CBL08**	0.100 *0.220*
	Between the Magelis HMISTO501 or HMISTO705 Small Panel (9-way removable screw terminal block) and the Zelio Logic smart relays (programming port connector)	**SR2CBL09**	-
Bluetooth interface for Zelio Logic smart relays	Between the PC (wireless link) and the Zelio Logic smart relay. Range of 10 m *(32.80 ft.)* (class 2)	**SR2BTC01**	0.015 *0.033*
Memory cartridges *(3)*			
EEPROM memory cartridges	For firmware (software embedded in the smart relay) version ≤ 2.4	**SR2MEM01**	0.010 *0.022*
	For firmware (software embedded in the smart relay) version ≥ 3.0	**SR2MEM02**	0.010 *0.022*

Online documentation available

User Manuals for direct programming on the Zelio Logic smart relay (in English, French, German, Italian, Portuguese, or Spanish): please visit our website www.schneider-electric.com.

Regulated switch mode power supplies

Input voltage	Nominal output voltage	Reference
100...240 V ∼ (50/60 Hz)	5 V ⎓, 12 V ⎓, or 24 V ⎓	Please refer to the product catalog (DIA3ED2170401EN) and visit our website www.schneider-electric.com

Converters

Description	Reference
Converters for J and K type thermocouples, for Pt100 probes, and voltage/current	See page 38

(1) Also available as a free download from www.schneider-electric.com.
(2) The SR2CBL09 cable used to connect an HMISTO705 terminal to a smart relay must be equipped with a shunt between the terminals marked CTS and RTS. This shunt is included on all cables leaving the factory after June 2017 (date code 1722).
(3) The use of memory cartridge SR2MEM02 to load the program is not compatible with the SR2COM01 modem communication interface.

30 mm Multifunction Operators UL Types 4, 4X, 13/NEMA 4, 4X, 13

Table 19.249: Non-Illuminated Push-Pull Screw-on Mushroom Operators, Plastic Head *[73]*

	Description	Color	With 2 N.C. Contacts (1 KA3, 1 KA5)	With 1 N.O. / 1 N.C. Contact (1 KA1)	Without Contacts *[74]*
 9001SKR9R Non-Illuminated 1-5/8 in. Diameter Knob Includes Type KN179WP Legend Plate Marked Pull To Start Push To Stop	**3 Position**				
	Momentary Pull-Maintained Neutral-Momentary Push *[75]*	Red	SKR8RH25	—	SKR8R
		Green	SKR8GH25	—	SKR8G
		Other *[76]*	SKR8▲H25	—	SKR8▲
	2 Position *[77]*				
	Maintained Pull-Maintained Push	Red	—	SKR9RH13	SKR9R
		Green	—	SKR9GH13	SKR9G
		Other *[76]*	—	SKR9▲H13	SKR9▲

Table 19.250: Non-Illuminated Turn-to-Release Mushroom Operators *[73]*

	Description	Color	With 1 N.O. Contact (KA1)	With 2 N.O. / 2 N.C. Contacts (2 KA1)	Without Contacts
 9001SKR16H2	2 Position, Plastic Head Turn-to-Release Trigger Action	Red	SKR16H13	SKR16H2	SKR16

Table 19.251: Screw-On Plastic Illuminated Push-Pull Mushroom Operators *[73]*

Illuminated	Description	Voltage	With Red Knob and 2 N.C. Contacts (1 KA3, 1 KA5) *[78]*	With Other Color Knob and 2 N.C. Contacts *[76] [78]*	With Other Color Knob Without Contacts *[74] [76] [78]*
 9001SKR9P1 Illuminated 1-5/8 in. Diameter Knob Includes Type KN179WP Legend Plate Marked Pull to Start Push To Stop	**3 Position**				
	Momentary Pull-Maintained Neutral-Momentary Push *[79]*	110–120 V, 50–60 Hz	SKR8P1RH25	SKR8P1▲H25	SKR8P1▲
		Other—Transformer, LED, Flashing *[80]*	SKR8P♦RH25	SKR8P♦▲H25	SKR8P♦▲
		Other—Full Voltage, Resistor, Neon *[75]*	SKR8P♦RH25	SKR8P♦▲H25	SKR8P♦▲
	Description	**Voltage**	**With Red *[77]* Knob and 1 N.O. & 1 N.C. Contact (KA1)**	**With Other Color Knob and 1 N.O. & 1 N.C. Contact (KA1) *[76]***	**With Other Color Knob Without Contacts *[76]***
	2 Position				
	Maintained Pull-Maintained Push	110–120 V, 50–60 Hz	SKR9P1RH13	SKR9P1▲H13	SKR9P1▲
		Other—Transformer, L.E.D., Flashing *[80]*	SKR9P♦RH13	SKR9P♦▲H13	SKR9P♦▲
		Other—Full Voltage, Resistor, Neon *[75]*	SKR9P♦RH13	SKR9P♦▲H13	SKR9P♦▲

Table 19.252: Color Codes

Color	SKR11, SKR12	SKR8, SKR9
Black *[81]*	B	B
Red	R	R
Green	G	G
Blue	L	L
Yellow	Y	Y
White	W	W
Orange *[81]*	S	S
Clear	—	C
Amber	—	A
Gray	E	—

Table 19.253: Positions for 9001SKR8RH1 or H13

		9001SKR8RH1 or H13		
		PULL	CTR	PUSH
(KA1)	KA3	X	O	O
	KA2	O	O	X

Table 19.254: Positions for 9001SKR8H25

	9001SKR8H25		
	PULL	CTR	PUSH
KA3	X	O	O
KA5	X	X	O
KA2	O	O	X

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

[73] When ordering, add prefix 9001 to the catalog number.
[74] These operators can be ordered complete with contact blocks. For maximum block usage, see "H" Codes, page 19-93. Add the chosen "H" number to the end of the operator.
[75] On neon light modules, use clear knobs only.
[76] ▲ See Table 19.252 Color Codes, page 19-83 and insert the color code in the Type number. **Example: SKR9( ) with a yellow knob = SKR9Y**
[77] To obtain a red knob with "Push Emergency Stop" printed on the red knob—substitute "R05" in place of "R"
[78] ♦ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91. **Example: SKR8P♦ with 277 V 50–60 Hz = SKR8P8**
[79] For positions, refer to Table 19.253 Positions for 9001SKR8RH1 or H13, page 19-83 and Table 19.254 Positions for 9001SKR8H25, page 19-83.
[80] The knob must be the same color as the LED light module chosen, for example, for a green LED, use a green knob.
[81] These colors are not available on illuminated push-pull operators.

Standard and Shallow Depth Light Modules

Table 19.273: Standard Light Modules for Types K, SK, and KX Control Units *[121][122][123][124]*

Voltage	Description	Light Module Type *[125]*	Voltage Assembly Code	Rating	Temperature Code T-Code	Replacement Lamp Part Number *[121]*
All	Full Voltage (without Bayonet Base Lamp)	KM40	40	—	—	None
6 Vac/Vdc	Full Voltage	KM31	31	.9 VA	T5	2550101020
6 Vac/Vdc	LED Red	KM31LR	31LR		T6	6508805201
6 Vac/Vdc	LED Green	KM31LG	31LG		T6	6508805203
6 Vac/Vdc	LED Yellow	KM31LY	31LY		T6	6508805202
12–14 Vac/Vdc	Full Voltage	KM32	32	1.2 VA	T5	2550101037
12–14 Vac/Vdc	LED Red	KM32LR	32LR		T6	6508805201
12–14 Vac/Vdc	LED Green	KM32LG	32LG		T6	6508805203
12–14 Vac/Vdc	LED Yellow	KM32LY	32LY		T6	6508805202
18 Vac/Vdc	Resistor	KM33	33	1.4 VA	T5	2550101037
24–28 Vac/Vdc	Full Voltage	KM35	35	1.2 VA	T3C	2550101002
24–28 Vac/Vdc	LED Red	KM35LR	35LR	.28 VA	T4	6508805210
24–28 Vac/Vdc	LED Green	KM35LG	35LG	.28 VA	T4	6508805212
24–28 Vac/Vdc	LED Yellow	KM35LY	35LY	.28 VA	T4	6508805211
24–28 Vac/Vdc	LED White	KM35LW	35LW	.28 VA	T4	6508805214
24–28 Vac/Vdc	LED Blue	KM35LL	35LL	.28 VA	T4	6508805213
48 Vac/Vdc	Full Voltage	KM36	36	2.6 VA	T3A	2550101025
110–120 V, 50–60 Hz	LED Red	KM1LR	1LR		T6	6508805201
110–120 V, 50–60 Hz	LED Green	KM1LG	1LG		T6	6508805203
110–120 V, 50–60 Hz	LED Yellow	KM1LY	1LY		T6	6508805202
110–120 V, 50–60 Hz	Transformer	KM1	1	2.4 VA	T6	2550101020
110–120 V, 50–60 Hz	Flashing	KMF1	F1	.85 VA	T6	2550101036
120 Vac/Vdc	Full Voltage/Resistor	KM38	38	3.0 VA	T4	2550101027
120 Vac/Vdc	Neon *[126]*	KM11	11	0.2 VA	T6	2550101013
120 Vac/Vdc	LED Red	KM38LR	38LR	1.4 VA	T4A	6508805210
120 Vac/Vdc	LED Green	KM38LG	38LG	1.4 VA	T4A	6508805212
120 Vac/Vdc	LED Yellow	KM38LY	38LY	1.4 VA	T4A	6508805211
120 Vac/Vdc	LED White	KM38LW	38LW	1.4 VA	T4A	6508805214
120 Vac/Vdc	LED Blue	KM38LL	38LL	1.4 VA	T4A	6508805213
208–220 V, 50–60 Hz	Transformer	KM3	3	2.5 VA	T6	2550101020
208–220 V, 50–60 Hz	LED Red	KM3LR	3LR		T6	6508805201
208–220 V, 50–60 Hz	LED Green	KM3LG	3LG		T6	6508805203
208–220 V, 50–60 Hz	LED Yellow	KM3LY	3LY		T6	6508805202
208–220 V, 50–60 Hz	LED White	KM3LW	3LW		T6	6508805215
208–220 V, 50–60 Hz	LED Blue	KM3LL	3LL		T6	6508805216
220–240 V, 50–60 Hz	Transformer	KM7	7	2.0 VA	T6	2550101020
220–240 V, 50–60 Hz	LED Red	KM7LR	7LR		T6	6508805201
220–240 V, 50–60 Hz	LED Green	KM7LG	7LG		T6	6508805203
220–240 V, 50–60 Hz	LED Yellow	KM7LY	7LY		T6	6508805202
220–240 V, 50–60 Hz	LED White	KM7LW	7LW		T6	6508805215
220–240 V, 50–60 Hz	LED Blue	KM7LL	7LL		T6	6508805216
240 Vac/Vdc	Resistor	KM25	25	6.0 VA	T3A	2550101027
240 Vac/Vdc	Neon *[126]*	KM12	12	0.3 VA	T6	2550101013
277 V, 50–60 Hz	Transformer	KM8	8	2.4 VA	T6	2550101020
380–480 V, 50–60 Hz	Transformer	KM5	5	2.8 VA	T6	2550101020
480 Vac/Vdc	Neon *[126]*	KM14	14	0.5 VA	T6	2550101013
550–600 V, 50–60 Hz	Transformer	KM6	6	2.5 VA	T6	2550101020

NOTE: Light modules are available in other voltages. For additional information, refer to Catalog **9001CT0001**.

The products in Table 19.273 have been assigned Temperature Classifications (T-Codes) in accordance with **UL 121201 (2017) — Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.** These codes can aid the user in proper application of these products in accordance with **ISO/ISA/IEC 60079–0 (2017–12) Explosive Atmospheres — Part 0: Equipment — General Requirements** and the **National Electric Code NFPA 70 — Article 500.**

NOTE: Light modules shown in Table 19.274 are not UL Certified for use in hazardous locations.

Table 19.274: Shallow Depth Light Modules For Types K and SK Control Units *[121] [123] [127] [122]*

Voltage	Description	Light Module Type *[125]*	Voltage Assembly Code	Rating	Temperature Code T-Code	Replacement Lamp Part Number
24–28 Vac/Vdc	Full Voltage	KM55	55	1.2 VA	—	2550101002
	LED Red	KM55LR	55LR	0.5 VA	—	6508805204
	LED Green	KM55LG	55LG		—	6508805206
	LED Yellow	KM55LY	55LY		—	6508805205
110–120 Vac/Vdc	Full Voltage	KM58	58	3.0 VA	—	2550101027
	LED Red	KM58LR	58LR	0.5 VA	—	6508805204
	LED Green	KM58LG	58LG		—	6508805206
	LED Yellow	KM58LY	58LY		—	6508805205

File: E78403
CCN: NKCR

File: LR25490
Class: 3211 03

CE marked

[121] For use with all operators except KX and remote test pilot.
[122] For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92.
[123] With LED light modules, use either a clear color cap or a cap the same color as the LED.
[124] With neon type light modules, use a **clear** color cap only.
[125] When ordering, add prefix 9001 to the catalog number.
[126] Not for use on KX operators.
[127] Reduces the depth of illuminated push buttons with contact blocks by over 33%.

30 mm Momentary Push Button Operators, UL Types 4, [illegible] NEMA 4, 4X, 13

Table 19.247: Non-Illuminated Momentary Push Button Operators *[67]*

Description	Color	Operator with 1 N.O. and 1 N.C. Contact (KA1)	Operator with 1 N.O. Contact (KA2)	Operator with 1 N.C. Contact (KA3)	Operator Only No Contacts *[68]*
 9001SKR1B Full Guard	Black	SKR1BH13	SKR1BH5	SKR1BH6	SKR1B
	Red	SKR1RH13	SKR1RH5	SKR1RH6	SKR1R
	Green	SKR1GH13	SKR1GH5	SKR1GH6	SKR1G
	Universal *[69]*	SKR1UH13	SKR1UH5	SKR1UH6	SKR1U
	Other *[70]*	SKR1■H13	SKR1■H5	SKR1■H6	SKR1■
 9001SKR3B No Guard	Black	SKR3BH13	SKR3BH5	SKR3BH6	SKR3B
	Red	SKR3RH13	SKR3RH5	SKR3RH6	SKR3R
	Green	SKR3GH13	SKR3GH5	SKR3GH6	SKR3G
	Universal *[69]*	SKR3UH13	SKR3UH5	SKR3UH6	SKR3U
	Other *[70]*	SKR3■H13	SKR3■H5	SKR3■H6	SKR3■
 9001SKR2B Extended Guard	Black	SKR2BH13	SKR2BH5	SKR2BH6	SKR2B
	Red	SKR2RH13	SKR2RH5	SKR2RH6	SKR2R
	Green	SKR2GH13	SKR2GH5	SKR2GH6	SKR2G
	Universal *[69]*	SKR2UH13	SKR2UH5	SKR2UH6	SKR2U
	Other *[70]*	SKR2■	SKR2■H5	SKR2■H6	SKR2■
 9001SKR4B 1-3/8 in. (35 mm) Mushroom Button	**Snap-In Mushroom Button**				
	Black	SKR4BH13	SKR4BH5	SKR4BH6	SKR4B
	Red	SKR4RH13	SKR4RH5	SKR4RH6	SKR4R
	Red *[71]*	SKR4R05H13	SKR4R05H5	SKR4R05H6	SKR4R05
	Green	SKR4GH13	SKR4GH5	SKR4GH6	SKR4G
	Other *[72]*	SKR4▲H13	SKR4▲H5	SKR4▲H6	SKR4▲
	Screw-On Mushroom Button with Set Screw Security				
	Black	SKR24BH13	SKR24BH5	SKR24BH6	SKR24B
	Red	SKR24RH13	SKR24RH5	SKR24RH6	SKR24R
	Green	SKR24GH13	SKR24GH5	SKR24GH6	SKR24G
	Other *[72]*	SKR24▲H13	SKR24▲H5	SKR24▲H6	SKR24▲
 9001SKR5 2-1/4 in. (57 mm) Mushroom Button	**Snap-In Mushroom Button, Plastic Head**				
	Black	SKR5BH13	SKR5BH5	SKR5BH6	SKR5B
	Red	SKR5RH13	SKR5RH5	SKR5RH6	SKR5R
	Red *[71]*	SKR5R05H13	SKR5R05H5	SKR5R05H6	SKR5R05
	Green	SKR5GH13	SKR5GH5	SKR5GH6	SKR5G
	Other *[72]*	SKR5▲H13	SKR5▲H5	SKR5▲H6	SKR5▲
	Screw-On Mushroom Button with Set Screw Security, Plastic Head				
	Black	SKR25BH13	SKR25BH5	SKR25BH6	SKR25B
	Red	SKR25RH13	SKR25RH5	SKR25RH6	SKR25R
	Green	SKR25GH13	SKR25GH5	SKR25GH6	SKR25G
	Other *[72]*	SKR25▲H13	SKR25▲H5	SKR25▲H6	SKR25▲

Table 19.248: Color Codes

Color	■ SKR1, 2, 3 Place Color Code in Type Number	▲ SKR4, 5, 24, 25 Place Color Code in Type Number
Blue	L	L
Yellow	Y	Y
White	W	—
Orange	S	S
Gray	E	—

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[67] When ordering, add prefix 9001 to the catalog number.
[68] These operators can be ordered complete with contact blocks. For maximum block usage, see "H" Codes, page 19-93. Add the "H" number to the end of the operator type number.
[69] The universal push button operators include one each of the following color inserts: black, red, green, yellow, orange, blue and white.
[70] ■ See Table 19.248 Color Codes , page 19-82.
[71] Knob has the words "Emergency Stop" in raised letters highlighted in white for readability.
[72] ▲ See Table 19.248 Color Codes , page 19-82.

Type KA Contact Blocks

The Class 9001 Type KA contact blocks are Fingersafe® contact blocks (meeting VDE 0106 Part 100). They have one screw mounting and captive (backed out) plus/minus terminal screws. These contact blocks are double-break, direct-acting contacts. Because of the wiping action of these contacts, they are suitable for use with programmable controllers. All contact blocks listed below accept up to 2 #12–#24 AWG solid or stranded wires. Recommended tightening torque for screw terminals is 7 lb-in.

Table 19.268: Standard Contact Blocks

Description	Symbol	Type
 (Clear Cover)	 Direct-Acting	KA1
 (Green Cover)		KA2
 (Red Cover)	 Direct-Acting	KA3
 (Clear Cover)	 N.O. Contact Early Closing	KA4
 (Red Cover)	 N.C. Contact Late Opening	KA5
 (Green Cover)	 N.O. Contact Early Closing	KA6

Table 19.269: Additional Circuit Arrangements

Description	Symbol		Type
Sequencing *[118]* N.O. Contact of KA4 closes before N.O. Contact on KA1	 KA4	 KA1	Order One Type KA4 and One Type KA1
Overlapping *[118]* N.O. Contact of KA4 closes before N.C. Contact of KA5 Opens	 KA4	 KA5	Order One Type KA4 and One Type KA5

Table 19.271: Contact blocks with Quick-Connect terminals (not Fingersafe)

Symbol	Type *[119]*
	KA12
	KA13

Symbol	Contact Blocks with Binder Head Screws (not Fingersafe)		Gold Flashed Contacts with Standard Pressure Wire Terminals
	Type *[119]*	Quantity *[120]*	Type *[119]*
	KA21	25–Up	KA31
	KA22	25–Up	KA32
	KA23	25–Up	KA33
N.O. Early Closing	KA24	25–Up	KA34
 N.C. Contact Late Opening	KA25	25–Up	KA35

Contact blocks listed below are not Fingersafe, but provide:

- Terminals that accept ring tongue/fork tongue connectors
- Short single circuit contact blocks (0.75" deep vs. 0.97" deep on the Fingersafe)
- Same as old style Series G product available prior to March, 1989.
- For assembled operators, use form Y238 (add to catalog number as suffix, for example: 9001KRU1H13Y238)

Table 19.270: Contact blocks (not Fingersafe)

Symbol	Type *[119]*	Symbol	Type *[119]*
	KA1G	N.O. Contact Early Closing	KA4G
	KA2G	N.C. Contact Late Opening	KA5G
	KA3G	N.O. Contact Early Closing	KA6G

Table 19.272: Maximum Current Ratings for Control Circuit Contacts—Types KA1–KA6, KA21–KA25, KA31–KA35, KA1G–KA6G

Volts	AC						Volts	DC				
	Inductive (NEMA / UL Type A600) 35% Power Factor					Resistive 75% Power Factor Make, Break and Continuous Amperes		Inductive and Resistive (NEMA Q600)				
	Make		Break		Continuous Carrying Amperes			Make and Break				Continuous Carrying Capacity
	Amperes	VA	Amperes	VA				KA1	KA2 KA3	KA4	KA5 KA6	
120	60	7200	6.0	720	10	10	125	0.55	0.55	—	—	2.5
240	30		3.0				250	0.27	0.27	—	—	
480	15		1.5				600	0.10	0.10	—	—	
600	12		1.2									

[118] For push buttons or two-position selector switches only. For sequencing or overlapping contacts on other operators, refer to catalog 9001CT0001.
[119] When ordering, add prefix 9001 to the catalog number.
[120] Minimum order quanitity is 25.

Type SK Corrosion Resistant Pilot Lights

Table 19.265: Pilot Lights—UL Types 4, 4X, *[105]*

Description			Voltage	Style	With Red Fresnel Color Cap *[106]*	With Green Fresnel Color Cap *[106]*	With Other Color Cap *[106] [107]*	Without Color Cap *[106]*
	9001SKP1	Standard Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKP1R31	SKP1G31	SKP1■	SKP1
			220–240 V, 50–60 Hz	Transformer	SKP7R31	SKP7G31	SKP7■	SKP7
			24–28 Vac/Vdc	Full Voltage	SKP35R31	SKP35G31	SKP35■	SKP35
			For other voltages *[106]*	Transformer, Flashing or LED *[108]*	SKP▲R31	SKP▲G31	SKP■	SKP▲
				Full Voltage, Neon or Resistor *[109]*	SKP▲R31	SKP▲G31	SKP▲■	SKP▲
	9001SKT1	Push-To-Test Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKT1R31	SKT1G31	SKT1■	SKT1
			220–240 V, 50–60 Hz	Transformer	SKT7R31	SKT7G31	SKT7■	SKT7
			24–28 Vac/Vdc	Full Voltage	SKT35R31	SKT35G31	SKT35■	SKT35
			For other voltages *[106]*	Transformer, Flashing or LED *[108]*	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
				Full Voltage, Neon or Resistor *[109]*	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
	9001SKTR38	Remote Test Pilot Light (Fresnel color cap shown)	120 Vac Only	Resistor	SKTR38R31	SKTR38G31	SKTR38■	SKTR38
			24–28 Vac Only	Full Voltage	SKTR35R31	SKTR35G31	SKTR35■	SKTR35
			For other voltages *[106] [107] [110]*	Full Voltage or Resistor *[111]*	SKTR▲R31	SKTR▲G31	SKTR▲■	SKTR▲

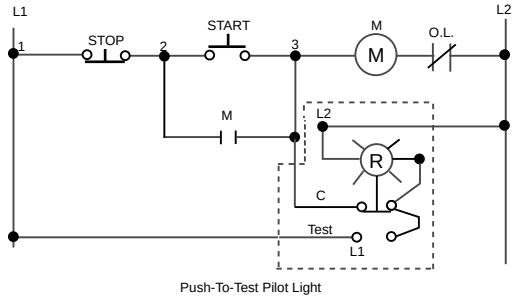

Plastic Fresnel


Plastic Domed

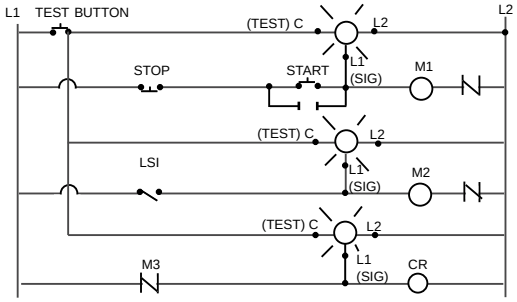
Table 19.266: Color Caps

Color	Plastic Fresnel *[112]*	Plastic Domed *[112]*
Amber	A31	A9
Blue	L31	L9
Clear	C31	C9
Green	G31	G9
Red	R31	R9
White	W31	W9
Yellow	Y31	Y9

Typical Wiring Diagram



Push-To-Test Pilot Light



Remote Test Pilot Light

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[105] When ordering, add prefix 9001 to the catalog number.
[106] ▲ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91.**EXAMPLE: SKT•••R31 with 208 Vac red LED voltage = SKT37LRR31.**
[107] ■ Add the color code as chosen from the color cap table below.**EXAMPLE: SKP1 with a blue fresnel cap = SKP1L31.**
[108] The cap must be the same color as the LED light module chosen, e.g., for a green LED, use a green color cap.
[109] On neon light modules, use clear color caps only.
[110] Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED, neon or transformer codes. For AC use only.
[111] Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED (exception — these LED codes are allowed: 38LG, 38LL, 38LR, 38LW, 38LY), neon or transformer codes. For AC use only.
[112] Add the color code as chosen from the color cap table below.**EXAMPLE: SKP1 with a blue fresnel cap = SKP1L31.**

Standard and Shallow Depth Light Modules

Table 19.273: Standard Light Modules for Types K, SK, and KX Control Units *[121][122][123][124]*

Voltage	Description	Light Module Type *[125]*	Voltage Assembly Code	Rating	Temperature Code T-Code	Replacement Lamp Part Number *[121]*
All	Full Voltage (without Bayonet Base Lamp)	KM40	40	—	—	None
6 Vac/Vdc	Full Voltage	KM31	31	.9 VA	T5	2550101020
6 Vac/Vdc	LED Red	KM31LR	31LR		T6	6508805201
6 Vac/Vdc	LED Green	KM31LG	31LG		T6	6508805203
6 Vac/Vdc	LED Yellow	KM31LY	31LY		T6	6508805202
12–14 Vac/Vdc	Full Voltage	KM32	32	1.2 VA	T5	2550101037
12–14 Vac/Vdc	LED Red	KM32LR	32LR		T6	6508805201
12–14 Vac/Vdc	LED Green	KM32LG	32LG		T6	6508805203
12–14 Vac/Vdc	LED Yellow	KM32LY	32LY		T6	6508805202
18 Vac/Vdc	Resistor	KM33	33	1.4 VA	T5	2550101037
24–28 Vac/Vdc	Full Voltage	KM35	35	1.2 VA	T3C	2550101002
24–28 Vac/Vdc	LED Red	KM35LR	35LR	.28 VA	T4	6508805210
24–28 Vac/Vdc	LED Green	KM35LG	35LG	.28 VA	T4	6508805212
24–28 Vac/Vdc	LED Yellow	KM35LY	35LY	.28 VA	T4	6508805211
24–28 Vac/Vdc	LED White	KM35LW	35LW	.28 VA	T4	6508805214
24–28 Vac/Vdc	LED Blue	KM35LL	35LL	.28 VA	T4	6508805213
48 Vac/Vdc	Full Voltage	KM36	36	2.6 VA	T3A	2550101025
110–120 V, 50–60 Hz	LED Red	KM1LR	1LR		T6	6508805201
110–120 V, 50–60 Hz	LED Green	KM1LG	1LG		T6	6508805203
110–120 V, 50–60 Hz	LED Yellow	KM1LY	1LY		T6	6508805202
110–120 V, 50–60 Hz	Transformer	KM1	1	2.4 VA	T6	2550101020
110–120 V, 50–60 Hz	Flashing	KMF1	F1	.85 VA	T6	2550101036
120 Vac/Vdc	Full Voltage/Resistor	KM38	38	3.0 VA	T4	2550101027
120 Vac/Vdc	Neon *[126]*	KM11	11	0.2 VA	T6	2550101013
120 Vac/Vdc	LED Red	KM38LR	38LR	1.4 VA	T4A	6508805210
120 Vac/Vdc	LED Green	KM38LG	38LG	1.4 VA	T4A	6508805212
120 Vac/Vdc	LED Yellow	KM38LY	38LY	1.4 VA	T4A	6508805211
120 Vac/Vdc	LED White	KM38LW	38LW	1.4 VA	T4A	6508805214
120 Vac/Vdc	LED Blue	KM38LL	38LL	1.4 VA	T4A	6508805213
208–220 V, 50–60 Hz	Transformer	KM3	3	2.5 VA	T6	2550101020
208–220 V, 50–60 Hz	LED Red	KM3LR	3LR		T6	6508805201
208–220 V, 50–60 Hz	LED Green	KM3LG	3LG		T6	6508805203
208–220 V, 50–60 Hz	LED Yellow	KM3LY	3LY		T6	6508805202
208–220 V, 50–60 Hz	LED White	KM3LW	3LW		T6	6508805215
208–220 V, 50–60 Hz	LED Blue	KM3LL	3LL		T6	6508805216
220–240 V, 50–60 Hz	Transformer	KM7	7	2.0 VA	T6	2550101020
220–240 V, 50–60 Hz	LED Red	KM7LR	7LR		T6	6508805201
220–240 V, 50–60 Hz	LED Green	KM7LG	7LG		T6	6508805203
220–240 V, 50–60 Hz	LED Yellow	KM7LY	7LY		T6	6508805202
220–240 V, 50–60 Hz	LED White	KM7LW	7LW		T6	6508805215
220–240 V, 50–60 Hz	LED Blue	KM7LL	7LL		T6	6508805216
240 Vac/Vdc	Resistor	KM25	25	6.0 VA	T3A	2550101027
240 Vac/Vdc	Neon *[126]*	KM12	12	0.3 VA	T6	2550101013
277 V, 50–60 Hz	Transformer	KM8	8	2.4 VA	T6	2550101020
380–480 V, 50–60 Hz	Transformer	KM5	5	2.8 VA	T6	2550101020
480 Vac/Vdc	Neon *[126]*	KM14	14	0.5 VA	T6	2550101013
550–600 V, 50–60 Hz	Transformer	KM6	6	2.5 VA	T6	2550101020

NOTE: Light modules are available in other voltages. For additional information, refer to Catalog **9001CT0001**.

The products in Table 19.273 have been assigned Temperature Classifications (T-Codes) in accordance with **UL 121201 (2017) — Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.** These codes can aid the user in proper application of these products in accordance with **ISO/ISA/IEC 60079–0 (2017–12) Explosive Atmospheres — Part 0: Equipment — General Requirements** and the **National Electric Code NFPA 70 — Article 500.**

NOTE: Light modules shown in Table 19.274 are not UL Certified for use in hazardous locations.

Table 19.274: Shallow Depth Light Modules For Types K and SK Control Units *[121] [123] [127] [122]*

Voltage	Description	Light Module Type *[125]*	Voltage Assembly Code	Rating	Temperature Code T-Code	Replacement Lamp Part Number
24–28 Vac/Vdc	Full Voltage	KM55	55	1.2 VA	—	2550101002
	LED Red	KM55LR	55LR	0.5 VA	—	6508805204
	LED Green	KM55LG	55LG		—	6508805206
	LED Yellow	KM55LY	55LY		—	6508805205
110–120 Vac/Vdc	Full Voltage	KM58	58	3.0 VA	—	2550101027
	LED Red	KM58LR	58LR	0.5 VA	—	6508805204
	LED Green	KM58LG	58LG		—	6508805206
	LED Yellow	KM58LY	58LY		—	6508805205

File: E78403
CCN: NKCR

File: LR25490
Class: 3211 03

marked

[121] For use with all operators except KX and remote test pilot.
[122] For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92.
[123] With LED light modules, use either a clear color cap or a cap the same color as the LED.
[124] With neon type light modules, use a **clear** color cap only.
[125] When ordering, add prefix 9001 to the catalog number.
[126] Not for use on KX operators.
[127] Reduces the depth of illuminated push buttons with contact blocks by over 33%.

Table 1.64: Plug-on Neutral Load Center Surge Packs (Compatible with Plug-On and Plug-On Neutral Circuit Breakers)

	Mains Rating	Max. 1P Circuits	Max. Tandem Circuit Breakers	Load Center Box, Interior, Cover and Branch Circuit Breakers		Equipment Ground Bars	Main Wire Size AWG/kcmil		Box No.
				Catalog Number	Included Load Center / Circuit Breakers / SPD	Catalog Number	Al	Cu	
Indoor	225	60	30	HOM3060L225PGCSVP2	(1) HOM3060l225PGC, (1) HOM230, (2) HOM120, (1) Plug-on Neutral HOM250PSPD, Cover & Ground Bar	PK9GTA, PK18GTAL (included)	4-300	4-250	10
Rainproof	200	16	8	HOM816M200PFTRBSP2	(1) HOM816M200PFTRB & (1) Plug-on Neutral HOM250PSPD	PK15GTA (order separately)	4-250		6R

QO Load Center Accessories

Table 1.65: QO Load Center Accessories

Description			Cat. No.	Schedule
Circuit Identification Stickers	Circuit identification stickers for use on cover directory labels to identify branch circuits		PSDS	DE5
Cover Sealing Strap	Provides means of sealing trim mounting screws on QO load center covers		QO1SE	DE3A
Door Lock Kits	Use with QO612L100DF/S, QO612L100DFCU/SCU, QO612L100DTF/S, QO816L100DF/S, QO816L100DFCU/SCU, QO816L100DTF/S, QO48M30DSGP, or QO48M60DSGP		PK8FL *[4]*	DE3A
	Use with convertible mains, 1Ø and 3Ø 100–225 A, and fixed mains, 3Ø 125–225 A indoor load centers		PK6FL	DE3A
	Use with 300 and 400 ampere indoor load centers		PK4FL	PE1A
Filler Plates	Fills opening in covers if twistout is removed in error		QOFP	DE3A
	Fills main circuit breaker opening in convertible load center covers 100–125 A		QOM1FP	DE3A
	Fills main circuit breaker opening in convertible load center covers 150–225 A		QOM2FP	DE3A
	Fills main circuit breaker opening in 3Ø load center covers (S01 and S02 Series)		KFP	DE3A
	Fills main circuit breaker opening in "Q" style 3Ø load center covers (S03 Series)		Q2FP	DE3A
Ground Bar Kits	Ground Bar Assembly—3 connectors		PK3GTA1	DE3A
	Ground Bar Assembly—4 connectors		PK4GTA	DE3A
	Ground Bar Assembly—7 connectors		PK7GTA	DE3A
	Ground Bar Assembly—9 connectors		PK9GTA	DE3A
	Ground Bar Assembly—12 connectors		PK12GTA	DE3A
	Ground Bar Assembly—15 connectors		PK15GTA	DE3A
	Ground Bar Assembly—18 connectors		PK18GTA	DE3A
	Ground Bar Assembly—23 connectors		PK23GTA	DE3A
	Ground Bar Assembly—27 connectors		PK27GTA	DE3A
	Ground Bar Assembly—21 connectors. Use in high amperage load centers.		PK15GTA6	DE3A
	Standard PK15GTA with a 1–4/0 Al/Cu Lug		PK15GTAL	DE3A
	Standard PK18GTA with a 1–4/0 Al/Cu Lug		PK18GTAL	DE3A
	Standard PK23GTA with a 1–4/0 Al/Cu Lug		PK23GTAL	DE3A
	Ground Bar Pack— PK9GTA, PK9GTA, & LK100AN		PKGTALP1	DE3A
	Ground Bar Pack— PK9GTA, PK18GTA, & LK100AN		PKGTALP2	DE3A
	Ground Bar Pack—PK15GTA, PK18GTA, & LK100AN		PKGTALP3	DE3A
	Insulator Kit for PK7GTA through PK27GTA		PKGTAB	DE3A
Handle Padlock Attachments	For padlocking main circuit breakers in convertible load centers OFF	50A–125A	QOM1PA	DE2E
	For padlocking main circuit breakers in convertible load centers OFF	100A–225A	QOM2PA	DE2E
Neutral Bonding Screw	For use on all Homeline and QO 125A convertible main load centers		4028344850K	DE5
	For use on QO 150A–225A convertible main load centers		4028345850K	DE5
Neutral / Ground Lugs	Field-installed for 12– 2 Al or 14–4 Cu AWG wire		LK70AN	DE3A
	Field-installed for 6–2/0 Al/Cu AWG wire		LK100AN	DE3A
	Field-installed for 14–2/0 Al/Cu AWG wire		LK125AN	DE3A
	Field-installed for 2–3/0 Al/Cu AWG wire		LK150AN	DE3A
	Field-installed for 4 AWG to 300 kcmil Al/Cu wire. Use in Series S, 150-225A QO load center or S03 and below, 150-225A HOM load center		LK225AN LK225ANHOM	DE3A
Replacement Cover Directory Label	1 through 42 numbered universal replacement directory label for load center covers		LSDL	DE5
Retaining Kit for Breakers Used as Back-fed Mains	Secures circuit breaker to interior when used as a back-fed main. For QO612L100F/S, RB, QO612L100DF/S, QO816L100F/S, RB, QO816L100DF/S and QO148L125GF/S, GRB load centers		PK2MB	DE3A
	Secures 3P circuit breaker without accessories to left side of interior when used as a back-fed main. For 3Ø load centers		PK3MB	DE3A
	Secures circuit breaker to interior when used as a back-fed main for 2P QO 150–200 A circuit breakers		PK5RK OBS	DE3A
	Secures ONE circuit breaker with or without electrical accessories to right side of interior when used as a back-fed main For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02		PK4MB2LA	DE3A
	Secures ONE circuit breaker with or without electrical accessories to right side of interior when used as a back-fed main For 1Ø 150–225 ampere convertible main load centers. Series S01 and S02		PK4MB2HA	DE3A
Service Entrance Barriers	QO / Homeline 1Ø 100–125 A QOM1 convertible main load centers		PKSB1LA	DE3A
	QO / Homeline 1Ø 150–225 A QOM2 convertible main load centers		PKSB1HA	DE3A
	QO 3Ø convertible main load centers		PKSB3	DE3A
	QO 1Ø back-fed main breaker applications		PKSB1QOBF	DE3A
	QO 3Ø back-fed main breaker applications		PKSB3BF	DE3A
QO Load Center Manual Power Transfer Accessories				
Generator Circuit Breaker Interlock Kit	For use on "G" and "S" Series NEMA 1 and "G", "S1" and "S2" Series NEMA 3R load centers. Interlocks a QOM1 2P main circuit breaker of a load center (100–125 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.		QOCRBGK1C	DE3A
	For use on "G" and "S" Series NEMA 1 and "G" and "S1" Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.		QOCGK2C	DE3A
	For use on "S2" Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.		QORBGK2C	DE3A

[4] QO403L60NF/S does not have provisions for a field-installed lock.

Counting Instruments

Technical Data 21

Electronic Hour Meter, AC Hour Meter
T50 Series

T50A2 T50B2

ENM's Series T50 electronic AC hour meter is a low cost reliable hour meter incorporating the latest state-of-the-art in electronics. It's quartz-crystal time base insures accurate long term time-keeping. A reliable electromechanical wheel-type indicator is used to store accumulated hours.
This compact tamperproof meter is sealed against the environment to provide years of service.
The T50 elapsed time indicator was designed for use on test and recording equipment, for providing maintenance control, for establishing warranty programs, for measuring machine utilization and production time, or for any application where time-in-use is to be determined.

Features

- Low Power Consumption
- Solid State Electronic Drive Circuit
- Quartz-Crystal for Accurate Timing
- Non-reset
- UL/cUL Recognized, CE & RoHS Compliant
- High Impact, Tamperproof Plastic Case
- IP65
- Indicates Operating Time in Hours and Tenths
- No Battery Back-Up Required
- Quiet operation
- MADE IN THE U.S.A.

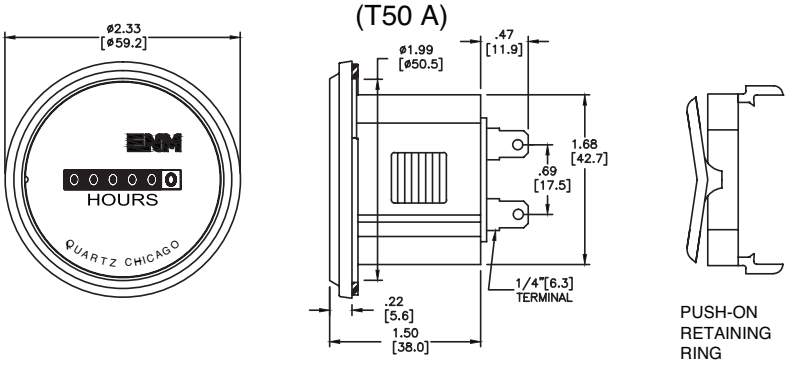
Specifications

Time Scale:	6-digits 99,999.9 Hours Automatic recycle to zero
Figures:	Hours - White on black Tenths - Red on white Height - 0.140"
Operation Voltage:	230, 115, 48, 24 VAC ±10% 50/60 Hz Other voltage available
Power Consumption:	Less than 0.4 Watts
Accuracy:	Better than ±0.02% over entire range
Temperature:	-40°F to +185°F (-40°C to +85°C)
Vibration Resistance:	Withstands 10-80 Hz at 20g's max. (SAE J1378)
Shock:	55g at 9-13 ms (SAE J1378)
Humidity:	95% (SAE J1378)
Terminations:	1/4" male blade terminals
Configuration:	Round SAE Bezel with new push-on retaining ring Round 3-Hole Bezel

Counting Instruments

ENM Company
5617 Northwest Highway, Chicago, IL 60646-6135
(773) 775-8400 • Fax: (773) 775-5968
Toll Free (888) 372-0465 • e-mail: customerservice@enmco.com
web site: www.enmco.com

(T50 A)



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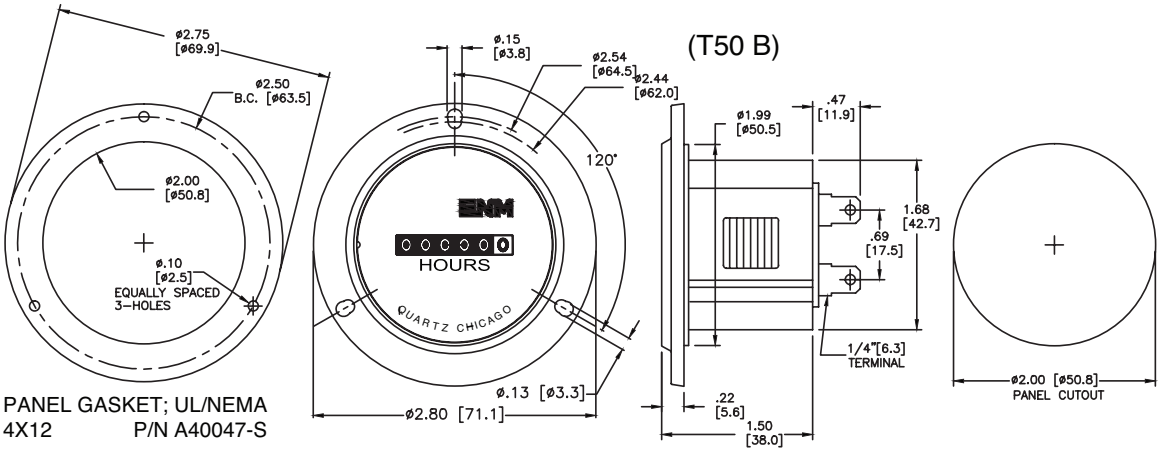
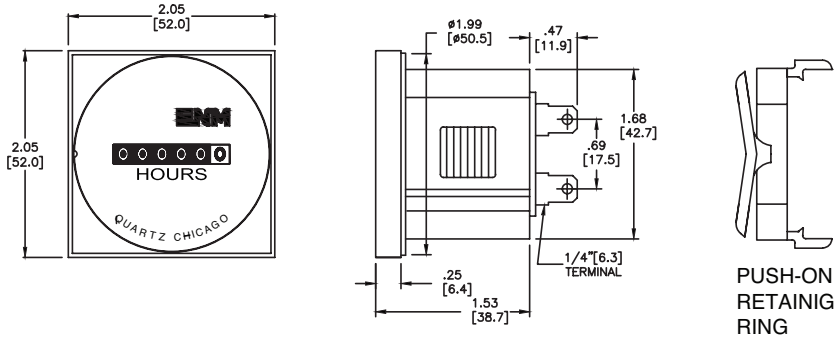


PANEL GASKET; UL/NEMA 4X12 P/N A40047-S

PANEL GASKET; UL/NEMA 4X12 WITH MTG HARDWARE; P/N B20017

(T50 E)



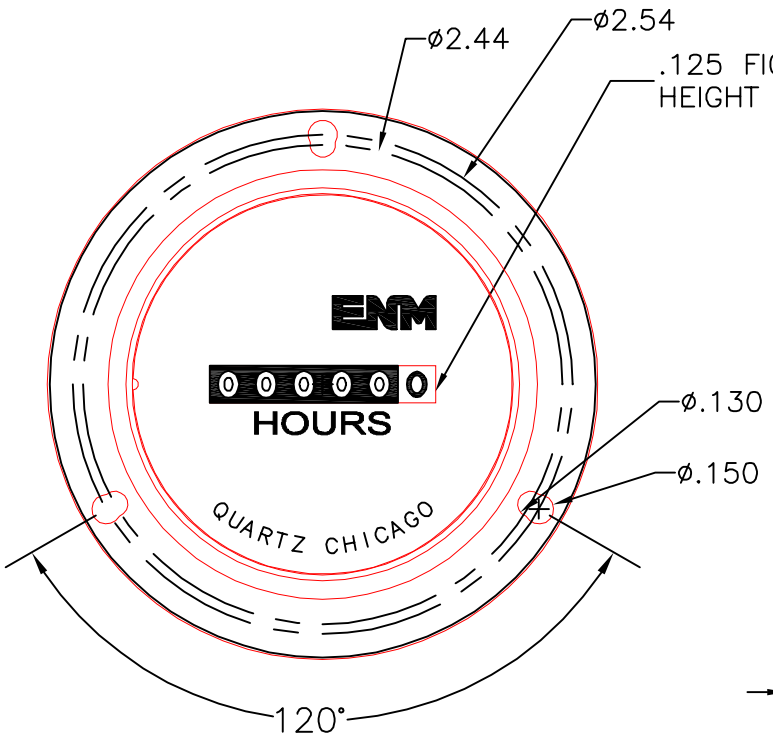
LIMITED WARRANTY

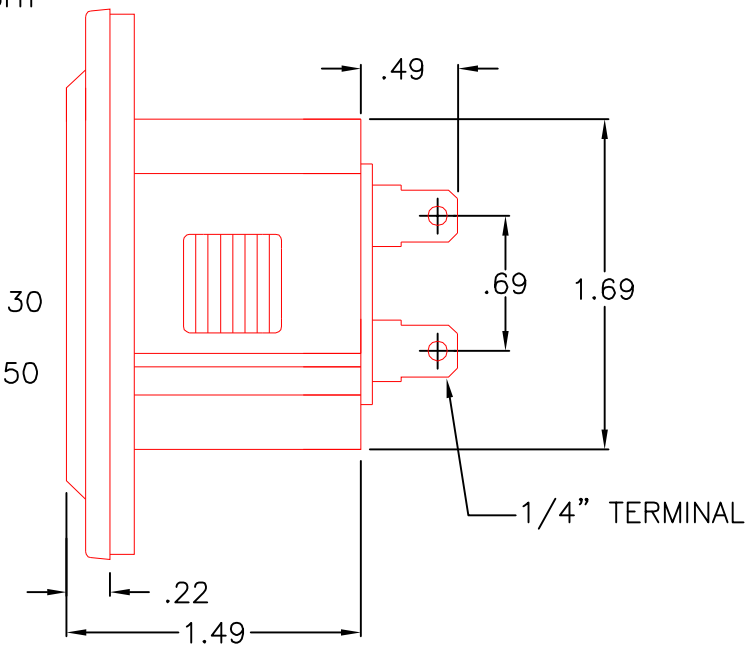
ENM Company resettable electromechanical counters are warranted to the consumer to be free from defects in material and workmanship for a period of 3 years. All ENM products which fall within the warranty period due to defects in material or workmanship will be repaired or replaced, at ENM's option, without charge to the consumer when returned with proof of purchase to any authorized ENM dealer in the United States, transportation charges prepaid, provided there is no evidence of improper installation, tampering, or other abuse. All implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, shall be limited in duration to the express warranty period specified above. ENM disclaims any liability for consequential damages due to breach of any written or implied warranty on its products. Datasheet information subject to change.

