# Master**PacT** NT/NW

## Universal Power Circuit Breakers

## Catalog

**0613CT0001 Rev06/20**
**06/2020**

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# Table of Contents

MasterPacT™ Circuit Breakers ..... 7
Introduction ..... 7
Codes and Standards ..... 8
Features and Benefits ..... 9
MasterPacT NW Circuit Breaker Design ..... 13
MasterPacT NW Cradle Design ..... 14
MasterPacT NW with ArcBlok™Technology ..... 15
MasterPacT NT Circuit Breaker and Cradle Design ..... 16
Ratings ..... 17
Correction Factors ..... 22
Shipping Weights ..... 23
Energy Management ..... 25
Energy Management Using the Enerlin'X System ..... 25
Measure ..... 25
Connect ..... 26
Save ..... 26
Enerlin'X Communication System Components ..... 27
MasterPacT Circuit Breakers with MicroLogic Trip Units ..... 27
Displays ..... 27
Power Meter Functions ..... 28
Display Function ..... 28
Measurement Function ..... 29
Histories ..... 31
Maintenance Indicators ..... 32
Management of Installed Devices ..... 33
FDM121 Display ..... 34
FDM121 Display of MicroLogic Trip Unit Measurements and Alarms ..... 34
FDM121 Status Indications and Remote Control ..... 35
FDM121 Mounting ..... 35
FDM121 Connection ..... 36
FDM121 Navigation ..... 36
FDM121 Screens ..... 37
Communication Components and FDM121 Connections ..... 38
FDM128 Display ..... 39
FDM128 Display of MicroLogic Trip Unit Measurements and Trips ..... 39
FDM128 Status Indications ..... 39
FDM128 Remote Control ..... 39
FDM128 Main Characteristics ..... 40
FDM128 Mounting ..... 40
FDM128 Connection ..... 40
FDM128 Navigation ..... 41
FDM128 Screens ..... 41
Communication Components and FDM128 Connections ..... 42
MicroLogic™Electronic Trip Systems ..... 45

Overview of MicroLogic Trip Systems ....45
Thermal Imaging ....45
Power Supply Information ....46
Ammeter (A) Trip Unit without 24 Vdc Power Supply at F1 and F2 ....46
Ammeter (A) Trip Unit with 24 Vdc Power Supply at F1 and F2 ....46
Power (P) and Harmonic (H) Trip Unit without 24 Vdc Power Supply at F1 and F2 ....46
Power (P) and Harmonic (H) Trip Unit with 24 Vdc Power Supply at F1 and F2 ....47
MicroLogic Trip Units–Overview ....47
MicroLogic 2.0, 3.0, and 5.0 Basic Trip Units ....50
MicroLogic 2.0A, 3.0A, 5.0A, & 6.0A Trip Units with Ammeter ....52
MicroLogic 5.0P & 6.0P Trip Units with Power Metering ....56
MicroLogic 5.0H and 6.0H Trip Units with Harmonic Metering ....63
Additional Technical Characteristics for Type P and Type H Trip Units ....64
MicroLogic Trip Unit Functions ....65
Trip Unit Communication Network ....66
COM Option in MasterPacT Circuit Breakers ....70
IFE Ethernet Interface ....72
IFM Modbus Communication Interface ....76
IO (Input/Output) Application Module ....78
EcoStruxure Power Commission Tool ....84
MasterPacT Circuit Breaker Accessories ....86
Options for Remote Operation ....86
Remote Operation Accessories ....86
Terminals ....87
Spring-Charging Motor (MCH) ....88
Shunt Trip (MX1) and Shunt Close (XF) ....89
Additional Shunt Trip (MX2) or Undervoltage Trip (MN) ....90
Time-Delay Module for Undervoltage Trip ....91
Ready-to-Close Switch (PF) ....91
Electrical Closing Push Button (BPFE) ....92
Remote Reset (RES) and Automatic Reset After Fault ....92
Switches and Switch Accessories ....93
Auxiliary Switch (OF) ....93
Overcurrent Trip Switch (SDE) ....93
Connected/Closed Switch (EF) ....94
Cradle Position Switch ....95
MicroLogic Trip Unit Accessories ....96
External Neutral Current Transformer (CT) ....96
External Sensor for (SGR) and (MDGF) ....96
Metering Current Transformers (CTs) ....96
Voltage Measurement Inputs ....97
Adjustable Rating Plugs ....97
External Power Supply Module ....98
External Battery Backup Module ....98

M2C/M6C Programmable Contact Modules ..... 98
Zone-Selective Interlocking (ZSI) ..... 99
Restraint Interface Module (RIM) ..... 99
Cradle Connections ..... 101
Test Equipment ..... 110
Hand-Held Test Kit ..... 110
Full-Function Test Kit ..... 110
Service Interface ..... 111
Circuit Breaker Locking and Interlocking ..... 112
Lockable Push Button Cover ..... 112
Open Position Padlock and Key Lock Provisions ..... 112
Cradle Locking and Interlocking ..... 113
Disconnected Position Locking ..... 113
Door Interlock (VPEC) ..... 113
Racking Interlock Between Racking Handle and Off Position ..... 113
Cable Door Interlock Kit ..... 113
Source Changeover Interlocks ..... 114
Open Door Racking Interlock (VPOC) ..... 114
Automatic Spring Discharge Mechanism ..... 115
Cradle Rejection Kits ..... 115
Rail Padlocking ..... 115
Miscellaneous Accessories ..... 116
Mechanical Operation Counter (CDM) ..... 116
Shutter and Shutter Lock ..... 116
Door Escutcheon (CDP) ..... 116
Transparent Cover (CCP) for Door Escutcheon ..... 117
Drawout MasterPacT NW Remote Racking Device ..... 117
Wiring Diagrams ..... 118
Wiring Diagrams for MasterPacT NW Circuit Breakers ..... 118
Wiring Diagrams for MasterPacT NT Circuit Breakers ..... 120
Additional Wiring Information for MasterPacT NW/NT Circuit Breakers ..... 122
MasterPacT NT Dimensional Drawings ..... 126
MasterPacT NT Enclosure Information ..... 126
UL Listed and ANSI Certified Three-Pole Drawout Circuit Breakers ..... 126
UL Listed and ANSI Certified Three-Pole Fixed Circuit Breakers ..... 131
UL Listed and ANSI Certified Four-Pole Drawout Circuit Breaker ..... 137
UL Listed and ANSI Certified Four-Pole Fixed Circuit Breakers ..... 142
IEC Rated Three-Pole Drawout Circuit Breakers ..... 147
IEC Rated Three-Pole Fixed Circuit Breakers ..... 151
IEC Rated Four-Pole Drawout Circuit Breakers ..... 156
IEC Rated Four-Pole Fixed Circuit Breakers ..... 160
MasterPacT NW Dimensional Drawings ..... 164
MasterPacT NT Enclosure Information ..... 164
MasterPacT NW UL/ANSI Three-Pole Drawout Circuit Breakers ..... 164
MasterPacT NW Drawout Cradle Mounting ..... 173
MasterPacT NW UL/ANSI Three-Pole Fixed Circuit Breakers ..... 181
MasterPacT NW UL/ANSI Four-Pole Drawout Circuit Breakers ..... 189

MasterPacT NW Neutral Current Transformers ..... 199
MasterPacT NW IEC Three-Pole Drawout Circuit Breakers ..... 201
MasterPacT NW IEC Three-Pole Fixed Circuit Breakers ..... 204
MasterPacT NW IEC Four-Pole Drawout Circuit Breakers ..... 208
MasterPacT NW IEC Four-Pole Fixed Circuit Breakers ..... 211
Accessory Dimensional Drawings ..... 215
IFE Ethernet Interface Dimensions ..... 215
I/O (Input/Output) Application Module Dimensions ..... 215
IFM Modbus-SL Interface Dimensions ..... 216
FDM121 Switchboard Display Dimensions ..... 216
FDM121 Switchboard Display Mounting Through Panel ..... 216
FDM121 Switchboard Display Mounting On Panel ..... 217
FDM128 Switchboard Display Dimensions ..... 217
FDM128 Switchboard Display Mounting on Panel ..... 218
MasterPacT NT and NW Circuit Breaker Communication ..... 219
Fixed MasterPacT NT and NW Connection to the Communication Interface Module ..... 220
Drawout MasterPacT NT and NW Connection to the IO and Communication Interface Module ..... 221
Selection ..... 222
Selection Introduction ..... 222
Overview of Selection Procedure ..... 222
Factory-Assembled Circuit Breakers and Switches ..... 224
T-Frame Circuit Breaker Selection ..... 224
T-Frame Switch Selection ..... 225
W-Frame Circuit Breaker Selection ..... 225
W-Frame Switch Selection ..... 228
Y-Frame Circuit Breaker Selection ..... 231
Y-Frame Switch Selection ..... 231
MasterPacT NT/NW Trip Curves ..... 233
MicroLogic 6.0 A/P/H Trip Units ..... 233
MicroLogic 5.0/6.0 A/P/H Trip Units ..... 236
MicroLogic 3.0A Trip Units ..... 239
MicroLogic 2.0A Trip Unit ..... 241
MasterPacT NT/NW MicroLogic Trip Unit Instantaneous Override Values ..... 242
MasterPacT NW/NT Low Arc Flash L1F and LF Circuit Breakers ..... 244

# MasterPacT™ Circuit Breakers

## Introduction

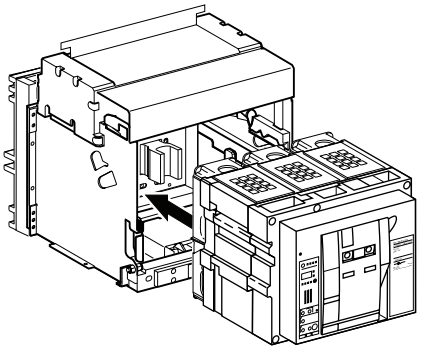
800–1600 A MasterPacT NT Drawout Circuit Breaker

MasterPacT NT/NW Universal Power Circuit Breakers are designed to protect electrical systems from damage caused by overloads, short circuits and equipment ground faults. All MasterPacT circuit breakers are designed to open and close a circuit manually, and to open the circuit automatically at a predetermined overcurrent setting.

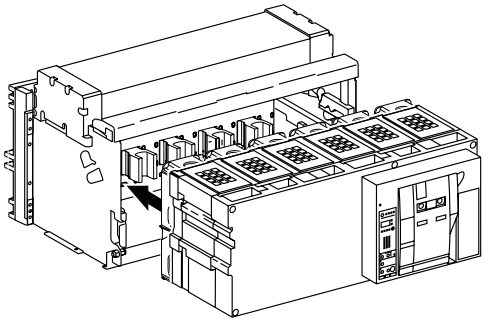
MasterPacT circuit breakers can also:

- • Enhance coordination by their adjustability.
- • Provide integral ground-fault protection for equipment.
- • Provide high interrupting ratings and withstand ratings.
- • Provide communications.
- • Provide power monitoring.
- • Provide protective relaying functions.
- • Provide zone-selective interlocking (ZSI) which can reduce damage in the event of a fault.

**MasterPacT NW Drawout Circuit Breakers**



**800–3200 A MasterPacT NW Drawout Circuit Breaker**



**4000–6300 A MasterPacT NW Drawout Circuit Breaker**

# Codes and Standards

MasterPacT circuit breakers are manufactured and tested in accordance with the following standards:

| Low-Voltage Power Circuit Breaker | Insulated Case Circuit Breaker | IEC Rated Circuit Breaker | IEC Extreme Atmospheric Conditions |
|---|---|---|---|
| ANSI C37.13 | UL 489 (UL Listed) | IEC 60947-2 | IEC 68-2-1: Dry cold at –55°C |
| ANSI C37.16 | NEMA AB1 | IEC 60947-3 | IEC 68-2-2: Dry heat at +85°C |
| ANSI C37.17 | CSA C22.2 No. 5 | | IEC 68-2-30: Damp heat (temp. +55°C, rel. humidity 95%) |
| ANSI C37.50 | NMX J-266-ANCE | | |
| UL 1066 (cULus Listed) | | | IEC 68-2-52 Level 2: Salt mist |
| NEMA SG3 | | | |

**NOTE:** Throughout this document, the phrase “ANSI® Certified” means the product meets the requirements of UL 1066 and ANSI C37. When “UL® Listed” appears, the product meets the requirements of UL 489.

The 800–2000 A ANSI Low Voltage Power Circuit Breakers type L1F and Insulated Case Circuit Breaker type LF are tested to show the arc flash hazard risk category as referenced by NFPA® 70E.

Circuit breakers should be applied according to guidelines detailed in the National Electrical Code® (NEC® ) and other local wiring codes.

MasterPacT circuit breakers are available in Square D™ or Schneider Electric™ brands.

UL File Numbers:

- MasterPacT NW: E161835 Vol. 2 Sec. 1
- MasterPacT NT: E161835 Vol. 2 Sec. 2

# Features and Benefits

**High Ampere Interrupting Rating (AIR)**: ANSI Certified MasterPacT NW circuit breakers have an interrupting rating of 200,000 A at 508 Vac without fuses.

**High Short-Time Current Rating**: MasterPacT NW circuit breakers have exceptional short-time ratings—up to 100,000 A.

**100% Rated Circuit Breaker**: MasterPacT circuit breakers are designed for continuous operation at 100% of their current rating.

**Reverse Fed Circuit Breaker**: MasterPacT circuit breakers can be fed either from the top of the circuit breaker or from the bottom.

**Two-Step Stored Energy Mechanism**: MasterPacT circuit breakers are operated via a stored-energy mechanism which can be charged manually or by a motor. The closing time is less than five cycles. Closing and opening operations can be initiated by remote control or by push buttons on the circuit breaker front cover. An O–C–O cycle is possible without recharging.

**Drawout or Fixed Mount, 3-Pole (3P) or 4-Pole (4P) Construction**: ANSI Rated, UL Listed and IEC Rated MasterPacT circuit breakers are available in drawout or fixed mounts, with either three-pole or four-pole construction.

**Field-Installable Trip Units, Sensor Plugs and Accessories**: Trip units, sensor plugs and most accessories are field installable with only the aid of a screwdriver and without adjusting the circuit breaker. The uniform design of the circuit breaker line allows most accessories to be common for the whole line.

**Reinforced Insulation**: Two insulation barriers separate the circuit breaker front from the current path.

**Isolation Function by Positive Indication of Contact Status**: The mechanical indicator is truly representative of the status of all the main contacts.

**Segregated Compartment**: Once the accessory cover has been removed to provide access to the accessory compartment, the main contacts remain fully isolated. Furthermore, interphase partitioning allows full insulation between each pole even if the accessory cover has been removed.

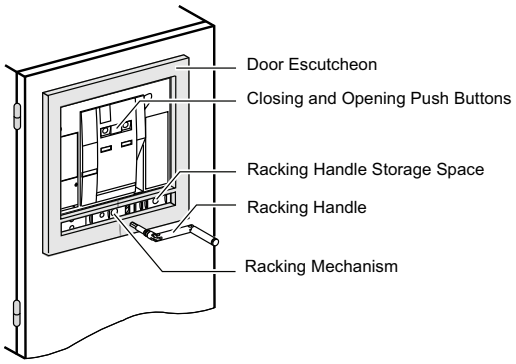
**Front Connection of Secondary Circuits**: All accessory terminals (ring terminals are available as an option) are located on a connecting block which is accessible from the front in the connected, test and disconnected positions. This is particularly useful for field inspection and modification.

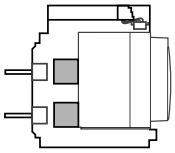
**Anti-Pumping Feature**: All MasterPacT NT and NW circuit breakers are designed with an anti-pumping feature that causes an opening order to always takes priority over a closing order. Specifically, if opening and closing orders occur simultaneously, the charged mechanism discharges without any movement of the main contacts keeping the circuit breaker in the open (OFF) position. In the event that opening and closing orders are simultaneously maintained, the standard mechanism provides an anti-pumping function which continues to keep the main contacts in the open position. In addition, after fault tripping or opening the circuit breaker intentionally (using the manual or electrical controls and with the closing coil continuously energized) the circuit breaker cannot be closed until the power supply to the closing coil is discontinued and then reactivated.

> **NOTE:** When the automatic reset after fault trip (RAR) option is installed, the automatic control system must take into account the information supplied by the circuit breaker before issuing a new closing order or before blocking the circuit breaker in the open position. The information is on the type of fault, e.g. overload, short-circuit or ground fault.

**Disconnection Through the Front Door**: The racking handle and racking mechanism are accessible through the front door cutout. Disconnecting the circuit breaker is possible without opening the door and exposing live parts.

### Racking Handle and Mechanism



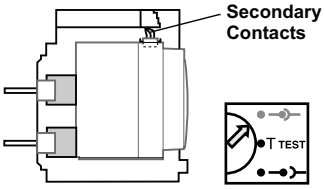



**Disconnected Position (Cluster Shield Not Shown)**

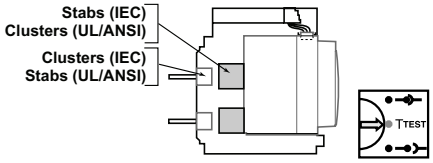
**Drawout Mechanism**: The drawout assembly mechanism allows the circuit breaker to be racked in four positions (connected, test, disconnected, or withdrawn), as shown in the figure below.

**NOTE:** For UL/ANSI circuit breakers, the clusters are mounted on the circuit breaker; for IEC circuit breakers, the clusters are mounted on the cradle.

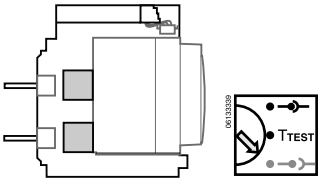
### Racking Positions (Cluster Shield Not Shown)



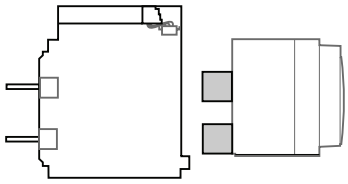

**Connected Position**




**Test Position**




**Disconnected Position**



**Withdrawn Position**

**Maintenance:** To maintain MasterPacT operating and safety characteristics from the beginning to the end of its service life, Schneider Electric recommends that systematic checks and periodic on-site maintenance be carried out by qualified personnel, as indicated in bulletin 0613IB1202, "Maintenance and Field Testing Guide for MasterPacT NT and NW Circuit Breakers".

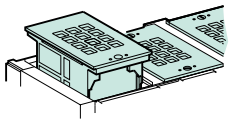
Schneider Electric Field Services offers a wide portfolio of field maintenance services named ONSITE MAINTENANCE which offers four types of services:

- OnSite Repair, which repairs a system in view of fulfilling a required function
- OnSite Preventive Maintenance, which carries out, at predetermined intervals, checks intended to reduce the probability of a failure or deterioration in the operation of a system

- Onsite Condition Maintenance, based on the recording and analysis of system parameters in addition to preventive checks, detects drift from the initial state and/or significant trends in performance. Using OnSite Condition Maintenance makes it possible to anticipate any necessary corrective action required to ensure equipment safety and continuity of service, and make repairs immediately if spare parts are onsite, or to plan the repair for a more convenient time.
- On-Site Asset Diagnostic, which is used to identify symptoms of malfunction or degradation before problems occur, things not possible to detect during standard preventive maintenance. It detects functional deviations versus original (new device) specifications. A repair plan is recommended to recover the original conditions when deviations are diagnosed.

The Maintenance Guide is available on the Internet (www.schneider-electric.com) and provides detailed information on:

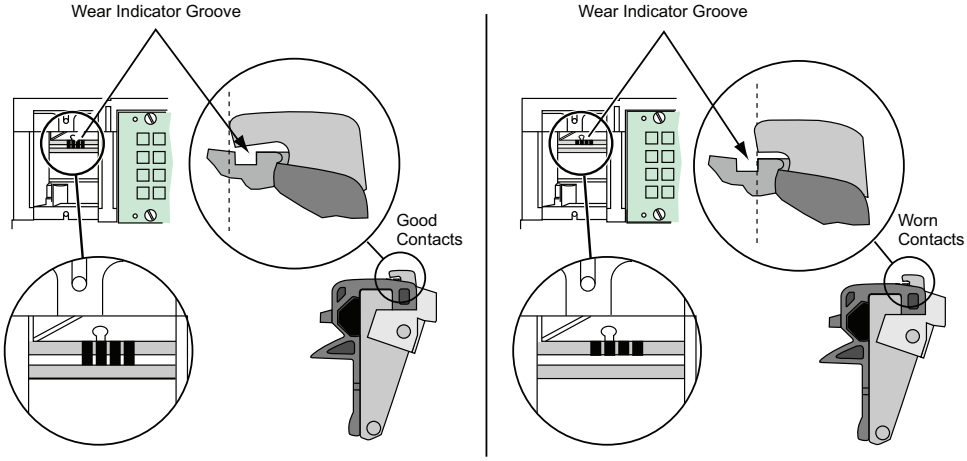
- types of maintenance required, depending on the criticality of the protected circuit, risks involved if the component ceases to operate correctly,
- what is understood by the terms normal, improved and severe environment and operating conditions,
- periodic preventive maintenance operations that should be carried out under normal environment and operating conditions as well as the level of competence required for the operations,
- the environment and operating conditions that accelerate device aging,
- the recommended timing of on-site maintenance according to equipment criticality and the environmental conditions in which the equipment operates



Arc Chamber

An example of preventive maintenance: the arc chambers are removed to allow visual inspection of the contacts and wear indicator groove (see Contact Wear *Indicators, page 12* for how wear is indicated). The operation counter can also indicate when inspections and possible maintenance should be done. The life of the circuit breaker may be extended by replacing the arc chamber and/or spring charging motor of ANSI Certified circuit breakers. See bulletin 0613IB1202, available at www.schneider-electric.com, for information on normal and adverse operating conditions.

**Contact Wear Indicators**




**Ambient Temperature:**

MasterPacT circuit breakers can operate under the following temperature conditions:

- The electrical and mechanical characteristics are stipulated for an ambient temperature between -13°F (25°C) and 158°F (70°C).
- Mechanical closing of the circuit breaker (by pushbutton) is possible down to -31°F (-35°C) and at an altitude up to +13,000 ft. (3900 m).

MasterPacT circuit breakers have been tested for operation in industrial atmospheres. It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust.

Operation at temperatures above 104°F (40°C) may require derating or overbussing the circuit breaker. See the appropriate instruction bulletin and *Temperature Correction Factors, page 26* of this catalog for additional information.

Storage Temperature

Circuit breakers with trip units without LCD displays may be stored in the original packaging at temperatures between -40°F (-40°C) and 185°F (85°C). For circuit breakers with trip units with LCD displays, this range is -13°F (-25°C) to 185°F (85°C).

**Altitude:**

MasterPacT circuit breakers are suitable for use at altitudes of 13,000 ft. (3900 m) and below. See Altitude Correction Factors per ANSI C37.20.1 par. 7.1.4.1 (Table *10), page 26* for altitude correction factors.

**Vibration:**

MasterPacT circuit breakers meet IEC 60068-2-6 Standards for vibration.

- 2 to 13.2 Hz and amplitude 0.039 in. (1 mm)
- 13.2 to 100 Hz constant acceleration 0.024 oz. (0.7 g)

**Humidity:**

MasterPacT circuit breakers have been tested to the following:

- IEC68-2-30—amp heat (temperature +55°C and relative humidity of 95%)
- IEC 68-2-52 level 2—alt mist

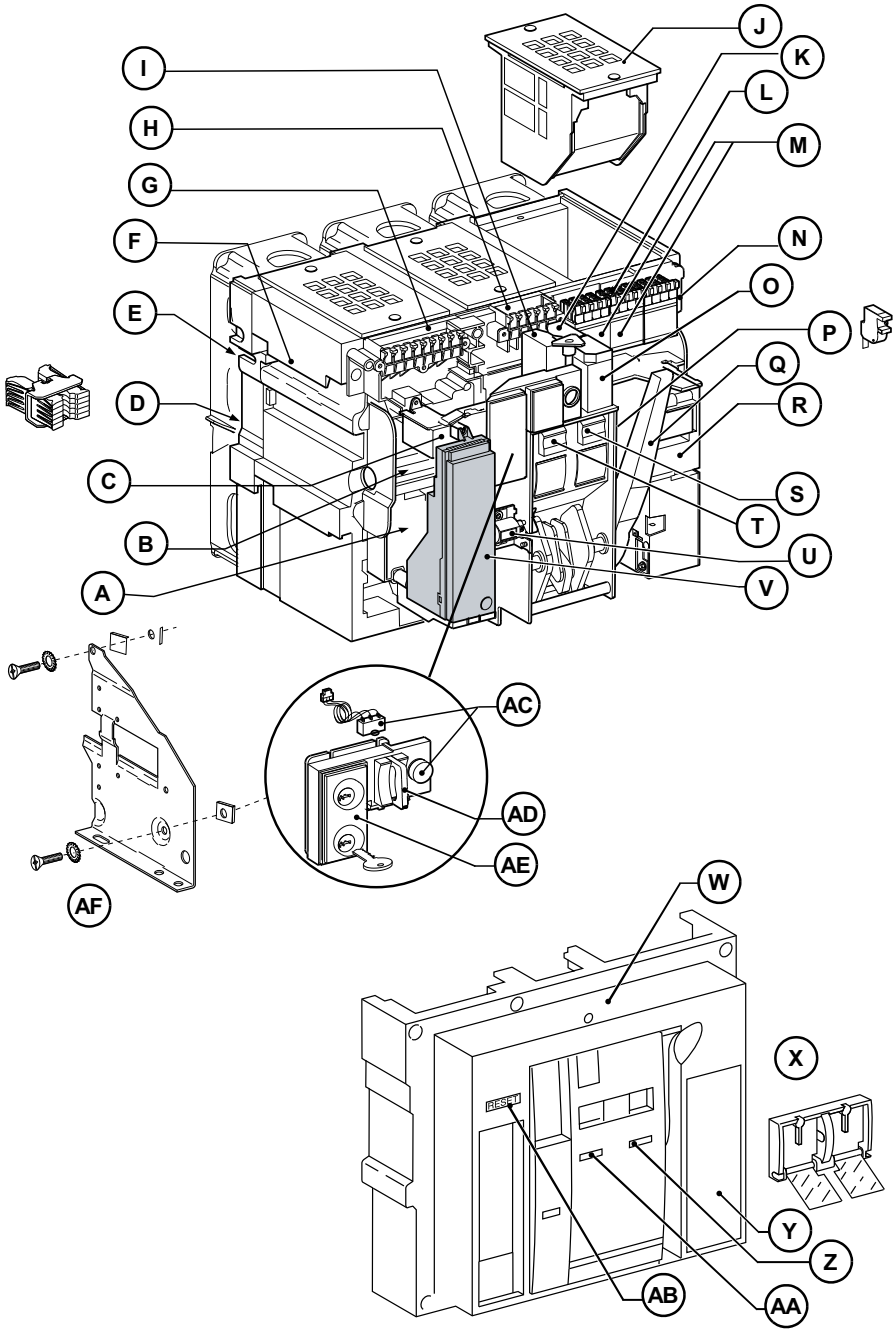
The materials used in MasterPacT NT and NW circuit breakers will not support the growth of fungus and mold.

# MasterPacT NW Circuit Breaker Design

**NOTE:** For UL Listed and ANSI Certified circuit breakers, the clusters are mounted on the circuit breaker; for IEC Rated circuit breakers, the clusters are mounted on the cradle.

- A Overcurrent Trip Switch (SDE1)
- B Circuit Breaker Communication Module
- C Overcurrent Trip Switch (SDE2) or Electric Reset
- D Cluster
- E Cradle Rejection Kit
- F Lifting Tab
- G Trip Connection to Overcurrent Trip Switch
- H Auxiliary Control Connection
- I Shunt Trip (MX2) or Undervoltage Trip Device
- J Arc Chamber
- K Shunt Trip (MX1)
- L Auxiliary Contact Connection
- M Two Blocks of Four Additional Switches (OF) or Combined “Connected,Closed” Switches (EF)
- N Block of Four Form C Auxiliary Contacts (OF)
- O Shunt Close (XF)
- P Ready-to-Close Contact
- Q Charging Handle
- R Spring-Charging Motor (MCH)
- S Closing Push Button
- T Opening Push Button
- U Operations Counter
- V Trip Unit
- W Accessory Cover
- X Open/Close Push Button Close (Lockable with Padlock)
- Y Faceplate
- Z Charged/Discharged Indicator
- AA Open/Close Indicator
- AB Push-to-Reset on Fault Trip
- AC Electrical Close Push Button (BPFE)
- AD Padlock Attachment
- AE Key Interlock
- AF Mounting Plate for Fixed Circuit Breaker

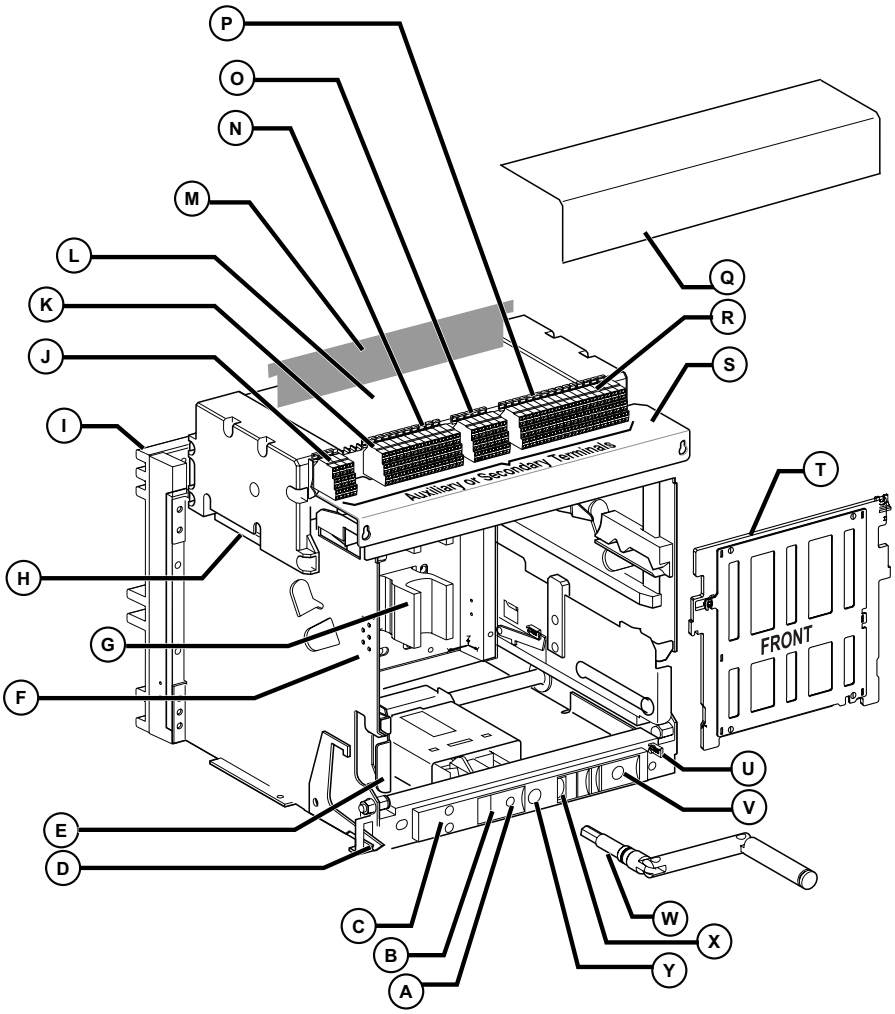
**MasterPacT NW Circuit Breaker**



# MasterPacT NW Cradle Design

A Stop Release Button
B Padlock Provision
C Key Interlock
D Door Interlock for Connected Device
E Pull-Out Hand Grip
F Rejection Feature
G Primary Stabs (UL)/ Clusters (IEC)
H Lifting Tab
I Cradle Back Mold
J Position Indicating Contact Terminal Block
K Overcurrent Trip Switch Terminal Block
L Arc Chamber Cover
M Tool Shield
N Position Indicating Contact Terminal Block
O Accessory Control Terminal Block
P Auxiliary Contact Terminal Block
Q Terminal Cover
R Position Indicating Contact Terminal Block
S Wiring Cover
T Shutter
U Racking Interlock for Open Door
V Crank Storage Space
W Racking Crank
X Position Indicator
Y Crank Insertion Opening

**MasterPacT NW Cradle**



# MasterPacT NW with ArcBlok™Technology

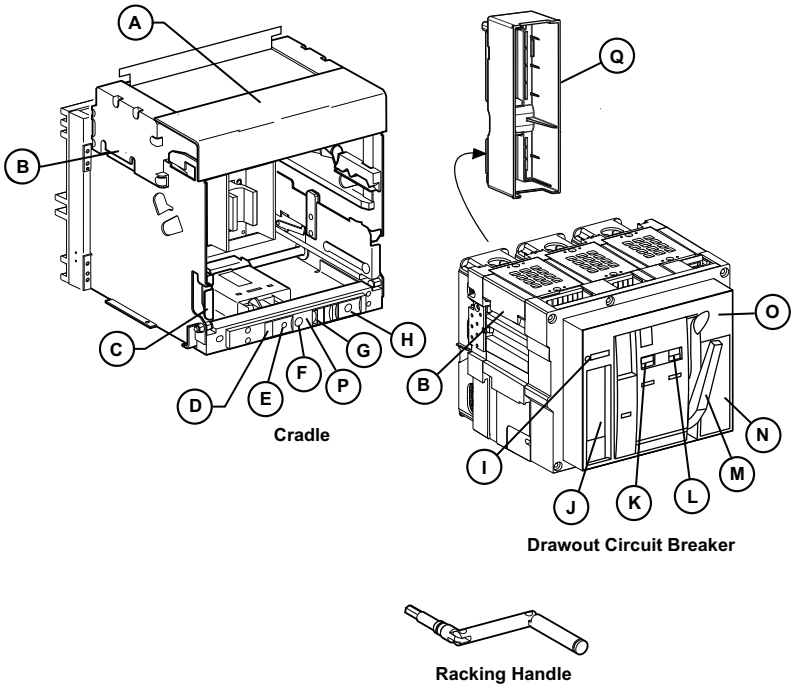
The MasterPacT NW low-voltage power circuit breaker and insulated case circuit breaker are available with ArcBlok technology designed to mount in an ArcBlok drawout cradle.

The MasterPacT NW with ArcBlok technology interfaces with the ArcBlok cradle to prevent arcing events by enclosing the phases at the primary connection of the cradle. If for any reason an arcing event happens, with the separation between phase to phase and phase to ground, the arc is extinguished in less than 12 ms to reduce arc flash energy.

The MasterPacT NW with ArcBlok technology is tested as part of Arc Resistant Equipment to ANSI C37.20.7.

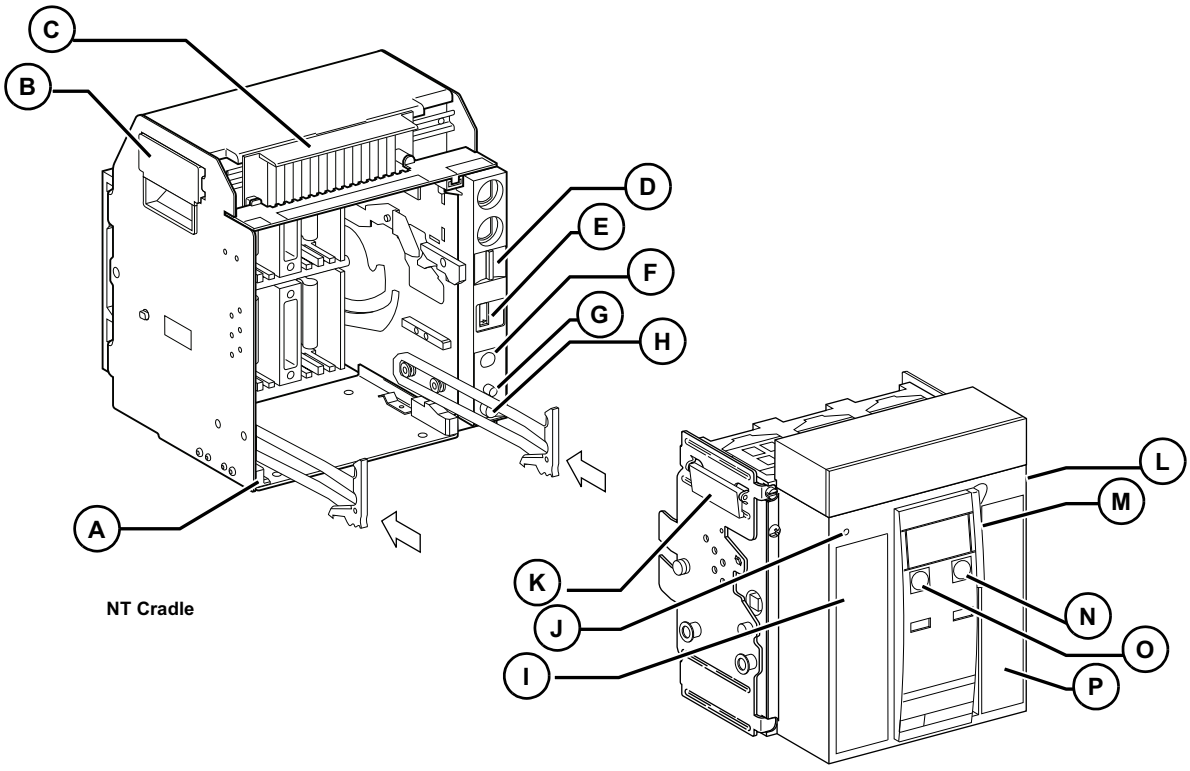
| | |
|---|---|
| A | Terminal Cover |
| B | Lifting Flanges |
| C | Extension Rail Handle |
| D | Padlock Provision |
| E | Stop Release Button |
| F | Racking Handle Insertion Opening |
| G | Position Indicator |
| H | Racking Handle Storage Space |
| I | Fault Trip Reset Button |
| J | Trip Unit |
| K | Push to Open Button |
| L | Push to Close Button |
| M | Charging Handle |
| N | Faceplate |
| O | Accessory Cover |
| P | Cradle Date Code |
| Q | ArcBlok Shield (rotated for clarity) |

**MasterPacT NW Circuit Breaker and Cradle with ArcBlok Technology**



# MasterPacT NT Circuit Breaker and Cradle Design

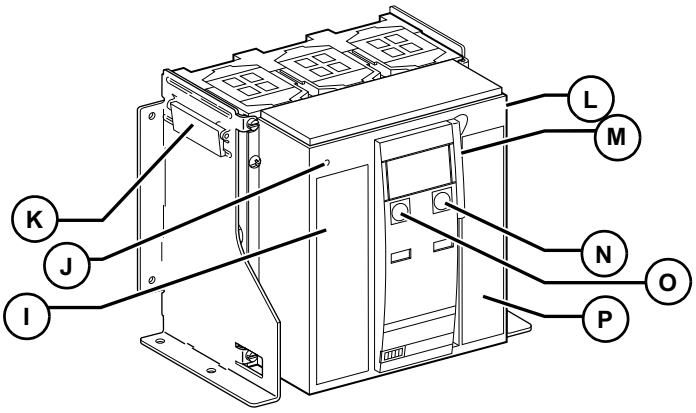
**MasterPacT NT Circuit Breaker**




**NT Cradle**

**NT Drawout Circuit Breaker**

| | |
|---|---|
| A | Extension Rail Handle |
| B | Lifting Handle |
| C | Terminal Cover |
| D | Padlock Provision |
| E | Position Indicator |
| F | Racking Handle Insertion Opening |
| G | Stop Release Button |
| H | Racking Handle Storage Space |
| I | Lifting Tab |
| J | Fault Trip Reset Button |
| K | Trip Unit |
| L | Accessory Cover |
| M | Charging Handle |
| N | Push-to-close” Button |
| O | Push-to-open” Button |
| P | Faceplate |




**NT Fixed Circuit Breaker**

# Ratings

## Ratings for ANSI C37 Certified MasterPacT NW Circuit Breakers 800–2000 A

| Frame Rating | | 800/1600 A | | | | | | 2000 A | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interrupting Rating Code | | N1 | H1 | H2 | H3 | L1(1), (2) | L1F(2) | H1 | H2 | H3 | L1(1), (2) | L1F(2) |
| Interrupting Current (kAIR) | 254 Vac 50/60 Hz | 42 | 65 | 85 | 100 | 200 | 200 | 65 | 85 | 100 | 200 | 200 |
| | 508 Vac 50/60 Hz | 42 | 65 | 85 | 100 | 200 | 200 | 65 | 85 | 100 | 200 | 200 |
| | 635 Vac 50/60 Hz | 42 | 65 | 85 | 85 | 130 | 130 | 65 | 85 | 85 | 130 | 130 |
| Short-Time Withstand Current (kA) | Vac 50/60 Hz, 0.5 s | 42 | 65 | 85 | 85 | 30 | 22 | 65 | 85 | 85 | 30 | 22 |
| Built In Instantaneous Override (Peak kA ±10%) —5 | | —(3) | —(3) | —(3) | 190 | 805 | 55 | — | — | 190 | 80 | 55 |
| Close and Latch Ratings (Peak kA) | Vac 50/60 Hz | 90 | 150 | 90 | 9 90 | 55 | 50 | 50 | 90 | 90 | 55 | 50 |
| Tested to show arc flash hazard risk category as referenced by NFPA70E | | — | — | — | — | — | Yes | — | — | — | — | Yes |
| Breaking Time | | 25 to 30 ms (with no intentional delay) 9 ms for L1 and L1F | | | | | | | | | | |
| Closing Time | | 70 ms | | | | | | | | | | |
| Sensor Rating | | 100–800 A<br>800–1600 A | | | | | | 1000–2000 A | | | | |
| Endurance Rating (C/O Cycles) (with no maintenance) | Mechanical | 12,500 | | | | | | 10,000 | | | | |
| | Electrical | 2800 | | | | | | 1000 | | | | |

## Ratings for ANSI C37 Certified MasterPacT NW Circuit Breakers 3200–6000 A

| Frame Rating | | 3200/4000 A(4) | | | | 4000/5000/6000(5) | | |
|---|---|---|---|---|---|---|---|---|
| Interrupting Rating Code | | H1 | H2 | H3 | L1(1). (2) | H2 | H3 | L1(1), (2) |
| Interrupting Current (kAIR) | 254 Vac 50/60 Hz | 65 | 85 | 100 | 200 | 85 | 100 | 200 |
| | 508 Vac 50/60 Hz | 65 | 85 | 100 | 200 | 85 | 100 | 200 |
| | 635 Vac 50/60 Hz | 65 | 85 | 85 | 130 | 85 | 85 | 130 |
| Short-Time Withstand Current (kA) | Vac 50/60 Hz, 0.5 | 65 | 85 | 85 | 100 | 85 | 85 | 100 |
| Built In Instantaneous Override (Peak kA ±10%) —5 | | — | — | 190 | 270 | — | — | 270 |
| Close and Latch Ratings (Peak kA) | Vac 50/60 Hz | 150 | 90 | 90 | 90 | 170 | 170 | 90 |
| Tested to show arc flash hazard risk category as referenced by NFPA70E | | — | — | — | — | — | — | — |
| Breaking Time | | | | | | | | |
| Closing Time | | | | | | | | |
| Sensor Rating | | 1600–4000 A | | | | 2000–4000 A<br>2500–5000 A<br>3000–6000 A | | |

(1) Interrupting ratings (kAIR) at 50 Hz: 200 kA (254 Vac), 150 kA (508 Vac), 100 kA (635 Vac).
(2) The interrupting ratings L1 and L1F are available only in 3P, drawout construction.
(3) 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.
(4) 4000 A standard width circuit breaker is not available in L1 interrupting rating code or drawout construction.
(5) ArcBlok circuit breakers are available only to 5000 A.

## Ratings for ANSI C37 Certified MasterPacT NW Circuit Breakers 3200–6000 A (Continued)

| Frame Rating | | 3200/4000 A(6) | | 4000/5000/6000(7) |
|---|---|---|---|---|
| Endurance Rating (C/O Cycles) (with no maintenance) | Mechanical | 10,000 | 5000 | 5000 |
| | Electrical | 1000 | | 1000 |

## Ratings for ANSI C37 Certified MasterPacT NW Automatic Switches

| Frame Rating | | 800 A | 1600 A | 2000 A | 3200 A | 4000 A(8) | 5000 A |
|---|---|---|---|---|---|---|---|
| Withstand Rating Code | | HA | HA | HA | HA | HA | HA |
| Breaking Capacity with External Relay (kA) 50/60 Hz | 254 Vac | 65 | 65 | 65 | 65 | 85 | 85 |
| | 508 Vac | 65 | 65 | 65 | 65 | 85 | 85 |
| | 635 Vac | 65 | 65 | 65 | 65 | 85 | 85 |
| Short-Time Withstand Current (kA) Vac 50/60 Hz, 0.5 s | | 65 | 65 | 65 | 65 | 85 | 85 |

## Ratings for UL 489 Listed MasterPacT NW Circuit Breakers

| Frame Rating | | 800/1200/1600/2000 A | | | | 2500/3000 A | | 4000/5000/6000 A | |
|---|---|---|---|---|---|---|---|---|---|
| Interrupting Rating Code | | N | H | L | LF | H | L | H | L |
| Interrupting Current (kAIR) | 240 Vac 50/60 Hz | 65 | 100 | 200 | 200 | 100 | 200 | 100 | 200 |
| | 480 Vac 50/60 Hz | 65 | 100 | 150 | 150 | 100 | 150 | 100 | 150 |
| | 600 Vac 50/60 Hz | 50 | 85 | 100 | 100 | 85 | 100 | 85 | 100 |
| Short-Time Withstand Current (kA) Vac 50/60 Hz, 0.5 s 421 | Vac 50/60 Hz, 0.5 s | 42(9) | 65(9) | 30(9), (10) | 22 | 65 | 65 | 85 | 100 |
| Built-In Instantaneous Override (Peak kA ±10%) | | 90 | 90 | 80(11), (12) | 55 | 150 | 150 | 170 | 170 |
| Close and Latch Ratings (Peak kA) | Vac 50/60 Hz | 90 | 90 | 55(13) | 50 | 90 | 90 | 90 | 90 |
| Tested to show arc flash hazard risk category as referenced by NFPA70E | | — | — | — | Yes | — | — | — | — |
| Breaking Time | | 25 to 30 ms (with no intentional delay) 9 ms for L and LF | | | | | | | |
| Closing Time | | 70 ms | | | | | | | |
| Sensor Rating | | 100–250 A / 400–800 A / 600–1200 A / 800–1600 A / 1000–2000 A | | | | 1200–2500 A / 1600–3000 A | | 2000–4000 A / 2500–5000 A / 3000–6000 A | |
| Endurance Rating (C/O Cycles) (with no maintenance) | Mechanical | 12,500(14) | | | | 10,000 | | 5000 | |
| | Electrical | 28,00(14) | | | | 1000 | | 1000 | |

(6) 4000 A standard width circuit breaker is not available in L1 interrupting rating code or drawout construction.
(7) ArcBlok circuit breakers are available only to 5000 A.
(8) 4000 A standard width automatic switch is not available in HC withstand rating code or drawout construction.
(9) 24 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.
(10) 65 kA for 2000 A.
(11) 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.
(12) 150 kA for 200 A sensor.
(13) 0 kA for 2000 A.
(14) The endurance rating for 2000 A, N/H/L/LF is 10,000 for mechanical and 1000 for electrical.

## Ratings for UL 489 Listed MasterPacT NW Automatic Switches

| Frame Rating | | 800 A | | 1200 A | | 1600 A | | 2000 A | | 2500 A | | 3000 A | | 4000 A | | 5000 A | | 6000 A | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Withstand Rating Code | | HF | HB | HF | HB | HF | HB | HF | HB | HF | HB | HF | HB | HF | HB | HF | HB | HF | HB |
| Withstand Ratings[15] Vac, 50/60 Hz (kA) | 240 Vac | 10-0 | 20-0 | 10-0 | 200 | 100 | 200 | 100 | 200 | 10-0 | 200 | 100 | 200 | 10-0 | 200 | 100 | 200 | 10-0 | 200 |
| | 480 Vac | 10-0 | 15-0 | 10-0 | 150 | 100 | 150 | 100 | 150 | 10-0 | 150 | 100 | 150 | 10-0 | 150 | 100 | 150 | 10-0 | 150 |
| | 600 Vac | 85 | 10-0 | 85 | 100 | 85 | 100 | 85 | 100 | 85 | 100 | 85 | 100 | 85 | 100 | 85 | 100 | 85 | 100 |
| Instantaneous Override (Peak kA) | | 90 | 80 | 90 | 50 | 90 | 80 | 90 | 80 | 15-0 | 150 | 150 | 150 | 17-0 | 170 | 170 | 170 | 17-0 | 170 |

## Ratings for IEC 60947-2 Rated MasterPacT NW Circuit Breakers 800–2000 A

| Frame Rating | | | 800/1000/1250/1600 A | | | | | 2000 A | | | | | | 2500/3200/4000 A | | | 4000-B/ 5000/ 6300 A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interrupting Rating Code | | | N1 | H1 | H2 | L1 | H10 | N1 | H1 | H2 | H2 H3 | L1 | H1-0 | H1 | H2 | H3 | H1 |
| Ultimate Breaking Capacity (kA) 50/60 Hz | Icu | 220/415 Vac | 42 | 65 | 100 | 150 | — | 42 | 65 | 100 | 150 | 150 | — | 65 | 100 | 150 | 100 |
| | | 440 Vac | 42 | 65 | 100 | 150 | — | 42 | 65 | 100 | 150 | 150 | — | 65 | 100 | 150 | 100 |
| | | 525 Vac | 42 | 65 | 85 | 130 | — | 42 | 65 | 85 | 130 | 130 | — | 65 | 85 | 130 | 100 |
| | | 690 Vac | 42 | 65 | 85 | 100 | — | 42 | 65 | 85 | 100 | 100 | — | 65 | 85 | 100 | 100 |
| | | 1150 Vac | — | — | — | — | 50 | — | — | — | — | — | 50 | — | — | — | — |
| Service Breaking Capacity | Ics | %Icu | 100% | | | | | 100% | | | | | | 100% | | | 100% |
| Short-Time Withstand Current (kA) | Icw | Vac 50/60 Hz, 1 s | 42 | 65 | 85 | 30 | 50 | 42 | 65 | 85 | 65 | 30 | 50 | 65 | 85 | 65 | 100 |
| | | Vac 50/60 Hz, 3 s | 22 | 36 | 50 | 30 | 50 | 22 | 36 | 75 | 65 | 30 | 50 | 65 | 75 | 65 | 100 |
| Built-In Instantaneous Override (Peak kA ±10%) | | | — | — | 190[16] | 80[16] | — | — | — 117 | 190 | 150 | 80 | — | — | 190 | 150 | — |
| Rated Making Current (Peak kA) 50/60 Hz | Icm | 220/415 Vac | 88 | 143 | 220 | 330 | — | 88 | 88 | 220 | 330 | 330 | — | 143 | 220 | 330 | 220 |
| | | 440 Vac | 88 | 143 | 220 | 330 | — | 88 | 88 | 220 | 330 | 330 | — | 143 | 220 | 330 | 220 |
| | | 525 Vac | 88 | 143 | 187 | 286 | — | 88 | 88 | 187 | 286 | 286 | — | 143 | 189 | 286 | 187 |
| | | 690 Vac | 88 | 143 | 187 | 220 | — | 88 | 88 | 187 | 220 | 220 | — | 143 | 189 | 220 | 187 |
| | | 1150 Vac | — | — | — | — | 105 | — | — | — | — | — | 105 | — | — | — | — |
| Break Time | | ms | 25 | | | | | 25 | | | | | | 25 | | | 25 |
| Closing Time | | ms | < 70 | | | | | < 70 | | | | | | < 70 | | | < 80 |
| Endurance Rating (with no maint.) C/O Cycles x 1000 | | Mechanical | 12.5 | | | | | 10 | | | | | | 10 | | | 5 |
| | | Electrical 440 V | 10 | 10 | 10 | 3 | — | 8 | 8 | 1 | 3 | 3 | — | 5 | 5 5 | 1.25 | 1.5 |
| | | Electrical 1150 V | — | — | — | — | 0.5 | — | — | — | — | — | 0.5 | — | — | — | — |

(15) The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.
(16) 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.

## Ratings for IEC 60947-2 Rated MasterPacT NW Circuit Breakers 800–2000 A 2500–6300 A

| **Frame Rating** | | | **2500/3200/4000 A** | | | | **4000B/5000/6300 A** | |
|---|---|---|---|---|---|---|---|---|
| **Interrupting Rating Code** | | | **10 H1** | **H2** | **H3** | **H10** | **H1** | **H2** |
| Ultimate Breaking Capacity (kA) 50/60 Hz | Icu | 220/415 Vac | 65 | 100 | 150 | — | 100 | 150 |
| | | 440 Vac | 65 | 100 | 150 | — | 100 | 150 |
| | | 525 Vac | 65 | 85 | 130 | — | 100 | 130 |
| | | 690 Vac | 65 | 85 | 100 | — | 100 | 100 |
| | | 1150 Vac | — | — | — | 50 | — | — |
| Service Breaking Capacity | Ics | %Icu | 100% | 100% | 100% | 100% | 100% | 100% |
| Short-Time Withstand Current (kA) | Icw | Vac 50/60 Hz, 1 s | 65 | 85 | 65 | 50 | 100 | 100 |
| | | Vac 50/60 Hz, 3 s | 65 | 75 | 65 | 50 | 100 | 100 |
| Built-In Instantaneous Override (Peak kA ±10%) | | | — | 190 | 150 | 801 | — | 117 |
| Rated Making Current (Peak kA) 50/60 Hz | Icm | 220/415 Vac | 143 | 220 | 330 | — | 220 | 330 |
| | | 440 Vac | 143 | 220 | 330 | — | 220 | 330 |
| | | 525 Vac | 143 | 189 | 286 | — | 187 | 286 |
| | | 690 Vac | 143 | 189 | 220 | — | 187 | 220 |
| | | 1150 Vac | — | — | — | 105 | — | — |
| Break Time | | ms | 25 | | | | 25 | |
| Closing Time | | ms | < 70 | | | | < 80 | |
| Endurance Rating (with no maint.) C/O Cycles x 1000 | | Mechanical | 10 | | | | 5 | |
| | | Electrical 440 V | 5 | 5 5 | 1.25 | — | 1.5 | 1.5 |
| | | Electrical 1150 V | — | — | — | 0.5 | — | — |

## Ratings for ANSI C37 Certified MasterPacT NT Circuit Breakers

| | | |
|---|---|---|
| Frame Rating | | 800 A |
| Interrupting Rating Code N1 | | N1 |
| Interrupting Current (kAIR) | 254 Vac 60 Hz | 42 |
| | 508 Vac 60 Hz | 42 |
| | 635 Vac 60 Hz | N/A |
| Short-Time Withstand Current (kA) | ac 60 Hz, 0.5 s | 42 |
| Built-In Instantaneous Override (Peak kA ±10%) — | | — |
| Close and Latch Ratings (Peak kA) | Close and Latch Ratings (Peak kA) ac 60 Hz | 90 |
| Tested to show arc flash hazard risk category as referenced by NFPA70E | | — |
| Breaking Time | | 25 to 30 ms (with no intentional time delay) |
| Closing Time | | < 50 ms |
| Sensor Rating | | 100 to 250 A / 400 to 800 A |
| Endurance Rating (C/O Cycles) (with no maintenance) | Mechanical | 12,500 |
| | Electrical | 2800 |

## Ratings for ANSI C37 Certified MasterPacT NT Non-Automatic Switches

| | | |
|---|---|---|
| Frame Rating | | 800 A |
| Withstand Rating Code | | NA |
| Short-Time Withstand Current Rating (kA) | Vac 50/60 Hz, | 0.5 s 42 |
| Breaking Capacity (with external protection relay) (kA) | 254/508/635 Vac, 60 Hz | 42/42/NA |

## Ratings for UL 489 Listed MasterPacT NT Circuit Breakers

| **Frame Rating** | | **800 A** | | | | | **1200 A** | | | | | **600 A**(17) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interrupting Rating Code | | N | H | L1 | L | LF | N | H | L1 | L | LF | N | H | L1 | L |
| Interrupting Current (kAIR) | 240 Vac, 60 Hz | 50 | 65 | 100 | 200 | 200 | 50 | 65 | 100 | 200 | 200 | 50 | 65 | 100 | 200 |
| | 480 Vac, 60 Hz | 50 | 50 | 65 | 100 | 100 | 50 | 50 | 65 | 100 | 100 | 50 | 50 | 65 | 100 |
| | 600 Vac, 60 Hz | 35 | 50 | N/A | N/A | N/A | 35 | 50 | N/A | N/A | N/A | 35 | 50 | N/A | N/A |
| Short-Time Withstand Current Rating (kA) | 60 Hz, 0.5 s | 35 | 35 | 10 | 10 | 10 | 35 | 35 | 10 | 10 | 10 | 35 | 35 | 10 | 10 |
| Built-In Instantaneous Override (Peak kA ±10%) | | 90 | 90 | 22 | 22 | 22 | 90 | 90 | 22 | 22 | 22 | 90 | 90 | 22 | 22 |
| Close and Latch Ratings (Peak kA) | Vac 60 Hz | 55 | 55 | 22 | 22 | 22 | 55 | 55 | 22 | 22 | 22 | 55 | 55 | 22 | 22 |
| Tested to show arc flash hazard risk category as referenced by NFPA70E | | — | — | — | — | Yes | — | — | — | — | Yes | — | — | — | — |
| Breaking Time | | 25 to 30 ms (with no intentional time delay)<br>9 ms for L and LF | | | | | | | | | | | | | |
| Closing Time | | < 50 ms | | | | | | | | | | | | | |
| Sensor Rating | | 100–250 A / 400–800 A | | | | | 600–1200 A | | | | | 800–1600 A | | | |
| Endurance Rating (C/O Cycles) (with no maintenance) | Mechanical | 12,500 | | | | | | | | | | | | | |
| | Electrical | 2800 | | | | | | | | | | | | | |

## Ratings for UL 489 Listed MasterPacT NT Automatic Switches

| **Frame Rating** | | **800 A** | | **1200 A** | | **1600 A** | |
|---|---|---|---|---|---|---|---|
| **Withstand Rating Code** | | **HF** | **HB** | **HF** | **HB** | **HF** | **HB** |
| Withstand Rating (18) (kA) Vac, 50/60 Hz | 240 Vac | 65 | 200 | 65 | 200 | 65 | 200 |
| | 480 Vac | 50 | 100 | 50 | 100 | 50 | 100 |
| | 600 Vac | 50 | NA | 50 | NA | 50 | NA |
| Instantaneous Override (Peak kA) | | 90 | 22 | 90 | 22 | 90 | 22 |

(17) Fixed-mounted only. 1600 A UL489 drawout circuit breakers are not available.
(18) The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

### Ratings for IEC 60947-2 Rated MasterPacT NT Circuit Breakers

| Frame Rating | | | 800/1000 A | | | 1250/1600 A | |
|---|---|---|---|---|---|---|---|
| **Interrupting Rating Code** | | | **H1** | **H2** | **L1** | **H1** | **H2** |
| Ultimate Breaking Capacity (kA) | Icu | 220/415 Vac, 50/60 Hz | 42 | 50 | 150 | 42 | 50 |
| | | 440 Vac, 50/60 Hz | 42 | 50 | 130 | 42 | 50 |
| | | 525 Vac, 50/60 Hz | 42 | 42 | 100 | 42 | 42 |
| | | 690 Vac, 50/60 Hz | 42 | 42 | 25 | 42 | 42 |
| | | 1000 Vac, 50/60 Hz | — | — | — | — | — |
| Service Breaking Capacity | Ics | %Icu | 100% | 100% | 100% | 100% | 100% |
| Short-Time Withstand Current (kA) | Icw | Vac 50/60 Hz, 1 s | 42 | 42 | 10 x In1 | 42 | 36 |
| Built-In Instantaneous Override (kA ±10%) | | | — | 90 | 10[19] | — | — |
| Rated Making Capacity (Peak kA) | Icm | 220/415 Vac, 50/60 Hz | 88 | 105 | 330 | 88 | 105 |
| | | 440 Vac, 50/60 Hz | 88 | 105 | 286 | 88 | 105 |
| | | 525 Vac, 50/60 Hz | 88 | 88 | 220 | 88 | 88 |
| | | 690 Vac, 50/60 Hz | 88 | 88 | 52 | 88 | 88 |
| | | 1000 Vac, 50/60 Hz | — | — | — | — | — |
| Break Time | | ms | 25 | 25 | 9 | 25 | 25 |
| Closing Time | | ms | 50 | 50 | 50 | 50 | 50 |
| Endurance Rting (C/O cycles) (with no maintenance) | | Mechanical | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 |
| | | Electrical 440 V | 6000 | 6000 | 3000 | 6000[20] | 6000[20] |
| | | Electrical 1000 V | — | — | — | — | — |

# Correction Factors

### Temperature Correction Factors

| **Maximum Ambient Temperature** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| °F | 158 | 140 | 122 | 1104 | 86 | 77 | 68 | 50 | 32 | 14 | -4 | -13 | -22 |
| 0 °C | 70 | 60 | 50 | 40 | 30 | 25 | 20 | 10 | 0 | -10 | -20 | -30 | -25 |
| Current | 0.75 | 0.83 | 0.92 | 1 | 1.07 | 1.11 | 1.14 | 1.21 | 1.27 | 1.33 | 1.39 | 1.42 | 1.44 |

### Altitude Correction Factors per ANSI C37.20.1 par. 7.1.4.1 (Table 10)

| | **< 6600 ft. (2000 m)** | **8500 ft (2600 m)** | **13,000 ft. (3900 m)** |
|---|---|---|---|
| Voltage | 1.00 | 0.95 | 0.80 |
| Current | 1.00 | 0.99 | 0.96 |

(19) SELLIM system.
(20) 1600 A at 690 V is 3000 electrical operations.

# Shipping Weights

### Shipping Weights for UL Listed/ANSI Certified MasterPacT NW Circuit Breakers

| Circuit Breaker Rating (A) | Circuit Breaker[21] (lb/kg) | | Cradle (lb/kg) | | Connector Type and Weight (lb/kg) | | | Pallet (lb/kg) | Total Weight (lb/kg) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3P | 4P | 3P | 4P | Type | 3P | 4P | | 3P | 4P |
| 800 | 109/50 | 142/65 | 97/44 | 116/53 | FCF | 42/19 | 55/25 | 17/8 | 265/121 | 320/151 |
| 1600 | | | | | FCT | 84/38 | 109/50 | | 307/140 | 384/176 |
| 2000 | | | | | RCTH or RCTV | 17/8 | 22/10 | | 297/136 | 297/136 |
| 2500 | 127/58 | 165/75 | 1124/57 | 149/68 | FCT | 80/36 | 104/47 | 17/8 | 348/159 | 435/198 |
| 3000 | | | | | RCTH or RCTV | 26/12 | 34/15 | | 294/135 | 365/166 |
| 2000 (L1, L1F)<br>3200 (H1, H2, H3) | 127/58 | 165/75 | 124/57 | 149/68 | RCOV (standard) | 100/46 | 130/59 | 17/8 | 368/169 | 461/210 |
| | | | | | RCOV (ArcBlok) | 153/69 | NA | | 421/191 | NA |
| 4000 W-Frame (H1, H2, H3) | | | | | RCOV (special) | 115/52 | 145/66 | | 259/118 | 327/149 |
| 3200 (L1)<br>4000 | 227/103 | 295/134 | 278/126 | 334/152 | FCF | 84/38 | 109/50 | 39/18 | 628/285 | 777/354 |
| | | | | | FCT | 168/77 | 218/99 | | 712/324 | 886/403 |
| | | | | | RCTH or RCTV | 52/24 | 68/31 | | 596/271 | 736/335 |
| 5000 | 227/103 | 295/134 | 278/126 | 334/152 | FCT | 168/77 | 218/99 | 39/18 | 712/324 | 886/403 |
| | | | | | RCTH or RCTV | 52/24 | 68/31 | | 596/271 | 736/335 |
| 6000 | 227/103 | 295/134 | 278/126 | 334/152 | RCTH or RCTV | 396/180 | 528/240 | 39/18 | 940/427 | 1196/544 |

### Shipping Weights for IEC 60947-2 Rated MasterPacT NW Circuit Breakers

| Circuit Breaker Rating (A) | Circuit Breaker[21] (lb/kg) | | Cradle (lb/kg) | | Connector Type and Weight (lb/kg) | | | Pallet | Total Weight (lb/kg) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3P | 4P | 3P | 4P | Type | 3P | 4P | (lb/kg) | 3P | 4P |
| 800 | 109/50 | 132/60 | 97/44 | 116/53 | FCF | 42/19 | 55/25 | 17/8 | 265/121 | 320/145 |
| 1000, 1250, 1600, 2000 | | | | | RCTH or RCTV | 17/8 | 22/10 | 17/8 | 240/110 | 287/131 |
| 2500 | 127/58 | 165/75 | 124/57 | 149/68 | FCF | 42/19 | 55/25 | 17/8 | 310/142 | 386/175 |
| 3200 | | | | | RCTH or RCTV | 17/8 | 22/10 | 17/8 | 285/131 | 353/161 |
| 4000 | 127/58 | 165/75 | 124/57 | 149/68 | RCTH or RCTV | 42/19 | 55/25 | 17/8 | 310/142 | 386/176 |
| 4000b, 5000, 6300 | 227/103 | 295/134 | 278/126 | 334/152 | RCTH or RCTV | 52/24 | 68/31 | 39/18 | 596/271 | 736/33 |

(21) Fixed circuit breaker weight = total weight – cradle weight.

## Shipping Weights for UL Listed/ANSI Certified MasterPacT NT Circuit Breakers

| Circuit Breaker Rating (A) | Circuit Breaker[22] (lb/kg) | | Cradle (lb/kg) | | Connector Type and Weight (lb/kg) | | | Pallet | Total Weight (lb/kg) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3P | 4P | 3P | 4P | Type | 3P | 4P | (lb/kg) | 3P | 4P |
| 800, 1200 | 40/18 | 8 52/24 | 36/16 | 6 43/20 | FCF | 15/7 | 20/9 | 10/5 | 101/46 | 125/58 |
| | | | | | RCTH or RCTV | 6/3 | 8/4 | | 92/42 | 113/53 |
| 1600[23] | 40/18 | 52/24 | N/A | N/A | RCTV | 18/8 | 20/9 | 10/5 | 68/31 | 82/38 |

## Shipping Weights for IEC 60947-2 Rated MasterPacT NT Circuit Breakers

| Circuit Breaker Rating (A) | Circuit Breaker[22] (lb/kg) | | Cradle (lb/kg) | | Connector Type and Weight (lb/kg) | | | Pallet | Total Weight (lb/kg) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3P | 4P | 3P | 4P | Type | 3P | 4P | (lb/kg) | 3P | 4P |
| 800 | 35/16 | 46/21 | 31/14 | 37/17 | FCF | 15/7 | 20/9 | 10/5 | 91/4 | 113/52 |
| 1000, 1250, 1600 | | | | | RCTH or RCTV | 6/3 | 8/4 | | 82/38 | 101/47 |

(22) Fixed circuit breaker weight = total weight – cradle weight.
(23) Fixed circuit breaker only.

# Energy Management

## Energy Management Using the Enerlin’X System

Use the Enerlin’X communication system to connect a building to real savings in three steps:

A. Measure

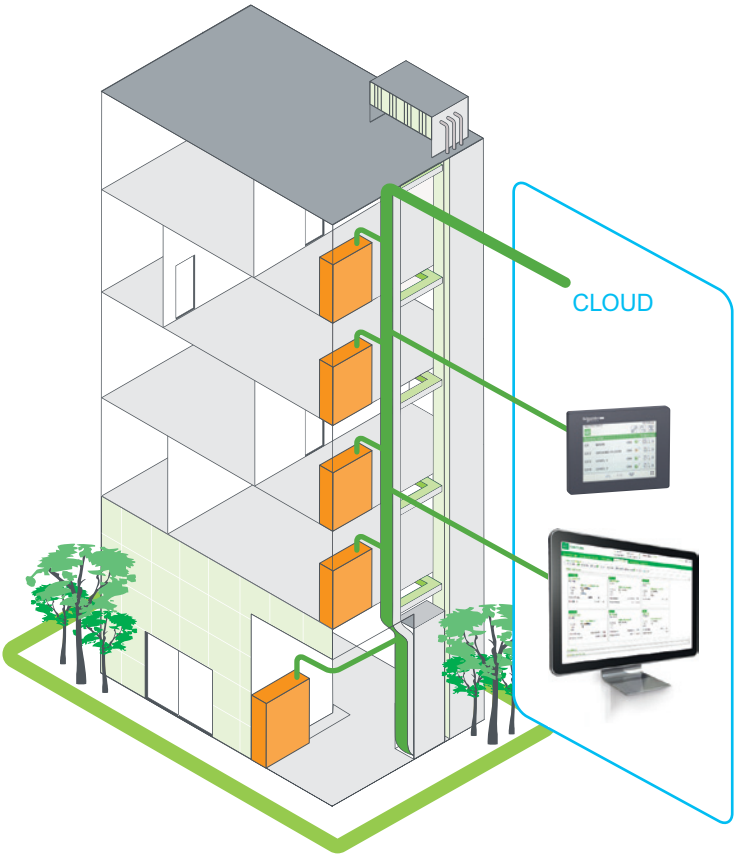
- Embedded and stand-alone metering and control

B. Connect

- Integrated communication interfaces
- Ready to connect to energy management platforms

C. Save

- Data-driven energy efficiency actions
- Real-time monitoring and control
- Access to energy and site information through on-line services




## Measure

Enerlin’X communication systems mean visible information.

Grouping most of the electrical protection, command and metering components, the switchboards are now significant sources of data locally displayed and sent via communication networks.

# Connect

Enerlin'X communication systems use reliable, simple-to-install-and-use displays, and Ethernet and Modbus interfaces. Information is safely transmitted through the most efficient networks:

- Modbus SL inside switchboards, between components,
- Ethernet, on cable or WiFi, inside the building and connecting switchboards and computers,
- Ethernet or GPRS, for access to on-line services by Schneider Electric.

Energy experts, no matter where they are located, can now provide advise based on the updated data of the building.

# Save

On-Site Real-Time Monitoring and Control

The FDM128 touch screen display connected to the Ethernet:

- shows essential electrical information and alarms concerning the electrical network,
- allows control (open, close, reset…) of various equipment.

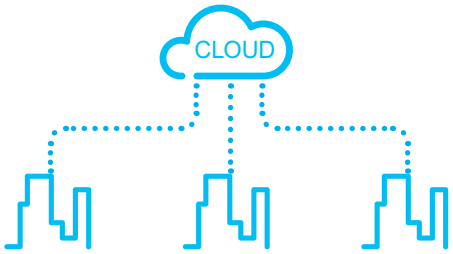
The FDM128 touch screen provides real-time value checking and control, directly on the front panel of the main switchboard.

On a PC display with common browser:

- shows monitoring web pages hosted into the local Ethernet interface,
- alarm events generate automatic email notifications,
- allows control (open, close, reset…) of various equipment.

The data is displayed graphically or recorded into files for optimizing the use of energy in the building.

As an example, the data can help validate the change of temperature settings, time scheduling in a Building Management System or other automated devices.




On-Line Energy Management Services

StruXureWare Energy Operation automates data collection using an open, scalable, and secure energy management information system.

With the help of the Schneider Electric energy management services team, data is turned into information to enable customers to understand their facilities' performance on an ongoing basis.

Energy Operation leverages companies' current investments in their existing systems, and can be used to communicate advanced results and performance to a broad audience for a shared understanding throughout an organization.

# Enerlin’X Communication System Components

## MasterPacT Circuit Breakers with MicroLogic Trip Units

Ammeter A

- 3.0 basic protection
- 5.0 selective protection
- 6.0 selective + ground-fault protection

Power Meter P

- 5.0 selective protection
- 6.0 selective + ground-fault protection

Harmonic Meter H

- 5.0 selective protection
- 6.0 selective + ground-fault protection

See MicroLogic 5.0H and 6.0H Trip Units with Harmonic Metering, page 63 for more information.

## Displays


Power Meter

FDM121

One-to-one front display module

SeeFDM121 Display, page 34 for more information

FDM128

One-to-eight front display module

SeeFDM128 Display, page 39 for more information

Operating Assistance Functions

Communication

Communication

- MasterPacT circuit breakers in a communication network
- I/O application module
- IFE: Ethernet interface module
- IFM: Modbus interface module

I/O Module

IFE Module

IFM Module

See FDM121 Display, page 34 for more information.

# Power Meter Functions

In addition to protection functions, MicroLogic A/P/H trip units offer all the functions of Power Meter products as well as operating assistance for the circuit breaker.

MicroLogic A/P/H trip unit measurement functions are made possible by the MicroLogic trip unit's intelligence and the accuracy of the sensors. They are handled by a microprocessor that operates independent of protection functions.

# Display Function

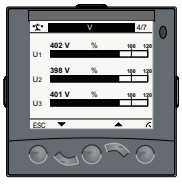
Display Function

**FDM121 Display Unit (One to One)**

The FDM121 switchboard display unit can be connected to a communication (COM) option (Breaker Communication Module [BCM ULP]) using a circuit breaker ULP cord to display all measurements on a screen. The LCD screen is 3.78 x 3.78 in. (96 x 96 mm). The FMD121 display unit requires a 24 Vdc power supply. The COM option (BCM ULP) unit is supplied by the same power supply via the circuit breaker ULP cord connecting it to the FDM121. See page FDM121 Display, page 34 for more information.


FDM121 Display Navigation


FDM121 Display Current




FDM121 Display: Voltage


FDM121 Display: Power


FDM121 Display: Consumption

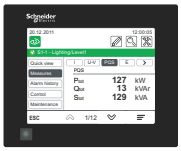
### FDM128 Display Unit (One to Eight)

The FDM128 display unit uses an IFE Ethernet interface for low-voltage circuit breakers.

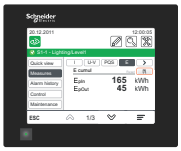
FDM128 Display Navigation

FDM128 Display Current

FDM128 Display: Voltage



FDM128 Display: Power



FDM128 Display: Consumption

For all FDM, in addition to the information displayed on the MicroLogic trip unit LCD, the FDM screen shows demand, power quality, and maximum/minimum ammeter values along with histories and maintenance indicators.

# Measurement Function

Measurement Function

### Instantaneous RMS Measurements

The MicroLogic trip unit continuously displays the RMS value of the highest current of the three phases and neutral (Imax). The navigation buttons can be used to scroll through the main measurements.

In the event of a fault trip, the trip cause is displayed.

The MicroLogic A trip unit measures phase, neutral, and ground fault currents.

MicroLogic P/H trip units offer voltage, power, power factor, frequency, and cos ? in addition to the measurements provided by MicroLogic A trip units.

### Maximum / Minimum Ammeter

Every instantaneous measurement provided by MicroLogic A trip units can be associated with a maximum/minimum ammeter. The maximum for the highest current of the three phases, neutral, and demand current can be reset using the FDM display unit or the communication system.

### Energy Metering

The MicroLogic P/H trip units also measures the energy consumed since the last reset of the meter. The active energy meter can be reset using the MicroLogic trip unit keypad, the FDM display unit, or the communication system.

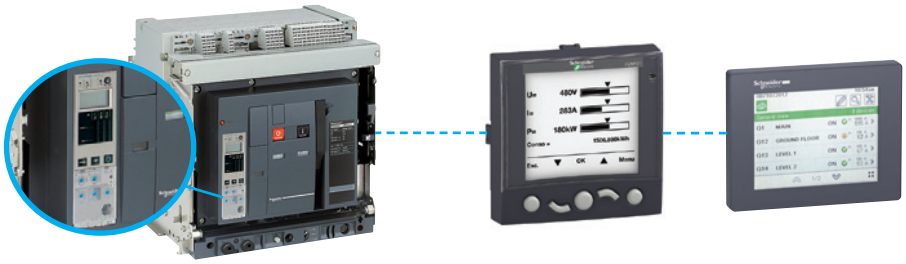
### Demand and Maximum Demand Values

MicroLogic P/H trip units also calculate demand current and power values. These calculations can be made using a block or sliding interval that can be set from five to sixty minutes in steps of one minute. The window can be synchronised with a signal sent through the communication system. Whatever the calculation method, the calculated values can be recovered on a PC through the communication network.

Ordinary spreadsheet software can be used to provide trend curves and forecasts based on this data. They provide a basis for load shedding and reconnection operations used to adjust consumption to the subscribed power.

### Power Quality

The MicroLogic H trip unit calculates power quality indicators taking into account the presence of harmonics up to the fifteenth harmonic, including the total harmonic distortion (THD) of current and voltage.



## MicroLogic A/P/H Trip Units Integrated Power Meter Functions

| MicroLogic A/P/H Integrated Power Meter Functions | | | Type | Display | |
|---|---|---|---|---|---|
| | | | | MicroLogic LCD | FDM Display |
| Display of protection settings | | | | | |
| Pick-ups (A) and delays | All settings can be displayed | Ir, tr, Isd, tsd, Ii, Ig, tg | A/P/H | X | — |
| Measurements | | | | | |
| Instantaneous rms measurements | | | | | |
| Currents (A) | Phases and neutral | $I_A$, $I_B$, $I_C$, $I_N$ | A/P/H | X | X |
| | Average of phases | Iavg = ($I_A$ + $I_B$ + $I_C$) / 3 | A/P/H | — | X |
| | Highest current of the 3 phases and neutral | Imax of $I_A$, $I_B$, $I_C$, $I_N$ | A/P/H | X | X |
| | Ground fault (MicroLogic 6) | % Ig (pick-up setting) | A/P/H | X | X |
| | Current unbalance between phases | % Iavg | P/H | — | X |
| Voltages (V) | Phase-to-phase | VAB, VBC, VCA | P/H | X | X |
| | Phase-to-neutral | $V_{AN}$, $V_{BN}$, $V_{CN}$ | P/H | X | X |
| | Average of phase-to-phase voltages | Vavg = ($V_{AB}$ + $V_{BC}$ + $V_{CA}$) / 3 | P/H | — | X |
| | Average of phase-to-neutral voltages | Vavg = ($V_{AN}$ + $V_{BN}$ + $V_{CN}$) / 3 | P/H | — | X |
| | Ph-Ph and Ph-N voltage unbalance | % Vavg | P/H | — | X |
| | Phase sequence | ABC, ACB | P/H | X | X(24) |
| Frequency (Hz) | Power system | f | P/H | X | X |
| Power | Active (kW) | P, total<br>P, per phase | P/H<br>P/H | X<br>X | X<br>X |
| | Reactive (kVAR) | Q, total<br>Q, per phase | P/H<br>P/H | X<br>X | X<br>X |
| | Apparent (kVA) | S, total<br>S, per phase | P/H<br>P/H | X<br>X | X<br>X |
| | Power Factor | PF, total<br>PF, per phase | P/H<br>P/H | X<br>X | X<br>X |
| | Cos φ | Cos φ, total<br>Cos φ, per phase | P/H<br>P/H | X<br>X | X<br>X |
| Maximum/Minimum Ammeter | Associated with instantaneous rms measurements | Reset using the FDM display unit and MicroLogic keypad | A/P/H | X | X |
| Energy Metering | | | | | |
| Energy | Energy Active (kW), reactive (kVARh), apparent (kVAh) | Total since last reset | P/H | X | X |

(24) FDM121 only.

### MicroLogic A/P/H Trip Units Integrated Power Meter Functions (Continued)

| MicroLogic A/P/H Integrated Power Meter Functions | | | Type | Display | |
|---|---|---|---|---|---|
| | | | | MicroLogic LCD | FDM Display |
| Demand and Maximum Demand Values | | | | | |
| Demand Current (A) | Phases and neutral P | Present value on the selected window<br>Maximum demand since last reset | P/H<br>P/H | X<br>X | X<br>X |
| Demand Power | Active (kWh), reactive (kVAR), apparent (kVA) | Present value on the selected window<br>Maximum demand since last reset | P/H<br>P/H | X<br>X | X<br>X |
| Calculation Window | Sliding, fixed or com-synchronised | Adjustable from 5 to 60 minutes in 1 minute steps(25) | P/H | — | — |
| Power Quality | | | | | |
| Total Harmonic Distortion (%) | Of voltage with respect to rms value | THDU,THDV of the Ph-Ph and Ph-N voltage | H | X | X |
| | Of current with respect to rms value | THDI of the phase current | H | X | X |

# Histories

- Trip indications in clear text in a number of user-selectable languages
- Time-stamping: date and time of trip.

(25) Available via the communication system only.

# Maintenance Indicators

MicroLogic trip units have indicators for, among other items, the number of operating cycles, contact wear P/H, load profile and operating times (operating hours counter) of the MasterPacT circuit breaker.

It is possible to assign an alarm to the operating cycle counter to plan maintenance.

The various indicators can be used together with the trip histories to analyze the level of stresses to which device has been subjected.

**Contact Wear**

Each time a MasterPacT circuit breaker opens, the MicroLogic P/H trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory. Breaking under normal load conditions results in a very slight increment. The indicator value may be read on the FDM display.

It provides an estimation of contact wear calculated on the basis of the cumulative forces affecting the circuit breaker. When the indicator reaches 100%, it is advised to visually inspect the contacts per the instructions in the circuit breaker user guide.

