SynergEX Panelboards for Hazardous Locations

Installation & Maintenance Information

IF 1823

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

1. APPLICATION

SynergEX panelboards provide short circuit protection for feeder or branch circuits to control lighting, heating, appliances, heat tracing, motor and similar circuits.

SynergEX panelboards are designed for use in Class I, Zone 2, Division 2, Groups A, B, C, D (classified) areas as defined by the National Electrical Code® (NEC) and Canadian Electrical Code (CEC), as well as in damp, wet locations – indoors and outdoors.

Panelboards should be installed, inspected, maintained and operated by qualified and competent personnel. Read entire instructions before starting installation of this product. Contact your Eaton's Crouse-Hinds Division sales representative, customer service or Crouse-Hinds distributor if you have any questions.

⚠ WARNING

To avoid fire, shock and/or explosion,

This product must be installed, inspected and maintained by qualified personnel in accordance with all applicable codes and these instructions.

All electrical power sources must be OFF and locked out, and the area must be free of flammable or explosive gases, vapors or dusts before performing any maintenance.

All wiring must be suitable for the area, and must comply with the nameplate ratings and these instructions.

Do not install where the marked operating temperature exceeds the ignition temperature of the hazardous atmosphere.

Do not operate in ambient temperatures outside of the nameplate markings.

Do not turn ON product when temperature is less than -20°C.

Keep tightly closed when in operation.

Encl. size	Height x width x depth			Mounting holes (D & E vertical, F & G horizontal)				Window	
	A	B	C	D	E	F	G	H	I
A	24.00	24.00	10.00	25.25	18.00	18.00	25.25	15.00	13.00
B	30.00	24.00	10.00	31.25	18.00	24.00	25.25	21.00	13.00
C	36.00	24.00	10.00	37.25	18.00	30.00	25.25	27.00	13.00
D	42.50	24.00	10.00	43.75	18.00	36.50	25.25	33.50	13.00
E	48.00	24.00	10.00	49.25	18.00	42.00	25.25	39.00	13.00
F	54.00	24.00	10.00	55.25	18.00	48.00	25.25	45.00	13.00
G	60.00	24.00	10.00	61.25	18.00	54.00	25.25	51.00	13.00

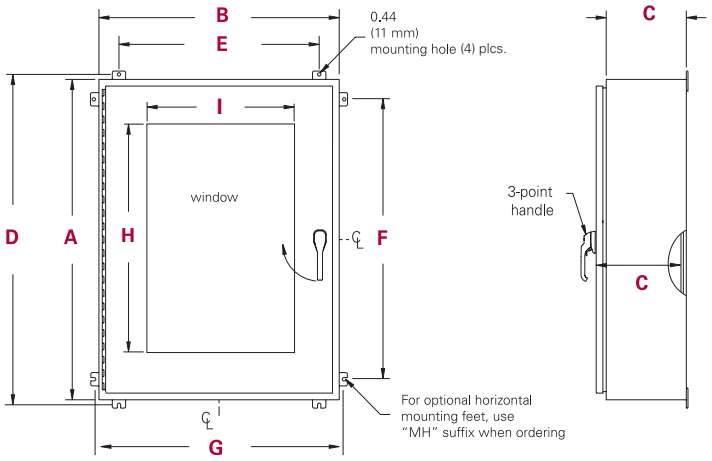


Figure 1 – Dimensions (inches)

2. CONFORMITY WITH STANDARDS

SynergEX Panelboards have been designed, manufactured and tested according to the following standards:

- CSA C22.2 No. 29 - M1989 (R2004)
- UL67 (Ed. 12): 09
- CAN/CSA C22.2 No. 60079-0:15
- CAN/CSA C22.2 No. 60079-15:12
- UL60079-0 (Ed. 5): 13
- UL60079-15 (Ed. 4): 13

3. TRANSPORT/STORAGE

To store, SynergEX panelboards shall be placed on a clean, dry and flat surface, whereby the position shall be maintained. SynergEX panelboards shall be protected against adverse weather conditions. Transport storage temperature: -20°C to +60°C.

