TRANSMITTAL OF SUBMITTAL

DATE: 8/11/23

TO: John Fleck

ESI
3855 Shallowford Road, Suite 525
Marietta, GA 30062

New Submittal _X__ Resubmittal __

Project: CCWA Hicks Blower Upgrade

Specification Section No. : 43 11 33-13

Supplier/Vendor/Subcontractor:

Manufacturer: Aerzen

FROM: LAKESHORE ENGINEERING

1259 Ellsworth Drive

Atlanta, GA 30318

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Submittal number	Submittal Type	Contains Variation to Contract	
				No	Yes
Email	Blower	43 11 33.13-01.00	Product Data	X	

Comments/Variation:

CONTRACTOR hereby certifies that (i) CONTRACTOR has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By:_____ __

Brandon Dow

AERZEN USA CORPORATION
108 Independence Way * Coatesville, PA 19320
Main Phone: 610-380-0244 * Fax: 610-380-0278

Letter of Transmittal

Company: Lakeshore Engineering	**Transmittal #: 01**
	Date: July 18th, 2023
Attn:	**PO #: 23132-11.870**
Subject: Clayton County Hicks WWTP	**Job #: SO-23-00162**

WE ARE SENDNG YOU

☐ Letter ☐ Purchase Order ☒ Submittal ☐ O&M Manual ☐ Other

 # OF COPIES: (1) PDF

TRANSMITTED as checked below:

☒ For Approval
☐ For Your Use
☐ As Requested
☐ As Built
☐ Action Specified Below

Remarks For Original Submission for SO-23-00162

Copy To:
Aaron.Groover@aerzen.com

PROJECT MANAGER:

NAME: Joseph Myslinski
Tel: (+1) 484-538-6995
Email: joe.myslinski@aerzen.com

Signed: Joseph Myslinski

Submittal

Positive Displacement Blowers

Spec Section 43 11 33.13

Contractor
Lakeshore Engineering
1259 Ellsworth Drive
Atlanta, GA 30318
404-355-3976 (tel)
404-355-2429 (fax)

Local Representative
The TDH Company
1230 Johnson Ferry Road, Suite H-30
Marietta, GA 30068
770-509-1808 (tel)
770-509-0620 (fax)

Manufacturer/Service/ Parts
Aerzen USA Corp.
108 Independence Way
Coatesville, PA 19320
800-444-1692 (tel)
610-380-0278 (fax)
www.aerzen.com/en-us

Aerzen USA Project:
SO-23-00162

Customer:
Lakeshore Engineering

Purchase Order No.
23132-11.870

Project:
Clayton Hicks WWTP

SECTION 1

Aerzen USA Corporation
108 Independence Way, Coatesville, PA 19320
Tel: (610) 380-0244 Fax: (610) 380-0278
website www.USA-Inquiries@aerzen.com

Job Specific Data Package

DATE	Aerzen Job #	Page
03.27.2014	SO-23-00162	1 of 3
Revision Letter		-

CUSTOMER INFORMATION

CUSTOMER	Lakeshore Engineering
CUSTOMER PO #	23132-11.870
PROJECT NAME	Clayton County Hicks WWTP

PACKAGE DESCRIPTION

EQUIPMENT IDENTIFICATION	PD Blower		**SERIAL NUMBERS**
BLOWER MODEL #	GM 060S-00	QTY. (2)	
PACKAGE DESCRIPTION	Pressure Unit w/ Enclosure		
DISCHARGE CONNECTION TYPE	150# ANSI Discharge Connection		
INLET CONNECTION TYPE	No Inlet Connection		
MOTOR CONDUIT LOCATION	F3 Conduit Box		
TOTAL PACKAGE WEIGHT	4768		

DOCUMENTATION

GENERAL ARRANGEMENT DRAWING	GB-005455
MOTOR CABLE ROUTING	IA-004545
OPERATIONS & MAINTENANCE MANUAL	G4-006
WARRANTY TERMS & CONDITIONS	A2-001-USA

PERFORMANCE DATA

MEDIUM		AIR
INLET CAPACITY	*ICFM*	1580
INLET CAPACITY	*SCFM*	1373
INLET PRESSURE	*PSIA*	14.2
DISCHARGE PRESSURE	*PSI*	10.5
INLET TEMPERATURE	*°F*	100
DISCHARGE TEMPERATURE	*°F*	239
NOMINAL BLOWER SPEED	*RPM*	2435
POWER @ BLOWER SHAFT	*BHP*	94
MOTOR RATING	*HP*	125
MOTOR SPEED	*RPM*	1800
SOUND PRESSURE LEVEL *	*dB(A)*	80

* measured in free field at 3 foot distance from the outline of the unit (tol. +/- 2 dB(A))

Tolerance on Power & Flow is +/- 5%

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Job Specific Data Package		
DATE	**Aerzen Job #**	**Page**
03.27.2014	SO-23-00162	2 of 3
Revision Letter		-

CRITICAL INFORMATION / NOTES

1 PRIOR TO SHIPMENT - AERZEN DOES THE FOLLOWING
Removes V-Belts from the motor sheave and wraps them around the blower sheave
Locks the motor hinge plate
Always refer to the operations manual for determining the most suitable lubricant.
Operating and ambient conditions may impact which lubricant to use.

2 UPON ARRIVAL
Immediately remove stretch wrap from package when storred outdoors

3 LIFTING PACKAGE
Without Sound Enclosure: lifting eye holes in the corner of the base frame
With Sound Enclosure: lifting through slots in base with fork lift

4 READ OPERATION MANUAL FOR INSTALLATION INSTRUCTIONS
Call Aerzen After-Sales / Service if you have any questions

5 AT COMMISSIONING - CUSTOMER / CONTRACTOR IS TO
Check oil level (refer to operations manual) - and adjust if necessary
Anchor the base or sound enclosure
Make grounding connections
Connect motor cable per Aerzen Drawing IA-004545
Verify correct rotation of motor (counter-clockwise, looking at drive shaft)
Remove locking device from motor pivot plate
Reinstall V-belts

6 **ALL CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED**

7 Recommended MINIMUM clearance at front and rear of package for "normal"
(i.e. inspect machine, change oil, replace belts, etc.) maintenance is 32 inches.

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108 Independence Way, Coatesville, PA 19320
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website www.USA-Inquiries@aerzen.com

Job Specific Data Package

Date	Aerzen Job #	Page
03.27.2014	SO-23-00162	3 of 3
Revision Letter		-

BILL OF MATERIAL for GB-005455

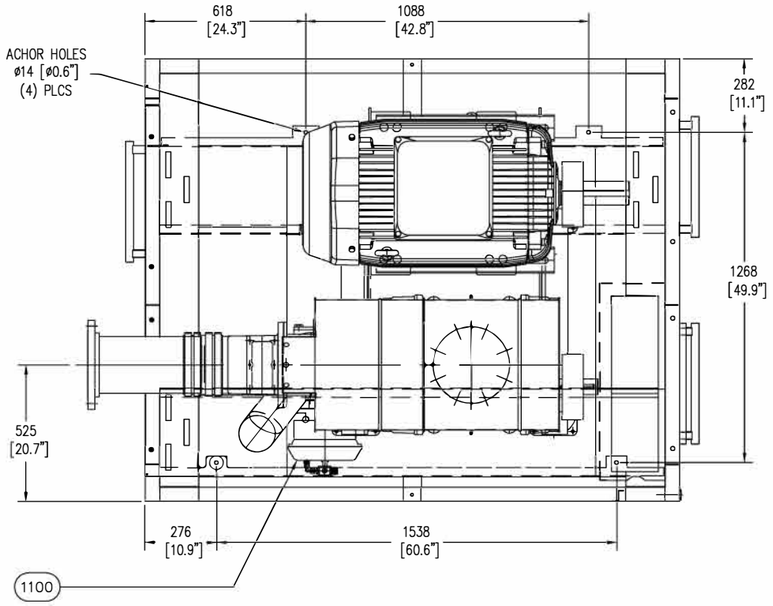
ITEM #	QTY	DESCRIPTION		PART #
1	1	Delta Blower Stage		GM 060S-00
2	1	Electric Motor		21-MTR-WG4-125DD301
3	1	Combination Base Frame / Silencer	DN-200	2000012591
4	1	Sound Enclosure (S.E.) w/ Dial Gauges		180741
5	1	Inlet Filter / Silencer Assembly		182117
6	1	Discharge Connection Housing		178667
10	1	Filter Element		* 2000049288
20	-	Drive Belts		* 156321000
30	1	One-way Valve	EPDM Flap	** 178655
50	4	Clamps for Discharge Connection	for Sleeve	168658
52	1	Stub Pipe w/ ANSI Flange (Discharge)	8" 150# ANSI Flange	21-002827-14
90	1	Safety Relief Valve	DN-125, set @ 1050 mbar	** 167375
100	-	Instrumentation		21-G5-IM-PS05-4000
	1	Filter Maintenance Indicator		21-000799
	1	Discharge Pressure Gauge		21-000814
	1	Discharge Temperture Gauge/Switch	set @ 274 °F	21-000805
140	1	Unloading Valve	Aeromat 5	150223
150	1	S.E. - Ventilation Fan	2000-3000 rpm	161705
170	1	Motor Sheave Bushing		165709000
180	1	Motor Sheave	Enter Size	170198000
190	1	Blower Sheave Bushing		156250000
200	1	Blower Sheave	Enter Size	166283000
250	4	Vibration Isolators		184821
260	1	Safety Relief Valve Hose		184096
270	3	Safety Relief Valve Hose Clamps		162923
	1	Non- Standard Key for belt drive		21-000840-06
	1	Oil Drain Valve		185388
	1	Seal Ring	for Drain Valve	119086
	1	Oil Drain Hose		2000023662
	1	Threaded Rod for Belt Drive		2000001790
		* The Above B.O.M is for 1 Blower unless Otherwise Stated*		
		Spares and Other services for the Entire Order		
	1	Spare Air Filter		2000049288
	1	Belt Set (3 Belts Per set)		156321000
	1	Spare Delta Lube (1-gal)		21-004391
	1	Startup, Installation, and Training, 2 trips, 4 days		N/A
	1	PTC-13 Testing Unwitnessed		N/A
	1	Blower Local Control Panel Shipped loose		TBD

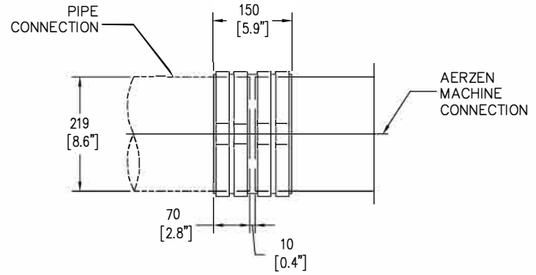
RECOMMENDED SPARE PARTS
* on hand items
** 2-5 year recommended items

NOTE(S): Always reference the blower s/n & the Aerzen Job # (if known) when ordering spare parts

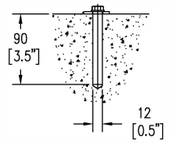
ITEM	QTY	DESCRIPTION	DESCRIPTION 2
100	1	BLOWER TORSO	GM60S, DN200
110	1	PRESSURE RELIEF VALVE	
200	1	SOUND ENCLOSURE	
300	1	ELECTRIC MOTOR	SHOWN WITH A 440 NEMA MOTOR
310	1	MOTOR MOUNTING	
320	1	BELT DRIVE	
400	1	BELT GUARD	
500	1	COOLING FAN	
600	1	DISCHARGE CONNECTION	8"-150# ANSI
800	1	INSTRUMENTATION	
1100	1	UNLOADING VALVE	(OPTIONAL)

PLAN VIEW

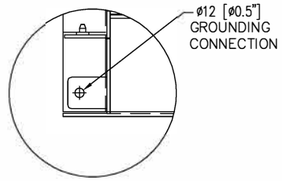




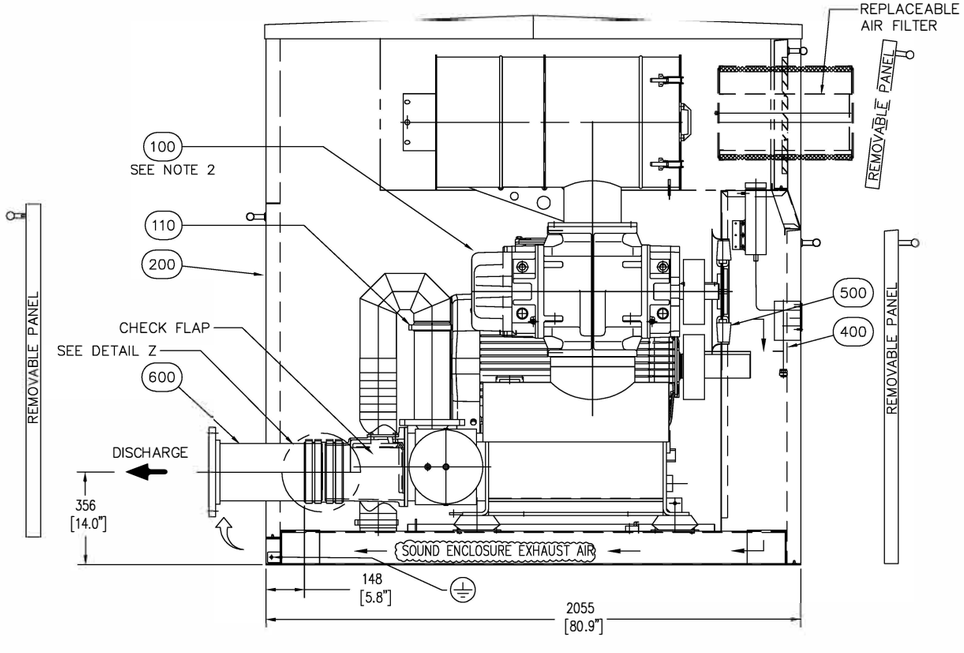
DETAIL Z
SLEEVE CONNECTION
CUSTOMER PIPE ENGAGEMENT
LEAVES 10 [0.4"] GAP
2X SCALE

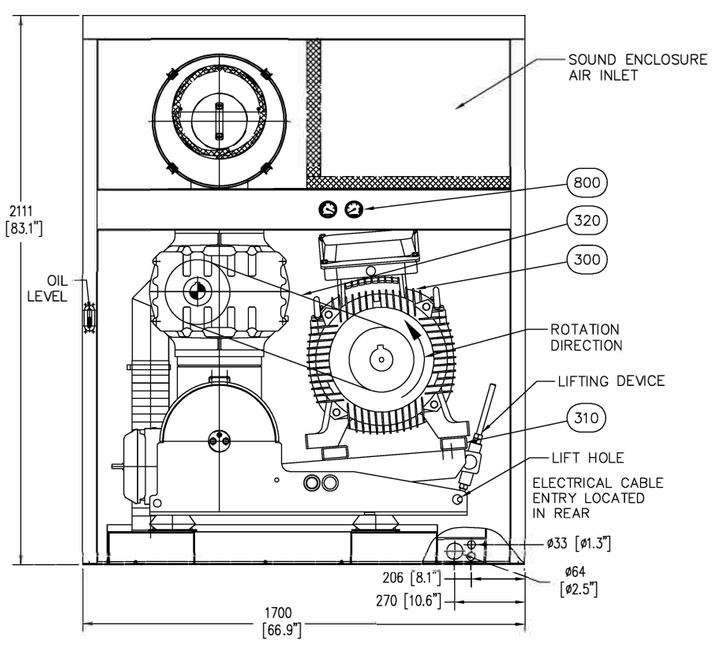


SOUND ENCLOSURE ANCHOR
RECOMMENDATION
SHOW WITH OPTIONAL ANCHOR
AERZEN PART NO. 2000053552
3X SCALE



EARTH GROUND
MAT'L: 304 SS
3X SCALE





FRONT VIEW

NOTES:

1. TOLERANCE ON DIMENSIONS = ±12mm [0.5"]
2. ITEM 100 (BLOWER TORSO) INCLUDES BLOWER STAGE, INLET SILENCER, BASE FRAME/DISCHARGE SILENCER, VIBRATION ISOLATORS, & CONNECTION HOUSING WITH CHECK FLAP
3. CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
4. LIFT PACKAGE FROM FRONT SIDE THROUGH FORK LIFT POCKETS IN BASE
5. SEE JOB DATA SHEETS FOR PERFORMANCE DATA, PART NUMBERS, TOTAL PACKAGE WEIGHT, INSTRUMENTATION, ANY OTHER OPTIONAL EQUIPMENT & OWNERS MANUAL
6. REGARDLESS OF THE OPERATING CONDITION, NO FORCES AND TORQUES MAY ACT ON THE MACHINE THROUGH THE CONNECTED SYSTEM PIPING. ALL CUSTOMER PIPING CONNECTIONS MUST BE DESIGNED AS FIXED POINTS AT THE AERZEN MACHINE LIMIT.

WEIGHT

BLOWER PACKAGE (LESS MOTOR)	1402 kg	3091 lbs
ELECTRIC MOTOR (ITEM 300)	-	1677 lbs
TOTAL (WET WEIGHT)		4768 lbs

AERZEN

AERZEN USA *CORPORATION*
108 INDEPENDENCE WAY, COATESVILLE, PA.
PH: (610) 380-0244 FX: (610) 380-0278
WWW.AERZEN.COM

CLASS I

	NAME	DATE
DRAWN BY	JRH	4.9.2019
CHECKED BY	RJP	4.9.2019
APPROVED BY	-	-

DRAWING NO.
GB-006957-P4031000
NAVISION PN.
-

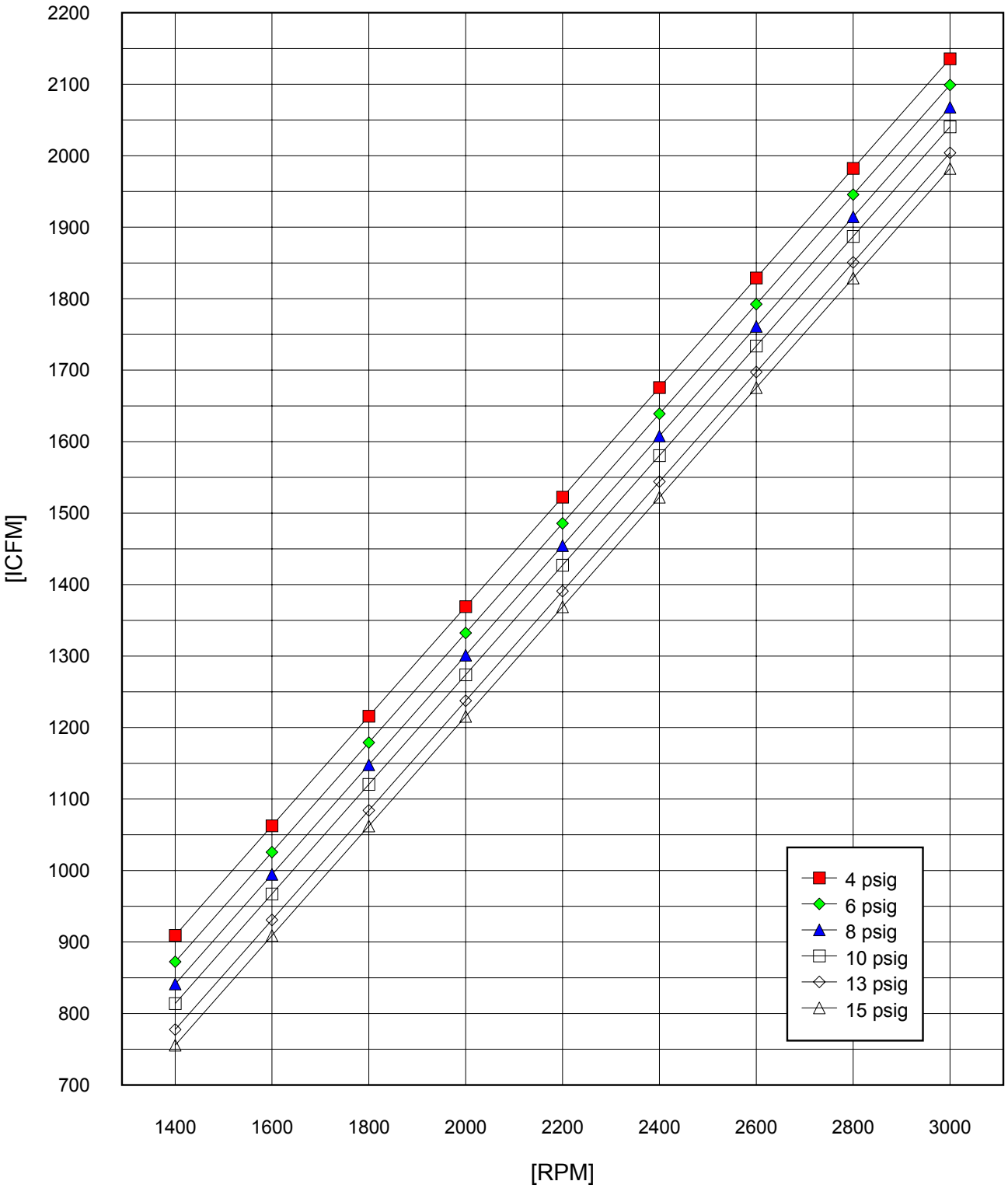
TITLE
GA DRAWING
GM60S, DN200, G5
F3 SOUND ENCL.
8"-150# ANSI (OUT)
PRESSURE
-

SCALE:- SHEET:1/ 1

REV.	NAME	DATE
A	DFT	01.27.2021
B	RCJ	05/19/2023
-	-	-
-	-	-
-	-	-
-	-	-

AERZEN GM 60S DELTA PACKAGE, PRESSURE

INLET FLOW

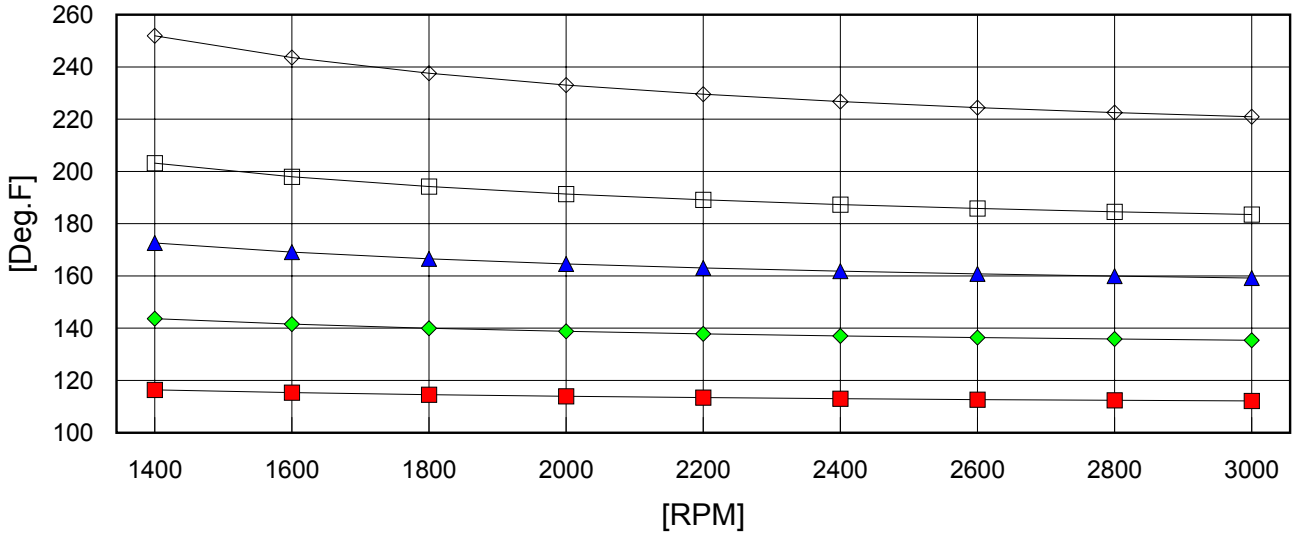


Performance data based on air @ 68 deg.F/ 14.7 psia inlet.

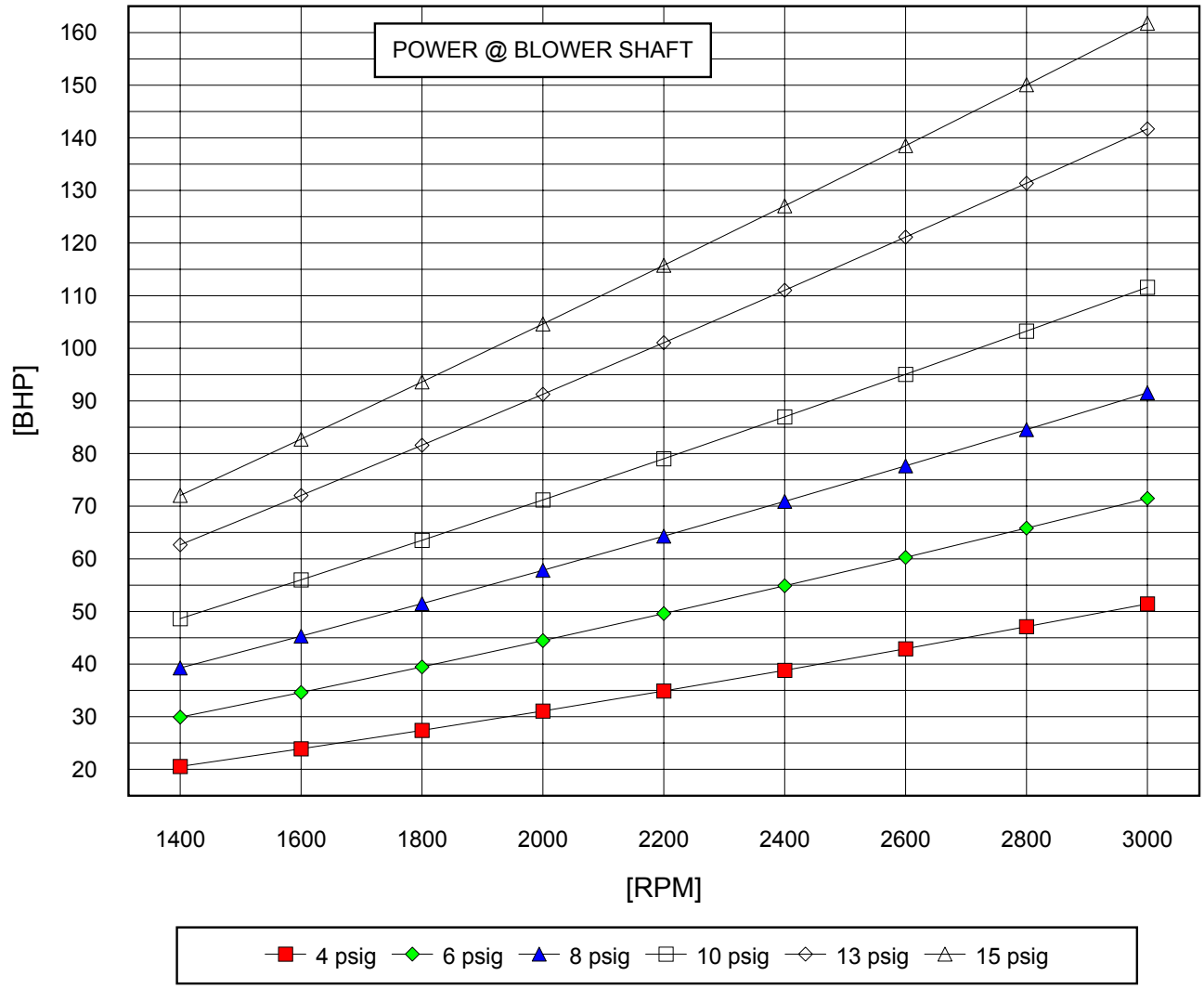
See temperature chart on second sheet for allowable operating range.

AERZEN GM 60S DELTA PACKAGE, PRESSURE

DISCHARGE TEMPERATURE



MAXIMUM ALLOWABLE DISCHARGE TEMPERATURE: 285 deg.F
Performance data based on air @ 68 deg.F/ 14.7 psia inlet.



SAMPLE – FOR REFERENCE ONLY

Aerzen USA Corporation
108 Independence Way
Coatesville, PA 19320
(610) 380-0244 ph
(610) 380-0244 fax

Aerzener Machinenfabrik GmbH
Since 1864
Reherweg 28 - D31855 Aerzen
Telefon: 0 51 54 / 810
Telefax: 0 51 54 / 811 91

Certified Test Report

evaluated date: **1-Aug-19**
evaluated by: Rzepka
certified by: Jarrow

Customer De Nora Water Technologies, Inc.
Customer PO# 23007-T019266

Aerzen reference # SO-18-01343

Performance & Order Data
Blower Model GM 90S **Serial #** 1619621

			Metric units		US units	
1)	Inlet flow	Q_1	56.19	m^3/min	1984.51	Icfm
2)	differential pressure	Δp	724	mbar	10.5	psig.
3)	Shaft Power	kW	85.15	kW	114.30	Bhp
4)	Blower Speed	rpm	1622	rpm	1622	rpm

Test Result			Metric units		US units	
5)	Volumetric Efficiency	$\eta_{vol, um}$	80%		80%	
6)	Actual Slip	$V_{verl, um}$	13.27	m^3/min	468.49	cfm
7)	Theoretical Volume	$V_{0, UM}$	67.35	m^3/min	2,378.28	cfm
8)	Actual Volume	$V_{1, UM}$	54.15	m^3/min	1,912.39	cfm
9)	Flow Variance	$V_{t, UM}$	-3.62%		-3.62%	
10	Actual Power	$P_{KU, UM}$	85.09	kW	114.10	Bhp
11	Power Variance	$P_{KU, UM}$	-0.08%		-0.08%	

Explanation and Summary
Lines 1), 2), 3). 4) above show required performance data (what was ordered).
Lines 5) through 11) show data that resulted from the performance test on the actual blower.
Line 9) shows a variance of 3.62% in the flow capacity of this unit.
Line 11) shows a variance of 0.08% in the power consumption of this unit.

Standard accepted tolerance is +/- 5%. The unit would be acceptable if the flow was no more than 5% below the expected flow and the power was no more than 5% of expected power.

For this specific case the flow is -3.62% **less than expected.**
For this specific case the power is -0.08% **less than expected.**

Serial number 1619621 **Model number GM 90S** **meets and exceeds the standard tolerance.**

Aerzen USA Corporation
108 Independence Way – Coatesville, PA 19320
Tel: (610) 380-0244 Fax: (610) 380-0278
Service Hotline (800) 444-1692
e-mail:USA-Inquiries@Aerzen.com website www.aerzen.com/en-us

Test Report AMUSA based on AMD Report	
DATE	**Document #**
5-Sep-19	**B-6-0202 rev "F"**

Blower Test Report will be provided in the project O&M Manual.

EC Declaration of Conformity

according to the Machinery Directive 2006/42/EC, Annex II, No.1 A

Company Name : Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen
Germany

Product Details :

The Declaration of Conformity for this piston engine is supplemented by the technical details in the chapter entitled "Performance Data".
The details provided therein identify the product and must be applied together with this Declaration of Conformity.

Appointed agent for the compilation of the technical documentation : Mr. Irtel, Managing Director
Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen
Germany

We hereby declare that the aforementioned product complies with all relevant provisions of Machinery Directive 2006/42/EC for the conveyance and compression of gaseous media.

The aforementioned product also fulfils all provisions of the following relevant EC-directives:

- EMC / Electromagnetic Compatibility 2004/108/EC
- Pressure Equipment Directive 97/23/EC
- The protection targets of the Low Voltage Directive 2006/95/EC have been fulfilled in accordance with Annex I, No. 1.5.1 of the Machinery Directive.

The following harmonised standards were applied:

• DIN EN ISO 12100	03-2011	Safety of Machines - General Design Principles Risk Assessment and Risk Reduction
• DIN EN 1012-1	02-2011	Compressors and Vacuum Pumps - Safety Requirements - Part 1: Compressors

This Declaration of Conformity applies to the product in its original state as placed on the market by the manufacturer. Any retrospective changes and/or retrospective work undertaken shall void this Declaration of Conformity.

Aerzen, 09-01-2012
Place, Date of issue

Mr. Björn Irtel, Managing Director-
Details of the Undersigned

SECTION 2

ROTARY LOBE BLOWER PACKAGES

DELTA BLOWER GENERATION 5

Intake volume flow from 20 cfm to 8,800 cfm

Quiet, Compact, Energy Efficient

Delta Blower 5 Generation

AERZEN

aerzenusa.com

Aerzen's Generation 5 Delta Blower

The 5th generation of Aerzen modular compact packages combines tradition and innovation.

1 Easy installation with forklift or pallet jack for placement

2 Room-saving, compact, side-by-side installation

3 Easy access to all components with one oil drain/oil fill point

4 Oil level can be observed from the outside

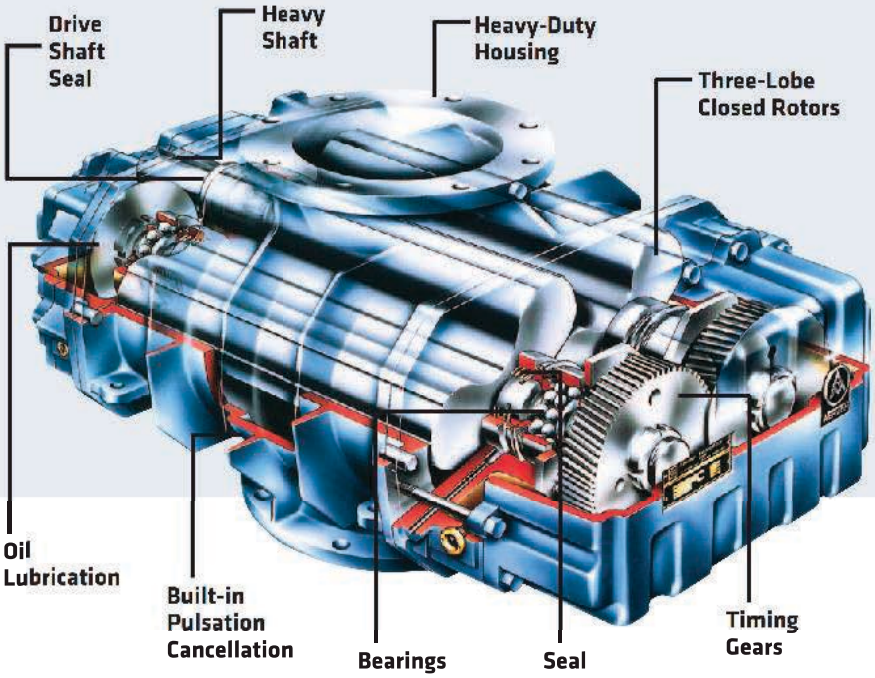
5 Automatic belt tension– No adjustment required

6 Typical machinery noise average SPL 75-80 dB(A) with acoustic hood

Aerzen Delta G5 Blower Stage

The details that set Aerzen Blowers apart.

Pulse Cancellation Built In, Active Noise Cancellation Built In

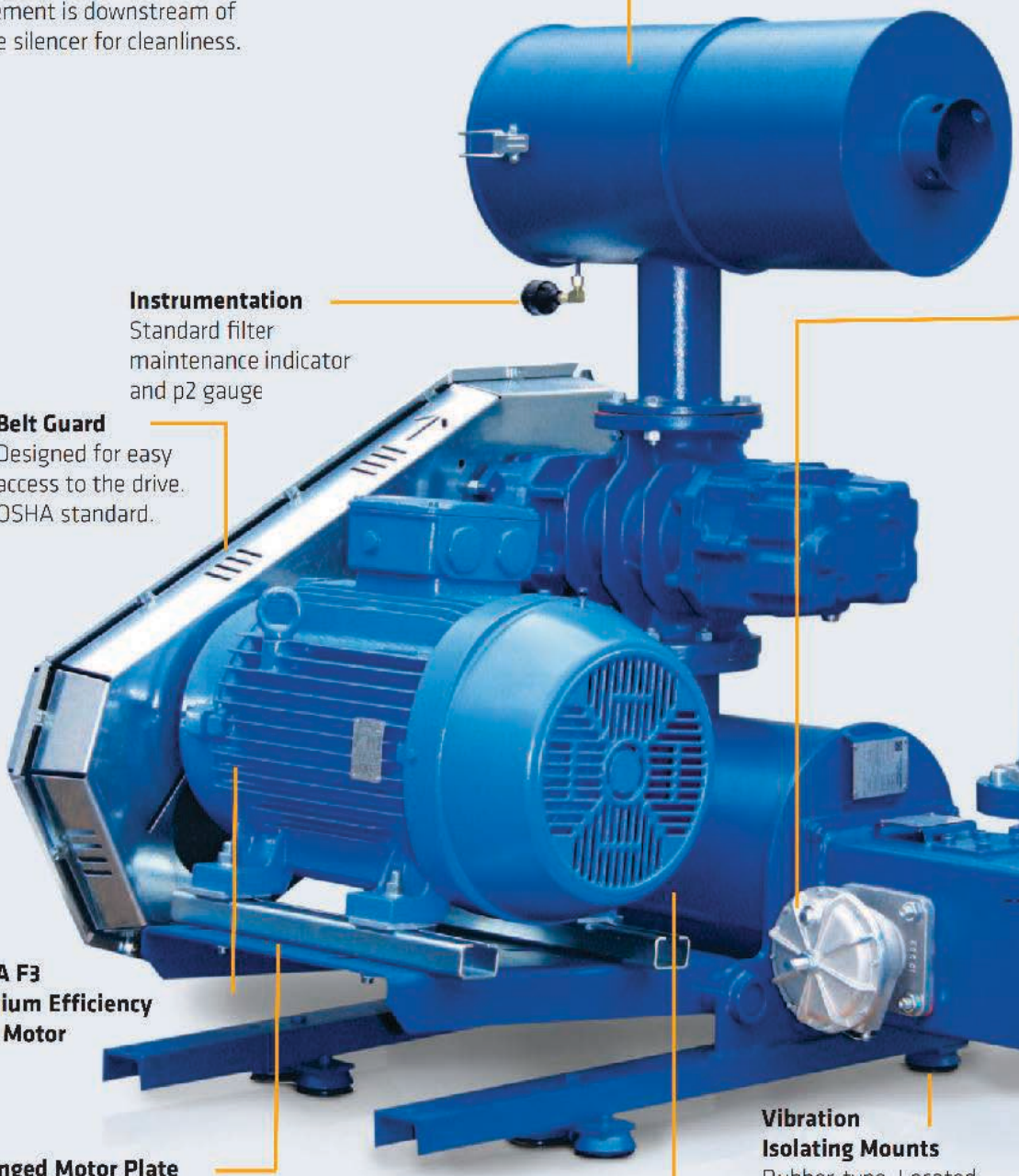


7 No need for additional electric motor and interlocks with shaft-mounted cooling fan for forced ventilation of the enclosure

8 Reactive discharge silencer without internal absorption material

For more information, visit **www.aerzenusa.com**

The accessories that make the difference.



Inlet Filter/Silencer
Easily replaceable filter element is downstream of the silencer for cleanliness.

Instrumentation
Standard filter maintenance indicator and p2 gauge

Belt Guard
Designed for easy access to the drive. OSHA standard.

NEMA F3 Premium Efficiency TEFC Motor

Hinged Motor Plate
Steady alignment and consistent tension provided by the motor weight. No springs needed. Constant high efficiency.

Reactive Discharge Silencer & Blower Base
Machined support surface for blower. Stiff for installation on vibration isolating mounts. Low pressure drop design. No absorption packing material. ATEX spark arrestor.*

Vibration Isolating Mounts
Rubber-type. Located under the supporting base. No special foundation required.

Discharge Flexible Connector
Reinforced rubber. Downstream of discharge silencer to reduce transmission of structure-borne noise.

Pressure Safety Valve
Spring-loaded. Specifically designed for low pressure applications. Mounted vertically downstream of the silencer for longevity.*

Aeromat Start Unloading Valve (Optional)
Allows startup of the main motor with no load. The valve is completely self activating and does not need any auxiliary electrical or pneumatic power source.

Discharge Manifold*
With integral full bore check valve for low pressure drop. The check valve can be inspected without disconnecting the piping. Non-chatter check valve suitable for adjustable speed operation.

Instrumentation package:
AERtronic Control System includes pressure transmitters for intake, discharge and oil pressure, as well as resistance temperature detectors (RTD) discharge and oil temperature and operator interface.

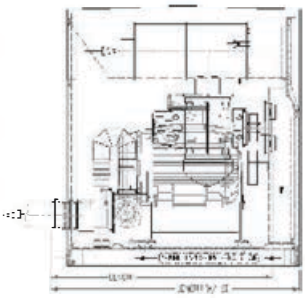
*PED compliant pressure vessel

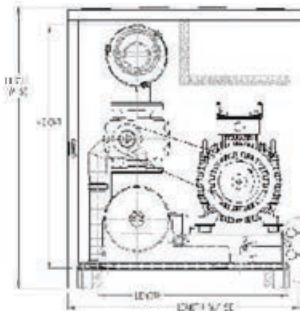
G5 Blower Dimensions

Aerzen Blower Model	Length (inches)	Width (inches)	Height (inches)	Weight (lbs)	Nominal Nozzle Size	Nominal Discharge Pipe Diam. (inches)	Max. Flow (icfm) at 10 psi rise	Pressure (psi)
GM 3S	31	33	43	485	DN-50	2	131	15
GM 4S	48	36	52	695	DN-80	3	184	15
GM 7L	48	36	52	706	DN-80	3	270	10
GM 10S	48	36	52	759	DN-80	3	339	15
GM 10S	55	51	61	1120	DN-100	4	385	15
GM 15L	55	51	61	1153	DN-100	4	576	10
GM 25S	59	55	61	1279	DN-125	5	823	15
GM 30L	80	73	78	2161	DN-150	6	1186	10
GM 35S	80	73	78	2293	DN-150	6	1370	15
GM 50L	80	73	78	2492	DN-150	6	1494	10
GM 50L	78	84	86	2889	DN-200	8	1896	10
GM 60S	78	84	86	3219	DN-200	8	2020	15
GM 80L	99	90	94	7872	DN-250	10	2828	10
GM 90S	99	90	94	8004	DN-250	10	3090	15
GM 130L	126	116	96	7111	DN-300	12	4449	9
GM 150S	126	116	96	7651	DN-300	12	5120	15
GM 240S	(depends on motor size)				DN-400	16	8800	12

Notes

1. *For informational use only. Dimensions shown are close estimates and are subject to change without notice. Contact Aerzen USA if certified dimensions are required. Dimensions are in inches, weights are in lbs.*
2. *Weight notes: motor not included.*
3. *Oversize/overweight motors may require hinge plate support; dimensions and weights may vary. Consult Aerzen USA with specific application.*
4. *Packages available w/o sound enclosure. Consult Aerzen USA.*





Aerzen means trouble-free compression.

Aerzen's modular blower packages have been offered since the 1960s. Aerzen Delta Blower packages have been in successful operation since the 1990s. They are just one of the offerings in our single stage positive displacement program. Whatever your application and installation requirements, be sure to consider Aerzen.

Delta Care Maintenance Agreement

Warranty: 5 years optional with our Care Maintenance Agreement

For Pressure

- Up to 15 psi: G5 Blower packages
- Delta Hybrid up to 22 psi
- 10 to 51 psi: Oil-free and air-cooled VM and VML screw compressors

For Vacuum (Dry)

- Up to 15″ Hg: G5 Blower packages
- Hybrid up to 20″ Hg
- Up to 25″ Hg: G5 Blower packages with pre-inlet cooling
- Up to 25.5″ Hg: Oil-free and air-cooled VM screw compressors at same flow (30% more efficient than PD blowers)
- Vacuum boosters to 10-3 mbar absolute

For Extended Pressure/Vacuum

- Up to 40,000 cfm available
- For other gases, higher pressure/vacuum consult factory

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AERZEN
EXPECT PERFORMANCE

AERZEN DELTA BLOWER GENERATION 5
North American Standard
Positive Pressure

Standard range

Blower sizes: ..... GM 3S to GM 150S

Package nominal sizes: ..... 2” (DN 50) to 12” (DN 300)

Medium: ..... Air

Flow range: ..... 35 to 5297 icfm (1.0 to 150 m^3/min)

Differential pressure: ..... 15 psi (1000 mbar) for “S” and 10 psi (700 mbar) for “L” machines

Maximum operating temperature: 285ºF (140ºC)

Drive: ..... V-belt drive with totally automatic belt tension adjustment

Introduction

The Aerzen Blower is renowned for its performance and its reliability. There is no secret: From the blower-stage through the accessories, Aerzen enhances key features of each component by applying sound engineering, precision machining, and superior workmanship.

The Delta Blower Generation 5 (G5 for short) is the synthesis of four previous Aerzen blower package generations combined with an array of new technical innovations to provide five key advantages to our customers:

- The machinery noise level has been lowered yet another 6-8dBa[1] on average compared to the previous Delta Blower
- The blower package is even more user friendly especially in transport, installation, operation, and maintenance
- The oil level is visible from the outside of the package, so the blower does not need to be shut down
- No absorption material is used in the discharge combination silencer; this eliminates the possibility of foreign objects contaminating the air or gas stream
- Use of a shaft mounted cooling fan, which reduces installation and operating costs by eliminating extra wiring, motor starters, and its interlocking with the main blower motor
- The compact footprint allows units equipped with sound enclosure to be mounted side-by-side since there is only one main maintenance access side

[1] Measured in 1m free-field conditions

Aerzen Delta Blower Generation 5 are pre-engineered modular compact packages, which offer a wide range of options from proven and standardized components at reasonable costs and short delivery times.

Shipped completely assembled, the Aerzen Delta Blower Generation 5 is indoor and outdoor rated. There is no extensive installation work - neither grouting nor special anchoring is required, just simply level it and bolt it to any standard industrial flooring or surface.

Scope of supply: basic configuration

- Aerzen Rotary Lobe Blower stage
- Combination Base Frame / Silencer combined with hinged motor plate for automatic belt tensioning – with 2 ½" diameter discharge pressure gauge
- Making belt changes as easy as possible a motor hinge plate lifting and locking mechanism is included with DN100-300 units and a hydraulic bottle jack is supplied with DN50 and 80 units.
- Set of vibration isolating mounts under the entire blower package
- Inlet silencer – filter with filter maintenance indicator
- Narrow V-belt drive and protection guard
- Pressure safety valve
- Discharge manifold with integral check valve and flexible pipe connector
- Standard paint system
- NEMA electric motor TEFC, Premium efficiency, VFD duty, with conduit box on top
- First oil fill and "Service kit"
- Packaging for domestic trucking
- Standard documentation in electronic format: English language, drawings with US-customary and metric units of measure

Standard options include (not limited to)

- Inlet pipe connection kit
- Sound enclosure with skid / oil-drip pan and forced ventilation
- Start-unloading valve Aeromat, with or without solenoid valve
- Pressure modulating valve Aeropress or Aeropress10S, pilot operated
- Other motors, e.g. misc vendors Premium Efficiency with conduit box on top
- Instrumentation & controls, e.g. AERtronic Aerzen blower controller

Description of the main components

The combination of key components marked with a * in the description below significantly contribute to the reliability and performance of the Aerzen Blower:

At the heart of the package: The Aerzen Rotary Lobe Blower

Low vibration and low pulsations - a key feature:

* Internal pulsation interference channels in conjunction with 3-lobe rotors reduce the pulse in the discharge air stream by as much as 90% or 20 dB at the lobe-passing frequency. This significant attenuation contributes strongly to reducing vibrations in the entire package and lowering the noise emitted by the downstream piping.

Positive displacement characteristic:

- The blower moves a fixed volume of gas with each shaft rotation, nearly independently from the operating pressure.
- At constant differential pressure, the load torque remains constant.
- For a given pressure, the power is directly proportional to the speed.

Flow across the blower stage:

- Vertical from top to bottom

Drive shaft location:

- On the left when facing the blower shaft

Rotation:

- Counterclockwise when facing the blower shaft

Housing:

- The central section, “the cylinder” and the two side-plates house the rotors, while a gear case and a drive end cover contain the lubricating oil for bearings and gears. Individual side plates allow for optimal setting of the radial rotor clearances: a valuable feature on blowers with the gas flowing perpendicular to the rotors.
- Connections: full-size, flat-faced flanges
- * Maintaining internal alignment under all operating conditions is paramount for the reliability of any rotating equipment. The housing is, for this purpose, designed to support the entire blower stage on its outlet flange only; no need to worry about a “soft foot” or uneven base support
- Materials: Gray cast iron EN-GJL-200 equivalent to ASTM A48 Cl.30 AISI A278 Cl. 30

Rotors:

- Up to and including the model GM 80L, rotors and shafts are made of a single, drop forged steel piece made from C45 steel equivalent to AISI Type 1045. Models GM35S, 50L, 90S, and 130L are made from a single piece of EN-GJS-500-7 nodular cast iron equivalent to ASTM A 536. Model GM150S rotors are comprised of a through shaft made from C45 steel equivalent to AISI Type 1045 and a rotor made from EN-GJS-400-15 nodular cast iron equivalent to ASTM A536 Gr. 60-40-18. Solid or dust-tight rotors do not have any open cavities that can trap contaminants. This is particularly important in food applications and applications requiring high purity. Moreover, rotor balance is maintained, and vibration is therefore minimized.
- Stiff rotor design: the rotors' first critical speed is always at least 10% above the maximum operating speed.
- The rotors meet or exceed the ISO 1940 / ANSI S2.19 G6.3 criteria of dynamic balancing

Timing gears:

- Helical gears with hardened and ground teeth to meet AGMA 12 quality standard with an AGMA service factor of 1.70.
- To maintain the advantage of high-quality gears, the gear wheels are secured onto the shafts by means of a tapered interference fit. Optimum concentricity is achieved and neither gear hub nor shaft keys are used. To prevent damaging the seats, gear installation and removal are carried out using hydraulic pressure to expand the gear wheels within their elastic limit.

Bearings:

- The rotors are supported by anti-friction bearings
- The bearings are housed in the side-plates and are sized for an expected 5 years between overhauls.
- The drive-shaft bearing is a cylindrical roller bearing whereas the other bearings are selected to achieve the proper clearances between rotors and housing, axial loads from the helical bearings: smaller machines up to GM 50L feature double angular ball bearings.

Lubrication:

- Oil splash lubrication of all bearings and gears through oil spray disks on both blower ends
- An oil sight glass is provided on each oil sump.
- An oil drain valve is provided on each oil sump (units without sound enclosure). The oil drain valves are directly mounted to the oil sump covers for clean, easy and fast oil change.
- Units with sound enclosure are plumbed together to an oil reservoir that serves as oil fill and drain device, and its oil sight glass is visibly mounted to the maintenance side of the enclosure.
- Aerzen USA provides the first oil fill with a lubricant as recommended in the operating manual as well as a service-kit containing oil fill funnel, and oil drain hose.

Seals at the rotor chamber:

- The rotor chamber is sealed from the oil chambers by four, all metal, non-rubbing seals, each consisting of the following components and in that sequence:
  - Oil slinger ring
  - Two restrictive piston-rings in a labyrinth
  - "Neutral chamber" located between the piston rings used for venting the seal
  - Two restrictive piston-rings in a grooved labyrinth bushing

Seal at the drive shaft:

- Double, permanently lubricated Viton seal ring
- Shaft sleeve: replaceable, hardened steel

Testing

- Each blower stage is subject to a full-load test to verify the volumetric flow and power values.
- Acceptance criteria are +5% on power and –5% on flow for all machine sizes.
- Orifice flow measurement and conversion of results to the operating conditions in accordance with ISO 1217, simplified

The package component Aerzen Rotary Lobe Blower

Intake air silencer & filter

- Absorption-type silencer upstream of the air filter element. For reasons of cleanliness, there is no silencing material between the filter and the inlet blower flange.
- The carbon steel housing is powder coated. Quick-release latches for quick access to the filter element
- Filter performance: G4 per EN 779 (greater than 90% of synthetic dust particles), equivalent to ASHRAE 52.2 MERV 7 (50-70% @3-10 microns)
- Progressively compressed, thermally bound polyester fibers, free of PVC, smoothened and compressed on the clean airside for highest dust separation and retention capacity. The filter media is made of a single, 30 mm thick continuous mat that is white in color and is food safe. Filter element mounts with a quick release turn and lock arrangement.
- Included is a filter maintenance indicator. If the sound enclosure option is selected, the filter maintenance indicator is mounted to the enclosure wall.

Base with integral discharge silencer:

- In addition to the blower's internal pulsation cancellation feature, the combination discharge, three-chamber reactive silencer is used to further reduce the noise and residual pulsation in the air stream across a wide range of operating speeds. The residual pulsation downstream of the silencer meets or exceeds the API 619 recommended 2% peak-to-peak of the absolute line pressure.
- The discharge silencer is combined with the support base into one compact rugged unit. It is made from pressure vessel steel it forms a torsion resistant cylindrical vessel supporting the blower stage and other components.
- The mounting surface for the blower is a full-size steel flange machined and continuously welded to the base with the full number of tapped holes for the studs to fasten the blower to the base - no need to align blower feet or to worry about a soft-foot condition. A surface sealant is used instead of a gasket.
- Maximum operating pressure: 1.1 bar gauge (16 psig) and 150ºC (300ºF), built and certified to the latest European Pressure Vessel Code, PED. Test pressure: 1.9 bar g. (27.6 psig)
- The base is mounted on a set of vibration-isolating mounts

Belt drive

- Narrow, anti-static V-belts
- Selected for a minimum service factor of 1.4 times operating power (BHP), or 1.1 times the motor nominal power (nameplate HP), whichever is greater.[2]
- * The Aerzen Delta Blower Generation 5 package provides entirely automatic tensioning of the belts. Thanks to the package configuration, the drive geometry is such that the motor hinges parallel to the motor shaft centerline, using only the motor mass to maintain this tension without need for adjustments or springs. This not only reduces maintenance; it also reduces the potential for operating with too little (slipping belts) or excessive belt tension (excessive bearing and shaft load).
- DN100-300 blower packages feature a multipurpose lifting device for the motor swing plate. In its most basic function, it serves as shipping locking device preventing the motor from unwanted movement. It also serves as the lifting mechanism for changing out the drive belts. Another additional purpose is limiting the belt tension when oversized motors are used. Finally, the device can be configured to aid limited movement for seismic or mobile blower package service. The maintenance kit provided by Aerzen USA also includes a ratchet wrench used for lifting the motor to change V belts.
- DN50 & DN80 blower packages have a simple to use bracket and hydraulic jack included in the maintenance kit to lift the motor and change or install the belts.
- Sheaves and bushings are dynamically balanced to ISO 1940 / ANSI S2.19 G6.3. For linear tip speeds > 6500 ft/min (33 m/s), nodular cast-iron, ventilated sheaves are used.

Belt guard

- OSHA compliant personnel guard, made of galvanized steel: either perforated steel or solid sheets with vents, depending upon the model.
- Units with sound enclosure feature hand protection fan and belt guards, and the enclosure itself serves as the ultimate protection device. The removable maintenance panels comprise lockable latches that help facilitate OSHA prescribed tag-out-lock-out procedures.

Vibration isolating mounts

- A set of vibration isolating mounts are located under the blower package to hinder the transmission of structure borne noise from the blower and the discharge silencer into any structure the package is installed on, such as a mounting skid if supplied with acoustic enclosure.

Discharge manifold

- Flange-mounted to the discharge silencer, the discharge manifold serves for mounting the pressure safety valve, an optional start-unloading valve and for connecting the blower package to the discharge piping.
- Materials of construction: Gray Cast Iron EN-GJL-250 equivalent to ASTM A48 (Aluminum stub pipe for DN50)
- The discharge manifold houses the discharge check-valve

Pressure safety valve

- DN100-300 blower packages have a vertically mounted, spring loaded, safety pressure valve sized for the full flow of the blower. DN50 and DN80 blower packages feature horizontally mounted safety relief valves.

---

[2] Higher values are not necessarily better as they could lead to belt slippage due to excessive stiffness, and also shaft damage (deflection) caused by higher tension values required by over sized v-belt drives.

- The valve's characteristic is nearly proportional. It not only opens, but also closes at the set pressure
- The valve has a built-in dampener that allows the valve to actuate smoothly, which prevents the "pop-off" effect commercially available valves exhibit.
- Pressure rise up to 10% at full flow. Certification of conformity to PED
- Being an all-metal valve, it is not suitable as a pressure modulating valve. If this function is needed use an Aerzen pilot operated Aeropress or Aeropress10S pressure modulating valve.
- Materials: seat of gray cast iron and, depending on the size, a brass or anodized aluminum bell and piston, galvanized spring, steel spring rod, and an aluminum or fabricated external steel cylinder.
- Standard set points are 15.2 psig (1050 mbar) for "S" model blowers operating above 10 psi (700 mbar), and 10.9 psig (750 mbar) for all machines operating under 10 psi (700 mbar), including all "L" model blowers[3].
- The valve protects the blower stage against line surges, and spikes. It does not protect against prolonged overloads or excessive discharge temperature. Therefore, it is not an absolute protection device, nor is it "bubble tight".

Discharge check valve

- A full-bore check valve that can be easily removed for inspection and maintenance without disconnecting the discharge piping[4]
- With its horizontal top-located steel shaft[5], the check valve naturally closes by gravity at no-flow.
- Without any springs, the check valve will not chatter, even at low flow conditions (for example in adjustable speed applications)
- Flap material: EPDM on steel for operating temperatures up to the blower limit
- Optional check valve flap material: Silicone rubber

Discharge flexible connector

- A reinforced silicone-rubber discharge flexible connector with heavy-duty clamps connects to the discharge piping.
- It prevents the transmission of structure-borne noise from the blower and its discharge silencer to the discharge piping.
- Located downstream of the silencer and with only a small gap (~1/2") between the package and the pipe, the noise sent to the outside is maintained at a minimum.
- The sleeves are sized for standard, schedule 40 pipe diameters.

Discharge pressure gauge

- Liquid filled, 2 ½ "dial. Units: mbar and psi
- If the sound enclosure option is selected, the discharge pressure gauge is mounted to the sound enclosure wall.

[3] The valves are adjustable, and different springs are available for other set points depending upon operating conditions, motor limitations, or customer's requests.

[4] Except DN50

[5] Except DN50

Optional sound enclosure

- — Covering the entire blower package with the drive motor, the enclosure provides suitable protection for outdoor installation up to 50 mph winds and 25 lb/ft^2 snow load and rain at a 45º angle
- * — The enclosure and the blower package are both mounted on a skid / oil-drip pan, designed for meeting environmental protection standards as well as for easy transportation and installation.
- * — The unique Aerzen package design makes it possible to mount multiple blowers side-by-side without hindering access to the maintenance side (front). All pipe and wiring connections are made from the backside. This offers the best use of available floor space.
- * — All maintenance activities can be carried out from the front of the package, e.g. air filter, belts, and oil maintenance. The oil level is visible from the outside and eliminates any guesswork. Oil can be filled and drained from a common reservoir that also houses the oil level gauge.[6] The oil level check can be done with the blower in operation.
- — The enclosure reduces the package noise level to less than 80 dB(A) – 75dB(A) in most cases- at 1 m, free field, per DIN 45635.
- — Quick release panels, each less than 50 lb (as mandated by MSHA) provide quick and easy access to the blower and the package components for routine maintenance.
- * — Blower packages are fitted with a shaft-mounted cooling fan for sufficient heat removal. There is no need for a separate electric driven fan and required interlock and controls.
- — Aerzen mounts the blower package in the sound enclosure at our factory prior to shipment.
- * — Panels are made of galvanized steel sheet, with self-extinguishing, non-dripping high-density polyester foam as absorption material.
- — The enclosure is powder coated in a UV resistant Aerzen Royal Blue color, accented with light gray maintenance panels

[6] Except DN50

Hebevorrichtung für Motorwippe

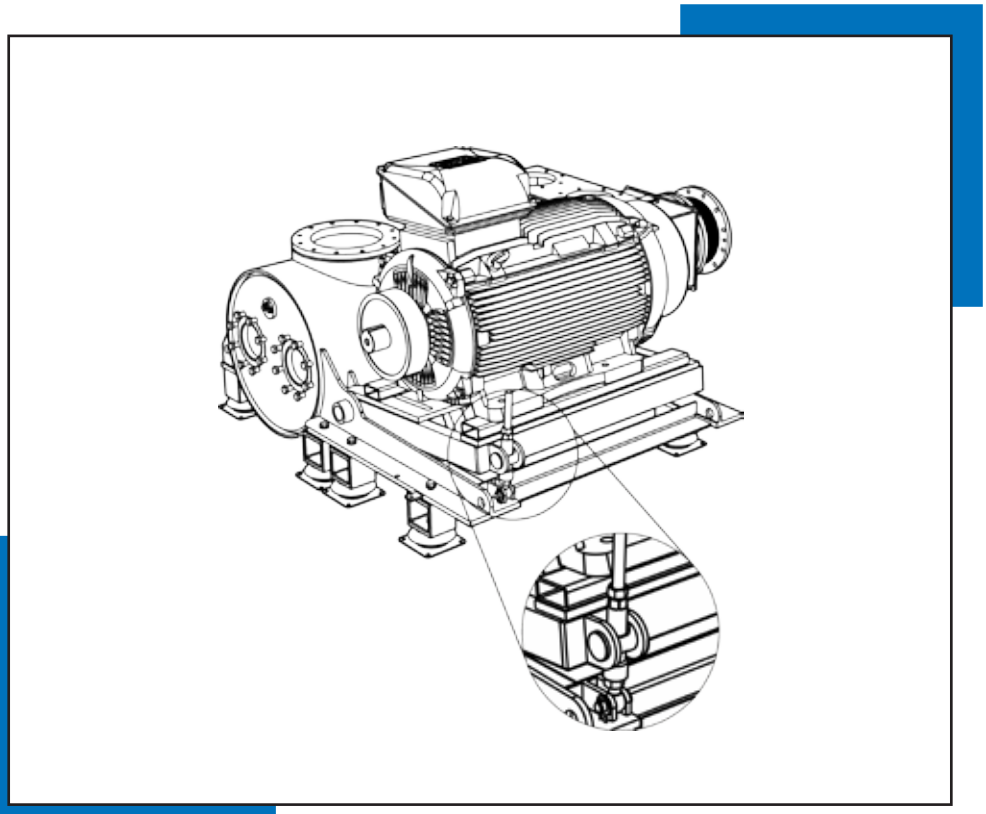
Lifting device for motor base

Dispositif de levage pour moto-interrupteur à bascule

Hijsinrichting voor motorwip

Mecanismo de elevación para base de motor

Dispositivo di sollevamento per basamento oscillante del motore



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... ...	03-2014

Typ / *type*

Delta Hybrid
Delta Blower Generation 5
Delta Screw Generation 5

1. General notes

- This description serves as guide for the operation of the hinged motor lifting device.
- Usage requires special knowledge in using and handling this kind of machine.
- For correct operation of the hinged motor in the Delta unit, qualified and trained specialists are required.
- Only use envisaged and suitable tools for adjusting the hinged motor.

Every person involved in the adjustment of the hinged motor should read and understand this description and the corresponding operating instructions and especially the safety instructions!

WARNING!
Danger of injury if insufficiently qualified!
Incorrect use can lead to considerable personal injury and property damage.

- All actions should therefore only be carried out by adequately qualified specialists.

Specialists
are due to their technical training, knowledge and experience as well as knowledge of the relevant provisions able to carry out all work assigned to them and to recognise and avoid possible dangers.

Only personnel are allowed to work whom it can be expected to carry out the work in a reliable manner.

Persons whose responsiveness is influenced due to drugs, alcohol or medication are not allowed.

Age and job-specific regulations should be taken into consideration with the choice of personnel.

Typ / *type*

Delta Hybrid
Delta Blower Generation 5
Delta Screw Generation 5

2. Safety information

The hinged motor should only be set or adjusted when the machine is not in operation and secured against reactivation!

Securing against reactivation

The machine should be secured against reactivation for all actions that require the machine to be in a non moving condition (e.g. work or fault rectification).

WARNING!
Lethal danger due to unauthorised, uncontrolled or impermissible reactivation!
Unauthorised or uncontrolled reactivation of the machine can lead to serious injuries or death!
Persons could be in the hazardous area.

Applying power can lethally injure these persons.
- Secure the main switch and lock.
- Signs should be placed on the main switch and users informed of the possible dangers.
- Before reactivation ensure that all safety equipment is assembled and fully functional and that there are no dangers existing to persons.
- Always adhere to the following procedure for securing against reactivation.

1. Switch off energy supply.
2. Secure the main switch using a lock which should be locked and a relevant sign should be placed on the main switch.
3. The key should be kept safe with a responsible person.
4. If the main switch cannot be secured, relevant signs should be placed indicating the dangers.
5. After all work is completed check that there are no persons in the hazardous area.
6. Make sure that all protection devices are installed and fully functional.
7. Unlock the main switch and remove the signs.

Typ / *type*

Delta Hybrid
Delta Blower Generation 5
Delta Screw Generation 5

CAUTION!
Danger of injury due to sharp edges and pointed corners!
Sharp edges and pointed corners can cause abrasions and cuts to the skin.
- Proceed carefully when working near sharp edges and pointed corners.
- If in doubt wear protection gloves.

WARNING!
Danger of injury due to moving and rotating components!
Moving and rotating components can cause serious injuries.
- Correctly take the machine out of operation and secure against reactivation before adjusting the hinged motor.
- During the adjustment of the hinged motor do not touch or grasp any moving components.
- Wear close fitting protective clothing with a low tear resistance when in the hazardous area.

WARNING!
Shear and crushing danger due to moving parts!
Moving components can cause shear and crushing injuries.
- Do not grasp between any moving components when working on the hinged motor.
- Never enter the swivel range of the hinged motor.

- Only use the ratchet spanner and the original mounting material that were delivered to adjust the hinged motor!

- The hinged motor should not rest on the guide bushing when in the operating position.
  Exception: Hinged motor support for motors with increased weight.

  Otherwise the belts slip and wear out sooner.
  Danger of property damage!

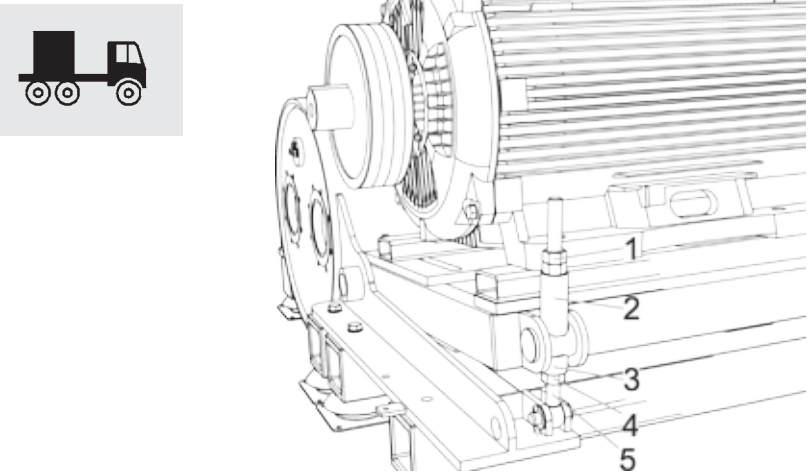
  The hinged motor should also have sufficient space to place the guide bushing after the belt has stretched.

Design with acoustic hood

- After adjusting the hinged motor correctly close the acoustic hood.

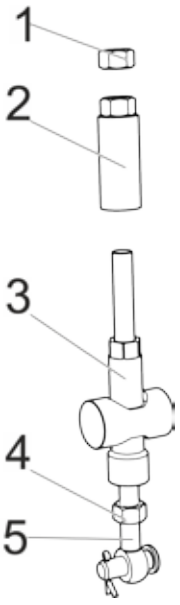
3. Delivery condition

Factory delivery condition / without drive belts.



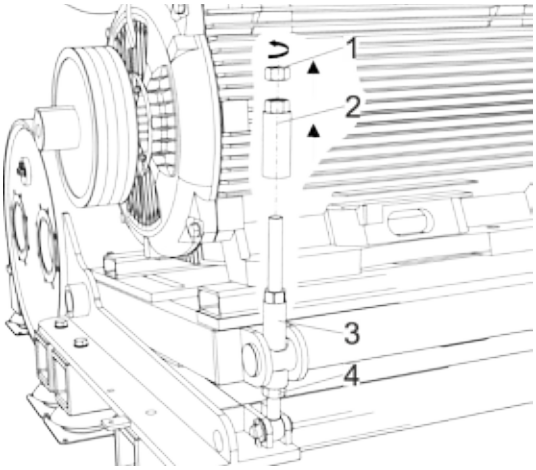
Fixed hinged motor / transportation lock

4. Assembly overview



Pos.	designation
1	Locking nut 1
2	Locking sleeve
3	Guide bushing
4	Locking nut 2
5	Eyebolt

5. Adjusting the hinged motor before commissioning



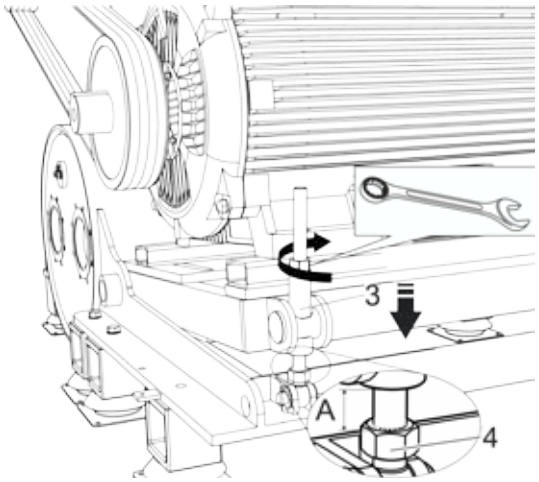
- Disassemble locking nut (1) and locking sleeve (2).

Check to direction of rotation
Observe the red direction of rotation label on the unit.
Briefly start the drive motor. (approx. 1 - 2 seconds)

Important: WITHOUT belt on the motor disc!

Incorrect direction will destroy the unit!
Direction of the drive motor and the unit must be the same.

- Mount the belt.



Pre tension the belt

- Screw down the guide bushing (3) with the ratchet spanner.
- The hinged motor is still slightly on the guide bushing (3).

Adjust dimension A

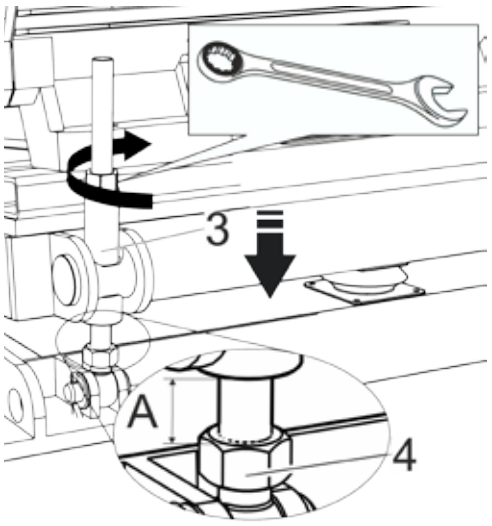
- Adjust the locking nut (4) to dimension A.
- Turn the guide bushing (3) onto the locking nut (4) with the ratchet spanner.

Delta Blower

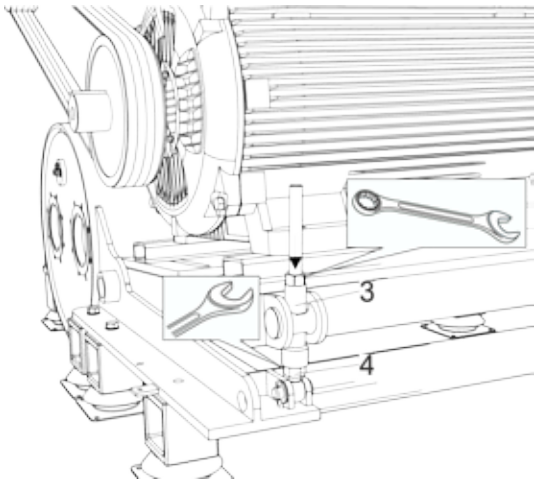
DN	dimension A in mm
80	20
100	25
125	30
150	35
200	40
250	45
300	50

Delta Hybrid

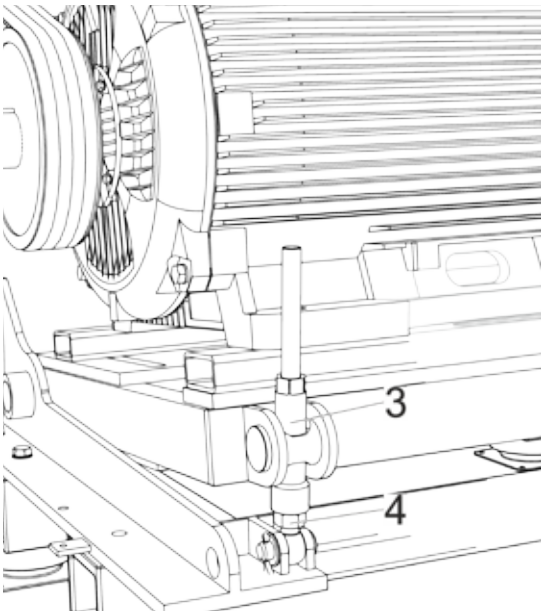
DN	dimensions A in mm
100	25
125	25
150	30
200	35
250	40
300	45



- Lock the guide bushing (3) against the locking nut (4).
- The hinged motor is completely held into place by the belt drive.



6. Operating condition, normal use



7. Adjustment of the hinged motor for truck, ship and earthquake preparation

Prepare the lifting device as with the standard application and set dimension A.

Rocker limit set to the upper position.

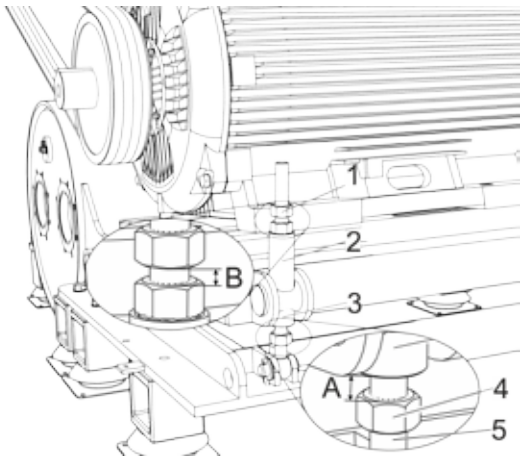
- Screw and tighten the locking sleeve (2) completely onto the eyebolt (5),
- Adjust the locking nut (1) to dimension B.

Delta Blower

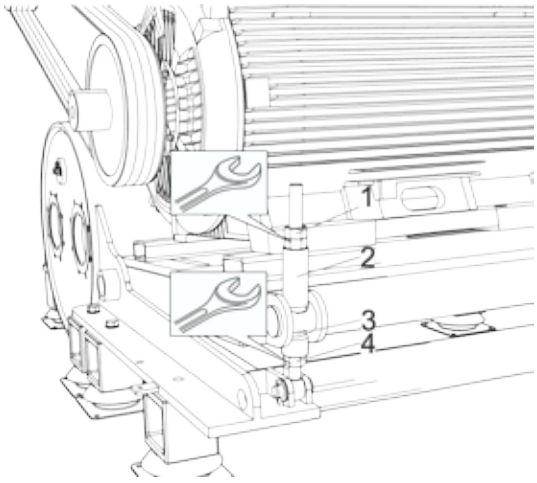
DN	Size B in mm
80	5
100	5
125	5
150	10
200	10
250	10
300	10

Delta Hybrid

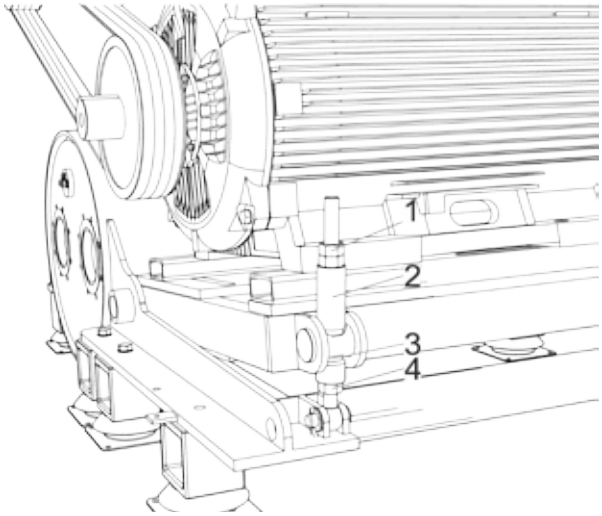
DN	Size B in mm
100	**5**
125	**5**
150	**5**
200	**5**
250	**5**
300	**5**



- Loosen the locking sleeve (2) turn upwards and lock with the locking nut (1).



8. Operating condition
Truck, ship and earthquake preparation

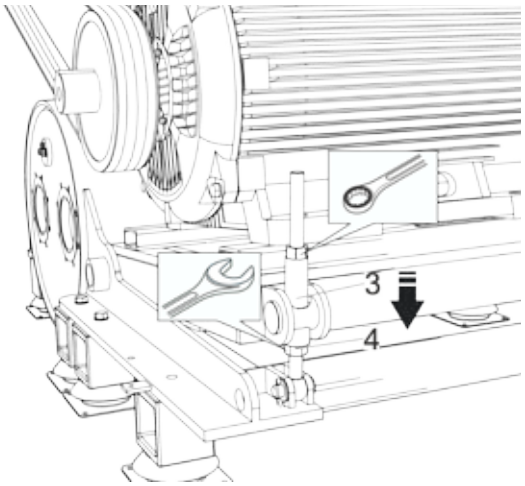


9. Adjustment of the hinged motor for rocker support

Prepare the lifting device as with normal use.

Lower the hinged motor until the belt is tensioned.

- Check the belt tension.
- If the belt tension is incorrect, lock the guide bushing (3) and the locking nut (2).
- Check the belt tension after the following intervals and adjust if necessary:
  after 24 op. hrs. after 500 op. hrs after 4000 opt. hrs

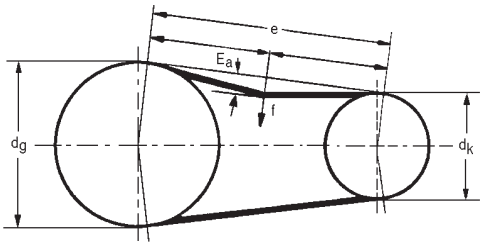


Belt tensioning

1. Set the testing force via the profile type.
2. Determine the disc diameter **dk** on the drive and derive from this the indentation depth **E.**
3. Calculate the indentation depth**Ea** with the existing axial distance **e.**
4. The testing force **f** is to be asserted in the middle of the axial distance **e** on the drive belt. The testing force should be exerted vertically on the strand! Pretension the drive to the calculated indentation depth **Ea.**

Pretension example: **Profile** = SPZ; **dk** = 100 mm; **e** = 380 mm; **f** = 2.5 daN; **E** = 2.00 mm; **Ea** = 7.6 mm

The drive belts should be re-tensioned after 30 min. of operation and be checked if possible after 24 hours.



e = axial distance
E = indentation depth every 100 mm axial distance
E_a = indentation depth of the strand
f = testing force

$$E_a = \frac{E \cdot e}{100}$$

Profile	Testing force f for each drive belt (daN)	Diameter d_k (mm)	indentation depth E (mm) each 100 mm Strand length with initial assembly	indentation depth E (mm) each 100 mm Strand length in operation after running in.
SPZ/3V XPZ/3VX	2.5	≥ 56 - 71 > 71 - 90 > 90 - 125 > 125	2.20 1.95 1.50 1.20	2.45 2.20 2.00 1.70
SPA XPA	5.0	≥ 71 - 100 > 100 - 140 > 140 - 200 > 200	2.80 2.50 2.20 2.15	3.20 2.85 2.55 2.40
SPB/5V XPB/5VX	7.5	≥ 112 - 160 > 160 - 224 > 224 - 355 > 355	2.40 2.10 1.70 1.40	3.00 2.65 2.22 1.90
SPC XPC	12.5	≥ 180 - 250 > 250 - 355 > 355 - 560 > 560	2.30 1.90 1.65 1.60	2.65 2.30 1.90 1.70

Technische Dokumentation

Technical Documentation

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e-mail info@aerzener.de

Kundenservice
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Aerzen im Internet
www.aerzener.com

SECTION 3

G-5 Combination Base - Discharge Silencer

Description: Combination base - discharge silencer

Base/discharge silencer includes three-chamber reactive silencer built as a pressure vessel, blower mounting-flange with studs, discharge connection with integrated check valve, hinged motor plate, entirely supported on vibration isolating feet.

Materials of construction:

Silencer: Pressure vessel quality carbon steel S 235 JR (St 37-2) equivalent to ASTM A 283 Grade B

Pressure vessel code: PED (European directive) PED – AD 2000, DGRL 97/23/EG with consideration given to static and dynamic stress (fatigue resistance)

Maximum operating data: 150 ºC (300 ºF) and 1.1 bar gauge (16 psig)

Test pressure: 1.9 bar gauge (27.5 psig)

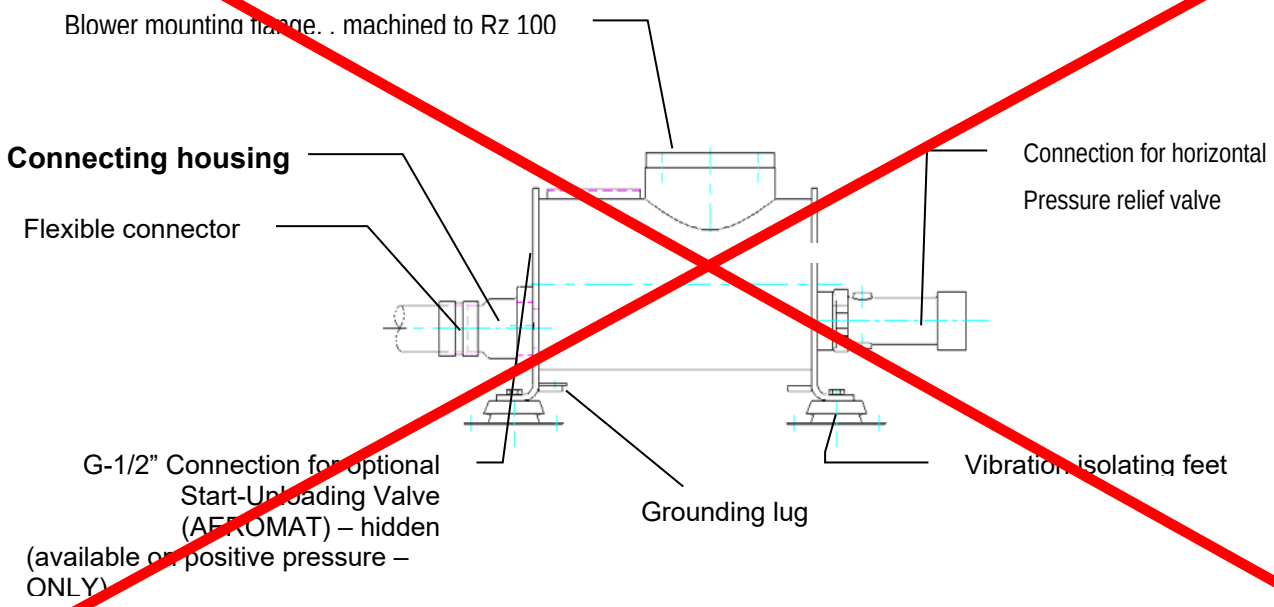
Shell wall thickness: depending on size: 6mm (1/4") for DN-50 → 15mm (5/8") for DN-300

Performance:

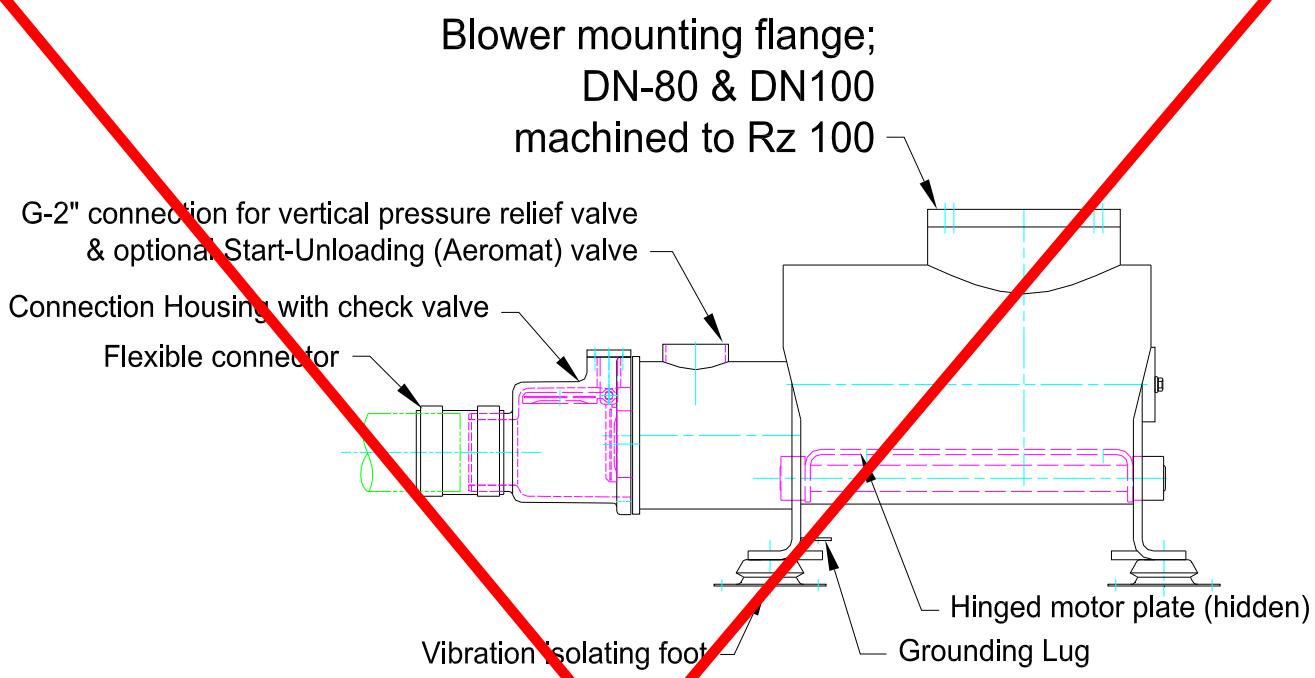
Pulsations in the air stream are reduced below the API 619 standard of 2% peak-to-peak of the mean line pressure.