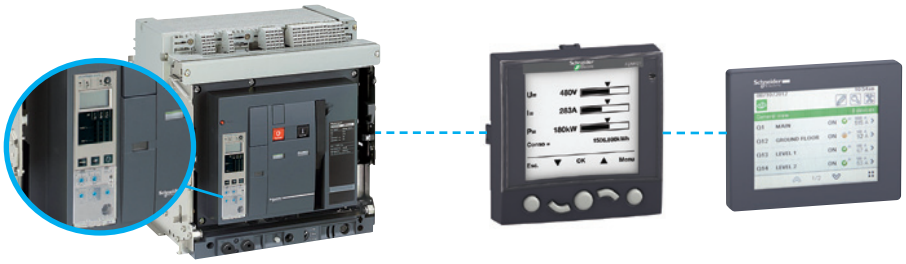
**Circuit Breaker Load Profile**

MicroLogic A/P/H trip units calculate the load profile of the circuit breaker protecting a load circuit. The profile indicates the percentage of the total operating time at four current levels (% of circuit breaker In):

- 0 to 49% In
- 50 to 79% In
- 80 to 89% In
- ≥ 90% In.

This information can be used to optimize use of the protected equipment or to plan ahead for maintenance interval extensions.

# Management of Installed Devices



### MicroLogic A/P/H Trip Units Operating Assistance Functions

| MicrLogic A/P/H Operating Assistance Functions | | | Type | Display | |
|---|---|---|---|---|---|
| | | | | MicroLogic LCD | FDM Display |
| Operating Assistance | | | | | |
| Trip History | | | | | |
| Trips | Cause of tripping | Ir, Isd, Ii, Ig, IDn | A/P/H | X | X |
| Maintenance Indicators | | | | | |
| Counter | Mechanical cycles | Assignable to an alarm | A/P/H | — | |
| | Electrical cycles | Assignable to an alarm | A/P/H | — | |
| | Hours | Total operating time (hours) | A/P/H | — | — |
| Indicator | Contact wear | % | P/H | X | X |
| Load Profile | Hours at different load levels | % of hours in four current ranges:<br>0-49% In, 50-79% In, 80-89% In and ≥ 90% In | P/H | — | X |

# FDM121 Display

MicroLogic trip unit measurement capabilities come into full play with the FDM121 display. It connects to the COM option (BCM ULP) with a circuit breaker ULP cord and displays the MicroLogic trip unit information. The result is a true integrated unit combining a circuit breaker and a power meter. Additional operating assistance functions can also be displayed.

An FDM121 display unit can be connected to ULP communication devices using a prefabricated cord to display all measurements, alarms, histories and event tables, maintenance indicators, and management of installed devices on a screen.

The FMD121 display unit requires a 24 Vdc power supply.

The FDM121 is a display that can be integrated with the PowerPacT H/J/L/P/R or MasterPacT NT circuit breaker systems. It uses the sensors and processing capacity of the MicroLogic trip unit. It is easy to use and requires no special software or settings. It is immediately operational when connected to the circuit breaker by a ULP cord.

It also provides monitoring and control with the use of the I/O application module, the motor mechanism module, or the circuit breaker communication module (BCM ULP).

The FDM121 has a large display, but requires very little depth. The anti-glare graphic screen is backlit for very easy reading even under poor ambient lighting and at sharp angles.

# FDM121 Display of MicroLogic Trip Unit Measurements and Alarms

The FDM121 is intended to display MicroLogic trip unit measurements, alarms and operating information. It cannot be used to modify the protection settings.

Measurements can be easily accessed using a menu. All user-defined alarms are automatically displayed. The display mode depends on the priority level selected during alarm set-up:

- high priority: a pop-up window displays the time-stamped description of the alarm and the orange Alarm LED flashes;
- medium priority: the orange Alarm LED goes continuously on;
- low priority: no display on the screen.

All faults resulting in a trip automatically produce a high-priority alarm, without any special settings required. In all cases, the alarm history is updated. The MicroLogic trip unit saves the information in its non-volatile memory in the event of an FDM121 power loss.

# FDM121 Status Indications and Remote Control


FDM121 Display

Surface Mount Accessory

Connection with FDM121 Display Unit

When the circuit breaker is equipped with the Breaker Communications Module (BCM ULP), the FDM121 display can also be used to view circuit breaker status conditions:

- O/F: ON/OFF
- SD: trip indication
- SDE: fault-trip indication (overload, short-circuit, or ground fault).

When the circuit breaker system is equipped with the I/O application module, the FDM121 can monitor and control:

- cradle management
- circuit breaker operation
- light and load control
- custom applications.

When the circuit breaker is equipped with the COM option (BCM ULP) (including connection to shunt close [XF] and shunt trip [MX1] communication voltage releases), the FDM121 display can also be used to control (open/close) the circuit breaker.

Two operating mode are available:

- local mode: open/close commands are enabled from the FDM121 while disabled from the communication network;
- remote mode: open/close commands are disabled from the FDM121 while enabled from the communication network.

# FDM121 Mounting

The FDM121 mounting:

- Has a standard door cut-out of 3.6 x 3.6 in. (92 x 92 mm).
- Is attached using clips.

To avoid a cut-out in the door, an accessory is available for surface mounting by drilling only two 0.87 in. (22 mm) diameter holes.

# FDM121 Connection

The FDM121 is equipped with a 24 Vdc terminal block:

- A plug-in type terminal block with two wire inputs per point for easy daisy-chaining.
- A power supply range of 24 Vdc -20% (19.2 V) to 24 Vdc +10% (26.4 V).
  A 24 Vdc auxiliary power supply must be connected to a single point on the ULP system. The FDM121 display has a two-point screw connector on the rear panel of the module for this purpose. The ULP module to which the auxiliary power supply is connected distributes the supply via the ULP cable to all the ULP modules connected to the system and therefore also to MicroLogic trip unit. See wiring diagram later in this section.
- Two RJ45 jacks.

The MicroLogic trip unit connects to the internal communication terminal block on the MasterPacT circuit breaker with the circuit breaker ULP cord. Connection to one of the RJ45 connectors on the FDM121 automatically establishes communication between the MicroLogic trip unit and the FDM121 and supplies power to the MicroLogic trip unit measurement functions.

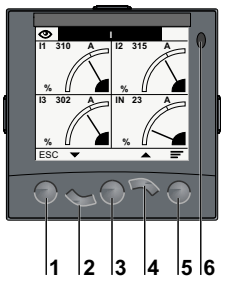
When the second connector is not used, it must be fitted with a line terminator.

# FDM121 Navigation

Five buttons are used for intuitive and fast navigation.

The “Context” button may be used to select the type of display (digital, bargraph, analogue).

The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.).




1 Escape

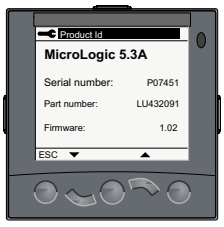
2 Down

3 OK

4 Up

5 Context

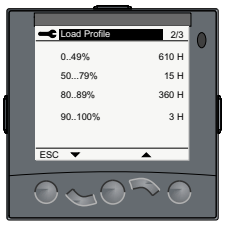
6 Alarm LED




Product Identification


Metering: Submenu


Metering: Meter

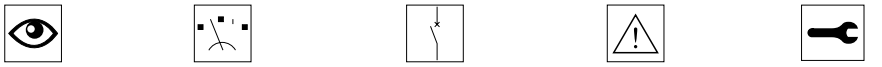



Services

# FDM121 Screens

Main Menu

When powered up, the FDM121 screen automatically displays the ON/OFF status of the device.



Quick View Metering Control Alarms Services

When not in use, the screen is not backlit. Backlighting can be activated by pressing one of the buttons. It goes off after three minutes.

Fast Access to Essential Information

- “Quick view” provides access to five screens that display a summary of essential operating information (I, U-V, f, P, E, THD, circuit breaker ON/OFF).

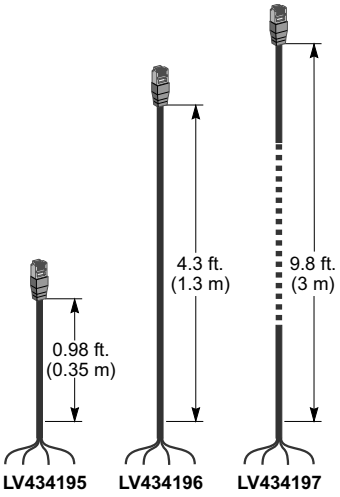
Access to Detailed Information

- “Metering” can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
- “Alarms” displays active alarms and the alarm history.
- “Services” provides access to the operation counters, energy and maximum ammeter reset function, maintenance indicators, identification of modules connected to the internal bus, and the FDM121 internal settings (language, contrast, etc.).

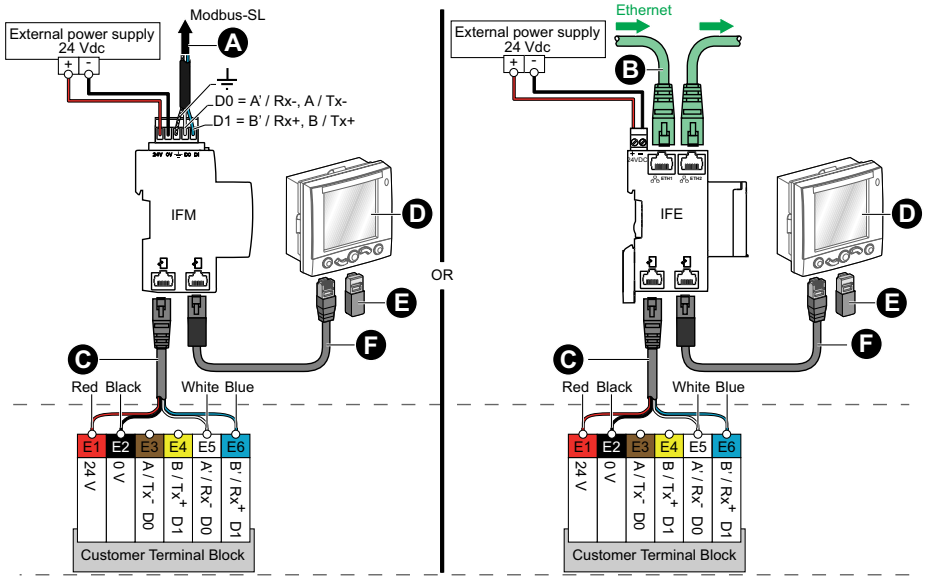
# Communication Components and FDM121 Connections

The FDM121 degree of protection is IP54 in front. IP54 is maintained after switchboard mounting by using the supplied gasket during installation.

## FDM121 Connections




Circuit Breaker ULP Cord




Connections

MasterPacT circuit breaker is connected to the ULP devices (FDM121 display, IFM, IFE or IO unit) via the circuit breaker ULP cord.

- Cord is available in three lengths: 0.98 ft. (0.35 m), 4.3 ft. (1.3 m) and 9.8 ft. (3 m).
- Lengths up to 32.9 ft. (10 m) are possible using extensions.

A. Modbus Network

B. Ethernet Network

C. Circuit Breaker ULP Cord

D. FDM Display

E. ULP Termination

F. ULP Cable

# FDM128 Display

The MicroLogic trip unit measurement capabilities are fully utilized with the FDM128 display. The FDM128 display connects to Ethernet communication using the RJ45 port and displays MicroLogic trip unit information. The result is an integrated unit combining a circuit breaker with a power meter. Additional operating assistance functions can also be displayed.

The FDM128 display unit can be connected to a MicroLogic COM option (BCM ULP through an IFE). It uses the sensors and processing capacity of the MicroLogic trip unit and requires no special software or settings. The FDM128 is a large display, but requires very little depth. The anti-glare graphic screen is backlit for easy reading even under poor ambient lighting and at sharp angles.

The FDM128 display is designed to manage up to eight devices (PowerPacT H/J/L/P/R or MasterPacT NW/NT circuit breakers).

## FDM128 Display of MicroLogic Trip Unit Measurements and Trips

The FDM128 is intended to display MicroLogic A/P/H trip unit measurements, trips, and operating information. It cannot be used to modify the protection settings.

- Measurements may be easily accessed using a menu.
- Trips are automatically displayed.
- A pop-up window displays the time-stamped description of the trip.

## FDM128 Status Indications

When the circuit breaker is equipped with the COM option (BCM ULP) (including its set of sensors) the FDM128 display can also be used to view circuit breaker status conditions:

- O/F: ON/OFF
- SDE: Fault-trip indication (overload, short-circuit, ground fault)
- PF: ready to close
- CH: charged (spring loaded)
- CE, CD, CT cradle management with I/O application module

## FDM128 Remote Control

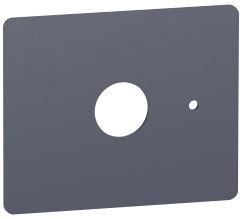
When the circuit breaker is equipped with the COM option (BCM ULP) (including connection to shunt close [XF] and shunt trip [MX1] communication voltage releases), the FDM128 display can also be used to operate (open/close) the circuit breaker.

Two operating mode are available:

- Local mode: open/close commands are enabled from the FDM128 while disabled from the communication network.
- Remote mode: open/close commands are disabled from the FDM128 while enabled from the communication network.

# FDM128 Main Characteristics

FDM128 Display



Surface Mount Accessory

Connection with Display Unit

- 4.54 x 3.40 in. (115.2 x 86.4 mm) with 5.7 in. (145 mm) QVGA display 320 x 240 pixels.
- Color TFT LCD, with LED backlight.
- Wide viewing angle: vertical ±80°, horizontal ±70°.
- High resolution: excellent reading of graphic symbols.
- Operating temperature range: +14 °F (-10 °C) to +131 °F (+55 °C).
- CE / UL / CSA marking.
- 24 Vdc power supply, -10%/+20% (limit 20.4 - 28.8 Vdc).
- Consumption 6.8 W.

# FDM128 Mounting

The FDM128 is easily installed in a switchboard.

- Standard door hole Ø 0.87 in. (22 mm).
- The FDM128 degree of protection is IP65 at the touch screen cover. IP54 is maintained after installation by using the supplied gasket.

# FDM128 Connection

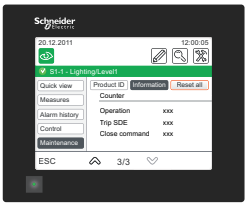
The FDM128 is equipped with:

- a 24 Vdc terminal block:
- a power supply range of 24 Vdc (limit 20.4 - 28.8 Vdc).
- the FDM128 display unit has a 2-point screw connector on the rear panel of the module for this purpose.
- One RJ45 Ethernet jacks.

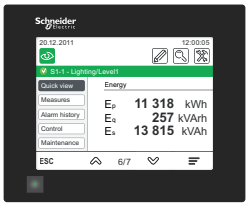
The MicroLogic trip unit connects to the internal communication terminal block on the MasterPacT circuit breakers through the circuit breaker ULP cord and Ethernet connection through the IFE.

# FDM128 Navigation

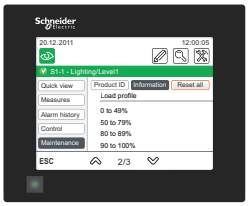
- A touch screen is used for intuitive and fast navigation.
- The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.).




Product Identification



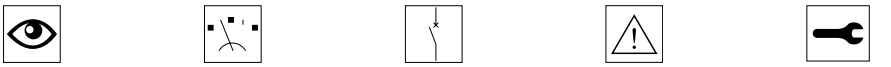

Metering: Meter




Services

# FDM128 Screens

Main Menu



Quick View | Metering | Control | Alarms | Services

When not in use, the screen is automatically shifted to low back-lighting.

Fast Access to Essential Information

- “Quick view” provides access to five screens that display a summary of essential operating information (I, U-V, f, P, E, THD, circuit breaker On / Off).

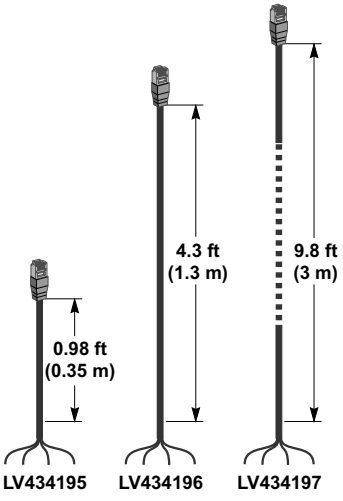
Access to Detailed Information

- "Metering" can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
- “Alarms” displays the trip history.
- “Services” provides access to the operation counters, energy and maximum ammeter reset function, maintenance indicators, identification of modules connected to the internal bus and FDM128 internal settings (language, contrast, etc.).

# Communication Components and FDM128 Connections

The FDM128 degree of protection is IP65 at the touch screen cover. IP54 is maintained after installation by using the supplied gasket.

## FDM128 Connections

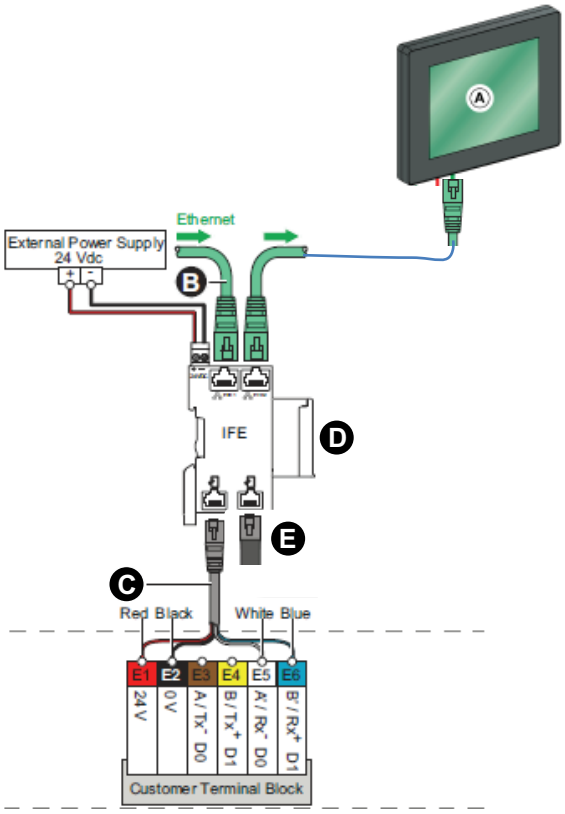



Circuit Breaker ULP Cord

**Connections**

MasterPact is connected to the ULP devices (FDM display, IFM, IFE or I/O unit via the circuit breaker ULP cord.

- *Cord is available in three lengths:* 0.98 ft. (0.35 m), 4.3 ft. (1.3 m) and 9.8 ft. (3 m).
- Lengths up to 32.9 ft. (10 m) possible using extensions.




A. FDM128

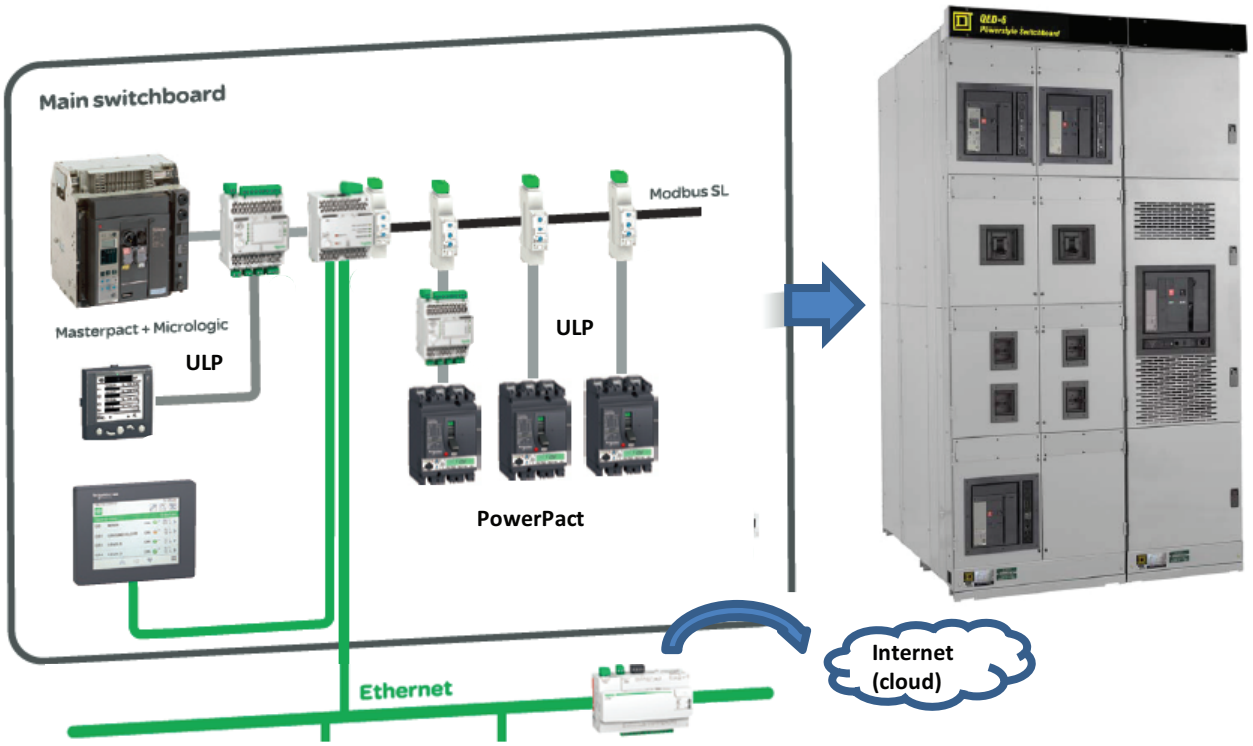
B. Ethernet Network

C. Circuit Breaker ULP Cord

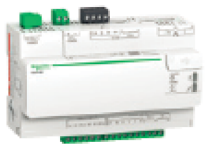
D. UFE

E. ULP Termination

## Panelboard and Switchboard Connections




## Enerlin'X Communication Devices and Displays

| | | Name | Function | Port | | Bin. Input | Analog. Input | Bin. Output |
|---|---|---|---|---|---|---|---|---|
| | | | | To Device | To Server | | | |
| A |  | Com'X 200 | Energy Server with Ethernet Gateway® Function | Modbus Master | Ethernet Cable + WIFI | 6 | 2 | — |
| B |  | FDM128 | Ethernet LCD Color Touch Screen | — | Ethernet | — | — | — |
| C |  | FDM121 | LCD Display for Circuit Breaker | ULP | — | — | — | — |

## Enerlin'X Communication Devices and Displays (Continued)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| D |  | IFE Interface + Gateway | Ethernet Interface & Gateway | Modbus Master & ULP | Ethernet | — | — | — |
| | | IFE Interface | Ethernet Interface for Circuit Breakers | ULP | Ethernet | — | — | — |
| E |  | IFM | Modbus Interface for Circuit Breakers | ULP | Modbus Slave | — | — | — |
| F |  | I/O | Input/Output Application Module for Circuit Breakers | ULP | ULP | 6 | 1 | 1 |

# MicroLogic™Electronic Trip Systems

## Overview of MicroLogic Trip Systems

P Trip Unit with Power Metering

| Model | LS0 | LI | LSI | LSIG |
|---|---|---|---|---|
| | Long-Time + Short-Time + Zero Delay | Long-Time + Instantaneous Protection | Long-Time + Short-Time + Instantaneous Protection | Long-Time + Short-Time + Instantaneous Protection + Equipment Ground-Fault Protection |
| | (IEC Rated) | (UL Listed and ANSI Certified) | (UL LIsted, ANSI Certified, IEC Rated) | (UL LIsted, ANSI Certified, IEC Rated) |
| Basic Trip Unit | 2.0 | 3.0 | 5.0 | — |
| A Trip Unit | 2.0A | 3.0A | 5.0A | 6.0A |
| P Trip Unit | — | — | 5.0P | 6.0P |
| H Trip Unit | — | — | 5.0H | 6.0H |

All MasterPacT circuit breakers are equipped with the MicroLogic trip system to protect power circuits and loads. MicroLogic trip systems use a set of current transformers (called CTs or sensors) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker. Adjustable rotary switches on the trip unit allow the user to set the proper overcurrent or equipment ground-fault current protection required in the electrical system. If current exceeds a set value for longer than its set time delay, the trip system opens the circuit breaker. Alarms may be programmed for remote indications. Measurements of current, voltage, frequency, power, and power quality optimize continuity of service and energy management. MicroLogic trip units can be changed on-site.

Integration of protection functions in the Application Specific Integrated Circuit (ASIC) electronic component used in all MicroLogic trip units guarantees a high degree of reliability and immunity to conducted or radiated disturbances. On MicroLogic P and H trip units, advanced functions are managed by an independent microprocessor.

MasterPacT circuit breakers are shipped with the long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings. Actual settings required for a specific application must be determined by a qualified consultant or plant engineer. A coordination study is recommended to provide coordination between all circuit breakers in the distribution system.

## Thermal Imaging

The thermal imaging function protects the cables or bus bars from overheating in case of low amplitude repetitive faults. Such overheating can be due to repetitive motor starting, fluctuating load, intermittent ground faults, or subsequent closing after a fault.

Traditional electronic protection does not protect against repetitive faults because the duration of each overload above the pickup setting is too short to achieve effective tripping. Nevertheless, each overload involves a temperature rise in the installation, the cumulative effect of which could lead to overheating of the system.

The thermal imaging function remembers and integrates the thermal heating caused by each pickup setting overrun. Before tripping, the integrated heating value will reduce the associated time delay and, therefore, the reaction of the trip unit will be closer to the real heating of the power network system. After tripping, the function will also reduce the time delay when closing the circuit breaker on an overload.

# Power Supply Information

## Ammeter (A) Trip Unit without 24 Vdc Power Supply at F1 and F2

| Sensor Plug Value (In) | Minimum Ground-Fault Pickup |
|---|---|
| 100–250 A | 30% of sensor rating |
| 400–1200 A | 20% of sensor rating 1600–6300 A |
| 1600–6300 A | 500 A |

- Provides fault protection for LSIG functions.
- Provides LED trip indication (powered by an onboard battery).
- All display functions and trip unit features power-up with current flow on one phase greater than or equal to the values in the table to the left.
- Ground-fault push-to-trip button works for testing ground fault with current flow on one phase greater than or equal to the values shown in the following table.

## Ammeter (A) Trip Unit with 24 Vdc Power Supply at F1 and F2

The Ammeter (A) trip unit provides all of the above plus additional functionality when powered by external 24 Vdc power supply:

- Ammeter and bar graph displays are functional with or without current flowing through the circuit breaker.
- Trip settings and (Max) current readings can be accessed on the display by pressing navigation button with or without current flowing through the circuit breaker.
- The ground-fault push-to-trip button works for testing ground fault with or without current flowing through the circuit breaker.
- Optional Modbus™ communications—also requires a separate 24 Vdc power supply for the circuit breaker communications module.

  **NOTE:** Ground-fault push-to-trip button will also be functional if a service interface, a hand-held test kit, or a full-function test kit is powering the trip unit.

## Power (P) and Harmonic (H) Trip Unit without 24 Vdc Power Supply at F1 and F2

The P and H trip units were designed to be used with the external 24 Vdc power supply. The large LCD display requires too much current to be powered by current flow through the circuit breaker. The P and H trip units do have a voltage power supply which will power the trip unit with 100 Vac or more between two phases or phase to neutral. The standard configuration for the voltage probes inside the circuit breaker is at the bottom connections. If the circuit breaker was open in a top fed application, there would be no voltage at the bottom of the circuit breaker and the trip unit would not be powered.

- Provides fault protection for LSIG functions.
- Provides LED trip indication (powered by an onboard battery).

  **NOTE:** Ground-fault push-to-trip button works for testing ground fault if the trip unit is powered by the voltage power supply. The ground-fault push-to-trip is also functional if a service interface, a hand-held test kit, or a full-function test kit is powering the trip unit.

# Power (P) and Harmonic (H) Trip Unit with 24 Vdc Power Supply at F1 and F2

- Provides all of the above.
- LCD display and backlight are functional.
- Ground-fault push-to-trip button works for testing ground fault.
- All metering, monitoring, and history logs are functional.
- Communications from trip unit to M2C and M6C programmable contact modules are powered by a 24 Vdc supply at F1 and F2. M6C also requires a 24 Vdc external power supply.
- Modbus communications—also requires a separate 24 Vdc power supply for the circuit breaker communications module.

  **NOTE:** Ground-fault push-to-trip button will also be functional if a service interface, a hand-held test kit, or a full-function test kit is powering the trip unit.

# MicroLogic Trip Units–Overview

## True RMS Current Sensing

The sensing system responds to the flow of current through the circuit breaker. Electronic trip circuit breakers are limited to ac systems because the electronic trip system uses current transformers to sense the current. The MicroLogic trip unit samples the current waveform to provide true RMS protection through the 15th harmonic.

This true RMS sensing gives accurate values for the magnitude of a non-sinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated.

The MicroLogic H trip unit provides additional sampling of the waveforms to measure and provide waveform capture of harmonic distortion to the 31st harmonic.

MasterPacT universal power circuit breakers use MicroLogic electronic trip systems to sense overcurrents and trip the circuit breaker. The MicroLogic basic trip unit is standard and all MasterPacT circuit breakers can be equipped with the optional MicroLogic trip systems listed below:

— MicroLogic Basic Trip Unit (standard).

- 2.0 basic protection (LS0, IEC)
- 3.0 basic protection (LI, UL®/ANSI)
- 5.0 selective protection (LSI)

— MicroLogic A: Trip Unit with Ammeter.

- 2.0A basic protection (LS0, IEC)
- 3.0A basic protection (LI, UL/ANSI)
- 5.0A selective protection (LSI)
- 6.0A selective protection with ground-fault protection for equipment (LSIG)

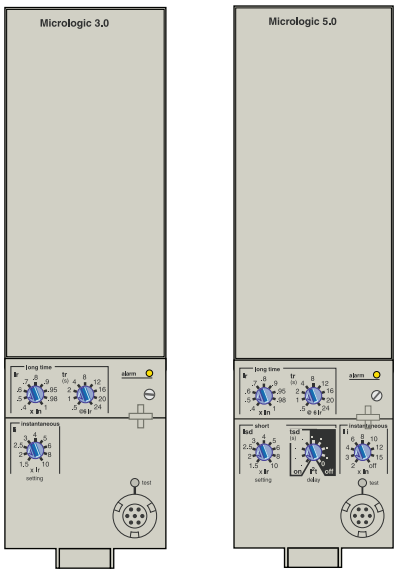
— MicroLogic P: Trip Unit with Power Metering.

- 5.0P selective protection (LSI)
- 6.0P selective protection with ground-fault protection for equipment (LSIG)

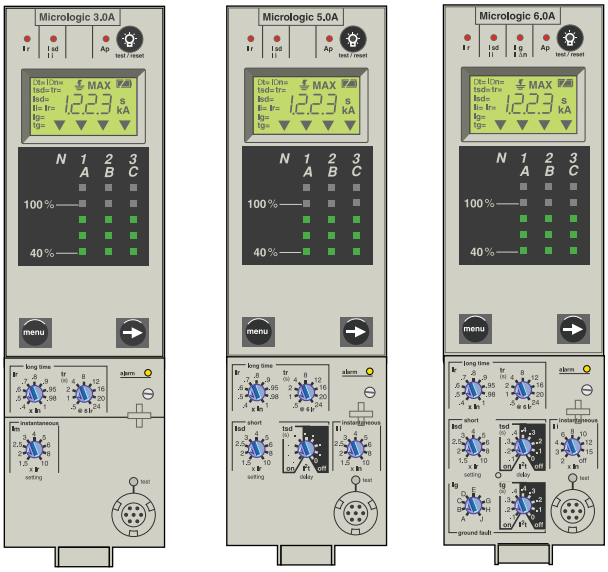
— MicroLogic H: Trip Unit with Harmonic Metering.

5.0H selective protection (LSI)

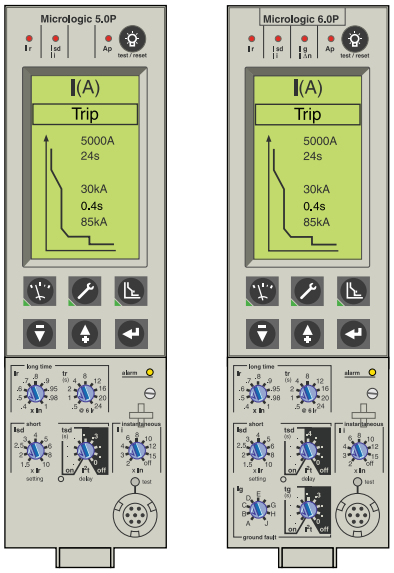
6.0H selective protection with ground-fault protection for equipment (LSIG)



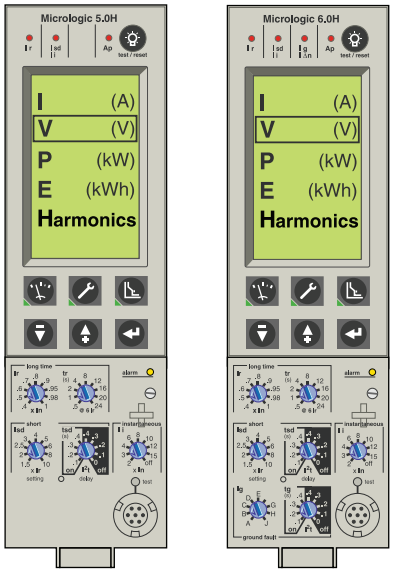

MicroLogic 3.0 and 5.0 Basic Trip Units




MicroLogic 3.0A, 5.0A and 6.0A Trip Units




MicroLogic 5.0P and 6.0P Trip Units




MicroLogic 5.0H and 6.0H Trip Units

# MicroLogic Trip Unit Features

| | MicroLogic Trip Unit (X = Standard Feature O = Available Option) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Standard | | | Ammeter | | | | Power | | Harmonics | |
| **Feature** | **2** | **3** | **5** | **2.0A** | **3.0A** | **5.0A** | **6.0A** | **5.0P** | **6.0P** | **5.0H** | **6.0H** |
| LI | — | X | — | — | X | — | — | — | — | — | — |
| LS0 | X | — | — | X | — | — | — | — | — | — | — |
| LSI | — | — | X | — | — | X | — | X | — | X | — |
| LSIG/Ground-Fault Trip(26) | — | — | — | — | — | — | X | — | X | — | X |
| Ground-Fault Alarm/No Trip(26),(27) | — | — | — | — | — | — | — | X | — | X | — |
| Ground-Fault Alarm and Trip(26),(27) | — | — | — | — | — | — | — | — | X | — | X |
| Adjustable Rating Plugs | X | X | X | X | X | X | X | X | X | X | X |
| True RMS Sensing | X | X | X | X | X | X | X | X | X | X | X |
| UL Listed | | X | X | — | X | X | X | X | X | X | X |
| Thermal Imaging | X | X | X | X | X | X | X | X | X | X | X |
| Phase-Loading Bar Graph | — | — | — | X | X | X | X | X | X | X | X |
| LED for Long-Time Pick-Up | X | X | X | X | X | X | X | X | X | X | X |
| LED for Trip Indication | — | — | — | X | X | X | X | X | X | X | X |
| Digital Ammeter | — | — | — | X | X | X | X | X | X | X | X |
| Zone-Selective Interlocking(28) | — | — | — | X | | X | X | X | X | X | X |
| Communications | — | — | — | O | O | O | O | X | X | X | X |
| LCD Dot Matrix Display | — | — | — | — | — | — | — | X | X | X | X |
| Advanced User Interface | — | — | — | — | — | — | — | X | X | X | X |
| Protective Relay Functions | — | — | — | — | — | — | — | X | X | X | X |
| Neutral Protection1 | — | — | — | — | — | — | — | X | X | X | X |
| Contact Wear Indication | — | — | — | — | — | — | — | X | X | X | X |
| Incremental Fine Tuning of Settings | — | — | — | — | — | — | — | X | X | X | X |
| Selectable Long-Time Delay Bands | — | — | — | — | — | — | — | X | X | X | X |
| Power Measurement | — | — | — | — | — | — | — | X | X | X | X |
| Power Quality Measurements | — | — | — | — | — | — | — | — | — | X | X |
| Waveform Capture | — | — | — | — | — | — | — | — | — | X | X |

(26) Requires neutral current transformer on three-phase four-wire loads.
(27) Requires the M2C/M6C Programmable Contact Module.
(28) Not available for 2.0A trip unit as upstream devices.

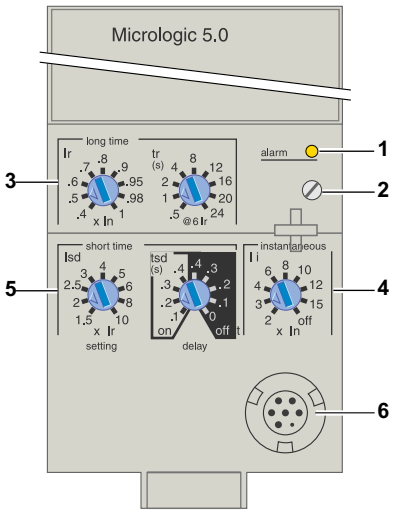
# MicroLogic 2.0, 3.0, and 5.0 Basic Trip Units

The MicroLogic 2.0, 3.0, and 5.0 trip units protect power circuits.

Protection thresholds and delays are set using the rotary switches.

A full-range of long-time settings are available via the field-installable adjustable rating plugs.

- Overload protection
- True RMS long-time protection
- Thermal imaging: active thermal imaging before and after tripping
- Short-circuit protection
- Short-time RMS
- Selection of $I^2t$ type (ON or OFF) for short-time delay
- Instantaneous protection
- Neutral protection on four-pole circuit breakers




1—Overload signal (LED)

2—Long-time rating plug screw

3—Long-time current setting and tripping delay

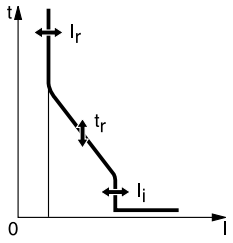
4—Instantaneous pickup

5—Short-time pickup and tripping delay

6—Test connector

MicroLogic 5.0 Basic Trip Unit

### MicroLogic 2.0 and 3.0 Basic Trip Unit Settings

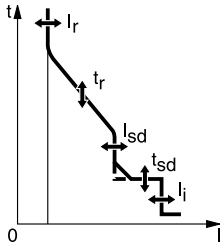



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Long-Time Protection | Current Setting (A) Tripping Between 1.05 and 1.20 x Ir | Ir = In x... | 2.0: | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| | | | 3.0: | 0.4 | 0.45 | 0.5 | 0.6 | 0.63 | 0.7 | 0.8 | 0.9 | 1 |
| | | | Other ranges are available by changing rating plug | | | | | | | | | |
| | Time Delay (s) Accuracy: 0 to –20% | tr at 1.5 x Ir | | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | | | | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | | | | 0.34 | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |

## MicroLogic 2.0 and 3.0 Basic Trip Unit Settings (Continued)

| | Thermal Imaging | | | 20 minutes before or after tripping | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Short-Time Protection | Current Setting (A)<br>Accuracy: ±10%<br>No Delay | Isd = Ir x... | 2.0: | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| Instantaneous Protection | Current Setting (A)<br>Accuracy: ±10% | Ii = In x... | 3.0: | 1.5 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 12 |

## MicroLogic 5.0 Basic Trip Unit Settings

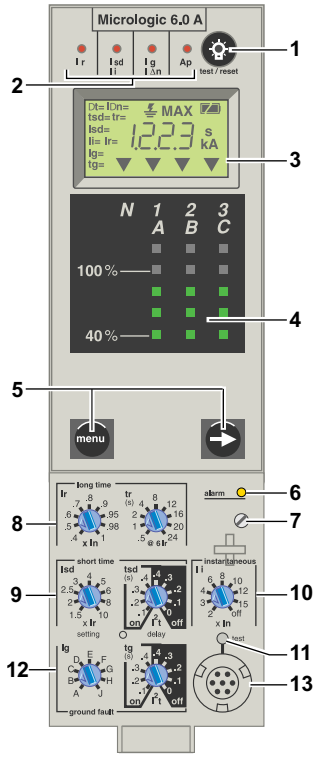



| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Long-Time Protection | Current Setting (A)<br>Tripping Between 1.05 and 1.20 x Ir | Ir = In x... | IEC: | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| | | | UL/ANSI: | 0.4 | 0.45 | 0.5 | 0.6 | 0.63 | 0.7 | 0.8 | 0.9 | 1 |
| | | | Other ranges are available by changing rating plug | | | | | | | | | |
| | Time Delay (s) | tr at 1.5 x Ir | | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | | tr at 6 x Ir | | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | | tr at 7.2 x Ir | | 0.34 | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| | Thermal Imaging | | | 20 minutes before or after tripping | | | | | | | | |
| Short-Time Protection | Current Setting (A)<br>Accuracy: ±10% | Isd = Ir x... | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| | Time Delay (s)<br>at 10 x Ir | Settings | $I^2t$ OFF | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | | $I^2t$ ON | | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | tsd | Min. trip time (ms) | 20 | 80 | 140 | 230 | 350 | | | | |
| | | | Max. trip time (ms) | 80 | 140 | 200 | 320 | 500 | | | | |
| Instantaneous Protection | Current Setting (A)<br>Accuracy: ±10% | Ii = In x... | | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 15 | off |

# MicroLogic 2.0A, 3.0A, 5.0A, & 6.0A Trip Units with Ammeter

MicroLogic A trip units protect power circuits and provide current measurements, overload protection, and short-circuit protection. In addition, the 6.0A trip units also provide ground-fault protection for equipment.

## Ammeter Trip Unit Protection Settings




MicroLogic 6.0A Trip Unit

1—Test lamp and reset

2—Indication of tripping cause

3—Digital display

4—Three-phase bar graph and ammeter

5—Navigation buttons

6—Overload signal (LED)

7—Long-time rating plug screw

8—Long-time current setting and tripping delay

9—Short-time pickup and tripping delay

10—Instantaneous pickup

11—Electronic push-to-trip

12—Ground-fault pickup and tripping delay

13—Test connector

Protection thresholds and delays are set using the rotary switches. The selected values are momentarily displayed in amperes and in seconds. A full-range of long-time settings are available via the field-installable rating plug.

- Overload protection (true RMS long-time protection)
- Thermal imaging (active thermal imaging before and after tripping)
- Short-circuit protection
  — Short-time RMS
  — $I^2t$ ON or OFF for short-time delay
- Instantaneous protection
- Ground-fault protection for equipment
  — Residual ground-fault protection for equipment
  — Source ground-return ground-fault protection for equipment
  — Modified differential ground-fault protection (MDGF) for equipment
- Neutral protection on four-pole circuit breakers
- ZSI: Zone-selective interlocking

  — ZSI terminal block may be used to interconnect a number of trip units to provide total discrimination for short-time and equipment ground-fault protection, without delay for tripping
  — Not available for 3.0 A trip unit
  — Not available for 2.0 A trip unit if installed as upstream device

# Ammeter Measurements

MicroLogic A trip units measure the true RMS value of currents. They provide continuous current measurement from 0.2 to 20 x $I_n$ with an accuracy of 1.5% (including sensors). No auxiliary source is needed where I > 0.2 x $I_n$. The optional external power supply (24 Vdc) makes it possible to display currents where I < 0.2 x $I_n$ and to store values of the interrupted current. A digital LCD screen continuously displays the most heavily loaded phase (Imax) or displays the Ia, Ib, Ic, Ig, and (on four-pole circuit breakers only) In stored current and setting values by successively pressing the navigation button.

# Communication Network

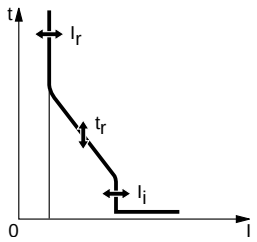
Four wire Modbus, RTU, RS485 or two wire Modbus, TRU, RS485 plus ULP. See COM Option in MasterPacT Circuit Breakers, page 70.

In conjunction with an optional communication network, the trip unit transmits the following parameters:

- Setting values.
- All ammeter measurements.
- Tripping causes.

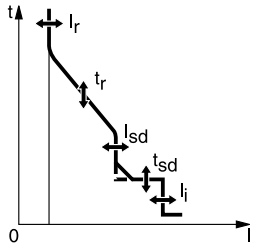
**NOTE:** Current-based protection functions require no auxiliary power source. When an external power supply is added, the value of the interrupted current is stored by the trip unit. The reset button resets alarms and stored interrupted current indications.

### MicroLogic 2.0A and 3.0A Trip Unit Settings




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Long-Time Protection | Current Setting (A) Tripping Between 1.05 and 1.20 x Ir | Ir = In x... | 2.0A: | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| | | | 3.0A: | 0.4 | 0.45 | 0.5 | 0.6 | 0.63 | 0.7 | 0.8 | 0.9 | 1 |
| | | | Other ranges are available by changing rating plug | | | | | | | | | |
| | Time Delay (s) Accuracy: 0 to –20% | tr at 1.5 x Ir | | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | | tr at 6 x Ir | | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | | tr at 7.2 x Ir | | 0.34 | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| | Thermal Imaging | | | 20 minutes before or after tripping | | | | | | | | |
| Short-Time Protection | Current Setting (A) Accuracy: ±10% No delay | Isd = Ir x... | 2.0A: | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| Instantaneous Protection | Current Setting (A) Accuracy: ±10% | Ii = In x... | 3.0A: | 1.5 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 12 |

### MicroLogic 5.0A and 6.0A Trip Unit Settings

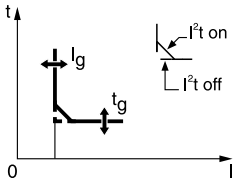



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Long-Time Protection | Current Setting (A) Tripping Between 1.05 and 1.20 x Ir | Ir = In x... | IEC: | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| | | | UL/ANSI: | 0.4 | 0.45 | 0.5 | 0.6 | 0.63 | 0.7 | 0.8 | 0.9 | 1 |
| | | | Other ranges are available by changing rating plug | | | | | | | | | |
| | Time Delay (s) Accuracy: 0 to –20% | tr at 1.5 x Ir | | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | | tr at 6 x Ir | | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |

## MicroLogic 5.0A and 6.0A Trip Unit Settings (Continued)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tr at 7.2 x Ir | | 0.34 | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| | Thermal Imaging | | | 20 minutes before or after tripping | | | | | | | | |
| Short-Time Protection | Current Setting (A) Accuracy: ±10% | Isd = Ir x... | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| | Time Delay (s) at 10 x Ir | Settings | I2t OFF | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | | I2t ON | | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | tsd | Min. trip time (ms) | 20 | 80 | 140 | 230 | 350 | | | | |
| | | | Max. trip time (ms) | 80 | 140 | 200 | 320 | 500 | | | | |
| Instantaneous Protection | Current setting (A) Accuracy: ±10% | Ii = In x... | | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 15 | off |

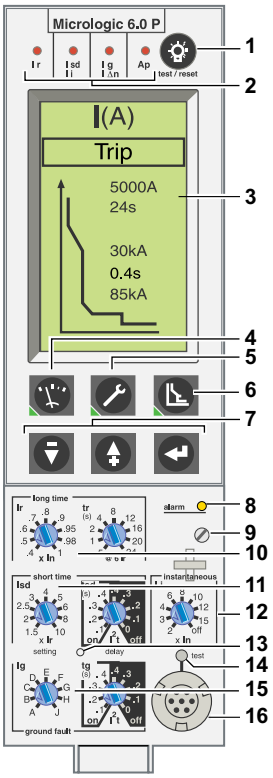
## MicroLogic 6.0A Trip Unit Ground-Fault Settings




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ground-Fault Pickup (A) Accuracy: ±10% | | Ig = In x... | A | B | C | D | E | F | G | H | J |
| | | In ≤ 400 A | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | | 400 A < In ≤1200 A | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | | In > 1200 A | 500 | 640 | 720 | 800 | 880 | 960 | 1040 | 1120 | 1200 |
| Time Delay (s) at 1 x In | Settings | I2t OFF | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | I2t ON | | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | tg | Minimum Trip Time (ms) | 20 | 80 | 140 | 230 | 350 | | | | |
| | | Maximum Trip Time (ms) | 80 | 140 | 200 | 320 | 500 | | | | |

# MicroLogic 5.0P & 6.0P Trip Units with Power Metering

## Protection Settings




MicroLogic 6.0P Trip Unit

1—Test lamp and indication reset

2—Indication of tripping cause

3—High resolution screen

4—Measurement display

5—Maintenance indicators

6—Protection settings

7—Navigation buttons

8—Overload signal (LED)

9—Long-time rating plug screw

10—Long-time current setting and tripping delay

11—Short-time pickup and

tripping delay

12—Instantaneous pickup

13—Hole for settings lockout pin

14—Electronic push-to-trip

15—Ground-fault pickup and tripping delay

16—Test connector

The adjustable protection functions of the 5.0P and 6.0P trip units are identical to those of MicroLogic A trip unit (overloads, short circuits, equipment ground-fault protection); see MicroLogic 2.0A, 3.0A, 5.0A, & 6.0A Trip Units with Ammeter, page 52.

These units also feature:

**Fine adjustment**: Within the range below the rotary switch setting, fine adjustments of pickups/delays in steps of 1 A/s (except for short-time and ground-fault) are possible on the keypad or remotely by the communication network.

**Inverse definite minimum time lag (IDMTL) setting**: Coordination with fuse-type or medium-voltage protection systems is optimized by adjusting the long-time delay curve around 6 x $I_r$ axis. This setting provides better coordination with certain loads.

**Neutral protection**: On three-pole circuit breakers, neutral protection may be set using the keypad or remotely using the communication network to one of four positions:

- OFF
- 1/2N (1/2 x $I_n$)
- 1N (1 x $I_n$)
- 2N (2 x $I_n$)

**NOTE:** The neutral protection is disabled if the long-time curve is set to one of the IDMTL protection settings.

## Configuring Alarms and Other Protection Functions

When the cover is closed, the keypad may no longer be used to change the protection settings, but it still provides access to the displays for measurements, histories, indicators, etc. Depending on the thresholds and time delays set, the MicroLogic P trip unit monitors current, voltage, power, frequency, and phase sequence. Each threshold overrun may be signalled remotely via the communication network.

Each threshold overrun may be combined with tripping (protection) or an indication carried out by an optional M2C/M6C programmable contact (alarm), or both (protection and alarm).

## Maintenance Record

The maintenance record can be consulted using a service interface, a full-function test kit, or remotely via the communication network. It can be used as an aid in troubleshooting and to assist scheduling for device maintenance operations.

Recorded indications include:

- Highest current measured
- Operation counter (both cumulative total and total since last reset)
- Number of test kit connections
- Number of trips in operating mode
- Contact wear (MasterPacT NW only)

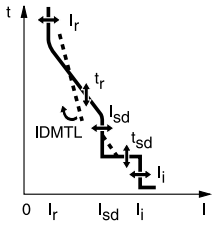
## Load Shedding and Reconnection Parameters

Load shedding and reconnection parameters can be set according to the power or the current flowing through the circuit breaker. Load shedding is carried out by a remote computer via the communication network or by an M2C or M6C programmable contact.

# Indication Option via Programmable Contacts

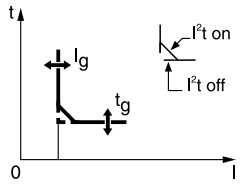
The M2C (two contacts) and M6C (six contacts) programmable contacts may be used to signal threshold overruns or status changes. They can be programmed using the keypad on the MicroLogic P and H trip units or remotely using the communication network. These contacts are required to obtain data from the protective relay functions on Type P and Type H trip units.

### MicroLogic 5.0P and 6.0P Trip Unit Settings




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Long-Time (RMS) Protection | Current Setting (A) Tripping Between 1.05 and 1.20 x Ir | Ir = In x... | IEC: | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| | | Ir = In x... | UL/ANSI: | 0.4 | 0.45 | 0.5 | 0.6 | 0.63 | 0.7 | 0.8 | 0.9 | 1 |
| | | | Other ranges are available by changing rating plug | | | | | | | | | |
| | Time Delay (s) Accuracy: 0 to –20% | tr at 1.5 x Ir | | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | | tr at 6 x Ir | | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | | tr at 7.2 x Ir | | 0.34 | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| | IDMTL Setting | Curve slope | | SIT | | VIT | | EIT | | HV Fuse | | DT |
| | Thermal Imaging | | | 20 minutes before or after tripping | | | | | | | | |
| Short-Time (RMS) Protection | Current Setting (A) Accuracy: ±10% | Isd = Ir x... | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| | Time Delay (s) at 10 x Ir | Settings | I2t OFF | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | | I2t ON | | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | tsd | Min. trip time (ms) | 20 | 80 | 140 | 230 | 350 | | | | |
| | | | Max. trip time (ms) | 80 | 140 | 200 | 320 | 500 | | | | |
| Instantaneous Protection | Current Setting (A) Accuracy: ±10% | Ii = In x... | | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 15 | off |

### MicroLogic 6.0P Trip Unit Ground-Fault Setting




| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ground-Fault Pickup (A) Accuracy: ±10% | Ig = In x... | A | B | C | D | E | F | G | H | J |
| | In ≤ 400 A | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | 400 A < In ≤ 1200 A | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | In > 1200 A | 500 | 640 | 720 | 800 | 880 | 960 | 1040 | 1120 | 1200 |
| Time Delay (s) at 1 x In | Settings | I²t OFF | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | I²t ON | 0.1 | 0.2 | 0.3 | 0.4 | | | | |

### MicroLogic 6.0P Trip Unit Ground-Fault Setting (Continued)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | tg | Min. trip time (ms) | 20 | 80 | 140 | 230 | 350 | |
| | | Max. trip time (ms) | 80 | 140 | 200 | 320 | 500 | |

### Settings for Alarms for Other Protection Functions for MicroLogic 5.0P and 6.0P Trip Units

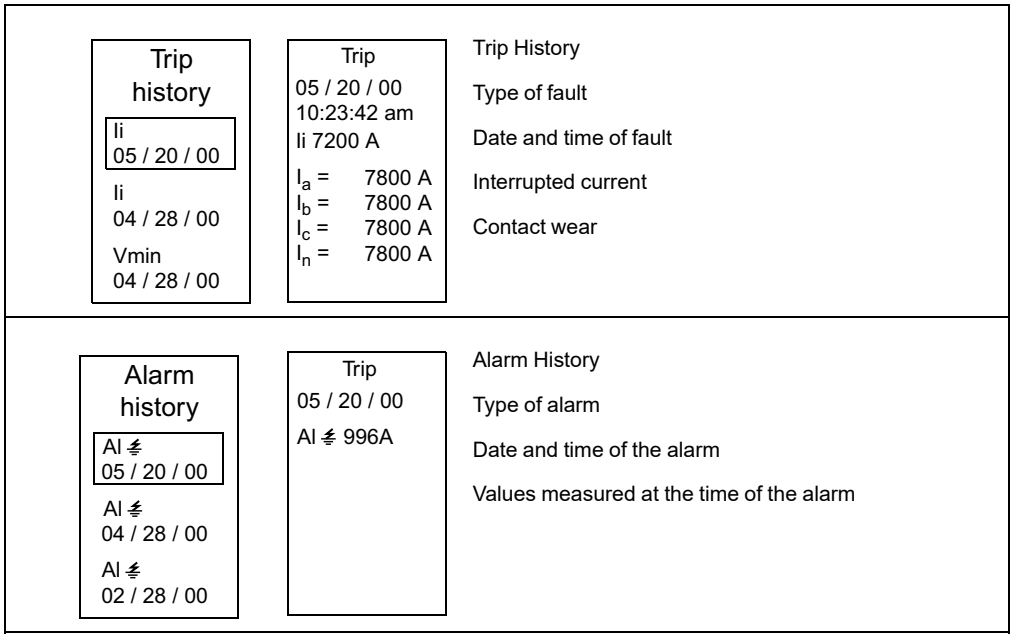
| | | | Threshold | Time Delay |
|---|---|---|---|---|
| Current | Current Imbalance | | 0.05 to 0.6 x Imax | 1 to 40 s |
| | Maximum Current | Imax: Ia, Ib, Ic, In, Ig | 0.2 to 1.0 x In | 15 to 1500 s |
| Voltage | Voltage Imbalance | | 0.02 to 0.3 x Vn | 1 to 40 s |
| | Minimum Voltage | Vmin | 100 to 725 V (phase total) | 0.25 to 0.5 s |
| | Maximum Voltage | Vmax | 100 to 1200 V (between phases) | 0.20 to 5.0 s |
| Power | Maximum Power | Pmax | 5 to 500 kW | 0.2 to 20 s |
| | Reverse Power | Pr | 0.02 to 0.2 x Pn | 0.5 to 20 s |
| Frequency | Minimum Frequency | Fmin | 45 to 65 Hz | 0.2 to 5 s |
| | Maximum Frequency | Fmax | 45 to 540 Hz | 0.2 to 5 s |
| Phase | Sequence | DØ | ØA-ØB-ØC or ØA-ØC-ØB | Instantaneous |

### Load-Shedding Settings for Current and Power Metering for MicroLogic 5.0P and 6.0P Trip Units

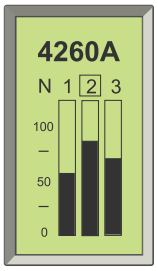
| | | Pick-Up | | Drop-Out | |
|---|---|---|---|---|---|
| | | Threshold | Time Delay | Threshold | Time Delay |
| Current | I | 0.5 to 1.0 x Ir per phase | 20% to 80% x tr | 0.3 to 1.0 x Ir per phase | 10 to 600 s |
| Power | P | 200 kW to 10 MW | 10 to 3600 s | 100 kW to 10 MW | 10 to 3600 s |

## Trip and Alarm Histories

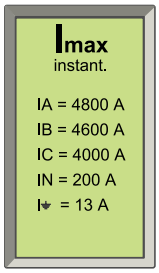
The last ten trips and ten alarms are recorded in two separate history files that can be displayed on the screen (sample displays are shown to the right). The following information is contained in these files:



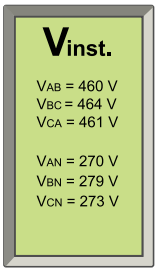

## Power Trip Unit Metering



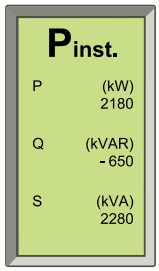

Current Metering



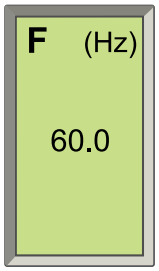

Maximum Current



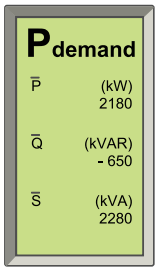

Voltage Metering




Power Metering




Frequency




Power Demand

The MicroLogic P trip unit calculates in real time all electrical values V, A, W, VAR, VA, Wh, VARh, VAh, Hz, power factor, and crest factor. The MicroLogic P trip unit also calculates demand current and demand power over an adjustable time period.

**Real-Time Metering:** The value displayed on the screen is refreshed every second. Minimum and maximum measurement values are stored in memory.

| Type of Measurement | | Unit of Measurement | Measurement Source |
|---|---|---|---|
| Current | IRMS | A | ØA, ØB, ØC or N |
| | IAVERAGE | A | (ØA + ØB + ØC)/3 |
| | IPEAK/Ö2 | A | ØA, ØB, ØC or N |
| Voltage | VRMS | V | (ØA–ØB),. ØB–ØC) and (ØC–ØA) |
| | VRMS | V | (ØA–N), (ØB–N) and ØC–N) |
| | VIMBALANCE | % | VRMS |
| Power | P, Q and S | W, VAR, VA | Total |
| | EP, EQ and ES | Wh, VARh, VAh | Total |
| | Power factor | | Total |
| Frequency | F | Hz | 50/60 |

**Demand Metering:** The demand is calculated over a fixed or sliding time window that can be programmed from five to sixty minutes. Depending on the contract signed with the power supplier, specific programming makes it possible to avoid or minimize the cost of overrunning the subscribed power. Maximum demand values are systematically stored and time stamped.

| **Type of Measurement** | | **Unit of Measurement** | **Measurement Source** |
|---|---|---|---|
| Current | IDEMAND | A | ØA, ØB, ØC or N |
| Power | P, Q and SDEMAND | W, VAR, VA | Total |

## Power Trip Units Communication Network

Four wire Modbus, RTU, RS485—The communication network may be used to:

- Remotely read parameters for the protection functions.
- Transmit all the measurements and calculated values.
- Signal the causes of tripping and alarms.
- Consult the history files and the maintenance indicator record.

In addition, an event log of the last 100 events and a maintenance record, which is stored in the trip unit memory but not available locally, may be accessed via the communication network.

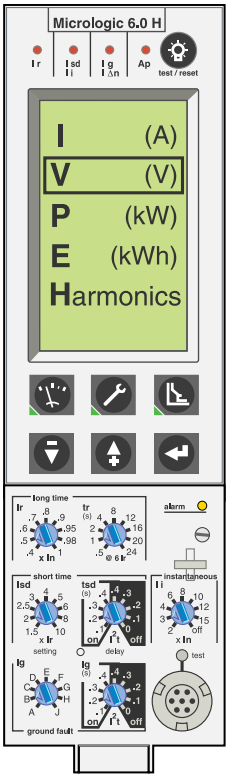
The Modbus communication system is compatible with PowerLogic™ System Manager™ (SMS) software.

## Power Trip Unit Event Log

The event log may be accessed by a remote computer via the communication network. All events are time stamped and include:

- Trips
- Beginning and end of alarms
- Modifications to settings and parameters
- Loss of time
- Overrun of wear indicators
- Test kit connections
- Counter resets
- System faults (thermal self-protection, major fault and minor fault alarms)

# MicroLogic 5.0H and 6.0H Trip Units with Harmonic Metering




MicroLogic 6.0H Trip Unit

In addition to the P functions, the MicroLogic H trip units offer:

- In-depth analysis of power quality including calculation of harmonics and the fundamentals.
- Diagnostics aid and event analysis through waveform capture.
- Customized alarm programming to analyze and track down a disturbance on the ac power system.
- Systematic time stamping of all events and creation of logs.

| Type of Measurement | | Unit of Measurement | Measurement Source |
|---|---|---|---|
| Current | IRMS | A | ØA, ØB, ØC or N |
| | IAVERAGE | A | (ØA + ØB + ØC) / 3 |
| | IPEAK/÷2 | A | ØA, ØB, ØC or N |
| | IIMBALANCE | % | ØA, ØB, ØC or N |
| Voltage | VRMS | V | (ØA–ØB), (ØB–ØC) and (ØC–ØA) |
| | VRMS | V | (ØA–N), (ØB–N) and (ØC–N) |
| | VIMBALANCE | % | VRMS |
| Power | P, Q and S | W, VAR, VA | Total |
| | EP, EQ and ES | Wh, VARh, VAh | Total |
| | W, VAR, VA | | Total |
| Frequency | F | Hz | ØA, ØB, or ØC |
| Power Quality Indicators | Fundamentals | 50/60 Hz component | V, I, P, Q, and S |
| THD | THD | % | V/I |
| V and I harmonics | V and I harmonics | Amplitude to phase | 1, 2, 3, 4...50 |

**Demand Metering**: Similar to the MicroLogic P trip unit, demand values are calculated over a fixed or sliding time window that can be set from five to 60 minutes.

| Type of Measurement | | Unit of Measurement | Measurement Source |
|---|---|---|---|
| Current | IDEMAND | A | ØA, ØB, ØC or N |
| Power | P, Q and SDEMAND | W, VAR, VA | Total |

## Waveform Capture

MicroLogic H trip units can capture and store current and voltage waveforms using digital sampling techniques similar to those used in oscilloscopes. Using the information available in the captured waveform, it is possible to determine the level of harmonics as well as the direction and amplitude of the flow of harmonic power.

Users of MicroLogic H trip units can record manually via the keypad the following waveforms:

- The four currents: $I_a$, $I_b$, $I_c$, and $I_N$
- The three phase-to-phase voltages: $V_{ab}$, $V_{bc}$, and $V_{ca}$

Waveforms may be displayed on the graphic screen of MicroLogic H trip units or communicated over a networked system. The recording takes place over one cycle

with a measurement range of 0 to 1.5 $I_N$ for current and 0 to 690 volts for voltage. The resolution is sixty-four points per cycle.

## Customized Alarm Programming

The instantaneous value of each measurement can be compared to user-set high and low thresholds. Overrun of a threshold generates an alarm. Programmable action can be linked to each alarm, including

## Harmonic Trip Unit Event Log

Each event is recorded with:

- The date, time, and name of the event.
- The event characteristics.

# Additional Technical Characteristics for Type P and Type H Trip Units

Setting the display language: System messages can be displayed in six different languages:

- English - US
- English - UK
- French
- German
- Spanish
- Italian

The desired language is selected via the keypad.

Protection functions: All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to ac power via a voltage measurement input built into the circuit breaker on the bottom side. (Optional external voltage measurement is available.)

Accuracy of measurements (including sensors):

- Voltage (V) 1%
- Current (A) 1.5% (higher accuracy [1%] may be achieved with special calibration on the current transformer [CT characterization option])
- Frequency (Hz) 0.1 Hz
- Power (W) and energy (Wh) 2.5%

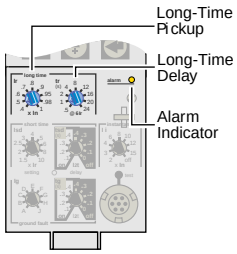
The MicroLogic H trip unit uses a dedicated metering data chain separate from the protection data chain so that a greater number of data samples can be used for metering. This increases the number of samples taken per time period, which in turn gives the H trip unit a higher degree of metering accuracy.

Stored information: The fine setting adjustments, the last 100 events and the maintenance record remain in the trip unit memory even when power is lost.

Reset: An individual reset, via the keypad or remotely, will reset alarms, minimum and maximum data, peak values, counters and the indicators.

# MicroLogic Trip Unit Functions

## Long-Time Trip Functions



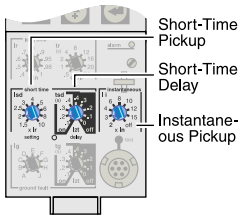

Long-Time Trip Functions

The *long-time pickup* switch sets the maximum current level the circuit breaker will carry continuously. The maximum current level ($I_r$) is the long-time pickup setting multiplied by the sensor plug amperage ($I_n$). If the current exceeds this value for longer than the long-time delay time, the circuit breaker will trip.

The *long-time delay* switch sets the length of time that the circuit breaker will carry a sustained overload before tripping. Delay bands are labeled in seconds of overcurrent at six times the ampere rating. For maximum coordination, there are eight delay bands. Long-time delay is an “inverse time” characteristic in that the delay time decreases as the current increases.

The trip unit includes an *alarm indicator* that will be lit continuously when the current is above 100% of the pickup setting.

## Short-Time Trip Functions




Short-Time and Instantaneous Trip Functions

The *short-time pickup* switch sets the short-circuit current level at which the circuit breaker will trip after the set short-time delay. The short-time current ($I_{sd}$) equals the short-time pickup setting multiplied by the long-time pickup ($I_r$).

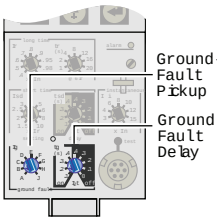
The *short-time delay* switch sets the length of time the circuit breaker will carry a short circuit within the short-time pickup range. The delay (based on 10 times the ampere rating $I_r$) can be adjusted to four positions of $I^2t$ ramp operation ($I^2t$ ON) or five positions of fixed time delays ($I^2t$ OFF). $I^2t$ ON delay is an “inverse time” characteristic in that the delay time decreases as the current increases. Short-time delay for the 2.0 trip unit is fixed at a delay band of 20 to 80 ms

## Instantaneous Trip Function

The *instantaneous pickup* switch sets the short-circuit current level at which the circuit breaker will trip with no intentional time delay. The instantaneous current ($I_i$) is equal to the instantaneous pickup setting multiplied by the sensor plug amperage ($I_n$).

The instantaneous function will override the short-time function if the instantaneous pickup is adjusted at the same or lower setting than the short-time pickup. In trip units with both adjustable short-time and instantaneous trip functions, the adjustable instantaneous trip can be disabled by setting Instantaneous pickup to OFF.

## Ground-Fault Trip Functions




Ground-Fault Trip Functions

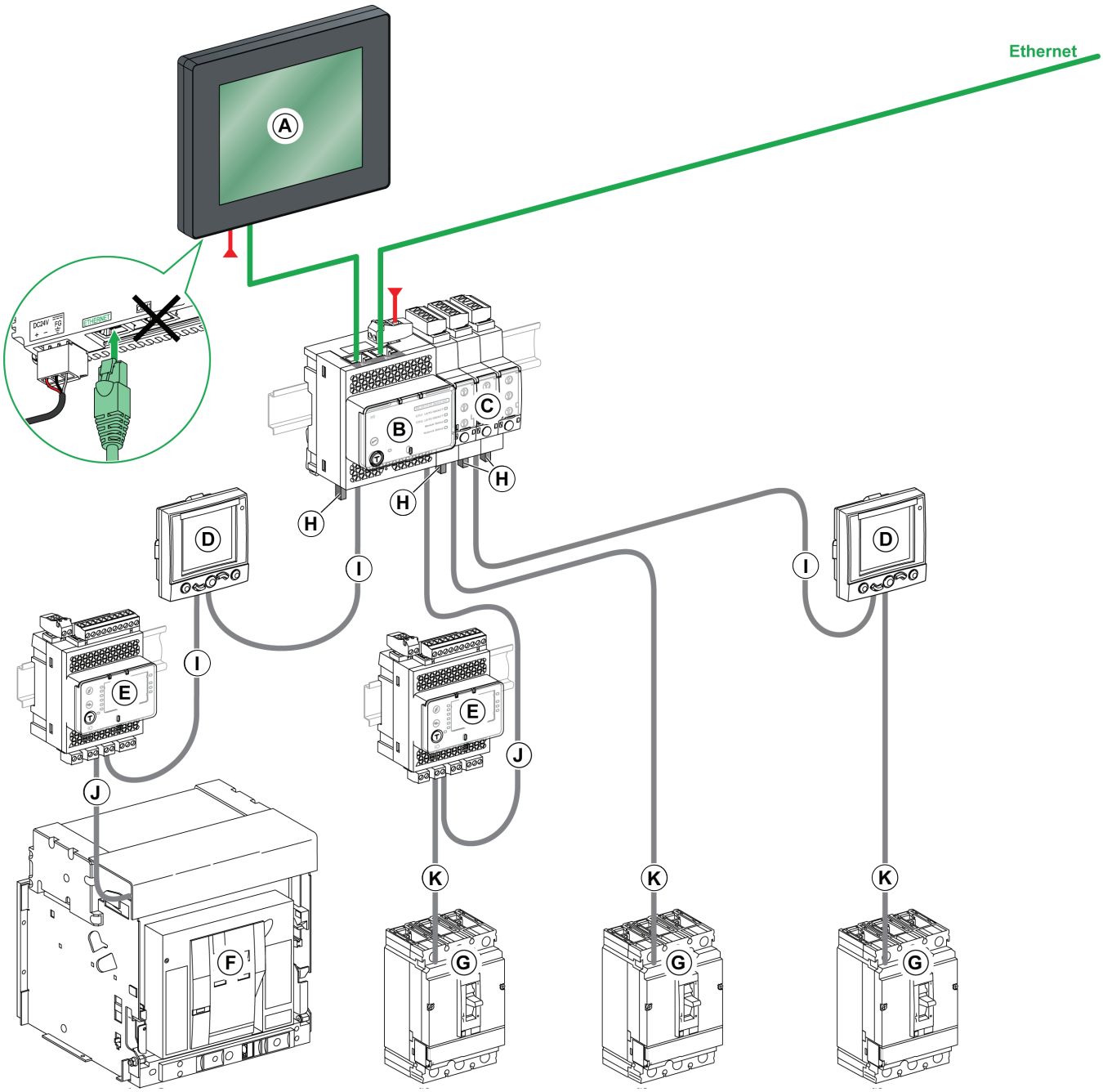
The *ground-fault pickup* switch sets the current level at which the circuit breaker will trip after the set ground-fault delay. Ground-fault pickup values ($I_g$) are based on circuit breaker sensor plug ($I_n$) only, not on the rating plug multiplier ($I_r$). Changing the rating plug multiplier has no effect on ground-fault pickup values.

The *ground-fault delay* switch sets the length of time the circuit breaker will carry ground-fault current which exceeds the ground-fault pickup level before tripping. The delay (based on the sensor plug amperage ($I_n$) can be adjusted to four positions of $I^2t$ ramp operation ($I^2t$ ON) or five positions of fixed time delays ($I^2t$ OFF). $I^2t$ ON delay is an “inverse time” characteristic in that the delay time decreases as the current increases.

# Trip Unit Communication Network

## Wiring System ULP

The wiring system is designed for low-voltage power switchboards. Installation does not require special tools or training. The prefabricated wiring provides both data transmission (Modbus protocol) and 24 Vdc power distribution for the communications modules on the MicroLogic trip units.




A. FDM128 display for 8 LV devices
B. IFE Ethernet interface for LV circuit breaker and gateway
C. IFM Modbus-SL interface for LV circuit breaker
D. FDM121 display for LV circuit breaker
E. IO input/output interface module for
F. PowerPacT H-, J-, or L-frame circuit breaker
G. ULP line terminator
H. ULP cable
I. Circuit breaker ULP cord
J. NSX cord

# Four Functional Levels

A: MicroLogic trip unit with ammeter

P: MicroLogic trip unit “Power”

H: MicroLogic trip unit “Harmonics”

The MasterPacT can be integrated into Ethernet and Modbus communication environment.

There are four possible functional levels that can be combined.

| Functional Level | Switch | Circuit Breaker | | |
|---|---|---|---|---|
| **Status Indications** | | | | |
| ON/OFF (O/F) \ | X | A | P | H |
| Spring charged | X | A | P | H |
| Ready to close | X | A | P | H |
| Fault-trip SDE | X | A | P | H |
| Connected / disconnected / test position CE/CD/ CT (CCM only) | — | A | P | H |
| **Controls** | | | | |
| MX1 shunt trip | X | A | P | H |
| XF shunt close | X | A | P | H |
| **Measurements** | | | | |
| Instantaneous measurement information | — | A | P | H |
| Averaged measurement information | — | — | — | H |
| Maximum / minimum Ammeter | — | A | P | H |
| Energy metering | — | — | P | H |
| Demand for current and power | — | — | P | H |
| Power quality | — | — | — | H |
| **Operating Assistance** | | | | |
| Protection and alarm settings | — | — | P | H |
| Histories | — | — | P | H |
| Time stamped event tables | — | — | P | H |
| Maintenance indicators | — | A | P | H |

# Modbus Principle

### Modbus Principle

The Modbus RS 485 (RTU protocol) system is an open bus on which communicating Modbus devices (MasterPacT NW with Modbus COM, Power Meter PM700, PM800, PowerPacT P/R frame, etc.) are installed. All types of PLCs and microcomputers may be connected to the bus.

### Addresses

The Modbus communication parameters (address, baud rate, parity) are entered using the keypad on the MicroLogic A, P, or H trip unit. For a switch, it is necessary to use the Electrical Asset Manager or RSU (Remote Setting Utility) MicroLogic utility.

### Number of Devices

The maximum number of devices that may be connected to the Modbus bus depends on the type of device (ComPacT circuit breaker with Modbus COM, PM700, PM800, MasterPacT circuit breaker, etc.), the baud rate (19200 is recommended), the volume of data exchanged and the desired response time. The RS 485 physical layer offers up to thirty-two connection points on the bus (one master, thirty-one slaves).

### Length of Bus

The maximum recommended length for the Modbus bus is 3940 feet (1200 meters).

### Bus Power Source

A 24 Vdc power supply is required (less than 20% ripple, insulation class II).

# Ethernet Principle

Ethernet is a data link and physical layer protocol defined by IEEE 802 10 and 100 Mbps specifications that connects computer or other Ethernet devices. Ethernet is an asynchronous Carrier Sense Multiple Access with Collision detection (referred as CSMA/CD) protocol. Carrier Sense means that the hosts can detect whether the medium (coaxial cable) is idle or busy.

Multiple Access means that multiple hosts can be connected to the common medium. Collision Detection means a host detects whether its transmission has collided with the transmission of another host (or hosts).

IFE Ethernet interface can be connected to a PC or a laptop over Ethernet. The maximum length of Ethernet cable is 325 feet (100 meters). IFE Ethernet interface + gateway provides a Modbus TCP/IP gateway over Ethernet to enable Modbus TCP communication from a Modbus TCP master to any Modbus slave devices connected to it. The maximum active Modbus TCP client connection is twelve.

IFE Ethernet interface has an embedded web server (web page).

# COM Option in MasterPacT Circuit Breakers

BCM ULP Module

All MasterPacT devices can be fitted with the communication function thanks to the COM option. MasterPacT uses the Ethernet or Modbus communications protocol for full compatibility with the supervision management systems.

For fixed and drawout devices, the common communication option is made up of:

A BCM ULP module, installed behind the MicroLogic trip unit and supplied with a set of switches (OF, SDE, PF and CH switches), a kit for connection to shunt close (XF) and shunt trip (MX1) communicating voltage releases, and a COM terminal block (inputs E1 to E6).

This module is independent of the trip unit and receives and transmits information on the communication network. An infra-red link transmits data between the trip unit and the communication module.

Consumption: 30 mA, 24 V.

and

The IFM module, the Modbus interface for connection to the network, contains the Modbus address (1 to 99) declared by the user using the two dials in front. It automatically adapts (baud rate, parity) to the Modbus network in which it is installed.

or

The IFE module, the Ethernet interface for low-voltage circuit breakers, enables an intelligent modular unit (IMU) such as a MasterPacT NT/NW or PowerPact circuit breaker to be connected to an Ethernet network. Each circuit breaker has its own IFE and a corresponding IP address.

I/O Application Module

For drawout devices the Cradle Management option must be added:

The I/O (Input/Output) application module for low-voltage circuit breakers is delivered with the drawout devices ordered with the COM option for cradle management. It must be installed on a steel DIN rail that is properly grounded near the device. The I/O module must be connected to the ULP system and to the cradle position contacts (CD, CT, CE) that transmit the position of the circuit breaker in the cradle.

For communicating remote control, shunt close (XF) and shunt trip (MX1) communicating voltage releases must be added:

The shunt close (XF) and shunt trip (MX1) communicating voltage releases are equipped for connection to the communication module.

The remote-tripping function shunt trip (MX2) and undervoltage release (MN) are independent of the communication option. They are not equipped for connection to the communication module.

## Communication Architecture–Electrically Operated

A. BCM ULP

B. OF, SDE, SD, PF, CH (tripped, Open/closed, overcurrent trip, ready to close, charged Switches

C. COM Terminal Block (E1 to E6)

D. Shunt Trip (MX1) and Shunt Close (XF)

E. CE, CD, and CT (connected, disconnected, test) Contacts

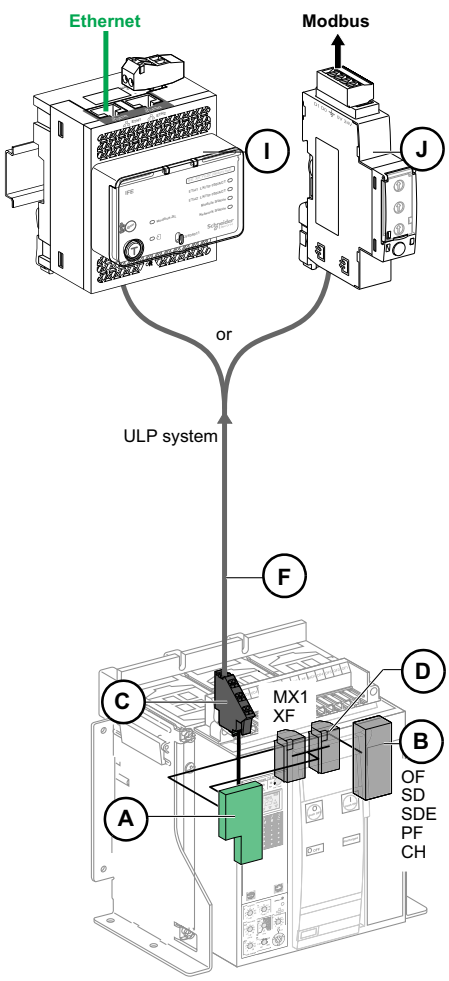
F. Circuit Breaker ULP Cord

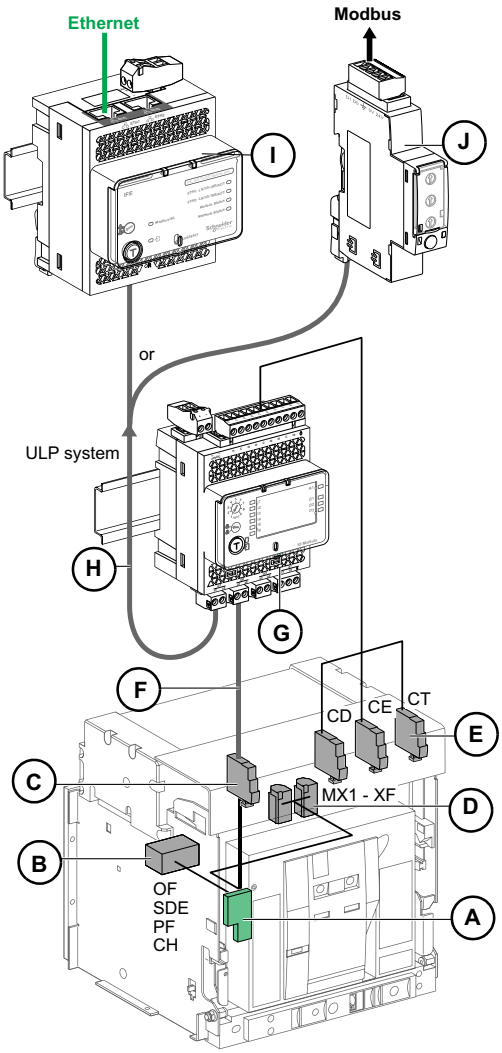
G. I/O Application Module

H. ULP Cable

I. IFE Module

J. IFM Module



# IFE Ethernet Interface


IFE Interface


IFE Interface + Gateway

### Introduction

The IFE interface and IFE interface + gateway enable low-voltage circuit breakers such as MasterPacT NT/NW or PowerPacT P/R-frame to be connected to an Ethernet network.