4. GENERAL INSTALLATION

1. Select a mounting location that will provide suitable strength and rigidity for supporting the panelboard and all components. Install two (2) bottom mounting screws loosely.
2. Align enclosure with the two (2) slotted mounting feet on installed screws. While continuing to support the enclosure in position, install the top two (2) screws and tighten the bottom two (2) screws. Securely torque all screws around enclosure before removing support.

   The enclosure shall rest evenly only on the fastening points provided for this purpose, and they shall be fixed in such a way that they cannot twist or turn.

   The screws used shall match the fixing holes (see Figure 1) and must not damage the openings (e.g. use of washers).

⚠ WARNING

Excessive tightening can result in damage to SynergEX panelboards.

3. After enclosure is positioned and secured in its permanent location, proceed to punching field entries in panelboard enclosure where required and continue to Step 6. **NOTE:** If gland plates were supplied, proceed to Step 4.

⚠ WARNING

Only certified cable entries and blanking plugs may be used.

4. Remove gland plates and drill desired conduit entries in accordance with the spacing chart for Myers™ hubs (see Figure 3) and the gland plate dimensional drawing (see Figure 2).

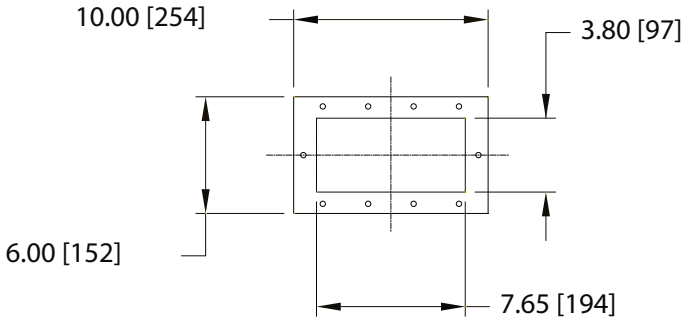


Figure 2 – Gland Plate Dimensional Drawing (inches and millimeters)

SPACING CHART FOR MYERS HUBS
CONDUIT

HOLE SIZE.	COND. SIZE.	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
9/16	¼	1 1/16													
11/16	⅜	1 5/32	1¼												
⅞	½	1 5/16	1 13/32	1 9/16											
1⅛	¾	1 7/16	1 17/32	1 11/16	1 13/16										
1⅜	1	1 19/32	1 11/16	1 27/32	1 31/32	2⅛									
1¾	1¼	1 25/32	1⅞	2 1/32	2 5/32	2 5/16	2½								
2	1½	1 31/32	2 1/16	2 7/32	2 11/32	2½	2 11/16	2⅞							
2½	2	2 7/32	2 5/16	2 15/32	2 19/32	2¾	2 15/16	3⅛	3⅜						
3	2½	2 15/32	2 9/16	2 23/32	2 27/32	3	3 3/16	3⅜	3 5/8	3⅞					
3⅝	3	2 25/32	2⅞	3 1/32	3 5/32	3 5/16	3½	3 11/16	3 5/16	4 3/16	4½				
4⅛	3½	3 3/32	3 3/16	3 11/32	3 15/32	3 5/8	3 13/16	4	4¼	4½	4 13/16	5⅛			
4⅝	4	3 11/32	3 7/16	3 19/32	3 23/32	3⅞	4 1/16	4¼	4½	4¾	5 1/16	5⅜	5¾		
5 11/16	5	4 1/32	4⅛	4 9/32	4 13/32	4 9/16	4¾	4 15/16	5 3/16	5 7/16	5¾	6 1/16	6 5/16	7⅛	
6¾	6	4 13/32	4½	4 21/32	4 25/32	4 15/16	5⅛	5 5/16	5 9/16	5 13/16	6⅛	6 7/16	6 11/16	7 3/8	7¾
		19/32	11/16	27/32	31/32	1⅛	1 5/16	1½	1¾	2	2 5/16	2⅝	2⅞	3 9/16	3 15/16

Minimum space from center of conduit to nearest obstruction.