Pressure drop of the entire Base-Silencer with connecting housing and check valve, at the maximum allowable flow: 35 mbar (0.5 psi); included in the power calculations of the Delta Blower package

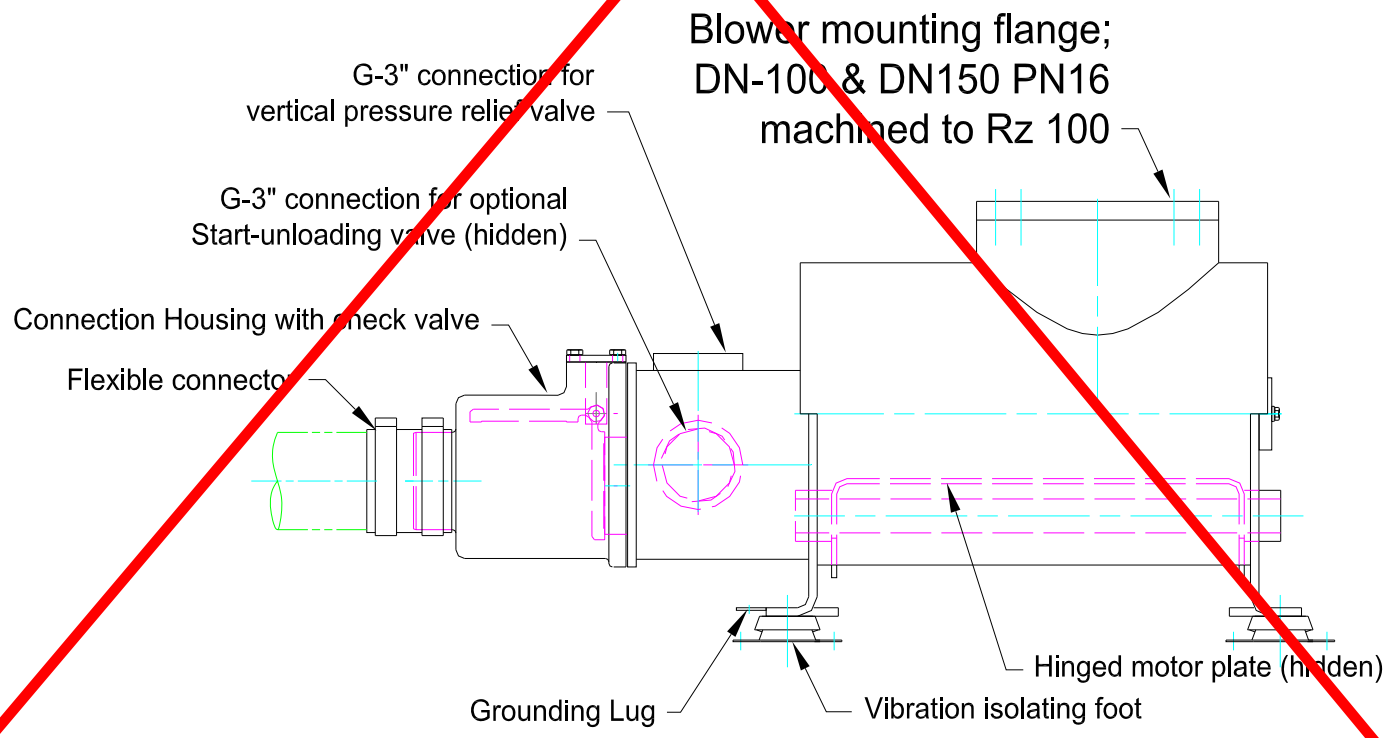
Combination Base - Discharge Silencer DN50



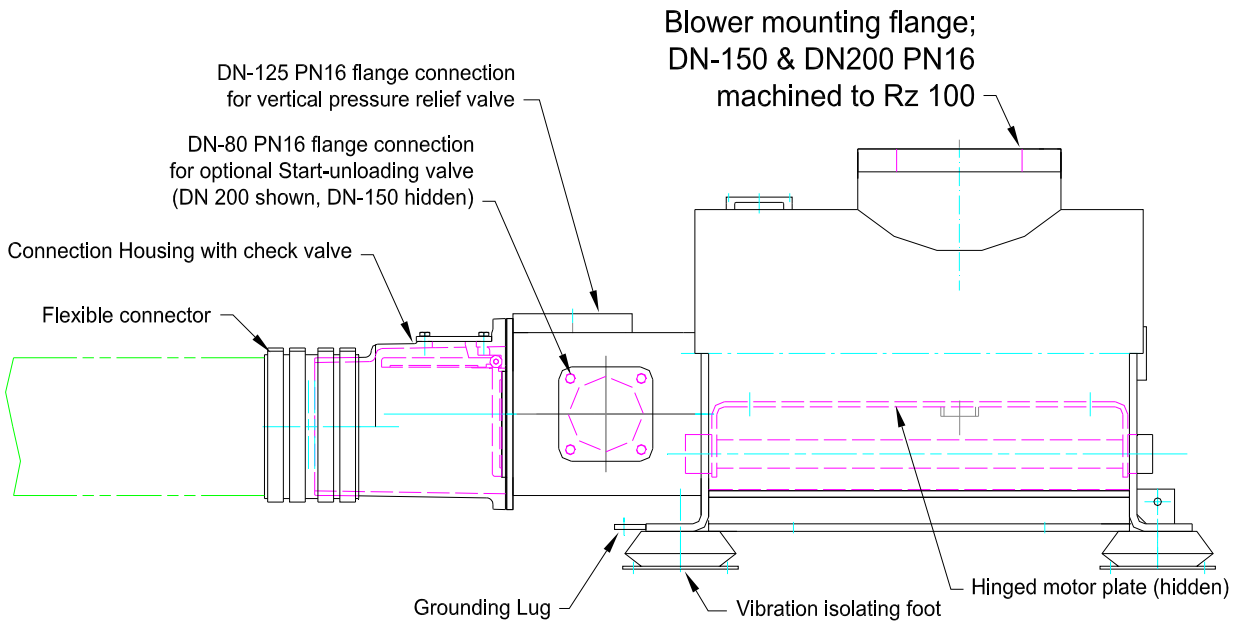
Combination Base - Discharge Silencer DN80



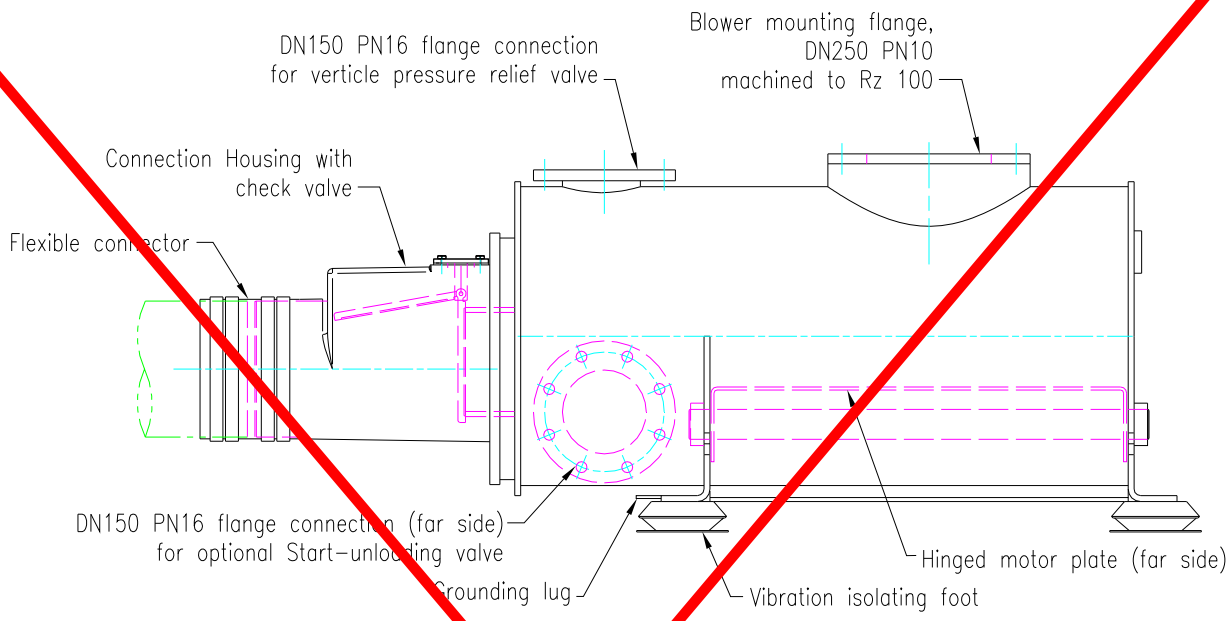
Combination Base - Discharge Silencer DN100/125



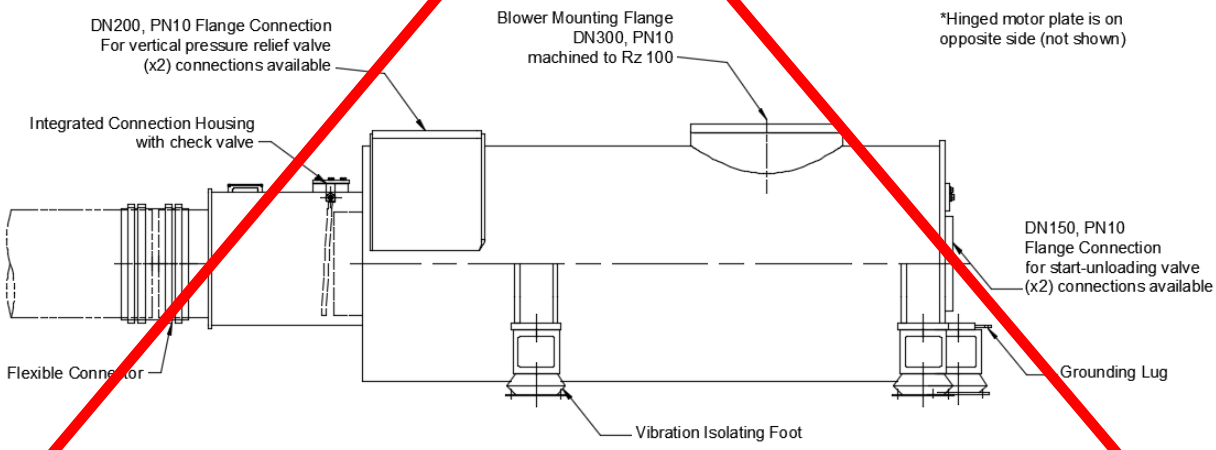
Combination Base - Discharge Silencer DN150 & DN-200



Combination Base-Discharge Silencer DN-250



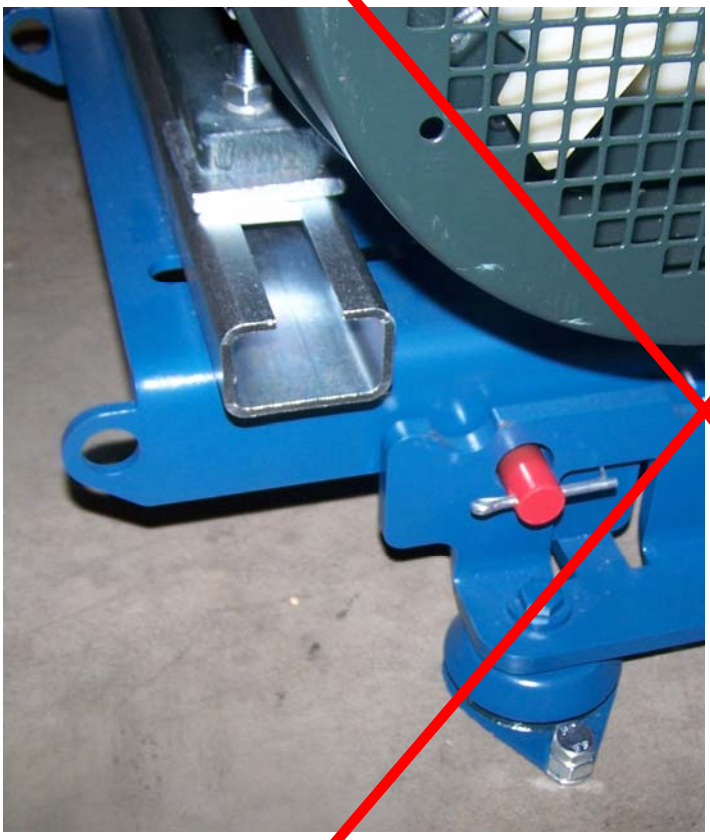
Combination Base-Discharge Silencer DN-300



Combination Base - Discharge Silencer

Hinged Motor Plate DN50 –DN80

The hinged motor plate of the base frame in sizes DN50 and DN80 allows the motor mass to properly tension the drive belts during normal operation. The motor is mounted and aligned before leaving the factory. The hinged motor plate is then locked in place for shipment. (see photo on the left below) Remove the red locking bar and use the Aerzen supplied bracket and hydraulic jack to raise the hinged motor plate for installation or maintenance of the drive belts. (see photo on the right below) Refer to the Operations Manual for commissioning and maintenance of the blower.



Hinge Plate with Locking Pin on Arrival

The red locking pin serves to keep the motor swing plate stable during shipping. Remove before attempting to raise the motor hinge plate.

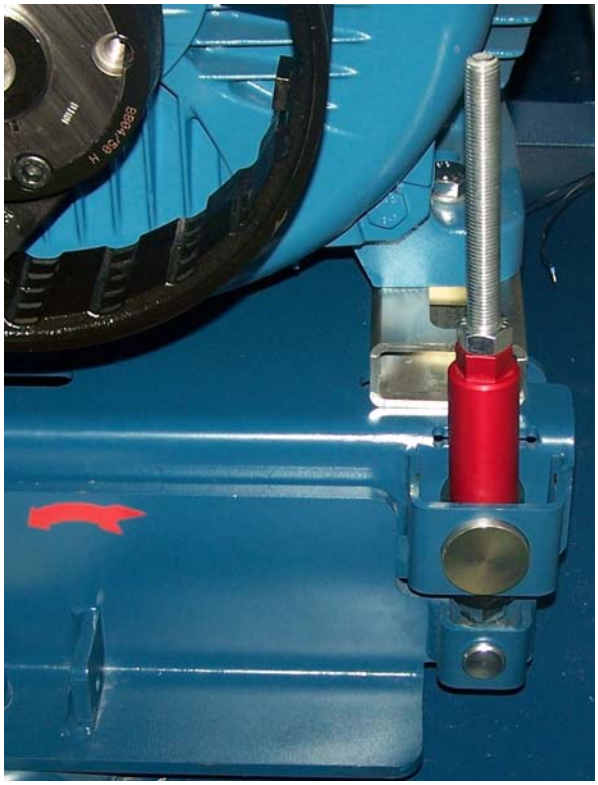
Raising the Hinged Motor Plate

Use the Aerzen supplied bracket and jack to raise the hinged motor plate when installing or maintaining the belts.

Combination Base - Discharge Silencer

Hinged Motor Plate DN100 –DN300

The hinged motor plate for sizes DN100 through DN250 features a multipurpose lifting device. In its most basic function it serves as shipping locking device (red part) preventing the motor from unwanted movement. It also serves as the lifting mechanism (black part) for changing the drive belts. During normal operation the motor mass tensions the drive belts in the tried and true Aerzen way. The motor swing plate does not rest on the lifting mechanism (see photo on the right below). No special adjustments are necessary during normal operation of the blower package. Another additional purpose is limiting the belt tension when oversized motors are used. Finally, the device can be configured to aid limited movement for seismic or mobile blower package service. Refer to G4-079 B XT for operation of Multipurpose Lifting Device. Depending on motor weight, DN300 units can have (1) or (2) lifting devices.

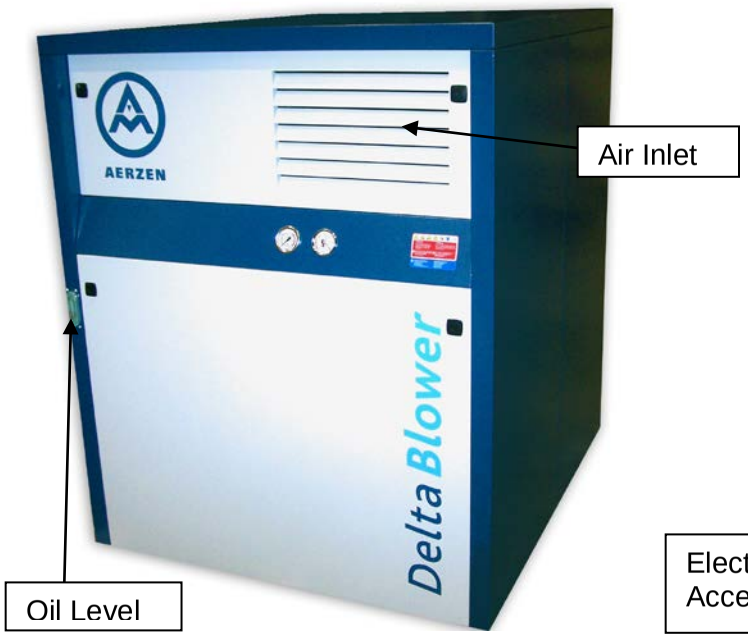


Lifting Device on Arrival

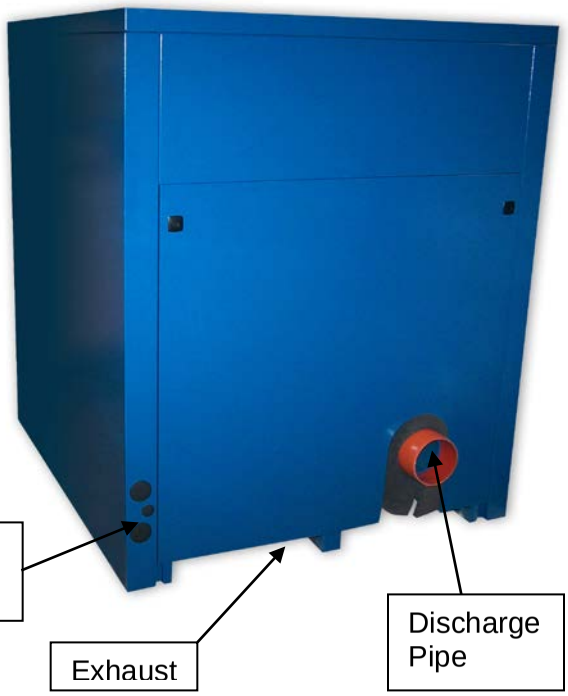
The red locking sleeve serves to keep the motor swing plate stable during shipping. It may also be used in seismic and mobile applications as a motor swing stop

Lifting Device in Normal Operation

The black guide bushing serves as a belt installation aid. Using an Aerzen supplied ratchet wrench, it helps lift the motor swing plate during belt installation and maintenance. Once new belts are installed it is backed down to the lock nut. **The motor hinge plate does not rest on the guide bushing during normal operation**. The guide bushing may also be used as tension limiter for use with overweight motors.



Shown is a DN-125 Sound Enclosure



Rear View of the Enclosure

Description: The sound enclosure surrounds the entire blower package to reduce noise and protect the machine from the weather while allowing easy access for maintenance. The base of the enclosure supports the entire blower package and contains an oil drip pan for environmental protection. Aerzen mounts the entire blower package within the sound enclosure at the factory prior to shipment. Transportation and installation are simplified by having the entire package supported and contained within the enclosure. The unit may be moved with a pallet jack or forklift.

The sound enclosure is designed with strategic consideration for airflow through the unit. A fan is mounted on the end of the blower shaft, so there is no need for a separate electric motor driven fan. From the cool, front side of the blower, air is drawn in through a sound trap. The air then passes over the motor and blower housings and finally is exhausted through the floor at the rear of the unit.

Quick release panels, each less than 45 lbs., provide access for routine maintenance of the blower and the package components. All maintenance and connections are located in the front and rear, allowing multiple machines to be placed side-by-side.

The oil level gauge is visible from the outside of the sound enclosure in sizes GM 4S DN-80 through GM 150 S DN-300 with the oil fill port and drain mounted to the enclosure just inside a removable panel.

The smallest size, GM 3S DN-50, has an easily removable roof to facilitate maintenance.

Materials:

Base pan – Polyester based powder coated steel weldment, 3 to 5 mm thick

Exterior panels - Polyester based powder coated galvanized steel

Sound insulation -Self-extinguishing, non-dripping high-density polyester foam

Technical:

Package noise level reduced to 80 dB, or less, at 1 m, free field, per DIN 45635.

Snow Load – 122 kg / m^2 (25 lbs / ft^2)

Wind Load – 80.4 km / hr (50 mph)

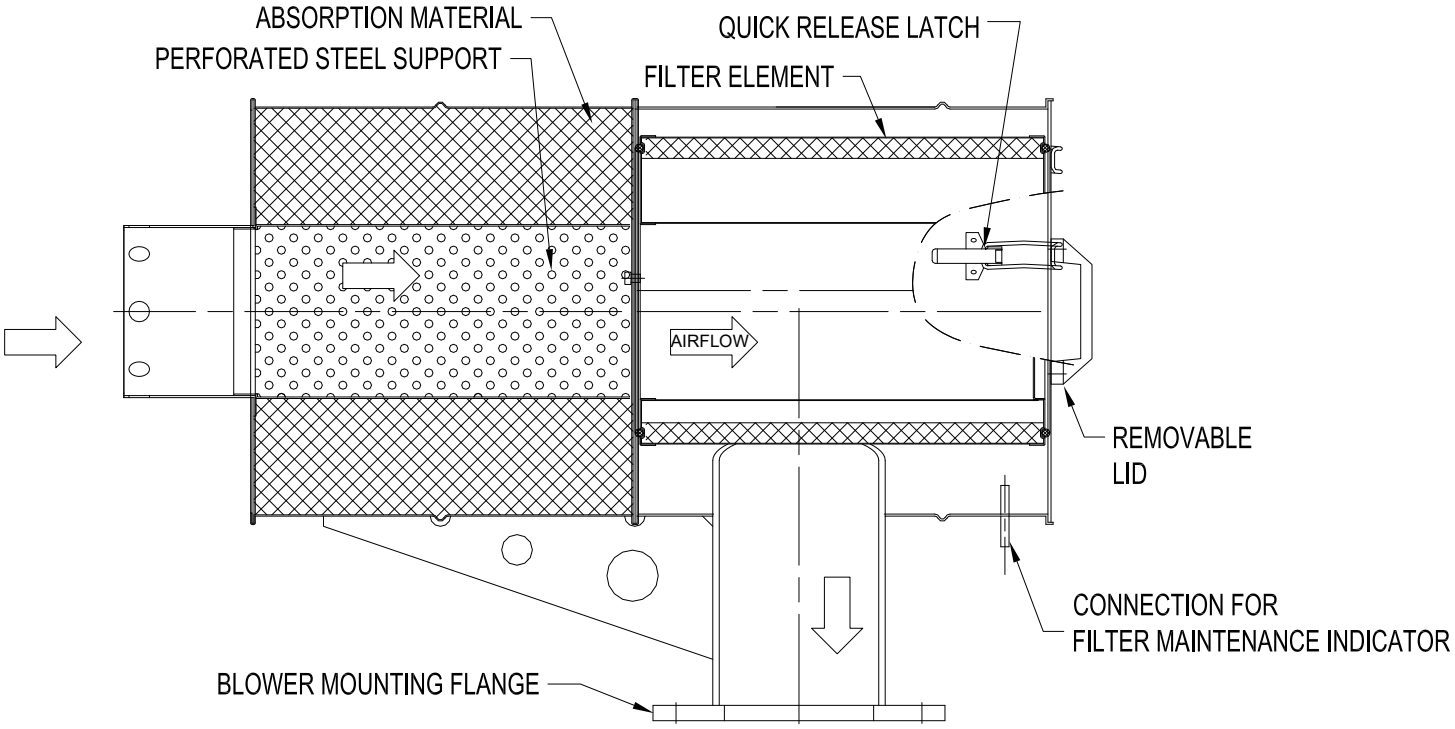
Suitable for indoor or outdoor installation

Part Numbers:

Size	Part No.
DN-050	180723
DN-080	180724
DN-100	180725
DN-125	
DN-150	180740
DN-200	180741
DN-250	181753
DN-300	184737

G5 Pressure Inlet Filter/ Silencer

DN 50 - DN 300



Description: Combination dry air intake filter and absorption type silencer with filter (or strainer) element located downstream from the silencer chamber

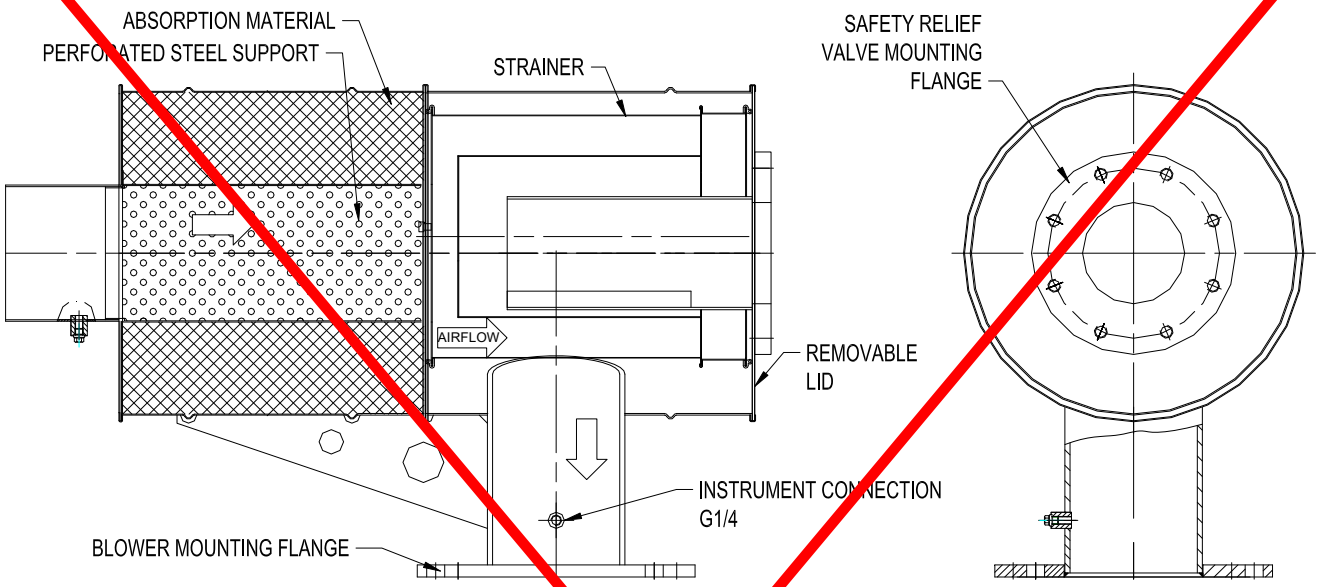
Materials of construction:

Casing:	Powder coated (RAL# 5001) Carbon Steel
	Maximum operating data: 60 °C (140 °F) and – 70 mbar (-2.07"Hg)
	Removable maintenance lid is held in place with quick release clamps
Absorption material:	Flame retardant, polyester based urethane foam, grey in color,
	secured in place with perforated steel
Filter element:	Thermally bound, food safe, polyester fibers, free of PVC, white in color
	Filter element mounts with a quick release turn and lock arrangement.

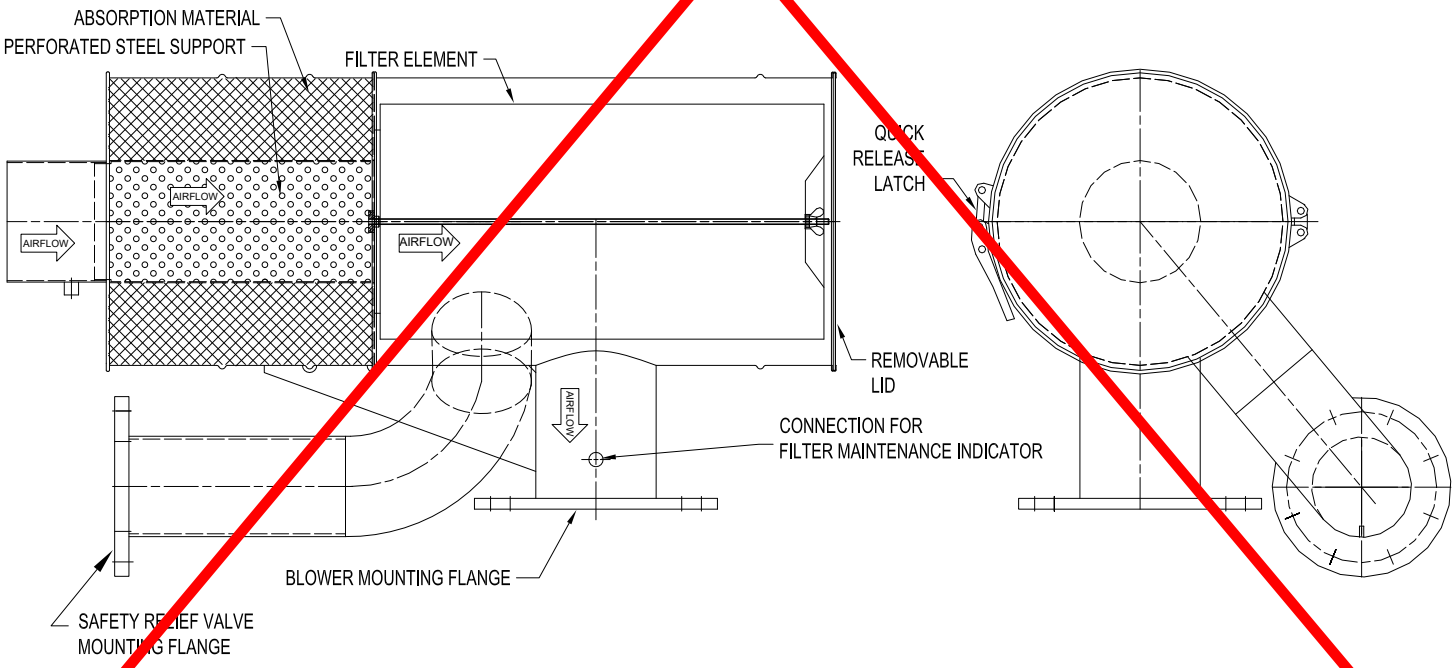
Performance:

Filtration class: G4 per EN 779 (greater than 90% of synthetic dust particles),
equivalent to ASHRAE 52.2 MERV 7 (50-70% @3-10 microns)
Pressure-drop of the entire silencer and clean filter at the maximum allowable flow: 10 mbar (0.15 psi)
Pressure drop filter element: 5 mbar (2" WC) clean, or replace at 45 mbar max. (18" WC)
Noise reduction: 10-15 dB mean noise reduction across audible octave bands

G5 Vacuum Inlet Silencer w/ Internal Strainer (No Filter)
DN 80 - DN 200



G5 Vacuum Inlet Filter/ Silencer
DN 80 - DN 200



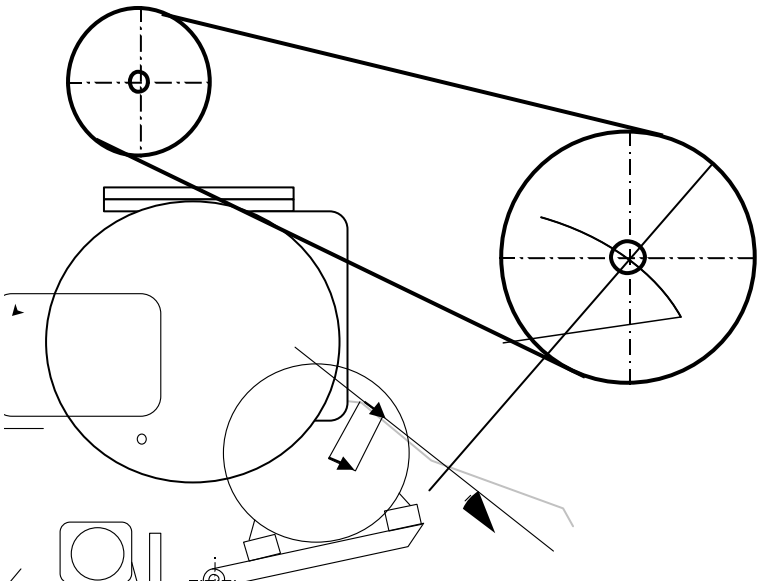
G5-WA Inlet Silencer Part Numbers

Filter nominal size	DN-50	DN-80		DN-100	DN-125	DN-150		DN-200	DN-250	DN-300
Blower size	**GM 3S**	**GM 4S GM 7L**	**GM 10S**	**GM 10S GM 15L**	**GM 25S**	**GM 30L GM 35S**	**GM 50L**	**GM 50L GM 60S**	**GM 80L GM 90S GM 100S**	**GM 130L/ GM 150S**
Pressure Filter / Silencer Assembly	182111	182112	182113	182114	182115	182116	182117		183114	184444/ 184443
Pressure Replacement Filter Element	2000049284	2000049285		2000049286		2000049287	2000049288		2000049289	2000049289 (x2)
Vacuum Inlet Silencer Assembly (No Filter)	182119	182120	182121	182122	182123	182124		182125	N/A	
Vacuum Filter / Silencer Assembly	N/A	184238001	184239001	184234001	184235001	186234000		184252001	N/A	
Vacuum Replacement Filter Element	N/A	2000008104		2000008109		185662		2000008113	N/A	

G5 (Original) Inlet Silencer Part Numbers

Filter nominal size	DN-50	DN-80		DN-100	DN-125	DN-150		DN-200	DN-250	DN-300
Blower size	**GM 3S**	**GM 4S GM 7L**	**GM 10S**	**GM 10S GM 15L**	**GM 25S**	**GM 30L GM 35S**	**GM 50L**	**GM 50L GM 60S**	**GM 80L GM 90S GM 100S**	**GM 130L GM 150S**
Filter / Silencer Assembly	175018	178810	173924	173882	173883	174143	173925		176294	N/A
Replacement Filter Element	2000049284	2000049285		2000049286		2000049287	2000049288		2000049289	2000049289 (x2)

Aerzen Delta Blower + G5

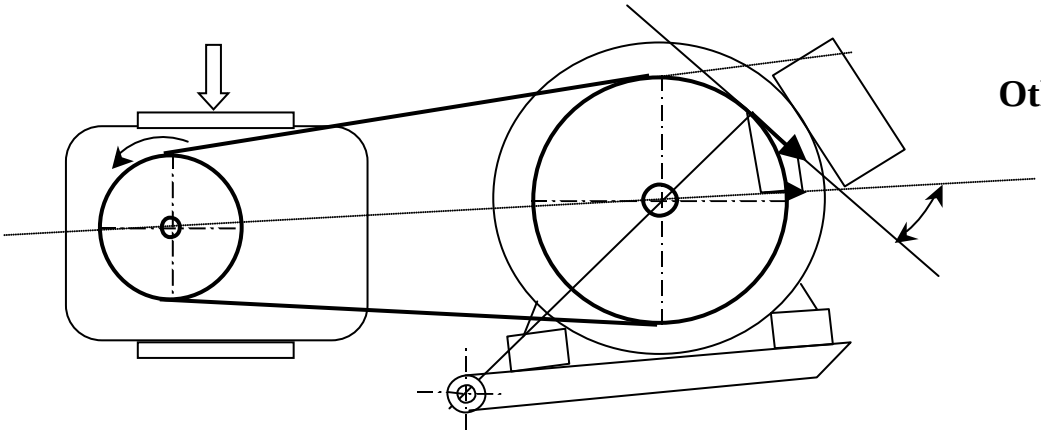


The drive configuration of the Aerzen Delta Blower is such that any change in the belt length (due to belt stretching) results in a nearly proportional displacement of the motor. Therefore, the motor weight alone can be used reliably for automatic belt tension adjustment.

This, however, is not achievable with a different geometry, such as shown below: In such cases, a slight change in the belt length requires a much greater displacement of the motor making a manual adjustment necessary. Improper adjustment leads to belt failure and other, more significant damages can follow.

Our belt tensioning principle offer two more benefits to the user, which are superior to any other system offered: We do not need any other tensioning mechanisms to tension the belts. This eliminates further wear and tear items that the user does not have to maintain or even check up on. Secondly, we have eliminated the need for re-aligning the motor upon changing belts. The motor stays put and is merely pivoted up and down during a belt change.

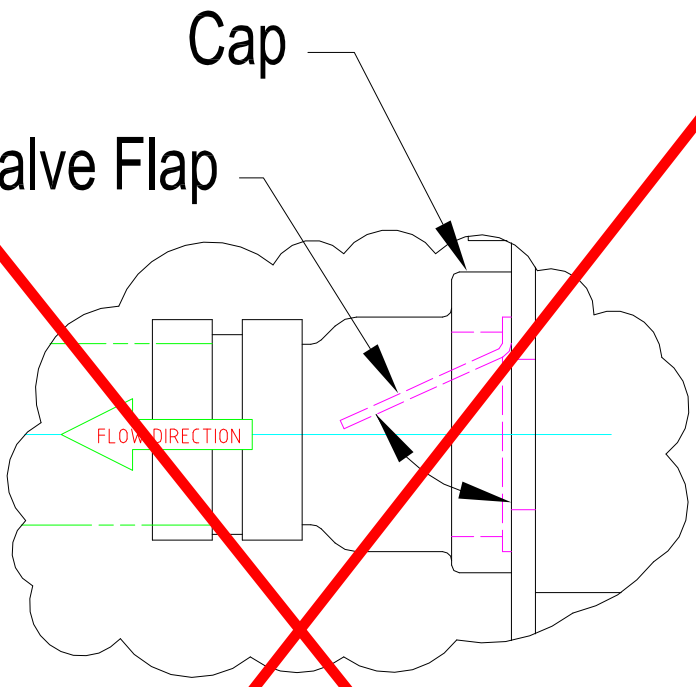
Others



DN-50 Check Valve

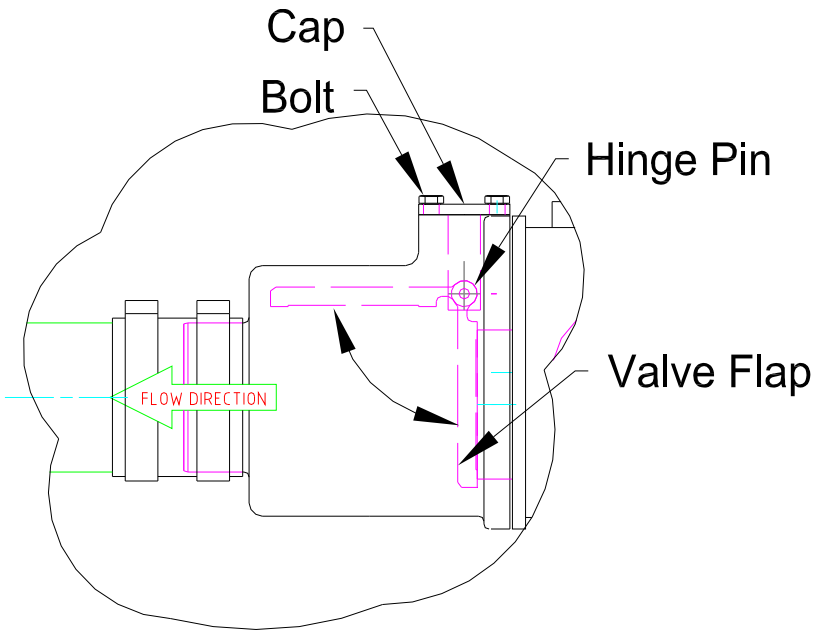
Description: The DN-50 check valve is a full-bore, cast aluminum housing with an embedded Viton flap sandwiched between the connection housing and the baseframe. The hinge is integrated to the rubber and closes naturally by gravity without use of a spring. Operating range is up to 150°C or 302°F.

Check Valve Assembly w/ Viton flap P/N: **146756**



Check Valve - DN-80 Through DN-300

Description: Housed in the connecting housing is a full-bore, steel embedded in rubber check-valve that closes naturally by gravity without use of spring. The check-valve flap can easily be pulled out for inspection, maintenance or replacement without disconnecting the piping: removing the bolts and lifting the cap.



Materials of construction:

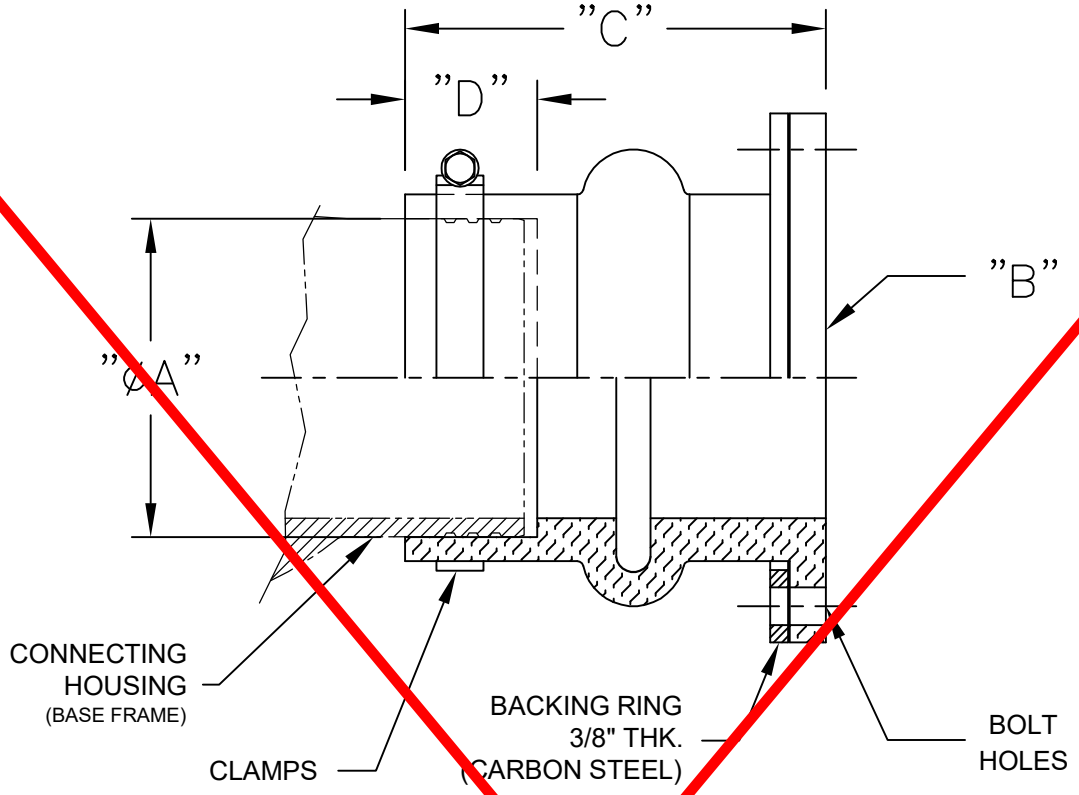
Temperature	Flap Sealing Material
Up to 149 °C (300 °F)	EPDM (standard)*
Up to 200 °C (392 °F)	Silicon*

*DN-250 & DN-300 units: Stainless steel plate with outer ring made of the sealing material

**DN-200 and smaller units: Steel plate fully embedded in the sealing material

Part Numbers:

Size DN	EPDM Check Valve Assembly P/N	EPDM Flap Only P/N	Silicone Check Valve Assembly P/N	Silicone Flap Only P/N
80	178653	178647	180877	N/A
100	178654	178648	180878	178651
125	178654	178648	180878	178651
150	178655	178649	180879	178652
200	178655	178649	180879	178652
250	168705	N/A	168711	N/A
300	158608	N/A	178266	N/A



MEDIA BEING CONVEYED = AIR OR NITROGEN

BACKING RING INCLUDED WITH JOINT

MATERIALS OF CONSTRUCTION: EPDM

MATERIAL	MAX. TEMP.	DESIGN PRESSURE
EPDM	300°F	-15"Hg to 25 psig

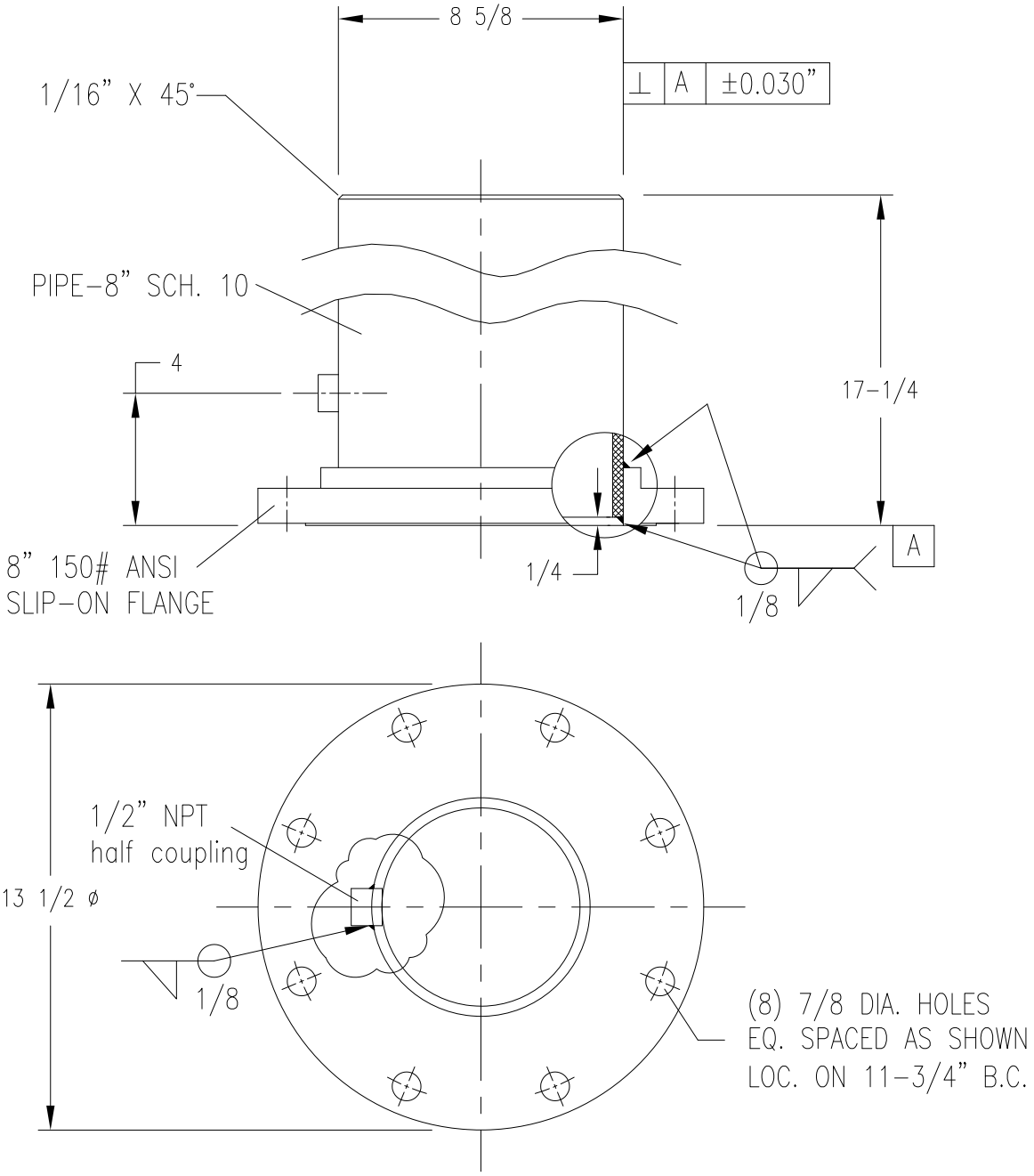
PACKAGE SIZE	Ø A (Sleeve ID)	B (150# ANSI Flange size)	C (Length)	D (Pipe Engagement)	PART No. 21-003168-____ MATERIAL EPDM	EXPANSION JOINT SPECIFICATIONS				CLAMPS	
						AXIAL COMPRESSION	AXIAL EXTENSION	LATERAL OFFSET	ANGULAR ROTATION	QTY	PART No. 21-000910-____
DN-050	2 3/8	2	8.00	2.31	-02X02EG	0.50	0.25	0.50	2°	1	_079-085
DN-080	3 1/2	3	8.00	2.31	-03X03EG	0.50	0.25	0.50	2°	1	_104-112
DN-080	3 1/2	4	8.00	2.31	-03X04EG	0.50	0.25	0.50	2°	1	_104-112
DN-100	4 1/2	4	8.00	2.31	-04X04EG	0.50	0.25	0.50	2°	1	_130-140
DN-125	5 9/16	5	9.00	2.5	-05X05EG	0.50	0.25	0.50	2°	2	_150-162
DN-125	5 1/2	5	9.00	2.5	-05X05EG-A1	0.50	0.25	0.50	2°	2	_150-162
DN-125	5 9/16	6	9.00	2.5	-05X06EG	0.50	0.25	0.50	2°	2	_150-162
DN-125	5 1/2	6	9.00	2.5	-05X06EG-A1	0.50	0.25	0.50	2°	2	_150-162
DN-150	6 5/8	6	9.00	2.5	-06X06EG	0.50	0.25	0.50	2°	2	_187-200
DN-150	6 5/8	8	10.00	2.5	-06X08EG	0.50	0.25	0.50	2°	2	_187-200
DN-200	8 5/8	8	10.00	2.75	-08X08EG	0.75	0.25	0.50	2°	2	11[illegible]191 (AMD)
DN-200	8 5/8	10	10.00	2.75	-08X10EG	0.75	0.25	0.50	2°	2	11719[illegible] (AMD)
DN-250	10 3/4	10	10.00	2.75	-10X10EG	0.75	0.25	0.50	2°	2	_290-305
DN-250	10 3/4	12	10.00	2.75	-10X12EG	0.75	0.25	0.50	2°	2	_290-305
DN-300	12 3/4	12	10.00	2.75	-12X12EG	0.75	0.25	0.50	2°	2	160404000

* Dimension in INCHES

Aerzen USA Corp.
108 Independance Way, Coatesville PA, 19320
(610) 380-0244 PH, (610) 380-0278 FX
www.aerzenusa.com

EPDM EXPANSION JOINT WITH CLAMPS
PIPE SLEEVE TO ANSI FLANGE

DATE	DOCUMENT NO.	REVISION	SHEET
7/29/2013	XA-005207_EG	B	1 of 1



NOTES

1. STD TOLER: UNLESS O'WISE NOTED
   FRACTIONAL = ±1/32
   .X=±0.03 .XX=±0.01 .XXX=±0.005
   ANGULAR = ±1/4° (INCL IMPLIED 90°)
   WELDMENTS = ±1/16
2. BREAK ALL SHARP EDGES
3. AIR TIGHT ASSEMBLY
4. POWDER COAT AERZEN RIVER ROCK BLUE (RAL 5001)
5. NO POWDER COAT ON INSIDE OF PIPE OR FLANGE FACE

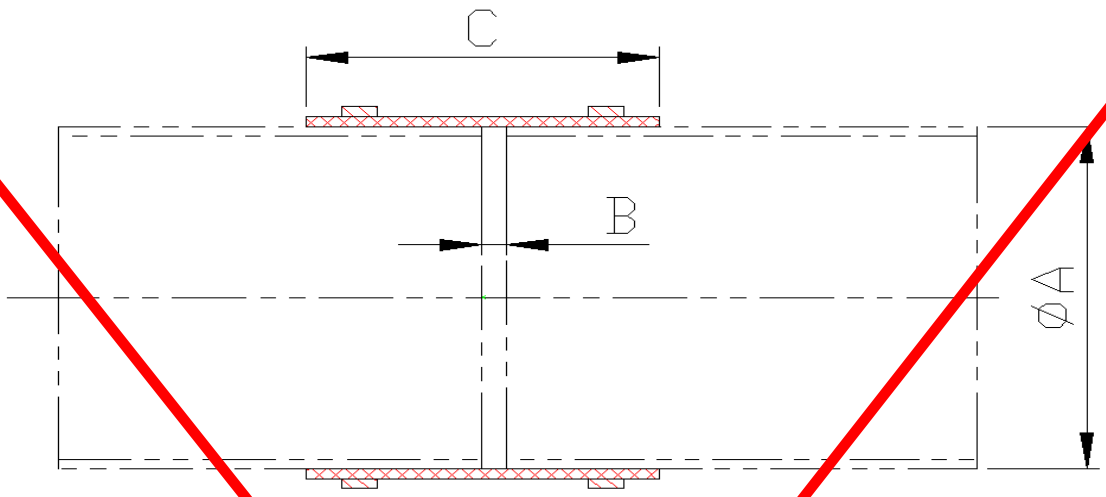
NONE = without coupling
–01 = with coupling

NAVISION #:	21–002827–14
DRAWING NO.	PA–005100–08–14 REV "C"

AERZEN USA CORP.
108 Independence Way, COATESVILLE PA 19320
(610) 380–0244 PH, (610) 380–0278 FX

TITLE
STUB PIPE – CARBON STEEL
8" PIPE X 8" FLANGE X 17–1/4" LONG

SCALE	DATE	DRAWN BY	CHECKED BY
MODEL SPACE 1:1	08/27/2009	J. P. SHIELDS	D.L.M.



Nominal Pipe		Sleeve	Pipe O.D A		End Clearance B		Maximum Misalignment		Sleeve Length C		# of clamps	Clamp P/N
DN	USA	P/N	mm	in.	mm	in.	mm	in.	mm	in.		
50	2”	159127	60.3	2-3/8	10	3/8	3	.12	50	2	2	168036
80	3”	159128	88.9	3-1/2	10	3/8	3	.12	100	4	2	163238
100	4”	159129	114.3	4-1/2	10	3/8	3	.12	100	4	2	169603
125	5”	162677	139.7	5-1/2	10	3/8	5	.20	150	6	2	162923
150	6”	159131	168.3	6-5/8	10	3/8	5	.20	150	6	4	165903
200	8”	159132	219.1	8-5/8	10	3/8	5	.20	150	6	4	168658
250	10”	159134	273	10-3/4	15	3/8	7	.28	200	8	4	159353
300	12”	159135	323.9	12-3/4	20	3/4	11	.43	200	8	4	160404
400	16	157607	406.3	16	20	3/4	15	.59	300	12	4	157608

Technical Data

Maximum operating pressure: 1.2 bar g (17.4 psig)

Test pressure: 2.4 bar (34.8 psig)

Operating temperature –40 to 180° C (-40 to 356° F)

Materials

Silicone Rubber with embedded woven fiber reinforcement up to DN-300

Perbunan rubber in DN-400

60 +/- 5 Shore A

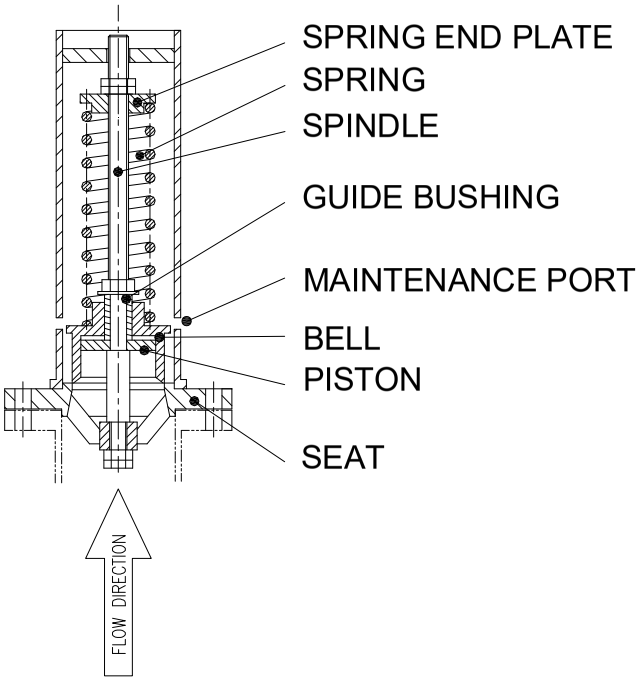
Shelf-life: up to 20 years, under clean, cool & dry conditions

CAUTION:

- Pipe misalignment could cause leaks and premature failure of the sleeve.
- It is imperative to maintain the recommended pipe-end clearance for the pipe connection to retain its flexibility and reduce the transmission of noise and vibrations from the blower package to the process piping.

Description:

The Pressure Relief Valve is designed for use with air or inert gasses to protect the blower and its accessories from damage in the event of excessive pressure. It is not to be used as a pressure regulating device. It contains a spring-loaded valve guided by a spindle and surrounded by a protective sheath that is capable of venting the entire volume flow of the blower. In positive pressure machines, it is installed downstream from the positive displacement blower and before the check valve or any shut-off valve. In vacuum applications, it is installed on the intake side of the blower.



QTY	DESCRIPTION	MATERIAL
1	Connection Flange or Thread with Valve Seat	Grey Cast Iron
1	Valve Spindle	Carbon Steel
1	Bell	Brass
1	Spring End Plate	Carbon Steel
2	Hex Nut	Carbon Steel

QTY	DESCRIPTION	MATERIAL
2	Guide Nut	Carbon Steel
1	Spring	Spring Steel
1	Valve Disc / Piston	Brass
1	Valve Guide / Bushing	Brass
1	Cover	Aluminum

Technical Data:

Maximum Temperature: 150° C (302° F)

Conforms to PED 97 / 23 / EG

Maximum Pressure: 1.1 Bar (15.9 PSIG)

Valve Characteristic: Proportional

Pressure Rise: 10%

Relief Valves

Nominal Package Size	Blower Designation	Valve Size	Positive Pressure Valve Connection	Vacuum Valve Connection
DN-50	GM 3S	DN -50	G-2” External	DN-50 PN 16 Flange
DN-80	GM 4S			
	GM 7L			
	GM 10S			
DN-100	GM 10S	DN-80	G-3” External	DN-80 PN 16 Flange
	GM 15L			
DN-125	GM 25S			
DN-150	GM 30L	DN-125	DN-125, PN16 Flange	DN-125, PN16 Flange
	GM 35S			
	GM 50L			
DN-200	GM 50L			
	GM 60S			
DN-250	GM 80L	DN-150	DN-150, PN16 Flange	DN-150, PN16 Flange
	GM 90S			
	GM100S			
DN-300	GM 130L	DN-150	DN-150, PN16 Flange	DN-150, PN16 Flange
	GM 150S			

Maintenance:

Periodically inspect for free movement of the valve. While the machine is stopped and the motor locked out, insert flat blade screw drivers into both maintenance ports and lift the valve. Remove the screw drivers and visibly ensure the valve is properly seated. When operated in clean environments, inspect valve either every six months or 1000 run hours, whichever occurs sooner. In dusty conditions, inspect every month. Refer to document G4-002 for complete operating instructions.

1. General

A start-unloading valve is generally used where more than one blower is connected to a common discharge header, each blower package being equipped with its own discharge check valve.

In absence of a start-unloading valve, the motor has to start the blower and to drive it up to its operating speed against the line pressure.

While starting, a squirrel cage induction motor typically draws 6 to 7 times its nominal current. To reduce this current peak, one can choose between several types of motor starters that start the motor at reduced voltage.

The most common type is the Y / # starter. While starting in the "Y" position, the starting torque of the motor is reduced to approximately 30 % of the full voltage starting torque.

By using a start-unloading valve, the blower can be started unloaded, allowing the motor to bring it to speed with reduced torque while in the "Y" position of the starter.

The starting torque for the fully unloaded blower amounts typically to approximately 5 – 10 % of the operating torque.

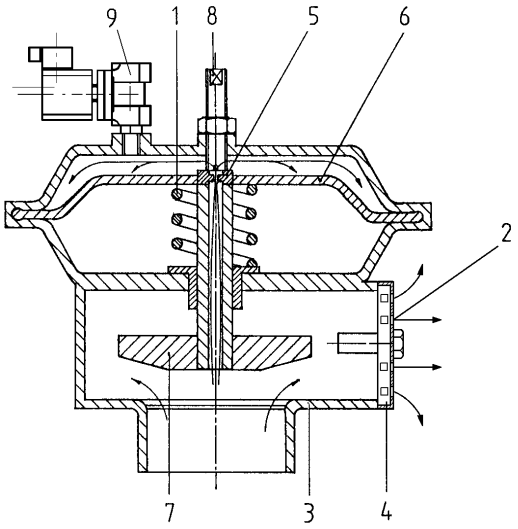
In its standard design (without solenoid valve), the AEROMAT start-unloading valve operates completely independent & without any electrical requirement.

2. Installation of the AEROMAT

Aerzen packages ordered with an unloading device are installed prior to shipment. An AEROMAT ordered after the initial sale is to be installed between the check valve and the blower. AEROMAT valves are sized according to performance. Refer to the table below in Section 7 for size and connection data. Optional flange connections may be available – please contact Aerzen After-Sales / Service for details.

The valve may be installed in any orientation except connection side up.

Remove all packaging materials before installation.



1. spring
2. vent opening
3. housing / valve seat
4. protective grill
5. hollow spindle with nozzle
6. diaphragm
7. valve piston
8. spindle
9. solenoid valve

3. Operation without solenoid valve (standard)

The unloading valve is a normally open device. Thus when the blower is started, the discharge air of the blower is diverted from the process piping (due to the closed check valve) through the unloading valve and out the vent opening (2). As the air flows through the valve a small amount of air travels up the spindle (5) to pressurize the top of the diaphragm (6). Ultimately the force resulting from the pressure on the diaphragm overcomes the spring force and the valve (7) closes, diverting the blower airflow back to the process piping. NORMAL CLOSING TIME 30-35 SECONDS.

4. Operation with solenoid valve (optional)

Operation of this system is the same as the "standard", except that a solenoid valve (9) is installed, venting the top of the diaphragm, keeping the unloading valve open as long as the solenoid valve remains open. This allows the blower to run unloaded for a longer period at start-up as well as allowing the unloading cycle to be controlled by an electrical signal from the operator.

The standard solenoid (9) is a ¼" normally closed valve with a 110V, 60Hz, 6.1 watt coil, (p/n 21-001726), thus requiring electric current to energize the coil and open the solenoid valve, venting the top chamber of the valve allowing the AEROMAT valve to open. An optional normally open valve can also be purchased, however the reason for the normally closed version is in case of failure of the solenoid valve (valve fails closed) the AEROMAT would still function as a "standard" unit. NOTE – other coil voltages are available upon request.

5. Maintenance

The AEROMAT unloading valve does not require any particular maintenance. It is important to make sure that the discharge opening is unobstructed with foreign material or paint.

Should the unloading device not close after correct adjustment, the nozzle (5) may need to be cleaned (refer to sectional drawing to disassemble unit) remove and blow out with compressed air.

6. Adjusting the closing time of the AEROMAT

The valves are shipped set up for maximum closing time. However if they need to be adjusted, in order to obtain the sufficient # P for the valve to operate properly (pressure drop across the valve should be between 2 psi and 1/3 of the normal operating pressure). After this initial adjustment the valve will operate automatically without any further manipulation. Follow this procedure for adjustment:

a) **Attention!** For safety reasons, adjustments are only to be preformed while the motor is switched off and the blower is stopped. Do not exceed the start per hour frequency of the drive motor.

b) Remove the maintenance door for units within a sound enclosure.

c) Valve closure may be detected by the noise of the air escaping from the unloading device or by monitoring the discharge pressure gauge.

d) If necessary, closing time may be adjusted. This can be done by loosening the lock-nut holding the spindle (8) and moving the spindle:
   - spindle (8) clockwise — closing time is decreased
   - spindle (8) counter-clockwise — closing time is increased

e) After the adjustment, tighten the lock-nut.

f) After resetting the unloading device, all loosened and disassembled parts are to be re-attached and secured properly.

7. Performance

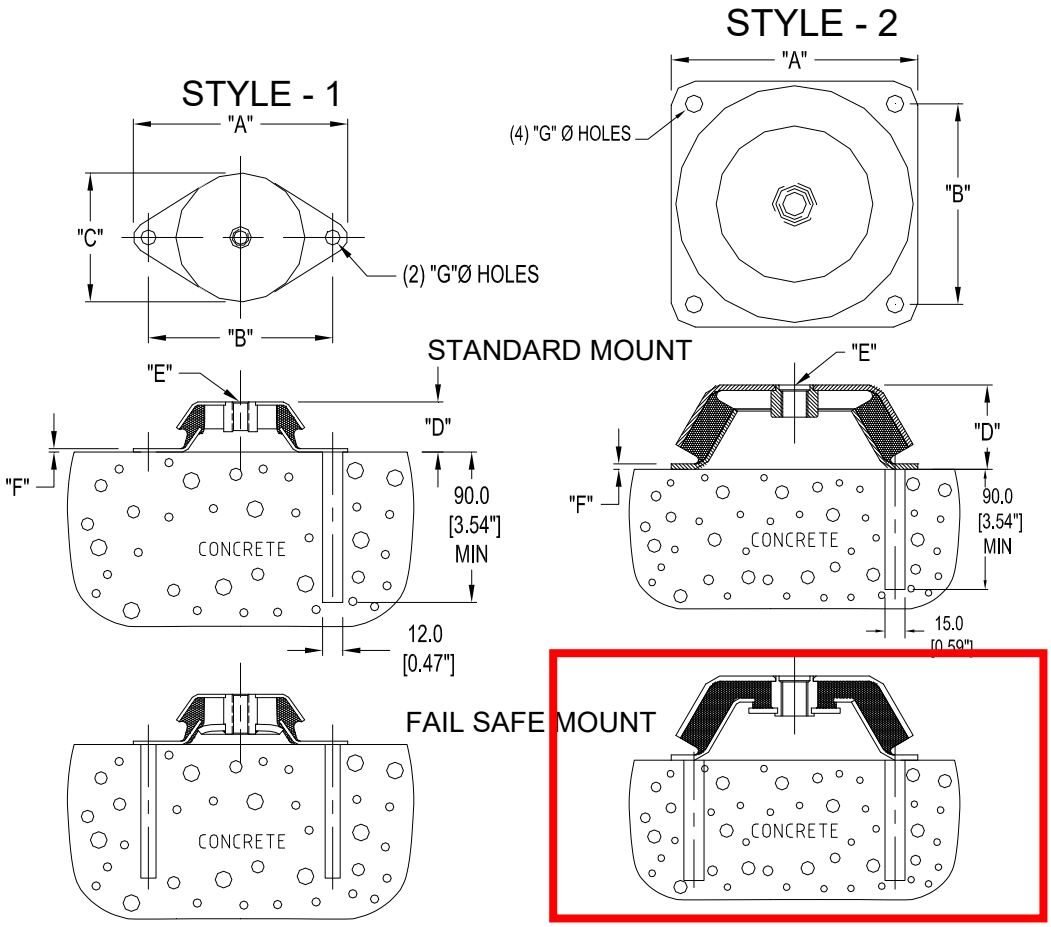
Temperature Range (min...max) -15...180°C (5...355°F)
Pressure Range (min...max) 100...2000 mbar (1.45...29 psig)

Aeromat Type	P/N	Connection Size	Application Flow Range	
			m^3/min	icfm
*	*	G-1/2" External	< 4	< 141
2	150219000	G-2" External	4 to 10.5	141 to 370
2	150220000	DN-80 Square Flange	4 to 10.5	141 to 370
3	178740000	G-3" External	10 to 25	353 to 883
3	159077000	DN-80 Square Flange	10 to 25	353 to 883
3	159561000	DN-80 Square Flange	10 to 25	353 to 883
4	150222000	DN-80 Square Flange	25 to 45	883 to 1589
4	154166000	DN-150 PN10 Flange	25 to 45	883 to 1589
4	159996000	DN-100 PN10 Flange	22 to 50	777 to 1765
5	150223000	DN-125 PN10 Flange	45 to 80	1589 to 2825
5	151763000	DN-150 PN10 Flange	45 to 80	1589 to 2825
5	159997000	DN-150 PN10 Flange	35 to 80	1236 to 2825
6	166088000	DN-150 PN10 Flange	80 to 110	2825 to 3885
8	157902000	DN-200 PN10 Flange	80 to 141	2825 to 4979

*NOTE: for flows below 4 m^3/min (141 cfm) an AEROMAT valve cannot be used. For these units Aerzen uses a ½" normally open (NO) solenoid valve with 110V, 60Hz, 10.1 watt coil (p/n 21-001746), other coil voltages are available upon request. Thus it is the responsibility of the owner / operator to energize the coil on the solenoid in order to close the valve and allow the blower to build up pressure.

8. Original Installation

Base Size	DELTA *Blower*, K4 Aeromat P/N	DELTA *Blower*, G5 Aeromat P/N	DELTA *Hybrid*, G5 Aeromat P/N
DN-50	21-001746	21-001746	n/a
DN-80	21-001746	21-001746	n/a
	150220	150219	
DN-100	150220	178740	159561
	159077		
DN-125	150220	178740	159561
	159077		
DN-150	150222	150222	159996
DN-200	154166	150222	159997
	151763	150223	
DN-250	151763	151763	166088
	166088	166088	
DN-300	166088	n/a	166088
		157902	(2) 159997
		(2) 166088	(2) 166088
DN-400	n/a	166088	n/a
		157902	n/a
		(2) 166088	n/a
		(2) 157902	n/a



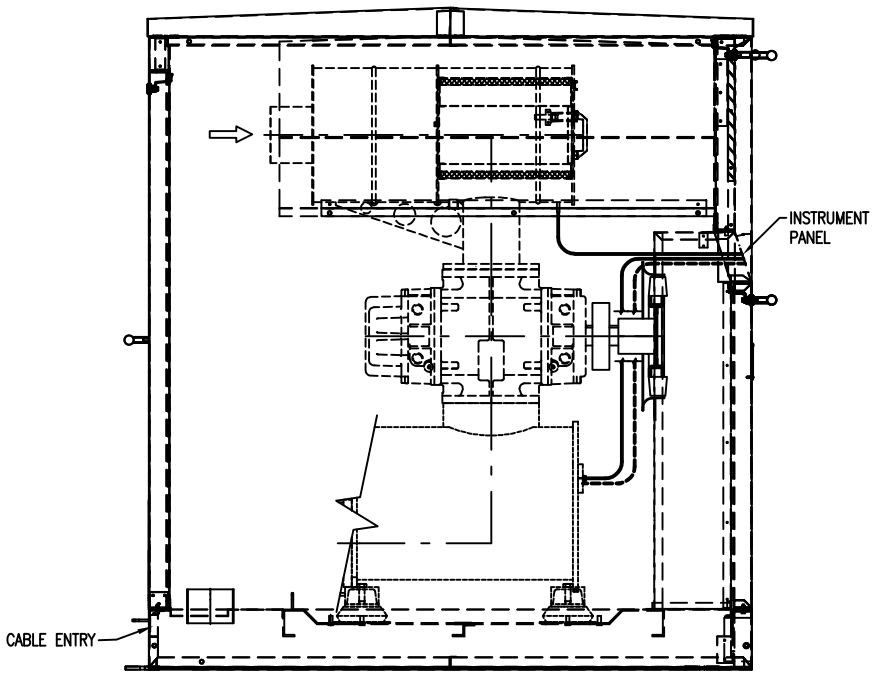
Only (1) anchor per foot is required for Standard mounts, anchor each hole ("G") for Fail-safe mounts.

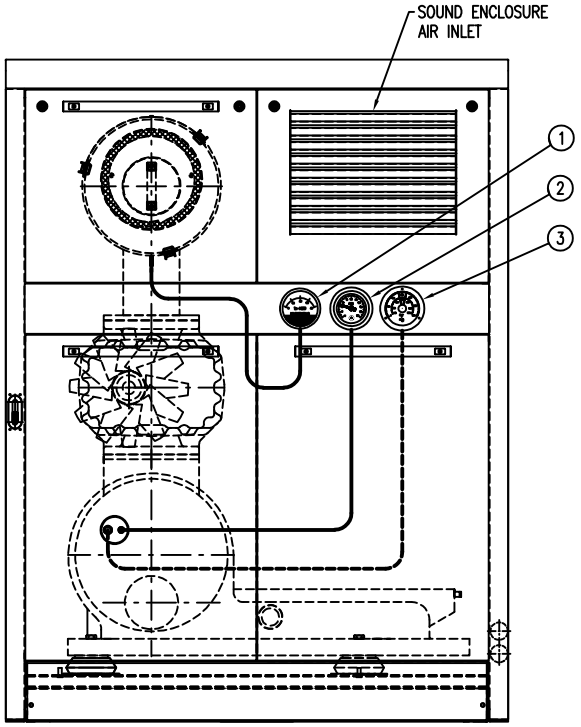
Standard mounts are not recommended for use where negative loads occur, (marine or earthquake zones) use Fail-safe mounts or contact Aerzen for alternates.

All vibrations isolators have a natural frequency that will not interfere with the fundamental blower package frequencies.

Baseframe	Standard P/N	Fail Safe P/N	Style	A (mm)	B (mm)	C (mm)	D (mm)	E	F (mm)	G (mm)	Maximum Load Per Foot		Recommended Anchor
											KN	Lbf	Aerzen P/N
DN-50	184818	184818	1	127	110	77	30	M10	2	9	1,4	315	200053552
DN-80	176394	184819	1	127	110	77	30	M10	2	9	2	450	200053552
DN-100													
DN-125													
DN-150	177128	184820	2	168	132	-	50	M16	4	13	4	899	120835000
DN-200	184821	184821	2	184	150	-	60	M20	4.5	13	9	2023	120835000
DN-250			2	184	150	-	60	M20	4.5	13	9	2023	120835000
DN-300													

SECTION 4





FRONT PANEL

NOTES:
1. ALL PRESSURE GAUGES & SWITCHES ARE INSTALLED WITH PULSATION DAMPERS. (EXCEPT IF GAUGE HAS A LIQUID FILL)

MAIN COMPONENTS

ITEM	DESCRIPTION	PART NO.
1	GAUGE, FILTER MAINTENANCE INDICATOR	21-006757
2	GAUGE, DISCHARGE PRESSURE	21-006758
3	GAUGE/SWITCH, DISCHARGE TEMPERATURE	21-006756

AERZEN USA CORP.
108 Independence Way, COATESVILLE PA 19320
(610) 380-0244 PH, (610) 380-0278 FX

TITLE
G-5 BLOWER - INSTR. (S.E.)
FILTER MAINTENANCE INDICATOR
DISCHARGE PRESSURE GAUGE
DISCHARGE TEMPERATURE GAUGE/SWITCH

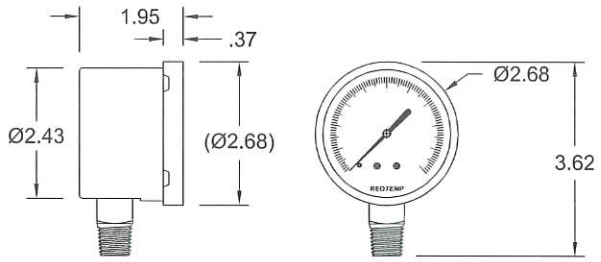
DATE	DRAWN BY:	CHECKED BY:	P.M. APPROVAL :	SCALE:
07/11/2017	RJP	DLM	-	MSPACE 1 :1

DRAWING NO:	REVISION NO:	SHEET:
G5-IM-PS05-4000-00	D	1/1

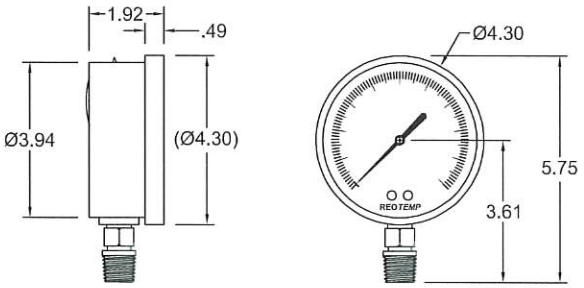
ALL STAINLESS STEEL LOW PRESSURE GAUGE

REOTEMP's Series PC low pressure gauges offer accurate and reliable measurements of gaseous media. Offered with stainless steel internals, the Series PC is designed to withstand corrosive media and ensure a long-lasting instrument.

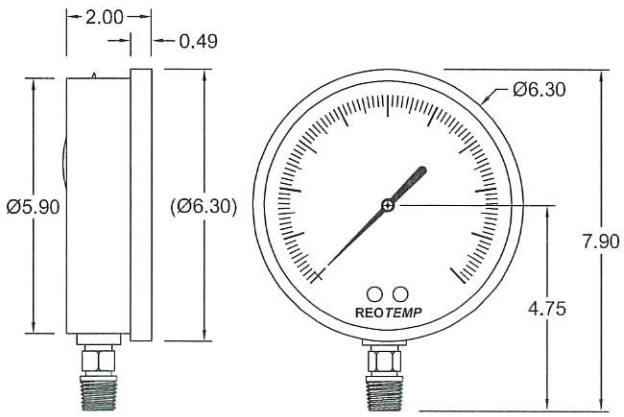
PC25S1 | PC40S1 | PC60S1



PC25S1 *dimensions in inches



PC40S1 *dimensions in inches



PC60S1 *dimensions in inches

Dials | Custom Logo | Diaphragm Seal Compatible

FEATURES / BENEFITS

- Sensitive Diaphragm/Capsule Mechanism
- All-Welded 316 Stainless Steel Capsule and Socket
- Easy-Access Zero Reset Screw on Dial

ASME B40.100 NACE

SPECIFICATIONS

Construction Materials:

Non Wetted
- Case: 304SS
- Ring: 304SS, Bayonet Twist-Off
- Dial: White Aluminum, Black Letters

Wetted
- Capsule: 316LSS
- Socket: 316SS

Case-to-Socket
- Screw Connection
- Vented Case

Lens
- Tempered Safety Glass (Standard), Plastic, or Laminated Safety Glass

Temperature Limits:

Ambient
-40°F — 150°F

Process
-40°F — 200°F

Process Temperature Limits When Assembled with a Diaphragm Seal

-60°F — 350°F
Direct Mount

-100°F — 750°F
Remote Mount or Cooling Tower

*Exact temperature limits will depend on diaphragm seal & fill fluid.

Accuracy: 2-1.6-2%
Fillable: No
Restrictor Screw: Yes
Weight: 2.5" = 0.5 lbs
4" = 1.1 lbs
6" = 2.1 lbs
Maximum Working Pressure:
Stable = 100%
Momentary = 130% of scale

ALL STAINLESS STEEL LOW PRESSURE GAUGE

Visit reotemp.com

✓ Check Stock ✓ Get Price
✓ Configure Part # ✓ Download PDF Data Sheets

HOW TO ORDER: Choose options to build a part number. For example: PC40S1A2P52-D-T-HV

PC40	S	1	A	2	P52	-D	-T	-HV
DIAL SIZE	CASE TYPE	CAPSULE & SOCKET	MOUNT TYPE	CONNECTION	RANGE CODE	CASE FILL	LENS	OPTIONS

DIAL SIZE

PC25 = 2.5"
PC40 = 4"
PC60 = 6"

CASE TYPE

S = 304SS Case & Bezel w/ Removable Bayonet, Zero Correction on Dial

CAPSULE & SOCKET

1 = 316SS

MOUNT TYPE

A = Bottom
B = Bottom/Rear Flange
*C = Center Back
*D = Center Back "U" Clamp
*E = Center Back/Front Flange

A = Bottom
B = Bottom/Rear Flange
*C = Lower Back
*E = Lower Back/Front Flange

CONNECTION

4 = 1/4" NPT
2 = 1/2" NPT

RANGE CODE

See Master Range Code Sheet on Page 46

Common Ranges
P50 = 0-10 in H_2O
P51 = 0-15 in H_2O
P52 = 0-30 in H_2O
P53 = 0-60 in H_2O
P54 = 0-100 in H_2O
P55 = 0-160 in H_2O
P56 = 0-200 in H_2O

Available Ranges
- 10" to 300" Water Column
- Gauge Pressure, Vacuum, or Compound

Standard Units
- in H_2O

Available Units
- kPa
- mbar
- psi
- mmH_2O
- inHg
- mmHg
- oz/in^2
- & more

P905 = -40..0 "H20

CASE FILL

Case is Not Fillable
-D = Dry

LENS

-T = Tempered Safety Glass (std)
-P = Plastic
-S = Laminated Safety Glass

OPTIONS

-HV = Hi-Vis™ Dial
-OX = Cleaned for O_2 Service
-C3 = 3 pt. Calibration Certificate
-TS = Stainless Steel Tag
-NC = NACE Compliance Certificate
-PM = Positive Material Identification Certification
-R5 = 1.5% Full Scale Accuracy (Not Available on Compound Ranges)

*Non-standard configuration

Diaphragm Seal Suitability Guide

Low pressure capsule gauges are very sensitive and require diaphragm seals with high fluid displacement. If a diaphragm seal is required to isolate the process fluid from the pressure gauge, the following seal model types are available for the Series PC.

Diaphragm Seal Model

High Displacement

Total Gauge Span* (in H_2O)

	10"	15"	20"	30"	40"	60"	100"	160"	200"	300"
W6	X	X	X	X	X	X	S	S	T	T
W7	X	X	X	S	S	T	T	T		
V5	X	S	S	T	T	T	T	T		
T6	X	X	X	X	X	S	S	S	S	S

*Total gauge span is additive of negative and positive pressures.

Example: -15 - 0 - 30 psi = 45 psi span

- Assembly will function correctly with minimal accuracy degradation.
- T — Assembly will function correctly given stable temperature.
- S — Assembly is highly sensitive to orientation and temperature variance. REOTEMP cannot guarantee a stated accuracy.
- X — Assembly will not work. The diaphragm does not displace enough fill fluid to drive the pressure gauge.

PRESSURE GAUGE RANGES AND CODES

SPECIAL RANGE TYPES

Receiver Ranges			Refrigerant Ranges			Tank Level Ranges	
Code	Element	Dial Range	Code	Dial Range	Refrigerant	Code	Range
P60	3-15psi	0-100%	N06	-30inHg to 160psi	Ammonia	F14	0-24ft H2O
P61	3-15psi	0-10 sq rt	R06	-30inHg to 160psi	R134A	F15	0-30ft H2O
P62	3-15psi	0-100% & 0-10 sq.rt.	R06A	-30inHg to 160psi	R22	F15C	0-40ft H2O
			R06C	-30inHg to 160psi	R404A	F16	0-60ft H2O
			N07	-30inHg to 200psi	Ammonia	F165	0-100ft H2O
			N08	-30inHg to 300psi	Ammonia		

LOW PRESSURE RANGES (PC SERIES ONLY)

inH_2O		oz/in²		inH_2O & oz/in²		mbar		psi	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
Low Pressure Ranges									
P50	0-10	Z50	0-6	Q50Z	0-10 inH_2O & 0-6 oz/in²				
P51	0-15	Z51	0-8			M51	0-40		
P49	0-20	Z49	0-10	Q49C	0-20 inH_2O & 0-12 oz/in²				
P515	0-25	Z52E	0-15						
P52	0-30			Q52N	0-30 inH_2O & 0-18 oz/in²	M521	0-70	I52	0-1
P525	0-40	Z52	0-20	Q525W	0-40 inH_2O & 0-24 oz/in²	M525	0-100		
P53	0-60	Z53	0-30	Q53	0-60 inH_2O & 0-35 oz/in²	M53F	0-150	I53	0-2
P54	0-100	Z54	0-60	Q54B	0-100 inH_2O & 0-60 oz/in²	M54	0-250	I54	0-3
P55	0-160					M55	0-400	I55	0-5
P56	0-200	Z56	0-100	Q56C	0-200 inH_2O & 0-115 oz/in²	M56	0-500	I56	0-7
Vacuum Ranges									
P88	-10-0	Z88	-6-0	Q88	-10/0 inH_2O & -6/0 oz/in²				
P90	-30-0	Z90	-20-0	Q90	-30/0 inH_2O & -18/0 oz/in²	M905	-100-0	I90	-1-0
P91	-60-0	Z91	-30-0	Q91	-60/0 inH_2O & -35/0 oz/in²	M94	-200-0	I91	-2-0
P92	-100-0	Z92	-60-0	Q92	-100/0 inH_2O & -60/0 oz/in²	M95	-400-0		
Compound Ranges									
P7A	-5/0/5	Z7A	-3/0/3			M71	-20/0/20		
P70	-10/0/10			Q70C	-10/0/10 inH_2O & -6/0/6 ozin²	M72E	-30/0/30		
P71	-15/0/15					M72	-40/0/40		
P72	-20/0/20	Z72	-10/0/10	Q72C	-20/0/20 inH_2O & -12/0/12 oz/in²			I73	-1-0-1
P73	-30/0/30			Q73C	-30/0/30 inH_2O & -18/0/18 oz/in²	M735	-100/0/100	I74	-2-0-2
P74	-60/0/60	Z745	-30/0/30					I55U	-3/0/3
P75	-100/0/100			Q75B	-100/0/100 inH_2O & -60/0/60 oz/in²			P14C	-5/0/5

DIFFERENTIAL PRESSURE RANGES (DP GAUGES ONLY)

psid		inH_2Od		bard		mbard		kPad	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
PD1	0-1	ID10	0-10	BD1	0-1	MD40	0-40	AD2.5	0-2.5
PD3	0-3	ID20	0-20	BD1.6	0-1.6	MD60	0-60	AD6	0-6
PD5	0-5	ID30	0-30	BD2.5	0-2.5	MD100	0-100	AD10	0-10
PD10	0-10	ID50	0-50	BD4	0-4	MD160	0-160	AD25	0-25
PD20	0-20	ID100	0-100	BD6	0-6	MD250	0-250	AD40	0-40
PD50	0-50	ID150	0-150	BD7	0-7	MD400	0-400	AD100	0-100
PD100	0-100	ID200	0-200	BD11	0-11	MD600	0-600	AD250	0-250
PD200	0-200	ID400	0-400	BD55	0-55	MD1000	0-1000	AD700	0-700
PD6000	0-6000			BD400	0-400				

PRESSURE GAUGE OPTIONS

		Heavy-Duty Industrial Gauges				Process Gauges			Stainless Steel Case Industrial Gauges			Commercial Gauges		Low Pressure Capsule Gauges			Test Gauges
Part #	Description	PR25	PR35	PR40	PR60	PT45P	PT45T	PI45	PM	PG**C	PG**S	PD15/20/25	PD35/40	PC25N	PC25S	PC40/45/60	PL60/45
CASE FILL OPTIONS																	
-G	Glycerin Filled Case	✓	✓	✓	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
-W	Glycerin Water Filled Case (65/35)	✓	✓	✓	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
-S	Silicone Filled Case	✓	✓	✓	✓	✓	✓	N/A	✓	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-T	Teflon-coated Movement (No case fill)	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓
LENS OPTIONS																	
-P	Plastic Lens	STD	✓	✓	✓	✓	✓	STD	STD	STD	✓	✓	MQ	✓	✓	✓	✓
-T	Tempered Safety Glass Lens	✓	STD	STD	STD	STD	STD	N/A	N/A	N/A	STD	N/A	N/A	N/A	STD	STD	STD
-S	Laminated Safety Glass Lens	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓
-G	Plain Glass	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MQ	MQ	N/A	MQ	STD	N/A	N/A	N/A	N/A
POINTER OPTIONS																	
-RP	Red Pointer	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓
-MP	Min/Max Pointer (Drag Hand)	✓	N/A	✓	✓	✓	✓	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-MQ	Min/Max Pointer (Tamper-proof)	✓	N/A	✓	✓	✓	✓	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-RH	Red Set Hand (Manual Adjustment)	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-EC	Electrical Contacts	N/A	N/A	✓	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DIAL OPTIONS																	
-CL	Custom Logo Dial	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	✓
-HV	Hi-Vis Dial	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	N/A
-CB	Color Band	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	N/A
-CP	Color Pie	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	N/A
-DM	Dial Marking	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	✓	✓	✓	✓
-LP	Removable Lens Protector	N/A	N/A	N/A	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CALIBRATION OPTIONS																	
-R1	Upgrade to 1% FS Accuracy	✓	✓	STD	STD	N/A	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-R2	Upgrade to 0.5% FS Accuracy	N/A	N/A	✓	✓	STD	STD	STD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-R5	Upgrade to 1.5% FS Accuracy	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	N/A
-C1	1pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-C3	3pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-C5	5pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-CX	10pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	STD
-CS	Calibration Sticker (No logged pts.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
TAG OPTION																	
-TS	Stainless Steel Tag (1-10 Characters)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-TM	Stainless Steel Tag (11-80 characters)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-TP	Paper Tag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CERTIFICATION OPTIONS																	
-CM	General Material Conformance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-NC	Certificate of NACE Compliance	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓
-PM	Positive Material Identifiaction Certificate (PMI)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-HT	Hydrostatic Test per ASME B31.3 (5 min)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-LC	Argon Leak Check Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLEANING OPTIONS																	
-DG	Degreased - Wiped Clean of Oils, Shipped in Sealed Bag	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	✓
-OX	Cleaned for Oxygen Service per ASME B40.1	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	✓	✓	✓	✓
-OY	Cleaned for Oxygen Service per MIL-STD-1330D	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	✓

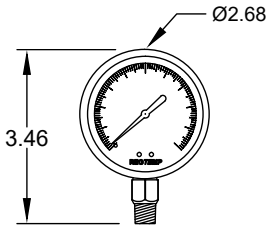
✓	Indicates that the option is available with the model.	N/A	Indicates the option is not available with this model.
STD	Indicates standard options with no additional cost.	MQ	Minimum order quantity applies.