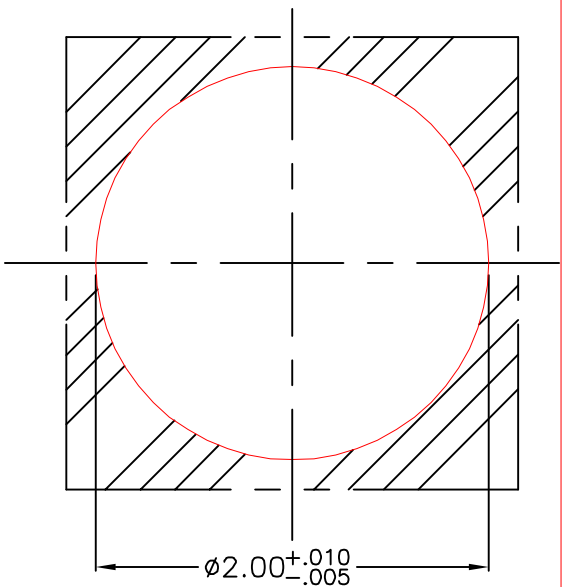
Counting Instruments

ENM Company
5617 Northwest Highway, Chicago, IL 60646-6135
(773) 775-8400 • Fax: (773) 775-5968 • Toll Free (888) 372-0465
e-mail: customerservice@enmco.com
ISO 9001:2000 **web site: www.enmco.com**

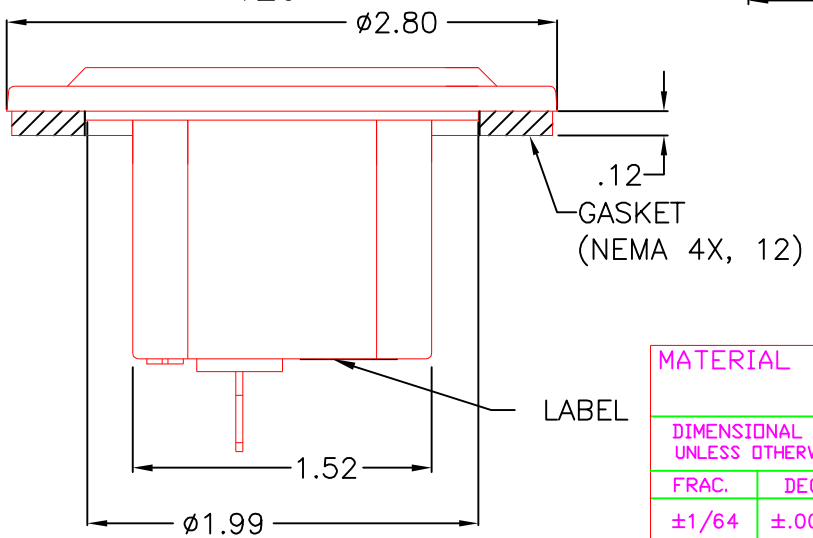
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL







PANEL CUT-OUT



NOTES:
OPERATING VOLTAGE: 440 – 480 VAC 50/60 Hz
LOW POWER CONSUMPTION: 0.15W. – 0.6W.
TAMPERPROOF PLASTIC CASE
TOTALLY SEALED
OPERATING TEMPERATURE; -40°F (-40°C) TO +185°F (85°C)
MTG. HARDWARE ARE BULK PACK IN PLASTIC BAG.

MATERIAL	FINISH	HEAT TREAT
		WEIGHT

DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRAC.	DEC.	ANG.
±1/64	±.005	±30"
	.XX ±.01	

TITLE

HOUR METER

ENM
Chicago, Illinois

SCALE	NO. REQ.D
1:1	
NEXT ASSY.	

DRAWN	j.g.	DATE 02-09-11
CHECKED		DATE
APPROVED		DATE

SIZE	DRAWING NUMBER	ISSUE
A	S-T50B5912	01

Two-Hole, Single Barrel Lug

For Use with Stranded Aluminum or Copper Code Conductors

Type LAMB

- Made from high strength, extruded aluminum alloy to provide premium electrical and mechanical performance
- Tin-plated to inhibit corrosion
- Compact design saves space
- Wide wire range-taking capability minimizes inventory requirements
- Inspection window to visually assure full conductor insertion
- Plated steel or aluminum set screw provides high strength, durable electrical contact between conductor and connector
- LAMLB provided with dual set screws for premium clamping of conductor to connector for heavy duty applications
- UL Listed and CSA Certified for use up to 600 V and UL temperature rated 90°C
- Available with NEMA hole sizes and spacing

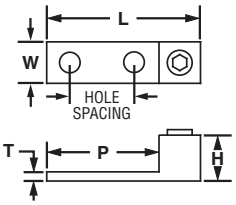


Figure 1

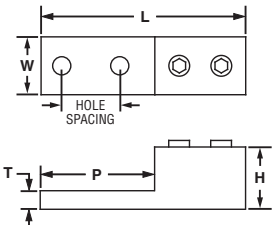


Figure 2

	Part Number	Figure No.	Conductor Size Range	Stud Hole Size (In.)	Stud Hole Spacing (In.)	Hex Key Size (In.)	Figure Dimensions (In.)					Std. Pkg. Qty.
							L	W	H	T	P	
◆	**LAMB350-12-6Y**	1	#6 AWG – 350 kcmil	1/2	1.75	5/16	4.19	1.13	1.28	0.28	3.05	6
◆	**LAMB600-12-3Y**	1	#2 AWG – 600 kcmil	1/2	1.75	1/2	4.69	1.60	1.57	0.44	3.31	3
◆	**LAMLB1000-12-3***	2	500 – 1000 kcmil	1/2	1.75	1/2	6.19	1.63	1.88	0.56	3.44	3

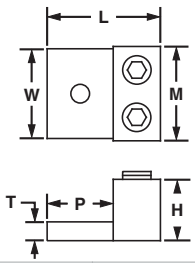
The use of Panduit oxide inhibiting joint compound (CMP-100) is recommended for pad to pad and conductor connections. See page D2.155.
*UL Listed and CSA Certified.
uNEMA hole sizes and spacing.

One-Hole, Two-Barrel Lug

For Use with Stranded Aluminum or Copper Code Conductors

Type LAM2A

- Dual barrel provides termination of two conductors
- Made from high strength, extruded aluminum alloy to provide premium electrical and mechanical performance
- Tin-plated to inhibit corrosion
- Wide wire range-taking capability minimizes inventory requirements
- Inspection window to visually assure full conductor insertion
- Plated steel or aluminum set screw provides high strength, durable electrical contact between conductor and connector
- UL Listed and CSA Certified for use up to 600 V and UL temperature rated 90°C
- Available with NEMA hole sizes and spacing

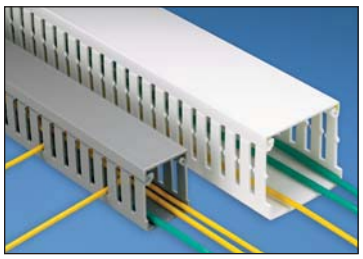


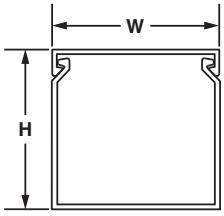
Part Number	Conductor Size Range	Stud Hole Size (In.)	Hex Key Size (In.)	Figure Dimensions (In.)						Std. Pkg. Qty.
				L	W	H	T	P	M	
LAM2A1/0-14-6Y	#14 AWG – 1/0 AWG	1/4	**	1.47	1.13	0.78	0.19	0.85	1.13	6
LAM2A2/0-14-6Y	#14 AWG – 2/0 AWG	1/4	3/16	1.47	1.20	0.78	0.19	0.85	1.20	6
LAM2A250-38-6Y	#6 AWG – 250 kcmil	3/8	3/8	2.56	1.50	1.19	0.25	1.56	1.64	6
LAM2A350-12-6Y	#6 AWG – 350 kcmil	1/2	5/16	2.87	1.73	1.25	0.25	1.74	1.91	6
LAM2A600-12-6Y*	#2 AWG – 600 kcmil	1/2	3/8	3.19	2.00	1.56	0.44	1.81	2.38	6
LAM2A1000-58-6Y*	500 kcmil – 1000 kcmil	5/8	3/8	3.50	3.50	1.94	0.50	1.88	3.50	6

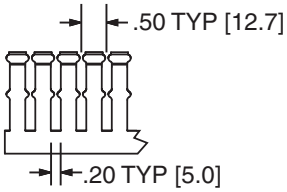
The use of Panduit oxide inhibiting joint compound (CMP-100) is recommended for pad to pad and conductor connections. See page D2.155.
*UL Listed and CSA Certified.
**Uses slotted head set screw.

Panduct® Type F Narrow Slot Wiring Duct

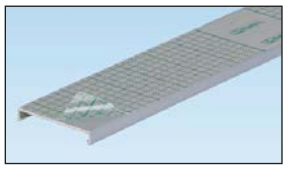
- Narrow slot/finger design provides more slots to fit the spacing of high-density terminal blocks and other hardware
- Material: Lead-free PVC
- UL recognized continuous use temperature: 122°F (50°C)
- UL 94 flammability rating of V-0
- Conforms with NFPA 79-2007 section 13.3.1 requirement for flame retardant material
- Provided with mounting holes
- Base and cover length is 6 feet







Multiple slot restrictors present with 2" and greater duct wall height.



To order cover with protective film add "-F" to part number. 6" cover not available with film.

NEW!

Base Part Number	Duct Size (W x H)* In.	Duct Size (W x H)* mm	Slot Width In.	Slot Width mm	Cover Part Number	Std. Pkg. Qty.	Base Ctn. Qty.	Cover Ctn. Qty.
F.5X.5LG6	0.69 x 0.60	17.5 x 15.2	0.20	5.0	**C.5LG6**	6	120	120
F.5X1LG6	0.69 x 1.06	17.5 x 26.9	0.20	5.0	**C.5LG6**	6	120	120
F.75X.75LG6	0.93 x 0.82	23.6 x 20.9	0.20	5.0	**C.75LG6**	6	120	120
F.75X1.5LG6	0.93 x 1.57	23.6 x 39.9	0.20	5.0	**C.75LG6**	6	120	120
F1X1LG6	1.26 x 1.13	32.0 x 28.7	0.20	5.0	**C1LG6**	6	120	120
F1X1.5LG6	1.26 x 1.62	32.0 x 41.1	0.20	5.0	**C1LG6**	6	120	120
F1X2LG6	1.26 x 2.12	32.0 x 53.8	0.20	5.0	**C1LG6**	6	120	120
F1X3LG6	1.26 x 3.12	32.0 x 79.2	0.20	5.0	**C1LG6**	6	120	120
F1X4LG6	1.26 x 4.10	32.0 x 104.1	0.20	5.0	**C1LG6**	6	60	120
F1.5X1LG6	1.75 x 1.12	44.5 x 28.4	0.20	5.0	**C1.5LG6**	6	120	120
F1.5X1.5LG6	1.75 x 1.62	44.5 x 41.1	0.20	5.0	**C1.5LG6**	6	120	120
F1.5X2LG6	1.75 x 2.12	44.5 x 53.8	0.20	5.0	**C1.5LG6**	6	120	120
F1.5X3LG6	1.75 x 3.12	44.5 x 79.2	0.20	5.0	**C1.5LG6**	6	120	120
F1.5X4LG6	1.75 x 4.10	44.5 x 104.1	0.20	5.0	**C1.5LG6**	6	60	120
F2X1LG6	2.25 x 1.12	57.2 x 28.4	0.20	5.0	**C2LG6**	6	120	120
F2X1.5LG6	2.25 x 1.62	57.2 x 41.1	0.20	5.0	**C2LG6**	6	120	120
F2X2LG6	2.25 x 2.12	57.2 x 53.8	0.20	5.0	**C2LG6**	6	120	120
F2X3LG6	2.25 x 3.12	57.2 x 79.2	0.20	5.0	**C2LG6**	6	60	120
F2X4LG6	2.25 x 4.10	57.2 x 104.1	0.20	5.0	**C2LG6**	6	60	120
F2X5LG6	2.25 x 5.10	57.2 x 129.5	0.20	5.0	**C2LG6**	6	60	120
F2.5X3LG6	2.75 x 3.12	69.9 x 79.2	0.20	5.0	**C2.5LG6**	6	120	120
F3X1LG6	3.25 x 1.12	82.6 x 28.4	0.20	5.0	**C3LG6**	6	120	120
F3X2LG6	3.25 x 2.12	82.6 x 53.8	0.20	5.0	**C3LG6**	6	120	120
F3X3LG6	3.25 x 3.12	82.6 x 79.2	0.20	5.0	**C3LG6**	6	60	120
F3X4LG6	3.25 x 4.10	82.6 x 104.1	0.20	5.0	**C3LG6**	6	60	120
F3X5LG6	3.25 x 5.10	82.6 x 129.5	0.20	5.0	**C3LG6**	6	60	120
F4X2LG6	4.25 x 2.12	108.0 x 53.8	0.20	5.0	**C4LG6**	6	60	120
F4X3LG6	4.25 x 3.12	108.0 x 79.2	0.20	5.0	**C4LG6**	6	60	120
F4X4LG6	4.25 x 4.10	108.0 x 104.1	0.20	5.0	**C4LG6**	6	60	120
F4X5LG6	4.25 x 5.10	108.0 x 129.5	0.20	5.0	**C4LG6**	6	60	120
F6X4LG6	6.25 x 4.15	158.8 x 105.4	0.20	5.0	**C6LG6**	6	60	120

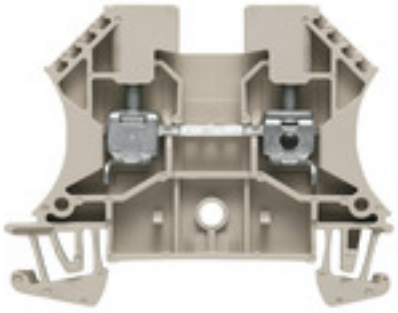
Part number shown for LG (Light Gray). For other color availability see color selection guide, page C1.48.
Base and cover sold separately.
*"H" dimension includes duct and cover.

WDU 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



Klippon® Connect with clamping yoke Technology
The high reliability and variety of designs of the terminal blocks with clamping yoke connections make planning easer and optimises operational safety. Klippon® Connect provides a proven response to a range of different requirements.

General ordering data

Version	Feed-through terminal, Screw connection, 4 mm², 800 V, 32 A, dark beige
Order No.	1020100000
Type	WDU 4
GTIN (EAN)	4008190150617
Qty.	100 pc(s).

WDU 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Depth including DIN rail	47 mm	Height	60 mm
Height (inches)	2.362 inch	Net weight	9.57 g
Weight	9 g	Width	6.1 mm
Width (inches)	0.24 inch		

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	32 A
Wire cross section max. (ATEX)	4 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	32 A	Wire cross section max. (IECEX)	4 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for plug-in cross-connector, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, solid, two clampable wires, max.	2.5 mm²	Cross-section for connected wire, solid, two clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	1.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	1.5 mm²

Weidmüller

WDU 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size B (CSA)	35 A
Current size C (CSA)	35 A	Voltage size C (CSA)	600 V
Wire cross section max. (CSA)	10 AWG	Wire cross section min. (CSA)	26 AWG

Conductors for clamping (rated connection)

Blade size	0.6 x 3.5 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 Nm	
		max.	6 Nm	
		nominal	4 Nm	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
Clamping range, max.	6 mm²			
Clamping range, min.	0.13 mm²			
Clamping screw	M 3			
Connection cross-section, stranded, max.	6 mm²			
Connection cross-section, stranded, min.	1.5 mm²			
Connection direction	on side			

WDU 4

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Gauge to IEC 60947-1	A4
Number of connections	2
Stripping length	10 mm
Tightening torque, max.	1 Nm
Tightening torque, min.	0.5 Nm
Torque level with DMS electric screwdriver	2
Twin wire-end ferrules, max.	2.5 mm²
Twin wire-end ferrules, min.	0.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 10
Wire connection cross section AWG, min.	AWG 26
Wire connection cross section, finely stranded, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	4 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	4 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	6 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 10	Wire connection cross section AWG, min.	AWG 26

Rating data

Power loss in accordance with IEC 60947-7-x	1.02 W	Rated cross-section	4 mm²
Rated voltage	800 V	Rated current	32 A
Current at maximum wires	41 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	1 mΩ	Rated impulse withstand voltage	8 kV
Pollution severity	3		

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	10 AWG
Conductor size Factory wiring min. (UR)	26 AWG	Conductor size Field wiring max. (UR)	10 AWG
Conductor size Field wiring min. (UR)	22 AWG	Current size C (UR)	35 A
UL_current_Print	35 A	UL_voltage_Print	600 V
UL_wire_max_Print	10 AWG	UL_wire_min_Print	26 AWG
Voltage size C (UR)	600 V		

RTE Series — Analog Timers

Key features:

- 20 time ranges and 10 timing functions
- Time delays up to 600 hours
- Space-saving package
- High repeat accuracy of ± 0.2%
- ON and timing OUT LED indicators
- Standard 8- or 11-pin and 11-blade termination
- 2 form C delayed output contacts
- 10A Contact Rating

TÜV Cert. No. E9950913332316 (EMC, RTE)
Cert. No. BL960813332355 (LVD, RTE)

c UL us UL Listed
File No. E66043

CE

General Specifications

Operation System			Solid state CMOS Circuit		
Operation Type			Multi-Mode		
Time Range			0.1sec to 600 hours		
Pollution Degree			2 (IE60664-1)		
Over voltage category			III (IE60664-1)		
Rated Operational Voltage		AF20	100-240V AC(50/60Hz)		
		AD24	24V AC(50/60Hz)/24V DC		
		D12	12V DC		
Voltage Tolerance		AF20	85-264V AC(50/60Hz)		
		AD24	20.4-26.4V AC(50/60Hz)/21.6-26.4V DC		
		D12	10.8-13.2V DC		
Input off Voltage			Rated Voltage x10% minimum		
Ambient Operating Temperature			-20 to +65°C (without freezing)		
Ambient Storage and Transport Temperature			-30 to +75°C (without freezing)		
Relative Humidity			35 to 85%RH (without condensation)		
Atmospheric Pressure			80kPa to 110kPa (Operating), 70kPa to 110kPa (Transport)		
Reset Time			100msec maximum		
Repeat Error			±0.2%, ±20msec*		
Voltage Error			±0.2%, ±20msec*		
Temperature Error			±0.5%, ±20msec*		
Setting Error			±10% maximum		
Insulation Resistance			100MΩ minimum (500V DC)		
Dielectric Strength			Between power and output terminals: 2000V AC, 1 minute		
			Between contacts of different poles: 2000V AC, 1 minute		
			Between contacts of the same pole:1000V AC, 1 minute		
Vibration Resistance			10 to 55Hz amplitude 0.5mm² hours in each of 3 axes		
Shock Resistance			Operating extremes: 98m/sec² (10G)		
			Damage limits: 490m/sec² (50G)		
			3 times in each of 3 axes		
Degree of Protection			IP40 (enclosure) (IEC60529)		
Power Consumption (Approx.)	TYPE		RTE-P1, -B1		RTE-P2, -B2
	AF20	120V AC/60Hz	6.5VA		6.6VA
		240V AC/60Hz	11.6VA		11.6VA
	24V AC 60Hz/DC		3.4VA/1.7W		3.5VA/1.7W
	D12		1.6W		1.6W
Mounting Position			Free		
Dimensions		RTE-P1, P2	40Hx 36W x 77.9D mm		
		RTE-B1, B2	40Hx 36W x 74.9D mm		
Weight (Approx.)			RTE-P1	RTE-P2	RTE-B1, -B2
			87g	89g	85g

Contact Ratings

Contact Configuration		2 Form C, DPDT (Delay output)
Allowable Voltage / Allowable Current		240V AC, 30V DC / 10A
Maximum Permissible Operating Frequency		1800 cycles per hour
Rated Load	Resistive	10A 240V AC, 30V DC
	Inductive	7A 240V AC, 30V DC
	Horse Power Rating	1/6 HP 120V AC, 1/3 HP 240V AC
Life	Electrical	500,000 op. minimum (Resistive)
	Mechanical	50,000,000 op. minimum

*For the value of the error against a preset time, whichever the largest, applies.

Part Numbering Guide

RTE series part numbers are composed of 4 part number codes. When ordering a RTE series part, select one code from each category.
Example: **RTE-P1AF20**

RTE	–	P	1	AF20
① Series		② Terminal Style	③ Function Group	④ Input Voltage

Part Numbers: RTE Series

	Description	Part Number Code	Remarks
① Series	RTE series	RTE	For internal circuits, see next page.
② Terminal Style	Pin	P	Select one only.
	Blade	B	
③ Function Group	ON-delay, interval, cycle OFF, cycle ON	1	Each function group has different timing functions.
	ON-delay, cycle OFF, cycle ON, signal ON/ OFF delay, OFF-delay, one-shot	2	See page 832.
④ Input Voltage	100 to 240V AC(50/60Hz)	AF20	
	24V AC(50/60Hz)/24V DC	AD24	
	12V DC	D12	

Part Numbers

Voltage	Power Triggered		Start Input Triggered	
	8-Pin	Blade	11-Pin	Blade
12V DC	RTE-P1D12	RTE-B1D12	RTE-P2D12	RTE-B2D12
24V AC/DC	RTE-P1AD24	RTE-B1AD24	RTE-P2AD24	RTE-B2AD24
100-240V AC	RTE-P1AF20	RTE-B1AF20	RTE-P2AF20	RTE-B2AF20

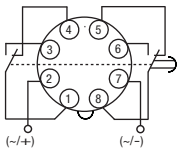
Time Range Determined by Time Range Selector and Dial Selector

	Dial	0 - 1	0 - 3	0 - 10	0 - 30	0 - 60
Range	Second	0.1 sec - 1 sec	0.1 sec - 3 sec	0.2 sec - 10 sec	0.6 sec - 30 sec	1.2 sec - 60 sec
	Minute	1.2 sec - 1 min	3.6 sec - 3 min	12 sec - 10 min	36 sec - 30 min	1.2 min - 60 min
	Hour	1.2 min - 1 hr	3.6 min - 3 hr	12 min - 10 hr	36 min - 30 hr	1.2 hr - 60 hr
	10 Hours	12 min - 10 hr	36 min - 30 hr	2 hr - 100 hr	6 hr - 300 hr	12 hr - 600 hr

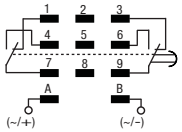
Timing Diagrams

RTE-P1, -B1

RTE-P1

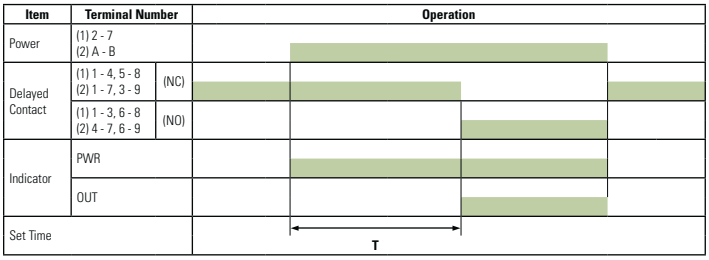


RTE-B1

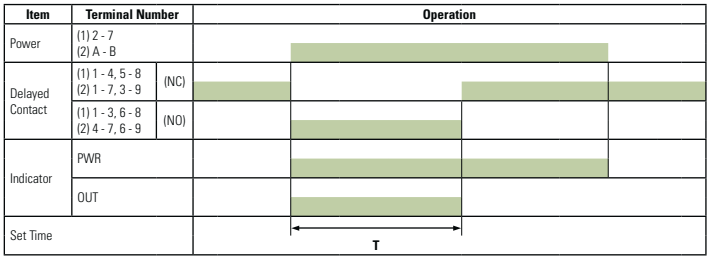


1. RTE-B1: Do not apply voltage to terminals #2, #5 & #8.
2. IDEC sockets are as follows: RTE-P1: SR2P-06* pin type socket, RTE-B1: SR3B-05* blade type socket, (*-may be followed by suffix letter A,B,C or U).

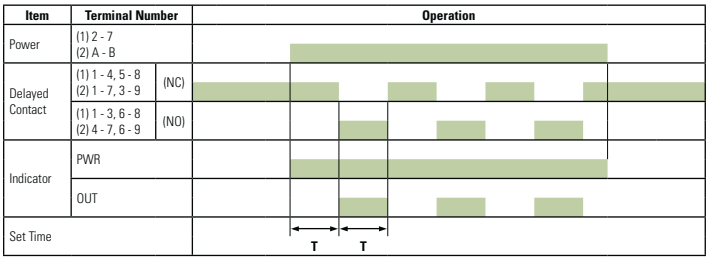
A: ON-Delay 1 (power start)
Set timer for desired delay, apply power to coil. Contacts transfer after preset time has elapsed, and remain in transferred position until timer is reset. Reset occurs with removal of power.



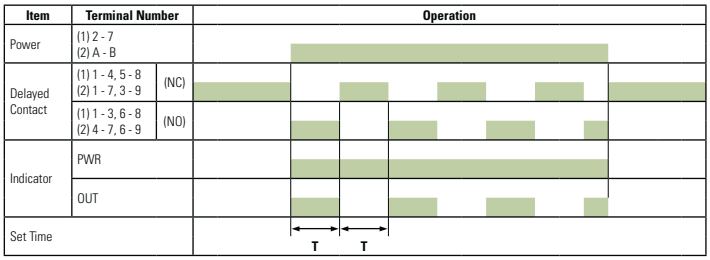
B: Interval (power start)
Set timer for desired delay, apply power to coil. Contacts transfer immediately, and return to original position after preset time has elapsed. Reset occurs with removal of power.



C: Cycle 1 (power start, OFF first)
Set timer for desired delay, apply power to coil. First transfer of contacts occurs after preset delay has elapsed, after the next elapse of preset delay contacts return to original position. The timer now cycles between on and off as long as power is applied (duty ratio 1:1).

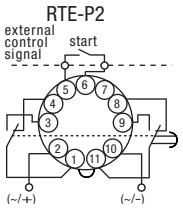


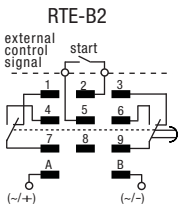
C: Cycle 3 (power start, ON first)
Functions in same manner as Mode C, with the exception that first transfer of contacts occurs as soon as power is applies. The ratio is 1:1. Time On = Time Off



Timing Diagrams con't

RTE-P2, -B2





1. RTE-P2: Do not apply voltage to terminals #5, #6 & #7.
2. RTE-B2: Do not apply voltage to terminals #2, #5 & #8.
3. IDEC sockets are as follows: RTE-P2: SR3P-05* pin type socket, RTE-B2: SR3B-05* blade type socket, (*-may be followed by suffix letter A,B,C or U).

A: ON-Delay 2 (signal start)
When a preset time has elapsed after the start input turned on while power is on, the NO output contact goes on.

Item	Terminal Number		Operation
Power	(A) 2 - 10 (B) A - B		
Start	(A) 5 - 6 (B) 2 - 5		
Delayed Contact	(A) 1 - 4, 8 - 11 (B) 1 - 7, 3 - 9	(NC)	
	(A) 1 - 3, 9 - 11 (B) 4 - 7, 6 - 9	(NO)	
Indicator	PWR		
	OUT		
Set Time			T

B: Cycle 2 (signal start, OFF first)
When the start input turns on while power is on, the output oscillates at a preset cycle (duty ratio 1:1), starting while the NO contact off.

Item	Terminal Number		Operation
Power	(A) 2 - 10 (B) A - B		
Start	(A) 5 - 6 (B) 2 - 5		
Delayed Contact	(A) 1 - 4, 8 - 11 (B) 1 - 7, 3 - 9	(NC)	
	(A) 1 - 3, 9 - 11 (B) 4 - 7, 6 - 9	(NO)	
Indicator	PWR		
	OUT		
Set Time			T T T T T T T T T Ta

C: Cycle 4 (signal start, ON first)
When the start input turns on while power is on, the NO contact goes on. The output oscillates at a preset cycle (duty ratio 1:1).

Item	Terminal Number		Operation
Power	(A) 2 - 10 (B) A - B		
Start	(A) 5 - 6 (B) 2 - 5		
Delayed Contact	(A) 1 - 4, 8 - 11 (B) 1 - 7, 3 - 9	(NC)	
	(A) 1 - 3, 9 - 11 (B) 4 - 7, 6 - 9	(NO)	
Indicator	PWR		
	OUT		
Set Time			T T T T T T T T Ta

D: Signal ON/OFF-Delay
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed while the start input remains on, the output contact goes off. When the start input turns off, the NO contact goes on again. When a preset time has elapsed after the start input turned off, the NO contact goes off.

Item	Terminal Number		Operation
Power	(A) 2 - 10 (B) A - B		
Start	(A) 5 - 6 (B) 2 - 5		
Delayed Contact	(A) 1 - 4, 8 - 11 (B) 1 - 7, 3 - 9	(NC)	
	(A) 1 - 3, 9 - 11 (B) 4 - 7, 6 - 9	(NO)	
Indicator	PWR		
	OUT		
Set Time			T T Ta T T Ta

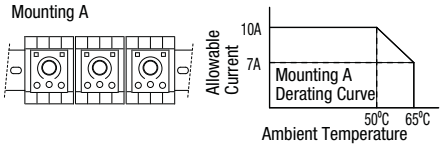
E: Signal OFF-Delay
When power is turned on while the start input is on, the NO output contact goes on. When a preset time has elapsed after the start input turned off, the NO output contact goes off.

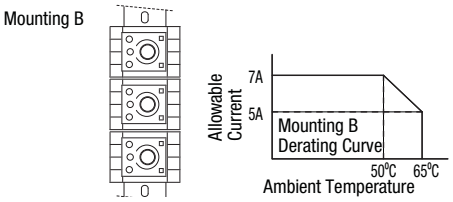
Item	Terminal Number		Operation
Power	(A) 2 - 10 (B) A - B		
Start	(A) 5 - 6 (B) 2 - 5		
Delayed Contact	(A) 1 - 4, 8 - 11 (B) 1 - 7, 3 - 9	(NC)	
	(A) 1 - 3, 9 - 11 (B) 4 - 7, 6 - 9	(NO)	
Indicator	PWR		
	OUT		
Set Time			T Ta T Ta

F: One-Shot (signal start)
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed, the NO output contact goes off.

Item	Terminal Number		Operation
Power	(A) 2 - 10 (B) A - B		
Start	(A) 5 - 6 (B) 2 - 5		
Delayed Contact	(A) 1 - 4, 8 - 11 (B) 1 - 7, 3 - 9	(NC)	
	(A) 1 - 3, 9 - 11 (B) 4 - 7, 6 - 9	(NO)	
Indicator	PWR		
	OUT		
Set Time			

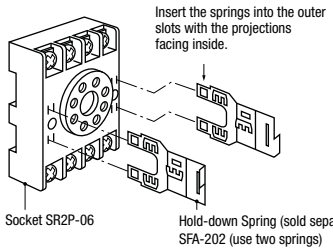
Temperature Derating Curves

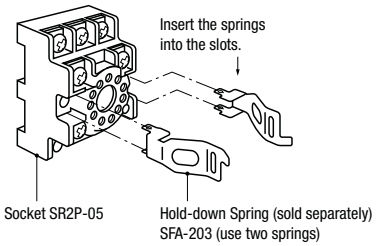




Instructions

Installation of Hold-Down Springs DIN Rail Mount Socket





Switch Settings

①Operator Mode Selector
②Scale Selector
③Time Range Selector

1. Turn the selectors securely using a flat screwdriver 4mm wide (maximum).
   Note that incorrect setting may cause malfunction. Do not turn the selectors beyond their limits.
2. Since changing the setting during timer operation may cause malfunction, turn power off before changing.

Safety Precautions

Special expertise is required to use Electronic Timers.

- All Electronic Timers are manufactured under IDEC's rigorous quality control system, but users must add a backup or fail safe provision to the control system when using the Electronic Timer in applications where heavy damage or personal injury may occur should the Electronic Timer fail.
- Install the Electronic Timer according to instructions described in this catalog.
- Make sure that the operating conditions are as described in the specifications. If you are uncertain about the specifications, contact IDEC in advance.
- In these directions, safety precautions are categorized in order of importance under Warning and Caution.

Warnings

Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

- Turn power off to the Electronic timer before starting installation, removal, wiring, maintenance, and inspection on the Electronic Timer.
- Failure to turn power off may cause electrical shocks or fire hazard.
- Do not use the Electronic Timer for an **emergency stop circuit** or **interlocking circuit**. If the Electronic Timer should fail, a machine malfunction, breakdown, or accident may occur.

Caution

Caution notices are used where inattention might cause personal injury or damage to equipment.

- The Electronic Timer is designed for installation in equipment. Do not install the Electronic Timer outside equipment.
- Install the Electronic Timer in environments described in the specifications. If the Electronic Timer is used in places where it will be subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, or excessive shocks, then electrical shocks, fire hazard, or malfunction could result.
- Use an IEC60127-approved fuse and circuit breaker on the power and output line outside the Electronic Timer.
- Do not disassemble, repair, or modify the Electronic Timer.
- When disposing of the Electronic Timer, do so as industrial waste.

Accessories

DIN Rail Mounting Accessories

DIN Rail/Surface Mount Sockets and Hold-Down Springs

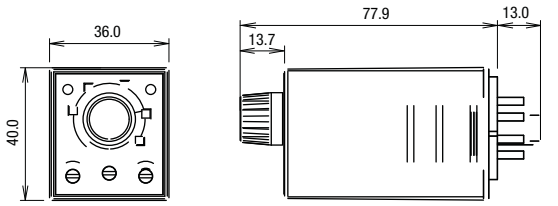
DIN Rail Mount Socket				Applicable Hold-Down Springs	
Style	Appearance	Use with Timers	Part Number	Appearance	Part Number
11-Pin Screw Terminal (dual tier)		RTE-P2	SR3P-05		SFA-203
11-Pin FingerSafe Socket		RTE-P2	SR3P-05C		
8-Pin Screw Terminal		RTE-P1	SR2P-06		SFA-202
8-Pin Fingersafe Socket			SR2P-05C		
11-Blade Screw Terminal		RTE-B1 RTE-B2	SR3B-05		
DIN Mounting Rail Length 1000mm		—	BNDN1000		

Panel Mounting Accessories

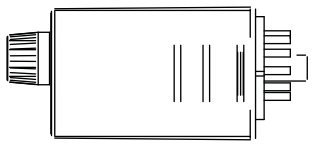
Flush Panel Mount Adapter and Sockets that use an Adapter

Accessory	Description	Appearance	Use with	Part No.
Panel Mount Adapter	Adaptor for flush panel mounting RTE timers		All RTE timers	RTB-G01
Sockets for use with Panel Mount Adapter	8-pin screw terminal	 (Shown: SR6P-M08G Wiring Socket Adapter)	RTE-P1	SR6P-M08G
	11-pin screw terminal		RTE-P2	SR6P-M11G
	8-pin solder terminal		RTE-P1	SR6P-S08
	11-pin solder terminal		RTE-P2	SR6P-S11

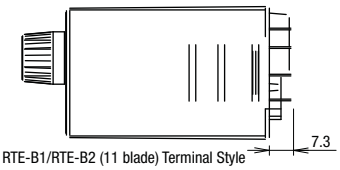
Dimensions



RTE-P1 (8 pin) Terminal Style



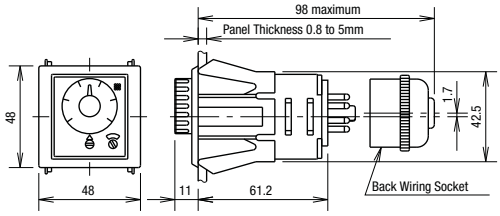
RTE-P2 (11 pin)Terminal Style



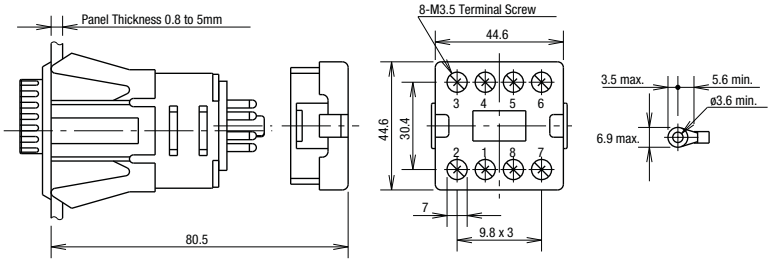
RTE-B1/RTE-B2 (11 blade) Terminal Style

Panel Mount Adapter

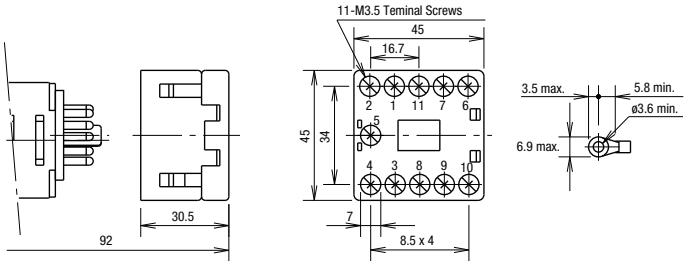
RTE Timer, 8-Pin and 11-Pin with SR6P-S08 or SR6P-S11



RTE Timer, 8-Pin with SR6P-M08G



RTE Timer, 11-Pin with SR6P-M11G



General Instructions for All Timer Series

Load Current

With inductive, capacitive, and incandescent lamp loads, inrush current more than 10 times the rated current may cause welded contacts and other undesired effects. The inrush current and steady-state current must be taken into consideration when specifying a timer.

Contact Protection

Switching an inductive load generates a counter-electromotive force (back EMF) in the coil. The back EMF will cause arcing, which may shorten the contact life and cause imperfect contact. Application of a protection circuit is recommended to safeguard the contacts.

Temperature and Humidity

Use the timer within the operating temperature and operating humidity ranges and prevent freezing or condensation. After the timer has been stored below its operating temperature, leave the timer at room temperature for a sufficient period of time to allow it to return to operating temperatures before use.

Environment

Avoid contact between the timer and sulfurous or ammonia gases, organic solvents (alcohol, benzine, thinner, etc.), strong alkaline substances, or strong acids. Do not use the timer in an environment where such substances are prevalent. Do not allow water to run or splash on the timer.

Vibration and Shock

Excessive vibration or shocks can cause the output contacts to bounce, the timer should be used only within the operating extremes for vibration and shock resistance. In applications with significant vibration or shock, use of hold down springs or clips is recommended to secure a timer to its socket.

Time Setting

The time range is calibrated at its maximum time scale; so it is desirable to use the timer at a setting as close to its maximum time scale as possible. For a more accurate time delay, adjust the control knob by measuring the operating time with a watch before application.

Input Contacts

Use mechanical contact switch or relay to supply power to the timer. When driving the timer with a solid-state output device (such as a two-wire proximity switch, photoelectric switch, or solid-state relay), malfunction may be caused by leakage current from the solid-state device. Since AC types comprise a capacitive load, the SSR dielectric strength should be two or more times the power voltage when switching the timer power using an SSR.

Generally, it is desirable to use mechanical contacts whenever possible to apply power to a timer or its signal inputs. When using solid state devices, be cautious of inrushes and back-EMF that may exceed the ratings on such devices. Some timers are specially designed so that signal inputs switch at a lower voltage than is used to power the timer (models designated as "B" type).

Timing Accuracy Formulas

Timing accuracies are calculated from the following formulas:

Repeat Error

$$= \pm \frac{1 \times \text{Maximum Measured Value} - \text{Minimum Measured Value} \times 100\%}{2 \text{ Maximum Scale Value}}$$

Voltage Error

$$= \pm \frac{Tv - Tr \times 100\%}{Tr}$$

Tv: Average of measured values at voltage V
Tr: Average of measured values at the rated voltage

Temperature Error

$$= \pm \frac{Tt - T20 \times 100\%}{T20}$$

Tt: Average of measured values at °C
T20: Average of measured values at 20°C

Setting Error

$$= \pm \frac{\text{Average of Measured Values} - \text{Set Value} \times 100\%}{\text{Maximum Scale Value}}$$

RR Series Power Relays

Key features:

- SPDT through 3PDT, 10A contacts
- Midget power type relays
- Available in pin and blade terminal styles.
- Options include an indicator, check button for test operations and side flange.
- DIN rail, surface and panel mount sockets are available for a wide a variety of mounting applications.