1. **Dimensions in black squares are centers for conduits of same size. Example: How close may 3″ conduits be spaced? Answer 4½″.**
2. **Dimensions in grey squares are for centers of conduits NOT of the same size. Example: What is the minimum spacing for 2″ and ¾″ conduit? Read down column marked ¾″ to figure opposite 2″ and find dimensions is 2 19/32″.**
3. **Minimum spacing dimensions as shown will give approximately ⅛″ clearance between locking nuts.**

Figure 3 – Spacing Chart for Myers Hubs

5. Reinstall gland plate to stainless steel terminal housing and be sure to tighten screws to the torque values provided in the torque requirement chart (see Figure 4).

Mounting Location	Fastener Size	Torque (in.-lb.)	Torque (N-m)	Tolerance
Lexan Shield				±15%
Neutral Bar				±15%
Ground Bar	#10	29.7	3.4	±15%
Main Circuit Breaker	M6	22.1	2.5	±15%
Main Circuit Breaker – Terminal	Terminal Screw	88.5	10.0	+10%
Branch Circuit Breaker	#10	22.1	2.5	±15%
Branch Circuit Breaker – Terminal	Terminal Screw	31.0	3.5	+10%
Bus Bar to Bracket	M6	29.7	3.4	±15%
Bus Bar Bracket to Back Pan	1/4″	84.0	9.5	±15%
Dead Front Bracket to Back Pan	1/4″	84.0	9.5	±15%
Main Lug	5/16″	168.0	19.0	±15%
Main Lug – Terminal Set Screw	5/16″	275.0	31.0	±15%
Back Pan	3/8″	168.0	19.0	±15%
Dead Front	1/4″	22.1	2.5	±15%
Gland Plate	#10	35.0	3.95	±15%

Figure 4 – Electrical Distribution Panel – Bolt Torque Specifications

6. Install appropriate Myers hubs per desired entries selected.
7. Install conduit and cable glands using Myers hub connections.
8. After installation of appropriate Myers hubs and conduit, pull wires into panelboard enclosure through entries, making sure that they are long enough to make the required connections (refer to Section 17 regarding wire sizes).

⚠ WARNING

The electrical connection of the apparatus may only be carried out by trained staff.

⚠ WARNING

The incoming and outgoing wires shall be identified as sized for 75C.

9. Connect main power directly to main lugs (with main lug only panels) or to main circuit breaker. Wires for branch power connect directly to the corresponding breaker. Please ensure terminals are tightened to torque values found in torque requirement chart (see Figure 4).

⚠ WARNING

Excessive tightening can result in damage to SynergEX panelboards.

5. INSTALLATION/SERVICE OF SYNERGEX PANELBOARD

1. Open the front door panel using the handle.
2. Remove the protective cover (dead front) by removing the screws in four (4) corners (see Figure 5).
3. With the protective cover removed, access is available to the chassis and breakers.
4. To reinstall protective cover, align with enclosure and reinstall screws.

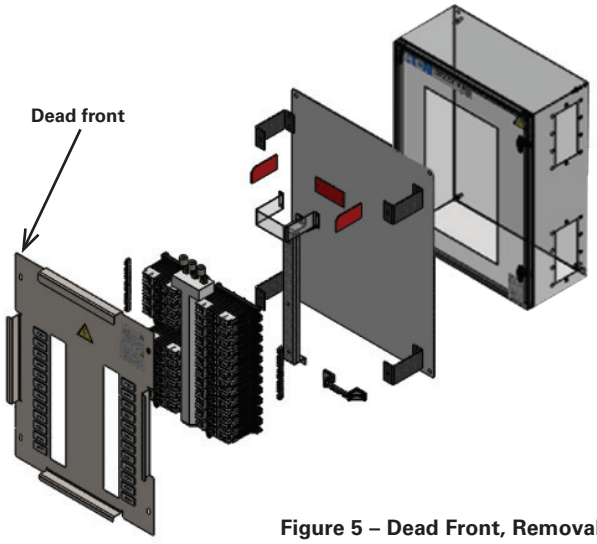


Figure 5 – Dead Front, Removal

6. FIELD COUPLING KIT *(IF APPLICABLE)*

The field coupling kit is designed to provide a joint between two (2) horizontally paired or two (2) vertically stacked panelboards such that the environmental rating of the enclosure is maintained. Assemble all components in the order shown and torque hardware to 50 in-lbs. Any unused coupling entries must be plugged with a cap-off or blanking plug suitable for the environment. One (1) coupling assembly is required per pair of enclosures; all components (including hardware) are supplied by the factory when a coupled pair of enclosures is ordered.