INDUSTRIAL STAINLESS/BRASS GAUGE

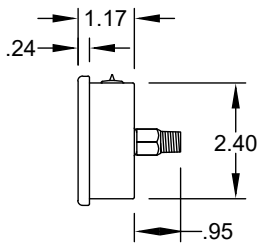
REOTEMP's Series PG gauges are an economical choice where ambient corrosion and vibration are of concern. The stainless steel case and ring offer excellent corrosion resistance, and is fillable for applications with vibration. It is suitable for all fluids compatible with copper alloys.

PG25C2

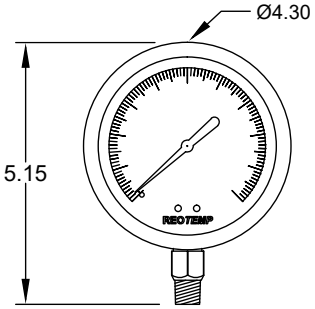
PG40C2



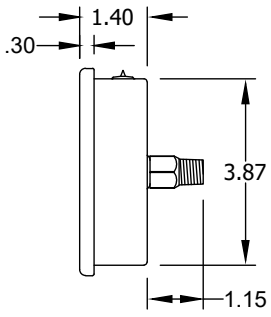
PG25C2



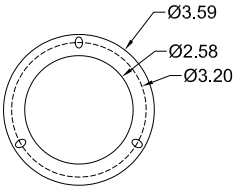
*dimensions in inches



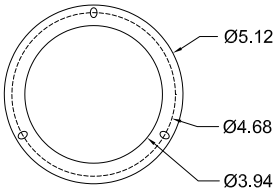
PG40C2



*dimensions in inches



2.5" MOUNTING FLANGE



4" MOUNTING FLANGE

Fillable Custom Logo

FEATURES / BENEFITS

ASME B40.100

- Stainless Steel Case
- Copper Alloy Wetted Parts
- Field Fillable Case
- Convenient Panel Mounting Adapters

SPECIFICATIONS

Accuracy	2.5" = 3 - 2 - 3%, ASME Grade B 4" = 2 - 1 - 2%, ASME Grade A
Ambient Limits	-40°F/140°F
Process Limits	-40°F/140°F
Process Limits with Diaphragm Seal	Cannot be mounted to a diaphragm seal.
Wetted Materials	Tube: Copper Alloy Socket: Copper Alloy
Lens	Plastic (Standard) or Glass
Other Materials	Case: 304SS Ring: 304SS Dial: White Aluminum, Black Letters Case-to-Socket: Screw Connection
Fillable	Yes
Restrictor Screw	Built-in, Non-Removable
Maximum Working Pressure	Stable = 100% Momentary = 110% of scale
Environmental Protection	NEMA 4X/IP65
Weight	2.5" = 0.25 lbs (0.4 lbs filled) 4" = 0.6 lbs (1.2 lbs filled)

INDUSTRIAL STAINLESS/BRASS GAUGE

Visit reotemp.com

- ✓ Check Stock
- ✓ Get Price
- ✓ Configure Part #
- ✓ Download PDF Data Sheets

HOW TO ORDER: Choose options to build a part number. For example: PG25C2A4P18-D-P-TS

PG25	C	2	A	4	P18	-D	-P	-TS
DIAL SIZE	CASE TYPE	TUBE & SOCKET	MOUNT TYPE	CONNECTION	RANGE CODE	CASE FILL	LENS	OPTIONS
PG25 = 2.5" **PG40** = 4"	**C** = 304SS Crimped Ring	**2** = Copper Alloy	**A** =  Bottom **B** =  Bottom/Rear Flange **C** =  Center Back **D** =  Center Back "U" Clamp **E** =  Center Back/Front Flange	**4** = 1/4" NPT ***2** = 1/2" NPT	*Common Ranges* **P16** = 0-30 psi **P17** = 0-60 psi **P18** = 0-100 psi **P19** = 0-160 psi **P20** = 0-200 psi **P21** = 0-300 psi **P23** = 0-600 psi **P25** = 0-1,000 psi *Available Ranges* ■ Gauge Pressure, Vacuum, or Compound ■ Vac to 6,000 psi *For Additional Range Codes See Page 45*	**-D** = Dry **-G** = Glycerin **-W** = Glycerin/ Water (65/35) *Note: This model cannot be filled with silicone.*	**-P** = Plastic ***-G** = Glass	**-TS** = Stainless Steel Tag

*Non-standard configuration

Master Range Code Sheet

PRESSURE GAUGE RANGES AND CODES

VACUUM/COMPOUND RANGES

psi		Dual Scale & psi & Metric						Single Scale-Metric					
"Hg/0/psi		psi & bar		psi & kg/cm²		psi & kPa		bar		kg/cm²		kPa	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
P01	-30"Hg/0	D01	"Hg & -1/0 bar	G01	"Hg & -1/0 kg/cm²	L01	"Hg & -100/0 kPa	B00	-1/0 bar	K00	-1/0 kg/cm²	A00	-100/0 kPa
P02	-30/0/15	D02	psi & -1/0/1	G02	psi & -1/0/1	L02	psi & -100/0/100	B01	-1/0/1	K01	-1/0/1	A01	-100/0/100
P03	-30/0/30	D03	psi & -1/0/2	G03	psi & -1/0/2	L03	psi & -100/0/200	B02	-1/0/2	K02	-1/0/2	A02	-100/0/200
P04	-30/0/60	D04	psi & -1/0/4	G04	psi & -1/0/4	L04	psi & -100/0/400	B04	-1/0/4	K04	-1/0/4	A04	-100/0/400
P05	-30/0/100	D05	psi & -1/0/7	G05	psi & -1/0/7	L05	psi & -100/0/700	B07	-1/0/7	K07	-1/0/7	A07	-100/0/700
P06	-30/0/160	D06	psi & -1/0/11	G06	psi & -1/0/11	L06	psi & -100/0/1,100	B011	-1/0/11	K011	-1/0/11	A011	-100/0/1,100
P07	-30/0/200	D07	psi & -1/0/14	G07	psi & -1/0/14	L07	psi & -100/0/1,400	B014	-1/0/14	K014	-1/0/14	A014	-100/0/1,400
P08	-30/0/300	D08	psi & -1/0/20	G08	psi & -1/0/20	L08	psi & -100/0/2,000	B020	-1/0/20	K020	-1/0/20	A020	-100/0/2,000

PRESSURE RANGES

psi		Dual Scale & psi & Metric						Single Scale-Metric					
psi		psi & bar		psi & kg/cm²		psi & kPa		bar		kg/cm²		kPa	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
P14	0-10 psi	D14	psi & .7 bar	G14	psi & .7 kg/cm²	L14	psi & 70 kPa						
P15	0-15	D15	psi & 0-1	G15	psi & 0-1	L15	psi & 0-100	B1	0-1 bar	K1	0-1 kg/cm²	A1	0-100 kPa
P16	0-30	D16	psi & 0-2	G16	psi & 0-2	L16	psi & 0-200	B2	0-2	K2	0-2	A2	0-200
P17	0-60	D17	psi & 0-4	G17	psi & 0-4	L17	psi & 0-400	B4	0-4	K4	0-4	A4	0-400
P18	0-100	D18	psi & 0-7	G18	psi & 0-7	L18	psi & 0-700	B7	0-7	K7	0-7	A7	0-700
P19	0-160	D19	psi & 0-11	G19	psi & 0-11	L19	psi & 0-1,100	B11	0-11	K11	0-11	A11	0-1,100
P20	0-200	D20	psi & 0-14	G20	psi & 0-14	L20	psi & 0-1,400	B14	0-14	K14	0-14	A14	0-1,400
P21	0-300	D21	psi & 0-20	G21	psi & 0-20	L21	psi & 0-2,000	B20	0-20	K20	0-20	A20	0-2,000
P22	0-400	D22	psi & 0-28	G22	psi & 0-28	L22	psi & 0-2,800	B28	0-28	K28	0-28	A28	0-2,800
P23	0-600	D23	psi & 0-40	G23	psi & 0-40	L23	psi & 0-4,000	B40	0-40	K40	0-40	A40	0-4,000
P24	0-800	D24	psi & 0-55	G24	psi & 0-55	L24	psi & 0-5,500	B55	0-55	K55	0-55	A55	0-5,500
P25	0-1,000	D25	psi & 0-70	G25	psi & 0-70	L25	psi & 0-7,000	B70	0-70	K70	0-70	A70	0-7,000
P30	0-1,500	D30	psi & 0-100	G30	psi & 0-100	L30	psi & 0-10,000	B100	0-100	K100	0-100	A100	0-10,000
P31	0-2,000	D31	psi & 0-140	G31	psi & 0-140	L31	psi & 0-14,000	B140	0-140	K140	0-140	A140	0-14,000
P32	0-3,000	D32	psi & 0-200	G32	psi & 0-200	L32	psi & 0-20,000	B200	0-200	K200	0-200	A200	0-20,000
P33	0-4,000	D33	psi & 0-280	G33	psi & 0-280	L33	psi & 0-28,000	B280	0-280	K280	0-280	A280	0-28,000
P34	0-5,000	D34	psi & 0-350	G34	psi & 0-350	L34	psi & 0-35,000	B350	0-350	K350	0-350	A350	0-35,000
P35	0-6,000	D35	psi & 0-400	G35	psi & 0-400	L35	psi & 0-40,000	B400	0-400	K400	0-400	A400	0-40,000
P36	0-8,000	D36	psi & 0-550	G36	psi & 0-550	L36	psi & 0-55,000	B550	0-550	K550	0-550	A550	0-55,000
P37	0-10,000	D37	psi & 0-700	G37	psi & 0-700	L37	psi & 0-70,000	B700	0-700	K700	0-700	A700	0-70,000
P38	0-15,000	D38	psi & 0-1,000	G38	psi & 0-1,000	L38	psi & 0-100,000	B1K	0-1,000	K1K	0-1,000	A1K	0-100,000
P39	0-20,000	D39	psi & 0-1,400	G39	psi & 0-1,400	L39	psi & 0-140,000						
P40	0-30,000	D40	psi & 0-2,000	G40	psi & 0-2,000	L40	psi & 0-200,000						
P41	0-40,000	D41	psi & 0-2,800	G41	psi & 0-2,800	L41	psi & 0-280,000						
P42	0-50,000	D42	psi & 0-3,500	G42	psi & 0-3,500	L42	psi & 0-350,000						

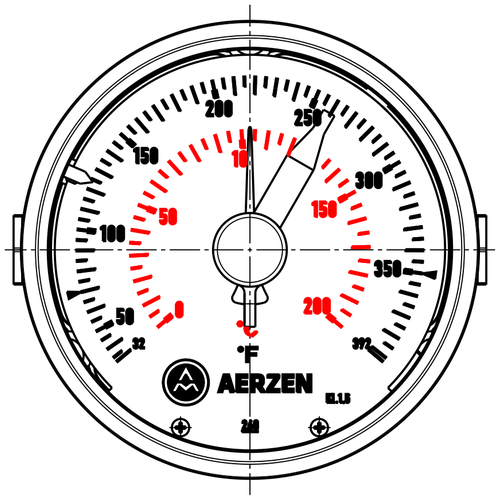
Don't See The Range You Need? REOTEMP has thousands of specialty dial ranges available and will work with you to create a custom range, just contact REOTEMP customer service.

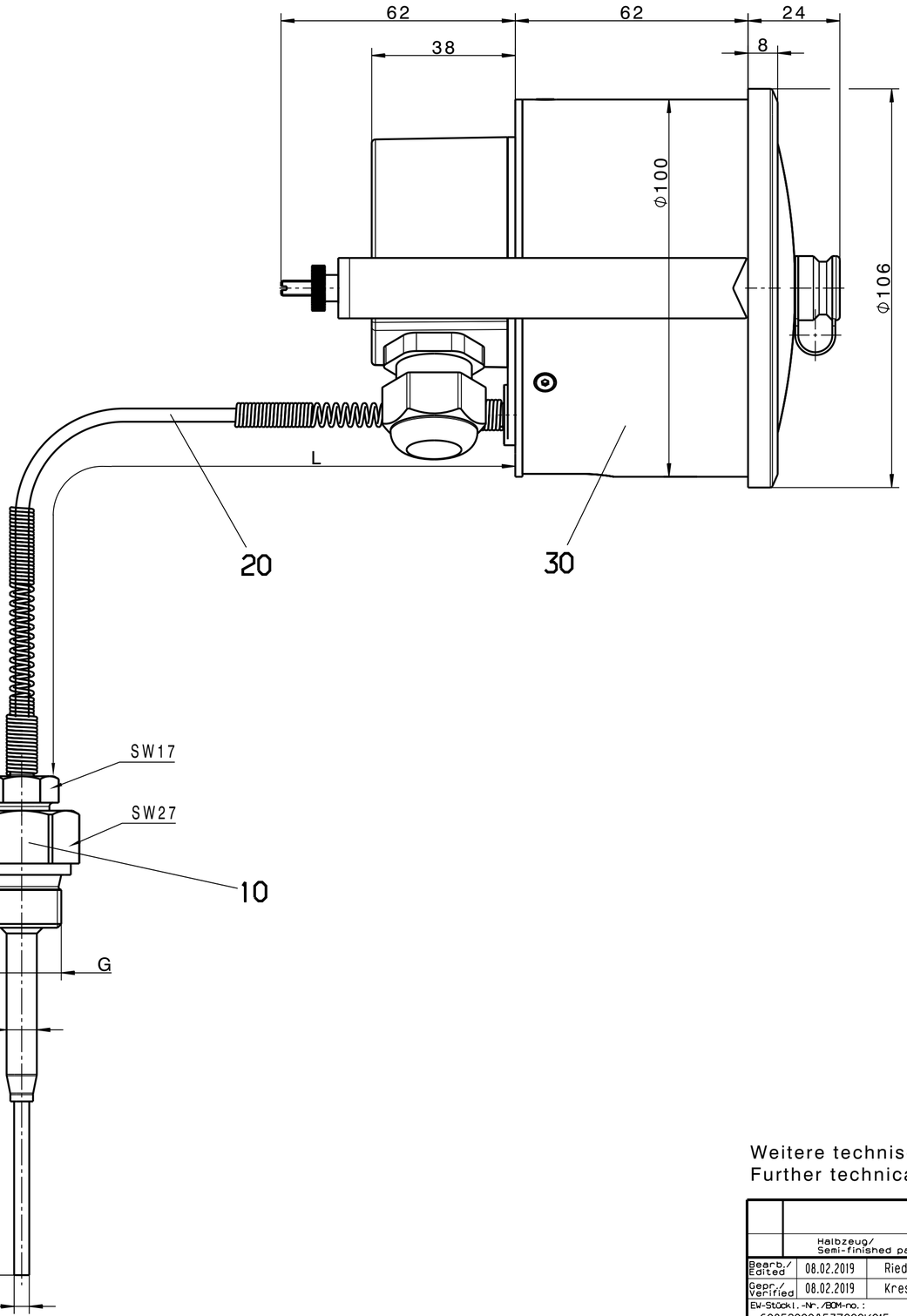
PRESSURE GAUGE OPTIONS

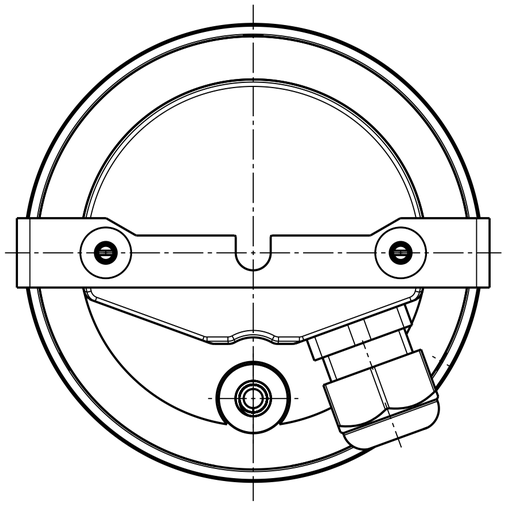
		Heavy-Duty Industrial Gauges				Process Gauges			Stainless Steel Case Industrial Gauges			Commercial Gauges		Low Pressure Capsule Gauges			Test Gauges
Part #	Description	PR25	PR35	PR40	PR60	PT45P	PT45T	PI45	PM	PG**C	PG**S	PD15/20/25	PD35/40	PC25N	PC25S	PC40/45/60	PL60/45
CASE FILL OPTIONS																	
-G	Glycerin Filled Case	✓	✓	✓	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
-W	Glycerin Water Filled Case (65/35)	✓	✓	✓	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
-S	Silicone Filled Case	✓	✓	✓	✓	✓	✓	N/A	✓	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-T	Teflon-coated Movement (No case fill)	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓
-I	Inert Case Fill	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LENS OPTIONS																	
-P	Plastic Lens	STD	✓	✓	✓	✓	✓	STD	STD	STD	✓	✓	MQ	✓	✓	✓	✓
-T	Tempered Safety Glass Lens	✓	STD	STD	STD	STD	STD	N/A	N/A	N/A	STD	N/A	N/A	N/A	STD	STD	STD
-S	Laminated Safety Glass Lens	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓
-G	Plain Glass	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MQ	MQ	N/A	MQ	STD	N/A	N/A	N/A	N/A
POINTER OPTIONS																	
-RP	Red Pointer	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓
-MP	Min/Max Pointer (Drag Hand)†	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-MQ	Min/Max Pointer (Tamper-proof)†	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-RH	Red Set Hand (Manual Adjustment)	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-EC	Electrical Contacts	N/A	N/A	✓	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DIAL OPTIONS																	
-CL	Custom Logo Dial	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	✓
-HV	Hi-Vis Dial	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	N/A
-CB	Color Band	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	N/A
-CP	Color Pie	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	N/A
-DM	Dial Marking	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	✓	✓	✓	✓
-LP	Removable Lens Protector	N/A	N/A	N/A	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CALIBRATION OPTIONS																	
-R1	Upgrade to 1% FS Accuracy	✓	✓	STD	STD	N/A	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-R2	Upgrade to 0.5% FS Accuracy	N/A	N/A	✓	✓	STD	STD	STD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-R5	Upgrade to 1.5% FS Accuracy	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	N/A
-C1	1pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-C3	3pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-C5	5pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-CX	10pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	STD
-CS	Calibration Sticker (No logged pts.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
TAG OPTION																	
-TS	Stainless Steel Tag (1-10 Characters)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-TM	Stainless Steel Tag (11-80 characters)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-TP	Paper Tag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CERTIFICATION OPTIONS																	
-CM	General Material Conformance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-NC	Certificate of NACE Compliance	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓
-PM	Positive Material Identification Certificate (PMI)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-HT	Hydrostatic Test per ASME B31.3 (5 min)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-LC	Argon Leak Check Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLEANING OPTIONS																	
-DG	Degreased - Wiped Clean of Oils, Shipped in Sealed Bag	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	✓
-OX	Cleaned for Oxygen Service per ASME B40.1	✓	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	✓	✓	✓	✓
-OY	Cleaned for Oxygen Service per MIL-STD-1330D	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	✓
OTHER OPTIONS																	
-NR	No Restrictor Screw	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A
-FI	Dry Gauge Shipped with Fill Plug Installed	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

✓	Indicates that the option is available with the model.	N/A	Indicates the option is not available with this model.
STD	Indicates standard options with no additional cost.	MQ	Minimum order quantity applies.

†This option is only available with a plastic lens.

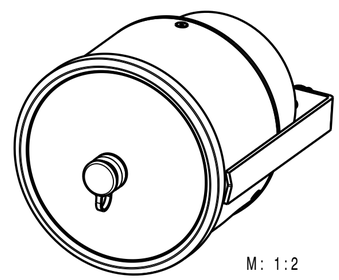






Typenschlüssel/ type code: 608520/2110-832-23-4000-876-8-104-26-46-106-20/426,430,477,522

Pos.	Pos.	001
Typ	type	2110
AB [°C]	display range	0...+200
AB-Einheit	display range oneness	°F/°C
Fl Typ	capillary typ	-
Werkst. Fühler	material bulb	CrNi
L [mm]	L	4000
L_2 [mm]	L_2	-
Anschluß	connection	SH 10
G Gewinde	treath	G1/2
Werkst. Anschluß	material connection	CuZn
d [mm]	d	4
D [mm]	D	8
S [mm]	S	106
Schaltausgang	switching output	SA20
TZ	extra code	426,430,477,522
Laser Nr	laser No.	2463
Weitere Angaben n. Typenblatt	more information at datasheet	60.8520
Bedienungsanleitung	user manual	B60.8520
Grundtyp	type	85.364.00.00
TN	partnumber	00717805



M: 1:2

Weitere technische Daten nach Typenblatt 60.8520
Further technical details as per data sheet 60.8520

Halbzeug/ Semi-finished part	Werkstoff-Nr./ Material-no.	DIN-Kurzbezeichnung/ DIN-code	Oberfläche/ Surface

Bearb./ Edited	08.02.2019	Riedel	
Gepr./ Verified	08.02.2019	Kress	
EW-Stückl.-Nr./BOM-no.: 60852000A53Z000K015 00718107			

Zeigerkontakt-thermometer

60852000A00Z001 K015
Zeichnungs-Nr./Drawing-no.

Vers. Rev.	Änderung/ Modification	Datum/ Date	Name
02	EW-70	21.02.2019	Riedel
01	EW-70	14.02.2019	Riedel
00	EW-70	08.02.2019	Riedel

Ersatz für Nr./ Replace

JUMO GmbH & Co. KG
Fulda Germany

Maße ohne Toleranzangabe/ Tol. unless otherwise specified: DIN ISO 2768-m

Maßstab/Scale: 1:1

Teile-Nr./Part-no.

Größe/ Size: A2

Blatt/ Sheet: 01/01

AERZEN USA

Corporation

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Coatesville, Pa. 19320

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www.aerzen.com

Main Process	-
Process Style	-
Highest Level of Treatment	-
Process System Size	-

Process Flow Diagram (PFD)

Customer	HICKS WWTP
Facility Location	CLAYTON GA
Sales No.	-
Order No.	SO-23-00162
System Description	MCP - AERPROCESS: SEQUENCING PANEL

System Description

MCP - AERPROCESS: SEQUENCING PANEL

BLOWER TECHNOLOGY: PD

BLOWER CONTROL METHOD:
- CONTROL METHOD: NONE
- LEAD LAG MODE: STANDARD SEQUENCING
- VFD INTEGRATION METHOD: N/A

PROCESS CONTROL METHOD
- DO CONTROL METHOD: NONE
- FIELD IO: NONE
- FIELD DEVICES: NA

ADDITIONAL FEATURES: REMOTE SUPPORT

Rev.	Date	By	Description of Revision	Date Checked	Checked By
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

Date Drawn	06/09/2023
Drawn By	JEK
Date Checked	---
Checked By	AC

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IB-006466-23-00162 Rev "–"

CLASS I

SHEET 1 of 4

TABLE OF CONTENTS

Rev.	Date	By	Description of Revision	Date Checked	Checked By
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

Date Drawn	06/09/2023
Drawn By	JEK
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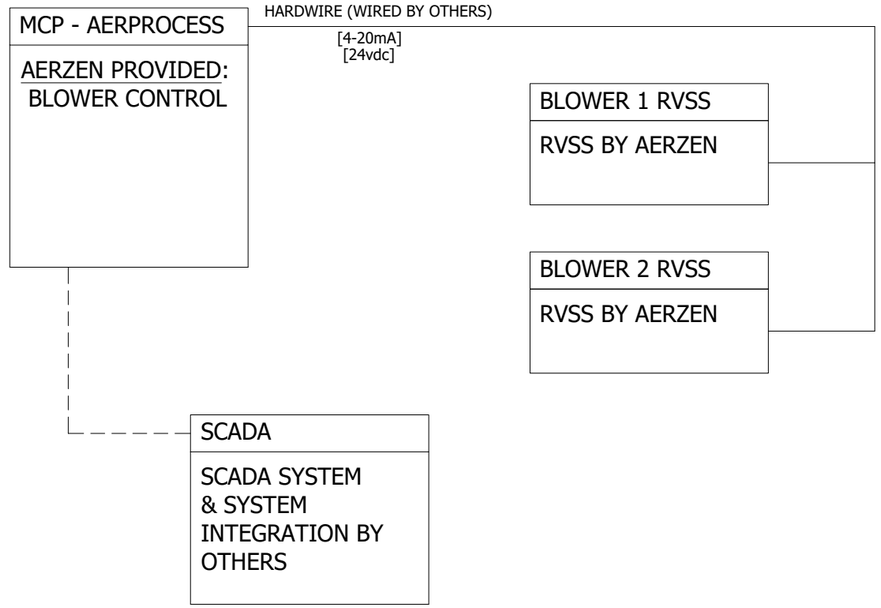
CLASS I

SHEET 2 of 4



NOTE:

COMMUNICATION WITH BLOWER UNITS SHALL BE PERFORMED VIA CAT 5E/6 ETHERNET CABLE AND ETHERNET/IP COMMUNICATION PROTOCOL

PROVISIONS SHALL BE MADE FOR THE AERZEN SUPPLIED MCP TO COMMUNICATE WITH A SCADA/DCS SYSTEM (BY OTHERS) VIA CAT 5E/6 ETHERNET CABLE AND ETHERNET/IP COMMUNICATION PROTOCOL

MCP CONTROL SIGNALS SHALL BE CONVEYED TO THE RVSS VIA HARDWIRE

Rev.	Date	By	Description of Revision	Date Checked	Checked By
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

Date Drawn	06/09/2023
Drawn By	JEK
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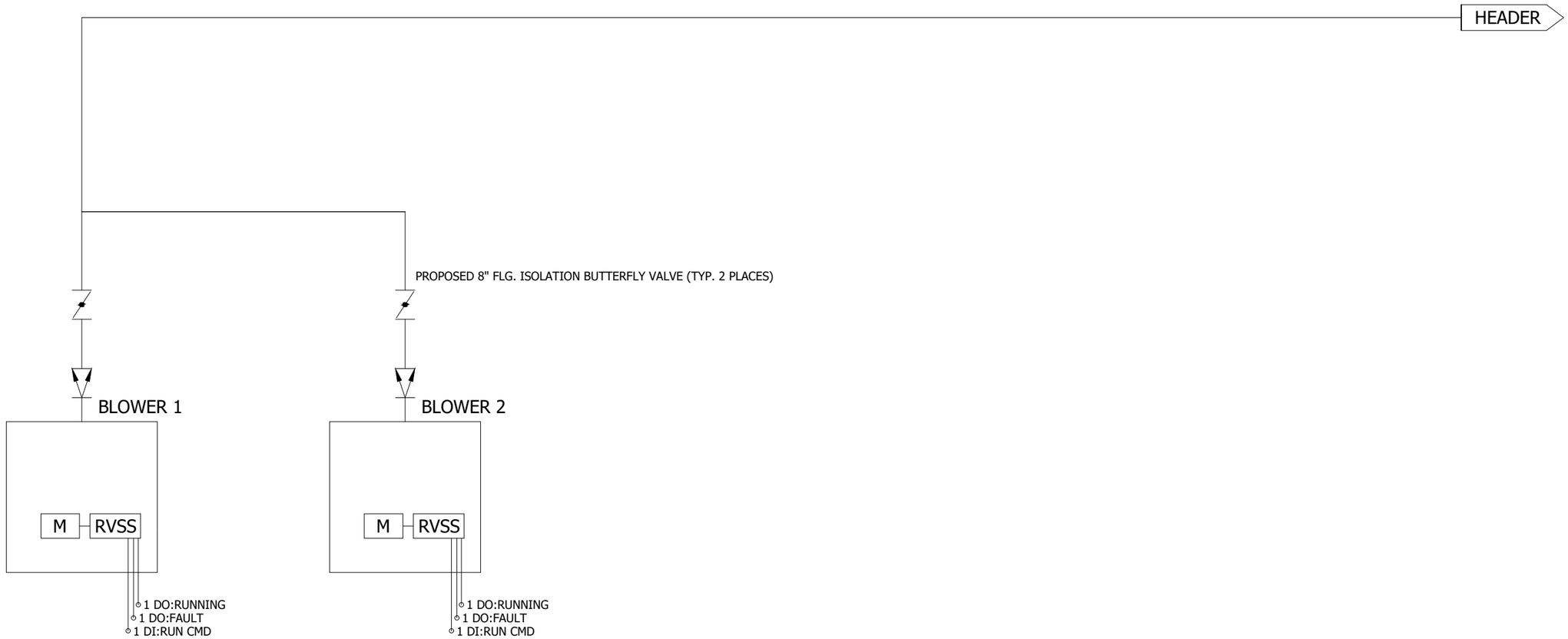
CLASS I

SHEET 3 of 4



NARRATIVE SUMMARY: (INTEGRATION METHOD 1 PER 0510)

MCP - AERPROCESS SHALL ACT AS THE DO AND AERATION CONTROLLER AND ASSUME DEFAULT CONTROL AND FAULT HANDLING DUTIES RELATED TO AERZEN PROVIDED BLOWERS 1 AND 2.

LEAD/LAG BLOWER SEQUENCING METHODS SHALL BE PROVIDED TO PROVIDE PROCESS ROBUSTNESS AND EQUALIZE UNIT UTILIZATION/RUNTIME.

BLOWER RVSS SHALL RECEIVE COMMANDS FROM MCP AERPROCESS VIA HARDWIRE CONNECTIONS

Rev.	Date	By	Description of Revision	Date Checked	Checked By
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

Date Drawn	06/09/2023
Drawn By	JEK
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IB-006466-23-00162 Rev "-"

CLASS I

SHEET 4 of 4

Aerzen AERprocess Control Narrative

SO #: 23-00162

System Description: Blower Control System
(2) RVSS Controlled PD's
Coms via Hardwire
All EtherNet Coms EtherNet/IP

Compressed air, gas and vacuum solutions

Aerzen USA
108 Independence Way
Coatesville, PA 19320 USA

Date: 06/16/2023

Revision 1.4 – 0475-A-6

PREFACE

The intent of this document is to summarize the control functionality and operational sequence of the AERprocess dissolved oxygen control system proposed by Aerzen USA. In general, the AERprocess control system can be broken down into three constituent software components:

- Blower Control Module
- Human Machine Interface

All software shall be prepared using RSlogix 5000 V32 and Factorytalk View Studio V12 . Screen layouts developed by Aerzen shall be shared with facility/system integrator to allow for easy integration into existing SCADA/DCS network (by others).

Below, please find information regarding the purpose and functional breadth of each control module. Required communication pathways with field and PLC based SCADA/DCS systems are proposed in the companion AERprocess Process Flow Diagram (PFD). Tags and IP addressing necessary for integrating external control devices with the AERprocess are detailed in a separate communication coordination document.

SECTION: 1 Blower Control Module

The Blower Control Module coordinates the operation of Aerzen blower packages in a manner conducive to promoting equipment health and process robustness. In general, blower run commands and speed setpoints are adjusted in accordance with process demands – as identified by the process control module.

1.01 Basic Operation

A. (PD/Hybrid Blower Start/Stop) - Shall allow for automatic or manual operation of all Aerzen supplied blowers

1. System Operation shall allow operators to determine the number of packages to run as well as the order in which those packages should be brought online/offline
2. Automated sequencing methods shall operate packages in the blower system in such a way so as to comply with Aerzen blower startup and shutdown guidelines for PDs, Hybrids, and Turbos by coordinating blower startup, shutdown, loading, and unloading to promote system stability and robustness

B. **Standard Lead/Lag Management -** Shall energize blowers in a lead and lag fashion depending on each unit's availability and user defined selection criteria:

1. User defined (preferred) lead/lag order (or)
2. Lowest runtime first (or)
3. Lowest number of starts first

C. Addition of a blower to service shall occur when the following conditions are fulfilled
   1. A run command has been requested.

D. Subtraction of a blower from service shall occur when the following conditions are fulfilled
   1. A run command has been removed.

E. General fault handling
   1. The system shall produce latching faults for all manufacturer recommended fault conditions
      a. Latching faults require user intervention to unlatch/clear
   2. In the event that an active blower has a fault condition, the control system shall attempt to energize the next lag blower to compensate for the loss of an online blower.

F. Power fault handling **(Optional – not available for turbo blowers)**
   1. AERprocess shall have a UPS battery backup
   2. AERprocess shall have a method of detecting a loss of power event
   3. In the event that there is a power interruption to the AERprocess main control panel, the system will automatically reset all faults generated as a result of the loss of power event when power is restored and resume normal operation

1.02 Commissioning and Integration

A. Communication
   1. Aerzen shall provide PLC tag arrays to which an external control device may read/write to
      a. IO list to contain blower status, landed and scaled IO signals, and system health information
      b. Aerzen shall provide IO list and IP addressing documentation for customer approval
   2. Programming/Integration of an external control device to accommodate these IO points by others

B. Remote support for Commissioning
   1. Blower MCP shall come equipped with user controlled 4g support device to facilitate troubleshooting, startup, commissioning, and training.
   2. 4g connection can be disabled by operators on demand
   3. Aerzen shall supply a 4g data plan through warranty support period at no additional charge
   4. Enabling the data connection shall allow Aerzen to collect data on the operational performance of the AERprocess control system

SECTION: 2 Human Machine Interface

The Human Machine Interface (HMI) shall serve as a functional ‘window’ into the control logic. Unless otherwise specified, all user interaction with the AERprocess shall be via the panel mounted touch screen HMI.

A. Touchscreen Interface

1. All menus shall be configured to respond to user touch

B. User Control and password protection

1. Sensitive tuning parameters and system variables which may directly affect the robustness and/or stability of the system shall require an appropriate level of password clearance to modify

C. Data Display

1. HMI shall provide process and blower package monitoring screens and display all control system relevant process and blower data as made available through hardwired or EtherNet/IP connections

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Service Hotline (800) 444-1692

AERprocess Communication Coordination	
DATE	**Document #**
6-Jun-23	0472-A-7 Rev1
	SO-23-00162

The purpose of this sheet to to coordinate the sharing of information required to integrate the AERprocess Control system with the facility's SCADA or DCS system. Please confirm or assign the appropriate IP addresses and provide a list of IO points which Aerzen should make available for SCADA messaging. Aerzen will program the labeled components below according to this table - additional on-site time spent to modify IP addresses from this approved list may be subject to additional biling.

Assigned IP Addresses for Devices

a) PLC

	IP Address	Subnet Mask	Gateway (optional)	Device Note:
i)	192.168.1.100	255.255.255.0	XXX.XXX.XXX	AERprocess PLC

b) HMI

	IP Address	Subnet Mask	Gateway (optional)	Device Note:
i)	192.168.1.101	255.255.255.0	XXX.XXX.XXX	AERprocess HMI

d) Programming/Development Device(s)

	IP Address	Subnet Mask	Gateway (optional)	Device Note:
i)	192.168.1.102	255.255.255.0	XXX.XXX.XXX	Aerzen Programming Laptop
ii)	192.168.1.103	255.255.255.0	XXX.XXX.XXX	Ewon - VPN Remote Access

e) Additional IP addresses reserved for Aerzen

	IP Address	Subnet Mask	Gateway (optional)	Device Note:
i)	192.168.1.104	255.255.255.0	XXX.XXX.XXX	Spare
ii)	192.168.1.105	255.255.255.0	XXX.XXX.XXX	Spare

If the customer has requested that AERZEN use a managed switch, please provide the configuration file this switch is to be delivered with.

Managed Switch Required: **No**

IO List: Aerzen to SCADA/DCS

If an IO communications list has already been prepared - please attach this file in lieu of filling action section 2 and 3.

Unless otherwise noted, the default communication protocol for the AERprocess is Allen Bradley's Ethernet IP

Aerzen indexes are addressed by Train, then Zone:

i.e. for a 2 train 8 zone process, T1 Z0 = Index 0, T2 Z3 = Index 6

i.e. for a 3 Train 3 Zone process, Train A Basin 1 = index 0, Train A Basin 2 = index 1

Analog Values

Aerzen Data Array Name: AERprocess_to_SCADA_REAL

Aerzen Array Data Type: Real[0]

Spare Indexes: 0

Process Variable	QTY		Scale	Notes:	Aerzen Assigned Array	Array Index Start	Array Index End
Second	1		x1	mg/L	AERprocess_to_SCADA_REAL	0	0

Discrete Values

Aerzen Data Array Name: AERprocess_to_SCADA_DINT

Aerzen Array Data Type: DINT[2]

Spare Indexes: 1

Process Variable	QTY		Scale	Notes:	Aerzen Assigned Array	Index	Bit Start
Blower Running	2		NA	1 = run, 0 = off	AERprocess_to_SCADA_DINT	0	0
Blower Fault	2		NA	1 = fault	AERprocess_to_SCADA_DINT	0	2
AERemote Enabled	1		NA	1 = fault	AERprocess_to_SCADA_DINT	0	4
Blink	1		NA	if available	AERprocess_to_SCADA_DINT	0	5

IO List: SCADA/DCS to AERprocess

If the following process variables are landed by the SCADA/DCS, please indicate what tag the AERprocess we be able to read the data from

Aerzen will organize an AERprocess to SCADA/DCS data array on the AERprocess controller to accommodate these values

Unless otherwise noted, the default communication protocol for the AERprocess is Allen Bradley's Ethernet IP

Process Variable	QTY	Data Type	Scale	Notes:	SCADA Tag	Array Index Start	Array Index End
Blower Run Cmd	1	DINT	N/A	1 = run, 0 = off	SCADA_to_AERprocess	0	0

Please contact Aerzen USA if anything is unclear, prior to completion of this document.

By reviewing and approving this document, I certify that I understand the purpose of this coordination sheet and confirm that the information present on this document is accurate and complete to the best of my knowledge. All equipment provided by Aerzen USA shall be programmed, FAT'ed, and shipped according to the above parameters. Should these parameters require modifications post shipment, Aerzen USA reserves the right to charge the appropriate/responsible parties on a time and materials basis to account for additional or extraneous efforts which may be required to reconfigure equipment in the field to accomodate alternative communication parameters.

Aerzen USA
Compressed Air, Gas and Vacuum Solutions
108 Independence Way Coatesville, PA 19320 USA
Telephone: (610) 380-0244 Fax: (610) 380-0278
usa-inquiries@aerzen.com www.aerzen.com/en-us

Master Control Panel Factory Acceptance Test & Preparation for Shipment/Startup

Project: _____

Inspector/Engineer: _____

Date: _____

SECTION: 1 Master Control Panel Inspection

1.01	Confirm Level 3 Incoming Inspection Complete	☐ or NA
1.02	Review of As Built Drawings	☐ or NA
1.03	Review Control Narrative & Control Strategies	☐ or NA
	A. Pressure Based Control	☐ or NA
	B. Airflow Based Control	☐ or NA
	C. Dissolved Oxygen Vector Control	☐ or NA
	D. Valve Control	☐ or NA
	E. HMI Screens & Functions	☐ or NA
	F. System Response Simulation (FAT)	☐ or NA

Notes on Simulated System Response for Testing:

_____

_____

_____

_____

_____

_____

_____

SECTION: 2 MCP Configuration

2.01 Wire and Energize Components ☐ or NA

2.02 Configure MCP Hardware

A. PLC IP Address ____.____.____.____

1. Subnet Mask ____.____.____.____
2. Gateway ____.____.____.____
3. Template File Used _____
4. Update Firmware ☐ or NA
   a. Firmware Rev. _____
5. Download Project ☐ or NA
   a. Project File _____
6. Set Time/Date ☐ or NA
7. Added to AERprocess Revision Record ☐ or NA
8. Set to “Manual” & De-energize devices ☐ or NA
9. Set Controller to Run Mode ☐ or NA

B. HMI

1. IP Address ____.____.____.____
2. Subnet Mask ____.____.____.____
3. Gateway ____.____.____.____
4. Update Firmware ☐ or NA
   a. Firmware Rev. _____
5. Download Project ☐ or NA
   a. Project File _____
6. Transfer Font Files
   a. Klavika Regular Plain ☐ or NA
   b. Klavika Medium Plain ☐ or NA
7. Install USB for Data Storage ☐ or NA
8. Set Time/Date ☐ or NA
9. Change Startup Option
10. “Load Project On Restart” ☐ or NA
11. Start Project ☐ or NA

C. Remote VPN (Optional)

1. eWON Communication via GSM ☐ or NA
   a. Pre-Activated Sim Card ICCID# _____
   b. Register Pre Activated SIM Card on eCatcher ☐ or NA
   c. Install Pre Activated SIM Card on eWON ☐ or NA
   d. Ext User Memory Card ☐ or NA
   e. eWON Firmware Update ☐ or NA
      i. Firmware Rev (13.3s0) _____
   f. Set Memory Settings: "16.19.1524.13107" ☐ or NA
2. IP Address (LAN) ____.____.____.____
   a. Subnet Mask ____.____.____.____
   b. Gateway ____.____.____.____
   c. Communication/internet connection/modem/Outgoing/Global/Idle before hanging up time set to 1200 seconds ☐ or NA
   d. Communication/VPN connection/Global/Advanced settings/keep alive interval 1200 seconds ☐ or NA
   e. Run System Wizard ☐ or NA
   f. Run Internet Wizard ☐ or NA
   g. Run VPN Wizard with the Activation key ☐ or NA
3. I/O Server Configuration ☐ or NA
   a. Disable Tag on Error ☐ or NA
   b. I/O Server Type ____.____.____.____
   c. PLC Address, 1, 0 ____.____.____.____
   d. Poll Rate (2000 ms) _____
4. Storage (EUM Card Installed) ☐ or NA
   a. IDE Script for Exporting Historical log to SD Card ☐ or NA
   b. IDE Script for Geo Location ☐ or NA
5. SMTP Configuration ☐ or NA

6. Create or Upload Applicable Tags ☐ or NA
7. Confirm eWON is Online on eCatcher ☐ or NA
8. Back-Up Project & Save on Job Folder ☐ or NA
   a. Project Name _____
9. Test Signal Strength ☐ or NA
   a. Signal Strength _____

D. UPS Device (optional)

1. Battery Connected ☐ or NA
2. Battery Charged 24h ☐ or NA
3. Fuses Supplied ☐ or NA
4. Backup Power Test Successful ☐ or NA
5. PLC Line Power Monitoring ☐ or NA

2.03 Networked Devices (Circle Type & Fill out if applicable)

A. Device 1 – Blwr (Anybus) / VFD / Instr.

1. Device Name _____
2. IP Address ____.____.____.____
3. Subnet Mask ____.____.____.____
4. Gateway ____.____.____.____
5. Firmware _____
6. Project File _____

B. Device 2 – Blwr (Anybus) / VFD / Instr.

1. Device Name _____
2. IP Address ____.____.____.____
3. Subnet Mask ____.____.____.____
4. Gateway ____.____.____.____
5. Firmware _____
6. Project File _____

C. Device 3 – Blwr (Anybus) / VFD / Instr.

1. Device Name _____
2. IP Address ____.____.____.____
3. Subnet Mask ____.____.____.____
4. Gateway ____.____.____.____
5. Firmware _____

6. Project File _____

2.04 Software Testing

A. Ping Each Device ☐ or NA

B. HMI-PLC Com Test

1. Startup Text Blinking ☐ or NA

2. All fields populating (no errors) ☐ or NA

C. PLC-VPN Com Test (Optional)

1. Test Remote Enable Bit ☐ or NA

D. Review Accessibility of Control Settings

1. Timer Settings ☐ or NA

2. Deadbands ☐ or NA

3. Accessibility of Tuning Parameters ☐ or NA

a. Admin Password: _____

b. Super Admin Password: _____

c. HMI Windows CE Admin Password: _____

E. Review of Alarms ☐ or NA

1. Test remote alarm reset ☐ or NA

F. Point to Point Testing

1. Analog Input Verification

a. Test loop powered devices ☐ or NA

b. Test with signal generator ☐ or NA

2. Analog Output Verification ☐ or NA

3. Discrete Input Verification ☐ or NA

4. Discrete Output Verification ☐ or NA

SECTION: 3 Software Tests (If Applicable)

3.01 Test MCP Control of Blowers (If Applicable) ☐ or NA

A. Blower 1

1. Off to Load at 50% SV ☐ or NA

2. Load at 50% to Load at 70% SV ☐ or NA

3. Load (to Unload if applicable) to Off ☐ or NA

B. Blower 2

1. Off to Load at 50% SV ☐ or NA
2. Load at 50% to Load at 70% SV ☐ or NA
3. Load (to Unload if applicable) to Off ☐ or NA

3.02 Test MCP Control Strategies with Simulated plant Feedback ☐ or NA

A. Demonstrate Sequencing

1. Add Blower Transition ☐ or NA
2. Remove Blower Transition ☐ or NA
3. Fault Recovery ☐ or NA
4. Demonstrate Lead/Lag Assignment ☐ or NA

B. Manual Control Modes

1. Manual Airflow Setpoint ☐ or NA
2. Manual DO Setpoint ☐ or NA
3. Manual Blower Speed and Run Commands ☐ or NA
4. Manual Valve Setpoint ☐ or NA
5. Manual Pressure Setpoint ☐ or NA

C. Dissolved Oxygen Control Modes

1. Airflow Based Control Mode ☐ or NA
   a. Details:

_____

_____

_____

_____

_____

2. Pressure Control Mode (No Airflow) ☐ or NA
   a. Details:

_____

_____

_____

_____

_____

3. Vector DO Control Mode (No Airflow) ☐ or NA

Details:

_____

_____

_____

_____

_____

4. Custom Control Features ☐ or NA

Details:

_____

_____

_____

_____

_____

D. Demonstrate DO Control Readiness as detailed above ☐ or NA

a. Details:

_____

_____

_____

_____

_____

SECTION: 4 Instrument and Materials Pre-Shipment Checks

4.01 Pre-Ship Checklist

A. Save software as FAT revision for records ☐ or NA

B. Disable simulation mode, io forces, enable mapping, routines and enable VFD/LCP Bits ☐ or NA

C. Save software as “As Shipped Revision”

1. Ensure As shipped revision is loaded on equipment ☐ or NA

D. As-Built Drawings Printed and Enclosed in Panel ☐ or NA

E. Software has been archived in Job Folder ☐ or NA

F. Video Walkthrough recorded ☐ or NA

1. Review Narrative
2. Walk through Panel Layout
3. Walk through Screen Navigation
4. Discuss deviations observed in FAT
5. Outline Startup Requirements

G. Instrument QTY and type has been checked ☐ or NA

a. Details:

_____

_____

_____

_____

_____

H. Handoff to PM/After-Sales ☐ or NA

Testing Notes:

SECTION: 5 Testing/Configuration Acknowledgement & Sign Off

Witnessed By: Date:

_____ or NA _____

End User / Engineer / Contractor
Representative

_____ or NA _____

UL Listed Panel Manufacturer
Representative

_____ _____

Aerzen USA Testing
Representative & Primary Investigator

TORQUE CHART

DEVICE	FIELD CONNECTION TORQUE RATING
DS1	6AWG-300MCM, 88.5IN-LBS
GL1-3	6AWG-250MCM, 275IN-LBS

480 VAC
3 PH
60 HZ

65 kA SCCR

DS1 200A

FU1 [200A] FU3 [200A] FU5 [200A]

PDB1

FB1: FU2 [200A], FU4 [200A], FU6 [200A]

RVSS1 3.23

MOT1 BLOWER 1 MOTOR
125 HP
VOLTAGE (VAC): 480
TYP. FLA (A):156.00
ACT. FLA (A):

GL1, GL2

MOTORS ARE ELECTRICALLY INTERLOCKER - ONLY ONE CAN RUN AT A TIME

FB2: FU7 [200A], FU8 [200A], FU9 [200A]

RVSS2 3.32

MOT2 BLOWER 1 MOTOR
125 HP
VOLTAGE (VAC): 480
TYP. FLA (A):156.00
ACT. FLA (A):

GL3

SPD1
NO
NC

FU10 5A, FU11 5A

480VAC
H1 H3 H2 H4
T1 1000VA
X1 X2
120VAC

CB1 13A

CB2 4A

TS1 ENCLOSURE THERMOSTAT

FAN1: ENCLOSURE COOLING FAN AIRFLOW W/ FILTER, 125 CFM TYP. FL 0.33A

FAN2: ENCLOSURE COOLING FAN AIRFLOW W/ INLET FAN, 151 CFM TYP. FL 0.33A

CB3 2A

HTR1: ENCLOSURE HEATER 125W

2.01 3

2.01 2

UL 508A

PANEL TERMINAL
COMPONENT WIRING
FIELD WIRING
PANEL WIRING

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REV.	NAME	DATE
0	RAP	6/27/23
1	EGW	7/13/23

TITLE
BLOWER CONTROL PANEL
TYPE 4X ENCLOSURE
HICKS, GA - ENV-223442

	NAME	DATE
DRAWN BY	RAP	6/27/23
CHECKED BY		
APPROVED BY		

DRAWING NO. 32845E02

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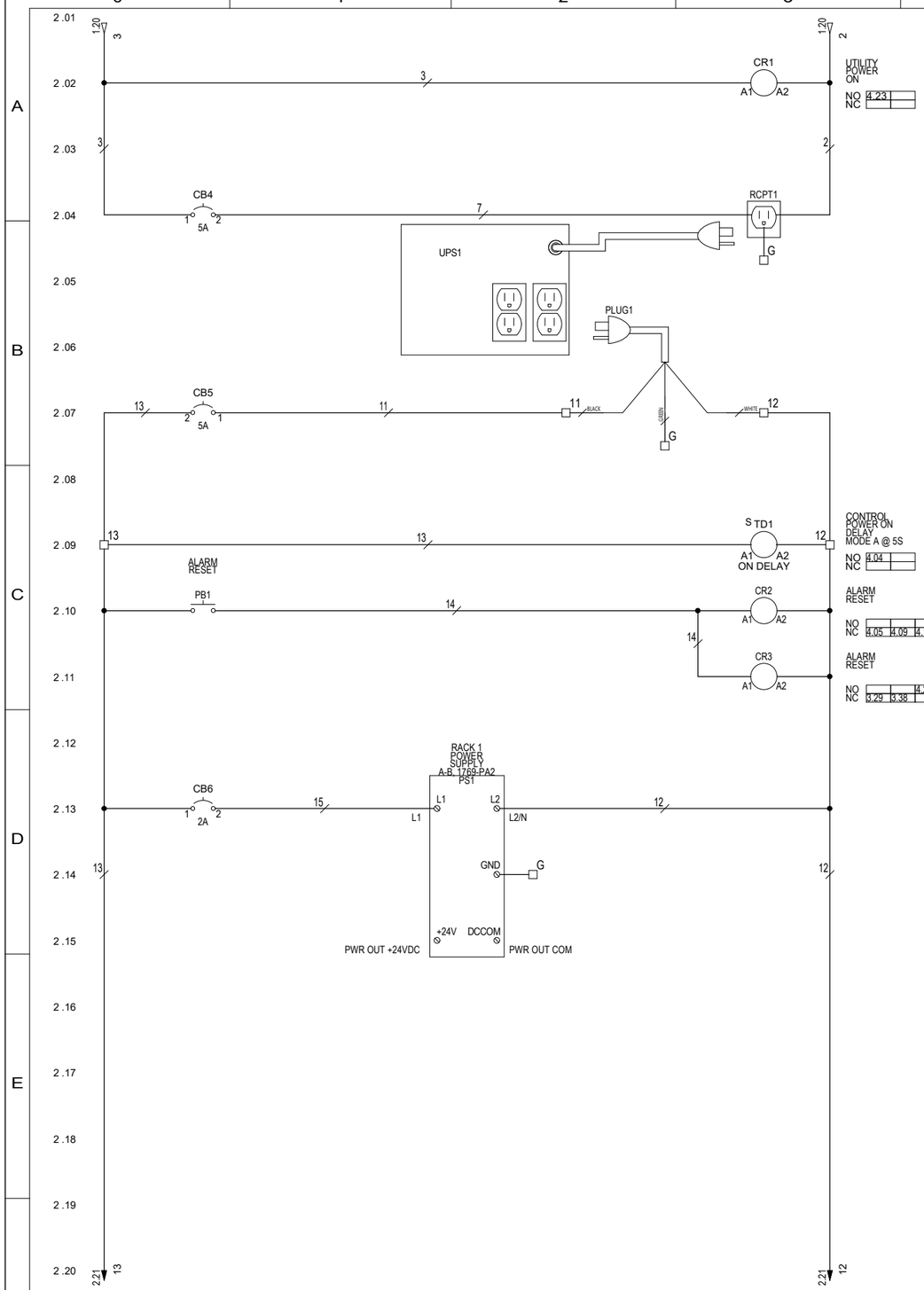

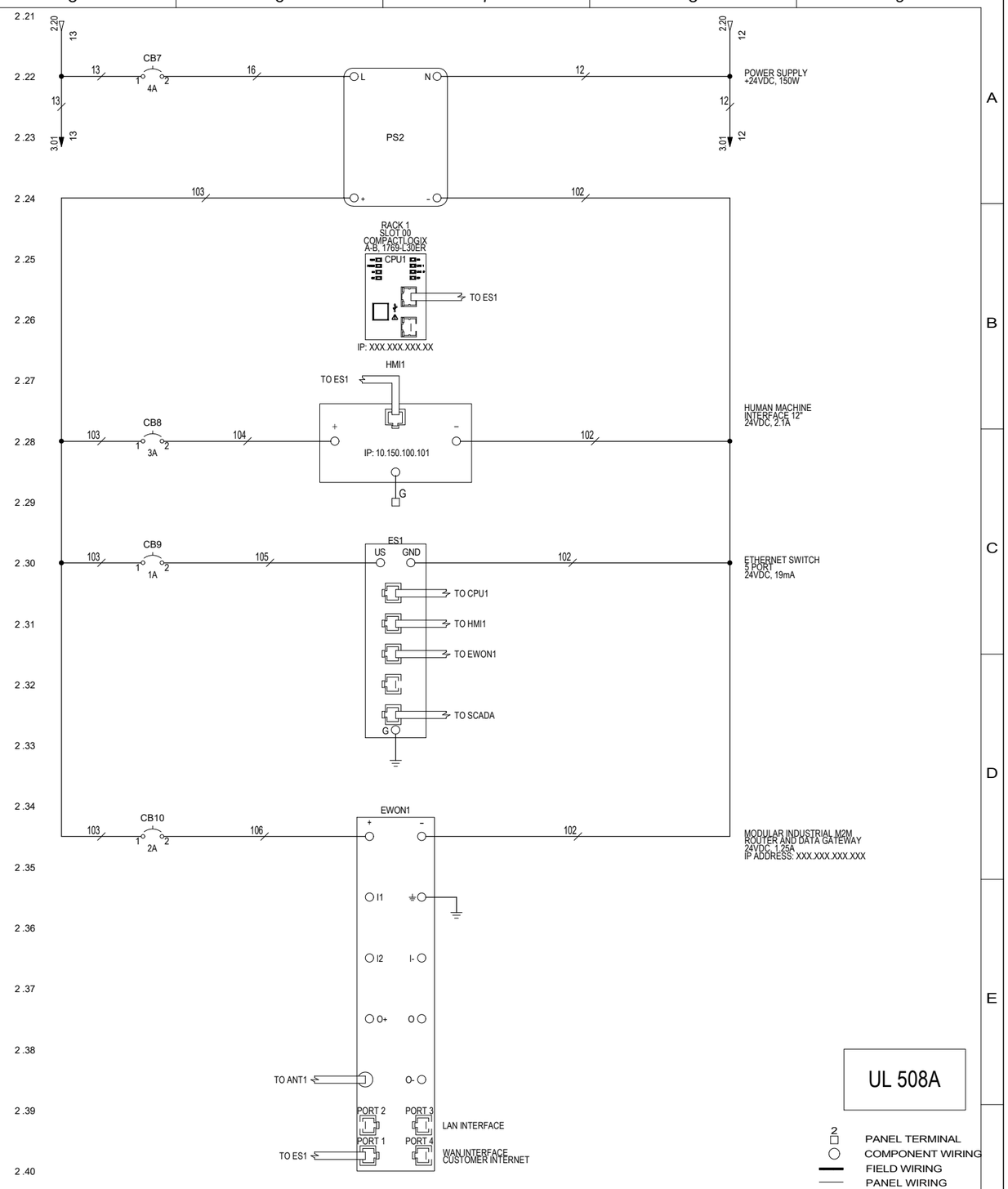

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2 PANEL TERMINAL
COMPONENT WIRING
FIELD WIRING
PANEL WIRING

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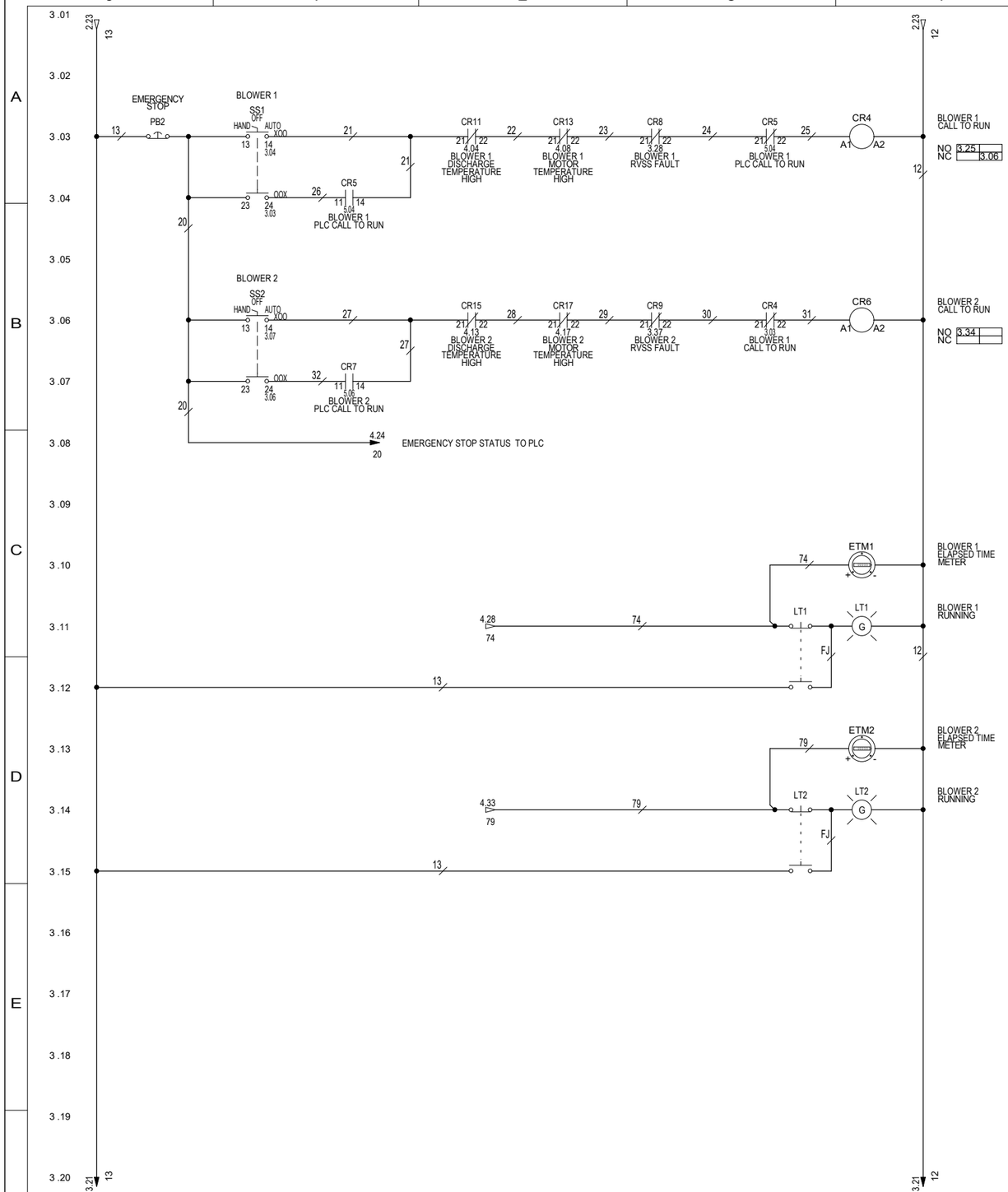

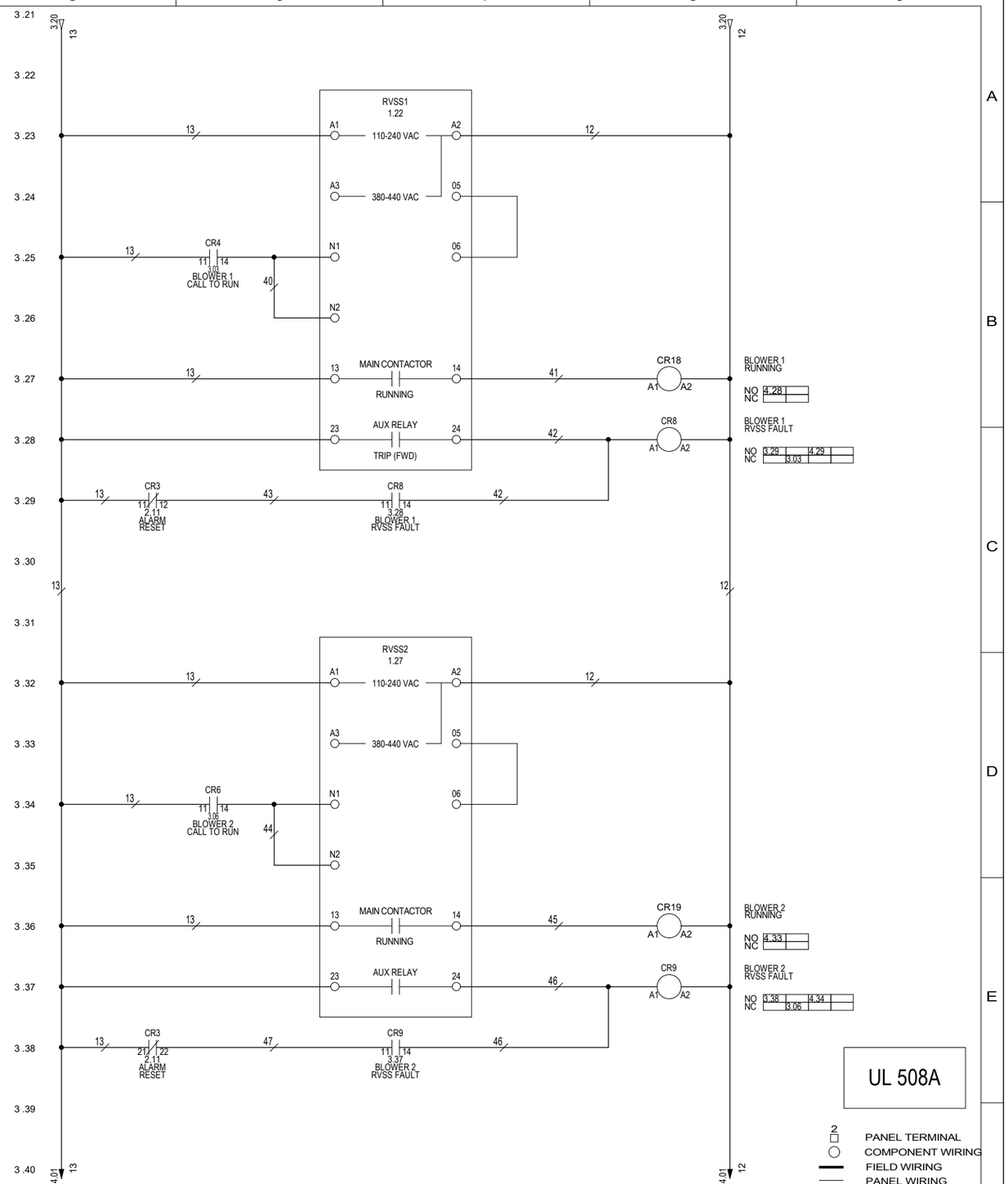

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2 PANEL TERMINAL
COMPONENT WIRING
FIELD WIRING
PANEL WIRING

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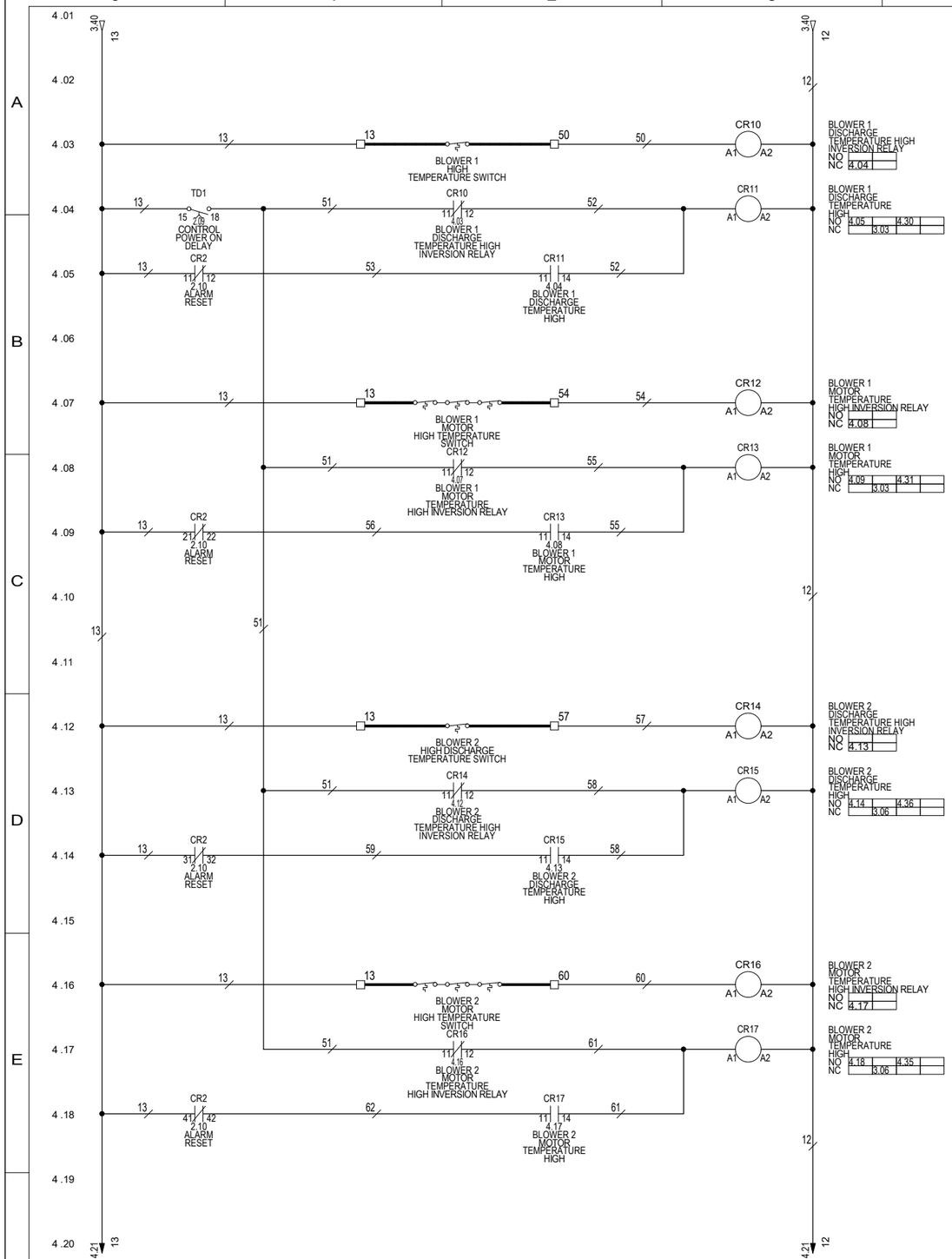

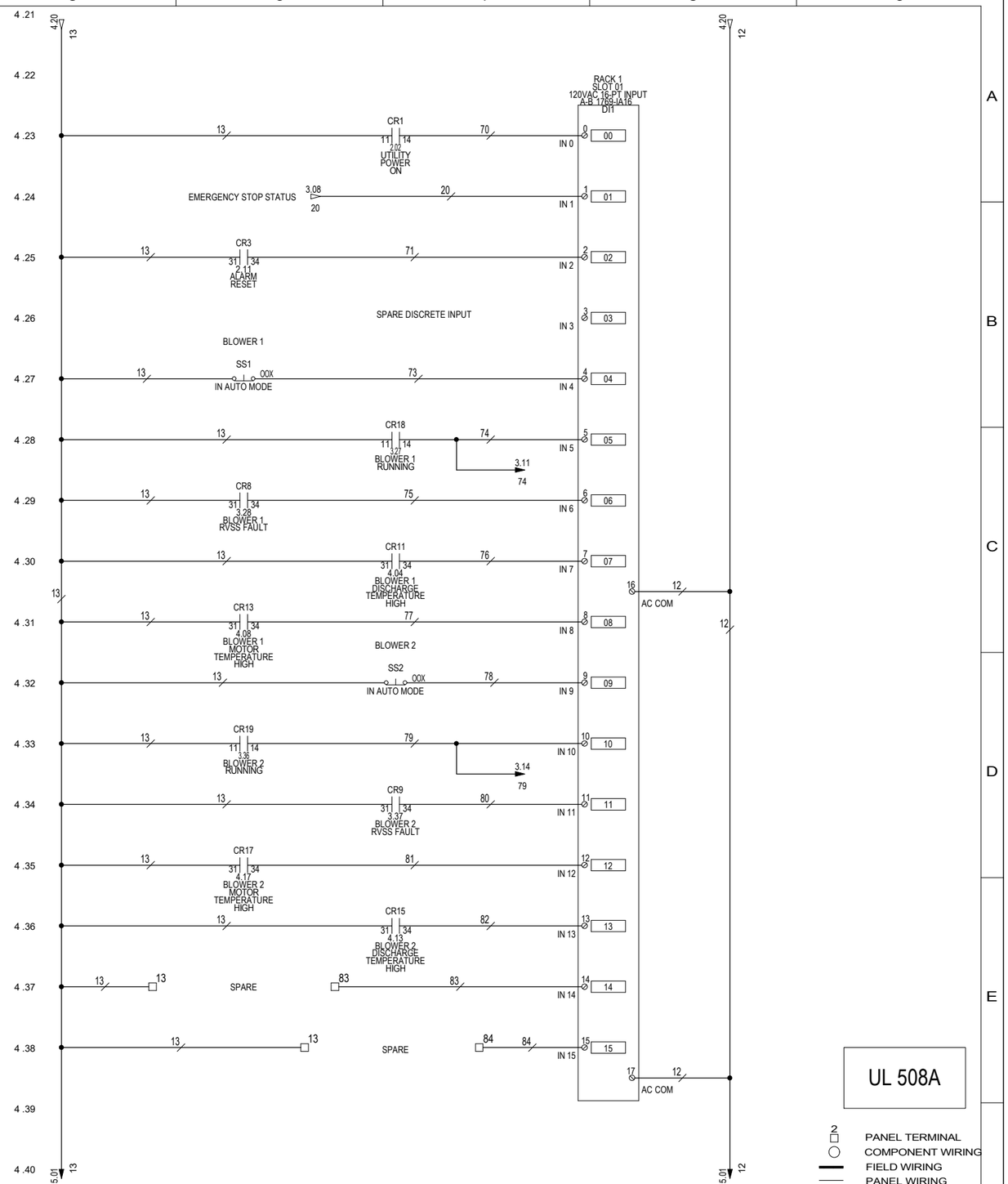

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FIELD WIRING
PANEL WIRING

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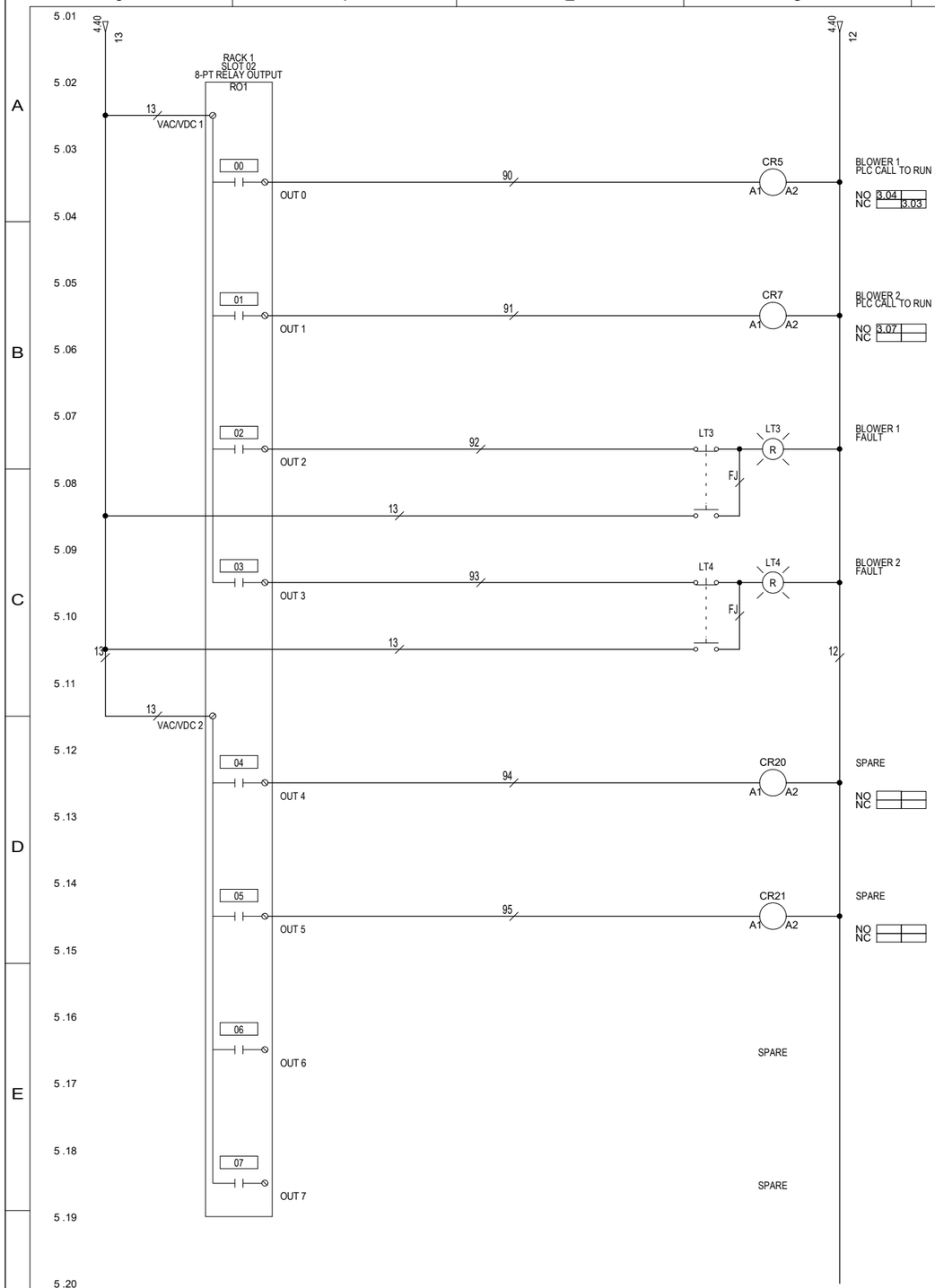

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PANEL TERMINAL
COMPONENT WIRING
FIELD WIRING
PANEL WIRING

REV.	NAME	DATE
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1	EGW	7/13/23

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HICKS, GA - ENV-223442

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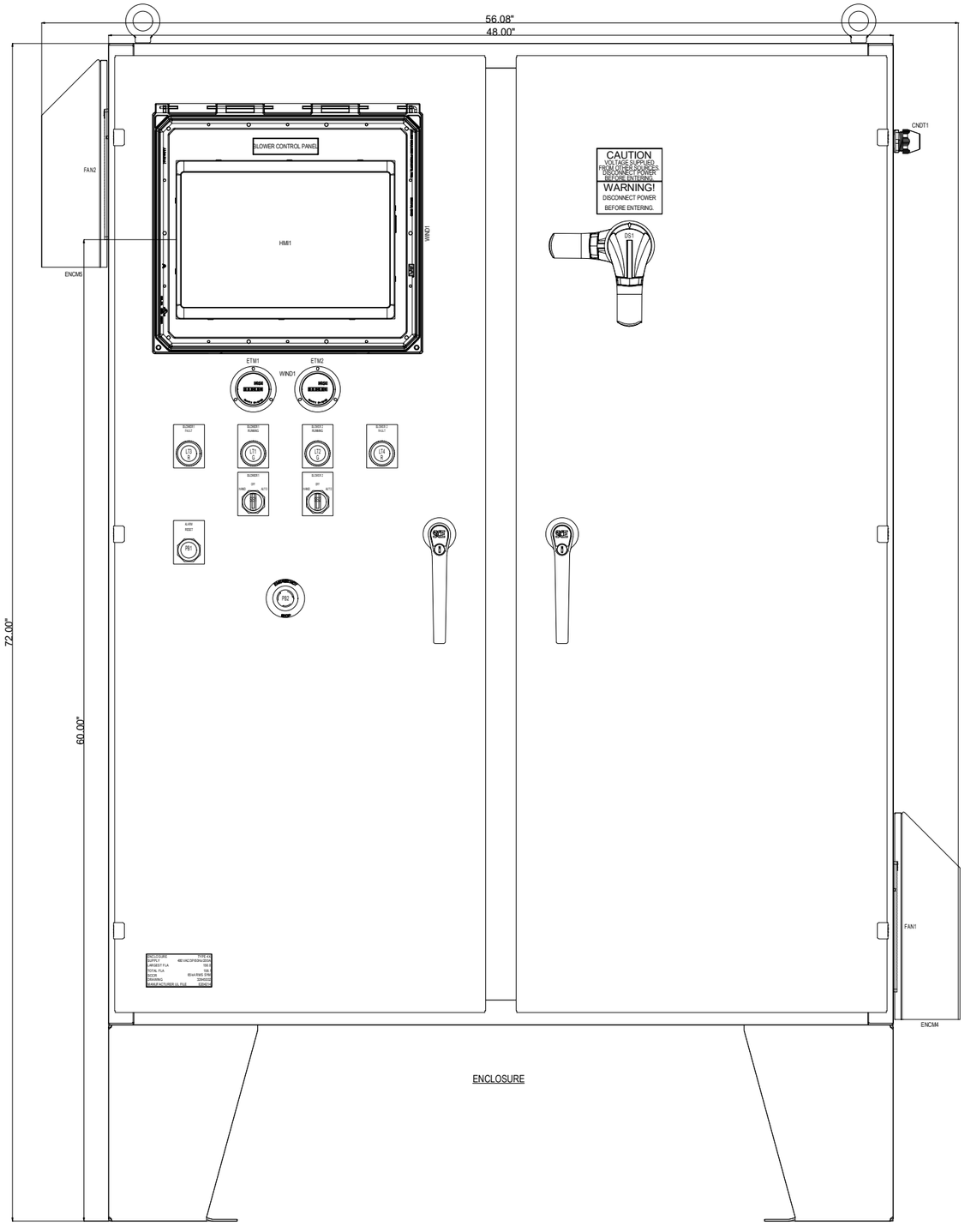

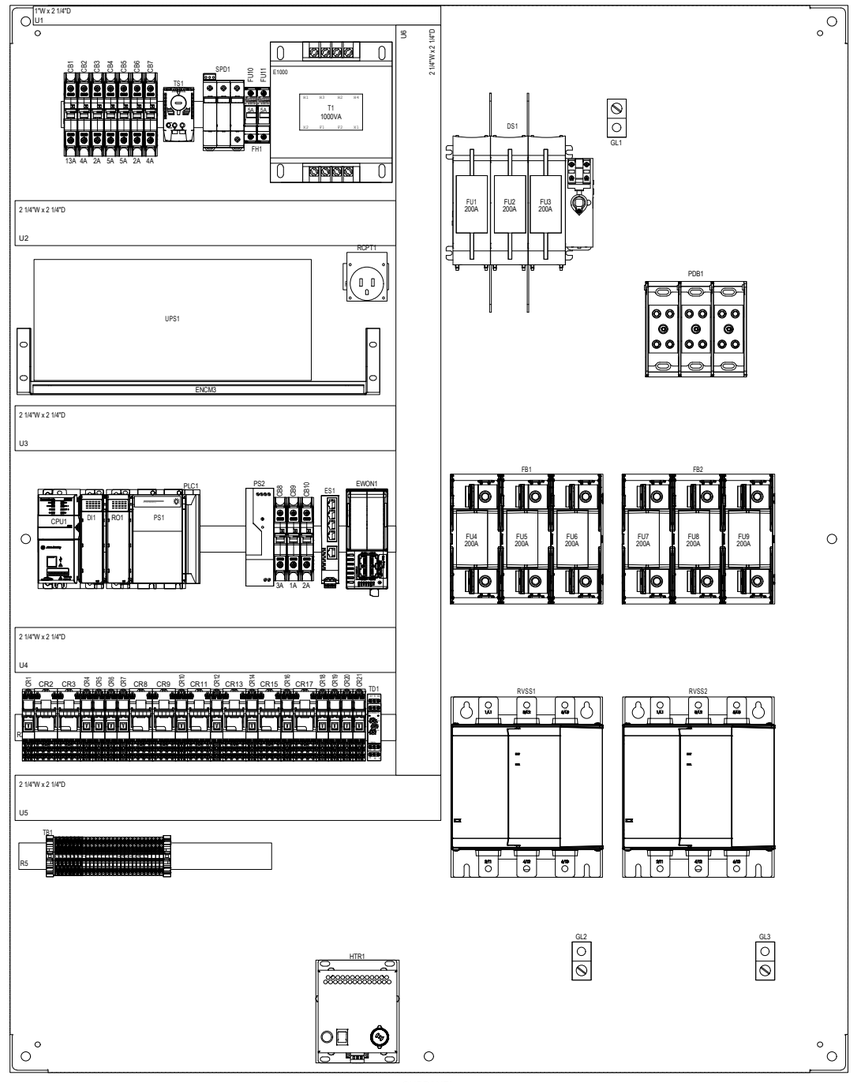

SUBPANEL

TB1
G
G
G
G
G
G
G
2
11
12
13
13
13
13
13
13
50
54
57
60
83
84
13
12

UL 508A

REV.	NAME	DATE
0	RAP	6/27/23
1	EGW	7/13/23

TITLE

BLOWER CONTROL PANEL
TYPE 4X ENCLOSURE
HICKS, GA - ENV-223442

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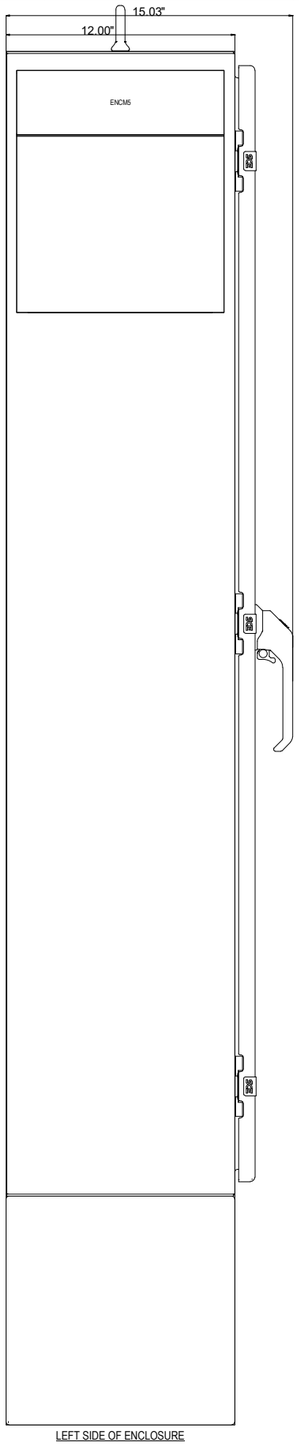
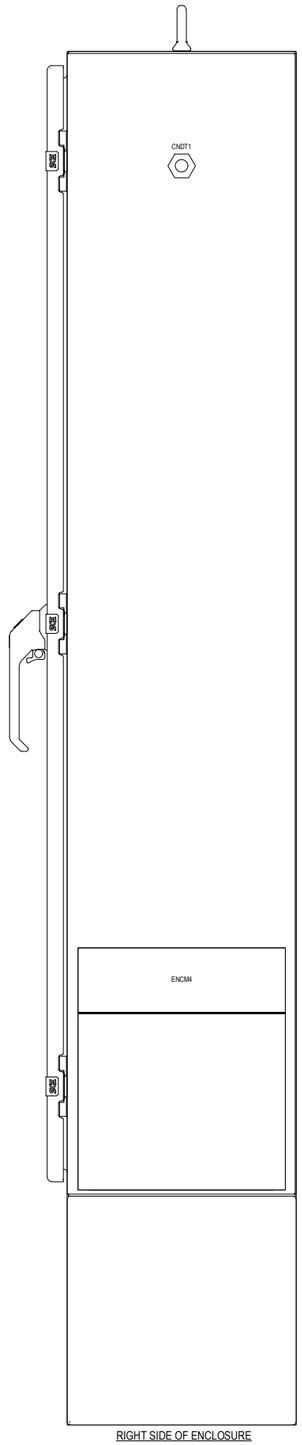