### IFE Interface

Provides Ethernet access to a single low-voltage circuit breaker.

Function: Interface - one circuit breaker is connected to the IFE interface using its ULP port.

### IFE Interface + Gateway

Provides Ethernet access to one or several low-voltage circuit breakers.

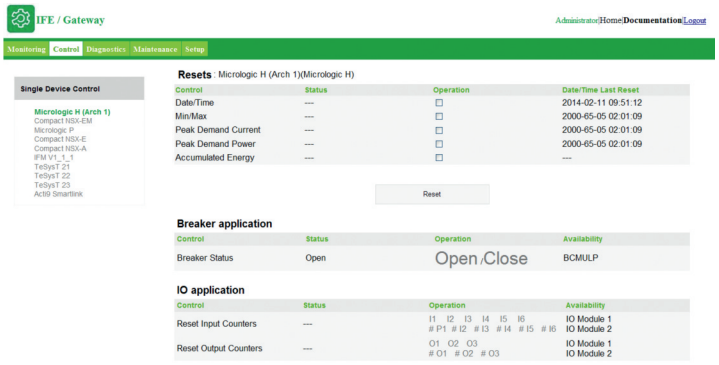
### Functions:

- Interface - one circuit breaker is connected to the IFE interface using its ULP port.
- Gateway: several circuit breakers on a Modbus network are connected using the IFE interface + gateway master Modbus port.

### IFE Interface, IFE Interface + Gateway Features

- Dual 10/100 Mbps Ethernet port for simple daisy chain connection.
- Device profile web service for discovery of the IFE interface, IFE interface + gateway on the LAN.
- Ethernet interface for MasterPacTt and PowerPacT circuit breakers.
- Gateway for Modbus-SL connected devices (IFE interface + gateway only).
- Embedded set-up web pages.
- Embedded monitoring web pages.
- Embedded control web pages.
- Built-in e-mail alarm notification.

### IFE Interface, IFE Interface + Gateway Screen




# IFE Ethernet Interface Mounting

The IFE interface and IFE interface + gateway are DIN rail mounted devices. A stacking accessory enables the user to connect several IFMs (ULP to Modbus interfaces) to an IFE interface + gateway without additional wiring.

## IFE Ethernet Interface 24 Vdc Power Supply

The IFE interface and the IFE interface + gateway must always be supplied with 24 Vdc.

The IFMs stacked to an IFE interface + gateway have power supplied by the IFE interface + gateway, thus it is not necessary to supply them separately. It is recommended to use a UL listed and recognized limited voltage/limited current or a class 2 power supply with a 24 Vdc, 3 A maximum.

## Required Circuit Breaker Communication Modules

The connection to an IFE interface or IFE interface + gateway requires a communication module embedded into the circuit breaker:

MasterPacT NT/NW (fixed or drawout) circuit breakers: BCM ULP communication module

Drawout MasterPacT NT/NW circuit breakers: BCM ULP and its respective I/O (Input/Output) application module.

All connection configurations for MasterPacTt NT/NW circuit breakers require the circuit breaker ULP cord. The insulated NSX cord is mandatory for system voltages greater than 480 Vac. When the second ULP RJ45 connector is not used, it must be closed with a ULP terminator (TRV00880).

**Network Communication Interface**

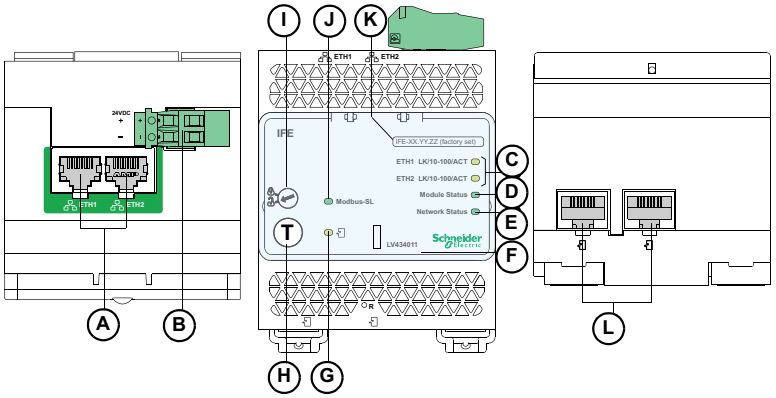
| Characteristic | | Value |
|---|---|---|
| Type of interface module | | Modbus RTU, RS485 serial connection<br>Modbus TCP/IP Ethernet |
| Transmission | Modbus RS485 | – Transfer rate: 9,600–19,200 Baud<br>– Medium Double shielded twisted pair<br>– Impedance 120 Ω |
| | Ethernet | – Transfer rate: 10/100 Mbps<br>– Medium STP, Cat5e, straight cable |
| Structure | Type | Modbus, Ethernet |
| | Method | Master/Slave |
| Device type | Modbus | Master |
| | Ethernet | Server |
| Turnaround time | Modbus | 10 ms |
| | Ethernet | 1 ms |
| Maximum length of cable | Modbus | 1000 m |
| | Ethernet | 100 m |
| Type of bus connector | Modbus | 4-pin connector |
| | Ethernet | RJ45 (Shielded) |

## Characteristics

| General Characteristics | |
|---|---|
| Environmental Characteristics | |
| Conforming to standards | UL 508, UL 60950, IEC 60950, 60947-6-2 |
| Certification | cUIUs, FCC, CE |
| Ambient temperature | Storage: -40 to +185 °F (-40 to +85 °C) |
| | Operation: -13 to +158 °F (-25 to +70 °C) |
| Protective Treatment | ULVO, conforming to IEC 60068-2-30 |
| Pollution | Level 3 |
| Mechanical Characteristics | |
| Shock resistance | Conforming to IEC 60068-2-27 15g/11ms, 1/2 sinusoidal |
| Resistance to sinusoidal vibrations | Conforming to IEC 60068-2-6 |
| Electrical Characteristics | |
| Power Supply | 24 Vdc, -20%/+10% (19.2 to 26.4 Vdc) |
| Consumption | Typical: 4 Vdc, 120 mA at 68 °F (20 °C) |
| | Maximum with gateway: 26.4 Vdc, 3 A at 140 °F (60 °C) |
| Physical Characteristics | |
| Dimensions | 2.83 x 4.13 x 2.79 in. (72 x 105 x 71 mm) |
| Mounting | Mounting DIN rail |
| Weight | 182.5 g (0.41 lb) |
| Degree of protection of the installed module | On the front panel (wall mounted enclosure): IP4x |
| | Connectors: IP2x |
| | Other parts: IP3x |
| Connections | Screw type terminal blocks |
| Technical Characteristics - 24 Vdc Power Supply | |
| Power supply type | Regulated switch type |
| Rated power | 72 W |
| Input voltage 200–500 Vac phase-to-phase | 100–120 Vac for single phase |
| | 200–500 Vac phase-to-phase |
| PFC filter | With IEC 61000-3-2 |
| Output voltage | 24 Vdc |
| Power supply out current | 3:00 AM |

| IFE Web Page Description | |
|---|---|
| Monitoring Web Page | |
| Real time data | X |
| Device logging | X |
| Control Web Page | |
| Single device control | X |
| Diagnostics Web Page | |
| Statistics | X |
| Device information | X |
| IMU (circuit breaker) information | X |
| Read device registers | X |
| Communication check | X |
| Maintenance Web Page | |
| Maintenance log | X |
| Maintenance counters | X |
| Setup Web Page | |
| Device localization/name | X |
| Ethernet configuration (dual port) | X |
| IP configuration | X |
| Modbus TCP/IP filtering | X |
| Serial port | X |
| Date and time | X |
| E-mail server configuration | X |
| Alarms to be e-mailed | X |
| Device list | X |
| Device logging | X |
| Device log export | X |
| SNMP parameters | X |
| Documentation links | X |
| Preferences | X |
| Advanced services control | X |
| User accounts | X |

**NOTE:** Use a UL Listed/UL Recognized limited voltage/limited current or a Class 2 power supply with a 24 Vdc, 3 A maximum.




A. Ethernet 1 and Ethernet 2 communication port

B. 24 Vdc power supply terminal block

C. Ethernet communication LEDs:

- yellow: 10 Mb
- green: 100 Mb

D. Module status LED:

- steady off: no power
- steady green: device operational
- steady red: major fault
- flashing green: standby
- flashing red: minor fault
- flashing green/red: self-test

E. Network status LED:

- steady off: no power/no valid IP address
- steady green: connected, valid IP address
- steady orange: default IP address
- steady red: duplicated IP address
- flashing green/red: self-test

F. Sealable transparent cover

G. ULP status LED

H. Test button (accessible closed cover)

I. Locking pad

J. Modbus traffic status LED (IFE Interface + Gateway only)

K. Device name label

L. ULP ports

# IFM Modbus Communication Interface

## IFM Modbus Communication Interface Function

IFM Modbus
Communication Interface

An IFM Modbus communication interface is required for connection of a MasterPacT or PowerPacT circuit breaker to a Modbus network as long as this circuit breaker is provided with a ULP (Universal Logic Plug) port. The port is available on the BCM ULP.

Once connected, the circuit breaker is considered as a slave by the Modbus master. Its electrical values, alarm status, open/close signals can be monitored or controlled by a Programmable Logic Controller or any other system.

## IFM Modbus Communication Interface Characteristics

**ULP Port**

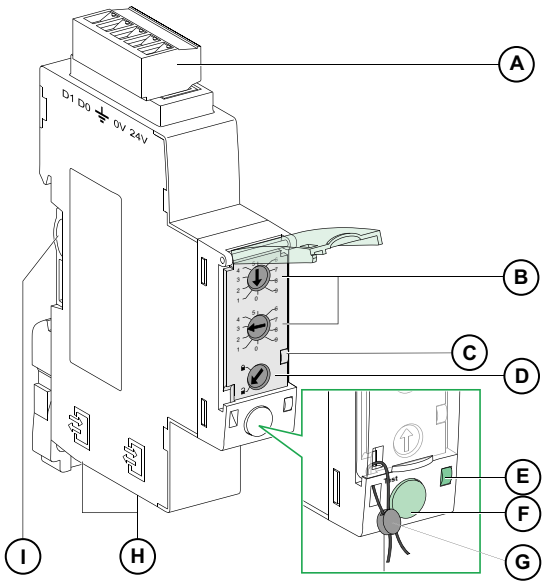
Two RJ45 sockets, internal parallel wiring.

- Connection of a single circuit breaker.
- A ULP line terminator or an FDM121 display unit must be connected to the second RJ45 ULP socket.
- The RJ45 sockets deliver a 24 Vdc supply fed from the Modbus socket.
- Built-in test function, for checking the correct connection to the circuit breaker and FDM121 display

**Modbus Slave Port**

- Top socket for screw-clamp connector, providing terminals for:
  - 24 Vdc input supply (0 V, +24 V)
  - Modbus line (D1, D2, Gnd) 2-wire Modbus system
- Lateral socket, for DIN-rail stackable connector. Both top and lateral sockets are internally parallel

  wired.
- Multiple IFMs can be stacked, thus sharing a common power supply and Modbus line without individual wiring.
- On the front face:
  - Modbus address setting (1 to 99): two coded rotary switches
  - Modbus locking pad: enables or disable the circuit breaker remote control and modification of IFM parameters
- Self-adjusting communication format (Baud rate, parity




A. Modbus Screw Clamp Connector

B. Modbus Address Switches

C. Modbus Traffic LED

D. Modbus Locking Pad

E. ULP Activity LED

F. Test Button

G. Mechanical Lock

H. ULP RJ45 Connectors

I. Stacking Accessory Connection

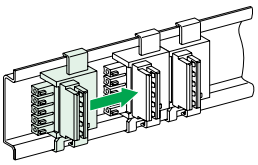
# IFM Modbus Communication Interface Technical Characteristics

### IFM Modbus Communication Interface

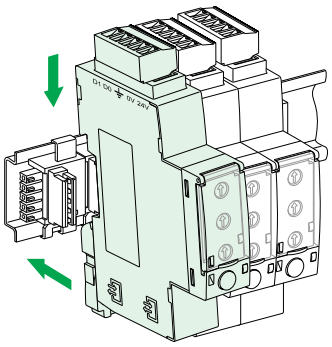
| | | |
|---|---|---|
| Dimensions | | 0.71 x 2.83 x 3.78 in. (18 x 72 x 96 mm) |
| Maximum number of stacked IFM | | 12 |
| Degree of protection of the installed module | Part projecting beyond the escutcheon | IP4x |
| | Other module parts | IP3x |
| | Connectors | IP2x |
| Operating temperature | | -25 to +70 °C |
| Power supply voltage | | 24 Vdc -20%/+10% (19.2–26.4 Vdc) |
| Consumption | Typical | 21 mA/24 Vdc at 68 °F (20°C) |
| | Maximum | 30 mA/19.2 Vdc at 140 °F (60 °C) |
| Certification | CE | IEC/EN 60947-1 |
| | UL | UL 508 - Industrial Control Equipment |
| | CSA | No. 142-M1987 - Process Control Equipment |
| | | CAN/CSA C22.2 No. 0-M91 - General requirements - Canadian Electrical Code Part |
| | | CAN/CSA C22.2 No. 14-05 - Industrial Control Equipment |

# IFM Modbus Communication Interface Simplifed Installation

Stacking an IFM

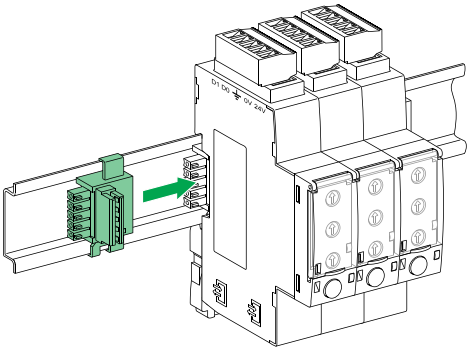


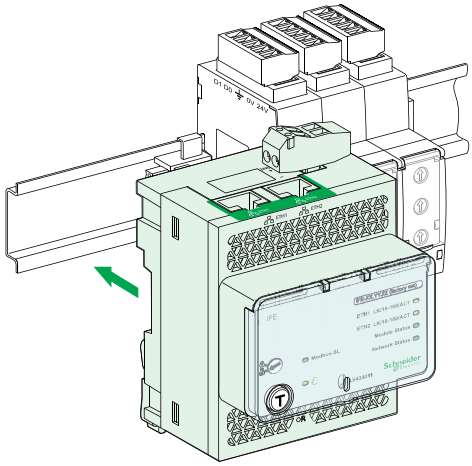
Stacking Accessories



Up to 12 Stacked IFM

Stacking an IFE Interface + Gateway with IFMs





# IO (Input/Output) Application Module

## IO Application Module Description

IO Application Module

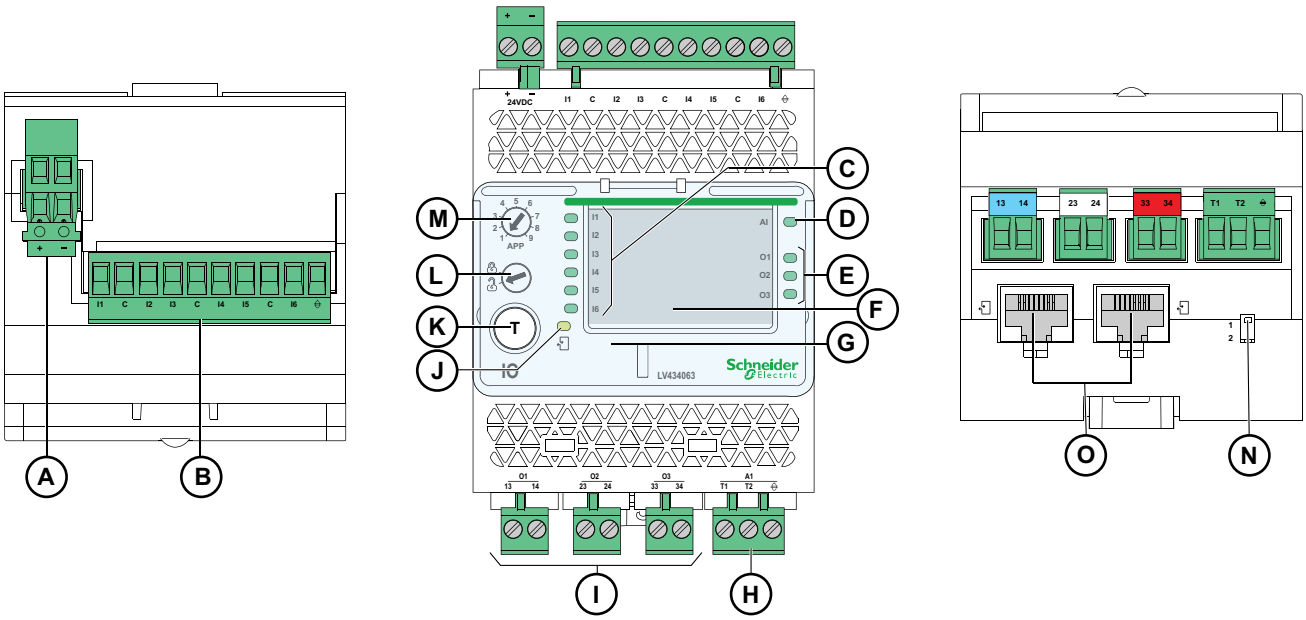
The IO (Input/Output) application module for an low-voltage circuit breaker is part of an ULP system with built-in functions and applications to enhance the application needs. The ULP system architecture can be built without any restrictions using the wide range of circuit breakers.

The IO application module is compliant with the ULP system specifications.

Two IO application modules can be connected in the same ULP network.

The ranges of low-voltage circuit breakers enhanced by the IO application module are:

- MasterPacT NW
- MasterPacT NT
- PowerPacT R-Frame
- PowerPacT P-Frame




A. 24 Vdc power supply terminal block.

B. Digital input terminal block:
6 inputs, 3 commons and 1 shield

C. 6 input status LEDs

D. Analog input status LED

E. 3 output status LEDs

F. IO application module identification labels

G. Sealable transparent cover

H. Analog input terminal block

I. Digital output terminal blocks

J. ULP status LED

K. Test/reset button (accessible with cover closed).

L. Setting locking pad

M. Application rotary switch: 1 to 9

N. Switch for I/O addressing (I/O 1 or I/O 2)

O. ULP connectors

## IO (Input/Output) Application Module for Low-Voltage Circuit Breaker Resources

IO (Input/Output) Application Module for Low-Voltage Circuit Breaker Resources

The IO application module resources are:

- Six digital inputs that are self powered for either NO and NC dry contact or pulse counter.
- Three digital outputs that are a bistable relay (5 A maximum).
- One analog input for PT100 temperature sensor.

## IO Application Module User-Defined Applications

User-defined applications are processed by the IO application module in addition to the pre-defined application selected.

The user-defined applications are available depending on:

- the pre-defined application selected
- the IO application module resources (inputs and outputs) not used by the application

The resources required by user-defined applications are assigned using the customer engineering tool:

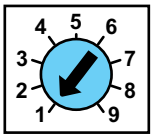
- protection
- control
- energy management

- monitoring

## IO Application Module Mounting

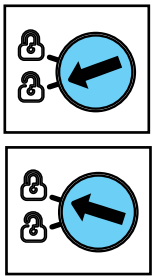
The IO application module is a DIN rail mounted device. Install on a steel DIN rail that is properly grounded near the device.

## I/O Application Module Application Rotary Switch




The application rotary switch enables the selection of the pre-defined application. It has nine positions and each position is assigned to a pre-defined application. The factory set position of the switch is pre-defined application one.

## IO Application Module Setting Locking Pad



The setting locking pad on the front panel of the IO application module enables the setting of the I/O application module by the customer engineering tool.

# IO Application Module General Characteristics

## IO Module General Characteristics

| | | |
|---|---|---|
| Environmental Characteristics | Conforming to standards | UL 508, UL 60950, IED 60950, 60947-6-2 |
| | Certification | cULus, EAC, FCC, CE |
| | Ambient temperature | Storage: -40 to +185 °F (-40 to +85 °C) |
| | | Operation: -13 to +158 °F (-25 to +70 °C) |
| | Protective Treatment | ULVO, conforming to IEC 60068-2-30 |
| | Pollution | Level 3 |
| Mechanical Characteristics | Shock resistance | Conforming to IEC 60068-2-27 15g/11ms, 1/2 sinusoidal |
| | Resistance to sinusoidal vibrations | Conforming to IEC 60068-2-6 |
| Electrical Characteristics | Power Supply | 24 Vdc, -20%/+10% (19.2 to 26.4 Vdc) |
| | Consumption | Typical: 24 Vdc, 165 mA at 20°C |
| | | Maximum with gateway: 26.4 Vdc, 420 mA at 60°C |
| Physical Characteristics | Dimensions | 2.83 x 4.52 X 2.79 in. (72 x 115 x 71 mm) |
| | Mounting | DIN rail |
| | Weight | 0.51 lb. (229.5 g) |
| | Degree of protection of the installed IO application module | –On the front panel (wall mounted enclosure): IP4x<br>–IO parts: IP3x<br>–Connectors: IP2x |
| | Connections | Screw type terminal blocks |
| Technical Characteristics 24 Vdc power supply<br>**NOTE:** It is recommended to use an UL listed/UL listed recognized limited voltage/ limited current or a class 2 power supply with a 24 Vdc, 3 A maximum. | Power supply type | Regulated switch type |
| | Rated power | 72 W |
| | Input voltage | 100–120 Vac for single phase |
| | | 200–500 Vac phase-to-phase maximum |
| | PFC filter | With IEC 61000-3-2 |
| | Output voltage | 24 Vdc |
| | Power supply out current | 3:00 AM |
| Digital Inputs | Digital input type | Self powered digital input with current limitations as per IEC 61131-2 type 2 standards (7 mA) |
| | Input limit values at state 1 (close) | 19.8–25.2 Vdc, 6.1–8.8 mA |
| | Input limit values at state 0 (open | 0–19.8 Vdc, 0 mA |
| | Maximum cable length (29) | 33 ft (10 m) |

## IO Module Digital Characteristics

| | | |
|---|---|---|
| Digital Inputs | Digital input type | Self powered digital input with current limitations as per IEC 61131-2 type 2 standards (7 mA) |
| | Input limit values at state 1 (close) | 19.8–25.2 Vdc, 6.1–8.8 mA |
| | Input limit values at state 0 (open | 0–19.8 Vdc, 0 mA |
| | Maximum cable length (29) | 33 ft (10 m) |
| Digital Outputs | Digital output type | Bistable relay |

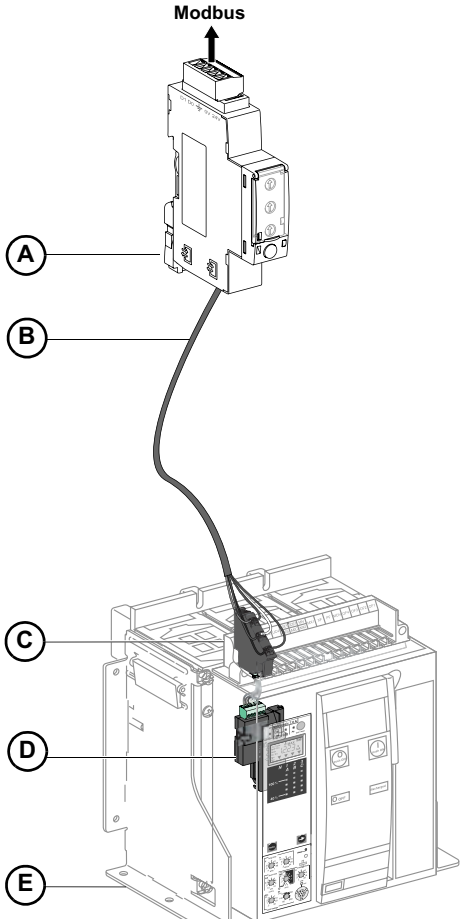
(29) For a length greater than 10 m (33 ft) and up to 300 m (1,000 ft), it is mandatory to use a shielded twisted cable. The shield cable is connected to the IO functional ground of the IO application module.

## IO Module Digital Characteristics (Continued)

| | | |
|---|---|---|
| | Rated load | 5 A at 250 Vac |
| | Rated carry current | 5:00 AM |
| | Maximum switching voltage | 380 Vac, 125 Vdc |
| | Maximum switch current | 5:00 AM |
| | Maximum switching power | 1250 VA, 150 W |
| | Minimum permissible load | 10 mA at 5 Vdc |
| | Contact resistance | 30 mΩ |
| | Maximum operating frequency | 18000 operations/hr (Mechanical) |
| | | 1800 operations/hr (Electrical) |
| | Digital output relay protection by an external fuse | External fuse of 5 A or less |
| | Maximum cable length | 10 m (33 ft) |
| Analog Inputs | The IO application module analog input can be connected to a Pt100 temperature sensor | |
| | Range | -22 to 392 °F (-30 to 200 °C) |
| | Accuracy | -22 to 68 °F (-30 to 20 °C): ±3.6 °F (2 °C) |
| | | 68 to 284 °F (20 to 140 °C): ±1.8 °F (1 °C) |
| | | 284 to 392 °F (140 to 200 °C): ±3.6 °F (2 °C) |
| | Refresh interval | 5 s |

## Connection of the IFM to MasterPacT NT/NW

Connect the IFM to a fixed electrically-operated MasterPacT NT/NW circuit breaker using the circuit breaker ULP cord. Connect the IFM to a drawout MasterPacT NT/NW circuit breaker using the circuit breaker ULP cord.




A. IFM Ethernet interface for low-voltage circuit breaker

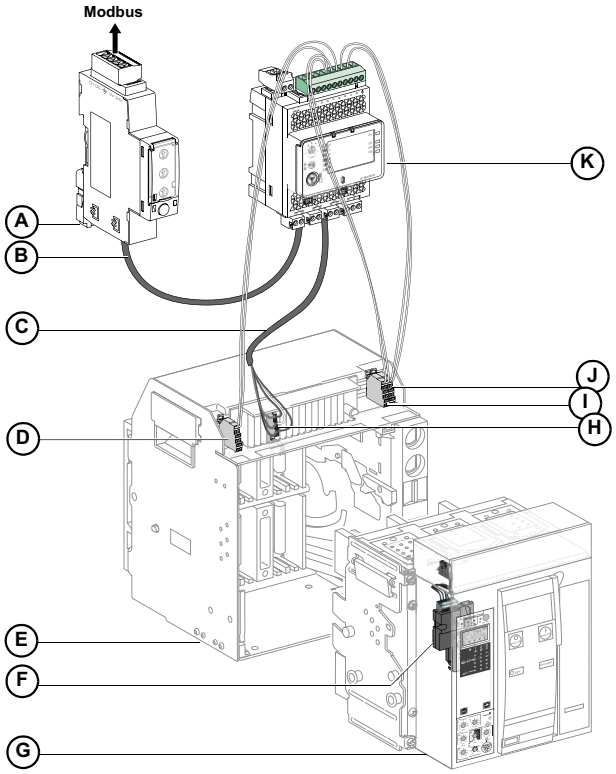
B. Circuit breaker ULP cord

C. Fixed terminal block

D. BCM ULP communication module

E. Fixed electrically operated circuit break

Connect the IFM to a fixed electrically-operated MasterPacT NT/NW circuit breaker using the circuit breaker ULP cord. Connect the IFM to a drawout MasterPacT NT/NW circuit breaker using the circuit breaker ULP cord.




A. IFM Ethernet interface for low-voltage circuit breaker

B. ULP cable

C. Circuit breaker ULP cord

D. Circuit breaker disconnected position contact (CD)

E. Circuit breaker cradle

F. BCM ULP communication module

G. Drawout circuit breaker

H. Drawout terminal block

I. Circuit breaker connected position contact (CE)

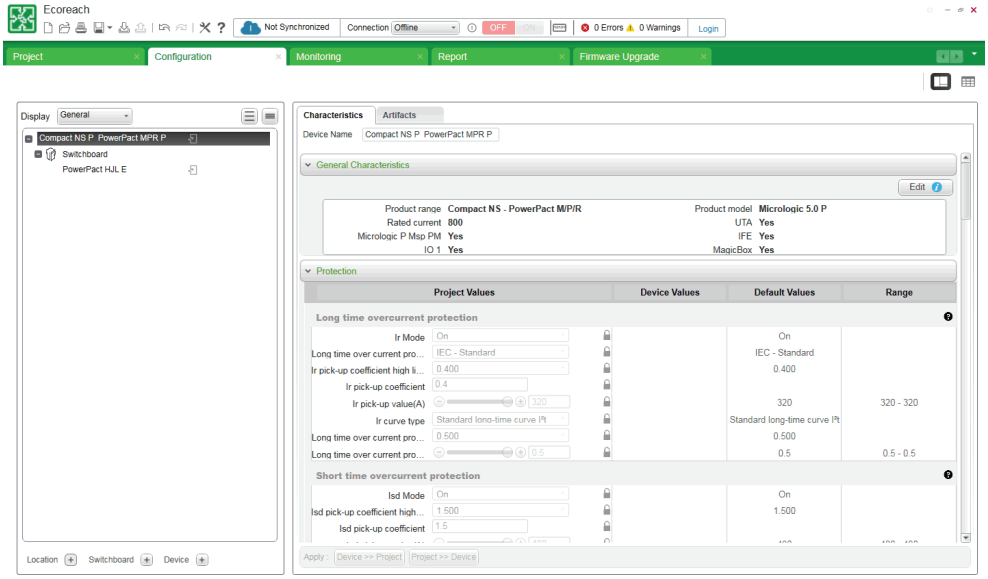
J. Circuit breaker test position contact (CT)

K. IO (Input/Output) application module for low-voltage circuit breaker

# EcoStruxure Power Commission Tool

## EcoStruxure Power Commission Tool Introduction

The EcoStruxure Power Commission Tool engineering tool is a software application that helps the user to manage a project as part of designing, testing, site commissioning, and maintenance of the project life cycle. It enables the user to prepare the settings of the devices offline (without connecting to the device) and configure them when connected with the devices. It also provides other value-added features for the user to manage the project such as: safe repository in cloud, attach artifacts to each device or at the project level, organize devices in switchboard, manage a hierarchical structure of the installation, etc.




## Compatible Devices (Configuration and Device Management)

The EcoStruxure Power Commission engineering tool is compatible with the following devices:

- ComPacT NSX100-630 (IEC) circuit breakers
- PowerPacT (UL) circuit breakers
- ComPacT NS630b-3200 (IEC) circuit breakers
- MasterPacT NT/NW (IEC and UL) circuit breakers
- Compatible devices (Device Management in the project)
- Switches (ComPacT NSX, MasterPacT & PowerPacT Family)
- Third party devices

References:

The EcoStruxure Oiwer Cimmission software package can be downloaded from our website:

www.schneider-electric.com

# EcoStruxure Power Commission Tool Features

The EcoStruxure Power Commission Tool includes the Schneider Electric customer engineering tools such as the Remote Setting Utility (RSU) and Remote Control Utility (RCU) with additional features.

The EcoStruxure Power Commission Tool supports the connection of Schneider Electric communicable devices to:

- create projects by device discovery, selection of devices, and importing a Bill of Material (BOM)
- monitor the status of protection and I/O status
- read information (alarms, measurements, parameters)
- check protection discrimination between two devices
- upload and download of configuration or settings in batch mode to multiple devices.
- carry out commands and tests
- generate and print a device settings report and communication test report
- manage multiple devices with a electrical and communication hierarchy model
- manage artifacts (project documents)
- check consistency in settings between devices on a communication network
- compare configuration settings between PC and device (online)
- download latest firmware

The EcoStruxure Power Commission Tool enables the user to access the advanced features of the software once the project is saved in the Schneider Electric cloud.

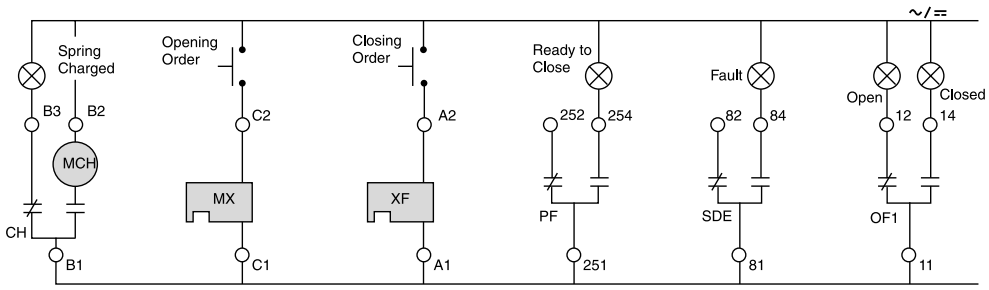
# MasterPacT Circuit Breaker Accessories

## Options for Remote Operation

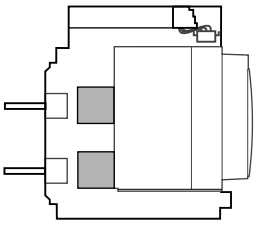
Two options are available for remote operation of MasterPacT circuit breakers: direct connection or a communication network.

**NOTE:** When remote operation features are used, a minimum of four seconds is required for the spring charging motor (MCH) to completely charge the circuit breaker closing springs prior to actuating the shunt close (XF) device.

The wiring diagrams for these two options are shown below.




## Remote Operation Accessories



MasterPacT Circuit Breaker Equipped for Remote ON/OFF Function

Cluster shield is not shown

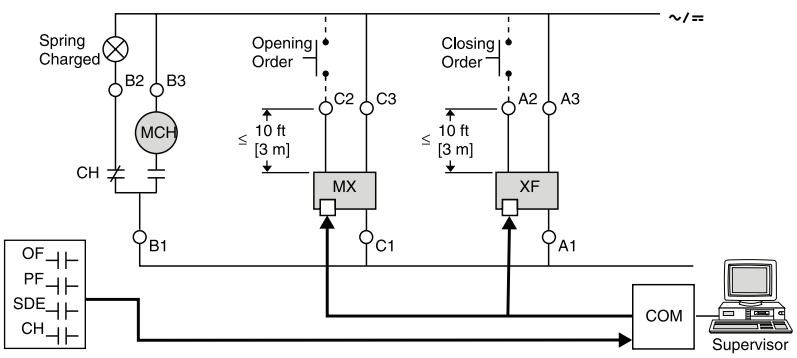
The remote ON/OFF function is used to remotely open and close the circuit breaker. It is made up of the following components:

- A spring-charging motor (MCH) equipped with a spring-charged limit switch; see Spring-Charging Motor (MCH), page 88 for more information.
- A shunt close (XF); see Shunt Trip (MX1) and Shunt Close (XF), page 89 for more information.
- A shunt trip (MX1); see Shunt Trip (MX1) and Shunt Close (XF), page 89 for more information

Optionally, the function may be completed with:

- A ready-to-close contact (PF).
- An electrical closing push button (BPFE).
- A remote reset following a fault (RES).
- The remote operation function may be completed with:
- Auxiliary contacts (OF).
- Overcurrent trip switch (SDE).

### Wiring Diagram for Remote ON/OFF Function by Communication Network




**NOTE:** Induced voltages in the circuit at terminal C2 and/or A2 can cause the shunt close to not work properly. The best way to control induced voltages is to keep the circuit to terminal C2 and A2 as short as possible. If it is impossible to keep the circuit less than 10 feet (3 m), use an interposing relay near terminal C2 or A2.

**NOTE:** When communicating MX1 or XF coils are used, terminal (C3 or A3) must be connected to line even if the communication module is not installed. The bypass circuit through terminal C2/A2 is only momentary duty for 0.5 sec. For continuous duty, use the communications command.

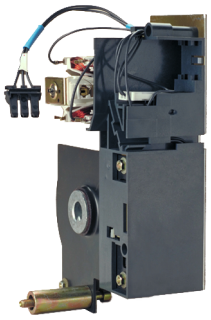
# Terminals

Terminal

### Terminal Characteristics

| | | |
|---|---|---|
| Standards | | UL 486E |
| Termination Capacity | | 22–14 AWG solid or stranded wire with max. O.D. of insulation 3.5 mm |
| Current | Nominal | 10:00 AM |
| | Minimum | 100mA at 24 V |
| Pull-Out Forces | | 22 AWG = 4.5 lbs. (20 N) |
| | | 20 AWG = 6.75 lbs. (30 N) |
| | | 18 AWG = 6.75 lbs. (30 N) |
| | | 16 AWG = 9 lbs. (40 N) |
| | | 14 AWG = 11.5 lbs. (50 N) |

# Spring-Charging Motor (MCH)



Spring-Charging Motor (NW)

Spring-Charging Motor (NT)

The spring-charging motor automatically charges the spring mechanism for closing the circuit breaker and also recharges the spring mechanism when the circuit breaker is in the ON position. Instantaneous reclosing of the circuit breaker is thus possible following circuit breaker opening. The spring-mechanism charging handle is used only as a backup if auxiliary power is absent.

The spring-charging motor is equipped as standard with a limit switch contact (CH) that signals the charged positio

### Spring-Charging Motor Characteristics

| Characteristics | | MCH |
|---|---|---|
| Voltage Ratings (Vn) | Vac 50/60 Hz | 48/60, 100/130, 200/250, 240/277, 380/415, 400/440, 480 |
| | Vdc | 24/30, 48/60, 100/125, 200/250 |
| Operating Threshold | | 0.85 to 1.1 Vn |
| Power Consumption | | 180 VA |
| Motor Overcurrent | | 2–3 x In for 0.1 s |
| Charging Time | | 4 s maximum on NW, 3 s maximum on NT |
| Duty Cycle | | 3 cycles per minute maximum |
| Endurance | | 10,000 cycles for NW < 4000 A |
| | | 5000 cycles for NW ³ 4000 A |
| CH Contact | | 10 A at 240 V |

# Shunt Trip (MX1) and Shunt Close (XF)

Maximum Wire Length—The inrush currents for these devices are approximately 200 VA. When low supply voltages (12, 24 or 48 V) are used, the maximum allowable wire length is dependent on the voltage and the wire size.

| Device | Percent of Source Voltage | Source Voltage | | | | | |
|---|---|---|---|---|---|---|---|
| | | 12 Vdc | | 24 Vdc | | 48 Vdc | |
| Wire Size | | 14 AWG (2.08 mm2) | 16 AWG (1.31 mm2) | 14 AWG (2.08 mm2) | 16 AWG (1.31 mm2) | 14 AWG (2.08 mm2) | 16 AWG (1.31 mm2) |
| UVR (MN) | 100% | — | — | 159 ft. (48.5 m) | 100 ft. (30.5 m) | 765 ft. (233.2 m) | 472 ft. (143.9 m) |
| | 85% | — | — | 44 ft. (13.4 m) | 29 ft. (8.8 m) | 205 ft. (62.5 m) | 129 ft. (39.3 m) |
| Shunt Trip (MX) and Shunt Close (XF) | 100% | 57 ft. (17.4 m) | 34 ft. (10.4 m) | 314 ft. (95.7 m) | 200 ft. (61.0 m) | 1503 ft. (457.8 m) | 944 ft. (287.7 m) |
| | 85% | 27 ft. (8.2 m) | 17 ft. (5.2 m) | 205 ft. (62.5 m) | 126 ft. (38.4 m) | 957 ft. (291.7 m) | 601 ft. (183.2 m) |

Shunt Trip (MX1) and Shunt Close (XF)

**Shunt Trip (MX1):** When energized, the shunt trip instantaneously opens the circuit breaker. The shunt trip may be energized continuously or intermittently.

**Shunt Close (XF):** Remotely closes the circuit breaker if the spring mechanism is charged.

Do not use a standing close order on the shunt close coil (XF). Any opening order will open the circuit breaker so a standing close order is not necessary. See .

Communication versions of the MX1 and XF are available for direct connection via the circuit breaker communication module (BCM ULP).

### Shunt Trip and Shunt Close Characteristics

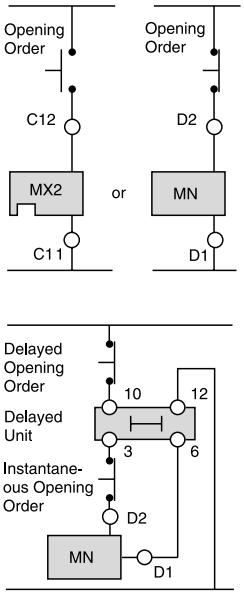
| Characteristics | | MX1 and MX2 | XF | Min | Max |
|---|---|---|---|---|---|
| Voltage Ratings (Vn) | Vac 50/60 Hz | 24 Vac | | 17 Vac | 26 Vac |
| | | 48 Vac | | 34 Vac | 52 Vac |
| | | 120 Vac | | 60 Vac | 132 Vac |
| | | 240 Vac | | 168 Vac | 264 Vac |
| | | 277 Vac | | 194 Vac | 304 Vac |
| | | 380 Vac | | 266 Vac | 418 Vac |
| | | 480 Vac | | 336 Vac | 528 Vac |
| | Vdc | 12 Vdc | | 8 Vdc | 13 Vdc |
| | | 24 Vdc | | 17 Vdc | 26 Vdc |
| | | 48 Vdc | | 34 Vdc | 52 Vdc |
| | | 125 Vdc | | 88 Vdc | 137 Vdc |
| | | 250 Vdc | | 175 Vdc | 275 Vdc |
| Operating Threshold | | 0.7 to 1.1 Vn | 0.85 to 1.1 Vn | | |
| Power Consumption (VA or W) | Steady-State/Inrush | 4.5/200 | | | |
| Circuit Breaker Response Time at Vn(30) | | 50 ms ±10 (NW and NT) | 70 ms ±10 (NW ≤ 4000 A)<br>80 ms ±10 (NW > 4000 A)<br>55 ms (NT) | | |

(30) Shunt trip (MX1) and shunt close (XF) circuits must be energized for minimum of 200 ms.

# Additional Shunt Trip (MX2) or Undervoltage Trip (MN)

Second Shunt Trip (MX2)

Remote Tripping Function Wiring




This function opens the circuit breaker via an electrical order.

It is made up of:

- Shunt trip (MX2, second MX) or,
- Undervoltage trip (MN)
  - Instantaneous trip
  - Fixed undervoltage trip (time delayed) or,
  - Adjustable undervoltage trip (time delayed)

As shown in the wiring diagram for the remote tripping function, the delay unit (installed outside the circuit breaker) may be disabled by an emergency off button to obtain non-delayed opening of the circuit breaker.

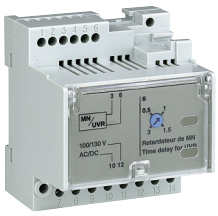
When energized, the shunt trip (MX1 or MX2) instantaneously opens the circuit breaker.

The undervoltage trip (MN) instantaneously opens the circuit breaker when its supply voltage drops to a value between 35% and 70% of its rated voltage.

If the undervoltage trip is not energized, it is impossible to close the circuit breaker, either manually or electrically. An attempt to close the circuit breaker produces no movement of the main contacts. Closing is allowed when the supply voltage of the undervoltage trip reaches 85% of rated voltage.

| **Characteristics** | | **MN** |
|---|---|---|
| Voltage Ratings (Vn) | Vac 50/60 Hz | 24 Vac |
| | | 48 Vac |
| | | 120 Vac |
| | | 240 Vac |
| | | 277 Vac |
| | | 380 Vac |
| | | 480 Vac |
| | Vdc | 12 Vdc |
| | | 24 Vdc |
| | | 48 Vdc |
| | | 125 Vdc |
| | | 250 Vdc |
| Power Consumption (VA or W) | Constant/Inrush | 4.5/200 |
| Operating Threshold | Opening | 0.35 to 0.70 Vn |
| | Closing | 0.85 Vn |
| Circuit Breaker Response Time at Vn | NW | 90 ms ±10 |
| | NT | 40 ms ±10 |

# Time-Delay Module for Undervoltage Trip



Time-Delay Module for Undervoltage Trip (MN)

To eliminate circuit breaker nuisance tripping during temporary voltage dips (micro-breaks), operation of the undervoltage trip (MN) can be delayed. This function is achieved by adding an external delay unit (either adjustable or non-adjust

### Time-Delay Module Characteristics

| | | | |
|---|---|---|---|
| Voltage Ratings of Undervoltage Trip | | Vac 50/60 Hz | 24/30, 48/60, 100/130, 200/250, 380/480 |
| | | Vdc | 24/30, 48/60, 100/130, 200/250 |
| Voltage Ratings of Time-Delay Module | Adjustable | Vac 50/60 Hz | 48/60, 100/130, 200/250, 380/480 |
| | | Vdc | 48/60, 100/130, 200/250, 380/480 |
| | Non-Adjustable | Vac 50/60 Hz | 100/130, 200/250 |
| | | Vdc | 100/130, 200/250 |
| Operating Threshold | | Opening | 0.35 to 0.7 Vn |
| | | Closing | 0.85 Vn |
| Power Consumption | | | 4.5 VA/W (Holding), 200 VA/W (Inrush) |
| Time-Delay Settings | Adjustable | | 0.5, 0.9, 1.5, and 3.0 s |

# Ready-to-Close Switch (PF)

Ready-to-Close Switch (PF)

The ready-to-close position switch indicates that the following conditions are met and the circuit breaker can be closed:

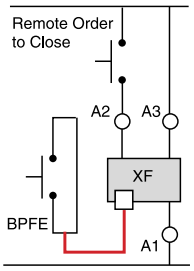
- The circuit breaker is open.
- The closing springs are charged.
- There is no standing closing or opening order.

### Ready-to-Close Switch Characteristics

| | | | | |
|---|---|---|---|---|
| Type of Contact | 1a/1b Form C | | | |
| Maximum Number of Contacts | 1 | | | |
| Breaking Capacity at a Power Factor (p.f.) of 0.3 | **Standard: 100 mA/24V minimum load** | | **Low-Level: 2 mA/15 V minimum load** | |
| | 240/380 Vac | 5:00 AM | 24/48 Vac | 3:00 AM |
| | 480 Vac | 5:00 AM | 240 Vac | 3:00 AM |
| | 600/690 Vac | 3:00 AM | 380 Vac | 3:00 AM |
| | 24/48 Vdc | 3:00 AM | 24/48 Vdc | 3:00 AM |
| | 240 Vdc | 0.3 A | 125 Vdc | 0.3 A |
| | 380 Vdc | 0.15 A | 250 Vdc | 0.15 A |

# Electrical Closing Push Button (BPFE)

Electrical Closing Push Button (BPFE)



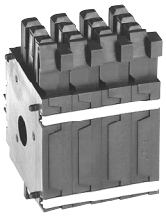

Located on the front panel of the circuit breaker, this push button carries out electrical closing of the circuit breaker, taking into account all of the safety functions that are part of the control/monitoring system of the installation. The push button is installed on the control circuit of the shunt close, and connects to the communicating shunt close module (XF-COM). Terminal A2 of XF-COM is used to remotely close the circuit breaker.

# Remote Reset (RES) and Automatic Reset After Fault

- Remote reset (RES): following tripping, the remote reset (RES) resets the overcurrent trip switch (SDE) and the mechanical indicator. (Voltage rating: 110/130 Vac and 200/240 Vac.) RES is not compatible with an additional overcurrent trip switch (SDE2).
- Automatic reset after fault-trip: following tripping, a reset of the mechanical indicator (reset button) is no longer required to enable circuit breaker closing (factory adjustable only).

# Switches and Switch Accessories

## Auxiliary Switch (OF)



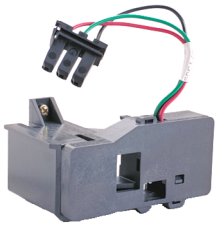
Auxiliary Switch (OF) with Four Contacts for MasterPacT NW Circuit Breaker

MasterPacT NT Aux Switch (OF) with One Contact

The rotary-type auxiliary switches are directly driven by the trip mechanism when the minimum isolation distance between the main circuit breaker contact is reached.

| **Circuit Breaker Type** | | | **NT** | **NW** |
|---|---|---|---|---|
| Supplied as Standard (Form C) | | | 4 | 4 |
| Maximum Number of Contacts | | | 4 | 12 |
| Breaking Capacity at a Power Factor (p.f.) of 0.3 | Standard (100 mA/24 V minimum load) | | | |
| | Vac | 240/380 | 6:00 AM | 10:00 AM |
| | | 480 | 6:00 AM | 10:00 AM |
| | | 600/690 | 6:00 AM | 6:00 AM |
| | Vdc | 24/48 | 2.5 A | 10:00 AM |
| | | 240 | 0.5 A | 10:00 AM |
| | | 380 | 0.3 A | 3:00 AM |
| | Low-Level (1 mA/4 V minimum load with a maximum current and voltage of 100 mA/10 V. | | | |
| | **NOTE:** If the maximum voltage and current is exceeded, the low-level function of the switch will be lost but the switch will continue to function as a standard switch with the following specifications. | | | |
| | Vac | 24/48 Vac | 5:00 AM | 6:00 AM |
| | | 240 Vac | 5:00 AM | 6:00 AM |
| | | 380 Vac | 5:00 AM | 3:00 AM |
| | Vdc | 24/48 Vdc | 5/2.5 A | 6:00 AM |
| | | 125 Vdc | 0.5 A | 6:00 AM |
| | | 250 Vdc | 0.3 A | 3:00 AM |

## Overcurrent Trip Switch (SDE)



Overcurrent Trip Switch (SDE)

Circuit breaker tripping due to a fault is signalled by a red mechanical fault indicator (reset) and one overcurrent trip switch (SDE).

Following tripping, the mechanical indicator must be reset before the circuit breaker may be closed. An additional overcurrent trip switch (SDE2) is supplied as an option and is not compatible with the remote reset (RES).

### Overcurrent Trip Switch Characteristics

| Supplied as Standard | 1a/1b Form C | | | |
|---|---|---|---|---|
| Maximum Number of Contacts | 2 | | | |
| Breaking Capacity at a Power Factor (p.f.) of 0.3 | Standard: 100 mA/24 V Minimum Load | | Low-Level: 2 mA/15 V Minimum Load | |
| | 240/380 Vac | 5 A | 24/48 Vac | 3 A |
| | 480 Vac | 5 A | 240 Vac | 3 A |
| | 600/690 Vac | 3 A | 380 Vac | 3 A |
| | 24/48 Vdc | 3 A | 24/48 Vdc | 3 A |
| | 240 Vdc | 0.3 A | 125 Vdc | 0.3 A |

**Overcurrent Trip Switch Characteristics (Continued)**

| | | | | |
|---|---|---|---|---|
| | 380 Vdc | 0.15 A | 250 Vdc | 0.15 A |

# Connected/Closed Switch (EF)

Connected/Closed Switch (EF) NW only

This switch combines the “device connected” and “device closed” information to produce “circuit closed” information. The connected/closed switch (EF) is supplied as an option and must be used with an additional auxiliary switch (OF) and fits into its connector (it is not available for ring terminals).

**Connected/Closed Switch Characteristics**

| Circuit Breaker Type | NW (not available for NT) | | | |
|---|---|---|---|---|
| Maximum Number of Contacts | 8a/8b Form C | | | |
| Breaking Capacity at a Power Factor (p.f.) of 0.3 | Standard: 100 mA/24 V Minimum Load | | Low-Level: 2 mA/15 V Minimum Load | |
| | 240/380 Vac | 6:00 AM | 24/48 Vac | 5:00 AM |
| | 480 Vac | 6:00 AM | 240 Vac | 5:00 AM |
| | 600/690 Vac | 6:00 AM | 380 Vac | 5:00 AM |
| | 24/48 Vdc | 2.5 A | 24/48 Vdc | 2.5 A |
| | 125 Vdc | 0.8 A | 125 Vdc | 0.8 A |
| | 250 Vdc | 0.3 A | 250 Vdc | 0.3 A |

# Cradle Position Switch

Cradle Position Switch (CE, CD, CT)

Three series of optional auxiliary switches are available for the cradle:

- Cradle position switches to indicate the connected position (CE).
- Cradle position switches to indicate the disconnected position (CD). This position is indicated when the required clearance for isolation of the power and auxiliary circuits is reached.
- Cradle position switches to indicate the test position (CT). In this position, the power circuits are disconnected and the auxiliary circuits are connected.

### Cradle Position Switch Characteristics

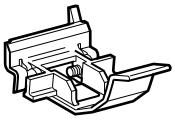
| Circuit Breaker Type | | | NT | | | NW | | |
|---|---|---|---|---|---|---|---|---|
| | | | CE | CD | CT | CE | CD | CT |
| Maximum Push-In Switches with Standard Actuators | | | 3 | 2 | 1 | 31 | 31 | 31 |
| With Additional Actuators | | | | | | 9 | 0 | 0 |
| | | | | | | 6 | 3 | 0 |
| | | | | | | 3 | 6 | 0 |
| | | | | | | 6 | 0 | 3 |
| Breaking Capacity at a Power Factor (p.f) of 0.3 | Standard (100 mA/24 V minimum load) | | | | | | | |
| | | Vac | 240 | 8 A | | 8 A | | |
| | | | 380 | 8 A | | 8 A | | |
| | | | 480 | 8 A | | 8 A | | |
| | | | 600/690 | 6 A | | 6 A | | |
| | | Vdc | 24/48 | 2.5 A | | 2.5 A | | |
| | | | 125 | 0.8 A | | 0.8 A | | |
| | | | 250 | 0.3 A | | 0.3 A | | |
| | Low-Level (2 mA/15 V minimum load) | | | | | | | |
| | | Vac | 24/48 | 5 A | | 5 A | | |
| | | | 240 | 5 A | | 5 A | | |
| | | | 380 | 5 A | | 5 A | | |
| | | Vdc | 24/48 | 2.5 A | | 2.5 A | | |
| | | | 125 | 0.8 A | | 0.8 A | | |
| | | | 250 | 0.3 A | | 0.3 A | | |

| Possible Ring-Terminal Combinations | | |
|---|---|---|
| CE | CD | CT |
| 1b | 1a | 1b |
| 1b | 1a, 1b | 1b |
| 1a, 2b | 1a, 2b | 1a |
| 1a, 2b | 2a, 1b | 1b |
| 2a, 1b | 1a, 2b | 1b |
| 1a | 1a | 1a |
| 3a | 3a | 1a |
| 3b | 3b | 1b |

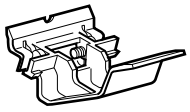
**Additional Actuators for Cradle Position Switches on MasterPacT NW Circuit Breakers**
A set of additional actuators may be installed on the cradle to change or add the functions of the cradle position switches. Each standard actuator can be replaced by any other actuator to change the function of the cradle position switch.

### Cradle Position Switch Actuators

Actuator for up to Three CE Switches (standard)



Actuator for up to Three CD Switches (standard)



Actuator for up to Three CT Switches (standard)

# MicroLogic Trip Unit Accessories

## External Neutral Current Transformer (CT)

External Neutral Current Transformer (CT)

The sensor is installed on the neutral conductor for neutral protection and metering and residual current ground-fault protection for equipment.

**NOTE:** The rating of the external neutral current transformer must be compatible with the rating of the circuit breaker.

## External Sensor for (SGR) and (MDGF)

**NOTE:** MDGF and SGR are for use on circuit breakers with 400 A and higher sensors.

For SGR System: The sensor is installed around the connection of the transformer neutral point to ground and connects to the MicroLogic 6.0A, 6.0P or 6.0H trip units. SGR requires a modified differential ground-fault (MDGF) sensor and MDGF interface module to connect to the trip unit.

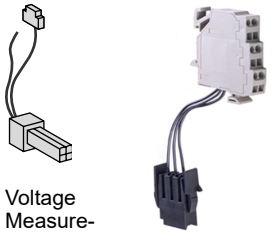
For MDGF System: An MDGF sensor is installed on each phase and neutral of each circuit breaker and connects to the MicroLogic trip unit through an MDGF module. See MDGF Instruction Bulletin 48049-182.

## Metering Current Transformers (CTs)

Toroidal Current Transformers (CTs) for W-Frame Circuit Breakers

Metering current transformers are optional and are mounted on the NW UL or ANSI cradle. They permit connection to the standard metering device. All metering transformers are accurate with the 0.3% accuracy class, 5 A output ratio at full load (for example, a 1600 A metering CT would send 5 A at the full load of 1600 A). A standard wiring harness is also included for factory-installed MCTs. Not available for neutral pole on a four-pole circuit breaker. Not available on cradles with ArcBlok technology.

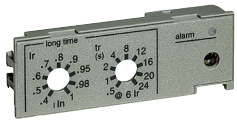
# Voltage Measurement Inputs



Voltage Measure-ment Inputs

Voltage measurement inputs are required for power measurements. As standard, the trip unit is supplied by internal voltage measurement inputs placed on the bottom terminals of the circuit breaker. On request, the internal voltage measurement inputs may be replaced by an external source.

# Adjustable Rating Plugs




Adjustable Rating Plug

Eight interchangeable rating plugs are available to limit the long-time threshold setting range for greater versatility.

| Rating Plug | | Switch Settings Ir = In x... | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| UL Listed/ ANSI Certified | Type A(31) | 0.4 | 0.45 | 0.5 | 0.6 | 0.63 | 0.7 | 0.8 | 0.9 | 1 |
| | Type B | 0.4 | 0.44 | 0.5 | 0.56 | 0.63 | 0.75 | 0.88 | 0.95 | 1 |
| | Type C | 0.42 | 0.5 | 0.53 | 0.58 | 0.67 | 0.75 | 0.83 | 0.95 | 1 |
| | Type D | 0.4 | 0.48 | 0.64 | 0.7 | 0.8 | 0.9 | 0.93 | 0.95 | 1 |
| | Type E | 0.6 | 0.7 | 0.75 | 0.8 | 0.85 | 0.9 | 0.93 | 0.95 | 1 |
| | Type F | 0.84 | 0.86 | 0.88 | 0.9 | 0.92 | 0.94 | 0.96 | 0.98 | 1 |
| | Type G | 0.66 | 0.68 | 0.7 | 0.72 | 0.74 | 0.76 | 0.78 | 0.8 | 0.82 |
| | Type H | 0.48 | 0.5 | 0.52 | 0.54 | 0.56 | 0.58 | 0.6 | 0.62 | 0.64 |
| IEC Rated | Type R1 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| | Type S | 0.4 | 0.45 | 0.5 | 0.55 | 0.6 | 0.65 | 0.7 | 0.75 | 0.8 |
| | Type T | 0.8 | 0.82 | 0.85 | 0.88 | 0.9 | 0.92 | 0.95 | 0.98 | 1 |
| | Type P (off plug) | No long-time protection. | | | | | | | | |

(31) Standard

# External Power Supply Module

External Power Supply Module

Power supply modules are available in six input voltages: 24/30 Vdc, 48/60 Vdc, 125 Vdc, 110/130 Vac, 200/240 Vac, and 380/415 Vac (all +10%, -15%). The output voltage for each is 24 Vdc; the output power is 5 VA/5 W (ripple < 5%). The modules are not UL Listed.

When used with the MicroLogic A, P, and H trip units, a power supply module makes it possible to:

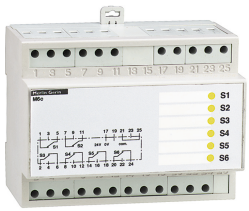
- Display currents less than 20% of sensor ($I_n$).
- Maintain display of tripping causes after opening of the circuit breaker (P and H trip units only).
- Store the value of the interrupted current (P and H trip units only).
- Power the M2C module (P and H trip units only).

# External Battery Backup Module

External Battery Backup Module

The external battery backup module provides up to 12 hours of backup power for the power supply module.

# M2C/M6C Programmable Contact Modules



M6C Programmable Contact Module

M2C Programmable Contact Module

These contacts are used with the MicroLogic P and H control units, and indicate the type of fault and instantaneous or delayed threshold overruns (i.e trip unit protection pick-up, current/voltage unbalance, under/over voltage, reverse power, phase rotation, under/over frequency, and load shedding). The M2C unit is powered from the control unit's 24 Vdc source (100 mA consumption); the M6C unit requires an external 24 Vdc power supply (100 mA consumption).

They are programmed via the control unit using a keypad or via a supervisory station with the COM communication option. They may be programmed:

- with instantaneous return to the initial state;
- without return to the initial state;
- with return to the initial state following a delay.

**Characteristics for M2C/M6C Programmable Contacts**

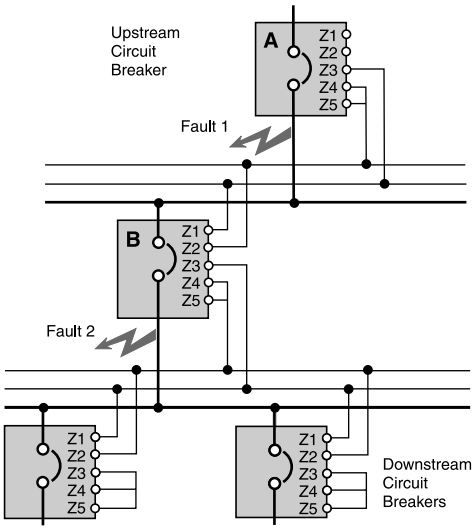
| | | |
|---|---|---|
| Minimum Load | | 100 mA/24 V |
| Breaking Capacity at a Power Factor (p.f.) of 0.7 | 240 Vac | 5 A |
| | 380 Vac | 3 A |
| | 24 Vdc | 1.8 A |
| | 48 Vdc | 1.5 A |
| | 125 Vdc | 0.4 A |
| | 250 Vdc | 0.15 A |

# Zone-Selective Interlocking (ZSI)

Zone-selective interlocking (ZSI) is used to reduce the stress on electrical distribution equipment during fault conditions by reducing the time it takes to clear the fault, while maintaining system coordination between overcurrent protective devices.

During a short-circuit or ground-fault condition on a ZSI system, the device directly ahead of the fault sends a signal upstream via control wiring to restrain upstream circuit breakers from tripping and then trips with no intentional time delay to clear the fault. Upstream devices which receive a restraint signal obey their short-time and/or ground-fault delay settings to maintain coordination in other areas of the system. Upstream devices that do not receive a restraint signal trip with no intentional time delay.

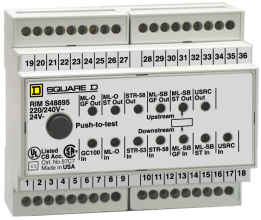
For ZSI to work, trip settings must be coordinated so a downstream circuit breaker will trip before an upstream circuit breaker under overload, short-circuit or ground-fault conditions. (Effective coordination requires a system coordination study.)




Fault 1—The upstream circuit breaker (A) will clear the fault with no intentional delay, regardless of its time-delay setting.

Fault 2—Circuit breaker (B) will inform upstream circuit breaker (A) that it is clearing the fault. This will prevent circuit breaker (A) from tripping instantaneously. Circuit breaker (A) will trip at the end of its time delay setting if the fault is not cleared during this time.

# Restraint Interface Module (RIM)



Restraint Interface Module (RIM)

The restraint interface module (RIM) is used to allow zone-selective interlocking communications between circuit breakers with old Square D MicroLogic, Merlin Gerin™, or Federal Pioneer™ trip units and GC series ground-fault relays.

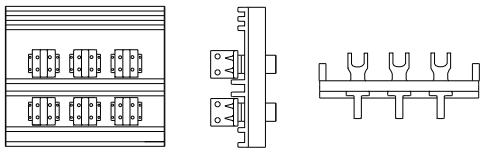
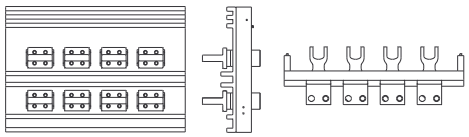
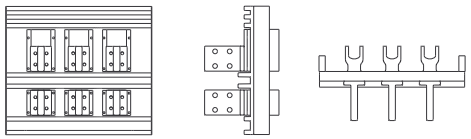
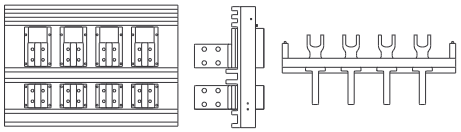
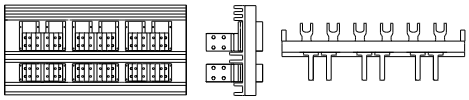
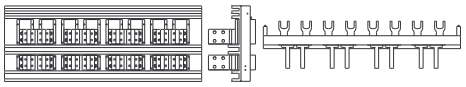
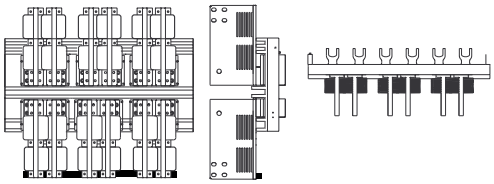
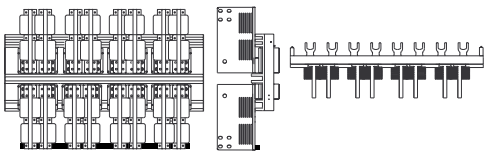
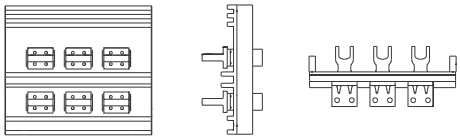
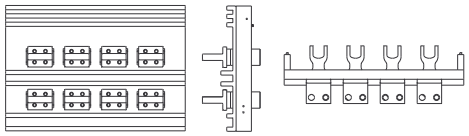
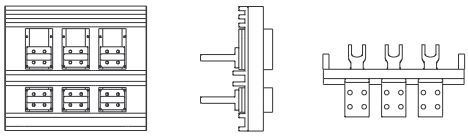
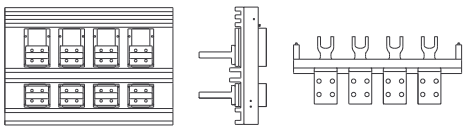
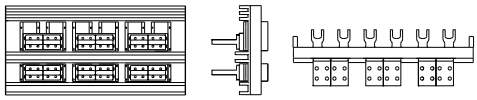
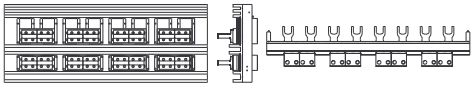
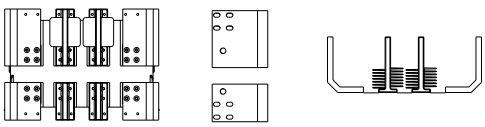
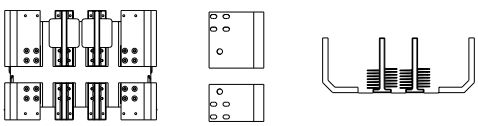
Downstream circuit breakers with MicroLogic 2.0A, 5.0A, 5.0P, 5.0H, 6.0A, 6.0P, and 6.0H trip units can restrain up to 15 upstream circuit breakers with MicroLogic 5.0A, 5.0P, 5.0H, 6.0A, 6.0P and 6.0H trip units without requiring a restraint interface module. If the number of upstream circuit breakers exceeds 15, then a RIM is required.

| Downstream Device (sends output to RIM) | Upstream Device (receives output to RIM)[32] | | | | | |
|---|---|---|---|---|---|---|
| | MicroLogic Trip Unit[33] | MicroLogic Series B Trip Unit | Square D GC-100 Relay | Square D GC-200 Relay | Merlin Gerin STR58 Trip Units | Federal Pioneer USRC and USRCM Trip Units |
| MicroLogic Trip Unit[33] | 15 | R | R | 15 | 15 | R |
| Square D MicroLogic Series B Trip Units | R | 26 | R | R | R | 15 |
| Square D GC-100 Relay | R | R | 7 | R | R | R |
| Square D GC-200 Relay | 15 | R | R | 15 | 15 | R |
| Merlin Gerin STR58 Trip Units | 15 | R | R | 15 | 15 | R |
| Merlin Gerin STR53 Trip Units | 15 | R | R | 15 | 15 | R |
| Federal Pioneer USRC and USRCM Trip Units | R | 15 | R | R | R | 15 |
| Square D Add-On Ground Fault Module for Equipment Protection | R | 5 | R | R | R | R |
| R Denotes that a Restraint Interface Module (RIM) is required. | | | | | | |

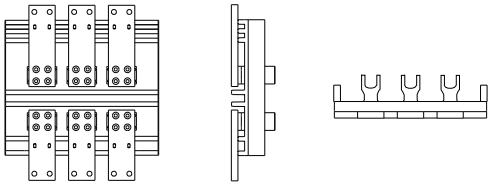
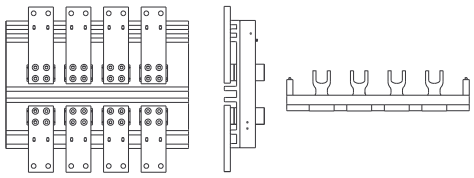
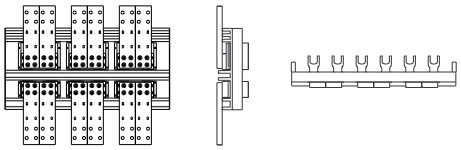
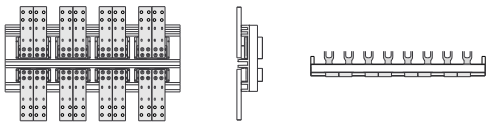
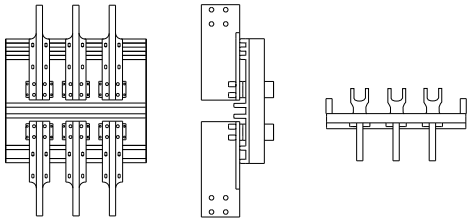
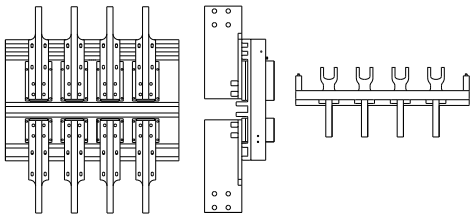
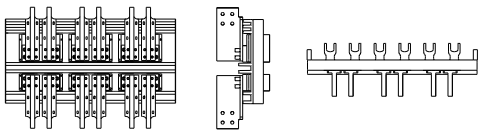
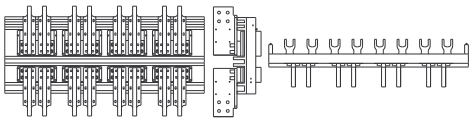
(32) Number denotes maximum number of upstream circuit breakers that can be restrained without requiring a RIM.
(33) Includes 2.0A (as a downstream trip unit only), 5.0A, 5.0P, 5.0P, 5.0H, 6.0A, 6.0P, and 6.0H trip units.