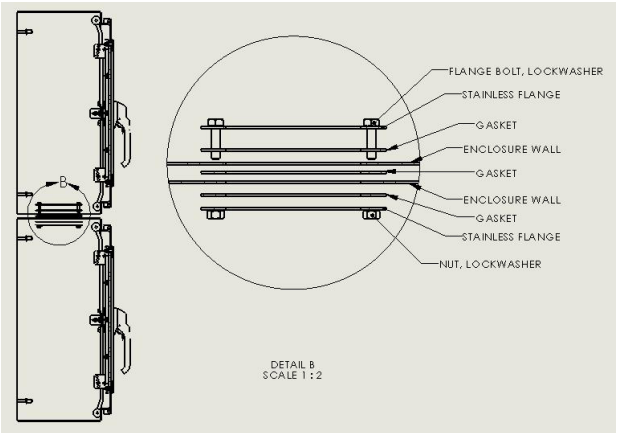


Figure 6 – Field Coupling Diagram

7. PUTTING INTO OPERATION

Before putting SynergEX panelboards into operation, the tests specified in the individual national regulations shall be performed. In addition to this, before being put into operation, the correct functioning of the SynergEX panelboards and of the built-in components shall be checked in accordance with these operating instructions and other applicable regulations.

8. CIRCUIT BREAKER REMOVAL/INSTALLATION

Remove circuit breaker from the panel by loosening the main terminal screws and removing the two (2) mounting screws.

Install circuit breaker into the panel by pressing the terminal locations into the busbar stabs. Insert/tighten the two (2) mounting screws and tighten the main terminal screws. Be sure all hardware is installed in the correct location and torqued to the required values per Figure 4.

9. CIRCUIT BREAKER OPERATION

The function of circuit breakers and ground fault/earth leakage device (if installed) shall be checked after several short circuits. Once the cause for the tripping has been eliminated, it can be reset and turned on again by switching the toggle to the "OFF" position first, then to the "ON" position.

10. BUSBAR SYSTEM

The electrical connection may only be carried out by skilled electricians. In order to maintain the mode of protection, special care shall be taken when connecting the conductors.

The minimum/maximum connectible conductor cross sections and the maximum rated current of the busbar system, specified in the technical data section shall be observed.

Do not exceed 80% of maximum load rating for continuous use.

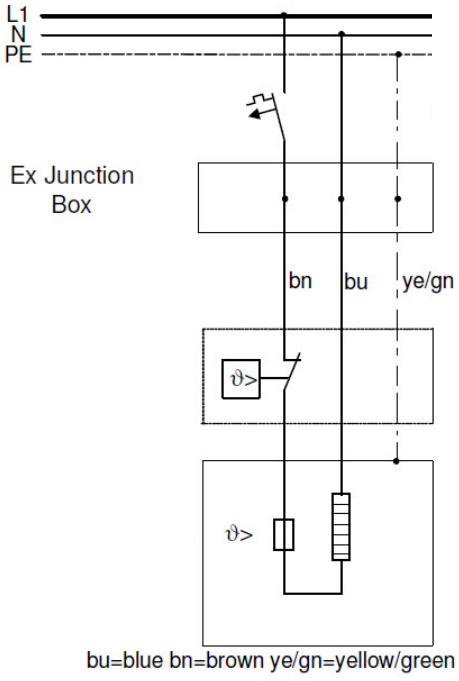
11. LOCKOUT

The lockout on the MCB should be used whenever the operator is in the "OFF" position. Ensure proper operation of lockout mechanism whenever the dead front is removed and reinstalled. The lockout will function with most style locks with a shank diameter no larger than 7/16".

12. HEATER *(IF APPLICABLE)*

If heater is installed, it will turn on at -15°C and turn off at -5°C.