LEFT SIDE OF ENCLOSURE



RIGHT SIDE OF ENCLOSURE

UL 508A

REV.	NAME	DATE
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TITLE

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BILL OF MATERIALS

ID	DEVICE DESIGNATION	NEC PART#	MANUFACTURER PART#	MANUFACTURER	QTY	DESCRIPTION
1	CB9	CBKR1013	1489-M1C010	A-B	1	CIRCUIT BREAKER, 1 AMP, 1 POLE
2	CB3,6,10	CBKR1025	1489-M1C020	A-B	3	CIRCUIT BREAKER, 2 AMP, 1 POLE
3	CB8	CBKR1033	1489-M1C030	A-B	1	CIRCUIT BREAKER, 3 AMP, 1 POLE
4	CB2,7	CBKR1041	1489-M1C040	A-B	2	CIRCUIT BREAKER, 4 AMP, 1 POLE
5	CB4-5	CBKR1052	1489-M1C050	A-B	2	CIRCUIT BREAKER, 5 AMP, 1 POLE
6	CB1	CBKR1131	1489-M1C130	A-B	1	CIRCUIT BREAKER, 13 AMP, 1 POLE
7	SS1-2	CBLK032	800T-XD2	A-B	2	CONTACT BLOCK, 1 N.C.
8	CNDT1	CNDT011	5262	T&B	1	SEALING RING, 1/2" CONDUIT, STAINLESS STEEL
9	CNDT1	CNDT012	141	T&B	1	LOCKNUT, 1/2" CONDUIT
10	CNDT1	CNDT054	LT50P	T&B	1	FITTING, 1/2" PLASTIC, LIQUIDTIGHT
11	CORD1	CORD143	SO 14/3	GENERIC	1	CORD, 3 CONDUCTOR, SO14/3
12	T1	CPXF100	E1000	SOLAHD	1	CONTROL TRANSFORMER, 1000VA, 230/460 X 120
13	PDB1	DBLA002	MPDBC6667	MERSEN	3	SAFETY COVER
14	PDB1	DBLK010	MPDB67523	MERSEN	1	POWER DISTRIBUTION BLOCK, 3 POLE, (2) 4/0-6 ~ (2) 4/0-10
15	DS1	DISC522	SF400PH10X10	EATON	1	SHAFT, 15.7" LONG, 10 MM
16	DS1	DISC541	LK3R9DL	EATON	2	LUG KIT, 200 AMP
17	DS1	DISC614	38613020	SOCOMEC	1	DISCONNECT SWITCH, FUSED ROTARY, 200 AMP
18	DS1	DISC622	14001032	SOCOMEC	1	SHAFT, 15.7" LONG, 10 MM
19	DS1	DISC632	142D2111	SOCOMEC	1	DISCONNECT HANDLE, S2, BLUE, NEMA 4X
20	ENCL1,ENCM4-5	ENCB001	CUSTOM	GENERIC	3	POWDER COAT ENCLOSURE WHITE - RAL9016
21	FAN1	ENCF0082	11633156055	PFANNENBERG	1	FAN KIT, 8" FILTERED, 120VAC/1P/60HZ, SLIM LINE
22	FAN2	ENCF0083	11633156054	PFANNENBERG	1	OUTLET FAN KIT, 8" FILTERED, 120VAC/1P/60HZ, SLIM LINE
23	ENCM4-5	ENCH408	18182000014	PFANNENBERG	2	RAIN HOOD, 8" FANS, 10.9" DEEP, 4X 304SS
24	ENCL1	ENCL1322	SCE-60EL4812SS6LPPL	SAGINAW	1	ENCLOSURE, NEMA 4X 316SS, 60X48X12
25	ENCL1	ENCM448	SCE-105604	SAGINAW	1	INTERLOCK, MECHANICAL FOR RIGHT DOOR AS MAIN
26	ENCM3	ENCM457	ESH198	HOFFMAN	1	SHELF, 19 WIDE X 8 DEEP X 3.7 HIGH
27	ENCM2	ENCM529	SCE-60P48	SAGINAW	1	SUB-PANEL, 60 X 48
28	FB1-2	FBLA010	CVR-J-60200-M-3	BUSSMANN	2	SAFETY COVER, 200 AMP FUSE, (3) PACK
29	FB1-2	FBLK045	JM60200-3CR	BUSSMAN	2	FUSE BLOCK, 200 AMP, 3 POLE, OPEN
30	FU1-9	FDFJ200	DFJ-200	BUSSMANN	9	FUSE, 200 AMP,CLASS J, HIGH SPEED
31	FU10-11	FFNQR005	FNQ-R-5	BUSSMANN	2	FUSE, 5 AMP, CLASS CC
32	FH1	FHOLB002	CHCC2DU	BUSSMANN	1	FUSEHOLDER, TWO POLE CLASS CC
33	GL1-3	GLUG002	TA-250	ILSCO	3	GROUND LUG
34	HTR1	HETR028	SCE-HF1251A	SAGINAW	1	HEATER, 125 WATT, 110 VAC
35	SPD1	LNFL151	STP480Y07M	MERSEN	1	SURGE PROTECTIVE DEVICE, 480 3W W GROUND, 75KA
36	ETM1-2	MELT001	T50B2	ENM	2	ELAPSED TIME METER
37	ETM1-2	MELT011	B20017	ENM	2	GASKET KIT, NEMA 4X, 12
38	NP1	NMPL034	NMPL034	GT ENGRAVING	1	WARNING LABEL, DISCONNECT POWER BEFORE ENTERING
39	NP2	NMPL037	NMPL037	GT ENGRAVING	1	CAUTION LABEL, CAUTION VOLTAGE SUPPLIED FROM OTHER SOURCES
40	PB2	PBTA208	PBTA208	GT ENGRAVING	1	LEGEND PLATE, E-STOP, 30.5MM, 60MM DIAMETER
41	PB2	PBUT174	800H-TFRXT6D2	A-B	1	PUSH BUTTON, RED PUSH/PULL. TWIST HEAD
42	PB1	PBUT176	800H-AR2D1	A-B	1	PUSH BUTTON, BLACK FLUSH HEAD, NO
43	HMI1	PLCA086	2711P-T12W21D8S	A-B	1	PLC DISPLAY, 12" COLOR PANELVIEW PLUS 7 STANDARD TOUCHPAD
44	DI1	PLCA214	1769-IA16	A-B	1	INPUT MODULE, (16) DIGITAL, 120 VAC
45	RO1	PLCA223	1769-OW8	A-B	1	OUTPUT MODULE, (8) RELAYS
46	CPU1	PLCA234	1769-L30ER	A-B	1	1769-L30ER COMPACTLOGIX PROCESSOR
47	PS1	PLCA249	1769-PA2	A-B	1	POWER SUPPLY, 2A
48	PLC1	PLCA299	1769-ECR	A-B	1	RIGHT END COVER
49	ES1	PLCA9020	1085039	PHOENIX	1	ETHERNET SWITCH, 5TX PORT, UNMANAGED
50	EWON1	PLCE992	FLB3205	EWON	1	4G CELLULAR EXTENESION CARD W/ 4G AT&T SIM CARD KIT
51	EWON1	PLCE993	FLEXY20500	EWON	1	FLEXY 205 BASE UNIT
52	LT1-2	PLIT212	800H-QRTH2G	A-B	2	PILOT LIGHT, PUSH TO TEST, GREEN, 12-130V AC/DC
53	LT3-4	PLIT213	800H-QRTH2R	A-B	2	PILOT LIGHT, PUSH TO TEST, RED, 12-130V AC/DC
54	PLUG1	PLUG002	HBL5965VY	HUBBLE	1	PLUG, 3 WIRE, 125 VOLT, 15 AMP
55	PS2	PWRS2463	2904376	PHOENIX	1	POWER SUPPLY, 24VDC, 6.25 AMP
56	UPS1	PWRU753	SMT750	APC	1	UNINTERRUPTABLE POWER SUPPLY, 750VA WITH SMART CARD
57	R1-5	RAIL001	3FD	OMEGA	5	DIN RAIL, 7.5MM X 35.0 MM
58	RCPT1	RECP074	DMRBA	ALTECH	1	RECEPTACLE, 3 WIRE, 125 VOLT, 15 AMP, SINGLE
59	CR1,4-7,10,12,14,16,18-21	RELP221	2909775	PHOENIX	13	RELAY, 2PDT 120VAC, ASSEMBLED WITH SOCKET, BRACKET & VARISTOR, 16MM WIDE, 8A CONTACT
60	CR2-3,8-9,11,13,15,17	RELP421	2903305	PHOENIX	8	RELAY, 4PDT 120VAC, ASSEMBLED WITH SOCKET, BRACKET & VARISTOR, 31MM WIDE, 6A CONTACT
61	SS1-2	SLSW016	800H-JR2A	A-B	2	SELECTOR SWITCH, 3 POS.
62	RVSS1-2	STRS152	MCD202-110-T6-CV3	DANFOSS	2	STARTER, SOLID STATE REDUCED VOLTAGE
63	TB	TBLK250	3211935	PHOENIX	7	TERMINAL BLOCK GROUND
64	TB	TBLK251	3211896	PHOENIX	21	TERMINAL BLOCK, PUSH IN, PTS 2,5-TWIN
65	TB	TBLK252	3031762	PHOENIX	1	END COVER
66	TB	TBLK253	3022218	PHOENIX	2	END CLAMP, CLIPFIX
67	TD1	TIMR052	TE-8812U	MACROMATIC	1	TIMER, 17.5MM, 2 POLE, 12-240 VAC/DC
68	TS1	TMST003	17121000010	PFANNENBERG	1	THERMOSTAT, COOLING (CONTACT CLOSES ABOVE SETPOINT)
69	WIND1	WNDW123	PJHMI1614CCH	HAMMOND	1	WINDOW, 16" X 14", HINGED/SCREW
70	RVSS1-2	WTRM400	CRA04/0-14	ILSCO	6	COMPRESSION LUG, 4/0- 1, ILSCO CRA-4/0-14 OR EQUAL
71	U1	WWAY103	T1E-1022W	IBOCO	1	WIRE WAY, 1 X 2-1/4, WHITE
72	U2-6	WWAY203	T1E-2222W	IBOCO	5	WIRE WAY, 2-1/4 X 2-1/4, WHITE

BILL OF MATERIALS - SHIPPED LOOSE & FIELD DEVICES

ID	DEVICE DESIGNATION	NEC PART#	MANUFACTURER PART#	MANUFACTURER	QTY	DESCRIPTION
1	ANT1	PLCE991	FAC90901-0100	EWON	1	4G CELLULAR ANTENNA WITH 5M CABLE

UL 508A

REV.	NAME	DATE
0	RAP	6/27/23
1	EGW	7/13/23

TITLE

BLOWER CONTROL PANEL
TYPE 4X ENCLOSURE
HICKS, GA - ENV-223442

	NAME	DATE
DRAWN BY	RAP	6/27/23
CHECKED BY		
APPROVED BY		

DRAWING NO. 32845E02

AERZEN "BUILT EXCLUSIVELY FOR AERZEN USA BY NE CONTROLS"

DESIGN TYPE

SHEET NO. 8 / 8

AERZEN USA CORP.
108 INDEPENDENCE WAY,
COATESVILLE, PA.
PH: (610) 380-0244
FX: (610) 380-0278
WWW.AERZENUSA.COM

NE CONTROLS, LLC
7048 INTERSTATE ISLAND RD.,
SYRACUSE, NY. 13209
PH: (315) 299-5161
FX: (315) 299-6317
WWW.NECONTROLS.COM

1489-M1C010 1489-M1C020
1489-M1C030 1489-M1C040
1489-M1C050 1489-M1C130

1489-M Circuit Breakers

Bulletin 1489-M thermal magnetic Circuit Breakers are approved for branch circuit protection in the United States and Canada, and are certified as Miniature Circuit Breakers for IEC applications.

These branch protectors are compatible with many accessories to meet diverse application needs, including UL 508 Listed bus bars for convenience in panel assembly, auxiliary contacts, signal contacts and shunt trips for versatility, and lock out attachments for safety during maintenance.

Features

- Current limiting
- Fast breaking time
- High rated voltage
- Superior shock and vibration resistance to help prevent nuisance tripping
- Dual terminals allow the connection of two wires, or both a wire and bus bar (self declared)
- Terminal design helps prevent wiring misses by directing wires into the terminal openings, even while tightening
- Reversible line and load connections
- Single and multi-pole toggle mount lock out attachments available for Lock Out Tag Out (LOTO)
- RoHS compliant and fully-recyclable device
- Suitable for extreme ambient conditions

1489-M Circuit Breakers	
Rated Voltage	UL/CSA: Max. 480Y/277V AC IEC: Ue 230/400V AC
Interrupting Capacity	UL/CSA: 10 kA IEC: 15 kA
Current Ratings	0.5...63 A
Poles	1, 2, 3
Trip Curves	C, D
Standards Compliance	UL 489 CSA C22.2 No. 5.1 EN 60947-2 GB 14048.2
Certifications	UL Listed, File No. E197878 CSA Certified CE Marked VDE Certified CCC Certified RoHS Compliant

1489-M1C010 1489-M1C020
1489-M1C030 1489-M1C040
1489-M1C050 1489-M1C130

Catalog Number Explanation

Note: Examples given in this section are for reference purposes. This basic explanation should not be used for product selection; some combinations may not produce a valid catalog number.

1489	-	M	1	C	005
		a	*b*	*c*	*d*

a

Voltage Type	
Code	**Description**
M	AC Circuit Breaker

b

Poles	
Code	**Description**
1	1-Pole
2	2-Pole
3	3-Pole

c

Trip Curve	
Code	**Trip Curve**
C	Trip Curve C
D	Trip Curve D

d

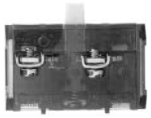
Rated Current (I_n)	
Code	**Current [A]**
005	0.5
010	1
016	1.6
020	2
030	3
040	4
050	5
060	6
070	7
080	8
100	10
130	13
150	15
160	16
200	20
250	25
300	30
320	32
350	35
400	40
500	50
600	60
630	63

800T-XD2
800T-XA4

Contact Blocks

Contact blocks are packaged in kit form for field installation. All necessary mounting hardware is provided with each contact block kit. Contact ratings are listed on page 4.

IMPORTANT
- It is recommended that contact blocks are mounted no more than two blocks deep.
- Time delay contacts are only available as one circuit per operator.

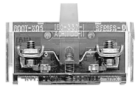




Contact Type	Shallow Block (1) (2)		PenTUFF™ (Low Voltage) Block (1) (2)		Logic Reed Block (2) (3)		Explosion-protected Block (1) (3)		Stackable Sealed Switch Block (3)	
	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code
1 N.O.	800T-XD1	D	800T-XD1V	H	800T-XD1R	V	–	–	800T-XD1Y	5
1 N.C.	800T-XD2	E	800T-XD2V	U	800T-XD2R	W	–	–	800T-XD2Y	6
1 N.O.E.M.	800T-XD3	G	800T-XD3V	I	–	–	–	–	–	–
1 N.C.L.B.	800T-XD4	J	800T-XD4V	Q	–	–	–	–	–	–
1 N.O. - N.C.	800T-XA	A	800T-XAV	F	800T-XAR	T	800TC-XAF	0	800T-XAY	7
2 N.O.	800T-XA2 (4)	M	–	–	800T-XA2R (4)	Y	–	–	–	–
2 N.C.	800T-XA4	N	–	–	800T-XA4R	Z	–	–	–	–
1 N.C.L.B. - 1 N.O.	800T-XA1	B	–	–	–	–	–	–	–	–
1 N.C.L.B. - 1 N.C.	800T-XA7	C	–	–	–	–	–	–	–	–

(1) Contact blocks with normally closed contacts meet direct drive positive opening standard requirements when properly fused to IEC 269-1 and 269-2. Shallow/mini contacts: 10 A gl or N type cartridge fuse. PenTUFF contacts: 6 A gl or N type cartridge fuse.
(2) Specify Bulletin 800TC for fingersafe contact blocks. Example: Cat. No. 800T-XA becomes Cat. No. 800TC-XA.
(3) Suitable for use in a Class I, Div. 2 hazardous location when device is installed in a suitable UL Listed enclosure.
(4) Additional contacts cannot be stacked on XA2 and XA2R contact blocks.

Contact Type	Self-Monitoring Contact Block (SMCB) (1) (2)	
	Cat. No.	Code
1 N.C.L.B. (wired in series with 1 N.O. monitoring contact)	800TC-XD4S	3

(1) Contact blocks with normally closed contacts meet direct drive positive opening standard requirements when properly fused to IEC 269-1 and 269-2. Shallow/mini contacts: 10 A gl or N type cartridge fuse. PenTUFF contacts: 6 A gl or N type cartridge fuse.
(2) Must be mounted on the first level of the operator. The N.O. monitoring contact automatically closes when the S.M.C.B. is properly installed onto the operator. If the S.M.C.B. is separated from the operator, the N.O. monitoring contact automatically opens.



Contact Type	Mini Block (1) (2)		Time Delay Block (3)	MaxDuty Block (2)	
	Cat. No.	Code	Cat. No.	Cat. No.	Code
1 N.O.	800T-XD5	K	800T-XT	800T-XD1M	1
1 N.C.	800T-XD6	L	800T-XS	800T-XD2M	2
1 N.C.L.B.	–	–	–	800T-XD4M	4

(1) Contact blocks with normally closed contacts meet direct drive positive opening standard requirements when properly fused to IEC 269-1 and 269-2. Shallow/mini contacts: 10 A gl or N type cartridge fuse. PenTUFF contacts: 6 A gl or N type cartridge fuse.
(2) Specify Bulletin 800TC for fingersafe contact blocks. Example: Cat. No. 800T-XD5 becomes Cat. No. 800TC-XD5.
(3) For contact ratings, see page 4.

Liquidtight Flexible Metal Conduit Fittings

T&B Catalog Number: 5262
UPC Number: 78621005262
Status: Active
Description:

1/2 in. liquidtight sealing gasket with 316 stainless steel retainer and santoprene sealing material.

Features

	Design locks resilient sealing material in steel.
	Steel retainer protects seal from extruding out under torque and limits compression to an optimum predetermined value; provides high quality seal.
	Resilient material flows and seals rough edges.

Application

	When used with an externally threaded connector provides a tight seal against oil, fumes or moisture at the knockout opening.

General

Trade Size (inches)	1/2
Material	Stainless Steel

Dimension Information

Dimension A (inches)	1.16
Dimension B (inches)	0.18

Specifications

3dmodel	Available on Website

Packaging

T&B Inner Pack	50
Package in Units	100
T&B Sold in UOM	Each
T&B Weight Per UOM	8.13 lbs. per 1000

Certifications

RoHS Compliance	Yes

Certifications

File Nbr:
E 13938

For further technical assistance, please contact us...

Thomas & Betts - USA
8155 T&B Blvd.
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www.tnb.com

T&B Technical Support
MS 3B-50
8155 T&B Blvd.
Memphis, TN 38125

Hours: 7AM - 6PM CDT
Monday-Friday
Phone: (888) 862-3289
Fax: (901) 252-1321
Email:techsupport@tnb.com

Actual

Representative

Catalog Number: **141**
Product ID: 7TBD012050R0002
UPC Number: 78621000141
EAN Number: 05414363076674
Status: Active

1/2 Inch Steel Locknut for Use With Rigid/IMC Conduit

- Tightens without deformation
- To effectively bond conduit or connector to box or enclosure.

Header

3D Model	Available on Website

North American Specifications (UNSPSC)

UNSPSC	31161716 Locknuts
IGCC	2849 Locknuts
Brand Name	T&B
Type	Locknuts
Special Features	Hardened Steel, Malleable Iron, Copper-Free Aluminum Construction
Application	To Connect Externally Threaded Conduit or Connector to a Threadless Opening In a Box or Enclosure.
Standard	UL E23018, CSA
Material of Construction	Steel
Thread Size	1/2 Inch

European Specifications (ETIM)

ETIM	EC002382 Locknut
Material	Steel
Surface protection	Untreated
With nylon ring	N

Packaging

Inner Quantity	100
Inner Dimensions (inches)	3.5x3x3
Outer Quantity	1000
Outer Dimensions (inches)	16.5x7.75x4
Weight Uom	1.31 lbs. per 100

Documents / Support Tools

Technical Data Sheet US	Available on Website
Technical Data Sheet CA	Available on Website

For further technical assistance, please contact us...

Thomas & Betts - USA
8155 T&B Blvd.
Memphis, TN 38125
www.tnb.com

T&B Technical Support
MS 3B-50
8155 T&B Blvd.
Memphis, TN 38125

Hours: 7AM - 6PM CDT
Monday-Friday
Phone: (888) 862-3289
Fax: (901) 252-1321
Email:techsupport@tnb.com

TECHNICAL DATA SHEET

Bullet® liquidtight fittings

Liquidtight flexible non-metallic conduit

01

02

Engineered to meet the demand for a tough, reusable, non metallic liquidtight fitting.

Certifications / Standards:

—
01
straight LT38P black fitting

02
90° LT38P black fitting

—

Features:

- Connect assembles to conduit without disassembly
- Designed to be installed with a positive installation criteria (gland bottoms on body shoulder)
- Rugged low profile non-metallic body and gland construction
- Captivated sealing “O” ring with predetermined compression for a reliable seal at enclosure
- Connector ferrule designed to accept variations in conduit inside diameter and is tolerant of field conduit cuts
- Designed to reduce friction between conduit I.D. and ferrule allowing conduit to seat properly for effective seal
- Easy installation
- Provides a double sealing action
- Elongated gland nut profile designed to provide additional strain relief for 90° pull and an easy hand grip
- Performance unaffected by exposure to detergents, cleaners, and sanitizers commonly encountered in food processing plants and tropical industrial environment.
- Performance unaffected by cutting fluids, wiring pulling compounds and Marine environment
- Meets industry standards for cold impact

—

Applications:

- A series of non-metallic connectors designed to provide a liquidtight seal when terminating liquid-tight non-metallic conduit (UL Type B) or non-metallic tubing to a box or enclosure with knockout opening or a threaded hub

—

Conforms to:

- C.S.A. 22.2 No. 227.2 & No. 227.3
- ANSI/UL514B
- Watertight requirements of Type 4 and Type 6 enclosures
- Federal Standards H28 (NPT threads)

—

Material / Materials / Finishes

- Body Gland-Weather stabilized thermoplastic (black)
- “O” Ring - Nitrile (blue)
- Locknut - Steel/ electro zinc plated
- Matl. temp. rating - Thermoplastic - 40°C to 105°C
- Material Flammability Rating: UL94-V2

—

Temperature range:

- -18°C to +105°C (-2°F to +221°F)

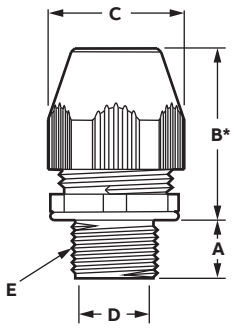
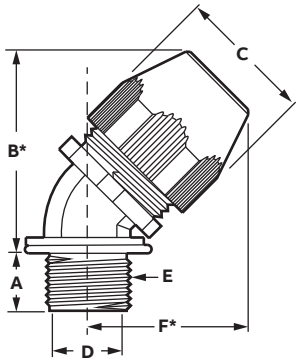
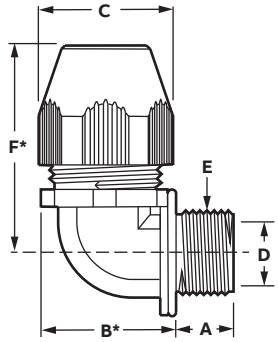
—

Chemical resistance:

- See publication TDS000081

Technical Data:

Product selection and dimension

Drawing	Part No.**	Trade Size	Dimensions					
			A Inches ±0.15 (mm) ±0.40	B* Inches ±0.15 (mm) ±0.90	C Inches ±0.15 (mm) ±0.40	D min. Inches (mm)	E Thread NPT (ISO)	F** aprox. Inches (mm)
LT38P series straight fittings								
	LT38P (-ISO20)	⅜"	.570 (14.48)	1.595 (40.51)	1.354 (34.39)	.417 (10.59)	½ - 14 (20)	–
	LT50P (-ISO20)	½"	.570 (14.48)	1.636 (41.55)	1.448 (36.78)	.550 (13.97)	½ - 14 (20)	–
	LT75P (-ISO25)	¾"	.582 (14.78)	1.757 (44.63)	1.740 (44.20)	.740 (18.80)	¾ - 14 (25)	–
	LT100P	1"	.726 (18.44)	1.923 (48.84)	2.068 (52.53)	.940 (23.88)	1 - 11½	–
	LT125P	1 ¼"	.750 (19.05)	2.164 (54.97)	2.494 (63.35)	1.257 (31.93)	1¼ - 11½	–
	LT150P	1 ½"	.767 (19.48)	2.353 (59.77)	2.784 (70.71)	1.453 (36.91)	1½ - 11½	–
	LT200P	2"	.794 (20.17)	2.605 (66.17)	3.362 (85.39)	1.883 (47.83)	2 -11 ½	–
LT38P series 45° fittings								
	LT438P	⅜"	.570 (14.48)	2.012 (51.10)	1.354 (34.39)	.417 (10.59)	½ - 14 (20)	1.534 (38.96)
	LT450P	½"	.570 (14.48)	2.092 (53.14)	1.448 (36.78)	.550 (13.97)	½ - 14 (20)	1.590 (40.39)
	LT475P	¾"	.582 (14.78)	2.452 (62.28)	1.740 (44.20)	.740 (18.80)	¾ - 14 (25)	1.821 (46.25)
	LT4100P	1"	.726 (18.44)	2.684 (68.17)	2.068 (52.53)	.940 (23.88)	1 - 11½	2.034 (51.66)
	LT4125P	1 ¼"	.750 (19.05)	3.264 (82.91)	2.494 (63.35)	1.257 (31.93)	1¼ - 11½	2.385 (60.58)
	LT4150P	1 ½"	.767 (19.48)	3.605 (91.57)	2.784 (70.71)	1.453 (36.91)	1½ - 11½	2.604 (66.14)
	LT4200P	2"	.794 (20.17)	4.210 (106.93)	3.362 (85.39)	1.883 (47.83)	2 -11½	3.050 (77.47)
LT38P series 90° fittings								
	LT938P (-ISO20)	⅜"	.570 (14.48)	1.380 (35.05)	1.354 (34.39)	.417 (10.59)	½ - 14 (20)	1.880 (47.75)
	LT950P (-ISO20)	½"	.570 (14.48)	1.489 (37.82)	1.448 (36.78)	.550 (13.97)	½ - 14 (20)	1.986 (50.44)
	LT975P (-ISO25)	¾"	.582 (14.78)	1.790 (45.47)	1.740 (44.20)	.740 (18.80)	¾ - 14 (25)	2.212 (56.18)
	LT9100P	1"	.726 (18.44)	2.104 (53.44)	2.068 (52.53)	.940 (23.88)	1 - 11½	2.508 (63.70)
	LT9125P	1 ¼"	.750 (19.05)	2.564 (65.13)	2.494 (63.35)	1.257 (31.93)	1¼ - 11½	2.856 (72.54)
	LT9150P	1 ½"	.767 (19.48)	2.854 (72.49)	2.784 (70.71)	1.453 (36.91)	1½ - 11½	3.144 (79.86)
	LT9200P	2"	.794 (20.17)	3.432 (87.17)	3.362 (85.39)	1.883 (47.83)	2 -11½	3.675 (93.34)

Note: Product must be installed in accordance with applicable national and local electrical codes.
** Fittings with ISO threads will have the ISO threaded suffix as part of the catalog number. (Example: LT938PISO20)
* After assembly

ABB Installation Products Inc.
Memphis, Tennessee
tnb.abb.com
USA

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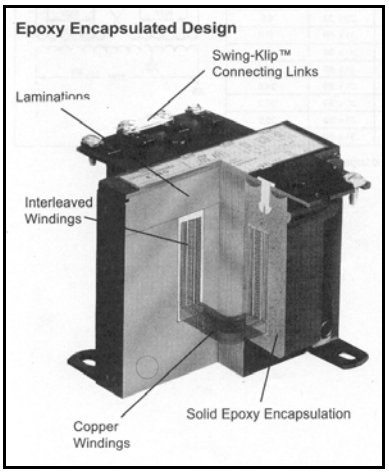
SO 14/3

14/3 SO Cord | 14 AWG 3 Conductor SOOW Cable Specifications: (subject to change without notice)	
AWG Size	14
No. of Cond.	3
Conductor Stranding	41/30
No. of Strands	41
Strand Size	30
Nom. Insul. Thick. (in)	0.045
Jacket Thick	0.075
Nom. O.D. of Cable (in)	0.535
Amps	18
Approx LBS/MFT	170.00
UL Style	SOOW
CSA Type	Approved
Min. Temp	-40°C
Max. Temp	90°C
Cond. Material	Bare Copper
Insul. Material	Ethylene Propylene Diene Monomer Rubber (EPDM)
Jacket Material	Thermoplastic Elastomer (TPE)
Voltage	600

E1000

NE Controls, L.L.C. Syracuse, NY 13209 Telephone 315-299-5161	**Product Profile**	Control Transformer SBE

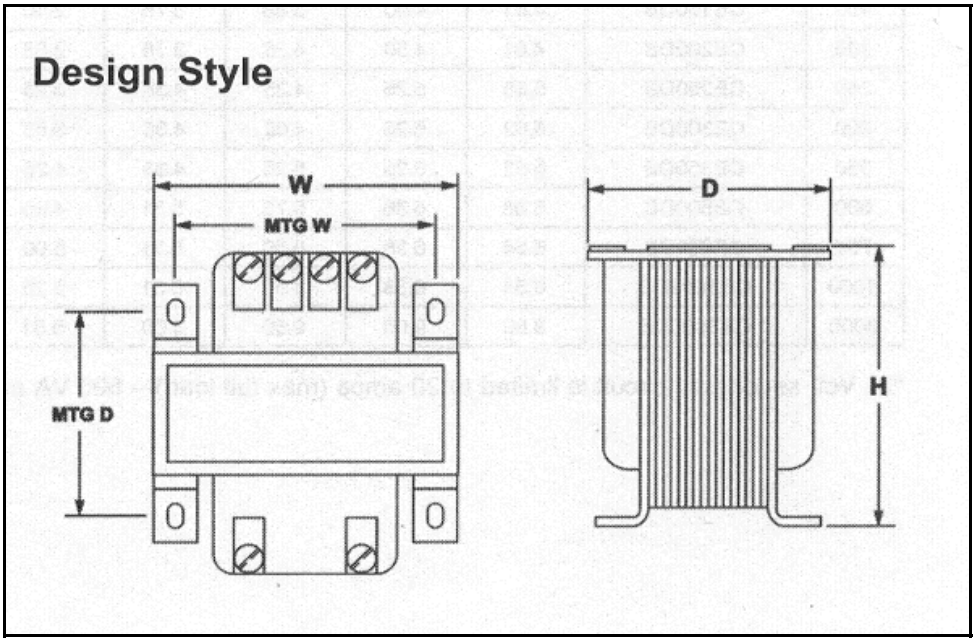


Sola/Hevi-Duty

SBE type

Benefits and features

- Exceeds NEMA,
- 230/460 Volt Primary
- 120 Volt Secondary
- Rated for 50/60Hz usage.
- UL listed, CSA certified.



UL Listed

SA ®Certified

VA	Catalog Number	Height	Width	Depth	Mtg. Width	Mtg. Depth	Slot Size	Weight
50	E050	2.81	3.00	3.56	2.50	2.00	.20 x .33	2.5
75	E075	3.25	3.38	3.56	2.81	2.19	.20 x .33	3.7
100	E100	3.25	3.38	3.56	2.81	2.38	.20 x .33	4.1
150	E150	4.25	4.50	4.44	3.75	2.25	.20 x .33	7.0
200	E200	4.25	4.50	4.69	3.75	2.50	.20 x .33	8.0
250	E250	4.25	4.50	5.06	3.75	2.88	.20 x .33	9.8
300	E300	5.06	5.25	4.94	4.38	3.25	.31 x .69	11.8
350	E350	5.06	5.25	5.44	4.38	3.63	.31 x .69	14.2
500	E500	5.06	5.25	5.94	4.38	4.25	.31 x .69	17.6
750	E750	6.06	6.38	6.88	5.31	4.25	.31 x .69	26.5
1000	E1000	6.06	6.38	7.13	5.31	5.00	.31 x .69	33.5

MPDB67523
MPDBC6667

MPDB Series

Open-Style Power Distribution Blocks

POWER DISTRIBUTION BLOCKS

THE NEXT GENERATION
POWER DISTRIBUTION BLOCK (PDB)

Mersen power distribution blocks provide a safe and easy method of splicing cables, splitting primary power into secondary circuits and fulfilling requirements for fixed junction tap-off points. Unless noted otherwise, all blocks are UL and CSA approved while meeting spacing requirements for feeder and branch circuits in conjunction with UL508A and the National Electrical Code®. PDB options include single or dual conductor primary inputs and up to 30 secondary outputs. Specialty blocks are available allowing for up to 7 primary inputs. The MPDB series is offered in three size categories: miniature (MPDB62 and MPDB63 series), intermediate (MPDB66 and MPDB67 series), and large (MPDB68 and MPDB69 series), in both aluminum and copper.

FEATURES/BENEFITS:

- **Adder Poles:** All sizes have optional adder poles for increased flexibility and ease-of-use. Adder poles can be stacked to form multi-pole units in the field without the use of tools. Adder poles allow for customization of primary and secondary wire combinations. End barriers are also available for sale, catalog numbers can be found in the catalog number selection tables for each size block.
- **Wire Connectors:** Standard aluminum and copper wire connectors are available. Aluminum connectors accept both AL or CU wire while copper connectors accept CU wire only. Connectors are all 1-piece tin-plated. Many part numbers are rated to accept DLO-type fine-strand wire, allowing users to connect flexible conductors. (Continued on next page.)

RATINGS:

Volts: 1000VAC/DC

Amps: 65 to 2260A based on NEC table 310.15(B)(16) 75ºC ampacities

SCCR: 100kA with properly sized fuse (See Mersen's PDB SCCR guide at ep.mersen.com or contact Mersen Technical Services)

APPROVALS:

- UL Listed to subject 1953, File E352417 unless noted otherwise
- CSA Certified Class 6228 01

Mersen
Expertise, our source of energy

MPDB67523

MPDBC6667

FEATURES/BENEFITS (CONTINUED):

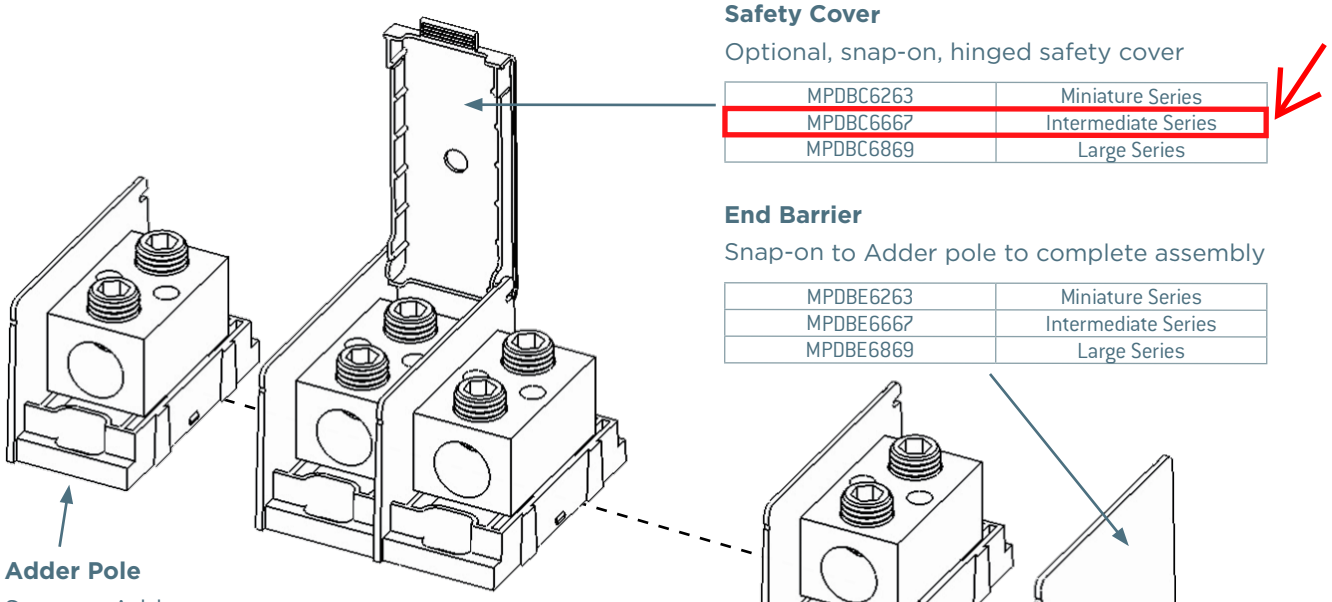
- **Insulators:** Insulators are virtually unbreakable, made of glass-filled polycarbonate. "Se ed safety covers are optional and provide a greater degree of safety and shock resistance. Hinged covers can be installed without tools.
- **Spacings:** 1 inch through air and 2 inches over surface between uninsulated live parts of opposite polarity meets requirements for feeder and branch circuit applications of UL508A.
- **Safety Covers:** Polycarbonate safety covers provide dead-front protection. One cover is needed for each pole. Each cover has a test probe hole in the center for circuit checking. Covers are optional accessories and catalog numbers can be found in the catalog selection tables for each size block.

ADDITIONAL SPECIFICATIONS:

Wire Type:	Copper Blocks: 60/75ºC Solid/Stranded CU; Aluminum Blocks: 60/75/90ºC Solid/Stranded AL and CU
Connector:	Copper Blocks: Highly conductive tin-plated copper; Aluminum Blocks: Highly conductive tin-plated aluminum
Insulating Material:	Glass-filled polycarbonate with verified dielectric strength in excess of 2500V
Flammability:	UL94-V0
Mounting:	Direct panel mount
Environmental:	RoHS compliant, Lead Free

PART SELECTION NOTES

MPDBs in each size category come in one, two, and three pole configurations (ending in -1, -2, and -3 accordingly). Users also have the ability to field install additional poles, end barriers, and safety covers.



Safety Cover

Optional, snap-on, hinged safety cover

MPDBC6263	Miniature Series
MPDBC6667	Intermediate Series
MPDBC6869	Large Series

End Barrier

Snap-on to Adder pole to complete assembly

MPDBE6263	Miniature Series
MPDBE6667	Intermediate Series
MPDBE6869	Large Series

Adder Pole

Snap-on Adder poles to fully assembled units to add additional poles in the field. Adder pole catalog numbers in all.

Adder Pole

Field assemble Adder poles to form multi-pole units.

CATALOG NUMBERS, INTERMEDIATE ALUMINUM MPDBs, BOX-BOX CONFIGURATION

MPDB67523
MPDBC6667

Line Side		Load Side		Catalog Numbers				Amp Rating per Pole	
Wire Range	Openings per Pole	Wire Range	Openings per Pole	ADDER	1-P	2-P	3-P	Cu Wire	Al Wire
2/0-14	1	2/0-14	1	MPDB67050	MPDB67051	MPDB67052	MPDB67053	175	135
2/0-14	1	2-14	4	MPDB67570	MPDB67571	MPDB67572	MPDB67573	175	135
1/0-14 (DLO)		3-14 (DLO)						125 (DLO)	
2/0-14	1	2-14	6	MPDB67560	MPDB67561	MPDB67562	MPDB67563	175	135
1/0-14 (DLO)		3-14 (DLO)						125 (DLO)	
2/0-14	1	2-14	8	MPDB67580	MPDB67581	MPDB67582	MPDB67583	175	135
2/0-14	1	6-14	10	MPDB67590	MPDB67591	MPDB67592	MPDB67593	175	135
2/0-14	1	10-14	12	MPDB67110	MPDB67111	MPDB67112	MPDB67113	175	135
1/0-14 (DLO)		12-14 (DLO)						125 (DLO)	
350-6	1	350-6	1	MPDB67000	MPDB67001	MPDB67002	MPDB67003	310	250
300-6 (DLO)		300-6 (DLO)						285 (DLO)	
350-6	1	2/0-14	2	MPDB67010	MPDB67011	MPDB67012	MPDB67013	310	250
350-6	1	2-14	4	MPDB67670	MPDB67671	MPDB67672	MPDB67673	310	250
350-6	1	2-14	6	MPDB67660	MPDB67661	MPDB67662	MPDB67663	310	250
300-6 (DLO)		3-14 (DLO)						285 (DLO)	
350-6	1	2-14	8	MPDB67630	MPDB67631	MPDB67632	MPDB67633	310	250
300-6 (DLO)		3-14 (DLO)						285 (DLO)	
350-6	1	6-14	10	MPDB67650	MPDB67651	MPDB67652	MPDB67653	310	250
350-6	1	10-14	15	MPDB67620	MPDB67621	MPDB67622	MPDB67623	310	250
500-4	1	500-4	1	MPDB67400	MPDB67401	MPDB67402	MPDB67403	380	310
500-4	1	350-6 & 2-14	1 & 3	MPDB67450	MPDB67451	MPDB67452	MPDB67453	380	310
500-4	1	4/0-10	2	MPDB67420	MPDB67421	MPDB67422	MPDB67423	380	310
500-4	1	2/0-14	4	MPDB67410	MPDB67411	MPDB67412	MPDB67413	380	310
500-4	1	2-14	6	MPDB67460	MPDB67461	MPDB67462	MPDB67463	380	310
500-4	1	2-14	8	MPDB67430	MPDB67431	MPDB67432	MPDB67433	380	310
500-4	1	6-14	10	MPDB67480	MPDB67481	MPDB67482	MPDB67483	380	310
500-4	1	10-14	18	MPDB67490	MPDB67491	MPDB67492	MPDB67493	380	310
2/0-14	2	2/0-14	2	MPDB67020	MPDB67021	MPDB67022	MPDB67023	350	270
2/0-14	2	2-14	6	MPDB67510	MPDB67511	MPDB67512	MPDB67513	350	270
1/0-14 (DLO)		3-14 (DLO)						300 (DLO)	
2/0-14	2	2-14	8	MPDB67610	MPDB67611	MPDB67612	MPDB67613	350	270
2/0-14	2	6-14	10	MPDB67530	MPDB67531	MPDB67532	MPDB67533	350	270
2/0-14	2	10-14	15	MPDB67550	MPDB67551	MPDB67552	MPDB67553	350	270
4/0-6	2	4/0-10	2	MPDB67520	MPDB67521	MPDB67522	MPDB67523	460	360
4/0-6	2	2-14	6	MPDB67540	MPDB67541	MPDB67542	MPDB67543	460	360

(DLO) Indicates Ampere Rating or Wire Range applicable to Copper DLO class wire

CATALOG NUMBERS, INTERMEDIATE ALUMINUM MPDBs, BOX-STUD CONFIGURATION

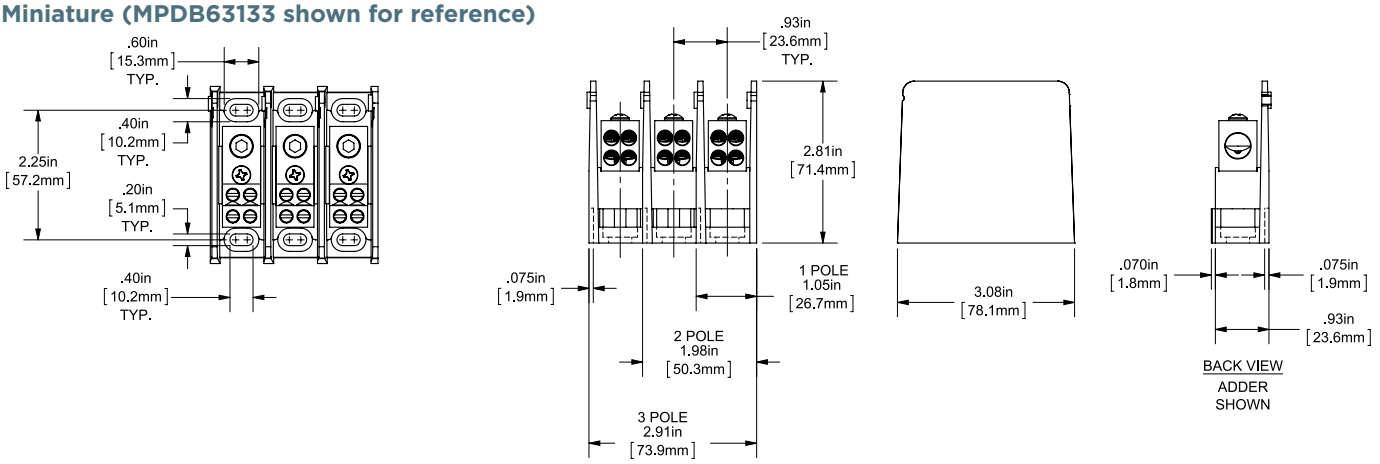
Line Side		Load Side		Catalog Numbers				Amp Rating per Pole	
Wire Range	Inputs	Stud Size	Outputs	ADDER	1-P	2-P	3-P	Ratings (Cu)	Ratings (Al)
350-6	1	3/8"-16 X 1-1/16"	1	MPDB67250	MPDB67251	MPDB67252	MPDB67253	310	250
500-4	1	3/8"-16 X 1-1/16"	1	MPDB67220	MPDB67221	MPDB67222	MPDB67223	380	310

Hinged Safety Cover for MPDB66 and MPDB67 series: Catalog number MPDBC6667
End Barrier for MPDB66 and MPDB67 series: Catalog Number MPDBE6667

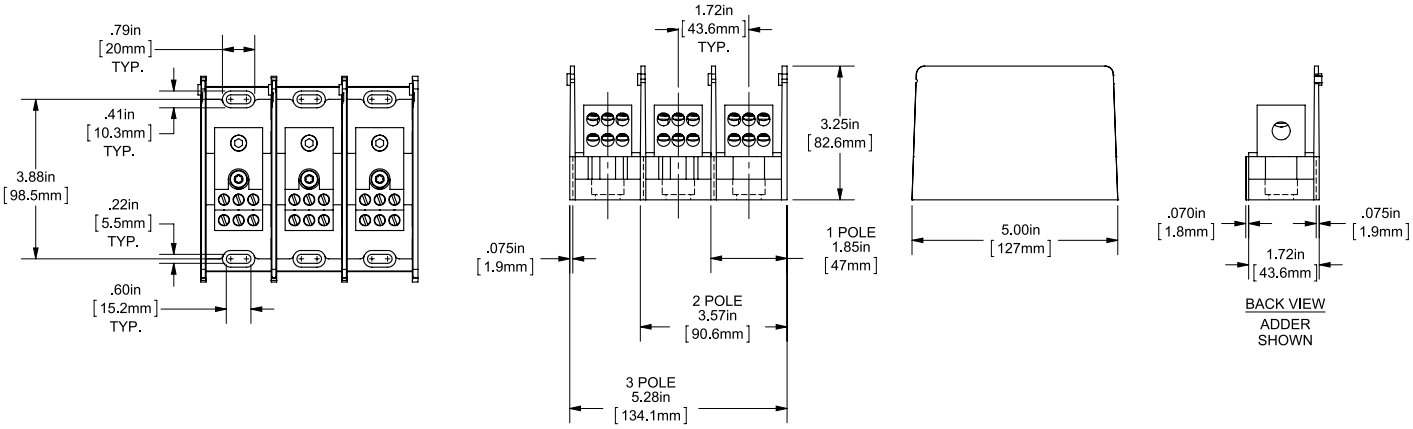
MPDB67523
MPDBC6667

DIMENSIONS

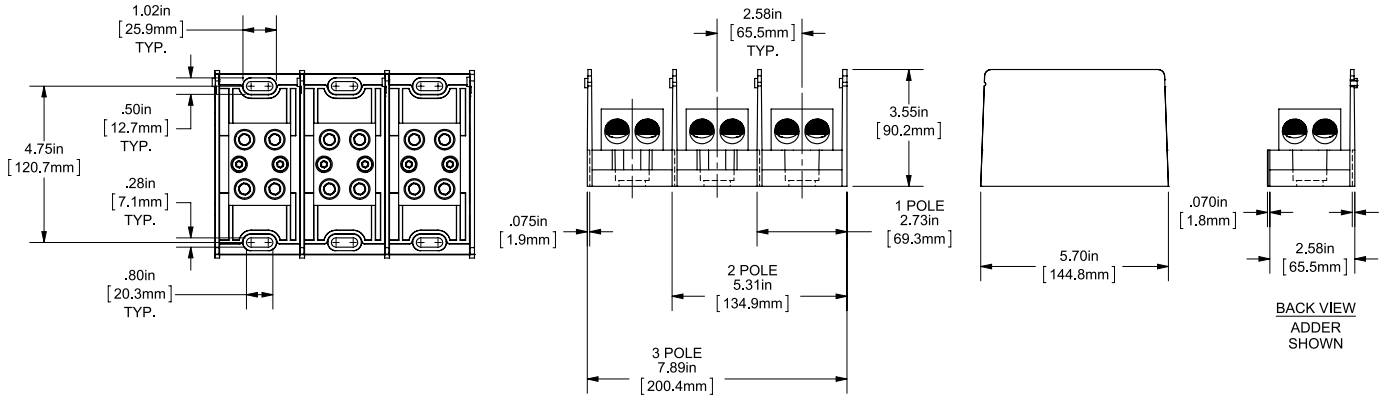
Miniature (MPDB63133 shown for reference)



Intermediate (MPDB67563 shown for reference)



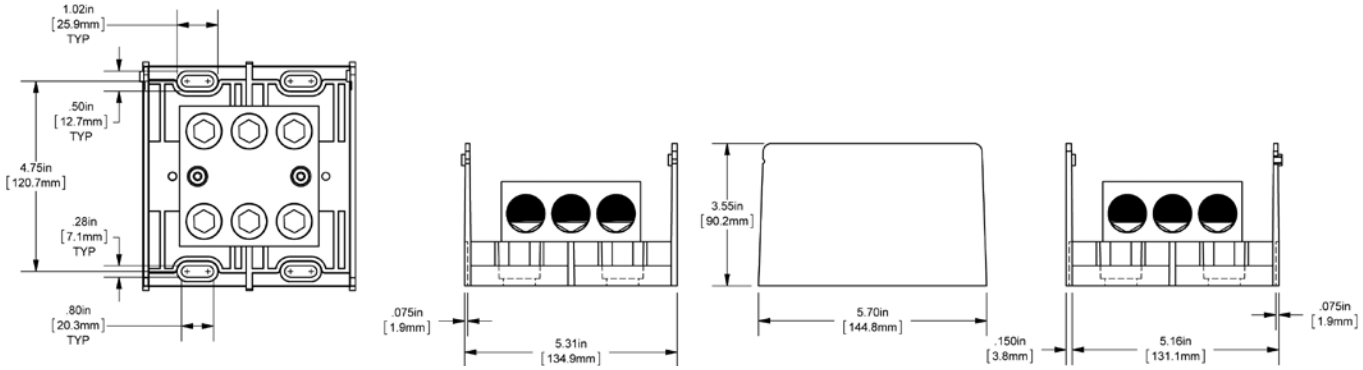
Large (MPDB69123 shown for reference)



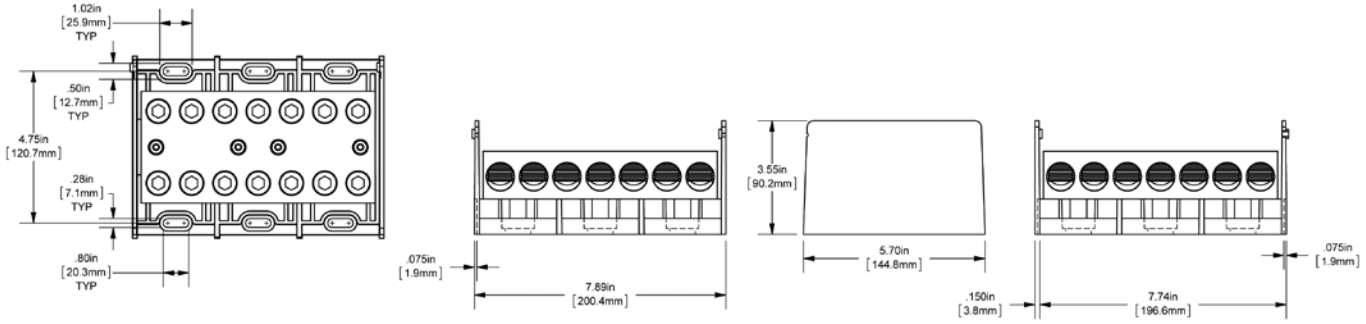
MPDB67523
MPDBC6667

DIMENSIONS (CONTINUED)

Double-Wide (MPDB69331 shown for reference)



Triple-Wide (MPDB800061 shown for reference)



SF400PH10X10

58

Catalog Number Selection

Disconnects

R5 A 3 016 U _

UL Listing
- **R5** = UL 508
- **R9** = UL 98
- **R4** = UL 489

Frame Designation
- **A** = UL 508 (16–40A)
- **B** = UL 508 (60–80A)
- **C** = UL 98 Non-fusible (30–100A modular)
- **V** = UL 98 Non-fusible (60–100A visible blade)
- **D** = UL 98 Non-fusible (100–200A)
- **E** = UL 98 Non-fusible (400A)
- **F** = UL 98 Non-fusible (600A)
- **G** = UL 98 Non-fusible (800–1200A)
- **H** = UL 489 Fusible (30A compact)
- **I** = UL 98 Fusible (30A)
- **J** = UL 98 Fusible (30–60A)
- **K** = UL 98 Fusible (60–100A)
- **L** = UL 98 Fusible (200A)
- **M** = UL 98 Fusible (400A)
- **N** = UL 98 Fusible (600–800A)

Phase
- **2** = Two-pole
- **3** = Three-pole
- **4** = Four-pole

Ampere Rating
- **016** = 16A
- **025** = 25A
- **030** = 30A
- **040** = 40A
- **060** = 60A
- **080** = 80A
- **100** = 100A
- **200** = 200A
- **400** = 400A
- **600** = 600A
- **800** = 800A
- **1000** = 1000A
- **1200** = 1200A

Protection
- **U** = Non-fusible
- **F** = Fusible

Fuse Type Accepted
- **CC** = Class CC
- **J** = Class J
- **L** = Class L
- **Blank** = Non-fusible device

External Handles

SH B 00 4X F _

Handle Type
- **SH** = Selector handle
- **PH** = Pistol handle

Color
- **B** = Black/blue
- **R** = Red/yellow

Size (Smallest to Largest)
- **00** = Size 00
- **0** = Size 0
- **1** = Size 1
- **2** = Size 2
- **3** = Size 3
- **4** = Size 4

NEMA Type Rating
- **12** = Type 1, 3R, 12
- **4X** = Type 4, 4X

Operation
- **F** = Front
- **S** = Right side
- **Blank** = Front or right side

Additional Features ①
- **T** = Test position function
- **Blank** = No test function

Shafts

SF 150 SH 5X5 _

Product Type
- **SF** = Shaft

Length
- **55** = 55 mm
- **90** = 90 mm
- **150** = 150 mm
- **200** = 200 mm
- **320** = 320 mm
- **400** = 400 mm
- **500** = 500 mm

Applicable Handle Type
- **SH** = Selector handle
- **PH** = Pistol handle

Shaft Cross Section
- **5x5** = 5 mm x 5 mm
- **6x6** = 6 mm x 6 mm
- **10x10** = 10 mm x 10 mm
- **12x12** = 12 mm x 12 mm
- **15x12** = 15 mm x 12 mm

Additional Features ②

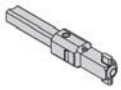
Notes

① **HV** at the end of some catalog numbers indicates use with H and V switches only. Not all handles are designed to go with all disconnects. Consult specific section of the catalog for available options.

② **H** at the end of some catalog numbers indicates use with H Frame switches only. Not all shafts are designed to go with all disconnects. Consult specific section of the catalog for available options.

SF400PH10X10

Front and Right Side Operation, continued

Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Shaft Extensions for Pistol Handle Only In (mm) (Choose One)	NFPA 79 Kit	Auxiliary Contacts (Choose One)	S Type Auxiliary Contacts (Choose One)	Terminal Shrouds
30 Compact (H Frame) (CC)	3	**R4H3030FCC**	7.90 (200.0) **SF200PH5X5**	**NFPA79H**	1 AC NO **AC1NOR9**	—	Integral to switch
30 (H Frame) (CC)	3 + switched neutral	**R4H3030FCCSN**	12.60 (320.0) **SF320PH5X5**		1 AC NC **AC1NCR**		
30 Compact (H Frame) (J)	3	**R4H3030FJ**	15.70 (400.0) **SF400PH5X5**				
30 (H Frame) (J)	3 + switched neutral	**R4H3030FJSN**					
30 (I Frame) (CC)	3	**R9I3030FCC**	7.90 (200.0) **SF200PH10X10**	**NFPA79JKL**		1 AC NO + NC **AC1NO1NCJ2N**	
	4	**R9I4030FCC**					
30 (J Frame) (J)	2	**R9J2030FJ**	12.60 (320.0) **SF320PH10X10**			2 AC NO + NC **AC2NO2NCJ2N**	
	3	**R9J3030FJ**					
	4	**R9J4030FJ**	15.70 (400.0) **SF400PH10X10**			1 AC NO + NC w/ TEST **AC1NO1NCJ2NT**	
60 ① (J Frame) (J)	2	**R9J2060FJ**					
	3	**R9J3060FJ**	19.70 (500.0) **SF500PH10X10**			2 AC NO + NC w/ TEST **AC2NO2NCJ2NT**	
	4	**R9J4060FJ**					

Note

① 100 kA short-circuit rating.

Auxiliary Contacts ①

Description	Ampere Rating (Frame)	Number of AC	AC Type	Catalog Number
100–200A, up to two ACs max.	100–400 (D-, E-Frame)	1NO / 1NC	Standard	**AC1NONCDE**
400A, up to two ACs max.		1NO / 1NC	Low Level ②	**AC1NONCDELL**
		2NO / 2NC	Standard	**AC2NONCDE**
		2NO / 2NC	Low Level ②	**AC2NONCDELL**
600–1200A, up to four ACs max.	600–1200 (F-, G-Frame)	1NO	Standard	**AC1NOR9** ③
		1NC	Standard	**AC1NCR9** ③
Auxiliary contact holder (for use with AC1NOR9 and AC1NCR9)	600–1200 (F-, G-Frame)	—	—	**ACHFG**

Terminal Screens

Description	Maximum Ampere Rating (Frame)	Number of Poles	Line/Load Side	Catalog Number
Line and load protection against direct contact with terminals or connection parts. Line side terminal shrouds are included standard on 600–1200A non-fusible switches. Shrouds are not included on the 100–400A.	100–200 (D-Frame)	3	Line	**TS3R9DT**
		3	Load	**TS3R9DB**
		4	Line or load	**TS4R9DTB**
	400 (E-Frame)	3	Line	**TS3R9ET**
		3	Load	**TS3R9EB**
	600 (F-Frame)	4	Line or load	**TS4R9ETB**
		3	Line or load	**TS3R9F**
	800–1200 (G-Frame)	4	Line or load	**TS4R9F**
		3	Line or load	**TS3R9G**
		4	Line or load	**TS4R9G**

Line and Load Terminal Lugs

Description	Maximum Ampere Rating (Frame)	Number of Poles	Number of Lugs/Pole	Lug Capacity/Phase	Cable Type	Catalog Number
Connection of copper cables on to the terminals (no spade lugs). Each kit includes lugs for line or load side. For line and load side, order two kits. For Dimensions, see **Page V5-T8-23**.	100–200 (D-Frame)	3	1	#6–300 kcmil	Cu/Al	**LK3R9DL**
		4	1	#6–300 kcmil	Cu/Al	**LK4R9DL**
	400 (E-Frame)	3	1	#2–600 kcmil	Cu/Al	**LK3R9EM** ④
		4	1	#2–600 kcmil	Cu/Al	**LK4R9EM** ④
	600 (F-Frame)	3	1	(2) #2–600 kcmil	Cu/Al	**LK3R9FN**
		4	1	(2) #2–600 kcmil	Cu/Al	**LK4R9FN**
	800–1200 (G-Frame)	3	2	2x (2) #2–600 kcmil	Cu/Al	**LK6R9G**
		4	2	2x (2) #2–600 kcmil	Cu/Al	**LK8R9G**

Notes

① Early-break/same-make.
② Gold plated for minimal resistance—for PLC applications.
③ Requires use of ACHFG auxiliary contact holder for F- and G-Frame switches.
④ For two-hole lug, consult factory.

FUSERBLOC UL 98 Fusible Disconnect Switches

14001032

socomec
Innovative Power Solutions

Right Side Operation Handles (No door interlocking)

Part Number	Description	Switch Body Rating (A)	Fits Frame	Handle Color	Handle Type	NEMA/ UL Type	Test	
141H6111	Side operation handle for UL 98 fusible disconnect switches	30-60	4	Black/Blue	S1	4, 4X	I - O	
141I6111				Red/Yellow				
142H6111		100-400	5, 6, 7	Black/Blue	S2			
142I6111				Red/Yellow				
141H6911	Heavy duty side operation handle for UL 98 fusible disconnect switches*	30-60	4	Black/Blue	S1			
141I6911				Red/Yellow				
142H6911		100-400	5, 6, 7	Black/Blue	S2			
142I6911				Red/Yellow				

141H6111

Heavy duty handles have larger metal hasp to accommodate multiple locking devices.

Shafts for External Handles

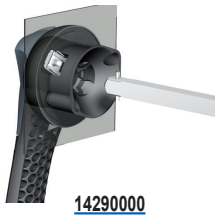
Part Number	Switch Body Rating (A)	Handle Type	Length		
			in	mm	
14001020	30-400	S1, S2	7.9	200	
14001032			12.6	320	
14001040			15.7	400	
14001220	600	S3	7.9	200	
14001232			12.6	320	
14001240			15.7	400	

14001020

14001220

Shaft Guide for External Handle

Part Number	Description	Fits Handle Type	
14290000	This accessory makes alignment connections between the shaft and handle easier. Allows up to 15mm misalignment tolerance. Required for a shaft length longer than 300mm. Included with longer shafts.	S1, S2, S3	



14290000

Auxiliary Contacts

Part Number	Description	Body Switch Rating (A)	Contacts	
39990701	Front mount auxiliary contacts can be configured to be operated on standard and TEST position switches. Each slot can accomodate up to 2 interlocked auxiliary contacts. 3A @ 240VAC. For 30 to 200A/J, maximum of 4 auxiliary contacts	30 - 600	1 NO	
39990702			1 NC	
3999U041	Side operated auxiliary contacts for frame sizes 3 to 8 UL 98 fusible disconnect switches, position OFF and ON signalled by 1 to 4 NO + NC auxiliary contacts. 10A @ 600 VAC/DC. 2/pk	30-200	1 NO	
3999U042		30-200	1NO / 1NC	

39990701

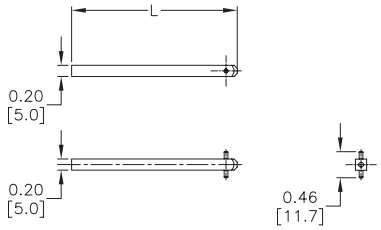
3999U041

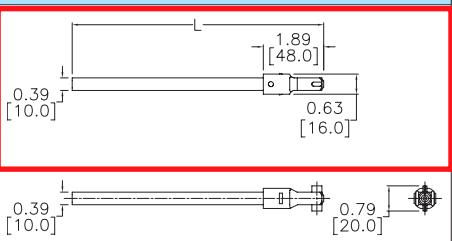
Accessories Dimensions

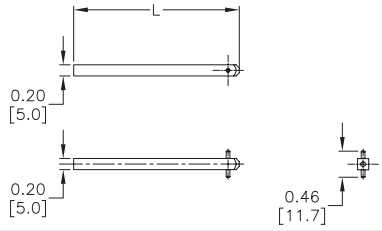
Shafts for Fusible Disconnect Switches 14001032

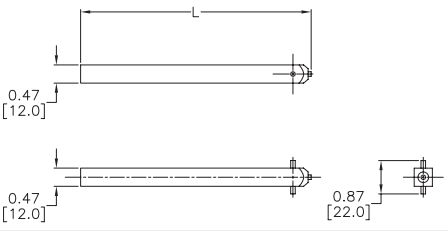
[inches/mm]

Shafts for Fusible Disconnect Switches

Shafts for S0 Handle Type	Part Number	Body Switch Rating	Length in	Length mm
	14050620	30A	7.9	200
	14050632		12.6	320
	14050640		15.7	400

Shafts for S2 Handle Type	Part Number	Body Switch Rating	Length in	Length mm
	14001020	30A to 400A	7.9	200
	14001032	30A to 200A	12.6	320
	14001040	30A to 400A	15.7	400

Shafts for S1 Handle Type	Part Number	Switch Body Rating	Length in	Length mm
	14010520	30A	7.9	200
	14010532		12.6	320
	14010540		15.7	400

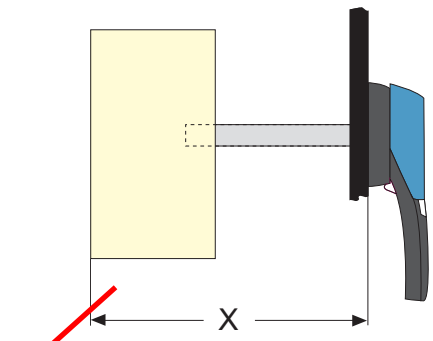
Shafts for S3 Handle Type	Part Number	Switch Body Rating	Length in	Length mm
	14001220	600A	7.9	200
	14001232		12.6	320
	14001240		15.7	400

Please see our website www.AutomationDirect.com for complete engineering drawings.

Shaft Length Minimum Dimensions

Use standard lengths:
–7.9 in / 200mm – 12.6 in / 320mm – 15.7 in / 400mm

Switch Body Rating (A)	Dimension X in	Dimension X mm	Handle Type	Length in	Length mm	Part Number
30	4.02 - 9.65	102 - 245	S0	7.9	200	14050620
30	4.02 - 14.37	102 - 365	S0	12.6	320	14050632
30	4.02 - 17.52	102 - 445	S0	15.7	400	14050640
30	4.02 - 9.65	102 - 245	S1	7.9	200	14010520
30	4.02 - 14.37	102 - 365	S1	12.6	320	14010532
30	4.02 - 17.52	102 - 445	S1	15.7	400	14010540
30 - 100	5.3 - 9.06	135 - 230	S2	7.9	200	14001020
200	5.7 - 9.06	145 - 230	S2	7.9	200	14001020
400	7.87 - 10.24	200 - 260	S2	7.9	200	14001020
30 - 100	5.3 - 13.78	135 - 350	S1, S2	12.6	320	14001032
200	5.7 - 13.78	145 - 350	S2	12.6	320	14001032
400	7.87 - 14.96	200 - 380	S2	12.6	320	14001032
30 - 100	5.3 - 16.93	135 - 430	S1, S2	15.7	400	14001040
200	5.7 - 16.93	145 - 430	S2	15.7	400	14001040
400	7.87 - 18.1	200 - 460	S2	15.7	400	14001040
600 - 800	10.63 - 11.97	270 - 304	S3	7.9	200	14001220
600 - 800	10.63 - 16.69	270 - 424	S3	12.6	320	14001232
600 - 800	10.63 - 19.84	270 - 504	S3	15.7	400	14001240



FUSERBLOC UL 98 Fusible Disconnect Switches

142D2111
38613020

To assemble a switch, please select:

Direct Operation

Switch Body

+

Direct Handle

OR

External Operation

Switch Body

+

Shaft

+

External Handle

UL 98 Fusible Disconnect Switches

Part Number	Description	Switch Body Rating (A)	Frame Size	Number of Poles	
38612004	Front or side operated UL 98 Class J fusible switch, 600VAC, 250VDC	30	4	2	
38613004				3	
38616004				4	
38612005		60		2	
38613005				3	
38616005				4	
38612010		100	5	2	
38613010				3	
38616010				4	
38612020		200	6	2	
38613020				3	
38616020				4	
38513038		400	7	3	
38503060		600	8	3	

Front Operation Handles

Part Number	Description	Switch Body Rating (A)	Fits Frame	Handle Color	Handle Type	NEMA/ UL Type	Test	
36297910	Direct mount handle	30-400	4 - 7	Black	–	–	–	
38596011		600	8	Black	–	–	–	
141F2111	Front operation handle for UL 98 fusible disconnect switches	30-60	4	Black/Blue	S1	1, 3R, 12	I - O	
141G2111				Red/Yellow				
141D2111				Black/Blue	S1	4, 4X	I - O	
141E2111				Red/Yellow				
141D2115				Black/Blue	S1		I - O - Test	
141E2115				Red/Yellow				
142D2115		100-200	5, 6	Black/Blue	S2	4, 4X	I - O - Test	
142E2115				Red/Yellow				
142F2111		100-400	5, 6, 7	Black/Blue	S2	1, 3R, 12	I - O	
142G2111				Red/Yellow				
142D2111				Black/Blue		4, 4X	I - O	
142E2111				Red/Yellow				
143F3111		600	8	Black/Blue	S3	1, 3R, 12	I - O	
143G3111				Red/Yellow				
143D3111				Black/Blue		4, 4X	I - O	
143E3111				Red/Yellow				
141D2911	Heavy duty front operation handle for UL 98 fusible disconnect switches	30-60	4	Black/Blue	S1	4, 4X	I - O	
141E2911				Red/Yellow				
142D2911		100-400	5, 6, 7	Black/Blue	S2	4, 4X	I - O	
142E2911				Red/Yellow				
143D3911		600	8	Black/Blue	S3	4, 4X	I - O	
143E3911				Red/Yellow				

Direct Handle
36297910

S1 Handle
142F2111

S2 Handle
142G2111

S3 Handle
143D3111

11633156055
11633156054
17121000010

PF 33000 SL

Slim Line Filterfans 4.0™

Pfannenberg Filterfans® with low installation depth

- Installation size 3, air flow rate up to 115 CFM
- System of protection IP 55, NEMA 12
- UL, cUL to NITW2 Category and CE approved, CSA pending

11633156054-Outlet Fan

Data		PF33000 SL			Unit
Part number	RAL 9011 (Black Grill)	11633106050	11633156050	11633806050	
	RAL 7035 (Lt. Gray Grill)	11633106055	11633156055	11633806055	
		AC 50 Hz / 60 Hz		DC	
Rated voltage ± 10 %		230	115	24	V
Unimpeded airflow (CFM2)		152 (258)			CFM (m³/h)
Air flow rate in combination (PF + PFA 30000) (CFM3)		115 (196)			
Power consumption		19 / 18	20 / 20	5	W
Current consumption		0.12 / 0.18	0.24 / 0.23	0.21	A
Noise level (according to EN ISO 3741)		40			
Weight		1.9 (0.87)		1.3 (0.61)	lb (kg)
Type of connection		terminal strip		cable, 2-core, length 310 mm	
Fuse (maximum)		6			A
System of protection according to EN 60529 / UL 50		NEMA 12 - fluted filter / IP 55			
Filtration efficiency		91			%
Filter mat quality class [1]		G 4			
Duty cycle		100			%
Bearing type		sleeve bearing		ball bearing	
Service life L_{10} (+ 40 °C)[2]		37500	40000	62500	h
Temperature range		+ 5 … + 131 / - 15 … + 55			°F / °C
Material Protection Rating		made of injection-molded thermoplastic, self-extinguishing, UL 94 V0, UV-resistant optional			

Inlet Fan

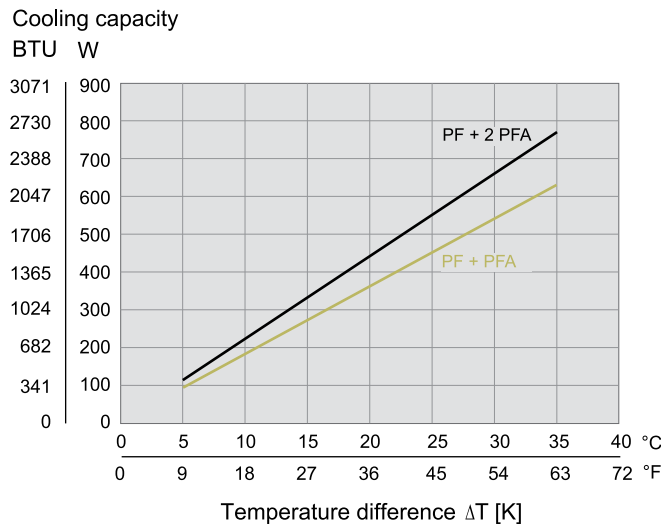
Accessories		Piece	Part number	Information on page
Exhaust filter PFA 30000	RAL 9011 (Black Grill)	1	11730004050	171
	RAL 7035 (Lt. Gray Grill)	1	11730004055	171
Thermostat FLZ 530° F		1	17121000010	186

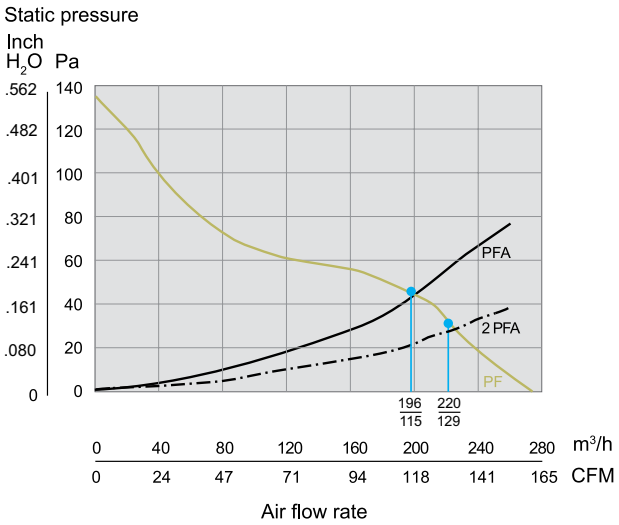
[1] according to DIN EN 779
[2] fan failure is defined as being when the current and speed deviate or the operating noises are out of the ordinary
Approvals see page 148

11633156055
11633156054
17121000010

Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

Cooling Capacity Performance Curves	Static Pressure Performance Curves
PF 33000 SL	PF 33000 SL



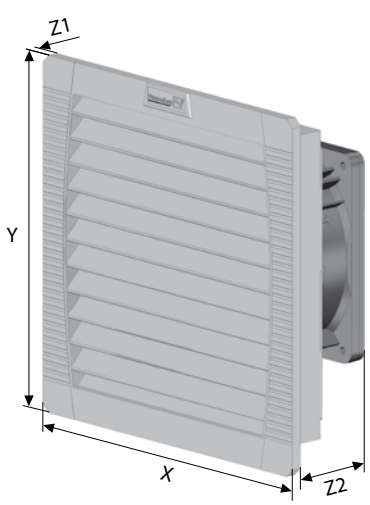


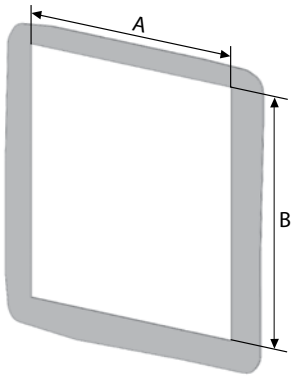
Dimensions

inches (mm)	PF 33000 SL		PFA 30000
	AC	DC	Exhaust
X	7.95 (202)	7.95 (202)	7.95 (202)
Y	7.95 (202)	7.95 (202)	7.95 (202)
Z1	.24 (6)	.24 (6)	.24 (6)
Z2	3.43 (87)	3.19 (81)	1.34 (34)
A[1]	6.97 (177)[2]	6.97 (177)[2]	6.97 (177)[2]
B[1]	6.97 (177)[2]	6.97 (177)[2]	6.97 (177)[2]

[1] for material thicknesses up to .07" (2 mm)
+1 mm for thickness of material > .07" (2 mm) ≤ 1.2" (3 mm)

[2] add .039" (1 mm) for EMC version





Filterfans 4.0™

18182000014

Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

NEMA TYPE 3R/4/4X FILTERFAN®

RAINHOODS

Pfannenberg Rainhoods (Patent Pending) feature a robust design rated to NEMA TYPE 3R/4/4x and IPx6 when used with Pfannenberg Filterfans®. Options include painted galvanized steel, stainless steel and FDA compliant food and beverage grade versions.

NEMA Type 3R, 4, 4X Rated / IPx6 Rating

c UL us LISTED

Caution: De-energize system before washdown. Rainhoods will not prevent hazardous gases or humidity from entering the cabinet.

Multi-Dam Seal Technology:

High compression, closed cell gasket w/multiple seal dams ensuring a proper NEMA Type / IP rating seal to the enclosure.

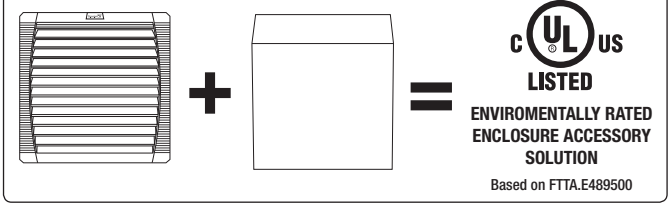
NEMA Type 3R/4/4X / IPx6 Design:

This mounting system was designed to ensure a proper NEMA Type / IP rating and protection when used with Pfannenberg Filterfans® and exhaust filters.

Maximized Airflow & Superior Overspray Protection:

Direct spray barrier and high air-flow baffle allow for superior protection from overspray entering the cabinet while minimizing airflow loss.

INDUSTRY'S FIRST UL LISTED RAINHOOD SOLUTION



Rugged Steel Construction:

Choose from Industrial or Sanitary Versions. Industrial version is available in powder coated RAL 7035 light grey galvanized steel, ANSI 61 dark grey, and 304 or 316 stainless steel cover design. Sanitary version is available in a stainless steel, FDA compatible white gasket design.

Easy Maintnenace:

Our tool-less design allows for easy removal of the rainhood for maintenance and filter mat replacement. **Tamper-proof options also available.**

Easy Installation:

The mounting bracket can easily be installed to the enclosure around the existing cut-out.

Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

18182000014

NEW

Sanitary Rainhood

In addition to our standard painted and stainless steel designs, **Pfannenberg also offers a specialty 4X stainless steel rainhood to meet the FDA compatible requirements** found in Food & Beverage Manufacturing Facilities.

FDA Compatible White Gasket Design
Our white gasket design is ideal for Rainhoods that are used on enclosures in Food & Beverage applications. This gasket allows for easy detection of any contamination and is free of potenially harmful color additives.

Robust Sealing Against Enclosure
A primary design element found within our rainhoods is the robust sealing of our gasket. Our gasket features; multiple seal dams with a high compression ratio and dense closed cell material. This gasket found in both our regular and sanitary designs.

Easy Washdown and Disinfection
With a smooth, clean and seamless design, Pfannenberg Rainhoods allow for easy washdown and disinfection. Direct spray barrier design allows for superior protection from overspray entering the cabinet while minimizing airflow loss.

Compatible with Existing Fan Cutouts
Rainhoods come in different sizes and are designed to be compatible with existing Pfannenberg Filterfans® and Exhaust Filters.

Easy Maintenance
Easily remove the rainhood for maintenance and filter mat replacement. The gasket will not be comprimised due to it's ultimate bond with high peel/shear resistance and excellent UV aging. Tool-less design comes standard, tamper-proof option available.

NEMA TYPE 3R/4/4X / IPx6 SERIES RAINHOODS FOR FILTERFANS®

Model Numbers	Description	Dimensions W x H x D (mm)	Compatibility	Part Number	
PF-RH-20000-WD-LG	Rainhood, Lt Grey RAL 7035, NEMA Type 3R/4	221 x 265 x 102	PF 22000 Filterfans® PFA 20000 Exhaust Filters	18182000010	
PF-RH-20000-WD-GY	Rainhood, Grey ANSI 61, NEMA Type 3R/4			18182000009	
PF-RH-20000-WD-SS	Rainhood, 304 SS NEMA Type 4/4X			18182000011	
PF-SH-20000-WD-SS	Sanitary Hood SS NEMA Type 4/4X (White FDA Gasket)			18182000026	
PF-RH-30000-WD-LG	Rainhood, Lt Grey RAL 7035, NEMA Type 3R/4	276 x 322 x 102	PF 3X000 Filterfans® PFA 30000 Exhaust Filters	18182000013	
PF-RH-30000-WD-GY	Rainhood, Grey ANSI 61, NEMA Type 3R/4			18182000012	
PF-RH-30000-WD-SS	Rainhood, 304 SS NEMA Type 4/4X			18182000014	
PF-SH-30000-WD-SS	Sanitary Hood SS NEMA Type 4/4X (White FDA Gasket)			18182000027	
PF-RH-40000-WD-LG	Rainhood, Lt Grey RAL 7035, NEMA Type 3R/4	326 x 372 x 102	PF 4XX00 Filterfans® PFA 40000 Exhaust Filters	18182000016	
PF-RH-40000-WD-GY	Rainhood, Grey ANSI 61, NEMA Type 3R/4			181820000015	
PF-RH-40000-WD-SS	Rainhood, 304 SS NEMA Type 4/4X			18182000017	
PF-SH-40000-WD-SS	Sanitary Hood SS NEMA Type 4/4X (White FDA Gasket)			18182000028	
PF-RH-60000-WD-LG	Rainhood, Lt Grey RAL 7035, NEMA Type 3R/4	394 x 440 x 102	PF 6XX00 Filterfans® PFA 60000 Exhaust Filters	18182000019	
PF-RH-60000-WD-GY	Rainhood, Grey ANSI 61, NEMA Type 3R/4			18182000018	
PF-RH-60000-WD-SS	Rainhood, 304 SS NEMA Type 4/4X			18182000020	
PF-SH-60000-WD-SS	Sanitary Hood SS NEMA Type 4/4X (White FDA Gasket)			18182000029	

For 316 Stainless Steel parts and pricing please consult factory.

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-60EL4812SS6LPPL

Product Specifications:

Part Number: SCE-60EL4812SS6LPPL
Description: S.S. 2DR EL LPPL Enclosure
Height: 60.00"
Width: 48.00"
Depth: 12.00"
Price Code: S4
List Price: $8,347.79
Catalog Page: 296
Est. Ship Weight: 509.00 lbs

Construction
- 0.104 In. stainless steel Type 316/316L.
- Seams continuously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Removable center post.
- Heavy duty lifting eyes anchor into reinforced top.
- Body stiffeners.
- Stainless steel concealed hinge.
- Black key locking padlocking handles.
- 3-point latching mechanism.
- Removable print pocket.
- 12 inch removable floor stands.
- Panel supports.
- Provision for mechanical interlock.
- Pour in place oil & water resistant gasket
- Ground stud on door & body.
- Provisions for light kit.
- Collar studs 3/8-16 provided for mounting optional panels.

Application
Designed to house electrical and electronic controls, instrumentation and components in indoor & outdoor locations. For outdoor applications a drip shield is recommended.

Options
Provisions for mechanical interlock. See Accessory section to order.

Finish
#4 brushed finish on all exterior surfaces. Optional sub-panels are powder coated white.

Industry Standards - (IS6)
- NEMA Type 3R, 4, 4X, 12 and Type 13
- UL Listed Type 3R, 4, 4X and 12
- CSA Type 4, 4X and 12
- IEC 60529
- IP 66

Notes
Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.