# Cradle Connections

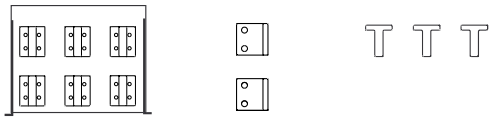
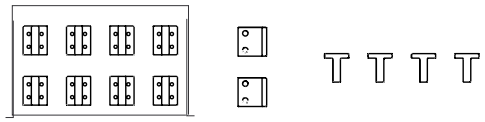
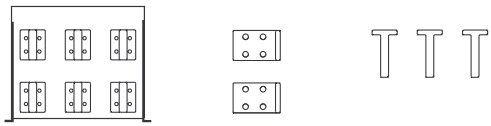
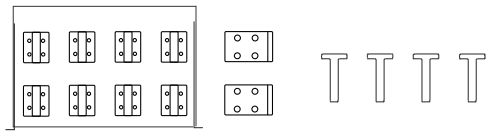
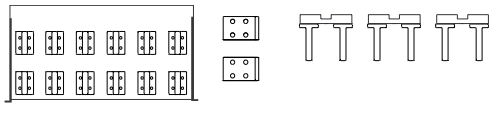
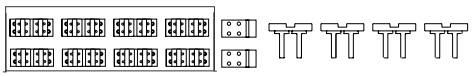
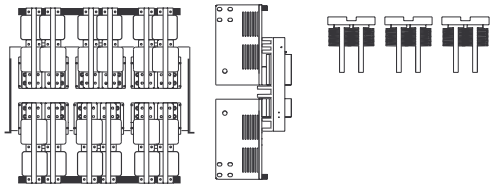
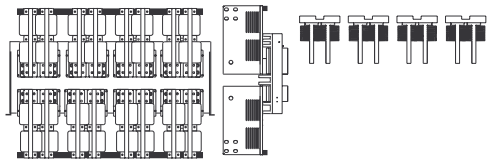
### MasterPacT NW UL Listed/ANSI Certified 3P/4P Drawout Circuit Breakers (Rear Connections)

| Connector Type | Ampere Rating | 3P Layout (Back/Side/Top) | 4P Layout (Back/Side/Top) |
|---|---|---|---|
| Rear-Connected “T” Vertical (RCTV) | 800 to 2000 A |  |  |
| | 2500 to 3000 A |  |  |
| | 3200 A (L1)<br>4000 to 5000 A |  |  |
| | 6000 A |  |  |
| Rear-Connected “T” Horizontal (RCTH) | 800 to 2000 A |  |  |
| | 2500 to 3000 A |  |  |
| | 3200 A (L1)<br>4000 to 5000 A |  |  |
| Rear-Connected Offset Vertical (RCOV) | 3200 A<br>2000 A (L1/L1F) |  |  |

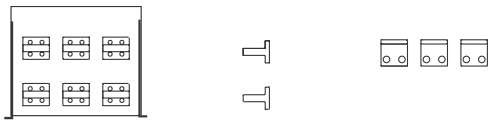
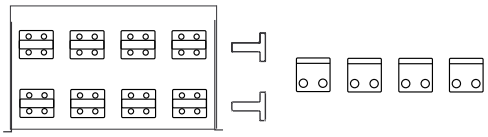
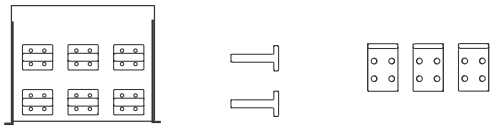
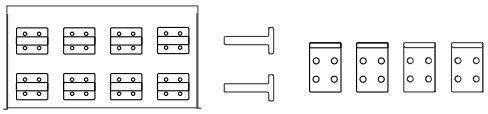
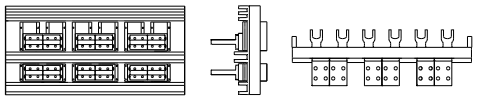
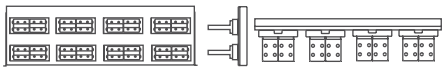
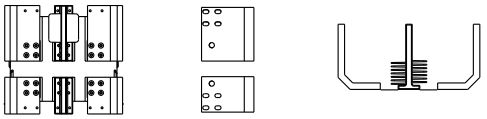
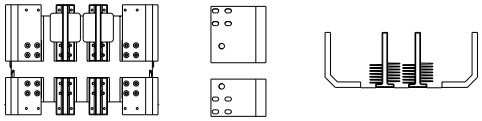
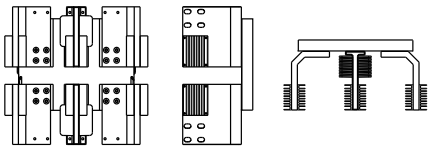
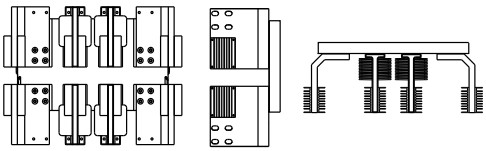
## MasterPacT NW UL Listed/ANSI Certified 3P/4P Drawout Circuit Breakers (Front Connections)

| Connector Type | Ampere Rating | 3P Layout (Back/Side/Top) | 4P Layout (Back/Side/Top) |
|---|---|---|---|
| Front-Connected Flat (FCF) | 800 to 2000 A |  |  |
| | 3200 A (L1)<br>4000 A |  |  |
| Front-Connected “T” (FCT) | 800 to 3000 A |  |  |
| | 3200 A (L1)<br>4000 to 5000 A |  |  |

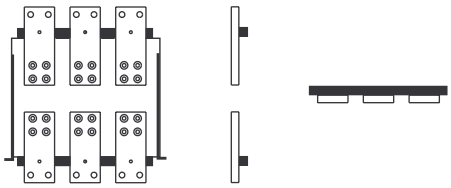
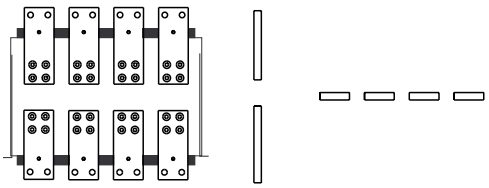
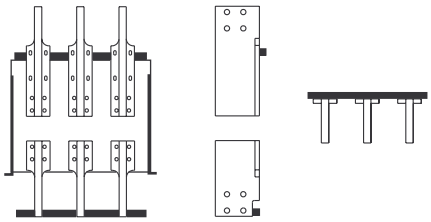
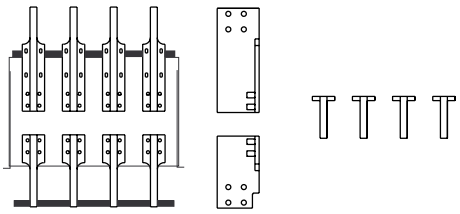
## MasterPacT NW UL Listed/ANSI Certified 3P/4P Fixed Circuit Breakers (Rear Connections)(Continued)

| Connector Type | Ampere Rating | 3P Layout (Back/Side/Top) | 4P Layout (Back/Side/Top) |
|---|---|---|---|
| Rear-Connected “T” Vertical (RCTV) | 800 to 2000 A |  |  |
| | 2500 to 3000 A |  |  |
| | 4000 to 5000 A |  |  |
| | 6000 A |  |  |

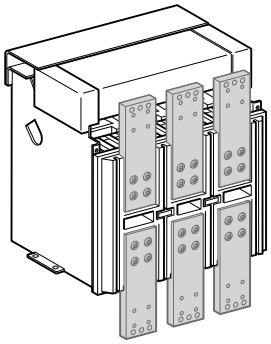
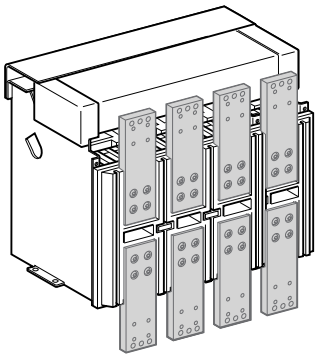
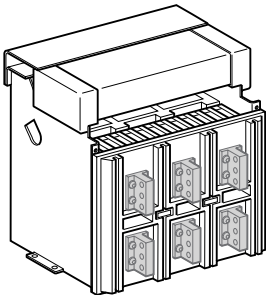
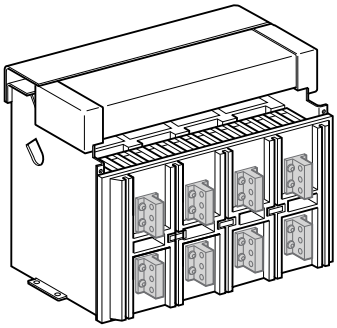
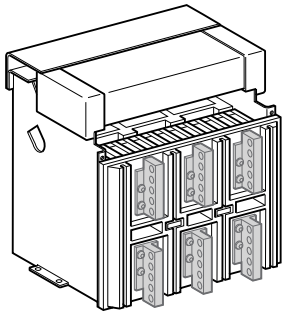
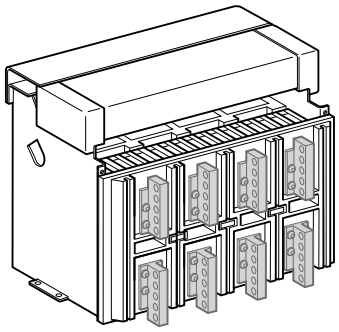
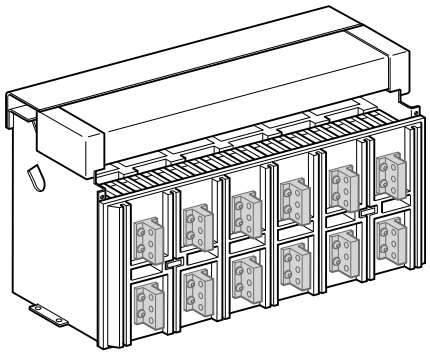
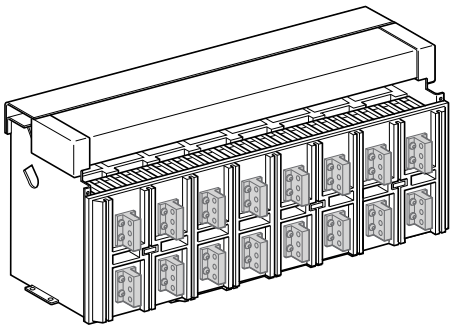
## MasterPacT NW UL Listed/ANSI Certified 3P/4P Fixed Circuit Breakers (Rear Connections)(Continued) (Continued)

| | | | |
|---|---|---|---|
| Rear-Connected “T” Horizontal (RCTH) | 800 to 2000 A |  |  |
| | 2500 to 3000 A |  |  |
| | 4000 to 5000 A |  |  |
| Rear-Connected Offset Vertical (RCOV) | 3200 A |  |  |
| Rear-Connected Offset Vertical (Special) (W-Frame) | 4000 A (B) |  |  |

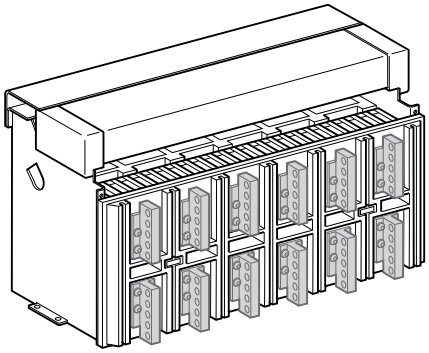
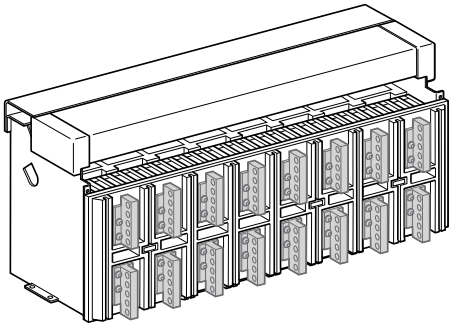
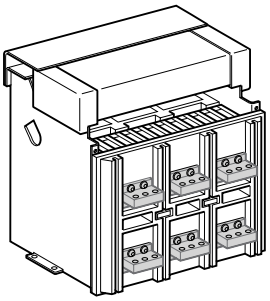
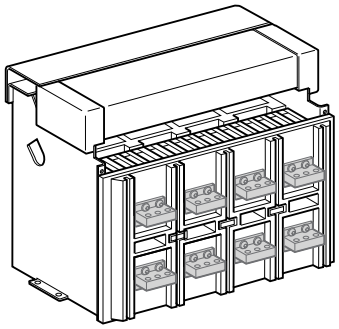
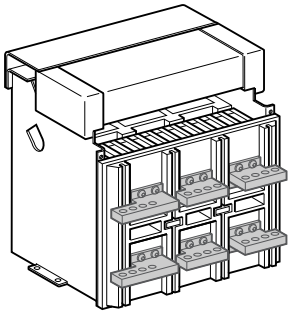
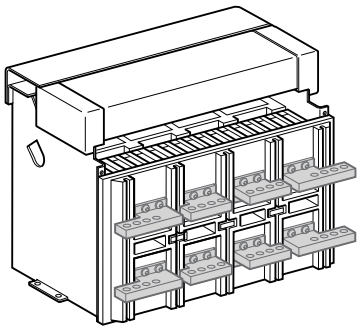
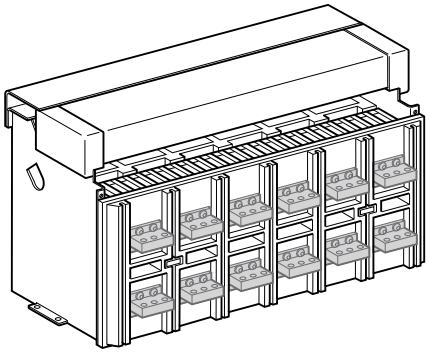
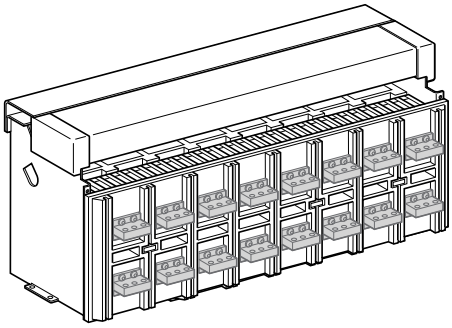
## MasterPacT NW UL Listed/ANSI Certified 3P/4P Fixed Circuit Breakers (Front Connections)

| Connector Type | Ampere Rating | 3P Layout (Front/Side/Top) | 4P Layout (Front/Side/Top) |
|---|---|---|---|
| Front-Connected Flat (FCF) | 800 to 2000 A |  |  |
| Front-Connected “T” (FCT) | 800 to 3000 A |  |  |

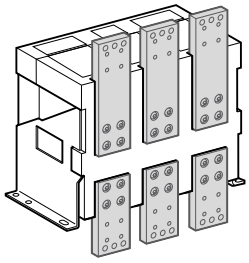
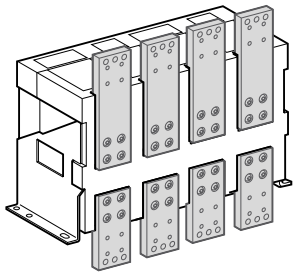
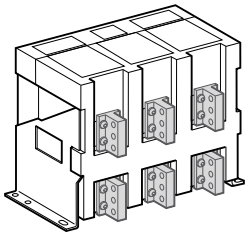
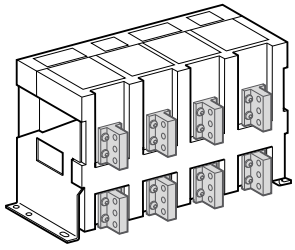
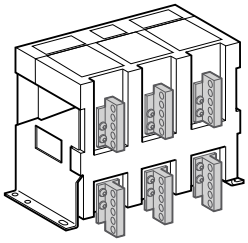
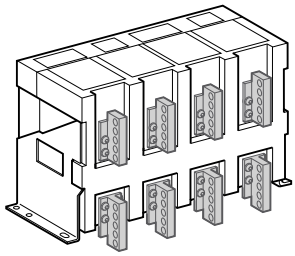
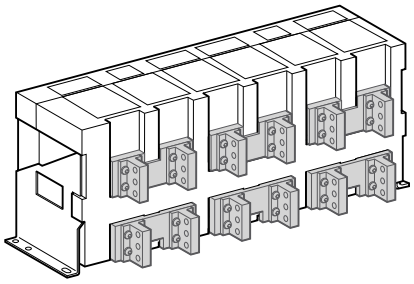
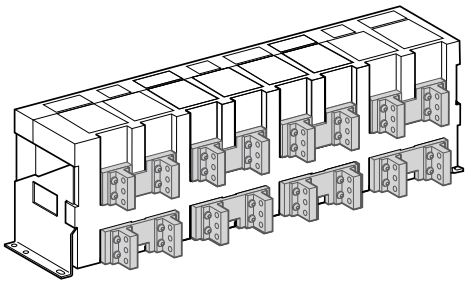
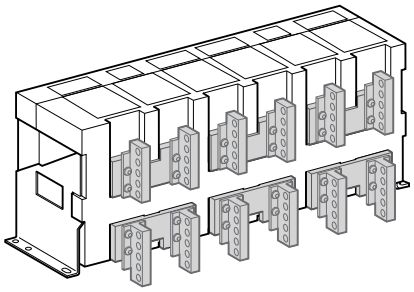
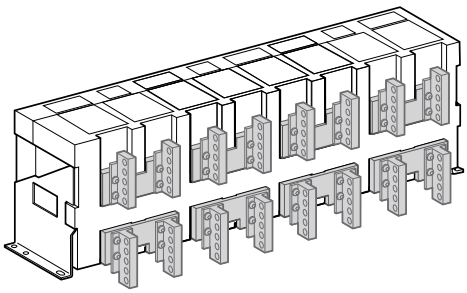
## MasterPacT NW IEC Rated 3P/4P Drawout Circuit Breakers

| Connector Type | Ampere Rating | 3P Layout | 4P Layout |
|---|---|---|---|
| Front-Connected Flat (FCF) | 800 to 3200 A |  |  |
| Rear-Connected “T” Vertical (RCTV) | 800 to 3200 A |  |  |
| | 4000 A |  |  |
| | 5000 A |  |  |

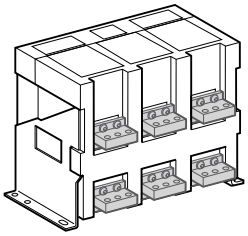
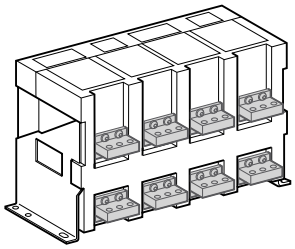
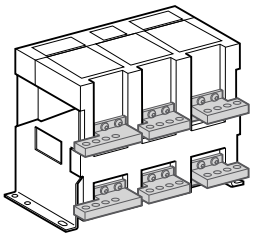
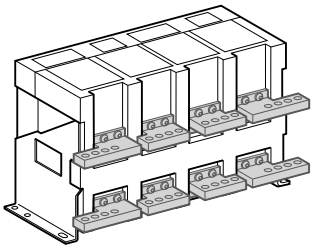
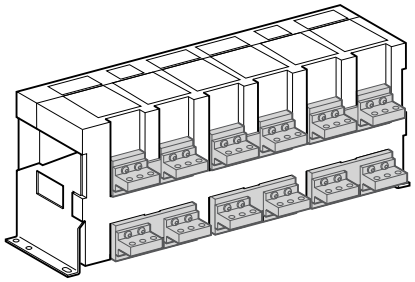
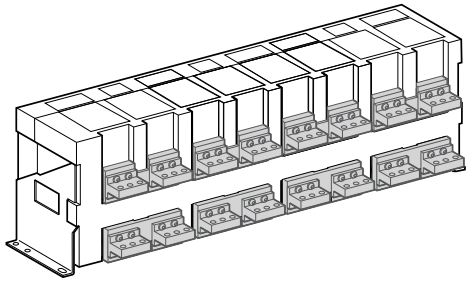
## MasterPacT NW IEC Rated 3P/4P Drawout Circuit Breakers (Continued)

| Connector Type | Ampere Rating | 3P Layout | 4P Layout |
|---|---|---|---|
| | 6300 A |  |  |
| Rear-Connected “T” Horizontal (RCTH) | 800 to 3200 A |  |  |
| | 4000 A |  |  |
| | 4000b, 5000 A |  |  |

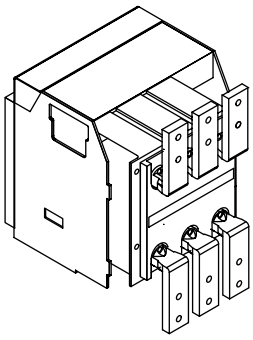
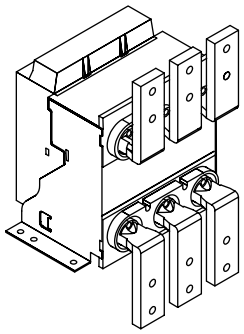
## MasterPacT NW IEC Rated 3P/4P Fixed Circuit Breakers

| Connector Type | Ampere Rating | 3P Layout | 4P Layout |
|---|---|---|---|
| Front-Connected Flat (FCF) | 800 to 3200 A |  |  |
| Rear-Connected “T” Vertical (RCTV) | 800 to 3200 A |  |  |
| | 4000 A |  |  |
| | 4000b, 5000 A |  |  |
| | 6300 A |  |  |

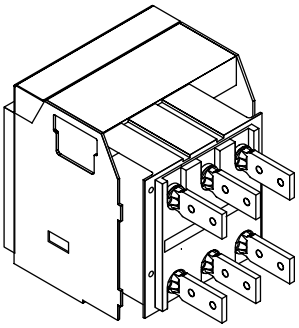
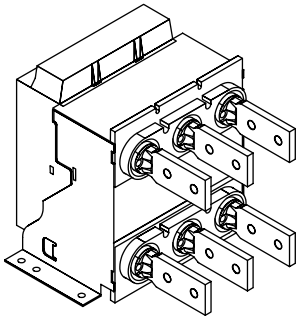
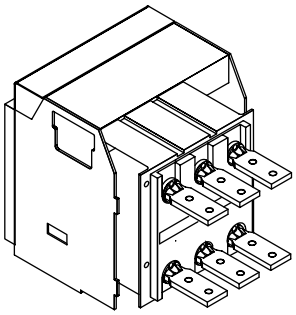
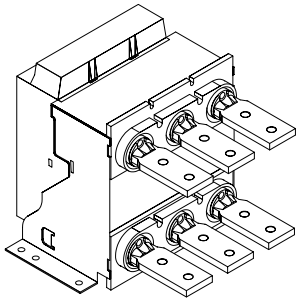
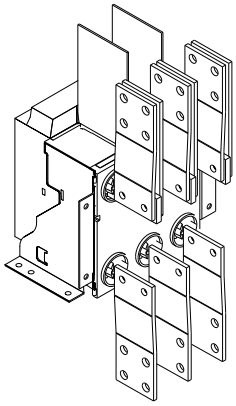
## MasterPacT NW IEC Rated 3P/4P Fixed Circuit Breakers (Continued)

| Connector Type | Ampere Rating | 3P Layout | 4P Layout |
|---|---|---|---|
| Rear-Connected “T” Horizontal (RCTH) | 800 to 3200 A |  |  |
| | 4000 |  |  |
| | 4000b, 5000 A |  |  |

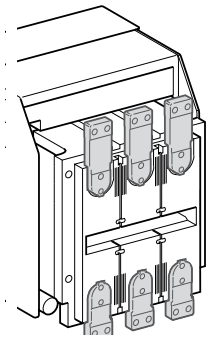
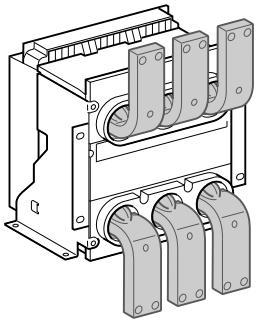
## MasterPacT NT UL Listed/ANSI Certified 3P/4P Fixed and Drawout Circuit Breakers

| Connector Type | Drawout Circuit Breakers | Fixed Circuit Breakers |
|---|---|---|
| Front-Connected Flat (FCF) 800 to 1200 A |  |  |

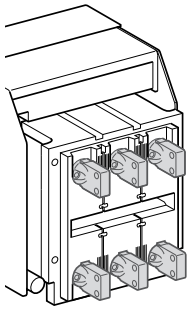
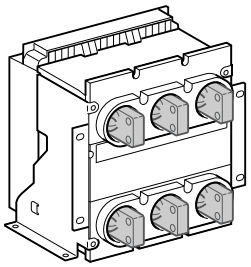
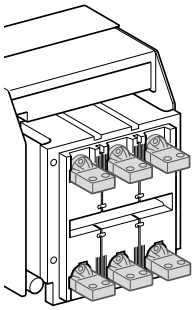
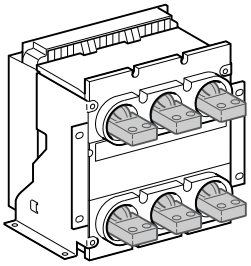
## MasterPacT NT UL Listed/ANSI Certified 3P/4P Fixed and Drawout Circuit Breakers (Continued)

| | | |
|---|---|---|
| Rear-Connected “T” Vertical (RCTV)<br>800 to 1200 A |  |  |
| Rear-Connected “T” Horizontal (RCTH)<br>800 to 1200 A |  |  |
| Rear-Connected Vertical<br>1600 A | N/A |  |

## MasterPacT NT IEC Rated 3P/4P Fixed and Drawout Circuit Breakers

| Connector Type | Drawout Circuit Breakers | Fixed Circuit Breakers |
|---|---|---|
| Front-Connected Flat (FCF)<br>800 to 1600 A |  |  |

**MasterPacT NT IEC Rated 3P/4P Fixed and Drawout Circuit Breakers (Continued)**

| | | |
|---|---|---|
| Rear-Connected “T” Vertical (RCTV) 800 to 1600 A |  |  |
| Rear-Connected “T” Horizontal (RCTH) 800 to 1600 A |  |  |

# Test Equipment

## Hand-Held Test Kit

Hand-Held Test Kit

The hand held test kit may be used to:

- Verify trip unit operation, the mechanical operation of the circuit breaker, and the electrical continuity of the connection between the trip solenoid and the trip unit.
- Supply control power to the trip unit for settings via the keypad when the circuit breaker is open (MicroLogic type A, P or H trip units).
- Inhibit thermal imaging for primary injection test (MicroLogic type A, P or H trip units).
- Inhibit ground fault for primary injection test (MicroLogic type A, P or H trip units).
- Self-restrain zone-selective interlocking (ZSI).

## Full-Function Test Kit

Full-Function Test Kit

The full-function test kit can be used to verify LSIG functionality.

- Optional
- Can be used to check trip unit operation, for example:
  - Display of settings.
  - Operating tests on the electronic component.
  - Automatic and manual tests on protection functions (trip curve verification).
  - Tests on the zone-selective interlocking
  - (ZSI) functions.
  - Inhibit thermal imaging for primary injection testing.
  - Self-restrain zone-selective interlocking (ZSI).
- Can also be used to:
  - Check mechanical operation of the circuit breaker.
  - Check the electrical continuity of connection between the trip solenoid and the trip unit.
  - Print the trip unit and circuit breaker test report when used in conjunction with a PC
  - FFTK report generator software (cat. no. FFTKRPT-V1-0) is required.

**NOTE:** The Full-Function Test Kit is obsolete October 2020, and is being replaced by the Service Interface. The Service Interface covers all test functions of the MasterPacT NT/NW and PowerPacT P/R circuit breakers through EPC-based software.

# Service Interface

Service Interface

The Service Interface is a portable test instrument designed for field testing. It is used for configuring various Schneider Electric circuit breakers and communication accessories. The Service Interface replaces the Full-Function Test Kit (FFTK) and the Universal Test Adapter (UTA).

The Service Interface is powered by a 24 V SELV power adapter and the test port is compatible with all supported devices with various cable accessories. In additions, the communications LEDs on the Service Interface indicate the status of the circuit breakers and communication accessories connected to it.

EcoStruxure™ Power Commission (EPC) software is the user interface for testing the circuit breakers and communication accessories through the Service Interface.

Use the Service Interface to perform the following tests on the communicating trip units through the EcoStruxure Power Commission Software:

- Automatic Trip Curve Tests
- Device Check (Force Trip Test)
- Zone-Selective Interlocking Test (ZSI)
- Preparation for Primary Injection Tests.

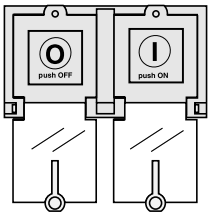
Please contact the SE Service Team for Breaker Test Services and for the Service Interface. The EcoStruxure Power Commission Software is available for download from SE.com.

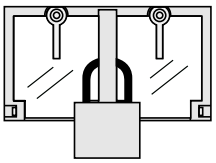
# Circuit Breaker Locking and Interlocking

## Lockable Push Button Cover

A transparent cover blocks access to the push buttons used to open and close the device. It is possible to independently lock the opening button and/or the closing button. The push buttons may be locked using:

- One to three padlocks: 3/16 to 5/16 in. (4.8 to 7.9 mm) diameter, not supplied
- Wire seal
- Two screws



**Push Button Lock**

## Open Position Padlock and Key Lock Provisions

Open Position Key Lock (NW)

Open Position Padlock Provision (NW)

The circuit breaker is locked in the off position by physically keeping the opening push button pressed down using one of the following:

- One to three padlocks: 3/16 to 5/16 in. (4.8 to 7.9 mm) diameter, not supplied.
- Key locks: One or two Kirk® key locks (keyed alike or differently) are available for UL Listed/ANSI Certified circuit breakers; for IEC Rated circuit breakers, Ronis, Castell, or Profalux key locks are available. (MastePacT NT circuit breakers may have only one key lock on the circuit breaker.)

Keys may be removed only when locking is effective. The key locks are available in any of the following configurations:

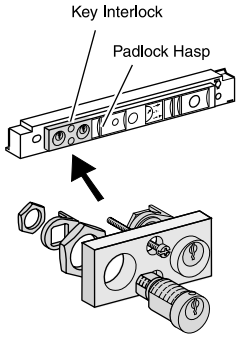
- One key lock
- One key lock mounted on the device plus one identical key lock supplied separately for interlocking with another device
- Two different key locks mounted on the circuit breaker for double locking

A locking kit for installation of one or two key locks may be ordered separately.

| **Type of Locking** | | **Maximum Number of Locks** |
|---|---|---|
| Pushbutton Locking | Using padlocks | Three padlocks |
| Open Position Locking | Using key locks | Two key locks (optional) |
| | Using padlocks and key locks | Up to three padlocks and two key locks (optional) |

# Cradle Locking and Interlocking

## Disconnected Position Locking

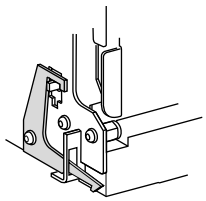



Disconnected Position Locking Provisions

The circuit breaker can be locked in the disconnected position by key interlock (optional) or padlock (standard). The key interlock is on the cradle and accessible with the door locked.

- Kirk key interlocks are available for UL/ANSI circuit breakers; for IEC circuit breakers, Ronis, Castell, or Profalux key locks are available. Key is captive when key interlock is unlocked.
- Locking on disconnected, test, and connected positions is optional for IEC circuit breakers and standard for UL/ANSI circuit breakers.

## Door Interlock (VPEC)



Door Interlock (NW)

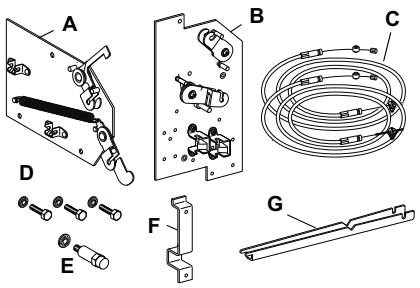
The door interlock prevents the compartment door from being opened when the circuit breaker is in the connected or test position. If the circuit breaker is put into the connected position with the door open, the door can be closed without disconnecting the circuit breaker. For greater protection, this interlock can be used in conjunction with the open door racking interlock.

## Racking Interlock Between Racking Handle and Off Position

The racking interlock is standard for UL and ANSI circuit breakers, and optional for IEC circuit breakers. It prevents insertion of the racking handle unless the OFF push button is pressed. Not available for IEC Rated MasterPacT NT circuit breakers.

## Cable Door Interlock Kit

The optional cable door interlock prevents the compartment door from being opened when the circuit breaker is in the closed position. This kit includes:




Kit Contents

(A) Panel Interlocking Plate

(B) Circuit Breaker Interlocking Plate

(C) Interlocking Cables

(D) Bolts with Washers

(E) Guide-Bolt with Washer

(F) Interlocking Bracket

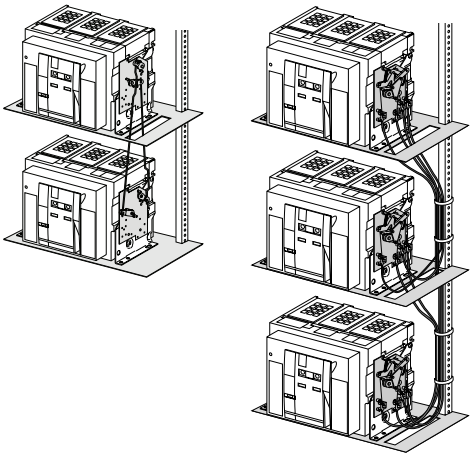
(G) Calibration Tray

## Source Changeover Interlocks

Source changeover interlocks allow mechanical interlocking between two or three circuit breakers (fixed and drawout).

**NOTE:** Source changeover interlocks for MasterPact NT circuit breakers are IEC only.

**Source Changeover Interlocks**



Two NW Circuit Breakers Interlocked Using Rods

Three NW Circuit Breakers Interlocked Using Cables

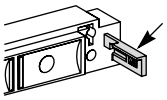
Interlocking Two Circuit Breakers

- Interlocking Two Mains Using Rods
- Interlocking Two Mains Using Cables

Interlocking Three Circuit Breakers Using Cables

- Interlocking Two Mains and One Generator
- Interlocking Two Mains and One Tie
- Interlocking Three Mains

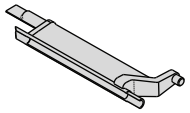
## Open Door Racking Interlock (VPOC)



(VPOC)

The racking interlock prevents racking in the circuit breaker when the door is open. (Insertion of the circuit breaker racking handle is not possible when the compartment door is open.)

# Automatic Spring Discharge Mechanism

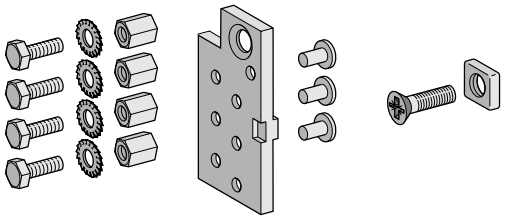


Automatic Spring Discharge Mechanism (NW)

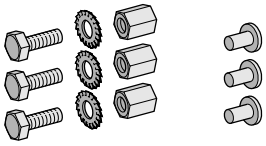
The automatic spring discharge mechanism is standard for UL and ANSI circuit breakers, and optional for IEC circuit breakers. It releases the closing spring energy when the circuit breaker is moved from the disconnected position to the fully withdrawn position. Not available for IEC Rated MasterPacT NT circuit breakers.

# Cradle Rejection Kits

The cradle rejection feature (standard) ensures that only the properly designated circuit breaker or switch is matched with the selected cradle assembly.



Cradle Rejection Kit Contents (NW)



Cradle Rejection Kit Contents (NT)

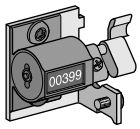
# Rail Padlocking

Rail padlocking is standard for UL, ANSI, and IEC cradles. When used in combination with the disconnected position locking device, rail padlocking prevents the movement of the circuit breaker from the disconnected position to the fully withdrawn position when the padlock hasp is pulled out and locked.

# Miscellaneous Accessories

## Mechanical Operation Counter (CDM)

The mechanical operation counter (CDM) registers the total number of operating cycles. One CDM is installed per circuit breaker.



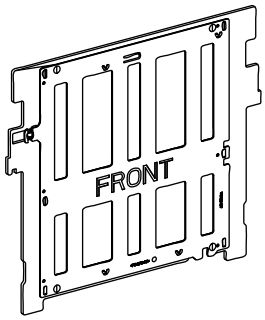

Mechanical Operation Counter (CDM)

## Shutter and Shutter Lock

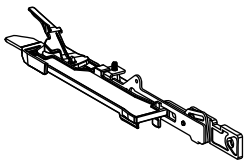
The shutters automatically block access to the main disconnects when the circuit breaker is in the disconnected, test, or fully withdrawn position.

The shutter lock is used to prevent connection of the circuit breaker or to lock the shutters in the closed position.

Not available on cradles with ArcBlok technology.



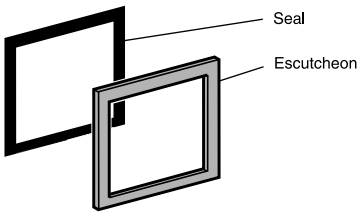

UL® Circuit Breaker Shutter



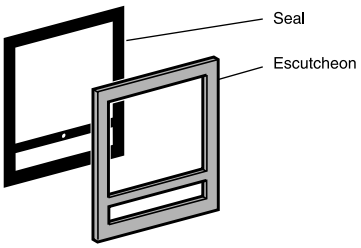
Shutter Lock

## Door Escutcheon (CDP)

These door escutcheons provide a frame and seal for the circuit breaker.



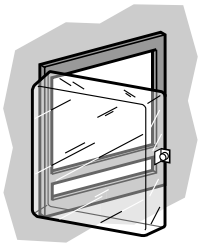

Door Escutcheon (NW Fixed)




Door Escutcheon (NW Drawout)

# Transparent Cover (CCP) for Door Escutcheon

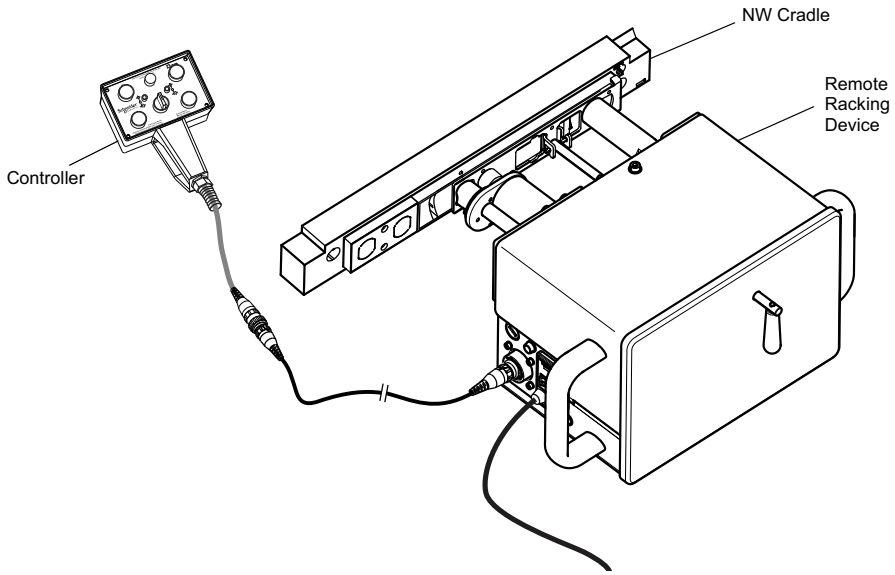
The cover is hinged-mounted and locked with a milled head, and is designed to be installed on the door escutcheon.



Transparent Cover (CCP)

# Drawout MasterPacT NW Remote Racking Device

The remote racking device allows the operator to perform circuit breaker racking operations from a distance of up to 30 feet (9.1 m) away from the circuit breaker using the controller. This distance exceeds the arc flash boundary described in the arc flash safety guidelines outlined in NFPA-70E.

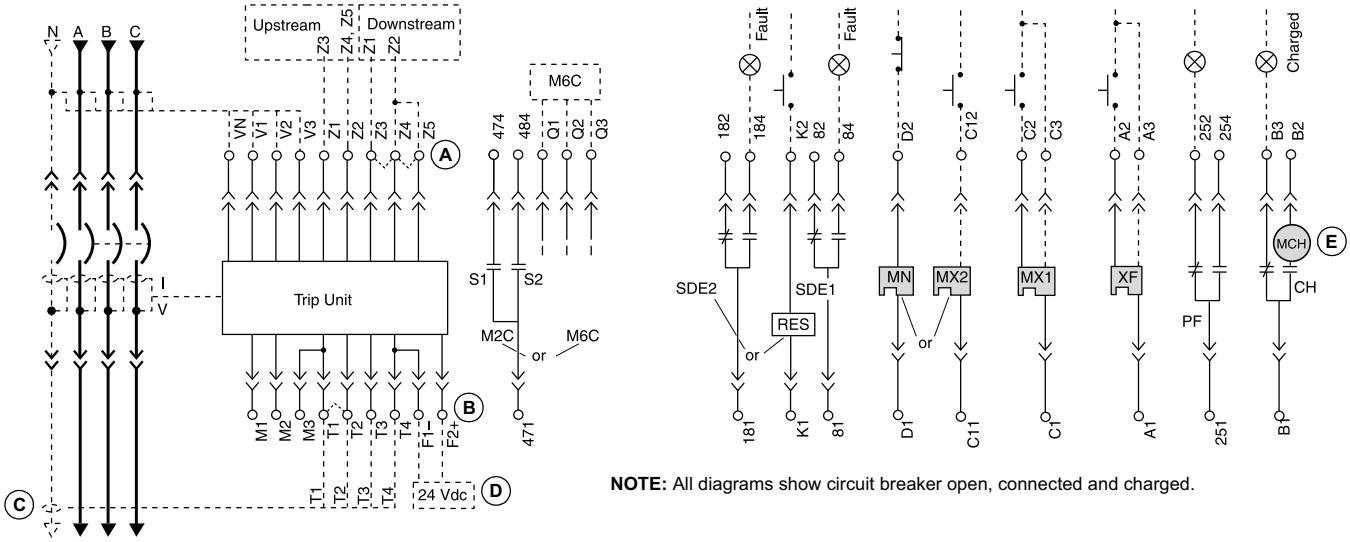


# Wiring Diagrams

## Wiring Diagrams for MasterPacT NW Circuit Breakers

### Wiring Diagrams for MasterPacT NW Circuit Breakers

Power Trip Unit Remote Operation




**NOTE:** All diagrams show circuit breaker open, connected and charged.

A—Do not remove factory-installed jumpers between Z3, Z4 and Z5 unless ZSI is connected.
B—Do not remove factory-installed jumper between T1 and T2 unless neutral CT is connected. Do not install jumper between T3 and T4.
C—For proper wiring of neutral CT, refer to Instruction Bulletin 48041-082-01 shipped with it.
D—24 Vdc power supply for trip unit must be separate and isolated from 24 Vdc power supply for communication modules.
E—When remote operation features are used, make sure there is a minimum of four seconds for the spring charging motor (MCH) to completely charge the circuit breaker closing springs prior to actuating the shunt close (XF) device.

### Markings for Push-In Type Terminals

| Cell Switches | | |
|---|---|---|
| CD3 | CD2 | CD1 |
| 834 | 824 | 814 |
| 832 | 822 | 812 |
| 831 | 821 | 811 |

or

| CE6 | CE5 | CE4 |
|---|---|---|
| 364 | 354 | 344 |
| 362 | 352 | 342 |
| 361 | 351 | 341 |

| Trip Unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| COM | UC1 | UC2 | UC3 | UC4 | M2C/M6C | SDE2/RES | SDE1 | |
| E5 E6 | Z5 M1 | M2 M3 | F2+ | V3 | 484/Q3 | 184/K2 | 84 | |
| E3 E4 | Z3 Z4 | T3 T4 | VN | V2 | 474/Q2 | 182 | 82 | |
| E1 E2 | Z1 Z2 | T1 T2 | F1− | V1 | 471/Q1 | 181/K1 | 81 | |

| Cell Switches | | | | | | Remote Operation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CE3 | CE2 | CE1 | MN/MX2 | MX1 | XF | PF | MCH | | | | |
| 334 | 324 | 314 | D2/C12 | C2 | A2 | 254 | B2 | | | | |
| 332 | 322 | 312 | C13 | C3 | A3 | 252 | B3 | | | | |
| 331 | 321 | 311 | D1/C11 | C1 | A1 | 251 | B1 | | | | |

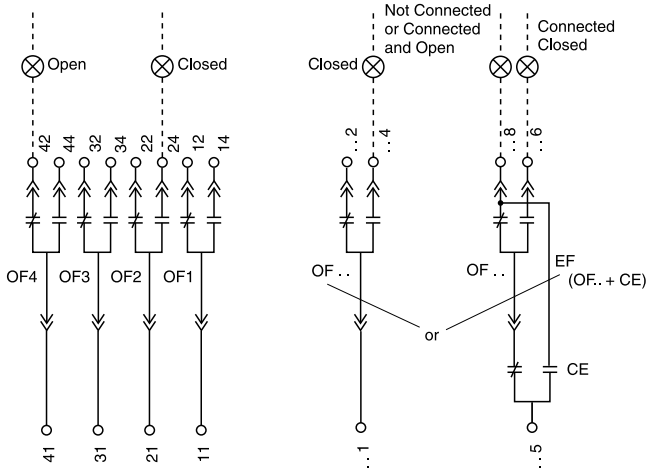
### Markings for Ring Terminals

| Cell Switches | | |
|---|---|---|
| CD3 | CD2 | CD1 |
| 834/832 | 824/822 | 814/812 |
| 831 | 821 | 811 |

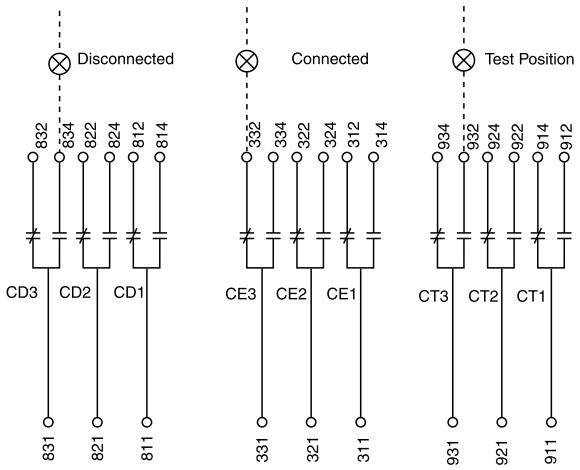
| Trip Unit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COM | UC1 | UC2 | UC3 | UC3a | M2C/M6C | SDE2/RES | SDE2a | SDE1 | SDE1a |
| E5 E6 | Z5 M1 | M2 M3 | F2+ | VN | 484/Q3 | 184/K2 | 182 | 84 | 82 |
| E3 E4 | Z3 Z4 | T3 T4 | F1− | | 471/Q1 | 181/K1 | | 81 | |
| E1 E2 | Z1 Z2 | T1 T2 | | | | | | | |

| Remote Operation | | | | |
|---|---|---|---|---|
| MN/MX2 | MX1 | MX1a | XF | XFa |
| D2/C12 | C2 | C3 | A2 | A3 |
| D1/C11 | C1 | | A1 | |

Auxiliary Contacts




Cell Switches




## Markings for Push-In Type Terminals

| Auxiliary Contacts | | | | | | | | | | | | Cell Switches | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OF24 | OF23 | OF22 | OF21 | OF14 | OF13 | OF12 | OF11 | OF4 | OF3 | OF2 | OF1 | CT3 | CT2 | CT1 |
| 244 | 234 | 224 | 214 | 144 | 134 | 124 | 114 | 44 | 34 | 24 | 14 | 934 | 924 | 914 |
| 242 | 232 | 222 | 212 | 142 | 132 | 122 | 112 | 42 | 32 | 22 | 12 | 932 | 922 | 912 |
| 241 | 231 | 221 | 211 | 141 | 131 | 121 | 111 | 41 | 31 | 21 | 11 | 931 | 921 | 911 |

or

| EF24 | EF23 | EF22 | EF21 | EF14 | EF13 | EF12 | EF11 |
|---|---|---|---|---|---|---|---|
| 248 | 238 | 228 | 218 | 148 | 138 | 128 | 118 |
| 246 | 236 | 226 | 216 | 146 | 136 | 126 | 116 |
| 245 | 235 | 225 | 215 | 145 | 135 | 125 | 115 |

or

| CD6 | CD5 | CD4 |
|---|---|---|
| 864 | 854 | 844 |
| 862 | 852 | 842 |
| 861 | 851 | 841 |

or

| CE9 | CE8 | C7 |
|---|---|---|
| 394 | 384 | 374 |
| 392 | 382 | 372 |
| 391 | 381 | 371 |

**NOTE:** Fixed-mounted circuit breaker does not have cell switches (CE, CD, CT).

## Markings for Ring Terminals

| Alarm Switches | | | |
|---|---|---|---|
| PF | CT1 | MCH | MCHa |
| 252 | 914/912 | B2 | B3 |
| 251 | 911 | B1 | |

| Auxiliary Contacts | | | | | | | |
|---|---|---|---|---|---|---|---|
| OF14 | OF13 | OF12 | OF11 | OF4 | OF3 | OF2 | OF1 |
| 144 | 134 | 122 | 112 | 44 | 34 | 22 | 12 |
| 141 | 131 | 121 | 111 | 41 | 31 | 21 | 11 |

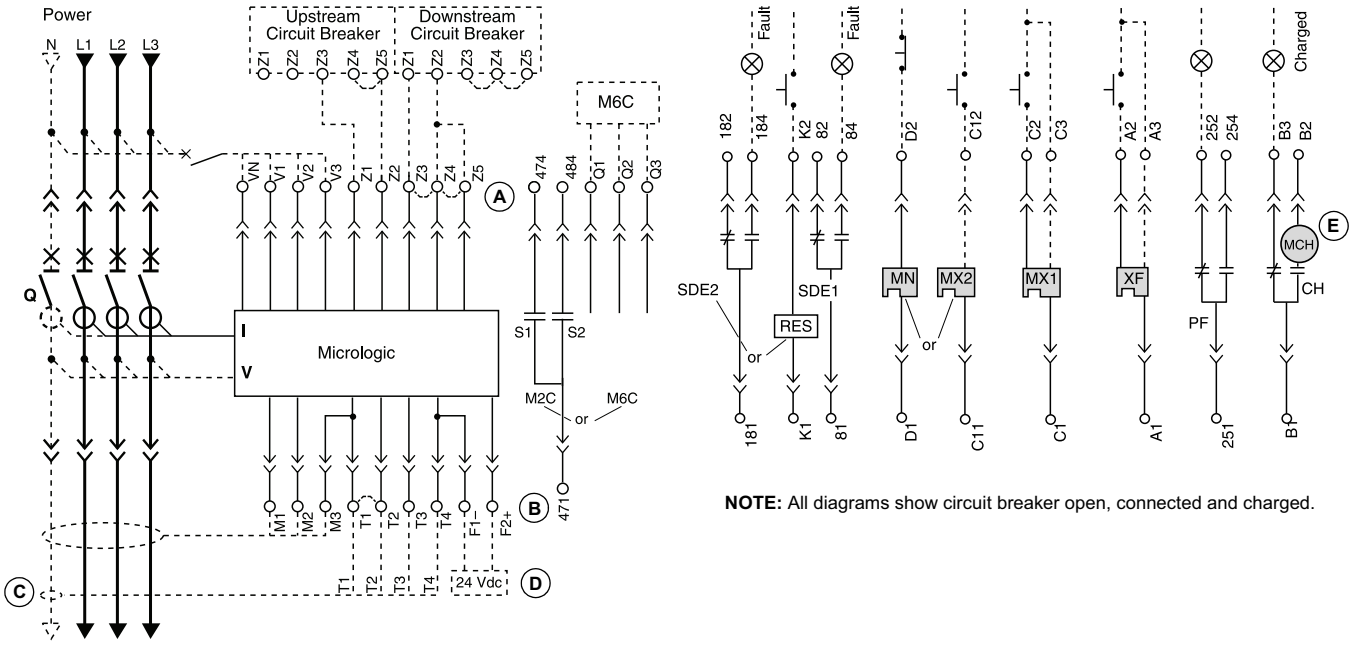
| Cell Switches | | |
|---|---|---|
| CE3 | CE2 | CE1 |
| 334/332 | 324/322 | 314/312 |
| 331 | 321 | 311 |

**NOTE:** Fixed-mounted circuit breaker does not have cell switches (CE, CD, CT).

# Wiring Diagrams for MasterPacT NT Circuit Breakers

## Wiring Diagrams for Push-In Type Terminals

**Power** **Trip Unit** **Remote Operation**




**NOTE:** All diagrams show circuit breaker open, connected and charged.

A—Do not remove factory-installed jumpers between Z3, Z4 and Z5 unless ZSI is connected.

B—Do not remove factory-installed jumper between T1 and T2 unless neutral CT is connected. Do not install jumper between T3 and T4.

C—For proper wiring of neutral CT, refer to Instruction Bulletin 48041-082-01 shipped with it.

D—24 Vdc power supply for trip unit must be separate and isolated from 24 Vdc power supply for communication modules.

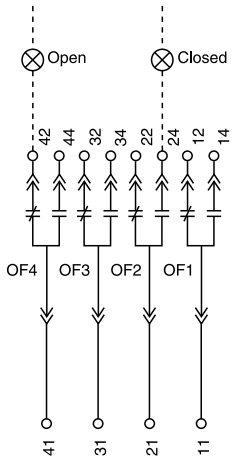
E—When remote operation features are used, make sure there is a minimum of four seconds for the spring charging motor (MCH) to completely charge the circui breaker closing springs prior to actuating the shunt close (XF) device.

## Markings for Push-In Type Terminals

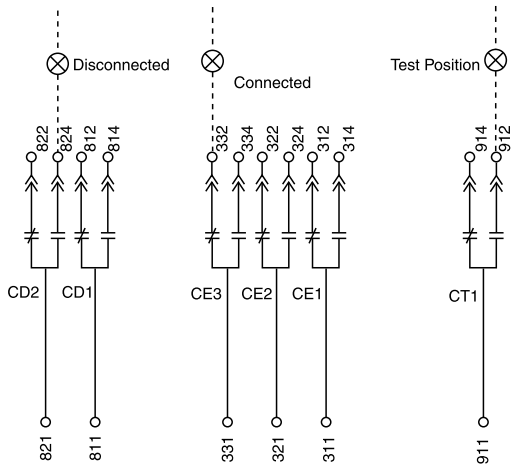
| Cell Switches | | Trip Unit | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CD2** | **CD1** | **COM** | **UC1** | **UC2** | **UC3** | **UC4 / M2C / M6C** | **SDE2 / RES** | **SDE1** |
| 824 | 814 | E5 E6 | Z5 M1 | M2 M3 | F2+ | V3 / 484 / Q3 | 184 / K2 | 84 |
| 822 | 812 | E3 E4 | Z3 Z4 | T3 T4 | VN | V2 / 474 / Q2 | 182 | 82 |
| 821 | 811 | E1 E2 | Z1 Z2 | T1 T2 | F1– | V1 / 471 / Q1 | 181 / K1 | 81 |

| Remote Operation | | | | |
|---|---|---|---|---|
| **MN / MX2** | **MX1** | **XF** | **PF** | **MCH** |
| D2 / C12 | C2 | A2 | 254 | B2 |
| C13 | C3 | A3 | 252 | B3 |
| D1/C11 | C1 | A1 | 251 | B1 |

**Auxiliary Contacts**




**Cell Switches**

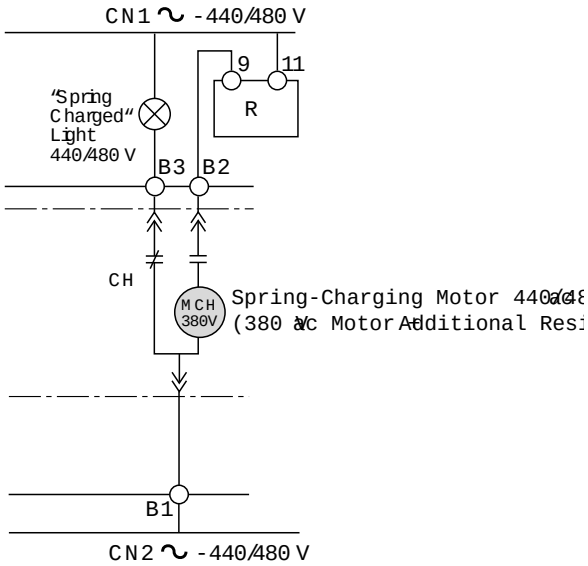



## Markings for Push-In Type Terminals

| Auxiliary Switches | | | |
|---|---|---|---|
| OF4 | OF3 | OF2 | OF1 |
| 44 | 34 | 24 | 14 |
| 42 | 32 | 22 | 12 |
| 41 | 31 | 21 | 11 |

| Cell Switches | | | |
|---|---|---|---|
| CE3 | CE2 | CE1 | CT1 |
| 334 | 324 | 314 | 914 |
| 332 | 322 | 312 | 912 |
| 331 | 321 | 311 | 911 |

### Spring-Charging Motor



# Additional Wiring Information for MasterPacT NW/NT Circuit Breakers

### Alarm Contacts (OF1, OF2, OF3 and OF4 are standard equipment)

| | | |
|---|---|---|
| OF4<br>OF3<br>OF2<br>OF1 | Open/Closed Circuit Breaker or Switch Position Contacts | OF24: Open/Closed Circuit Breaker or Switch Position Contact<br>or<br>EF24: Combined Connected and Closed Contact |
| | | OF23 or EF23 |
| | | OF22 or EF22 |
| | | OF21 or EF21 |
| | | OF14 or EF14 |
| | | OF13 or EF13 |
| | | OF12 or EF12 |
| | | OF22 or EF22 |
| | | OF11 or EF11 |

### Cradle Contacts

| | | | | | |
|---|---|---|---|---|---|
| CD3<br>CD2<br>CD1 | Disconnected Position Contacts | CE3<br>CE2<br>CE1 | Connected Position Contacts | CT3<br>CT2<br>CT1 | Test Position Contacts |
| or | | | | or | |
| CE6-<br>CE5-<br>CE4 | Connected Position Contacts | | | CE9<br>CE8<br>CE7 | Connected Position Contacts |
| | | | | or | |
| | | | | CD6<br>CD5<br>CD4 | Disconnected Position Contacts |

### Trip Unit

| Basic | A | P | H | | |
|---|---|---|---|---|---|
| — | X | X | X | Com: | E1–E6 Communication |
| — | X | X | X | UC1: | Z1–Z5 Logical Selectivity |
| | X | X | X | | Z1–Z5 Logical Selectivity |
| | X | X | X | | Z1 = ZSI OUT |
| | X | X | X | | Z2 = ZSI OUT Source; Z3 = ZSI IN Source |
| | X | X | X | | Z4 = ZSI IN Short-Time Delay |
| | X | X | X | | Z5 = ZSI IN Ground Fault |
| | X | X | X | UC3: | F2+, F1– 24 Vdc External Power Supply |
| | | X | X | | External Neutral VN Plug |
| | — | X | X | UC4 | External Phase Voltage Sensing |
| | — | X | X | M2C or M6C | Two Programmable Contacts (internal relay) |
| | — | X | X | | Six Programmable Contacts (for connection to external M6C module) |

### Remote Operation

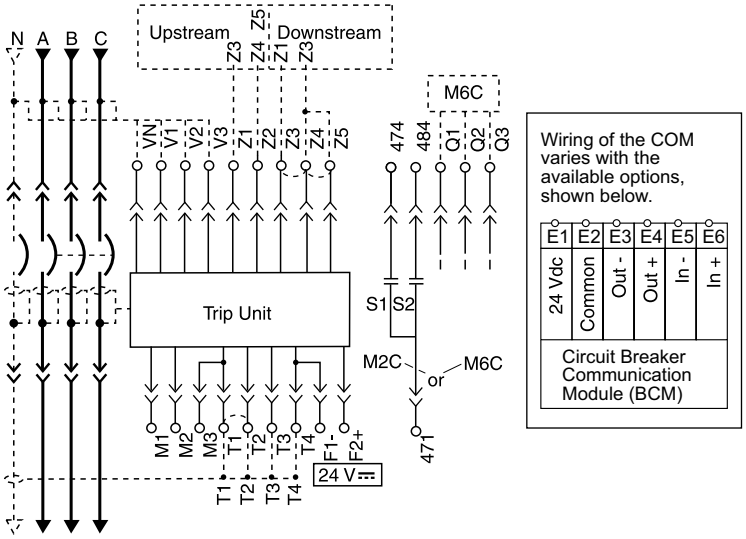
| | |
|---|---|
| SDE2 or RES | Electrical Fault Alarm Contact |

### Remote Operation (Continued)

| | |
|---|---|
| | Remote Reset |
| SDE1 | Electrical Fault Alarm Contact (standard) |
| MN or MX2 | Undervoltage Trip Device |
| | Additional Shunt Trip |
| MX1 | Shunt Trip (standard or networked) |
| XF | Shunt Close (standard or networked) |
| PF | Ready-to-Close Contact |
| MCH | Spring-Charging Motor |

**NOTE:** When communication version of the MX1 or XF coils are used, terminals (C3, A3) must be connected to line even if the communications module is not installed.
The bypass circuit through terminal C2/A2 is only momentary duty for 0.5 sec. For continuous duty, use the communications command.

### Connection of the Communications Option



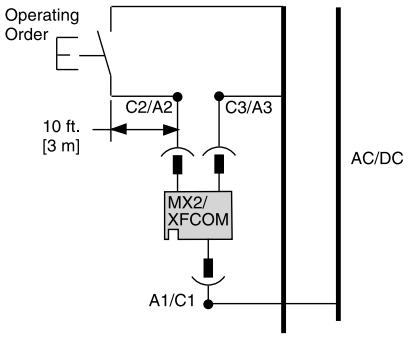

A—24 Vdc power supply for trip unit must be separate and isolated from 24 Vdc power supply for communication modules.

B—Refer to instructions bulletin 48041-082 included with neutral CT for proper wiring.

**NOTE:** Fixed-mounted circuit breaker does not have cell switches (CE, CD, CT).

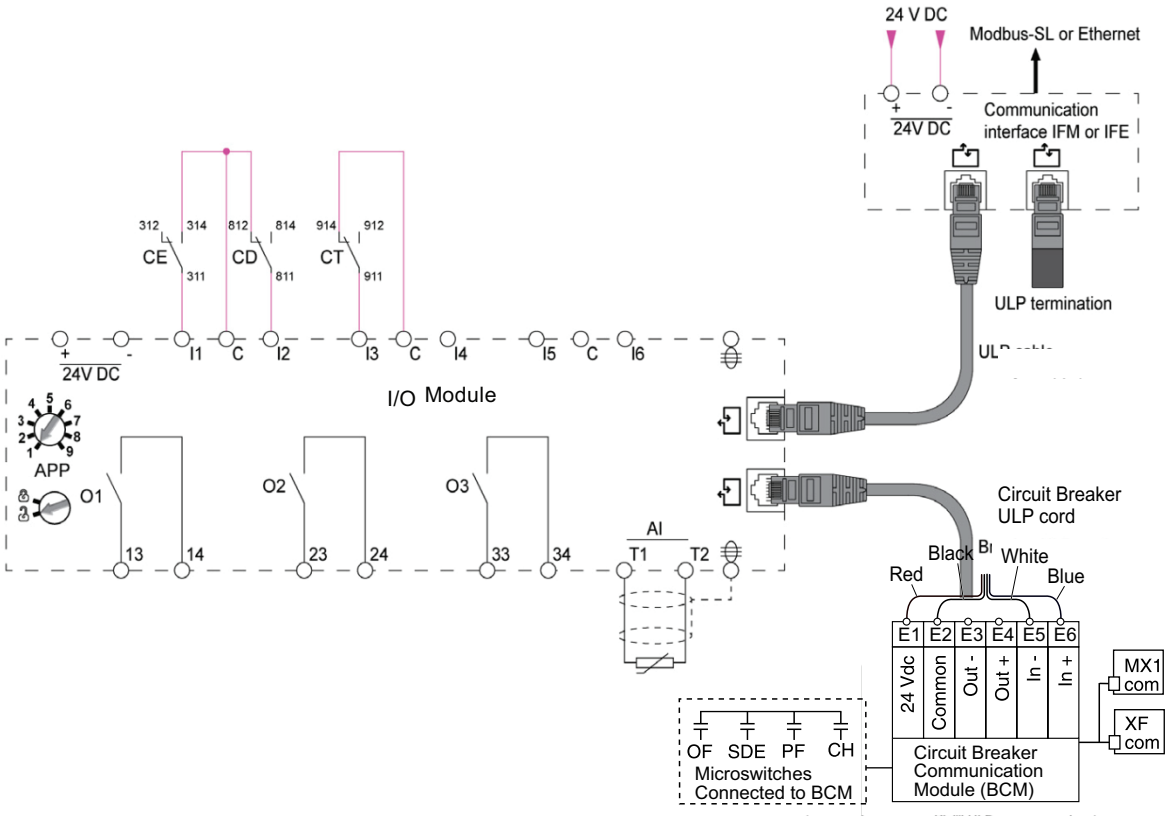
**NOTE:** A recommended wiring schematic for the communicating style shunt trip or shunt close coils is shown below.

A2 can cause the shunt trip or shunt close to not work properly. The best way to control the induced voltages is keep the circuit to terminal C2 and A2 as short as possible. If it is impossible to keep the circuit less than 10 feet (3 m), use an interposing relay near terminal C2 or A2



## Wiring Diagrams for the COM Option

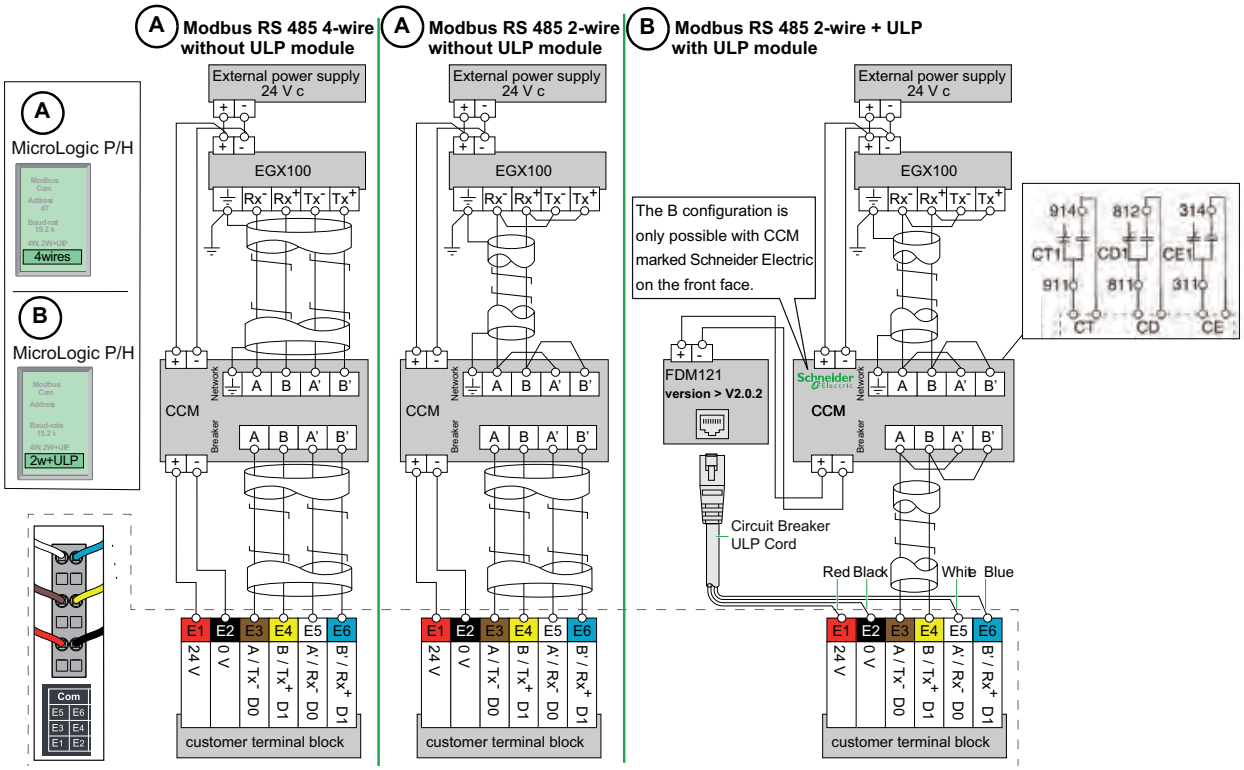
### Wiring of the I/O Modules




See *Connection of the Communications Option, page 125*.

## Wiring Diagrams for the COM Option (Continued)

### Wiring of the COM Option (Modbus BCM ULP and CCM Modules



# MasterPacT NT Dimensional Drawings

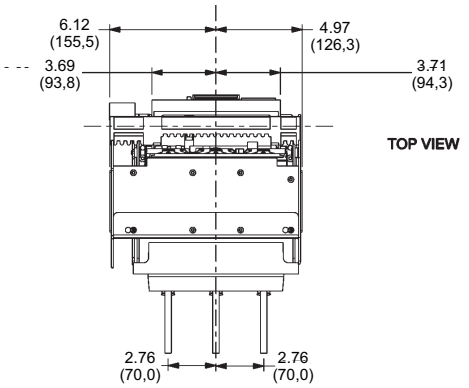
## MasterPacT NT Enclosure Information

### Minimum Enclosure Information

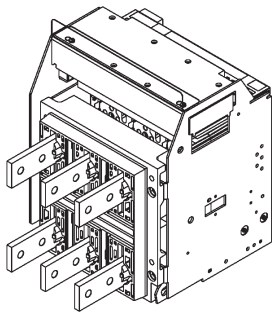
| Number of Poles | Circuit Breaker Rating | Circuit Breaker Enclosure Dimensions | | Ventilation Area | | |
|---|---|---|---|---|---|---|
| | | (H x W x D) | | Top | | Bottom |
| | | in. | mm | in.2 | mm2 | in.2 |
| 3 | 800 to 1600 A (N, H, L1) | 18.25 x 13 x 9.5 | 463.5 x 330.2 x 241.3 | 9 | 5806 | 9 |
| | 800 to 1600 A (L) | 62.25 x 23 x 14.75 | 1581.2 x 584.2 x 374.7 | 16.5 | 10645 | 16.5 |
| 4 | 800 to 1600 A (N, H, L1) | 18.25 x 15.8 x 9.5 | 463.5 x 401.3 x 241.3 | 9 | 5806 | 9 |
| | 800 to 1600 A (L) | 62.25 x 25.76 x 14.75 | 1581.2 x 654.2 x 374.7 | 16.5 | 10645 | 16.5 |

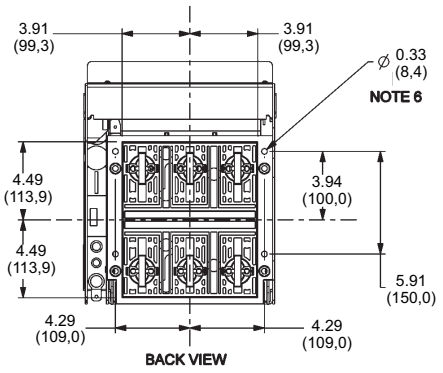
## UL Listed and ANSI Certified Three-Pole Drawout Circuit Breakers

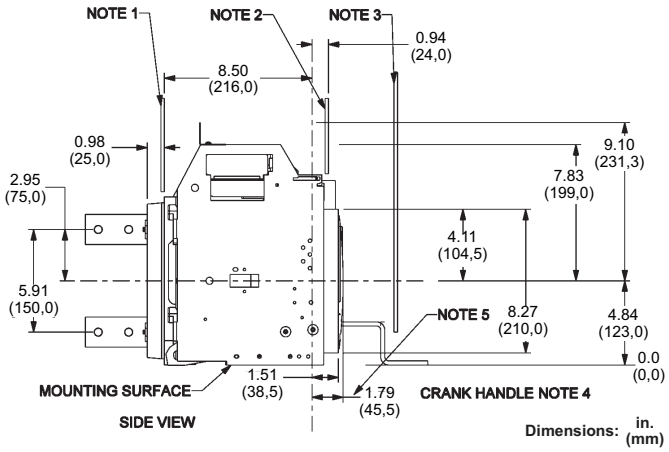
### 800–1200 A MasterPacT NT Three-Pole Drawout—Master Drawing



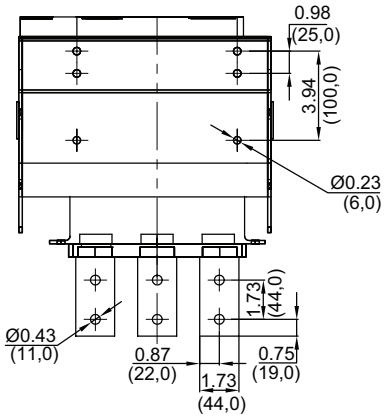

1. Rear Panel
2. Front Door
3. Distance to Drawout Position: 8.27 in. (210 mm)
4. Crank Handle Extension to Mounting Surface: Add 2.36 in. (60 mm)
5. Distance from Connect to Drawout Position: 1.81 in. (46 mm)
6. Rear Panel Mounting Holes



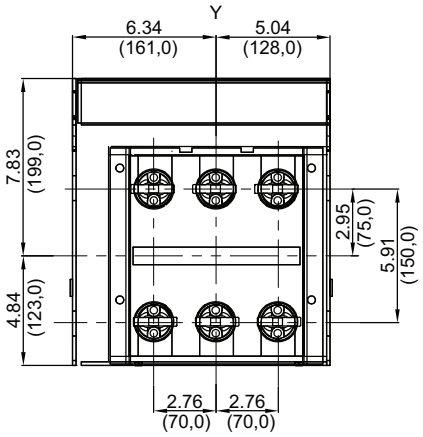


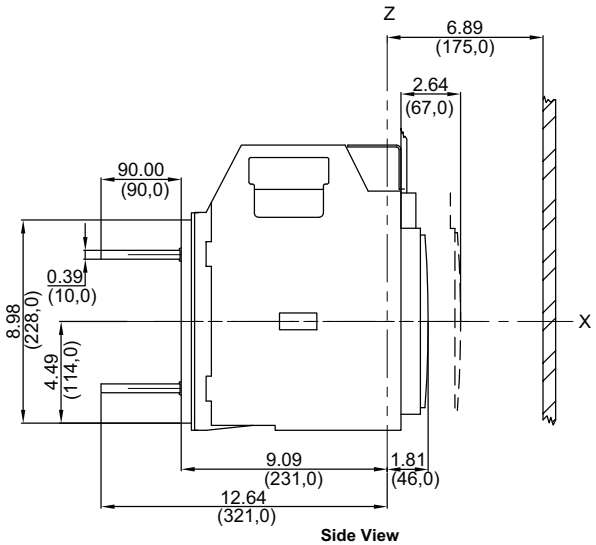
## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Drawout—RCTH Rear-Connected “T” Horizontal




**Top View**



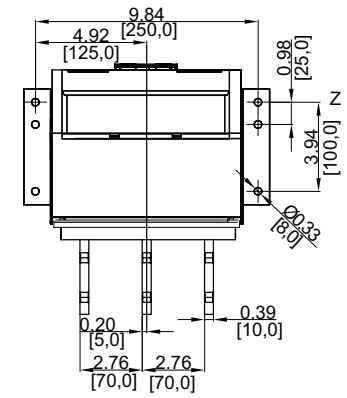

**Back View**



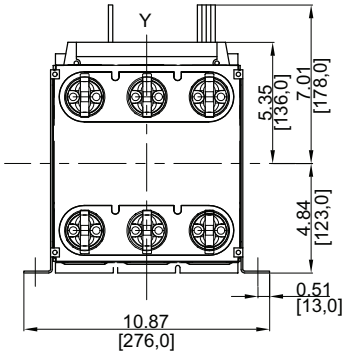

**Side View**

**Dimensions: in. (mm)**

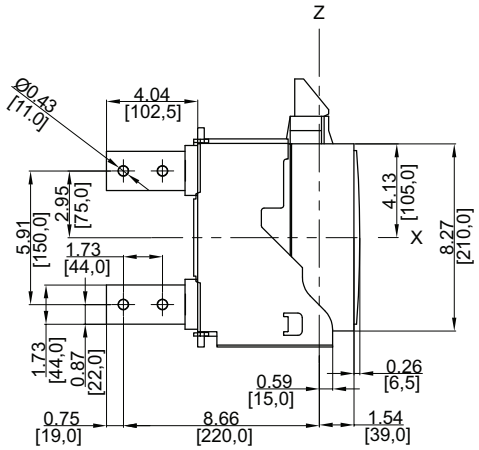
## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Drawout—RCTV Rear-Connected “T” Vertical




**Top View**



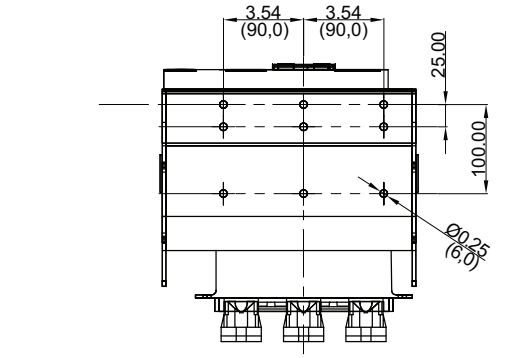

**Back View**



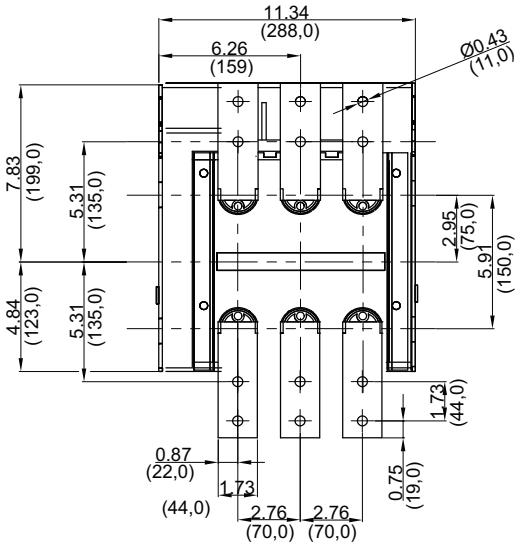

**Side View**

**Dimensions:** in. (mm)

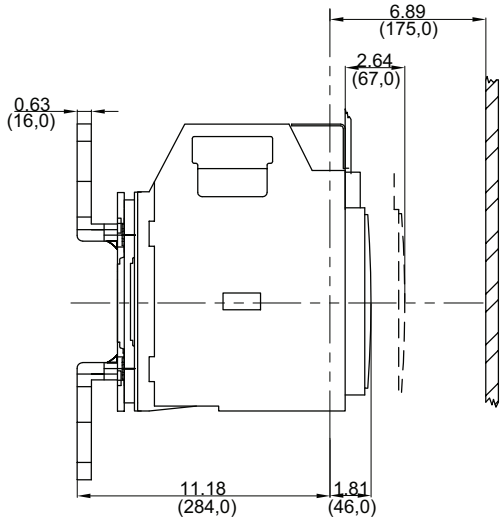
## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Drawout—FCF Front-Connected Flat




Top View



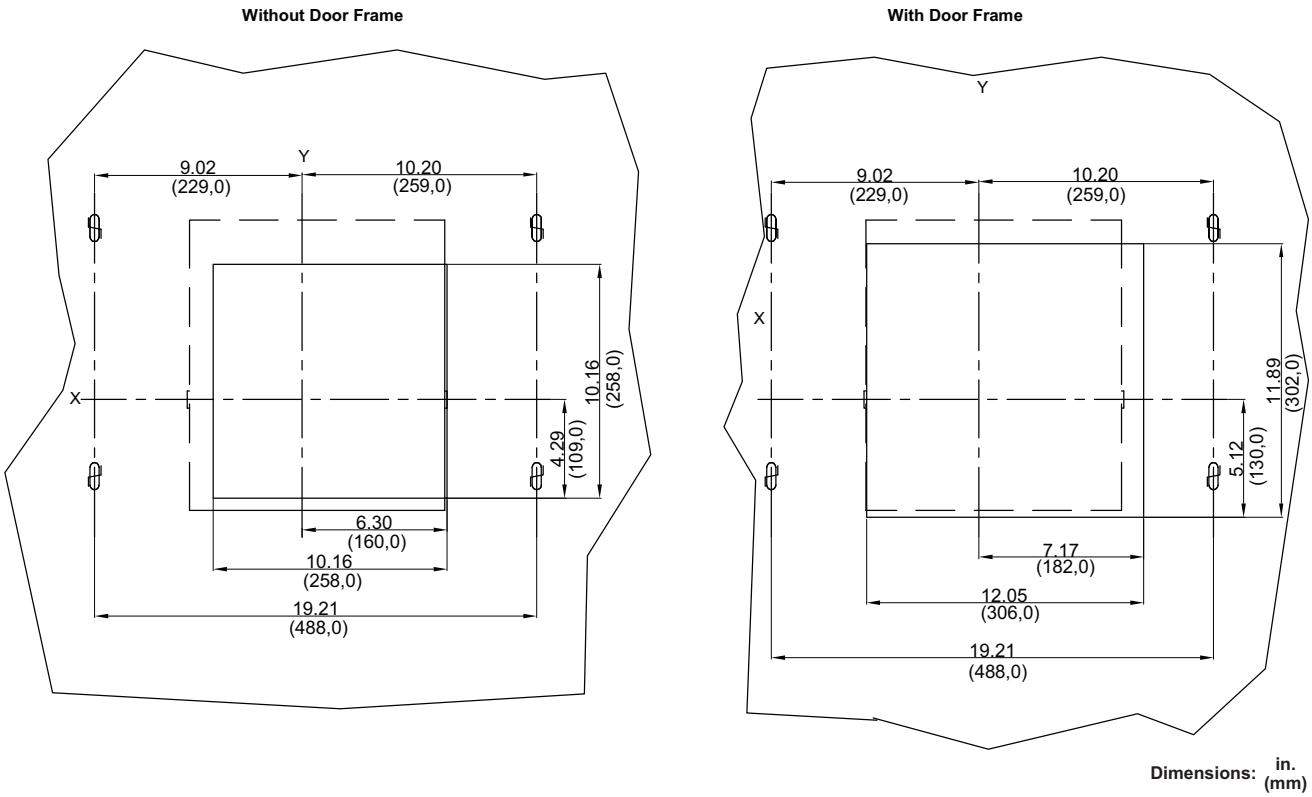

Back View



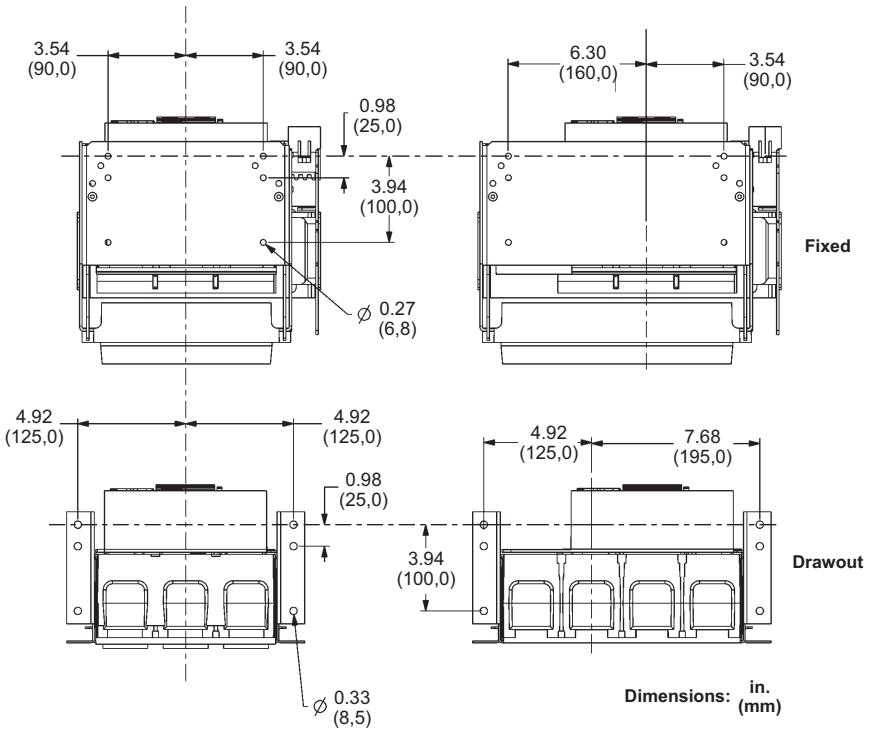

Side View

Dimensions: in. (mm)

## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Drawout—Door Cutout Dimensions

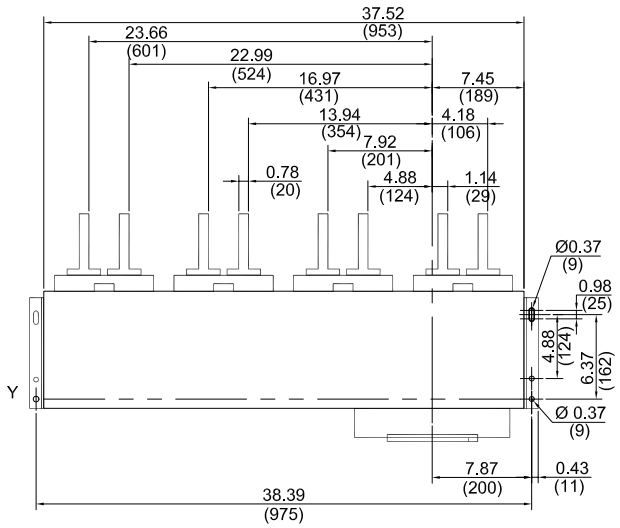



## 800–1200 A MasterPacT NT UL/ANSI Drawout and Fixed—Pan Dimensions

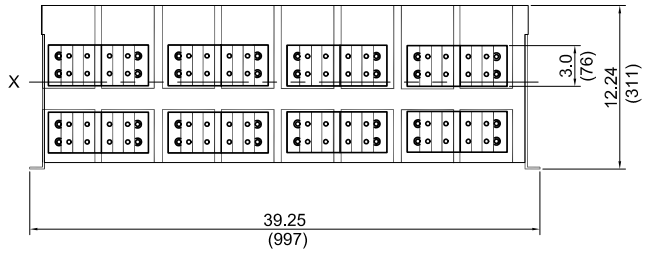


# UL Listed and ANSI Certified Three-Pole Fixed Circuit Breakers

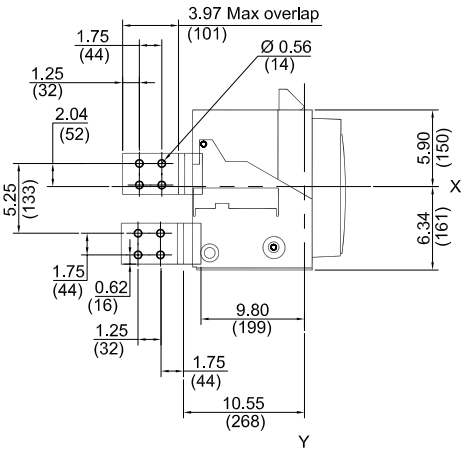
### 800–1200 A and 1600 A MasterPacT NT UL/ANSI Three-Pole Fixed—Master Drawing




**Top View**



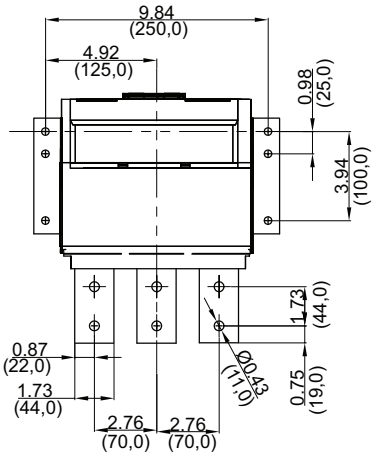

**Back View**



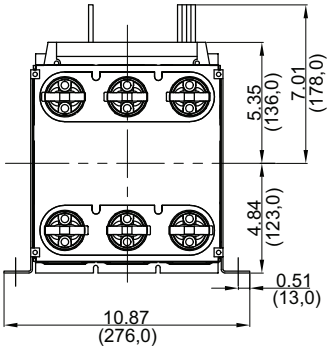

**Side View**

**Dimensions: in. (mm)**

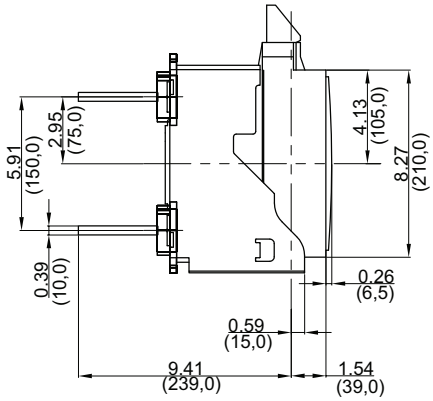
## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Fixed—RCTH Rear-Connected “T” Horizontal




**Top View**



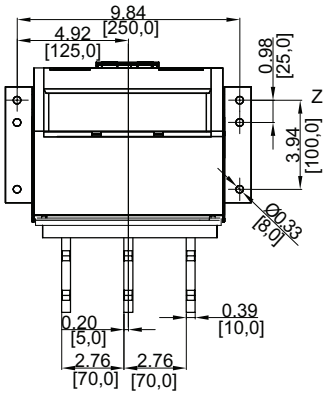

**Back View**



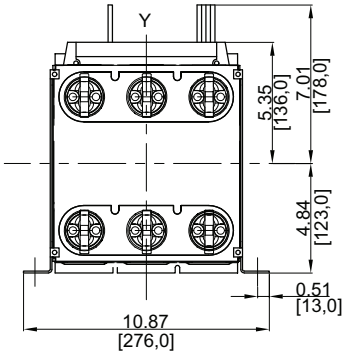

**Side View**

**Dimensions:** in. (mm)

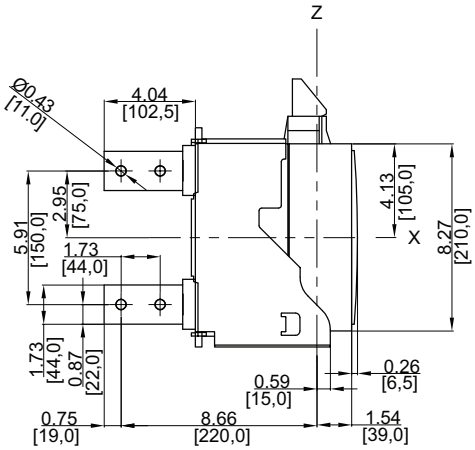
## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Fixed—RCTV Rear-Connected “T” Vertical




**Top View**



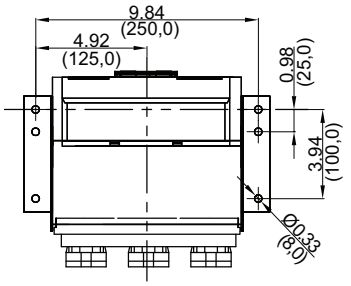

**Back View**



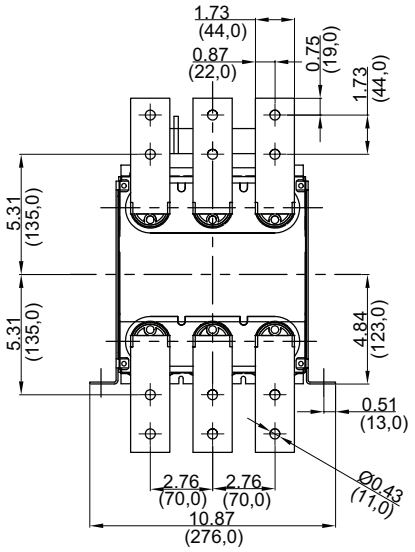

**Side View**

**Dimensions:** in. (mm)

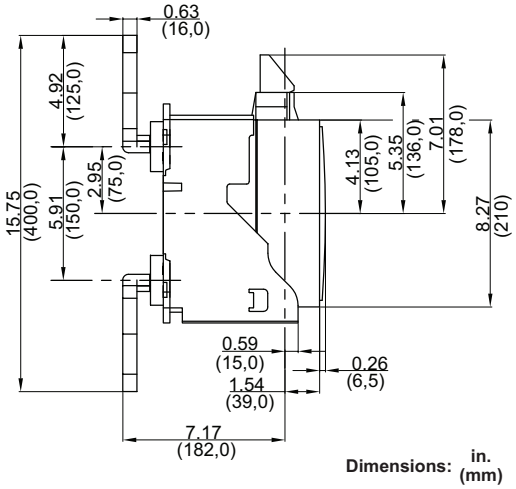
## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Fixed—FCF Front-Connected Flat