Wiring diagram:



13. GENERAL MAINTENANCE

⚠ WARNING

Personnel injury or damage to equipment can occur if all power upstream from panel is not fully disconnected prior to opening enclosure.

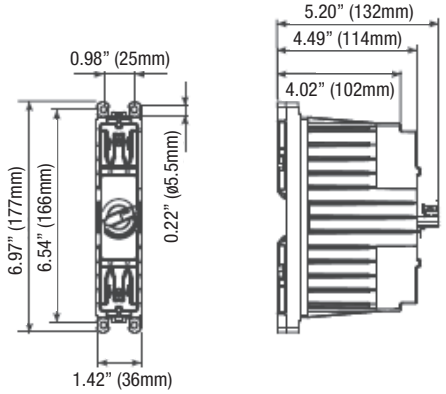
1. Eaton's Crouse-Hinds Division recommends an Electrical Preventative Maintenance Program as described in the National Fire Protection Association Bulletin NFPA 70B: Recommended Practice for Electrical Equipment Maintenance (www.nfpa.org).
2. Perform visual, electrical and mechanical checks on all components on a regular basis.
    a. Visually check for undue heating evidenced by discoloration of wires or other components, damaged or worn parts, or leakage evidenced by water or corrosion in the interior.
    b. Check to make sure that all connections are clean and tight.
    c. Mechanically check that all parts are properly assembled and operating mechanisms move freely.
    d. Ensure all insulation inside panel is properly intact.
3. If the window requires cleaning, wipe the window with a clean, damp cloth. If this is not sufficient, use a mild soap or a liquid cleaner such as Collinite NCF or Duco #7. Do not use an abrasive, strong alkaline or acid cleaner, as this may result in damage.
4. It is recommended that GFI and EPD breakers be tested monthly.
5. Panelboard exterior should be dusted periodically to avoid build-up of dust and dirt.

14. REPLACEMENT PARTS

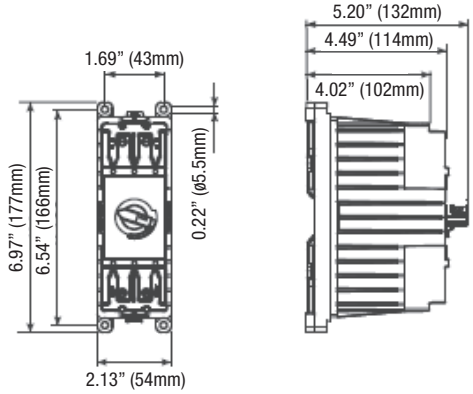
Ex-d components in SynergEX panelboards may only be replaced by components of the same type (electrical ratings and mechanical size). SynergEX panelboards are designed to provide years of reliable, trouble-free performance. However, should the need for replacement parts arise, they are available through your authorized Eaton's Crouse-Hinds Division distributor.

Assistance may also be obtained through your local Eaton's Crouse-Hinds Division representative or Sales Service Department, 1201 Wolf Street, Syracuse, New York 13208, Phone (866) 764-5454.