Optional Accessories
SCE-104941 Interlock, Mechanical for Left Door as Main
SCE-105604 Interlock, Mechanical for Right Door as Main
SCE-13ELJEXPP Pocket, Exterior Print
SCE-19ELJEXPP Pocket, Exterior Print
SCE-60P48 Subpanel, Bent
SCE-60P48GALV Subpanel, Bent Galvanized
SCE-BP5612 Plate, Barrier
SCE-BVK Breather Vent
SCE-DF60EL48 Panel, Dead Front (Enviroline Floor Mount)
SCE-DS48SS Shield, S.S. Drip
SCE-FS1212SS Shelf, S.S. Folding
SCE-FS1818SS Shelf, S.S. Folding
SCE-FS2424SS Shelf, S.S. Folding
SCE-LF18 Fixture, LED Light
SCE-LF18NO Fixture, LED Light w/o Outlet
SCE-RDL60EL48SS6 Door, Replacement
SCE-RDR60EL48SS6 Door, Replacement

Similar Part Numbers
SCE-60EL4818SS6LPPLS.S. 2DR EL LPPL Enclosure
SCE-60EL6012SS6LPPLS.S. 2DR EL LPPL Enclosure
SCE-60EL6018SS6LPPLS.S. 2DR EL LPPL Enclosure
SCE-72EL6012SS6LPPLS.S. 2DR EL LPPL Enclosure
SCE-72EL6018SS6LPPLS.S. 2DR EL LPPL Enclosure

Installation Information
- Mechanical Interlock
- Dead Front 2 Door W/Center Post Installation Instructions
- LED Light Fixture
- Folding Shelf Hole Pattern
- Drip Shield Kit Assembly
- Service Parts Free Standing & Floor Mount Enclosures

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SAGINAW CONTROL & ENGINEERING
Your Enclosure Source ®

SCE-105604

Product Specifications:

Part Number: SCE-105604
Description: Interlock, Mechanical for Right Door as Main
Height: 7.50"
Width: 6.50"
Depth: 5.50"
Price Code: P2
List Price: $165.43
Catalog Page: 416
Est. Ship Weight: 1.74 lbs

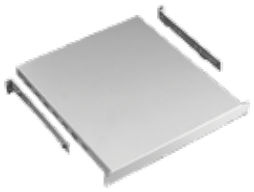
Application
Designed for use with Enviroline two door enclosures to interlock the master door to the slave door.

Industry Standards - (IS17)
- NEMA Not Applicable
- UL Not Applicable
- CSA N/A

Notes
For use on enclosures greater than or equal to 30" in height with a center channel.

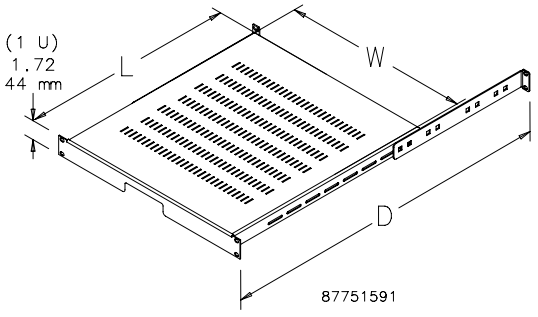
Similar Part Numbers
SCE-104941Interlock, Mechanical for Left Door as Main

RACK-MOUNT ADJUSTABLE SHELF



Mounts to front surface of front and back rack angles. Shelf is made of painted 14 gauge steel and the adjustable support brackets are clear-plated 12 gauge steel. Adjustable to fit multiple-depth enclosures or rack angle placement. Both solid and vented models available. Fits 19- or 23-in. rack spacing. Requires only 1U of rack space. Shelf has RAL 7035 light-gray textured or RAL 9005 black textured polyester powder paint finish. Load rating: 150 lb. (68 kg)

BULLETIN: DACCY



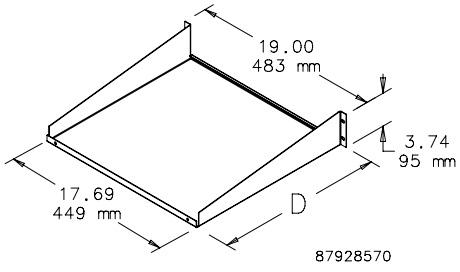
Catalog Number	Type	Size	Finish	L x W (in.)	L x W (mm)	D max. (in.)	D max. (mm)	Fits Enclosure Depth Up To (in.)	Fits Enclosure Depth Up To (mm)
P19SH68	Solid	19 in.	Gray	19.68 x 17.32	500 x 440	30.71	780	31.50	800
P19SH68B	Solid	19 in.	Black	19.68 x 17.32	500 x 440	30.71	780	31.50	800
P19VSH68B	Vented	19 in.	Black	19.68 x 17.32	500 x 440	30.71	780	31.50	800
P19SH810	Solid	19 in.	Gray	27.56 x 17.32	700 x 440	38.58	980	39.37	1000
P19SH810B	Solid	19 in.	Black	27.56 x 17.32	700 x 440	38.58	980	39.37	1000
P19VSH810B	Vented	19 in.	Black	27.56 x 17.32	700 x 440	38.58	980	39.37	1000
P23SH68B	Solid	23 in.	Black	19.68 x 21.32	500 x 542	30.71	780	31.50	800
P23VSH68B	Vented	23 in.	Black	19.68 x 21.32	500 x 542	30.71	780	31.50	800
P23SH810B	Solid	23 in.	Black	27.56 x 21.32	700 x 542	38.58	980	39.37	1000
P23VSH810B	Vented	23 in.	Black	27.56 x 21.32	700 x 542	38.58	980	39.37	1000

SINGLE-SIDED SHELF

Mounts to 19-in. rack angles to house voice/data networking equipment. RAL 9005 black finish. Load rating: 75 lb. (34 kg)

BULLETIN: DACCY

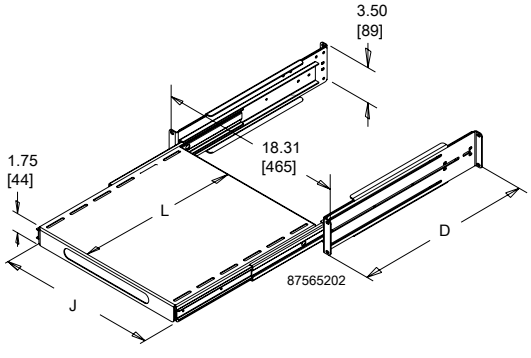
Catalog Number	H x W x D (in.)	H x W x D (mm)	Style	Rack Units
ESH198	3.74 x 19.00 x 8.00	95 x 483 x 203	Solid	2
ESH1915	3.74 x 19.00 x 15.00	95 x 483 x 381	Solid	2
ESH1915V	3.74 x 19.00 x 15.00	95 x 483 x 381	Vented	2
ESH1917	3.74 x 19.00 x 17.00	95 x 483 x 432	Solid	2



RACK-MOUNT, PULL-OUT SHELF

Rack-Mount, Pull-out Shelf mounts to front surface of front and back rack angles. Models fit 19- or 23-in. rack spacing. Adjusts to fit multiple-depth enclosures and rack angle placements. Shelf can be used on 2-post rack or cabinet with front rack angles only by reversing support bracket. Optional cable manager arm available. 14 gauge steel with 12 gauge supports and RAL 9005 black or RAL 7035 gray polyester powder paint finish. Load rating: 150 lb. (68.0 kg) with four corner mounting; 75 lb. (34.0 kg) with two-post or front-rack-angle cabinet mounting.
Optional Cable Manager Arm is recommended to help control cable movement as shelf slides in and out.

BULLETIN: DACCY, P20



Catalog Number	D Max. (in.)	D Max. (mm)	L (in.)	L (mm)	J (in.)	J (mm)	Shelf Pullout (in.)	Shelf Pullout (mm)	Fits Rack	Rack Units	Color
P19SHP68B	37.40	950	16.72	425	16.20	412	17.00	432	19 in.	2	Black
P19SHP68	37.40	950	16.72	425	16.20	412	17.00	432	19 in.	2	Gray

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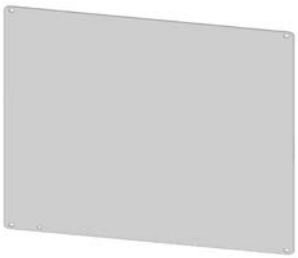
SCE-60P48



Product Specifications:

Part Number: SCE-60P48
Description: Subpanel, Bent
Height: 56.00"
Width: 44.00"
Depth: 0.88"
Price Code: P3
List Price: $268.38
Catalog Page: 382
Est. Ship Weight: 100.00 lbs
Edge Flanges: Four
Configuration: C

Finish
Powder Coated White.

Industry Standards - (IS17)
- NEMA Not Applicable
- UL Not Applicable
- CSA N/A

Similar Part Numbers
SCE-48P36Subpanel, Bent
SCE-48P42Subpanel, Bent
SCE-48P48Subpanel, Bent
SCE-60BFP42Subpanel, Bent
SCE-60P36Subpanel, Bent
SCE-60P42Subpanel, Bent
SCE-60P60Subpanel, Bent
SCE-60PC36Subpanel, Bent
SCE-64P37Subpanel, Bent
SCE-64P52Subpanel, Bent

Installation Information
- Sub-Plate Layout & Grounding for 3/8-16

Modular Ferrule Fuse Blocks for Class J Fuses

Description

JM Series for use with Class J fuses JHL & JDL

Mounting

35mm DIN rail or panel mount

Specifications

Materials:
Base – Thermoplastic
Terminals – Tin-plated copper brass
Covers – Thermoplastic
Screws and pressure plates – Zinc-plated steel

SCCR: 200kA

Flammability rating:
Blocks – UL 94V0, self-extinguishing
Covers – UL 94HB, self-extinguishing

Operating and storage temp range:
Blocks – -40° to 120°C [-40° to 248°F]
Covers – indicating -20° to 90°C [-4° to 194°F]
non-indicating -40° to 120°C [-40° to 248°F]

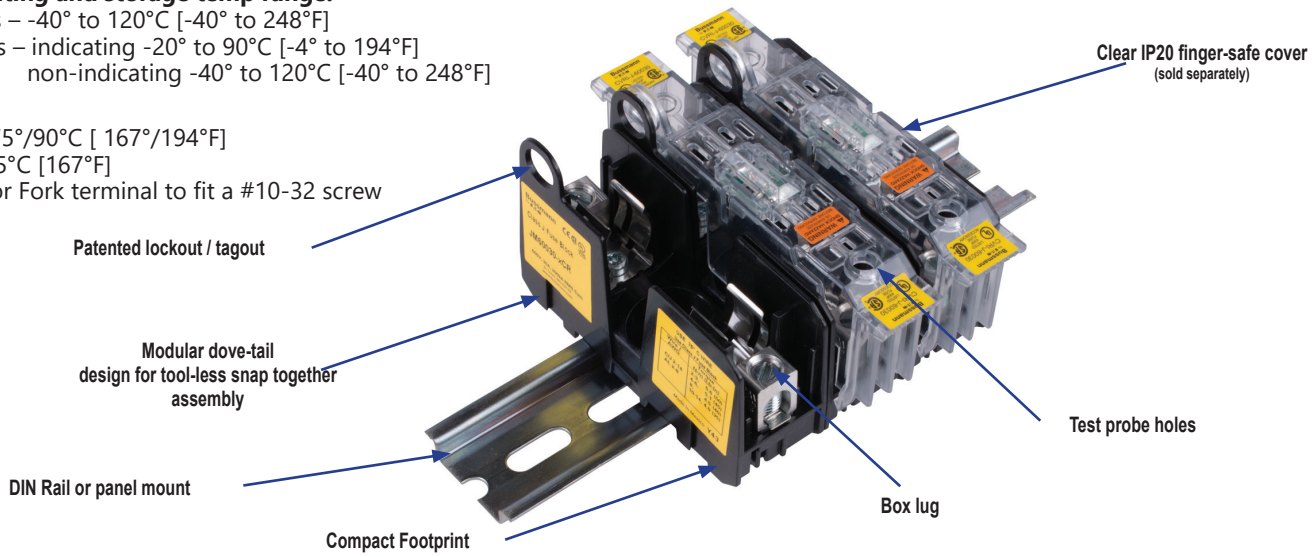
Wire:
Cu – 75°/90°C [167°/194°F]
Al – 75°C [167°F]
Ring or Fork terminal to fit a #10-32 screw

Agency Approvals

Fuse Blocks
- UL® Listed E14853 - IZLT
- CSA® Certified 47235-6225-01
- CE
- RoHS Compliant
- Conflict mineral free
- REACH Compliant

Covers
- Covers are included in the overall UL Listing/Recognition and CSA Certification
- IP20 finger-safe
- RoHS compliant
- REACH Compliant

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

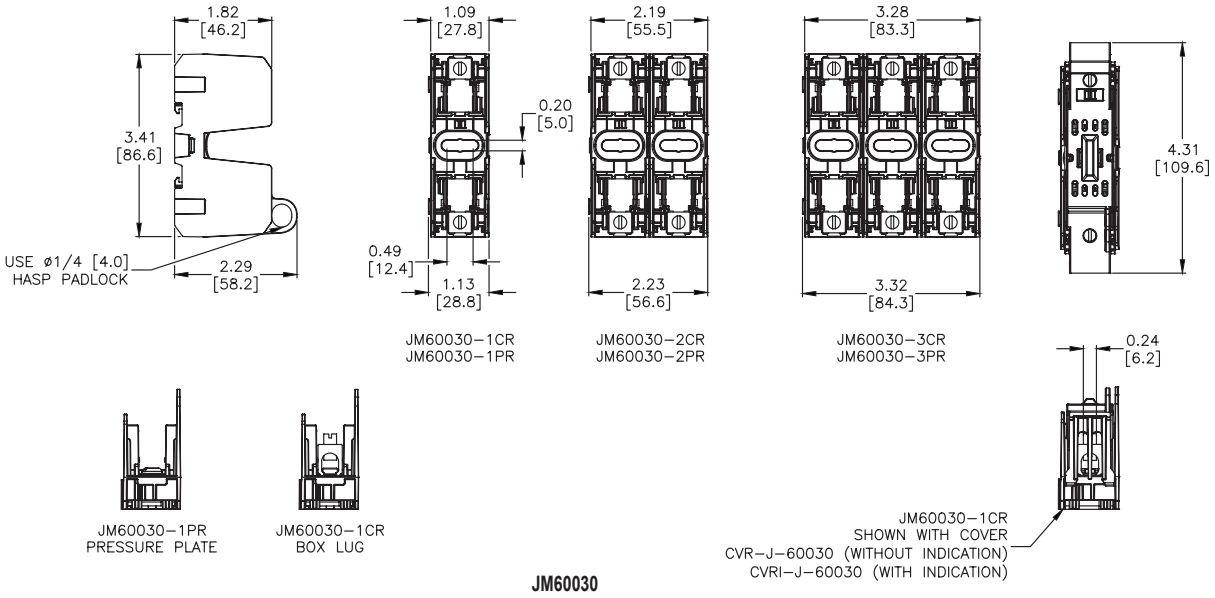


Modular Ferrule Fuse Blocks for Class J Fuses													
							Wire Range		Torque	Wt.	Covers (sold separately)		
Type	Part Number	Pc/ pkg		Volts	Amps	Poles	solid and stranded	fine stranded (Cu)	lb·in [N·m]	lb [kg]	w/o Indication	w/ Indication[1]	Pc/ pkg
Box lug	JM60030-1CR	1		600V AC/DC	30	1	14-2 AWG (Cu) 8-2 AWG (Al)	3-2 AWG 6-4 AWG 8AWG 14-10 AWG	50 [5.6] 45 [5.1] 40 [4.5] 35 [4.0]	0.15 [0.08]	CVR-J-60030	CVRI-J-60030	1
	JM60030-2CR	1				2				0.25 [0.12]			
	JM60030-3CR	1				3				0.40 [0.18]			
Pressure Plate	JM60030-1PR	1				1	18-10 AWG (Cu)	18-10 AWG	20 [2.3]	0.15 [0.08]			
	JM60030-2PR	1				2				0.25 [0.12]			
	JM60030-3PR	1				3				0.40 [0.18]			
Box lug	JM60060-1CR	1			60	1	14-2 AWG (Cu) 8-2 AWG (Al)	3-2 AWG 6-4 AWG 8AWG 14-10 AWG	50 [5.6] 45 [5.1] 40 [4.5] 35 [4.0]	0.20 [0.10]	CVR-J-60060	CVRI-J-60060	1
	JM60060-2CR	1				2				0.35 [0.16]			
	JM60060-3CR	1				3				0.55 [0.26]			

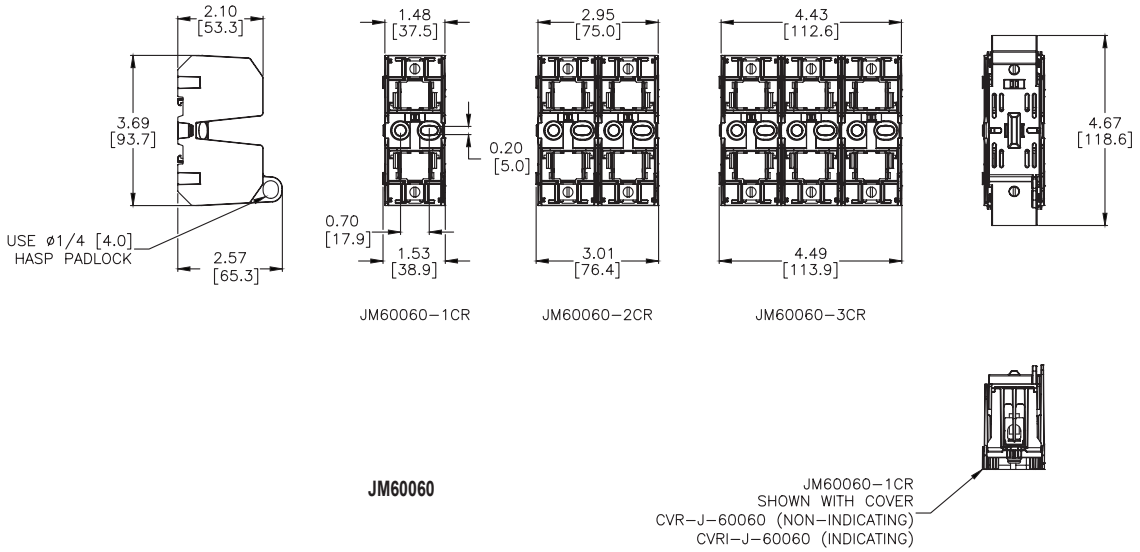
[1] Open fuse indication requires 90V minimum and closed circuit to operate.

Modular Ferrule Fuse Blocks for Class J Fuses Dimensions

in [mm]



JM60030



JM60060

Please see our website www.AutomationDirect.com for complete engineering drawings. Dimensions are approximate. Not for construction purposes.

Modular Fuse Blocks for Class J Fuses

Description

For use with Edison JHL, JDL, Class J fuses

Specifications

Materials:

Base – thermoplastic
Box lug terminals – tin-plated aluminum

SCCR: 200kA

Flammability rating:

Blocks – UL 94V0, self-extinguishing

Covers – UL 94HB, self-extinguishing

Operating and storage temp range:

Blocks – -40° to 120°C [-40° to 248°F]

Covers – indicating -20° to 90°C [-4° to 194°F]
non-indicating -40° to 120°C [-40° to 248°F]

Wire:
Cu/Al – 75°/90°C [167°/194°F](100-200 A)
Cu/Al – 75°C [167°F] only (400-600 A)*

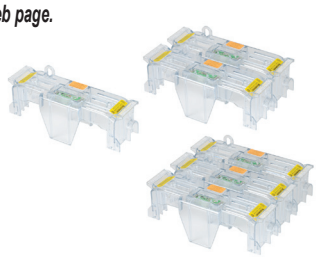
Note: Higher temperature rated wire can be used with appropriate derating.
* 400A Class J double box lug rated for 75°/90°C Cu/Al.

Agency Approvals

- Blocks - UL - Listed cULus E14853 – IZLT & IZLT7
- CSA - Certified 47235 – 6225-01
- Covers - UL - Listed UL E58836 – JDVS
- CE, RoHS, Reach compliant

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

Class J Fuse Blocks



Class J Fuse Block Covers

JM Series Modular Fuse Blocks

Part Number (1 pc/pkg)	Volts	Amps	Poles	Wire Range		Torque	Wt.	Covers**		
				solid and stranded***	fine stranded (Cu)	lb·in [N·m]	lb [kg]	w/o Indication	w/ Indication	Pcs/ Pkg
JM60100-1CR-1	600	100	1	–	3-1 AWG	55 [6.2]	0.32 [0.14]	CVR-J-60100-M-1	CVRI-J-60100-M-1	1
JM60100-1CR-2			2	3-1/0 AWG; (2) Cu 6-4 AWG	6-4 AWG	50 [5.6]	0.64 [0.28]	CVR-J-60100-M-2	CVRI-J-60100-M-2	2
JM60100-1CR-3			3	6-4 AWG; (2) Cu 8AWG	8AWG	45 [5.1]	0.96 [0.42]	CVR-J-60100-M-3	CVRI-J-60100-M-3	3
JM60200-1CR-1	600	200	1	8AWG ; (2) Cu 14-10 AWG	–	40 [4.5]	0.82 [0.37]	CVR-J-60200-M-1	CVRI-J-60200-M-1	1
JM60200-1CR-2			2	Cu 14-10 AWG; Al 12-10 AWG	–	35 [4.0]	1.64 [0.74]	CVR-J-60200-M-2	CVRI-J-60200-M-2	2
JM60200-1CR-3			3	1AWG - 250MCM	1-3/0 AWG	375 [42]	2.46 [1.11]	CVR-J-60200-M-3	CVRI-J-60200-M-3	3
JM60400-1CR-1	600	400	1	6-2 AWG; (2) Cu 6-2 AWG	6-2 AWG	275 [31]	2.16 [0.98]	CVR-J-60400-M-1	CVRI-J-60400-M-1	1
JM60400-1CR-3			3	600MCM	N/A	500 [57]	6.48 [2.94]	CVR-J-60400-M-3	CVRI-J-60400-M-3	3
JM60400-1MW22-1*	600	400	1	500MCM		450 [51]	2.58 [1.17]	CVR-J-60400-M-1	CVRI-J-60400-M-1	1
JM60400-1MW22-3*			3	(2) Cu 4-3/0 AWG	NA	500 [57]	7.74 [3.51]	CVR-J-60400-M-3	CVRI-J-60400-M-3	3
JM60600-1CR-1*	600	600	1	(2) Al 4-3/0 AWG		300 [34]	3.92 [1.78]	CVR-J-60600-1	CVRI-J-60600-1	1
JM60600-1CR-3*			3	(2) 1AWG - 350MCM	N/A	375 [42]	11.76 [5.34]	CVR-J-60600-3	CVRI-J-60600-3	3
				(2) 6-2 AWG		275 [51]				
				(2) 4AWG - 500MCM		450 [51]				

** Modular double box lug fuse block*
*** Covers sold separately. Blown fuse indication requires 90V minimum and closed circuit to operate.*
**** Ratings are for copper and aluminum wire except where otherwise noted.*

Double Box Lug Configurations

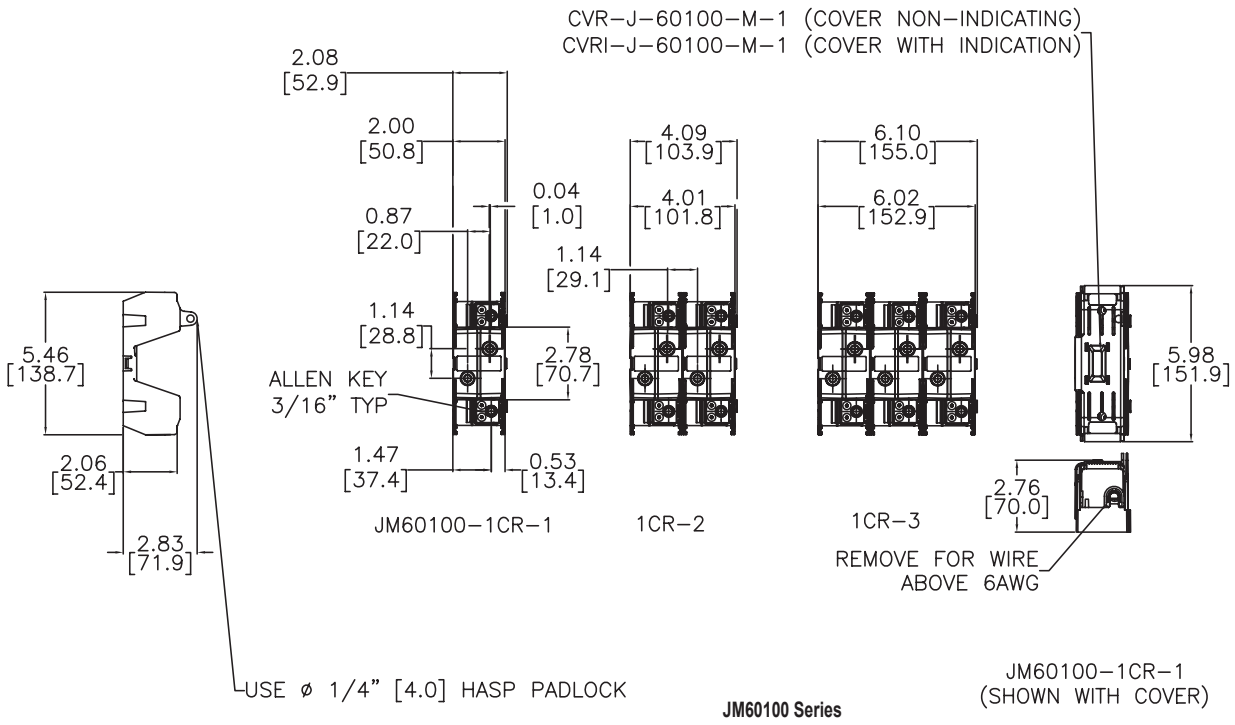
- Allows for ease of installation with smaller, more flexible wire
- Capable of achieving maximum current rating with parallel copper or aluminum wires
- Standard on all 600A blocks
- Optional on 400A blocks
- Compatible with IP20 finger-safe covers (for 400A double box lug configuration, optional cover provides IP20 finger-safe protection for dual 1AWG - 350MCM wires or one single 6AWG - 350MCM)

JM60400-1MW22

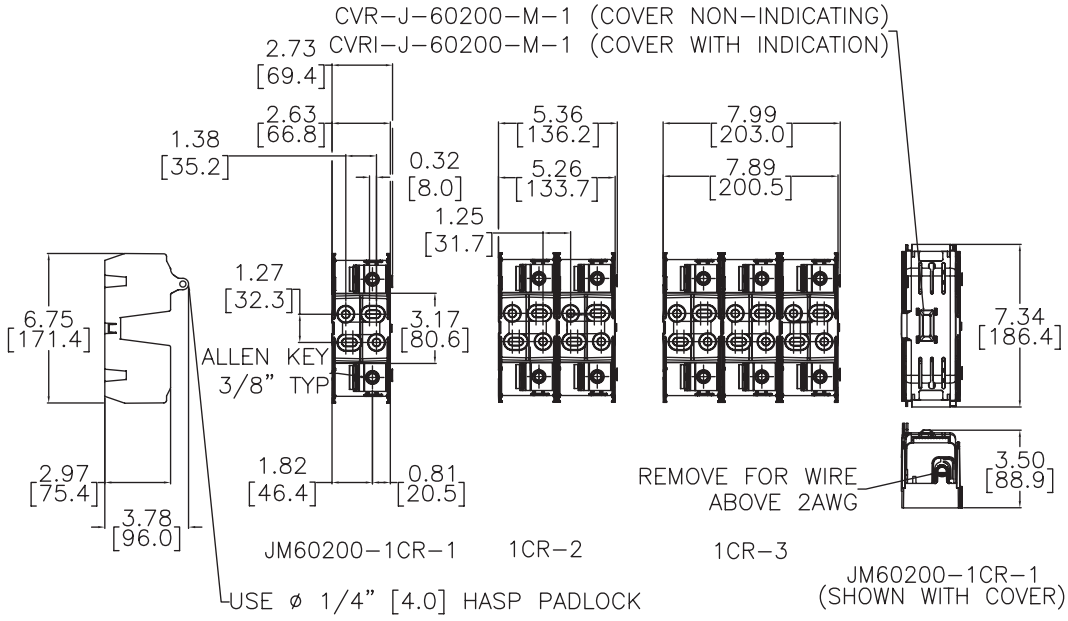
Fuse Blocks for Class J Fuses

Dimensions

in [mm]



JM60100 Series



JM60200 Series

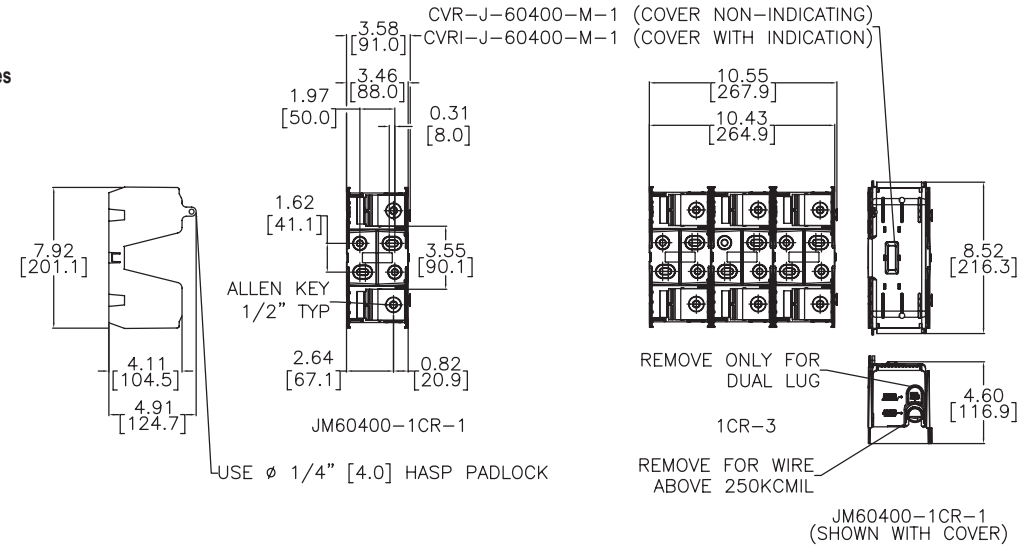
Please see our website www.AutomationDirect.com for complete engineering drawings. Dimensions are approximate. Not for construction purposes.

Fuse Blocks for Class J Fuses

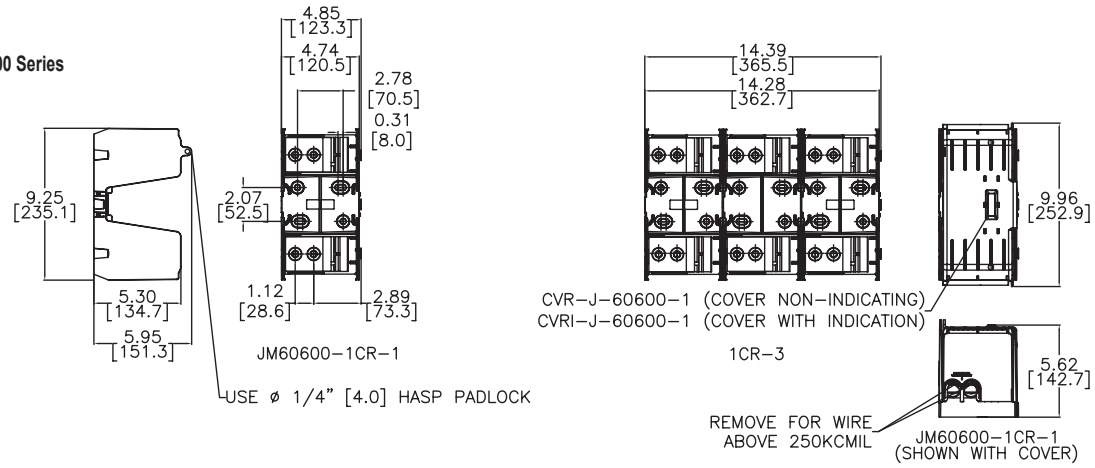
Dimensions

in [mm]

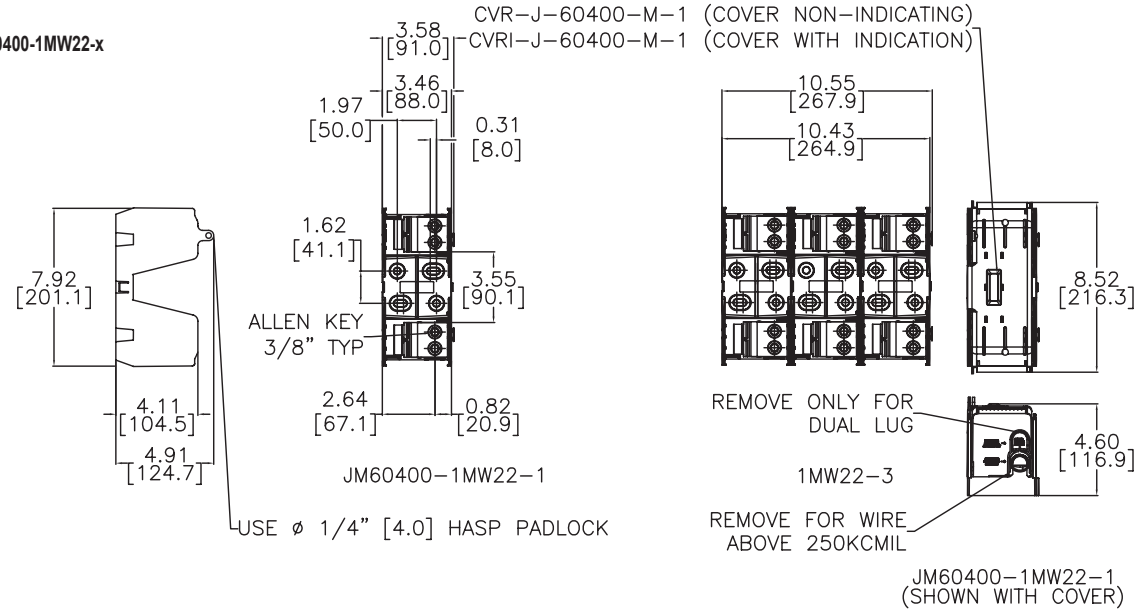
JM60400 Series



JM60600 Series



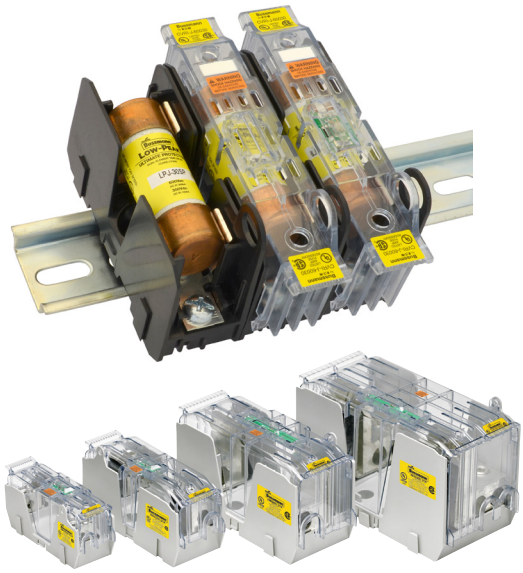
JM60400-1MW22-x



Please see our website www.AutomationDirect.com for complete engineering drawings. Dimensions are approximate. Not for construction purposes.

Class J modular ferrule and knifeblade fuse blocks

RoHS



Catalog symbol:

- JM60_

Description:

Bussmann® series Class J modular fuse blocks increase versatility, reduce labor and enhance safety for any panel or electrical system design. Available for the full Class J fuse amp range.

These fuse blocks feature a standard fuse clip reinforcing spring for enhanced electrical contact between the blcok and fuse. All blocks are available as single-pole versions that snap together for the required number of poles, or as factory configured 2-, and 3-pole versions to meet stocking requirements.

The modular design permits reducing inventory, assembly time and labor with tool-less assembly of multiple poles at point of use.

Ferrule fuse blocks up to 60 amps save panel space with the smallest width dimension on the market and feature DIN-Rail and panel mount versatility so that one product can be used for multiple applications with lower inventory cost.

Knifeblade fuse blocks from 100 to 600 amps feature phase barriers between poles for additional safety with up to four mounting holes per pole increase installation flexibility. All knifeblade blocks meet UL creep and clearance requirements for Industrial Power Circuits (UL 508 and UL 845).

Additionally, the 200 to 600 amp blocks meet the higher UL creep and clearance requirements for Power Distribution Standards (UL 98, UL 67, UL 489, UL 891 and UL 869A)

All blocks have optional IP20 finger-safe high clarity, see-through covers for inspecting wire terminations or thermography measurements without removal. All covers enhance safety by featuring probe holes for easier, safer testing and a lockout/tagout capability. These covers also have optional open fuse indication to speed troubleshooting.

Easy circuit identification is available for 30 and 60 amp blocks and covers with universal marker labels.

Specifications:

Ratings

- Volts 600 V
- Amps up to 600 A
- Withstand 200 kA RMS Sym

Agency information

- Blocks:
  - UL® Listed E14853 — IZLT and IZLT7
  - CSA® Certified 47235-6225-01
  - CE
  - RoHS Compliant
  - REACH declaration available upon request
- Covers:
  - UL Listed E58836 - JDVS
  - CSA Certified 47235-6225-01 (30 and 60A)
  - RoHS Compliant
  - REACH declaration available upon request

Poles

- 1-, 2-, 3-pole units factory assembled
- Single-pole units snap together to create desired number of poles

Flammability ratings

- Blocks: UL 94V0, self-extinguishing
- Covers: UL 94HB, self-extinguishing

Operating and storage temperature range

- Blocks -40°C to +120°C
- Covers;
  - Non-Indicating -40°C to +120°C
  - Indicating -20°C to +90°C*

* Indication requires minimum 90V and closed circuit to illuminate.

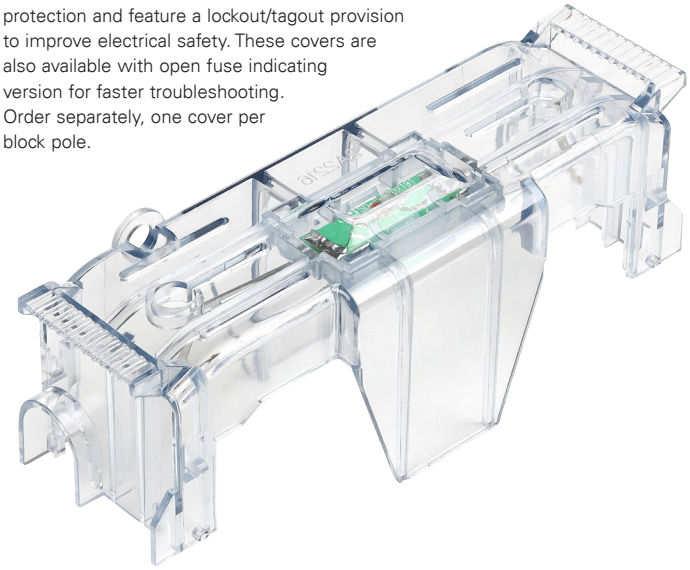
Materials

- Base: Thermoplastic
- Terminals:
  - Tin-plated copper brass (30 and 60A)
  - Tin-plated aluminum (box lug)
- Covers: Thermoplastic

Conductors

- See catalog numbers for details and torque specifications.

Optional see-through covers provide IP20 finger-safe protection and feature a lockout/tagout provision to improve electrical safety. These covers are also available with open fuse indicating version for faster troubleshooting. Order separately, one cover per block pole.



Standard dual lugs on 600A blocks and optional dual lugs on 400A blocks for easier wiring using two, smaller conductors.

Modular Class J ferrule and knifeblade fuse blocks

30 and 60 amp ferrule fuse blocks have DIN-rail and panel mounting capability, the modular designs allows blocks toand snap together for the desired number of poles. They accept optional snap-on covers for IP20 finger-safe protection and feature a lockout/tagout to improve electrical safety.

100 to 600 amp knifeblade fuse blocks are panel mount with multiple holes for installation flexibility and the modular design allows blocks to snap together for the desired number of poles. They accept optional snap-on covers for IP20 finger-safe protection and feature a lockout/tagout provision to improve electrical safety.

On blocks rated from 100 to 600A, the optional covers can be completely removed for servicing or simply hinged open.

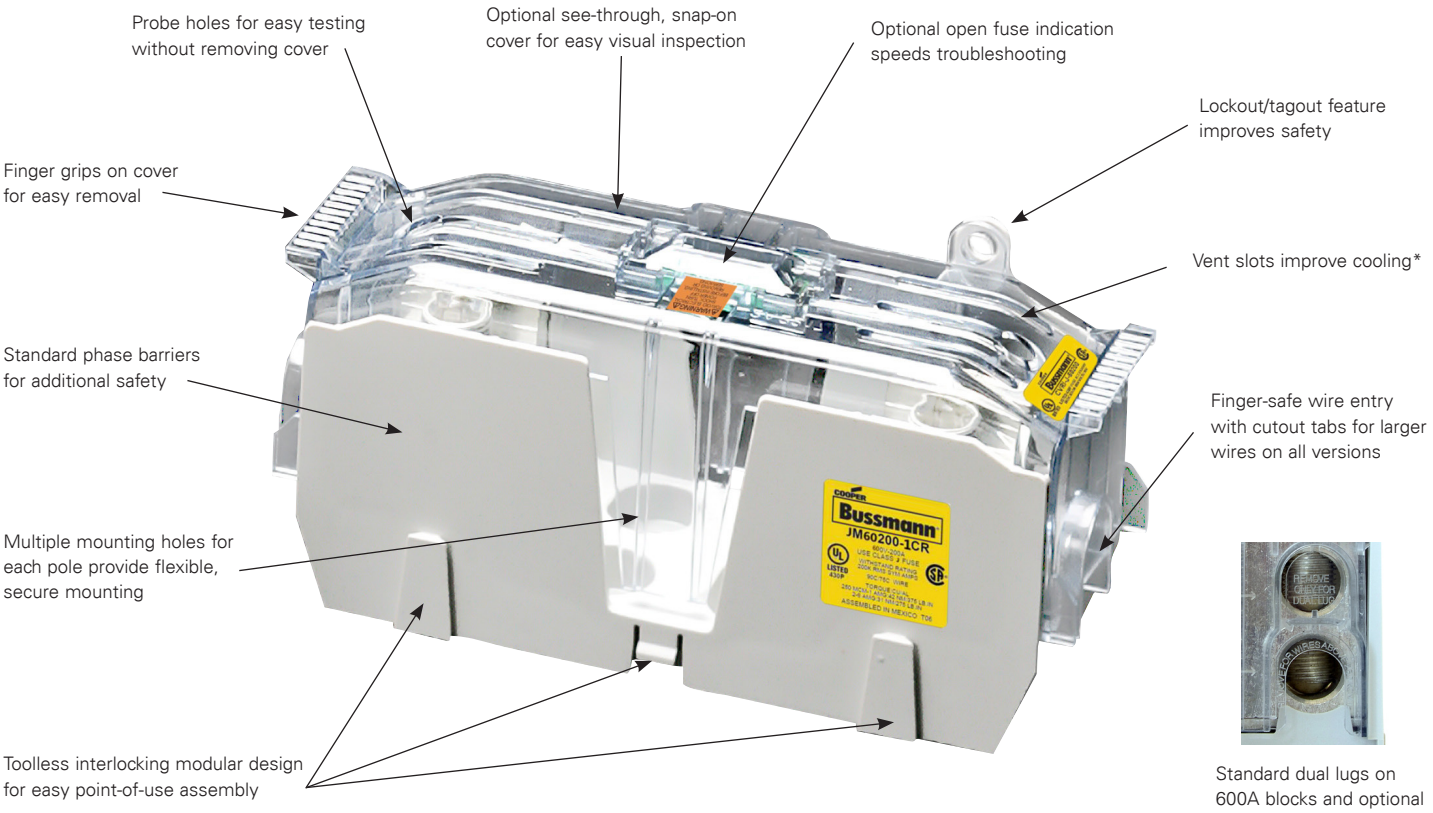
Table 6: Class J 100 to 600 amp knifeblade blocks and covers

Fuse amp range	Poles	Catalog nos.	Covers*		Conductors***		
			Non-indicating	Indicating**	Solid and stranded	Fine stranded	Torque N•m (lb-in)
70-100	1	JM60100-1CR	CVR-J-60100	CVRI-J-60100	—	Cu 1-3 AWG	6.2 (55)
					1/0-3 AWG; (2) Cu 4-6 AWG	Cu 4-6 AWG	5.6 (50)
	2	JM60100-2CR			2 4-6 AWG; (2) Cu 8 AWG	Cu 8 AWG	5.1 (45)
					8 AWG; (2) Cu 10-14 AWG	—	4.5 (40)
	3	JM60100-3CR			Cu 10-14 AWG; Al 10-12 AWG	—	4.0 (35)
110-200	1	JM60200-1CR	CVR-J-60200	CVRI-J-60200	250kcmil-1 AWG	Cu 3/0-1 AWG	42 (375)
	2	JM60200-2CR			2-6 AWG; (2) Cu 2-6 AWG	Cu 2-6 AWG	31 (275)
	3	JM60200-3CR					
225-400	1	JM60400-1CR	CVR-J-60400	CVRI-J-60400	600kcmil	N/A	57 (500)
	2	JM60400-2CR			500kcmil-4 AWG		51 (450)
	3	JM60400-3CR			(2) Cu 3/0 - 4 AWG		57 (500)
	1	JM60400-1MW22					
	2	JM60400-2MW22			(2) Al 3/0 - 4 AWG		34 (300)
	3	JM60400-3MW22					
450-600	1	JM60600-1CR	CVR-J-60600	CVRI-J-60600	2 (2) 500kcmil-4 AWG	N/A	51 (450)
	2	JM60600-2CR					
	3	JM60600-3CR					

* Covers sold separately.
** Open fuse indication requires 90 volts minimum and closed circuit to operate.
*** Ratings for copper and aluminum conductors except where otherwise noted.

Recommended Bussmann series fuses

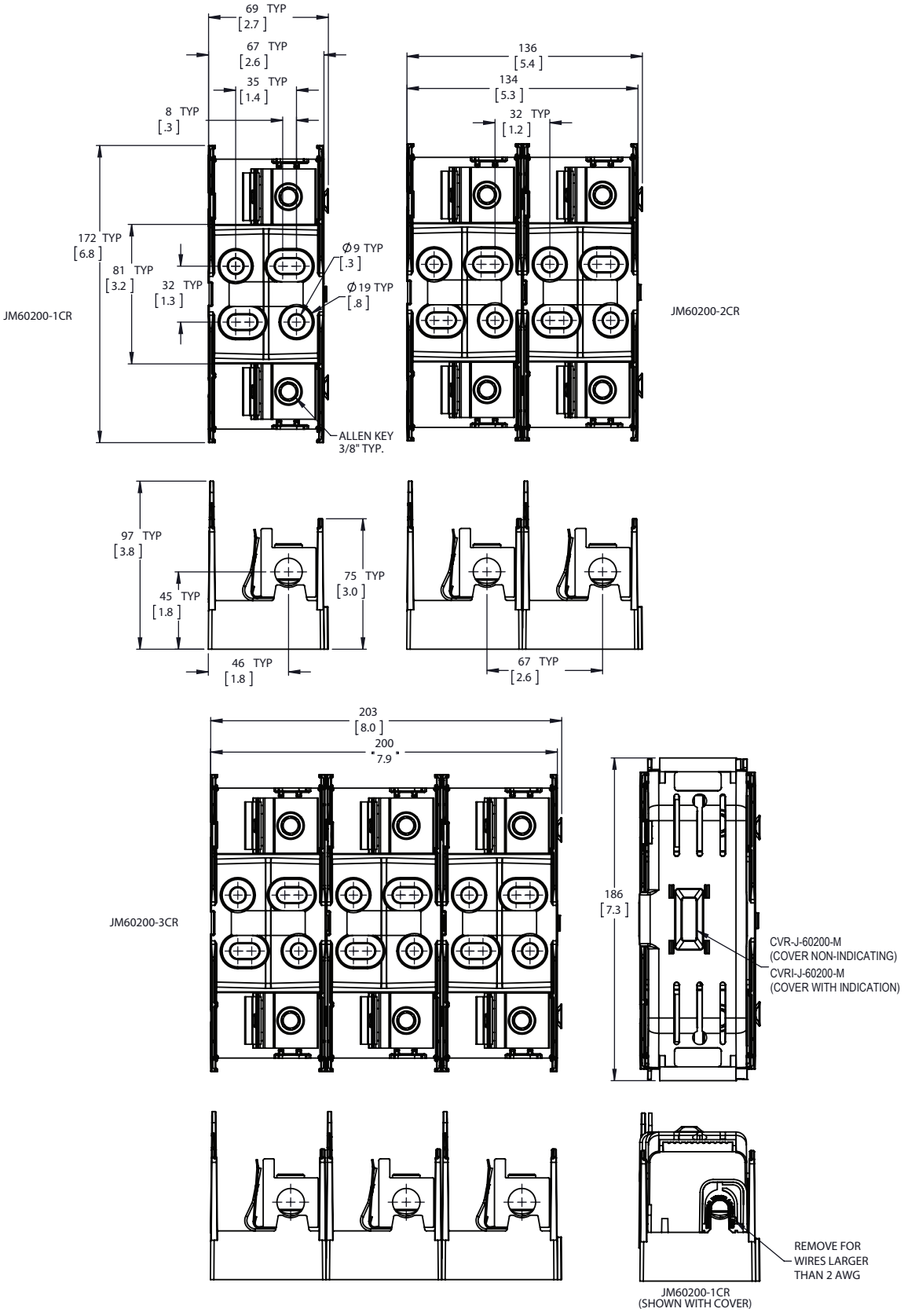
Description	Amps	Data sheet no.
Ultimate protection Low-Peak LPJ time-delay fuses	70 to 600	1007
Advanced protection Limitron JKS fast-acting fuses	70 to 600	1026
High speed DFJ drive fuse	70 to 600	1048



Standard dual lugs on 600A blocks and optional dual lugs on 400A blocks for easier wiring using two, smaller conductors.

*No fuse derating necessary.

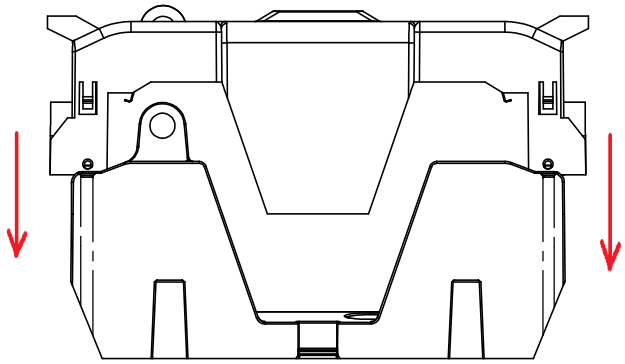
Dimensions; 200A Class J block - in (mm)



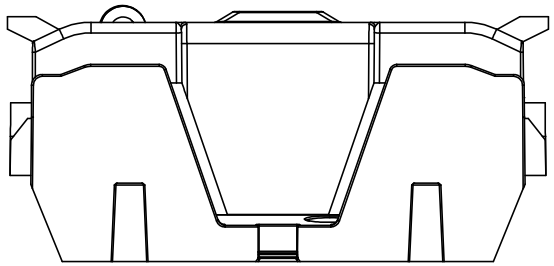
DESIGN UNITS: METRIC (mm) [INCHES] UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

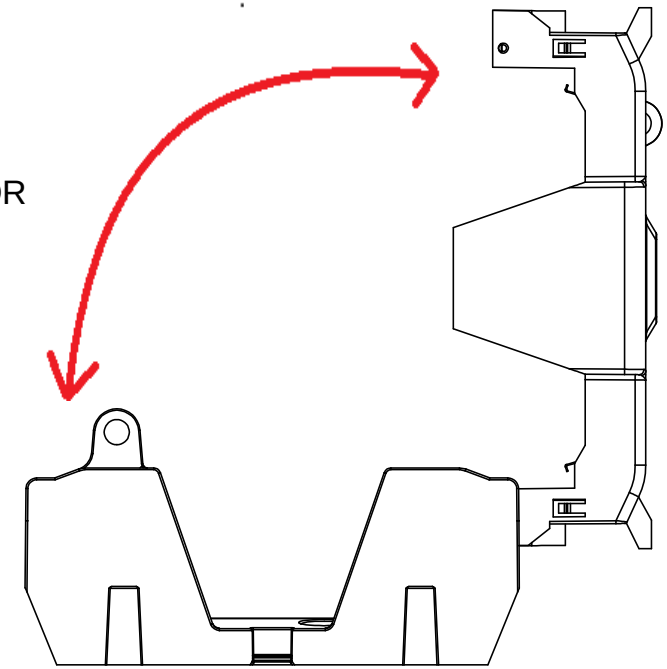
JM60300-3CR

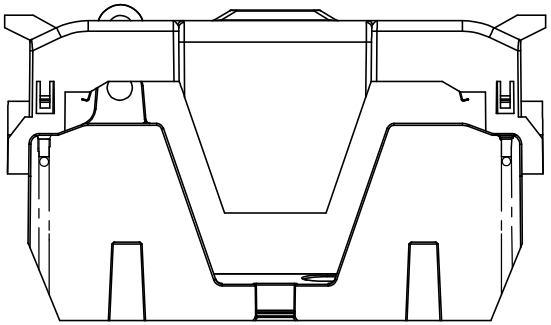


LIFTS DOWN



LIFTS OUT OR ROTATES OVER





LIFTS UP

COOPER Bussmann
St. Louis MO 63178

TITLE:

Class J fuse holder-CUST

SCALE:	SIZE:	SHEET:
1:2	A3	2 OF 14

Drawing template A3 : Rev 05

www.Bussmann.com

FDFJ-200

DFJ Class J high speed fuses

RoHS

Catalog symbol:

- DFJ-_

Description:

The Bussmann™ series DFJ drive fuse is a high speed, current-limiting fuse that provides maximum protection for AC and DC drives and controllers and meet NEC® branch circuit protection requirements. The drive fuse has the lowest I^2t of any branch circuit fuse to protect power semiconductor devices that utilize diodes, GTOs, SCRs and SSRs.

Specifications:

Ratings

- Volts
  - 600Vac (or less)
  - 450Vdc (or less, 15-600A)
- Amps 1-600A
- IR
  - 200kA RMS Sym.
  - 100kA DC

Agency information

- UL® Listed Standard 248-8, Class J, Guide JDDZ, File E4273
- CSA® Certified, C22.2 No. 248.8, Class 1422-02, File 53787
- RoHS compliant
- CE

Features:

- Easily coordinated with existing and new variable speed drives and electric controllers.
- Standard Class J dimensions allow using readily available fuse blocks, holders and switches.
- Has the lowest let-through energy of any branch circuit overcurrent protective device.

Typical applications

- Protection of AC and DC drives
- Equipment using power semiconductor devices

Catalog numbers (amps):

DFJ-1	DFJ-15	DFJ-60	DFJ-200
DFJ-2	DFJ-17.5	DFJ-70	DFJ-225
DFJ-3	DFJ-20	DFJ-80	DFJ-250
DFJ-4	DFJ-25	DFJ-90	DFJ-300
DFJ-5	DFJ-30	DFJ-100	DFJ-350
DFJ-6	DFJ-35	DFJ-110	DFJ-400
DFJ-8	DFJ-40	DFJ-125	DFJ-450
DFJ-10	DFJ-45	DFJ-150	DFJ-500
DFJ-12	DFJ-50	DFJ-175	DFJ-600

Carton quantity:

Amp rating	Carton qty.
1–60	10
70–200	5
225–600	1

Powering Business Worldwide

FNQ-R-5

LIMITRON™ FNQ-R Class CC 600Vac, 1/4-30A, time-delay fuses

RoHS

Catalog numbers (amps)			
FNQ-R-1/4	FNQ-R-1-3/10	FNQ-R-3-2/10	FNQ-R-8
FNQ-R-3/10	FNQ-R-1-4/10	FNQ-R-3-1/2	FNQ-R-9
FNQ-R-4/10	FNQ-R-1-1/2	FNQ-R-4	FNQ-R-10
FNQ-R-1/2	FNQ-R-1-6/10	FNQ-R-4-1/2	FNQ-R-12
FNQ-R-6/10	FNQ-R-1-8/10	FNQ-R-5	FNQ-R-15
FNQ-R-3/4	FNQ-R-2	FNQ-R-5-6/10	FNQ-R-17-1/2
FNQ-R-8/10	FNQ-R-2-1/4	FNQ-R-6	FNQ-R-20
FNQ-R-1	FNQ-R-2-1/2	FNQ-R-6-1/4	FNQ-R-25
FNQ-R-1-1/8	FNQ-R-2-8/10	FNQ-R-7	FNQ-R-30
FNQ-R-1-1/4	FNQ-R-3	FNQ-R-7-1/2	

Catalog symbol:

- FNQ-R-(amp)

Description:

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

Specifications:

Ratings

- Volts
  - 600Vac
  - 300Vdc (15 & 20A)
- Amps 1/4-30A
- IR
  - 200kA Vac RMS Sym.
  - 20kA Vdc (15 & 20A)

Agency information

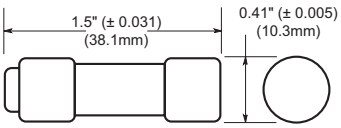
- UL® Listed, Std. 248-4, Class CC, Guide JDDZ, File E4273
- CSA® Certified, Class CC CSA, Class 1422-01, File 53787–HRC-MISC
- CE
- RoHS compliant*

* FNQ-R-1/4 not RoHS complaint.

Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in:



Features:

- Provides 10X better current limitation to help prevent equipment damage caused by short-circuit events.
- 200kA 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.
- Rejection type fuse fits both standard and rejection-style holders.
- The Class CC FNQ-R Limitron fuse meets the needs of control circuit transformer protection.
- 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.
- Ideal for critical industrial or commercial applications that have specific current limitation requirements.

Applications:

- Branch circuits
- Line protection
- Small control transformers
- Industrial control

Powering Business Worldwide

Modular Fuse Holder Specifications and Selection Guide

Features and Benefits

RoHS

- High SCCR rated, UL Listed Class CC holder with indicator option for 600Vac/dc and 48Vdc.
- UL Recognized midget and 10 x 38 holders with factory assembled neutral pole option.
- Agency ratings up to 1000Vdc for use with solar PV fuses.
- Available remote PLC indication with the CH-PLC module.
- Rated for use with 75ºC or 90ºC wire, fine stranded wire, spade terminals and comb-bus bars. Use any higher temperature rated wire with appropriate derating.
- Complete range of UL Listed and high SCCR rated 1-phase and 3-phase finger-safe comb-bus bars and power feed lugs.

Specifications

Agency Information: UL File E14853
Guide IZLT Listed, IZLT2 Recognized
CSA: File 47235, CHPV and CHM - Class 6225-30, CHCC - Class 6225-01

Ratings:
600V/30A (UL)
690V/32A (IEC)

Wire Range:
#18 to #4 (0.8mm^2 to 21.1mm^2)

Torque Ratings:
30 Lb-In (3.4 N•m) maximum

Flammability Ratings:
UL 94V0, self-extinguishing

Storage & Operating Temperature Range:
-20ºC to +90ºC (indicating)
-20ºC to +120ºC (non-indicating)

Series & Size	Catalog Number		Voltage & Current	Agency Markings	Number of Poles	Terminal Rating	SCCR Rating	Cooper Bussmann Fuses
	With Indicator	Without Indicator						
CHM 10x38 and Midget	CHM1DIU	CHM1DU	UL 600V/30A; IEC 690V/32A	UR; IEC 60269-2; CSA; CCC	1	Solid, Stranded, Fine Stranded, Spade Lug, Comb Bus Bar; Single and Dual Wire; 75ºC and 90ºC Cu wire	200kA rms sym	FNQ, KLM, FNM, KTK, BAF, FWA, DCM, C10 SERIES, AGU, BAN, FWC
	CHM2DIU	CHM2DU			2			
	CHM3DIU	CHM3DU			3			
	CHM4DIU	CHM4DU			4			
	CHM1DNIU	CHM1DNU		IEC 60269-2	1 pole + 1 neutral			
	CHM3DNIU	CHM3DNU			3 poles + 1 neutral			
	CHM1DI-48U		UL 48Vdc/30A; IEC 48Vdc/32A	UR; IEC 60269-2; CSA; CCC	1			
		CHM1DNXU	IEC 690V/32A	IEC60269-2	1 neutral		n/a	n/a
CHPV	CHPV1IU	CHPV1U	UL & IEC; 1000Vdc/30A	UL; CSA; UL4248-18; IEC60269-1; CCC	1		33kA	Solar PV series
	CHPV2IU	CHPV2U			2			
CHCC Class CC	CHCC1DIU	CHCC1DU	UL 600V/30A	UL; CSA; CCC	1		200kA rms sym	LP-CC, FNQ-R, KTK-R
	CHCC2DIU	CHCC2DU			2			
	CHCC3DIU	CHCC3DU			3			
		CHCC1DI-48U	UL 48Vdc/30A		1			

TA-250

NE Controls, L.L.C.
Syracuse, NY 13209 Telephone 315-299-5161

Product Profile

Mechanical Lugs

ILSCO

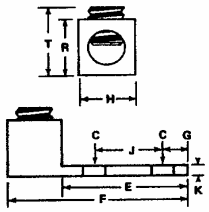
Aluminum Mechanical Lugs

TYPE
TA

Features
- Manufactured from high strength 6061-T6 aluminum alloy.
- Electro-tin plated
- Chamferred wire entry
- Meets UL 486B 90° C requirements and is CSA certified.

Benefits
- Suitable for use with either copper or aluminum conductors.
- Provides low contact resistance
- Provides ease of installation
- Ensures reliability for copper or aluminum conductors.

Rated for 600 Volts



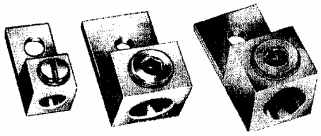


Fig. 1 Fig. 2 Fig. 3

Fig. 4

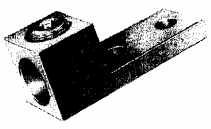


Fig. 5

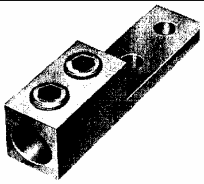


Fig. 6

Catalog Number	Figure Number	Conductor Range Al. or Cu.	Bolt Size	Dimensions									Hex Size	Temperature Rating
				C	E	F	G	H	J	K	R	T		
TA-6S	1	4-14	1/4	17/64	11/16	1-1/16	1/4	1/2	–	3/32	1/2	41/64	S	90° C
TA-2	1	2-14	1/4	17/64	11/16	1-5/32	5/16	1/2	–	7/64	9/16	3/4	S	90° C
TA-0	1	1/0-14	1/4	17/64	27/32	1-15/32	7/16	5/8	–	3/16	25/32	29/32	S	90° C
TA-2/0	2	2/0-14	1/4	17/64	27/32	1-15/32	7/16	5/8	–	3/16	25/32	1-1/32	3/16	90° C
TA-250	2	250MCM-6	5/16	21/64	1	2	15/32	1	–	1/4	1-1/8	1-21/64	5/16	90° C
TA-300	2	300MCM-6	1/4	9/32	1	2	1/2	55/64	–	1/4	1-1/8	1-11/32	5/16	90° C
TA-350	2	350MCM-6	3/8	13/32	1-1/8	2-1/4	1/2	1-1/8	–	1/4	1-1/4	1-29/64	3/8	90° C
TA-500	2	500MCM-4	3/8	13/32	1-19/32	2-13/16	7/8	1-1/2	–	5/16	1-13/16	1-13/16	3/8	90° C
TA-500S	3	One 600MCM-4 Two 250MCM-1/0	3/8	13/32	1-1/2	2-13/16	5/8	1-3/8	–	5/16	1-13/16	2-3/16	1/2	90° C
TA-600	2	600MCM-2	3/8	13/32	1-13/16	3-3/16	7/8	1-1/2	–	7/16	1-9/16	1-31/32	1/2	90° C
TA-800	2	800MCM-300MCM	5/8	21/32	1-3/4	3-3/8	7/8	1-3/4	–	1/2	1-15/16	2-15/64	1/2	90° C
TA-800S	4	800MCM-3/0 CU 800-250MCM AL	5/8	21/32	1-3/4	3-1/4	11/16	1-5/16	–	1/2	1-13/16	2-3/16	1/2	90° C
TA-1000	2	1000MCM-350MCM	5/8	21/32	1-3/4	3-3/8	7/8	1-3/4	–	1/2	1-15/16	2-25/64	9/16	90° C
TA-1000S	4	1000-500MCM	5/8	21/32	1-3/4	3-1/4	11/16	1-7/16	–	1/2	1-13/16	2-3/16	9/16	90° C
TA-350-2NS	5	350MCM-6	1/2	9/16	3	4-5/16	5/8	1-1/8	1-3/4	5/16	1-3/8	1-29/64	3/8	90° C
TA-600-2NS	5	600MCM-2	1/2	9/16	3-5/16	4-11/16	5/8	1-1/2	1-3/4	7/16	1-3/8	1-59/64	1/2	90° C
TA-800-2NS	5	800MCM-300MCM	1/2	9/16	3-1/8	4-3/4	5/8	1-3/4	1-3/4	1/2	1-15/16	2-3/16	1/2	90° C
TA-1000-2NS	5	1000MCM-500MCM	1/2	9/16	3-1/8	4-3/4	5/8	1-3/4	1-3/4	1/2	1-15/16	2-27/64	9/16	90° C
TA-350-2N	6	350MCM-6	1/2	9/16	3-1/4	5-1/2	5/8	1-1/4	1-3/4	3/8	1-1/2	1-21/32	(2)3/8	90° C
TA-600-2N	6	600MCM-2	1/2	9/16	3-1/4	5-1/2	5/8	1-3/8	1-3/4	3/8	1-1/2	1-31/32	(2)3/8	90° C
TA-800-2N	6	800MCM-300MCM	1/2	9/16	3-7/16	6-3/16	5/8	1-3/4	1-3/4	9/16	1-7/8	2-15/64	(2)1/2	90° C
TA-1000-2N	6	1000MCM-500MCM	1/2	9/16	3-7/16	6-3/16	5/8	1-5/8	1-3/4	9/16	1-15/16	2-25/64	(2)1/2	90° C

DE-OX Inhibitor is recommended for all aluminum terminations

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SAGINAW CONTROL & ENGINEERING
Your Enclosure Source ®

SCE-HF1251A

Product Specifications:

Part Number: SCE-HF1251A
Description: Heater W/Thermostat
Height: 5.41"
Width: 4.38"
Depth: 4.56"
Price Code: P1
List Price: $388.67
Catalog Page: 402
Est. Ship Weight: 4.00 lbs
Model No.: KH 801
Volt: 120 VAC

Construction
- Brushed Aluminum housing.
- Thermostat Range 0° to 100°F (-18° to 38°C).
- Heat discharge at the top of the heater.
- Panel mount.
- Air volume of 16 CFM on 125 & 200 Watt Heaters, 26 CFM on 400 & 800 Watt Heaters.
- Heat Indicator Light.
- Switch for Auto tuning on and off with the heating thermostat or set to - Fan - to run continuous & independent of the heating thermostat.
- Temperature differential hysteresis 5.4°F
- UL Recognized Component.

Application
Designed to protect electrical controls, instruments and sensitive components from low temperatures and the effects of condensation and corrosion by maintaining a stable temperature within the electrical enclosure. These heaters are not intended for use in hazardous, wet, dusty or dirty locations.

Finish
Brushed Aluminum

Industry Standards - (IS24)
- UL Component Recognized

Notes
UL File #E358386

Similar Part Numbers
SCE-HF1252AHeater W/ Thermostat (230 Volt)
SCE-HF2001AHeater W/ Thermostat
SCE-HF2002AHeater W/ Thermostat (230 Volt)
SCE-HF4001BHeater W/ Thermostat
SCE-HF4002BHeater W/ Thermostat (230 Volt)
SCE-HF8001BHeater W/ Thermostat
SCE-HF8002BHeater W/ Thermostat (230 Volt)

Installation Information
- Fan/Heater with Thermostat

STP480Y07M

SURGE PROTECTIVE DEVICE

SURGE-TRAP® PLUGGABLE

DIN-RAIL PLUGGABLE SPD FOR ANSI/UL 1449 TYPE 1 AND 2 APPLICATIONS

Surge-Trap® Pluggable Surge Protective Device (SPD) is a no-fuse, fail-safe surge suppressor featuring Mersen's patented TPMOV® technology inside. UL 1449 4th Edition approved, it is DIN-rail mountable featuring a fail-safe self-protected design, visual indicator, and a small footprint. A remote indicator option provides status to critical control circuitry. The Surge-Trap Pluggable SPD has a high short circuit rating and a thermally protected MOV, which eliminates the need for additional overcurrent protection devices.

NEW AND IMPROVED 75KA RATING

Mersen's DIN-Rail Pluggable SPD is one of a kind – the combination of a robust 75kA surge capacity along with no requirement of backup fusing creates an offering unique to the market. Add this to the reliability and safety of Mersen's patented TPMOV technology and you have a truly superior product.

RATINGS:

- **Volts (U_n):** 120-690VAC
- **Nominal Discharge Current Rating (I_n):** 10-20kA
- **Surge Capacity:** 75kA
- **Short-Circuit Current Rating (SCCR):** 200kA

FEATURES/BENEFITS:

- Easy installation or retrofit
- DIN-rail mountable
- Fail-safe, self-protected design
- Remote indicator
- Visual indicator
- IP20 finger-safe design
- Small footprint
- No additional overcurrent protection devices required
- Easy to replace modules
- 2-year warranty

APPROVALS:

- ANSI/UL 1449 4th Edition, Type 1 Component Assembly SPD, File E210793
- ANSI/IEEE C62.41.1, C62.41.2, C62.45
- RoHS Compliant

GENERAL PRODUCT SPECIFICATIONS

Mounting:	35mm DIN-Rail	Operating & Storage Temperature:	– 40°C to + 85°C
Wire Range:	4-14AWG Solid / Stranded CU	Visual End of Life Indicator:	RED = End of Life
Terminal Torque:	35.4 lbs-in	Remote End of Life Indicator:	NO/NC Dry Contact
Degree of Protection:	IP 20	Frequency:	50-60 Hz
Flammability:	UL94 V0		

1-POLE, SINGLE-PHASE, 2-WIRE

CATALOG NUMBER	NOMINAL VOLTAGE (VAC)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV, VAC)				VOLTAGE PROTECTION RATING (VPR, VAC)				REPLACEMENT PLUG	I_n (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L	L-1	
STP120P07(M)	120	175	-	-	-	600	-	-	-	SP07U175	20
STP230P07(M)	240	275	-	-	-	600	-	-	-	SP07U275	20
STP277P07(M)	277	320	-	-	-	600	-	-	-	SP07U320	20
STP347P07(M)	347	420	-	-	-	800	-	-	-	SP07U420	10

2-POLE, SPLIT-PHASE, 3-WIRE

CATALOG NUMBER	NOMINAL VOLTAGE (VAC)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV, VAC)				VOLTAGE PROTECTION RATING (VPR, VAC)				REPLACEMENT PLUG	I_n (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L	L1, L2	
STP240S07(M)	120/240	175	-	-	350	600	-	-	1800	SP07U175	20
STP480S07(M)	240/480	275	-	-	550	600	-	-	1200	SP07U275	20

3-POLE, 3-PHASE DELTA, 4-WIRE

CATALOG NUMBER	NOMINAL VOLTAGE (VAC)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV, VAC)				VOLTAGE PROTECTION RATING (VPR, VAC)				REPLACEMENT PLUG	I_n (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L	L1, L2, L3	
STP240D07(M)	240	-	275	-	550	-	900	-	1800	SP07U275	20
STP480D07(M)	480	-	550	-	1100	-	1500	-	3000	SP07U550	10

3-POLE, 3-PHASE WYE, 4-WIRE

CATALOG NUMBER	NOMINAL VOLTAGE (VAC)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV, VAC)				VOLTAGE PROTECTION RATING (VPR, VAC)				REPLACEMENT PLUG	I_n (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L	L1, L2, L3	
STP208Y07(M)	120/208	175	-	-	350	600	-	-	1200	SP07U175	20
STP480Y07(M)	277/480	320	-	-	640	1500	-	-	2500	SP07U320	20
STP600Y07(M)	347/600	420	-	-	840	1500	-	-	2500	SP07U420	10
STP690Y07(M)	400/690	420	-	-	840	1500	-	-	2500	SP07U420	10

4-POLE, 3-PHASE WYE, 5-WIRE, INCLUDING N-G MODE

CATALOG NUMBER	NOMINAL VOLTAGE (VAC)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV, VAC)				VOLTAGE PROTECTION RATING (VPR, VAC)				REPLACEMENT PLUG		I_n (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L	L1, L2, L3	N-G	
STP208YN07(M)	120/208	175	175	175	350	600	1200	600	1200	SP07U175	SP07U175	20
STP480YN07(M)	277/480	320	495	175	640	1000	1500	600	2000	SP07U320	SP07U175	20
STP600YN07(M)	347/600	420	695	275	840	1500	2000	800	2500	SP07U420	SP07U275	10
STP690YN07(M)	400/690	420	740	320	840	1500	2000	800	2500	SP07U420	SP07U320	10

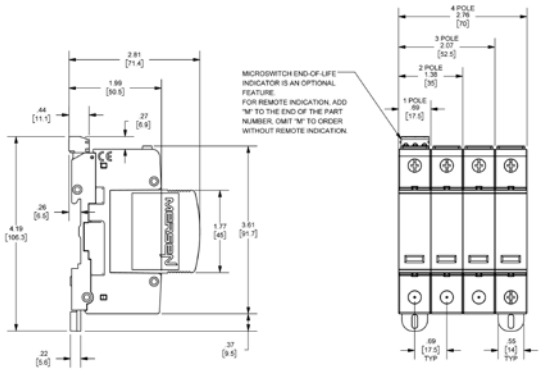
4-POLE, 3-PHASE DELTA HIGH-LEG, 5-WIRE, INCLUDING N-G MODE

CATALOG NUMBER	NOMINAL VOLTAGE (VAC)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV, VAC)				VOLTAGE PROTECTION RATING (VPR, VAC)				REPLACEMENT PLUG			I_n (kA)
		L-L/L-G	L-N/N-G	H-L/H-G	H-N	L-L/L-G	L-N/ N-G	H-L/H-G	H-N	L1, L3	L2	N-G	
STP240HN07(M)	120/240	350	175	450	275	1200	600	1500	800	SP07U175	SP07U275	SP07U175	20
STP480HN07(M)	240/480	550/450	275/175	825/725	550	1500	800/600	2500/2000	1500	SP07U275	SP07U550	SP07U175	10

STP480Y07M

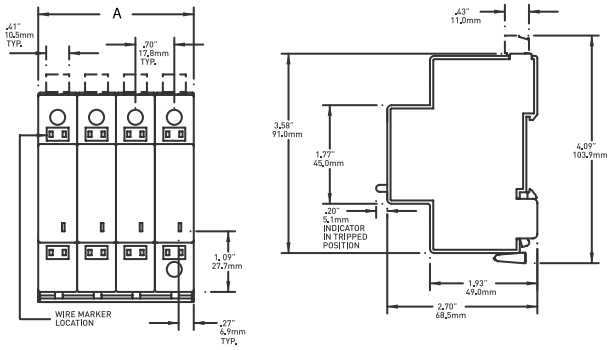
DIMENSIONS - STP SERIES

POLES	A	
	IN	MM
1 Pole	0.69	17.5
2 Pole	1.38	35
3 Pole	2.07	52.5
4 Pole	2.76	70



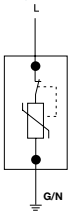
DIMENSIONS - ST SERIES

POLES	A	
	IN	MM
1 Pole	0.7	17.8
2 Pole	1.39	35.5
3 Pole	2.1	53.3
4 Pole	2.8	71

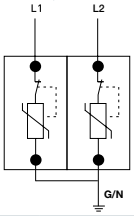


WIRING DIAGRAMS

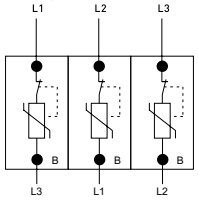
1-POLE, SINGLE-PHASE, 2-WIRE



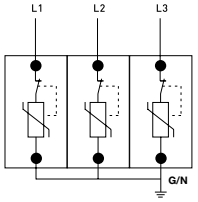
2-POLE, SPLIT-PHASE, 3-WIRE



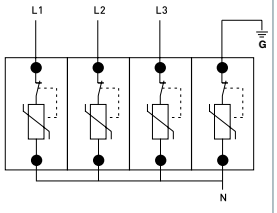
3-POLE, 3-PHASE DELTA, 3-WIRE



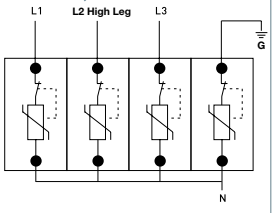
3-POLE, 3-PHASE DELTA, 3-PHASE WYE, 4-WIRE



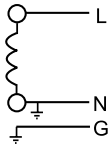
4-POLE, 3-PHASE WYE, 5-WIRE



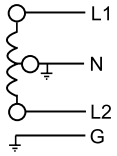
4-POLE, 3-PHASE DELTA HIGH-LEG, 5-WIRE



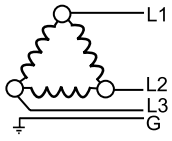
SINGLE PHASE
2 WIRE + GROUND



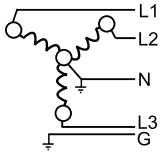
SPLIT PHASE
3 WIRE + GROUND



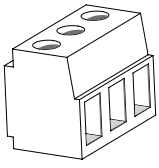
3 PHASE DELTA
3 WIRE + GROUND

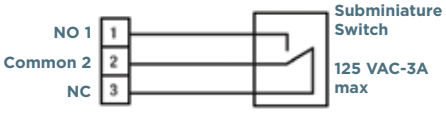


3 PHASE WYE
4 WIRE + GROUND



REMOTE STATUS INDICATOR





Signal Wire Range	#16 to #30 AWG
Terminal Torque	2.2 lb-in
Cont. between Comm + NO	Product Offline, Not Protected
Cont. between Comm + NC	Product Online, Protected

ST AND STP SERIES: FOR REMOTE INDICATION, ADD "M" TO THE END OF THE CATALOG NUMBER. FOR EXAMPLE, ST4803PYGM.

T50B2
B20017

Counting Instruments

Technical Data 211

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.

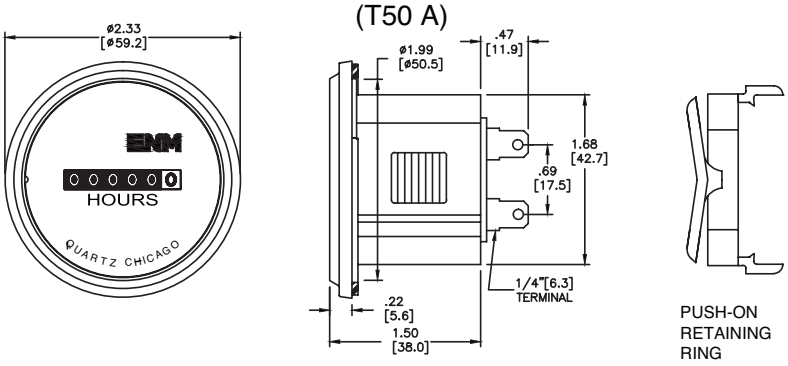
Specifications

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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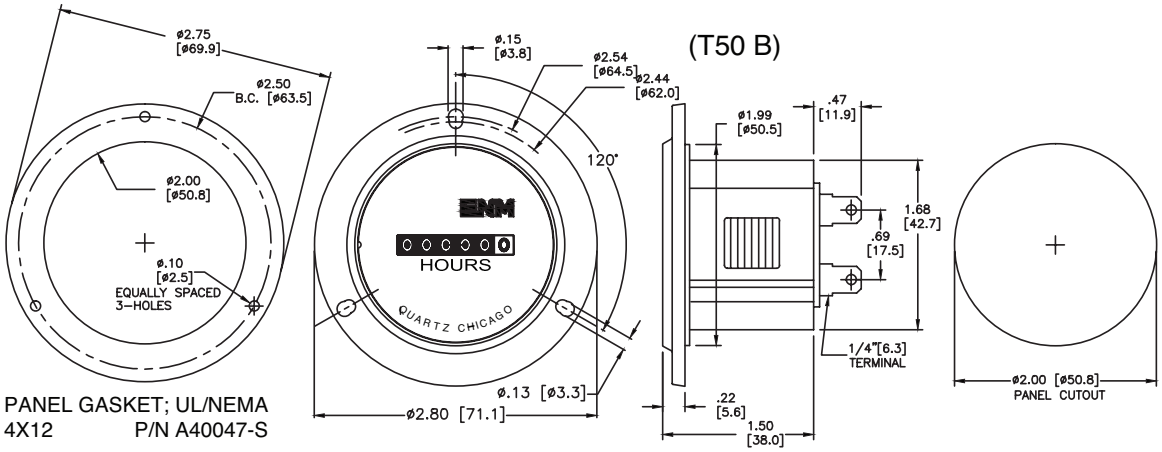
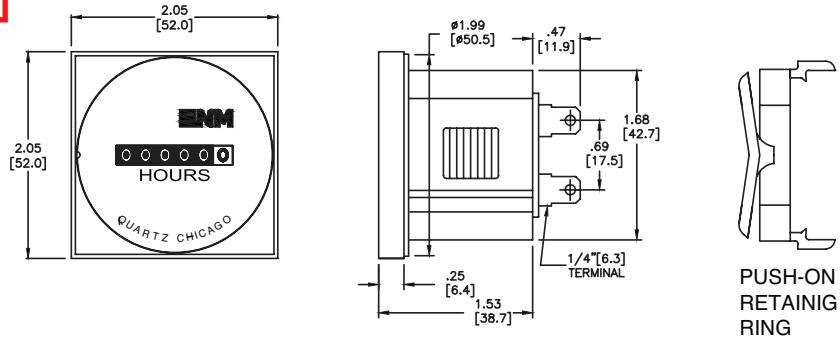


PANEL GASKET; UL/NEMA 4X12 P/N A40047-S

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

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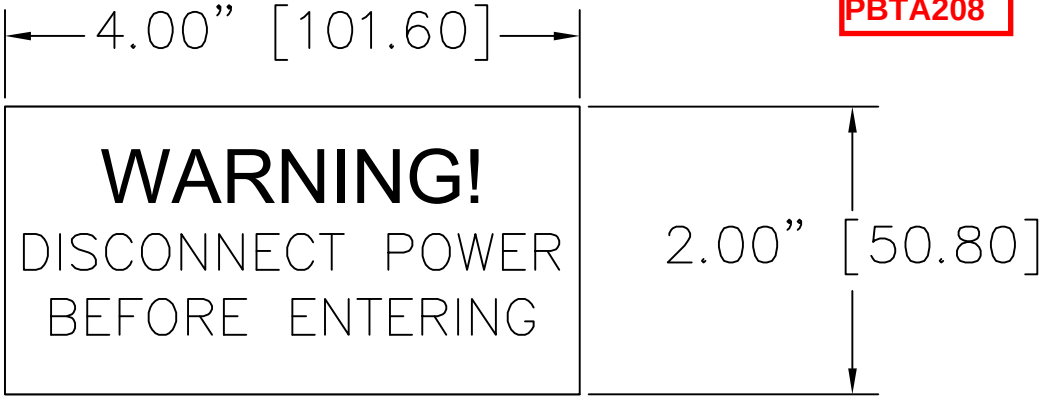
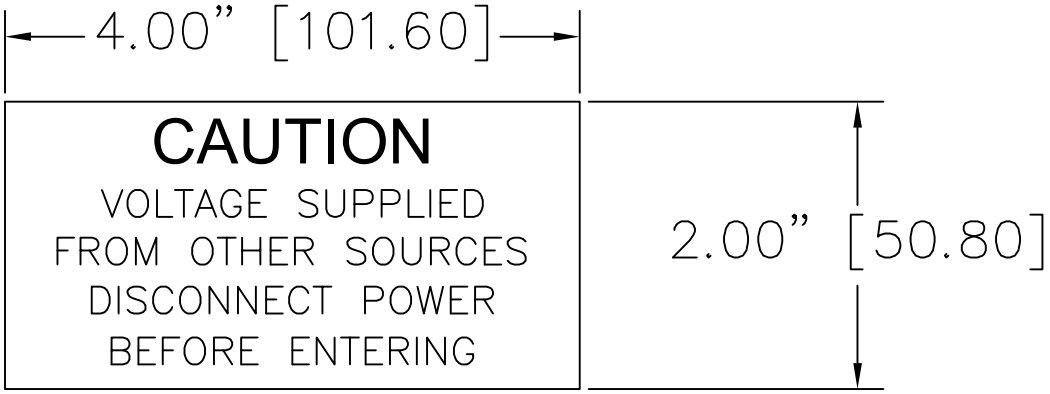
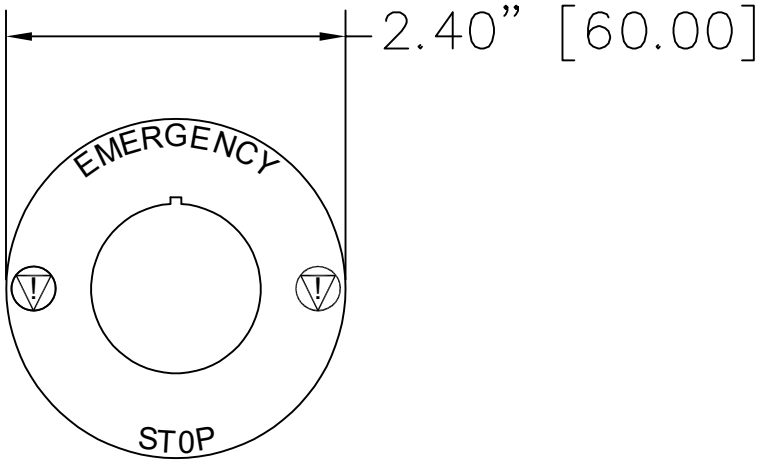


2X4 RED LAMINATE
0.32/0.24 IN WHITE LETTERS
BLACK ADHESIVE



2X4 YELLOW LAMINATE
0.32/0.19 IN BLACK LETTERS
BLACK ADHESIVE



YELLOW LAMINATE
0.20 IN BLACK LETTERS

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SAFETY DATA SHEET

SDS No: 0054

Section 1. Product and Company Identification

Product Name: LaserMax ® Reverse Light Blockers

Trade Name: Film-stamped Impact Modified Acrylic

Recommended Use: Signage, Other

Restrictions on Use: None

Manufacture: Rowmark
5409 Hamlet Drive
Findlay, OH 45840

In Case of Emergency: Call: Medical:911
Call: Poison Control: 800-589-3897
Email:

Information: Call: 1-877-ROWMARK
Email: techhelp@rowmark.com

Section 2. Hazard Identification

GHS Classification: Not Classified

GHS Label Elements: Not Applicable

GHS Rating

Health	5
Flammability	4
Instability	5
Special	

NEW GHS Hazard Categories
Category 1 = Severe Hazard
Category 2 = Serious Hazard
Category 3 = Moderate Hazard
Category 4 = Slight Hazard
Category 5 = Minimal Hazard

Other Hazards: Not Applicable

Section 3. Composition / Information on Ingredients

Name	CAS #	% by Weight	OHSA
P (EA/MMA)	Proprietary	50-54	N
Acrylic Styrene Copolymer	Proprietary	35-50	N
Methyl methacrylate	80-62-6	< 0.5	Y
Ethyl acrylate	140-88-5	< 0.1	Y
Aluminium Flake	7429-90-5	1-5	
Carbon Black	1333-86-4	1-5	
Copper	7440-50-8	1-2	

The substance(s) marked with a "Y" in the OSHA column are idenfitied as hazardous chemicals according to the criteria of the OSHA Hazardous Communication Standard (29 CFR 1910.1200).