Top View



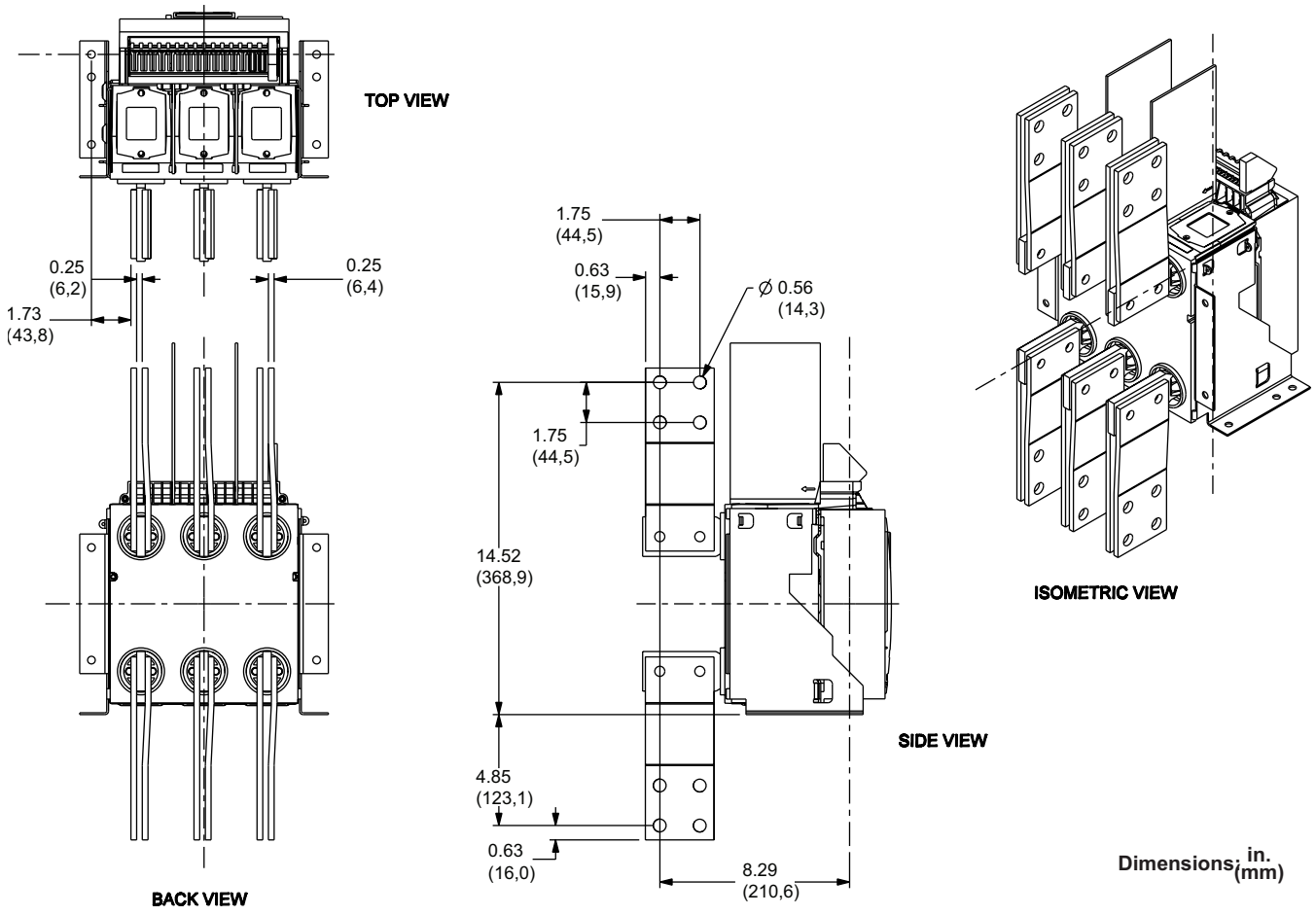

Back View



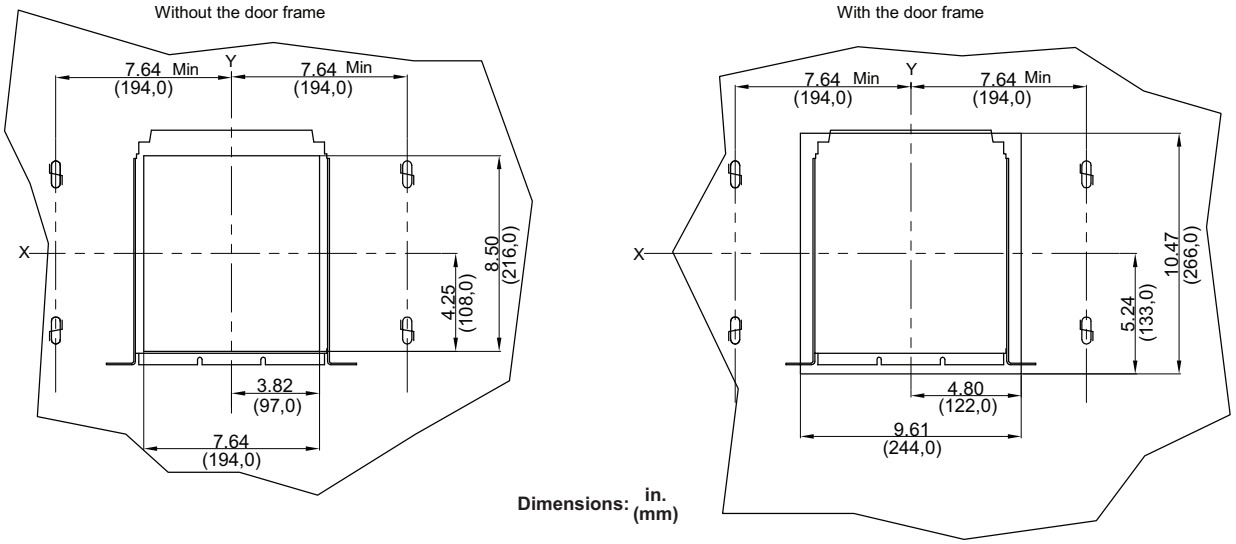

Side View

Dimensions: in. (mm)

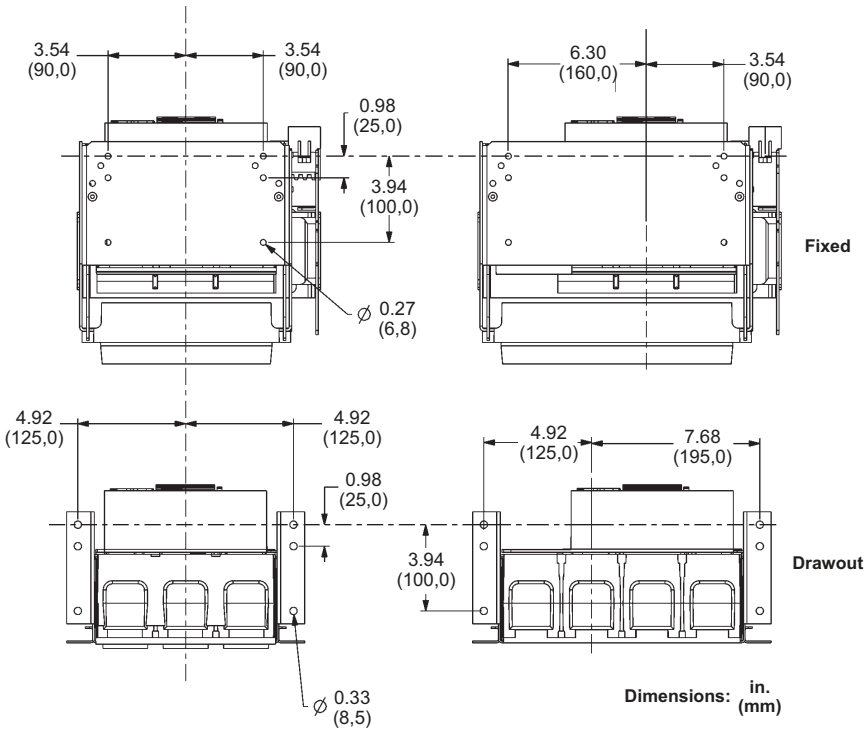
## 1600 A MasterPacT NT UL Three-Pole Fixed—RCV Rear-Connected Vertical




## 800–1200 A MasterPacT NT UL/ANSI Three-Pole Fixed—Door Cutout Dimensions

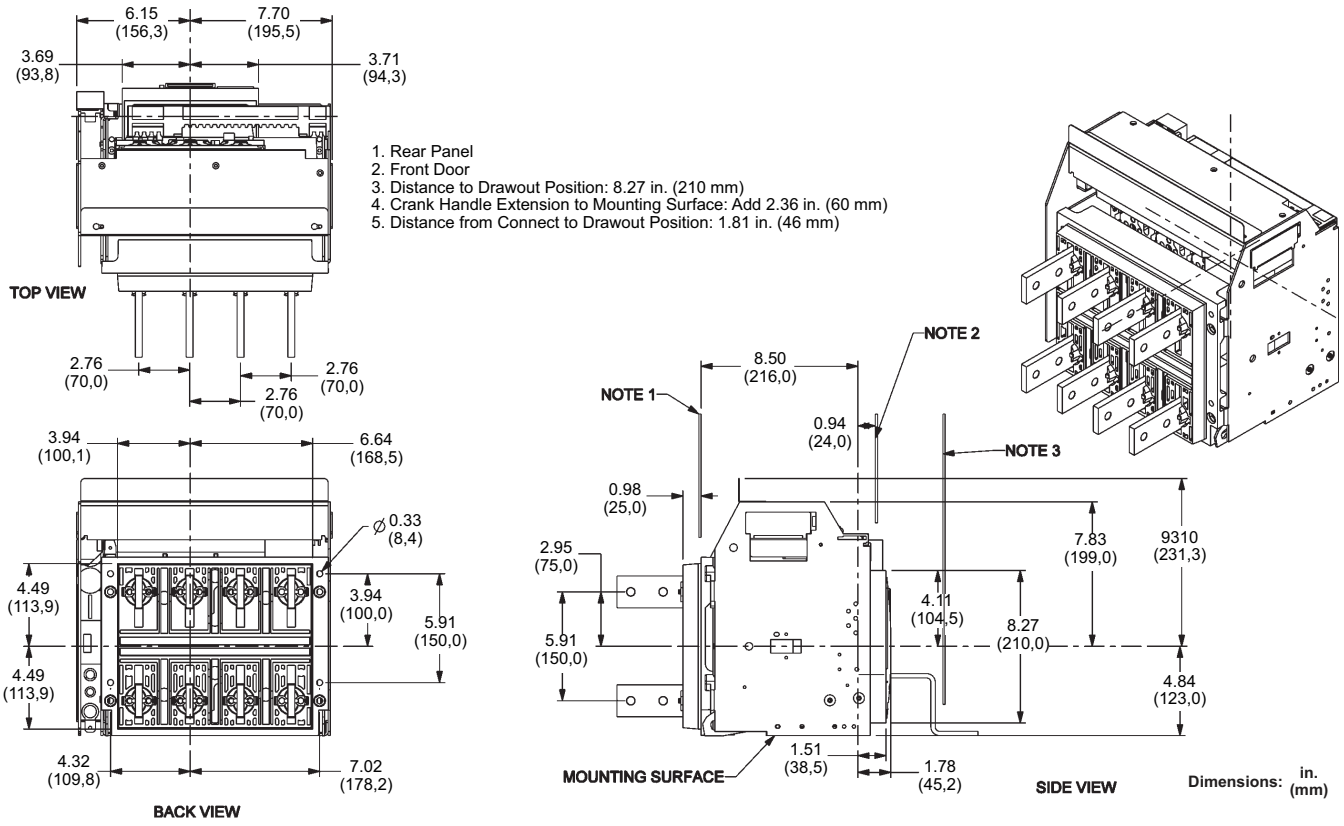


## 800–1200 A MasterPacT NT UL/ANSI Fixed and Drawout—Pan Dimensions

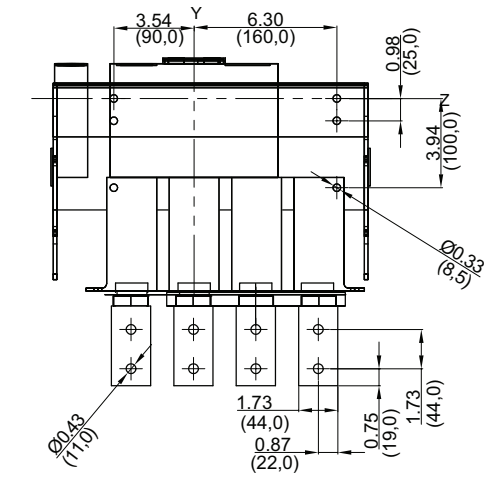


# UL Listed and ANSI Certified Four-Pole Drawout Circuit Breaker

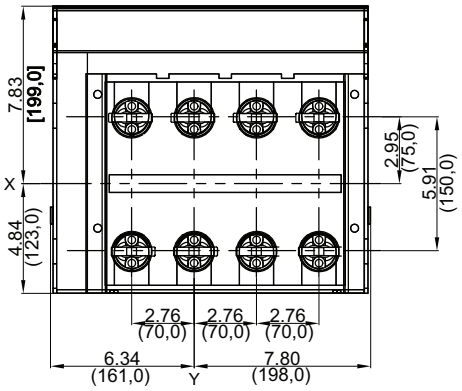
### 800–1200 A and 1600 A MasterPacT NT UL/ANSI Four-Pole Drawout—Master Drawing



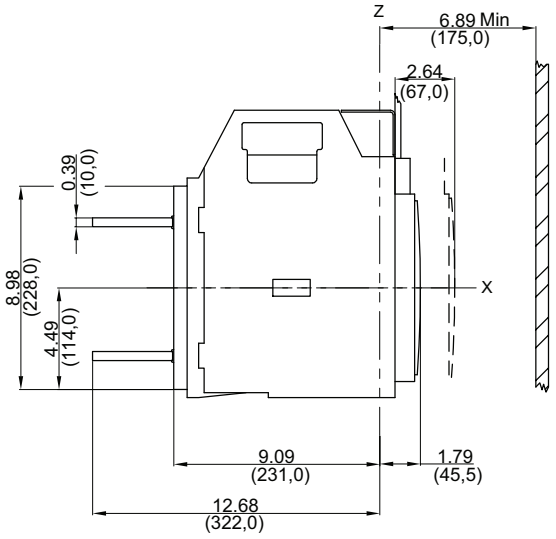
## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Drawout—RCTH Rear-Connected “T” Horizontal




**Top View**



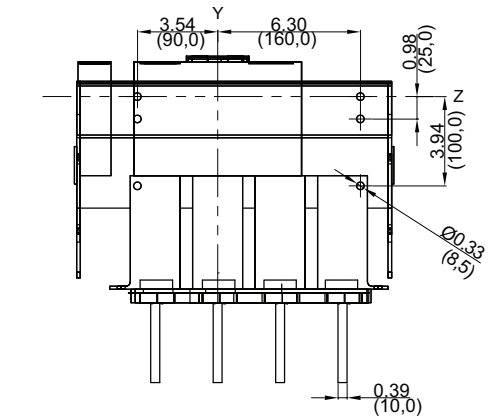

**Back View**



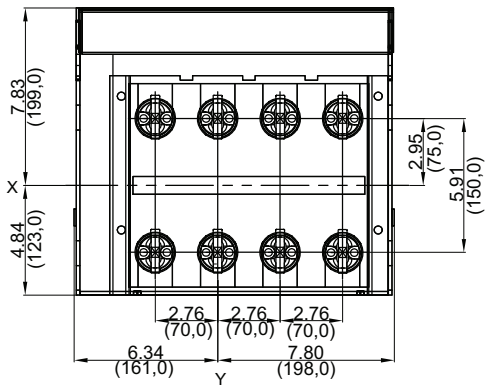

**Side View**

**Dimensions: in. (mm)**

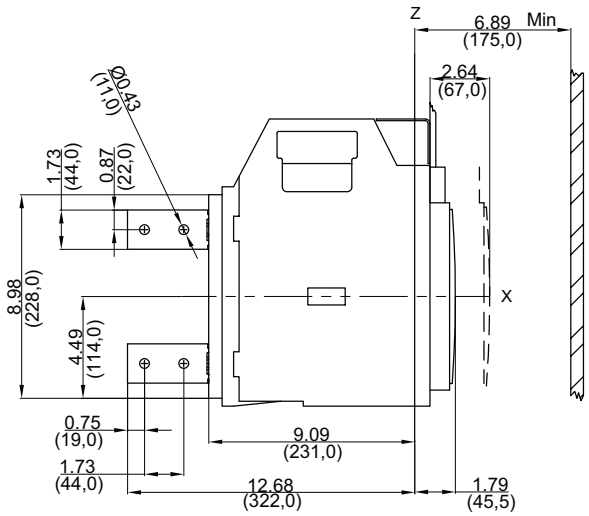
## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Drawout—RCTV Rear-Connected “T” Vertical




Top View



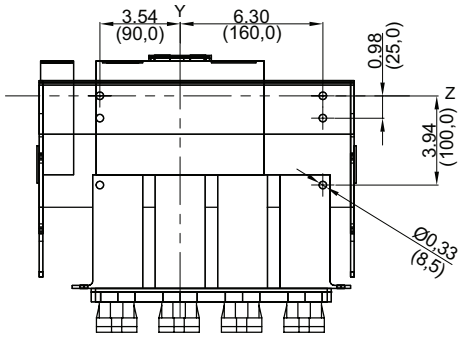

Back View



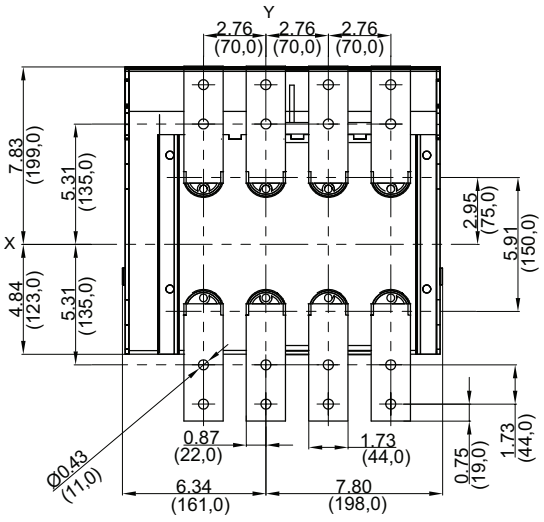

Side View

Dimensions: in. (mm)

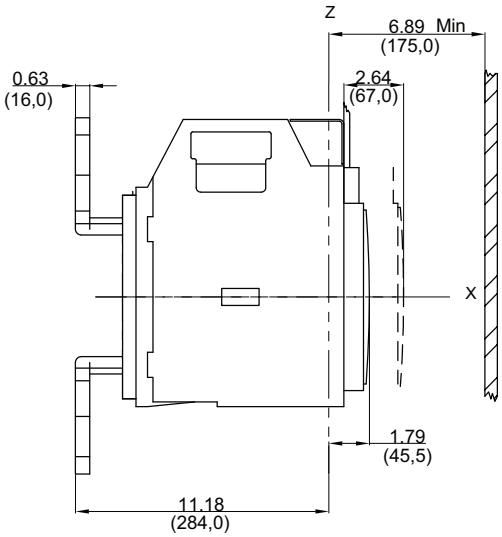
## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Drawout—FCF Front-Connected Flat




Top View




Back View

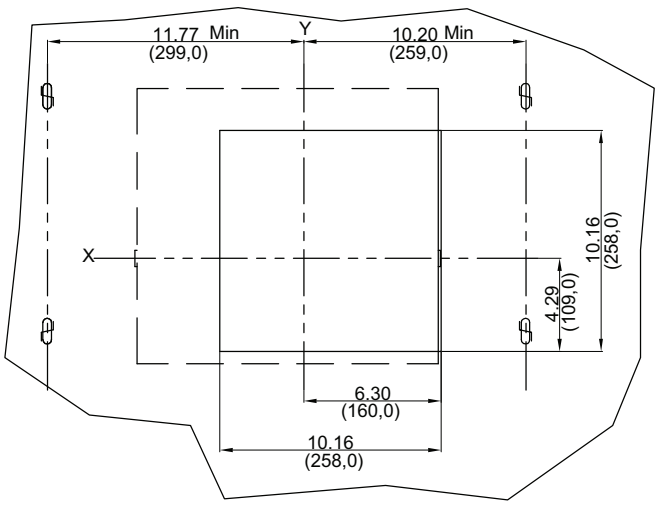



Dimensions: in. (mm)

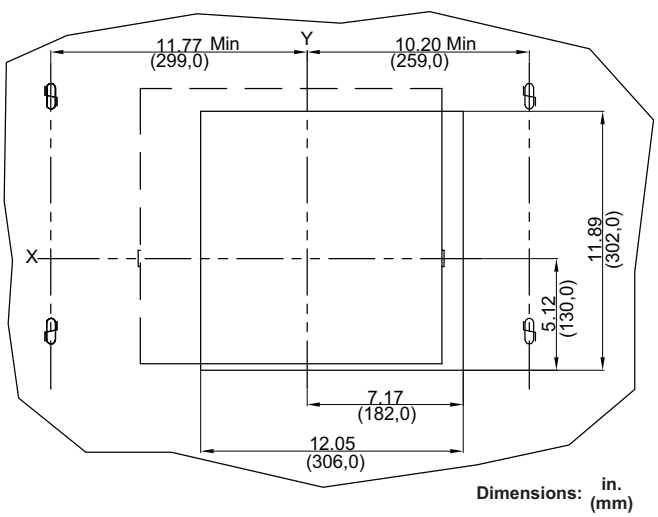
Side View

## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Drawout—Door Cutout Dimensions

Without Door Frame

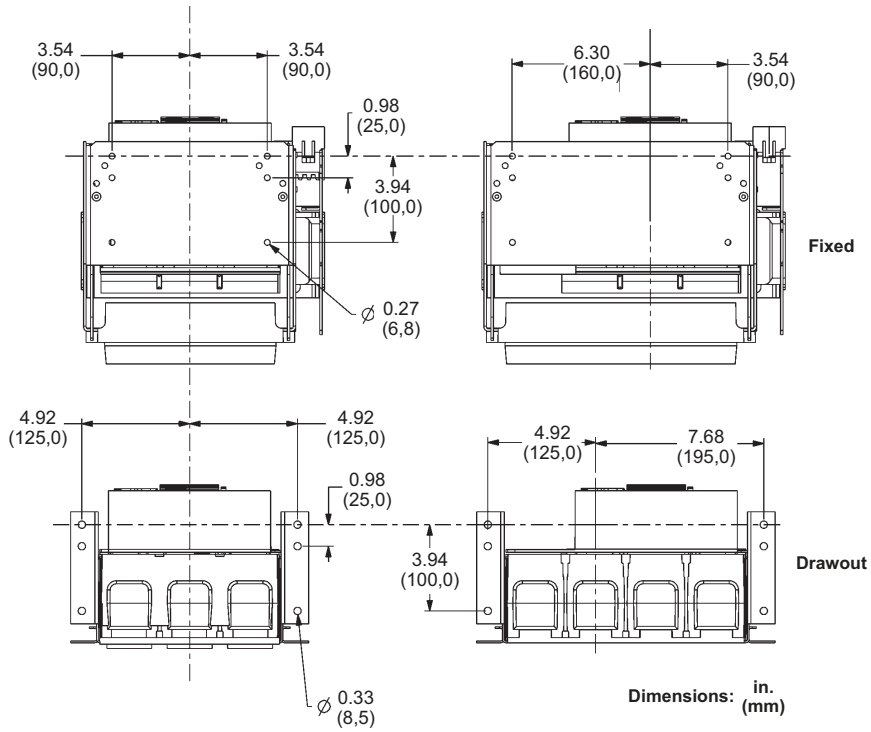



With Door Frame



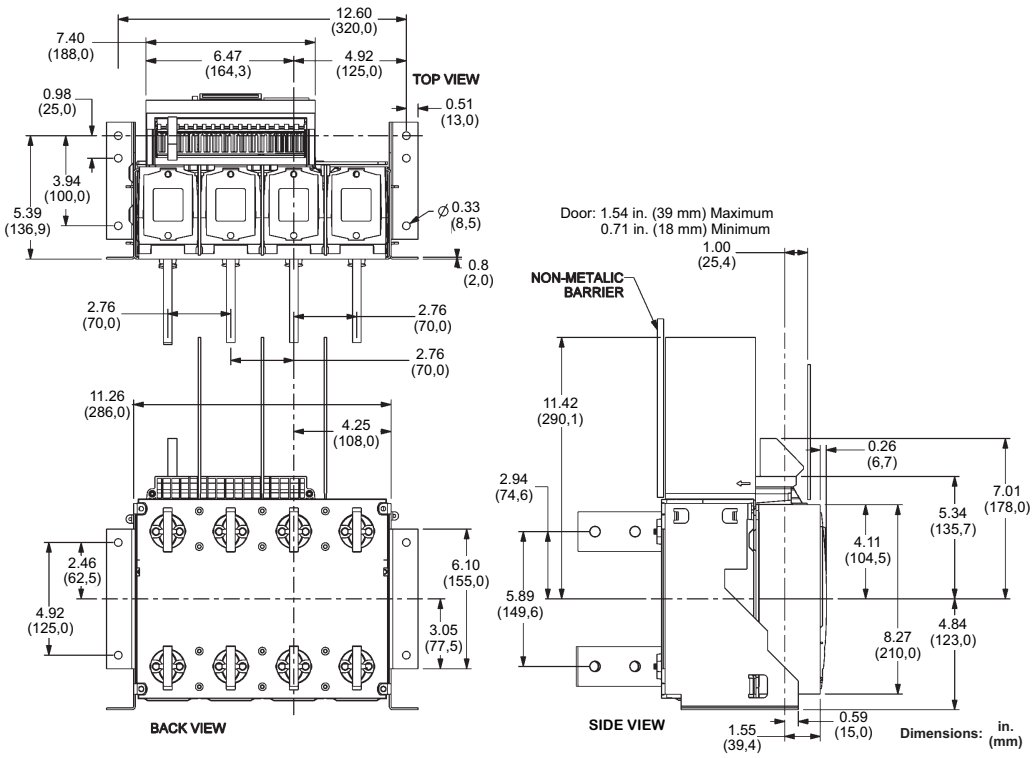

Dimensions: in. (mm)

## 800–1200 A MasterPacT NT UL/ANSI Drawout—Pan Dimensions

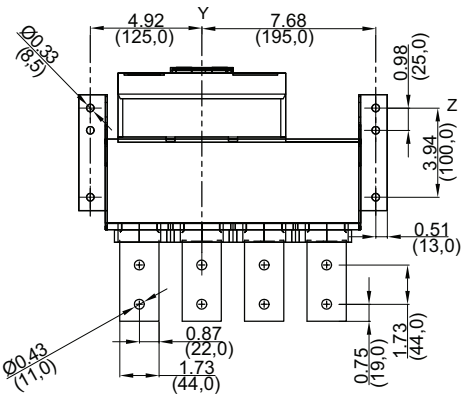


# UL Listed and ANSI Certified Four-Pole Fixed Circuit Breakers

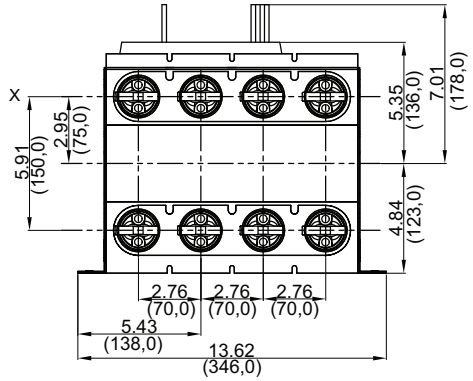
### 800–1200 A MasterPacT NT UL/ANSI Four-Pole Fixed—Master Drawing



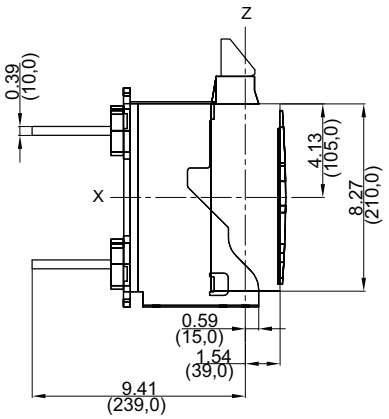
## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Fixed—RCTH Rear-Connected “T” Horizontal




**Top View**



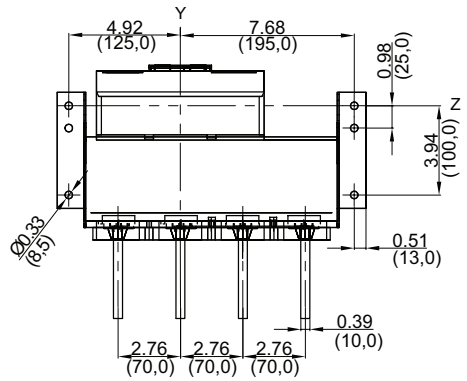

**Back View**



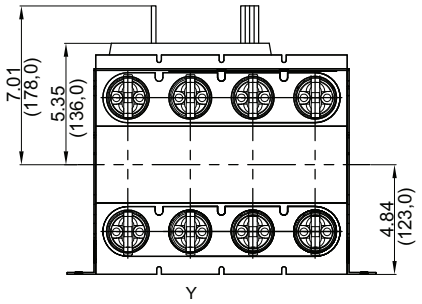

**Side View**

**Dimensions:** in. (mm)

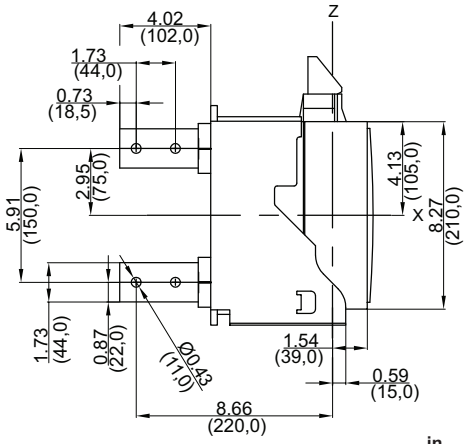
## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Fixed—RCTV Rear-Connected “T” Horizontal




**Top View**



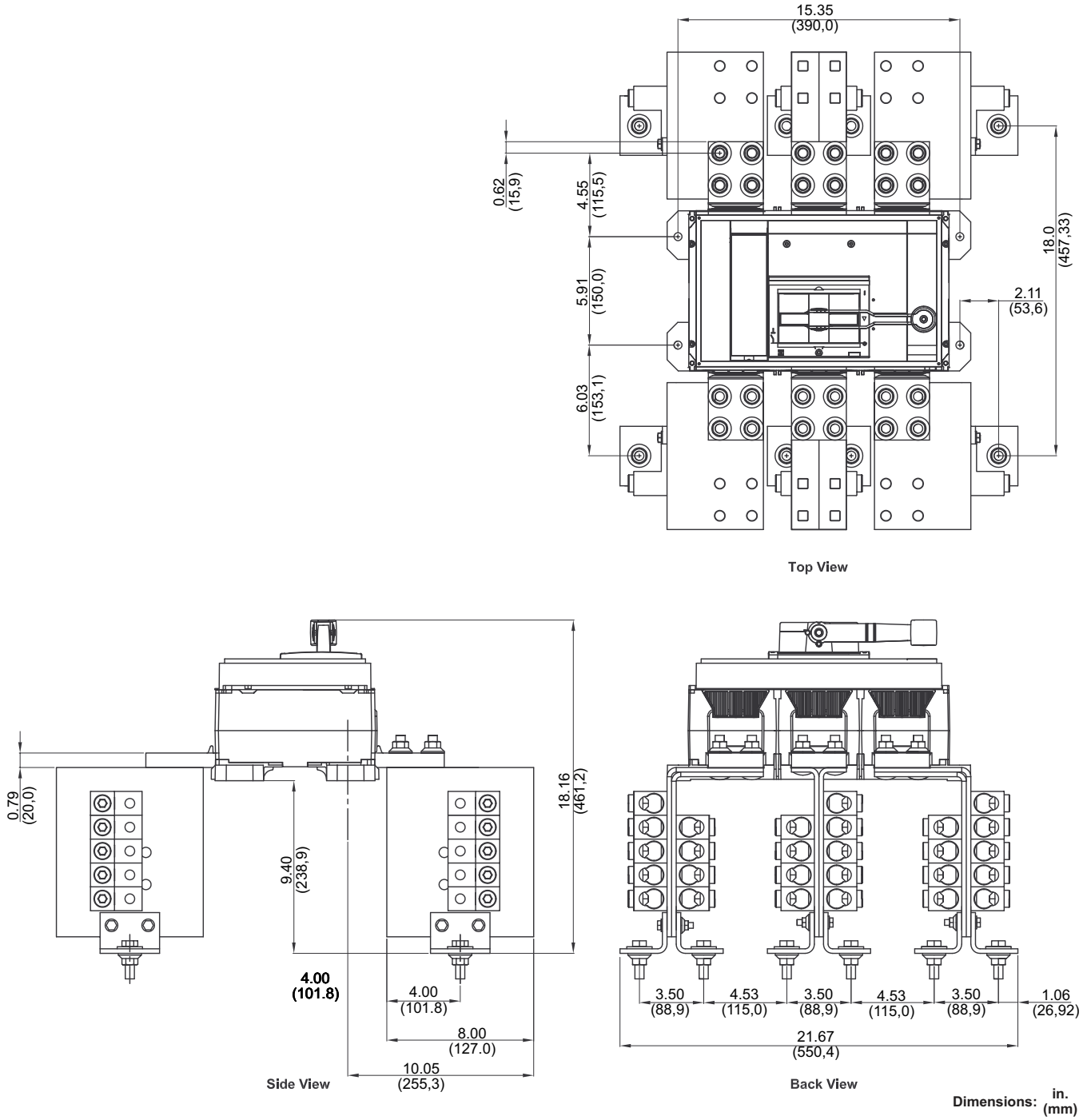

**Back View**



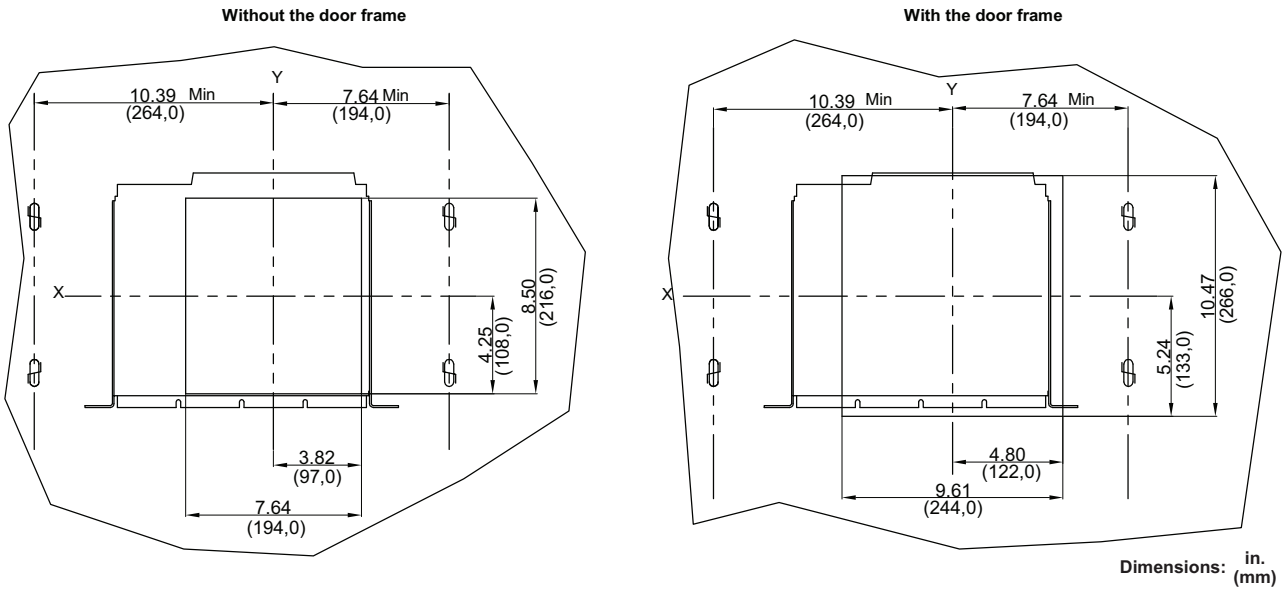

**Side View**

**Dimensions: in. (mm)**

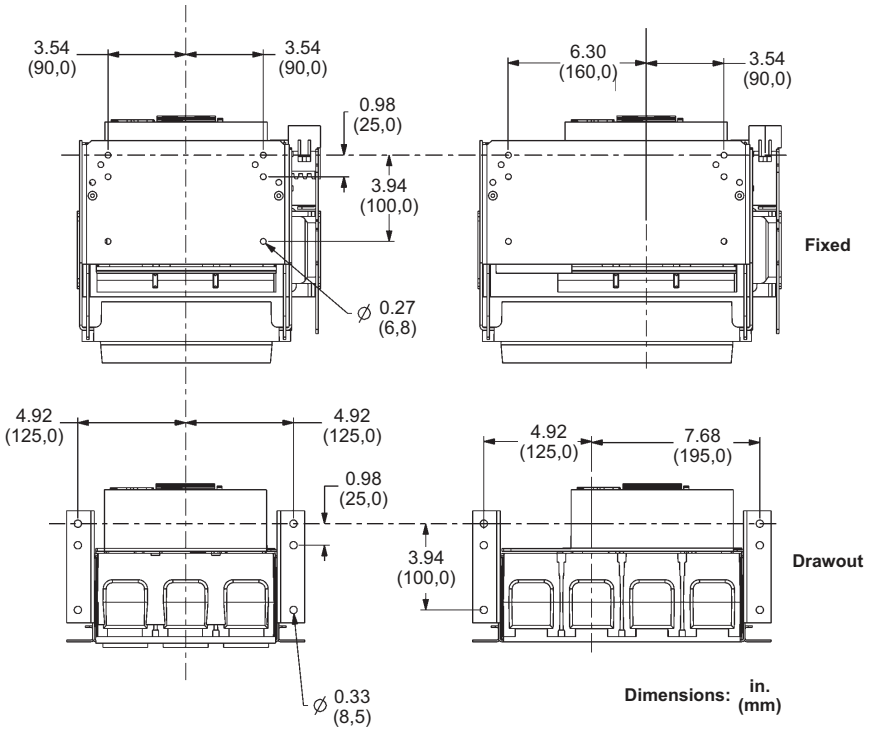
## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Fixed—FCF Front-Connected Fla



## 800–1200 A MasterPacT NT UL/ANSI Four-Pole Fixed—Door Cutout Dimensions

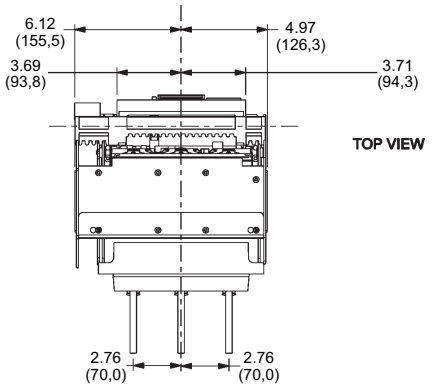



## 800–1200 A MasterPacT NT UL/ANSI Fixed—Pan Dimensions

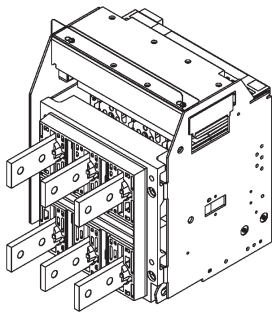


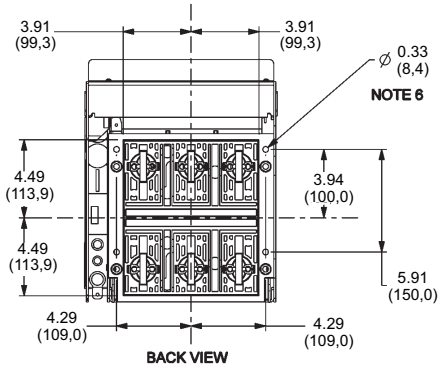
# IEC Rated Three-Pole Drawout Circuit Breakers

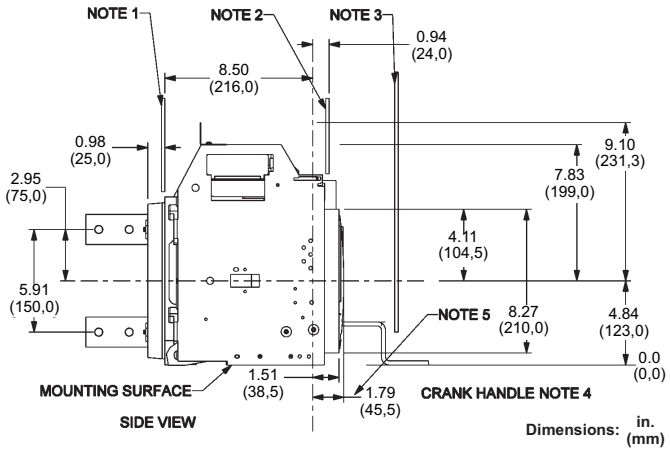
### 800–1600 A MasterPacT NT 3P Drawout—Master Drawing



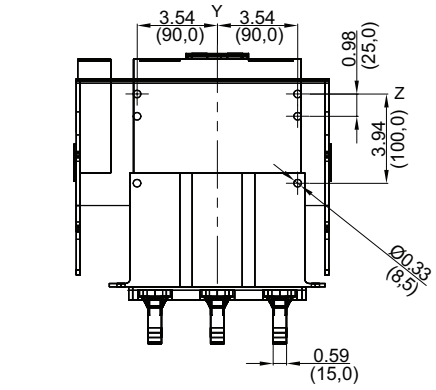

1. Rear Panel
2. Front Door
3. Distance to Drawout Position: 8.27 in. (210 mm)
4. Crank Handle Extension to Mounting Surface: Add 2.36 in. (60 mm)
5. Distance from Connect to Drawout Position: 1.81 in. (46 mm)
6. Rear Panel Mounting Holes



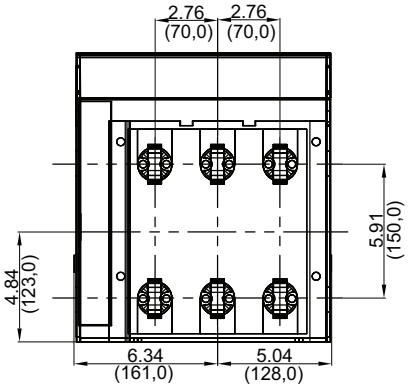


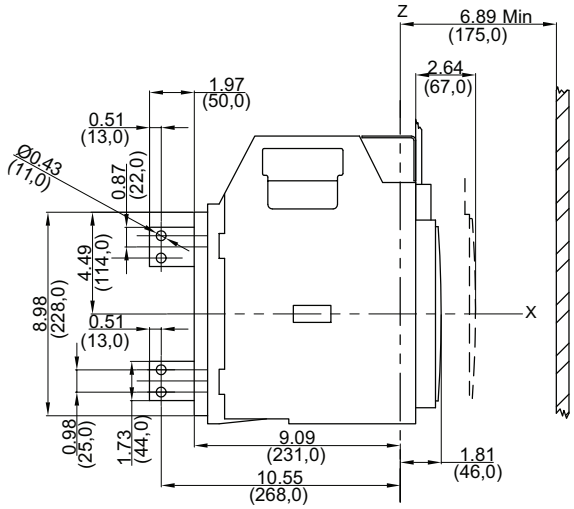



## 800–1600 A MasterPacT NT IEC Three-Pole Drawout—RCTV Rear-Connected “T” Vertical



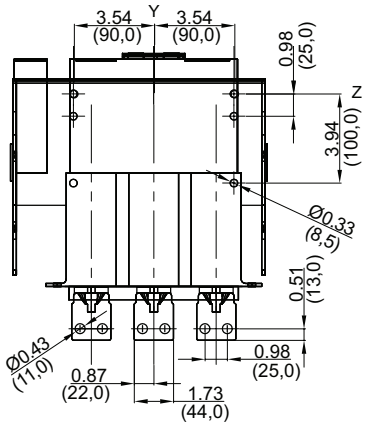

Top View



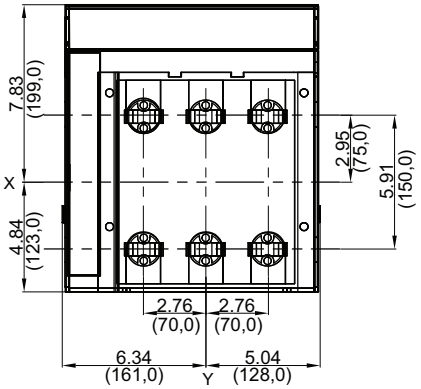




Dimensions: in. (mm)

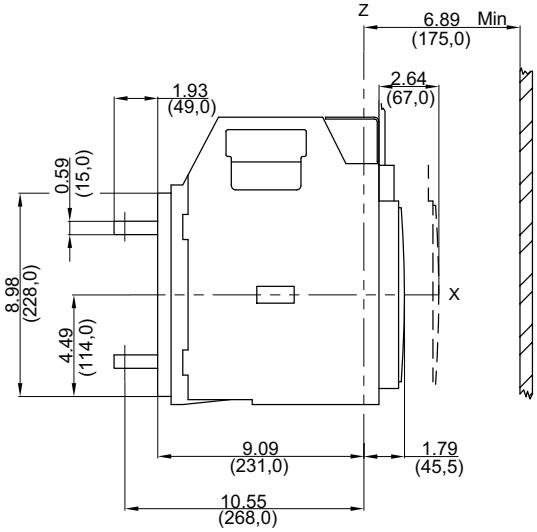
## 800–1600 A MasterPacT NT IEC Three-Pole Drawout—RCTH Rear-Connected “T” Horizontal




**Top View**



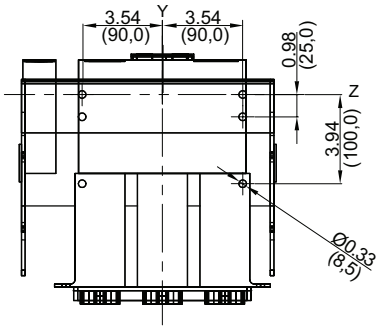

**Back View**



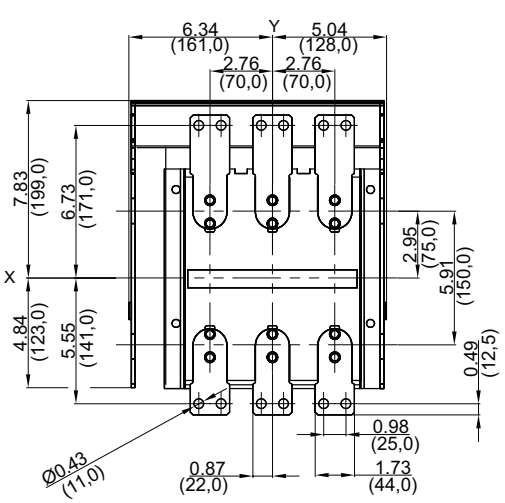

**Side View**

**Dimensions: in. (mm)**

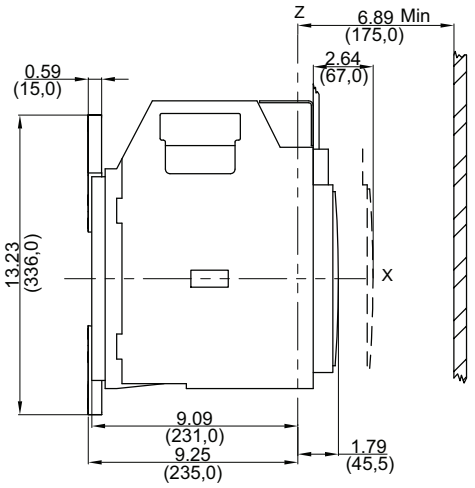
## 800–1600 A MasterPacT NT IEC Three-Pole Drawout—FCF Front-Connected Flat




Top View



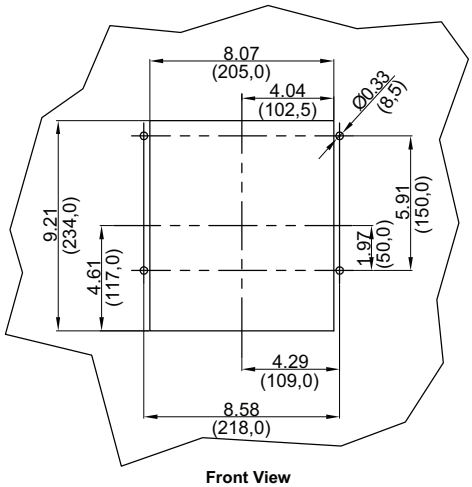

Back View



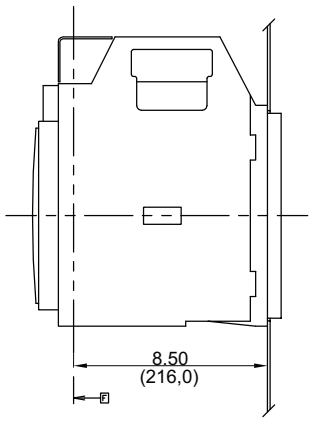

Side View

Dimensions: in. (mm)

## 800–1200 A MasterPacT NT IEC Three-Pole Drawout—Rear Cutout Dimensions




Front View

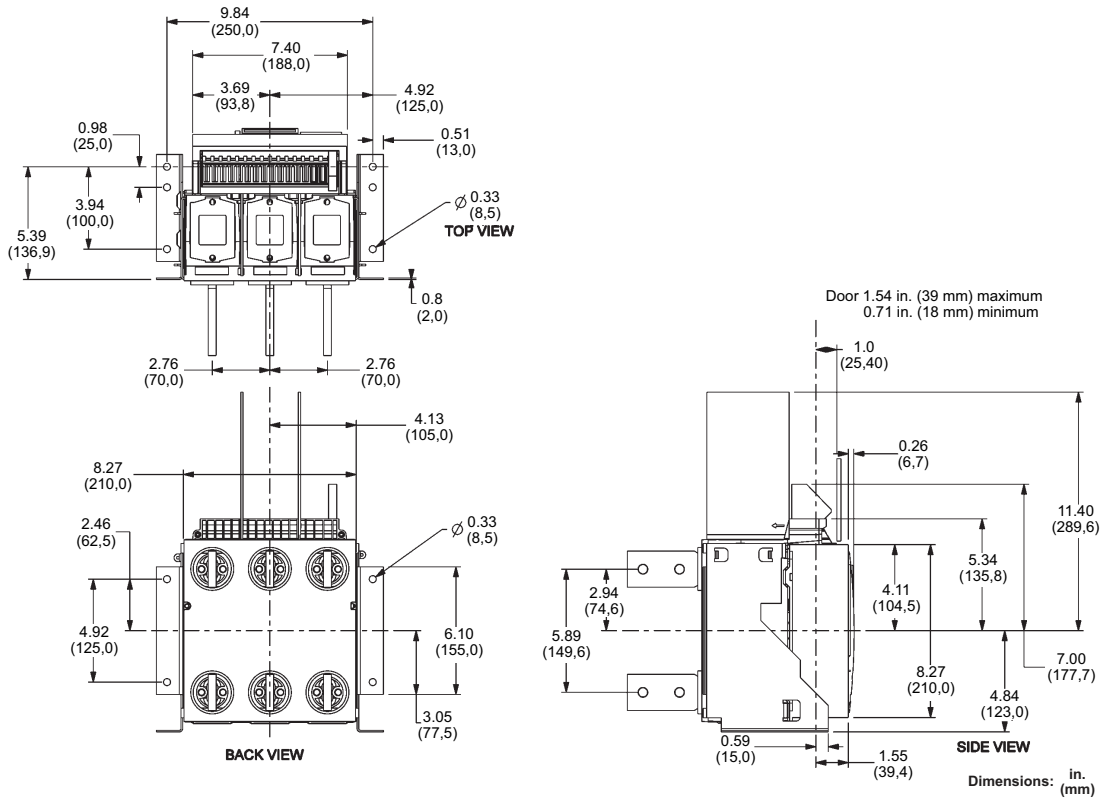



Side View

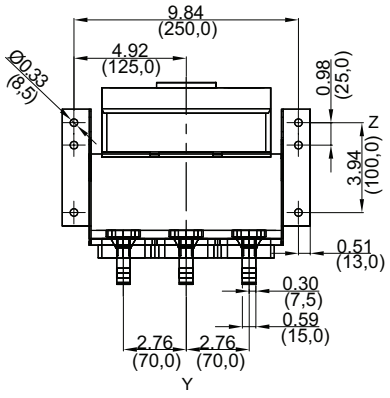
Dimensions: in. (mm)

# IEC Rated Three-Pole Fixed Circuit Breakers

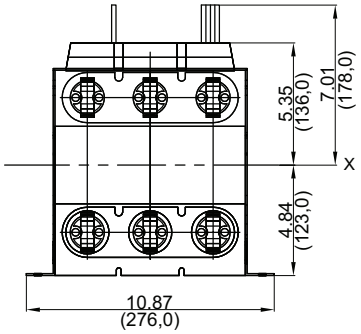
### 800–1600 A MasterPacT NT Three-Pole Fixed—Master Drawing



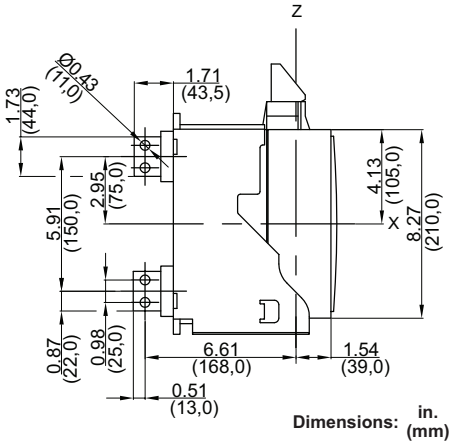
## 800–1600 A MasterPacT NT IEC Three-Pole Fixed—RCTV Rear-Connected “T” Vertical




**Top View**



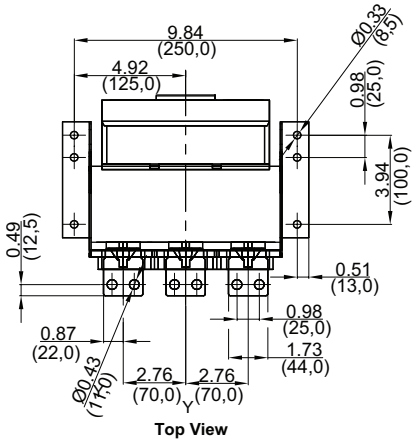

**Back View**



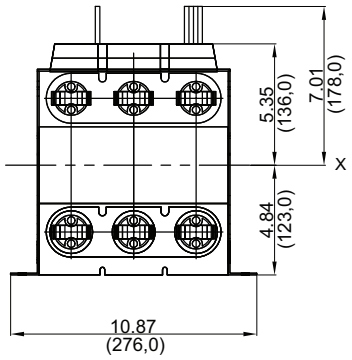

**Dimensions: in. (mm)**

**Side View**

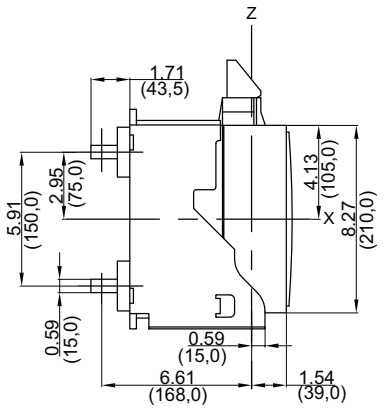
## 800–1600 A MasterPacT NT IEC Three-Pole Fixed—RCTH Rear-Connected “T” Horizontal




**Top View**



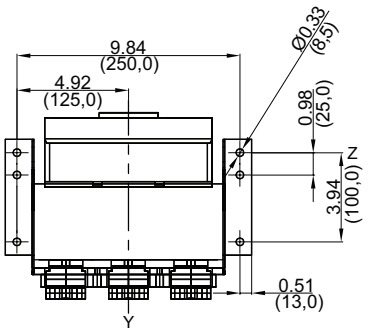

**Back View**



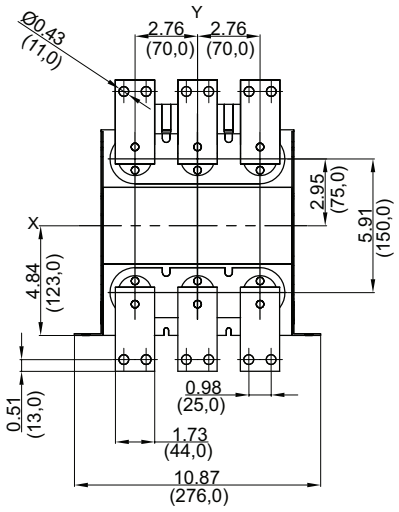

**Side View**

**Dimensions: in. (mm)**

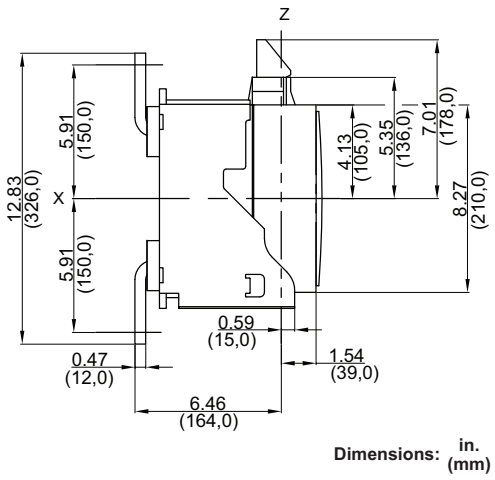
## 800–1600 A MasterPacT NT IEC Three-Pole Fixed—FCF Front-Connected Flat




**Top View**



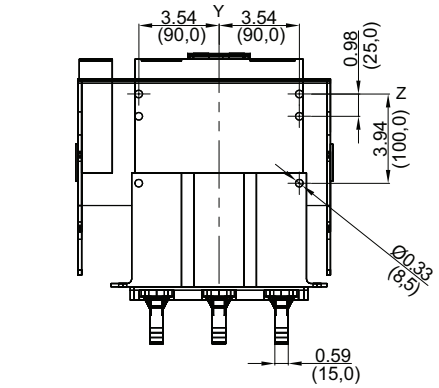

**Back View**



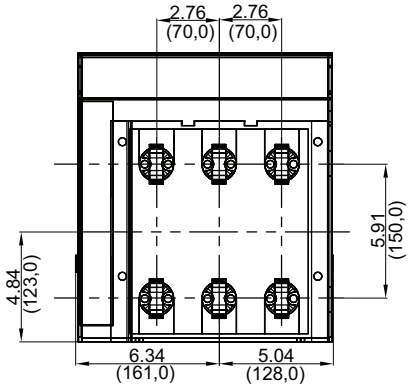

**Dimensions: in. (mm)**

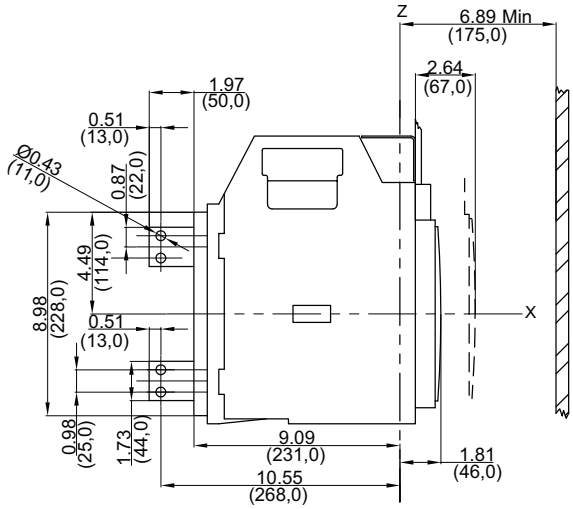
**Side View**

## 800–1200 A MasterPacT NT IEC Three-Pole Fixed—Rear Cutout Dimensions




**Top View**

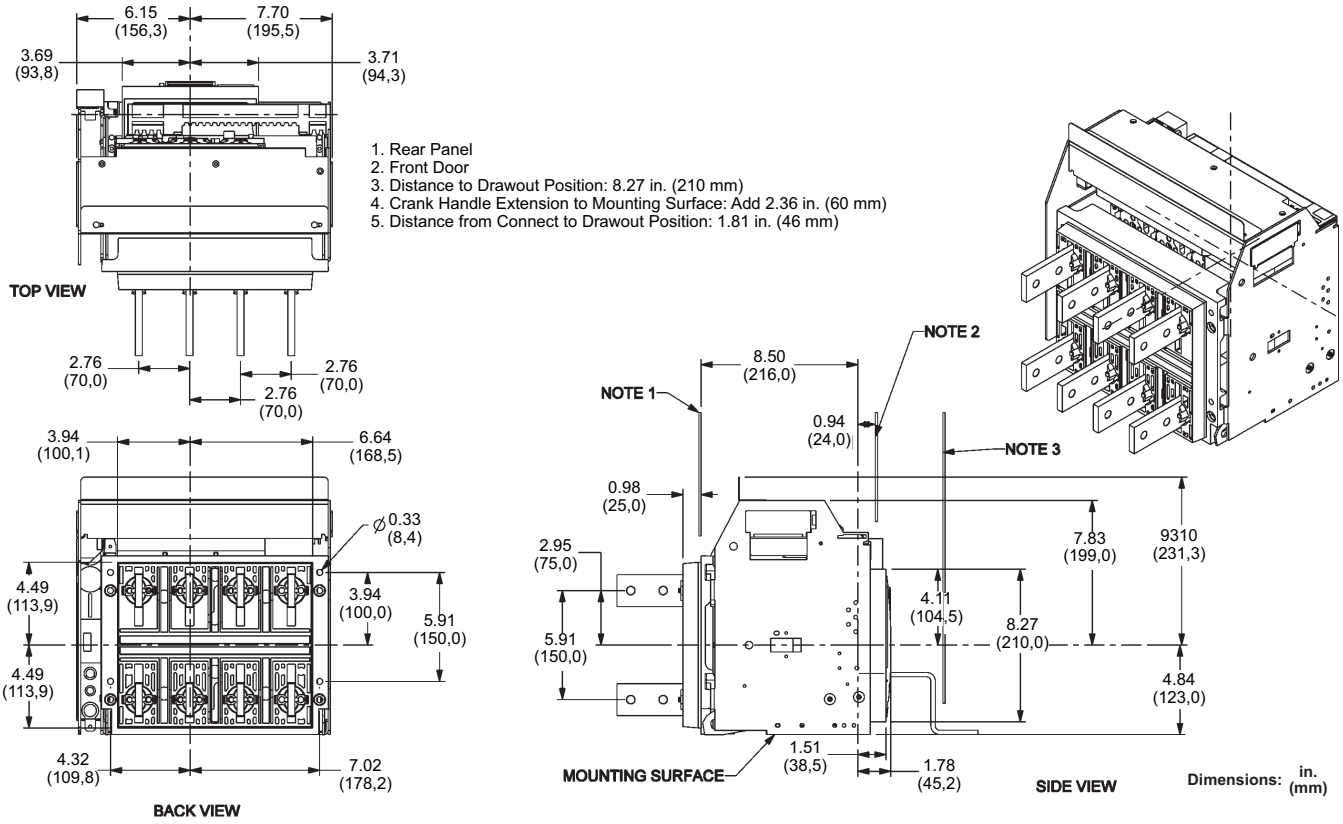


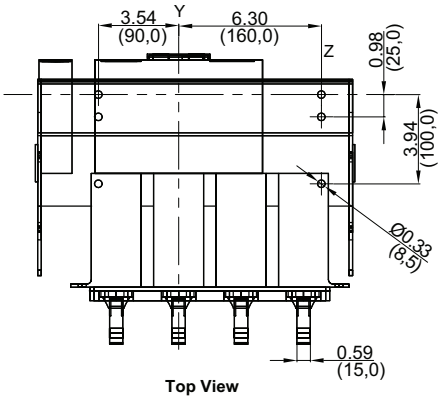

**Dimensions: in. (mm)**

# IEC Rated Four-Pole Drawout Circuit Breakers

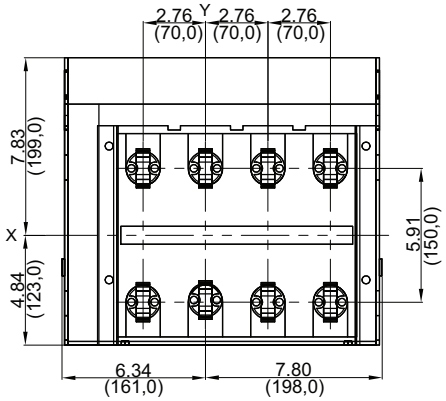
### 800–1600 A MasterPacT NT Four-Pole Drawout—Master Drawing



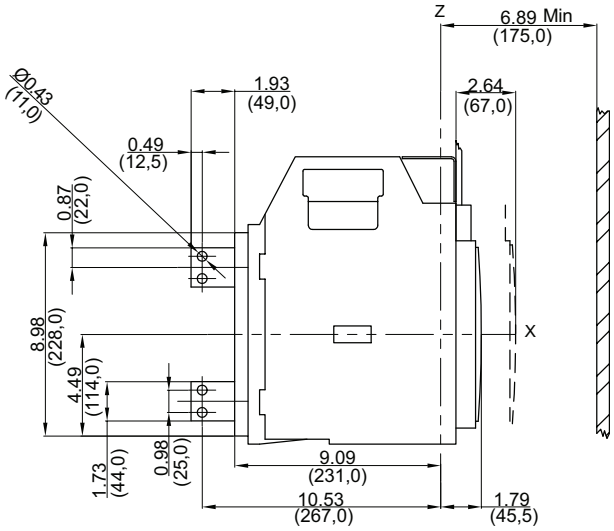
## 800–1600 A MasterPacT NT IEC Four-Pole Drawout—RCTV Rear-Connected “T” Vertical




**Top View**



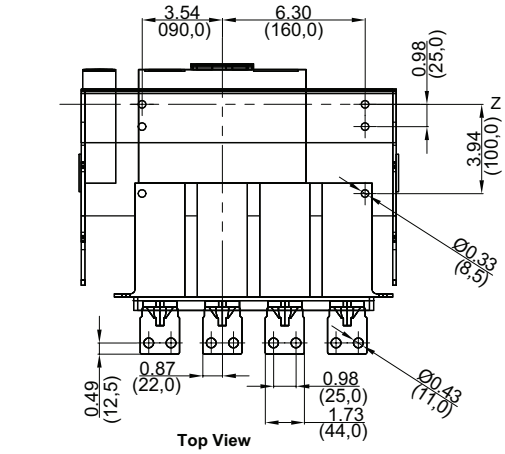

**Back View**



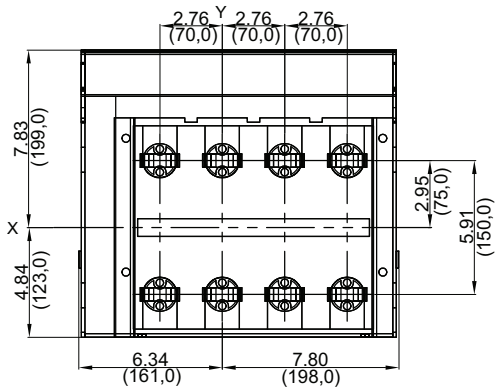

**Side View**

**Dimensions: in. (mm)**

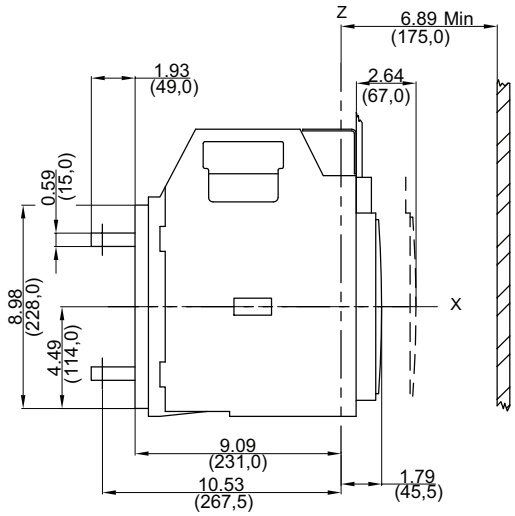
## 800–1600 A MasterPacT NT IEC Four-Pole Drawout—RCTH Rear-Connected “T” Horizontal




**Top View**



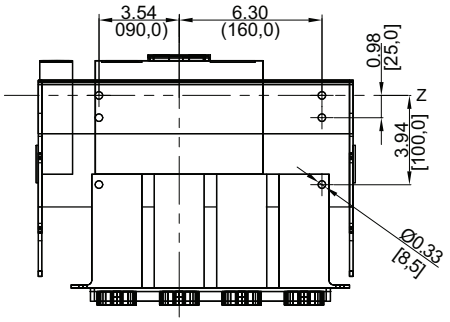

**Back View**



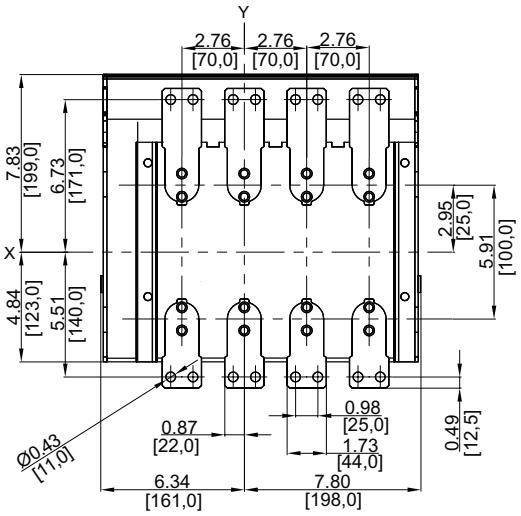

**Side View**

**Dimensions: in. (mm)**

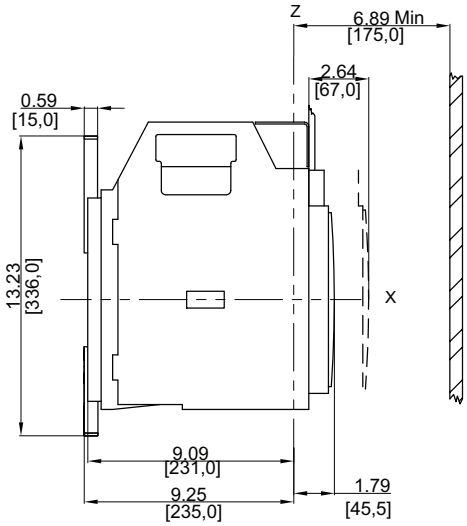
## 800–1600 A MasterPacT NT IEC Four-Pole Drawout—FCF Front-Connected Flat




Top View



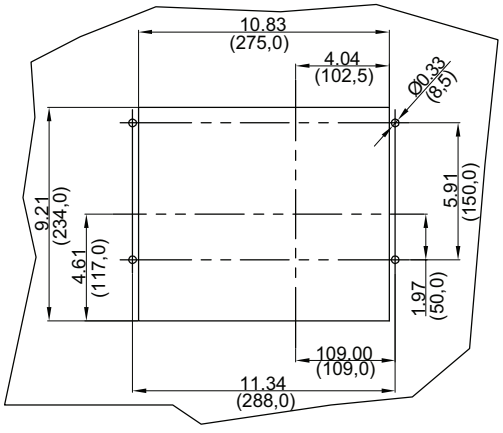

Back View



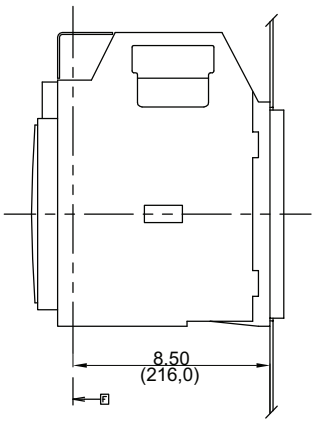

Side View

Dimensions: in. (mm)

## 800–1200 A MasterPacT NT IEC Four-Pole Drawout—Rear Cutout Dimensions




Front View

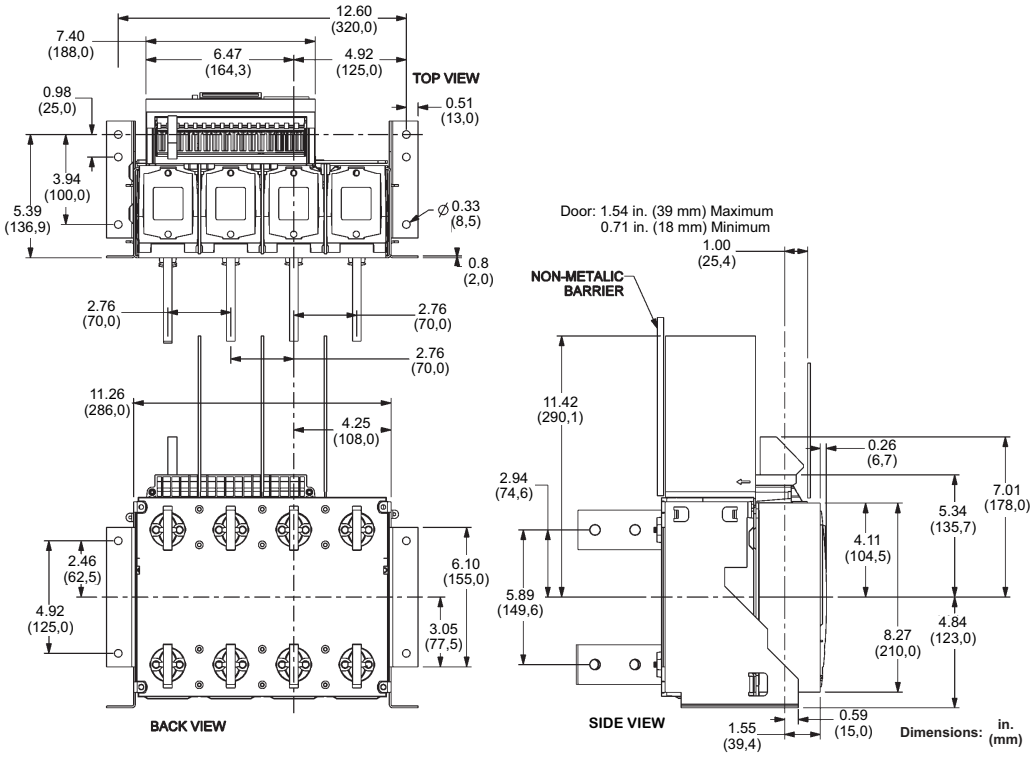



Side View

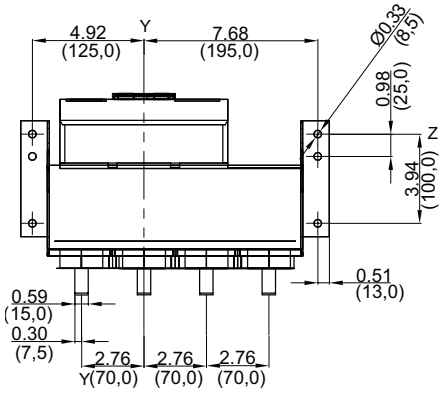
Dimensions: in. (mm)

# IEC Rated Four-Pole Fixed Circuit Breakers

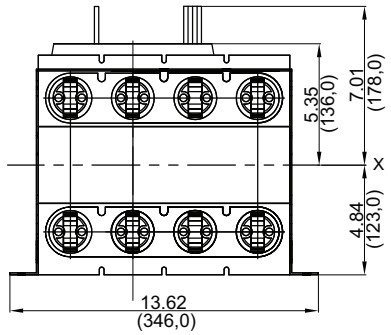
### 800–1600 A MasterPacT NT Four-Pole Fixed—Master Drawing



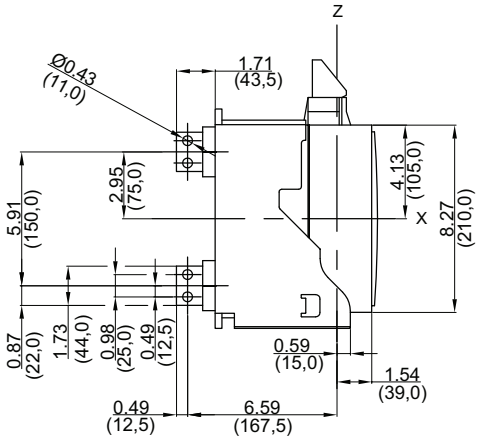
## 800–1600 A MasterPacT NT IEC Four-Pole Fixed—RCTV Rear-Connected “T” Vertical




**Top View**



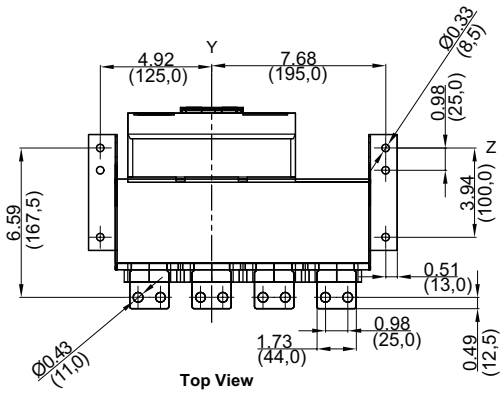

**Back View**



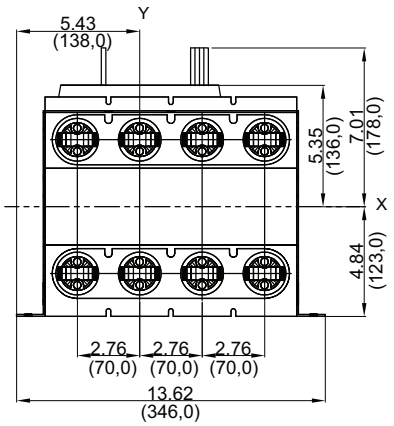

**Side View**

**Dimensions: in. (mm)**

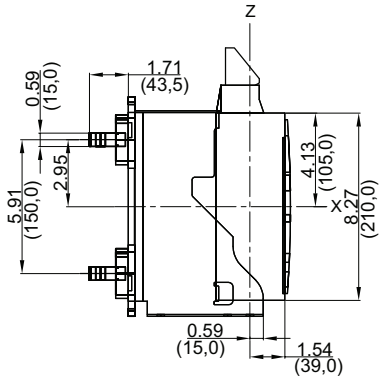
## 800–1600 A MasterPacT NT IEC Four-Pole Fixed—RCTH Rear-Connected “T” Horizontal




**Top View**



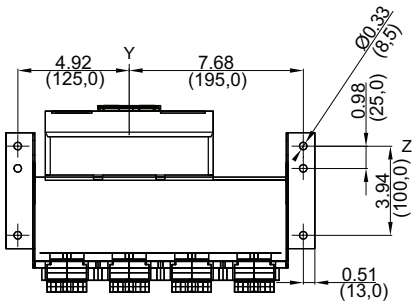

**Back View**



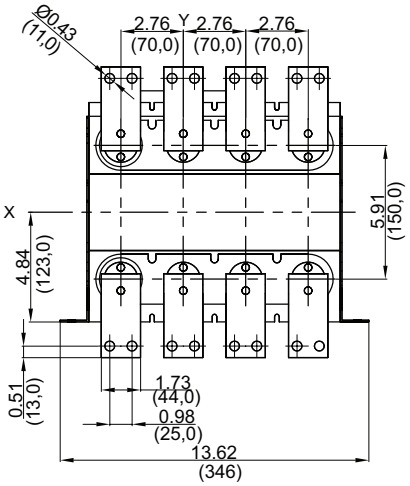

**Side View**

**Dimensions: in. (mm)**

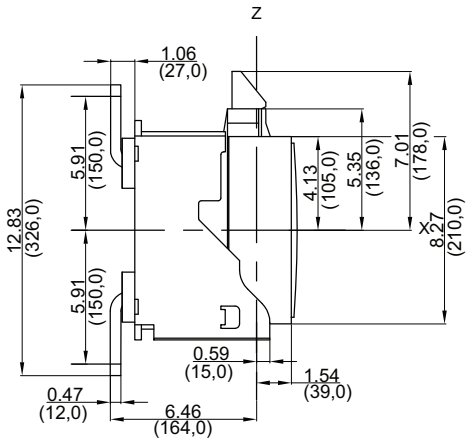
## 800–1600 A MasterPacT NT IEC Four-Pole Fixed—FCF Front-Connected Flat




**Top View**



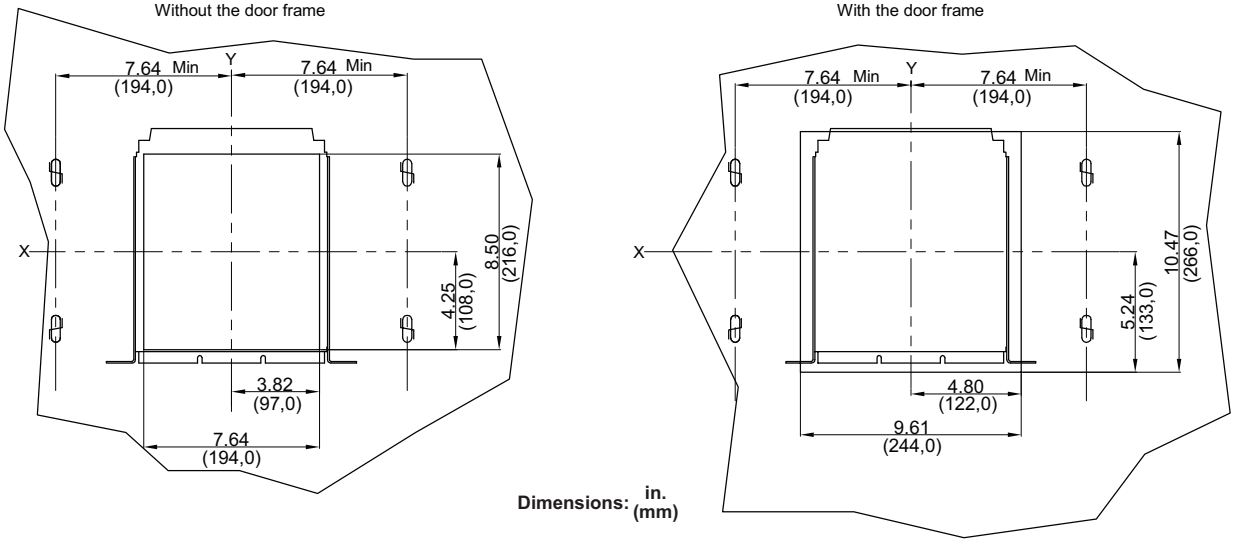

**Back View**




**Dimensions: in. (mm)**

**Side View**

## 800–1200 A MasterPacT NT IEC Four-Pole Fixed—Rear Cutout Dimensions




**Dimensions: in. (mm)**

# MasterPacT NW Dimensional Drawings

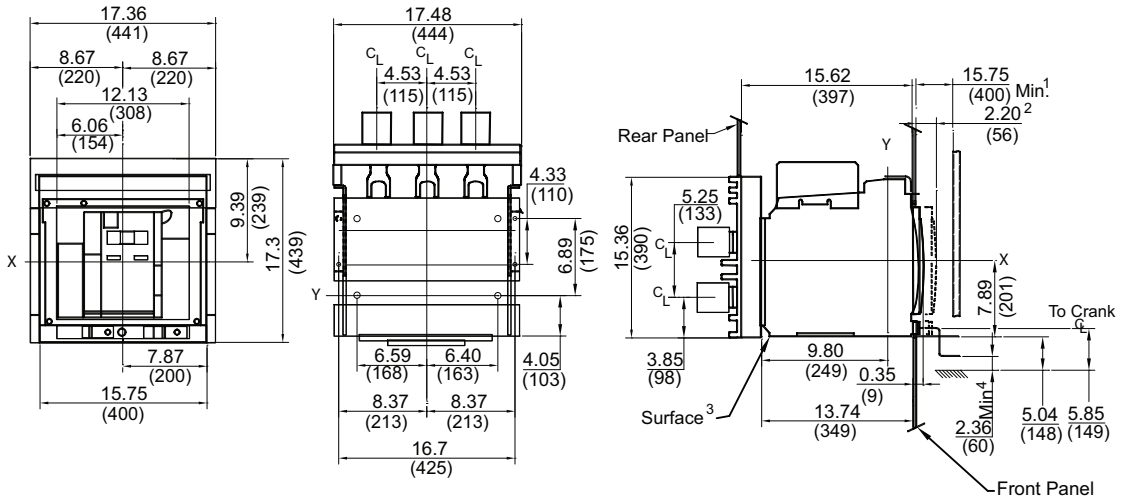
## MasterPacT NT Enclosure Information

### Minimum Enclosure Information

| Number of Poles | Circuit Breaker Rating | Circuit Breaker Enclosure Dimensions | | Ventilation Area | | |
|---|---|---|---|---|---|---|
| | | (H x W x D) | | Top | | Bottom |
| | | in. | mm | in.2 | mm2 | in.2 |
| 3 | 800 to 1600 A (N, H, L1) | 18.25 x 13 x 9.5 | 463.5 x 330.2 x 241.3 | 9 | 5806 | 9 |
| | 800 to 1600 A (L) | 62.25 x 23 x 14.75 | 1581.2 x 584.2 x 374.7 | 16.5 | 10645 | 16.5 |
| 4 | 800 to 1600 A (N, H, L1) | 18.25 x 15.8 x 9.5 | 463.5 x 401.3 x 241.3 | 9 | 5806 | 9 |
| | 800 to 1600 A (L) | 62.25 x 25.76 x 14.75 | 1581.2 x 654.2 x 374.7 | 16.5 | 10645 | 16.5 |

## MasterPacT NW UL/ANSI Three-Pole Drawout Circuit Breakers

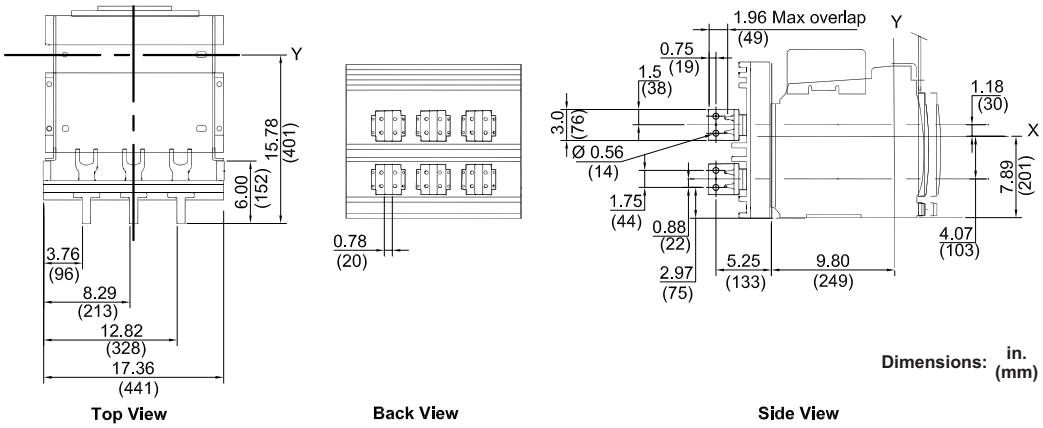
### 800–3000 A and 4000 A (H1, H2, H3) Master Drawing



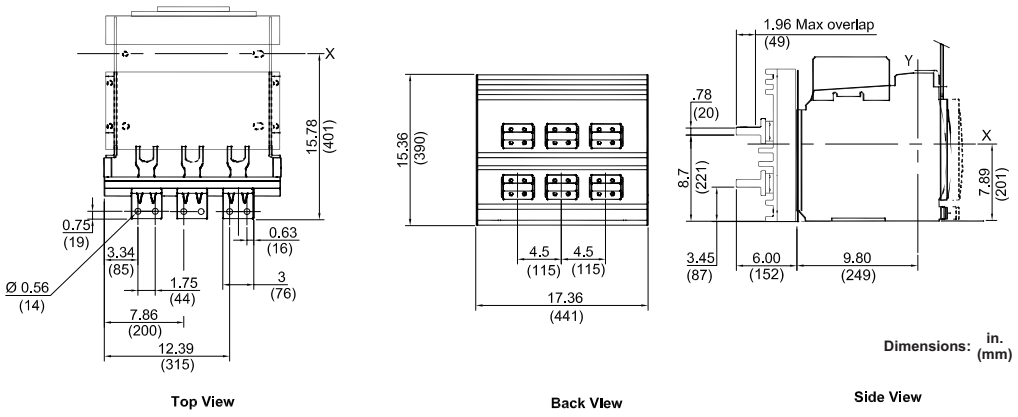

**Front View** **Top View** **Side View** **Dimensions: in. (mm)**

1. Minimum to withdraw circuit breaker.
2. Distance to drawout position.
3. Circuit breaker mounting surface.
4. Minimum for circuit breaker racking handle.