Part Number Selection

Contact	Model	Part Number: Pin Terminal	Part Number: Blade Terminal*	Coil Voltage Code (Standard Stock Items in Bold)
SPDT 	Standard	—	RR1BA-U ☐	AC6V, AC12V, AC24V, AC110V, **AC120V**, AC240V, DC6V, DC12V, **DC24V**, DC48V, DC110V
	With Indicator		RR1BA-UL ☐	
	With Check Button		RR1BA-UC ☐	
	With Indicator and Check Button		RR1BA-ULC ☐	
	Side Flange Model		RR1BA-US ☐	
DPDT 	Standard	RR2P-U ☐	RR2BA-U ☐	
	With Indicator	RR2P-UL ☐	RR2BA-UL ☐	
	With Check Button	RR2P-UC ☐	RR2BA-UC ☐	
	With Indicator and Check Button	RR2P-ULC ☐	RR2BA-ULC ☐	
	Side Flange Model	—	RR2BA-US ☐	
3PDT 	Standard	RR3PA-U ☐	RR3B-U ☐	
	With Indicator	RR3PA-UL ☐	RR3B-UL ☐	
	With Check Button	RR3PA-UC ☐	RR3B-UC ☐	
	With Indicator and Check Button	RR3PA-ULC ☐	RR3B-ULC ☐	
	Side Flange Model	—	RR3B-US ☐	

*Blade type not TUV tested or CE marked.
Side flange model mounts directly to panel with no socket required.

Ordering Information
When ordering, specify the Part No. and coil voltage code:
(example) **RR3B-U** **AC120V**
Part No. — Coil Voltage Code

Sockets

Relays	Standard DIN Rail Mount	Finger-safe DIN Rail Mount	Through Panel Mount
RR2P	SR2P-05 SR2P-06	SR2P-05C	SR2P-51
RR3PA	SR3P-05 SR3P-06	SR3P-05C	SR3P-51
RR1BA RR2BA RR3B	SR3B-05	—	SR3B-51



All DIN rail mount sockets shown above can be mounted using DIN rail BNDN1000.

Hold Down Springs & Clips

Appearance	Description	Relay	For DIN Mount Socket	For Through Panel & PCB Mount Socket
	Pullover Wire Spring	RR2P	SR2B-02F1	SR3P-01F1
		RR3PA	SR3B-02F1	
		RR1BA, RR2BA, RR3B	SR3B-02F1	SR3B-02F1
	Leaf Spring (side latch)	RR2P, RR3PA	SFA-203	–

Accessories

Item	Appearance	Use with	Part No.	Remarks
Aluminum DIN Rail (1 meter length)		All DIN rail sockets	BNDN1000	The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm).
DIN Rail End Stop		DIN rail	BNL5	9.1 mm wide.
Replacement Hold-Down Spring Anchor		Horseshoe clip for sockets SR3B-05, SR2P-06, SR3P-06	Y778-011	For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket.
		Chair clip for sockets SR2P-05(C), SR3P-05(C)	Y703-102	

Specifications

Contact Material		Silver	
Contact Resistance [1]		30 mΩ maximum	
Minimum Applicable Load		1V DC, 10 mA	
Operating Time [2]		25 ms maximum	
Release Time [2]		25 ms maximum	
Power Consumption (approx.)		AC: 3 VA (50 Hz), 2.5 VA (60 Hz) DC: 1.5W	
Insulation Resistance		100 MΩ minimum (500V DC megger)	
Dielectric Strength	Pin Terminal	Between live and dead parts:	1500V AC, 1 minute
		Between contact and coil:	1500V AC, 1 minute
		Between contacts of different poles:	1500V AC, 1 minute
		Between contacts of the same pole:	1000V AC, 1 minute
	Blade Terminal	Between live and dead parts:	2000V AC, 1 minute
		Between contact and coil:	2000V AC, 1 minute
		Between contacts of different poles:	2000V AC, 1 minute
		Between contacts of the same pole:	1000V AC, 1 minute
Operating Frequency		Electrical:	1800 operations/h maximum
		Mechanical:	18,000 operations/h maximum
Vibration Resistance		Damage limits:	10 to 55 Hz, amplitude 0.5 mm
		Operating extremes:	10 to 55 Hz, amplitude 0.5 mm
Shock Resistance		Damage limits:	1000 m/s² (100g)
		Operating extremes:	100 m/s² (10G)
Mechanical Life		10,000,000 operations	
Electrical Life		200,000 operations (220V AC, 5A)	
Operating Temperature [3]		–25 to +40°C (no freezing)	
Operating Humidity		5 to 85% RH (no condensation)	
Weight (approx.) (Standard type)		RR2P: 90g, RR3PA: 96g, RR1BA/RR2BA/RR3B: 82g	

1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
3. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve.

Coil Ratings

Rated Voltage (V)		Rated Current (mA) ±15% (at 20°C)		Coil Resistance (Ω) ±10% (at 20°C)	Operating Characteristics (values at 20°C)		
		50 Hz	60 Hz		Maximum Continuous Applied Voltage	Pickup Voltage	Dropout Voltage
AC (50/60 Hz)	6	490	420	4.9	110%	80% maximum	30% minimum
	12	245	210	18			
	24	121	105	79			
	110	27	23	1,680			
	120	24	20.5	2,100			
	240	12.1	10.5	8,330			
DC	6	240		25	110%	80% maximum	10% minimum
	12	120		100			
	24	60		400			
	48	30		1,600			
	110	13		8,460			

Contact Ratings

Maximum Contact Capacity					
Continuous Current	Allowable Contact Power		Rated Load		
	Resistive Load	Inductive Load	Voltage (V)	Res. Load	Ind. Load
10A	1650VA AC 300W DC	1100VA AC 150W DC	110 AC	10A	7.5A
			220 AC	7.5A	5A
			30 DC	10A	5A

Note: Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

TÜV Ratings

Voltage	
240V AC	10A
30V DC	10A

AC: cos ø = 1.0, DC: L/R = 0 ms

UL Ratings

Voltage	Resistive	General use	Horse Power Rating
240V AC	10A	7A	1/3 HP
120V AC	10A	7.5A	1/4 HP
30V DC	10A	7A	—

CSA Ratings

Voltage	Resistive	General use
240V AC	10A	7A
120V AC	10A	7.5A
100V DC	—	0.5A
30V DC	10A	7.5A

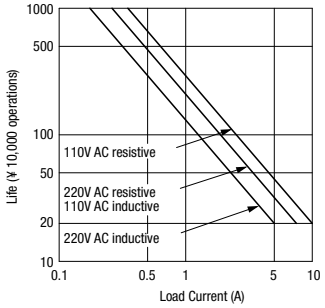
Socket Specifications

	Relays	Terminal	Electrical Rating	Wire Size	Torque
DIN Rail Sockets	SR2P-05	M3 screw with captive wire clamp	300V, 10A	Maximum 2 - #12 AWG	9 - 11.5in•lbs
	SR2P-05C	M3 screw with captive wire clamp, fingersafe	300V, 10A	Maximum 2 - #12 AWG	9 - 11.5in•lbs
	SR2P-06	M3 screw with captive wire clamp	300V, 10A	Maximum 2 - #12 AWG	9 - 11.5in•lbs
	SR3P-05	M3 screw with captive wire clamp	300V, 10A	Maximum 2 - #12 AWG	9 - 11.5in•lbs
	SR3P-05C	M3 screw with captive wire clamp, fingersafe	300V, 10A	Maximum 2 - #12 AWG	9 - 11.5in•lbs
	SR3P-06	M3 screw with captive wire clamp	300V, 10A	Maximum 2 - #12 AWG	9 - 11.5in•lbs
	SR3B-05	M3 screw with captive wire clamp	300V, 15A (10A)* (*CSA rating)	Maximum 2 - #12 AWG	9 - 11.5in•lbs
Through Panel Mount Sockets	SR2P-51	Solder	300V, 10A	—	—
	SR3P-51	Solder	300V, 10A	—	—
	SR3B-51	Solder	300V, 10A	—	—

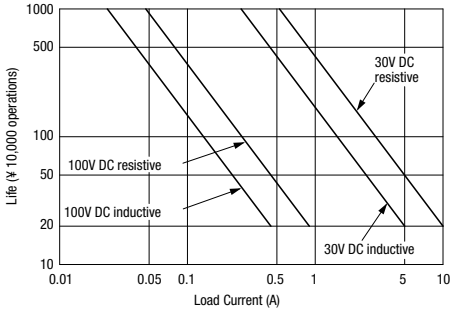
Characteristics (Reference Data)

Electrical Life Curves

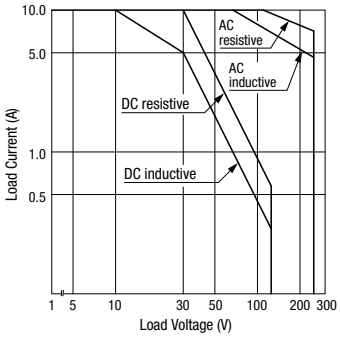
AC Load



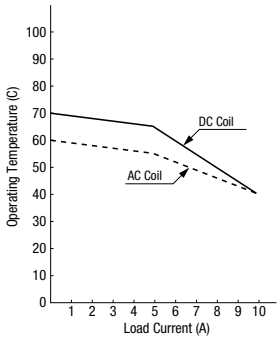
DC Load



Maximum Switching Capacity



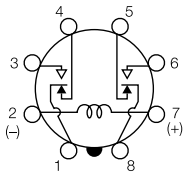
Continuous Load Current vs. Operating Temperature Curve (Standard Type, With Check Button, and Side Flange Type)



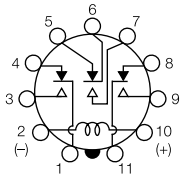
Internal Connection (View from Bottom)

Standard Type

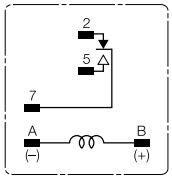
RR2P-U



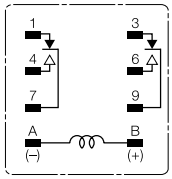
RR3PA-U



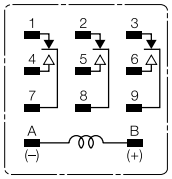
RR1BA-U



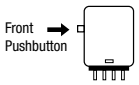
RR2BA-U



RR3B-U

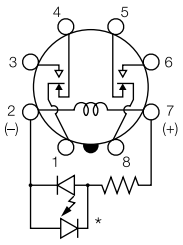
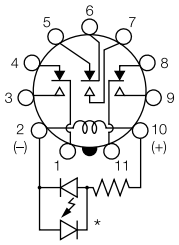
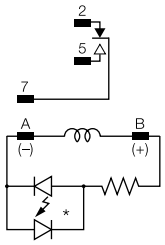
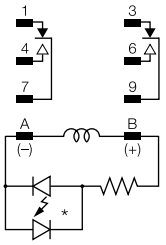
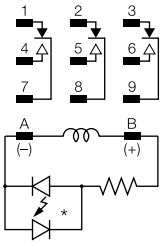
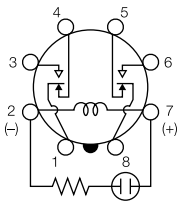
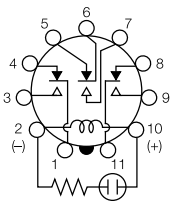
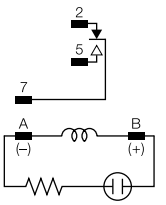
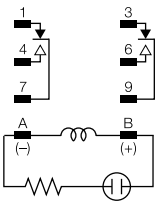
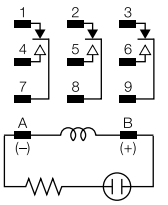


With Check Button



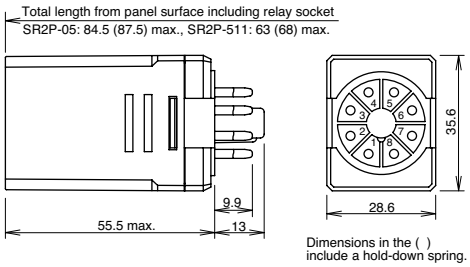
Contacts can be operated by pressing the check button.

With Indicator (-UL type)

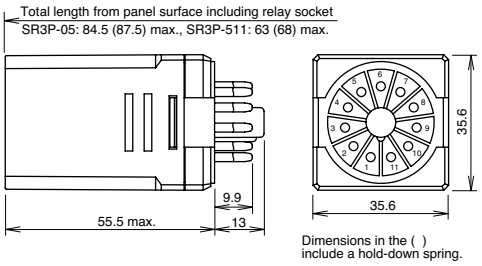
	RR2P	RR3PA	RR1BA	RR2BA	RR3B	
Coil Below 100V AC/DC						When the relay is energized, the indicator goes on. • An LED protection diode is not contained in relay coils below 100V DC. • Coils below 100V use LED indicator while coils above 100V use neon lamp indicator.
Coil 100V AC/DC and over						

Dimensions (mm)

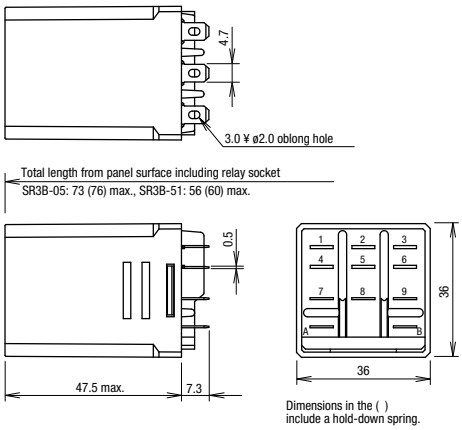
RR2P-U/RR2P-UL



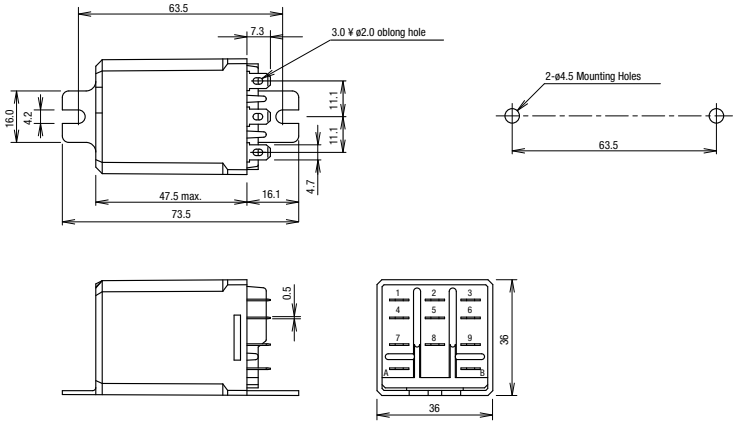
RR3PA-U/RR3PA-UL



RR1BA-U/RR2BA-UL/RR2BA-U RR2BA-UL/RR3B-U/RR3B-UL

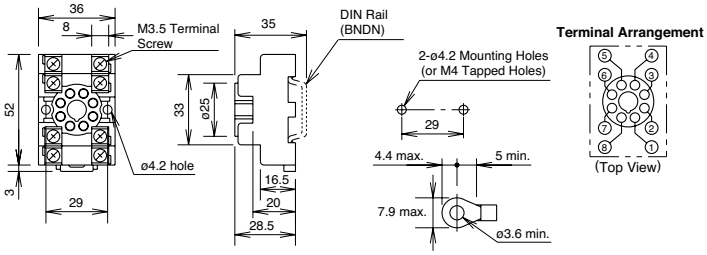


RR1BA-US/RR2BA-US/RR3B-US

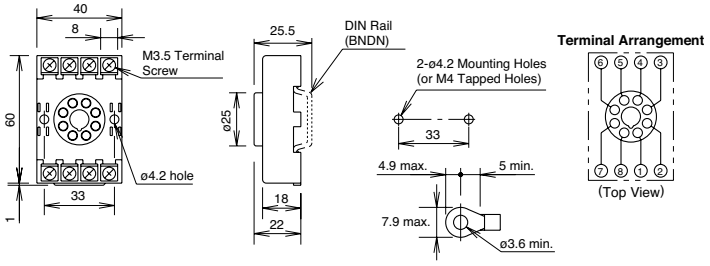


Standard DIN Rail Mount Sockets

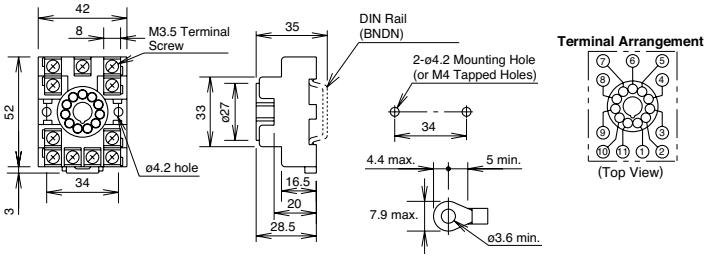
SR2P-05



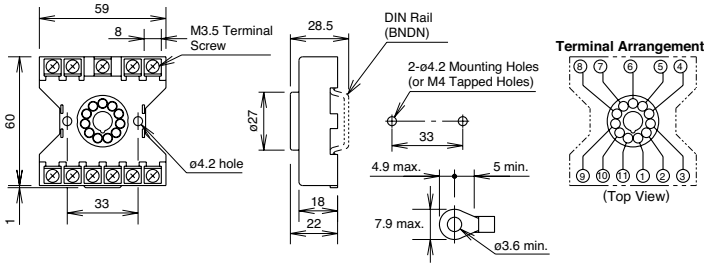
SR2P-06



SR3P-05

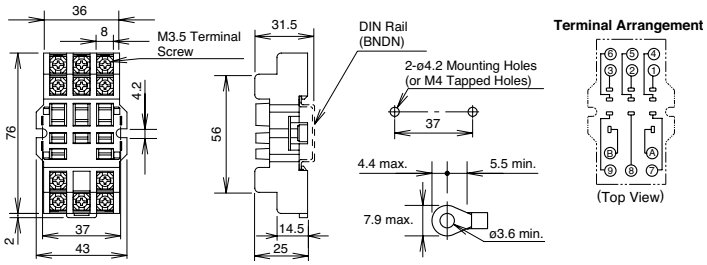


SR3P-06



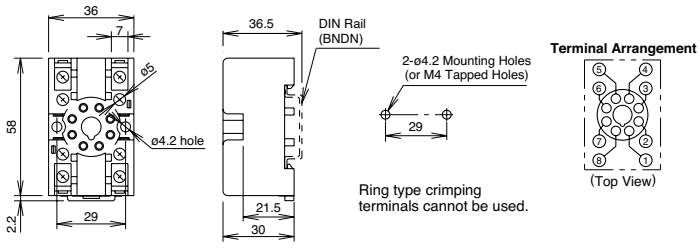
Standard DIN Rail Mount Sockets

SR3B-05

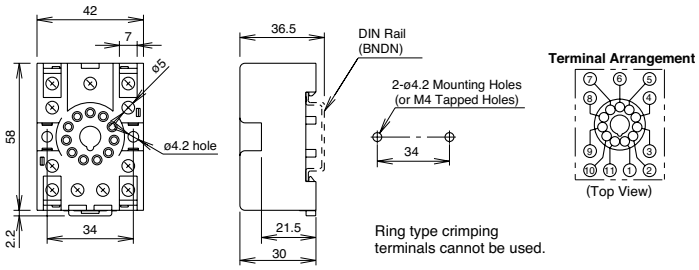


Finger-safe DIN Rail Mount Sockets

SR2P-05C

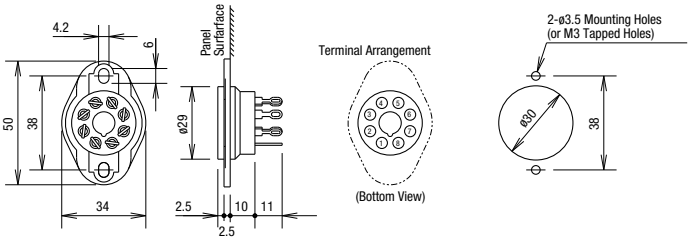


SR3P-05C

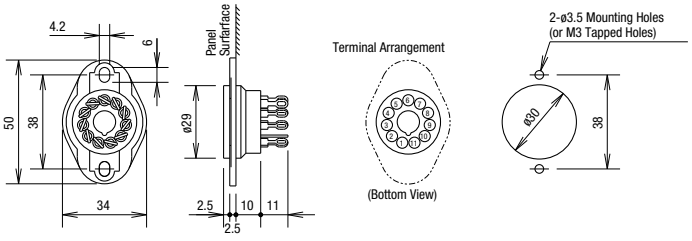


Through Panel Mount Socket

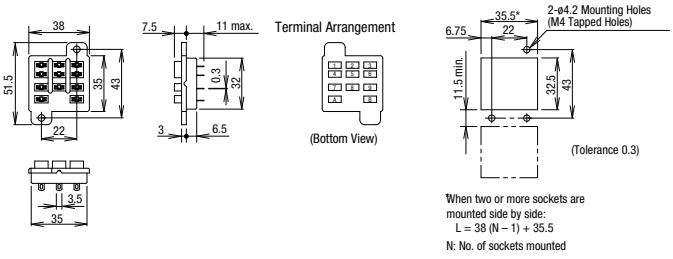
SR2P-51



SR3P-51



SR3B-51

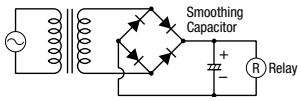


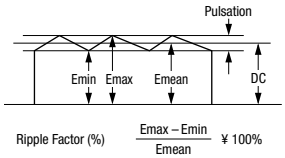
Operating Instructions

Driving Circuit for Relays

1. To ensure correct relay operation, apply rated voltage to the relay coil.

2. Input voltage for the DC coil:
   A complete DC voltage is best for the coil power to make sure of stable relay operation. When using a power supply containing a ripple voltage, suppress the ripple factor within 5%. When power is supplied through a rectification circuit, the relay operating characteristics, such as pickup voltage and dropout voltage, depend on the ripple factor. Connect a smoothing capacitor for better operating characteristics as shown below.



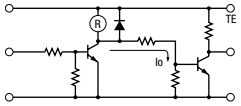


$$\text{Ripple Factor (\%)} = \frac{\text{Emax} - \text{Emin}}{\text{Emean}} \times 100\%$$

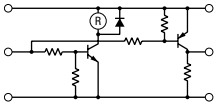
Emax = Maximum of pulsating current
Emin = Minimum of pulsating current
Emean = DC mean value

3. Leakage current while relay is off:
   When driving an element at the same time as the relay operation, special consideration is needed for the circuit design. As shown in the incorrect circuit below, leakage current (Io) flows through the relay coil while the relay is off. Leakage current causes coil release failure or adversely affects the vibration resistance and shock resistance. Design a circuit as shown in the correct example.

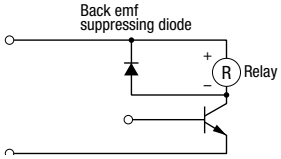
Incorrect



Correct



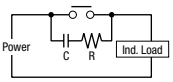
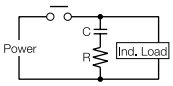
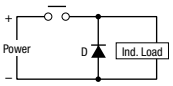
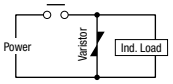
4. Surge suppression for transistor driving circuits:
   When the relay coil is turned off, a high-voltage pulse is generated, causing a transistor to deteriorate and sometimes to break. Be sure to connect a diode to suppress the back electromotive force. Then, the coil release time becomes slightly longer. To shorten the coil release time, connect a Zener diode between the collector and emitter of the transistor. Select a Zener diode with a Zener voltage slightly higher than the power voltage.



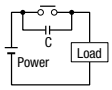
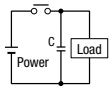
Protection for Relay Contacts

1. The contact ratings show maximum values. Make sure that these values are not exceeded. When an inrush current flows through the load, the contact may become welded. If this is the case, connect a contact protection circuit, such as a current limiting resistor.

2. Contact protection circuit:
   When switching an inductive load, arcing causes carbides to form on the contacts, resulting in increased contact resistance. In consideration of contact reliability, contact life, and noise suppression, use of a surge absorbing circuit is recommended. Note that the release time of the load becomes slightly longer. Check the operation using the actual load. Incorrect use of a contact protection circuit will adversely affect switching characteristics. Four typical examples of contact protection circuits are shown in the following table:

RC		This protection circuit can be used when the load impedance is smaller than the RC impedance in an AC load power circuit. • R: Resistor of approximately the same resistance value as the load • C:0.1 to 1 µF
		This protection circuit can be used for both AC and DC load power circuits. R: Resistor of approximately the same resistance value as the load C: 0.1 to 1 µF
Diode		This protection circuit can be used for DC load power circuits. Use a diode with the following ratings. Reverse withstand voltage: Power voltage of the load circuit x 10 Forward current: More than the load current
Varistor		This protection circuit can be used for both AC and DC load power circuits. For a best result, when using a power voltage of 24 to 48V AC/DC, connect a varistor across the load. When using a power voltage of 100 to 240V AC/DC, connect a varistor across the contacts.

3. Do not use a contact protection circuit as shown below:

	This protection circuit is very effective in arc suppression when opening the contacts. But, the capacitor is charged while the contacts are opened. When the contacts are closed, the capacitor is discharged through the contacts, increasing the possibility of contact welding.
	This protection circuit is very effective in arc suppression when opening the contacts. But, when the contacts are closed, a current flows to charge the capacitor, causing contact welding.

Generally, switching a DC inductive load is more difficult than switching a DC resistive load. Using an appropriate arc suppressor, however, will improve the switching characteristics of a DC inductive load.

Soldering

1. When soldering the relay terminals, use a soldering iron of 30 to 60W, and quickly complete soldering (within approximately 3 seconds).

2. Use a non-corrosive rosin flux.

Operating Instructions con't

Other Precautions

1. General notice:
   To maintain the initial characteristics, do not drop or shock the relay.

   The relay cover cannot be removed from the base during normal operation. To maintain the initial characteristics, do not remove the relay cover.

   Use the relay in environments free from condensation, dust, sulfur dioxide (SO_2), and hydrogen sulfide (H_2S).

   Make sure that the coil voltage does not exceed applicable coil voltage range.

2. UL and CSA ratings may differ from product rated values determined by IDEC.

3. Do not use relays in the vicinity of strong magnetic field, as this may affect relay operation.

Safety Precautions

- Turn off the power to the relay before starting installation, removal, wiring, maintenance, and inspection of the relays. Failure to turn power off may cause electrical shock or fire hazard.
- Observe specifications and rated values, otherwise electrical shock or fire hazard may be caused.
- Use wires of the proper size to meet voltage and current requirements. Tighten the terminal screws on the relay socket to the proper tightening torque.
- Surge absorbing elements on AC relays with RC or DC relays with diode are provided to absorb the back electromotive force generated by the coil. When the relay is subject to an excessive external surge voltage, the surge absorbing element may be damaged. Add another surge absorbing provision to the relay to prevent damage.

Precautions for the RU Relays

- Before operating the latching lever of the RU relay, turn off the power to the RU relay. After checking the circuit, return the latching lever to the original position.
- Do not use the latching lever as a switch. The durability of the latching lever is a minimum of 100 operations.
- When using DC loads on 4PDT relays, apply a positive voltage to terminals of neighboring poles and a negative voltage to the other terminals of neighboring poles to prevent the possibility of short circuits.
- DC relays with a diode have a polarity in the coil terminals. Apply the DC voltage to the correct terminals.

SDSA1175 and SDSA 3-Phase Surge Protective De

SDSA1175

SDSA 3-Phase

Surgelogic™ SDSA1175 surge protective devices are designed and listed for indoor or outdoor installation and surge suppression for single-phase three-wire 120/240 Vac or two-wire 120 Vac 60 Hz electrical services. This product is ideal for panel builders as well as manufacturers and integrators of instrumentation cabinets for industrial and commercial applications for single-phase power systems. Two SDSA1175 surge protection devices can be installed to provide suppression for 208Y/120 Vac three-phase four-wire services.

Surgelogic™ SDSA 3-Phase surge protective devices are designed and listed for indoor or outdoor installation and surge suppression for three-phase electrical services up to 600 Vac. The SDSA 3-Phase series is used extensively in service entrance panels to provide an efficient and economical means of surge suppression and also ideal for point of use applications for that added level of protection.

US and Canadian UL® Listed as Type 1 SPD to the UL 1449 standard. Complies with requirements of NEC® Article 285, CSA 233.1-87, and CSA C22.2 No. 8-M1986 as appropriate.

- LED indicates operational status
- Short circuit current rating 25 kA (SDSA1175), 200 kA (SDSA 3-Phase)
- Suitable for indoor and outdoor applications (NEMA Type 4X rated)
- Convenient back-nipple mounting
- Optional mounting bracket QOSAMK (for SDSA1175/SDSA1175T)

Table 6.9: SDSA1175 and SDSA 3-Phase Surge Protective Devices

System Voltage	Peak Surge Current Rating per Phase (kA)	Cat. No.
SDSA1175		
120/240 V, 1-phase, 3-wire	36	SDSA1175
120 V, 1-phase, 2-wire	36	SDSA1175T
SDSA 3-Phase		
208Y/120 V, 3-phase, 4-wire *[10] [11]*	40	SDSA2040
240 V Delta, 3-phase, 3-wire *[12]*	40	SDSA2040D
480Y/277 V, 3-phase, 4-wire *[13] [10]*	40	SDSA4040
480 V Delta, 3-phase, 3-wire	40	SDSA4040D
600Y/347 V, 3-phase, 4-wire *[10]*	40	SDSA3650
600 V Delta, 3-phase, 3-wire	40	SDSA3650D

[10] Do not use on ungrounded systems. Systems must be solidly grounded.
[11] Applicable voltages: 220Y/127V, 208Y/120V.
[12] Applicable voltages: 240V Delta, 240/120V High-Leg Delta.
[13] Applicable voltages: 480Y/277V, 415Y/240V, 400Y/230V, 380Y/220V.

Overview

HydroRanger 200 HMI is an ultrasonic level controller for up to six pumps and provides control, differential control, and open channel flow monitoring.

Benefits

- Easy to use HMI display with local four-button programming, menu-driven parameters, and Wizard support for key applications
- English, German, French, Spanish, Chinese, Italian, Portuguese, and Russian texts on the HMI
- Removable terminal blocks for ease of wiring
- Monitors wet wells, weirs, and flumes
- Communication using built-in Modbus RTU via RS 485 and SIMATIC PDM configuration software
- Compatible with SmartLinx system: PROFIBUS DP, PROFINET (cyclic access of process values only), DeviceNet, Modbus TCP/IP, and EtherNet/IP
- Single or dual point level monitoring
- 6 relays
- Auto False-Echo Suppression for fixed obstruction avoidance
- Anti-grease ring/tide mark buildup
- Differential amplifier transceiver for common mode noise rejection and improved signal-to-noise ratio
- Wall and panel mounting options

Application

For water authorities, municipal water, and wastewater plants, HydroRanger 200 HMI is an economical, low-maintenance solution delivering control efficiency and productivity needed to meet today's exacting standards. It offers single point monitoring with all models, and optional dual-point monitoring with 6 relay model. As well, it has digital communications with built-in Modbus RTU via RS 485.

The standard 6 relay HydroRanger 200 HMI will monitor open channel flow and features advanced relay alarming and pump control functions as well as volume conversion. It is compatible with SIMATIC PDM, allowing for PC configuration and set-up. Sonic Intelligence advanced echo-processing software provides increased reading reliability.

HydroRanger 200 HMI uses proven continuous ultrasonic echo ranging technology to monitor water and wastewater of any consistency up to 15 m (50 ft) in depth. Achievable resolution is 0.1 % with accuracy to 0.25 % of range. Unlike contacting devices, HydroRanger 200 HMI is immune to problems caused by suspended solids, harsh corrosives, grease or silt in the effluent, reducing downtime.

- Key Applications: wet wells, flumes/weirs, bar screen control

Technical specifications

Mode of Operation	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft), transducer dependent
Measuring points	1 or 2
Input	
Analog	0 ... 20 mA or 4 ... 20 mA, from alternate device, scalable (6 relay model)
Discrete	10 ... 50 V DC switching level Logical 0 ≤ 0.5 V DC Logical 1 = 10 ... 50 V DC max. 3 mA
Output	
EchoMax transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and EchoMax series XPS-10, XPS-15/15F, and XRS-5
Relays[1]	Rating 5 A at 250 V AC, non-inductive
• Model with 6 relays	4 SPST Form A/2 SPDT Form
mA output	0 ... 20 mA or 4 ... 20 mA
• Max. load	750 Ω, isolated
• Resolution	0.1 % of range
Accuracy	
Error in measurement	0.25 % of range or 6 mm (0.24 inch), whichever is greater
Resolution	0.1 % of measuring range or 2 mm (0.08 inch), whichever is greater[2]
Temperature compensation	• -50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values
Rated operating conditions	
Installation conditions	
• Location	Indoor / outdoor
• Installation category	II
• Pollution degree	4
Ambient conditions	
• Ambient temperature (enclosure)	-20 ... +50 °C (-4 ... +122 °F)
Design	
Weight	
• Wall mount	1.22 kg (2.68 lb)
• Panel mount	1.35 kg (2.97 lb)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3
Cable	
• Transducer and mA output signal	2-core copper conductor, twisted, shielded, 300 Vrms, 0.82 mm² (18 AWG), Belden 8 760 or equivalent is acceptable
• Max. separation between transducer and transceiver	365 m (1 200 ft)
Displays and controls	60 x 40 mm (2.36 x 1.57 inch) LCD 240 x 160 pixels resolution
Power supply[3]	
AC version	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA (17 W)
DC version	12 ... 30 V DC (20 W)

HydroRanger 200 HMI

Certificates and approvals	• CE, RCM, EAC, KCC[4)] • FM, $CSA_{US/C}$, UL listed • $CSA_{US/C}$ Class I, Div. 2, Groups A, B, C and D, Class II, Div. 2, Groups F and G, Class III (wall mount only) • MCERTS Class 2 approved for Open Channel Flow
Communication	• RS 232 with Modbus RTU or ASCII via RJ-11 connector • RS 485 with Modbus RTU or ASCII via terminal blocks • Optional: SmartLinx cards for - PROFIBUS DP-V1, PROFINET (cyclic access of process values only) - DeviceNet, Modbus TCP/IP, EtherNet/IP

1) All relays certified for use with equipment that fails in a state at or under the rated maximums of the relays.

2) Program range is defined as the empty distance to the face of the transducer plus any range extension.

3) Maximum power consumption is listed

4) EMC performance available upon request

Selection and Ordering data	Article No.
Siemens HydroRanger 200 HMI Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring.	**7ML5034-**
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Mounting, enclosure design	
4 button HMI, Wall mount, standard enclosure	**4**
4 button HMI, Wall mount, 4 entries, 4 M20 cable glands included	**5**
4 button HMI, Panel Mount	**6**
Input voltage	
100 ... 230 V AC	**A**
12 ... 30 V DC	**B**
Number of measurement points	
Single point model, 6 relays	**A**
Dual point model, 6 relays	**B**
Communication (SmartLinx)	
Without module	**0**
SmartLinx PROFIBUS DP-V0 module	**2**
SmartLinx DeviceNet module	**3**
SmartLinx PROFIBUS DP-V1 module	**4**
SmartLinx PROFINET module[2)]	**5**
SmartLinx EtherNet/IP module	**6**
SmartLinx Modbus TCP/IP module	**7**
See SmartLinx product page 4/348 for more information	
Approvals	
General Purpose CE, FM, $CSA_{US/C}$, UL listed, RCM, EAC, KCC	**1**
CSA Class I, Div. 2, Groups A, B, C, and D; Class II, Div. 2, Groups F and G; Class III[1)]	**2**

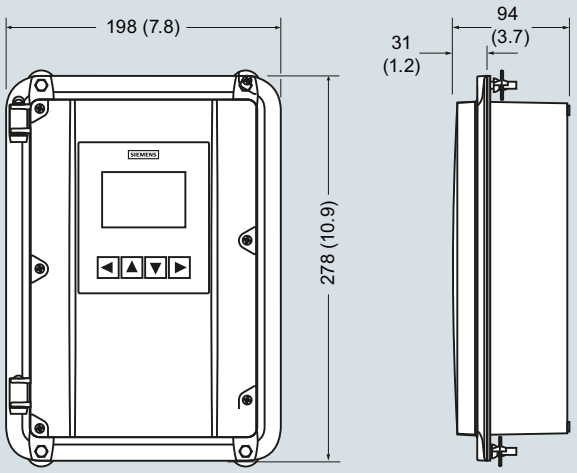
1) Available with Mounting/Enclosure design options 4 or 5.

2) SmartLinx PROFINET module is certified per standard V2.2.4.

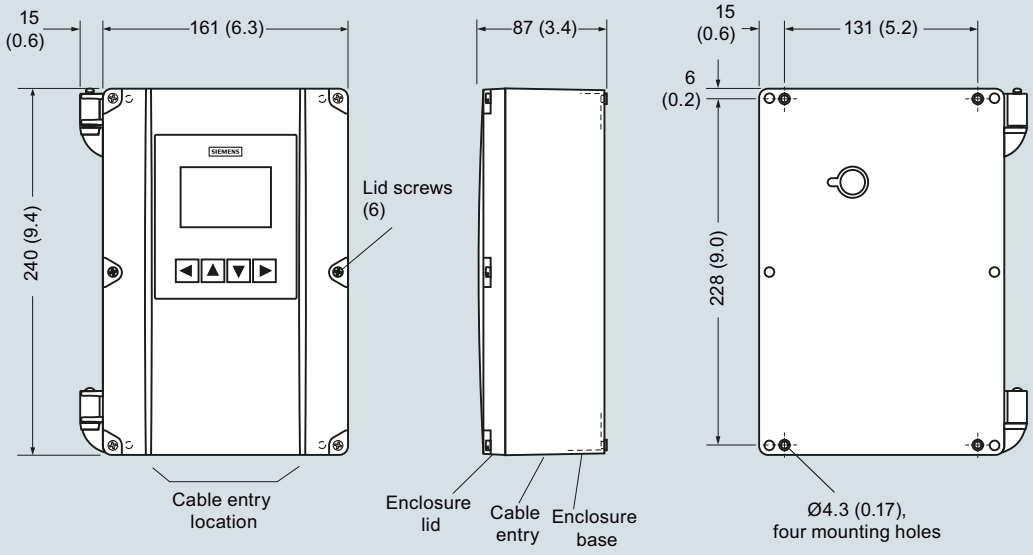
Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters), specify in plain text	**Y15**
Test Certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	**C11**
Operating Instructions	
English	**A5E36281317**
German	**A5E36281391**
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Accessories	Article No.
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure	**7ML1930-1AC**
Sunshield kit, 304 stainless steel	**7ML1930-1GA**
USB to RS 232 adapter	**7ML1930-6AK**
RS 232 to RJ11 COMMS adapter	**7ML1830-1MC**
SITRANS RD100, loop powered display - see Chapter 7	**7ML5741-...**
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	**7ML5740-...**
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	**7ML5744-...**
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	**7ML5750-...**
Spare parts	
Power Supply Board (100 ... 230 V AC)	**7ML1830-1MD**
Power Supply Board (12 ... 30 V DC)	**7ML1830-1ME**
Removable terminal blocks	**A5E38824197**
Spare lid with HMI, MultiRanger 200 HMI/ HydroRanger 200 HMI, wall	**A5E35778738**
Spare lid with HMI, MultiRanger 200 HMI/ HydroRanger 200 HMI, panel	**A5E35778740**
SmartLinx DeviceNet module	**7ML1830-1HT**
SmartLinx PROFIBUS DP-V1 module	**A5E35778741**
Smartlinx PROFINET IO module	**7ML1830-1PM**
SmartLinx Modbus TCP/IP, EtherNet/IP module	**7ML1830-1PN**

Dimensional drawings

Panel mount dimensions

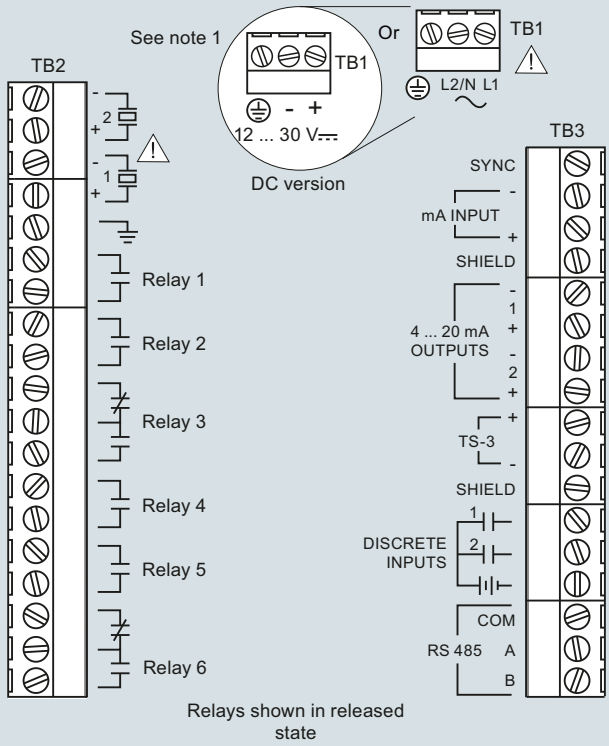


Wall mount dimensions



HydroRanger 200 HMI, dimensions in mm (inch)

Circuit diagrams



Note:

1. Use 2-core copper wire, twisted, with shield, for expansion up to 365 m (1 200 ft). Route cable in grounded metal conduit, separate from other cables.
2. Verify that all system components are installed in accordance with instructions.
3. Connect all cable shields to the HydroRanger shield connections. Avoid differential ground potentials by not connecting cable shields to ground (earth) anywhere else.
4. Keep exposed conductors on shielded cables as short as possible to reduce noise on the line caused by stray transmissions and noise pickup.

HydroRanger 200 HMI connections

vynckier
ENCLOSURE SYSTEMS INC.

APO DT Covers - NEMA 4X Rated Non-Metallic Enclosures

LG: Transparent hinged inspection window cover and 4 non-metallic corner screws to secure the cover to the base. Intended for use on Vynckier APO Series enclosures.
KIT: Transparent hinged inspection window cover and 4 non-metallic blanking inserts to secure the cover to the base. Suitable for mounting on 3rd party enclosures and panels. Blanking inserts reduce mounting holes to hold a #10 self tapping screw.
* DTCOVER-KIT can be mounted on any smooth flat surface. Installation instructions included.

Features

- 5 available sizes from 12" x 7" to 24" x 12" (H x W).
- DT Covers are maintenance free and corrosion resistant.
- Frames are made from hot compression molded halogen free, self extinguishing fiberglass reinforced polyester (FRP) that can withstand continuous temperatures from -58°F to 302°F (-50°C to 150°C).
- Inspection windows are made from transparent polycarbonate that can withstand continuous temperatures to 248°F (120°C).
- Included thumb screw inserts allow quick window opening for access to interior components.
- Gaskets are made from continuously poured polyurethane foam.

Applications
APO DT Covers are designed for use as inspection windows in highly corrosive environments where easy viewing and access is essential.