While this material is not classified as hazardous under Federal OSHA regulations, this SDS contains valuable information critical to the safe handling and proper use of this product. This SDS should be retained and available for employees and other users of this product.

The components of this product are all on the TSCA Inventory list.

* Remaining components are proprietary, non-hazardous, and/or present at amounts below reportable limits.

Section 4. First Aid Measures

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Inhalation:	Dust and process vapors may be irritation to the nose, throat and respiratory tract. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get Medical attention.
Eyes:	Dust, fines and process vapors may irritate the eyes. Immediately flush eyes with water for at least 15 minutes. Get medical attention.
Skin:	Exposure to molten plastic may cause thermal burns. If molten material comes in contact with the skin, cool under ice water or a running stream.
Ingestion:	No adverse health effects expected from ingestion.

Section 5. Fire-Fighting Measures

Suitable Extinguishing Methods:	Dry Chemical, Water Spray, Foam Carbon Dioxide. Avoid using direct streams of water on molten burning material.
Unsuitable Extinguishing Methods:	NONE known.
Hazards During Fire-fighting:	Carbon monoxide, carbon dioxide, original monomer other hydrocarbon oxidation products.
Protective Equipment:	Wear self-contained breathing apparatus and protective suit.

Section 6. Accidental Release Measures

Personal Precautions:	See Section 8 - Exposure Controls / Personal Protection.
Environmental Precautions:	No Special environmental precautions required.

Methods and Materials for Containment and Cleaning Up

Spill / Leak:	Containment of this material should not be necessary. Sweep up or gather material and place in appropriate container for disposal.

Section 7. Handling and Storage

Handling:	Keep away from heat, flame and strong oxidizing agents.
Storage:	Keep away from heat, sparks, and flame. Store in cool place in original container and protect form sunlight.

Section 8. Exposure Control and Personal Protection

Exposure Limits:

1) Effects of Acute Exposure:	Inhalation of vapors may result in irritation of upper respiratory tract	
2) Effects of Chronic Over Exposure:		
3) OSHA Permissible Exposure Limits:	US. ACGIF Threshold Limit Values	
	Form:	Inhalable particles
	Time weighted average	10 mg/m3
	Form:	Respirable particles
	Time weighted average	3 mg/m3
	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)	
	Form:	Respirable fraction
	PEL:	5 mg/m3
	Form:	Total dust
	PEL:	15 mg/m3
	US. OSHA Table Z-3 (29 CFR 1910.1000)	
	Form:	Respirable fraction
	Time weighted average	15 ppm
	Form:	Total dust
	Time weighted average	50 ppm
	Form:	Respirable fraction
	Time weighted average	5 mg/m3
	Form:	Total dust
	Time weighted average	15 mg/m3

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4) Carcinogen Potential:

Engineering Controls:

Use recommended safe handling practices to minimize unnecessary exposure.

General room ventilation is adequate for storage and ordinary handling.

Use local exhaust at points of fume generation or if dusty conditions prevail.

Personal Protective Equipment:

Wear safety glasses with side shields or chemical goggles to prevent eye contact.

Have eye-washing facilities readily available where eye contact can occur.

Wear impervious gloves and protective clothing to prevent skin contact.

Section 9. Physical and Chemical Properties

Appearance:	Various Colors	Vapor Pressure:	Not Applicable
Odor:	Slightly acrylic	Vapor Density:	Not Applicable
pH:	Not applicable	Relative Density:	1.19 g/cm3
Melting Point / Freezing Point:	No data available	Solubility (ies):	Not Applicable
Boiling Point:	No data available	Partition Coefficient ($_{N\text{-}Octanol/Water}$):	No data available
Flash Point:	Not applicable	Auto-Ignition Temperature:	739°F (393°C)
Evaporation Rate:	Not applicable	Decomposition Temperature:	>572°F (> 300°C)
Flammability (solid, gas):	See GHS in section 2	Viscosity:	No data available
Upper Explosive Limit:	Not applicable	Specific Gravity:	1.19 Water = 1 (liquid)
Lower Explosive Limit:	Not applicable	Percent Volatile:	0%

Section 10. Stability Reactivity

Reactivity:	No data available
Chemical Stability:	Stable
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur
Conditions to Avoid:	Avoid flames, welding arcs, potential ignition sources, or other high temperature sources, prolonged contact with acids, alkalis and strong oxidizing agents
Incompatible Materials:	None under normal conditions of use
Hazardous Decomposition Products:	Carbon oxides, Acrylates, Methacrylates, Hazardous organic compounds
Combustion Products:	No data available

Section 11. Toxicological Information

Irritation Effects

Eye Irritation:	Solid particles may cause transient irritation from mechanical abrasion.
Skin Irritation:	Not expected to cause skin irritation. Molten material may cause thermal burns.
Inhalation:	Not a likely route of exposure. Process fumes may cause irritation.
Ingestion:	May cause a choking hazard if swallowed.

Data for PLEXIGLAS® DR®-101 ACRYLIC RESIN

Acute Toxicity

Dermal:	Acute toxicity estimate > 5,000 mg/kg
Inhalation:	4 h Acute toxicity estimate > 10 mg/L

Data for Acrylic copolymers (Proprietary)

Other Information

The information presented is from representative materials in this chemical class. The results may vary depending on the test substance.

Effects due to processing releases or residual monomer: Possible cross sensitization with other acrylates and methacrylates.

Data for Acrylic styrene copolymers (proprietary)

Other Information

The information presented is from a representative material with a similar structure. The results vary depending on the size and composition of the test substance.

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Effects due to processing releases or residual monomer: Possible cross sensitization with other acrylates and methacrylates.

Additional Toxicological Information

When used and handled according to specifications, the product does not have any harmful effects according to research and information provided by suppliers.

Carcinogenic Effect

International Agency for Research on Cancer (IARC) : Group3 NOT classifiable as to its carcinogenicity to humans.

Section 12. Ecological Information

Eco-toxicity:	Toxicity to fish - No relevant studies identified.
Persistence and Degradability:	This material is not expected to be readily biodegradable.
Bio-accumulate Potential:	Product is not likely to accumulate in biological organisms.
Mobility in Soil:	This Product has not been found to migrate through soils.
Other Adverse Effects:	This Substance is not in Annex I of Regulation (EC) 2037/2000 on substances that deplete the ozone layer.

Section 13. Disposal Considerations

Disposal Methods

Product Recommendation:

1. Recycle (Reprocess) if product has not been contaminated so as to make it unsuitable for its intended use.
2. Disposal through controlled incineration or authorized waste dump in accordance with Local, State or Federal Regulations.

Uncleaned Packaging Recommendation:

1. Disposal must be done in accordance with Local, State, or Federal Regulation.

Section 14. Transportation Information

UN Number:	Not Relevant
UN Proper Shipping Name:	Not Relevant
Transportation Hazard Class(es)	
DOT:	Not Regulated/classified
ADR / RID:	Not Regulated/classified
IMDG:	Not Regulated/classified
ICAO/IATA	Not Regulated/classified
Packing Group:	Not Applicable
Environmental Hazards:	Not Relevant
Transportation in Bulk (According to Annex II of MARPOL 73/78 and IBC Code):	Not Relevant
Special Precautions for User:	No special precautions

Section 15. Regulatory Information

(Not meant to be all-inclusive -- selected regulations represented)

Hazard categories under criteria of SARA Title III Rules (40 CFR Part 370)

Immediate (Acute) Health	N	Delayed (Chronic) Health	N
Sudden Release of Pressure	N	Reactive	N
Fire	N		

The components of this product are all on the TSCA inventory list.

INGREDIENT RELATED REGULATORY INFORMATION:

	SARA REPORTABLE QUANTITIES	CERCLA RQ	SARA TPQ
	Ethyl acrylate	1000 LBS	N/A
	Methyl methacrylate	1000 LBS	N/A

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	P (EA/MMA)	N/A	N/A

SARA TITLE III, SECTION 313

This product does contain chemical(s), which are defined as toxic chemicals under and subject to the reporting requirements of, Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. See section 2.

Chemical Name	CAS-No.	De minimis concentration	Reportable Threshold:
Ethyl acrylate	Not assigned	Not assigned	Not assigned
Methy methacrylate	Not assigned	Not assigned	Not assigned
Aluminium	Not assigned	Not assigned	Not assigned
Copper	Not assigned	Not assigned	Not assigned
2-Propenoic acid, ethyl ester	140-88-5	0.10%	10000 lbs (otherwise used (non-manufacturing/processing)) 25000 lbs (manufacturing and processing)

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-Reportable Quantity (RQ)

Chemical Name	CAS-No.	Reportable quantity
2-Propenoic acid, 2-methyl-, methyl ester	80-62-6	1000 lbs
2-Propenoic acid, ethyl ester	140-88-5	1000 lbs

Chemical Inventory Status

EU. EINECS	EINECS	Conforms to
United States TSCA Inventory	TSCA	The components of this product are all on the TSCA Inventory
Canadian Domestic Substnaces List (DSL)	DSL	All components of this product are on the Canadian DSL.
China. Inventory of Existing Chemical Substances in China (IECSC)	IECSC (CN)	Does not conform
Japan. ENCS - Existing and New Chemical Substances Inventory	ENCS (JP)	Does not conform
Japan. ISHL-Inventory of Chemical Substances	ISHL (JP)	Does not conform
Korea. Korean Existing Chemicals Inventory	KECI (KR)	Conforms to
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	PICCS (PH)	Conforms to
Australia Inventory of Chemical Substances	AICS	Conforms to

State Right-to-Know Information

The following chemicals are specifically listed by individual states; other product specific data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Section 16. Other Information

No Additional Information

NOTICE: The information presented in this Safety Data Sheet is based on data considered to be accurate as of the date this Safety Data Sheet was prepared. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In additional, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

Revision Date: January 4, 2019

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OSHA HazCom: This Material is not Hazardous b OSHA Hazardous Communication Standard 29 CFR 1910.1200

SARA 313:

Immediate Hazard: NO	**Fire Hazard**: NO	**Reactivity Hazard**: NO
Delayed Hazard: NO	**Pressure Hazard**: NO	

Section 16. Other Information

No Additional Information

NOTICE: The information presented in this Safety Data Sheet is based on data considered to be accurate as of the date this Safety Data Sheet was prepared. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In additional, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

Revision Date: March 7, 2017

Specifications★

Electrical Ratings		
Contact ratings		Refer to the contact ratings tables on page 10-4.
Dielectric strength		2200V for one minute, 1300V for one minute (Logic Reed)
Mechanical Ratings		
Vibration		10…2000 Hz, 1.52 mm displacement (peak-to-peak) max./ 10 G max. (except Logic Reed)
Shock		1/2 cycle sine wave for 11 ms ≥ 25 g (contact fragility) and no damage at 100 g
Degree of protection		Type 1/4/12/13 (800T); Type 1/4/4X/12/13 (800H); EN/IEC 60529 IP66/65
Mechanical design life cycles		
Push buttons	(Momentary, non-illuminated, flush and extended head)	10,000,000 min.
	(Momentary, illuminated)	250,000 min.
	(Push-pull/twist-to-release)	250,000 min. ‡
Selector switches	(Non-illuminated)	1,000,000 min.
	(Illuminated, key-operated)	200,000 min.
Potentiometers		25,000 min.
All other devices		200,000 min.
Contact operation		Shallow, mini, and low-voltage contact blocks: Slow, double make and break Logic Reed and sealed switch contact blocks: Single break magnetic
Wire gauge/Terminal screw torque		#18…14 AWG (#18…10 Max Duty) / 6…8 lb•in
Typical operating forces Operators without contact blocks		Flush, extended button, standard mushroom, jumbo plastic mushroom: 2 lbs max. Jumbo and extended aluminum mushroom head: 3.95 lbs max. Maintained selector switch: 3.6 in•lb max.
Spring return selector switches		3.6 in•lb to stop, 0.2 in•lb to return
Illuminated push buttons and push-to-test pilot lights		5 lb max.
2-position push-pull		8.0 lb max. push or pull
3-position push-pull		8 lb max. push to in position or pull to center position (15 lb max. pull to out position)
Twist-to-release or push-pull		9 lbs max. push or pull 30 in•oz max. twist, 6 in•oz minimum return
Potentiometer		Rotational torque 3…12 in•oz; stopping torque 12 in•lb (minimum)
Contact blocks	Standard	1 lb
	Logic Reed	1 lb max.
	Sealed switch	3 lb max. at 0.205 in. plunger travel
	Stackable sealed switch	1 lb max.
	MaxDuty	1.4 lb max.
	PenTUFF	1.4 lb max.
	Self Monitoring	1.6 lb
Environment		
Temperature range	Operating	-40…+131 °F (-40…+55 °C)
	Storage	-40…+185 °F (-40…+85 °C)
Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for use in lower temperature applications.		
Humidity		50…95% RH from 77…140 °F (25…60 °C) per Procedure IV of MIL-STD-810C, Method 507.1 cycling test

★ **Performance Data** — Performance data given in this publication is provided only as a guide for the user in determining suitability and do not constitute a performance warranty of any kind. Such data may represent the results of accelerated testing at elevated stress levels, and the user is responsible for correlating the data to actual application requirements. ALL WARRANTIES AS TO ACTUAL PERFORMANCE, WHETHER EXPRESS OR IMPLIED, ARE EXPRESSLY DISCLAIMED.

‡ Illuminated Trigger Action E-stops are rated for 150,000 min. mechanical operations when using Cat. No. 800TC-XD4S Self-Monitoring Contact Blocks (SMCBs).

Standard Contact Ratings

Minimum: 24V, 24 mA

Maximum thermal continuous current I^{th} 10 A AC/2.5 A DC. Bulletin 800T units with 800T-XA contacts have ratings as follows:

Max. Opertnl. Volts U_e	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts U_e	Make	Break
AC 600	AC-15	A600	120…600 72…120 24…72	7200VA 60 A 60 A	720VA 720VA 10 A
DC 600	DC-13	Q600	28…600 24…28★	69VA 2.5 A	

★ For applications below 17V/5 mA, Pen*TUFF* or Logic Reed contacts are recommended.

Electrical design life cycles: 1,000,000 (at max. rated load)

Explosion-Protected Contact Ratings

Max. Opertnl. Volts U_e	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts U_e	Make	Break
AC 600	AC-15	A600	120…600 72…120 24…72	7200VA 60 A 60 A	720VA 720VA 10 A
DC 600	DC-13	Q600	28…600 24…28	69VA 2.5 A	

Maximum thermal continuous current Ith = 10 A
Minimum low energy switching load: 17V DC, 5 mA
Electrical design life cycles: 1,000,000 (24V DC, 25 mA)
Vibration: 5 g, 0.7 mm peak-to-peak displacement, sine sweep 10…2000 Hz / IEC 60068-2-6
Shock: 15 g (800H-TFRX_ trigger action E-stops), 50 g (all other devices) / IEC 60068-2-27

Sealed Switch Contact Ratings

Minimum: 5V, 1 mA

Maximum continuous current I_{th} 5 A. Bulletin 800T units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts U_e	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts U_e	Make	Break
AC 600	AC-15	B600	120…600 0…120	3600VA 30 A	360VA 3 A
DC 300	DC-13	P300	24…300 0…24	138VA 5.0 A	

Stackable Sealed Switch Contact Ratings

Minimum: 5V, 10 mA (digital); 24V, 1 mA (analog)

Maximum continuous current I_{th} 2.5 A. Bulletin 800T units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts U_e	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts U_e	Make	Break
AC 300	AC-15	C300	120…300 0…120	1800VA 15 A	180VA 1.5 A
DC 150	DC-13	Q150	24…150 0…24	69VA 2.5 A	

Logic Reed Contact Ratings

Minimum — DC: 5V, 1 mA
Maximum — DC: 30V, 0.06 A, AC: 150V, 0.15 A
Should only be used with resistive loads.
Electrical design life cycles: 200,000 (at max. rated load)

Pen*TUFF*™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA
Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC. Bulletin 800T units with 800T-XAV contacts have ratings as follows:

Max. Opertnl. Volts U_e	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts U_e	Make	Break
AC 300	AC-15	C300	120…300 0…120	1800VA 15 A	180VA 1.5 A
DC 150	DC-13	R150	24…150 0…24	28VA 1.0 A	

Snap Action Contact Ratings

Max. Opertnl. Volts U_e	Contact Rating Designation	Rated Operational Currents		
		Volts U_e	Make	Break
AC 300	A300	120…300 24…72	7200VA 60 A	720VA 10 A
DC 250	—	230…250 115…125	0.2 A 0.4 A	

MaxDuty Contact Rating

Maximum thermal continuous current I_{th} 24 A.
Pilot Duty — 120V AC, 12 A; 24V DC, 10 A
Motor Ratings — 120V AC, 1.5 Hp; 240V AC, 3 Hp; 24V DC, 10 A FLA/60 A LRA

Time Delay Contacts

Max. Opertnl. Volts U_e	Contact Rating Designation	Rated Operational Currents		
		Volts U_e	Make	Break
AC 120	B150	120	3600VA	360VA

Note: This device is not rated for DC applications.

Adjustment range: 0.5…15 s ± 25% I_{th} = 5 A

Materials Used in 800H Type 4X Operators

Thermoplastic Polyester (Fiberglass Reinforced)

- Bushings
- Mounting Rings
- Sockets

Transparent Amorphous Nylon

- Pilot light lens cap
- Illuminated button caps

Mineral Filled Nylon

- Trim washer

Thermoplastic Polyester

- Non-illuminated button caps

Glass Filled Crystalline Nylon

- Thrust washer

Nitrile (Synthetic Rubber)

- Gaskets and internal seals

Standards Compliance

UL 508

CCC

Certifications

UL Listed
(File No. E14840, E10314
Guide No. NKCR, NOIV, NISD)

CSA Certified
(File No. LR1234, LR11924)

CSA C22.2, No. 14

CE Marked (EN/IEC 60947-5-1, EN/IEC 60947-5-5, EN ISO 13850)

800H-TFRXT6D2

2-Position Red Trigger Action Twist-to-Release, Non-Illuminated

- Tamper resistant – front-of-panel mounting and non-removable operator head
- Compliant with global E-stop standards, including EN ISO 13850 and EN 60947-5-5

Cat. No. 800T-TFXJET6

Cat. No. 800T-TFXLET6

Cat. No. 800T-TFXK6

Cat. No. 800H-TFRXT6

800	T		– TFX	T	6	D2
	a	*b*	*c*	*d*		*e*

a

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

b

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

c

800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
TFX	Standard (45 mm) mushroom head	TFRX
TFXJ	Jumbo (60 mm) mushroom head	TFRXJ
TFXJE	Jumbo (60 mm) mushroom head with "E-STOP"	TFRXJE
TFXK	45 mm mushroom head key release	—
TFXL	63 mm anodized aluminum head	—
TFXLE	63 mm anodized aluminum head with "E-STOP"	—

d

Release Function	
Code	Color
Blank	Key release♠
T	Twist release

e

Contact Block(s)			
Code	Operator Position		Description
	Out	In	
Blank	—	—	No contacts on operator
Standard			
D2	X	O	1 N.C.
A	O X	X O	1 N.O. - 1 N.C.
A4	X X	O O	2 N.C.
Pen*TUFF* (Low Voltage)			
D2V	X	O	1 N.C.
AV	O X	X O	1 N.O. - 1 N.C.

Note: X = Closed/O = Open
♠ Configurable only with **FXK** head type.

800H-AR2D1

NE Controls, L.L.C.

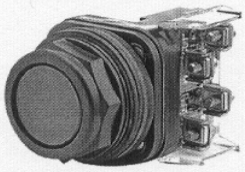
Product Profile

Push Buttons
Momentary
800H

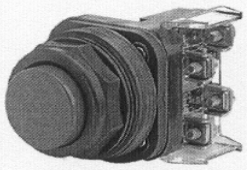
Allen-Bradley

Momentary Contact Push Button Units, Non-Illuminated
30.5mm Push Buttons
Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight

Booted Unit
Cat. No. 800H-R2A

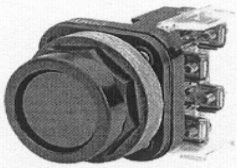


Bootless Flush Head Unit
Cat. No. 800H-AR1A



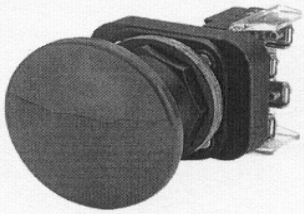
Bootless Extended Head Unit
Cat. No. 800H-BR6A

Contact Type	Button Color	Booted	Bootless Flush Head	Bootless Extended Head
		Cat. No.	Cat. No.	Cat. No.
No Contacts	Green	800H-R1	800H-AR1	800H-BR1
	Black	800H-R2	800H-AR2	800H-BR2
	Red	800H-R6	800H-AR6	800H-BR6
1 N.O.	Green	800H-R1D1	800H-AR1D1	800H-BR1D1
	Black	800H-R2D1	800H-AR2D1	800H-BR2D1
	Red	800H-R6D1	800H-AR6D1	800H-BR6D1
1 N.C.	Green	800H-R1D2	800H-AR1D2	800H-BR1D2
	Black	800H-R2D2	800H-AR2D2	800H-BR2D2
	Red	800H-R6D2	800H-AR6D2	800H-BR6D2
1 N.O. - 1 N.C.	Green	800H-R1A	800H-AR1A	800H-BR1A
	Black	800H-R2A	800H-AR2A	800H-BR2A
	Red	800H-R6A	800H-AR6A	800H-BR6A
2 N.O. - 2 N.C.				
	Green	800H-R1B	800H-AR1B	800H-BR1B
	Black	800H-R2B	800H-AR2B	800H-BR2B
	Red	800H-R6B	800H-AR6B	800H-BR6B



Bootless Guarded Head
Cat. No. 800H-GR1A

Bootless Mushroom Head
Cat. No. 800H-DR6A



Jumbo Mushroom Head
Cat. No. 800H-DR6JA

Contact Type	Button Color	Bootless Guarded Head	Bootless Mushroom Head	Jumbo Mushroom Head
		Cat. No.	Cat. No.	Cat. No.
No contacts	Green	800H-GR1	800H-DR1	800H-DR1J
	Black	800H-GR2	800H-DR2	800H-DR2J
	Red	800H-GR6	800H-DR6	800H-DR6J
1 N.O.	Green	800H-GR1D1	800H-DR1D1	800H-DR1JD1
	Black	800H-GR2D1	800H-DR2D1	800H-DR2JD1
	Red	800H-GR6D1	800H-DR6D1	800H-DR6JD1
1 N.C.	Green	800H-GR1D2	800H-DR1D2	800H-DR1JD2
	Black	800H-GR2D2	800H-DR2D2	800H-DR2JD2
	Red	800H-GR6D2	800H-DR6D2	800H-DR6JD2
1 N.O. - 1 N.C.	Green	800H-GR1A	800H-DR1A	800H-DR1JA
	Black	800H-GR2A	800H-DR2A	800H-DR2JA
	Red	800H-GR6A	800H-DR6A	800H-DR6JA

Technical Data

Allen-Bradley

PanelView Plus 7 Standard Terminals

Catalog Numbers 2711P-T4W21D8S, 2711P-T4W22D8S, 2711P-T4W21D8S-B, 2711P-T4W22D8S-B, 2711P-T6C21D8S, 2711P-T6C22D8S, 2711P-T6C21D8S-B, 2711P-T6C22D8S-B, 2711P-T7C21D8S, 2711P-T7C22D8S, 2711P-T7C21D8S-B, 2711P-T7C22D8S-B, 2711P-T9W21D8S, 2711P-T9W22D8S, 2711P-T9W21D8S-B, 2711P-T9W22D8S-B, 2711P-T10C21D8S, 2711P-T10C22D8S, 2711P-T10C21D8S-B, 2711P-T10C22D8S-B, 2711P-T12W21D8S, 2711P-T12W22D8S, 2711P-T12W21D8S-B, 2711P-T12W22D8S-B, 2711P-T15C21D8S, 2711P-T15C22D8S, 2711P-T15C21D8S-B, 2711P-T15C22D8S-B

Summary of Changes

Topic	Page
In the Technical Specifications table, corrected the measurements (in inches) in the Cutout dimensions line for the 9 in. terminals.	5

The PanelView™ Plus 7 Standard terminals are operator interface devices. They monitor and control devices that are attached to ControlLogix® 5570 and CompactLogix™ 5370 controllers on an EtherNet/IP network. Animated graphic and text displays provide operators a view into the operating state of a machine or process. Operators interact with the control system by using touch screen input.

The PanelView Plus 7 Standard terminals include these features:

- Terminal functionality permits connection to 1 controller, up to 25 screens, and up to 200 alarms.
- FactoryTalk® View Machine Edition software provides a familiar environment for creating HMI applications.
- Windows CE operating system with desktop access for configuration and third-party applications.
- Ethernet communication that supports linear and star network topology.
- PDF viewer to access PDF files that are stored on the terminal.

- More screen options including 4-in., 6-in., 7-in., 9-in., 10-in., 12-in., and 15-in. terminals.
- Widescreen on three sizes, 4-in., 9-in., and 12-in. terminals.
- Greater screen resolution.
- Terminals are available with an Allen-Bradley brand marking, or with no marking for customers who want to put their own brand label on the terminal.
- Certifications including Class I, Div. 2; Class II, Div. 2; Class III; and ATEX and INMETRO Zones 2 and 22.

Environmental Specifications

Table 1 - Environmental Specifications - 2711P-T4W21D8S, 2711P-T4W22D8S, 2711P-T4W21D8S-B, 2711P-T4W22D8S-B, 2711P-T6C21D8S, 2711P-T6C22D8S, 2711P-T6C21D8S-B, 2711P-T6C22D8S-B, 2711P-T7C21D8S, 2711P-T7C22D8S, 2711P-T7C21D8S-B, 2711P-T7C22D8S-B, 2711P-T9W21D8S, 2711P-T9W22D8S, 2711P-T9W21D8S-B, 2711P-T9W22D8S-B, 2711P-T10C21D8S, 2711P-T10C22D8S, 2711P-T10C21D8S-B, 2711P-T10C22D8S-B, 2711P-T12W21D8S, 2711P-T12W22D8S, 2711P-T12W21D8S-B, 2711P-T12W22D8S-B, 2711P-T15C21D8S, 2711P-T15C22D8S, 2711P-T15C21D8S-B, 2711P-T15C22D8S-B[1]

Attribute	Value
Temperature, operating	0…55 °C (32…131 °F)
Temperature, nonoperating	-25…+70 °C (-13…+158 °F)
Relative humidity	5…95% without condensation
Heat dissipation	4 in., 15 W = 51 BTU 6 in., 15 W = 51 BTU 7 in., 15 W = 51 BTU 9 in., 20 W = 68 BTU 10 in., 20 W= 68 BTU 12 in., 30 W= 102 BTU 15 in., 30 W= 102 BTU
Altitude, operating	2000 M
Vibration 4.3-in., 5.7-in., 6.5-in., 9.0-in., 10.4-in., 12.1-in., and 15-in.	 0.012 pk-pk, 10…57 Hz 2g peak at 57…500 Hz
Shock, operating	15 g at 11 ms
Shock, nonoperating	30 g at 11 ms
Enclosure ratings	NEMA and UL Type 12, 13, 4X (indoor use only), also rated IP54 or IP66 as Classified by UL

(1) Catalog numbers with a -B extension denote terminals that do not include the Allen-Bradley brand marking. Customers can put their own brand labels on these terminals.

Certifications

Table 2 Certifications - 2711P-T4W21D8S, 2711P-T4W22D8S, 2711P-T4W21D8S-B, 2711P-T4W22D8S-B, 2711P-T6C21D8S, 2711P-T6C22D8S, 2711P-T6C21D8S-B, 2711P-T6C22D8S-B, 2711P-T7C21D8S, 2711P-T7C22D8S, 2711P-T7C21D8S-B, 2711P-T7C22D8S-B, 2711P-T9W21D8S, 2711P-T9W22D8S, 2711P-T9W21D8S-B, 2711P-T9W22D8S-B, 2711P-T10C21D8S, 2711P-T10C22D8S, 2711P-T10C21D8S-B, 2711P-T10C22D8S-B, 2711P-T12W21D8S, 2711P-T12W22D8S, 2711P-T12W21D8S-B, 2711P-T12W22D8S-B, 2711P-T15C21D8S, 2711P-T15C22D8S, 2711P-T15C21D8S-B, 2711P-T15C22D8S-B(1)

Certification(2)	Value
cULus	cULus Listed Industrial Control Equipment for use in Hazardous Locations (E10314) per standards ANSI / ISA 12.12.01 and CSA C22.2 No. 213. rated: • Class I, Division 2, Groups A, B, C and D • Class II, Division 2, Groups F and G • Class III Enclosure type ratings per UL50 and CSA C22.2 No. 94.2-07. Enclosure ingress protection classified by UL per IEC 60529
ATEX	European Union 94/9/EC ATEX Directive, compliant with: • EN 60079-0:2009; EN 60079-11:2012; EN 60079-15:2010; and EN 60079-31:2009 • II 3 GD • Ex ic nA IIC T4 Gc • Ex tc IIIC T135 °C (275 °F) Dc IP66 • Tamb = 0 °C to +55 °C (32 °F to +131 °F) • DEMKO 14 ATEX 1302X
INMETRO	ABNT NBR IEC 60079-0:2008+Errata 1:2011; ABNT NBR IEC 60079-11:2009; ABNT NBR IEC 60079-15:2012; ABNT NBR IEC 60079-31:2011 Ex ic nA IIC T4 Gc Ex tc IIIC T135 °C (275 °F) Dc IP66 Tamb = 0 °C to +55 °C (32 °F to +131 °F) UL-BR 14.0716X
CE (EMC)	European Union 2004/108/EC EMC Directive, compliant with: • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers
CE (LVD)	European Union 2006/95/EC Low Voltage Directive, compliant with: • EN 61131-2; Programmable Controllers
RCM	Australian Radio Communications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
EAC	Certificate of compliance
RoHS	China RoHS, Turkey RoHS, European RoHS
KCC	Certificate of compliance

(1) Catalog numbers with a -B extension denote terminals that do not include the Allen-Bradley brand marking. Customers can put their own brand labels on these terminals.

(2) When marked. See the Product Certification link on http://www.ab.com for declarations of conformity, certificates, and other certification details.

Table 5 - PanelView Plus 7 Standard 12-in. and 15-in. Terminals

Attribute	12-in. Touch 2711P-T12W21D8S, 2711P-T12W21D8S-B, 2711P-T12W22D8S, 2711P-T12W22D8S-B	15-in. Touch 2711P-T15C21D8S, 2711P-T15C21D8S-B, 2711P-T15C22D8S, 2711P-T15C22D8S-B
Operator Input	Touch	Touch
Display type	Color TFT LCD	Color TFT LCD
Display size, diagonal	12.1 in. widescreen	15-in.
Viewing area	261 x 163 mm	304 x 228 mm
Display resolution	1280 x 800 WXGA, 18-bit color graphics	1024 x 768 XGA, 18-bit color graphics
Aspect ratio	5:3	4:3
Brightness, typical	300 nits	
Backlight life	50,000 h life, min. at 40° C to half-brightness. Backlight is not replaceable	
Touch screen	Analog resistive Actuation rating: 1 million presses Operating force: 100 grams	
Battery (real-time clock backup)	Accuracy: +/-2 minutes per month Battery life: 4 years min at 25 °C (77 °F) Replacement: CR2032 lithium coin cell	
Memory System User	 512 MB RAM and 512 MB storage 80 MB nonvolatile storage for applications	
Secure Digital (SD) card slot	One SD card slot for storing application files Replacement: Allen-Bradley part number 1784-SD1 (1 GB) and 1784-SD2 (2 GB)	
USB ports Host Device	 One USB 2.0 high-speed host port (type A) support removal flash drives for storage One high-speed 1.0 device port (type B) supports connection to host computer	
Ethernet port Cat. Nos. with 21 Cat. Nos. with 22	 One 10/100Base-T, Auto MDI/MDI-X Ethernet port with IEEE1588 support Two 10/100Base-T, Auto MDI/MDI-X Ethernet ports supporting star, linear, or DLR network topology	
Operating system	Windows CE includes FTP, VNC client server, ActiveX controls, PDF reader, third-party device support	
Software	FactoryTalk View Studio for Machine Edition, version 8.0 or later, FactoryTalk ViewPoint, version 2.6 or later	
Electrical		
Input voltage, DC	24V DC nom (18…30V DC), nonisolated DC power supply	
Power consumption, DC	50 W max (2.1A at 24V DC)	
Power supply	DIN-rail power supply, AC-to-DC, 85…265V AC, 47…63 Hz Replacement: Allen-Bradley part number 2711P-RSACDIN	
Mechanical		
Weight, approx.	1.95 kg (4.29 lb)	3.07 kg (6.75 lb)
Dimensions, HxWxD, approx.	240 x 340 x 56.5 mm (9.65 x 13.39 x 2.22 in.)	318 x 381 x 56.5mm (12.52 x 15.00 x 2.22 in.)
Cutout dimensions, HxW, approx.	218 x 312 mm (8.58 x 12.28 in.)	290 x 353 mm (11.42 x 13.90 in.)

Product Dimensions

The table provides product dimensions. The 5.7-in. and 10.4-in. touch-screen terminals are shown for illustrative purposes. All other terminal sizes look similar. For information on proper mounting clamp installation, refer to the PanelView Plus 7 Standard Terminals User Manual, publication 2711P-UM007.

Figure 1 - Series A and Series B Terminals, Front View

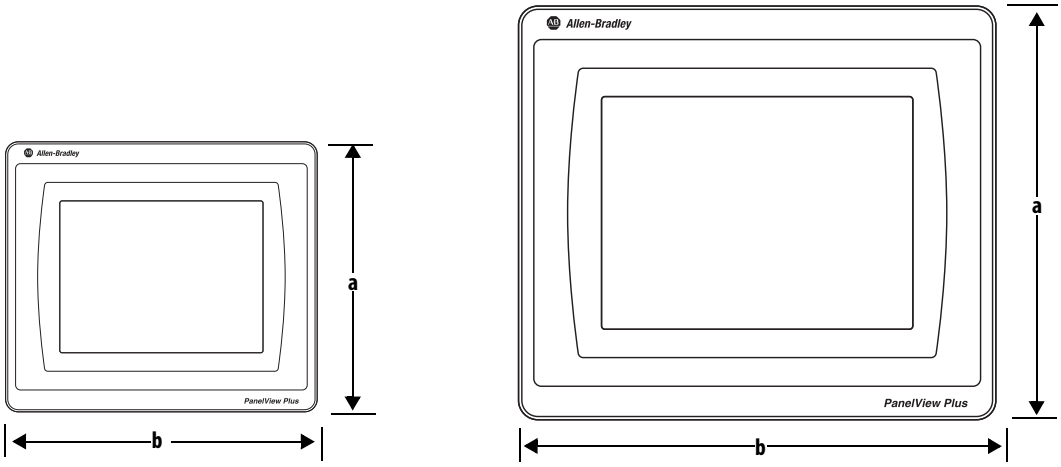


Figure 2 - Series A and Series B Terminals with Single Ethernet Port, Bottom View

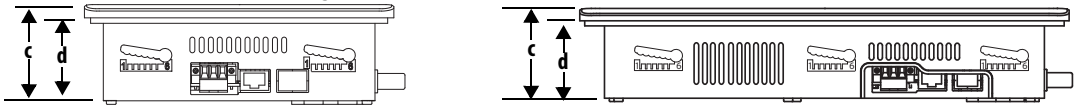


Figure 3 - Series B Terminals with Dual Ethernet Ports, Bottom View

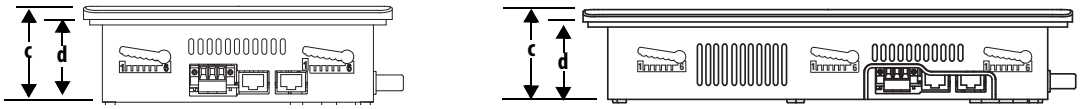


Table 6 - PanelView Plus 7 Standard Dimensions

Terminal Size	Input Type	Height (a) mm (in.)	Width (b) mm (in.)	Overall Depth (c) mm (in.)	Mounted Depth (d) mm (in.)
4.3 in.	Touch	110 (4.33)	135 (5.31)	56.5 (2.22)	50.14 (1.97)
5.7 in.	Touch	152 (5.98)	176 (6.93)	56.5 (2.22)	50.14 (1.97)
6.5 in.	Touch	170 (6.69)	212 (8.35)	56.5 (2.22)	50.14 (1.97)
9 in.	Touch	190 (7.48)	280 (11.02)	56.5 (2.22)	50.14 (1.97)
10.4 in.	Touch	252 (9.92)	297 (11.69)	56.5 (2.22)	50.14 (1.97)
12.1 in.	Touch	240 (9.65)	340 (13.39)	56.5 (2.22)	50.14 (1.97)
15 in.	Touch	318 (12.52)	381 (15.00)	56.5 (2.22)	50.14 (1.97)

TIP When mounted in a panel, the front of the bezel extends less than 6.36 mm (0.25 in.) from the front of the panel.

Table 3 - Certifications - 1769-IA8I

Certification[1]	1769-IA8I
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

(1) When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.

1769-IA16

Compact 120V AC input module

1769-IA16

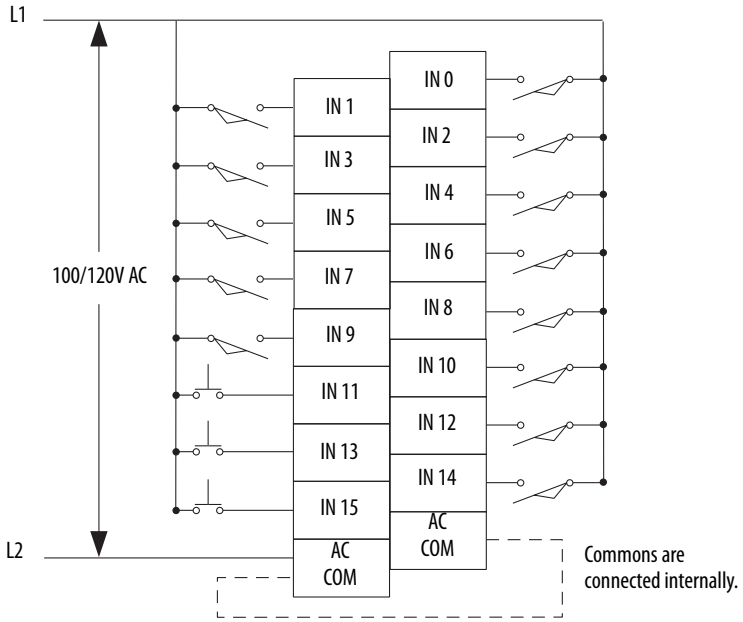


Table 4 - Technical Specifications - 1769-IA16

Attribute	1769-IA16
Inputs	16 (16 points/group, internally connected commons)
Voltage category	100/120V AC
Operating voltage range	79…132V AC, 47…63 Hz
Input delay, on	20 ms
Input delay, off	20 ms
Current draw @ 5.1V	115 mA
Heat dissipation, max	3.30 W
Off-state voltage, max	20V AC
Off-state current, max	2.5 mA

Table 4 - Technical Specifications - 1769-IA16

Attribute	1769-IA16
On-state voltage, min	79V AC
On-state current, min	5 mA @ 74V AC
On-state current, max	12 mA @ 120V AC
Inrush current, max(1)	250 mA
Input impedance, max	12 kΩ @ 50 Hz 10 kΩ @ 60 Hz
Isolation voltage	Verified by one of the following dielectric tests: 1517V AC for 1 s or 2145V DC for 1 s, input point to bus 132V AC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	280 g (0.61 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22…14 AWG) solid (22…16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
IEC input compatibility	Type 1+
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	82
Enclosure type rating	None (open-style)

(1) A current limiting resistor can be used to limit inrush current; however, the operating characteristics of the AC input circuit are affected. If a 6.8 kΩ (2.5 W minimum) resistor is placed in series with the input, the inrush current is reduced to 35 mA. In this configuration, the minimum on-state voltage increases to 92V AC. Before adding the resistor in a hazardous environment, be sure to consider the operating temperature of the resistor and the temperature limits of the environment. The operating temperature of the resistor must remain below the temperature limit of the environment.

Table 5 - Certifications - 1769-IA16

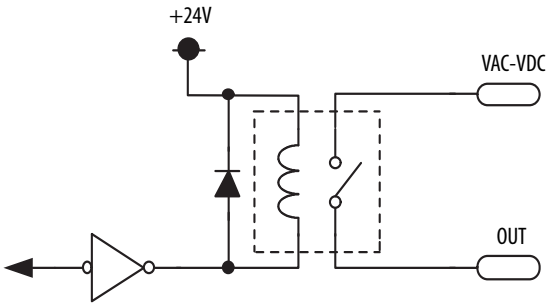
Certification(1)	1769-IA16
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

(1) When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.

1769-OW8

Compact AC/DC relay contact module

Simplified Output Circuit Diagram



1769-OW8

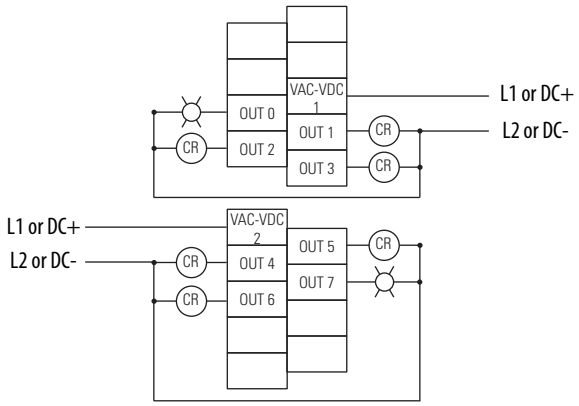


Table 92 - Technical Specifications - 1769-OW8

Attribute	1769-OW8
Outputs	8 normally open (4 points/group)
Operating voltage range	5…265V AC 5…125V DC
Delay, on	10 ms
Delay, off	10 ms
Current draw @ 5.1V	125 mA
Current draw @ 24V	100 mA
Heat dissipation, max	2.83 W
Off-state leakage, max	0 mA
On-state current, min	10 mA @ 5V DC
Current per point, max	2.5 A
Current per module, max	16 A
Isolation voltage	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s, output point to bus and group to group 265V AC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	280 g (0.61 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22…14 AWG) solid (22…16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
Replacement terminal block	1769-RTBN10 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)

Table 92 - Technical Specifications - 1769-0W8

Attribute	1769-0W8
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	86
Enclosure type rating	None (open style)

Table 93 - Relay Contact Ratings - 1769-0W8

Volts, max	Continuous Amps per Point, max	Amperes[1]		Voltamperes		NEMA ICS 2-125
		Make	Break	Make	Break	
240V AC	2.5 A	7.5 A	0.75 A	1800VA	180VA	C300
120V AC		15 A	1.5 A			
125V DC	1.0 A	0.22 A[2]		28VA		R150
24V DC	2.0 A	1.2 A[2]		28VA		—

(1) If you connect surge suppressors across your external inductive load, you extend the life of the relay contacts.

(2) For DC voltage applications, the make/break ampere rating for relay contacts can be determined by dividing 28VA by the applied DC voltage. For example, 28VA/48V DC = 0.58 A. For DC voltage applications less than 48V, the make/break ratings for relay contacts cannot exceed 2 A.

Table 94 - Certifications - 1769-0W8

Certification[1]	1769-0W8
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	C-Tick compliant for all applicable directives Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

(1) When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.

CompactLogix 5370 L3 Controllers

In a CompactLogix 5370 L3 controller system, the 1769 I/O modules can be placed to the left and the right of the power supply. As many as eight modules can be placed on each side of the power supply. The CompactLogix 5370 L3 controller comes with:

- dual EtherNet/IP ports for ring topologies.
- USB port for firmware download and programming.

Characteristic	1769-L30ER	1769-L30ERM	1769-L30ER-NSE	1769-L33ER	1769-L33ERM	1769-L36ERM
Available user memory	1 MB	1 MB	1 MB No capacitor	2 MB	2 MB	3 MB
Memory card	1784-SD1 (1 GB), shipped with controller 1784-SD2 (2 GB)					
Communication ports	• 2 EtherNet/IP • 1 USB					
EtherNet/IP connections	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP
EtherNet/IP nodes in a single Logix Designer application, max	16			32		48
Integrated motion on an EtherNet/IP network	—	Supports up to 4 axes	—	—	Supports up to 8 axes	Supports up to 16axes
Module expansion capacity	8 1769 modules 1 bank of modules			16 1769 modules 2 banks of modules		30 1769 modules 3 banks of modules
Battery	None					
Power supply distance rating	4 modules			4 modules		4 modules
Programming software support	• RSLogix 5000 software, version 20 - For controllers using firmware revision 20.*xxx*. • Logix Designer application, version 21 or later - For controllers using firmware revision 21.*xxx* or later.					

These controllers replace previous catalog numbers:

New Controller	Replaces Previous Controller(1)	Differences
1769-L30ER 1769-L30ERM 1769-L30ER-NSE	1769-L31 1769-L32C(2) 1769-L32E	• Additional memory • Integrated motion on EtherNet/IP support (1769-L30ERM, 1769-L33ERM, 1769-L36ERM) • USB port instead of RS-232 port • Dual-port EtherNet/IP support • SD card instead of Compact Flash card • Support for additional expansion I/O modules
1769-L33ER 1769-L33ERM	1769-L35CR(2) 1769-L35E	
1769-L36ERM	Any previous 1769-L3*x* controller	

(1) These catalog numbers are still available for sale, see page 12 for details. Please contact your local Rockwell Automation sales office for ordering information.

(2) Requires converting from ControlNet connections to EtherNet/IP connections.

1769-L30ER

CompactLogix Communication Options

You can configure your system for information exchange between a range of devices and computing platforms and operating systems. Select a CompactLogix controller with integrated communication or the appropriate communication module.

For detailed specifications, see:

- CompactLogix Controllers Specifications Technical Data, publication 1769-TD005.
- CompactLogix Communication Modules Specifications Technical Data, publication 1769-TD007.

EtherNet/IP Communication Options

The Ethernet Industrial network protocol (EtherNet/IP) is an open industrial-networking standard that supports both real-time I/O messaging and message exchange. The EtherNet/IP network uses off-the-shelf Ethernet communication chips and physical media.

Dual-port EtherNet/IP support embeds switch technology directly in the controller to so the controller can operate on star, linear, or ring EtherNet/IP topologies.

Cat. No.	Description	Communication Rate	Logix Resources[1]	TCP/IP Connections
1769-L16ER-BB1B,	CompactLogix 5370 L1 controller with integrated EtherNet/IP dual-port, POINT I/O form factor	10/100 Mbps	4 nodes 256 EtherNet/IP connections	120
1769-L18ER-BB1B, 1769-L18ERM-BB1B			8 nodes 256 EtherNet/IP connections	
1769-L24ER-BB1B, 1769-L24ER-QBFC1B	CompactLogix 5370 L2 controller with integrated EtherNet/IP dual-port, Compact I/O form factor	10/100 Mbps	8 nodes 256 EtherNet/IP connections	120
1769-L27ERM-QBFC1B		10/100 Mbps	16 nodes 256 EtherNet/IP connections	
1769-L30ER, 1769-L30ERM	CompactLogix 5370 L3 controller with integrated EtherNet/IP dual-port	10/100 Mbps	16 nodes 256 EtherNet/IP connections	120
1769-L33ER, 1769-L33ERM			32 nodes 256 EtherNet/IP connections	
1769-L36ERM			48 nodes 256 EtherNet/IP connections	
1768-ENBT	1768 EtherNet/IP communication bridge module	10/100 Mbps	128 EtherNet/IP connections	64
1768-EWEB	1768 Ethernet web server module	10/100 Mbps	128 EtherNet/IP connections	64

(1) The number of nodes listed for CompactLogix 5370 controllers represents the maximum number of EtherNet/IP nodes you can include in a Logix Designer application project for those controller. For example, in a Logix Designer application project that uses a 1769-L18ERM-BB1B controller, you can only add as many as 8 EtherNet/IP nodes to the project.

1769-PA2

Rockwell Automation

POWER SUPPLIES

Specifications

	1769-PA2	1769-PB2	1769-PA4	1769-PB4
Input Voltage, Nom.	120V ac or 240V ac	24V dc	120V ac or 240V ac	24V dc
Input Voltage Range	85…265V ac	19.2…31.2V dc	85…132V or 170…265V ac	19.2…31.2V dc
Real Input Power, Max.	44W	50W @ 24V dc	90W	100W @ 24V dc
Apparent Input Power, Max.	100 VA @ 120V ac 130 VA @ 240V ac	50 VA @ 24V dc	200 VA @ 120V ac 240 VA @ 240V ac	100 VA @ 24V dc
Typical Apparent Input Power @ Full Load	80 VA	50 VA @ 24V dc	160 VA	100 VA @ 24V dc
Line Loss Ridethrough	10 ms (min) to 10 seconds (max.)		5 ms (min) to 10 seconds (max.)	
Frequency	47…63 Hz	dc	47…63 Hz	dc
Backplane Output Current, 0…55 °C, Max.	2A @ 5V dc 0.8A @ 24V dc 250 mA @ 24V dc User	2A @ 5V dc 0.8A @ 24V dc	4A @ 5V dc 2A @ 24V dc	4A @ 5V dc 2A @ 24V dc
Backplane Output Current, 55…60 °C, Max.	2A @ 5V dc 675 mA @ 24V dc 200 mA @ 24V dc User	2A @ 5V dc 0.8A @ 24V dc	4A @ 5V dc 1.7A @ 24V dc	4A @ 5V dc 1.7A @ 24V dc
Fuse	Front Access			
Dimensions (HxWxD), Approx.	118 x 70 x 87 mm (4.65 x 2.76 x 3.43 in) Height including mounting tabs is 138 mm (5.43 in)			
Weight	0.5 kg (1.2 lb)		0.6 kg (1.4 lb)	
Operating Temperature	0…60 °C (32…140 °F)			
Storage Temperature	-40…85°C (-40…185 °F)			
Relative Humidity	5…95% (without condensation)			
Agency Certification (when product is marked)	c-UL-us certified (under CSA C22.2 No. 142) CE compliant for all applicable directives			
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D certified for U.S. and Canada			

NE Controls, L.L.C.
Syracuse, NY 13209 Telephone 315-299-5161

Product Profile

End Cap 1769

Allen-Bradley
Compact I/O End Caps and Expansion Cables 1769

Compact I/O End Caps

Catalog Number	End Cap Type
1769-ECL	Left end cap
1769-ECR	Right end cap

Compact I/O Expansion Cables

Catalog Number	Cable Type	Length
1769-CRR1	Right end to right end of bank	305mm (1 ft.)
1769-CRR3	Right end to right end of bank	1m (3.28 ft.)
1769-CRL1	Right end to left end of back	305mm (1 ft.)
1769-CRL3	Right end to left end of bank	1m (3.28 ft.)
1769-CLL1	Left end to left end of bank	305mm (1 ft.)
1769-CLL3	Left end to left end of bank	1m (3.28 ft.)

Industrial Ethernet Switch - FL SWITCH 1005N - 1085039

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://phoenixcontact.com/download)

Narrow Ethernet switch, five RJ45 ports with 10/100 Mbps on all ports, automatic data transmission speed detection, autocrossing function, and QoS

Your advantages

- Auto negotiation and autocrossing detection simplifies installation and setup
- Local diagnostic indicators with LEDs
- RJ45 ports support a transmission speed of 10/100 Mbps
- QoS-prioritized (Quality of Service) messages
- PROFINET conformance Class A for real-time data exchange
- Energy-efficient Ethernet in accord. with IEEE 802.3az
- PROFINET PTCP filter for reliable communication on PROFINET networks
- Enhanced traffic prioritization for automation protocols

Key Commercial Data

Packing unit	1 pc
Weight per Piece (excluding packing)	220.000 g
Country of origin	Taiwan

Technical data

Note

Utilization restriction	EMC: class A product, see manufacturer's declaration in the download area

Dimensions

Width	22.5 mm
Height	117 mm
Depth	84 mm

Industrial Ethernet Switch - FL SWITCH 1005N - 1085039

Technical data

Ambient conditions

Degree of protection	IP30
Ambient temperature (operation)	-10 °C ... 60 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)
Air pressure (operation)	79 kPa ... 108 kPa up to 2000 m above mean sea level (Without derating)
Air pressure (storage/transport)	79 kPa ... 108 kPa up to 2000 m above mean sea level (Without derating)

Interfaces

Interface	Ethernet (RJ45)
No. of ports	5 (RJ45 ports)
Note on the connection method	Auto negotiation and autocrossing
Transmission physics	Ethernet in RJ45 twisted pair
Transmission speed	10/100 Mbps
Transmission length	100 m (per segment)
Signal LEDs	Data receive, link status

Function

Basic functions	Unmanaged switch
	Autonegotiation
	Store and Forward switching mode
Additional functions	100 BASE-TX/100BASE-FX (IEEE 802.3u)
	Quality of Service (QoS) prioritization (IEEE 802.1p)
	Energy-efficient Ethernet (IEEE 802.3az)
	10Base-T (IEEE 802.3)
MAC address table	2k
PROFINET conformance class	Conformance-Class A
Status and diagnostic indicators	LEDs: U_S, link and activity per port

Network expansion parameters

Cascading depth	Network, linear, and star structure: any
Maximum conductor length (twisted pair)	100 m

Supply voltage

Supply voltage	24 V DC
	24 V AC (50/60 Hz)
Residual ripple	3.6 V_{PP} (within the permitted voltage range)
Supply voltage range	9 V DC ... 32 V DC
	18 V AC ... 30 V AC (50/60 Hz)

Industrial Ethernet Switch - FL SWITCH 1005N - 1085039

Technical data

Supply voltage

Typical current consumption	19 mA
Max. current consumption	110 mA

General

Mounting type	DIN rail
Net weight	161.3 g
Housing material	Polycarbonate fiber reinforced
MTTF	167.2 Years (MIL-HDBK-217F standard, temperature 25°C, operating cycle 100%)
	1627 Years (SN 29500 standard, temperature 25°C, operating cycle 21%)
	1526 Years (Telcordia standard, 25°C temperature, 21% operating cycle (5 days a week, 8 hours a day))

Connection data

Connection method	Push-in spring connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	12
Stripping length	10 mm

Standards and Regulations

Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Interference emission	EN 61000-6-2 EN 61000-4-8 (electromagnetic fields) Criterion A
Conducted noise emission	EN 61000-6-2 Class A
Immunity to surge	EN 61000-6-2 EN 61000-4-5 (surge) Criterion B
Immunity to burst	EN 61000-6-2 EN 61000-4-4 (EFT burst) Criterion A
Immunity to EF	EN 61000-6-2 EN 61000-4-3 (electromagnetic fields) Criterion A
Immunity to ESD	EN 61000-6-2 EN 61000-4-2 (ESD) Criterion B
Immunity to conducted interference	EN 61000-6-2 EN 61000-4-6 (line noise immunity) Criterion A
Type of test	Free fall in accordance with EN 61131-2
Noise emission	EN 61000-6-4:2007 + A1:2011
Noise immunity	EN 61000-6-2:2005
Vibration (storage/transport)	5g, 150 Hz, in acc. with IEC 60068-2-6
Vibration (operation)	in acc. with IEC 60068-2-6: 5g, 150 Hz
Shock (operation)	30g (EN 60068-2-27)
UL, USA / Canada	UL 61010-1, UL 61010-2-201, UL 62368-1 Class I, Div. 2, Groups A, B, C, D, T4

Industrial Ethernet Switch - FL SWITCH 1005N - 1085039

Technical data

Standards and Regulations

	Class I, Zone 2, Group IIC, T4

Environmental Product Compliance

REACh SVHC	Lead 7439-92-1

Classifications

eCl@ss

eCl@ss 10.0.1	19170402
eCl@ss 11.0	19170402
eCl@ss 9.0	19170106

ETIM

ETIM 7.0	EC000734

UNSPSC

UNSPSC 18.0	43222612
UNSPSC 19.0	43222612
UNSPSC 20.0	43222612
UNSPSC 21.0	43222612

Approvals

Approvals

Approvals

IECEE CB Scheme / UL Listed / cUL Listed / UL Listed / IECEE CB Scheme / cUL Listed / EAC / KC

Ex Approvals

UL Listed / cUL Listed / cULus Listed

Approval details

IECEE CB Scheme	CB scheme	http://www.iecee.org/	DK-91246-UL

Industrial Ethernet Switch - FL SWITCH 1005N - 1085039

Approvals

UL Listed	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 238705
cUL Listed	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 238705
UL Listed	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 140403
IECEE CB Scheme	http://www.iecee.org/	DK-91138-UL
cUL Listed	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 140403
EAC		RU *-DE.A*08.B.00731
KC	http://eng.kcc.go.kr/user/ehpMain.do	R-R-PCK-1085039

FLB3205
FLEXY20500

DATASHEET

Flexy 205

IIOT GATEWAY AND REMOTE ACCESS ROUTER

Highlights

- IIoT gateway with most PLC protocols
- Flexible WAN interface: Ethernet, 4G, 3G, WiFi
- High performance for data processing
- Data logging and alarm notification
- OPC UA & Modbus server
- Compact and robust design, ideal for electrical cabinet
- Easy to set up through embedded web pages
- MQTT scripting to connect with IIoT Platforms
- SD card ready for easy commissioning

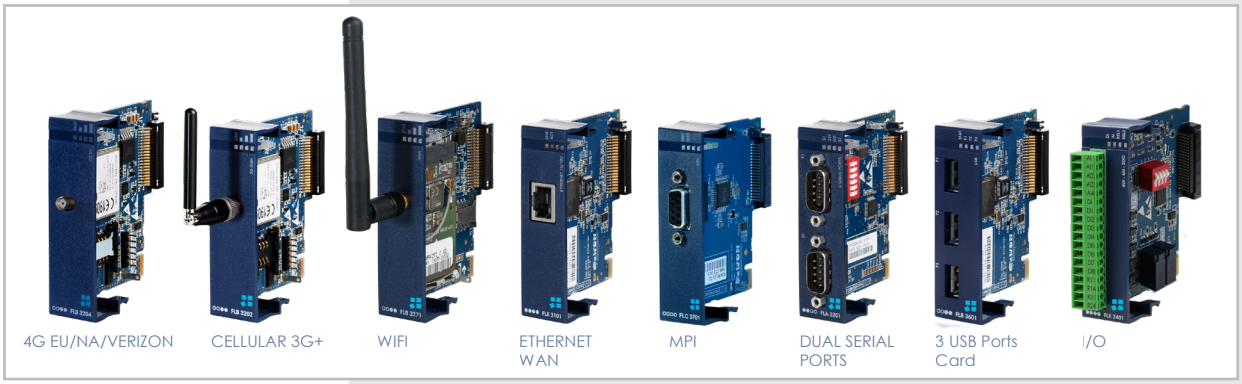
Typical Applications

- Remote Data Collection with IIoT platforms
- Remote Monitoring
- Remote Access

eWON Flexy 205 is a compact modular gateway for collecting Remote Data and providing Remote Access to your industrial equipment. With a configurable WAN/LAN switch, this gateway offers a wide range of extension cards to best fit your application and is perfect for data-intensive applications. Whether your requirements are to: create alarms, monitor dashboards, collect data for machine performance analysis, or even other advanced solutions, the Flexy 205 will meet your needs and expand your possibilities.

Like other routers from the Flexy family, the Flexy 205 has a web-based configuration and built-in scripting tools for customization.

Through the use of our Talk2M APIs, HTTPs scripting, or MQTT scripting, we enable easy integration with your favorite IIoT platform. The flexibility and robustness of the Flexy 205 guarantees a wide array of value-add services for Machines Builders.



GENERAL FEATURES	
Routing	Routing capability between LAN and WAN Ethernet interface and Ethernet to serial gateway
Ethernet to Serial Gateways	MODBUS TCP to MODBUS RTU; XIP to UNITELWAY; EtherNet/IP™ to DF1; FINS TCP to FINS Hostlink; ISO TCP to PPI, MPI (S7) or PROFIBUS (S7); VCOM to ASCII.
Data Acquisition Protocols	OPC UA, MODBUS/RTU, MODBUS/TCP, Unitelway, DF1, PPI, MPI (S7), PROFIBUS (S7), FINS Hostlink, FINS TCP, EtherNet/IP™, ISO TCP, Mitsubishi FX, Hitachi EH, ASCII, BACnet/IP. Stored in 2500 internal tags
Data Publishing Protocols	OPC UA, Modbus, MQTT, SNMP
Alarms	Alarms notification by email, SMS, FTP put and/or SNMP traps. 4 Thresholds : low, lowlow, high, highhigh + deadband and activation delay.Alarm logs in http and via FTP, Alarm cycle: ALM, RTN, ACK and END
Datalogging	Internal data base for data logging (real-time logging and historical logging up to 1,000,000 timestamps). Retrieval of the database with files transferred by FTP or email
SD card reader	YES, for easy commissioning (firmware upgrade, backup, Talk2M registration).
Router	IP filtering, IP forwarding, NAT, Port forwarding, Proxy, Routing table, DHCP client/server
VPN Tunnelling	Open VPN either in SSL UDP or HTTPS
VPN Security	VPN sessions are end-to-end encrypted using SSL/TLS protocol. Communications between the remote user and the eWON are fully encrypted using the SSL/TLS protocol, thereby ensuring data authenticity, integrity & confidentiality. Indeed, all users and eWON units are authenticated using x509 SSL certificates and end-to-end traffic is encrypted using strong symmetric & asymmetric algorithms that are part of the SSL/TLS protocol cipher suite.
Programmable	Script interpreter for Basic language, Java 2 Standard Edition environment
Synchronization	Embedded real-time clock, manual setup via http or automatic via NTP
File Management	FTP client and server for configuration, firmware update and data transfer
Website	Embedded web interface with setup wizards for configuration and maintenance (no extra software needed). Authentication with login/password and session control for security. Possibility of uploading custom web GUI. Compatible with viewON web HMI.
User Flash Disk	up to 30MB available for user application
Maintenance	SNMP and/or via FTP files

FLEXY 205 BASE MODULE	
Mechanicals	Din Rail or wall screw fixing system Dimensions: 133 x 122 x 55 mm (H x D x W); Weight: 280 g without extension card
Power supply	12 - 24VDC +/-20%, LPS Consumption: depending on the extension card installed (see Installation guide on our website)
Input/output	2x digital input: 0 to 12/24VDC; 1.5kV isolation 1x digital output: open drain (MOSFET) 200mA; 1.5 kV isolation
Flexy 205 base module interface	4 x RJ45 Ethernet 10/100 Mb .Configurable LAN/WAN ports, port 1 always LAN

FLEXY EXTENSION CARDS

Dual serial ports (FLA3301)

Number of ports	1x male SUBD9 serial port RS232/422/485 configurable by dipswitch and 1x male SUBD9 RS232 serial port with RTS, CTS signals

Cellular 3G+ (FLB3202)

Frequencies	Pentaband UMTS/HSPA+ modem (800/850, 900, AWS1700, 1900, 2100 MHz) Quad band GPRS/EDGE (850, 900, 1800, 1900 MHz)
Antenna Connector	Type SMA - Female
Antenna	Not included in the delivery

EU 4G LTE (FLB3204)

Frequencies	4G: B7(2600), B1(2100), B3(1800), B8(900), B20 (800)MHz 3G: B1 (2100), B8 (900) MHz 2G: B3 (1800) , B8(900) MHz
Antenna Connector	Type SMA - Female
Antenna	Not included in the delivery

NA 4G LTE (FLB3205)

Frequencies	AT&T compliant 4G: B12/B17(700),B5(850), B4(AWS1700),B2(1900), B13(700)MHz 3G: B2(1900), B5(850)MHz
Antenna Connector	Type SMA - Female
Antenna	Not included in the delivery

Verizon 4G LTE (FLB3203)

Frequencies	only Verizon network compatible, no CDMA 4G: B4(AWS1700), B13(700) MHz
Antenna Connector	Type SMA - Female
Antenna	Not included in the delivery

WiFi (FLB3271)

Wan connectivity	WiFi: 802.11 b/g/n WiFi/WLAN client for remote connection
Frequencies	Channels: 1 to 11 (inclusive)
Security	WPA2, WPA and WEP
Antenna Connector	Reverse SMA male connector
Antenna	included in the delivery; frequency: 2.4 GHz; impedance: 50 Ohms, gain:2.0 dB

I/O card (FLX3402)

Number of inputs/output	I/O card with 8x DI, 2x DO, 4x AI (0-10V, 4-20mA)
Range	AI : voltage mode 0-10V - 16 bit resolution or current mode 4-20mA, user selectable with Dip Switch configuration. DI : 0 to 12/24 VDC,DO: 2A/30V VAC/VDC
Isolation	AI: 1.5kV from power supply, DI: 1.5 kV from electronic AND power supply, DO: 1.5kV from electronic AND from power supply

3 USB Ports Card (FLB3601)	
Leds	4 leds : 1 global status, 1 for each port status
Connector	Type A female
Current limit	Each port has its own 500mA current limit. Global current limit on the board is 500mA
Port activation	All ports will be enabled/disabled together
Isolation	Earth GND isolation is limited to 500V due to USB connector design
Ethernet WAN (FLX3101)	
Ethernet port	1x RJ45 Ethernet 10/100 base Tx; 1.5kV isolation
MPI (FLC3701)	
	1 x female SUBD9 MPI port, 1.5kV functional isolation from power supply

GENERAL CHARACTERISTICS, STANDARDS & DIRECTIVES

Temperature Range	
base modules and extension cards	Operating: -25°C to +70°C, 10 to 95% relative humidity (non-condensing) Storage: -40°C to +70°C, 10 to 95% relative humidity (non-condensing)
Marking	CE FCC cULus
Warranty	36 months
Type tests	Temperature - Operating & Storage tested according to: IEC 60068-2-1 Cold test IEC 60068-2-2 Dry heat test IEC 60068-2-14 Change of temperature IEC 60068-2-30 Cyclic damp heat test Vibration & shocks tested according to: IEC 60068-2-27 Bumps IEC 60068-2-64 Vibration (broad-band random) IEC 60068-2-6 Vibration (sinusoidal)
CE	Compliant with: EMC directive 2014/30/EU RE directive 2014/53/EU* LV directive 2014/35/EU* RoHS directive 2011/65/EU REACH regulation 1907/2006 According to standards: EMC: ITE emission Class A and Immunity EN55032; EN55024 EN301489-1*; EN301489-17*; EN301489-52* Spectrum*: EN301511; EN301908-1; -2 & 13 EN300328 Health: EN62311 Safety: EN60950
FCC	Compliant with: CFR 47, part 15B class A; 15C*; 22H*; 24E*; 27*; 68*
IC	Compliant with IC (Industry Canada) RSS-130 -132; RSS-133; RSS-139; RSS-210
Japan	This equipment has the Type Approval Certification based on the Radio Law

* when applicable depending on the plugged EXT cards

Safety	Conform to: EN60950-1; UL60950-1; CSA-C22.2 n° 60950-1-07 UL recognized: file number E350576

PART NUMBER

Base Module	Part Number
Flexy 205	Flexy205
Extension Cards	
Dual serial ports	FLA3301
Cellular 3G+	FLB3202
EU 4G LTE	FLB3204
NA 4G LTE	FLB3205
VERIZON 4G LTE	FLB3203
WIFI	FLB3271
3 USB Ports Cards	FLB3601
Ethernet WAN	FLX3101
Extension I/O card	FLX3402
MPI	FLC3701

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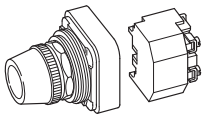
Pilot Light Devices

Transformer Type Pilot Light
Cat. No. 800T-P16R

Push-to-Test Pilot Light
Cat. No. 800T-PT16R

(Push-to-Test)

800	T		–	P	T		16	G	AR
	a	*b*		*c*	*d*	*e*	*f*	*g*	*h*



a

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

b

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

c

Power Module Type		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
P	Transformer (or dual input)	PR
Q	Full voltage/ Universal	QR

d

Lamp Test Options	
Code	Description
Blank	No test option▽
T	Push-to-test
D	Dual input — diode△♠
DT	Dual input — transformer relay♠
Note: Push-to-test supplied with factory jumpered contact block.	

e

Illumination Options	
Code	Description
Blank	Incandescent
H	LED♣

f

Voltage	
Transformer	
Code	Description
16	120V AC 50/60 Hz
26	240V AC 50/60 Hz
46	480V AC 50/60 Hz
56	600V AC 50/60 Hz
Full Voltage — Incandescent	
12	12V AC/DC
24	24V AC/DC
48	48V AC/DC
10	120V AC/DC
20	240V AC/DC
Universal — LED	
2	12…130V AC/DC
Dual Input	
16	120V AC
24	24V AC/DC (Dual input diode only)

g

Lens Color		
Code	Color	Glass Code #
Blank	No lens	Blank
A	Amber	D
B	Blue	E
C	Clear	F
G	Green	H
R	Red	J
W	White	K

h

Contact Blocks (Push-to-test units only)	
Code	Description
Standard	
Blank	1 N.O. - 1 N.C.
PenTUFF (Low Voltage)	
AV	1 N.O. - 1 N.C.
Class 1, Div. 2	
Logic Reed	
AR	1 N.O. - 1 N.C.
Sealed Switch	
AP	1 N.O. - 1 N.C.
Stackable Sealed Switch	
AY	1 N.O. - 1 N.C.

▽ Non-push-to-test pilot lights using the universal LED option cannot be ordered as Bul. 800HC or 800TC. The terminals are finger-safe as standard.
△ Diode type dual input provides circuit isolation via opposing diodes. Not recommended for use with solid-state outputs.
♠ Dual input devices (diode or transformer type) cannot be ordered as Bul. 800HC or 800TC. Finger-safe terminal guards are not available.
♣ LED illumination option is not available with diode type dual input.
Glass lens available on 800T pilot lights only. Not available on push-to-test units.

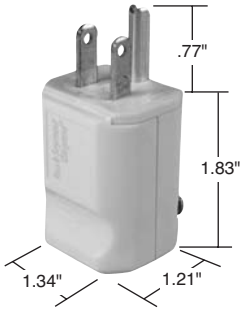
HBL5965VY

Pass & Seymour
legrand

Straight Blade Plugs & Connectors
MaxGrip® M³
2 Pole, 3 Wire Grounding 15 & 20A, 125 & 250V

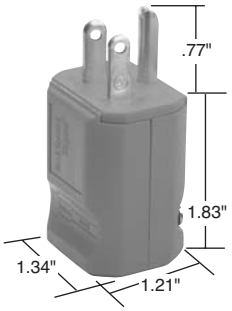
Hospital Grade version displays the Hospital Grade green dot.

High-visibility yellow and orange, or gray.



PS5965-Y

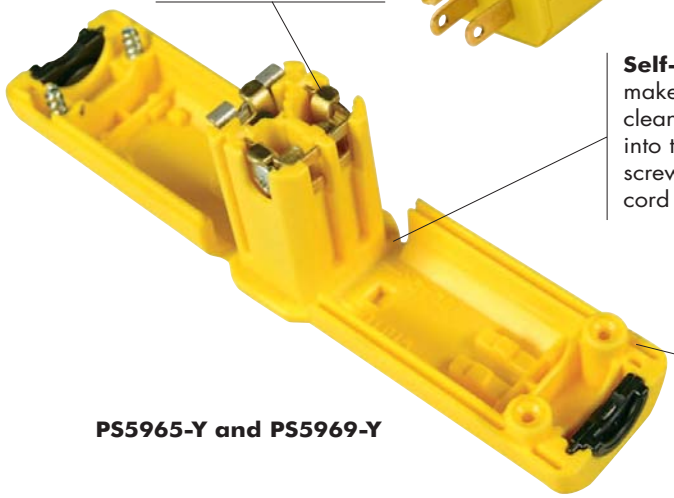
PS5969-Y



PS5965-O

PS5969-O

Enclosed terminals provide solid, internally-clamped connections.

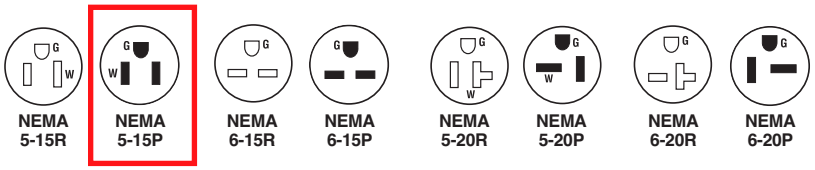

PS5965-Y and PS5969-Y

Molded finger grips promote safe, sure handing.

Self-hinge swings wide open to make quick, easy work of tight, clean connections. Insert conductors into terminals and tighten terminal screws; close hinge housing around cord and tighten housing screws.

Tough nylon construction with crush/impact resistance that exceeds hospital grade and Fed Spec requirements; arc resistance exceeds UL requirements.

Catalog Number	Rating A.	Rating V.	Description	Cord Diameter	NEMA Config. No.	3rd Party Compliance cULus	3rd Party Compliance FSUL WC596
NEW Hospital Grade MaxGrip® M³							
PS8115	15	125	Hospital Grade Plug, Gray	.230"-.720"	5-15P	•	•
PS8119	15	125	Hospital Grade Connector, Gray	.230"-.720"	5-15R	•	•
NEW MaxGrip M³							
PS5965-Y	15	125	Plug, Yellow	.230"-.720"	5-15P	•	
PS5965-GRY	15	125	Plug, Gray	.230"-.720"	5-15P	•	
PS5965-IG	15	125	Plug, Orange, for use with equipment restricted to isolated ground receptacles	.230"-.720"	5-15P	•	
PS5965-O	15	125	Plug, Orange	.230"-.720"	5-15P	•	
PS5969-Y	15	125	Connector, Yellow	.230"-.720"	5-15R	•	
PS5969-GRY	15	125	Connector, Gray	.230"-.720"	5-15R	•	
PS5969-O	15	125	Connector, Orange	.230"-.720"	5-15R	•	
PS5364-Y	20	125	Plug, Yellow	.230"-.720"	5-20P	•	•
PS5364-GRY	20	125	Plug, Gray	.230"-.720"	5-20P	•	•
PS5369-Y	20	125	Connector, Yellow	.230"-.720"	5-20R	•	•
PS5369-GRY	20	125	Connector, Gray	.230"-.720"	5-20R	•	•
PS5666-Y	15	250	Plug, Yellow	.230"-.720"	6-15P	•	•
PS5669-Y	15	250	Connector, Yellow	.230"-.720"	6-15R	•	•
PS5464-Y	20	250	Plug, Yellow	.230"-.720"	6-20P	•	•
PS5469-Y	20	250	Connector, Yellow	.230"-.720"	6-20R	•	•



All devices listed on this page conform to NEMA WD-1 and WD-6.

Power supply unit - UNO-PS/1AC/24DC/150W - 2904376

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Primary-switched UNO power supply for DIN rail mounting, input: 1-phase, output: 24 V DC/150 W

Product Description

UNO POWER power supplies - compact with basic functionality
Thanks to their high power density, compact UNO POWER power supplies offer the ideal solution for loads up to 150 W, particularly in compact control boxes. The power supply units are available in various performance classes and overall widths. Their high degree of efficiency and low idling losses ensure a high level of energy efficiency.

Why buy this product

- Flexible mounting by simply snapping onto the DIN rail
- More space in the control cabinet with up to 20 % higher power density
- Maximum energy efficiency, thanks to over 90 % efficiency and extremely low idling losses under 0.3 W
- Outdoor installation, thanks to the wide temperature range from -25°C to +70°C

RoHS

Key Commercial Data

Packing unit	1 STK
GTIN	4 046356 897099
GTIN	4046356897099
Weight per Piece (excluding packing)	500.000 g
Custom tariff number	85044030
Country of origin	Germany

Technical data

Dimensions

Width	37 mm
Height	130 mm
Depth	125 mm

Ambient conditions

Degree of protection	IP20

Power supply unit - UNO-PS/1AC/24DC/150W - 2904376

Technical data

Ambient conditions

Ambient temperature (operation)	-25 °C ... 70 °C (> 55 °C Derating: 2,5 %/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Noise immunity	EN 61000-6-2:2005

Input data

Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range	85 V AC ... 264 V AC
AC frequency range	45 Hz ... 65 Hz
Current consumption	1.4 A (120 V AC)
	0.8 A (230 V AC)
Inrush surge current	< 50 A (typical)
Power failure bypass	> 20 ms (120 V AC)
	> 20 ms (230 V AC)
Input fuse	2.5 A (slow-blow, internal)
Choice of suitable circuit breakers	6 A ... 16 A (Characteristics B, C, D, K)
Type of protection	Transient surge protection
Protective circuit/component	Varistor

Output data

Nominal output voltage	24 V DC ±1 %
Setting range of the output voltage (U_{Set})	24 V DC ... 28 V DC ±1 %
Nominal output current (I_N)	6.25 A (-25°C ... 55°C)
Derating	55 °C ... 70 °C (2.5%/K)
Connection in parallel	Yes, for redundancy and increased capacity
Connection in series	No
Control deviation	< 1 % (change in load, static 10 % ... 90 %)
	< 2 % (change in load, dynamic 10 % ... 90 %)
	< 0.1 % (change in input voltage ±10 %)
Residual ripple	< 40 mV_{PP} (with nominal values)
Output power	150 W
Typical response time	< 1 s
Maximum power dissipation in no-load condition	< 1.2 W
Power loss nominal load max.	< 9.7 W

General

Net weight	0.5 kg
Efficiency	> 94 % (for 230 V AC and nominal values)
Insulation voltage input/output	4 kV AC (type test)
	3 kV AC (routine test)
Protection class	II (in closed control cabinet)
MTBF (IEC 61709, SN 29500)	> 868000 h (40°C)

Power supply unit - UNO-PS/1AC/24DC/150W - 2904376

Technical data

General

Mounting position	horizontal DIN rail NS 35, EN 60715
Assembly instructions	Alignable: 0 mm horizontally, 30 mm vertically

Connection data, input

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	14
Stripping length	8 mm
Screw thread	M3

Connection data, output

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	14
Stripping length	8 mm
Screw thread	M3

Standards and Regulations

Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Shock	18 ms, 30g, in each space direction (according to IEC 60068-2-27)
Noise immunity	EN 61000-6-2:2005
Standards/regulations	EN 61000-4-2
	EN 61000-4-3
	EN 61000-4-4
	EN 61000-4-5
	EN 61000-4-6
	EN 61000-4-11
Standard - Safety of transformers	EN 61558-2-16
Standard - Electrical safety	EN 60950-1/VDE 0805 (SELV)
Standard – Electronic equipment for use in electrical power installations and their assembly into electrical power installations	EN 50178/VDE 0160 (PELV)
Standard – Safety extra-low voltage	EN 60950-1 (SELV) and EN 60204 (PELV)
Standard - Safe isolation	DIN VDE 0100-410
Standard – Limitation of mains harmonic currents	EN 61000-3-2
UL approvals	UL Listed UL 508

Power supply unit - UNO-PS/1AC/24DC/150W - 2904376

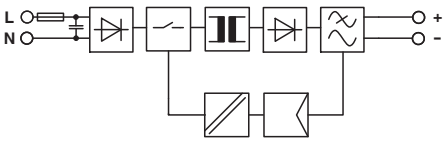
Technical data

Standards and Regulations

	UL/C-UL Recognized UL 60950
	UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D T4 (Hazardous Location)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm (according to IEC 60068-2-6)
	15 Hz ... 150 Hz, 2.3g, 90 min.
Low Voltage Directive	Conformance with LV directive 2006/95/EC
Approval - requirement of the semiconductor industry with regard to mains voltage dips	EN 61000-4-11
Information technology equipment - safety (CB scheme)	CB Scheme

Drawings

Block diagram



Classifications

eCl@ss

eCl@ss 4.0	27040702
eCl@ss 4.1	27040702
eCl@ss 5.0	27049002
eCl@ss 5.1	27049002
eCl@ss 6.0	27049002
eCl@ss 7.0	27049002
eCl@ss 8.0	27049002
eCl@ss 9.0	27040701

ETIM

ETIM 4.0	EC000599
ETIM 5.0	EC002540
ETIM 6.0	EC002540

UNSPSC

UNSPSC 13.2	39121004

Approvals

Approvals

Power supply unit - UNO-PS/1AC/24DC/150W - 2904376

Approvals

Approvals

UL Recognized / UL Listed / cUL Recognized / cUL Listed / EAC / IECEE CB Scheme / cULus Recognized / cULus Listed

Ex Approvals

UL Listed / cUL Listed / cULus Listed

Approval details

UL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 214596
UL Listed	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 123528
cUL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 214596
cUL Listed	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 123528
EAC		7500651.22.01.00242
IECEE CB Scheme	http://www.iecee.org/	DK-42308-UL
cULus Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	
cULus Listed		

Power supply unit - UNO-PS/1AC/24DC/150W - 2904376

Accessories

Accessories

Redundancy module

Redundancy module - UNO-DIODE/5-24DC/2X10/1X20 - 2905489

Redundancy module, 5 V - 24 V DC, 2 x 10 A, 1 x 20 A.

Smart-UPS 120 V

Advanced line interactive power protection for servers and network equipment

The world's most popular network and server UPS

The award-winning Smart-UPS™ unit from APC™ by Schneider Electric™ is the most popular UPS in the world for servers, storage, and networks. Trusted to protect critical data and equipment from power problems, the UPS supplies clean and reliable network-grade power. In addition to Legendary Reliability and manageability, Smart-UPS units have extremely high efficiency at low, medium, and high load levels, making them ideal for today's multi-core or virtualized servers that have varying load consumption. Available in a variety of form factors (tower, rack-mount, rack/tower convertible), there is a model for every application and budget.

Intelligent and efficient network power protection from entry level to scaleable runtime. Ideal for servers, point-of-sale, routers, switches, hubs, and other network devices.

- Reliable
- Intelligent
- Efficient
- Manageable

APC™
by Schneider Electric

SMT750

Smart-UPS Tower and Rack-mount 750 – 3,000 VA

Application-optimized standard models, ideal for servers, storage, point-of-sale, and other network devices

[SMT1500RM1U]

[SMT1500RM2U]

[SMT1500RM2U]

[SMT750]

[SMT750]

Standard Features

High-efficiency Green Mode:
Optimum efficiency which saves utility and cooling costs

Emergency Power Off (EPO):
Provides for remote UPS shut-off in the event of a fire or other emergency (2,200 VA and above)

Alphanumeric LCD Display:
Intuitive interface provides detailed and accurate information with ability to configure locally

Battery Disconnect:
Convenient way to disconnect battery for transport

Network-grade Power:
Provides most stable power conditions by filtering noise, automatic voltage regulation (AVR), and surge protection

Communication Ports:
Serial, USB, and SmartSlot™ for accessory cards

Advanced Battery Management:
Temperature-compensated charging extends life and advanced algorithms recommend replacement date

SMT750

Smart-UPS Display

Intuitive, easy-to-use LCD interface

Standard Features

LCD Display Screen
Clear, consistent, and detailed information in your choice of basic or advanced menus

Power Status:
- Operating mode and efficiency
- Load VA/Watts/Amps
- Input/Output voltage and frequency
- Battery capacity and runtime
- Energy meter and more

Control:
UPS and outlet group settings

Configuration:
- Language
- Power quality settings
- Alarm, delay, and threshold settings

Test and Diagnostics:
Initiate battery and runtime calibration tests

Logs:
See explanation of last 10 transfers and faults

About:
UPS and replacement battery part numbers, serial numbers, battery install, and suggested replacement dates

About:
UPS and replacement battery part numbers, serial numbers, battery install, and suggested replacement dates

Quick Status Indicators
Online, on battery, fault, and replace battery LEDs for quick status identification

Escape:
Exits to the previous menu or screen

Return:
Used to enter or confirm settings

Navigation Arrows:
Allow for quick adjustment of settings

Product Services and Accessories

Schneider Electric Critical Power & Cooling Services (CPCS) provides the highest quality services and solutions by trained and trusted professionals. Our world-class services offer a smart way to build, operate, and maintain your critical applications, ensuring the right people, in the right place, at the right time.