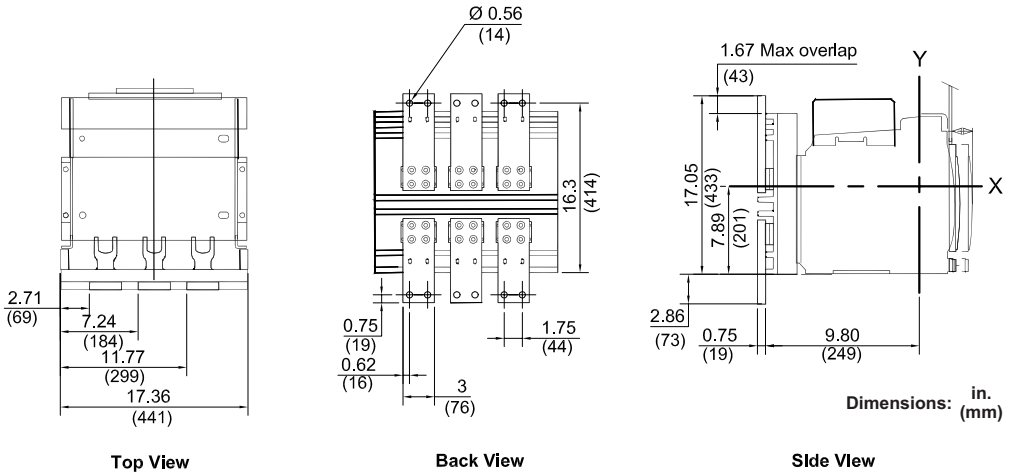
## 800–2000 A Rear-Connected "T" Vertical (RCTV)



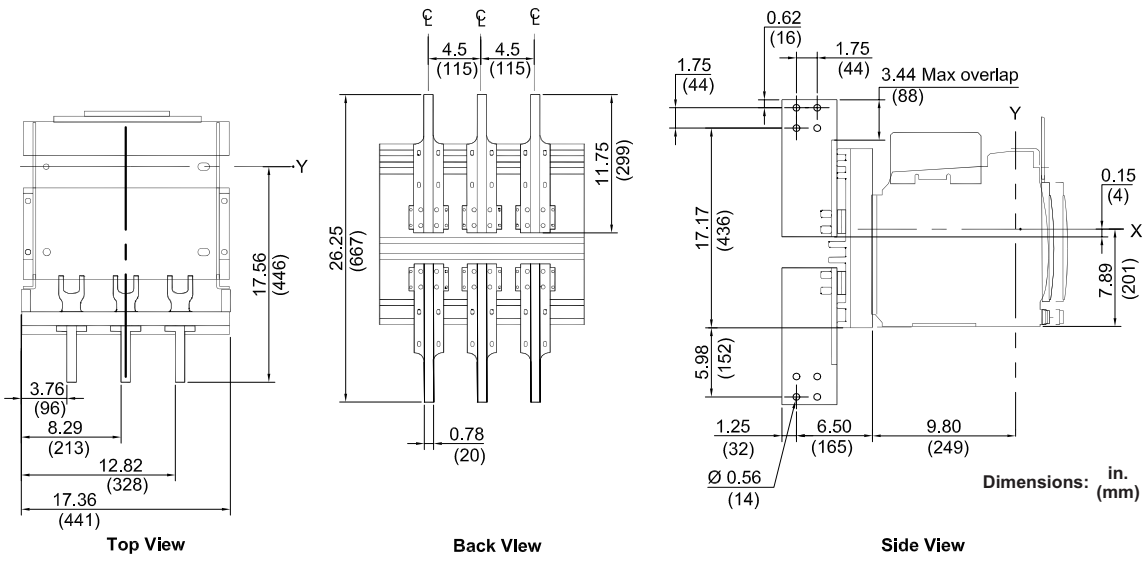

## 800–2000 A Rear-Connected "T" Horizontal (RCTH)



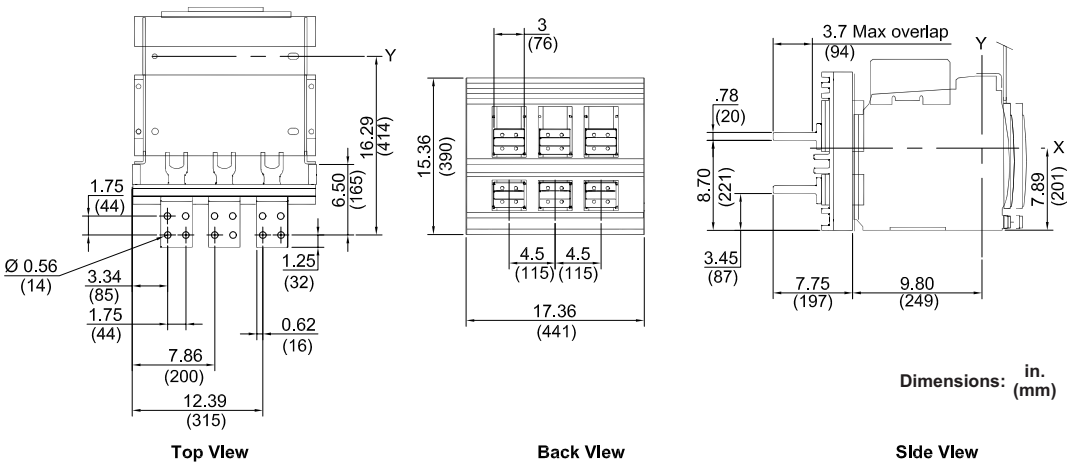

## 800–2000 A Front-Connected Flat (FCF)



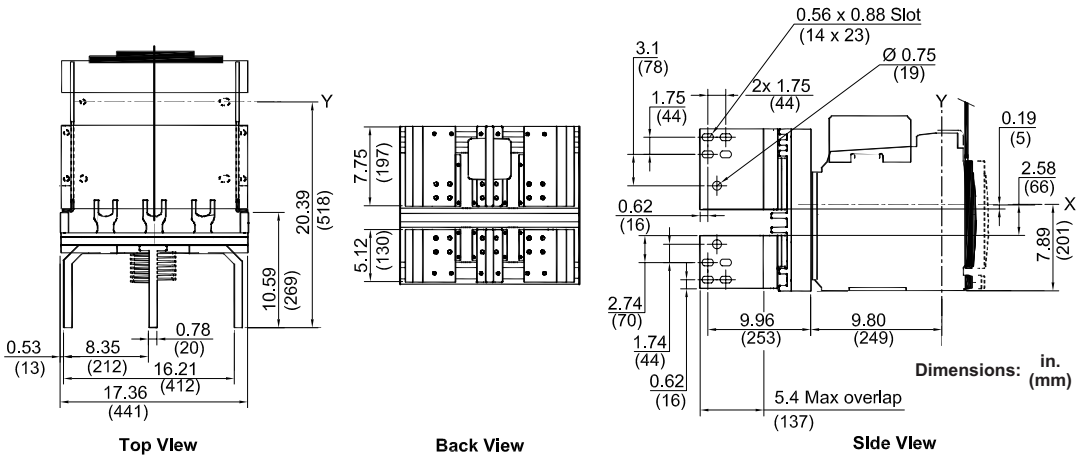
## 800–3000 A Front-Connected "T" (FCT)



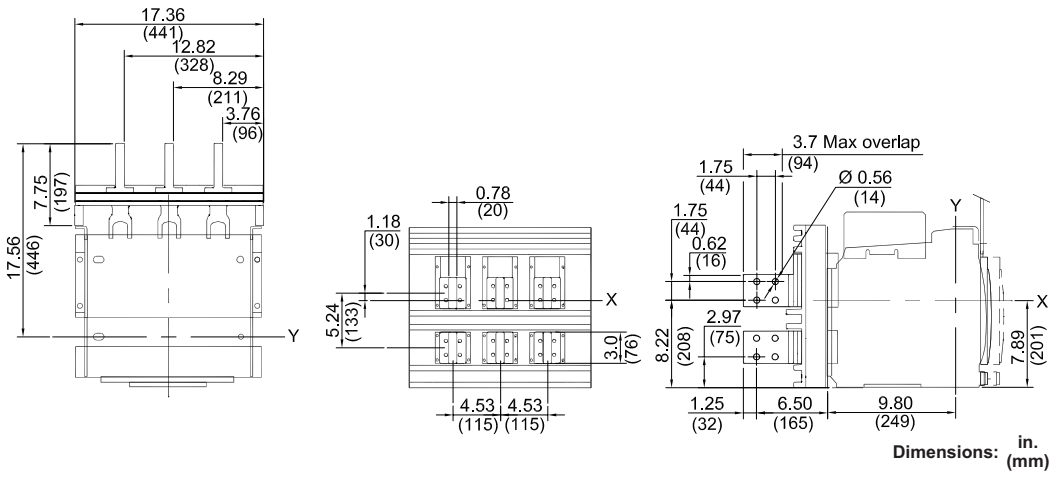

## 2500–3000 A Rear-Connected "T" Horizontal (RCTH)




## 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)

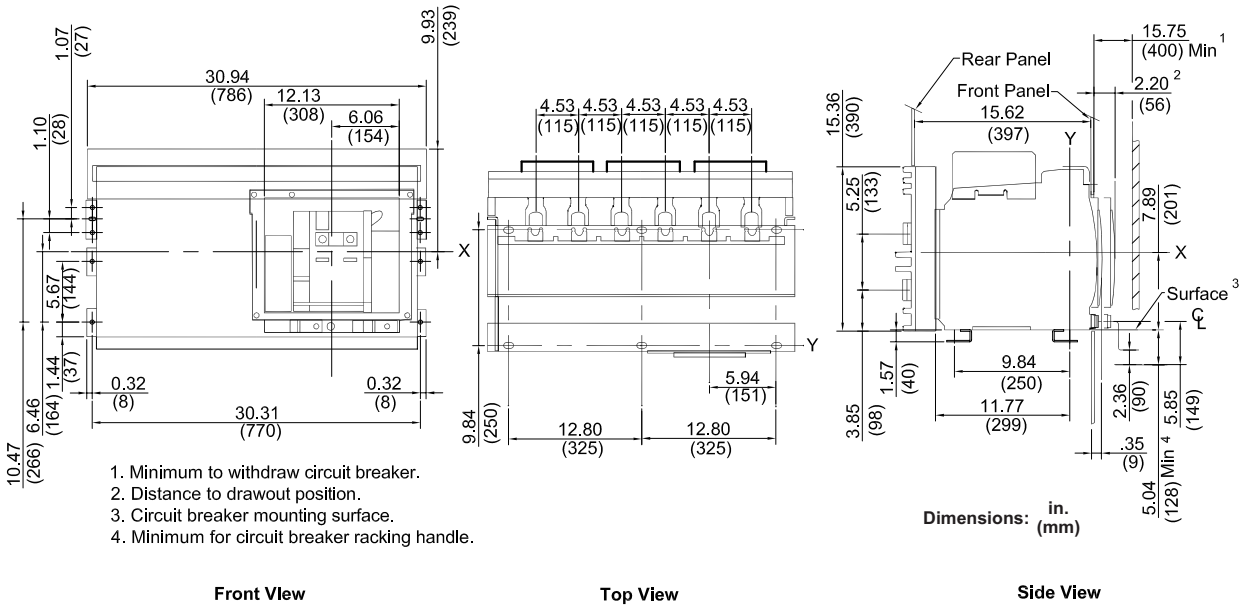


## 2500–3000 A Rear-Connected "T" Vertical (RCTV)




Top View Back View Side View

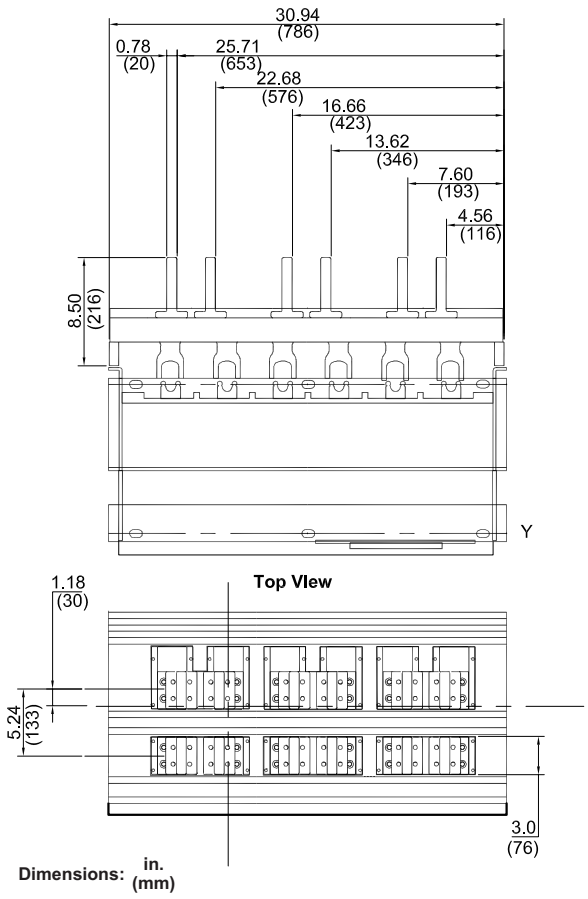
## 3200 A L1 and 4000–6000 A Master Drawing

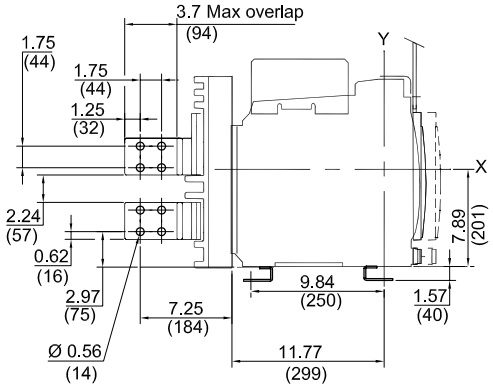



1. Minimum to withdraw circuit breaker.
2. Distance to drawout position.
3. Circuit breaker mounting surface.
4. Minimum for circuit breaker racking handle.

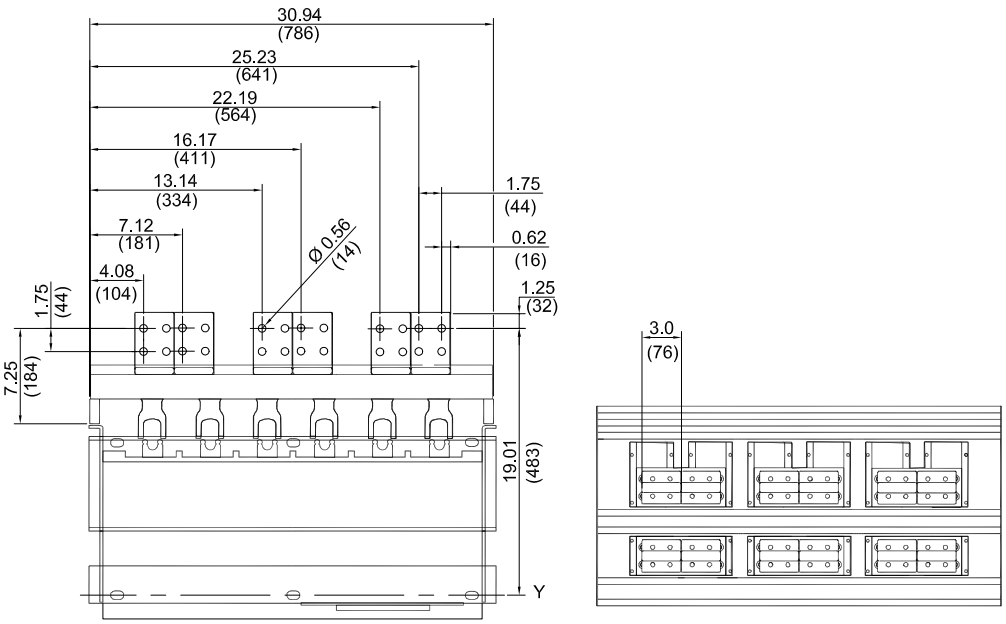
Front View Top View Side View

## 3200 A L1 and 4000–5000 A Rear-Connected "T" Vertical (RCTV)



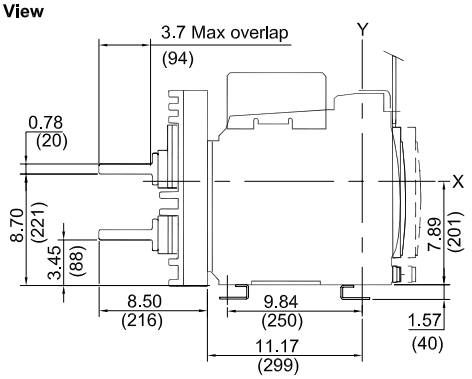



## 3200 A L1 and 4000–5000 A Rear-Connected "T" Horizontal (RCTH)




**Top View**

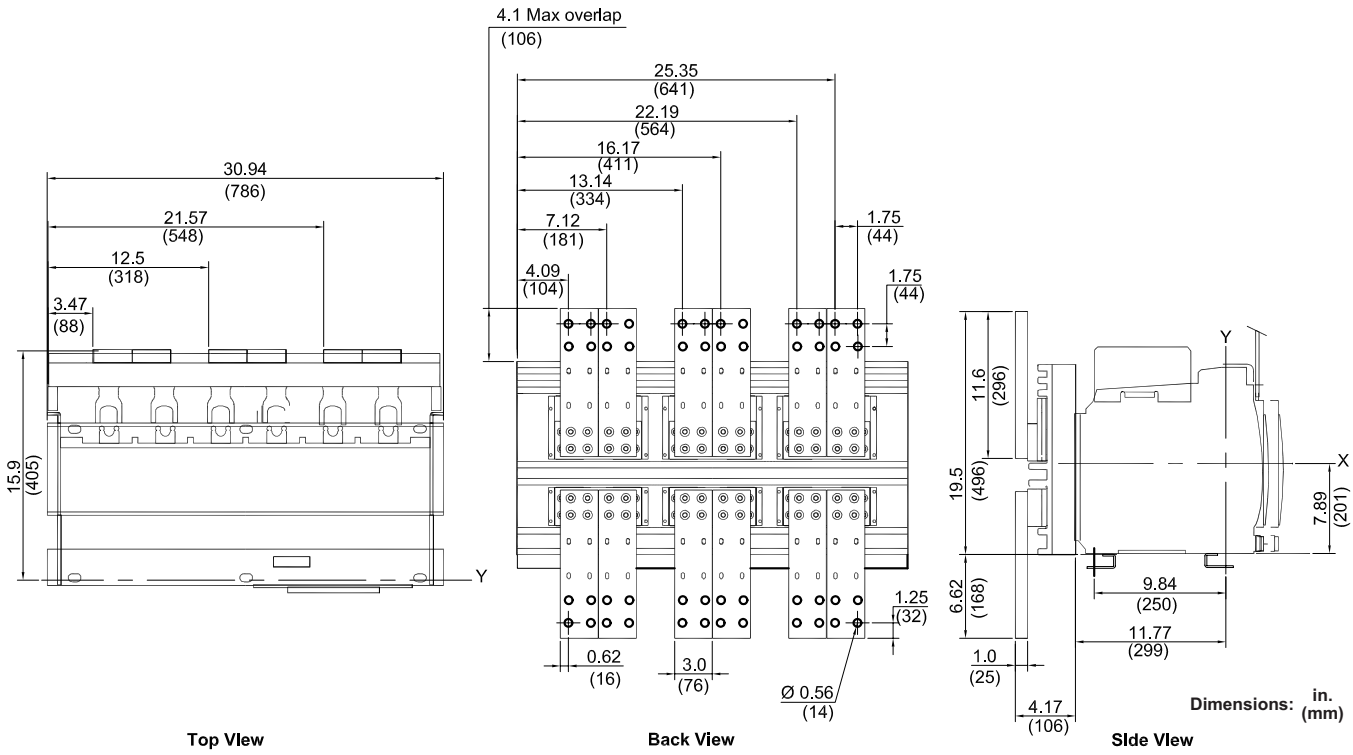
**Back View**



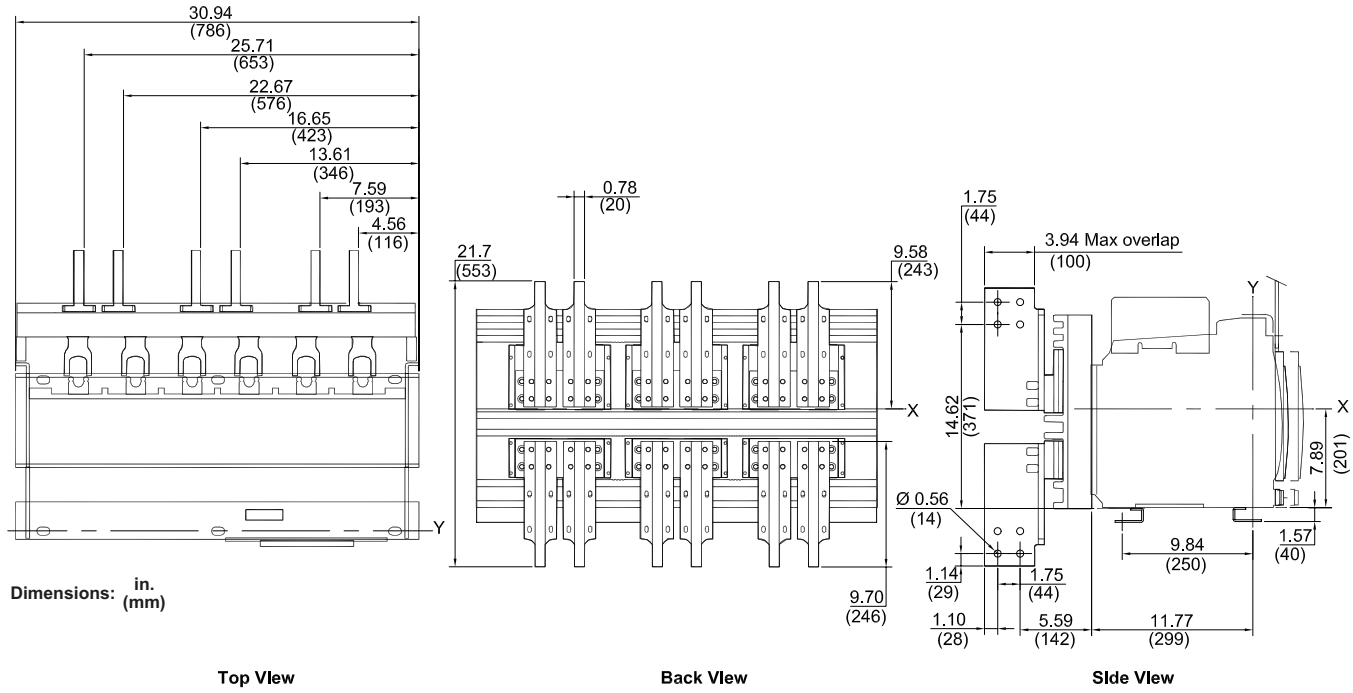

**Side View**

**Dimensions:** in. (mm)

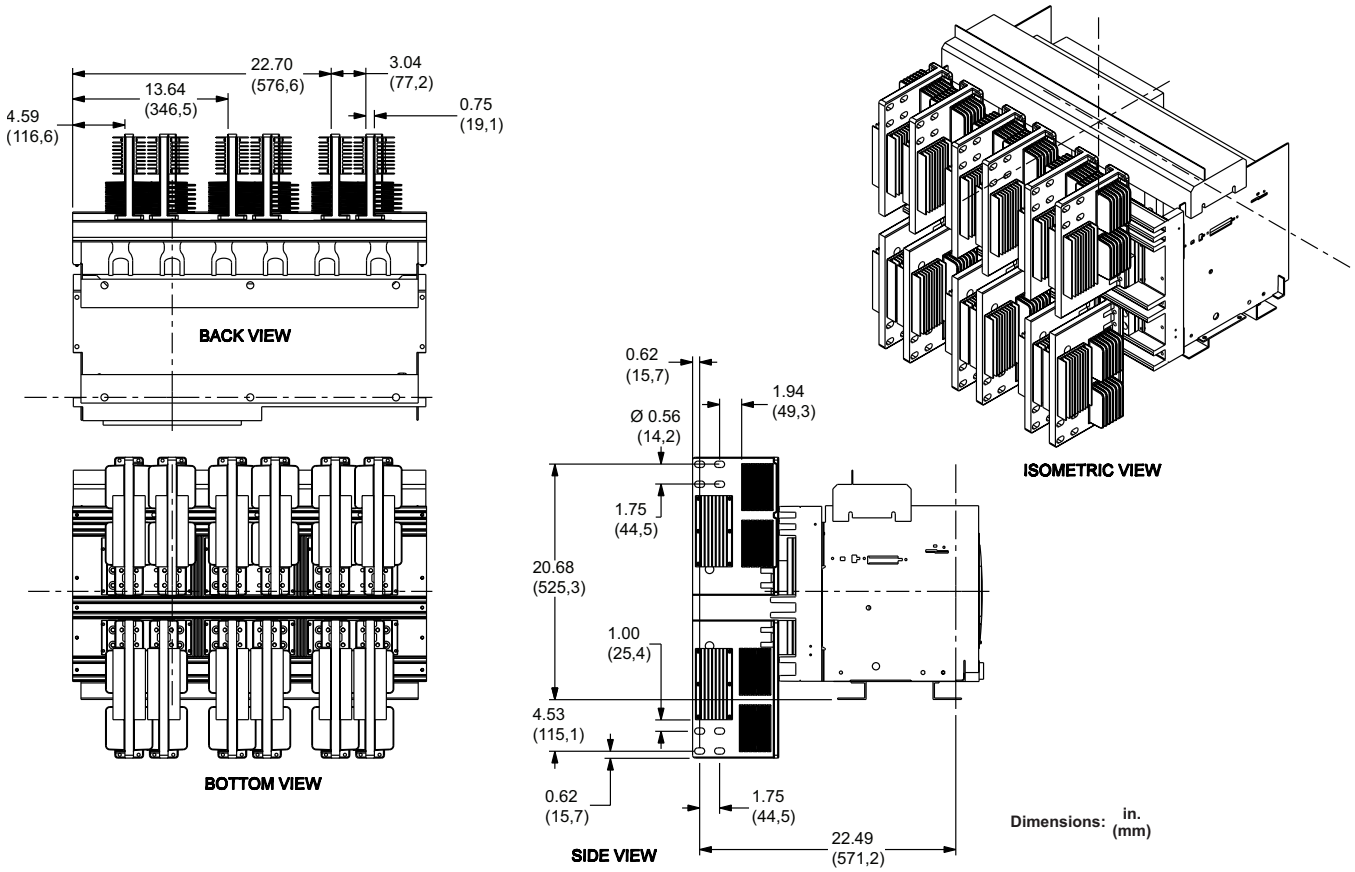
## 3200 A L1 and 4000 A Front-Connected Flat (FCF)



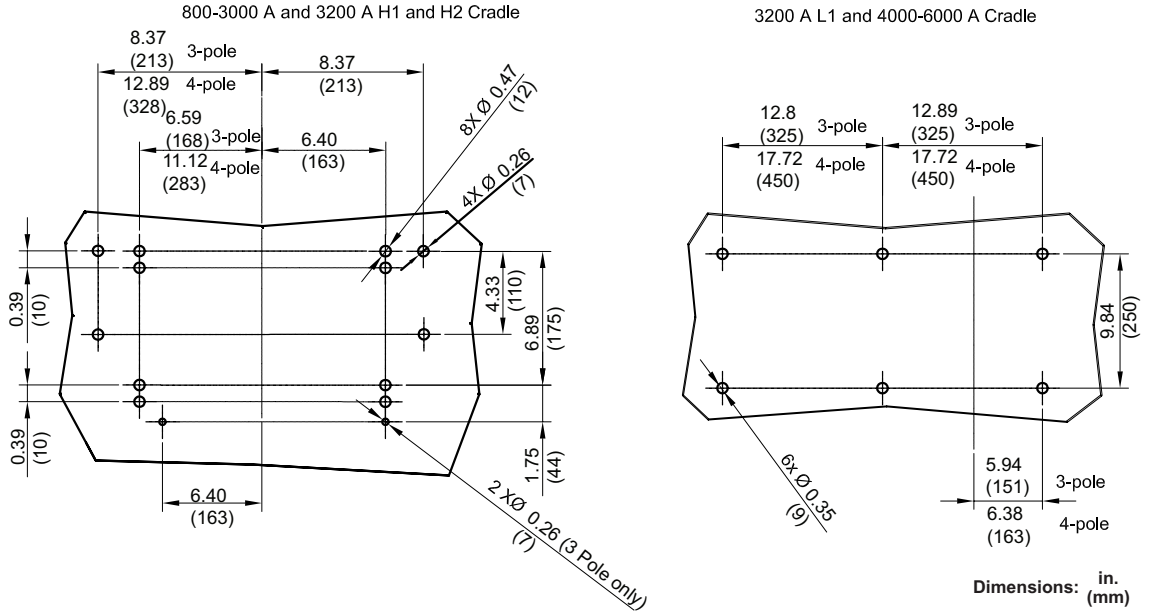

## 3200 A L1 and 4000–5000 A Front-Connected "T" (FCT)



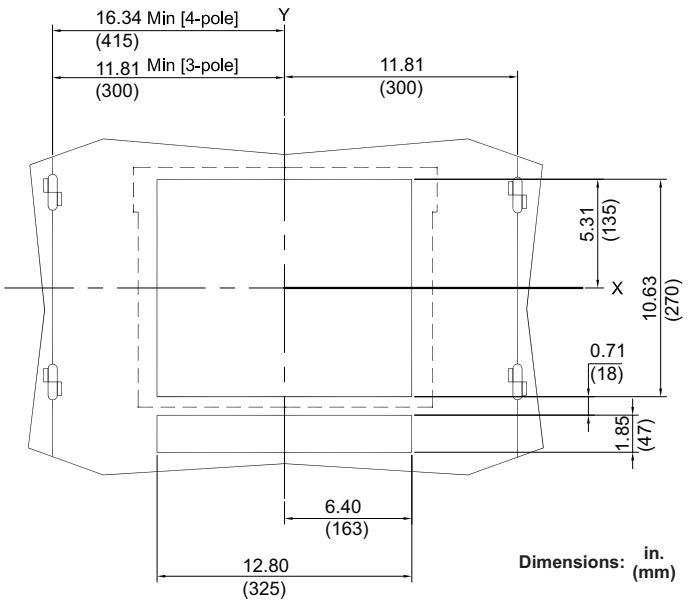
## 6000 A Rear-Connected "T" Vertical (RCTV)



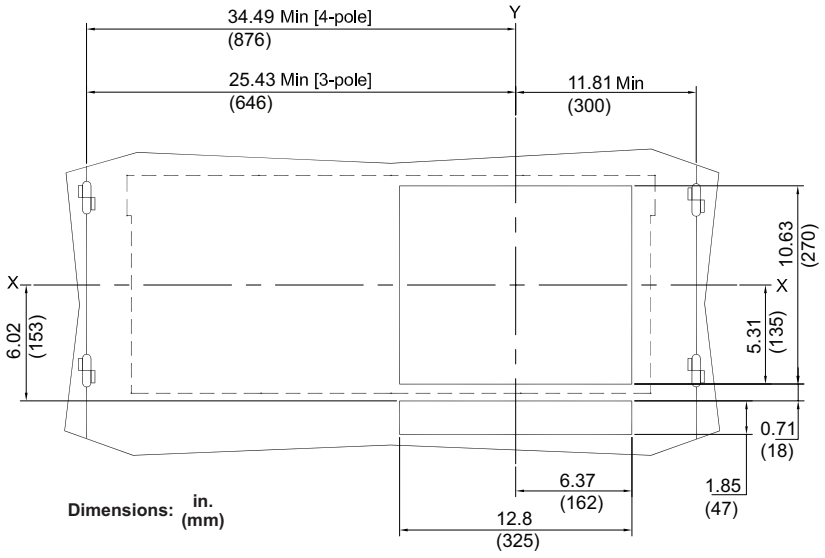

## Drawout Cradle Mounting



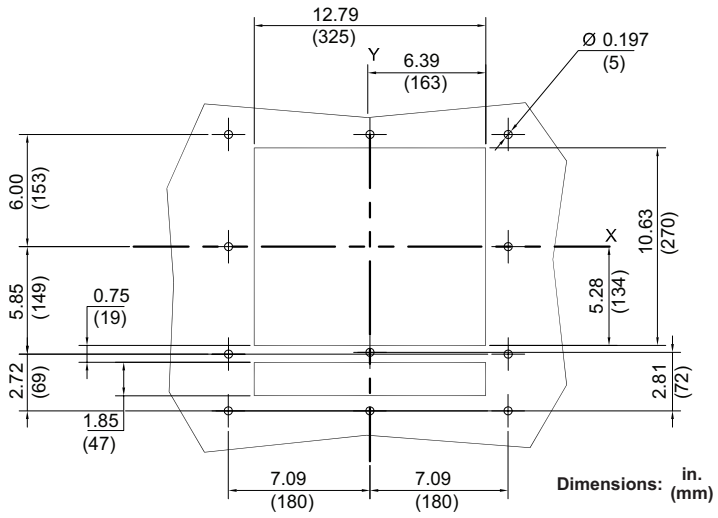
## 800–3000 A and 3200 A (H1, H2, H3) Door Cutout




## 3200 A L1 and 4000–6000 A Door Cutout

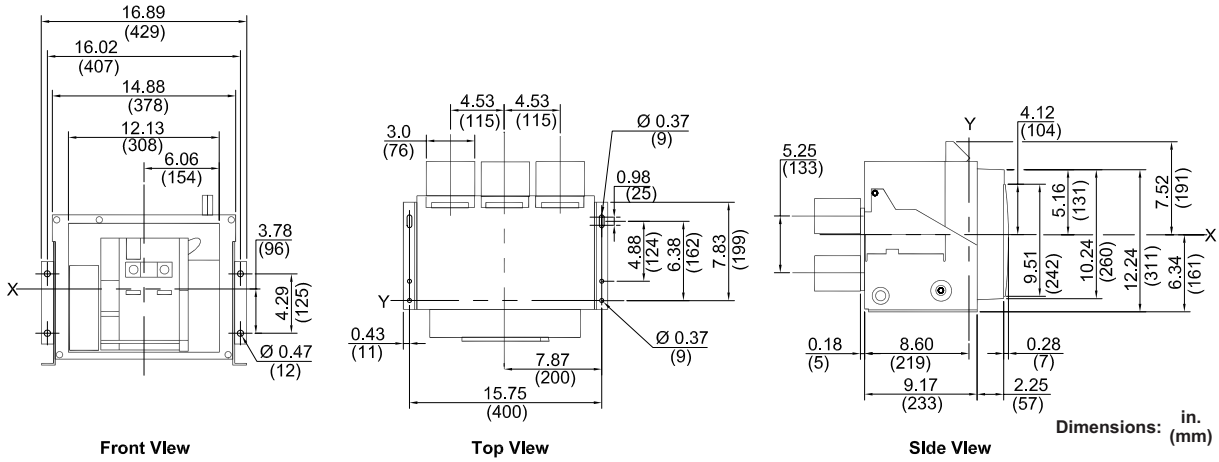


### Door Escutcheon Hole Pattern

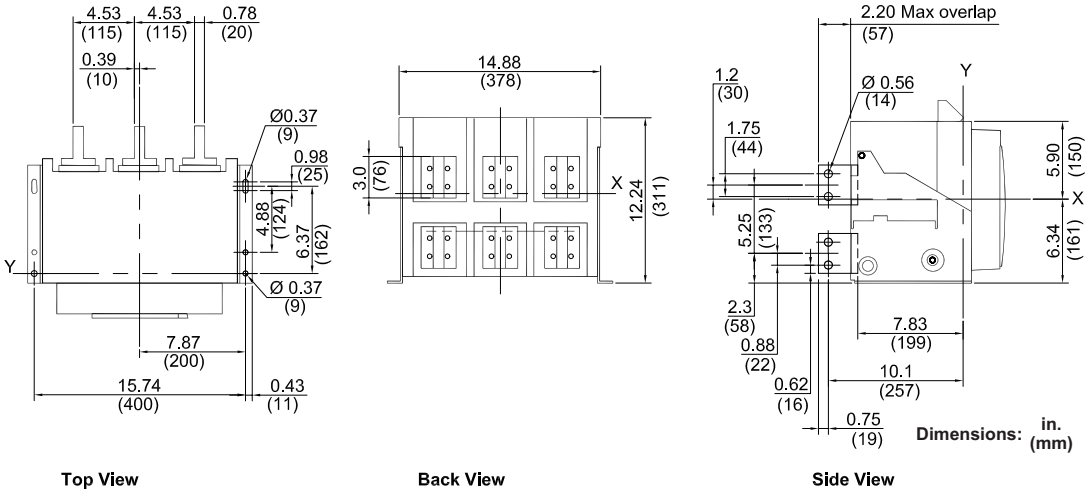



# MasterPacT NW Drawout Cradle Mounting

### 800–3000 A, 3200 A and 4000 A (W-Frame) Master Drawing

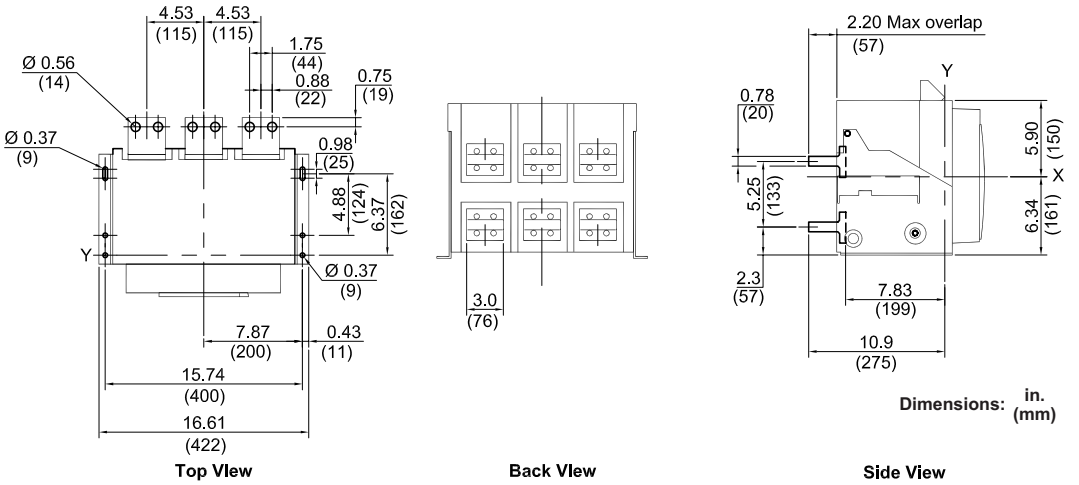


## 800–2000 A Rear-Connected "T" Vertical (RCTV)



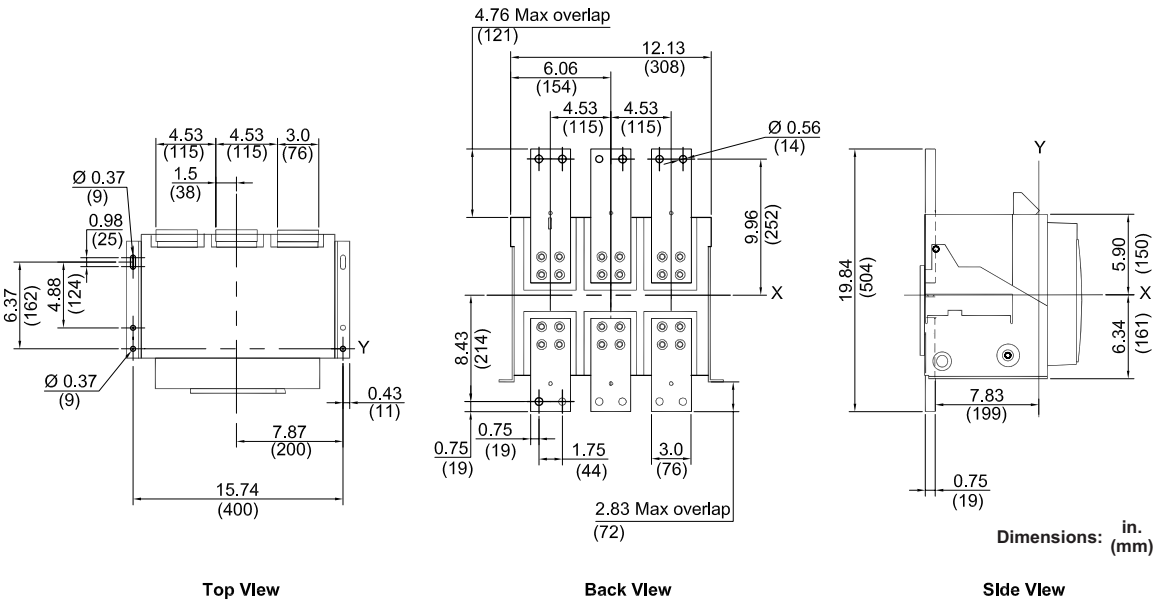

Top View Back View Side View

## 800–2000 A Rear-Connected "T" Horizontal (RCTH)



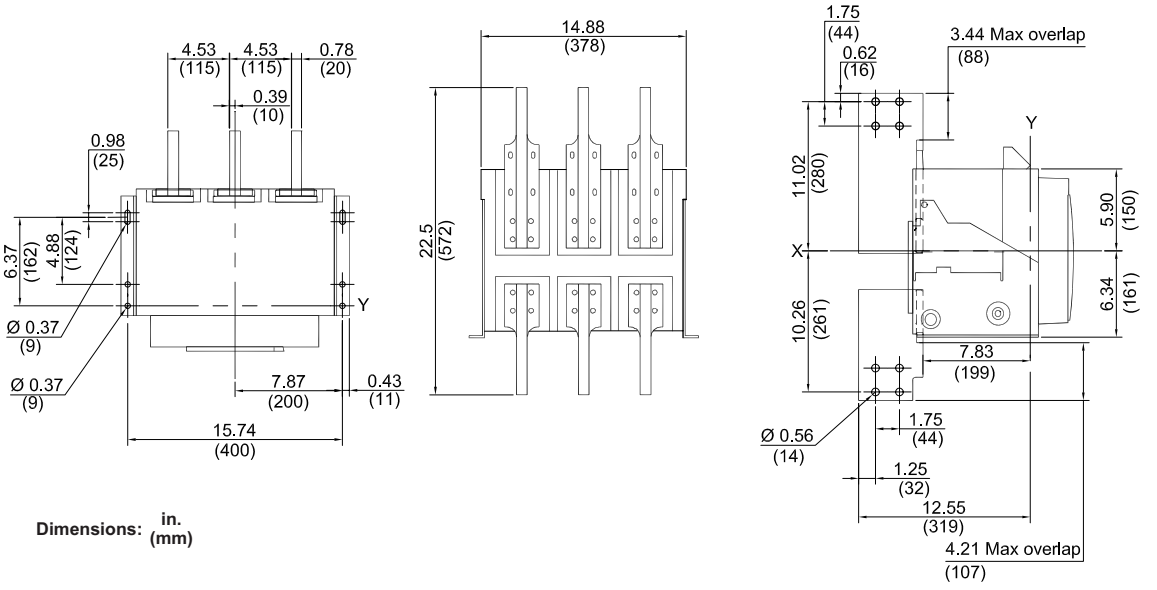

Top View Back View Side View

## 800–2000 A Front-Connected Flat (FCF)



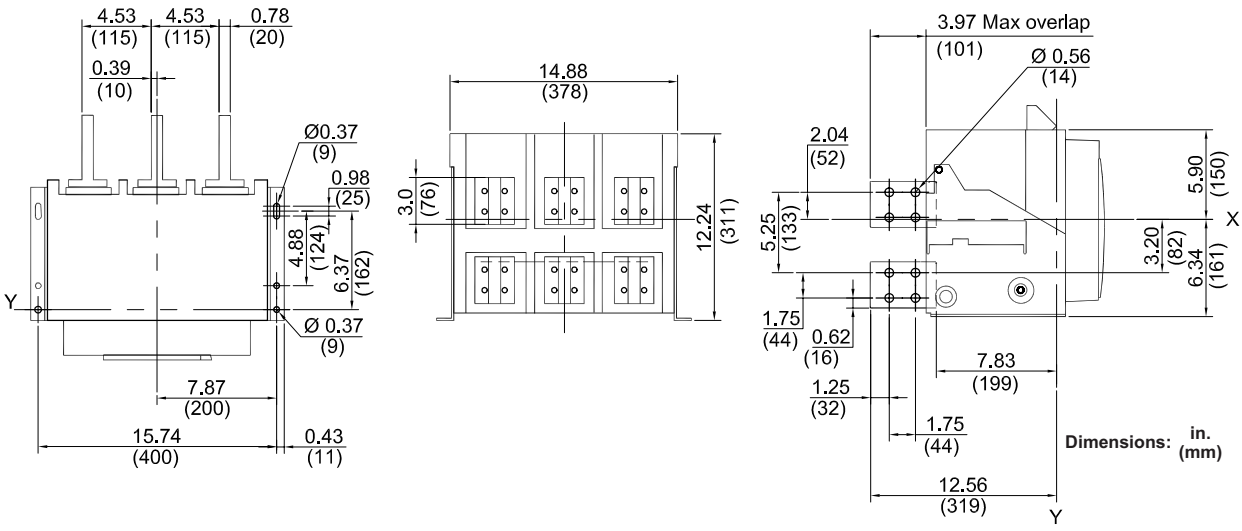

Top View Back View Side View

## 800–3000 A Front-Connected "T" (FCT)



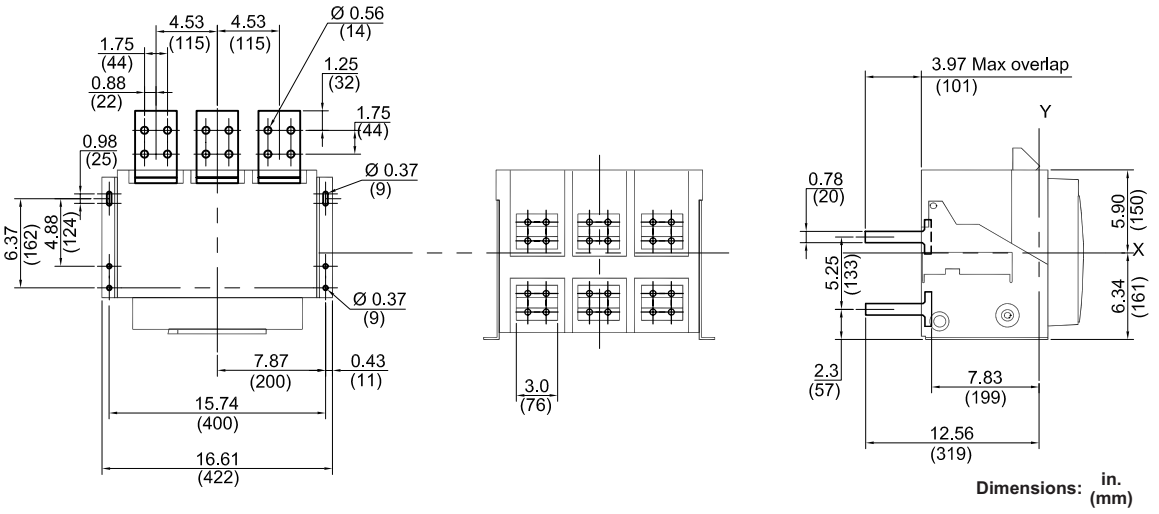

Top View Back View Side View

## 2500–3000 A Rear-Connected Vertical "T" Horizontal (RCTV)



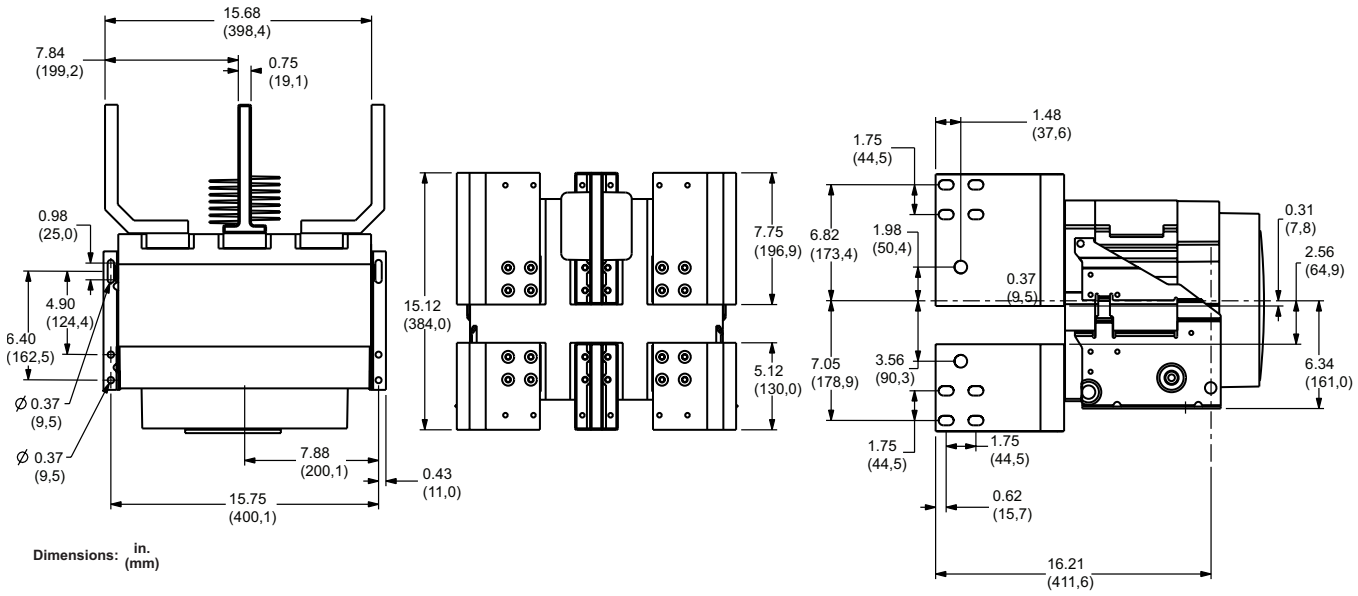

**Top View** **Back View** **Side View**

## 2500–3000 A Rear-Connected "T" Horizontal (RCTH)

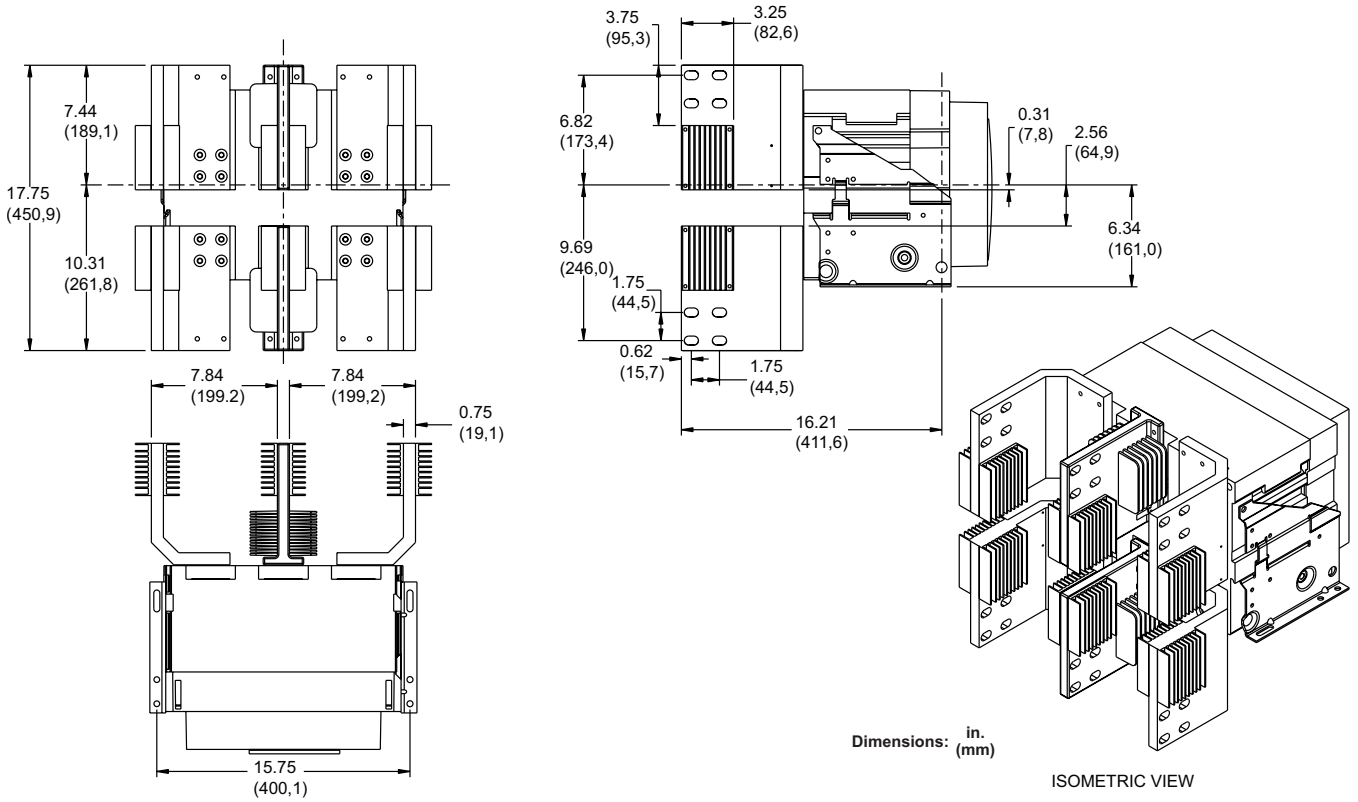



**Top View** **Back View** **Side View**

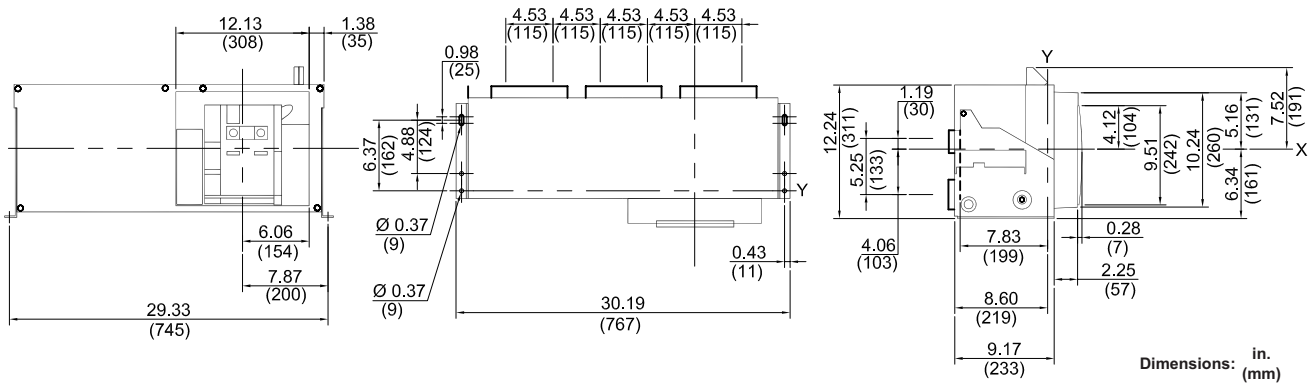
## 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)




## 4000 A (W-Frame) Rear-Connected Offset Vertical (RCOV)

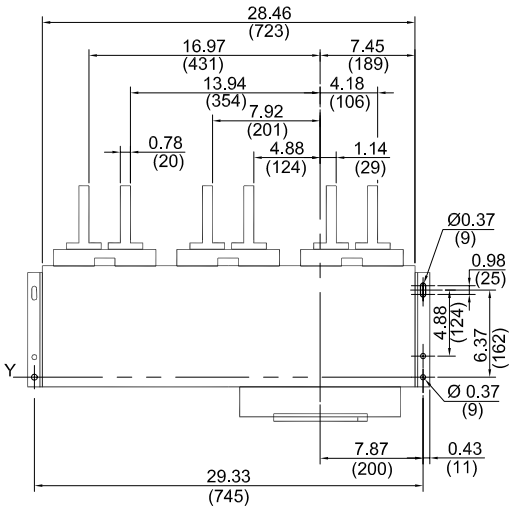


## 4000–6000 A Master Drawing

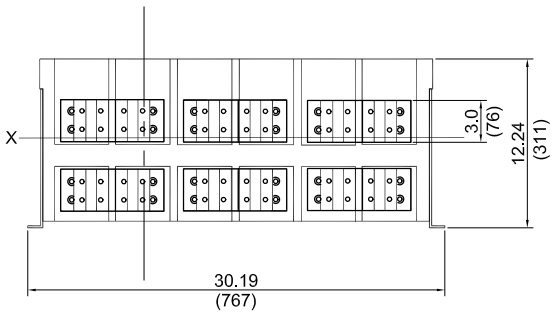



**Front View** **Top View** **Side View**

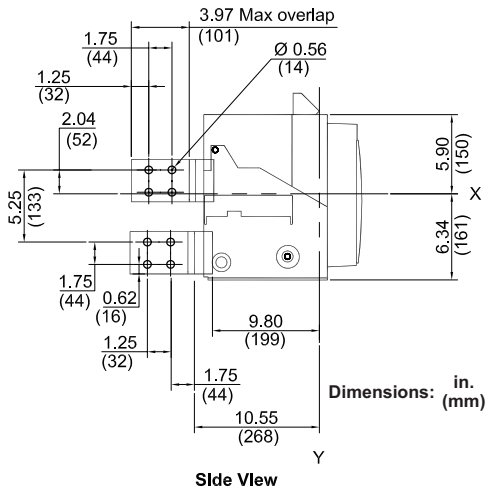
## 4000–5000 A Rear-Connected "T" Vertical (RCTV)




**Top View**

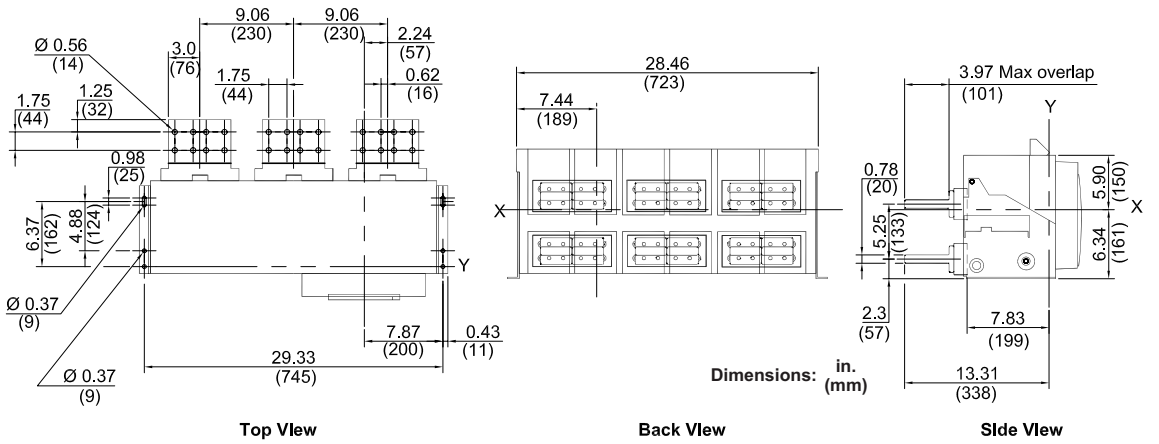



**Back View**

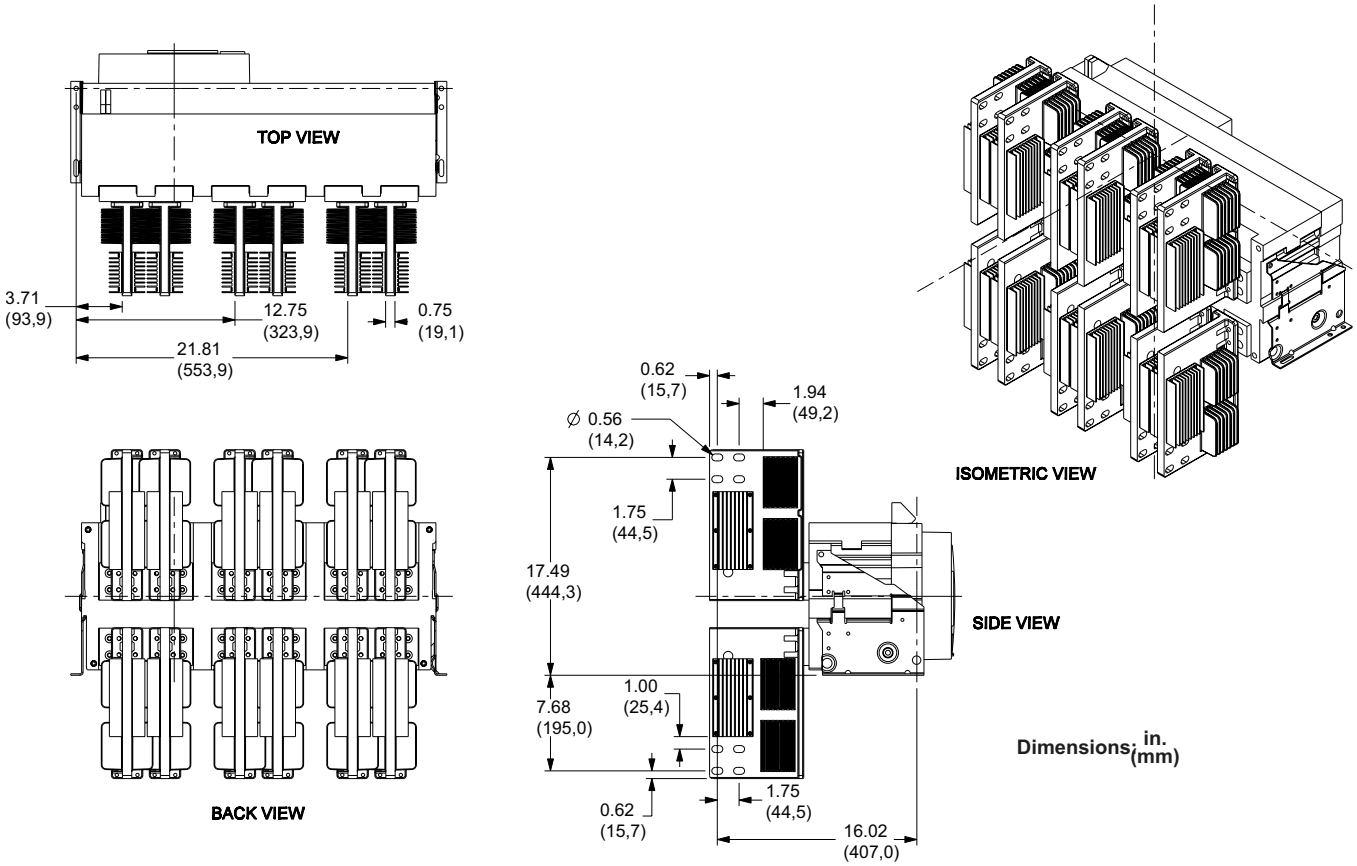



**Side View**

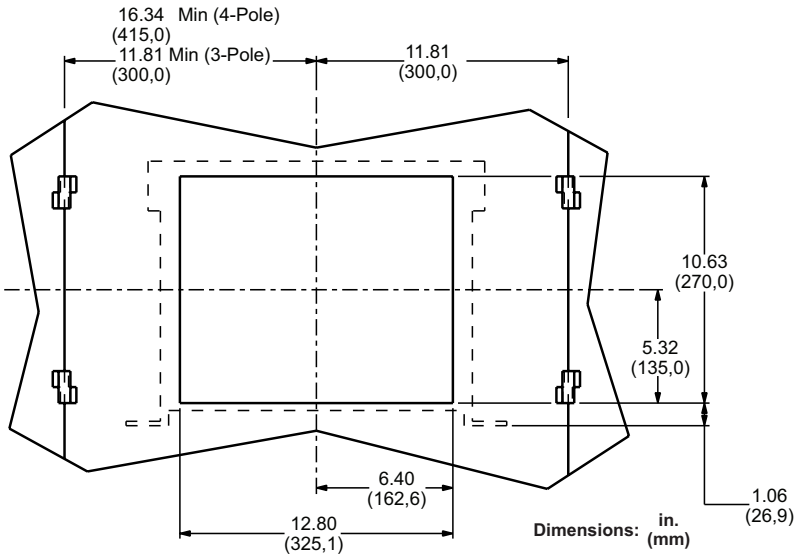
## 4000–5000 A Rear-Connected "T" Horizontal (RCTH)



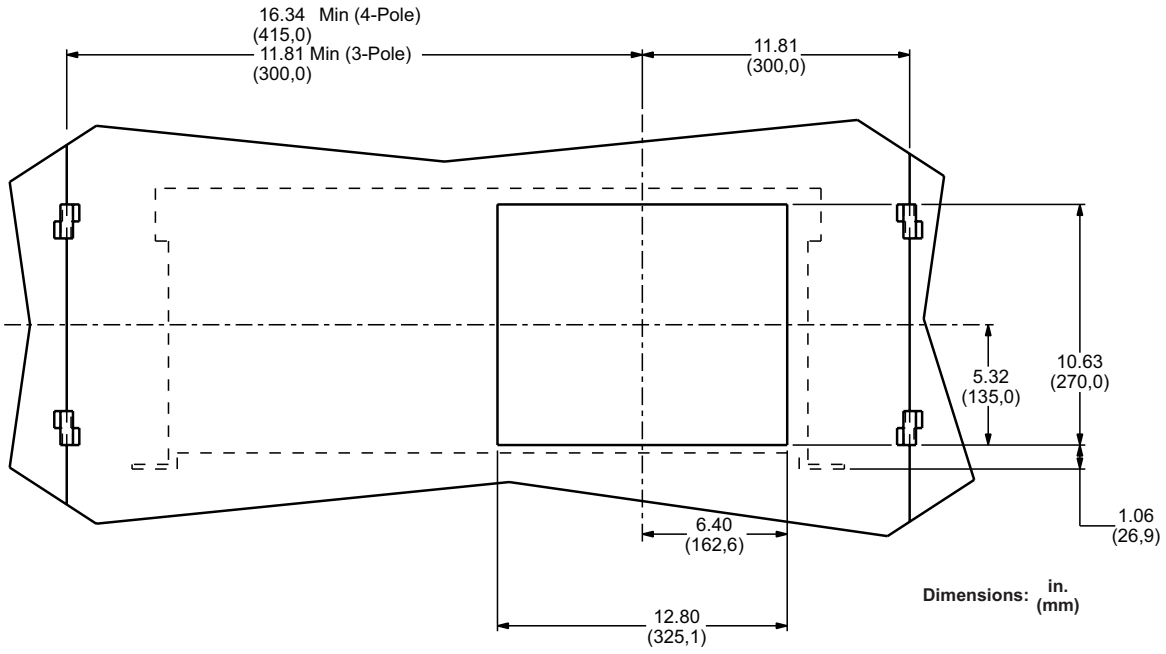

## 6000 A Rear-Connected "T" Vertical (RCTV)



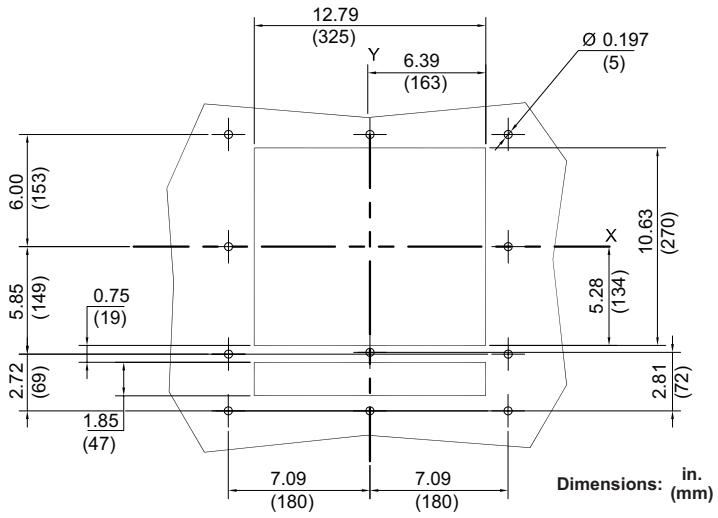
### 800–3200 A and 4000 A (W-Frame) Circuit Breaker Door Cutout