Standards
IEC 60529 (IP67)
IEC 62262 (IK10)
IEC 60439-1
IEC 62208
EN 60529 (IP67)
EN 62262 (IK10)
EN 60439-1
EN 62208

Approvals
UL Recognized for Types:
3, 3R, 4, 4X & 12
UL File E54315
DT Cover is UL-Recognized for UL Type 4X which allows the customer to submit entire application for UL Listing of product

APO DT Cover Series Data Sheet

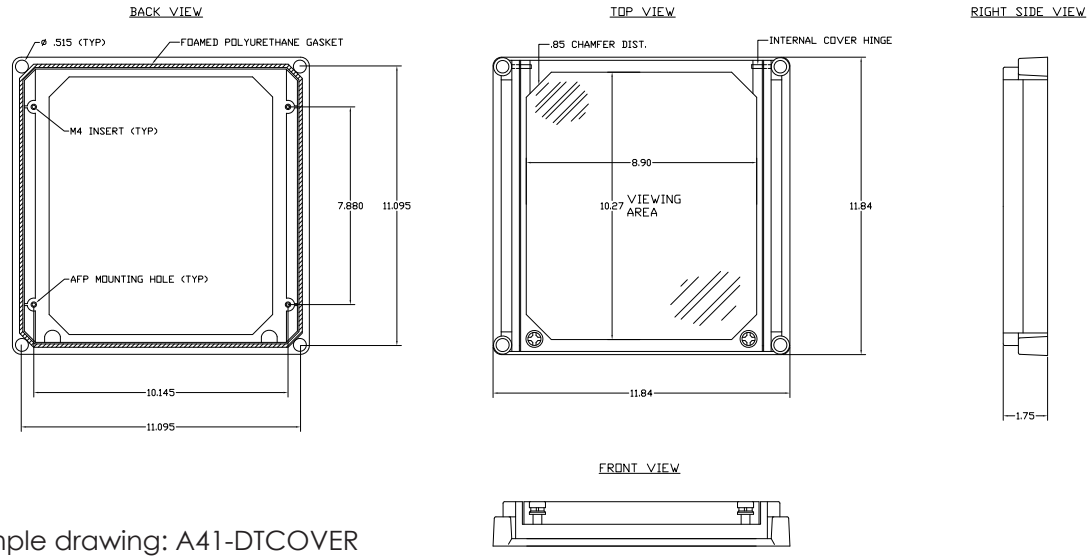
Rev 01/12/16

vynckier
ENCLOSURE SYSTEMS INC.

APO DT Cover Series Data Sheet

Part Number	Exterior Dimensions	Interior Dimensions	Viewing Area	Weight	Front Plate
**suffix (ex. A1-1207E1DTHPL2)	H x W x D Inches (mm)	H x W x D Inches (mm)	H x W Inches (mm)	Lbs (kg)	A: Aluminum
A31-DTCOVERLG A31-DTCOVERKIT	11.89 x 7.32 x 1.77 (302 x 186 x 45)	11.10 x 6.54 x 1.65 (282 x 166 x 42)	10.27 x 4.30 (261 x 109)	2.05 (.93)	AFP1207A
A41-DTCOVERLG A41-DTCOVERKIT	11.89 x 11.89 x 1.77 (302 x 302 x 45)	11.10 x 11.10 x 1.65 (282 x 282 x 42)	10.27 x 8.90 (261 x 226)	2.27 (1.03)	AFP1212A
A71-DTCOVERLG A71-DTCOVERKIT	14.65 x 11.89 x 1.77 (372 x 302 x 45)	13.86 x 11.10 x 1.65 (352 x 282 x 42)	11.66 x 10.27 (296 x 261)	3.13 (1.42)	AFP1412A
A51-DTCOVERLG A51-DTCOVERKIT	19.20 x 11.89 x 1.77 (488 x 302 x 45)	18.40 x 11.10 x 1.65 (467 x 282 x 42)	16.12 x 10.27 (409 x 261)	3.55 (1.61)	AFP1912A
A61-DTCOVERLG A61-DTCOVERKIT	23.74 x 11.89 x 1.77 (603 x 302 x 45)	22.91 x 11.10 x 1.65 (582 x 282 x 42)	20.70 x 10.27 (526 x 261)	4.55 (2.06)	AFP2412A

Manufacturer's Recommended Installation Instructions:
As each application is different, these are general guidelines only:
1. Using DT Cover corner hole center dimensions pre-drill (hole diameter .203) panel for a #10 self-tapping screw (not included).
2. Mounting surface area should be flush and clean of dirt and debris.
3. Wipe clean DT cover gasket with clean cloth and alcohol.
4. Cover can be mounted on panel using VES "Blanking Insert" part # 41523.079 (included in KIT).
5. Place cover on panel and using the Blanking Insert, place one in each corner from the outside and secure from the inside with #10 self-tapping screw.
6. Seal head of screw on inside of panel with RTV to ensure watertight integrity.
Alternate construction:
Using long machine screws or bolts and a large enough washer to cover the DT cover corner screw holes, these can be used to mount the cover to the panel.



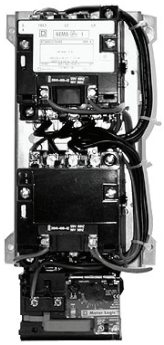
example drawing: A41-DTCOVER

271 McCarty, Houston, TX 77029 (713) 374-7850 www.vynckier.com

Introduction and Overload Relays

NEMA Sizes 00, 0, 1 Reversing Starter

Horizontal Type



Vertical Type

Class 8736 Type S reversing magnetic starters are used for full-voltage starting, stopping, and reversing AC squirrel cage motors. Class 8736 starters consist of one Class 8502 contactor and one Class 8536 starter mechanically and electrically interlocked. Open type devices, Sizes 0–5, are available in either horizontal or vertical arrangements. Sizes 00, 6, and 7 are available as horizontal only. Enclosed devices use horizontally arranged components. Type S starters are designed for operation at up to 600 Vac, 50/60 Hz.
For How to Order Information, see page 16-28

Motor Logic™ Solid-State Overload Relay (SSOLR) Protection
These ambient insensitive overload relays are available on three phase sizes 00 through 6 and standard on size 7. They provide phase loss, phase unbalance protection. To order, add Form **H30** (for selectable trip class 10 or 20 protection). For more information about Motor Logic solid-state overload relays (SSOLRs), see pages page 16-101 and page 16-119. (Catalog no. example: 8736SCO8V06H30)

New! **Adapted Bimetallic or Solid-State Overload Relay (NEMA Sizes 00–1)**
The Adapted Bimetallic or Solid-State starter includes a specially designed adapter that attaches with bus bars to the Type S NEMA contactor. This adapter allows direct mounting of the IEC Style bimetallic (LRD or LR3D) or solid-state (LR9D) overload relay (OLR). To order this starter configuration, add **Form E** (adapter only) to the standard catalog number. The LRD, LR3D, or LR9D OLR must be purchased separately, based on the FLA of the motor, and installed in the field to properly operate the starter. For the Adapted Bimetallic device only, if the FLA is known at the time of purchase, you can order the starter with the OLR installed. For more information and a list of options, see Adapted Bimetallic Overload Relay Forms, page 16-119. (Catalog no. example: 8736SCO8V06E—without OLR)

New! **TeSys T Motor Management System (NEMA Sizes 1–6)**
TeSys T is a flexible system that integrates seamlessly into your automation system through five major communication protocols. TeSys T can predict what will happen in the process, as it accurately monitors current, voltage, and power over a wide range. For additional information about the TeSys T Motor Management System, see page 16-103 (for example, 8736SCO8V06**H616**).

Melting Alloy Overload Relays
Melting alloy type thermal overload blocks are installed as part of the starter, and thermal elements must be selected and installed separately in order to operate the starter. For a three-phase motor, three thermal units must be ordered using the tables beginning under page 16-133. The catalog number includes no Form number (for example, 8736SCO8V06).

Type S Reversing Starters, 3–Pole Polyphase

NOTE: In Table 16.171, replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in . For information on field modification of NEMA 12 enclosures, see page 16-112. For Form H30• (special lower-FLA factory-assembled starter combinations with Motor Logic SSOLR protection), see Solid-State Overload Relay Forms, page 16-119.

Table 16.171: 3–Pole Polyphase, 600 Vac Maximum, 50–60 Hz, with Motor Logic SSOLR *[9]*

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Style		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure (Sizes 0–5) *[10]*	NEMA 7 & 9 *[11]* Hazardous Locations Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R *[12]* Dusttight, Driptight Industrial Use Enclosure
				Vertical	Horizontal					
				Type	Type	Type	Type	Bolted, Type	SPIN-TOP™ , Type	Type
00	9	200 230 460 575	1.5 1.5 2 2	—	SAO16●●●H30 *[13]*	SAG16●●●H30 *[13]*	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	200 230 460 575	3 3 5 5	SBO10●●●H30 *[13]*	SBO4●●●H30 *[13]*	SBG4●●●H30 *[13]*	SBW14●●●H30 *[13]*	SBT49●●●H30 *[13]*	SBR9●●●H30 *[13]*	SBA4●●●H30 *[13]*
1	27	200 230 460 575	7.5 7.5 10 10	SCO7●●●H30 *[13]*	SCO8●●●H30 *[13]*	SCG8●●●H30 *[13]*	SCW14●●●H30 *[13]*	SCT49●●●H30 *[13]*	SCR9●●●H30 *[13]*	SCA4●●●H30 *[13]*
2	45	200 230 460 575	10 15 25 25	SDO1●●●H30 *[13]*	SDO2●●●H30 *[13]*	SDG2●●●H30 *[13]*	SDW11●●●H30 *[13]*	SDT43●●●H30 *[13]*	SDR3●●●H30 *[13]*	SDA1●●●H30 *[13]*
3	90	200 230 460 575	25 30 50 50	SEO1●●●H30	SEO2●●●H30	SEG2●●●H30	SEW11●●●H30	—	—	SEA1●●●H30
4	135	200 230 460 575	40 50 100 100	SFO1●●●H30	SFO3●●●H30	SFG3●●●H30	SFW11●●●H30	—	—	SFA1●●●H30
5	270	200 230 460 575	75 100 200 200	SGO1●●●H30	SGO3●●●H30	SGG3●●●H30	SGW11●●●H30	—	—	SGA1●●●H30

[9] To order melting alloy overload relay, remove form "H30" from part number.
[10] NEMA 4 and 4X stainless steel enclosures (sizes 0–5) have a brushed finish. Sizes 6 and 7 are painted sheet steel and are rated NEMA 4 only.
[11] NEMA 7 and 9 bolted are not UL listed.
[12] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications.
[13] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See "Solid-State Overload Relay Forms" on page 16-119

Table 16.171 3–Pole Polyphase, 600 Vac Maximum, 50–60 Hz, with Motor Logic SSOLR *[16.171]* (cont'd.)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Style		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure (Sizes 0–5) *[14]*	NEMA 7 & 9 *[15]* Hazardous Locations Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R *[16]* Dusttight, Driptight Industrial Use Enclosure
				Vertical	Horizontal					
				Type	Type	Type	Type	Bolted, Type	SPIN-TOP™ , Type	Type
6	540	200 230 460 575	150 200 400 400	—	SHO1●●●H30	SHG1●●●H30	SHW1●●●H30	—	—	SHA1●●●H30
7	810	200 230 460 575	– 300 600 600	—	SJO1●●●H30	SJG1●●●H30	SJW1●●●H30	—	—	SJA1●●●H30

Type S, 2- and 3-Pole Single Phase, 4-Pole Polyphase

Devices require melting alloy thermal units, page 16-132.

NOTE: In Table 16.172, replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in .

For information on field modification of NEMA 12 enclosures, see page 16-112 .

Table 16.172: 2- and 3-Pole Single Phase, 4-Pole Polyphase, 600 Vac Maximum—50–60 Hz

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Type of Motor	Open Type		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 7 & 9 *[15]* Hazardous Locations Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R*[16]* Dusttight, Driptight Industrial Use Enclosure
					Vertical Type	Horizontal Type	Type	Type	Bolted Type	Spin Top™ Type	Type
2-Pole Single Phase—1 Thermal Unit Required											
00	9	115 230	1/3 1	Single Phase 3-Wire	—	SAO13●●●	SAG13●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	115 230	1 2		SBO7●●●	SBO1●●●	SBG1●●●	SBW11●●●	SBT46●●●	SBR6●●●	SBA1●●●
1	27	115 230	2 3		SCO1●●●	SCO2●●●	SCG2●●●	SCW11●●●	SCT46●●●	SCR6●●●	SCA1●●●
3-Pole Single Phase—1 Thermal Unit Required											
00	9	115 230	1/3 1	4-Wire Rep.-Ind.	—	SAO14●●●	SAG14●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
		115 230	1/3 1	4-Wire Split Ph.	—	SAO15●●●	SAG15●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	115 230	1 2	4-Wire Rep.-Ind.	SBO8●●●	SBO2●●●	SBG2●●●	SBW12●●●	SBT47●●●	SBR7●●●	SBA2●●●
		115 230	1 2	4-Wire Split Ph.	SBO9●●●	SBO3●●●	SBG3●●●	SBW13●●●	SBT48●●●	SBR8●●●	SBA3●●●
1	27	115 230	2 3	4-Wire Rep.-Ind.	SCO3●●●	SCO4●●●	SCG4●●●	SCW12●●●	SCT47●●●	SCR7●●●	SCA2●●●
		115 230	2 3	4-Wire Split Ph.	SCO5●●●	SCO6●●●	SCG6●●●	SCW13●●●	SCT48●●●	SCR8●●●	SCA3●●●
4-Pole Polyphase—2 Thermal Units Required											
0	18	200 230 460 575	3 3 5 5	2 Phase 4-Wire	SBO11●●●	SBO5●●●	SBG5●●●	SBW15●●●	Consult the Customer Care Center at 1-888-778-2733	SBR10●●●	SBA5●●●
1	27	200 230 460 575	7.5 7.5 10 10		SCO9●●●	SCO10●●●	SCG10●●●	SCW15●●●		SCR10●●●	SCA5●●●
2	45	200 230 460 575	10 15 25 25		—	SDO4●●●	SDG4●●●	SDW12●●●		SDR4●●●	SDA2●●●
3	90	200 230 460 575	25 30 50 50		—	SEO4●●●	SEG4●●●	SEW12●●●	—	—	SEA2●●●
4	135	200 230 460 575	40 50 100 100		—	SFO4●●●	SFG4●●●	SFW12●●●	—	—	SFA2●●●

Table 16.173: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[17]*	—	V01
120*[18]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page page 16-118. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is supplied at no charge.

Dimensions: page 16-64
Factory Modifications (Forms) page 16-117
Separate Enclosures (Class 9991): page 16-110
Replacement Parts (Class 9998): page 16-122
Type S Accessories (Class 9999): page 16-125

For How to Order Information, see page 16-28.

[14] NEMA 4 and 4X stainless steel enclosures (sizes 0–5) have a brushed finish. Sizes 6 and 7 are painted sheet steel and are rated NEMA 4 only.
[15] NEMA 7 and 9 bolted are not UL listed.
[16] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications.
[17] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8736SCO1V01S).
[18] This voltage code can include **Form S** for separate control (provided at no charge) (for example, order as 8736SBO7V02S).

Open and NEMA 1 Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.174: Open Style, 2 or 3-Pole Only (Mounting: H = Horizontal; V = Vertical)
See Figures: Class 8702 Contactor, Open Type **and** Class 8736 Starter, Open Type

NEMA Size	Type	Mtg.	Fig. No.	Dimensions, in. A	B	C	D	E	F	G	H	I	J	K	L	M	Wt. (lb)
Class 8702 Contactors																	
00	SAO	H	1	7.13	5	5.31	—	—	3.41	0.47	4.34	0.19	5.5	0.91	—	—	12
0, 1	SBO, SCO	H V	1 1 *[19]*	7.13 5.47	5 9.22	5.31 5.31	— 5.5	— 0.22	3.41 —	0.47 0.61	4.34 8	0.19 0.61	5.5 5.03	0.91 0.22	—	—	12 12
2	SDO	H V	1 1 *[19]*	9 6.75	6.88 11.38	6.03 6.03	— 6.25	— 0.25	4.5 —	0.38 0.5	5.63 10.38	0.25 0.5	6 0.25	1.5 0.25	—	—	16 16
3	SEO	H V	1 1 *[19]*	12.72 7.20	7.97 19	7 7	11.75 6.25	0.48 0.48	—	0.48 1.02	7 17	0.48 0.98	11.75 6.25	0.48 0.48	—	—	35 35
4	SFO	H V	1 1 *[19]*	14.25 7.97	11.69 23.91	7 7	13.25 7	0.5 0.48	—	0.5 1.81	8 20.25	1.84 1.19	13.25 7	0.5 0.48	—	—	45 45
5	SGO	H V	1 1 *[19]*	19.31 10.75	16.19 34.41	9.38 9.38	18 9.5	0.66 0.63	—	1.03 1.25	14 32	1.16 1.16	18 9.5	0.66 0.63	—	—	98 98
6	SHO	H	1	22.38	28.05	9.52	18	0.63	—	3.83	21.19	3.03	18	0.77	—	—	195
7	SJO	H	1	24.25	37.25	13.81	19.75	1.52	—	—	30	—	—	—	—	—	310
Class 8736 Starters																	
00	SAO		2	7.13	6.91	5.31	—	—	3.41	0.47	4.34	6.22	4.53	5.06	0.66	—	13
0, 1	SBO, SCO	H V	2 2 *[19]*	7.13 5.47	6.91 11.52	5.31 5.31	— 5.03	— 0.22	3.41 —	0.47 0.61	4.34 8	6.22 10.70	4.53 2.52	5.06 5.06	0.66 0.22	— 5.03	13 13
2	SDO	H V	2 2 *[19]*	9 6.75	8.5 13.48	6.03 6.03	— 6.25	— 0.25	4.5 —	0.38 0.78	5.63 10.38	7.5 12.97	5 3.13	5.16 5.16	1.5 0.25	— 6	18 18
3	SEO	H V	2 2 *[19]*	12.72 7.31	11.72 22.25	7 7	11.75 6.25	0.48 0.48	—	0.48 1.02	10.75 20.75	10.75 —	11.75 6.25	6.25 6.25	0.48 0.48	11.75 6.25	38 38
4	SFO	H V	2 2 *[19]*	14.25 7.97	14.59 26.81	7 7	13.25 7	0.5 0.48	—	1.84 1.84	12.25 24.5	12.25 —	13.25 4.05	6.25 6.25	0.5 0.48	13.25 7	48 48
5	SGO	H V	2 2 *[19]*	19.31 10.75	20.91 39.16	9.38 9.38	18 9.5	0.66 0.66	—	1.28 1.28	19 37.25	19 37.25	18 9.5	6.63 6.63	0.63 0.63	18 9.5	115 115
6	SHO	H	2	22.38	28.05	9.52	18	0.69	—	3.83	21.19	3.03	18	0.77	—	—	200
7	SJO	H	1	24.25	37.25	13.81	19.75	1.52	—	—	30	—	—	—	—	—	315

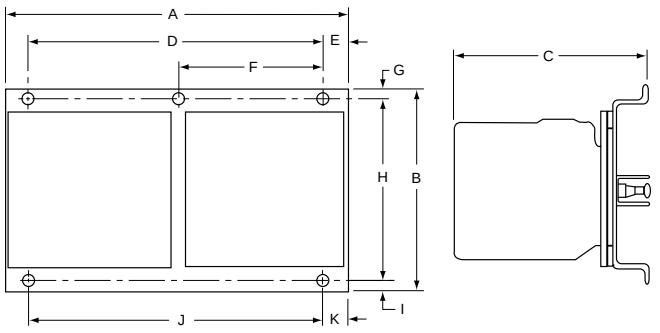


Figure 16.9: Class 8702 Contactor, Open Type

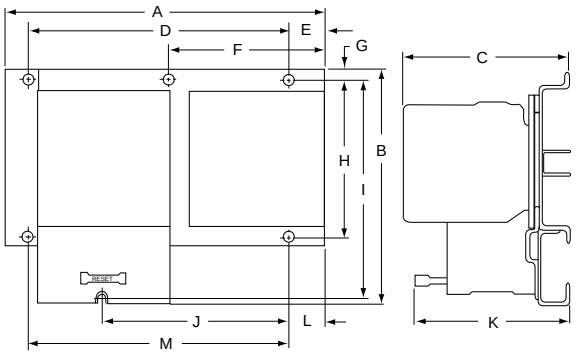


Figure 16.10: Class 8736 Starter, Open Type

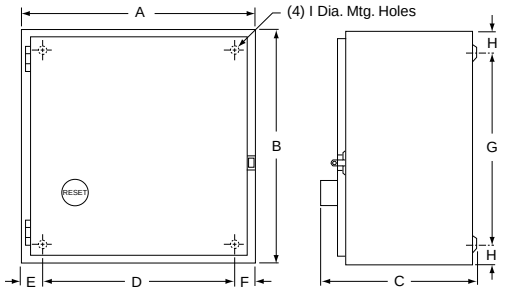


Figure 16.11: NEMA 1

Table 16.175: NEMA 1, Class 8702 and 8736 (see Figure: NEMA 1)

NEMA Size	Dimensions—in. A	B	C 8702	C 8736	D	E	F	G	H	I	Weight (lb) 8702	8736
00, 0 *[20]* 1 *[21]*	11.88	11.88	7.41	7.53	9.75	1.06	1.06	9.75	1.06	0.31	16	17
2 *[21]*	14.88	14.13	7.56	7.66	12.75	1.06	1.06	12	1.06	0.31	24	25
3 *[20]* 4 *[20]*	18.16	29.16	9.25	9.25	15.5	1.33	1.33	26.5	1.33	0.44	95	98
5	35.22	46.22	12.81	12.94	31	2.11	2.11	42	2.11	0.56	298	315
6	36.22	62.22	19.47		Floor Mounting.						400	405
7	34.5	93	23.5								—	—

[19] The vertical design differs from the horizontal design figure shown for the corresponding NEMA size, but the dimensions listed apply.
[20] 3-Pole only.
[21] The standard enclosure has space for a fused control transformer, **Form FF4T**, on Sizes 0-2 (except 4-pole devices, Size 0 and 1).

Motor Logic—Class 9999

Isolated Auxiliary Contacts for Motor Logic Overload Relays

Overload relay auxiliary contacts are available factory installed or in kit form for field installation on Motor Logic overload relays. These contacts may be used for isolated alarm contact applications.

Table 16.356: Isolated Auxiliary Contacts for Motor Logic Overload Relays

For Use With		Parts Kit Description	Class 9999 Type
Class & Type	NEMA Size *[9]*		
8536 SA-SJ	00B through 7	N.O. or N.C. Auxiliary Contact (Field Convertible)	AC04
9065 SS, SR, SF, ST	00B through 7		

Table 16.357: DIN Adapter

For Use With		Parts Kit Description	Class 9999 Type
Class & Type	NEMA Size *[9]*		
9065 SS or SF	00B, 00C, 0, and 1	DIN Adapter	DA01

Table 16.358: Lug-Lug and Lug-Extender Kits

For Use With		Parts Kit Description	Class 9999 Type
Class & Type	NEMA Size *[9]*		
9065 SS or SF	00B, 00C, 0, and 1	Lug-Lug Kit for separate mounting	LL0
9065 SS or SF	00B, 00C, 0, and 1	Lug-Extender Kit for retrofitting existing NEMA S starters	LB0

Class 9999 Type SB6
Single Power Pole Adder

Class 9999 Type SB9
Double Power Pole Adder

DIN Adapter

The DIN adapter provides a method to mount the Motor Logic overload relay to a 35 mm DIN rail.

Lug-Lug and Lug-Extender Kits

A Class 9999 LL0 Lug-Lug Kit can be field installed on separately mounted overload relays. The standard Size 00B, 00C, 0, and 1 Class 9065 Type SS and SF overload relays are supplied without lugs. A Class 9999 LB0 Lug-Extender Kit is designed for Size 00B, 00C, 0, and 1 Retrofit Starter Applications. This kit allows the lugs to be in the same location as the Class 9065 melting alloy overload relay, eliminating the need for additional wire length.

Remote Reset Module

The Remote Reset Module can be easily field installed on solid-state overload relays. This module will allow the overload relay to be reset from a remote location.

Table 16.359: Remote Reset Module

For Use With		Parts Kit Description	Class 9999 Type
Class and Type	NEMA Size *[9]*		
536 SA-SJ	00B through 7	Remote Reset Module	RR04 *[10]*
9065 SS, SR, SF, ST	00B through 7		
8536 SE-SF	3 and 4	Top Mounting Bracket	RB34 *[10][11]*
9065 SS, SR, SF, ST	3 and 4		

Power Pole Adders

One single- or double-circuit power pole kit can be field added to a basic two- or three-pole Type S contactor or starter Sizes 0, 1 and 2, or lighting contactors 30–60 A. See Table 16.360 for selection. The ratings for these power pole adders correspond to the NEMA contact ratings found on page 16-122. A two- or three-pole contactor or starter accepts only one single- or double-circuit unit. A power pole cannot be used on four- or five-pole devices, or on devices that are mechanically interlocked.

When adding a power pole to a Size 0 or 1 device, remove the return springs according to the instructions that come with the device.

When adding a power pole to a Size 2 or 60 A device, a coil change is required. Select a four- or five-pole coil from page 16-122, or specify Form Y118 as noted in the footnote below.

When adding Size 0–2 power pole kits to a Size 3–7 or 100–800 A device, an adapter bracket (9999 SBT1) is required. The Class 9999 Types SB6–SB15 power pole kits are suitable for copper wire only. Types SB21–SB25 come with lugs suitable for copper or aluminum wire.

Table 16.360: Power Pole Adders—Selection

For Use With		Power Pole Adder Kit	
Type	Size	Description	Class 9999 Type
SB, SC, and SM	0, 1, and 30 A	One N.O. power pole adder	SB6
SD	2		SB11 *[12]*
SP	60 A		SB21 *[12]*
SB, SC, and SM	0, 1, and 30 A	One N.C. power pole adder	SB7
SD	2		SB12 *[12]*
SP	60 A		SB22 *[12]*
SB, SC, and SM	0, 1, and 30 A	One N.O. and one N.C. power pole adder	SB8
SD	2		SB13 *[12]*
SP	60 A		SB23 *[12]*
SB, SC, and SM	0, 1, and 30 A	Two N.O. power pole adders	SB9
SD	2		SB14 *[12]*
SP	60 A		SB24 *[12]*
SB, SC, and SM	0, 1, and 30 A	Two N.C. power pole adders	SB10
SD	2		SB15 *[12]*
SP	60 A		SB25 *[12]*
SE–SJ and SQ–SZ and SJ	3–7 and 100–800 A	Adapter bracket	SBT1

[9] Size 00B and 00C are not actual NEMA sizes. These designations are used to differentiate the lower FLA of these devices from the NEMA Size 00 Motor Logic solid-state overload relay.
[10] 120 Vac power required.
[11] For mounting the remote reset module on the top of the overload relay.
[12] To order a Size 2 or 60 A power pole kit complete with a new starter coil, specify **Form Y118,** the voltage, and the frequency (for example, Class 9999 Type SB11 **Y118,** 120 V, 60 Hz).

Monitoring Relays
1-Phase True RMS AC Over or Under Current
Type DIB01 100A

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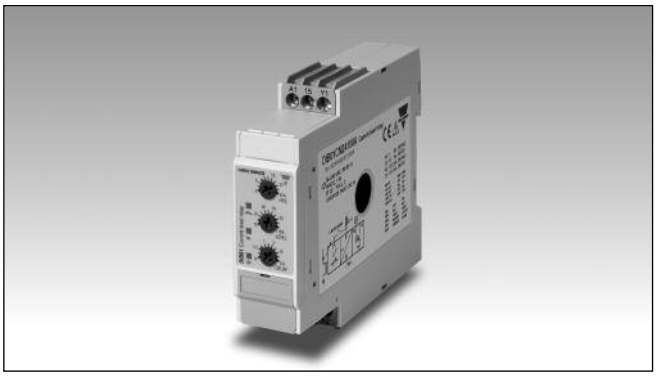

- **TRMS AC over or under current monitoring relay**
- **Current measuring through built-in current transformer**
- **Selection of measuring range by DIP-switches**
- **Measuring ranges from 2 A to 100 A AC**
- **Adjustable current on relative scale**
- **Adjustable hysteresis on relative scale**
- **Adjustable delay function (0.1 to 30 s)**
- **Programmable latching or inhibit at set level**
- **Output: 8 A SPDT relay N.D. or N.E. selectable**
- **For mounting on DIN-rail in accordance with DIN/EN 50 022**
- **22.5 mm Euronorm housing**
- **LED indication for relay, alarm and power supply ON**
- **Galvanically separated power supply**

Product Description

DIB01 is a precise TRMS AC over or under current (selectable by DIP-switch) monitoring relay.
Owing to the built-in latch function, the ON-position of the relay output can be maintained. Inhibit function can be used to avoid relay operation when not desired (maintenance, transitions).
The LED's indicate the state of the alarm and the output relay. Through the built-in current transformer it is possible to monitor loads up to 100 A AC.

Ordering Key

DIB 01 C M24 100A

- **Housing**
- **Function**
- **Type**
- **Item number**
- **Output**
- **Power supply**
- **Measuring range**

Type Selection

Mounting	Output	Measuring range	Supply: 24 VDC and 24 to 240 VAC
DIN-rail	SPDT	2 to 100 A AC	**DIB 01 C M24 100A**

Input Specifications

Input (current level)		
DIB01 100A		Built-in current transformer
Measuring ranges		
Selectable by DIP-switch		**Max current**
2 to 20 A AC		120 A
5 to 50 A AC		120 A
10 to 100 A AC		120 A
Max. current for 30 s	250 A	
Max. current for 1 s	2000 A	

Contact input	
DIB01	Terminals A1, Y1
Disabled	Open
Enabled	< 10 kΩ
Latch disable	> 500 ms

Supply Specifications

Power supply	Overvoltage cat. III (IEC 60664, IEC 60038)
Rated operational voltage through terminals: A1, A2	24 VDC - 15% +10% 24 to 240 VAC ± 15% 45 to 65 Hz
Dielectric voltage	
Supply to input	4 kV
Supply to output	4 kV
Input to output	4 kV
Rated operational power	
DC	1 W
AC	1 W / 35 VA

Output Specifications

Output		SPDT relay
Rated insulation voltage		250 VAC
Contact ratings ($AgSnO_2$)		μ
Resistive loads	AC 1	8 A @ 250 VAC
	DC 12	5 A @ 24 VDC
Small inductive loads	AC 15	2.5 A @ 250 VAC
	DC 13	2.5 A @ 24 VDC
Mechanical life		≥ 30 x 10^6 operations
Electrical life		≥ 10^5 operations (at 8 A, 250 V, cos φ = 1)
Operating frequency		≤ 7200 operations/h
Dielectric strength		
Dielectric voltage		≥ 2 kVAC (rms)
Rated impulse withstand volt.		4 kV (1.2/50 μs)

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General Specifications

Power ON delay	1 s ± 0.5 s or 6 s ± 0.5 s
Reaction time	
Alarm ON delay	< 100 ms
Alarm OFF delay	< 100 ms
Accuracy	(15 min warm-up time)
Temperature drift	± 500 ppm/°C
Delay ON alarm	± 10% on set value ± 50 ms
Repeatability	± 0.5% on full-scale
Indication for	
Power supply ON	LED, green
Alarm ON	LED, red (flashing 2 Hz during delay time)
Output relay ON	LED, yellow
Environment	(EN 60529)
Degree of protection	IP 20
Pollution degree	3
Operating temperature	-20 to 60°C, R.H. < 95%
Storage temperature	-30 to 80°C, R.H. < 95%

Housing	
Dimensions	22.5 x 80 x 99.5 mm
Material	PA66 or Noryl
Weight	Approx. 155 g
Screw terminals	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
Product standard	EN 60255-6
Approvals	UL, CSA
CE Marking	L.V. Directive 2006/95/EC EMC Directive 2004/108/EC
EMC	
Immunity	According to EN 60255-26 According to EN 61000-6-2
Emissions	According to EN 60255-26 According to EN 61000-6-3

Mode of Operation

DIB01 monitors AC over or under current through an internal current transformer.

Example 1
(connection between terminals A1, Y1 - latching function enabled - Relay ND)
The relay operates and latches in operating position when the measured value exceeds (or drops below) the set level for more than the set delay time. Provided that the current has dropped below (or has exceeded) the set point (see hysteresis setting), the relay releases when the interconnection between terminals A1, Y1 is interrupted or the power supply is interrupted as well. The red LED flashes until the delay time has expired.

Example 2
(no connection between terminals A1, Y1 - latch function disabled - Relay ND)
The relay operates when the measured value exceeds (or drops below) the set level for more than the set delay time. It releases when the current drops below (or exceeds) the set level (see hysteresis setting) or when power supply is interrupted.

Note
When the inhibit contact is opened, if the input signal is already in alarm position, the delay time needs to elapse before relay activation.

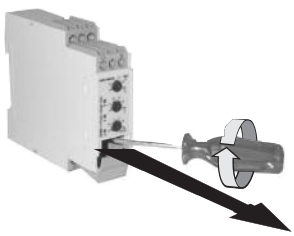
Function/Range/Level and Time Delay Setting

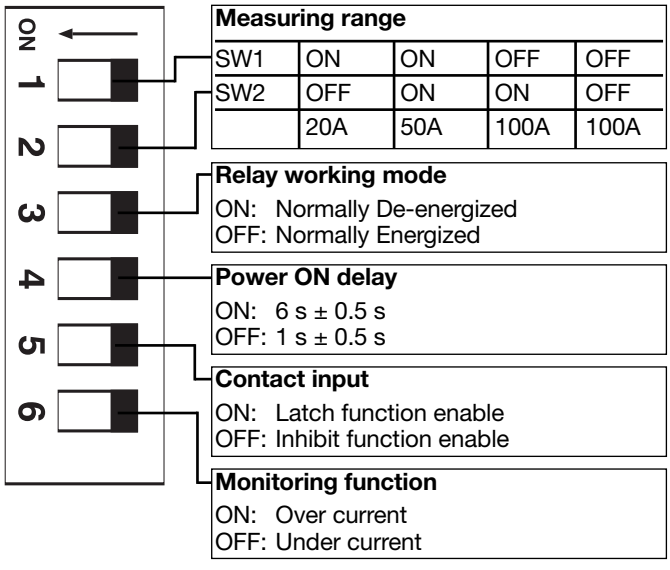
Adjust the input range setting DIP switches 1 and 2 as shown below.
Select the desired function setting DIP switches 3 to 6 as shown below.
To access the DIP switches open the grey plastic cover as shown below.
Selection of level and time delay:

Upper knob:
Setting of hysteresis on relative scale: 0 to 30% on set value.

Centre knob:
Current level setting on relative scale: 10 to 110% on full scale.

Lower knob:
Setting of delay on alarm time on absolute scale (0.1 to 30 s).





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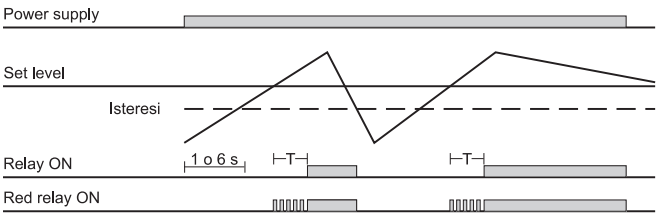
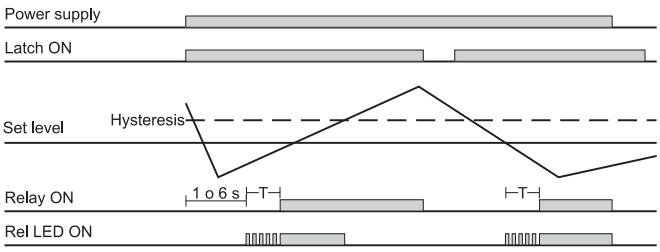
Operation Diagrams

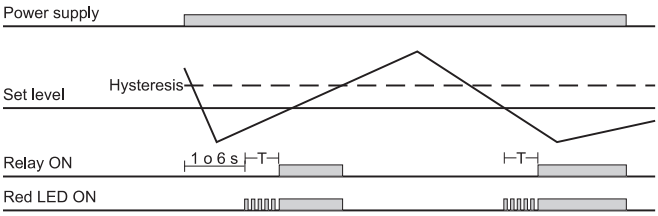
Over current - N.D. relay



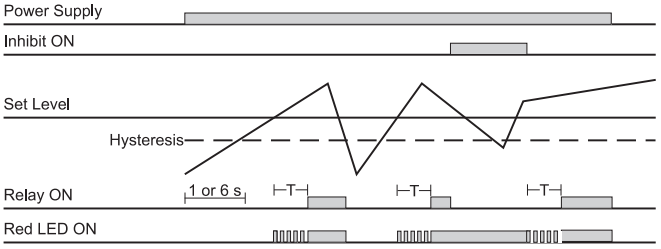
Under current - Latch function - N.D. relay



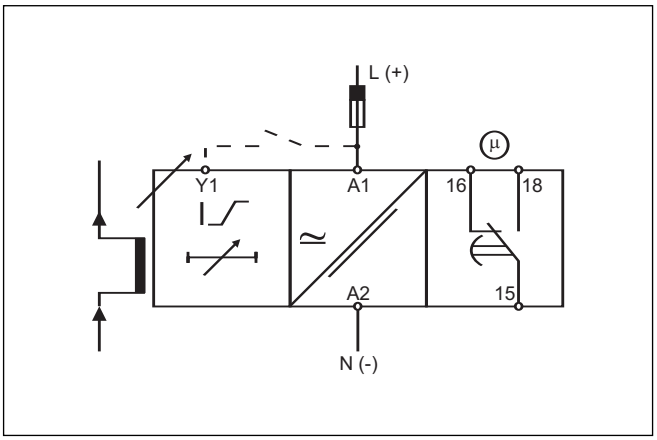
Under current - N.D. relay



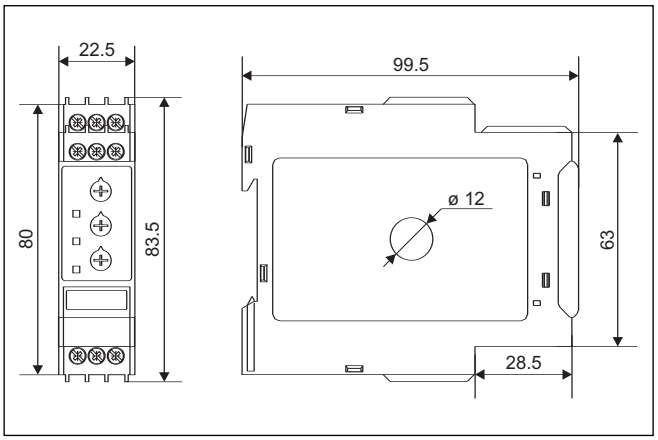
Over current - Inhibit function - N.D. relay



Wiring Diagram



Dimensions

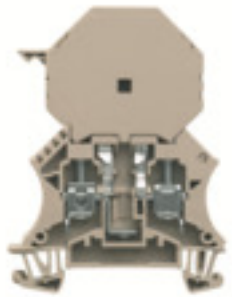


WSI 6/2/LD 60-150VDC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



Klippon® Connect with clamping yoke Technology
The high reliability and variety of designs of the terminal blocks with clamping yoke connections make planning easer and optimises operational safety. Klippon® Connect provides a proven response to a range of different requirements.

General ordering data

Version	W-Series, Fuse terminal, Rated cross-section: 6 mm², Screw connection
Order No.	1014300000
Type	WSI 6/2/LD 60-150VDC/AC
GTIN (EAN)	4008190084424
Qty.	25 pc(s).