Management Cards

AP9630: UPS Network Management Card

AP9631: UPS Network Management Card with Environmental Monitoring

AP9620: Legacy Communications SmartSlot Card

Battery Packs

SMX48RMBP2U: APC Smart-UPS 48 V External Battery Pack Rack/Tower

SMX120RMBP2U: APC Smart-UPS 120 V External Battery Pack Rack/Tower

Additional Accessories

AP9625: APC Smart-UPS Two-post Rail Kit

SMX039-2: APC Smart-UPS 48V Battery Extension Cable

SMX040: APC Smart-UPS 120V Battery Extension Cable

Service Bypass Panels

SBP1500RM: APC Service Bypass PDU, 120 V; 15 AMP W/ (8) NEMA 5-15R

SBP3000RM: APC Service Bypass PDU, 120 V; 30 AMP W/ (4) NEMA 5-20R and (1) L5-30R

SBP3000: APC Service Bypass Panel- 100 – 240 V; 30 A; BBM; Hard-wire Input/Output

SBP3000RMHW: APC Service Bypass Panel- 100 – 240 V; 30 A; BBM; Hard-wire Input/Output

AP9631

SBP3000RM

SMT750

Standard Tower models

Product feature	SMT750	SMT1000	SMT1500	SMT2200	SMT3000
Output					
Power capacity	500 W/750 VA	700 W/1,000 VA	1,000 W/1,440 VA	1,980 W/2,200 VA	2,700 W/3,000 VA
Nominal output voltage	120 V				
Output frequency	57 – 63 Hz				
Waveform type	Sine wave				
Output connections (NEMA)	(6) 5-15R	(8) 5-15R		(8) 5-15R (2) 5-20R	
Switched outlet groups	-	1			
Input					
Nominal input voltage	120 V				
Input voltage range for main operations (Max adjustable range)	82 – 144 V (75 – 154 V)				
Input frequency	50/60 Hz +/- 3 Hz (auto sensing)				
Input connection	5-15P, 6 ft. cord			5-20P	L5-30P
Batteries and runtime					
Battery type	Maintenance-free sealed lead-acid battery with suspended electrolyte; leak proof				
Replacement battery	RBC48	RBC6	RBC7	RBC55	
Runtime estimates					
200 W	:22	:45	1:24	2:17	2:29
500 W	:05	:10	:23	:51	:55
700 W		:06	:12	:34	:37
1,000 W			:07	:21	:23
1,400 W				:13	:14
1,600 W				:10	:12
Full load	:05	:06	:07	:07	:06
Communication and management					
Interface ports	Serial (RJ45), USB, and SmartSlot				
Control panel and audible alarms	Alpha-numeric LCD display with LED status indicators; alarm on battery, distinctive low battery alarm and configurable delays				
Emergency power off (EPO)	Optional			Yes	
Surge protection and filtering					
Surge energy rating	459 J	480 J			
Filtering meets	Full-time multi-pole noise filtering: 0.3% IEEE surge let-through, zero clamping response time, meets UL 1449				
Physical					
Maximum height (inches)	6.2	8.5	8.5	17.0	17.0
Maximum width (inches)	5.4	6.7	6.7	7.7	7.7
Maximum depth (inches)	14.1	17.3	17.3	21.5	21.5
Net weight (pounds)	29	42	53	112	116
Conformance					
Regulatory	UL 1778, CSA				
Warranty and equipment protection policy	3-year electronics, 2-years battery, and $150,000 lifetime EPP				

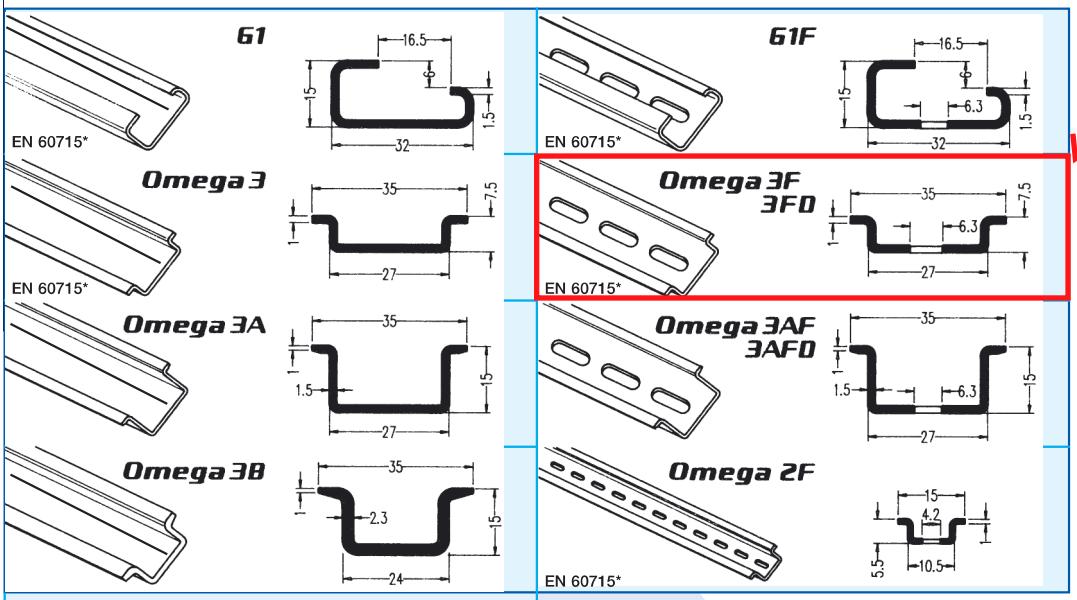
3FD

DIN RAILS

RoHS compliant

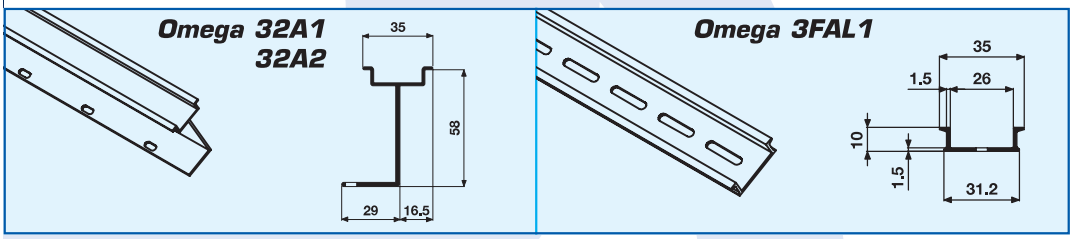
Treated with galvanic zinc plating and passivation (gal Zn 8c according to Din 50960)
Minimum thickness 6 microns
Standard length: 2 meters (6'6¾")

The most comprehensive range of ***Din metal mounting rails***



Omega 75 75 mm x 25 mm
EN 60715*

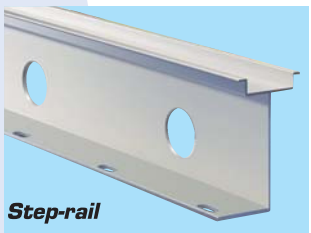
CENTER LINE
The unperforated mounting rails (G1/OMEGA 3/OMEGA 3A/ OMEGA 3B) have a center line in order to expedite the drilling of the mounting holes.

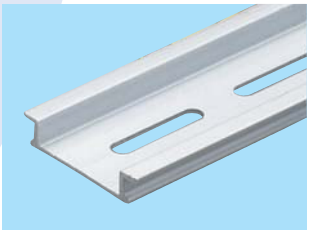


Catalog Number	Lengths Per Pack
G1	12
G1F	12
OMEGA 2F	20
OMEGA 2F1	40*
OMEGA 3	20
OMEGA 3F	20
OMEGA 3F1	40*
OMEGA 3FD	20
OMEGA 3A	10
OMEGA 3AF	10
OMEGA 3AF1	20*
OMEGA 3AFD	10
OMEGA 3B	10
OMEGA 3B1	10*
OMEGA 75	2

Catalog Number	Lengths Per Pack
ALUMINUM	
OMEGA 32A1	6*
OMEGA 32A2	6
OMEGA 3FAL1	40*
GROMMET	
IG-11	10
COPPER	
OMEGA 3ACU	1
STAINLESS STEEL	
OMEGA 3SS	2
OMEGA 3SS1	6*

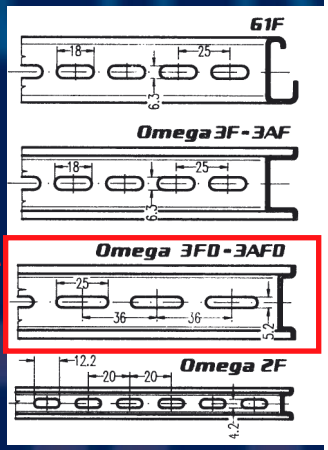
*One meter long

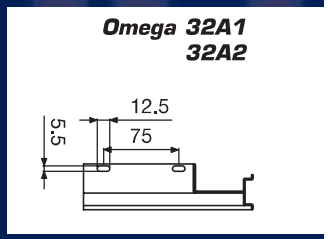

Step-rail

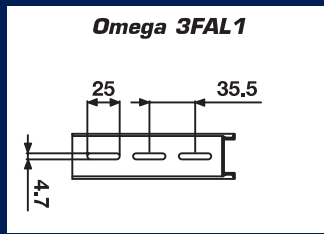


In compliance with EN 60715 standard

Bottom perforation







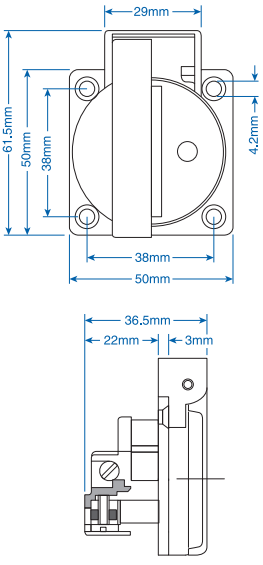
Receptacles

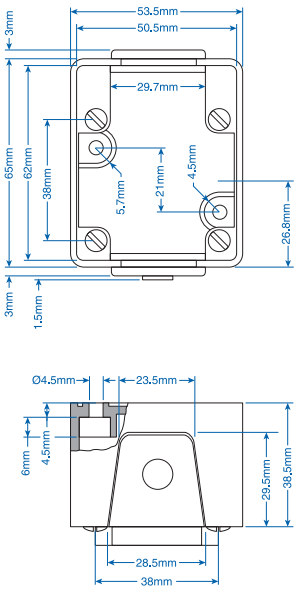
DMRBA

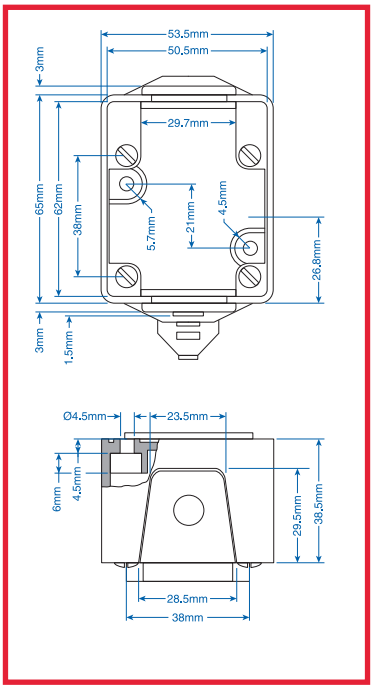
Features:
- DIN Rail, Panel Mount or Wall Mount
- Rating: 15A/125V AC
- Finger Protection: IP54
- Available in 3 colors.

	PANEL MOUNT	WALL MOUNT	DIN RAIL MOUNT
			
External Dimension (HxWxL mm)	36.5 x 61.5 x 50	50 x 71 x 53.5	58.5 x 84 x 53.5
Stripping Length	10 mm	10 mm	10 mm
Insulation Material	Thermoplastic	Thermoplastic	Thermoplastic
Type of Connection	3 screw clamps	3 screw clamps	3 screw clamps
Approvals*	c UL us E154664	c UL us E154664	c UL us E154664
Voltage Rating	125 V	125 V	125 V
Current Rating	15 A	15 A	15 A

	Cat. No.	Std. Pk.	Cat. No.	Std. Pk.	Cat. No.	Std. Pk.
Complete Kit:						
Blue	PMRBU	1	WMRBU	1	DMRBU	1
Gray	PMRGR	1	WMRGR	1	DMRGR	1
Black	PMRBA	1	WMRBA	1	DMRBA	1
Optional Accessory Sealing Gasket for Panel Mount Receptacles	SEALGASK	1	Includes Sealing Gasket		Includes Sealing Gasket	





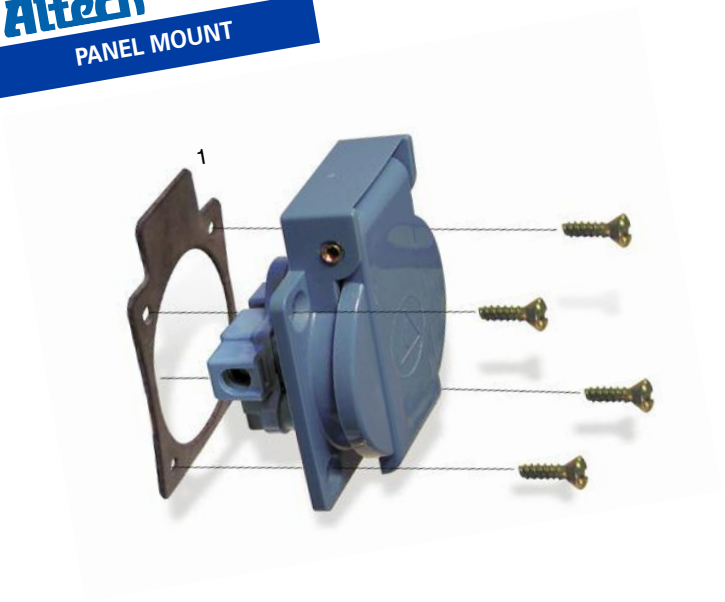


*UL approval applies to outlet only, not enclosure or DIN rail clip.

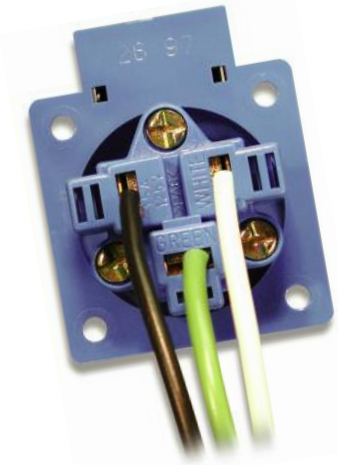
DMRBA

Altech®

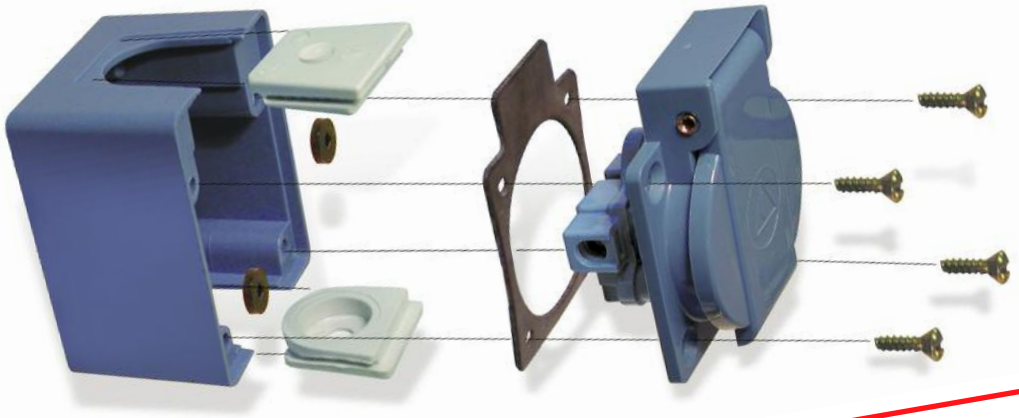
PANEL MOUNT



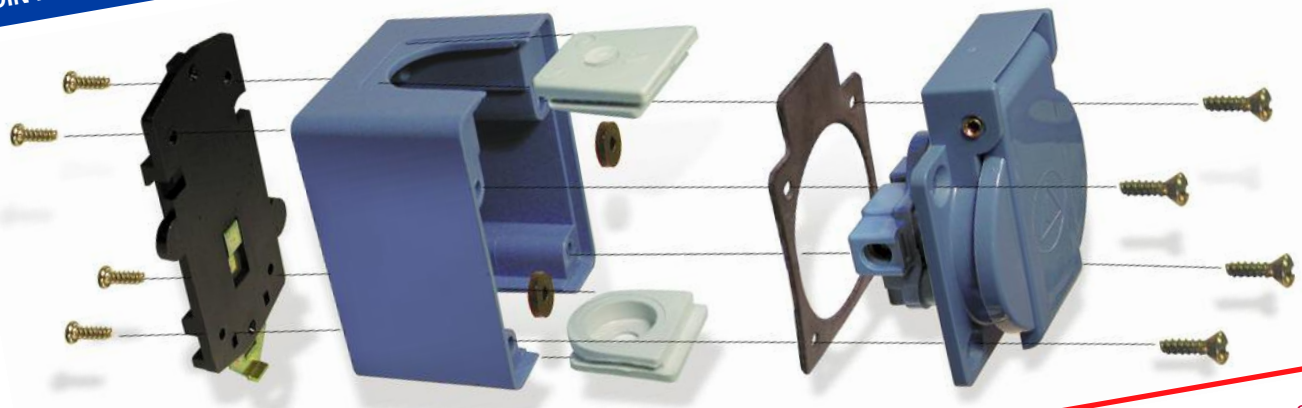
Wiring of Receptacles



WALL MOUNT



DIN RAIL MOUNT



1 Optional Sealing Gasket for wet environments.

Altech Corp.® • 35 Royal Road • Flemington, NJ 08822-6000 • Phone (908)806-9400 • FAX (908)806-9490 • www.altechcorp.com

Relay Module - RIF-1-RPT-LV-120AC/2X21MS - 2909775

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://phoenixcontact.com/download)

Pre-assembled relay module with push-in connection, consisting of: relay base, relay retaining bracket, plug-in suppressor module, and power contact relay with test button and integrated status LED. Contact type: 2 PDTs. Input voltage: 120 V AC

Product Description

Key Commercial Data

Packing unit	1 pc
GTIN	4 055626 380278
GTIN	4055626380278
Weight per Piece (excluding packing)	70.000 g
Custom tariff number	85364900
Country of origin	China

Technical data

Note

Utilization restriction	EMC: class A product, see manufacturer's declaration in the download area

Dimensions

Width	16 mm
Height	93 mm
Depth	75 mm

Ambient conditions

Ambient temperature (operation)	-40 °C ... 45 °C

Relay Module - RIF-1-RPT-LV-120AC/2X21MS - 2909775

Technical data

Ambient conditions

Ambient temperature (storage/transport)	-40 °C ... 85 °C
Degree of protection	IP20 (Relay base)
	RT II (Relay)

Coil side

Nominal input voltage U_N	120 V AC
Input voltage range in reference to U_N	see diagram
Mains frequency	50/60 Hz
Typical input current at U_N	7 mA
Typical response time	4 ms ... 10 ms
Typical release time range	3 ms ... 20 ms
Coil voltage	120 V AC
Protective circuit	Varistor
Operating voltage display	Yellow LED
Power dissipation for nominal condition	0.84 W

Contact side

Contact type	2 PDT
Type of switch contact	Single contact
Contact material	AgNi
Maximum switching voltage	250 V AC/DC
Minimum switching voltage	12 V (at 10 mA)
Min. switching current	10 mA (at 12 V)
Maximum inrush current	16 A (20 ms, N/O contact)
Limiting continuous current	see diagram
Interrupting rating (ohmic load) max.	192 W (at 24 V DC)
	62 W (at 48 V DC)
	42 W (at 60 V DC)
	55 W (at 110 V DC)
	66 W (at 220 V DC)
	2000 VA (for 250 V AC)
Switching capacity min.	120 mW
Switching capacity	1 A (at 24 V, DC13)
	1.5 A (at 230 V, AC15)

General

Test voltage relay winding/relay contact	4 kV_{rms} (50 Hz, 1 min.)
Test voltage PDT/PDT	2.5 kV_{rms} (50 Hz, 1 min.)
Operating mode	100% operating factor

Relay Module - RIF-1-RPT-LV-120AC/2X21MS - 2909775

Technical data

General

Mechanical service life	approx. 5x 10^6 cycles
Service life, electrical	see diagram
Mounting position	any
Assembly instructions	In rows with zero spacing

Connection data

Connection name	Coil side
Connection method	Push-in connection
Stripping length	8 mm
Conductor cross section solid	0.14 mm² ... 1.5 mm²
Conductor cross section flexible	0.14 mm² ... 1.5 mm²
	0.14 mm² ... 1.5 mm² (Ferrule with plastic sleeve)
	0.14 mm² ... 1 mm² (Ferrule with plastic sleeve, two conductors on double terminal block)
Conductor cross section AWG	26 ... 16 (solid)
	26 ... 16 (flexible)

Connection data 2

Connection name	Contact side
Connection method	Push-in connection
Stripping length	8 mm
Conductor cross section solid	0.14 mm² ... 1.5 mm²
Conductor cross section flexible	0.14 mm² ... 1.5 mm²
	0.14 mm² ... 1.5 mm² (Ferrule with plastic sleeve)
	0.14 mm² ... 1 mm² (Ferrule with plastic sleeve, two conductors on double terminal block)
Conductor cross section AWG	26 ... 16 (solid)
	26 ... 16 (flexible)

Standards and Regulations

Standards/regulations	DIN EN 50178
Rated insulation voltage	250 V AC
Rated surge voltage	6 kV
Insulation	safe isolation
Pollution degree	2
Overvoltage category	III

Environmental Product Compliance

China RoHS	Environmentally Friendly Use Period = 50

Relay Module - RIF-2-RPT-LV-120AC/4X21 - 2903305

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Pre-assembled relay module with push-in connection, consisting of: relay base, power contact relay, plug-in display/suppressor module, and retaining bracket. Contact type: 4 PDTs. Input voltage: 120 V AC

Product Description

Key Commercial Data

Packing unit	1 pc
GTIN	4 046356 732123
GTIN	4046356732123
Weight per Piece (excluding packing)	110.000 g
Custom tariff number	85364900
Country of origin	Germany

Technical data

Note

Utilization restriction	EMC: class A product, see manufacturer's declaration in the download area

Dimensions

Width	31 mm
Height	96 mm
Depth	75 mm

Ambient conditions

Ambient temperature (operation)	-40 °C ... 50 °C

Relay Module - RIF-2-RPT-LV-120AC/4X21 - 2903305

Technical data

Ambient conditions

Ambient temperature (storage/transport)	-40 °C ... 85 °C
Degree of protection	IP20 (Relay base)
	RT I (Relay)

Coil side

Nominal input voltage U_N	120 V AC
Input voltage range in reference to U_N	see diagram
Mains frequency	50/60 Hz
Typical input current at U_N	13 mA
Typical response time	5 ms ... 15 ms
Typical release time range	5 ms ... 20 ms
Coil voltage	120 V AC
Protective circuit	Varistor
Operating voltage display	Yellow LED
Power dissipation for nominal condition	1.56 W

Contact side

Contact type	4 PDTs
Type of switch contact	Single contact
Contact material	AgNi
Maximum switching voltage	250 V AC/DC
Minimum switching voltage	5 V (At 24 mA)
Min. switching current	5 mA (at 24 V)
Maximum inrush current	16 A (20 ms, N/O contact)
Limiting continuous current	5 A (see diagram)
Interrupting rating (ohmic load) max.	120 W (at 24 V DC)
	124 W (at 48 V DC)
	108 W (at 60 V DC)
	52 W (at 110 V DC)
	48 W (at 220 V DC)
	1250 VA (for 250 V AC)
Switching capacity	2 A (at 24 V, DC13)
	0.22 A (at 120 V, DC13)
	0.11 A (at 250 V, DC13)
	1.5 A (at 24 V, AC15)
	1.5 A (at 120 V, AC15)
	1 A (at 240 V, AC15)

General

Relay Module - RIF-2-RPT-LV-120AC/4X21 - 2903305

Technical data

General

Test voltage relay winding/relay contact	2.5 kV_{rms} (50 Hz, 1 min.)
Test voltage relay contact/relay contact	2 kV_{rms} (50 Hz, 1 min.)
Operating mode	100% operating factor
Mechanical service life	approx. 2x 10^7 cycles
Mounting position	any
Assembly instructions	In rows with zero spacing

Connection data

Connection name	Coil side
Connection method	Push-in connection
Stripping length	8 mm
Conductor cross section solid	0.14 mm² ... 1.5 mm²
Conductor cross section flexible	0.14 mm² ... 1.5 mm²
	0.14 mm² ... 1.5 mm² (Ferrule with plastic sleeve)
	0.14 mm² ... 1 mm² (Ferrule with plastic sleeve, two conductors on double terminal block)
Conductor cross section AWG	26 ... 16 (solid)
	26 ... 16 (flexible)

Connection data 2

Connection name	Contact side
Connection method	Push-in connection
Stripping length	8 mm
Conductor cross section solid	0.14 mm² ... 1.5 mm²
Conductor cross section flexible	0.14 mm² ... 1.5 mm²
	0.14 mm² ... 1.5 mm² (Ferrule with plastic sleeve)
	0.14 mm² ... 1 mm² (Ferrule with plastic sleeve, two conductors on double terminal block)
Conductor cross section AWG	26 ... 16 (solid)
	26 ... 16 (flexible)

Standards and Regulations

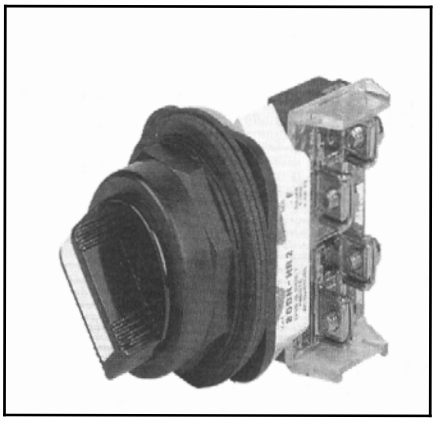
Connection in acc. with standard	CSA
Standards/regulations	DIN EN 50178
Rated insulation voltage	250 V AC
Rated surge voltage	2.5 kV
Insulation	Basic insulation
Pollution degree	2
Overvoltage category	II

NE Controls, L.L.C.
Syracuse, NY 13209 Telephone 315-299-5161

Product Profile

Selector Switch
Maintained
800H-HR

Allen-Bradley Selector Switches Maintained Contacts Watertight/Oiltight



Technical Data

Mechanical life	1,000,000 ops.
Electrical life	1,000,000 ops.
Housing	glass filled polyester
Contacts	silver
Normal load break	3 amps @ 240vac
Terminals	brass
Terminal screws	brass

Note: X=Closed/O=Open

Contact Type	Contact Location		Operator Position		Operator Type M=Maintained S=Spring Return	Standard Knob	
	Side	Contact	↖	↗		Catalog Number	*
No Contacts	—	—	—	—	M M	800H-HR2	
					S→M	800H-HR4	
					M←S	800H-HR5	
1 N.O.	White	A	O	X	M M	800H-HR2D1	
					S→M ❶	800H-HR4D1	
					M←S	800H-HR5D1	
1 N.O. - 1 N.C.	White	A B	O X	X O	M M	800H-HR2A	
					S→M ❶	800H-HR4A	
					M←S	800H-HR5A	
2 N.O. - 2 N.C.	White Black	A B A B	O X O X	X O X O	M M	800H-HR2B	
					S→M ❶	800H-HR4B	
					M←S	800H-HR5B	

❶ Target tables are reversed from those shown.

UL Listed

CSA® Certified

800H-JR2A

3-Position Selector Switch Units, Non-Illuminated

Standard Knob Operator
Cat. No. 800T-J2A

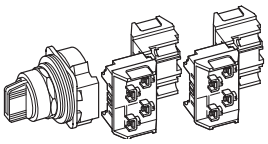
Knob Lever Operator
Cat. No. 800T-J17A

Standard Knob Operator
Cat. No. 800H-JR2A

Contact Type	Operator Position			Operator Type M = Maintained S = Spring Return	Type 4/13 Standard Knob Cat. No.	Type 4/13 Knob Lever Cat. No.	Type 4/4X/13 Standard Knob Cat. No.
No Contacts	—	—	—	M M M	800T-J2	800T-J17	800H-JR2
				S→M M	800T-J4	800T-J18	800H-JR4
				M M←S	800T-J5	800T-J19	800H-JR5
				S→M←S	800T-J91	800T-J20	800H-JR91
 1 N.O. - 1 N.C.	O X	O O	X O	M M M	800T-J2A	800T-J17A	800H-JR2A
				S→M M	800T-J4A	800T-J18A	800H-JR4A
				M M←S	800T-J5A	800T-J19A	800H-JR5A
				S→M←S	800T-J91A	800T-J20A	800H-JR91A

Note: X = Closed/O = Open

800 T – J 2 C
a b c d e f



a

Protection Rating	
Code	**Description**
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

b

Finger-Safe Guards	
Code	**Description**
Blank	No Guards
C	Guards on Terminals

c

Knob Insert Colors		
800T Type 4/13 Code	**Description**	**800H Type 4/4X/13 Code**
J	White	JR
JA	Red	JRA
JB	Green	JRB
JC	Blue	JRC
JE	Yellow	JRE
JF	Orange	JRF
JX	Packet of Colored Inserts ❶	JRX
Metal Wing Lever Colors ❷		
Code	**Color**	**Code**
JA	Red	—
JG	Gray	—

d

Knob/Lever Type Operators	
Standard Knob	
Code	**Operator Function**
2	Maintained
4	Spring Return from Left
5	Spring Return from Right
91	Spring Return from Both
Knob Lever ❷	
Code	**Operator Function**
17	Maintained
18	Spring Return from Left
19	Spring Return from Right
20	Spring Return from Both
Metal Wing Lever ❷	
Code	**Operator Function**
11	Maintained
15	Spring Return from Left
16	Spring Return from Right
141	Spring Return from Both
Coin Slot ❷	
Code	**Operator Function**
10	Spring Return from Both

e

Cam Option ❸	
Code	**Description**
Blank	KB7 Cam (Std.)
KA1	KA1 Cam
KA7	KA7 Cam

Note: See Table 1 for cam selections.

e (cont'd)

Cam Option ❸	
Code	**Description**
KC1	KC1 Cam
KC7	KC7 Cam
KD7	KD7 Cam
KE7 ❹	KE7 Cam
KQ1	KQ1 Cam
KQ7	KQ7 Cam
KR1 ❹	KR1 Cam
KR7 ❹	KR7 Cam
KT1 ❹	KT1 Cam
KT7 ❹	KT7 Cam
KU7 ❹	KU7 Cam

Note: See Table 1 for cam selections.

f

Contact Blocks	
Code	**Description**
Blank	No Contacts on operator
Standard	
A	1 N.O. - 1 N.C. 1-**800T-XA** on white side
B	2 N.O. - 2 N.C. 2-**800T-XA**s — 1 on white side/1 on black side
Pen*TUFF* (Low Voltage)	
AV	1 N.O. - 1 N.C. 1-**800T-XAV** on white side
BV	2 N.O. - 2 N.C. 2-**800T-XAV**s — 1 on white side/1 on black side

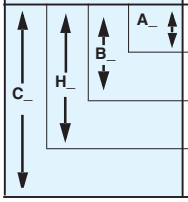
f (cont'd)

Contact Blocks	
Code	**Description**
Class 1, Div. 2/Zone 2	
Logic Reed	
AR	1 N.O. - 1 N.C. 1-**800T-XAR** on white side
BR	2 N.O. - 2 N.C. 2-**800T-XAR**s — 1 on white side/1 on black side
Sealed Switch	
AP	1 N.O. - 1 N.C. 1-**800T-XAP** on white side
BP	2 N.O. - 2 N.C. 2-**800T-XAP**s — 1 on white side/1 on black side
Stackable Sealed Switch	
AY	1 N.O. - 1 N.C. 1-**800T-XAY** on white side
BY	2 N.O. - 2 N.C. 2-**800T-XAY**s — 1 on white side/1 on black side

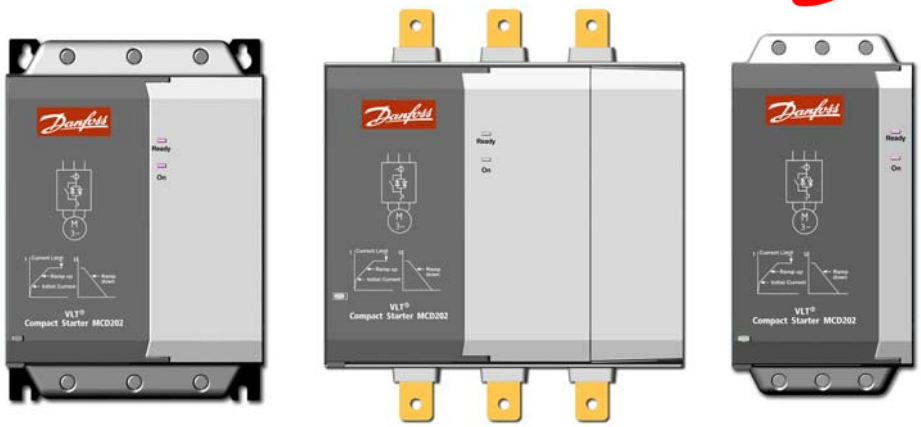
Note: Associated targets shown in Table 1.

❶ Packet of colored inserts, one of each color.
❷ Only available on 800T, Type 4/13 operators.
❸ If an overlapping cam is required, consult factory.
❹ Wing levers are not suitable with these cam codes.

Table 1. Cam and Contact Block Functionality Table (**Note:** X = Closed/O = Open)

Contact Block Suffix Code	Contact Block Side	Ckts	Cam Codes: KB7 (Std.)	KA1	KA7	KC1	KC7	KD7	KE7	KQ1	KQ7	KR1	KR7	KT1	KT7	KU7
	White	A	X O O	X O O	O O X	O O X	X O O	O O X	X O O	X O X	X O X	X O X	X O X	O O X	X O O	X O O
		B	O O X	O X O	O X O	O X O	O X O	O X O	O X X	O X O	O X O	O X O	O X O	O X O	O O X	O X O
	Black	A	X O O	X O O	O O X	O O X	X O O	X O O	O O X	X O X	X O O	O O X	O O X	O O X	X O O	O O X
		B	O O X	O X O	O X O	X O O	O O X	O X O	X X O	O X O	O X O	O X O	X X O	O X X	X X O	X X O
	White	A	X O O	X O O	O O X	O O X	X O O	O O X	X O O	X O X	X O X	X O X	X O X	O O X	X O O	X O O
		B	O O X	O X O	O X O	O X O	O X O	O X O	O X X	O X O	O X O	O X O	O X O	X O O	O O X	O X O
	Black	A	X O O	X O O	O O X	O O X	X O O	X O O	O O X	O X O	X O O	O O X	O O X	O O X	X O O	O O X
		B	O O X	O X O	O X O	X O O	O O X	O X O	X X O	O X O	O X O	O X O	X X O	O X X	X X O	X X O

MCD202-110-T6-CV3



NEW Compact Soft Starters from Danfoss

Danfoss is pleased to announce the addition of the MCD 201 and MCD 202 series of Softstarters. These new Softstarters will help to compete with other less featured Softstarters in the market.

Benefits

- Small footprint and compact size saves panel space
- Easy to install and use
- Built-in bypass minimizes installation cost and eliminates power loss
- Superior standard and heavy duty ratings
- Essential motor protections (MCD 202) reduce overall cost
- Advanced accessories allow enhanced functionality

Features

- Power ratings up to 150Hp
- Easy DIN rail mounting for sizes up to 40 Hp
- 2-wire or 3-wire start/stop control
- Excellent starting duty – 4x I_e for 6 seconds
- Heavy starting ratings at 4x I_e for 20 seconds
- Compatible with grounded delta power systems
- Optional Remote Operator and display. 4-20 mA analog output proportional to motor current (MCD 202)
- Built-in Bypass
- PC-based MCD setup software
- AS-i, Profibus, Modbus, & Device Net networks

MCD202-110-T6-CV3

Technical Specifications

Main Voltage	3 x 200 – 575 V AC
Main Frequency	45 Hz to 66 Hz
Control Voltage	100 – 240 V AC, 380 – 480 V AC or 24 V AC / 24 V DC
Power Range	10 – 150 Hp @ 480 V AC
Control Inputs	Start, Stop Reset push-button on the unit
Relay Outputs	1 x Main contactor 1 x Programmable * (Trip or Run)
Protections	• Motor thermistor input * • Motor temperature – Thermal model * • Phase imbalance * • Phase sequence * • Excess start time * • Supply fault • Shorted SCR
LED Indications	Ready / Fault Run
Enclosure	Chassis, (IP 20/IP 00) (based on frame size)
Operating temperature	- 5 to 60 °C *(above 40 °C with derating)*

** MCD 202 only*

Sales Aids

MCD 200 Series Fact Sheet
MCD Software
PowerPoint Presentation
Softstarter Brochure
Comparing the MCD 3000 & MCD 200 Series will be available soon

Availability

These units will be available in Mid November

Approvals

UL, C-UL, CE, C-tick

Applications

Pumps, Fans, Compressors, Mixers, Conveyors etc.

MCD202-110-T6-CV3

Ratings

Hp Ratings

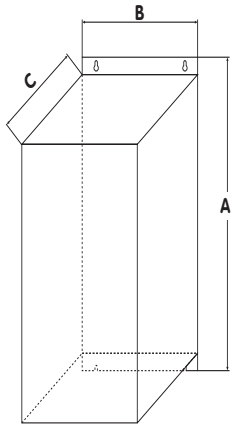
Catalog Number	Enclosure	208V	230V	480V	Current Rating	Order Number
MCD 201-007-T6-CV3	IP 20	5	5	10	18A, AC53b 4-6:354	175G5187
MCD 201-015-T6-CV3	IP 20	7.5/10	7.5/10	25	34A, AC53b 4-6:354	175G5188
MCD 201-018-T6-CV3	IP 20			30	42A, AC53b 4-6:354	175G5189
MCD 201-022-T6-CV3	IP 20	15	15		48A, AC53b 4-6:354	175G5190
MCD 201-030-T6-CV3	IP 20	20	20	40	60A, AC53b 4-6:354	175G5191
MCD 201-037-T6-CV3	IP 20	25	25	50	75A, AC53b 4-6:594	175G5192
MCD 201-045-T6-CV3	IP 20		30	60	85A, AC53b 4-6:594	175G5193
MCD 201-055-T6-CV3	IP 20	30	40	75	100A, AC53b 4-6:594	175G5194
MCD 201-075-T6-CV3	IP 00	40/50	50	100	140A, AC53b 4-6:594	175G5195
MCD 201-090-T6-CV3	IP 00	60	60	125	170A, AC53b 4-6:594	175G5196
MCD 201-110-T6-CV3	IP 00		75	150	200A, AC53b 4-6:594	175G5197

Hp Ratings

Catalog Number	Enclosure	208V	230V	480V	Current Rating	Order Number
MCD 202-007-T6-CV3	IP 20	5	5	10	17A, AC53b 4-6:354	175G5231
MCD 202-015-T6-CV3	IP 20	7.5/10	7.5/10	25	32A, AC53b 4-6:354	175G5232
MCD 202-018-T6-CV3	IP 20			30	40A, AC53b 4-6:354	175G5233
MCD 202-022-T6-CV3	IP 20	15	15		51A, AC53b 4-6:354	175G5234
MCD 202-030-T6-CV3	IP 20	20	20	40	53A, AC53b 4-6:354	175G5235
MCD 202-037-T6-CV3	IP 20	25	25	50	69A, AC53b 4-6:594	175G5236
MCD 202-045-T6-CV3	IP 20		30	60	74A, AC53b 4-6:594	175G5237
MCD 202-055-T6-CV3	IP 20	30	40	75	92A, AC53b 4-6:594	175G5238
MCD 202-075-T6-CV3	IP 00	40/50	50	100	126A, AC53b 4-6:594	175G5239
MCD 202-090-T6-CV3	IP 00	60	60	125	145A, AC53b 4-6:594	175G5240
MCD 202-110-T6-CV3	IP 00		75	150	176A, AC53b 4-6:594	175G5241

Dimensions

MCD 200 Series	Size – Hp (480 VAC)	(A) Height In (mm)	(B) Width In (mm)	(C) Depth In (mm)
MCD 20x- 007-030	10 – 40	7.48 (190)	3.78 (96)	5.98 (152)
MCD 20x- 037-055	50 - 75	7.87 (200)	5.51 (140)	6.93 (176)
MCD 20x- 075-110	100-150	9.13 (232)	11.02 (280)	8.07 (205)



MCD202-110-T6-CV3

Features

The market for soft starters has traditionally been divided between compact two-phase soft start controllers (1.5 to 75Hp) and bigger three-phase fully featured soft starters offering a high degree of motor and system protection to 1300 Hp.

There is a trend in the market towards compact soft starters with basic motor protection features.

The MCD201 is a traditional two-phase soft start controller.

The MCD202 is a new concept as it is based on a soft start controller but features 60-70% of the motor protection features offered traditionally with three-phase fully featured soft starters

Common features and specifications for MCD201 and MCD202:

- Internal and automatic thyristor bypass system
- Identical frame sizes – in total three sizes
- Two-phase control principle
- Remote Keypad available
- Approvals: UL508, CSA, CE, CCC, C-tick (UL approval only 200-575V versions)
- Field bus options available (see launch schedule)

Features and specifications for MCD201:

- Timed voltage ramp 0 – 20 seconds ramp up and ramp down
- Three adjustments can be made by rotary switches:
    - Initial torque
    - Start time
    - Stop time
- One standard relay output
- LED indication of status

Features and specifications for MCD202:

- Closed loop current controlled ramp up and ramp down
- Eight adjustments can be made by rotary switches:
    - Current limit start
    - Current ramp start
    - Percent motor FLC
    - Overload protection class
    - Excess start time protection
    - Phase rotation protection
    - Programmable relay outputs
    - Stop time
- Two standard relay output. One of them programmable
- Compatible with Remote Operator for remote control
- LED indication of status and trip codes
- Standard motor thermistor input

MCD202-110-T6-CV3

Features and functionality offered by MCD202 but not MCD201

- Current limit start
- Current ramp start
- Motor protection
- Three output relays (line/mains/trip)
- Coded LED flashing for trip diagnostics
- 4-20mA analogue output via optional Remote Operator

Features and functionality offered by MCD3000 but not MCD202

- Dual parameter set up
- Longer ramp times due to three-phase control principle
- Improved ramp programming features, i.e. 450 steps for start current
- Torque control
- Kick start
- Dual parameter set up
- DC brake
- Under current protection
- Shear pin protection
- Under frequency trip delay
- Restart delay
- Starter over temperature protection
- Automatic reset
- Warning flags before trips
- Phase imbalance sensitivity adjustment
- Local keypad
- Password protection
- Multiple soft stop profiles
- Inside delta wiring (MCD3132 – MCD3800)

Ground modular terminal block - PTS 2,5-TWIN-PE - 3211935

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Ground modular terminal block, connection method: Push-in connection, number of connections: 3, cross section:0.14 mm² - 4 mm², AWG: 26 - 12, width: 5.2 mm, color: green-yellow, mounting type: NS 35/7,5, NS 35/15

Why buy this product

- Same shape and pitch as the feed-through terminal blocks
- Contact is made free from mechanical and electrical errors by simply snapping onto the DIN rail
- All the requirements of standard IEC 60947-7-2 are met

RoHS

Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 046356 499538
GTIN	4046356499538
Weight per Piece (excluding packing)	8.000 g
Custom tariff number	85369010
Country of origin	Poland

Technical data

General

Number of levels	1
Number of connections	3
Nominal cross section	2.5 mm²
Color	green-yellow
Insulating material	PA
Flammability rating according to UL 94	V0

Ground modular terminal block - PTS 2,5-TWIN-PE - 3211935

Technical data

General

Rated surge voltage	8 kV
Overvoltage category	III
Insulating material group	I
Open side panel	Yes
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11
Back of the hand protection	guaranteed
Finger protection	guaranteed
Oscillation, broadband noise test result	Test passed
Test specification, oscillation, broadband noise	DIN EN 50155 (VDE 0115-200):2008-03
Test spectrum	Service life test category 1, class B, body mounted
Test frequency	f_1 = 5 Hz to f_2 = 150 Hz
ASD level	1.857 $(m/s^2)^2/Hz$
Acceleration	0,8 g
Test duration per axis	5 h
Test directions	X-, Y- and Z-axis
Shock test result	Test passed
Test specification, shock test	DIN EN 50155 (VDE 0115-200):2008-03
Shock form	Half-sine
Acceleration	5 g
Shock duration	30 ms
Number of shocks per direction	3
Test directions	X-, Y- and Z-axis (pos. and neg.)
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	130 °C
Static insulating material application in cold	-60 °C
Behavior in fire for rail vehicles (DIN 5510-2)	Test passed
Flame test method (DIN EN 60695-11-10)	V0
Oxygen index (DIN EN ISO 4589-2)	>32 %
NF F16-101, NF F10-102 Class I	2
NF F16-101, NF F10-102 Class F	2
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed
Calorimetric heat release NFPA 130 (ASTM E 1354)	28 MJ/kg
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3

Ground modular terminal block - PTS 2,5-TWIN-PE - 3211935

Technical data

General

Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Dimensions

Width	5.2 mm
End cover width	2.2 mm
Length	49 mm
Height NS 35/7,5	43 mm
Height NS 35/15	50.5 mm

Connection data

Note	Please observe the current carrying capacity of the DIN rails.
Connection method	Push-in connection
Connection in acc. with standard	IEC 60947-7-2
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	12
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	2.5 mm²
Min. AWG conductor cross section, flexible	26
Max. AWG conductor cross section, flexible	14
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	2.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	0.5 mm²
Stripping length	8 mm ... 10 mm
Internal cylindrical gage	A3
Stripping length	8 mm ... 10 mm

Standards and Regulations

Connection in acc. with standard	CSA
	IEC 60947-7-2
Flammability rating according to UL 94	V0
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3

Ground modular terminal block - PTS 2,5-TWIN-PE - 3211935

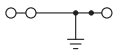
Technical data

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values

Drawings

Circuit diagram



Classifications

eCl@ss

eCl@ss 4.0	27141118
eCl@ss 4.1	27141118
eCl@ss 5.0	27141118
eCl@ss 5.1	27141118
eCl@ss 6.0	27141141
eCl@ss 7.0	27141141
eCl@ss 8.0	27141141
eCl@ss 9.0	27141141

ETIM

ETIM 2.0	EC000901
ETIM 3.0	EC000901
ETIM 4.0	EC000901
ETIM 5.0	EC000901
ETIM 6.0	EC000901

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Approvals

Approvals

Ground modular terminal block - PTS 2,5-TWIN-PE - 3211935

Approvals

Approvals

UL Recognized / cUL Recognized / RS / ABS / CSA / BV / EAC / EAC / NK / VDE approval of drawings / LR / DNV GL / IECEE CB Scheme / PRS / cULus Recognized

Ex Approvals

IECEx / ATEX

Approval details

UL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C
mm²/AWG/kcmil	26-12	26-12

cUL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C
mm²/AWG/kcmil	26-12	26-12

RS	http://www.rs-head.spb.ru/en/index.php	11.04057.250

ABS	http://www.eagle.org/eagleExternalPortalWEB/	16-HG1591536-PDA

CSA	http://www.csagroup.org/services-industries/product-listing/	13631

mm²/AWG/kcmil	26-12

BV	http://www.veristar.com/portal/veristarinfo/generalinfo/approved/approvedProducts/equipmentAndMaterials	25278/B0 BV

Ground modular terminal block - PTS 2,5-TWIN-PE - 3211935

Approvals

EAC		7500651.22.01.00246

EAC		EAC-Zulassung

NK	http://www.classnk.or.jp/hp/en/	14ME0912

VDE approval of drawings	http://www.vde.com/en/Institute/OnlineService/VDE-approved-products/Pages/Online-Search.aspx	40036433

mm²/AWG/kcmil	0.2-2.5

LR	http://www.lr.org/en	10/20040

DNV GL	http://exchange.dnv.com/tari/	TAE00000UD_01

IECEE CB Scheme	http://www.iecee.org/	DE1-55655_M2

mm²/AWG/kcmil	2.5

PRS	http://www.prs.pl/	TE/2107/880590/16

cULus Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm

Feed-through terminal block - PTS 2,5-TWIN - 3211896

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Feed-through terminal block, nom. voltage: 800 V, nominal current: 24 A, connection method: Push-in connection, number of connections: 3, cross section:0.14 mm² - 4 mm², AWG: 26 - 12, width: 5.2 mm, color: gray, mounting type: NS 35/7,5, NS 35/15

Why buy this product

- 2, 3, and 4-conductor terminal blocks with the same shape
- Ground terminal blocks of the same shape are available
- The PTS 2,5, which is equipped with four bridge shafts, offers a wide range of potential bridging options
- Angled conductor entry for use in flat terminal boxes
- Large space saving when used in concealed wiring systems

RoHS

Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 046356 499514
GTIN	4046356499514
Weight per Piece (excluding packing)	8.000 g
Custom tariff number	85369010
Country of origin	Poland

Technical data

General

Number of levels	1
Number of connections	3
Potentials	1
Nominal cross section	2.5 mm²

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Technical data

General

Color	gray
Insulating material	PA
Flammability rating according to UL 94	V0
Rated surge voltage	8 kV
Overvoltage category	III
Insulating material group	I
Maximum power dissipation for nominal condition	0.77 W
Maximum load current	28 A (with 4 mm² conductor cross section)
Nominal current I_N	24 A
Nominal voltage U_N	800 V
Open side panel	Yes
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11
Back of the hand protection	guaranteed
Finger protection	guaranteed
Result of surge voltage test	Test passed
Surge voltage test setpoint	9.8 kV
Result of power-frequency withstand voltage test	Test passed
Power frequency withstand voltage setpoint	2 kV
Result of the test for mechanical stability of terminal points (5 x conductor connection)	Test passed
Result of bending test	Test passed
Bending test rotation speed	10 rpm
Bending test turns	135
Bending test conductor cross section/weight	0.14 mm² / 0.2 kg
	2.5 mm² / 0.7 kg
	4 mm² / 0.9 kg
Tensile test result	Test passed
Conductor cross section tensile test	0.14 mm²
Tractive force setpoint	10 N
Conductor cross section tensile test	2.5 mm²
Tractive force setpoint	50 N
Conductor cross section tensile test	4 mm²
Tractive force setpoint	60 N
Result of tight fit on support	Test passed
Tight fit on carrier	NS 35
Setpoint	1 N
Result of voltage-drop test	Test passed

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Technical data

General

Requirements, voltage drop	≤ 3.2 mV
Result of temperature-rise test	Test passed
Short circuit stability result	Test passed
Conductor cross section short circuit testing	2.5 mm²
Short-time current	0.3 kA
Conductor cross section short circuit testing	4 mm²
Short-time current	0.48 kA
Result of aging test	Test passed
Ageing test for screwless modular terminal block temperature cycles	192
Result of thermal test	Test passed
Proof of thermal characteristics (needle flame) effective duration	30 s
Oscillation, broadband noise test result	Test passed
Test specification, oscillation, broadband noise	DIN EN 50155 (VDE 0115-200):2008-03
Test spectrum	Service life test category 1, class B, body mounted
Test frequency	f_1 = 5 Hz to f_2 = 150 Hz
ASD level	0.02 g²/Hz
Acceleration	0,8 g
Test duration per axis	5 h
Test directions	X-, Y- and Z-axis
Shock test result	Test passed
Test specification, shock test	DIN EN 50155 (VDE 0115-200):2008-03
Shock form	Half-sine
Acceleration	5 g
Shock duration	30 ms
Number of shocks per direction	3
Test directions	X-, Y- and Z-axis (pos. and neg.)
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Static insulating material application in cold	-60 °C
Behavior in fire for rail vehicles (DIN 5510-2)	Test passed
Flame test method (DIN EN 60695-11-10)	V0
Oxygen index (DIN EN ISO 4589-2)	>32 %
NF F16-101, NF F10-102 Class I	2
NF F16-101, NF F10-102 Class F	2
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Technical data

General

Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Dimensions

Width	5.2 mm
End cover width	2.2 mm
Length	49 mm
Height NS 35/7,5	43 mm
Height NS 35/15	50.5 mm

Connection data

Connection method	Push-in connection
Connection in acc. with standard	IEC 60947-7-1
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	12
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	2.5 mm²
Min. AWG conductor cross section, flexible	26
Max. AWG conductor cross section, flexible	14
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	2.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	0.5 mm²
Stripping length	8 mm ... 10 mm
Internal cylindrical gage	A3
Stripping length	8 mm ... 10 mm

Standards and Regulations

Connection in acc. with standard	CSA
	IEC 60947-7-1
Flammability rating according to UL 94	V0
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Technical data

Standards and Regulations

Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values

Drawings

Circuit diagram

Classifications

eCl@ss

eCl@ss 4.0	27141121
eCl@ss 4.1	27141121
eCl@ss 5.0	27141120
eCl@ss 5.1	27141120
eCl@ss 6.0	27141120
eCl@ss 7.0	27141120
eCl@ss 8.0	27141120
eCl@ss 9.0	27141120

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC000897
ETIM 5.0	EC000897
ETIM 6.0	EC000897

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Approvals

Approvals

Approvals

UL Recognized / cUL Recognized / RS / ABS / NK / CSA / BV / EAC / EAC / VDE approval of drawings / LR / PRS / DNV GL / IECEE CB Scheme / cULus Recognized

Ex Approvals

Approval details

UL Recognized		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C
mm²/AWG/kcmil	26-12	26-12
Nominal current IN	20 A	20 A
Nominal voltage UN	600 V	600 V

cUL Recognized		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C
mm²/AWG/kcmil	26-12	26-12
Nominal current IN	20 A	20 A
Nominal voltage UN	600 V	600 V

RS		http://www.rs-head.spb.ru/en/index.php	11.04057.250

ABS		http://www.eagle.org/eagleExternalPortalWEB/	16-HG1591536-PDA

NK		http://www.classnk.or.jp/hp/en/	14ME0912

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Approvals

CSA		http://www.csagroup.org/services-industries/product-listing/	13631

	B	C
mm²/AWG/kcmil	26-12	26-12
Nominal current IN	20 A	20 A
Nominal voltage UN	600 V	600 V

BV		http://www.veristar.com/portal/veristarinfo/generalinfo/approved/approvedProducts/equipmentAndMaterials	25278/B0 BV
EAC			7500651.22.01.00246
EAC			EAC-Zulassung
VDE approval of drawings		http://www.vde.com/en/Institute/OnlineService/VDE-approved-products/Pages/Online-Search.aspx	40032222

mm²/AWG/kcmil	0.2-2.5
Nominal current IN	24 A
Nominal voltage UN	800 V

LR		http://www.lr.org/en	10/20040
PRS		http://www.prs.pl/	TE/2107/880590/16
DNV GL		http://exchange.dnv.com/tari/	TAE00000UD_01

Feed-through terminal block - PTS 2,5-TWIN - 3211896

Approvals

IECEE CB Scheme		http://www.iecee.org/	DE1-55660/M2

mm²/AWG/kcmil	0.2-2.5
Nominal voltage UN	800 V

cULus Recognized		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm

End cover - D-STS 2,5 - 3031762

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End cover, length: 51 mm, width: 2.2 mm, height: 43 mm, color: gray

RoHS

Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 017918 193355
GTIN	4017918193355
Weight per Piece (excluding packing)	1.956 g
Custom tariff number	85389099
Country of origin	Germany

Technical data

General

Color	gray
Material	PA
Flammability rating according to UL 94	V0

Dimensions

Width	2.2 mm
Length	51 mm
Height	43 mm

General

Relative insulation material temperature index (Elec., UL 746 B)	130 °C

End cover - D-STS 2,5 - 3031762

Technical data

General

Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Static insulating material application in cold	-60 °C
Behavior in fire for rail vehicles (DIN 5510-2)	Test passed
Flame test method (DIN EN 60695-11-10)	V0
Oxygen index (DIN EN ISO 4589-2)	>32 %
NF F16-101, NF F10-102 Class I	2
NF F16-101, NF F10-102 Class F	2
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Standards and Regulations

Flammability rating according to UL 94	V0
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141145
eCl@ss 5.1	27141145
eCl@ss 6.0	27141133
eCl@ss 7.0	27141133
eCl@ss 8.0	27141133
eCl@ss 9.0	27141133

End cover - D-STS 2,5 - 3031762

Classifications

ETIM

ETIM 2.0	EC000886
ETIM 3.0	EC000886
ETIM 4.0	EC000886
ETIM 5.0	EC000886
ETIM 6.0	EC000886

UNSPSC

UNSPSC 6.01	30211827
UNSPSC 7.0901	39121424
UNSPSC 11	39121424
UNSPSC 12.01	39121424
UNSPSC 13.2	39121425

End clamp - CLIPFIX 35 - 3022218

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Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, width: 9.5 mm, color: gray

Why buy this product

- Phoenix Contact has engineered its CLIPFIX end brackets to maintain a secure grip on the various DIN rail systems
- Design width of just 9.5 mm
- Large-surface labeling

RoHS

Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 017918 156541
GTIN	4017918156541
Weight per Piece (excluding packing)	6.390 g
Custom tariff number	85389099
Country of origin	Poland

Technical data

Dimensions

Length (b)	55.6 mm
Width (a)	9.5 mm

General

Color	gray
Flammability rating according to UL 94	V2

End clamp - CLIPFIX 35 - 3022218

Technical data

General

Material	PA
Result	Test passed
Oxygen index (DIN EN ISO 4589-2)	>32 %
Class I	2
Class F	2
Surface flammability (ASTM E 162)	passed
Specific optical density of smoke (ASTM E 662)	passed
Smoke gas toxicity (SMP 800C)	passed
Heat dissipation calorimetric (ASTM E 1354)	27,5 MJ/kg
R22	HL 1 - HL 3
R23	HL 1 - HL 3
R24	HL 1 - HL 3
R26	HL 1 - HL 3

Standards and Regulations

Flammability rating according to UL 94	V2
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141135
eCl@ss 5.1	27141135
eCl@ss 6.0	27141135
eCl@ss 7.0	27141135
eCl@ss 8.0	27141135
eCl@ss 9.0	27141135

End clamp - CLIPFIX 35 - 3022218

Classifications

ETIM

ETIM 2.0	EC000761
ETIM 3.0	EC001041
ETIM 4.0	EC001041
ETIM 5.0	EC001041
ETIM 6.0	EC001041

UNSPSC

UNSPSC 6.01	30212109
UNSPSC 7.0901	39121708
UNSPSC 11	39121708
UNSPSC 12.01	39121708
UNSPSC 13.2	39121425

Modular Style Time Delay Relays

TE-8812U 901-0000-281

FEATURES

Up to 10 Functions

Broad Timing Range (from 0.1 sec to 10 days)
Contact Configuration
Universal Power Supply
2 LED Status Indicators
Only 17.5 mm Wide
DIN Rail Mountable
RoHS Compliant

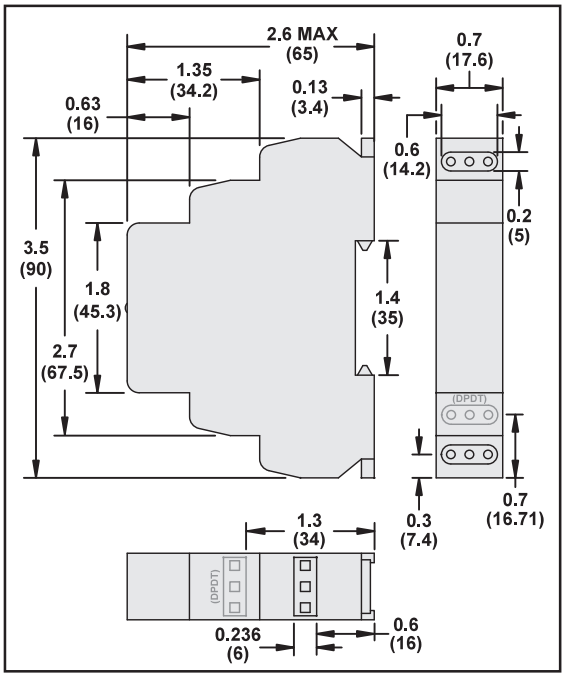
BENEFITS

5 Timing Functions Controlled via Supply Voltage
4 Timing Functions Controlled via Trigger Input
1 Timing Function of Memory Latching Relay
Meets Most Timing Requirements
SPDT or DPDT
12 to 240 VAC/VDC
Indicates Coil Status at a Glance
Ideal for Tight Spaces
Easy Installation / No Tools
Environmentally Friendly

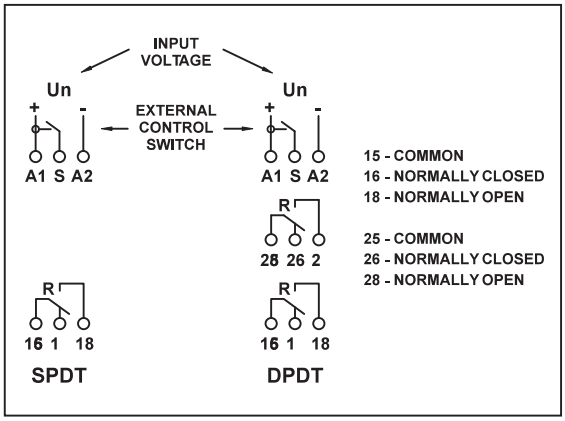
This device is designed for connection of 1-phase voltage, 12-240 V AC/DC and must be installed according to norms valid in existing state. Connections must be made according to details in this instruction sheet. Installation, connections, setting and servicing should be performed by qualified electrician staff, who understands this instruction sheet and functions of respective device.

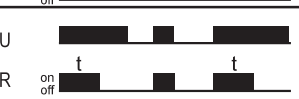
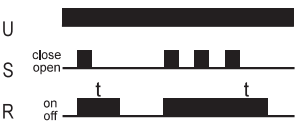
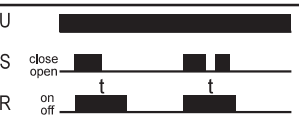
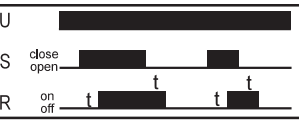
Before starting installation ensure that the main switch is in "OFF" position and there should be no power going to the device. Qualified installer must also ensure the device is being installed into a temperature controlled environment which will guarantee not to exceed the specified maximum operating temperature. For installation use a screwdriver with 2 mm tip.

DIMENSIONS INCHES (MILLIMETERS)



WIRING DIAGRAMS



Function	Operation	Timing Chart
A. ON DELAY Power On	When the input voltage U is applied, timing delay t begins. Relay contacts R change state after time delay is complete. Contacts R return to their shelf state when input voltage U is removed. Trigger switch is not used in this function.	
B. REPEAT CYCLE Starting Off	When input voltage U is applied, time delay t begins. When time delay t is complete, relay contacts R change state for time delay t. This cycle will repeat until input voltage U is removed. Trigger switch is not used in this function.	
C. INTERVAL Power On	When input voltage U is applied, relay contacts R change state immediately and timing cycle begins. When time delay is complete, contacts return to shelf state. When input voltage U is removed, contacts will also return to their shelf state. Trigger switch is not used in this function.	
D. OFF DELAY S Break	Input voltage U must be applied continuously. When trigger S is closed, relay contacts R change state. When trigger S is opened, delay t begins. When delay t is complete, contacts R return to their shelf state. If trigger S is closed before time delay t is complete, then time is reset. When trigger S is opened, the delay begins again, and relay contacts remain in their energized state. If input voltage U is removed, relay contacts R return to their shelf state.	
E. RETRIGGE-RABLE ONE SHOT	Upon application of input voltage U, the relay is ready to accept trigger signal S. Upon application of the trigger signal S, the relay contacts R transfer and the preset time t begins. At the end of the preset time t, the relay contacts R return to their normal condition unless the trigger signal S is opened and closed prior to time out t (before preset time elapses). Continuous cycling of the trigger signal S at a rate faster than the preset time will cause the relay contacts R to remain closed. If input voltage U is removed, relay contacts R return to their shelf state.	
F. REPEAT CYCLE Starting On	When input voltage U is applied, relay contacts R change state immediately and time delay t begins. When time delay t is complete, contacts return to their shelf state for time delay t. This cycle will repeat until input voltage U is removed. Trigger switch is not used in this function.	
G. PULSE GENERATOR	Upon application of input voltage U, a single output pulse of 0.5 seconds is delivered to relay after time delay t. Power must be removed and reapplied to repeat pulse. Trigger switch S is not used in this function.	
H. ONE SHOT	Upon application of input voltage U, the relay is ready to accept trigger signal S. Upon application of the trigger signal S, the relay contacts R transfer and the preset time t begins. During time-out, the trigger signal S is ignored. The relay resets by applying the trigger signal S when the relay is not energized.	
I. ON/OFF DELAY S Make/Break	Input voltage U must be applied continuously. When trigger S is closed, time delay t begins. When time delay t is complete, relay contacts R change state and remain transferred until trigger S is opened. If input voltage U is removed, relay contacts R return to their shelf state.	
J. MEMORY LATCH S Make	Input voltage U must be applied continuously. Output changes state with every trigger S closure. If input voltage U is removed, relay contacts R return to their shelf state.	

Modular Style Time Delay Relays

TE-8812U 901-0000-281

The device is constructed for 1-phase main and must be installed in accordance with regulations and standards applicable in the country of use. While installing the device, follow the instructions in this manual and on the cover packaging of the device. Do not operate the device out of the specified range of technical parameters. Installation and launching can be done only by a person with an adequate electro-technical qualifi cation who is accredited for this work and is informed about this manual and functions of this device. The person who performs the installation is responsible for correct and safe installation of this device. Keep in mind that this is a fully electronic device when mounting. Non problematic functioning of the device also depends on the previous way of transportation, storing and handling. If you find any signs of damage, deformation, malfunction or a missing part, do not install this device and claim it at its seller. After the expiration date of the product it is suggested to dismount, recycle, and store it at protected dumping site.

1) Protection of the device
- the device contains protection against over-voltage peaks, and disturbing surges in the mains. To ensure correct functioning of these protective elements, suitable protection of higher degree (A,B,C) must be present in the installation, and screening of switched devices (contactors, motors, inductive loads etc.) must be applied.
- ensure protection of the device by adequate elements of over-current and over-voltage fuses.

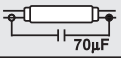
2) Operating conditions
- while installing this device , consider ambient temperature rate , so the operation temperature stated in the manual is maintained.
- ensure air circulation so the operation temperature is not exceeded in any case.
- to ensure the stated operating life and correct functioning of the device, it is not recommended to expose it to extreme influences that can negatively affect correct functioning; permanent exposure to temperatures (see technical parameters), aggressive evaporates of chemicals, high relative humidity above 95%, strong electromagnetic field or microwave radiation etc.
- all our products are in compliance with requirements of EMC (electromagnetic immunity and resistance) and in accordance with governmental regulation, however it is necessary to pay attention while connecting products to the circuit with appliances that create electromagnetic disturbances (nearby conductors, motors, or power cables). It is recommended to have the connection wires of a product (supply and operating inputs) as short as possible. In case of connecting product into a circuit with inductive loads, it is necessary to protect the product by adequate external RC varistors or surge voltage protectors.

3) Handling and use
- use a screwdriver with an approximate tip width of 2mm for installation and setting.
- so the inner construction of the device is not damaged, do not use brute force to screw input terminals (maximally 0.8N/m), and do not use excessive force on the holding parts of terminals.
- protect the device from drops and excessive vibrations.
- do not overload relay output contacts, mainly while using loads of another category than AC-1.
- if contacts of relay weld while switching large loads, it is necessary to use a contactor or power relay rated for required load in the installation.

All timers and monitoring relays in our assortment are equipped by protective elements against possible over-voltage in the mains. The nominal voltage of applied varistors is 275V. During short-time over-voltage peaks, the varistor lowers its leakage resistance and accumulates the grown over-voltage peaks. In case this over-voltage has a character of short-time peak, varistor is able to react repeatedly this way and thus non-destructively protect a device against these negative in fluences. Other protective elements that are used in devices are Zener diodes, which eliminate over-voltage pulses, and are installed in supply and input circuits of the device (for example when switching inductive loads). In case of switching loads of inductive character, it is recommended to separate supply of output elements (motors, contactors, etc.) from supply of monitoring and controlling inputs.

SPECIFICATIONS @ 25°C (UL 508)

OUTPUT CHARACTERISTICS		
Number and type of contacts		SPDT or DPDT
Contact material		Silver alloy
Current rating		15 A @ 240 VAC,
Switching voltage		240 V 50/60 Hz
		1/2 HP @ 120 V 50/60 Hz
		1 HP @ 240 V 50/60 Hz
		B300 pilot duty
Minimum switching requirement		100 mA
Indication		Red LED
INPUT CHARACTERISTICS		
Voltage range		12 to 240 V 50/60 Hz/ VDC
Operating range (% of nominal)		85% to 110%
Maximum consumption		3 VA (AC)
		1.7 W (DC)
Indication		Green LED
TIMING CHARACTERISTICS		
Functions available		10
Time scales		10
Time ranges		0.1 sec to 10 days
Tolerance (mechanical setting)		5%
Repeatability (constant voltage and temperature)		0.2%
Reset time (maximum)		150 ms
Trigger pulse length (minimum)		50 ms
PERFORMANCE CHARACTERISTICS		
Electrical life (operations @ rated current)		100,000 cycles (resistive)
Mechanical life (unpowered)		10,000,000 cycles
Dielectric strength	Input to contacts	2500 VAC
	Between open contacts	1000 VAC
Terminal wire capacity		14 AWG (2.1 mm2)
Terminal torque (maximum)		7.1 lbf in (0.8 Nm)
Field Wiring		75C Conductors
ENVIRONMENT		
Product certifications		UL, CE, RoHS
Ambient air temperature	Storage	-30 to +70 °C (-22 to +158 °F)
Around the device	Operation	-20 to +55 °C (-4 to +131 °F)
Degree of protection		IP 20
Weight		65 grams (2.3 oz)

RELAY CONTACT 15 A	LOAD								
						AC1A	C3	AC15	DC1 (24/110/220 V)
AgNi	1000 W					4000 VA	0.9 kW	750 VA	15 A/0.5 A/0.35 A

HAMMOND MANUFACTURING

Quality Products. Service Excellence.

Polycarbonate HMI Hinged Cover Kits *PJHMI Series*

Features

- Provides protection for instruments or electronics requiring routine attention or detail.
- Available in light gray solid opaque or polycarbonate thermoplastic clear covers.
- Cover Latching Options - hinged screw cover, tamper proof screw cover, and snap latch with pad lock feature.
- Listed UL component for use with enclosures rated Types 1, 3, 3R, 4, 4X, 12 or 13.
- CSA listed Type 1, 3, 3R, 4, 4X, 12 or 13.
- 316 stainless steel hinge pin.
- UV stabilized for outdoor use.
- Formed-In-Place (FIP) polyurethane gasket in continuous channel.
- Designed for use with wall thicknesses from 16 gauge through 1/4"
- #10-32 threaded brass inserts with plated steel mounting fasteners.
- Service temperature -31°F (-35°C) to 266°F (130°C)

Accessories

- HMI Cover Prop Arm

				Frame Size Dimensions			Viewing Area	
Clear Cover	Opaque Cover	Optional Prop Arm	Closure Style	H	W	D	H	W
PJHMI66CCH	PJHMI66H	PJHMIPROP66	Screw Cover	6.50	6.72	2.27	4.47	4.69
PJHMI66CCHTP	PJHMI66HTP	PJHMIPROP66	Tamperproof Screw Cover	6.50	6.72	2.27	4.47	4.69
PJHMI66CCL	PJHMI66L	PJHMIPROP66	Snap Latch Cover	6.50	6.72	2.27	4.47	4.69
PJHMI86CCH	PJHMI86H	PJHMIPROP86	Screw Cover	8.50	6.72	2.27	6.47	4.69
PJHMI86CCHTP	PJHMI86HTP	PJHMIPROP86	Tamperproof Screw Cover	8.50	6.72	2.27	6.47	4.69
PJHMI86CCL	PJHMI86L	PJHMIPROP86	Snap Latch Cover	8.50	6.72	2.27	6.47	4.69

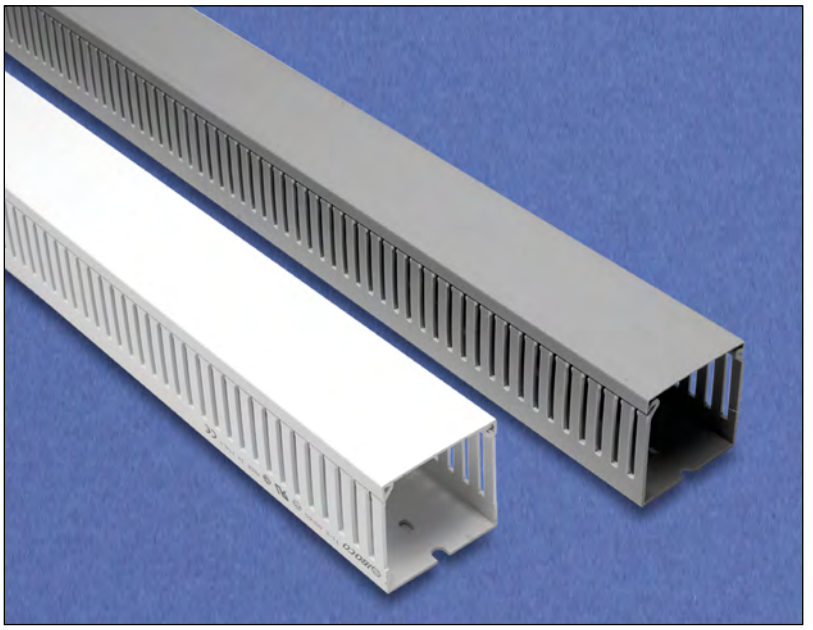
PJHMI1614CCH

Clear Cover	Opaque Cover	Optional Prop Arm	Closure Style	Frame Size Dimensions H	W	D	Viewing Area H	W
PJHMI88CCH	PJHMI88H	PJHMIPROP88	Screw Cover	7.93	8.15	2.27	6.47	6.69
PJHMI88CCHTP	PJHMI88HTP	PJHMIPROP88	Tamperproof Screw Cover	7.93	8.15	2.27	6.47	6.69
PJHMI88CCL	PJHMI88L	PJHMIPROP88	Snap Latch Cover	7.93	8.15	2.27	6.47	6.69
PJHMI108CCH	PJHMI108H	PJHMIPROP108	Screw Cover	9.93	8.15	2.27	8.47	6.69
PJHMI108CCHTP	PJHMI108HTP	PJHMIPROP108	Tamperproof Screw Cover	9.93	8.15	2.27	8.47	6.69
PJHMI108CCL	PJHMI108L	PJHMIPROP108	Snap Latch Cover	9.93	8.15	2.27	8.47	6.69
PJHMI1210CCH	PJHMI1210H	PJHMIPROP1210	Screw Cover	11.93	10.15	2.27	10.47	8.69
PJHMI1210CCHTP	PJHMI1210HTP	PJHMIPROP1210	Tamperproof Screw Cover	11.93	10.15	2.27	10.47	8.69
PJHMI1210CCL	PJHMI1210L	PJHMIPROP1210	Snap Latch Cover	11.93	10.15	2.27	10.47	8.69
PJHMI1412CCH	PJHMI1412H	PJHMIPROP1412	Screw Cover	13.95	12.07	2.20	12.49	10.71
PJHMI1412CCHTP	PJHMI1412HTP	PJHMIPROP1412	Tamperproof Screw Cover	13.95	12.07	2.20	12.49	10.71
PJHMI1412CCL	PJHMI1412L	PJHMIPROP1412	Snap Latch Cover	13.95	12.07	2.20	12.49	10.71
PJHMI1614CCH	PJHMI1614H	PJHMIPROP1614	Screw Cover	16.01	14.23	2.27	14.49	12.71
PJHMI1614CCHTP	PJHMI1614HTP	PJHMIPROP1614	Tamperproof Screw Cover	16.01	14.23	2.27	14.49	12.71
PJHMI1614CCL	PJHMI1614L	PJHMIPROP1614	Snap Latch Cover	16.01	14.23	2.27	14.49	12.71
PJHMI2016CCH	PJHMI2016H	PJHMIPROP2016	Screw Cover	20.50	16.72	2.27	18.49	14.71
PJHMI2016CCHTP	PJHMI2016HTP	PJHMIPROP2016	Tamperproof Screw Cover	20.50	16.72	2.27	18.49	14.71
PJHMI2016CCL	PJHMI2016L	PJHMIPROP2016	Snap Latch Cover	20.50	16.72	2.27	18.49	14.71

Tags: **window kit**, **hinged**, **solid cover**, **polycarbonate**, **prop arm**, **snap latch**, **screw cover**, **tamperproof**, *Data subject to change without notice*

T1E-1022W
T1E-2222W

Wiring Duct – T1E Thin Finger Series



UL file E123572

Overview

The T1E series of thin-finger wiring duct is made of rigid PVC and carries a UL 94V-0 flammability rating. All our wiring duct comes complete with cover. Replacement duct covers can be purchased separately.

Features

- Thin finger design for compact wiring configurations
- Provided with standard mounting holes
- Rounded, burr-free edges will not cut installers' hands or wiring insulation
- Non-slip cover
- Narrow thin finger design is compatible with thinner screwless terminal blocks
- Flush cover design holds 10 - 12 percent more wires than traditional designs
- Restricted slot design retains wires in slot for fast, easy wire installation or removal
- Two predetermined break lines, one for breaking off and removal of sidewall finger segments only, and another for removal of sidewall finger and base segments
- Patented recess boss for rapid mounting of components

Gray Open Slot Rigid PVC (including cover)

Catalog Number Standard Carton	Package Quantity	Price	Catalog Number Single Piece Pkg	Package Quantity	Price
T1E-1015G	18		T1E-1015G-1	1	
T1E-1022G	24		T1E-1022G-1	1	
T1E-1030G	24		T1E-1030G-1	1	
T1E-1515G	20		T1E-1515G-1	1	
T1E-1522G	18		T1E-1522G-1	1	
T1E-1530G	16		T1E-1530G-1	1	
T1E-1540G	8		T1E-1540G-1	1	
T1E-2215G	12		T1E-2215G-1	1	
T1E-2222G	12		T1E-2222G-1	1	
T1E-2230G	12		T1E-2230G-1	1	
T1E-2240G	4		T1E-2240G-1	1	
T1E-3015G	12		T1E-3015G-1	1	
T1E-3022G	12		T1E-3022G-1	1	
T1E-3030G	12		T1E-3030G-1	1	
T1E-3040G	4		T1E-3040G-1	1	
T1E-4015G	8		T1E-4015G-1	1	
T1E-4022G	8		T1E-4022G-1	1	
T1E-4030G	8		T1E-4030G-1	1	
T1E-4040G	4		T1E-4040G-1	1	

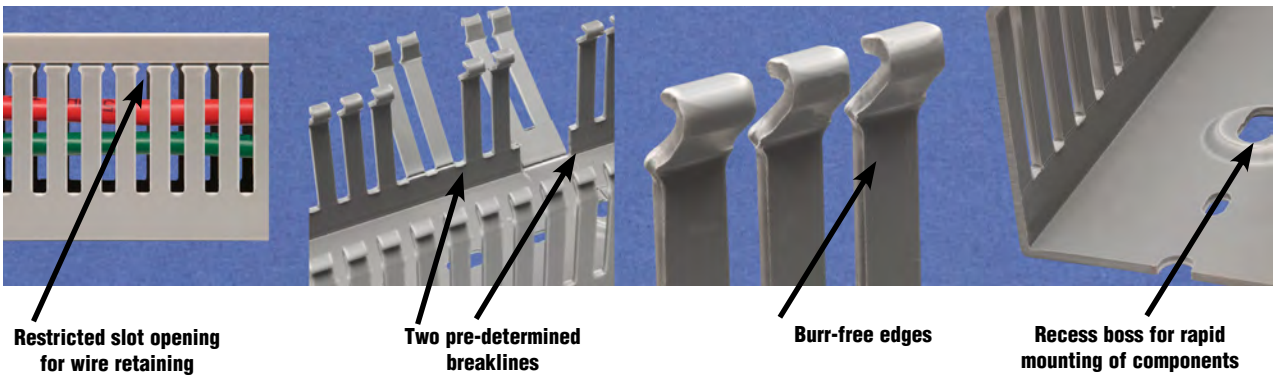
White Open Slot Rigid PVC (including cover)

Catalog Number Standard Carton	Package Quantity	Price	Catalog Number Single Piece Pkg	Package Quantity	Price
T1E-1015W	18		T1E-1015W-1	1	
T1E-1022W	24		T1E-1022W-1	1	
T1E-1030W	24		T1E-1030W-1	1	
T1E-1515W	20		T1E-1515W-1	1	
T1E-1522W	18		T1E-1522W-1	1	
T1E-1530W	16		T1E-1530W-1	1	
T1E-1540W	8		T1E-1540W-1	1	
T1E-2222W	12		T1E-2222W-1	1	
T1E-2230W	12		T1E-2230W-1	1	
T1E-2240W	4		T1E-2240W-1	1	
T1E-3022W	12		T1E-3022W-1	1	
T1E-3030W	12		T1E-3030W-1	1	
T1E-3040W	4		T1E-3040W-1	1	
T1E-4030W	8		T1E-4030W-1	1	
T1E-4040W	4		T1E-4040W-1	1	

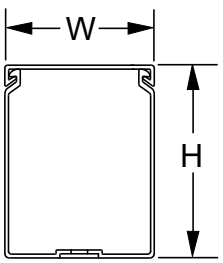
Note: All T1E duct comes in 6.56 feet (2m) lengths.

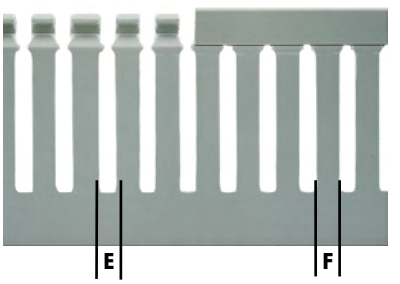
T1E-1022W
T1E-2222W

Wiring Duct – T1E Thin Finger Series



Dimensions





Open Slot Rigid PVC (including cover) Dimensions				
Nominal Size (WxH) inches (mm)	*Catalog Part Number*	*Actual Size (WxH) inches (mm)*	*Dimension E inches (mm)*	*Dimension F inches (mm)*
1.00 x 1.50 (25.4 x 38.1)	***T1E-1015****	1.00 x 1.57 (25 x 40)	0.16 (4.06)	0.24 (6.10)
1.00 x 2.25 (25.4 x 57.15)	***T1E-1022****	1.00 x 2.36 (25 x 60)	0.16 (4.06)	0.24 (6.10)
1.00 x 3.00 (25.4 x 76.2)	***T1E-1030****	1.00 x 3.15 (25 x 80)	0.16 (4.06)	0.24 (6.10)
1.50 x 1.50 (38.1 x 38.1)	***T1E-1515****	1.57 x 1.57 (40 x 40)	0.16 (4.06)	0.24 (6.10)
1.50 x 2.25 (38.1 x 57.15)	***T1E-1522****	1.57 x 2.36 (40 x 60)	0.16 (4.06)	0.24 (6.10)
1.50 x 3.00 (38.1 x 76.2)	***T1E-1530****	1.57 x 3.15 (40 x 80)	0.16 (4.06)	0.24 (6.10)
1.50 x 4.00 (38.1 x 101.6)	***T1E-1540****	1.57 x 3.94 (40 x 100)	0.16 (4.06)	0.24 (6.10)
2.25 x 1.50 (57.15 x 38.1)	***T1E-2215G***	2.36 x 1.57(60 x 40)	0.16 (4.06)	0.24 (6.10)
2.25 x 2.25 (57.15 x 57.15)	***T1E-2222****	2.36 x 2.36 (60 x 60)	0.16 (4.06)	0.24 (6.10)
2.25 x 3.00 (57.15 x 76.2)	***T1E-2230****	2.36 x 3.15 (60 x 80)	0.16 (4.06)	0.24 (6.10)
2.25 x 4.00 (57.15 x 101.6)	***T1E-2240****	2.36 x 3.94 (60 x 100)	0.16 (4.06)	0.24 (6.10)
3.00 x 1.50 (76.2 x 38.1)	***T1E-3015G***	3.15 x 1.57 (80 x 40)	0.16 (4.06)	0.24 (6.10)
3.00 x 2.25 (76.2 x 57.15)	***T1E-3022****	3.15 x 2.36 (80 x 60)	0.16 (4.06)	0.24 (6.10)
3.00 x 3.00 (76.2 x 76.2)	***T1E-3030****	3.15 x 3.15 (80 x 80)	0.16 (4.06)	0.24 (6.10)
3.00 x 4.00 (76.2 x 101.6)	***T1E-3040****	3.15 x 3.94 (80 x 100)	0.16 (4.06)	0.24 (6.10)
4.00 x 1.50 (101.6 x 38.1)	***T1E-4015G***	3.94 x 1.57 (100 x 40)	0.16 (4.06)	0.24 (6.10)
4.00 x 2.25 (101.6 x 57.15)	***T1E-4022G***	3.94 x 2.36 (100 x 60)	0.16 (4.06)	0.24 (6.10)
4.00 x 3.00 (101.6 x 76.2)	***T1E-4030****	3.94 x 3.15 (100 x 80)	0.16 (4.06)	0.24 (6.10)
4.00 x 4.00 (101.6 x 101.6)	***T1E-4040****	3.94 x 3.94 (100 x 100)	0.16 (4.06)	0.24 (6.10)

***Color: add suffix "G" for light Gray**
add suffix "W" for White
***Package: add "-1" for single piece package**

Note: All T1E duct comes in 6.56 feet (2m) lengths.