### 4000–6000 A Door Cutout

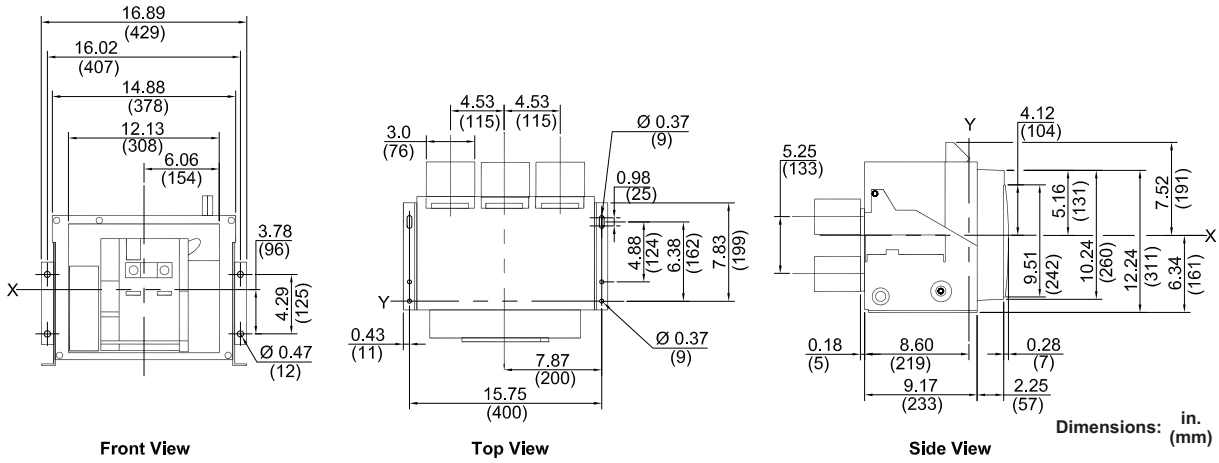


### Door Escutcheon Hole Pattern

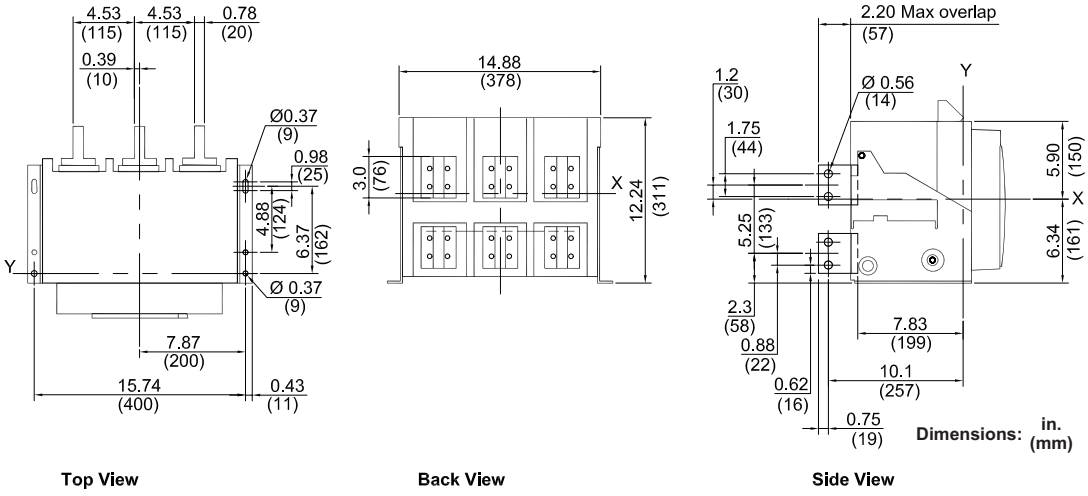



# MasterPacT NW UL/ANSI Three-Pole Fixed Circuit Breakers

### 800–3000 A, 3200 A and 4000 A (W-Frame) Master Drawing

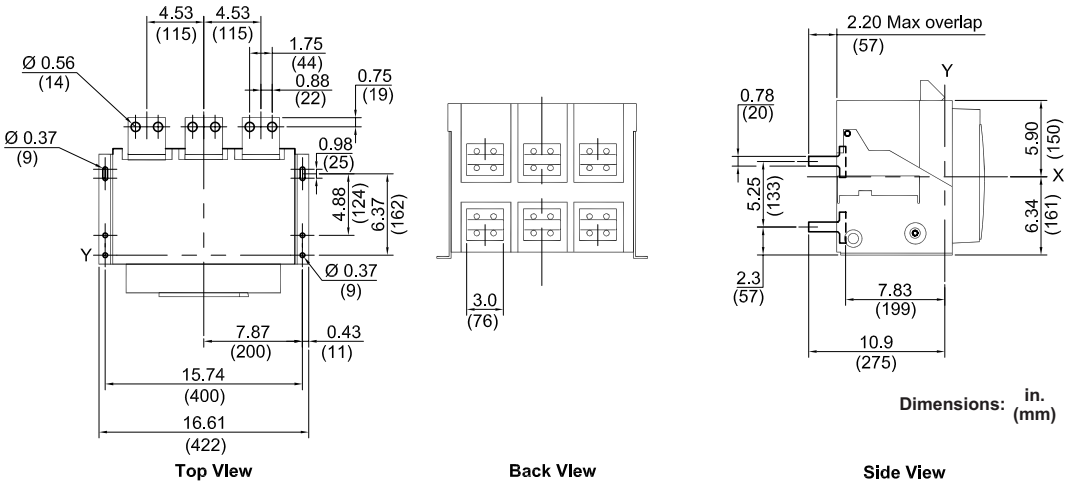


## 800–2000 A Rear-Connected "T" Vertical (RCTV)



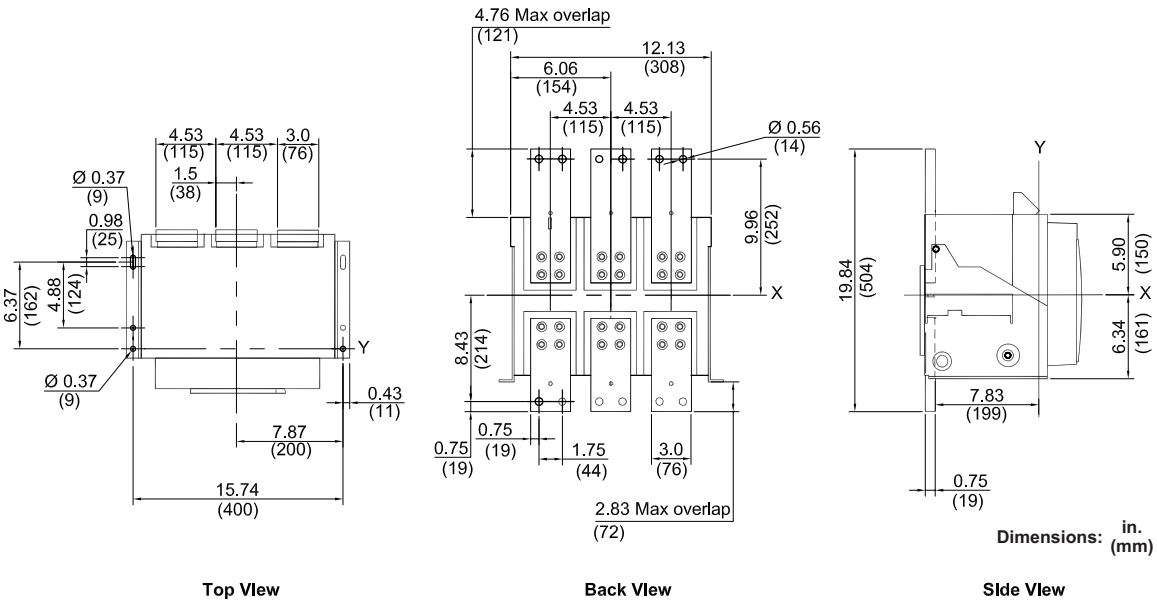

Top View Back View Side View

## 800–2000 A Rear-Connected "T" Horizontal (RCTH)



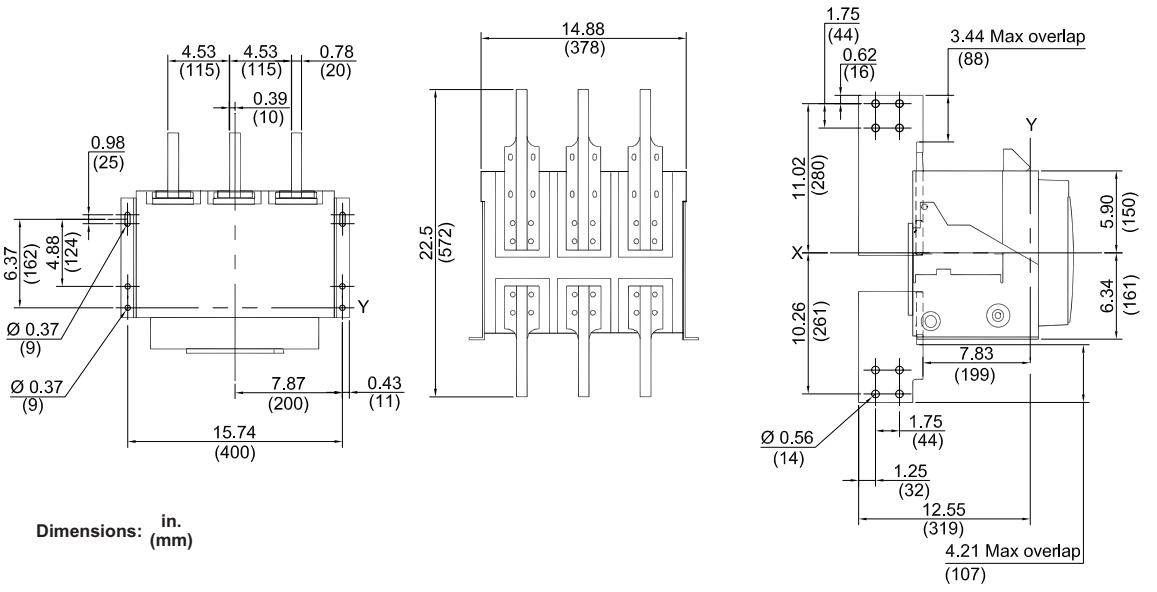

Top View Back View Side View

## 800–2000 A Front-Connected Flat (FCF)



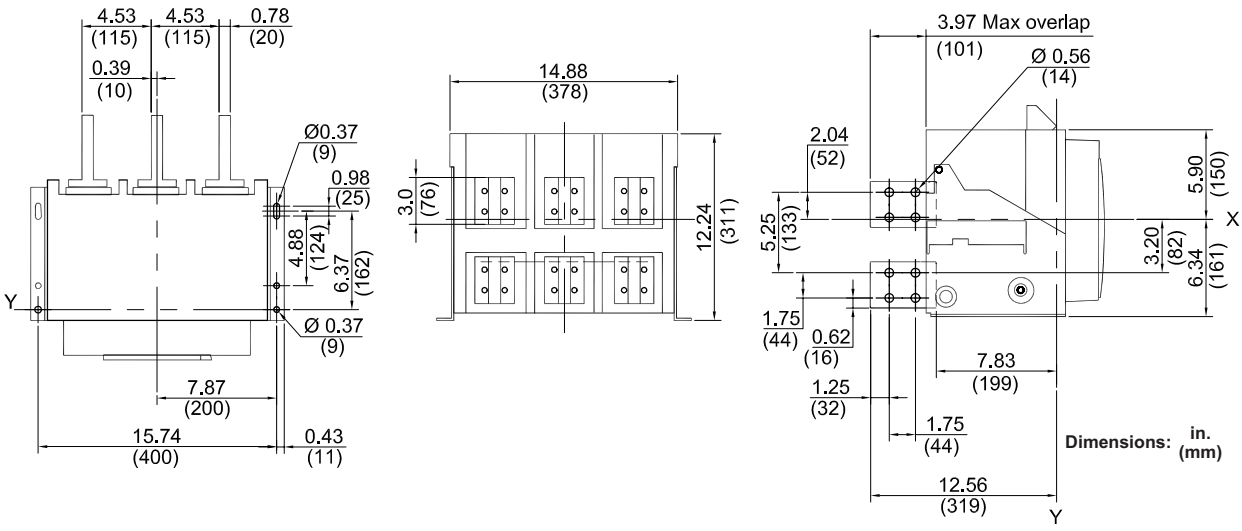

Top View Back View Side View

## 800–3000 A Front-Connected "T" (FCT)



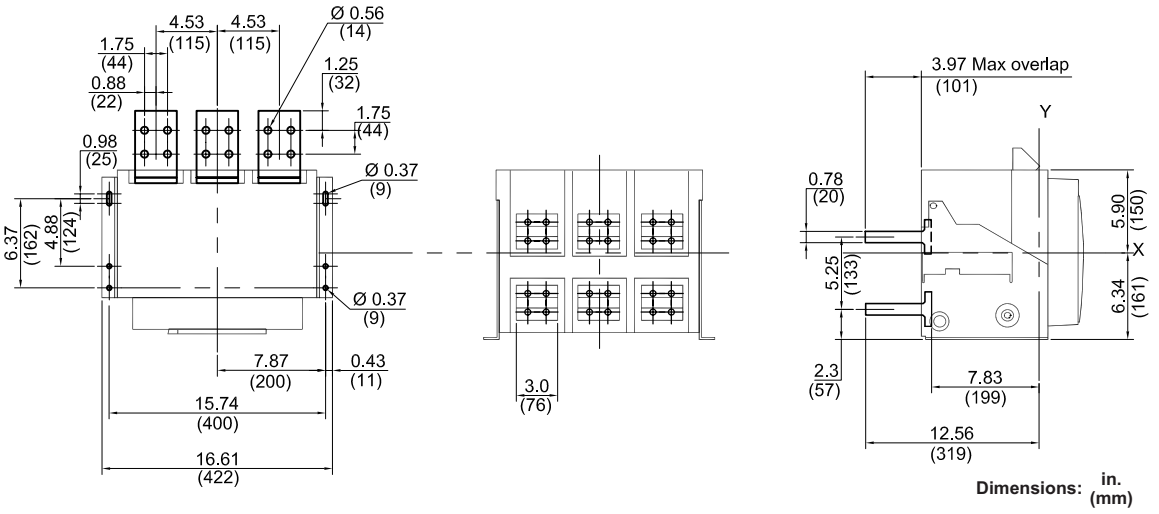

Top View Back View Side View

## 2500–3000 A Rear-Connected Vertical "T" Horizontal (RCTV)



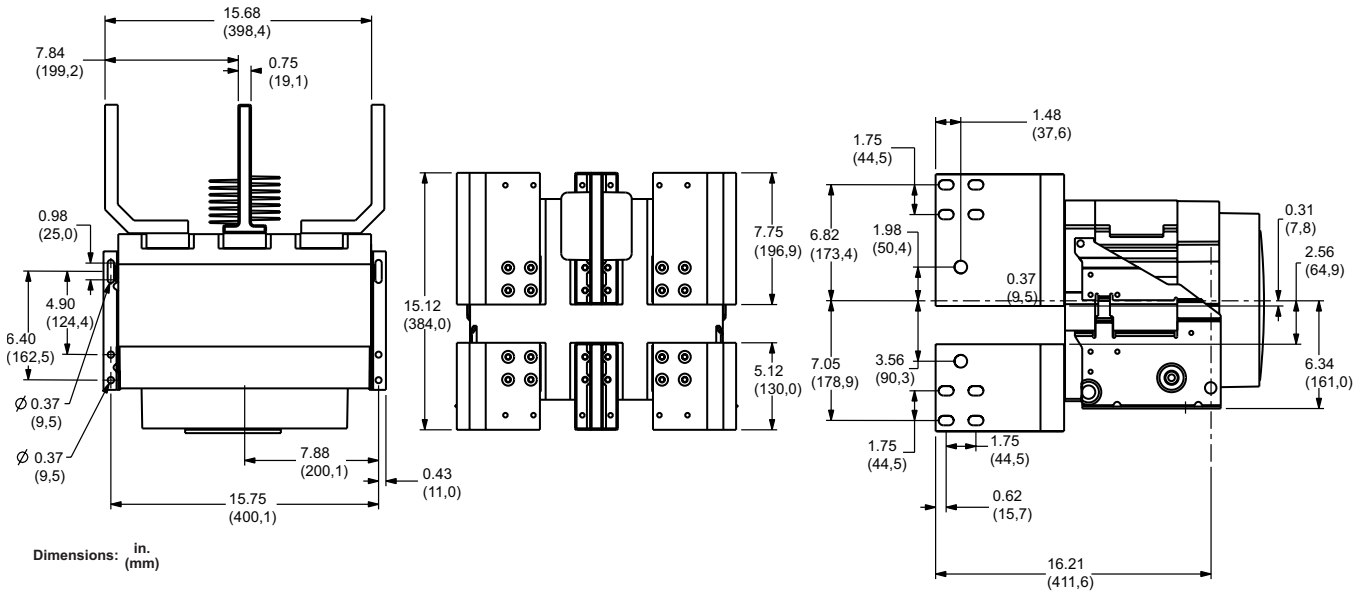

**Top View** **Back View** **Side View**

## 2500–3000 A Rear-Connected "T" Horizontal (RCTH)

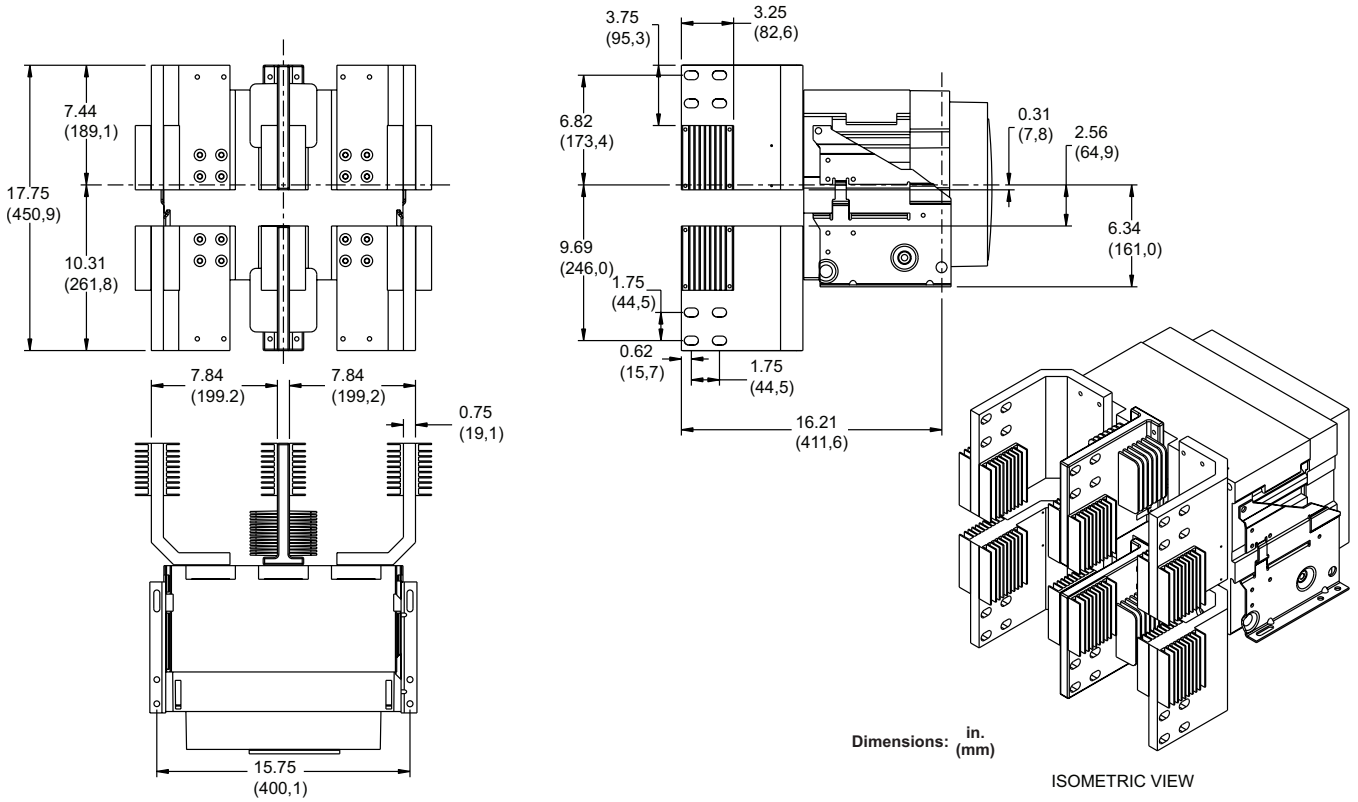



**Top View** **Back View** **Side View**

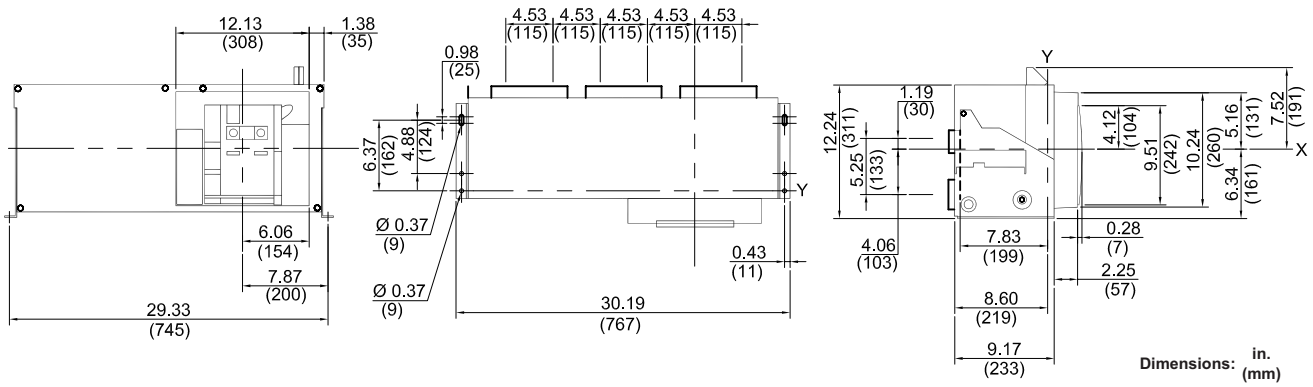
## 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)




## 4000 A (W-Frame) Rear-Connected Offset Vertical (RCOV)g

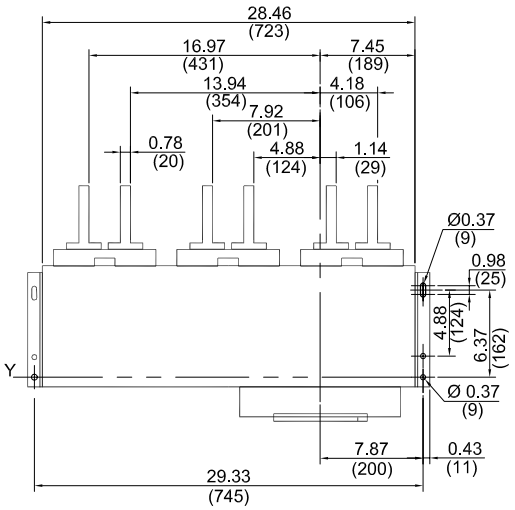


## 4000–6000 A Master Drawing

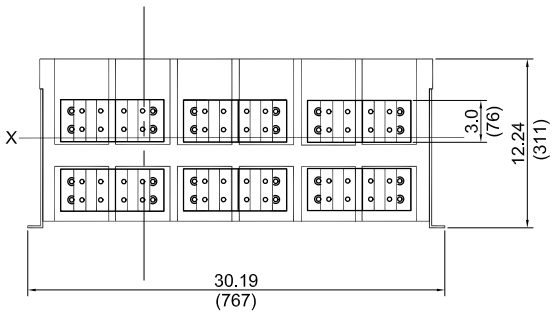



**Front View** **Top View** **Side View**

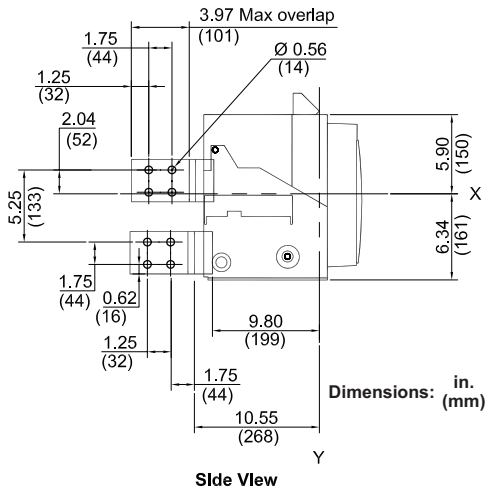
## 4000–5000 A Rear-Connected "T" Vertical (RCTV)




**Top View**

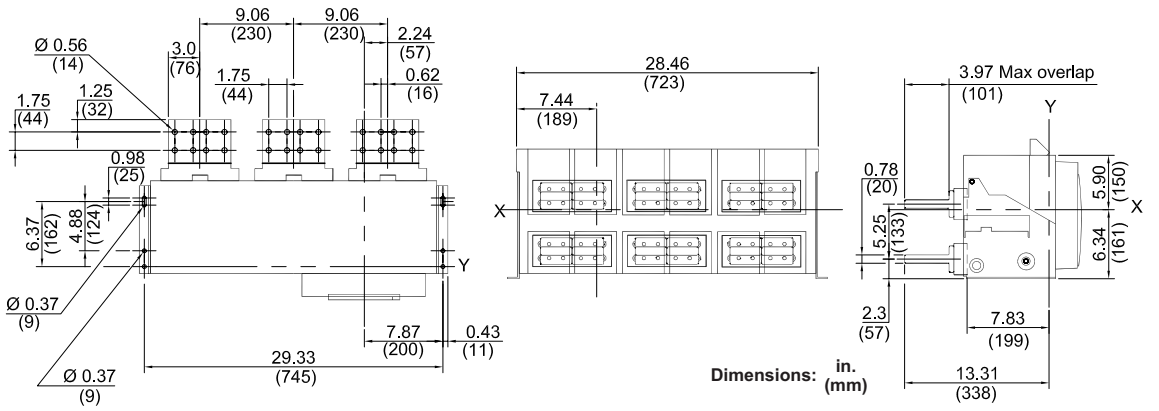



**Back View**

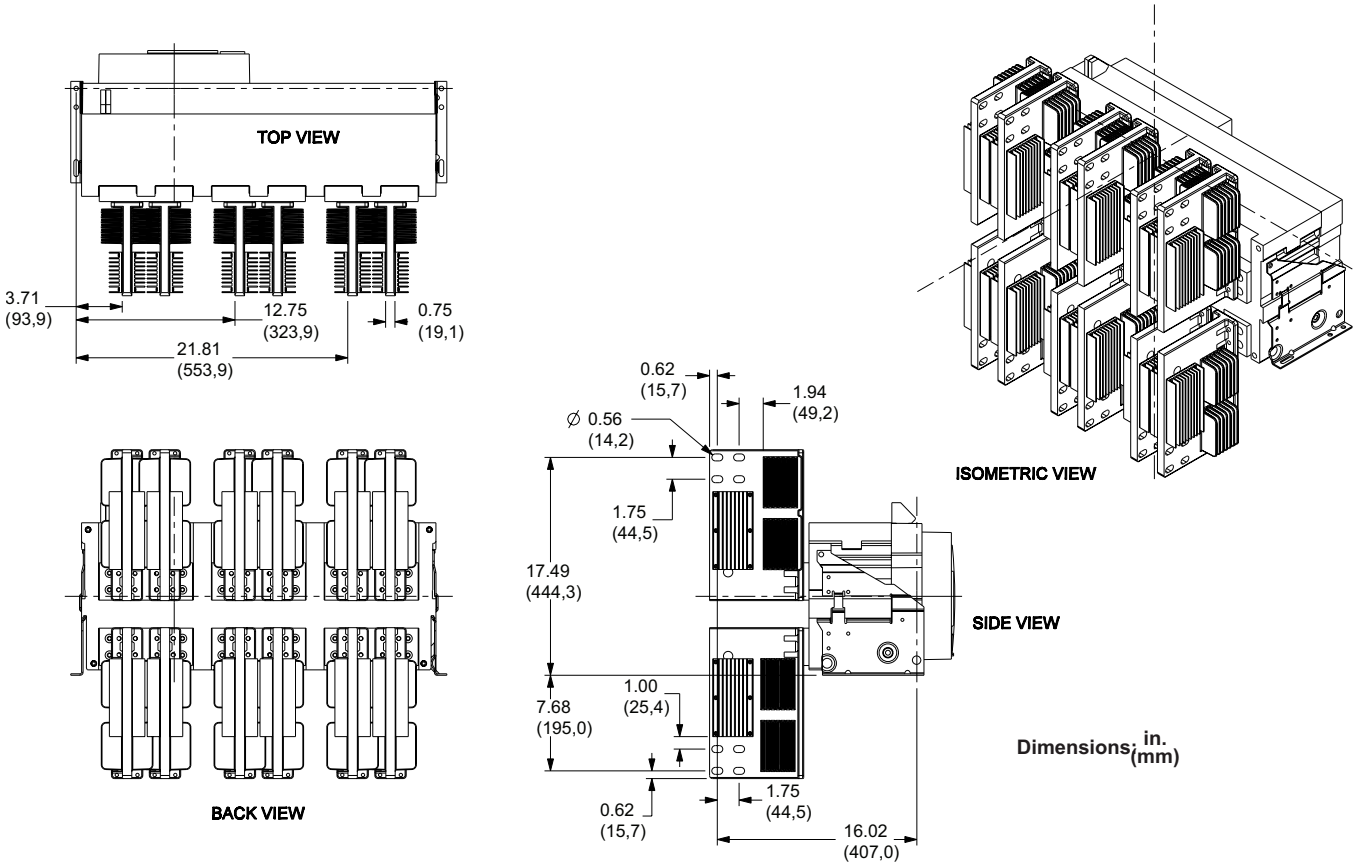



**Side View**

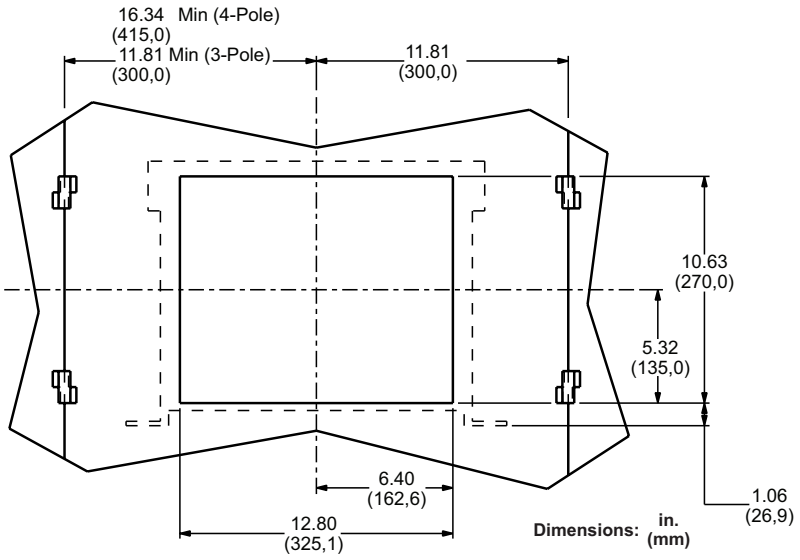
## 4000–5000 A Rear-Connected "T" Horizontal (RCTH)



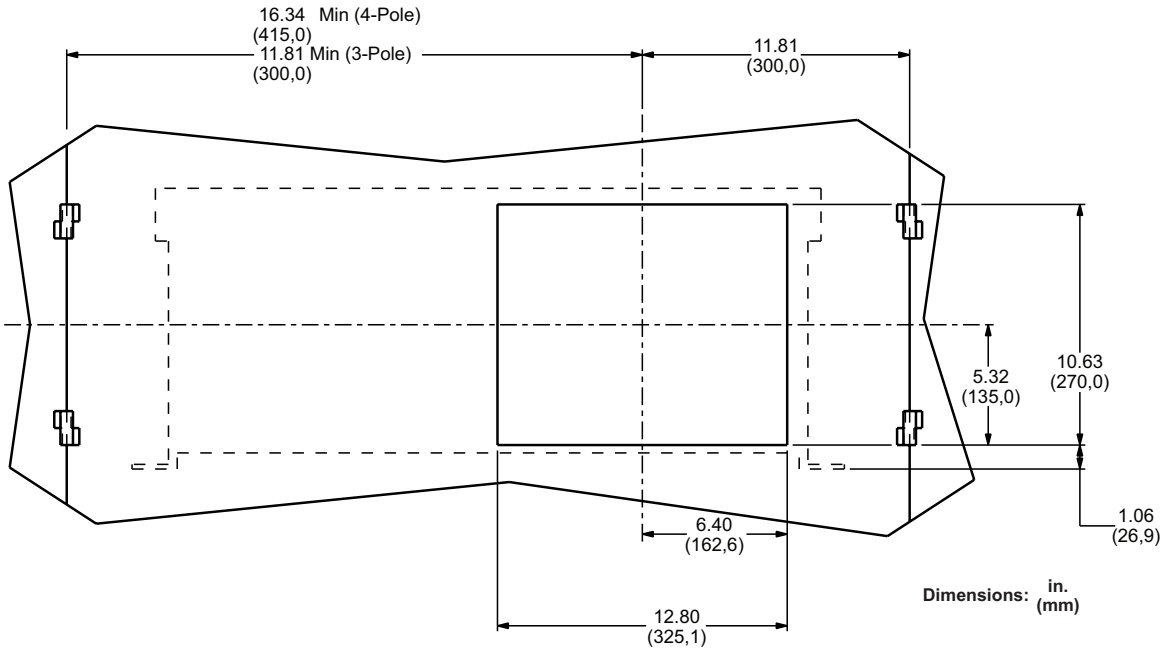

## 6000 A Rear-Connected "T" Vertical (RCTV)



### 800–3200 A and 4000 A (W-Frame) Circuit Breaker Door Cutout

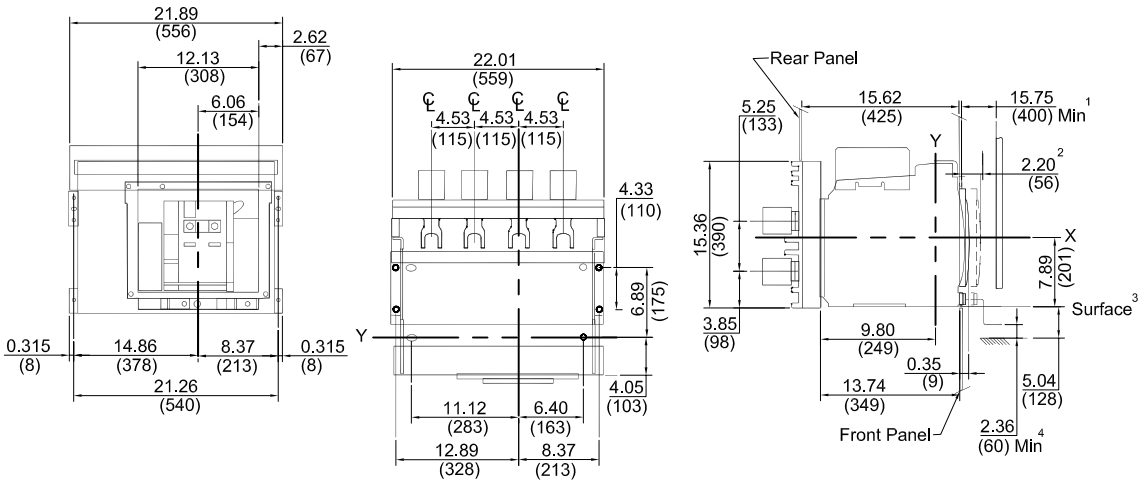



### 4000–6000 A Door Cutout



# MasterPacT NW UL/ANSI Four-Pole Drawout Circuit Breakers

## 800–3000 A and 3200 A Master Drawing

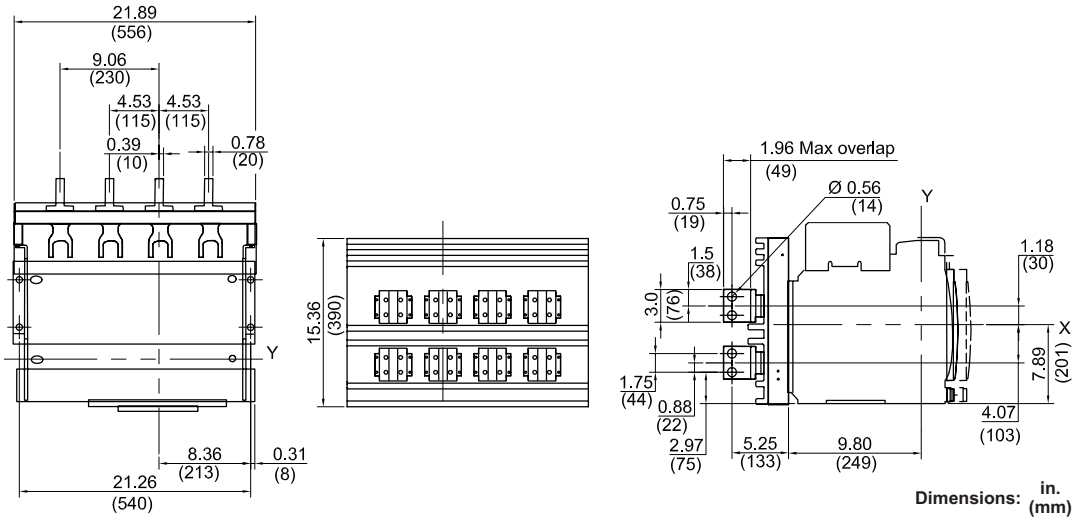



**Front View** **Top View** **Side View**

1. Minimum to withdraw circuit breaker.
2. Distance to drawout position.
3. Circuit breaker mounting surface.
4. Minimum for circuit breaker racking handle.

**Dimensions: in. (mm)**

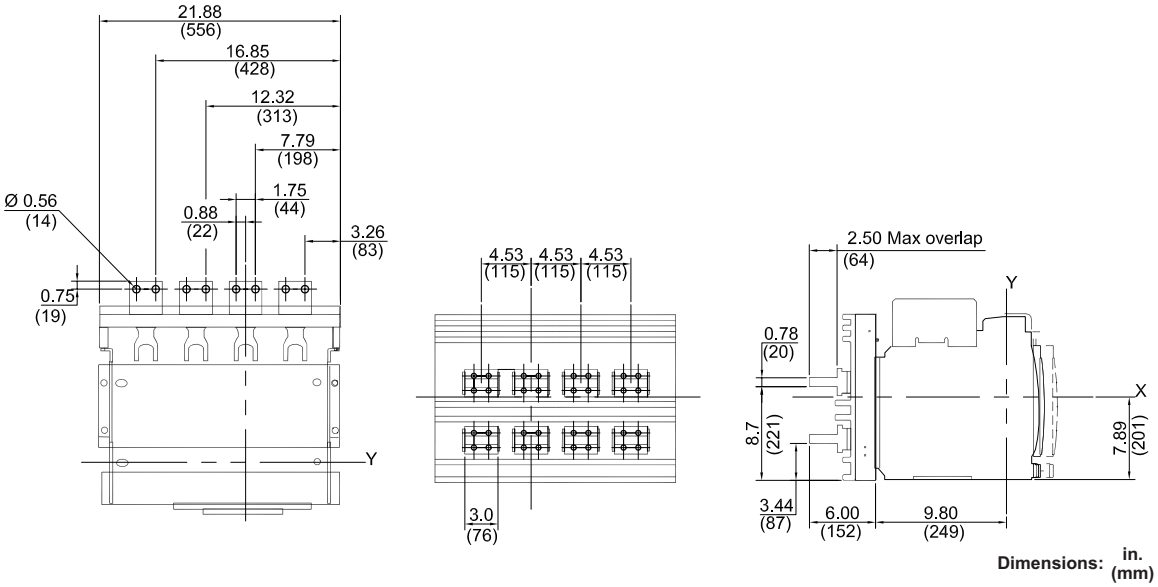
## 800–2000 A Rear-Connected "T" Vertical (RCTV)




**Top View** **Back View** **Side View**

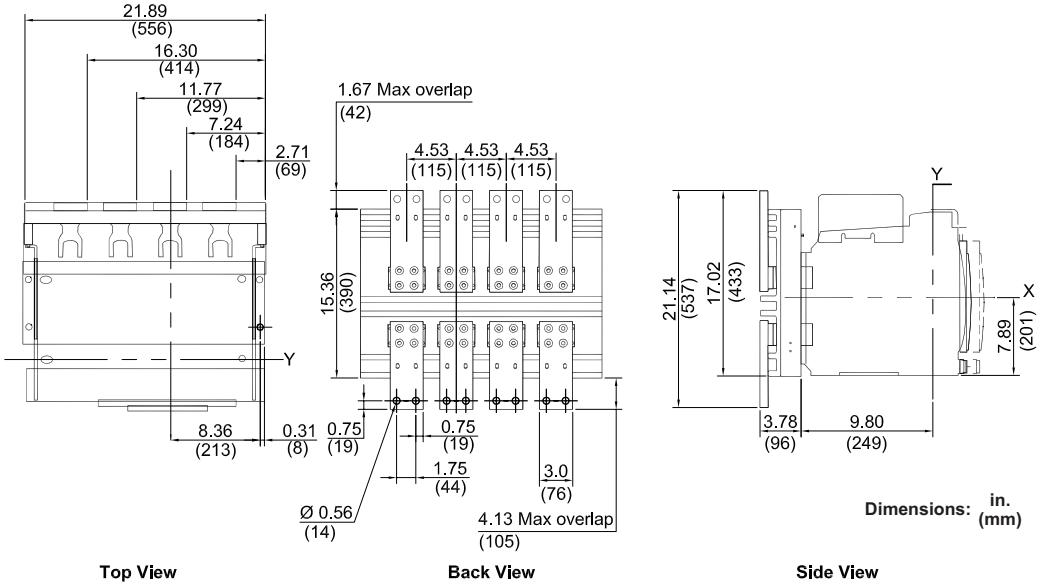
**Dimensions: in. (mm)**

## 800–2000 A Rear-Connected "T" Horizontal (RCTH)



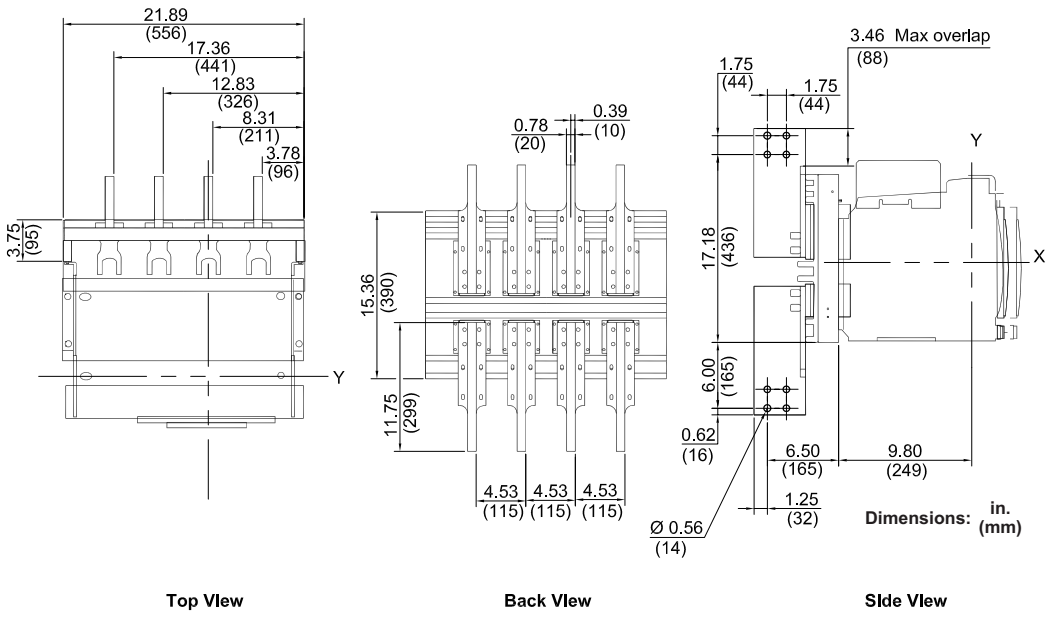

Top View Back View Side View

## 800–2000 A Front-Connected Flat (FCF)



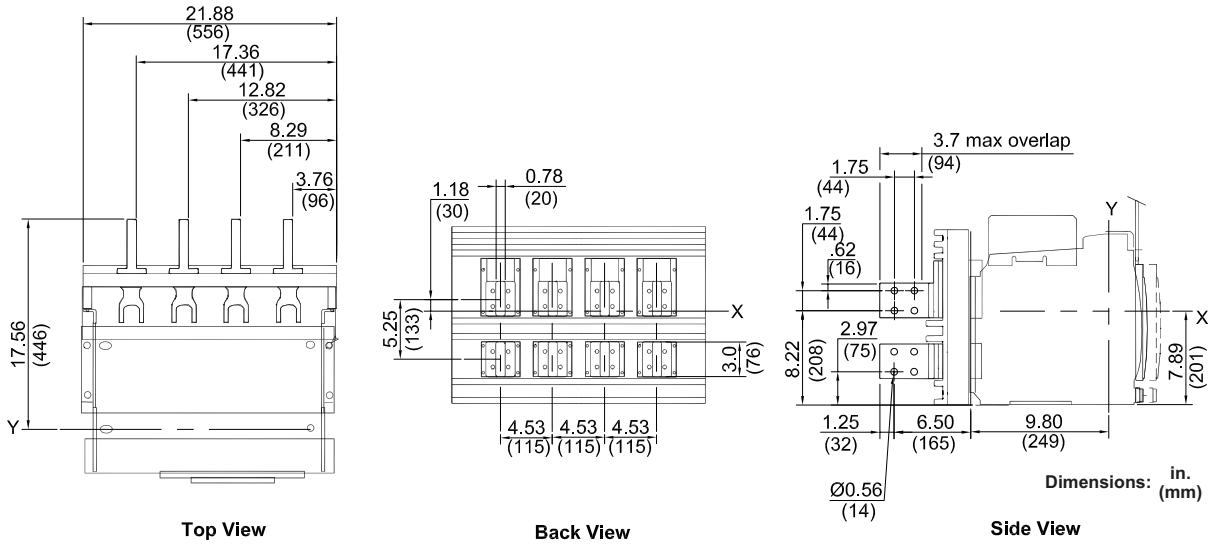

Top View Back View Side View

## 800–3000 A Front-Connected "T" (FCT)



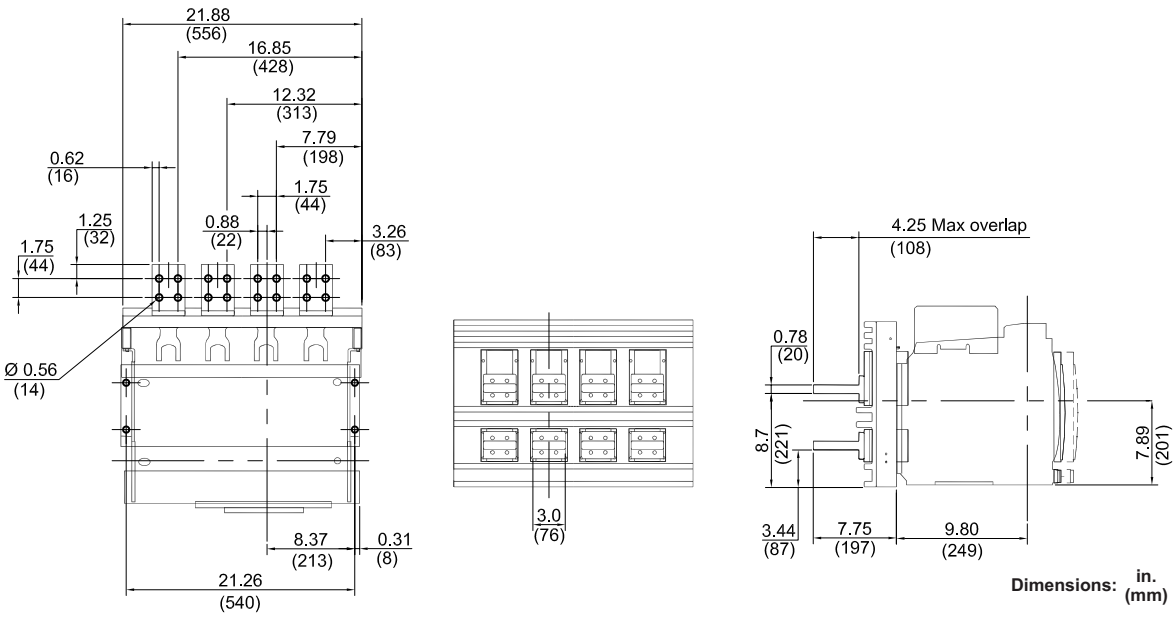

Top View Back View Side View

## 2500–3000 A Rear-Connected "T" Vertical (RCTV)

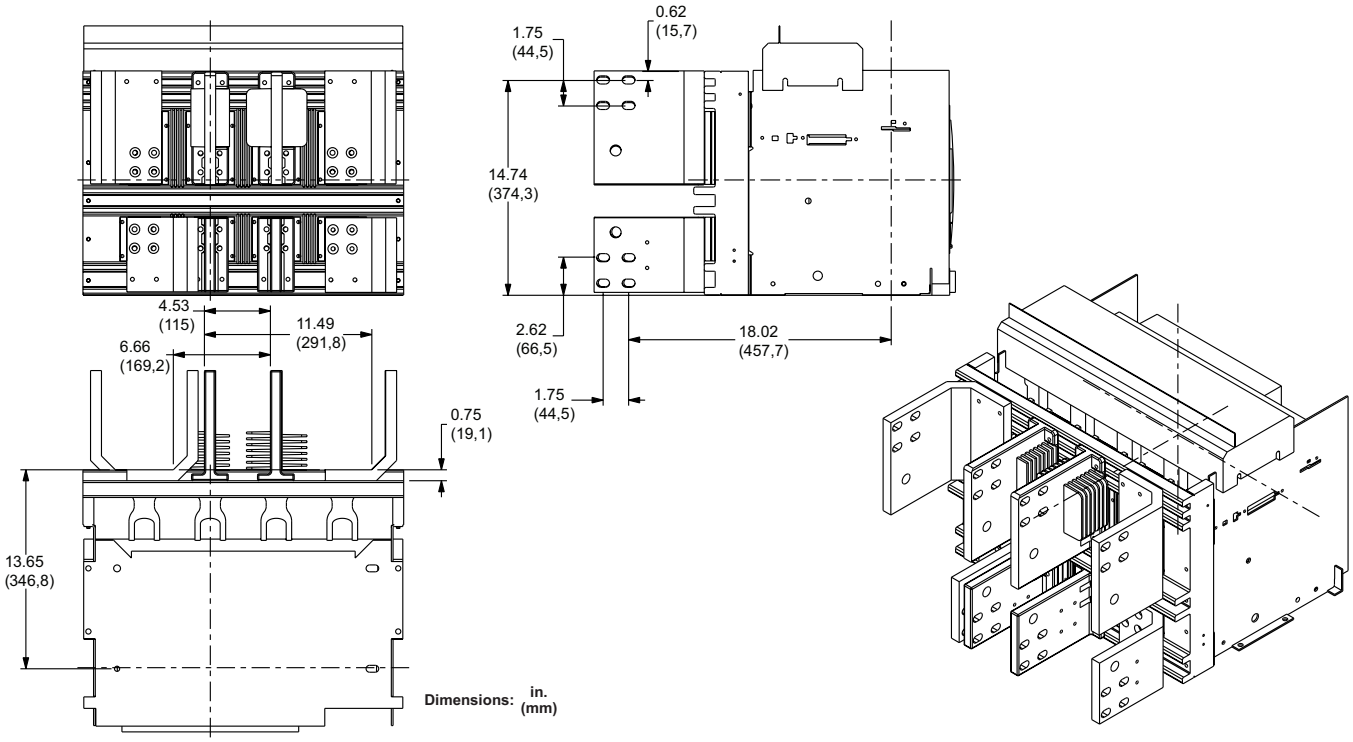



Top View Back View Side View

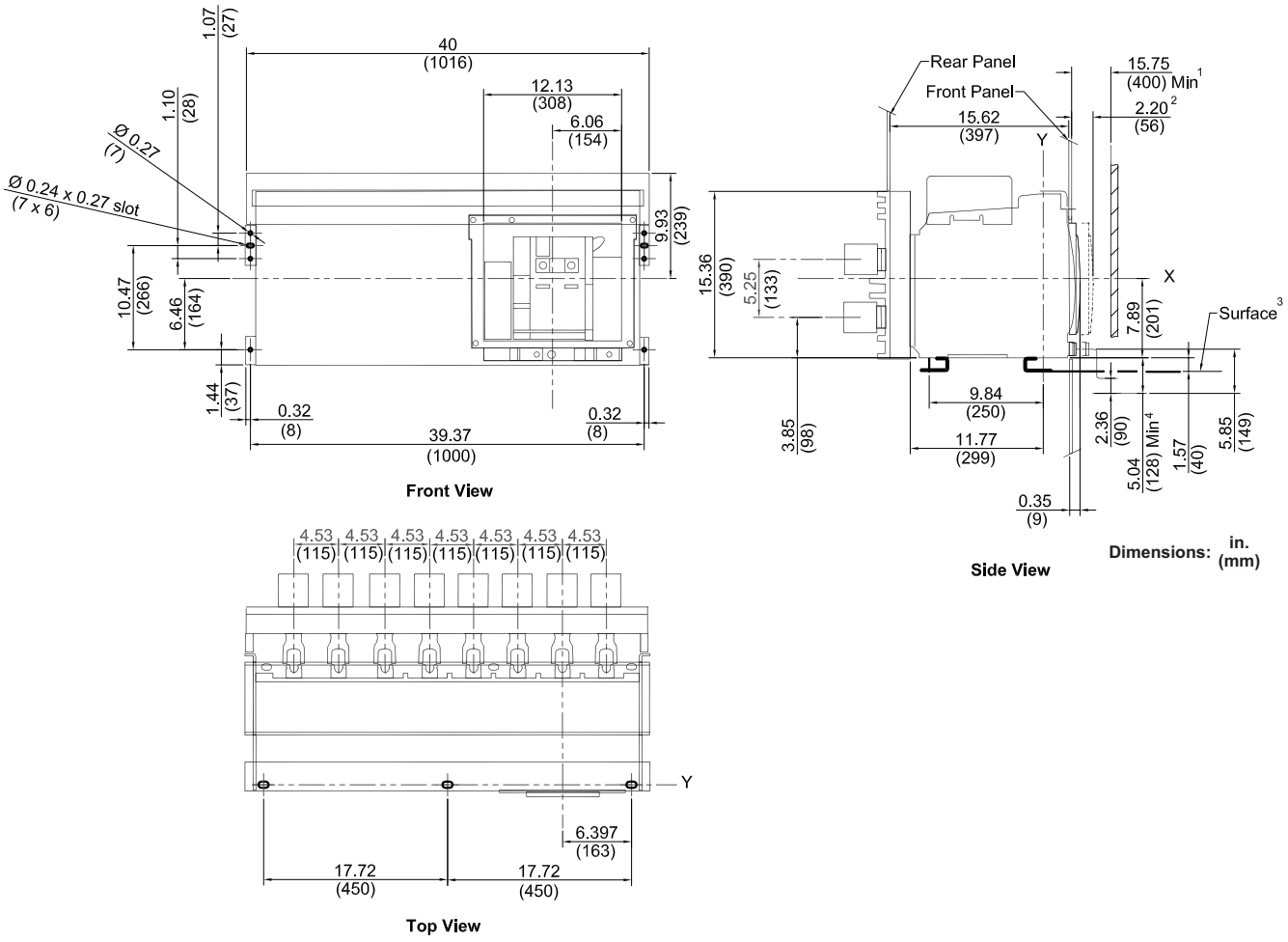
## 2500–3000 A Rear-Connected "T" Horizontal (RCTH)



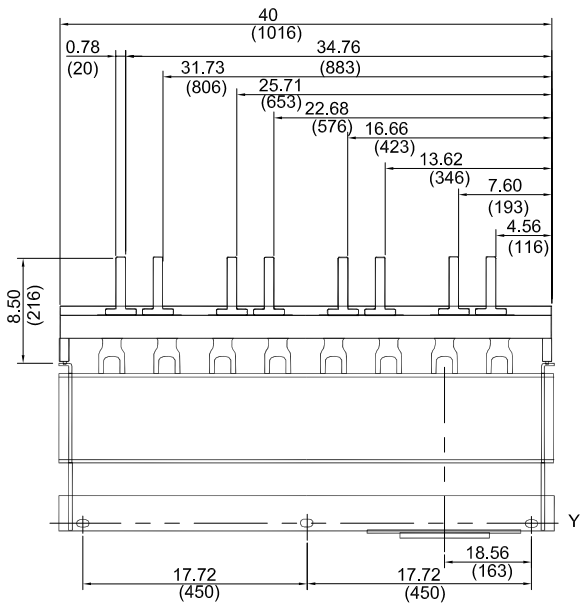

## 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)



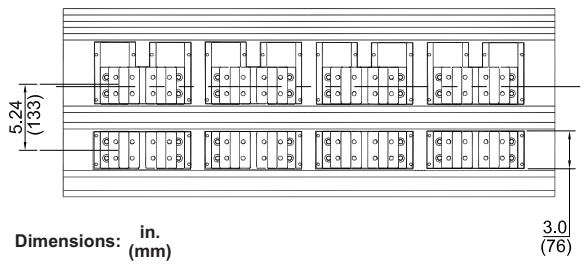
## 3200 A L1 and 4000–6000 A Master Drawing



## 3200 A L1 and 4000–5000 A Rear-Connected "T" Vertical (RCTV)

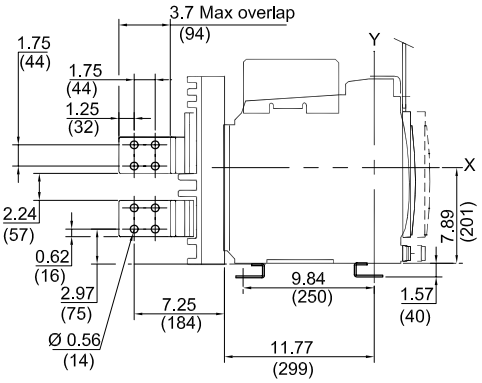



Top View



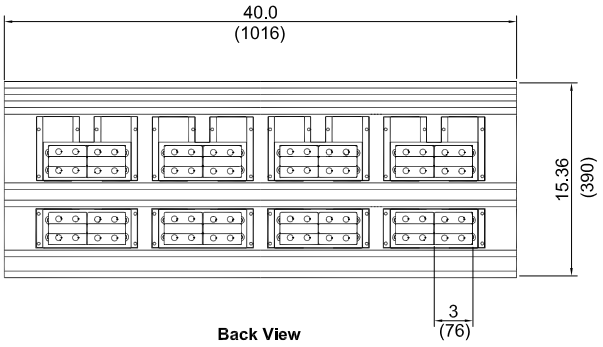

Dimensions: in. (mm)

Back View

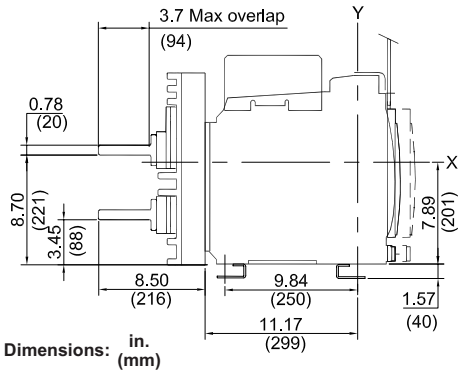



Side View

## 3200 A L1 and 4000–5000 A Rear-Connected "T" Horizontal (RCTH)

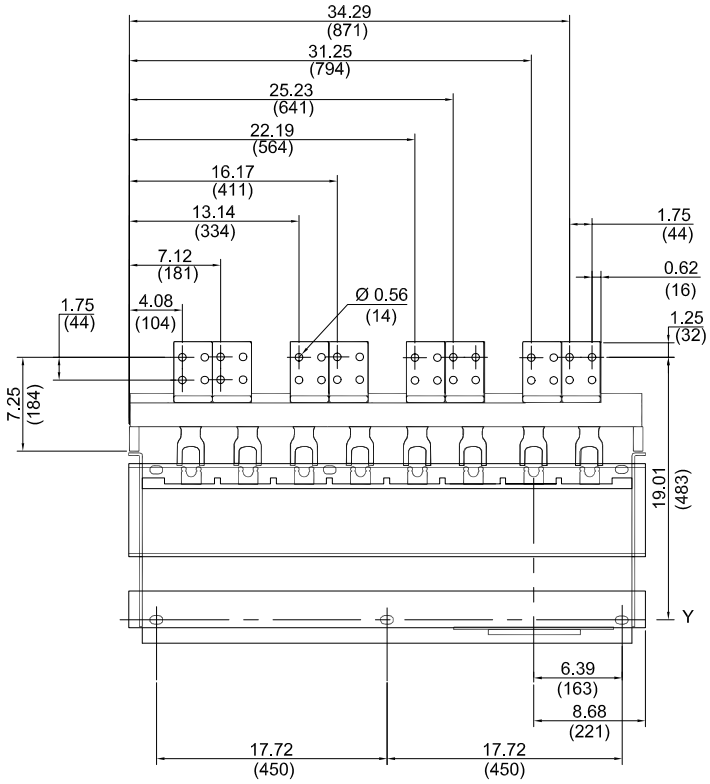



Back View



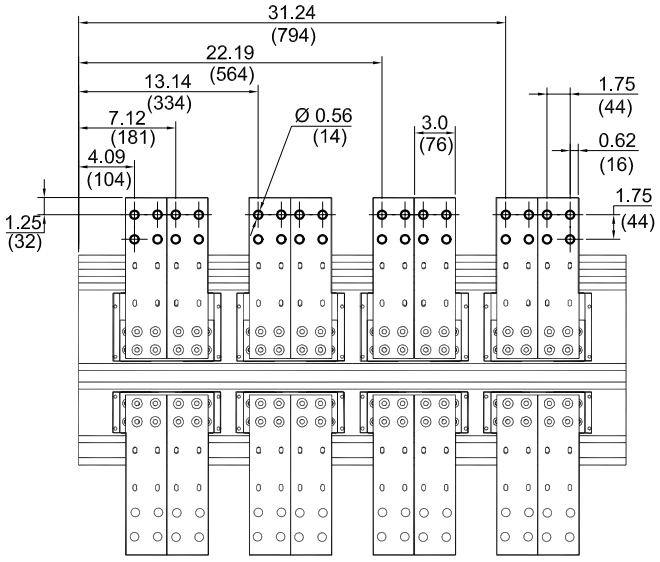

Dimensions: in. (mm)

Side View

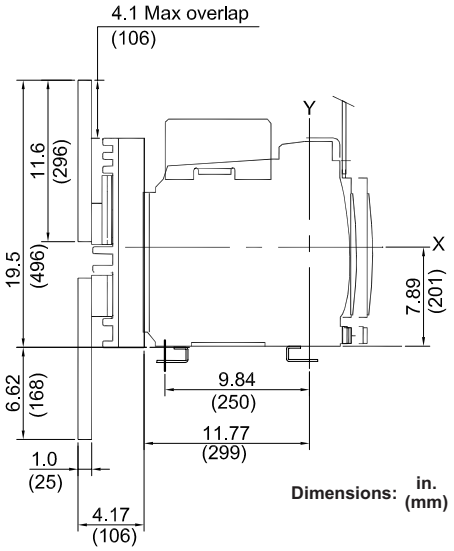



Top View

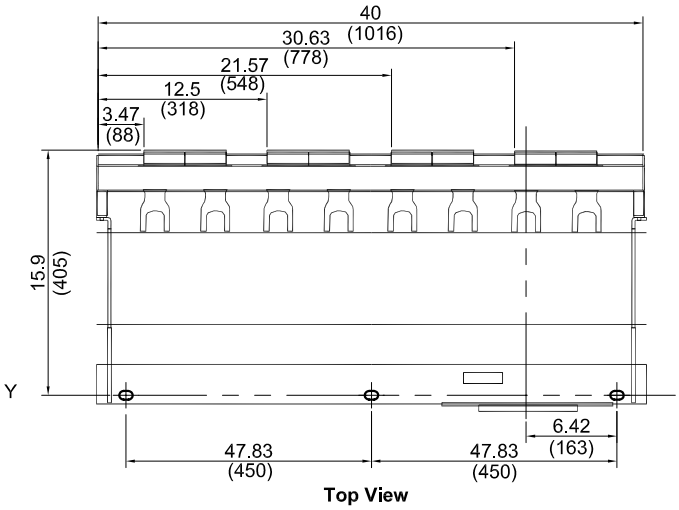
## 3200 A L1 and 4000 A Front-Connected Flat (FCF)




**Back View**

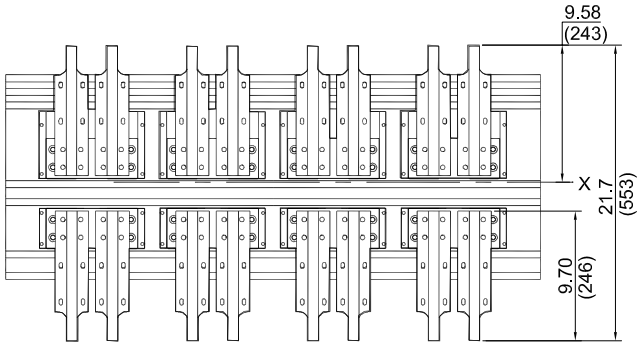



**Side View**

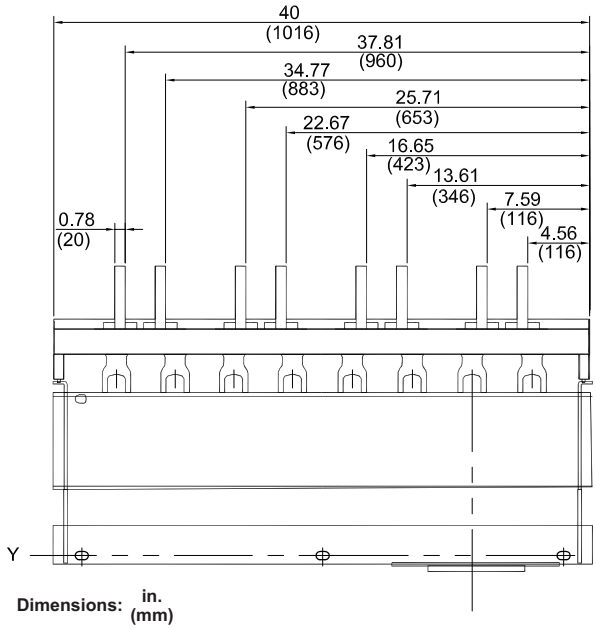



**Top View**

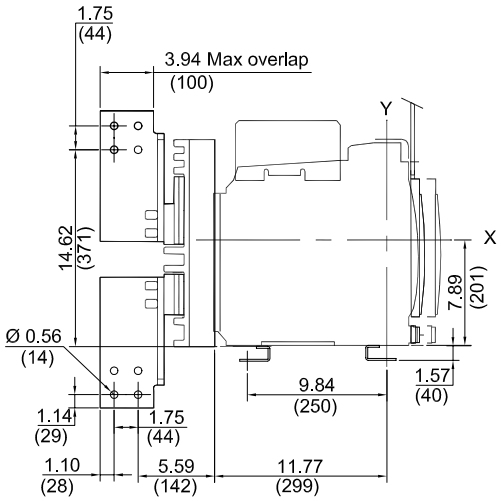
## 3200 A L1 and 4000–5000 A Front-Connected "T" (FCT)




Back View

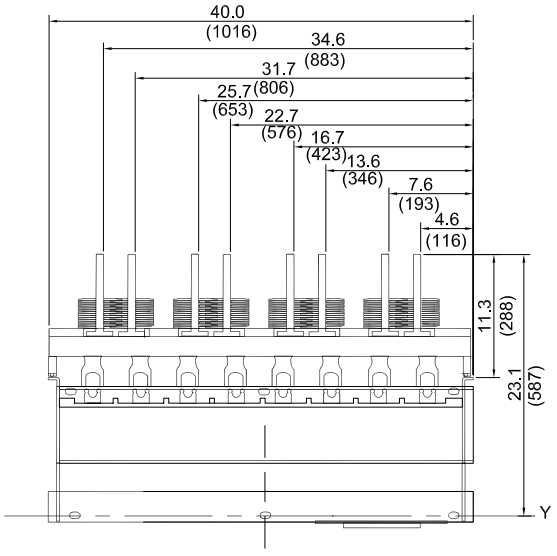



Top View

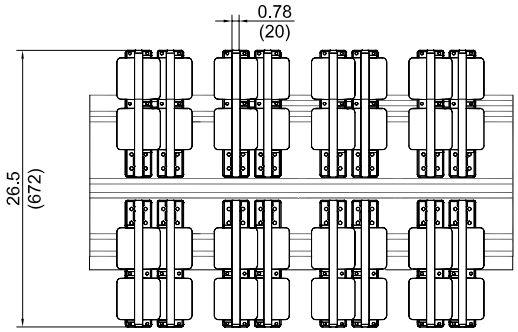



Side View

## 6000 A Rear-Connected "T" Vertical (RCTV)

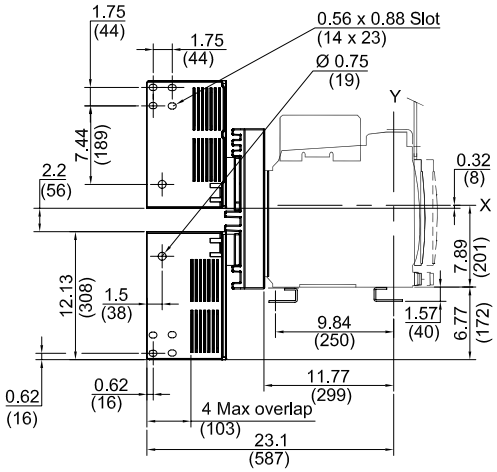



Top View




Dimensions: in. (mm)

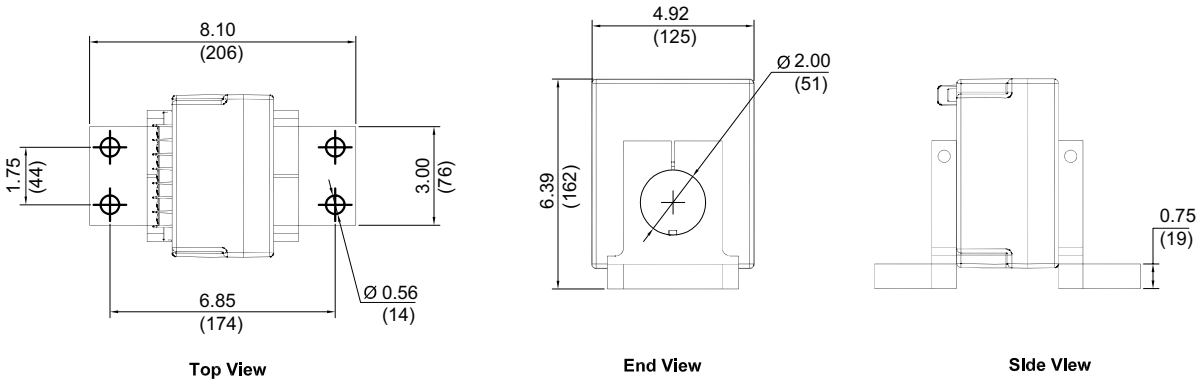
Back View



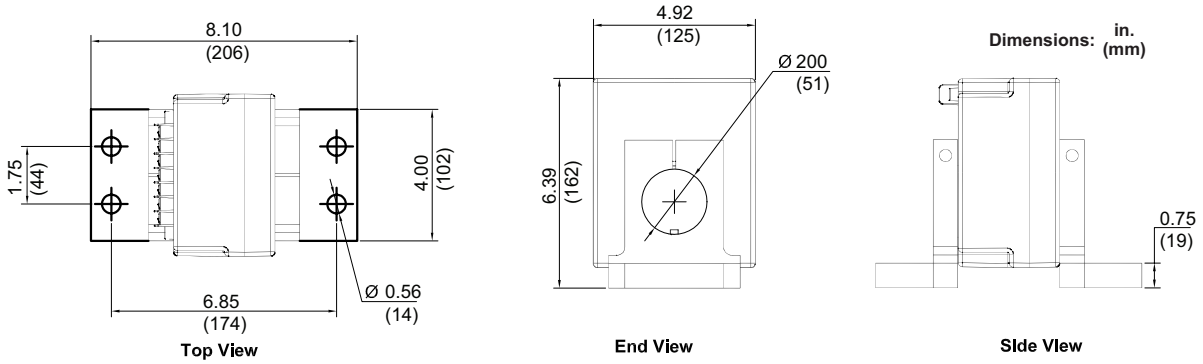

Side View

# MasterPacT NW Neutral Current Transformers

## Neutral Current Transformer 100–1600 A, 2000–4000 A

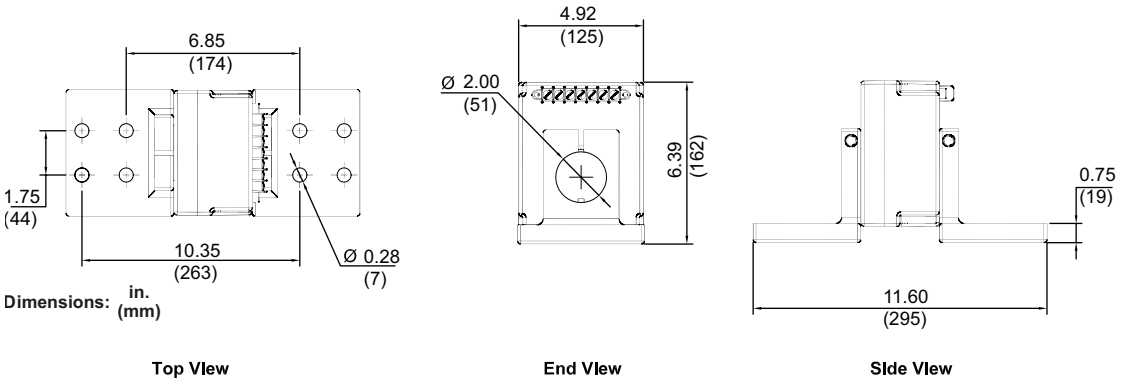



100-1600 A External Neutral Current Transformer

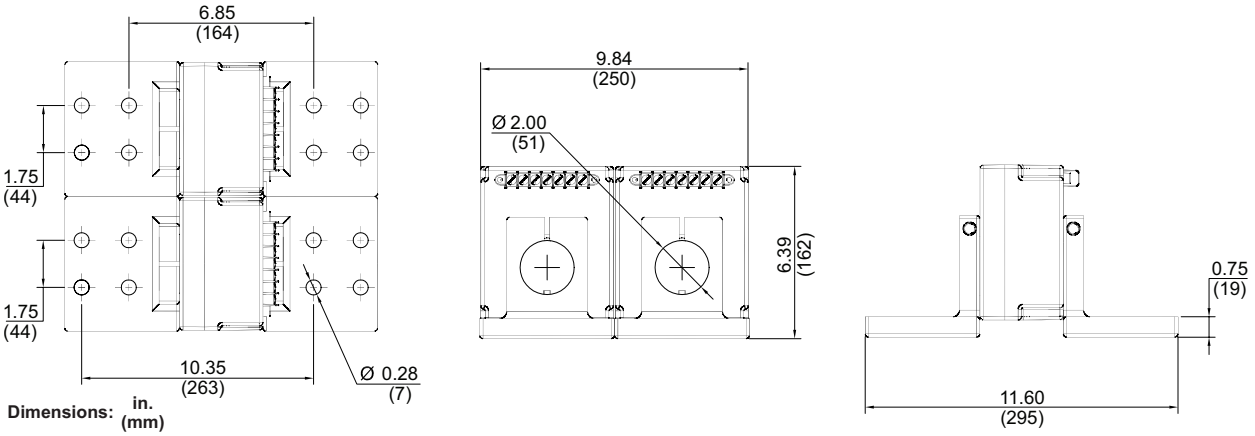



2000-4000 A Standard-width Circuit Breaker External Neutral Current Transformer

## Neutral Current Transformer 2000–4000 A

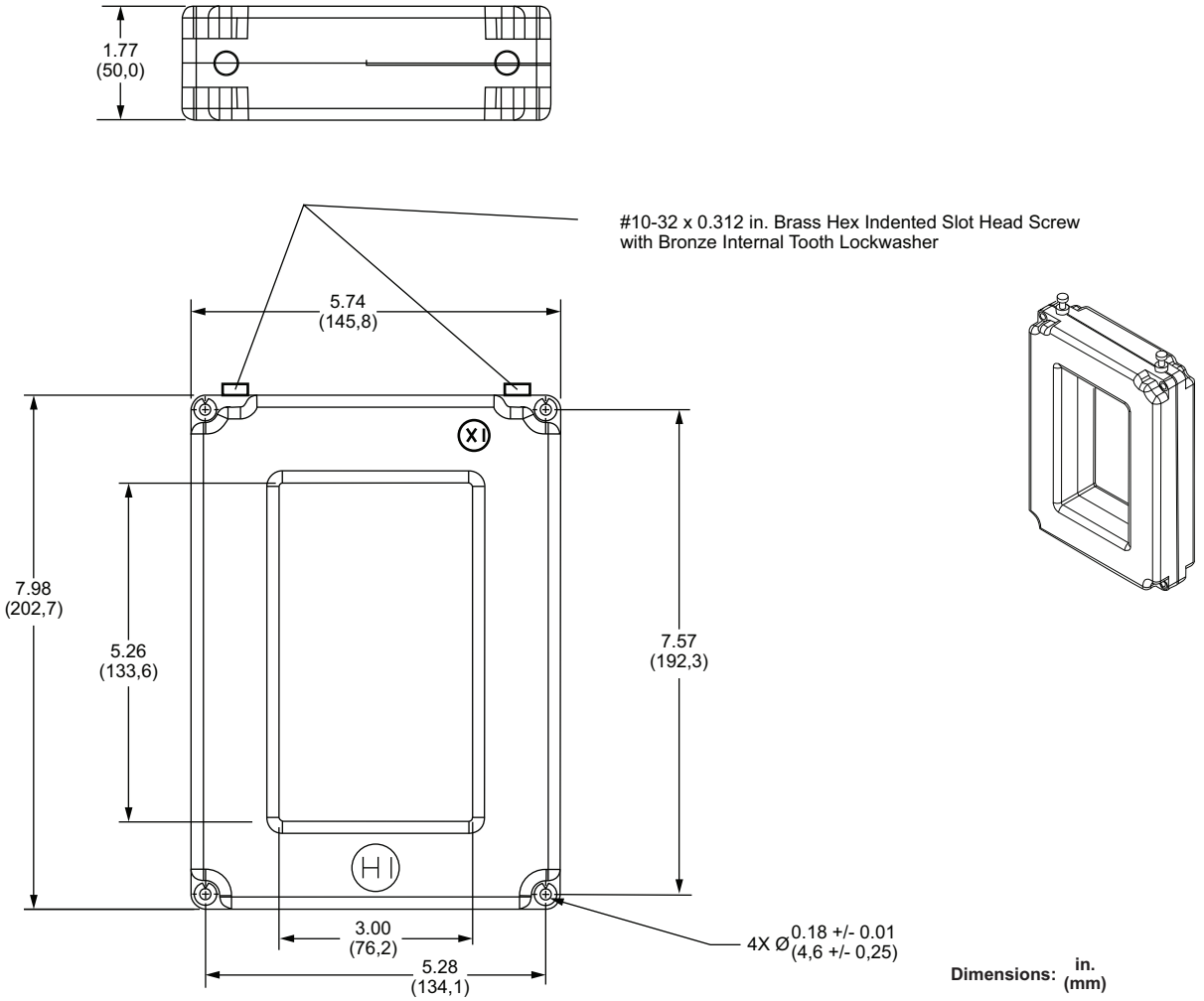


## Double Neutral Current Transformer 2000–6300 A



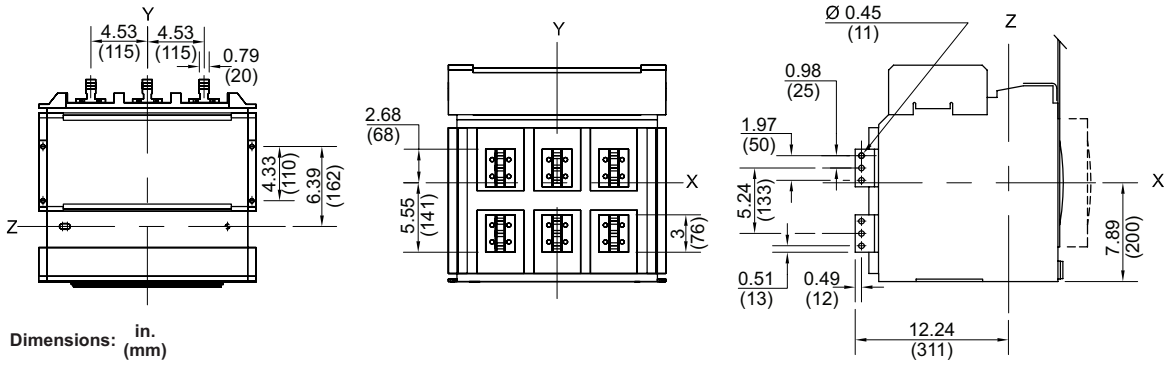

Top View End View Side View

## MDGF/SGR Current Transformer

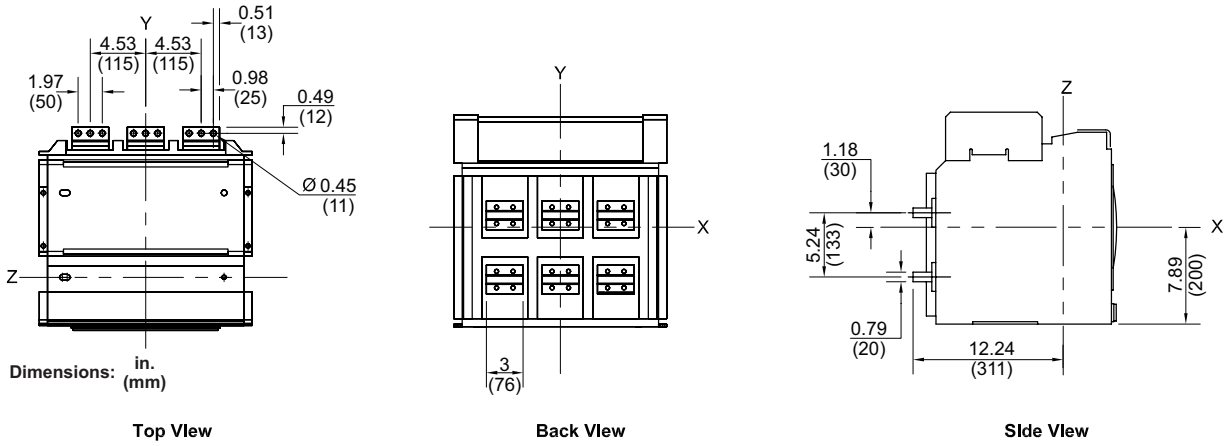


# MasterPacT NW IEC Three-Pole Drawout Circuit Breakers

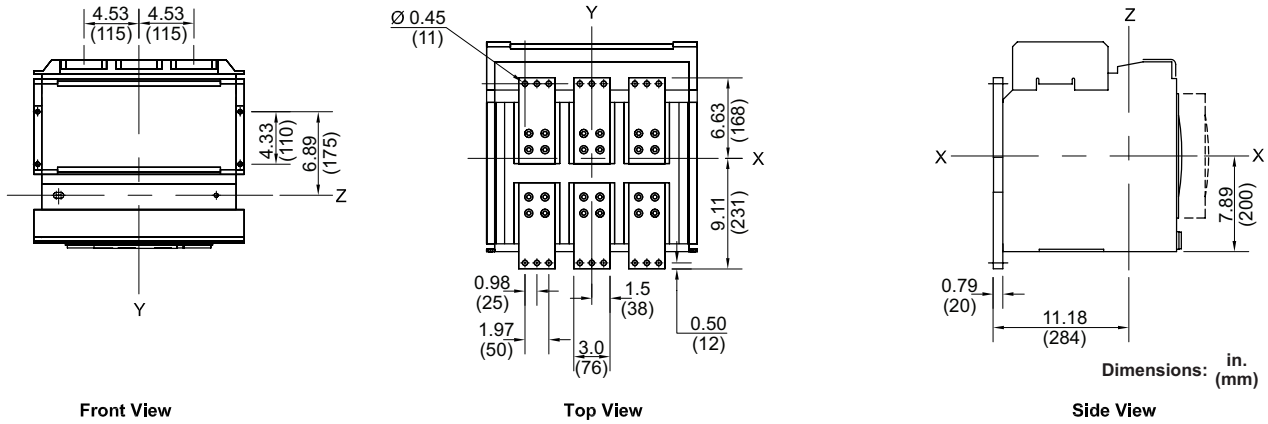
### 800–3200 A Rear-Connected "T" Vertical (RCTV)



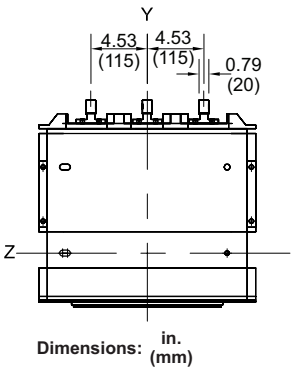

### 800–3200 A Rear-Connected "T" Horizontal (RCTH)



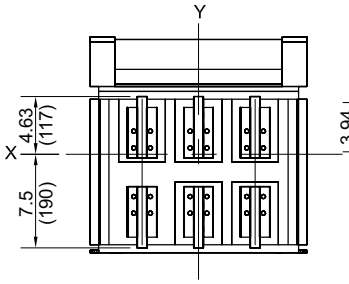

### 800–3200 A Front-Connected Flat (FCF)



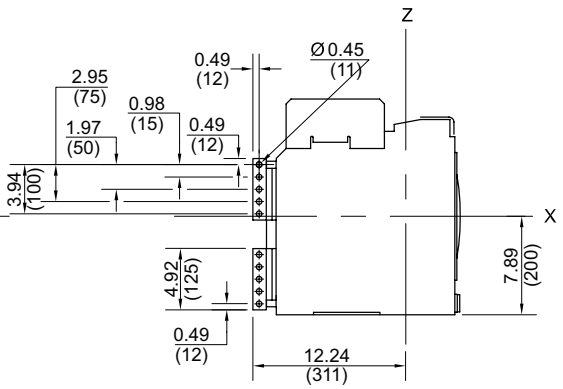
## 4000 A Rear-Connected "T" Vertical (RCTV)