WSI 6/2/LD 60-150VDC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	78.5 mm	Depth (inches)	3.091 inch
Depth including DIN rail	79.5 mm	Height	60 mm
Height (inches)	2.362 inch	Width	11.9 mm
Width (inches)	0.469 inch	Weight	28.8 g
Net weight	25.44 g		

Temperatures

Storage temperature	-25 °C...55 °C	Continuous operating temp., min.	-50 °C
Continuous operating temp., max.	120 °C		

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

System specifications

Version	Screw connection, Fuse isolator, with LED, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	2.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	2.5 mm²

Additional technical data

Explosion-tested version	No	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

CSA rating data

Certificate No. (CSA)	200039-1057876	Wire cross section max. (CSA)	6 AWG
Wire cross section min. (CSA)	20 AWG		

Conductors for clamping (additional connection)

Conductor cross-section, flexible plus plastic collar DIN 46228/1, further connection, max.	6 mm²

Conductors for clamping (rated connection)

Blade size	0.8 x 4.0 mm

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Technical data

Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		

Clamping range, max.	10 mm²
Clamping range, min.	0.5 mm²
Clamping screw	M 3.5
Connection cross-section, stranded, max.	10 mm²
Connection cross-section, stranded, min.	1.5 mm²
Connection direction	on side
Gauge to IEC 60947-1	A5
Number of connections	2
Stripping length	12 mm
Tightening torque, max.	1.6 Nm
Tightening torque, min.	0.8 Nm
Torque level with DMS electric screwdriver	3
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 8
Wire connection cross section AWG, min.	AWG 20
Wire connection cross section, finely stranded, max.	10 mm²
Wire connection cross section, finely stranded, min.	0.5 mm²

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Technical data

Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	10 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

Display element

Operating voltage for display, max.	150 V	Operating voltage for display, min.	60 V
Type of voltage for indicator	AC/DC		

Fuse terminals

Cartridge fuse	G-Si. 1 x 1/4	Display	Red LED
Fuse holder (cartridge holder)	Pivoting	Operating voltage, max.	150 V
Type of voltage for indicator	AC/DC		

General

Rail	TS 35	Standards	IEC 60947-7-3
Wire connection cross section AWG, max.	AWG 8	Wire connection cross section AWG, min.	AWG 20

Rating data

Rated cross-section	6 mm²	Rated voltage	150 V
Rated voltage to adjoining terminal	500 V	Rated current	6.3 A
Current at maximum wires	6.3 A	Standards	IEC 60947-7-3
Volume resistance according to IEC 60947-7-x	0.78 mΩ	Rated impulse withstand voltage	6 kV
Power loss in accordance with IEC 60947-7-x	1.31 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	8 AWG
Conductor size Factory wiring min. (UR)	22 AWG	Conductor size Field wiring max. (UR)	8 AWG
Conductor size Field wiring min. (UR)	22 AWG		

Classifications

ETIM 6.0	EC000899	ETIM 7.0	EC000899
ETIM 8.0	EC000899	ECLASS 9.0	27-14-11-16
ECLASS 9.1	27-14-11-16	ECLASS 10.0	27-14-11-16
ECLASS 11.0	27-14-11-16		

WSI 6/2/LD 60-150VDC/AC

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Technical data

Approvals

Approvals	
ROHS	Conform
UL File Number Search	E60693

Downloads

Approval/Certificate/Document of Conformity	CB Testreport CB Certificate EAC certificate DNVGL certificate Lloyds Register Certificate MARITREG Certificate CE Declaration of Conformity CE Declaration of Conformity all terminals
Engineering Data	CAD data – STEP
Engineering Data	EPLAN, WSCAD, Zuken E3.S
User Documentation	Beipackzettel_SAKS_GL_LD.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

WSI 6/2/LD 60-150VDC/AC

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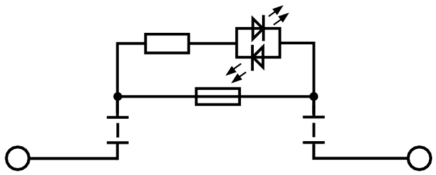
Drawings



¼″ x 1 ¼″ Time-Delay, Glass Tube Fuses
MDL Series

Description

RoHS 2002/95/EC

- Time-delay
- Optional axial leads available
- ¼ x 1 ¼ (6.4 x 31.7mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

Electrical Characteristics		
Rated Current	**% of Amp Rating**	**Opening Time**
1/16 - 30A	100%	None
	135%	60 minutes maximum
	200%	120 seconds maximum
1/16 - 3A	200%	5 seconds minimum
3-2/10 - 8A	200%	12 seconds minimum

Agency Information

- UL Listed Card: MDL 1/16 - 8A (Guide JDYX, File E19180)
- UL Recognized Card: MDL 9 - 30A (Guide JDYX2, File E19180)
- CSA Certification Card: MDL 1/16 - 8A (Class No. 1422-01)
- CSA Component Acceptance: MDL 9-30A (Class No. 1422-30)
- CE

Environmental Data

- Shock: 1A thru 30A – MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/4A thru 30A – MIL-STD-202, Method 204, Test Condition C (Except 5g, 500HZ)

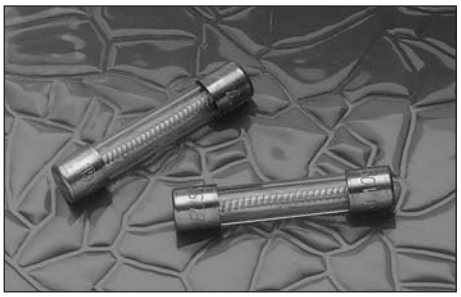
Ordering

Specify packaging code

- Insert packaging code prefix before part number. E.g., BK (or BK1)-MDL-5-R

Specify option codes if desired

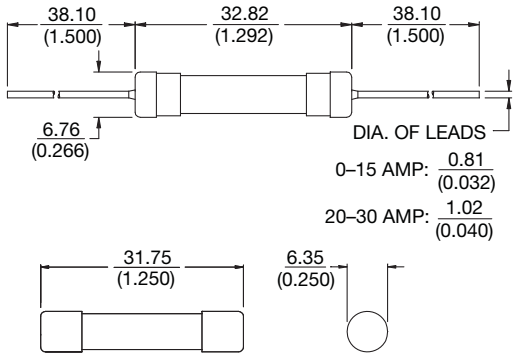
- For axial leads, insert “V” between catalog series and amp rating. E.g., BK-MDL-V-5-R



- For board washable, insert “B” between catalog series and amp rating. E.g., BK-MDL-B-5-R
- For axial leads and board washable, insert “B” then “V” between catalog series and amp rating. E.g., BK-MDL-BV-5-R

Dimensions - mm (in)

Drawing Not to Scale

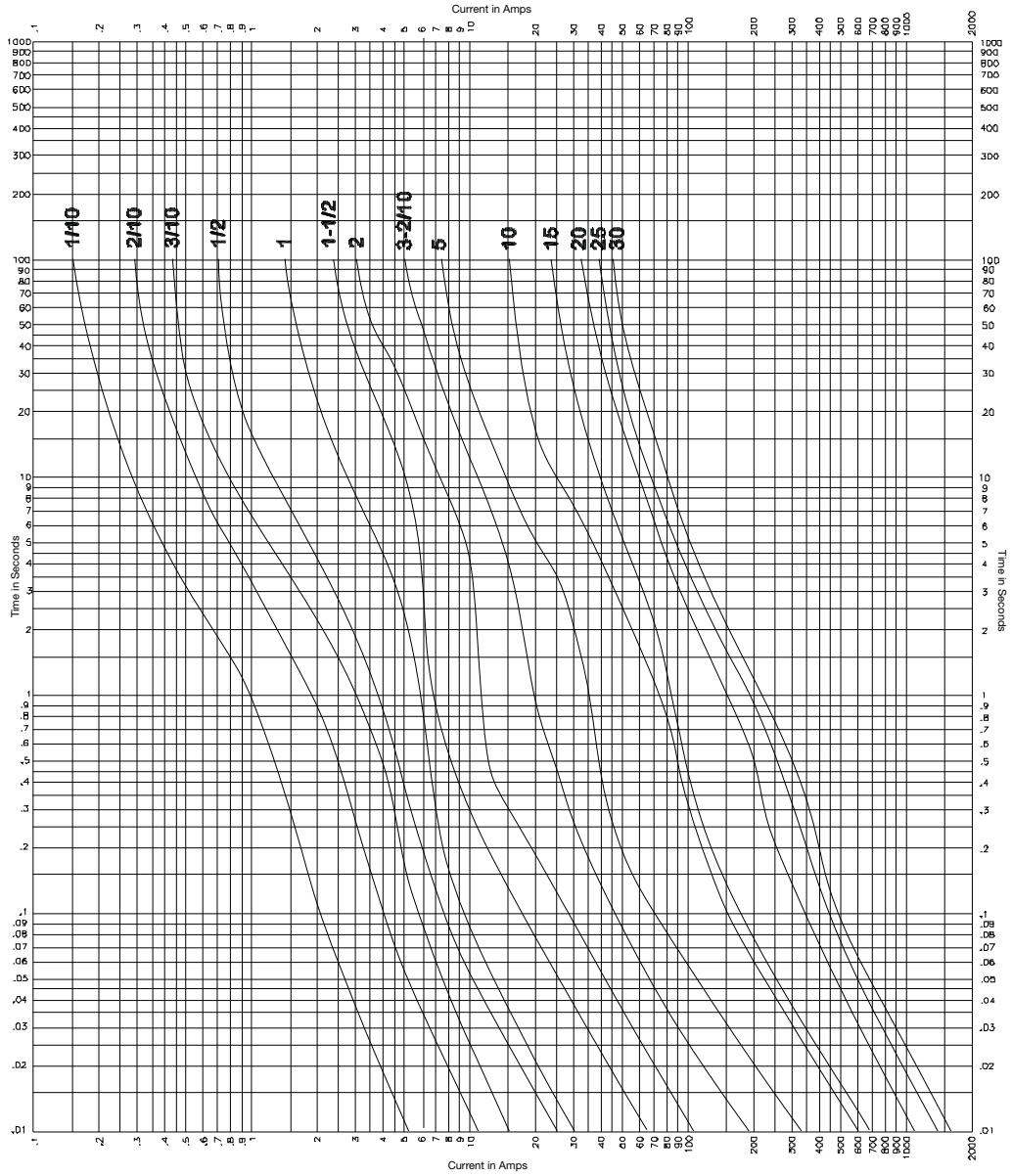


Specifications

Part Number	Voltage Rating Vac	AC Interrupting Rating* (amps)@ 250Vac	125Vac	32Vac	Typical DC Cold Resistance** (Ω)	Typical Melting I²t† AC	Typical Voltage Drop‡
MDL-1/16-R	250	35	10000	-	45.6	0.0046	2.79
MDL-1/10-R	250	35	10000	-	15.68	0.0420	1.95
MDL-1/8-R	250	35	10000	-	12.238	0.0422	1.52
MDL-3/16-R	250	35	10000	-	4.81	0.116	1.05
MDL-2/10-R	250	35	10000	-	5.234	0.314	0.972
MDL-1/4-R	250	35	10000	-	3.208	0.447	0.965
MDL-3/10-R	250	35	10000	-	2.046	0.412	0.808
MDL-3/8-R	250	35	10000	-	1.567	0.982	1.46
MDL-1/2-R	250	35	10000	-	0.943	1.656	1.27
MDL-3/4-R	250	35	10000	-	0.397	4.343	1.01
MDL-1-R	250	35	10000	-	0.273	11.498	0.995
MDL-1-1/4-R	250	100	10000	-	0.205	86.2	0.722
MDL-1-1/2-R	250	100	10000	-	0.156	22.7	0.721
MDL-2-R	250	100	10000	-	0.116	62.3	0.644
MDL-2-1/4-R	250	100	10000	-	0.096	49.6	0.535
MDL-2-1/2-R	250	100	10000	-	0.081	63.1	0.410
MDL-3-R	250	100	10000	-	0.057	67.5	0.345
MDL-4-R	250	200	10000	-	0.038	19.3	0.187
MDL-5-R	250	200	10000	-	0.025	32.0	0.160
MDL-6-R	250	200	10000	-	0.022	37.4	0.155
MDL-6-1/4-R	250	200	10000	-	0.02	38.7	0.152
MDL-7-R	250	200	10000	-	0.018	42.7	0.140
MDL-8-R	250	200	10000	-	0.015	47.8	0.119
MDL-9-R	32	-	-	1000	0.012	51.5	0.124
MDL-10-R	32	-	-	1000	0.01	64.4	0.114
MDL-15-R	32	-	-	1000	0.005	354.0	0.130
MDL-20-R	32	-	-	1000	0.004	2914.0	0.530
MDL-25††	32	-	-	1000	0.01225	15221.0	0.30
MDL-30††	32	-	-	1000	0.0011	15581.0	0.40

* Interrupting Ratings (Interrupting ratings were measured at 70% - 80% power factor on AC)
** DC Cold Resistance (Measured at ≤10% of rated current)
† Typical Melting I²t (A²Sec) (I²t was measured at listed interrupting rating and rated voltage.)
‡ Typical Voltage Drop (Voltage drop was measured at 25°C±3°C ambient temperature at rated current)
†† MDL-25 & MDL-30 not available in RoHS compliant construction.

Time-Current Curve



Packaging Code	
Packaging Code	**Description**
BK	100 fuses packed into a cardboard carton
BK1	1,000 fuses packed into a cardboard carton
BK8	8,000 fuses packed into a cardboard carton

	Option Code
Option Code	**Description**
B	Sealed to withstand aqueous cleaning (Board Washable)
V	Axial leads - copper tinned wire with nickel plated brass overcaps

COILTRONICS® COOPER Bussmann® PowerStor®

ELECTRIC HEATERS

115/230 Volt
100/200 Watt

115/230 Volt
400/800 Watt

115/230 Volt
1300 Watt

INDUSTRY STANDARDS

UL 508A Component Recognized; File No. E61997

CSA Certified, CSA File No. LR42186
CE

APPLICATION

Protect mechanical, electrical and electronic equipment from low temperatures, condensation and corrosion with this thermostatically controlled, fan-driven heater that maintains a stable enclosure temperature.
Fan draws cool air from the bottom of the enclosure and passes this air across the thermostat and heating element before being released into enclosure cavity. Heated air is discharged through the top of the heater unit.

SPECIFICATIONS

- Aluminum housing
- Thermostat range adjustable from 0 F to 100 F (-18 C to 38 C)
- Four 10-32 x self-tapping screws are included with each heater
- Ball bearing fan
- Terminal strip with clamp connector that accepts both solid and stranded wire

FINISH

- Brushed aluminum

⚠ CAUTION

These electric heaters are not designed for use in dusty, dirty, corrosive, or hazardous locations. Portions of the heater can get hot. Adequate protection must be taken to protect people from potential burns, and to protect other components from this heat. Pentair Technical Products recommends this heater only be installed in a totally-enclosed metal enclosure.

DO NOT INSTALL HEATERS ON WOOD PANELS. Heat sensitive components should not be placed near the heater discharge area since this air can be quite warm. The clearance range defines the space that must be kept free of these components for proper and safe operation of the heater.

Performance Data **100 and 200 Watt Heaters**

CATALOG NUMBERS	DAH1001A	DAH1002A	DAH2001A	DAH2002A
ELECTRICAL DATA				
Rated Voltage	**115**	**230**	**115**	**230**
Frequency (Hz)	50/60	50/60	50/60	50/60
Power Consumption (Watts)	100	100	200	200
Nominal Current (Amps)	0.98	0.49	1.89	0.95
HEATING PERFORMANCE				
Watts	**100**	**100**	**200**	**200**
UNIT CONSTRUCTION				
Weight (lb./kg)	1.6/0.73	1.6/0.73	1.6/0.73	1.6/0.73
X (in./mm)	4.00/102	4.00/102	4.00/102	4.00/102

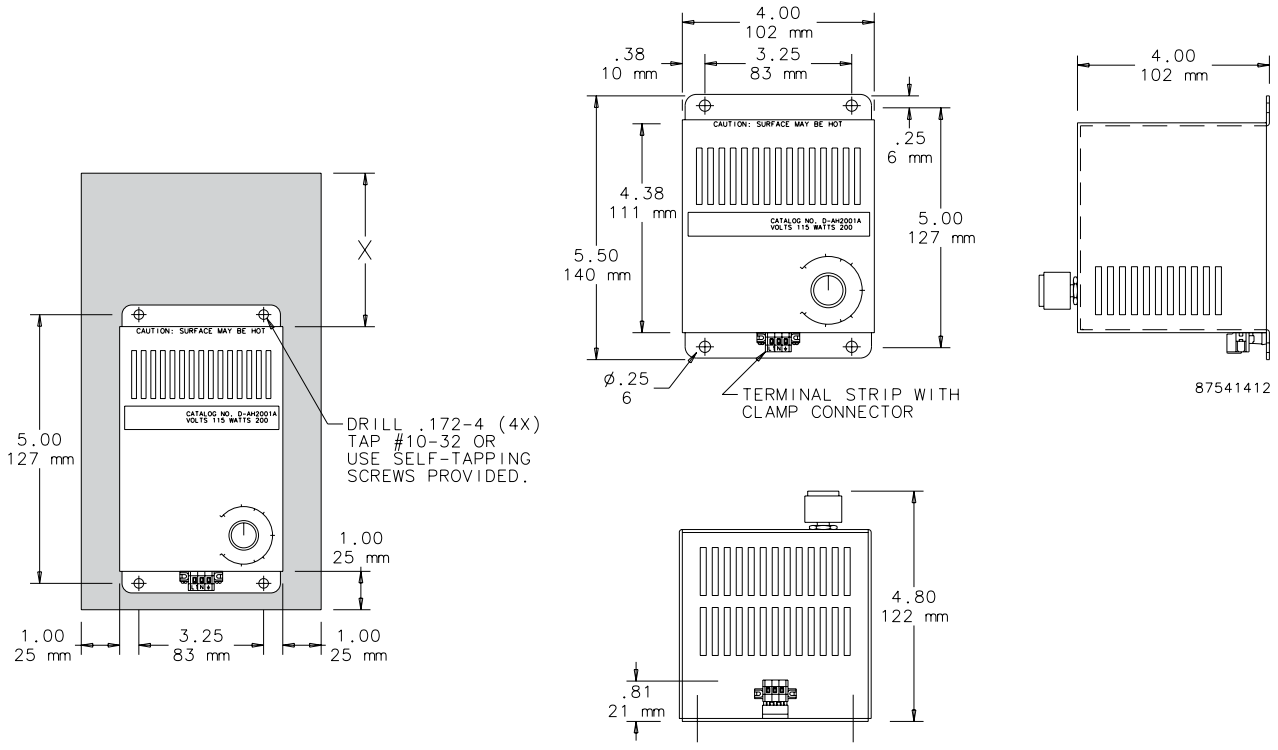
Performance Data **400 and 800 Watt Heaters**

CATALOG NUMBERS	DAH4001B	DAH4002B	DAH8001B	DAH8002B
ELECTRICAL DATA				
Rated Voltage	**115**	**230**	**115**	**230**
Frequency (Hz)	50/60	50/60	50/60	50/60
Power Consumption (Watts)	400	400	800	800
Nominal Current (Amps)	3.72	1.86	7.37	3.69
HEATING PERFORMANCE				
Watts	**400**	**400**	**800**	**800**
UNIT CONSTRUCTION				
Weight (lb./kg)	2.2/1.00	2.2/1.00	2.2/1.00	2.2/1.00
X (in./mm)	6.00/152	6.00/152	8.00/203	8.00/203

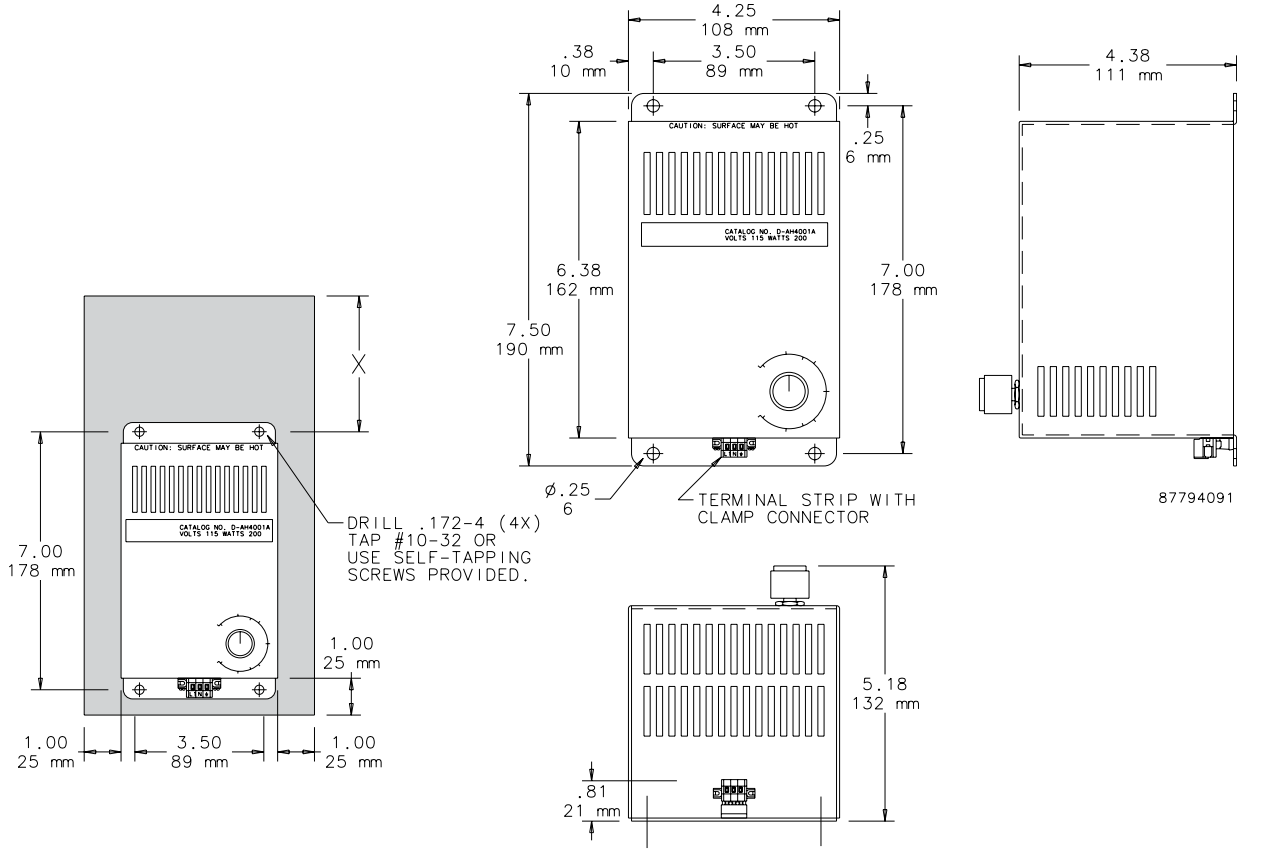
Performance Data **1300 Watt Heaters**

CATALOG NUMBERS	DAH13001C	DAH13002C
ELECTRICAL DATA		
Rated Voltage	**115**	**230**
Frequency (Hz)	50/60	50/60
Power Consumption (Watts)	1300	1300
Nominal Current (Amps)	11.5	5.7
HEATING PERFORMANCE		
Watts	**1300**	**1300**
UNIT CONSTRUCTION		
Weight (lb./kg)	3.4/1.54	3.4/1.54
X (in./mm)	8.00/203	8.00/203

Dimensions and Clearance Range Drawing for DAH1001A, -2A and DAH2001A, -2A



Dimensions and Clearance Range Drawing for DAH4001B, -2B and DAH8001B, -2B



Panel Thermostats

Small, compact size (17.5 mm wide)
1 NC 10 A - 250 V AC1
Snap action thermostatic Bimetal sensor
Wide temperature setting range
Long electrical life
35 mm rail (EN 60715) mount

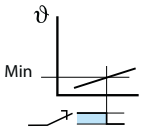
Approvals (according to type):

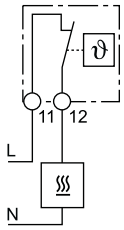
Type 7T.81.0.000.240x

Direct switching of heater loads up to 2500 VA

Type 7T.81.0.000.230x

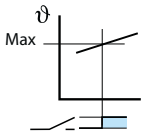
Direct switching of fans up to 130 W

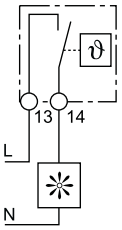




Heating control
Should the panel temperature fall below the (minimum) set temperature the contact will close to call for heat. The contact will open when this set temperature is exceeded.

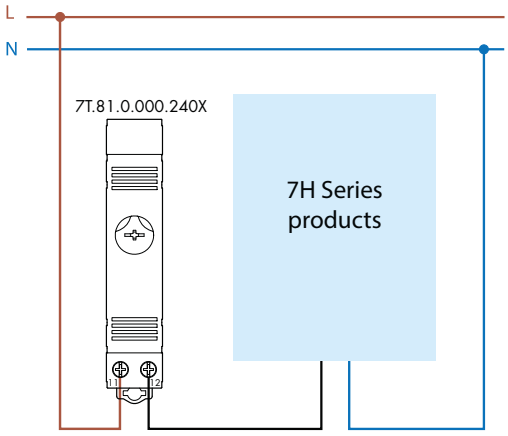
Heating: Red Dial
Temperature ranges: –20° a +40°C
0° a +60°C

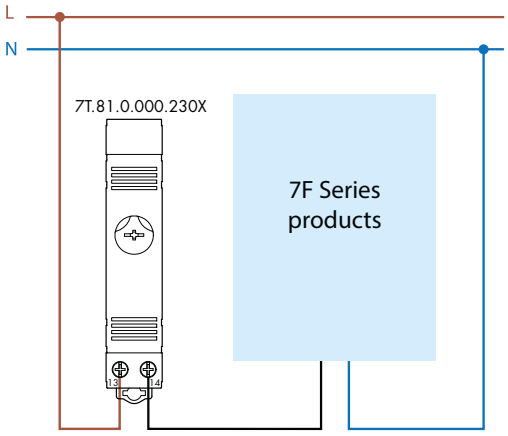




Ventilation control
Should the panel temperature exceed the (maximum) set temperature then the contact will close to call for cooling. The contact will open when the temperature falls below this set temperature.

Ventilation: Blue Dial
Temperature ranges: –20° a +40°C
0° a +60°C





COMPACT AXIAL FANS

FEATURES

- Maximum operating temperature is 158 F (70 C)
- 4-in. fan is thermally protected and uses permanently lubricated ball bearings
- 6- and 10-in. fans have ball-bearing construction and split-capacitor motors
- Split-capacitor motors are thermally protected to avoid premature failure
- Dynamically balanced impellers molded from polycarbonate material
- One finger guard is furnished (additional finger guards are available)
- All mounting hardware is provided
- 240 and 560 CFM fans have ball bearing construction and split capacitor motors
- Fans have leadwires with ends stripped 1/2-in. (12-mm) or 6-ft. (1.8-m) cord with polarized plug for power connections

Fan bracket and additional finger guards must be purchased separately

INDUSTRY STANDARDS

UL Component Recognized

APPLICATION

Compact Cooling Fans are ideal for applications where enclosure space is limited and quiet, reliable cooling is required. Engineered for 50,000 hours of continuous operation without lubrication or service.

Installation
Can be installed on any surface of an enclosure. With the addition of accessory fan brackets, Compact Cooling Fans can also be installed in any position inside the enclosure for spot cooling or air circulation.

FINISH

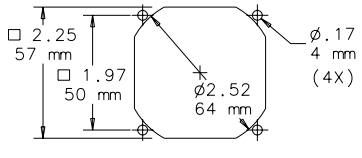
- Fan housing is black.

ACCESSORIES

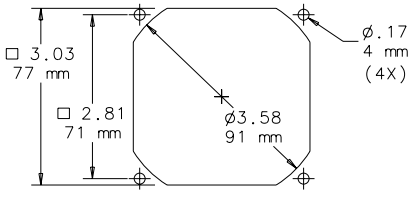
Fan Cords
Fan Cords With Inline Thermostat
Fan Filter and Finger Guard Kit
Fan Brackets
Finger Guards

Design Data **Compact Axial Fans**

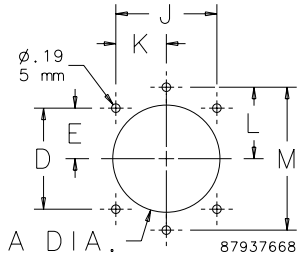
CATALOG NUMBERS	Nominal Size	Voltage	A in./mm	D in./mm	E in./mm	J in./mm	K in./mm	L in./mm	M in./mm
A2AXFN24	2	24 VDC	—	1.97/50	.98/25	1.97/50	.98/25	—	—
3-in. Fans									
A3AXFN	3	115 VAC	—	2.81/71	1.40/36	2.81/71	1.40/36	—	—
A3AXFN24	3	24 VDC	—	2.81/71	1.40/36	2.81/71	1.40/36	—	—
4-in. Fans									
A4AXFNGQ	4	115 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFNPG	4	115 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFN	4	115 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFN2	4	230 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFN24	4	24 VDC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
6-in. Fans									
A6AXFNGQ	6	115 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFNPG	6	115 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFN	6	115 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFN2	6	230 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFN24	6	24 VDC	5.88/149	—	—	—	—	3.19/81	6.38/162
10-in. Fans									
A10AXFNPG	10	115 VAC	9.00/229	6.85/174	3.44/87	6.85/174	3.44/87	—	—
A10AXFN	10	115 VAC	9.00/229	6.85/174	3.44/87	6.85/174	3.44/87	—	—
A10AXFN2	10	230 VAC	9.00/229	6.85/174	3.44/87	6.85/174	3.44/87	—	—



MOUNTING CUTOUT
DIMENSIONS 2 INCH



MOUNTING CUTOUT
DIMENSIONS 3 INCH



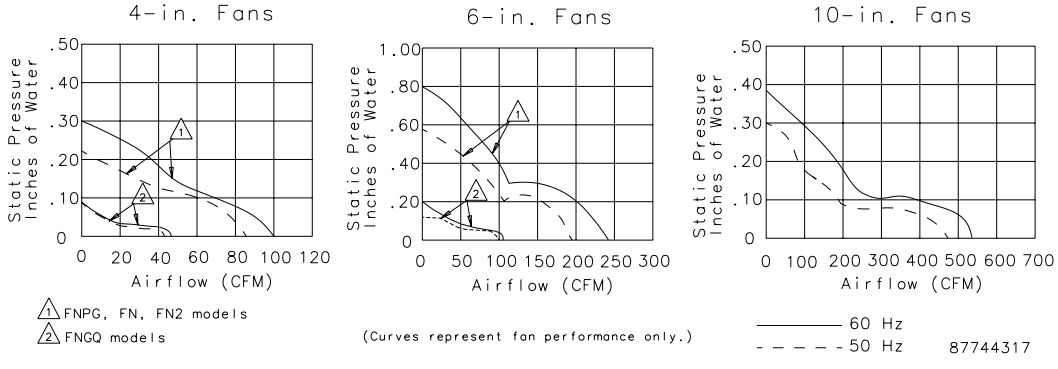
MOUNTING CUTOUT
DIMENSIONS 4,6,10 INCH

Performance Data **Compact Axial Fans**

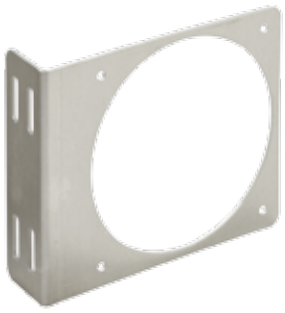
ELECTRICAL DATA					
Rated Voltage	**24 VDC**	**115 VAC Lead Wires**	**115 VAC Power Cord Quiet Fan**	**115 VAC Power Cord**	**230 VAC Lead Wires**
Frequency (Hz)	—	50/60	50/60	50/60	50/60
Power Connection	Lead Wires	Lead Wires	Power Cord	Power Cord	Lead Wires
2 inch Nominal-Size Fans					
Catalog Number	A2AXFN24	—	—	—	—
Nominal Current Maximum @50/60 Hz (Amps)	.09	—	—	—	—
Power Consumption Maximum @ 50/60 Hz (Watts)	2.16	—	—	—	—
Free Airflow @ 50/60 Hz (CFM)*	21.5	—	—	—	—
Free Airflow @ 50/60 Hz (m^3/hr.)*	36.5	—	—	—	—
Noise SIL @ 50/60 Hz (dBA)	65	—	—	—	—
Maximum RPM @50/60 Hz (RPM)	4550	—	—	—	—
Fan Size Diameter (in.)	2.36	—	—	—	—
Fan Depth (in.)	.98	—	—	—	—
3 inch Nominal-Size Fans					
Catalog Number	A3AXFN24	A3AXFN	—	—	—
Nominal Current Maximum @50/60 Hz (Amps)	.14	.09	—	—	—
Power Consumption Maximum @ 50/60 Hz (Watts)	3.36	7	—	—	—
Free Airflow @ 50/60 Hz (CFM)*	40	27	—	—	—
Free Airflow @ 50/60 Hz (m^3/hr.)*	68	46	—	—	—
Noise SIL @ 50/60 Hz (dBA)	35	40	—	—	—
Maximum RPM @50/60 Hz (RPM)	3400	2700	—	—	—
Fan Size Diameter (in.)	3.15	3.15	—	—	—
Fan Depth (in.)	.98	1.50	—	—	—
4 inch Nominal-Size Fans					
Catalog Number	A4AXFN24	A4AXFN	A4AXFNGQ	A4AXFNPG	A4AXFN2
Nominal Current Maximum @50/60 Hz (Amps)	.35	.26/.21	.09/.08	.26/.21	.14/.11
Power Consumption Maximum @ 50/60 Hz (Watts)	84	17/15	6/5	17/15	16/14
Free Airflow @ 50/60 Hz (CFM)*	118	85/100	46/49	85/100	85/100
Free Airflow @ 50/60 Hz (m^3/hr.)*	200	144/170	78/83	144/170	144/170
Noise SIL @ 50/60 Hz (dBA)	46.5	37/41	27/28	37/41	37/41
Maximum RPM @50/60 Hz (RPM)	3200	2415/2900	1350/1450	2415/2900	2415/2900
Fan Size Diameter (in.)	4.69	4.69	4.69	4.69	4.69
Fan Depth (in.)	1.52	1.52	1.52	1.52	1.52
6 inch Nominal-Size Fans					
Catalog Number	A6AXFN24	A6AXFN	A6AXFNGQ	A6AXFNPG	A6AXFN2
Nominal Current Maximum @50/60 Hz (Amps)	.88	.45/.36	.16/.19	.45/.36	.23/.18
Power Consumption Maximum @ 50/60 Hz (Watts)	21.1	36/32	16/18	36/32	39/35
Free Airflow @ 50/60 Hz (CFM)*	280	200/240	85/102	200/240	200/240
Free Airflow @ 50/60 Hz (m^3/hr.)*	476	340/408	144/173	340/408	340/408
Noise SIL @ 50/60 Hz (dBA)	62.5	50/56	35/38	50/56	50/56
Maximum RPM @50/60 Hz (RPM)	3750	2670/3200	1400/1650	2670/3200	2670/3200
Fan Size Diameter (in.)	6.77	6.77	6.77	6.77	6.77
Fan Depth (in.)	2.00	1.50	1.50	1.50	1.50
10 inch Nominal-Size Fans					
Catalog Number	—	A10AXFN	—	A10AXFNPG	A10AXFN2
Nominal Current Maximum @50/60 Hz (Amps)	—	1.0/.88	—	1.0/.88	.47/.43
Power Consumption Maximum @ 50/60 Hz (Watts)	—	36/36	—	36/36	36/36
Free Airflow @ 50/60 Hz (CFM)*	—	480/560	—	480/560	480/560
Free Airflow @ 50/60 Hz (m^3/hr.)*	—	816/951	—	816/951	816/951
Noise SIL @ 50/60 Hz (dBA)	—	46/49	—	46/49	46/49
Maximum RPM @50/60 Hz (RPM)	—	1350/1650	—	1350/1650	1350/1650
Fan Size Diameter (in.)	—	10.00	—	10.00	10.00
Fan Depth (in.)	—	3.50	—	3.50	3.50

*** CFM without exhaust grille**

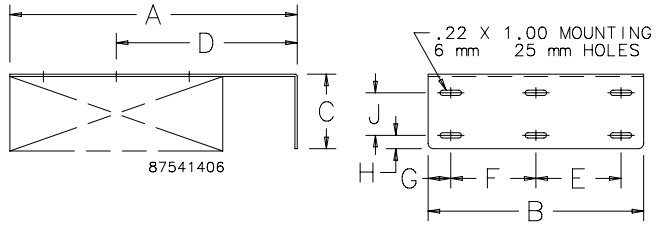
Performance Curves for Compact Axial Fans



FAN BRACKETS

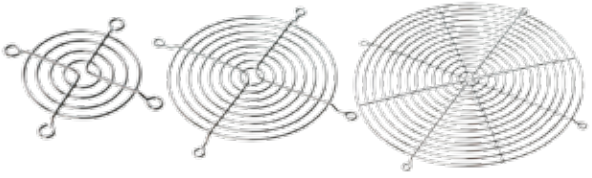


Designed to provide easy mounting of compact axial fans on enclosure panels. Brackets can be used for general air circulation or to direct air at problem areas. All sizes are .100-in. aluminum. Package quantity of 1 bracket. Fans must be ordered separately.



CATALOG NUMBERS	AxBxC in./mm	Used with Fan Catalog Number	D in./mm	E in./mm	F in./mm	G in./mm	H in./mm	J in./mm
ABRKT2	3.75x2.75x1.50 95x70x38	A2AXFN24	2.38/60	—	1.75/44	.50/13	.37/9	.62/16
ABRKT3	4.50x3.50x1.50 114x89x38	A3AXFN, A3AXFN24	2.75/70	—	2.50/64	.50/13	.37/9	.62/16
ABRKT4	6.00x5.00x1.50 152x127x38	A4AXFNPG, A4AXFNGQ, A4AXFN or A4AXFN2	3.50/89	—	3.00/76	1.00/25	.38/10	.62/16
ABRKT6	10.00x6.88x2.00 254x175x51	A6AXFNPG, A6AXFNGQ, A6AXFN or A6AXFN2	6.50/51	—	5.00/127	.94/24	.38/10	1.00/25
ABRKT10	13.50x10.12x3.50 343x257x89	A10AXFNPG, A10AXFNGQ, A10AXFN or A10AXFN2	8.50/216	4.00/102	4.00/102	1.06/27	.62/16	2.00/51

FINGER GUARDS



One finger guard is included with each Compact Axial Fan and Cooling Fan Package. Additional Finger Guards can be mounted on either side of the fan for maximum safety. All guards are chrome-plated and meet UL 507 .25-in. plug gauge test.

CATALOG NUMBERS	Use on Compact Axial Fan Catalog Numbers
AGARD2	A2AXFN24
AGARD3	A3AXFN, A3AXFN24
AGARD4	A4AXFNPG, A4XFNGQ, A4AXFN, A4AXFN2
AGARD6	A6AXFNPG, A6AXFNGQ, A6AXFN, A6AXFN2
AGARD10	A10AXFNPG, A10AXFNQR , A10AXFN, A10AXFN2

1-CHANNEL INTRINSICALLY SAFE RELAYS

ISE SERIES

- Approved for use in Class I, Class II, and Class III Hazardous Locations (Zones 0 & 1 in Canada)
- 1-Channel
- 5A relay output
- Universal input voltage of 102-132V AC & 10-125V DC
- Compact 17.5mm wide enclosure for both DIN-rail or panel-mount
- LED status indicator

c UL us

UL913 8th Edition

CE

MACROMATIC

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The ISE Series of Intrinsically Safe Relays provide a safe and reliable method to control a single load (motor starters, relays, etc.) with a single input device (switches, sensors, etc.) located in a hazardous area. These products are approved for use in Class I Groups A, B, C, D, Class II Groups E, F, G, and Class III Hazardous Locations (Zones 0 & 1 in Canada). The ISE Series relay must be mounted in a safe area, following Macromatic Control Drawing Number ISD2A01, as shown in Instruction Sheet 901-0000-329.

The ISE Series relays utilize a compact 17.5mm wide enclosure that can be both mounted on 35mm DIN rail or panel-mounted with two screws. Hazardous terminals are on the bottom of the unit for easy access in the enclosure to incoming wiring from the hazardous area and are clearly marked.

Standard Operation

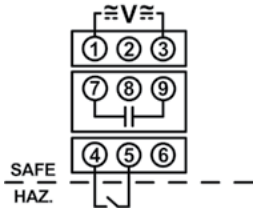
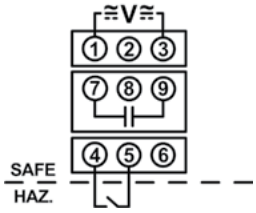
Each ISE Series relay consists of an intrinsically safe input and a corresponding electromechanical relay output. There is one bi-color LED for status indication. With input voltage applied, the LED will be ON (Green) to indicate power is applied.

When the input device from the hazardous area is *closed*, the output relay is energized and the LED is ON (Orange). When the input device *opens*, the output relay will de-energize and the LED will be ON (Green).

Inverted Operation (V-suffix)

Each ISE Series relay consists of an intrinsically safe input and a corresponding electromechanical relay output. There is one bi-color LED for status indication. With input voltage applied, the LED will be ON (GREEN) to indicate power is applied.

When the input device from the hazardous area is *open*, the output relay is energized and the LED is ON (ORANGE). When the input device *closes*, the output relay will be de-energized and the LED will be ON (GREEN).

INPUT VOLTAGE	NUMBER OF CHANNELS	CATALOG NUMBER	WIRING
102-132V AC (50/60Hz) & 10-125V DC	1	ISEUR1	 **DIAGRAM 811**
102-132V AC (50/60Hz) & 10-125V DC	1	ISEUR1V	 **DIAGRAM 811**

1-CHANNEL INTRINSICALLY SAFE RELAYS

ISE Series

Application Data

Input Voltage: 102-132V AC (50/60Hz.) & 10-125V DC

Load (Burden): 2VA Maximum

Input Switch Open Circuit Voltage: 10V DC

Output Contacts:
SPST-NO (Form A) 3A Resistive @ 125V AC @ 60ºC & 30V DC Resistive, Pilot Duty Rating D300

SPST-NO (Form A) 5A Resistive @ 125V AC @ 40ºC & 30V DC Resistive, Pilot Duty Rating D300

Life: Electrical: 50,000 Closures @ Full Load AC
Mechanical: 5 Million Closures @ No Load

Response Times: < 50ms

Temperature:
Operating: -28º to + 60º C (-18º F to +140º F)
Storage: -55º to +85º C (-67º to 185º F)

LED Indication:
Standard Operation, ON (Green) - Input voltage; ON (Orange) - Input closed and relay energized;
Inverse Operation (V-suffix), ON (Green) - Input voltage; ON (Orange) - Input open and relay energized

Insulation Voltage:
1500 V AC between coil & contacts
750 V AC between open contacts
1500 V AC between hazardous and safe circuits

Wire Sizes:
One #14-24 AWG Conductor or
Two #16 or 18 AWG Conductors

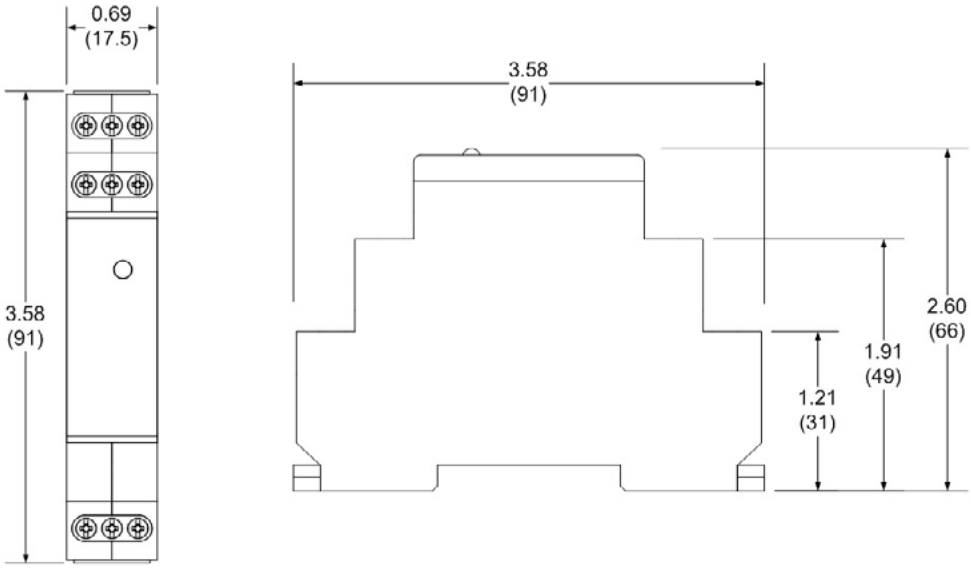
Mounting: Mounts on 35mm DIN-rail or panel-mounted with two #8 screws when DIN-rail clips are fully extended from under the enclosure.

Control Drawing: See Instruction Sheet 901-0000-329, which includes Control Drawing ISD1A04.

Approvals:

UL913 8th Edition
E318075

Dimensions



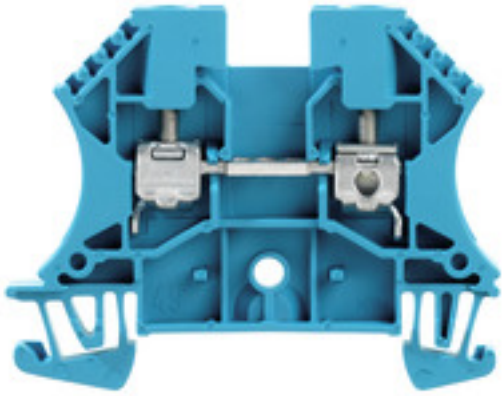
All Dimensions in
Inches (Millimeters)

WDU 4 BL

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



Klippon® Connect with clamping yoke Technology
The high reliability and variety of designs of the terminal blocks with clamping yoke connections make planning easer and optimises operational safety. Klippon® Connect provides a proven response to a range of different requirements.

General ordering data

Version	Feed-through terminal, Screw connection, 4 mm², 800 V, 32 A, blue
Order No.	1020180000
Type	WDU 4 BL
GTIN (EAN)	4008190185237
Qty.	100 pc(s).