Wiring Duct – T1E Thin Finger Series
Wire Fill Capacity

Wire Fill Capacity						
Nominal Duct Size (in inches)	12 AWG	14 AWG		16AWG	18 AWG	22 AWG
	Insulation Thickness (in inches)					
	1/32	3/64	1/32	1/32	1/32	1/64
	OD-0.158	OD-0.165	OD-0.139	OD-0.125	OD-0.113	OD-0.065
	Recommended Maximum Number of Wires per Wiring Duct (based on 50% fill capacity)					
1 x 1 1/2	31	28	39	48	59	180
1 x 2 1/4	45	40	57	71	85	261
1 x 3	59	53	75	92	113	341
1 1/2 x 1 1/2	51	46	65	81	99	299
1 1/2 x 2 1/4	77	70	98	121	148	449
1 1/2 x 3	102	92	130	160	196	593
1 1/2 x 4	125	113	159	197	241	729
2 1/4 x 1 1/2	78	70	99	123	150	453
2 1/4 x 2 1/4	114	103	146	180	221	667
2 1/4 x 3	156	141	199	246	302	912
2 1/4 x 4	194	176	247	306	375	1132
3 x 1 1/2	105	95	134	165	203	612
3 x 2 1/4	159	144	203	251	307	928
3 x 3	214	193	272	337	412	1246
3 x 4	267	242	341	421	515	1558
4 x 1 1/2	132	120	169	208	255	771
4 x 2 1/4	201	182	256	316	387	1171
4 x 3	270	244	344	425	520	1573
4 x 4	336	305	429	531	650	1963

Overview

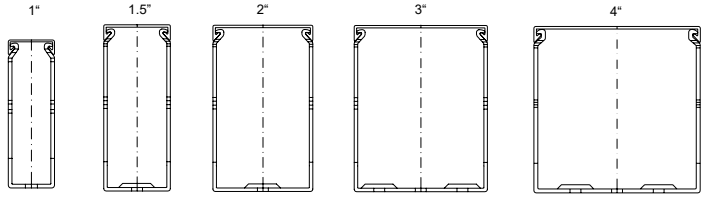
The base perforation of the T1E wiring duct series allows mounting on the panel with rivets (R6 or R4), or on DIN rail.

The recess bosses in the base permit rapid mounting of wire retainers (CL series), inserts (ZP2), and separators (SEP series) inside the wiring duct.

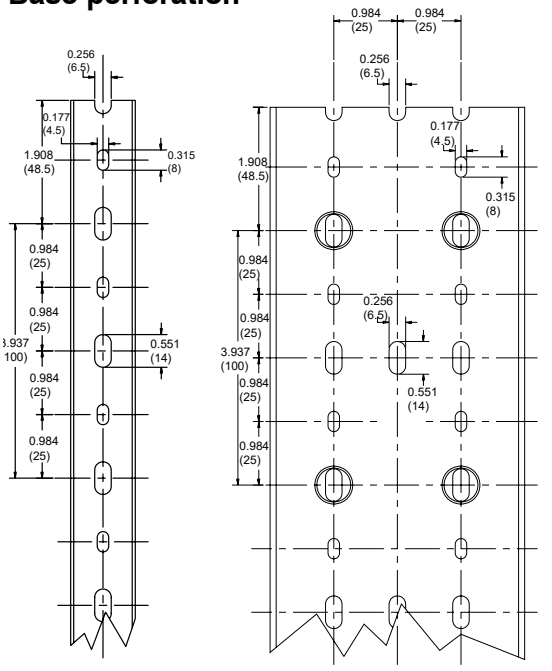
Note: Duct base perforation according to DIN 43659 and DIN VDE 0660 TEIL 506.

Dimensions

front section



Base perforation



1", 1.5", 2" wide **3" and 4" wide**

Wiring Duct – Material Specifications

Material Specifications								
Materials / **Technical Characteristics**	**Test Standard**	**Unit of Measure**	**Rigid PVC**	**Polypropylene**	**PVC Molded Components**	**Polyamide 6**	**Polyethylene**	**Flame Retardant Polyethylene**
Chemical/Physical Properties								
Specific Gravity	ASTM D792	g/cm^3	1.55	1.01	1.32	1.14	0.92	0.97
H_2O 73.4°F Absorption	ISO 62	%	<0.1	0.02	<0.1	2.5	<0.1	<0.1
Formaldehyde	–	ppm	absent	absent	absent	absent	absent	absent
Cadmium	–	ppm	absent	absent	absent	absent	absent	absent
Mechanical Properties								
Tensile Stress at Break	ASTM D638	MPa	39	28	30	45	17	15
Traction Strength	ASTM D638	MPa	44	27	27	55	9.5	9
Elongation at Break	ASTM D638	%	130	200	97	250	400	600
Modulus of Elasticity at Traction	ASTM D638	MPa	4400	n/a	–	950	–	240
Modulus of Elasticity at Flexion	ASTM D790	MPa	3200	2100	–	1100	210	130
Thermal Properties								
Temperature VICAT	ASTM D1525	°C	84	95	70	198	89	–
HDT	ASTM D648	°C	72	60	60	185	–	–
Coefficient of Expansion	ASTM D696	K^{-1}	$6\ 10^{-5}$	10^{-5}	$8\ 10^{-5}$	$8\text{-}10\ 10^{-5}$	$22\ 10^{-5}$	10^{-5}
Specific Heat	ASTM C351	kJ/kgK	0.94	n/a	1.24	1.7	–	–
Thermal Conductivity	ASTM C177	W/mK	0.14	0.21	0.14	0.29	0.32	0.32
Electrical Properties								
Dielectric Constant	ASTM D150	–	3.2 - 4.0	2.5	3.2	5.0	2.4	2.3
Dielectric Strength	IEC 243	kV/mm	70	25	60	35	90	90
Surface Resistance	IEC 93	Ω	10^{13}	10^{13}	10^{13}	$5\ 10^{11}$	10^{13}	10^{13}
Self-Extinguishing								
Self-Extinguishing UL 94 1.6 mm	UL 94	–	V-0	V-0	V-0	V-2	HB	V-2
Self-Extinguishing UL 94 3.2 mm	UL 94	–	V-0	V-0	V-0	V-2	HB	V-2
Hot Wire Test (2 mm)	IEC 695-2-1	°C	960	960	960	650	650	850
Oxygen Number	ASTM D2863	%	43	30	34	25	–	25

4G Cabled Antenna

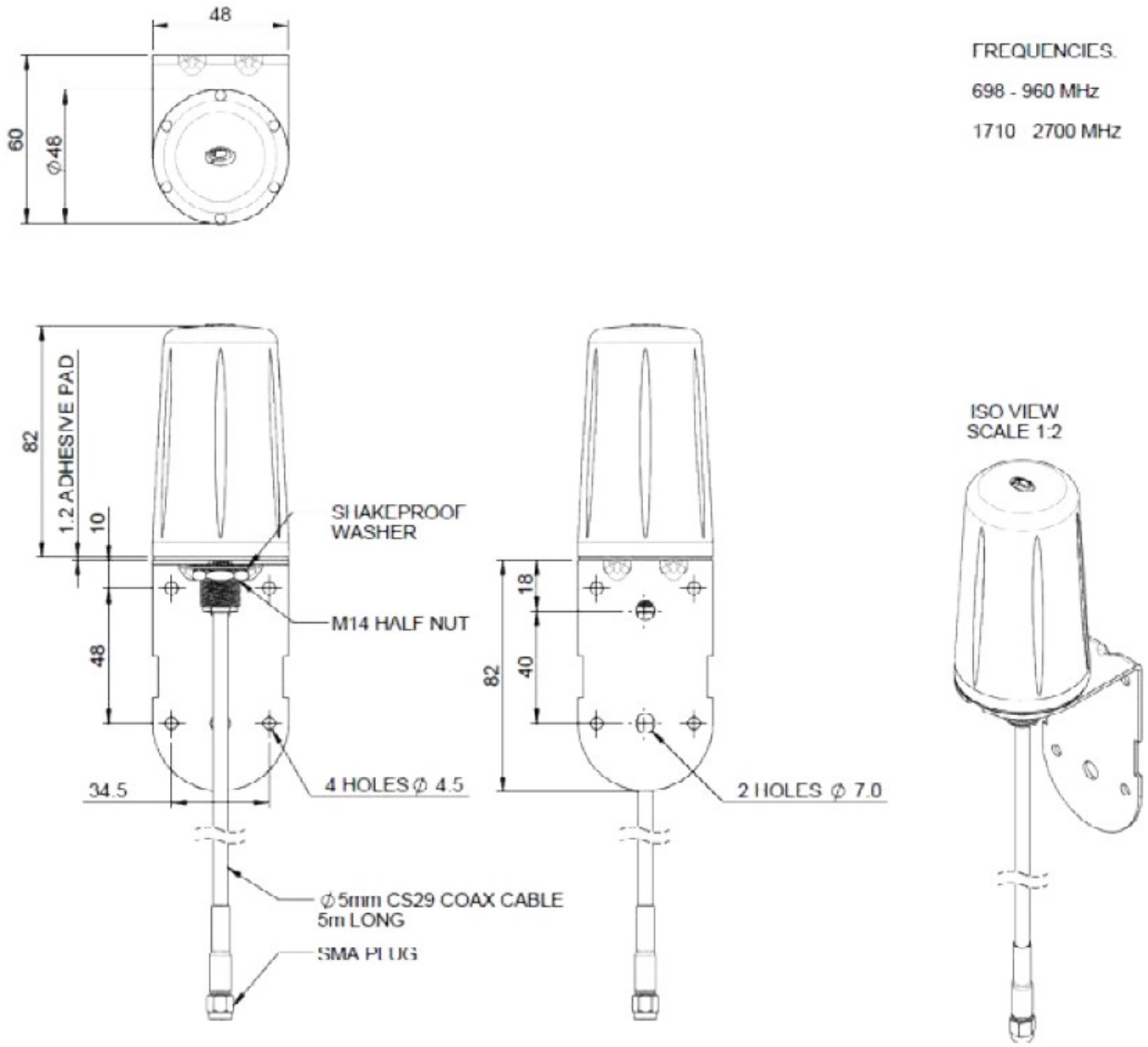
1.1. Material description

This antenna is an omni-directional broad band antenna for 4G/3G/2G eWON devices

The design of the mounting bracket enables simple wall mounting using the supplied screws and wall plugs or mast mounting using a pipe clip or cable ties (not supplied).

The omni-directional radiation pattern allows easy placement of the antenna in an elevated position.

1.2. Technical Drawing



1.3. Specifications

Electrical Data		
Frequency Range (MHz)	698-960, 1710-2700	
Operational Band	LTE 700 ; AMPS / GSM850 ; GSM900 ; GSM1800 ; PCS1900 ; 3G UMTS ; 2.4GHz WIFI ; 2.6GHz LTE	
VSWR	< 2.5:1	
Peak Gain: Isotropic	698-960MHz	2dBi
	1710-2700MHz	4dBi
Radiated Efficiency	> 70%	
Pattern	Omni-directional	
Polarisation	Vertical	
Impedance	50Ω	
Max Input Power (W)	60	

Mechanical Data		
Dimensions (mm)	Height Mounted	164 (6.46")
	Diameter	48 (1.89")
Operating Temp (°C)	-40°/+80°C (-40°/176°F)	
Material	ABS., Aluminium and Galvanised Steel	
Colour	Black & Natural	

Mounting Data		
Fixing	Wall mount or Mast mount	
Mounting Bracket (mm)	Height	82 (3,2")
	Recommended Screw Fixings	4 (0,16")

Cable Data	
Type	CS29
Diameter	5 (1,9")
Length (m)	5 (16'4")
Termination	SMA plug

1.4. Part Number

Item	EWON P/N	Manufacturer	Manufacturer P/N
Antenna + Cable + Mounting Bracket	FAC90901_0100	Panorama Antennas	B4BE-7-27-5SP

1.5. References

All the above content is based on the Panorama Antennas documentation:
www.panorama-antennas.com

Revision

Revision History

Revision Level	Date	Description
1.0	10/05/17	Original document
1.1	04/12/17	CHANGED: title

Document build number: 9

SECTION 5

Severe Duty is **Standard** with **WEG W22** motors.

You do not need a special motor for severe duty. Severe Duty is standard with WEG W22 motors.

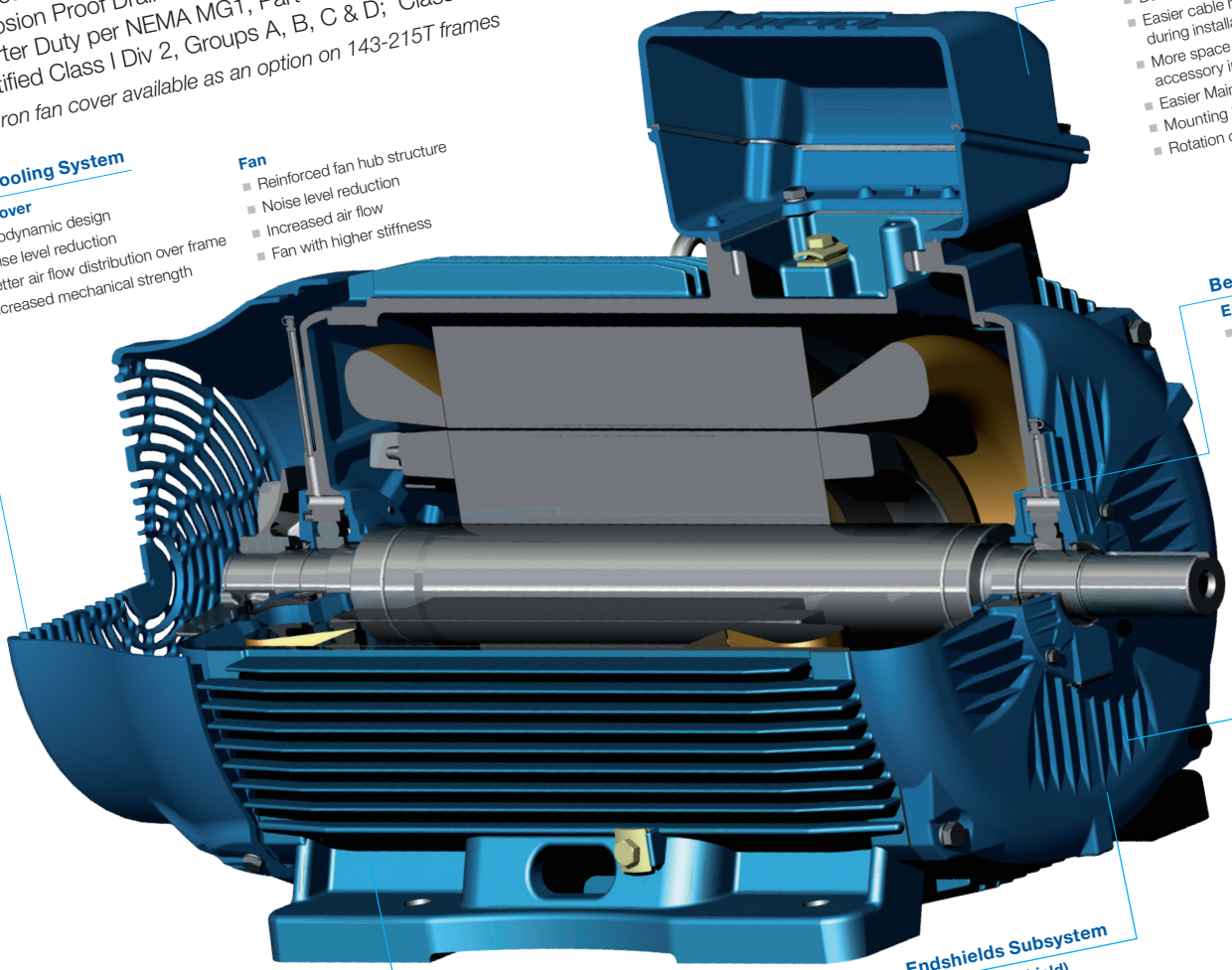
www.weg.net

You do not need a special motor for severe duty. Severe Duty is standard with WEG.

Features that make a difference:

- All NEMA Premium ratings have a 1.25 service factor (up to 100 HP) resulting in cooler operation and extended life of the motor
- All Cast Iron Construction, including Terminal Box and Fan Cover (*)
- Solid feet for reduced vibration levels and impact absortion
- Optimized ventilation system for cooler operation and extended life
- High Grade FC200 cast iron provides superior mechanical strength and heat dissipation
- All WEG W22 motors are Totally Enclosed Fan Cooled with a true IP55 rating against dust and moisture. (IPW56, IPW65 and IPW66 available as optional)
- Exclusive W-Seal 364T and larger provides superior bearing protection
- Taconite Labyrinth seal 586 Frame and larger
- Exclusive WEG painting system exceed 200hrs ASTM 117 corrosion test (Exceeds IEEE841 standard)
- Balanced to 0.08 inches per second vibration limits (Meets IEEE841 standard)
- Four Bolt Conduit Cover with glued Neoprene Gasket
- Impregnation Resin and magnet wire are insulation class H
- Stainless Steel Nameplate - Laser edged with high contrast background
- Corrosion Proof Drains
- Inverter Duty per NEMA MG1, Part 31
- Certified Class I Div 2, Groups A, B, C & D; Class II, Div 2, Groups F & G

cast iron fan cover available as an option on 143-215T frames



New Cooling System

Fan Cover
- Aerodynamic design
- Noise level reduction
- Better air flow distribution over frame
- Increased mechanical strength

Fan
- Reinforced fan hub structure
- Noise level reduction
- Increased air flow
- Fan with higher stiffness

Terminal Box
- Better connection quality
- Easier cable handling during installation
- More space available for accessory installation
- Easier Maintenance
- Mounting F1/F2/F3
- Rotation on 90° stages

Bearing Caps

External
- Finned surface for improved bearing heat dissipation

Internal
- Change of grease path for positive lubrication
- Bearing lubrication quality improvement
- Reduced bearing temperature

Seal Subsystem
- Increased dust and moisture protection
- Increased protection to high-pressure cleaning

Frame
- Reduced temperature on windings and bearings
- Noise level reduction
- Terminal box position outlet on top

Pad for vibration sensor
- Displaced 90º from each other

Enhanced Lifting Provisions
- Easier handling - horizontal & vertical
- Higher mechanical strength and handling safety

Solid feet
- More impact resistance
- Ideal for high vibration level applications

Endshields Subsystem

DE (Drive Endshield)
- New fin design
- Bearing moved outwards for better load support
- Improved bearing heat dissipation for reduced bearing temperature
- Reinforced endshield structure

NDE (Non-Drive Endshield)
- New design with smooth exterior surface
- Improved air flow
- Noise level reduction
- Improved structural rigidity for low vibration

DATA SHEET

Three Phase Induction Motor - Squirrel Cage

Customer	:

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11804907
		Catalog # :	12518ET3GRB444TF3-W2

Frame	: 444/5T	Locked rotor time	: 48s (cold) 27s (hot)
Output	: 125 HP	Temperature rise	: 80 K
Poles	: 4	Duty cycle	: Cont.(S1)
Frequency	: 60 Hz	Ambient temperature	: -20°C to +40°C
Rated voltage	: 460 V	Altitude	: 1000 m.a.s.l.
Rated current	: 139 A	Protection degree	: IP55
L. R. Amperes	: 904 A	Cooling method	: IC411 - TEFC
LRC	: 6.5x(Code G)	Mounting	: F-3
No load current	: 40.0 A	Rotation[1]	: Both (CW and CCW)
Rated speed	: 1780 rpm	Noise level[2]	: 73.0 dB(A)
Slip	: 1.11 %	Starting method	: Direct On Line
Rated torque	: 51.0 kgfm	Approx. weight[3]	: 761 kg
Locked rotor torque	: 200 %		
Breakdown torque	: 229 %		
Insulation class	: F		
Service factor	: 1.15		
Moment of inertia (J)	: 2.41 kgm²		
Design	: B		

Output	25%	50%	75%	100%
Efficiency (%)	94.9	95.0	95.4	95.4
Power Factor	0.52	0.74	0.82	0.85

Foundation loads	
Max. traction	: 799 kgf
Max. compression	: 1560 kgf

		Drive end	Non drive end
Bearing type	:	NU-319 C3	6316 C3
Sealing	:	WSeal	WSeal
Lubrication interval	:	5000 h	10000 h
Lubricant amount	:	45 g	34 g
Lubricant type	:	Mobil Polyrex EM	

Notes

This revision replaces and cancel the previous one, which must be eliminated.
(1) Looking the motor from the shaft end.
(2) Measured at 1m and with tolerance of +3dB(A).
(3) Approximate weight subject to changes after manufacturing process.
(4) At 100% of full load.

These are average values based on tests with sinusoidal power supply, subject to the tolerances stipulated in NEMA MG-1.

Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
Date	25/02/2020		1 / 7	

Customer :

Thermal protection

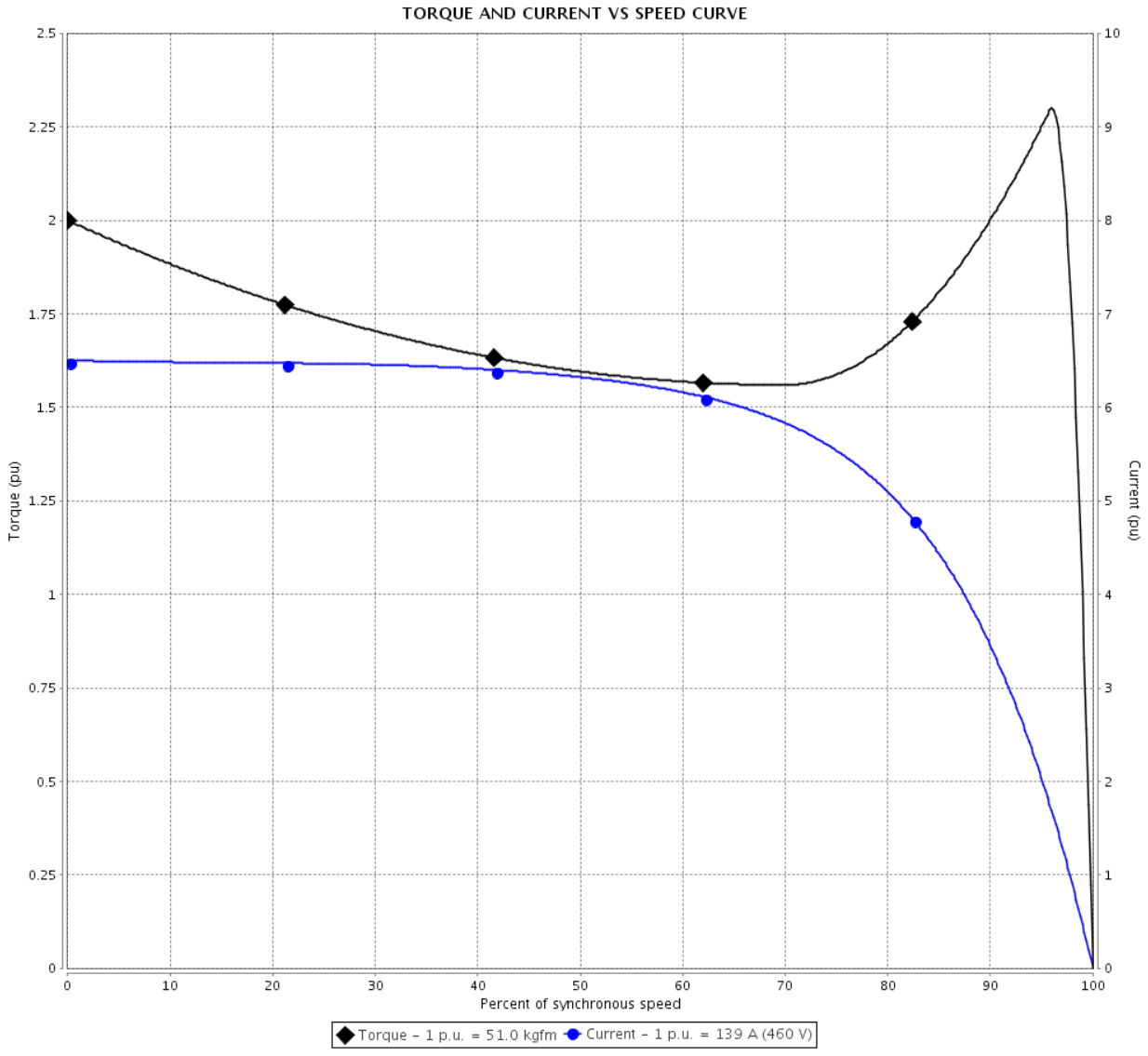
ID	Application	Type	Quantity	Sensing Temperature
1	Winding	Thermostat - 2 wires	1 x Phase	155 ºC

TORQUE AND CURRENT VS SPEED CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	:

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11804907
		Catalog # :	12518ET3GRB444TF3-W2



Performance	: 460 V 60 Hz 4P

Rated current	: 139 A	Moment of inertia (J)	: 2.41 kgm²
LRC	: 6.5	Duty cycle	: Cont.(S1)
Rated torque	: 51.0 kgfm	Insulation class	: F
Locked rotor torque	: 200 %	Service factor	: 1.15
Breakdown torque	: 229 %	Temperature rise	: 80 K
Rated speed	: 1780 rpm	Design	: B

Locked rotor time	: 48s (cold) 27s (hot)

Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
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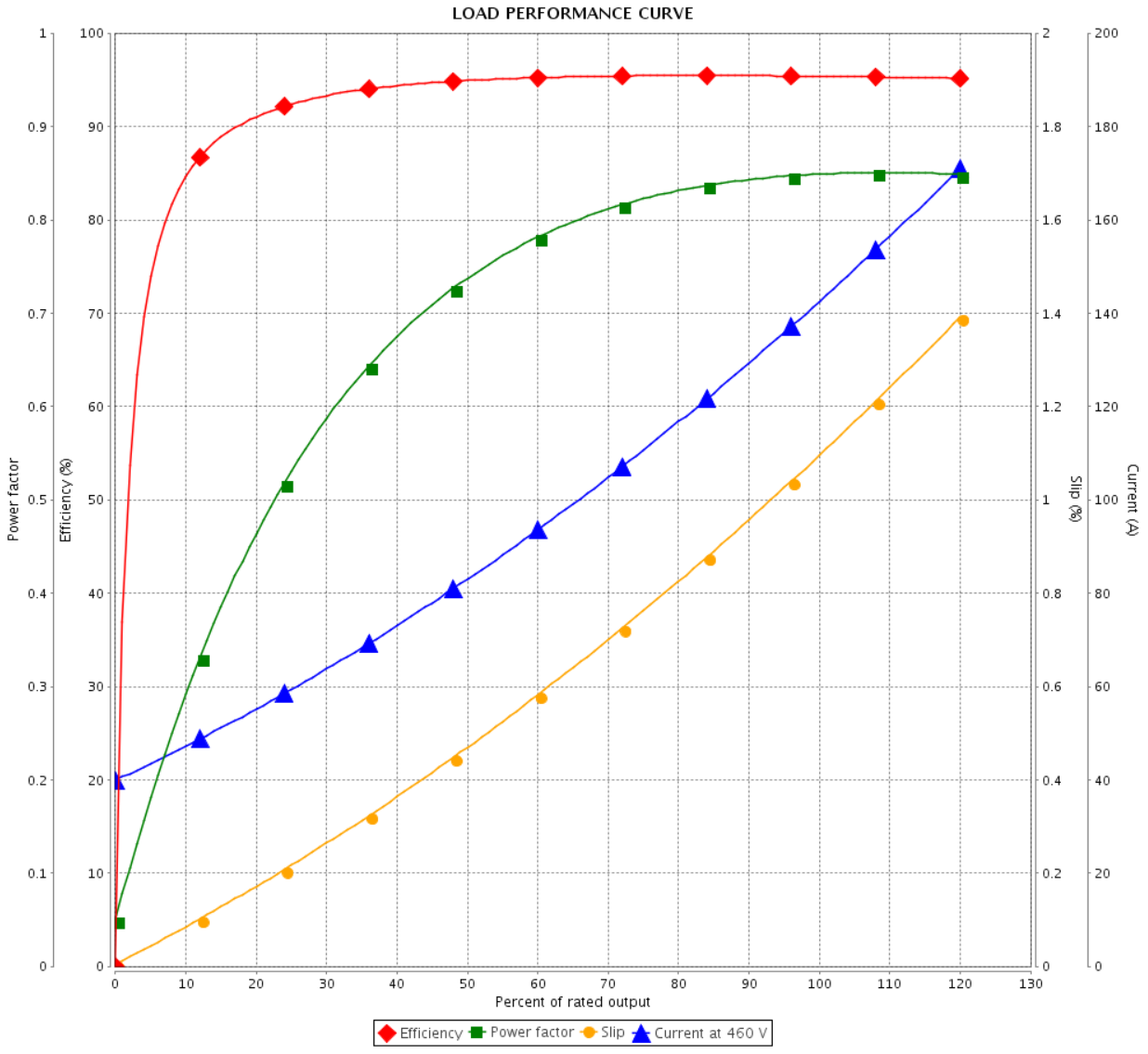
LOAD PERFORMANCE CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	:

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11804907
		Catalog # :	12518ET3GRB444TF3-W2



Performance	: 460 V 60 Hz 4P

Rated current	: 139 A	Moment of inertia (J)	: 2.41 kgm²
LRC	: 6.5	Duty cycle	: Cont.(S1)
Rated torque	: 51.0 kgfm	Insulation class	: F
Locked rotor torque	: 200 %	Service factor	: 1.15
Breakdown torque	: 229 %	Temperature rise	: 80 K
Rated speed	: 1780 rpm	Design	: B

Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
Date	25/02/2020		4 / 7	

THERMAL LIMIT CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	:

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11804907
		Catalog # :	12518ET3GRB444TF3-W2

Performance	: 460 V 60 Hz 4P

Rated current	: 139 A	Moment of inertia (J)	: 2.41 kgm²
LRC	: 6.5	Duty cycle	: Cont.(S1)
Rated torque	: 51.0 kgfm	Insulation class	: F
Locked rotor torque	: 200 %	Service factor	: 1.15
Breakdown torque	: 229 %	Temperature rise	: 80 K
Rated speed	: 1780 rpm	Design	: B

Heating constant	
Cooling constant	

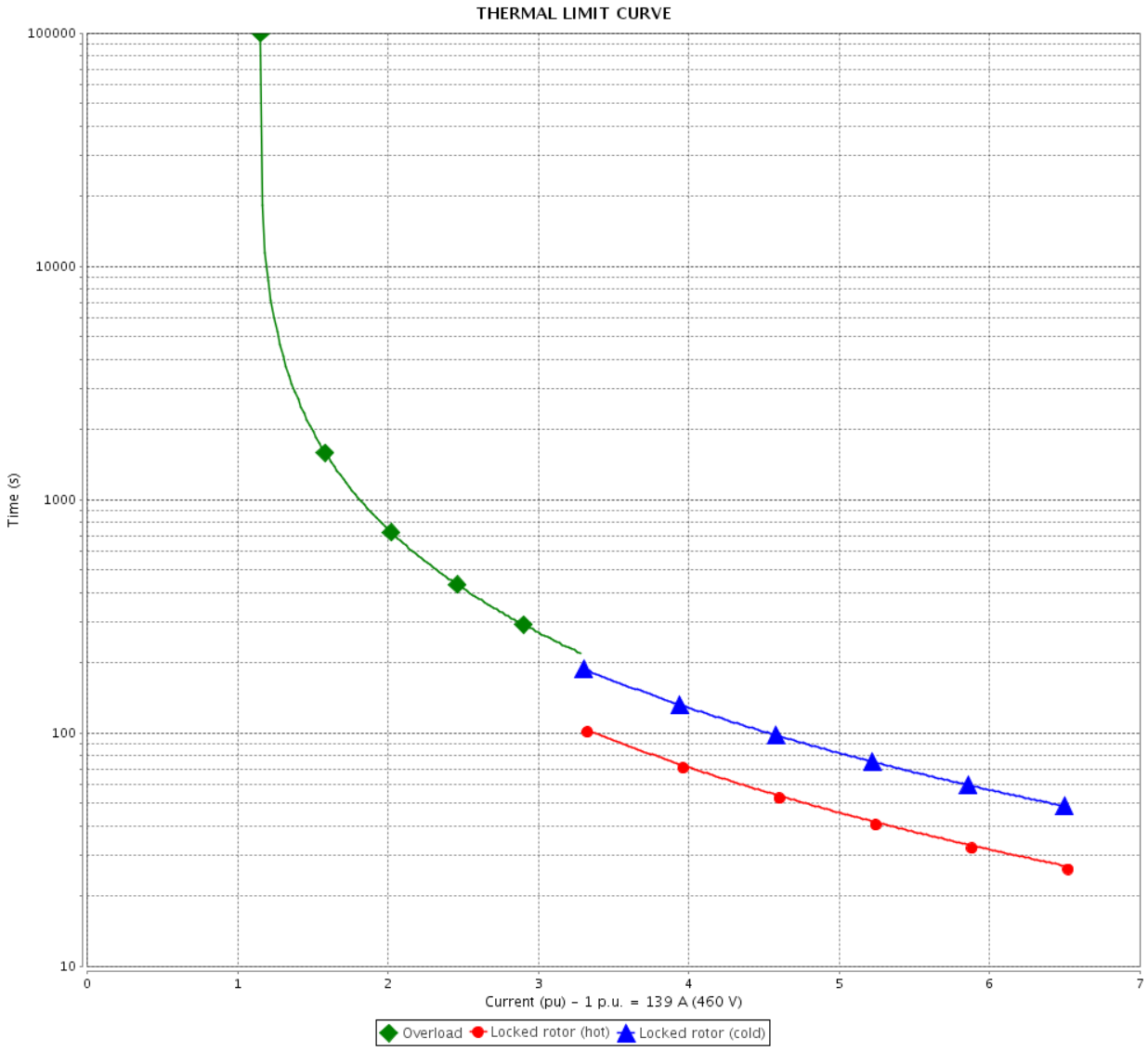
Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
Date	25/02/2020		5 / 7	

THERMAL LIMIT CURVE

Three Phase Induction Motor - Squirrel Cage

Customer :



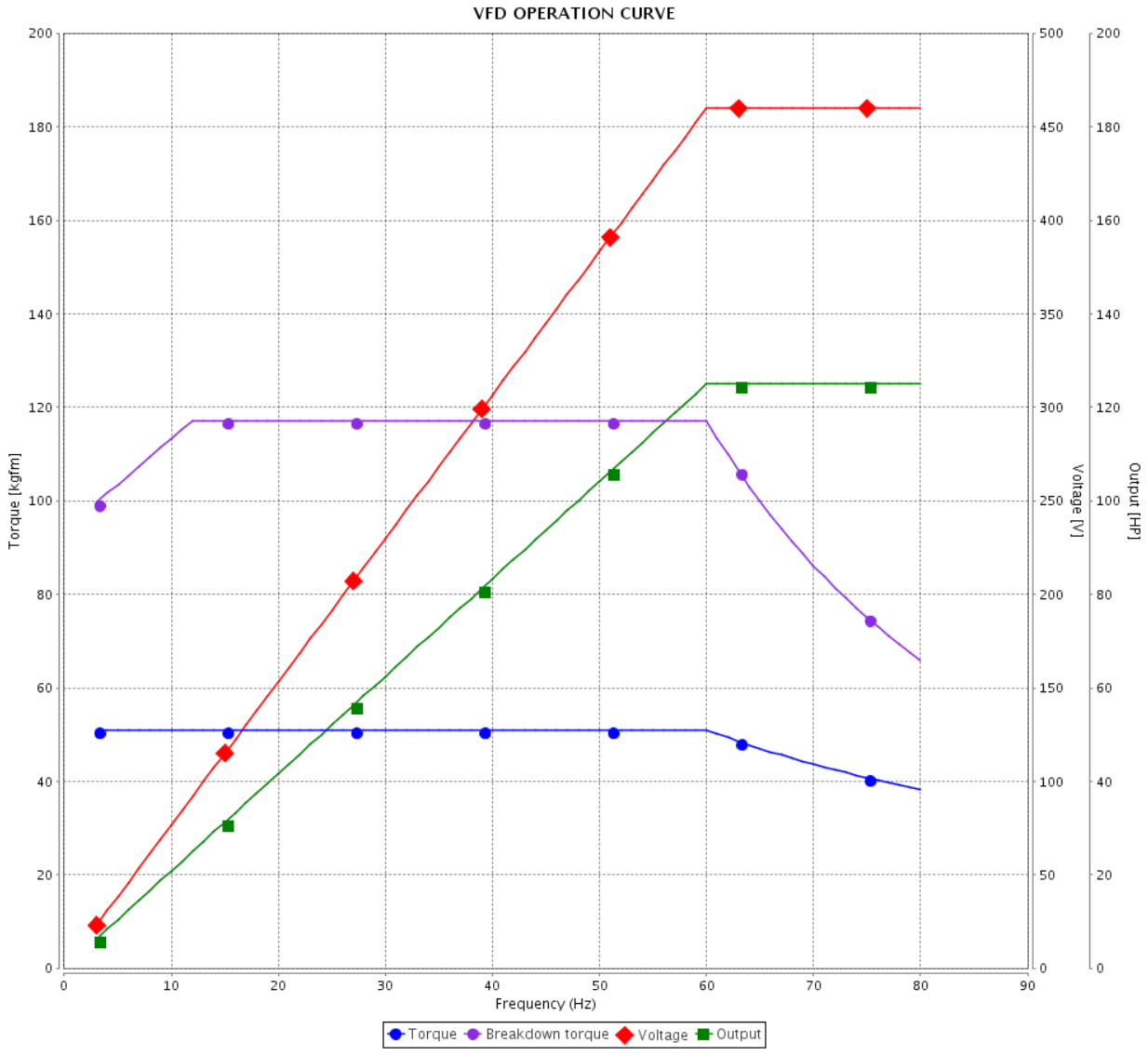
Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
Date	25/02/2020		6 / 7	

VFD OPERATION CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	:		
Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11804907
		Catalog # :	12518ET3GRB444TF3-W2



Performance	: 460 V 60 Hz 4P		
Rated current	: 139 A	Moment of inertia (J)	: 2.41 kgm²
LRC	: 6.5	Duty cycle	: Cont.(S1)
Rated torque	: 51.0 kgfm	Insulation class	: F
Locked rotor torque	: 200 %	Service factor	: 1.15
Breakdown torque	: 229 %	Temperature rise	: 80 K
Rated speed	: 1780 rpm	Design	: B

Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
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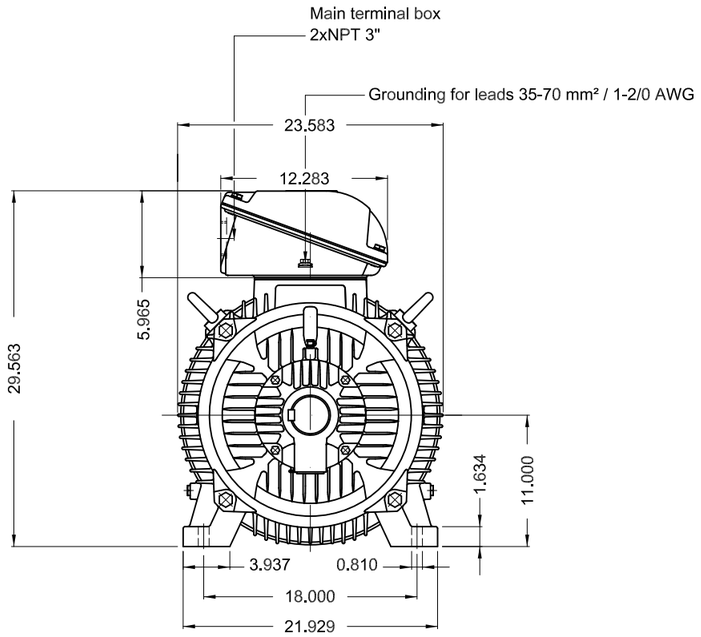
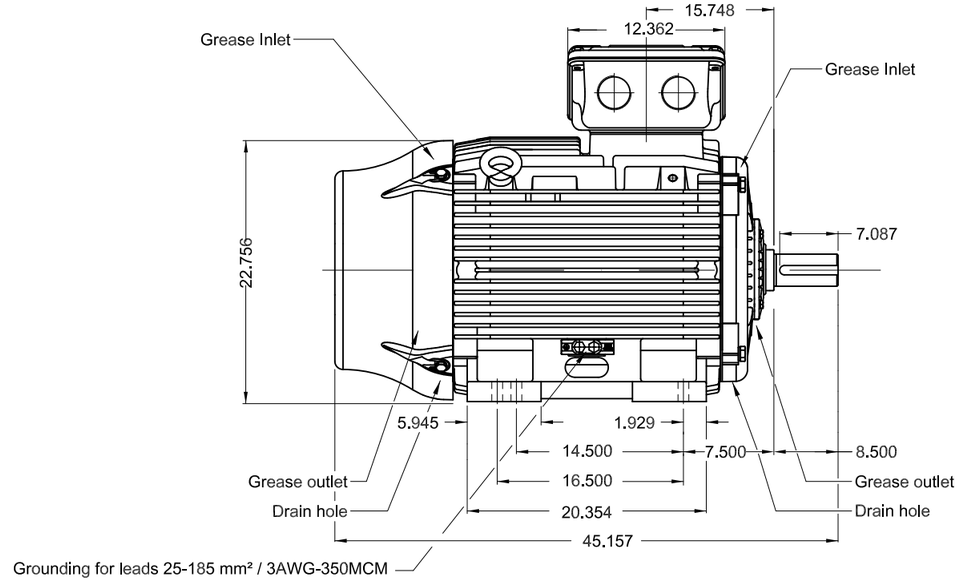
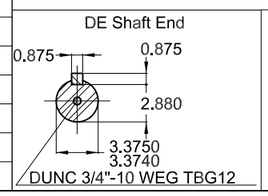




Without vertical jackscrews
DE roller bearing
Thermostats 155°C to trip
Shaft locking device
Color RAL 5009
Painting plan 203A
Mounting B3T



125 HP 04 Poles 60Hz | A

ECM	LOC	SUMMARY OF MODIFICATIONS	EXECUTED	CHECKED	RELEASED	DATE	VER

EXECUTED	PIRWBUSER	THREE PHASE W22 MOTOR - NEMA PREMIUM EFF	PREVIEW
CHECKED		FRAME 444/5T IP55 TEFC	WDD
RELEASED			
REL DT.		WMO Jaraguá do Sul Product Engineering	SHEET 1 / 1

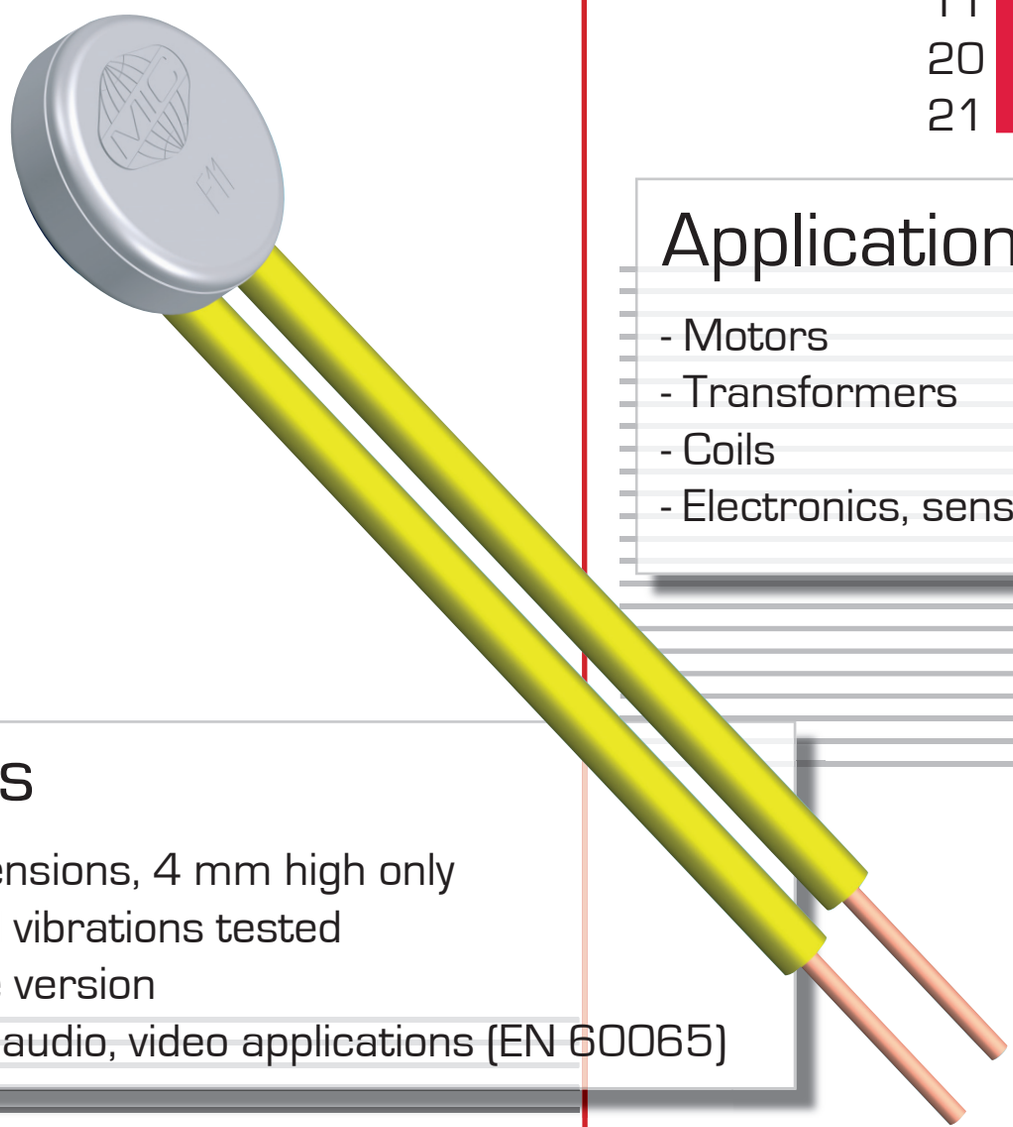
Dimensions in inches

XME A3

Thermal motor protector
Temperature limiter
Thermal cut-out

F

11
20
21

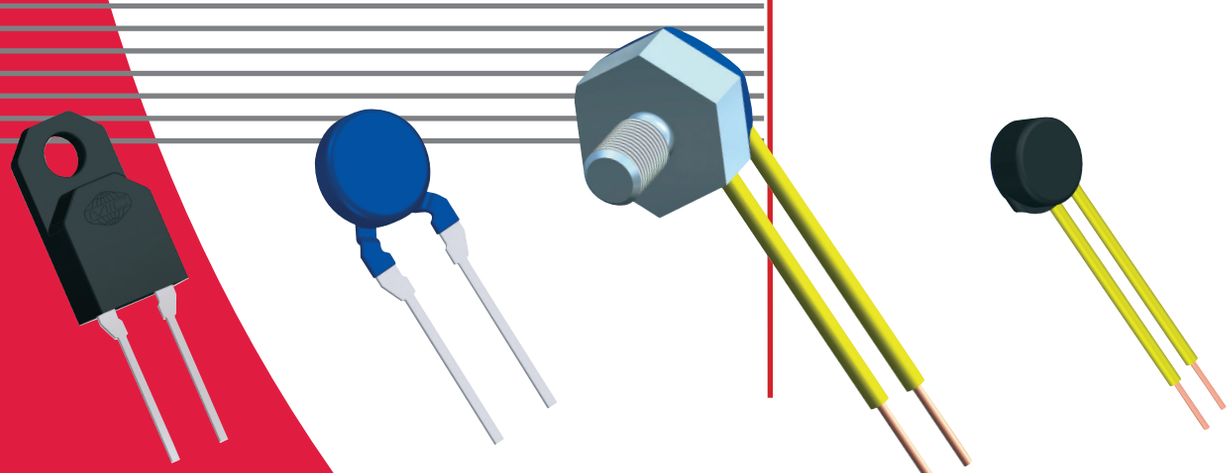


Applications

- Motors
- Transformers
- Coils
- Electronics, sensors

Benefits

- Small dimensions, 4 mm high only
- Shock- and vibrations tested
- Leadframe version
- Tested for audio, video applications (EN 60065)



MICROTHERM

MIC®
Microtherm International Cooperation

Technical data

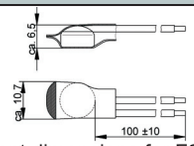
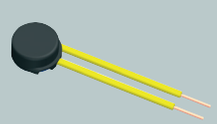
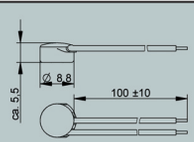
ratings \ control type		F11A / E F20A / E	F20B / G	F21A / E	
version		normally closed	normally open	normally closed	
rated current at 250 V 50/60 Hz (power factor 0.95 / 0.6)		2.0 A / 1.6 A	2.0 A / 1.6 A	3.0 A / 3.0 A	6.3 A / 1.0 A
switching cycles		10,000		10,000	700
max. current at 250 V 50/60 Hz (power factor 0.95)		6.3 A		8.0 A	
switching cycles under max. current		100			
temperature rating Ta (steps in 5 K)		70 °C ... 160 °C	70 °C ... 155 °C	70 °C ... 160 °C	
tolerances		Standard: ± 5 K			
feature of automatic action		1.B, 2.B.M, 1.C, 3.C		2.B, 1.C	
contact resistance (incl. wire of 100 mm)		< 50 mΩ			
hysteresis		30 K ± 15 K			
dielectric strength (standard insulation)		2 kV			
shock- / vibration testing (similar to EN 50155)		400 m/s² sine half wave / 100 m/s² 5 Hz ... 2,000 Hz sine			
resistances to impregnation		tight against ordinary resins and lacquers			
degrees of protection provided by enclosures (EN 60529)		IP00			
suitable for use in protection category		I, II			
approvals	**VDE / ENEC**	EN 60730-1 / -2-2 / -2-3 [1] /-2-9			
	UL	UL 2111 / UL 873			
	CSA	C22.2 No. 77 / C22.2 No. 24 [2]			

[1] different power rating
[2] on demand

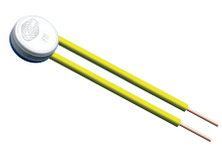
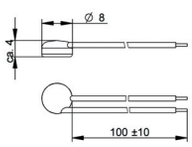
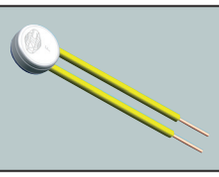
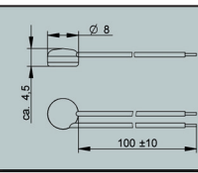
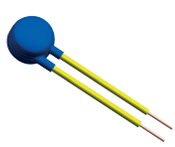
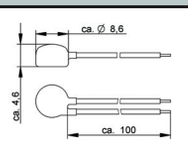
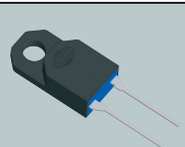
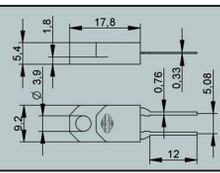
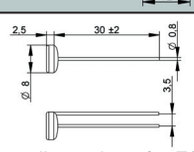
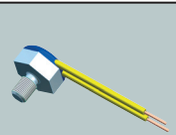
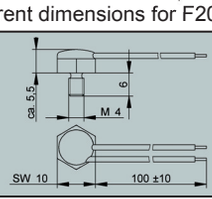
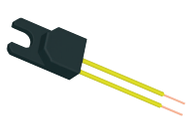
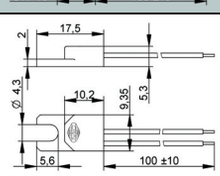
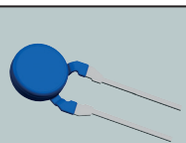
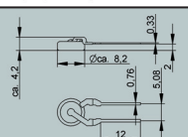
Standard wire (length 100 ± 10 mm, stripped 6 ± 1 mm)

lead	code	temperature max.	operating voltage max.	diameter insulation	cross section diameter	UL style
stranded white	L300	150 °C	300 V	1.57 mm	AWG24 / 0.21 mm²	3398
	L310			1.80 mm	AWG20 / 0.48 mm²	
	L330	200 °C	600 V	0.90 mm	AWG24 / 0.24 mm²	3557
solid yellow	L400	150 °C	300 V	1.40 mm	AWG24 / 0.51 mm	3398
	L410			1.65 mm	AWG20 / 0.81 mm	
	L430	200 °C	300 V	1.21 mm	AWG24 / 0.51 mm	1332
	L440			1.71 mm	AWG20 / 0.81 mm	

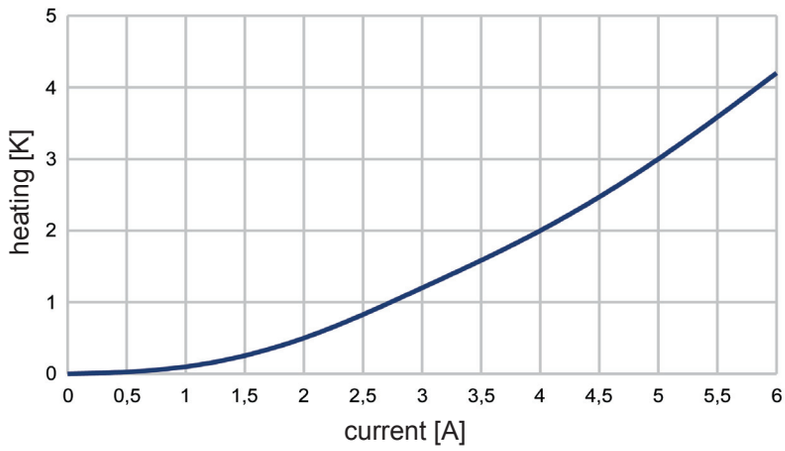
Standard insulation

control type	nc	no	code	illustration	drawing dimensions (mm)	technical specification	approvals
F11, F21 F20	A A	B	U254		 different dimensions for F20, F21	shrink cap potted Ta max. 155°C	VDE, UL
F11	A		U198		 different dimensions for F20, F21	cap of PPS potted	VDE, UL
F20 F21	A A	B	U185				

Specific variations

control type	nc	no	code	illustration	drawing dimensions (mm)	technical specification	approvals
F11	A					not insulated potted	VDE, UL, CSA
F20 F21	A A	B				not insulated potted	VDE, UL, CSA
F11, F21 F20	A A	B	U112		 different dimensions for F20, F21	coated	VDE, UL
F20 F21	A A	B	A150 U280			housing of PPS leadframe leads grid dimension 5.08 potted	VDE, UL
F11, F21 F20	A A	B	A800		 different dimensions for F20, F21	not insulated potted	VDE, UL
F20 F21	E E	G	G700			aluminium housing thread M4x6 potted Attention: Ta max. 150 °C	VDE, UL
F11	A		U281			housing of PPS potted	VDE, UL
F11, F21 F20	A A	B	A150 U112		 different dimensions for F20, F21	leadframe leads grid dimension 5.08 coated	VDE, UL

Heating by current



The diagram is measured with a thermal control without any insulation in an oil bath.

Attention:
The heating depends on the thermal conduction of the control to the equipment or part which should be protected.

Ordering and marking example

Ordering example

F11 A 120 05 L310 100 U254

- shrink cap insulation
- length 100 mm
- lead wire white, AWG20
- tolerance
- temperatue
- normally closed
- type

Deviations from standard controls on request.

Marking

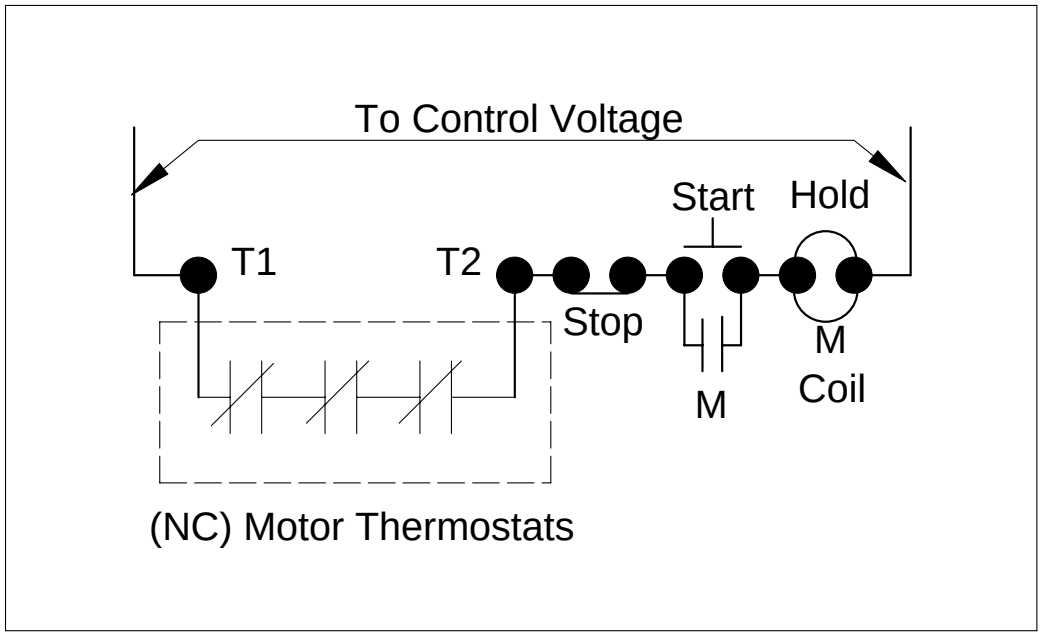
F11A	type (F11 nc)
12005	response temperature (120°C), tolerance (± 5K)
026D	date of manufacture (Feb.2006), country (D=Germany)

Representation office:

Microtherm GmbH
Täschenwaldstraße 3
Postfach 1208
D-75112 Pforzheim

Fon: +49 (0)7231 787-0
Fax: +49 (0)7231 787-155
E-Mail: mic-pforzheim@microtherm.de
Internet: www.microtherm.de

Typical Thermostat Control Schematic



BEST PRACTICES FOR VARIABLE FREQUENCY DRIVE (VFD) APPLICATIONS

VFD-induced shaft voltage can exist in every VFD driven motor application. It is not specific to the air movement industry, nor is it specific to any particular manufacturer's motors, drives or equipment. However, shaft voltage only becomes a problem when it leads to bearing current and consequential damage to the motor bearings.

NOTICE!

Risk of serious machine damage!
Appropriate measures must be implemented by the installation contractor to limit the shaft induced voltage to 1V – 2V as per IEEE 112.

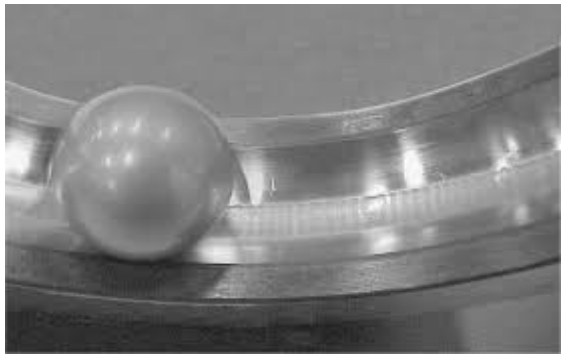


Figure 1 Bearing damage caused by EDM

Frequency converters (also known as variable frequency drives or VFD's) can induce a voltage on the shafts of drive motors and stages due to the high switching frequencies used in these drives. Shaft voltage can become a problem when it reaches a high enough level to discharge across the bearings, causing electrical discharge machining (EDM) and creating small grooves called fluting which can lead to premature bearing failure. The potential for this induced shaft voltage exists in every VFD driven motor application and must be addressed on an installation specific basis.

VFD induced voltage is a phenomenon that is somewhat rare and unpredictable. As additional protection, Aerzen USA offers options for mitigating induced shaft currents such as grounding rings and isolated motor non drive end bearings. Even with these options installed, there is no guarantee that this phenomenon will be entirely eliminated. Damage to the motor bearings from shaft / bearing currents is not covered by warranty from Aerzen, the motor manufacturer or VFD manufacturer.

GENERAL RECOMMENDATIONS:

Motors up to and including 100HP (75kW) – Low Voltage

For induction motors either foot mounted, c-face or d-flange mounted motors with single row radial ball bearings on both ends of the motors

- Install one AEGIS SGR Bearing Protection Ring on either the drive end or the non-drive end of the motor to discharge capacitive induced shaft voltage.

Motors Greater than 100HP (75kW)

For horizontally mounted motors with single row radial ball bearings on both ends of the motor:

- Non-Drive End (Opposite Drive End): Bearing housing must be isolated with insulated sleeve or coating or use insulated ceramic or hybrid bearing to disrupt circulating currents.
- Drive End: Install one AEGIS Bearing Protection Ring.

Motors in Hazardous Areas

Grounding rings are permitted. Consult Aerzen USA or your motor supplier for specific recommendations.

SECTION 6

Component Breakdown

Component	Material	Protection Method (Standard)	Quality Document (Standard)	Protection Method (Upgrade)	Quality Document (Upgrade)
Base/Silencer*	Carbon Steel	Painted Externally (Solvent Based)	QH-00408	SikaCor Zinc R	QH-00510
Belt Guard	Galvanized Sheet Metal	N/A	N/A	N/A	N/A
Belt Guard Supports	Galvanized Carbon Steel	N/A	N/A	N/A	N/A
Blower Stage	Cast Carbon Steel	Painted Externally (Water Based)	QH-00408	SikaCor Zinc R	QH-00510
Connecting Housing (DN50)	Cast Aluminum	N/A	N/A	N/A	N/A
Connecting Housing (DN80 - DN250)	Cast Iron	Powder Coated	QH-00552	SikaCor Zinc R	QH-00510
Fasteners - Bolts, Studs, Nuts	Carbon Steel	Zinc Coated	N/A	N/A	N/A
Flex Connector	Silicone	N/A	N/A	N/A	N/A
Hose Clamps	Carbon Steel	Zinc Coated	N/A	N/A	N/A
Inlet Filter/ Silencer Housing	Carbon Steel	Powder Coated	QH-00552	SikaCor Zinc R	A-6-450
Inlet Hose	Reinforced Rubber	N/A	N/A	N/A	N/A
Inlet Silencer	Carbon Steel	Powder Coated	QH-00552	SikaCor Zinc R	A-6-450
Motor Mounting Hardware	Galvanized Carbon Steel	N/A	N/A	N/A	N/A
Piping (Galvanized)	Galvanized Carbon Steel	N/A	N/A	N/A	N/A
Piping (Painted)	Carbon Steel	Painted Externally	QH-00408	SikaCor Zinc R	A-6-450
Pressure Safety/Vacuum Breaker Valves	Carbon Steel (Flange)	Painted Flange	QH-00408	N/A	N/A
Sound Enclosure - Base	Carbon Steel	Powder Coated	QH-00552	SikaCor Zinc R	QH-00510
Sound Enclosure	Galvanized Sheet Metal	Powder Coated	QH-00419	SikaCor Zinc R	QH-00510
Vent Silencer	Carbon Steel	Powder Coated	QH-00552	SikaCor Zinc R	A-6-450

*If made in the USA, Protection Method goes from Painted Externally to Powder Coated (A-6-450)

General Painting Information

The machine castings are fettled, cleaned and primed; the primer used is specially developed for machinery parts and is particularly notable for its excellent bonding characteristic and elasticity. Its base is a quick drying synthetic resin binder possessing a high degree of water resistance. The proportion of pigment to binder is such to ensure the best protection for the machines.

Total dry Film Thickness: 70 µm (2.75 mil)

Surface Preparation	Sand blasting, mechanical cleaning to near white surfaces per SA 2,5 acc. to DIN ISO 8501 or SSPC10	
Primer	Alkyd Resin: RAL 6006	Manufacturer: Relius Coatings
Final Coat	Alkyd Resin: RAL 5001 (Blue)	Manufacturer: Relius Coatings (BASF) or Dr. Demuth GmbH

General Powder Coating Information

SP Polyester Powder Paint, RAL 5001, structure, glossy

Relius No.: I536-5401

Total dry film thickness: 80 - 110µm

General Upgraded Protection Information

Surface Preparation	Sa 2 ½
Priming Coat	SikaCorEG4 (80µm max)
Intermediate Coat	SikaCorEG1 (80µm max)
Finishing Coat	SikaCorEG5 (80µm max)

SECTION 7

Aerzen USA Corporation
108 Independence Way
Coatesville, PA 19320
Ph: (610) 380-0244, Fx: (610) 380-0278
www.aerzen.com/en-us

Pre-Commissioning Checklist

	Document #	A-7-0288 rev "4"

The purpose of this pre-commissioning checklist is to ensure readiness to successfully commission your Aerzen packages. We will need some information from you in order to better prepare for the commissioning. We ask that your on-site representative complete and return this checklist to Aerzen USA at your earliest convenience.

We will also need to know if you have a target date in mind for our service technician to be on-site, and if the plant maintenance personnel will be on-site at that time to receive maintenance training. This training is normally hands-on in nature and should not take more than 1-2 hours. In addition to the pre-commissioning checklist, we will need an on-site contact and phone number for our service technician.

We will make every effort to meet your target date for commissioning. Please keep in mind that our start-up/commissioning schedule can run three to five weeks out. The earlier we know your target date the better chance we have of reserving your request on our schedule.

Please be aware that should the commissioning prerequisites not be completed prior to our arrival, Aerzen USA reserves the right to charge any and all responsible parties for additional time and travel expenses required to complete the commissioning service.

Below is a checklist of items requiring attention prior to our arrival. Please verify your understanding and completion of the prerequisites by initialing the check the boxes corresponding to each requirement. Please send this checklist to the Aerzen Service Coordinator once all the prerequisites have been verified

1	The Aerzen package has not been damaged during shipping and/or while on-site	☐
2	The Aerzen package is installed in permanent position, is level, properly grounded and anchored.	☐
3	The process pipework for the Aerzen package inlet and discharge is connected in its final position and independently supported (temporary supports are not acceptable	☐
4	Electrical connections have been completed for the motor using flexible conduit to allow the motor to be raised into its operational position.	☐
4A	The package safety switches (if applicable) are wired to the PLC or MCC (as applicable).	☐
4B	The Aerzen control panel (if applicable) is wired to the PLC or MCC (as applicable).	☐
4C	The correct voltage is fed to the control panel. Refer to the project specific wiring diagram for the voltage required	☐
4D	If there is a VFD or Soft-Starter and supplied by others, it has been configured with the following motor settings:	☐
4D-1	Horsepower (kilowatt)	☐
4D-2	Voltage	☐
4D-3	Maximum Frequency	☐

4D Continued

4D-4	Minimum Frequency - based on minimum speed of the blower or compressor in conjunction with the sheave combination	☐
4D-5	Full Load Amps	☐
4D-6	Time to Minimum Speed (3-5 seconds)	☐
4D-7	Coast to Stop (do not brake)	☐
4D-8	**CONSTANT TORQUE (VERY IMPORTANT!!!)**	☐
4D-9	Restart - only when the machine has come to a complete stop.	☐

5	Belts or coupling bolts removed for rotation test	☐
6	Verification that machine is filled to proper oil level with correct oil (if delivered without oil)	☐
7	Required personnel scheduled to attend startup (electrician, operators, maintenance personnel, etc)	☐
8	Proper paperwork completed to allow Aerzen technician on site	☐
9	If required, on-site safety training requirements for Aerzen personnel must be scheduled in advance. Please advise type, length and place of training).	☐

Company

Project Name or Number

Number of Packages to be commissioned

Representative completing this check-list

Date Completed

Date reqested for start-up

Aerzen USA Corporation
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Coatesville, PA 19320
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WWW.AERZEN.COM/EN-US

Start-Up Report

Document # BCH-7-0353_02 rev "B"

1.0 Machine data	
Date:	
Customer:	
Service Technician:	
Order # / SEO #:	
Serial #:	
Type:	
Package Serial #:	
Oil Type:	
Equipment ID:	
Operating hours total-Start:	
Operating hours total-End:	

2.0 Motor Data				
Model #:		Serial #:		Notes:
Motor Manufacturer		Motor Frame		
Motor HP Rating		Full Load Amps		
Motor Voltage Rating		Hertz		
Motor RPM		Service Factor		
Motor cooling		Motor Protection Type	Thermistor / Thermostat	
Motor Protection	NO / NC	Motor Protection Resistance		

3.0 Starter Data		
Manufacturer		Notes:
Starter type - Direct/Soft/VFD		
Actual voltage to motor		
Soft Start ramp up time		
VFD Max. Frequency		
VFD Min. Frequency		
VFD Ramp up Speed/Time		
VFD set to constant torque		
VFD Brake Mode = Coast		

4.0 Inspections					
	OK	Not OK		OK	Not OK
Sound Enclosure Aesthetics			Motor rotates in proper direction		
Package is level			Verify all oil lines are tight		
Oil drain hose, jack and funnel present			Oil filter		
Unit is properly anchored			Oil demister		
Expansion joints/flex connectors			Oil drain plugs tight		
Verify package is grounded			Cooling fan clearance in shroud		
Process piping is properly supported			Motor conduit conforms to IA-004545 rev "B"		
Anti-vibration feet			Sheaves are properly installed, set screws tightened		
Inlet air filter in place, clean & housing tightened			Enclosure inlet and outlet are free from obstructions		
Blower room ventilation adequate			All fasteners are secure		
Instrument connections tight			Check process piping path to the termination point		
Neutral chamber venting			Validate process piping will not dead head at startup		
Vent all pressure and vacuum gauges			Validate any customer added safety devices		
Motor and machine rotate freely by hand			Discuss application with end user		

4.1 Notes / Not OK, reason why. Correction needed/taken.

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Start-Up Report

Document # BCH-7-0353_02 rev "B"

5.0 Belt Drive Applications

	OK	Not OK	Notes / Not OK, reason why. Correction needed/taken.
Verify motor alignment			
V belt installed and tensioned?			
Verify V belt has the proper length			

6.0 Direct Drive Applications

	OK	Not OK	Notes / Not OK, reason why. Correction needed/taken.
Coupling bolt			
Compression sleeves			
Coupling halves (properly distanced)			
Coupling Alignment			

7.0 Safety Settings and Verification

7.1 Safety chain - Switch Based

Switch	Unit	Switch Point	Gauge Reading	Shutdown Initiated	Notes:

7.2 Safety chain - Controller Based

Controller:	Unit	Alarm	Fault	Functional	Notes:

8.0 Startup

	OK	Not OK	Notes:
Smooth Start Up			
Lubricate drive motor per O&M			

9.0 Functional Testing

	OK	Not OK	Notes:			
Aeromat			Closing time=			
Aeropress			Closing time=			
Aerovac			Closing time=			
Unload/load device are in synch			Closing time=			
Unload/Load Solenoid operational						
All gauges and switches operational						
S.E. fan has correct rotation						
PRV manual release functional			Set point =			
After fault does unit remain off						
Non-return flap (check valve)						
System is leak free-oil						
System is leak free-air						
Smooth running						
Motor cooling properly						

10.0 Post Run Checks

	OK	Not OK	Notes:
Smooth Coast Down			
Oil Level Correct			
Sheave Alignment			
Bolt Tightness			

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Start-Up Report

Document # BCH-7-0353_02 rev "B"

11.0 Technical data

11.1 Operational Readings

Elapsed Run Time	0:00	0:00	0:00	0:00	0:00		Notes:
Pressures							
Temperatures							
Miscellaneous							

11.2 Motor Operational Readings

Elapsed Run Time	0:00	0:00	0:00	0:00	0:00		Notes:

11.3 Vibration Readings

Elapsed Run Time	0:00	0:00	0:00	0:00	0:00		Notes:	Readings are in:	
Motor Non-Drive Horizontal									
Motor Non-Drive Vertical									
Motor Non-Drive Axial									
Motor Drive Horizontal									
Motor Drive Vertical									
Motor Drive Axial									

12.0 Notes/Summary

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Inspection Report

Document # BCH-7-0353_03 rev "C"

1.0 Machine data	
Date:	
Customer:	
Service Technician:	
Order # / SEO #:	
Serial #:	
Type:	
Package Serial #:	
Oil Type:	
Equipment ID:	
Operating hours total-Start:	
Operating hours total-End:	

2.0 Motor Data				
Model #:		Serial #:		Notes:
Motor Manufacturer		Motor Frame		
Motor HP Rating		Full Load Amps		
Motor Voltage Rating		Hertz		
Motor RPM		Service Factor		
Motor cooling		Motor Protection Type	Thermistor / Thermostat	
Motor Protection	NO / NC	Motor Protection Resistance		

3.0 Starter Data		
Manufacturer		Notes:
Starter type - Direct/Soft/VFD		
Actual voltage to motor		
Soft Start ramp up time		
VFD Max. Frequency		
VFD Min. Frequency		
VFD Ramp up Speed/Time		
VFD set to constant torque		
VFD Brake Mode = Coast		

4.0 Inspections					
	OK	Not OK		OK	Not OK
Sound Enclosure Aesthetics			Motor rotates in proper direction		
Package is level			Verify all oil lines are tight		
Oil drain hose, jack and funnel present			Oil filter		
Unit is properly anchored			Oil demister		
Expansion joints/flex connectors			Oil drain plugs tight		
Verify package is grounded			Cooling fan clearance in shroud		
Process piping is properly supported			Motor conduit conforms to IA-004545 rev "B"		
Anti-vibration feet			Sheaves are properly installed, set screws tightened		
Inlet air filter in place, clean & housing tightened			Enclosure inlet and outlet are free from obstructions		
Blower room ventilation adequate			All fasteners are secure		
Instrument connections tight			Check process piping path to the termination point		
Neutral chamber venting			Validate process piping will not dead head at startup		
Vent all pressure and vacuum gauges			Validate any customer added safety devices		
Motor and machine rotate freely by hand			Discuss application with end user		

4.1 Notes / Not OK, reason why. Correction needed/taken.

5.0 Maintenance				
Item Replaced	Yes	No	Part # and Qty.	Notes:
Oil				
Belts				
Oil Filter				
Air Filter				
Coupling Pins				
Coupling Bushing				
Oil Sample Taken			Tracking #:	

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Inspection Report

Document # BCH-7-0353_03 rev "C"

6.0 Belt Drive Applications			
	OK	Not OK	Notes / Not OK, reason why. Correction needed/taken.
Verify motor alignment			
V belt installed and tensioned?			
Verify V belt has the proper length			

7.0 Direct Drive Applications			
	OK	Not OK	Notes / Not OK, reason why. Correction needed/taken.
Coupling bolt			
Compression sleeves			
Coupling halves (properly distanced)			
Coupling Alignment			

8.0 Safety Settings and Verification

8.1 Safety chain - Switch Based

Switch	Unit	Switch Point	Gauge Reading	Shutdown Initiated	Notes:

8.2 Safety chain - Controller Based

Controller:	Unit	Alarm	Fault	Functional	Notes:

9.0 Startup			
	OK	Not OK	Notes:
Smooth Start Up			
Lubricate drive motor per O&M			

10.0 Functional Testing						
	OK	Not OK	Notes:			
Aeromat			Closing time=			
Aeropress			Closing time=			
Aerovac			Closing time=			
Unload/load device are in synch			Closing time=			
Unload/Load Solenoid operational						
All gauges and switches operational						
S.E. fan has correct rotation						
PRV manual release functional			Set point =			
After fault does unit remain off						
Non-return flap (check valve)						
System is leak free-oil						
System is leak free-air						
Smooth running						
Motor cooling properly						

11.0 Post Run Checks			
	OK	Not OK	Notes:
Smooth Coast Down			
Oil Level Correct			
Sheave Alignment			
Bolt Tightness			

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Inspection Report

Document # BCH-7-0353_03 rev "C"

12.0 Technical data

12.1 Operational Readings

Elapsed Run Time	0:00	0:00	0:00	0:00	0:00		Notes:
Pressures							
Temperatures							
Miscellaneous							

12.2 Motor Operational Readings

Elapsed Run Time	0:00	0:00	0:00	0:00	0:00		Notes:

12.3 Vibration Readings

Elapsed Run Time	0:00	0:00	0:00	0:00	0:00		Notes:	Readings are in:	
Motor Non-Drive Horizontal									
Motor Non-Drive Vertical									
Motor Non-Drive Axial									
Motor Drive Horizontal									
Motor Drive Vertical									
Motor Drive Axial									

13.0 Notes/Summary

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Training Sign In

Document # BCH-7-0353_06 rev "C"

1.0 Customer

Date:	
Customer:	
End User:	
Site Address:	
Service Technician:	
Equipment Type:	
Equipment Serial Number:	
Order # / SEO #:	

2.0 Trainee's Signatures

	Print	Signature	Title
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

3.0 Training Topics

4.0 Signatures

Date	**Customer Name**	**Customer Signature**
Date	**FST Name**	**FST Signature**

POSITIVE DISPLACEMENT BLOWER PERFORMANCE TEST PROTOCOL PER PTC 13

1.0 Summary

This protocol provides the specification and procedure for testing the total wire to air performance of an Aerzen positive displacement blower. The purpose is to determine if the customer quoted or guaranteed performance has been met within allowable tolerances. This protocol generally follows the methods of the ASME PTC13 performance test code modified as noted to suit the specifics of Aerzen's positive displacement and Hybrid blowers and aid practicality.

2.0 Definitions and Abbreviations

2.1 Blower or Compressor Package- Defined as the limits of the unit including the;

- 2.1.1 Inlet filter/silencer
- 2.1.2 All electrical components and power devices that affect power consumption to operate the blower or compressor including the motor, variable frequency drive (VFD), if applicable, fans and controls. The package shall be tested without a harmonic filter.
- 2.1.3 Blower or Compressor Stage- Direct mounted or belt driven positive displacement blower or compressor assembly
- 2.1.4 All cooling components including that of inverter cooling fans, motor cooling fans AND sound enclosure fans, independently internally mounted or direct driven by main blower motor.
- 2.1.5 The blower or compressor package includes a discharge silencer and check valve.
- 2.1.6 For variable speed packages where the VFD is included in Aerzen's scope of supply, the package VFD shall be used for the testing. For variable speed packages where the VFD is NOT included in Aerzen's scope of supply, the package shall be tested per Annex C at 60 HZ only. Alternatively, if agreed to by the relevant parties during the submittal process, the package VFD may be used for the testing if it is shipped to Aerzen USA's test facility or a shop VFD may be used for the testing.

2.2 Package Inlet- The unobstructed cross-section in the plane upstream of the process air intake filter(s) is referred to as the package inlet. All variables relating to this inlet plane shall equal atmospheric conditions to be identified using 'atm'

2.3 Blower inlet- The cross-section in the plane of the process air at the inlet to the blower stage defined in 2.1.3. All variables relating to this inlet plane to be identified using '1'

2.4 Package discharge- The unobstructed cross-section in the plane of the package discharge flange is referred to as the discharge of the blower package. All variables relating to this discharge plane to be identified using '2'

2.5 SCFM – Standard Cubic Feet per Minute- The volume of air in cubic feet per minute considering the gas state of 68°F, 14.696 psia, and 36% relative humidity is designated as SCFM, where the "S" denotes this as a standard gas condition. The equivalent gas state in SI units is 20°C, 101.325 kPa, and 36% relative humidity, designated as cubic meters per minute.

2.6 ACFM – Actual Cubic Feet per Minute- is the actual volume flow rate ($q_{V,\,atm}$) in cubic feet per minute considering the local conditions at the location of the flow measurement. ACFM is determined by the delivered mass flow rate($q_{m,2}$) divided by the total density at the flow measurement location. The SI designation is actual cubic meters per minute.

2.7 Isentropic Compressor Work (Isentropic Head)-The ideal work required to compress a unit of gas from inlet pressure and temperature to discharge pressure while accounting for changes in the kinetic energy of the gas during the compression as an isentropic process

2.8 Blower Package Total Wire to Air power- The blower package Total Wire to Air power (P_{wire}) is the electrical power measured at the input to the blower package. This shall include all power consuming electrical components of the compressor package as defined in 2.1.2

2.9 Theoretical Gas Power- The theoretical gas power is the mass flow rate multiplied by the isentropic head based upon 100% efficiency.

3.0 Guarantees

3.1 Conditions for the Guarantee- Previously agreed upon condition statement provided prior or during the sale between Aerzen USA Corporation and the customer. Any statements, whether in writing or oral, representation of data, or engineering sheets that vary from the contract and purchase agreements will not be misconstrued as a guarantee for this testing.

3.2 Tolerances of +/-5% for flow and power shall be accounted for.

4.0 Measurement Practice

4.1 The test stand will incorporate data measurement methods as identified in PTC 10 and/or PTC 13. Flow will be measured on the discharge side using orifice plates based on the methods described in PTC 19.5.

4.2 Electrical power will be measured at incoming delivery to blower package.

4.3 Instrumentation used shall be as recommended in PTC 19.

4.4 All measurements used to determine wire to air power shall be recorded from instruments independent of the blower package. Calibration certification for each instrument is available on request.

5.0 Procedure

5.1 Test points shall be selected to match the pressure ratio and volumetric inlet flow (ICFM) at the test site conditions to the design operating points. The test point pressure ratio shall be held to within -0/+2% of the design point pressure ratio. The test point ICFM shall be held to within +/-2% of the design point ICFM for variable speed packages and -0/+10% for constant speed packages.

5.2 In some cases, it may not be possible to achieve an inlet flow equal to the design point ICFM due to a higher inlet density at the test conditions than the design conditions. In this case, the highest flow possible at the design pressure ratio shall be achieved within the performance limits of the machine and at least two other test points at the same pressure ratio will be taken. These auxiliary test points will be achieved by the use of a variable frequency drive (VFD). For constant speed packages, a shop VFD will be used. For variable speed packages, the package VFD will be used. The three points will then be used to plot Power vs. ICFM at the design pressure ratio and used to extrapolate the power at the design ICFM and pressure ratio.

5.3 Prior to the performance test, each unit shall undergo a pretest check and functional test. Before test readings are taken, the blower shall be operated sufficiently long enough to ensure stable conditions are reached. Fluctuations of applicable measurements shall be maintained within the limits established by PTC 13.

5.4 Three readings shall be recorded at each test point at an interval of 5 minutes between readings. The result at each test point will be the average of the 3 readings.

6.0 Test Data Analysis

6.1 The wire to air efficiency at each test point shall be calculated based upon the theoretical gas power divided by the actual KW power. The calculated wire to air power at the design points shall be determined by multiplying the measured wire to air power by the ratio of the design isentropic power to the test isentropic power.

6.2 A comparison of the expected wire to air power to the calculated wire to air power for each design point shall be presented in a table. The percent difference between the results shall be within the allowable test tolerance.

7.0 Test Report: A comprehensive report shall be provided including the following information:

7.1 General information regarding the test.

7.2 A tabular summary of the design points, test points for each unit, and a comparison of design wire to air power vs. calculated wire to air power for each design point and each unit

7.3 A description of the test setup and method including process and instrumentation diagrams and photographs.

7.4 Test data for each unit including pretest checklists, functional tests, performance tests and vibration tests.

8.0 Test Facility: Aerzen USA designed and constructed a purpose built test facility for testing blower and compressor packages to the requirements of PTC13. This facility features multiple test stations, state of the art instrumentation and data acquisition, as well as flow measurement capability over the range of Aerzen's products. This facility is located at:

Aerzen USA

108 Independence Way

Coatesville, PA 19320

9.0 Test Personnel: Each test will be conducted by a qualified technician and overseen by a qualified test engineer. Customer witnessed tests are available.

Appendix A: Equations and Conversions

Density:

$$\rho = \frac{p}{R_{WET} \cdot T}$$

Ideal Gas Constant, corrected to actual conditions:

$$R_{WET} = 53.353 \times \left(\frac{1}{1 - (\frac{RH_a \times PV_a}{P_b}) \times .378} \right)$$

Pressure Ratio:

$$r_P = \frac{p_{DISCH.}}{p_{INLET}}$$

Isentropic Head, corrected to actual conditions:

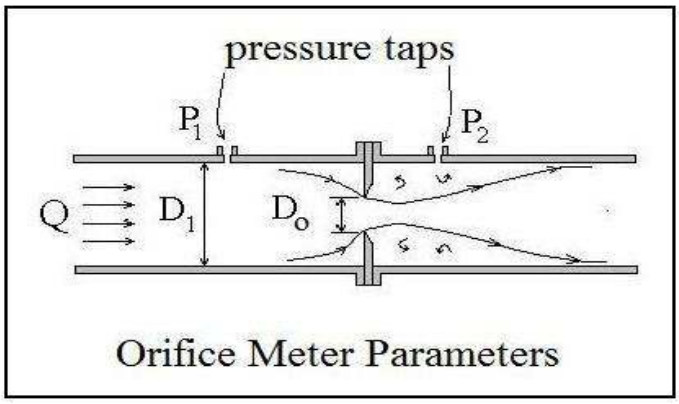
$$\mu_s = \left(\frac{k}{k-1} \right) \times R_{WET} \times T_1 \times Z \times \left(r_P^{\frac{k-1}{k}} - 1 \right)$$

Actual Flow Rate converted from Standard conditions to actual conditions:

$$q_{ACFM} = q_{SCFM} \times \frac{T_a}{T_s} \times \frac{P_b}{P_a} \times \frac{P_s - (RH_s \times PV_s)}{P_b - (RH_a \times PV_a)}$$

Orifice Plate Flow:

$$Q = C_o A_o Y \sqrt{\frac{2ZRT_1(P_1 - P_2)}{(MW)P_1(1 - \beta^4)}}$$



Orifice Meter Parameters

Mass Flow:

$$\dot{m} = q \cdot \rho$$

Isentropic Power:

$$P_s = \dot{m} \cdot \mu_s$$

Predicted Power:

$$P_{pr} = P_{test} \cdot \frac{P_{s,sp}}{P_{s,test}}$$