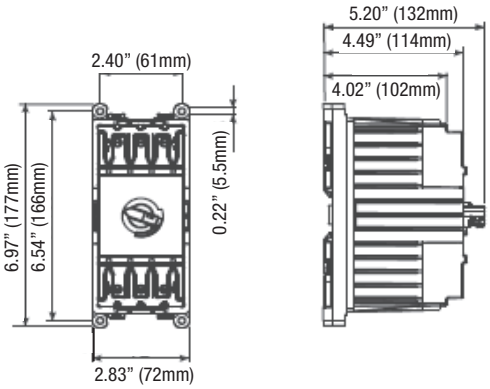
15. DIMENSIONAL DRAWINGS: BREAKERS



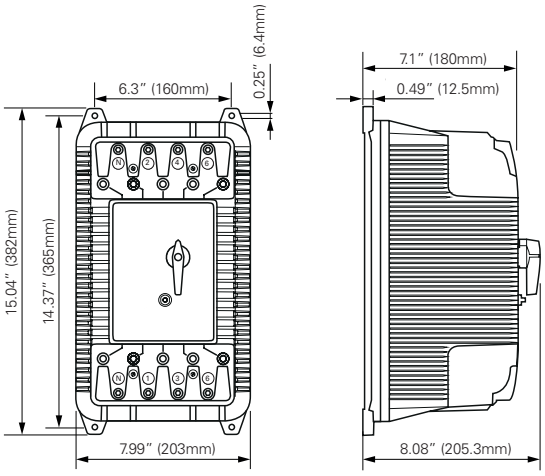
1-pole 277 VAC



2-pole; EPD and GFI 1-pole 277 VAC/480 VAC



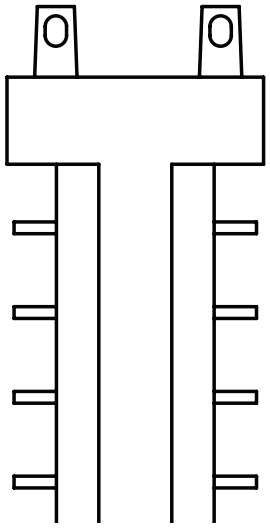
3-pole 277 VAC/480 VAC



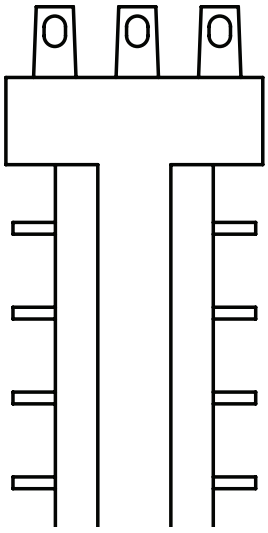
Main Breaker 277 VAC/480 VAC

16. BUSBAR SYSTEM

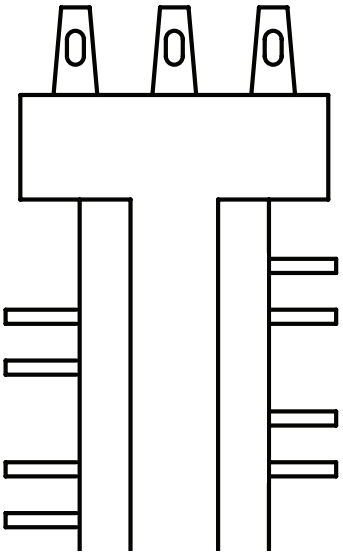
1 Phase
120/240V



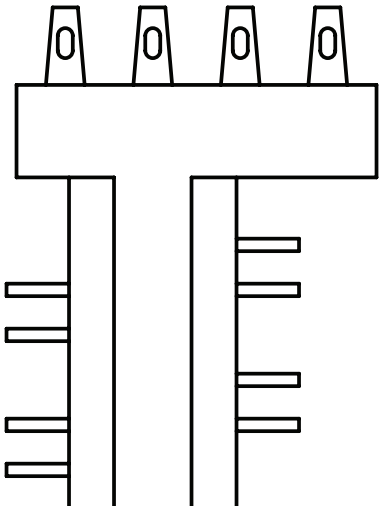
3 Phase
208/120V, 277/480V



1 Phase
120/240V
EPD/GFI



3 Phase
208/120V
EPD/GFI



17. TECHNICAL DATA

Certifications and Ratings

Certifications and Compliances:	**MLO**	Class I, Division 2, Groups A, B, C, D Class I, Zone 2, AEx nA IIC Gc T4 -20°C ≤ Ta ≤ +55°C Ex nA IIC T4 Gc -20°C ≤ Ta ≤ +55°C
	MCB	Class I, Division 2, Groups A, B, C, D Class I, Zone 2, AEx nA IIC Gc T4 -20°C ≤ Ta ≤ +40°C Ex nA IIC T4 Gc -20°C ≤ Ta ≤ +40°C
Rated Voltage		Up to 480 VAC, 60 Hz
Rated Short Circuit Current		10 kA
Rated Current		Max. 225A **Up to 40°C** Max. 200A **40°C to 55°C (MLO)**
Environmental Rating		3R, 4, 4X with stainless steel enclosure
Entries		Acc. to customer's specification and as certified (consult factory)
Terminal Cross-section – Incoming		MLO: 6 AWG - 250 MCM; MCB: 11 AWG - 350 MCM MLO: 10mm² - 120mm²; MCB: 4mm² - 185mm²
Incoming Wires		75°C
Outgoing Wires		75°C
Enclosure Material		Stainless steel or painted steel