WDU 4 BL

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Depth including DIN rail	47 mm	Height	60 mm
Height (inches)	2.362 inch	Width	6.1 mm
Width (inches)	0.24 inch	Weight	10.4 g
Net weight	9.42 g		

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	blue
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	32 A
Wire cross section max. (ATEX)	4 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	32 A	Wire cross section max. (IECEX)	4 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for plug-in cross-connector, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	Yes
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	1.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	1.5 mm²

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

WDU 4 BL

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

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Technical data

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size B (CSA)	35 A
Current size C (CSA)	35 A	Voltage size C (CSA)	600 V
Wire cross section max. (CSA)	10 AWG	Wire cross section min. (CSA)	26 AWG

Conductors for clamping (rated connection)

Blade size	0.6 x 3.5 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 Nm	
		max.	6 Nm	
		nominal	4 Nm	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
Clamping range, max.	6 mm²			
Clamping range, min.	0.13 mm²			
Clamping screw	M 3			
Connection cross-section, stranded, max.	6 mm²			
Connection cross-section, stranded, min.	1.5 mm²			
Connection direction	on side			
Gauge to IEC 60947-1	A4			
Number of connections	2			
Stripping length	10 mm			
Tightening torque, max.	1 Nm			
Tightening torque, min.	0.5 Nm			

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Technical data

Torque level with DMS electric screwdriver	2
Twin wire-end ferrules, max.	2.5 mm²
Twin wire-end ferrules, min.	0.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 10
Wire connection cross section AWG, min.	AWG 26
Wire connection cross section, finely stranded, max.	6 mm²
Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	4 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	4 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	6 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 10	Wire connection cross section AWG, min.	AWG 26

Rating data

Rated cross-section	4 mm²	Rated voltage	800 V
Rated current	32 A	Current at maximum wires	41 A
Standards	IEC 60947-7-1	Volume resistance according to IEC 60947-7-x	1 mΩ
Rated impulse withstand voltage	8 kV	Power loss in accordance with IEC 60947-7-x	1.02 W
Pollution severity	3		

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	10 AWG
Conductor size Factory wiring min. (UR)	26 AWG	Conductor size Field wiring max. (UR)	10 AWG
Conductor size Field wiring min. (UR)	22 AWG	Current size C (UR)	35 A
Voltage size C (UR)	600 V		

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ECLASS 9.0	27-14-11-20
ECLASS 9.1	27-14-11-20	ECLASS 10.0	27-14-11-20
ECLASS 11.0	27-14-11-20		

WDU 4 BL

Weidmüller Interface GmbH & Co. KG
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Germany

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Technical data

Approvals

Approvals	
ROHS	Conform
UL File Number Search	E60693

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate CB Testreport CB Certificate EAC certificate DNVGL certificate NEMKO certificate INMETRO certificate Lloyds Register Certificate MARITREG Certificate POLSKIREJ certificate EAC EX Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate CE Declaration of Conformity all terminals
Engineering Data	CAD data – STEP
Engineering Data	EPLAN, WSCAD, Zuken E3.S
User Documentation	NTI WDU/WPE 4 Usage of terminals in EXi atmospheres StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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Drawings

Straight Blade Devices
15A, 125V

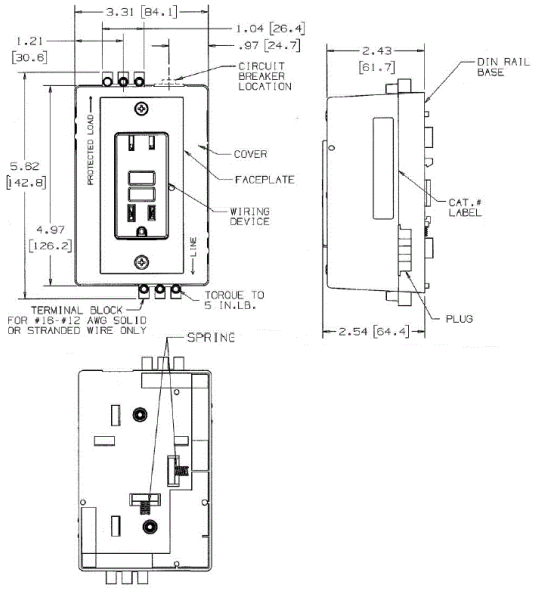
DIN Rail Utility Box- GFCI Duplex Receptacles

Features

- It provide utility power to any control cabinet
- Optional auxiliary contacts for feed through capability
- Pre-wired "kits" are available for end-user customization

Ordering Information

Description	Device Color	UPC	Catalog Number
Complete unit vertical mount	Gray	783585108056	DRUBGFI15



Listings

UL Listed
Certified to CSA

Specifications

Cover/Faceplate	PVC
Base	PVC
Plug	PVC

Resources

Customer Use Drawing
eCatalog

Dimensions in Inches (mm)

Wiring Device-Kellems

INDUSTRIAL CORROSION INHIBITORS

nVent HOFFMAN corrosion inhibitors protect

- Interior components of electrical enclosures, boxes, consoles and wireways
- Interior components of electronic enclosures
- Electrical and electronic equipment and controls
- Parts and components that are packaged in crates during shipping and storage
- Switch gear and relay cabinets
- Interiors of pipes, conduits and fuse boxes
- Process control computers, instruments and recording devices
- Tool chest interiors and contents
- Equipment stored at construction sites

Chief Advantages

- Protects against salt and high humidity
- Eliminates the need of oiling, plating or dipping metal
- Puts protected equipment to use immediately without degreasing or coating removal

How They Work

Each inhibitor contains a special chemical combination that vaporizes and condenses on all surfaces in an enclosed area. Vapors will redeposit as needed in the event of condensation of moisture on surfaces. These vapors reach every part of an enclosure, protecting all interior components. Spraying, wiping or greasing are not required. This eliminates precoating, special wraps and drying agents. Protection is effective even in salt-water atmospheres. The AHCI5E and AHCI10E emitters have additional red-metal inhibitors for further protection. Enclosures containing corrosion inhibitors must be reasonably sealed.

Life Expectancy and Usage

The normal useful life-span of nVent HOFFMAN corrosion inhibitors is in excess of one year. However, inhibitor life expectancy is shortened by approximately 25 percent when exposed to temperatures above 104 F (40 C). This product is not recommended for use where temperature exceeds 199 F. Since Hoffman corrosion inhibitors are vapor-phase protective, all surfaces to be protected should be accessible to the vapors. The maximum distance the vapors can travel is approximately 1.50 ft. (.46 m). Protection of long, narrow enclosures can be achieved with tape or multiple inhibitors.

Storage and Handling

Each nVent HOFFMAN corrosion inhibitor is individually packaged in a resealable bag for maximum effectiveness at the time of usage. Corrosion inhibitors should be stored at temperatures not exceeding 120 F (45 C). Hoffman corrosion inhibitors are not returnable.

When determining the proper corrosion inhibitor for your application, assume the enclosure volume to be protected is greater than calculated if (1) cabinet doors are opened frequently, (2) cabinet is located in an extremely corrosive area and/or (3) cabinet length divided by depth is greater than four.

AHCI1DV

Foam device protects one cubic foot (28 liters) of enclosure volume for approximately one year.
Size: .25 x 1.25 x 3.00 in. (6 x 32 x 76 mm)

AHCI5E

Emitter protects 5 ft.^{3} (142 liters) of enclosure volume for approximately two years from the date of manufacture. The useful life (protection) depends on the moisture surrounding the application. Severe environments recommend no more than 3 months before replacing, less severe recommend no more than 6 months before replacing. Emitters contain additional red metal (non-ferrous) inhibitors.
Size: 2.31 in. (diameter) x 0.81 in. (high) (59 mm x 21 mm)

AHCI10E

Emitter protects 10 ft.^{3} (283 liters) of enclosure volume for approximately two years from the date of manufacture. The useful life (protection) depends on the moisture surrounding the application. Severe environments recommend no more than 3 months before replacing, less severe recommend no more than 6 months before replacing. Emitters contain additional red metal (non-ferrous) inhibitors.
Size: 2.31 in. (diameter) x 1.38 in. (high) (59 mm x 35 mm)

AHCI60R

Tape protects 60 ft.^{3} of enclosure volume per roll. Use approximately 2.50 in. (63 mm) of tape per cubic foot (28 liters) of enclosure volume to be protected. Each roll of tape is packaged individually in a resealable bag.
Size: .25 in. x .75 in. x 12.00 ft. (6 mm x 19 mm x 3.6 m)

AHCI240R

Tape protects 240 ft.^{3} of enclosure volume per roll. Use approximately 1.00 in. (25 mm) of tape per cubic foot (28 liters) of enclosure volume to be protected. Each roll of tape is packaged individually in a resealable bag.
Size: .25 in. x 2.00 in. x 20.00 ft. (6 mm x 51 mm x 6.1 m)

AHCI238S

Spray is a non-conductive, nonflammable, vapor-phase film and is non-toxic. It has essentially neutral pH value. Application provides instant protection against corrosion. Spray is water soluble and can be easily flushed away with water if desired. This product should be kept from freezing and has a shelf life of 2+ years in normal warehouse conditions.

BULLETIN: A80

Standard Product

Catalog Number	Enclosure Volume Protected (ft.^{3})	Enclosure Volume Protected (liters)	Package Qty.
AHCI1DV	1	28.32	50
AHCI5E	5	141.6	25
AHCI10E	10	283.2	12
AHCI60R	60	1699	3
AHCI240R	240	6797	1
AHCI238S	50	1416	6

Metal Protection Chart

Metal	Protected by Chemical	Unprotected by Chemical
Aluminum	Marked reduction of surface attack; no pitting	Severe surface attack; tarnish; pitting
Brass[a]	Decreased tarnish; very minor surface attack	Surface discoloration; pitting
Steel, Iron	No change	Severe corrosion
Copper[a]	Slight staining	Heavy corrosive attack
Zinc Plate	Slight discoloration	Severe corrosion
Tin Plate	Slight discoloration	Moderate corrosive attack

[a] AHCI5E and AHCI10E emitters are recommended for these materials

Stahlin Enclosure Accessories

General Accessories

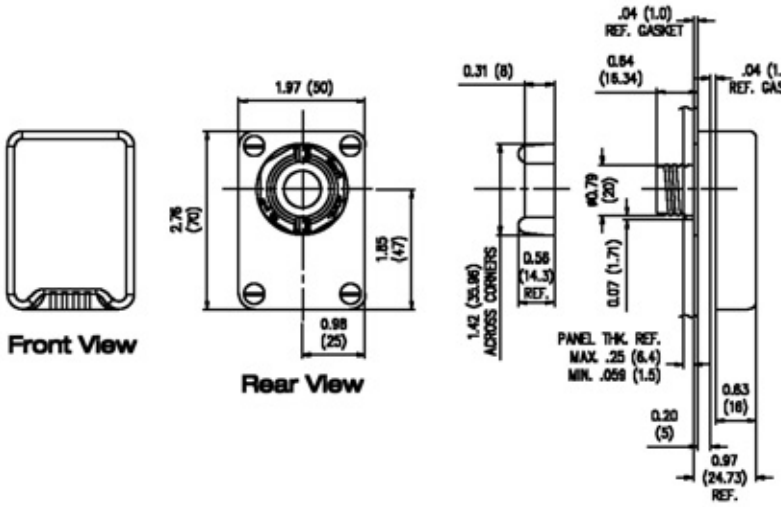
Stahlin enclosures are created in standard forms and shapes, but the ability to customize into unique end user configurations may be the single best reason to buy Stahlin products. Certain accessories are available by part number and can be added at the time of the enclosure purchase, or added later as a separate item.

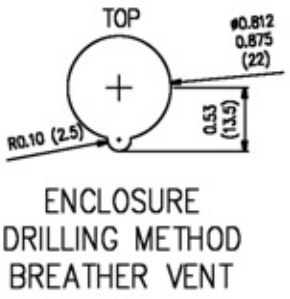
By comparison, modifications are considerably more complex and end user specific and they must be implemented before the enclosure leaves the factory. All items listed as **Accessories** are available as separately priced items. These services designated factory install **Modifications** must be requested at the time of order placement.

Breather Vent – 4X

Stahlin's non-metallic Breather Vent allows an enclosure to "breathe" — literally allowing the free passage of air while maintaining UL Type 4X enclosure integrity as a recognized component.

Breather Vent
CATALOG NUMBER
BV4XKIT

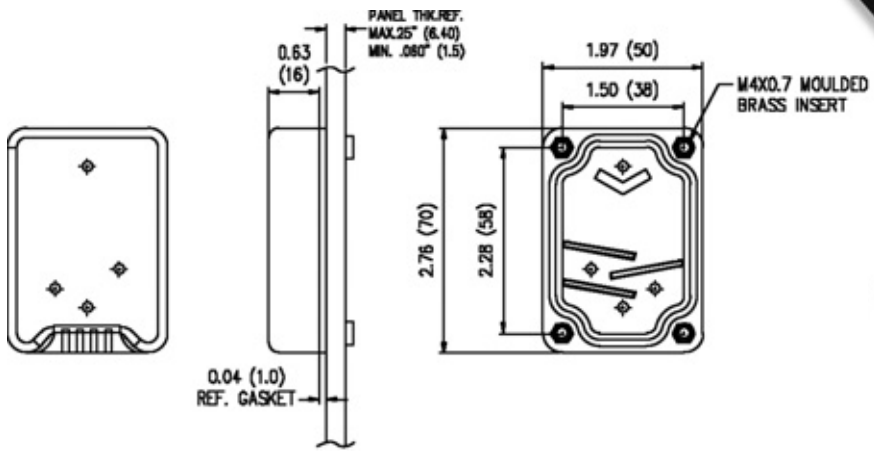




Drain Vent – 4X

Stahlin's new non-metallic Drain Vent reliably protects electrical equipment housed inside an enclosure by properly draining unwanted moisture or accumulated water from within, while maintaining UL Type 4X enclosure integrity as a recognized component.

Drain Vent
CATALOG NUMBER
DV4XKIT



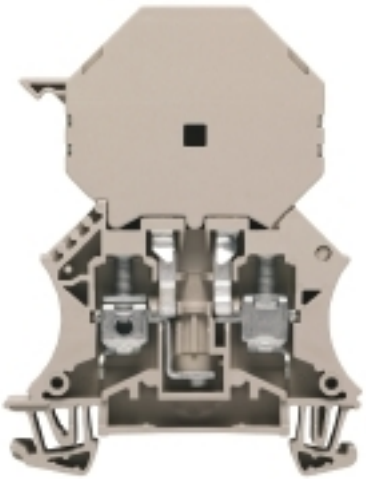
Stahlin Enclosures • 500 Maple Street, Belding, MI 48809 • Phone: 616-794-0700 • Fax: 616-794-3378 • www.stahlin.com

WSI 6/2/LD 10-36V DC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



Klippon® Connect with clamping yoke Technology
The high reliability and variety of designs of the terminal blocks with clamping yoke connections make planning easer and optimises operational safety. Klippon® Connect provides a proven response to a range of different requirements.

General ordering data

Version	W-Series, Fuse terminal, Rated cross-section: 6 mm², Screw connection
Order No.	1014100000
Type	WSI 6/2/LD 10-36V DC/AC
GTIN (EAN)	4008190156954
Qty.	25 pc(s).

WSI 6/2/LD 10-36V DC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	78.5 mm	Depth (inches)	3.091 inch
Depth including DIN rail	79.5 mm	Height	60 mm
Height (inches)	2.362 inch	Width	11.9 mm
Width (inches)	0.469 inch	Weight	29.8 g
Net weight	25.48 g		

Temperatures

Storage temperature	-25 °C...55 °C	Continuous operating temp., min.	-50 °C
Continuous operating temp., max.	120 °C		

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

System specifications

Version	Screw connection, Fuse isolator, with LED, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	2.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	2.5 mm²

Additional technical data

Explosion-tested version	No	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

CSA rating data

Certificate No. (CSA)	200039-1057876	Wire cross section max. (CSA)	6 AWG
Wire cross section min. (CSA)	20 AWG		

Conductors for clamping (additional connection)

Conductor cross-section, flexible plus plastic collar DIN 46228/1, further connection, max.	6 mm²

Conductors for clamping (rated connection)

Blade size	0.8 x 4.0 mm

WSI 6/2/LD 10-36V DC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		

Clamping range, max.	10 mm²
Clamping range, min.	0.5 mm²
Clamping screw	M 3.5
Connection cross-section, stranded, max.	10 mm²
Connection cross-section, stranded, min.	1.5 mm²
Connection direction	on side
Gauge to IEC 60947-1	A5
Number of connections	2
Stripping length	12 mm
Tightening torque, max.	1.6 Nm
Tightening torque, min.	0.8 Nm
Torque level with DMS electric screwdriver	3
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 8
Wire connection cross section AWG, min.	AWG 20
Wire connection cross section, finely stranded, max.	10 mm²
Wire connection cross section, finely stranded, min.	0.5 mm²

WSI 6/2/LD 10-36V DC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	10 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

Display element

Operating voltage for display, max.	36 V	Operating voltage for display, min.	10 V
Type of voltage for indicator	AC/DC		

Fuse terminals

Cartridge fuse	G-Si. 1 x 1/4	Display	Red LED
Fuse holder (cartridge holder)	Pivoting	Operating voltage, max.	36 V
Type of voltage for indicator	AC/DC		

General

Rail	TS 35	Standards	IEC 60947-7-3
Wire connection cross section AWG, max.	AWG 8	Wire connection cross section AWG, min.	AWG 20

Rating data

Rated cross-section	6 mm²	Rated voltage	36 V
Rated voltage to adjoining terminal	500 V	Rated current	6.3 A
Current at maximum wires	6.3 A	Standards	IEC 60947-7-3
Volume resistance according to IEC 60947-7-x	0.78 mΩ	Rated impulse withstand voltage	6 kV
Power loss in accordance with IEC 60947-7-x	1.31 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	8 AWG
Conductor size Factory wiring min. (UR)	22 AWG	Conductor size Field wiring max. (UR)	8 AWG
Conductor size Field wiring min. (UR)	22 AWG		

Classifications

ETIM 6.0	EC000899	ETIM 7.0	EC000899
ETIM 8.0	EC000899	ECLASS 9.0	27-14-11-16
ECLASS 9.1	27-14-11-16	ECLASS 10.0	27-14-11-16
ECLASS 11.0	27-14-11-16		

WSI 6/2/LD 10-36V DC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Approvals

Approvals	
ROHS	Conform
UL File Number Search	E60693

Downloads

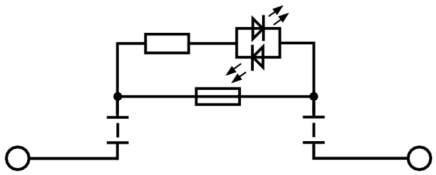
Approval/Certificate/Document of Conformity	CB Testreport CB Certificate EAC certificate DNVGL certificate Lloyds Register Certificate MARITREG Certificate CE Declaration of Conformity CE Declaration of Conformity all terminals
Engineering Data	CAD data – STEP
Engineering Data	EPLAN, WSCAD, Zuken E3.S
User Documentation	Beipackzettel_SAKS_GL_LD.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

WSI 6/2/LD 10-36V DC/AC

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Drawings



Technical Data **2543**

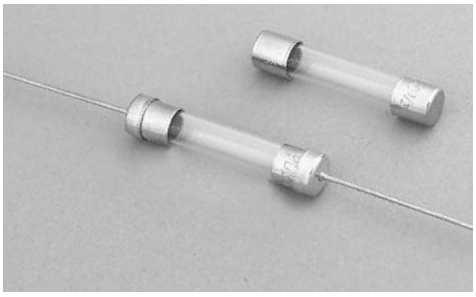
Effective May 2017
Supersedes November 2016

BUSSMANN SERIES

AGC

1/4" x 1 1/4" Fast-acting glass tube fuses

RoHS



Agency information

- UL Listed Card: AGC 1/20-10
- UL Recognition Card: AGC 11-40
- CSA Component Acceptance Card (Class No. 1422 30)
- CSA Certification Card (Class No. 1422 01)

Environmental data

- Shock: 1/20 - 3/4A – MIL-STD-202, Method 213, Test Condition I; 1 - 30A –MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/20 - 30A – MIL-STD-202,Method 204, Test Condition A (Except 5g, 500Hz)

Product features

- Fast-acting
- Optional axial leads available
- 1/4" x 1 1/4" (6.3 x 32mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

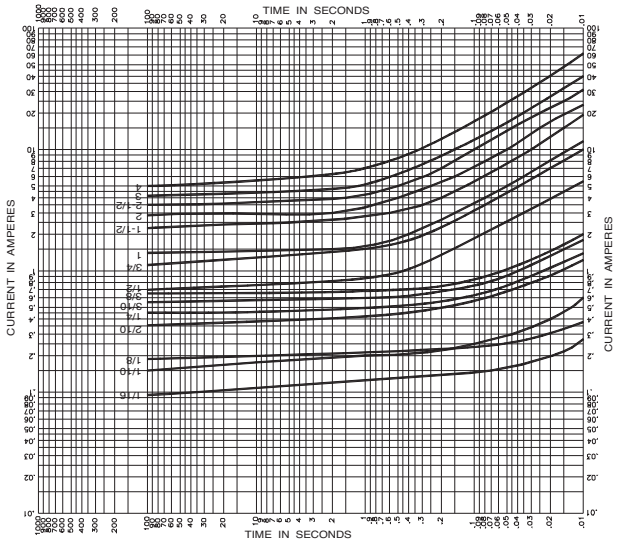
Ordering

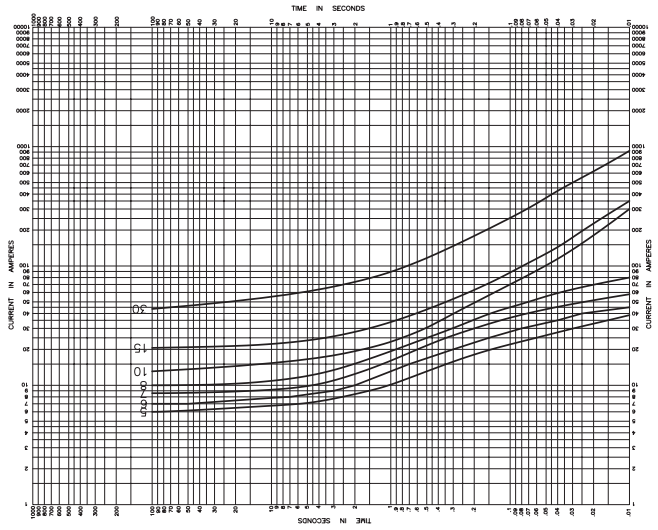
- Specify packaging code prefix, part number and option code suffix (if applicable)

		SPECIFICATIONS					
		AC Interrupting Rating (amps)			Typical DC Cold	Typical Melting	Typical Voltage
Part Number	AC Voltage Rating	250	125	32	Resistance* (Ω)	$I^2t^{\dagger}$ AC	Drop‡
AGC- 1/20-R	250	35	10,000	—	4.500	0.00773	0.67
AGC- 1/10-R	250	35	10,000	—	12.565	0.000787	6.00
AGC- 1/8-R	250	35	10,000	—	6.800	0.00131	4.67
AGC- 3/16-R	250	35	10,000	—	4.900	0.00637	4.12
AGC- 2/10-R	250	35	10,000	—	3.360	0.00435	4.51
AGC- 1/4-R	250	35	10,000	—	2.300	0.0148	0.89
AGC- 3/10-R	250	35	10,000	—	1.670	0.0208	2.88
AGC- 3/8-R	250	35	10,000	—	1.203	0.0321	4.59
AGC- 1/2-R	250	35	10,000	—	0.615	0.269	0.59
AGC- 3/4-R	250	35	10,000	—	0.312	0.815	0.37
AGC-1-R	250	35	10,000	—	0.190	1.615	0.31
AGC-1- 1/4-R	250	100	10,000	—	0.145	0.018	0.35
AGC-1- 1/2-R	250	100	10,000	—	0.115	0.0149	0.27
AGC-2-R	250	100	10,000	—	0.078	0.00509	0.28
AGC-2- 1/4-R	250	100	10,000	—	0.067	0.00588	0.26
AGC-2- 1/2-R	250	100	10,000	—	0.057	0.00879	0.31
AGC-3-R	250	100	10,000	—	0.045	0.0167	0.25
AGC-4-R	250	200	10,000	—	0.030	0.0305	0.22
AGC-5-R	250	200	10,000	—	0.024	0.045	0.23
AGC-6-R	250	200	10,000	—	0.020	0.071	0.23
AGC-7-R	250	200	10,000	—	0.017	0.105	0.23
AGC-7- 1/2-R	250	200	10,000	—	0.0146	—	—
AGC-8-R	250	200	10,000	—	0.014	0.152	0.19
AGC-9-R	250	200	10,000	—	0.012	0.21	0.18
AGC-10-R	250	200	10,000	—	0.008	0.492	0.20
AGC-12-R	32	—	—	1000	0.0070	—	—
AGC-14-R	32	—	—	1000	0.0062	—	—
AGC-15-R	32	—	—	1000	0.006	0.566	0.14
AGC-20-R	32	—	—	1000	0.004	1.438	0.12
AGC-25-R	32	—	—	1000	0.003	2.109	0.11
AGC-30-R	32	—	—	1000	0.002	3.807	0.12
AGC-35-R	32	—	—	1000	0.0014	—	—
AGC-40-R	32	—	—	1000	0.0019	—	—

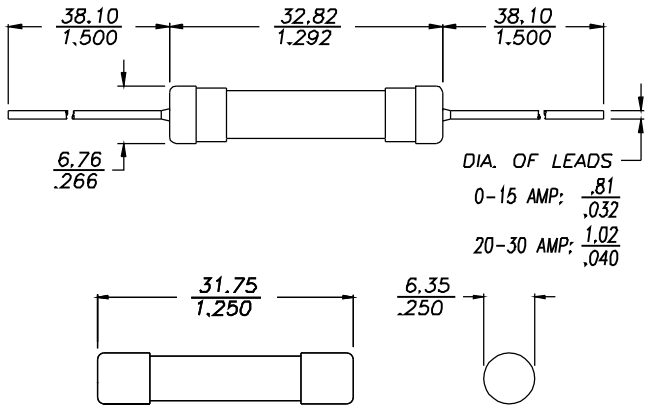
* DC Cold Resistance (Measured at ≤10% of rated current)
† Typical Melting I^2t (A^2Sec) (I^2t was measured at listed interrupting rating and rated voltage.)
‡ Typical Voltage Drop (Voltage drop was measured at 25°C ambient temperature at rated current)

Time-Current Curves





Dimensions - mm/in



Packaging Code Prefix	
Code	Description
BK	100 pieces of fuses packed into a cardboard carton with flaps folded
BK1	1000 pieces of fuses packed into a cardboard carton with flaps folded
Option Code Suffix	
Code	Description
B	Board Washable - Hermetically sealed to withstand aqueous cleaning
V	Axial leads - copper tinned wire with nickel-plated brass overcaps
-R	RoHS Compliant

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
www.eaton.com/electronics

Printed in USA
Publication No. 2543
May 2017

Powering Business Worldwide

Field Equipment

Overview

EchoMax XPS transducers use ultrasonic technology to measure level in a wide range of liquids and solids.

Benefits

- Integral temperature compensation
- Low ringing effect reduces blanking distance
- Optional foam facing for dusty applications
- Self-cleaning and low-maintenance
- Chemically resistant
- Hermetically sealed

Application

XPS transducers can be fully immersed, are resistant to steam and corrosive chemicals, and can be installed without flanges.

The XPS series offers versions for various measuring ranges up to 30 m (100 ft) and up to a max. temperature of 95 °C (203 °F).

During operation, the EchoMax transducers emit acoustic pulses in a narrow beam. The level monitor measures the propagation time between pulse emission and its reflection (echo) to calculate the distance.

Technical specifications

Input	XPS-10	XPS-15 (standard and F models)	XPS-30
Measuring range[1]	0.3 ... 10 m (1 ... 33 ft)	Standard: 0.3 ... 15 m (1 ... 50 ft) XPS-15F: 0.45 ... 15 m (1.5 ... 50 ft)	0.6 ... 30 m (2 ... 100 ft)
Output			
Frequency	44 kHz	44 kHz	30 kHz
Beam angle	12°	6°	6°
Environmental			
Location	Indoors/outdoors		
Ambient temperature	-40 ... +95 °C (-40 ... +203 °F)	Standard: -40 ... +95 °C (-40 ... +203 °F) XPS-15F: -20 ... +95 °C (-4 ... +203 °F)	-40 ... +95 °C (-40 ... +203 °F)
Storage temperature	-40 ... +95 °C (-40 ... +203 °F)	Standard: -40 ... +95 °C (-40 ... +203 °F) XPS-15F: -20 ... +95 °C (-4 ... +203 °F)	-40 ... +95 °C (-40 ... +203 °F)
Pollution degree	4		
Pressure	8 bar g (120 psi g) Flanged: 0.5 bar g (7.25 psi g)	8 bar g (120 psi g) Flanged: 0.5 bar g (7.25 psi g)	0.5 bar g (7.25 psi g) Flanged: 0.5 bar g (7.25 psi g)
Design			
Weight	0.8 kg (1.8 lb)	1.3 kg (2.8 lb) Flanged: 2 kg (4.4 lb)	4.3 kg (9.5 lb)
Power supply	Operation of transducer only with approved Siemens controllers		
Material	Standard: PVDF Flanged: PVDF with CPVC flange Option: PTFE face with CPVC flange	Standard: PVDF Flanged: PVDF with CPVC flange Option: PTFE face with CPVC flange	Standard: PVDF Flanged: PVDF with CPVC flange Option: PTFE face with CPVC flange
Color	Blue	Standard: Blue XPS-15F: Gray	Blue
Process connection	1" NPT or 1" BSPT	Standard: 1" NPT or 1" BSPT XPS-15F: 1" NPT	1.5" universal thread (NPT or BSPT)
Degree of protection	IP66/68	IP66/68	IP66/68
Cable	2-wire twisted pair/braided and foil shielded 0.5 mm^2 (20 AWG) PVC jacket		
Separation	Max. 365 m (1 200 ft)		
Certificates and approvals	Standard: CE, CSA, FM, ATEX, IECEx	Standard: CE, CSA, FM, ATEX, IECEx XPS-15F: FM Class I, Div. 1, Groups A, B, C, and D, Class II Div. 1, Groups E, F, and G, Class III	CE, CSA, FM, ATEX, IECEx

[1] Max range is rated for measurement of liquids, recommended range for solids is 50 % of maximum. Application conditions such as extreme dust or angle of repose may reduce the usable maximum range. Consult a local sales person for more details.

EchoMax XPS

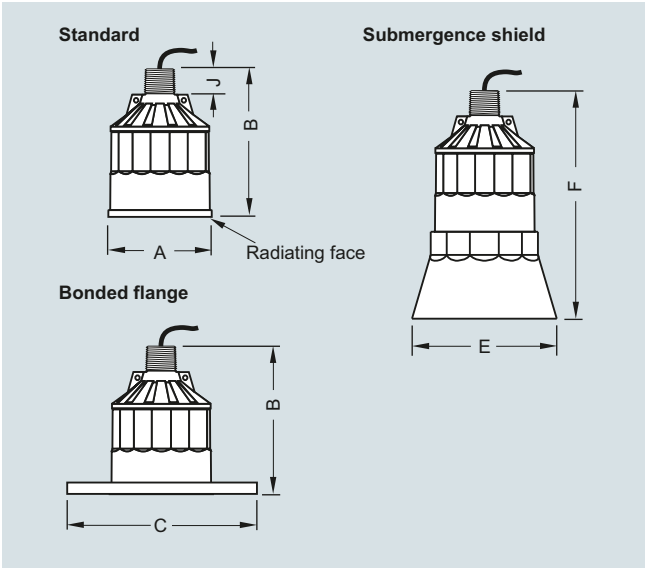
Selection and ordering data

	Article No.
EchoMax XPS-15F Ultrasonic level transducer ↗	**7ML1171-**
Continuous, non-contact, 15 m (49.21 ft), for liquids and solids.	**0**
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Mounting thread and facing	
1" NPT [(Taper), ANSI/ASME B1.20.1]	**1**
Cable length	
5 m (16.40 ft)	**B**
10 m (32.81 ft)	**C**
30 m (98.43 ft)	**D**
50 m (164.04 ft)	**E**
100 m (328.08 ft)	**F**
Mounting flange, flush mount	
None	**A**
6" ASME, 150 lb, flat faced	**B**
8" ASME, 150 lb, flat faced (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)	**C**
Approvals	
FM Class I, Div. 1, Groups A, B, C, and D, Class II Div. 1, Groups E, F, and G, Class III	**1**

	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring point number/ identification (max. 27 characters) specify in plain text	**Y15**
Operating Instructions	
All literature is available to download for free, in a range of languages, at	
http://www.siemens.com/processinstrumentation/documentation	

Accessories	Article No.
Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch), one text line for fastening on sensors	**7ML1930-1BJ**
Submergence shield kit	**7ML1830-1BJ**
Universal box bracket, mounting kit	**7ML1830-1BK**
Channel bracket, wall mount	**7ML1830-1BL**
Extended channel bracket, wall mount	**7ML1830-1BM**
Channel bracket, floor mount	**7ML1830-1BN**
Extended channel bracket, floor mount	**7ML1830-1BP**
Bridge channel bracket, floor mount (see Mounting Brackets on page 4/186 for more information)	**7ML1830-1BQ**
1" NPT locknut, plastic	**7ML1830-1DS**
Easy Aimer 2, aluminum, NPT with ¾" x 1" PVC coupling	**7ML1830-1AQ**
Easy Aimer 304, NPT with 1" stainless steel coupling	**7ML1830-1AU**

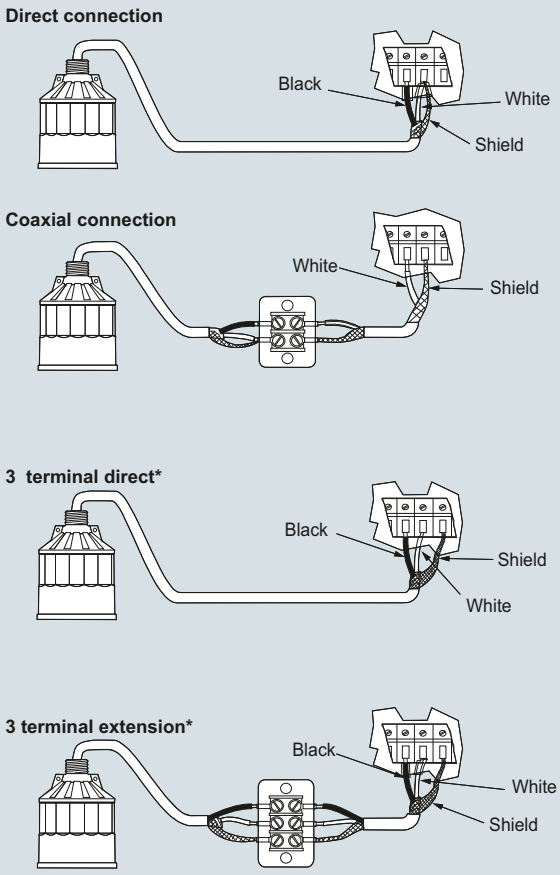
Dimensional drawings



XPS ultrasonic transducer

Version			
Dimension	**XPS-10**	**XPS-15**	**XPS-30**
A	88 mm (3.464 inch)	121 mm (4.764 inch)	175 mm (6.890 inch)
B	122 mm (4.803 inch)	132 mm (5.197 inch)	198 mm (7.795 inch)
C	According to ASME, DIN, and JIS		
E	124 mm (4.882 inch)	158 mm (6.220 inch)	n/a
F	152 mm (5.984 inch)	198 mm (7.795 inch)	n/a
J	28 mm (1.1 inch)	28 mm (1.1 inch)	28 mm (1.1 inch)

Circuit diagrams



* For SITRANS LUT400, MultiRanger 100/200, HydroRanger 200

Mounting
Make particularly sure that the radiating face of the transducer is protected from damage. Mount the transducer so that it is above the maximum material level by at least the blanking value. On liquid applications, the transducer must be mounted so that the axis of transmission is perpendicular to the liquid surface. On solids applications, an Easy Aimer should be used to facilitate aiming the transducer. Consider the optional temperature sensor when mounting the transducer.

Interconnection
Do not route cable openly or near high voltage or current runs, contactors and SCR control drives. For optimum isolation against electrical noise, run cable separately in a grounded metal conduit. Seal all thread connections to prevent ingress of moisture.

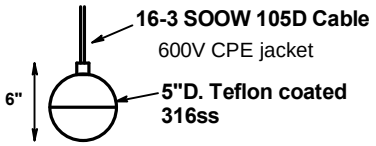
XPS ultrasonic transducer connections

GENERAL DESCRIPTION

The Roto-Float SSTNM is a non-mercury, direct acting float switch. Each float contains a single pole, single throw reed switch which changes state at +30 from horizontal and -30 from horizontal. The float housing is 5" in diameter, made of 316 stainless steel and Teflon coated for preventing grease and debris from collecting on the float. Extra-hard usage electrical cable is used to electrically connect the switch back to the control panel. The cable and switch are epoxy encapsulated in the float housing potting tube, forming a watertight, impact resistant unit. The Roto-Float SSTNM **Type P** is equipped with a stainless steel bracket for attachment to a 1" pipe, (by others). The **Type W** mounting style is equipped with a stainless steel bracket and clip assembly that secures the float to a WRW wire rope kit. The **Type S** suspended has an external lead weight attached to the cable and is suspended fro above on the floats own cable.

Applications

The Roto-Float SSTNM was designed primarily for controlling pumps in wastewater applications for turning pumps on and off in emptying or filling situations; signal alarm levels, and other application where liquid levels need to be automatically monitored. Its use may be suitable in other liquids, as well.



Specification Information

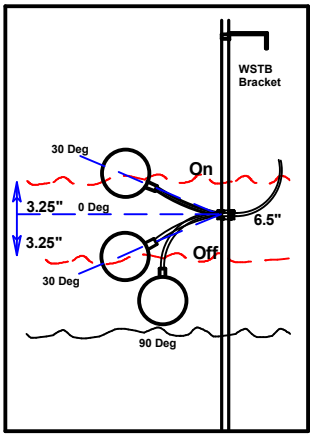
Electrical Rating: 1A @ 120Vac; reed switch
Temp. Limit: 110F
Circuit Configuration: NO, *normally open
NC, *normally closed
This switch is compatible with intrinsically safe circuits. The switch neither stores nor generates an electrical charge.

Mounting Styles:
Type P- Pipe mounted for 1" pipe
Type W- Wire rope mounted, (use w. WRW Kit)
Type S- Suspended, external weight on cable

Mounting Style	Cable Length	*Switch Configuration	*Model No.	Wgt
Type P	20	NO	P20NO-SSTNM	3.4
Type P	30	NO	P30NO-SSTNM	4.3
Type P	40	NO	P40NO-SSTNM	5.2
Type W	20	NO	W20NO-SSTNM	3.2
Type W	30	NO	W30NO-SSTNM	4.1
Type W	40	NO	W40NO-SSTNM	5.0
Type S	20	NO	S20NO-SSTNM	7.2
Type S	30	NO	S30NO-SSTNM	8.1
Type S	40	NO	S40NO-SSTNM	9.0

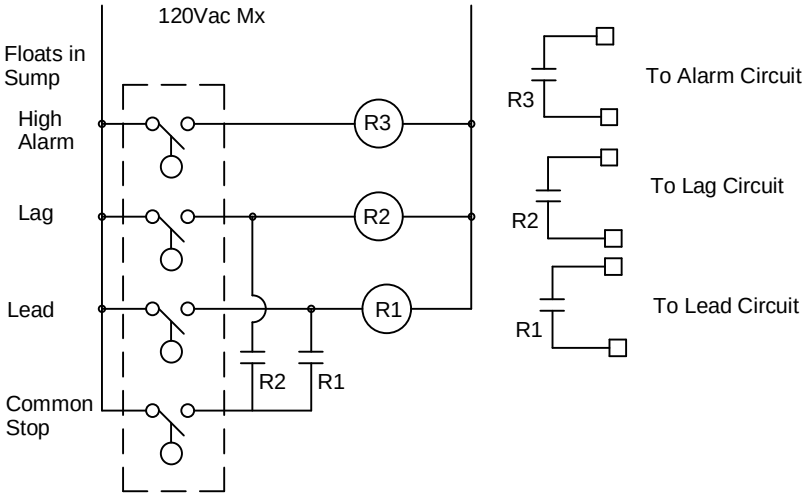
*Normal is defined as state of switch with no liquid present.

*Change 'NO' to 'NC' for normally closed floats. Longer lengths are available.



Normally Open Type P SSTNM
Switch Status vs. Liquid Level

Nominal Duplex Circuit (Reference Only!)



Submitted_____

Approved_____

Important Information:

The green wire should always be properly grounded, per NEC. Use this product in accordance with the NEC, local codes, and the authority having jurisdiction. Roto-Float SSTNM is suitable for use with intrinsically safe circuits.

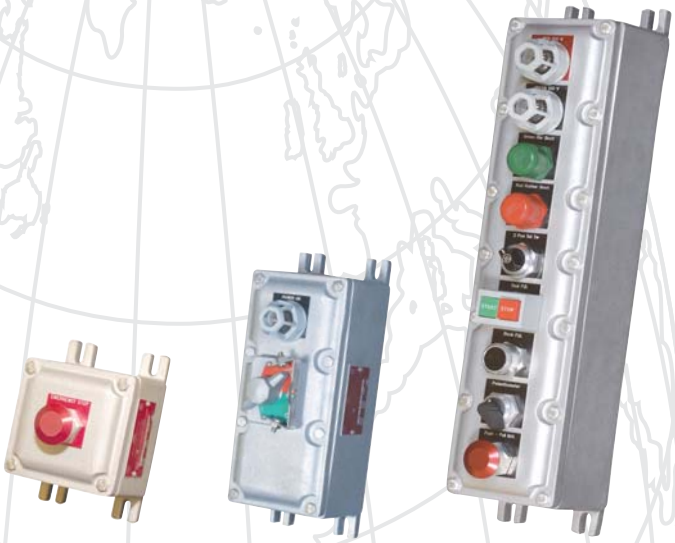
Do not use Roto-Float SSTNM in gasoline or other volatiles and combustibles. Check with the factory for exotic applications.

anchor scientific, inc.
Box 378
Long Lake, MN 55356 Ph: 952-473-7115

Drwn	Date	Roto-Float SSTNM
j.p.	3/11/11	
		Rev.
		DWG. SSTNM-BS1

Local Control Station

Explosion-Proof Control Stations
"CXI" Series



"When a smaller enclosure is needed for industrial controls, our CXI Series cannot be beat."

Features:

All enclosures are available in NEMA 4X with neoprene gasket for water tight applications.

All enclosures are suitable for surface or panel mounting.

Cast from light - weight corrosion resistant aluminum

Attractive wheelabrate finish

Durable cast mounting feet and easily accessible grounding screw.

Expanded internal space for splicing or terminal blocks.

Available to use with Mini Pilot Device Series (1" center to center)

Ordering Instructions:

All "CXI" enclosures are machined with operator (3/4" NPSM in cover) and standard conduit holes as specified in chart. (Consult factory for custom specifications).

To order NEMA-4 gasket, add suffix "N4" to part number (CXI 333-X1-N4). For Panel Mount Applications (3/4" NPSM in base instead of cover), use prefix "CXP" instead of "CXI" (CXP 333-X1).

To order Junction Box type enclosures, order "AXI" Series Enclosures.

Spacing constraints may apply when using some operator types (Mushroom Head P.B., Illum. P.B., Push to Test P.L., etc.); C/F

Consult factory for terminal installation or custom layouts.

See "order form page" on additional information to customize this enclosure.

Applications:

Locations such as Waste Water Treatment Plant (WWTP), Processing Facilities (Oil, Gas, etc.), Refineries, & Chemical Plants explosion

CXI series can be used for Control Stations, Manual Motor Starters, or Pendant Stations

Try our spacious CXI 484 when Group B is required

Materials:

Enclosures: Copper-free Aluminum (less than 0.25% copper content)

Cover Bolts: Cad-Plated or Stainless Steel (please specify)

Mounting Pan (Opt.): Aluminum*;

Galvanized Steel or Phenolic Materials available upon request.

*Note: Aluminum Mounting Pan will be provided if mounting pan is requested, unless otherwise noted.

Compliances:

N.E.C. - Class. I, Div. 1 & 2 Groups B*, C & D

Class. II, Div. 1 & 2 Groups E, F & G

Class. III

NEMA 7 & 9 (Optional 3, 4X)

* - CXI 484 Only

Certificate Number 03.059.1

ISO 9001 With Design

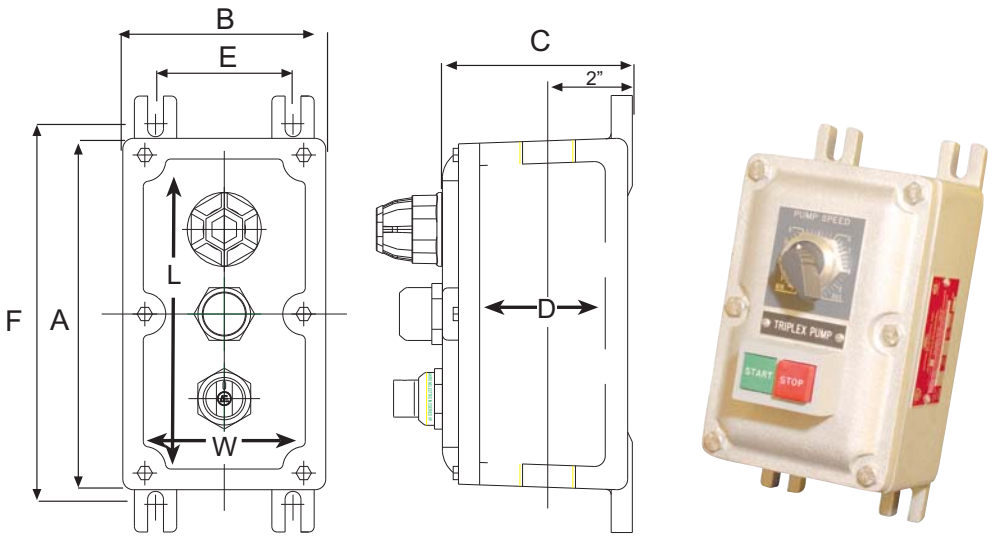
Approvals:

UL CLASSIFIED - Standard 886 - E94590

cUL (CXI 4 & 6) - Standard C22.2 No. 30-M1986 and No. 25-1966

CSA Certified (CXI 3) - Standard C22.2 No. LR64264

1025 Eagon Street Barberton, Ohio 44203 Ph: 330-745-8891 Fax: 330-745-2504
www.AkronElectric.Com E-Mail: Sales@AkronElectric.Com



CXI Dimensions

Catalog Number	Nominal Inside Dimensions W	L	D	Dimensions In Inches A	B	C	F	E	Est. Lbs.	Std. Conduit Size	Mtg. Bolt Size
CXI 333-X1	3-1/2	3-1/2	3	4-9/16	4-9/16	4-1/2	5-1/2	3-1/4	5	3/4"	1/4"
CXI 363-X2	3-1/2	6	3	7-1/16	4-9/16	4-1/2	8	3-1/4	6	3/4"	1/4"
CXI 373-X3	3-1/2	7	3	8-1/16	4-9/16	4-1/2	9	3-1/4	7	3/4"	1/4"
CXI 393-X4	3-1/2	9	3	10-1/16	4-9/16	4-1/2	11	3-1/4	8	1"	1/4"
CXI 3113-X5	3-1/2	11	3	12-1/16	4-9/16	4-1/2	13	3-1/4	10	1-1/4"	1/4"
CXI 3133-X6	3-1/2	13	3	14-1/16	4-9/16	4-1/2	15	3-1/4	11	1-1/4"	1/4"
CXI 3153-X7	3-1/2	15	3	16-1/16	4-9/16	4-1/2	17	3-1/4	12	1-1/4"	1/4"
CXI 3183-X8/X9	3-1/2	18	3	19-1/16	4-9/16	4-1/2	20	3-1/4	14	1-1/4"	1/4"

CXI Dimensions

Catalog Number	Nominal Inside Dimensions W	L	D	Dimensions In Inches A	B	C	F	E	Est. Lbs.	Max. Conduit Size	Mtg. Bolt Size
CXI 484	4-1/4	8	4	10-29/64	6-45/64	5-5/8	11-1/2	5-1/4	19	2"	1/4"
CXI 6104	6-1/2	10	4	11-1/16	7-9/16	6-1/8	11-27/32	6-1/4	21	2"	1/4"
CXI 6174	6-1/2	17	4	18-5/16	7-13/16	6-1/8	18-3/4	6-1/4	33	2"	1/4"
CXI 6244	6-1/2	24	4	25-13/16	7-13/16	6-1/8	26-1/4	6-1/4	45	2"	1/4"
CXI 6304	6-1/2	30	4	31-13/16	7-13/16	6-1/8	32-1/4	6-1/4	56	2"	1/4"

Note: All dimensions are for reference only

CXI SUFFIX	Number of Operators (Vert.)
X1	1
X2	2
X3	3
X4	4
X5	5
X6	6
X7	7
X8/X9	8/9

Note:

Each CXI Enclosure includes the appropriate number of operator holes as specified in the table to the left

By adding the suffixes (X1, X2, X3, etc.), one standard conduit size NPT hole will be placed at both the top and bottom of the enclosure along with the respective NPSM entries

If these specifications are not desired, please use simply the CXI number with the desired modifications listed underneath as shown on the "AKRON Easy Catalog Ordering Information" on Page 22.

TABLE III - OPTIONAL MODIFICATIONS

BD= Breather or Drain with 1/2" NPT (please specify)
2BD=Breather & Drain
C1= Circuit Breaker Handle, 100 AMP - installed
C2= Circuit Breaker Handle, 225 AMP - installed
C4= Circuit Breaker Handle, 600 AMP - installed
C5= Circuit Breaker Handle, 800 AMP - installed
C8= Circuit Breaker Handle, Custom - installed
C10= Panel Board Breaker Handle
CEN= Cenelec (ATEX) Option
E1= Corrosion-Resistant Epoxy Paint (Outside only)
E2= Corrosion-Resistant Epoxy Paint (Inside & Outside)
E3= Stainless Steel (316) Triple Lead Captive Quick Thread Cover Bolts
E4= Stainless Steel Mounting Hardware (Internal Hardware)
E5= Corrosion-Resistant Epoxy Paint (Inside Only)
E8= Custom Mounting Bracket (For meter, etc.)
E9= Clear Anodizing
G1= 1" Diameter Round Window Glass (Installed)
G2= 2" Diameter Round Window Glass (Installed)
G3= 3" Diameter Round Window Glass (Installed)
G4= 4" Diameter Round Window Glass (Installed)
G5= 5-1/4" Diameter Round Window Glass (Installed)
G6= 6-3/4" Diameter Round Window Glass (Installed)
G7= 7-5/8" Diameter Round Window Glass (Installed)
G8= Custom Square or Rectangular Window Glass (Installed / Specify)
H1= Stainless Steel Hinge Kit (for AXJ12126 and smaller)
HC1= Aluminum Cast Hinge Kit (for AXJ12126 and smaller)
H2= Medium Duty Cast Aluminum Hinge Kit (for CXJ12184 to CXJ18308)
H3= Heavy Duty Cast Aluminum Hinge Kit (for CXJ18368 to CXJ346810)
HL*= Hinge Lifter Guide Pin
K+= Terminal Block (Specify Qty.)
MS= Standard XJIH Mounting Strap
MSR= Raised XJIH Mounting Strap
MSD= Diamond Shaped XJIH Mounting Strap
N1= Aluminum Mounting Panel
N2= Galvanized Mounting Panel
N3= Phenolic Mounting Panel
N4= NEMA 4 O-ring Gasket
N5= Stainless Steel Rust Proof Cover Bolts
N6= Metallic Legend Plates
JN6= Jumbo Metallic Legend Plates
MN6= Mini Metallic Legend Plates
N7= Phenolic Legend Plates
N8= Custom Legend Plates
R3 = 3/4" NPSM Close-Up Plug
RP1= 1/2" NPT Conduit Entry Close-Up Plug
RP2= 3/4" NPT Conduit Entry Close-Up Plug
RP3= 1" NPT Conduit Entry Close-Up Plug
RP4= 1-1/4" NPT Conduit Entry Close-Up Plug
RP5= 1-1/2" NPT Conduit Entry Close-Up Plug
RP6= 2" NPT Conduit Entry Close-Up Plug
RP7= 2-1/2" NPT Conduit Entry Close-Up Plug
RP8= 3" NPT Conduit Entry Close-Up Plug
RP9= 3-1/2" NPT Conduit Entry Close-Up Plug
RP10= 4" NPT Conduit Entry Close-Up Plug

* - HL is suggested for enclosures with 30" of length, or when hinges are installed on the short side of the enclosure.

TABLE IV - CONDUIT SPACING

Outlet Code		MINIMUM CENTER TO CENTER CONDUIT SEPARATIONS INCHES (mm)									
		4 (M90)	3-1/2 (M85)	3 (M80)	2-1/2 (M75)	2 (M63)	1-1/2 (M50)	1-1/4 (M40)	1 (M32)	3/4 (M25)	1/2 (M20)
1	1/2	3-5/8 (92.08)	3-3/8 (85.73)	3 (76.2)	2-5/8 (66.68)	2-3/8 (60.33)	2 (50.8)	2 (50.8)	1-3/4 (44.45)	1-5/8 (41.28)	1-1/2 (38.1)
2	3/4	3-3/4 (95.25)	3-1/2 (88.9)	3-1/8 (79.38)	2-3/4 (69.85)	2-1/2 (63.5)	2-1/8 (53.98)	2-1/8 (53.98)	1-7/8 (47.63)	1-3/4 (44.45)	
3	1	4 (101.6)	3-5/8 (92.08)	3-1/4 (82.55)	3 (76.2)	2-5/8 (66.68)	2-3/8 (60.33)	2-3/8 (60.33)	2 (50.8)		
4	1-1/4	4-1/4 (107.95)	4 (101.6)	3-5/8 (92.08)	3-1/4 (82.55)	3 (76.2)	2-5/8 (66.68)	2-5/8 (66.68)			
5	1-1/2	4-1/4 (107.95)	4 (101.6)	3-5/8 (92.08)	3-1/4 (82.55)	3 (76.2)	2-5/8 (66.68)				
6	2	4-5/8 (117.48)	4-1/4 (107.95)	3-7/8 (98.43)	3-5/8 (92.08)	3-1/4 (82.55)					
7	2-1/2	4-7/8 (123.83)	4-5/8 (117.48)	4-1/4 (107.95)	3-7/8 (98.43)						
8	3	5-3/8 (136.53)	5 (127)	4-5/8 (117.48)							
9	3-1/2	5-5/8 (142.88)	5-1/4 (133.35)								
10	4	5-7/8 (149.23)									

* If seals are used, extra clearance may be required. Check dimensions of seals and fittings to determine required spacing. Consult factory for assistance.

Size	Pitch	Trade Size of Conduit (NPT)	Threads Per Inches	Minimum Wall Thickness (Inches)
M50	1.5, 2	1/2 - 3/4	14	.357
M80	2	1 - 2	11-1/2	.435
M90	2	2-1/2 - 4	8	.625

Explosion-Proof Pilot Devices

Nema Type 4, 4X, 7 & 9

Pilot Lights
- Pigtail
- Saddle Clamp
- Transformer
- Illuminated P.B.
- Push-To-Test
- Mini

Push Buttons
- Flush
- Extended
- Dual
- Mushroom Head
- Mini
- Maintained

Potentiometers
- 1k, 2k, 5k & 10k Ohms

Reset Push Buttons
- Standard
- Mini

Selector Switches
- 2-Position
- 2-Position Keyed
- 3-Position
- 3-Position Keyed
- Mini - Consult Factory

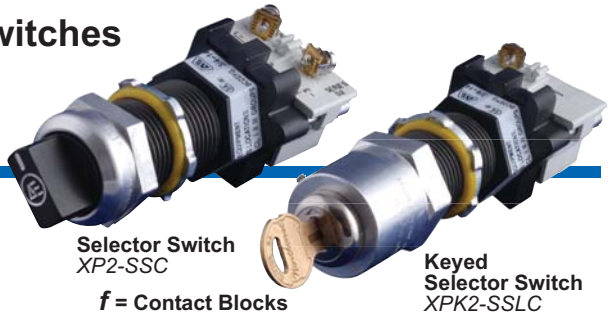
ATEX 100a Directive 94/9/EC

Consult factory to confirm certifications for complete product line

Specifications / XM & XP Series North American
- -25°C to +40°C Ambient
- NEMA 4X
- 3/4-14 npsm thread - standard series (XP-type)
- 3/8-16 unc thread - mini series (XM type)

XM (Mini) & XP (-CEN) Cenelec Series
- Ⓔx II 2 G Ex d IIB + H2
- Ⓔx II 2 D
- -55°C to +100°C Ambient
- IP66 when installed in an IP66 rated enclosure
- DEMKO 06 ATEX 0605697U
- Directive 94/9/EC
- "U" Component Certification
- EN 60079-0: 2004+ prAA:2005
- EN 60079-1: 2004
- EN 50281-1-1: 1998 incl. A1: 2002
- Please add "-CEN" to designate ATEX (Optional)

2 & 3 Position Selector Switches



Selector Switch
XP2-SSC

Keyed
Selector Switch
XPK2-SSLC

Specifications

XP_ 2 - S _ C C - AE1 - FS (-CEN)
a b c d e f g h

ATEX Optional

a = Switch Type

Code	Description
Blank	Standard
K	Keyed

b = Number of Positions

Code	Description
2	Two Position Switch
3	Three Position Switch

C/F for Selector Switches with greater than 3 positions

c = Sequence

Code	Description
S	Maintained
C	Return to Center
R	Return From Left
L	Return From Right

d = Barrel Type

Code	Description
S	Short Barrel
L	Long Barrel

e = Key Removal Position

Code	Description
Blank	No Key
C	Center Removal
R	Right Removal
L	Left Removal

g = Unique Key Configurations

Code	Description
AE1	Key #1
AE2	Key #2
AE3	Key #3

Part # XP3-LSC and XP3-SSD

f = Contact Blocks

Code	Description
Blank	No Contacts
A	1 N.O.
B	1 N.C.
2A	2 N.O.
2B	2 N.C.
C	1 N.O. / 1 N.C.
*D	2 N.O. / 2 N.C.
E	1 N.C.L.B.
F	1 N.O.E.M.
2E	2 N.C.L.B.
2F	2 N.O.E.M.
*G	1 N.O. / 1 N.C.L.B.
*H	1 N.C. / 1 N.C.L.B.
*J	3 N.O. / 3 N.C.
*K	4 N.O. / 4 N.C.
L	N.O.E.M.-N.C.
M	N.O.E.M.-N.O.
N	N.C.L.B.-N.O.E.M.
P	2 N.O. / 2 N.C. (300V)

h = Accessory

Code	Description
-FS	Finger Safe Options

N4= NEMA 4 locking collar is standard on all Akron Electric operators

3/4"-14 NPSM standard thread

CONTACT ABBREVIATION
N.O.= Normally Open
N.C.= Normally Closed
N.C.L.B.= Normally Closed- Late Break
N.O.E.M.= Normally Open- Early Make

All contact blocks are rated 600V unless noted.

Consult factory for switching sequences with multiple contacts. Up to four contacts may be stacked.

See Cam Page for Reference to Switching Sequences.

Pushbuttons can also be used with Allen Bradley or C3 Controls contact blocks. (C/F)

*Denotes multiple block configuration

XP 2 & 3 Selector Switch Operators (Keyed & Non-Keyed) Dimensional Data

Dimensions (Inches [mm])

Note: All dimensions are for reference only

CLASS I, Div 1 & 2, GROUPS B, C & D;
CLASS II, Div 1 & 2, GROUPS E, F & G;
CLASS III,
NEMA TYPE 4, 4X, 7 & 9

UL 698 Industrial Control Equipment in Hazardous (Classified) Locations.

UL 1203 Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

CSA C22.2 No. 30-LR86146 Explosion-Proof Enclosures for use in Class I Hazardous locations.

FILE NO. E203605
FILE NO. E181300
FILE NO. E139669

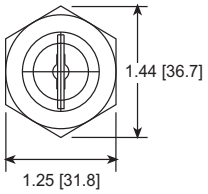
LR86146

(Optional)

FEATURES

- Operator bodies are black anodized & teflon impregnated.
- Operating Shafts are stainless steel.
- 3/4-14 NPSM threaded body size
- **Long Series:** Accommodates up to 2-1/2" thick enclosure wall thickness.
- **Short Series:** Accommodates up to 1" thick enclosure wall thickness.
- Explosion-Proof Operators are suitable for panel or surface mount applications.
- See Contact Block Information sheet for mounting and rating information.
- Selector Switches available in 2 or 3 positions (For Keyed - specify key removal position)
- Three unique key configurations available - Specify AE1, AE2, or AE3

Guard



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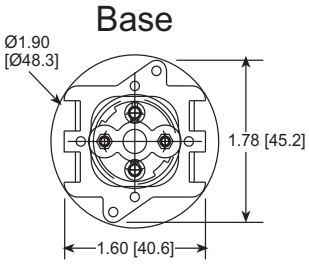
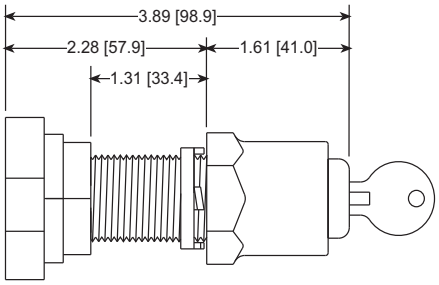
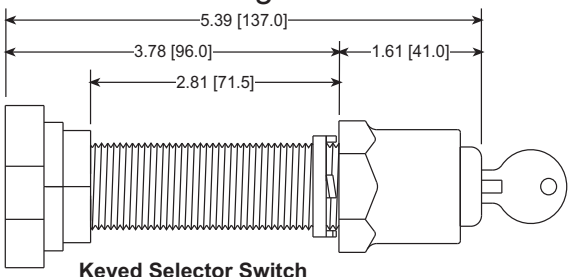


Short Barrel

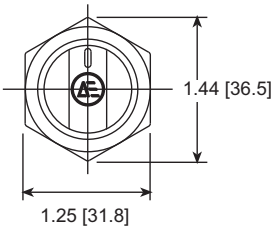


Long Barrel



Keyed Selector Switch
ex. XPK2-SSL

Guard



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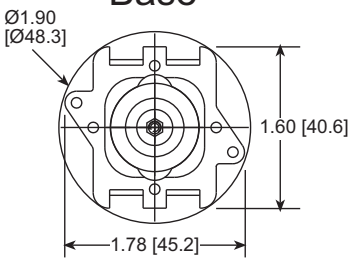
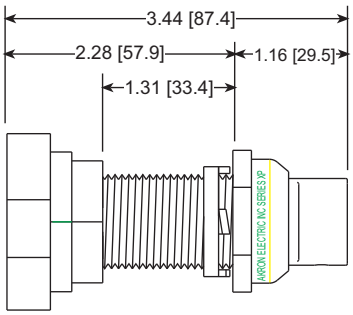
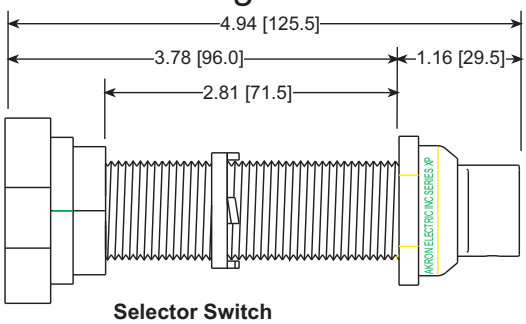


Short Barrel



Long Barrel



Selector Switch
ex. XP2-SS

1025 Eagon Street Barberton, Ohio 44203 Ph: 330-745-8891 Fax: 330-745-2504
www.AkronElectric.Com E-Mail: Sales@AkronElectric.Com

Selector Switch Contact Sequence Chart

Contact Block Switching Sequences (Standard Installation)

AE SUFFIX	CONTACT BLOCK (AE)	CONTACT BLOCK (CH)	CIRCUIT OF CONTACT BLOCK	MTG. POS.	2 POSITION	3 POSITION				
					CAM 1	CAM 2	CAM 3	CAM 4	CAM 5	CAM 6
	KNOB POSITION →				L R	L C R	L C R	L C R	L C R	L C R
"A"	2003ABB	10250T53	1 N.O.	A	O X	O O X	X O O	O X O	X X O	O X O
"B"	2003AAB	10250T51	1 N.C.	A	X O	X X O	O X X	X O X	O O X	O O X
"2A"	2003AEB	10250T2	1 N.O. 1 N.O.	A B	O X O X	O O X X O X	X O O O O X	O X O O X X	X X O X O O	O X O O O X
"2B"	2003ADB	10250T3	1 N.C. 1 N.C.	A B	X O X O	X X O O X O	O X X X X O	X O X X O O	O O X O X X	O O X X O O
"C"	2003ACB	10250T1	1 N.C. 1 N.O.	A B	X O O X	X X O X O X	O X X O O X	X O X O X X	O O X X O O	O O X O O X
"D"	(2) 2003ACB	(2) 10250T1	2 N.C. 2 N.O.	A B	X O O X	X X O X O X	O X X O O X	X O X O X X	O O X X O O	O O X O O X
"E"	2003AGB	10250T71	1 N.C.L.B	A	X O	X X O	O X X	X O X	O O X	O O X
"2E"	2003AHB	10250T45	1 N.C.L.B. 1 N.C.L.B.	A B	X O X O	X X O O X O	O X X X X O	X O X X O O	O O X O X X	O O X X O O
"J"	(3) 2003ACB	(3) 10250T1	3 N.C. 3 N.O.	A B	X O O X	X X O X O X	O X X O O X	X O X O X X	O O X X O O	O O X O O X
"K"	(4) 2003ACB	(4) 10250T1	4 N.C. 4 N.O.	A B	X O O X	X X O X O X	O X X O O X	X O X O X X	O O X X O O	O O X O O X
"L"	2003AJB	10250T47	1 E.C.N.O. 1 N.C	A B	O X X O	0 O X O X O	X O O X X O	O X O X O O	X X O O X X	X X O X O O
"M"	2003AKB	10250T57	1 E.C.N.O. 1	A B	O X O X	O O X X O X	X O O O O X	O X O O X X	X X O X O O	O X O O O X
"N"	2003ALB	10250T55	1 L.O.N.C. 1 E.C.N.O.	A B	X O O X	X X O X O X	O X X O O X	X O X O X X	O O X X O O	X O X O X X
"P"	2003AFB -RATED- -300V	10250T44 -RATED- -300V	1 N.C. 1 N.O. 1 N.C. 1 N.O.	A A B B	X O O X X O O X	X X O O O X O X O X O X	O X X X O O X X O O O X	X O X O X O X O O O X X	O O X X X O O X X X O O	O O X O X O X O O O O X

Inverted Contact Blocks (Rotated 180° from Standard)

AE SUFFIX	CONTACT BLOCK (AE)	CONTACT BLOCK (CH)	CIRCUIT OF CONTACT BLOCK	MTG. POS.	2 POSITION	3 POSITION				
					CAM 1	CAM 2	CAM 3	CAM 4	CAM 5	CAM 6
	KNOB POSITION →				L R	L C R	L C R	L C R	L C R	L C R
"A*"	2003ABB	10250T53	1 N.O.	B	O X	X O X	O O X	O X X	X O O	O O X
"B*"	2003AAB	10250T51	1 N.C.	B	X O	O X O	X X O	X O O	O X X	X O O
"E*"	2003AGB	10250T71	1 N.C.L.B	B	X O	O X O	X X O	X O O	O X X	X X O
"C*"	2003ACB	10250T1	1 N.O. 1 N.C.	A B	O X X O	O O X O X O	X O O X X O	O X O X O O	X X O O X X	O X O X O O
"D*"	(2) 2003ACB	(2) 10250T1	2 N.O. 2 N.C.	A B	O X X O	O O X O X O	X O O X X O	O X O X O O	X X O O X X	O X O X O O
"J*"	(3) 2003ACB	(3) 10250T1	3 N.O. 3 N.C.	A B	O X X O	O O X O X O	X O O X X O	O X O X O O	X X O O X X	O X O X O O
"K*"	(4) 2003ACB	(4) 10250T1	4 N.O. 4 N.C.	A B	O X X O	O O X O X O	X O O X X O	O X O X O O	X X O O X X	O X O X O O
"L*"	2003AJB	10250T47	1 L.O.N.C. 1 E.C.N.O.	A B	X O O X	X X O X O X	X O O X X O	O X O X O O	X X O O X X	O X O X O O
"M*"	2003AKB	10250T57	1 N.O. 1 E.C.N.O.	A B	O X O X	O O X X O X	X O O O O X	O X O O X X	X X O X O O	O X O O X X
"N*"	2003ALB	10250T55	1 E.C.N.O. 1 L.O.N.C.	A B	O X X O	O O X O X O	X O O X X O	O X O X O O	X X O O X X	X X O X X O

Note: Please consult our Engineering Department for assistance with the interpretation of this chart

Explosion-Proof Pilot Devices

Nema Type 4, 4X, 7 & 9

Pilot Lights
- Pigtail
- Saddle Clamp
- Transformer
- Illuminated P.B.
- Push-To-Test
- Mini

Push Buttons
- Flush
- Extended
- Dual
- Mushroom Head
- Mini
- Maintained

Potentiometers
- 1k, 2k, 5k & 10k Ohms

Reset Push Buttons
- Standard
- Mini

Selector Switches
- 2-Position
- 2-Position Keyed
- 3-Position
- 3-Position Keyed
- Mini - Consult Factory

ATEX 100a Directive 94/9/EC

Consult factory to confirm certifications for complete product line

Specifications / XM & XP Series North American
- -25°C to +40°C Ambient
- NEMA 4X
- 3/4-14 npsm thread - standard series (XP-type)
- 3/8-16 unc thread - mini series (XM type)

XM (Mini) & XP (-CEN) Cenelec Series
- Ex II 2 G Ex d IIB + H2
- Ex II 2 D
- -55°C to +100°C Ambient
- IP66 when installed in an IP66 rated enclosure
- DEMKO 06 ATEX 0605697U
- Directive 94/9/EC
- "U" Component Certification
- EN 60079-0: 2004+ prAA:2005
- EN 60079-1: 2004
- EN 50281-1-1: 1998 incl. A1: 2002
- Please add "-CEN" to designate ATEX (Optional)

Part #XPPPS-2RC

2 & 3 Position Push-Pull Switch Operators

2 Position Push-Pull Switch Operator
XPPPS-2GE

Specifications

XPPP S - 2 _ R A - FS (-CEN)
a b c d e f
ATEX Optional

a = Barrel Type

Code	Description
S	Short Barrel
L	Long Barrel

b = Number of Positions

Code	Description
2	2-Position
3	3-Position

c = **Mushroom Heads

Code	Description
Blank	Standard Mushroom Head
J	Jumbo Mushroom Head

Note: To engrave mushroom heads, C/F

d = Button Color

Code	Description
G	Green
R	Red

Part # XPPPS-2RC

e = Contact Blocks

Code	Description
Blank	No Contacts
A	1 N.O.
B	1 N.C.
2A	2 N.O.
2B	2 N.C.
C	1 N.O. / 1 N.C.
*D	2 N.O. / 2 N.C.
E	1 N.C.L.B.
F	1 N.O.E.M.
2E	2 N.C.L.B.
2F	2 N.O.E.M.
*G	1 N.O. / 1 N.C.L.B.
*H	1 N.C. / 1 N.C.L.B.
*J	3 N.O. / 3 N.C.
*K	4 N.O. / 4 N.C.
L	N.O.E.M.-N.C.
M	N.O.E.M.-N.O.
N	N.C.L.B.-N.O.E.M.
P	2 N.O. / 2 N.C. (300V)

f = Accessories

Code	Description
-FS	Finger Safe Option

CONTACT ABBREVIATION
N.O.= Normally Open
N.C.= Normally Closed
N.C.L.B.= Normally Closed- Late Break
N.O.E.M.= Normally Open- Early Make
E.C.N.O.= Early Close-Normally Open
L.O.N.C.= Late Open-Normally Closed

All contact blocks are rated 600V unless noted.

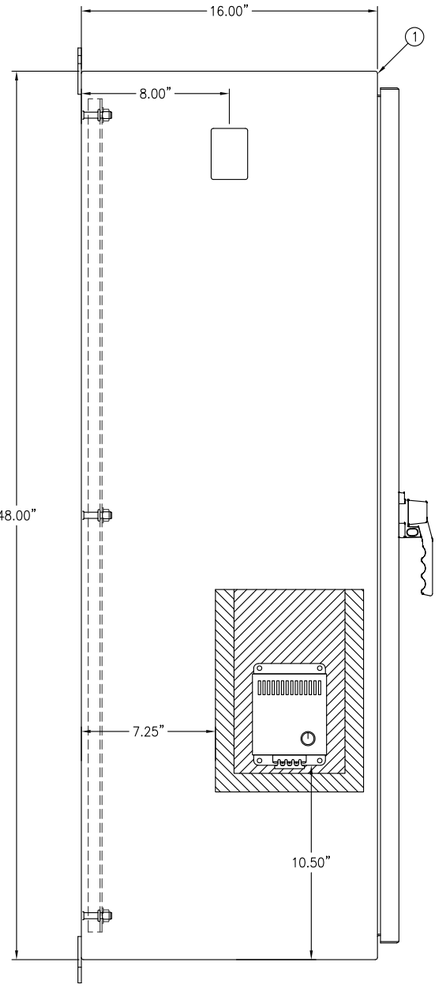
N4= NEMA 4 locking collar is standard on all Akron Electric operators

3/4"-14 NPSM standard thread

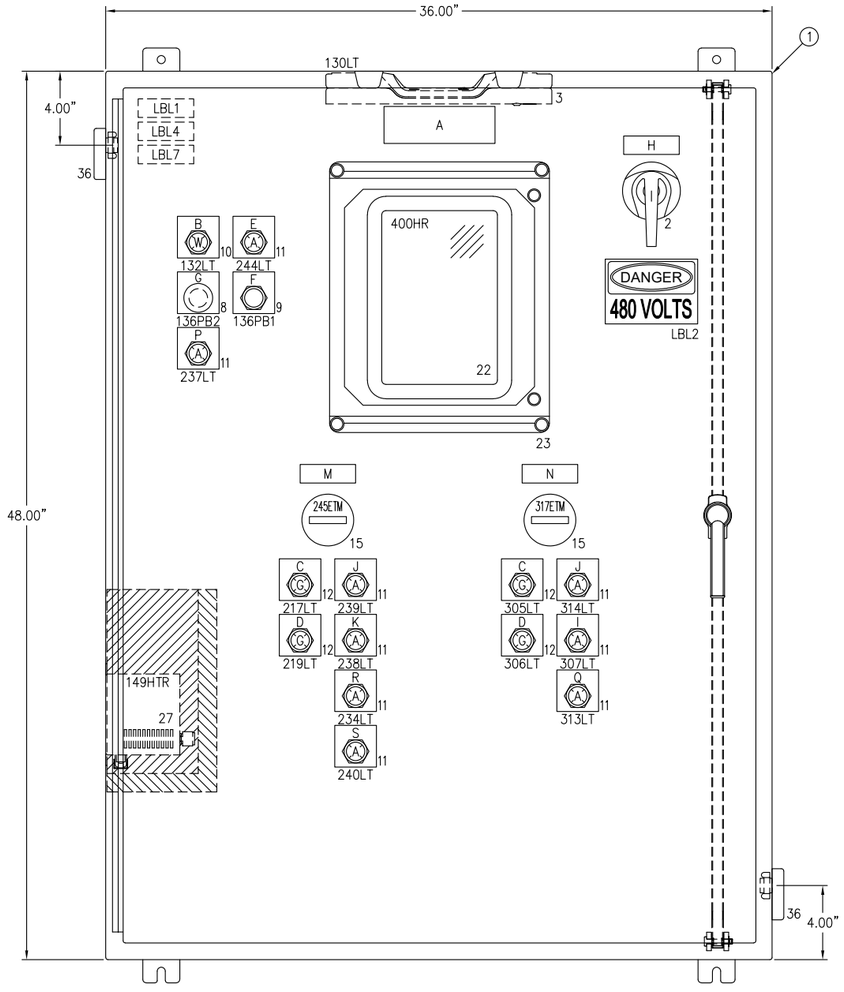
Pushbuttons can also be used with Allen Bradley or C3 Controls contact blocks. (C/F)

*Denotes multiple block configuration

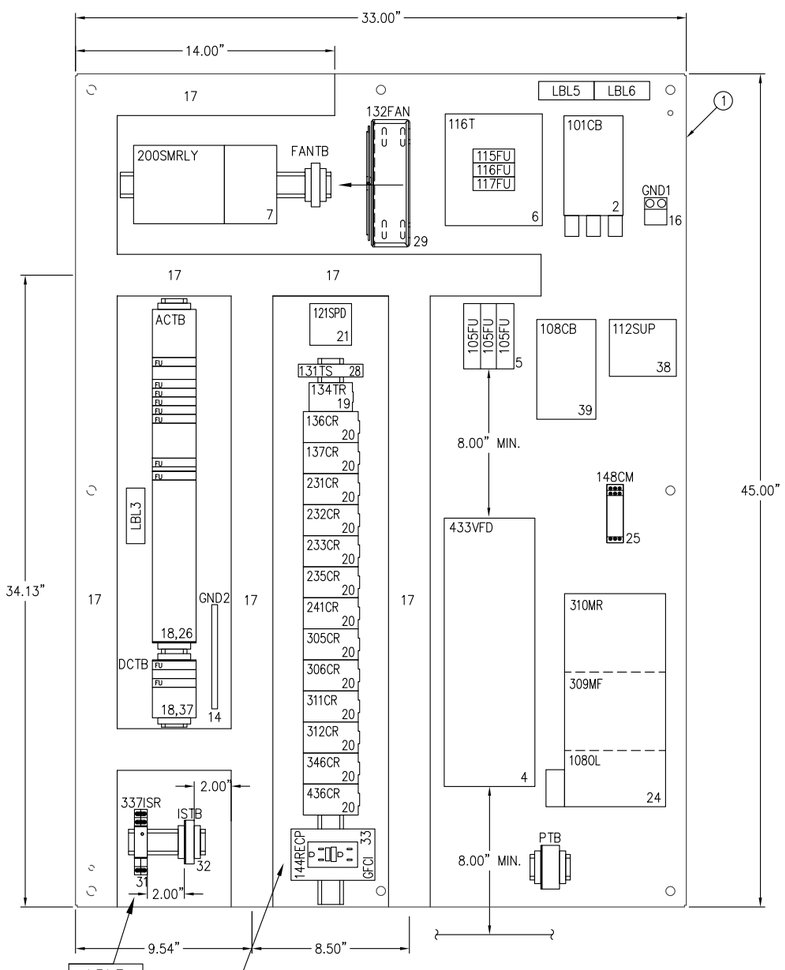
**Mushroom heads are made of Anodized Aluminum



LEFT SIDE VIEW



ENCLOSURE LAYOUT
(16" DEEP)



SUBPANEL LAYOUT
ALL WIRE DUCT 2.25" X 3"

REV #	DATE	REVISION
0	07/07/22	FOR APPROVAL

Headworks INTERNATIONAL

Headworks Inc.
11000 Brittmoore Park Drive
Houston, Texas 77041
Ph: 713.647.6667 Fax: 713.647.0999

PROJECT TITLE
CITY OF JEFFERSON
MGD WATER RECLAMATION FACILITY

SHEET TITLE
SCREENINGS SYSTEM
CONTROL PANEL
ENCLOSURE LAYOUT

DATE:	06/17/20
SCALE:	1/4" = 1"
DRAWN BY:	YNB / CAM
CAD FILE	AC0449
DWG. NO.	AC0449
SH	1
OF	9

WIRE REQUIREMENTS:

1. POWER AND CONTROL WIRING:
   - A. MATERIALS: STRANDED, SOFT ANNEALED COPPER.
   - B. INSULATION: 600 VOLTS TYPE MTW.
   - C. MINIMUM SIZES:
     - 1) PRIMARY POWER DISTRIBUTION: 12 AWG.
     - 2) SECONDARY POWER DISTRIBUTION: 14 AWG.
     - 3) CONTROL: 16 AWG.
   - D. COLOR:
     - 1) AC POWER (LINE AND LOAD): BLACK.
     - 2) AC POWER (NEUTRAL): WHITE.
     - 3) AC CONTROL: RED.
     - 4) AC CONTROL: ORANGE FOR FOREIGN VOLTAGES.
     - 5) DC POWER AND CONTROL (UNGROUNDED): BLUE.
     - 6) DC POWER AND CONTROL (GROUNDED): WHITE WITH BLUE STRIPE.
     - 7) GROUND: GREEN.
2. SIGNAL CABLES:
   - A. MATERIALS: STRANDED, SOFT ANNEALED COPPER.
   - B. INSULATION: 600 VOLTS, PVC OUTER JACKET.
   - C. MINIMUM SIZE: 18 AWG PAIRED TRIAD.
   - D. OVERALL ALUMINUM SHIELD (TAPE).
   - E. COPPER DRAIN WIRE.
   - F. COLOR:
     - 1) 2-CONDUCTOR:
       - A) POSITIVE (+): BLACK
       - B) NEGATIVE (-): WHITE AND RED
     - 2) 3-CONDUCTOR:
       - A) POSITIVE (+): BLACK.
       - B) NEGATIVE (-): RED.
       - C) SIGNAL: WHITE.
   - G. INSULATE THE FOIL SHIELDING AND EXPOSED DRAIN WIRE FOR EACH SIGNAL CABLE WITH HEAT-SHRINK TUBING.

ACTB		DCTB		PTB
1171		404FU	37	1T1
1171		4051		1T2
1171		405SH		1T3
N		406FU	37	1TGND
N		4071		
N		407SH		
N		4081		
N		4091		
N		4101		
N		4111		
N		412SH		
130FU	26	4331		ISTB
1361		4371		3381
1362				3382
1363				
141FU	26			FANTB
142FU	26			1301
143FU	26			N
144FU	26			
149FU	26			
1411				
1411				
1411				
1411				
1411				
1411				
1421				
1421				
151FU	26			
1512				
152FU	26			
1522				
2041				
2051				
2061				
2071				
2091				
2101				
2111				
2121				
2131				
2141				
2151				
2161				
2171				
2172				
2191				
2192				
2201				
2211				
2341				
2371				
2381				
2391				
2401				
2411				
2491				
2492				
2501				
2502				
2503				
2504				
2521				
2522				
2523				
2524				

+2 SPARE

TERMINAL BLOCK LAYOUT

ENGRAVING SCHEDULE

ID NO.	QTY	TYPE	SIZE	LETTER SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC
A	1	NP	2" X 6"	3/16"	BLACK	WHITE	(HEADWORKS LOGO) \ SCREENING SYSTEM \ MAIN CONTROL PANEL
B	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	POWER ON
C	2	LP	2-1/4" SQ	3/16"	BLACK	WHITE	RUNNING \ FORWARD
D	2	LP	2-1/4" SQ	3/16"	BLACK	WHITE	RUNNING \ REVERSE
E	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	COMMON ALARM
F	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	RESET
G	1	LP	2-1/4" SQ	3/16"	YELLOW	BLACK	EMERGENCY \ STOP
H	1	NP	1" X 3"	3/16"	YELLOW	BLACK	MAIN DISCONNECT \ 480VAC, 3PH, 60HZ
I	1	LP	2-1/4" SQ	3/16"	BLACK	BLACK	OVERLOAD
J	2	LP	2-1/4" SQ	3/16"	BLACK	WHITE	MOTOR OVERTEMP
K	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	VFD FAULT
L							
M	1	NP	1" X 3"	3/16"	BLACK	WHITE	BAR SCREEN
N	1	NP	1" X 3"	3/16"	BLACK	WHITE	WASHER/COMPACTOR
O							
P	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	HIGH WATER LEVEL
Q	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	OVER CURRENT
R	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	JAM DETECTED
S	1	LP	2-1/4" SQ	3/16"	BLACK	WHITE	EXCESSIVE JAMS

ATTACH NAMEPLATES WITH STAINLESS STEEL SCREWS

LABEL SCHEDULE

LBL1 RCS INFORMATION LABEL:
SERIAL NO. AC0449 CUSTOMER ID: _____
LINE VOLTAGE 480 , 3 PHASE, 3 WIRE, 60 Hz.
CONTROL VOLTAGE 120 LARGEST MOTOR HP 3 TOTAL FLA 12.5
RCS CONTACT C. MCMICKEN
REF. DWG. NO. AC0449 TYPE 4X ENCLOSURE
SHORT CIRCUIT CURRENT: 18 kA RMS SYMMETRICAL, 480 V. MAXIMUM

LBL2 DANGER 480VAC

LBL3 USE COPPER CONDUCTORS ONLY.
RECOMMENDED TORQUE: 8.9 IN. LB.

LBL4 TO MAINTAIN ENCLOSURE RATING, USE HUBS OR FITTINGS WITH THE SAME ENVIRONMENTAL RATING AS THE ENCLOSURE.

O-Z/GEDNEY	CHM SERIES HUBS
APPLETON	HUB SERIES HUBS
CROUSE HINDS	ST SERIES HUBS

LBL5 USE COPPER CONDUCTORS ONLY RATED 60° C OR HIGHER

LBL6 480 VAC

LBL7 UL698A LABEL

LBL8 5 AMP ONLY

LBL9 INTRINSICALLY-SAFE FIELD WIRING TERMINALS
WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
FOR DIVISION 1 HAZARDOUS (CLASSIFIED) LOCATION INSTALL IN ACCORDANCE WITH ARTICLE 504 OF THE NATIONAL ELECTRIC CODE

FUSES

105FU	JJS-15	15A	600V
115FU, 116FU	FNQR-5	5A	600V
117FU	FNM-10	10A	250V
130FU, 141FU, 142FU, 143FU	MDL-1	1A	250V
149FU, 151FU, 152FU	MDL-3	3A	250V
144FU	MDL-5	5A	250V
404FU, 406FU	AGC-1/2	1/2A	250V

NOTE: FUSE LABELS TO BE LOCATED NEAR EACH RESPECTIVE FUSEHOLDER.

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Houston, Texas 77041
Ph: 713.647.6667 Fax: 713.647.0999

PROJECT TITLE
CITY OF JEFFERSON
MGD WATER RECLAMATION FACILITY

SHEET TITLE
SCREENINGS SYSTEM
CONTROL PANEL
ENGRAVING, LABELS, AND TB DETAIL

DATE:	06/17/22
SCALE:	NONE
DRAWN BY:	YNB / CAM
CAD FILE	AC0449
DWG. NO.	AC0449
SH	2
OF	9

BILL OF MATERIAL

ITEM	QTY	MFG	CATALOG	DESCRIPTION
1	1	HOFFMAN	A48H3616SSLP3PT	ENCLOSURE, WALL-MOUNT, 3PT LATCH, NEMA 4X, 304SS, 48" X 36" X 16", 12 GAUGE
	1	HOFFMAN	A48P36	SUBPANEL, 45" X 33"
2	1	SQUARE D	BDL3620	CIRCUIT BREAKER, 3PH, 600Y/347V, 20 AMP
	1	SQUARE D	9421LB7	OPERATING MECHANISM
	1	SQUARE D	9421LS13	SHAFT
	1	SQUARE D	9421LC43	HANDLE ASSEMBLY, NEMA TYPE 4X
	1	SQUARE D	PDC6BD6	POWER DISTRIBUTION LUGS
3	1	HOFFMAN	7L.46.0.230.2100	ENCLOSURE LIGHT, 1200 LUMENS, LED, 110-240VAC/DC, MOTION DETECTOR, PUSH-IN CONNECTION
4	1	ABB	ACS580-01-04A8-4	VFD, 480V, 3 HP, 4.8A CONTINUOUS, WALL MOUNT, R1 FRAME
5	1	LITTLEFUSE	LFT600303C	FUSE HOLDER, CLASS T, 3 POLE, 30 AMP, 600V
	3	LITTLEFUSE	LFT60030FBC	FUSE BLOCK COVER, 1 PER POLE
	3	BUSSMANN	JJS-15	FUSE, FAST-ACTING, CLASS T, 15 AMP, 600VAC
6	1	SQUARE D	9070TF1000D1	TRANSFORMER, 1000VA, 240/480V-120V
	2	BUSSMANN	FNQ-R-5	FUSE, CLASS CC, 600VAC, 5 AMP, TIME-DELAY
	1	BUSSMANN	FNM-10	FUSE, 250VAC, 10 AMP, TIME-DELAY
	1	SQUARE D	9070FP1	FUSE PULLER
	1	SQUARE D	9070FSC1	FINGER SAFE TERMINAL COVER
7	1	SQUARE D	SR3B261FU	ZELIO SMART RELAY, 100-240VAC, 16 INPUTS, 10 OUTPUTS
	1	SQUARE D	SR3XT141FU	I/O EXTENSION MODULE, 100-240VAC, 8 INPUTS, 6 OUTPUTS
8	1	SQUARE D	9001SKR9P38LRRH13	MUSHROOM HEAD PUSHBUTTON, 30MM, RED, ILLUMINATED
9	1	SQUARE D	9001SKR1BH13	PUSHBUTTON, MOMENTARY, BLACK
	3	SQUARE D	9001KA1	CONTACT BLOCK, 1 NO - 1 NC
10	1	SQUARE D	9001SKT38LWW31	PILOT LIGHT, 30MM, PUSH-TO-TEST, WHITE
11	9	SQUARE D	9001SKT38LYA31	PILOT LIGHT, 30MM, PUSH-TO-TEST, AMBER
12	4	SQUARE D	9001SKT38LGG31	PILOT LIGHT, 30MM, PUSH-TO-TEST, GREEN
13		(NOT USED)		
14	1	SQUARE D	PK15GTA	GROUND BAR KIT
15	2	ENM	T50B212	ELAPSED TIME METER, 3 INCH, ROUND, 120VAC
16	1	PANDUIT	LAM2A2/0-14-6Y	GROUND LUG
17	A/R	PANDUIT	TYPE-F	WIRE DUCT
18	74	WEIDMULLER	1020100000	TERMINAL BLOCK, TYPE WDU4, 600V, 35A, #22-10 AWG WIRE RANGE
19	1	IDEC	RTE-P1AF20	TIME DELAY RELAY, 120VAC 8 PIN .1SEC - 600HR
	1	IDEC	SR2P-06	TIMER SOCKET
20	13	IDEC	RR3B-ULAC120V	RELAY, 3PDT, 120VAC W/ IND LIGHT, 10A CONTACTS
	13	IDEC	SR3B-05	SOCKET, 3PDT
21	1	SQUARE D	SDSA1175T	SURGE SUPPRESSOR, 120VAC, SINGLE PHASE TWO WIRE, 36kA, NEMA 4X
22	1	SIEMENS	7ML5034-6AB01	HYDRORANGER 200 HMI, DUAL POINT SINGLE POINT, PANEL MOUNT, NEMA 3
23	1	SQUARE D	A71-DT	WINDOW KIT, 11.88" X 14.68" X 1.77", NEMA 4X
24	1	SQUARE D	8736SB010V02S	REVERSING STARTER, 480VAC, NEMA SIZE 0, W/ OVERLOAD, VERTICAL
	1	SQUARE D	9999AC04	OVERLOAD ALARM CONTACT
	1	SQUARE D	9999RR04	REMOTE RESET MODULE
25	1	CARLO GAVAZZI	DIB01CM24100A	CURRENT MONITOR RELAY, 120VAC, SPDT, 2-100 AMP
26	8	WEIDMULLER	1014300000	TERMINAL BLOCK, FUSED-BFI, WSI 6/2/LD 60-150V DC/AC, 1/4 X 1-1/4, 20-8 AWG
	1	BUSSMANN	MDL-5	FUSE, TIME-DELAY, 5A, 250V 1/4 X 1-1/4
	3	BUSSMANN	MDL-3	FUSE, TIME-DELAY, 3A, 250V 1/4 X 1-1/4
	4	BUSSMANN	MDL-1	FUSE, TIME-DELAY, 1A, 250V 1/4 X 1-1/4
27	1	HOFFMAN	DAH1001A	ELECTRIC HEATER, 100 W, 120V, 1.89A
28	1	FINDER	7T.81.0.000.2303	THERMOSTAT, SPST-NO 10A, 0°C (32°F) TO +60°C (140°F)
29	1	HOFFMAN	A6AXFN	COOLING FAN, 115VAC
	1	HOFFMAN	AGARD6	FINDR GUARD
	1	HOFFMAN	ABRKT6	FAN BRACKET
30		(NOT USED)		
31	1	MACROMATIC	ISEUR1	INTRINSICALLY SAFE RELAY
32	2	WEIDMULLER	1020180000	TERMINAL BLOCK, TYPE WDU4, 600V, 35A, #22-10 AWG, BLUE

BILL OF MATERIAL (CONTINUED)

ITEM	QTY	MFG	CATALOG	DESCRIPTION
33	1	HUBBELL	DRUBGFI15	DUPLEX GFCI RECEPTACLE
34		(NOT USED)		
△ 35	4	HOFFMAN	AHCI10E	CORROSION INHIBITOR
36	2	STAHLIN	BV4XKIT	BREATHER VENT, TYPE 4X
37	2	WEIDMULLER	1014100000	FUSE TERMINAL BLOCK, WITH INDICATOR, 24VDC
	2	BUSSMANN	AGC-1/2	FUSE, FAST ACTING, 1/2A, 250V 1/4 X 1-1/4
38	1	SQUARE D	SDSA4040D	SURGE SUPPRESSOR, 480V DELTA, 3 PHASE, 3 WIRE
	1	SQUARE D	QOSAMK	MOUNTING BRACKET
39	1	SQUARE D	BDL36015	CIRCUIT BREAKER, 3PH, 600Y/347VAC, 15 AMP

△ DENOTES ITEMS SHIPPED LOOSE.