Hazardous Location Technical Data for Breakers

Explosion Category: **For USL** **For CNL**	 AEx de IIB/IIC Ex de IIB/IIC
Certifications and Compliances:	
For USL	Class I, Division 2, Groups A, B, C, D Class I, Zone 1
For CNL	Class I, Division 2, Groups A, B, C, D Zone 1
Ambient Temperature Range	IIB: -45°C to +55°C (GHG62-1/2...R...) IIB and IIC: -20°C to +40°C (GHG627...R...) IIC: -20°C to +55°C (GHG62-1/2/3/4...R...)
Permissible Service Temperature Range*	IIB: -45°C to +110°C (GHG62-1/2...R...) IIB and IIC: -20°C to +110°C (GHG627...R...) IIC: -20°C to +110°C (GHG62-1/2/3/4...R...)

*Other temperatures possible with special versions.

Mechanical Data – Circuit Breakers

Terminal Specifications					
	Branch				**Main**
Terminal Size	14-8 AWG 1.5mm² - 16mm²				11 AWG - 350 MCM 4mm² - 185mm²
Aux. Terminals	AWG 14				AWG 11-20
Quantity Terminals for the Module Size:	1P	2P	EPD/GFI	3P	Main Breaker
Main Terminals	1	2	2	3	3
Aux. Terminals	2	3	3	4	5
Torques: **Main Contacts** **Aux. Contacts** **Mounting Screws**	 3.5 N-m 2.5 N-m 2.5 N-m				 10 N-m 2.5 N-m 2.5 N-m

Mechanical Data – Neutral and Ground

Terminal Specifications				
	Neutral		**Ground**	
	Main Connection	**Branch Connection**	**Main Connection**	**Branch Connection**
Terminal Size	6 AWG - 350 MCM	14 - 4 AWG	14 - 2 AWG	14 - 4 AWG
Torques	375 in-lb. (42.3 N-m)	14-10 AWG: 20 in-lb. (2.3 N-m) 8 AWG: 25 in-lb. (2.8 N-m) 6-4 AWG: 35 in-lb. (3.95 N-m)	50 in-lb. (5.6 N-m)	14-10 AWG: 20 in-lb. (2.3 N-m) 8 AWG: 25 in-lb. (2.8 N-m) 6-4 AWG: 35 in-lb. (3.95 N-m)

277/480V Circuit Breakers – Branch

Rated Voltage	Main contact	Up to 277/480 VAC, 60 Hz		
Rated Current	Main contact	10A-40A		
Types	1-pole 2-pole 3-pole	GHG 623 1101 R... GHG 623 2101 R... GHG 623 3101 R...		
Rated Switching Capacity		10 kA		
Component Size		1-pole	2-pole	3-pole
Weight		0.60 kg	0.90 kg	1.20 kg

Aux./Signal Contact – Branch (available as optional)

Rated Voltage	to 230 VAC	277 VAC	480 VAC
Rated Current	2A	2A	1A
Minimum Switching Capacity	5 mA at 24V		

The technical data relates to standard built-in apparatus. If other built-in apparatus is used, the technical data sheets or the data on the type label shall be observed.

277/480V Circuit Breakers – Main

Rated Voltage	Main contact	Up to 277/480 VAC, 60 Hz
Rated Current	Main contact	60-225A
Types	3-pole	GHG627...R...
Rated Switching Capacity		10 kA
Component Size		3-pole
Weight		10.5 kg

Aux./Signal Contact – Main (available as optional)

Rated Voltage	Up to 480 VAC
Rated Current	5A

The technical data relates to standard built-in apparatus. If other built-in apparatus is used, the technical data sheets or the data on the type label shall be observed.

EATON CROUSE-HINDS SERIES

Eaton's Crouse-Hinds Division
1201 Wolf Street, Syracuse, New York 13208 • U.S.A.

IF 1823
Revision 2
Revised 02/19
Supercedes 10/17