FIELD ITEM BILL OF MATERIAL

ITEM	QTY	MFG	CATALOG	DESCRIPTION
1	2	SIEMENS	7ML1171-1DA10	ECHOMAX XPS-15F, ULTRASONIC LEVEL TRANSDUCER, 30m CABLE, CLASS 1 DIV 1
2	1	ANCHOR SCIENTIFIC	P30N0-SSTNM	FLOAT SWITCH, 1 NO CONTACT, 30 FT. CABLE

SPARE ITEM BILL OF MATERIAL (SHIPPED LOOSE)

ITEM	QTY	MFG	CATALOG	DESCRIPTION
1	3	BUSSMANN	JJS-15	FUSE, FAST-ACTING, CLASS T, 15 AMP, 600VAC
	2	BUSSMANN	FNQ-R-5	FUSE, CLASS CC, 600VAC, 5 AMP, TIME-DELAY
	1	BUSSMANN	FNM-10	FUSE, 250VAC, 10 AMP, TIME-DELAY
	3	BUSSMANN	MDL-5	FUSE, TIME-DELAY, 5A, 250V 1/4 X 1-1/4
	3	BUSSMANN	MDL-3	FUSE, TIME-DELAY, 3A, 250V 1/4 X 1-1/4
	3	BUSSMANN	MDL-1	FUSE, TIME-DELAY, 1A, 250V 1/4 X 1-1/4
	3	BUSSMANN	AGC-1/2	FUSE, FAST ACTING, 1/2A, 250V 1/4 X 1-1/4
2	1	SQUARE D	6508805214	WHITE BULB
	9	SQUARE D	6508805211	AMBER BULB
	4	SQUARE D	6508805212	GREEN BULB

REV #	DATE	REVISION
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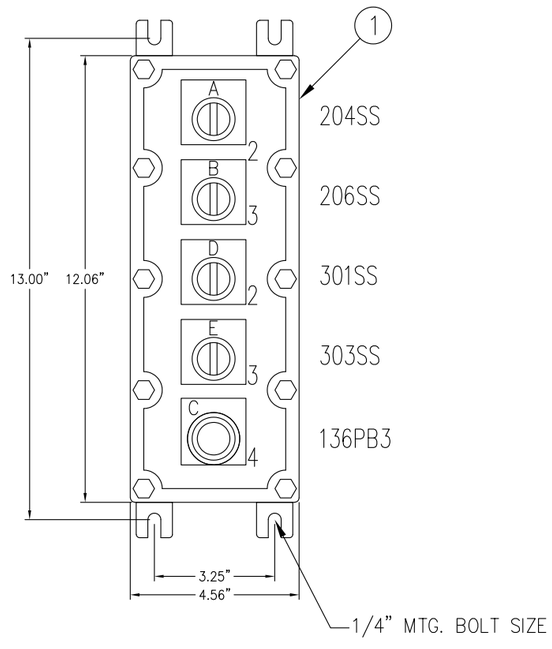
PROJECT TITLE
CITY OF JEFFERSON
MGD WATER RECLAMATION FACILITY

SHEET TITLE
SCREENINGS SYSTEM
CONTROL PANEL
BILL OF MATERIAL

DATE:	06/17/22
SCALE:	NONE
DRAWN BY:	YNB / CAM
CAD FILE	AC0449
DWG. NO.	AC0449
SH	3
OF	9

LOCAL CONTROL STATION				
ITEM	QTY	MFG	CATALOG	DESCRIPTION
1	1	AKRON	CXI 3113-X5-(5)N6-N4-N5	ENCLOSURE, NEMA 7, 5 OPERATORS
2	2	AKRON	XP3-SSD	SELECTOR SWITCH, 3 POSITION, MAINTAINED, 2 NO – 2 NC
3	2	AKRON	XP3-LSC	SELECTOR SWITCH, 3 POSITION, SPRING RETURN FROM RIGHT, 1 NO – 1 NC
4	1	AKRON	XPPPS-2RC	PUSHBUTTON, MAINTAINED, RED MUSHROOM HEAD, 1 NO – 1 NC

ENGRAVING SCHEDULE						
ID NO.	QTY	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC
A	1	LP	2-1/4" SQ.	BLACK	WHITE	BAR SCREEN \ HAND OFF AUTO
B	1	LP	2-1/4" SQ.	BLACK	WHITE	BAR SCREEN \ FWD OFF JOG REV
C	1	LP	2-1/4" SQ.	BLACK	WHITE	EMERGENCY STOP
D	1	LP	2-1/4" SQ.	BLACK	WHITE	COMPACTOR \ HAND OFF AUTO
E	1	LP	2-1/4" SQ.	BLACK	WHITE	COMPACTOR \ FWD OFF JOG REV



FRONT VIEW
4.5" DEEP

NOTE 1: INSTALL JUMPERS & 8FT LEADS ON LOCAL CONTROL STATION – LABEL WIRES

REV #	DATE	REVISION
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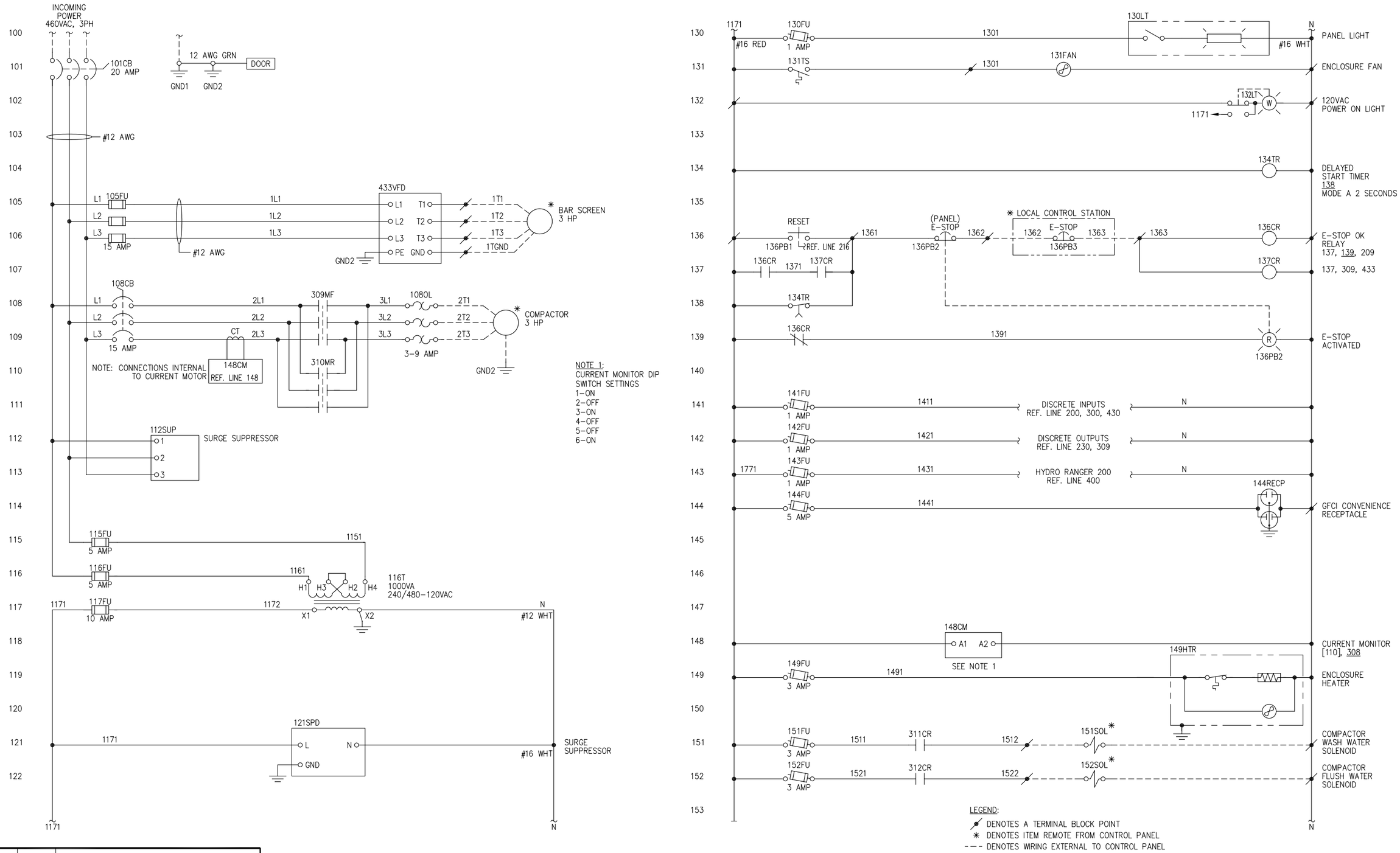
PROJECT TITLE
CITY OF JEFFERSON
MGD WATER RECLAMATION FACILITY

SHEET TITLE
SCREENINGS SYSTEM
CONTROL PANEL
LOCAL CONTROL STATION

DATE:	06/17/22
SCALE:	NONE
DRAWN BY:	YNB / CAM
CAD FILE	AC0449
DWG. NO.	AC0449
SH	4
OF	9



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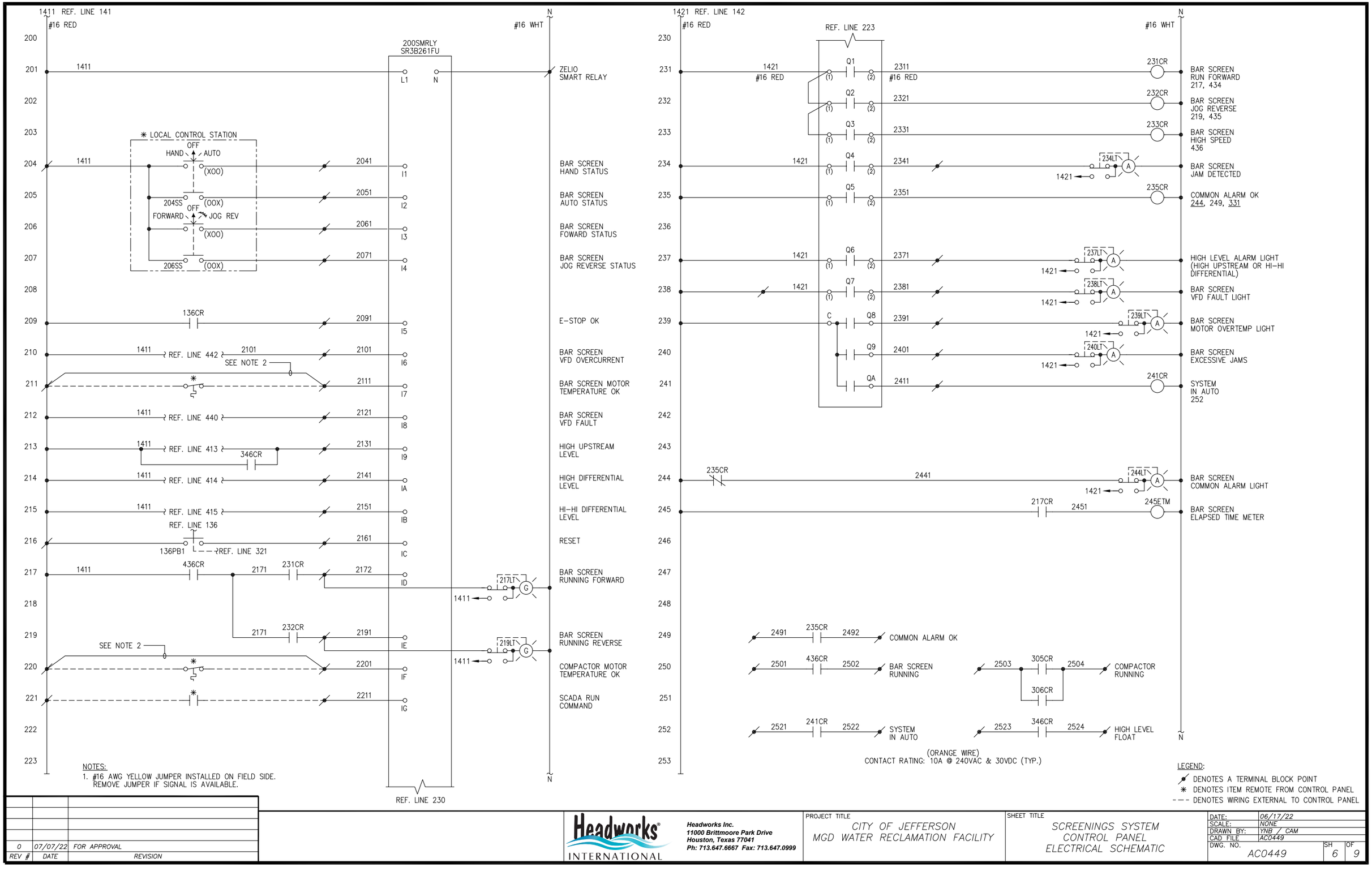
PROJECT TITLE
CITY OF JEFFERSON
MGD WATER RECLAMATION FACILITY

SHEET TITLE
SCREENINGS SYSTEM
CONTROL PANEL
ELECTRICAL SCHEMATIC

DATE:	06/17/22
SCALE:	NONE
DRAWN BY:	YNB / CAM
CAD FILE	AC0449
DWG. NO.	AC0449
SH	5
OF	9



REV #	DATE	REVISION
0	07/07/22	FOR APPROVAL

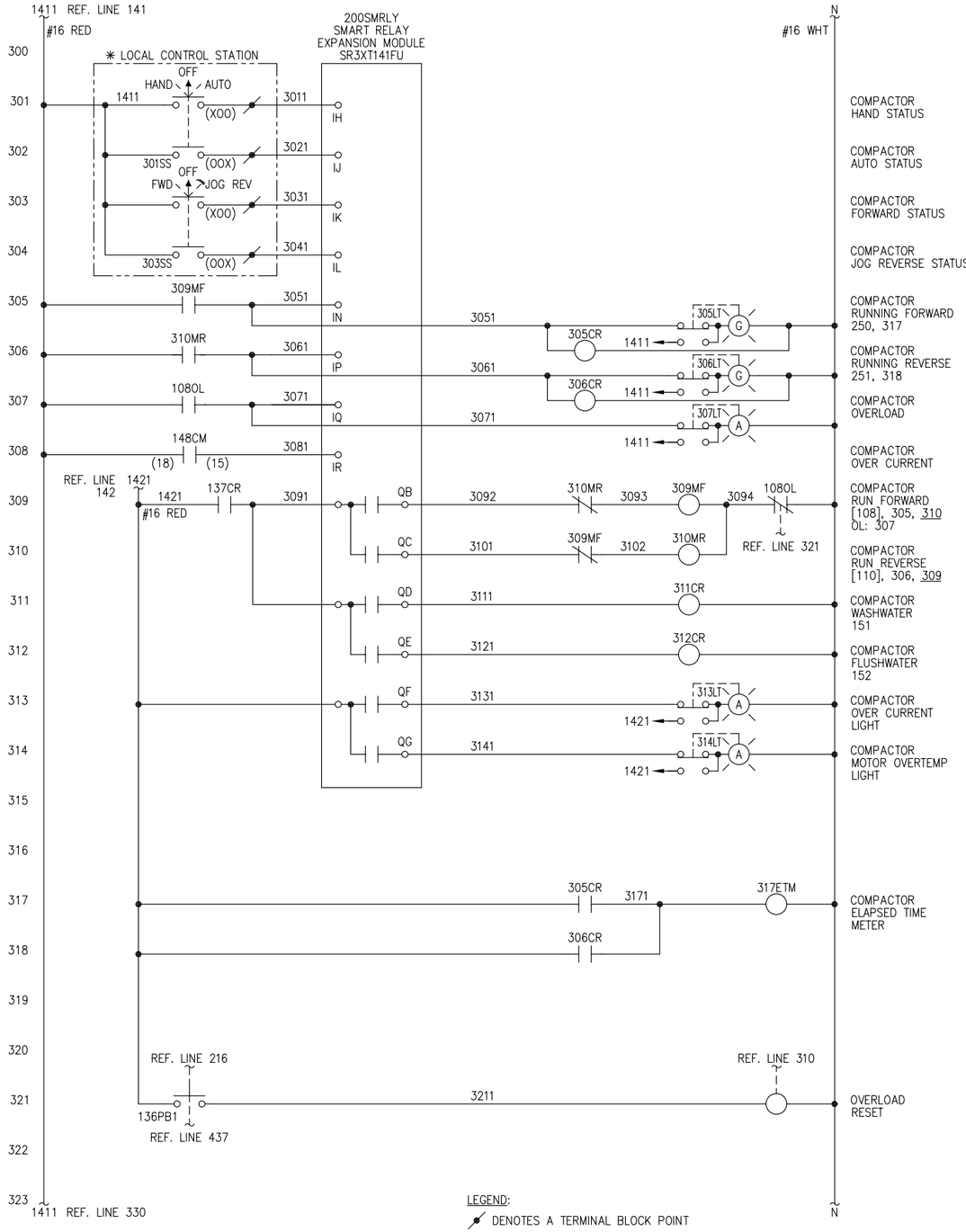
Headworks® INTERNATIONAL

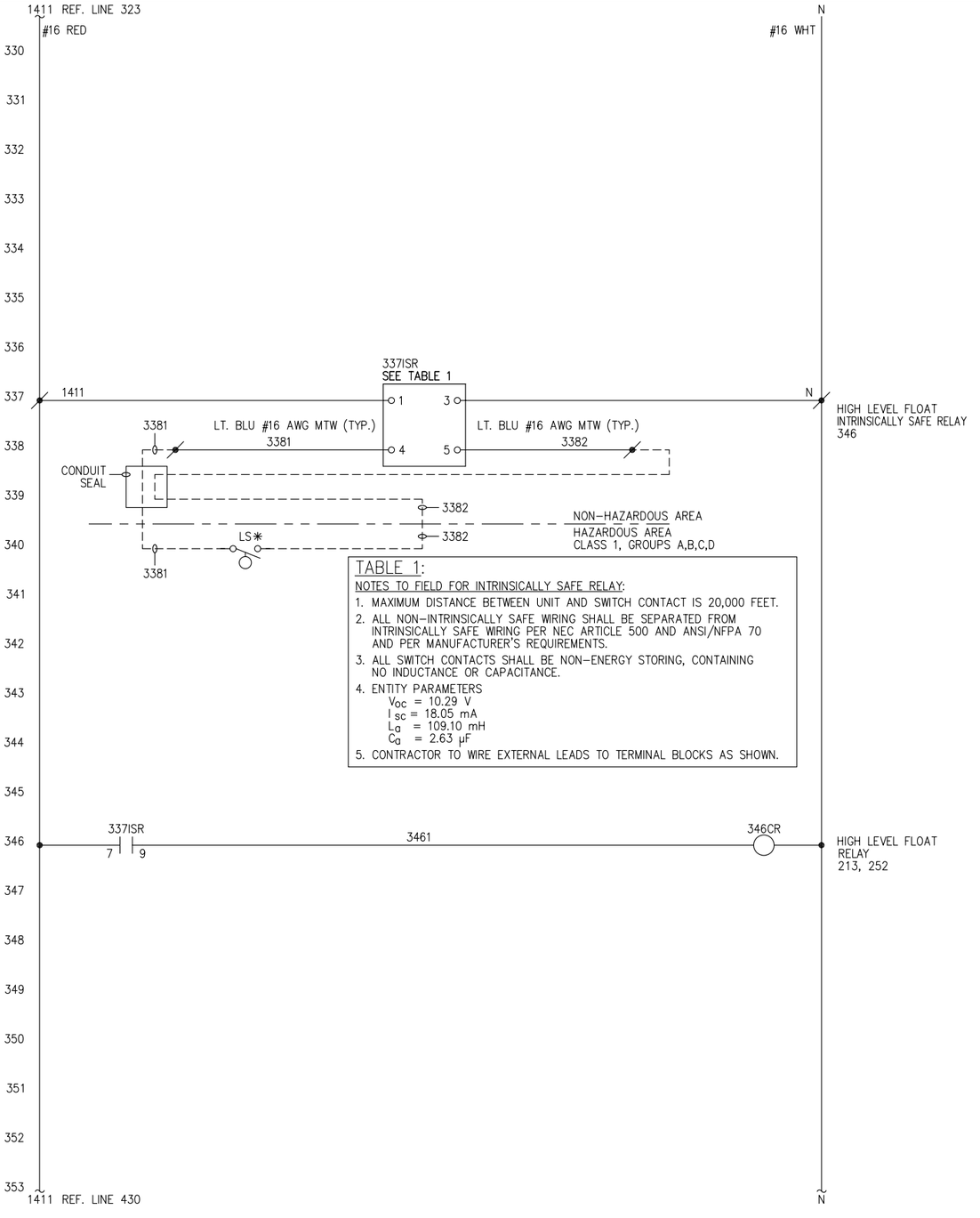
Headworks Inc.
11000 Brittmoore Park Drive
Houston, Texas 77041
Ph: 713.647.6667 Fax: 713.647.0999

PROJECT TITLE
CITY OF JEFFERSON
MGD WATER RECLAMATION FACILITY

SHEET TITLE
SCREENINGS SYSTEM
CONTROL PANEL
ELECTRICAL SCHEMATIC

DATE:	06/17/22
SCALE:	NONE
DRAWN BY:	YNB / CAM
CAD FILE	AC0449
DWG. NO.	AC0449
SH	6
OF	9





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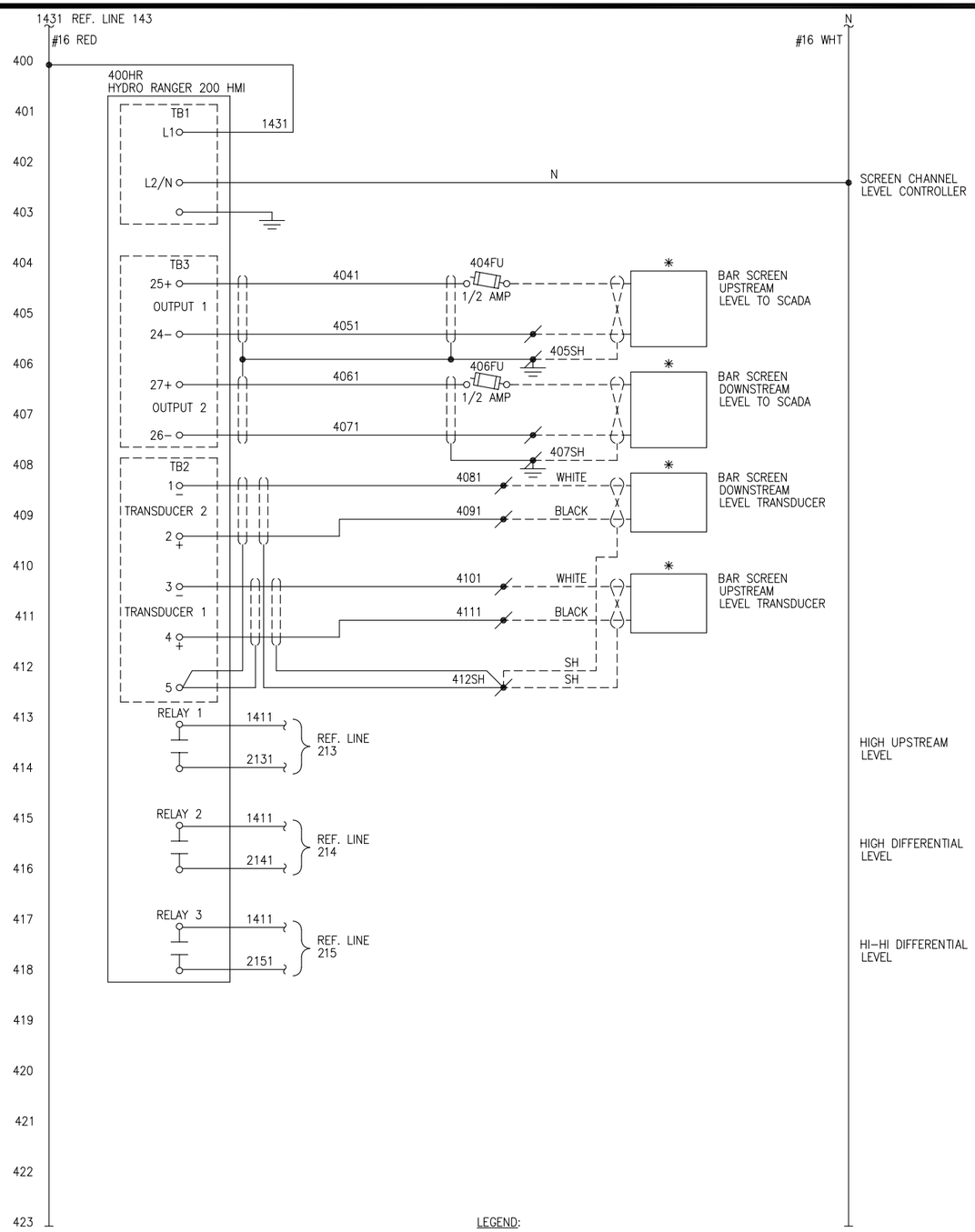
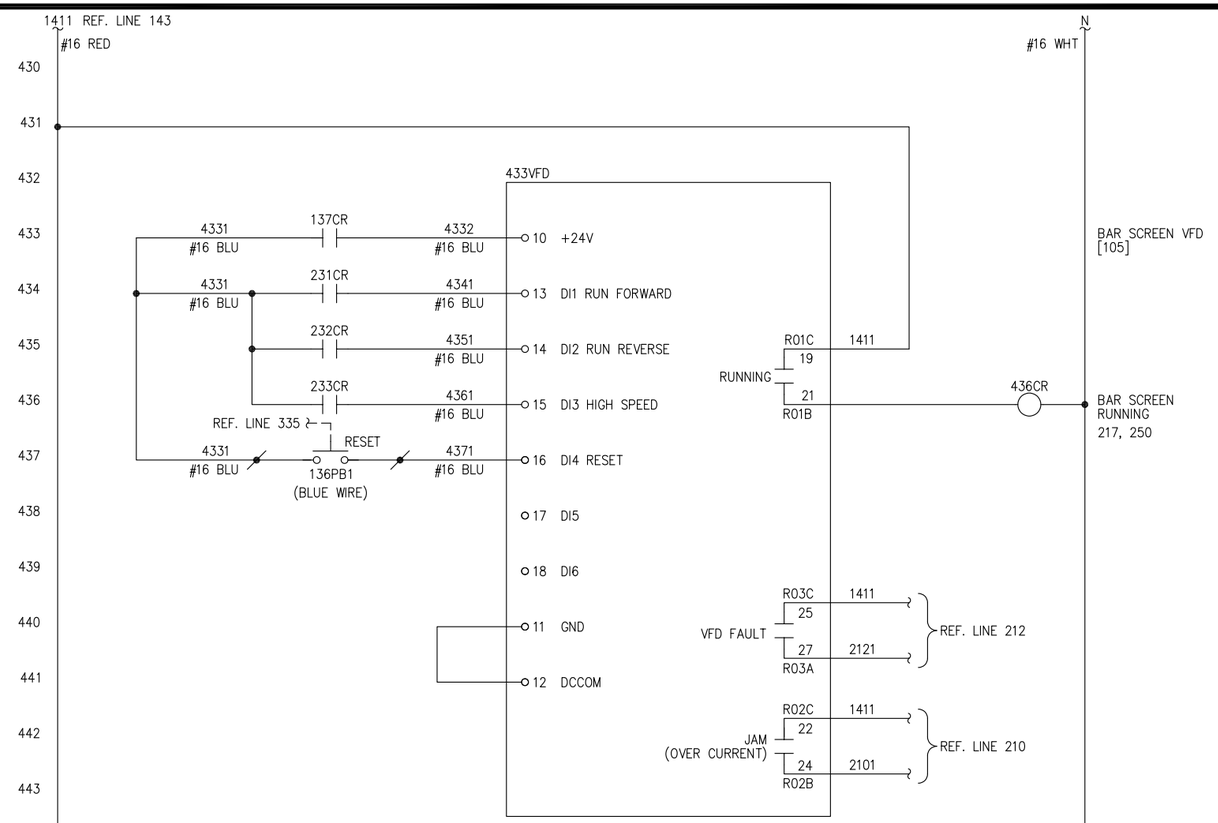
CAD FILE	AC0449		
DWG. NO.	AC0449	SH 7	OF 9





LEGEND:

- DENOTES A TERMINAL BLOCK POINT
- ✳ DENOTES ITEM REMOTE FROM CONTROL PANEL
- – – – DENOTES WIRING EXTERNAL TO CONTROL PANEL

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SH	8
OF	9

480VAC, 3PH, 60Hz
WIRED BY CONTRACTOR

L1 L2 L3 GND

101CB 20A

GND1

PTB
1T1
1T2
1T3
1TGND

TB
1411
2111

* BAR SCREEN 3 HP

MOTOR TEMP SWITCH

309MF/310MR/1080L
2T1
2T2
2T3
GND2

TB
MOTOR TEMP 1411
SWITCH 2201

* COMPACTOR 3 HP

ACTB
2491 COMMON ALARM OK
2492
2501 BAR SCREEN RUNNING
2502
2503 COMPACTOR RUNNING
2504
2521 SYSTEM IN AUTO
2522
2523 HIGH LEVEL FLOAT
2524

DRY CONTACT OUTPUTS

1411 SCADA RUN COMMAND
2211

* LOCAL CONTROL STATION

E-STOP 137PB3 1362 1363

1411

OFF HAND AUTO
BAR SCREEN HAND STATUS (X00) 2041
BAR SCREEN AUTO STATUS 204SS (00X) 2051

OFF FORWARD JOG REVERSE
BAR SCREEN FORWARD STATUS (X00) 2061
BAR SCREEN JOG REVERSE STATUS 206SS (00X) 2071

OFF HAND AUTO
COMPACTOR HAND STATUS (X00) 3011
COMPACTOR AUTO STATUS 301SS (00X) 3021

OFF FORWARD JOG REVERSE
COMPACTOR FORWARD STATUS (X00) 3031
COMPACTOR JOG REVERSE STATUS 303SS (00X) 3041

ACTB
1362
1363
1411
2041
2051
2061
2071
3011
3021
3031
3041

LS

ISTB
3381 HIGH LEVEL FLOAT
3382

DCTB
404FU
4051
405SH
WHITE
BLACK
* BAR SCREEN UPSTREAM LEVEL TO SCADA

DCTB
406FU
4071
407SH
WHITE
BLACK
* BAR SCREEN DOWNSTREAM LEVEL TO SCADA

DCTB
4081
4091
412SH
WHITE
BLACK
* BAR SCREEN DOWNSTREAM LEVEL LEVEL TRANSDUCER

DCTB
4101
4111
412SH
WHITE
BLACK
* BAR SCREEN UPSTREAM LEVEL LEVEL TRANSDUCER

SCREENING SYSTEM CONTROL PANEL

LEGEND:
* DENOTES ITEM REMOTE FROM SCREENINGS SYSTEM CONTROL PANEL

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OF	9

Section 6

Spare Parts Listing

Storage Instructions for Motor, Gear Reducer, Bar Screen and Screwpactor

Service Center Locations

Spare Parts

Spare Parts

Jefferson WPCP – PO 498

Headworks shall provide the following spare parts with this order:

For the Bar Screen:

- One (1) each, Strainer
- One (1) lot, Set of fuses for each fuse rating
- One (1) lot, Lamp lenses

Headworks

Storage Instructions

Storage Instructions

1. The bar screen ships on timbers. Unload the screen and use the same timbers to store the screens on the ground in the same manner as they come on the truck. The Screwpactor does not have any timbers. Unload the Screwpactor and use the legs to stand the equipment on the ground.

2. The bar screen and Screwpactor come covered in plastic. Cut ventilation holes on the side resting on the timbers so that air can circulate, but rain cannot collect and pool inside the equipment.

3. **Baldor Motor** - Baldor's long term storage requirements are attached.

4. **SEW Gearbox** - SEW Eurodrive's long term storage requirements are attached. When the gear reducer from SEW is ordered, all the storage requirements listed in the Technical Note are completed by the factory prior to shipment.

   Note: We recommend shipping the gearbox and motor separate from the screen if the equipment stays outside more than two (2) months, but that they remain connected to each other. This way you can remove the fan cover from the motor and hand rotate the fan until you see the gearbox output hollow shaft rotate 2-3 times. This should be done every two (2) months and will fulfill both the gearbox and motor long term storage requirements.

5. Headworks removes the paper coating from the polycarbonate covers so that they do not bond to the material from prolonged exposure.

6. When placing the screen in service, check the take up bearings and take up rods to ensure they are still lubricated.

7. Control Panel – The control panel battery must keep its charge so that the programming is not erased. Keep the Control Panel indoors until the time of installation.

Receiving

Each Baldor Electric Motor is thoroughly tested at the factory and carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your motor.
2. Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

Storage

If the motor is not put into service immediately, the motor must be stored in a clean, dry and warm location. Several precautionary steps must be performed to avoid motor damage during storage.

1. Use a “Megger” periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
2. Do not lubricate bearings during storage. Motor bearings are packed with grease at the factory. Excessive grease can damage insulation quality.
3. Rotate motor shaft at least 10 turns every two months during storage (more frequently if possible). This will prevent bearing damage due to storage.
4. If the storage location is damp or humid, the motor windings must be protected from moisture. This can be done by applying power to the motors’ space heater (if available) while the motor is in storage.

Unpacking

Each Baldor motor is packaged for ease of handling and to prevent entry of contaminants.

1. To avoid condensation inside the motor, do not unpack until the motor has reached room temperature. (Room temperature is the temperature of the room in which it will be installed). The packing provides insulation from temperature changes during transportation.
2. When the motor has reached room temperature, remove all protective wrapping material from the motor.

Handling

The motor should be lifted using the lifting lugs or eye bolts provided.

1. Use the lugs or eye bolts provided to lift the motor. Never attempt to lift the motor and additional equipment connected to the motor by this method. The lugs or eye bolts provided are designed to lift only the motor. Never lift the motor by the motor shaft or the hood of a WPII motor.
2. When lifting a WPII (weatherproof Type 2) motor, do not lift the motor by inserting lifting lugs into holes on top of the cooling hood. These lugs are to be used for hood removal only. A spreader bar should be used to lift the motor by the cast lifting lugs located on the motor frame.
3. If the motor must be mounted to a plate with the driven equipment such as pump, compressor etc., it may not be possible to lift the motor alone. For this case, the assembly should be lifted by a sling around the mounting base. The entire assembly can be lifted as an assembly for installation. Do not lift using the motor lugs or eye bolts provided.

   If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting.

Technical Note

Long-Term Storage

Mechanical

SEW supplies all gear reducers and gearmotors with oil. The quantity of oil depends upon the customer's mounting position. Since most mounting positions do not require the entire gear case to be filled with oil, moist air often exists within the cavity of the reducer. It is important that units not rest for an extended period of time without proper protection. Otherwise, problems can result. Rust could develop on the bearings, gears, and other steel components when the water molecules condense inside the reducer. In addition, flat spots could develop on the balls of the bearings or bearing raceway (brinelling) due to a concentrated load at a single point. Such loads exist on bearings that support the heavy rotors of large motors or on bearings that support the shaft of a bevel gear set, since the bevel sets are preloaded when installed.

To avoid potential problems during an extended rest period, SEW offers a "Long Term Storage" option that contains the following specifications.

Reducer

- Reducer is completely filled with the correct type of oil, regardless of mounting position.
- Oil level plug is installed at the correct location according to the mounting position.
- Reducer is painted per the required specifications.
- All unpainted exterior surfaces, such as input shaft, output shaft, and flange face are coated with a rust inhibitor.
- A breather plug is installed in the correct location for the mounting position specified on the nameplate.
- A "Long Term Storage" tag is attached to the eyebolt.

Motor

- Motor contains an insulation coating on the stator windings.
- Motor is painted per the required specifications.
- Any shaft extension protruding from the motor endbell is coated with a rust inhibitor.

Important! The output shaft of reducers and motors that contain long-term storage must be manually rotated every 2–3 months to keep the bearings from brinnelling. In addition, units must be stored in an area where they are not subject to vibration.

Technical Note

Varimot® or Varigear®

- Varimot® contains a chrome-plated driving disc.
- Varigear® contains nitrided driving pulleys and nitrided driven pulleys.
- Unit is painted per the required specifications.
- All unpainted exterior surfaces, such as input shaft, output shaft, and flange face are coated with a rust inhibitor.
- A “Long Term Storage” tag is attached to its eyebolt if a reducer is not supplied.

Important! The output shaft of variable speed units that contain long-term storage must be manually rotated every 2–3 months to keep the bearings from brinnelling. In addition, units must be stored in an area where they are not subject to vibration.

Placing Stored Units in Service:

When placing the unit in service, perform the following steps.

1. Remove the oil drain plug.
2. Drain the excess oil from the reducer.
3. Reinstall oil drain plug.
4. Check to see if the motor has absorbed moisture as a result of being in storage. Refer to the procedure described in the Operating Instructions sent with the drive. If you cannot locate your operating instructions, you may download a copy from the Technical Information section of the SEW website: www.seweurodrive.com.

If the actual mounting position is different than the mounting position stated on the nameplate, call your local SEW representative. Different mounting positions require different oil levels for proper operation. Also, you should request a new nameplate that contains the correct information.

No other steps are necessary before placing long-term storage units into service.

Service Center Locations

Permanent Service Headquarters Locations

For Baldor Motors:

Electric Motors Co
7705 Hwy. 29 South
Hull, GA 30646
+1 706 549 6556

For SEW Eurodive Reducers:

SEW- Eurodrive, Inc.
1295 Old Spartanburg Hwy.
P.O Box 518
Lyman, SC 29365
+1 864 439 7537

For Headworks® Equipment:

Headworks Inc.
11000 Brittmoore Park Dr.
Houston, TX 77041
Phone: +1 713 647 6667

Section 7

Warranty Information

Warranty for
Jefferson WPCP
Jefferson, GA

Warranty for Bar Screen

The seller warrants all equipment of its own manufacture to be free of defects caused by faulty material or workmanship for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever first occurs. Headworks will replace or repair any part or parts which upon examination shall show to have failed under normal use and service by the original user within the warranty period. In the event that defects develop during the warranty period, under normal and proper use, Headworks is to be notified promptly and with their consent the products are to be returned to Headworks F.O.B. Headworks factory at Buyer's expense. In the case of components purchased by Headworks and incorporated into the equipment, such as Electrical Controls, Instrumentation, Electrical Motors, Gear Reducers and related items, Headworks warranty is limited to the individual manufacturer's warranty for that component, usually one year. This warranty does not apply to equipment or parts thereof which have been altered or repaired other than by a representative of Headworks, or damaged by improper installation, application, erosion or corrosion of any sort, or subjected to misuse, abuse, neglect or accident.

THIS WARRANTY, INCLUDING THE STATED REMEDIES, IS EXPRESSLY MADE BY HEADWORKS AND ACCEPTED BY PURCHASER IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED, OR STATUTORY. HEADWORKS NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITIES WITH RESPECT TO ITS EQUIPMENT. HEADWORKS SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE DUE TO INOPERABILITY OF ITS EQUIPMENT FOR ANY REASON NOR ANY CLAIM THAT ITS EQUIPMENT WAS NEGLIGENTLY DESIGNED OR MANUFACTURED.

Warranty for
Jefferson WPCP
Jefferson, GA

Warranty for Screwpactor

The seller warrants all equipment of its own manufacture to be free of defects caused by faulty material or workmanship for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever first occurs. Headworks will replace or repair any part or parts which upon examination shall show to have failed under normal use and service by the original user within the warranty period. In the event that defects develop during the warranty period, under normal and proper use, Headworks is to be notified promptly and with their consent the products are to be returned to Headworks F.O.B. Headworks factory at Buyer's expense. In the case of components purchased by Headworks and incorporated into the equipment, such as Electrical Controls, Instrumentation, Electrical Motors, Gear Reducers and related items, Headworks warranty is limited to the individual manufacturer's warranty for that component, usually one year. This warranty does not apply to equipment or parts thereof which have been altered or repaired other than by a representative of Headworks, or damaged by improper installation, application, erosion or corrosion of any sort, or subjected to misuse, abuse, neglect or accident.

THIS WARRANTY, INCLUDING THE STATED REMEDIES, IS EXPRESSLY MADE BY HEADWORKS AND ACCEPTED BY PURCHASER IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED, OR STATUTORY. HEADWORKS NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITIES WITH RESPECT TO ITS EQUIPMENT. HEADWORKS SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE DUE TO INOPERABILITY OF ITS EQUIPMENT FOR ANY REASON NOR ANY CLAIM THAT ITS EQUIPMENT WAS NEGLIGENTLY DESIGNED OR MANUFACTURED.

Headworks®

End of Submittal