Top View

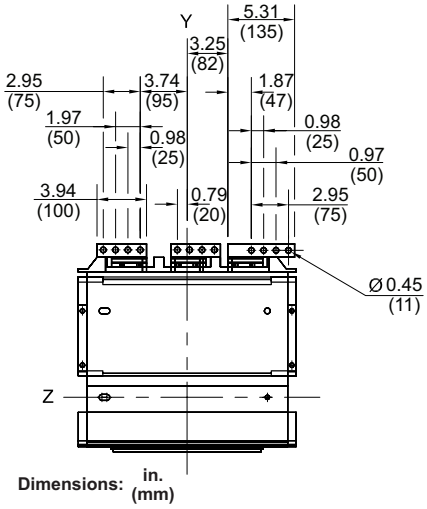



Back View

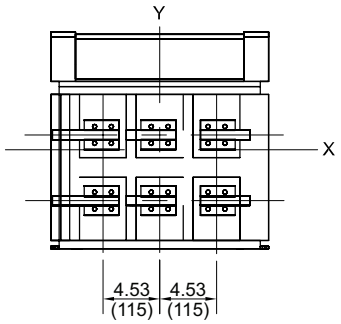



Side View

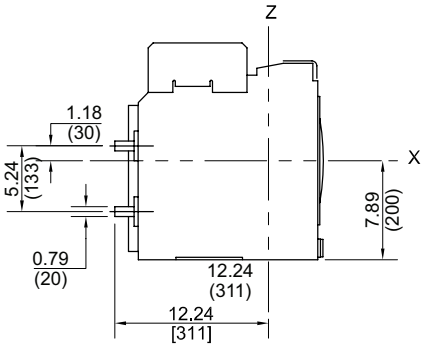
## 4000 A Rear-Connected "T" Horizontal (RCTH)




Top View

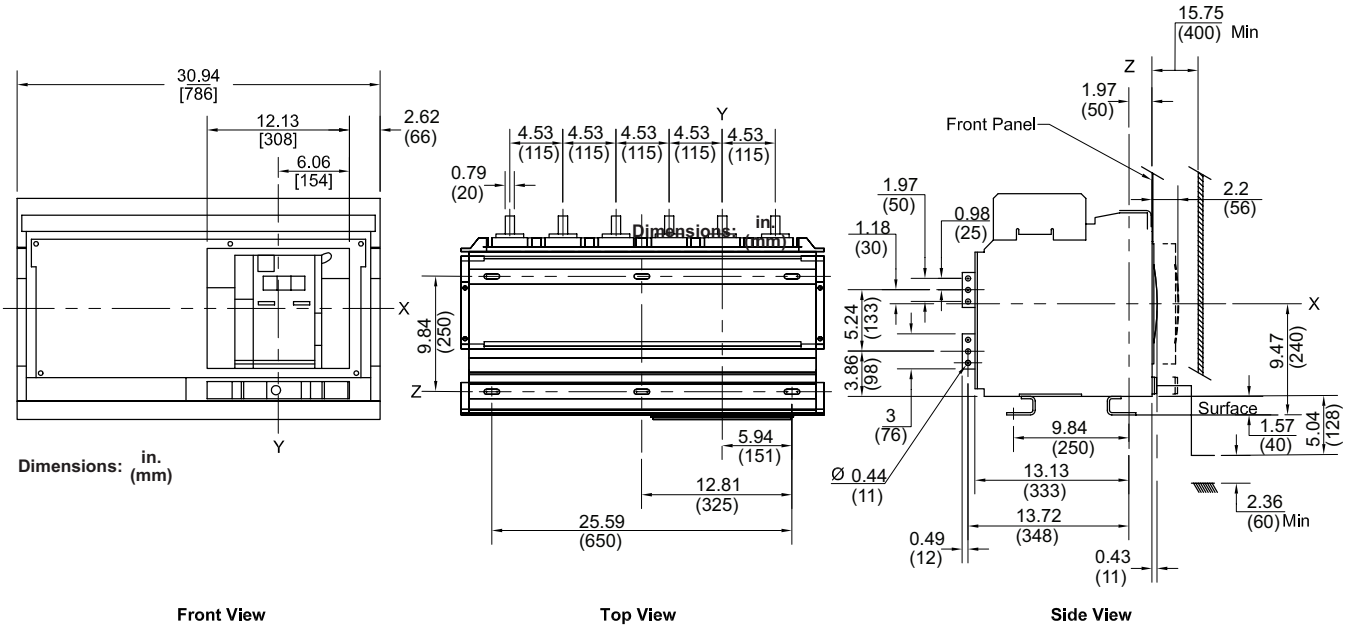



Back View

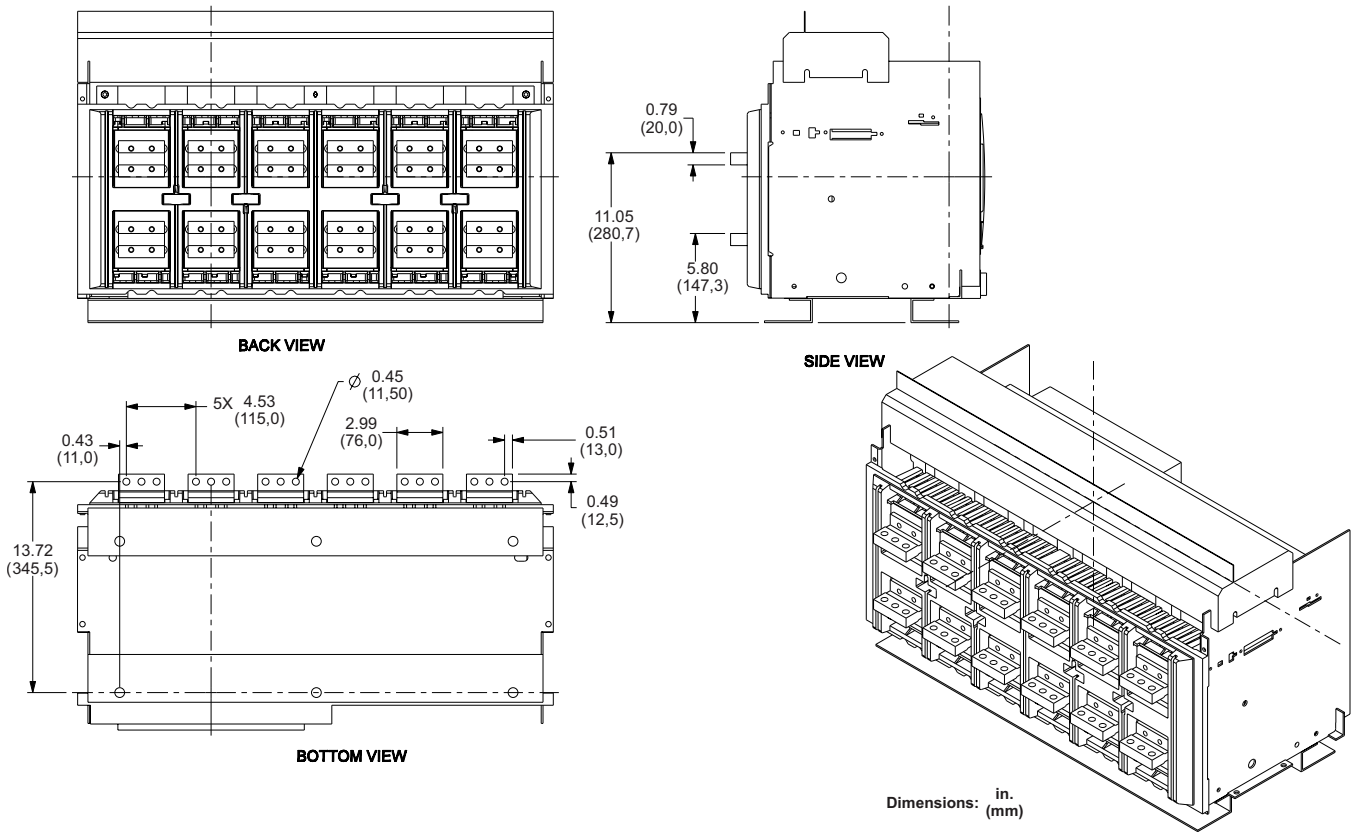



Side View

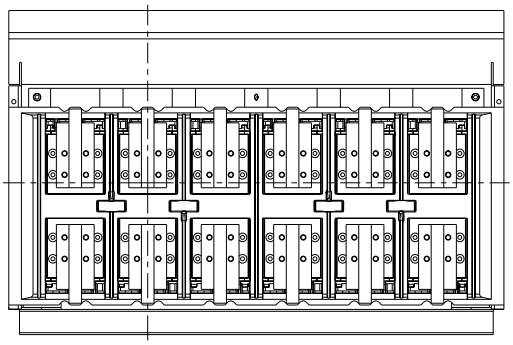
## 5000 A Rear-Connected "T" Vertical (RCTV)



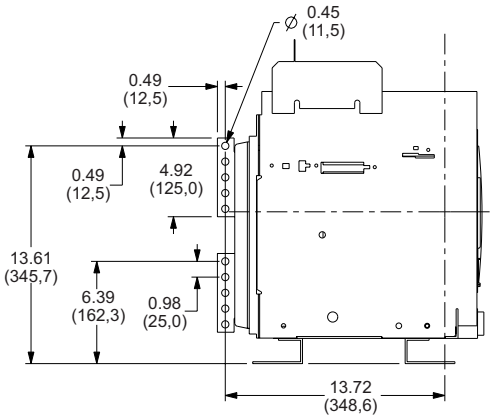

## 5000 A Rear-Connected "T" Horizontal (RCTH)



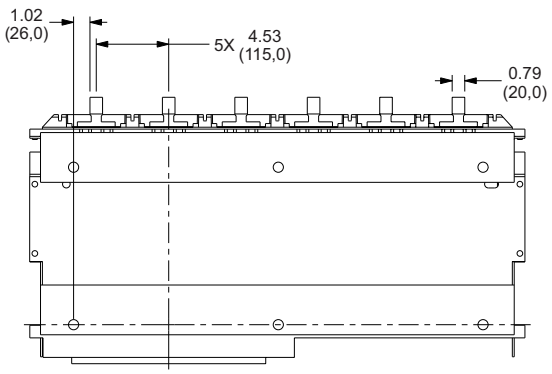
### 6300 A Rear-Connected "T" Vertical (RCTV)



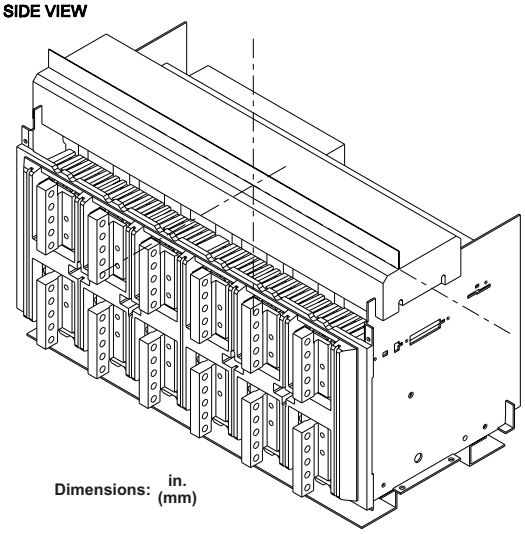
BACK VIEW




SIDE VIEW



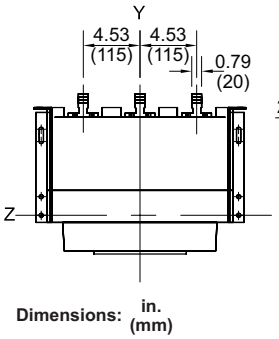

BOTTOM VIEW



Dimensions: in. (mm)

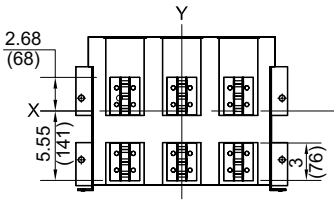
# MasterPacT NW IEC Three-Pole Fixed Circuit Breakers

### 800–3200 A Rear-Connected "T" Vertical (RCTV)

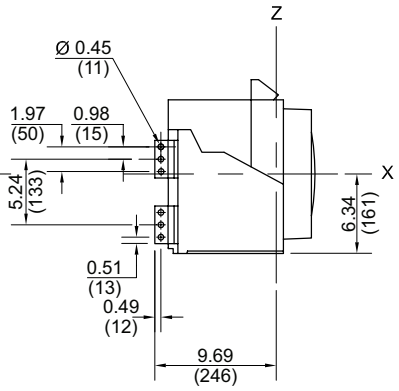



Dimensions: in. (mm)

Top View

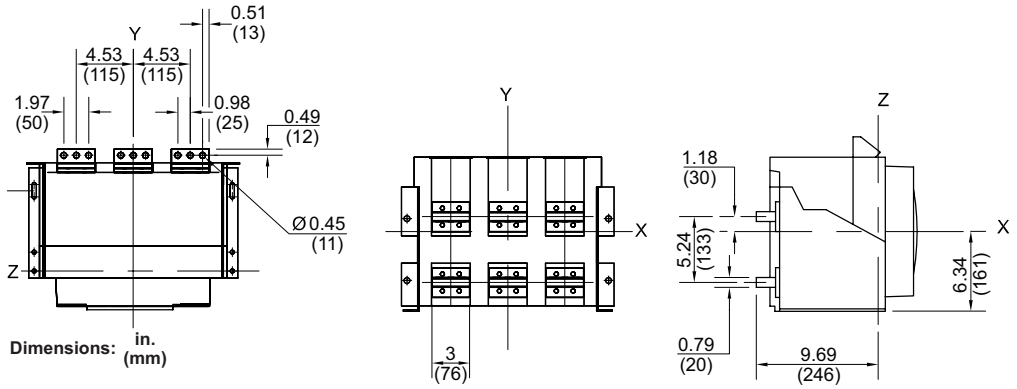



Back View



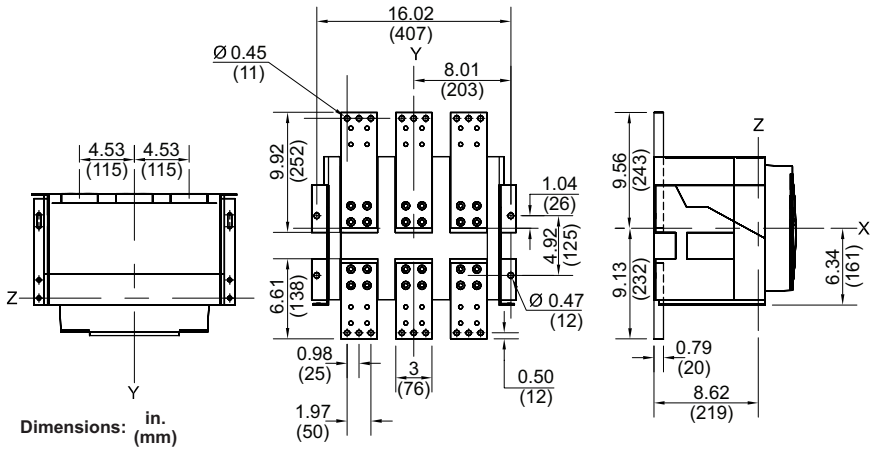

Side View

## 800–3200 A Rear-Connected "T" Horizontal (RCTH)



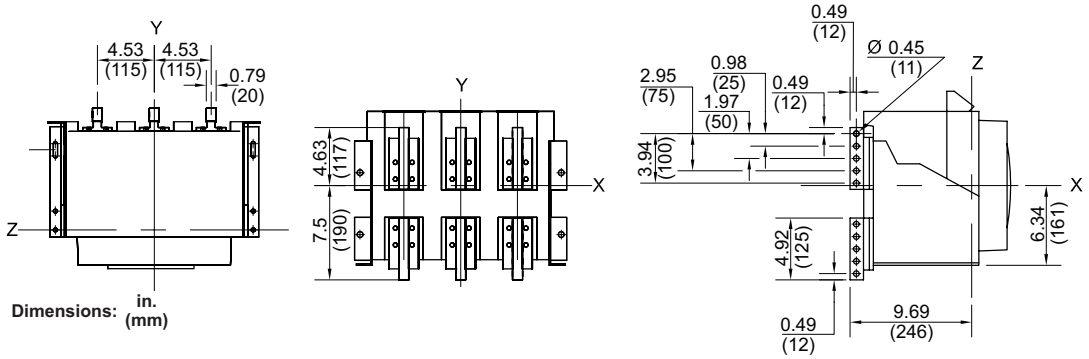

Top View Back View Side View

## 800–3200 A Front-Connected Flat (FCF)



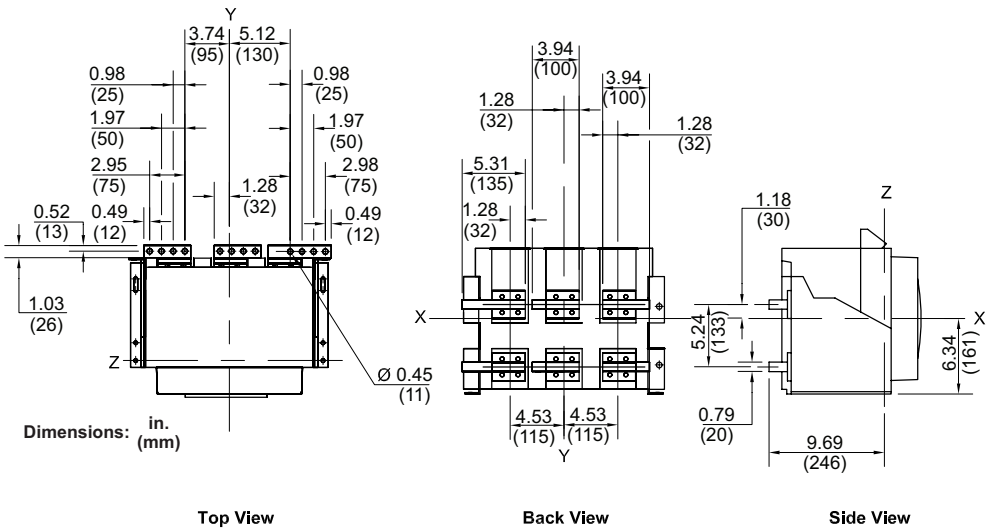

Top View Back View Side View

## 4000 A Rear-Connected "T" Vertical (RCTV)



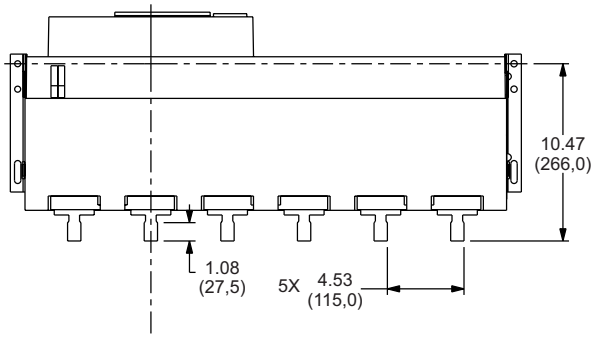

Top View Back View Side View

## 4000 A Rear-Connected "T" Horizontal (RCTH)

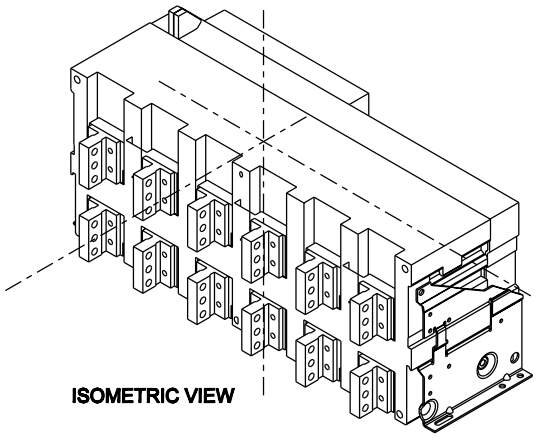



Top View Back View Side View

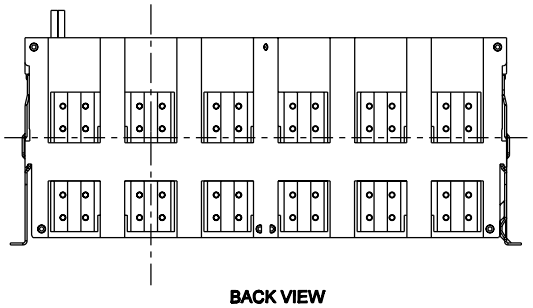
## 5000 A Rear-Connected "T" Vertical (RCTV)



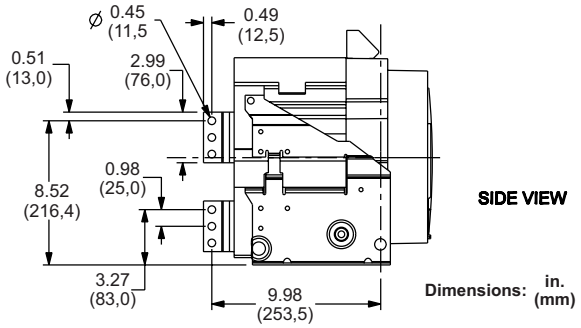

TOP VIEW



ISOMETRIC VIEW



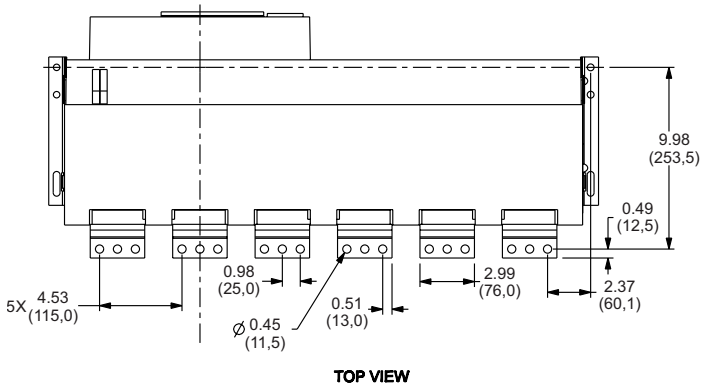
BACK VIEW



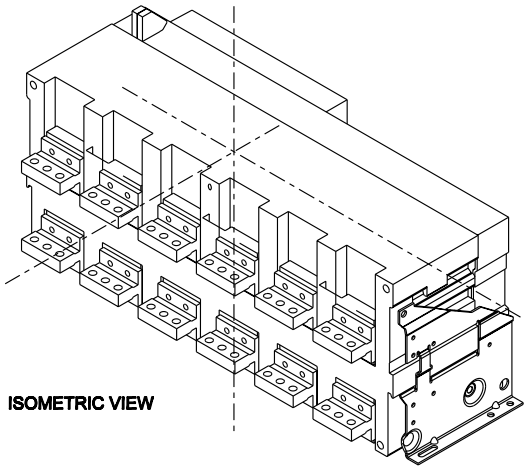

SIDE VIEW

Dimensions: in. (mm)

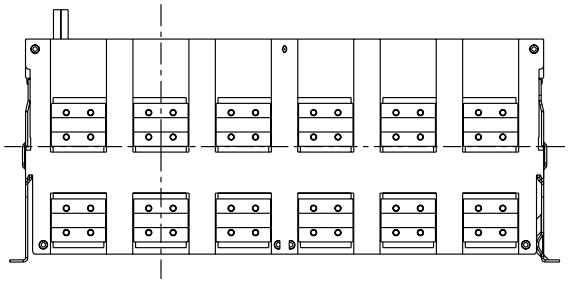
## 5000 A Rear-Connected "T" Horizontal (RCTH)



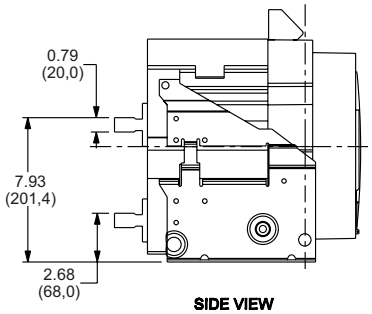

TOP VIEW



ISOMETRIC VIEW



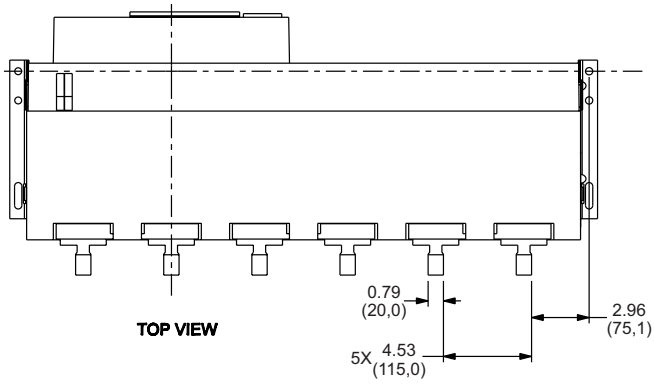
BACK VIEW



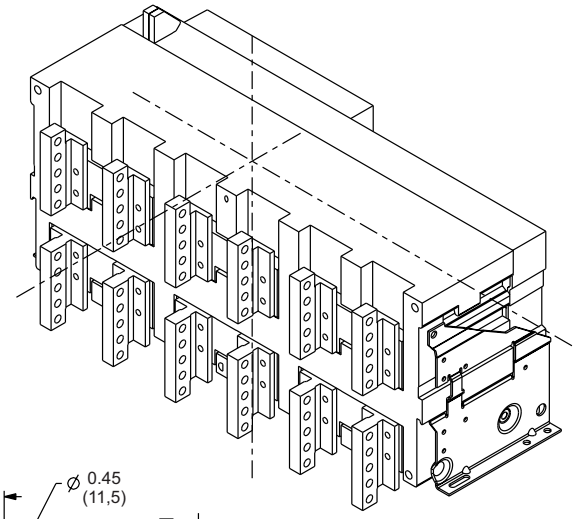

SIDE VIEW

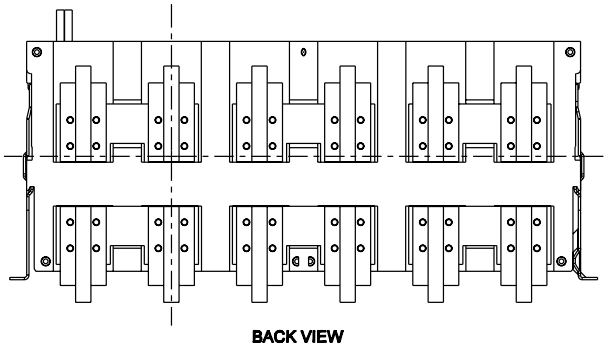
Dimensions: in. (mm)

## 6300 A Rear-Connected "T" Vertical (RCTV)

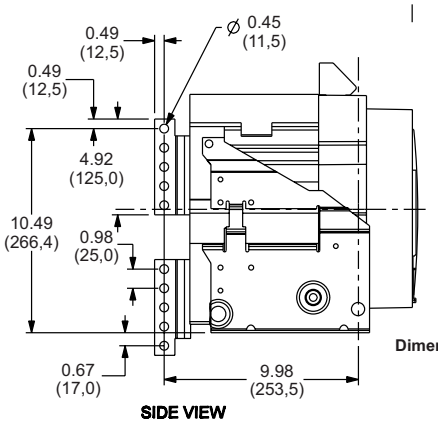



TOP VIEW





BACK VIEW

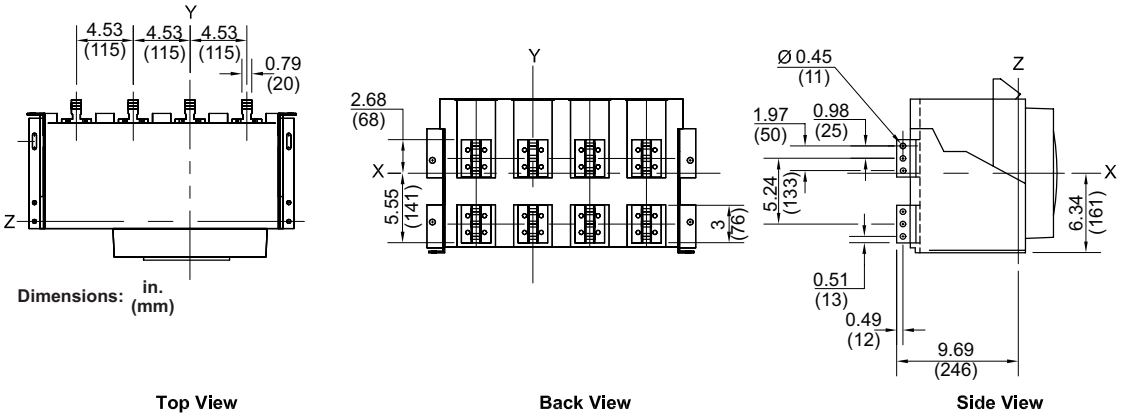



SIDE VIEW

Dimensions: in. (mm)

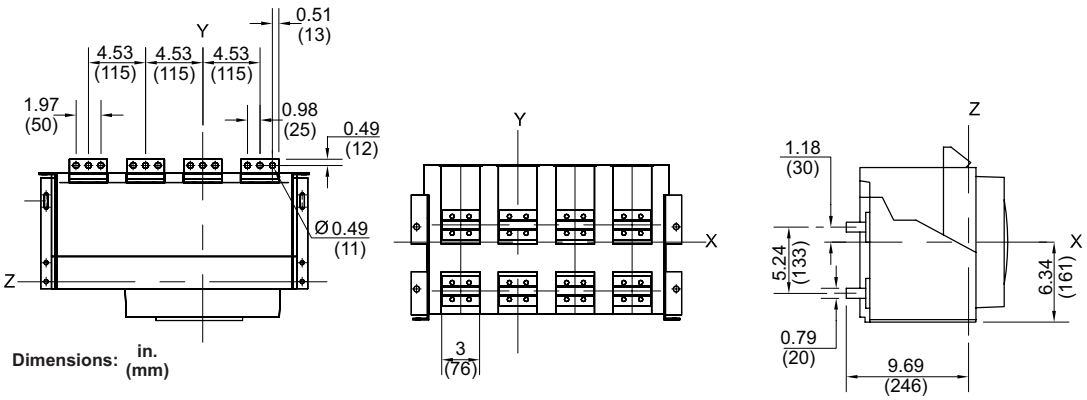
# MasterPacT NW IEC Four-Pole Drawout Circuit Breakers

## 800–3200 A Rear-Connected "T" Vertical (RCTV)



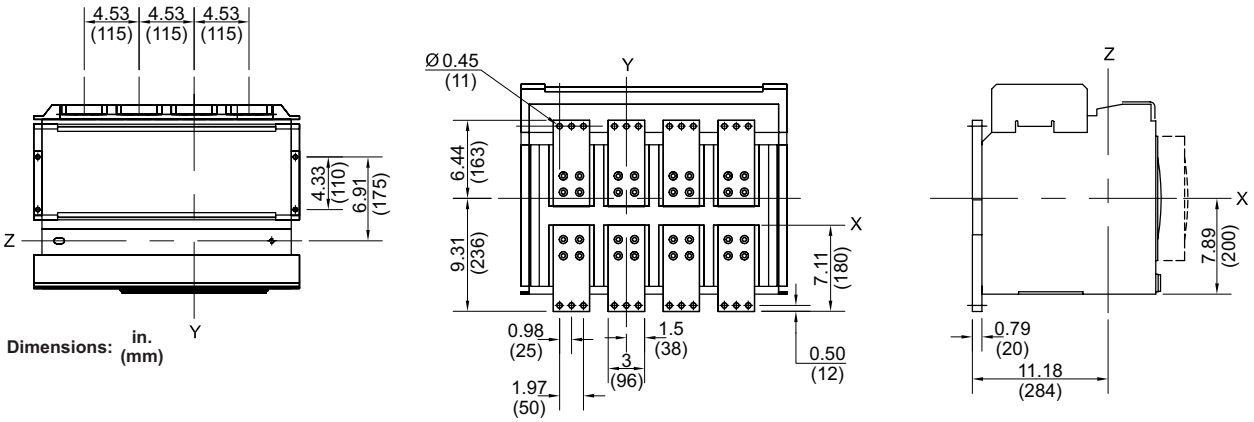

Top View Back View Side View

## 800–3200 A Rear-Connected "T" Horizontal (RCTH)



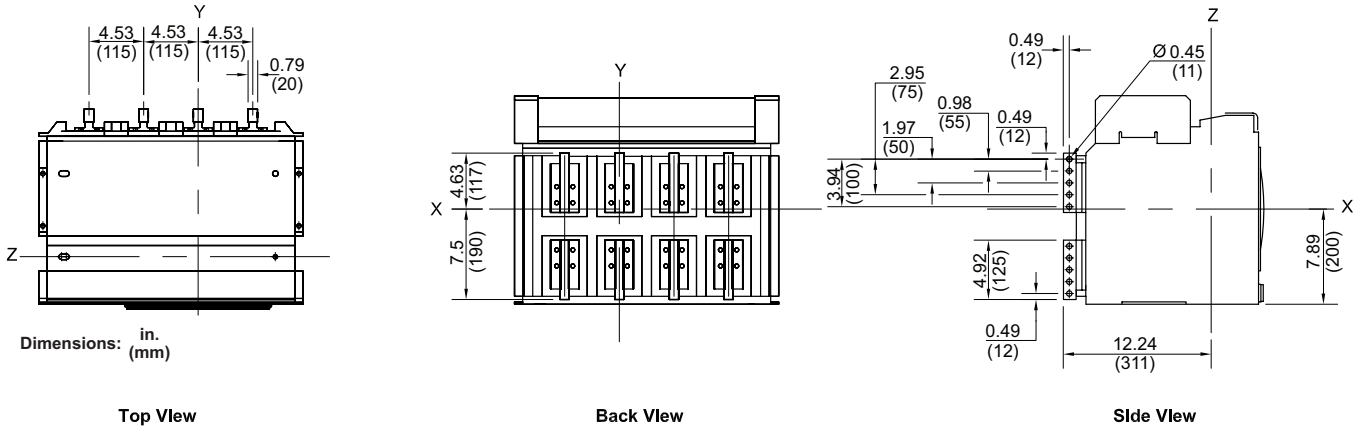

Top View Back View Side View

## 800–3200 A Front-Connected Flat (FCF)



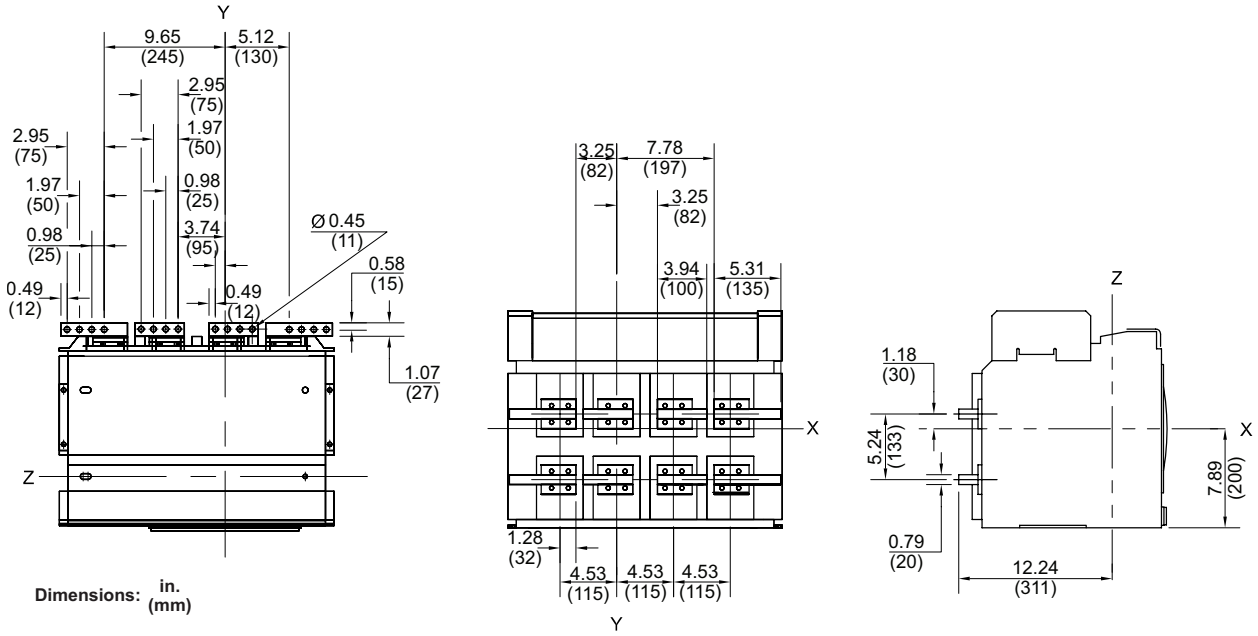

Top VIew Back VIew SIde VIew

## 4000 A Rear-Connected "T" Vertical (RCTV)



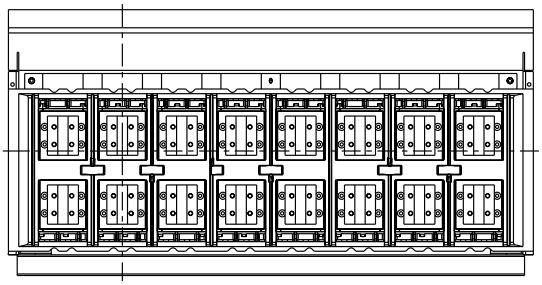

Top View Back View Side View

## 4000 A Rear-Connected "T" Horizontal (RCTH)

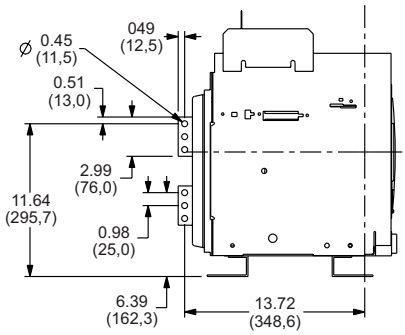



Top View Back View Side View

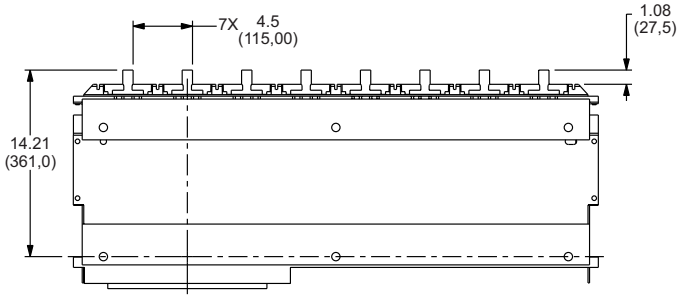
## 5000 A Rear-Connected “T” Vertical (RCTV)



BACK VIEW

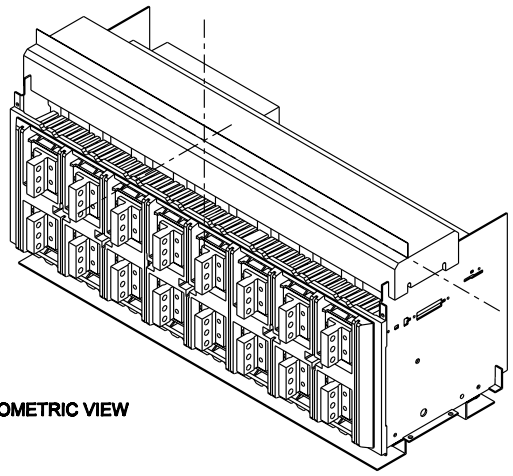



SIDE VIEW



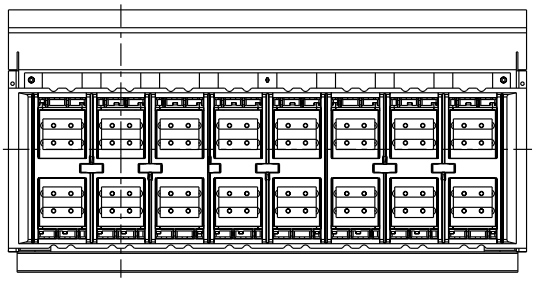

BOTTOM VIEW

Dimensions: in. (mm)

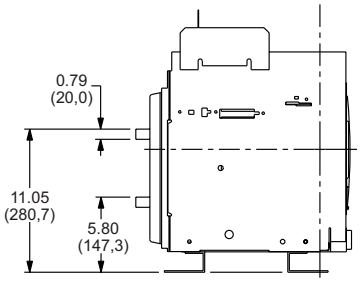


ISOMETRIC VIEW

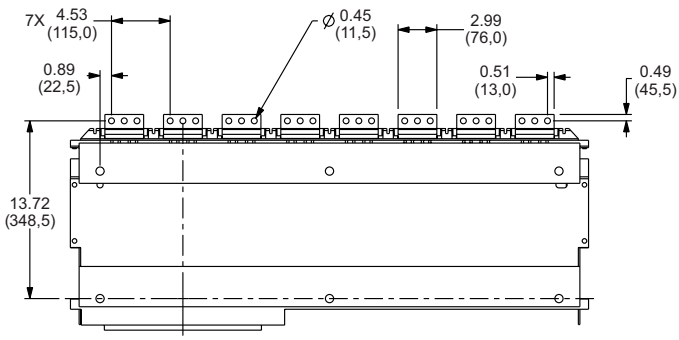
## 5000 A Rear-Connected “T” Horizontal (RCTH)



BACK VIEW

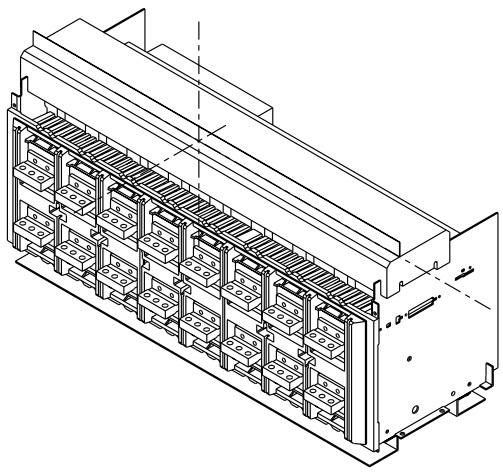



SIDE VIEW

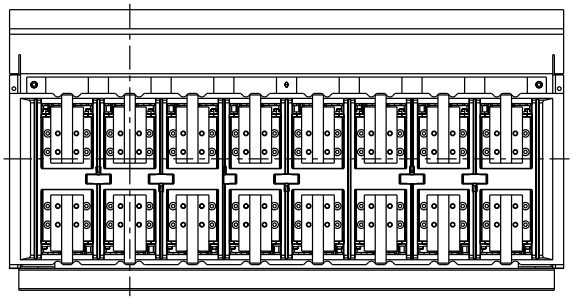



BOTTOM VIEW

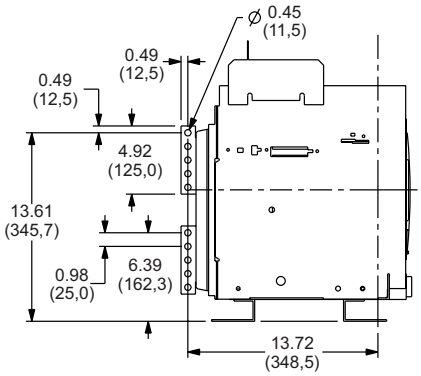
Dimensions: in. (mm)



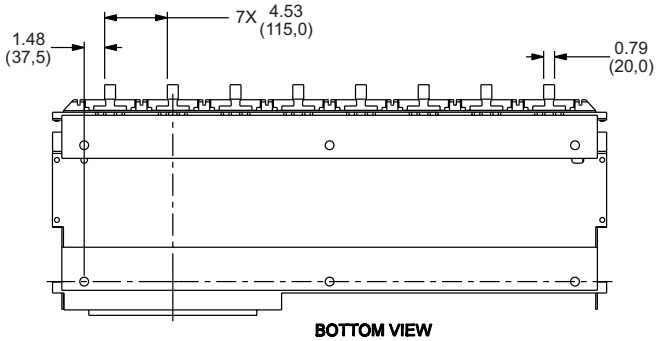
### 6300 A Rear-Connected “T” Vertical (RCTV)



BACK VIEW

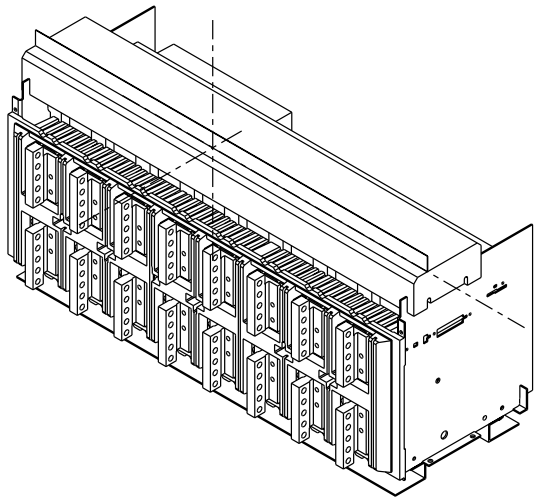



SIDE VIEW



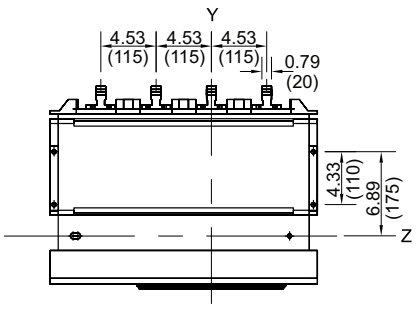

BOTTOM VIEW

Dimensions: in. (mm)



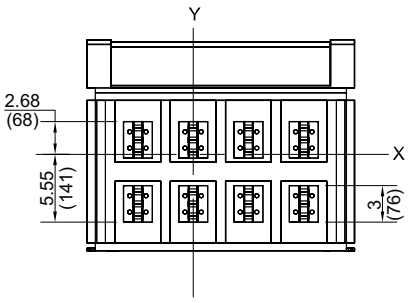
# MasterPacT NW IEC Four-Pole Fixed Circuit Breakers

### 800–3200 A Rear-Connected "T" Vertical (RCTV)

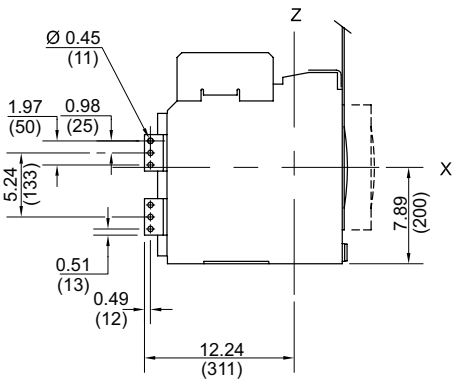



Dimensions: in. (mm)

Top View

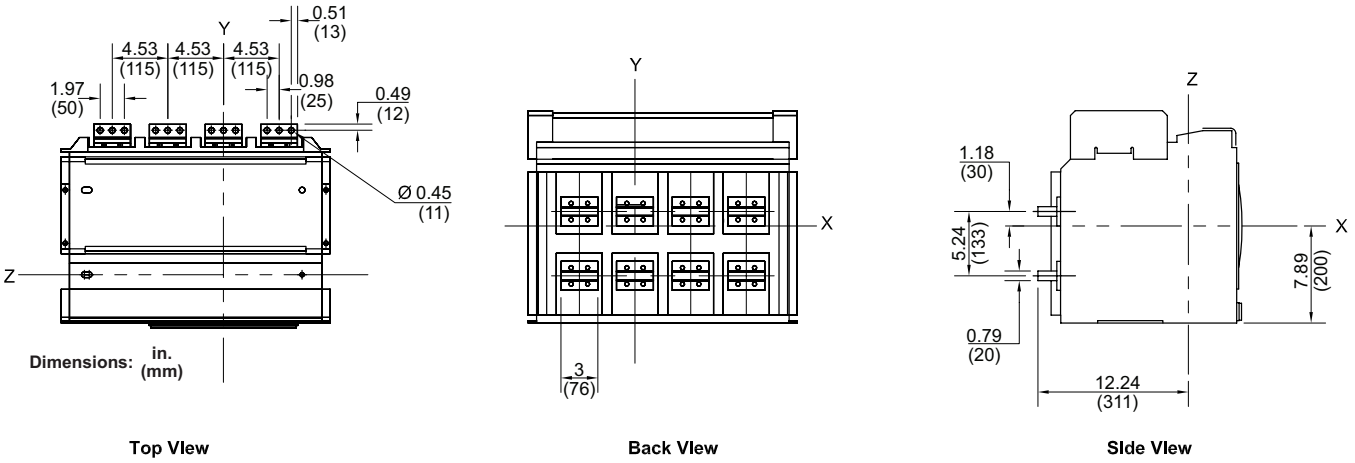



Back View

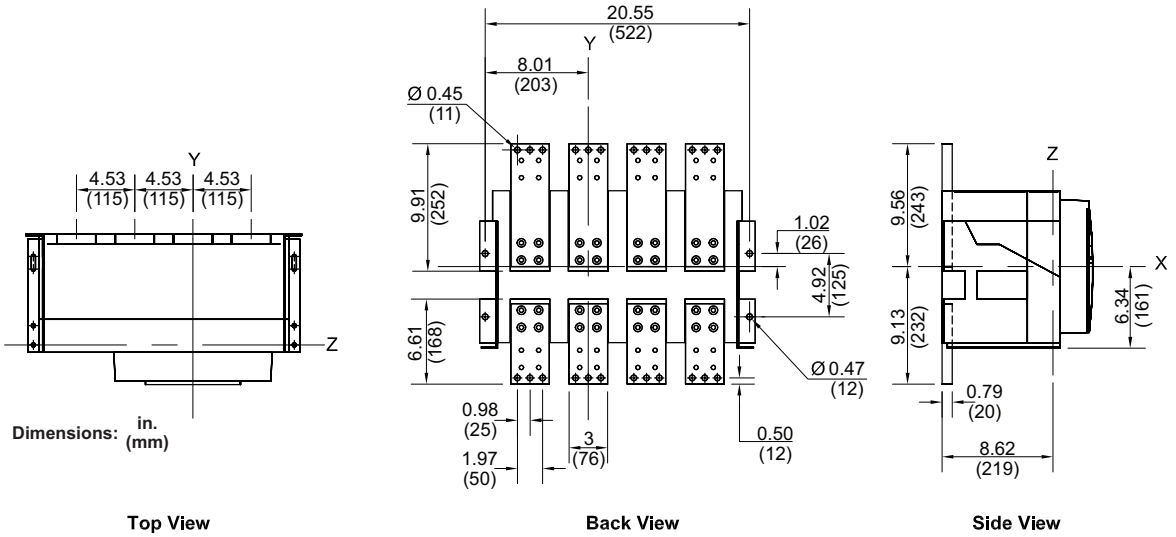



Side View

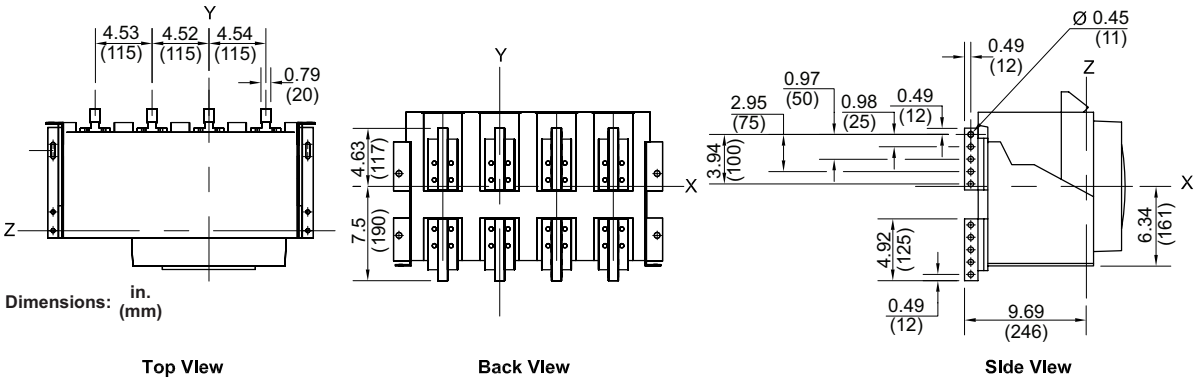
## 800–3200 A Rear-Connected "T" Horizontal (RCTH)



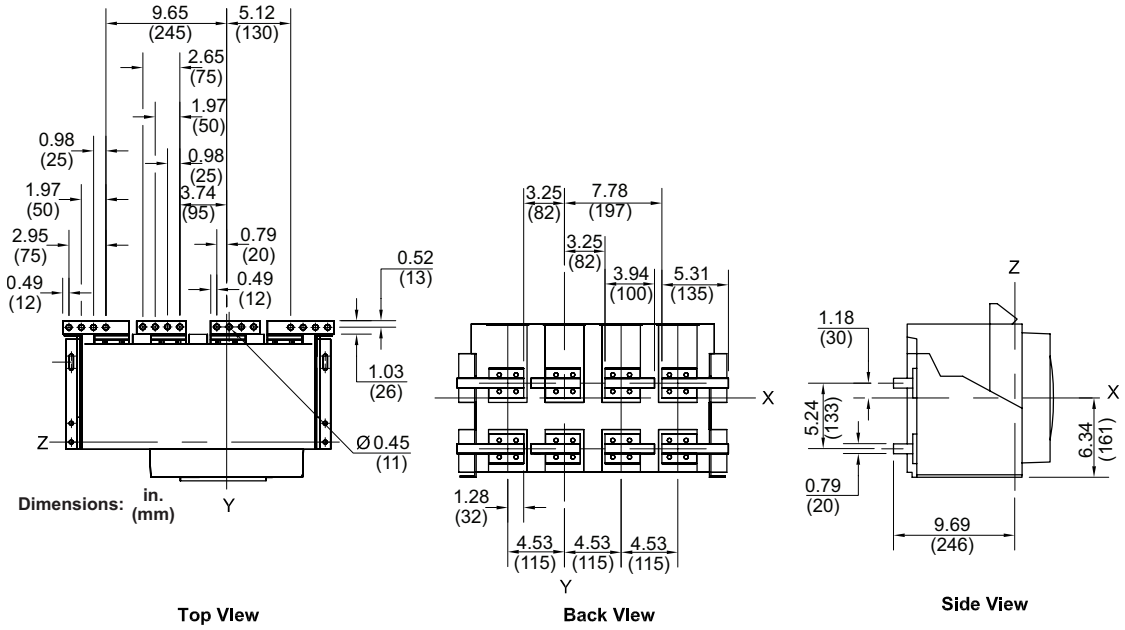

## 800–3200 A Front-Connected Flat (FCF)



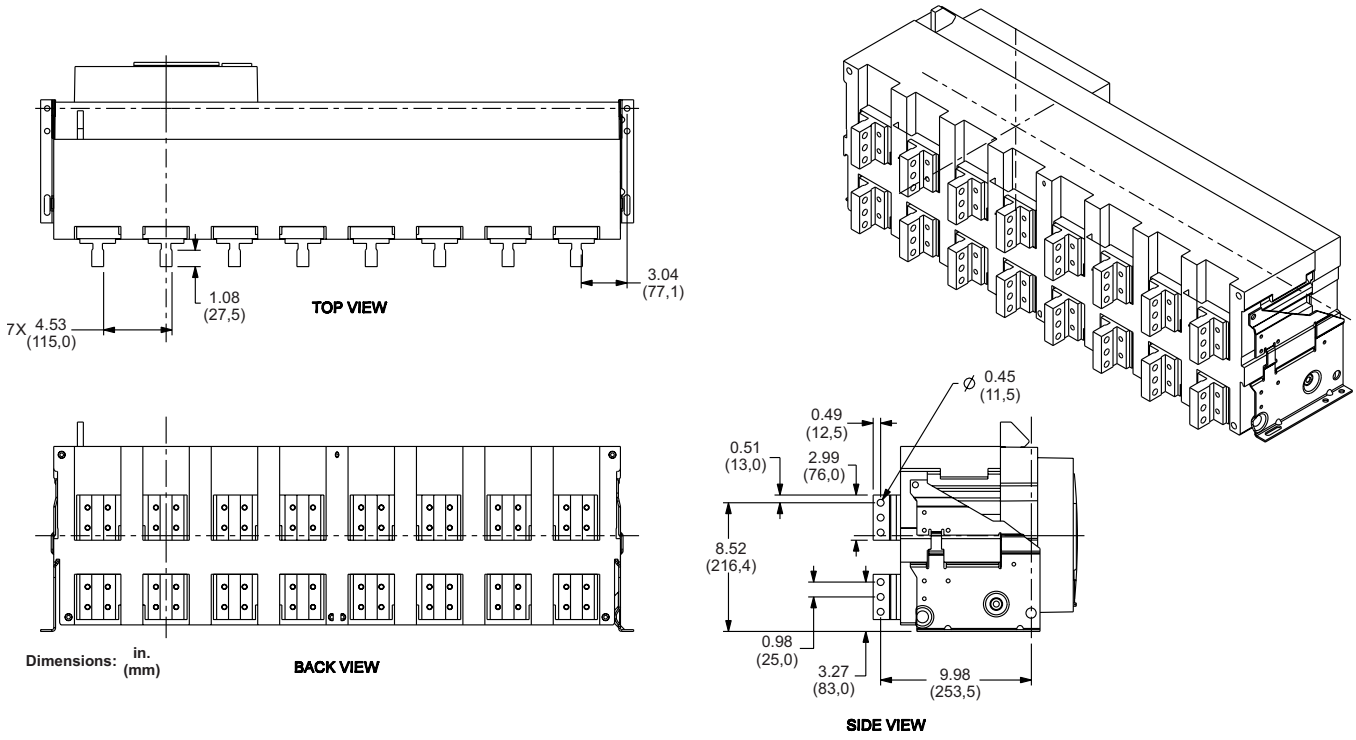

## 4000 A Rear-Connected "T" Vertical (RCTV)



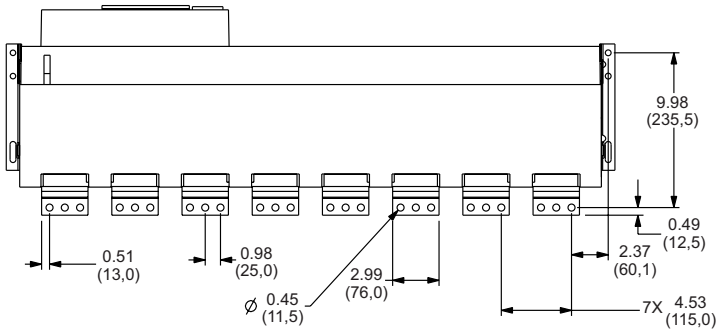
## 4000 A Rear-Connected "T" Horizontal (RCTH)



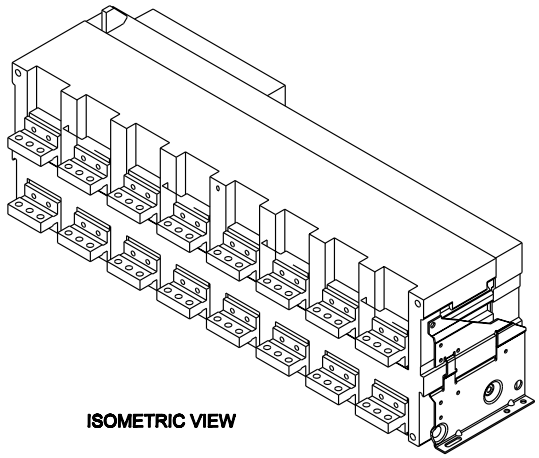

## 5000 A Rear-Connected “T” Vertical (RCTV)



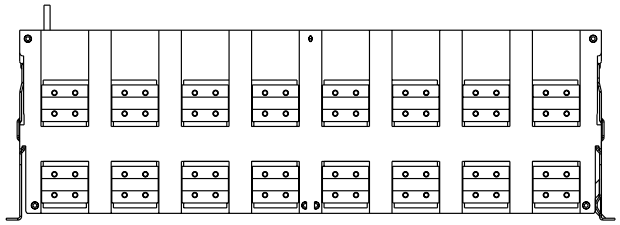
## 5000 A Rear-Connected “T” Horizontal (RCTH)




TOP VIEW

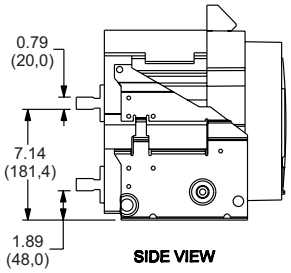


ISOMETRIC VIEW



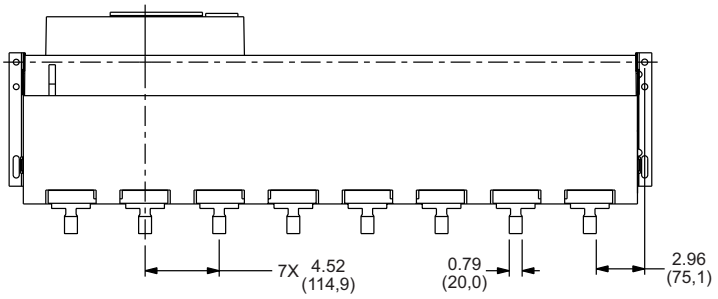
Dimensions: in. (mm)

BACK VIEW

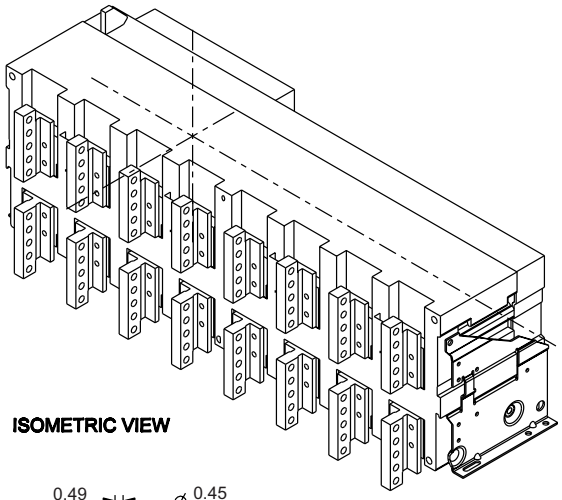



SIDE VIEW

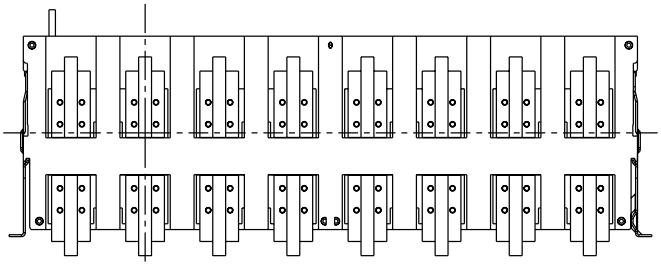
## 6300 Rear-Connected “T” Vertical (RCTV)




TOP VIEW

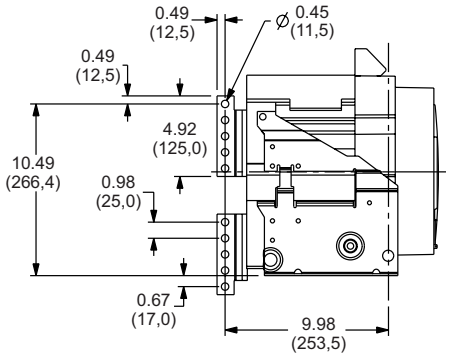


ISOMETRIC VIEW



Dimensions: in. (mm)

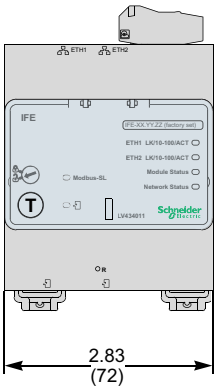
BACK VIEW

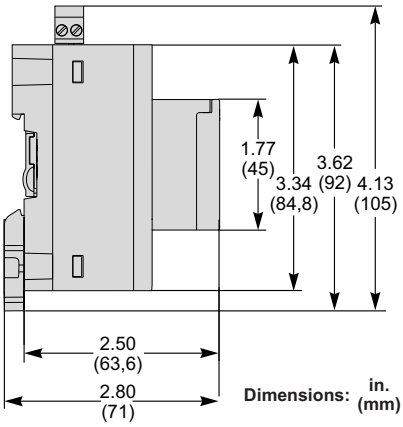



SIDE VIEW

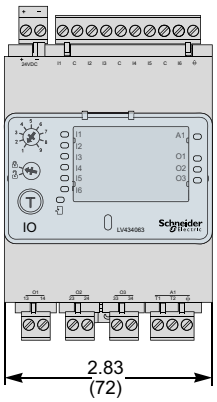
# Accessory Dimensional Drawings

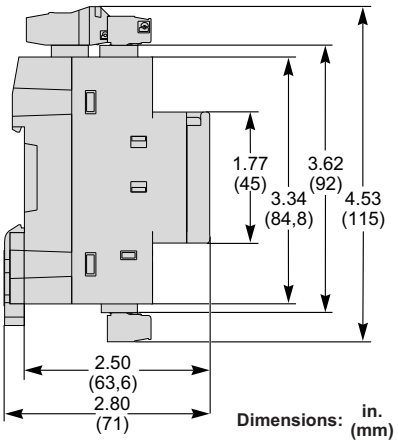
## IFE Ethernet Interface Dimensions



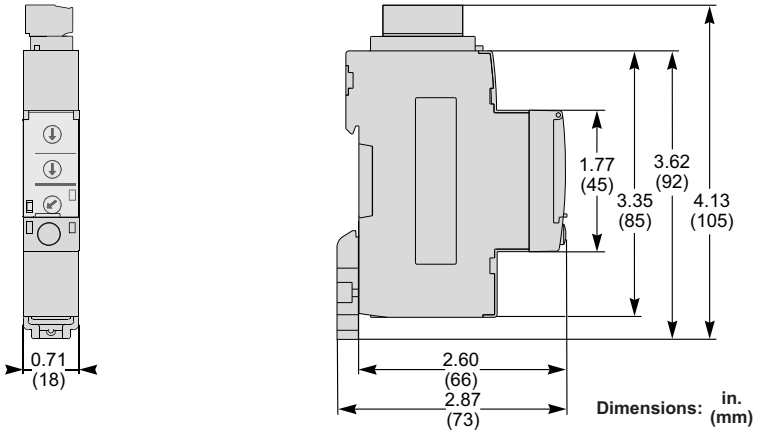




## I/O (Input/Output) Application Module Dimensions

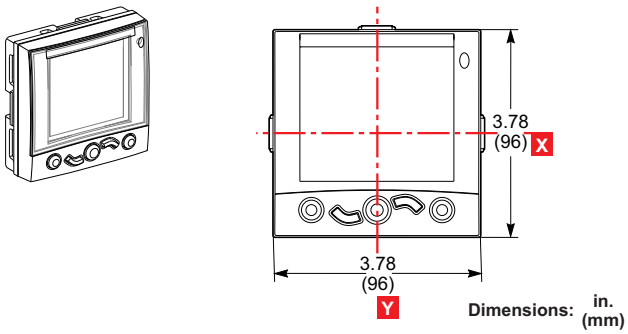


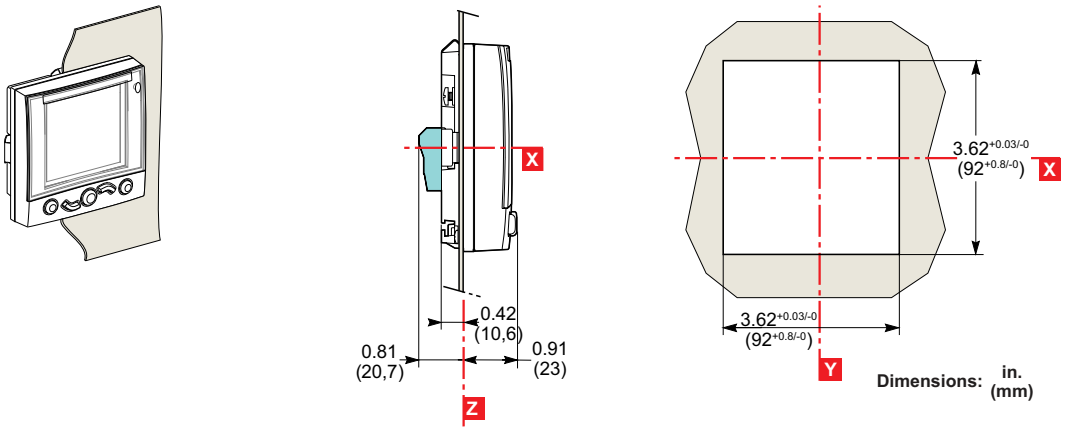
# IFM Modbus-SL Interface Dimensions



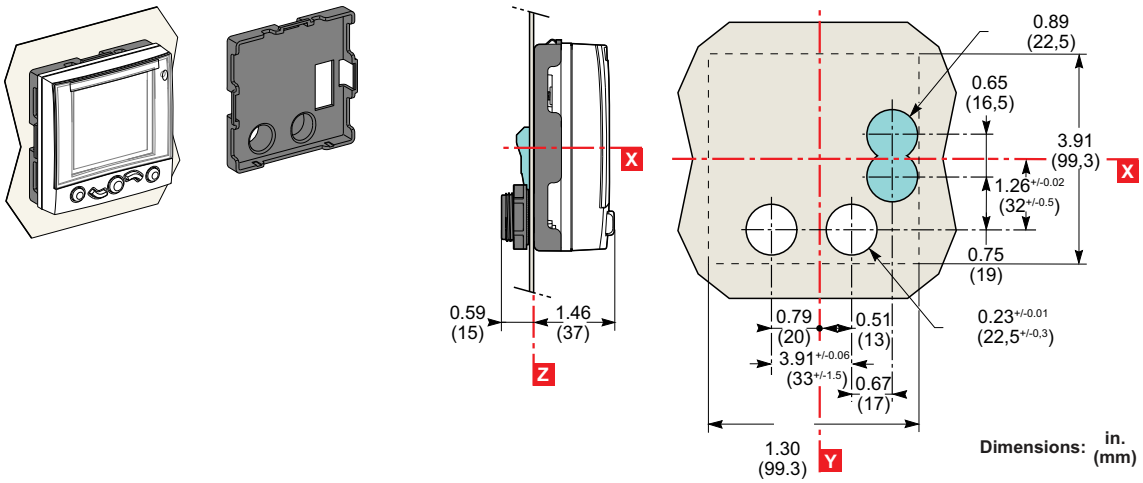

# FDM121 Switchboard Display Dimensions



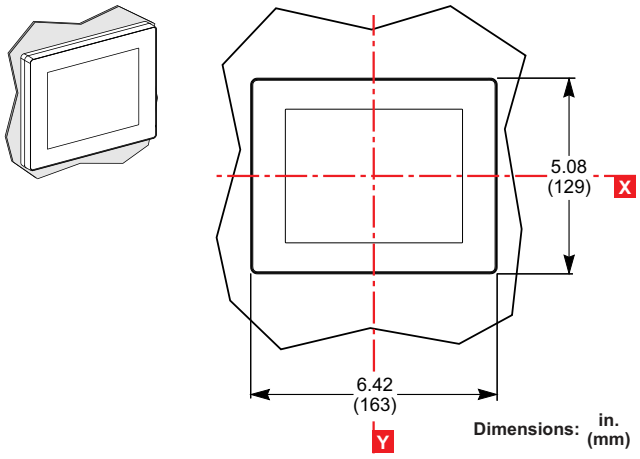

# FDM121 Switchboard Display Mounting Through Panel



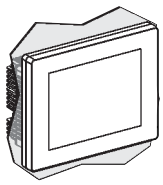
# FDM121 Switchboard Display Mounting On Panel

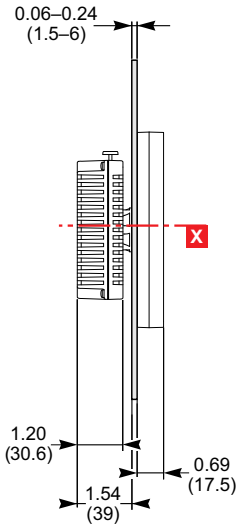


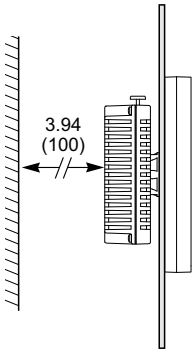

# FDM128 Switchboard Display Dimensions

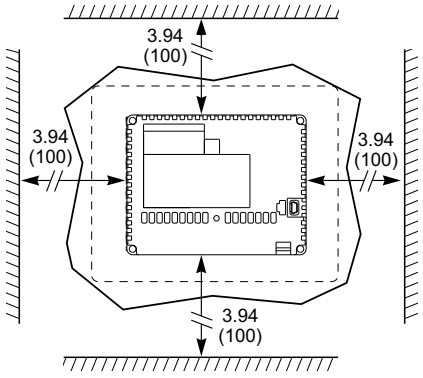


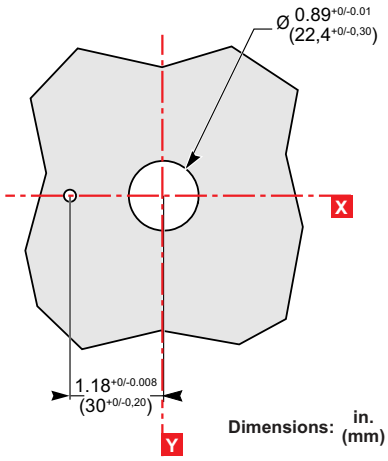
# FDM128 Switchboard Display Mounting on Panel



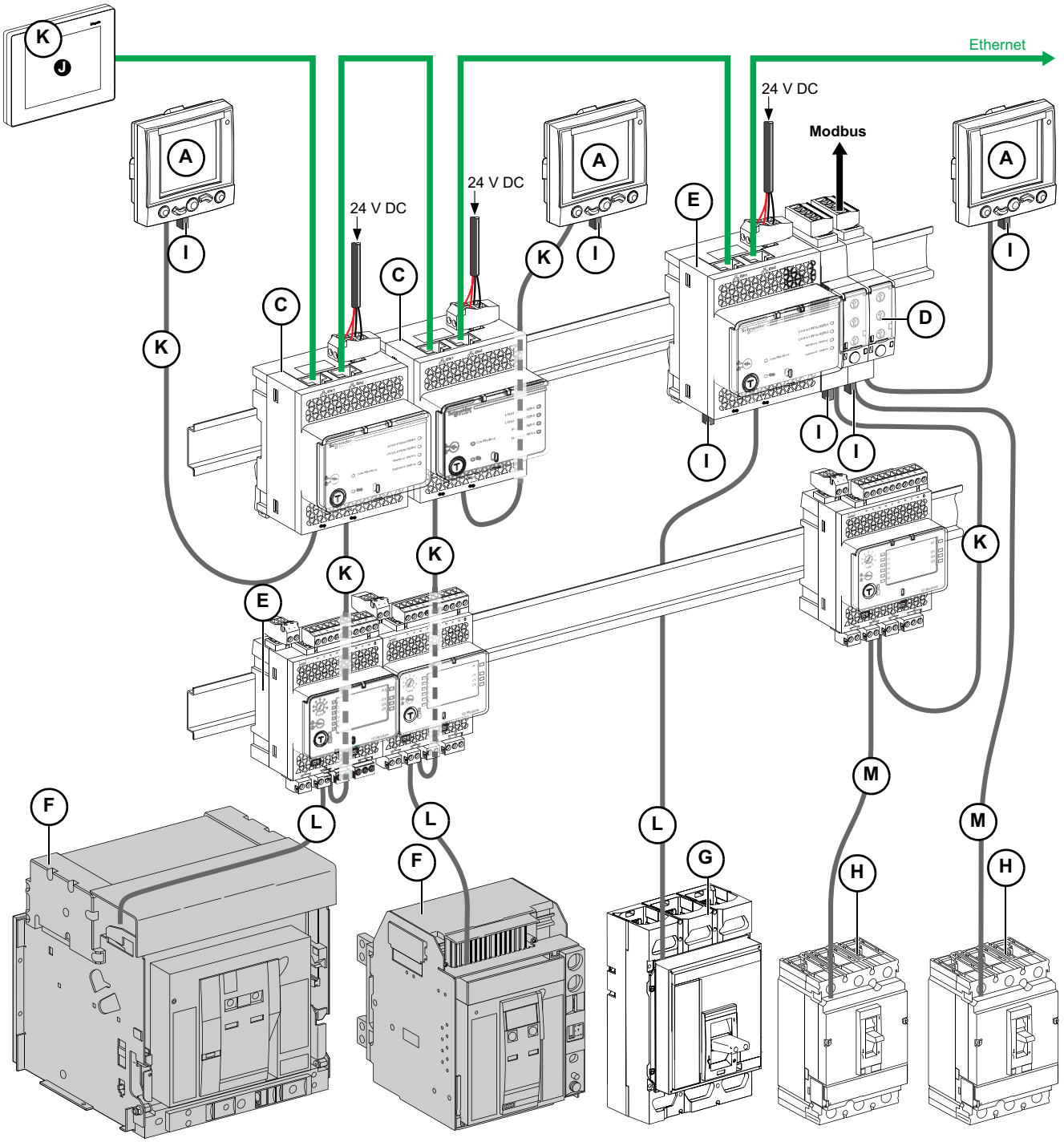


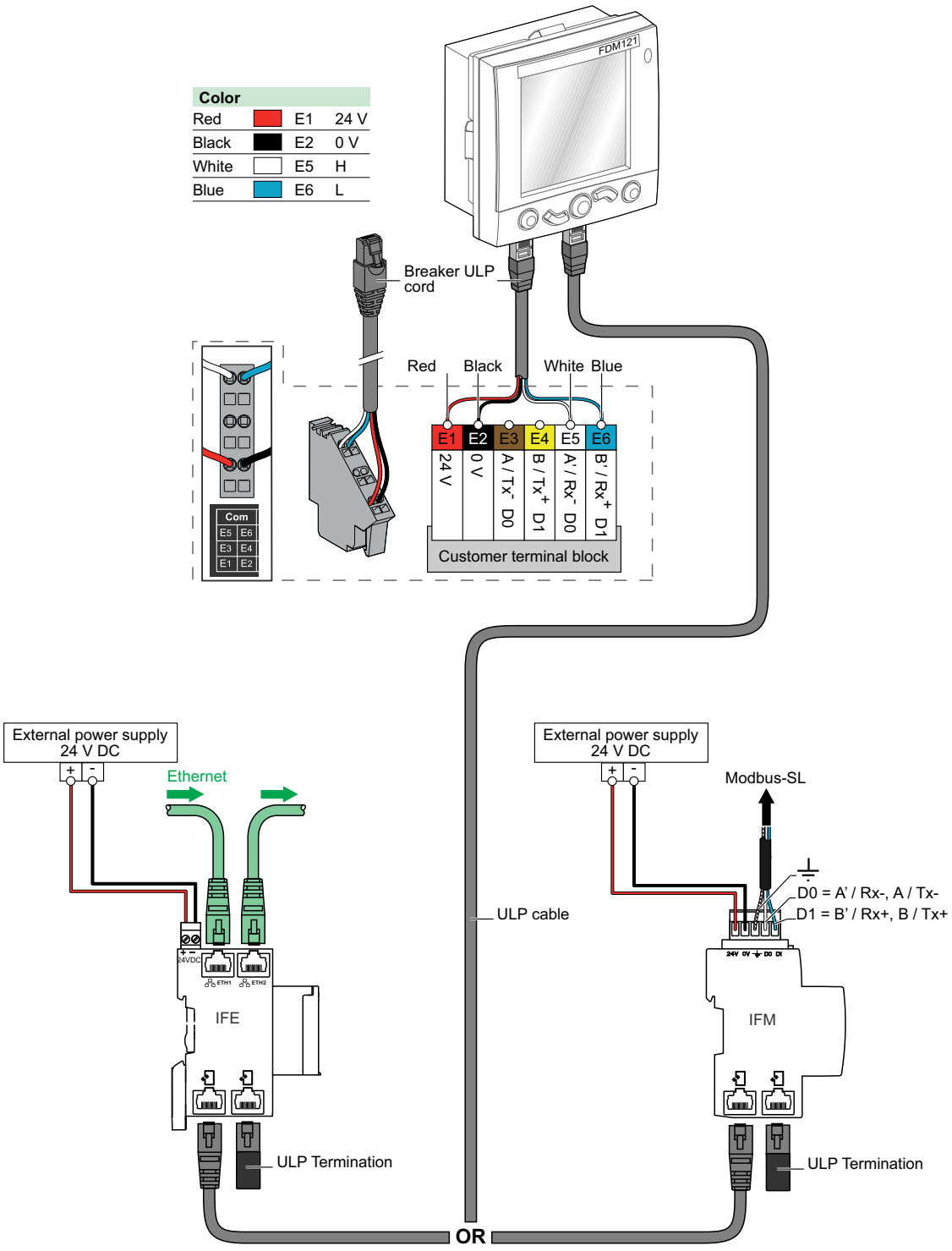



# MasterPacT NT and NW Circuit Breaker Communication

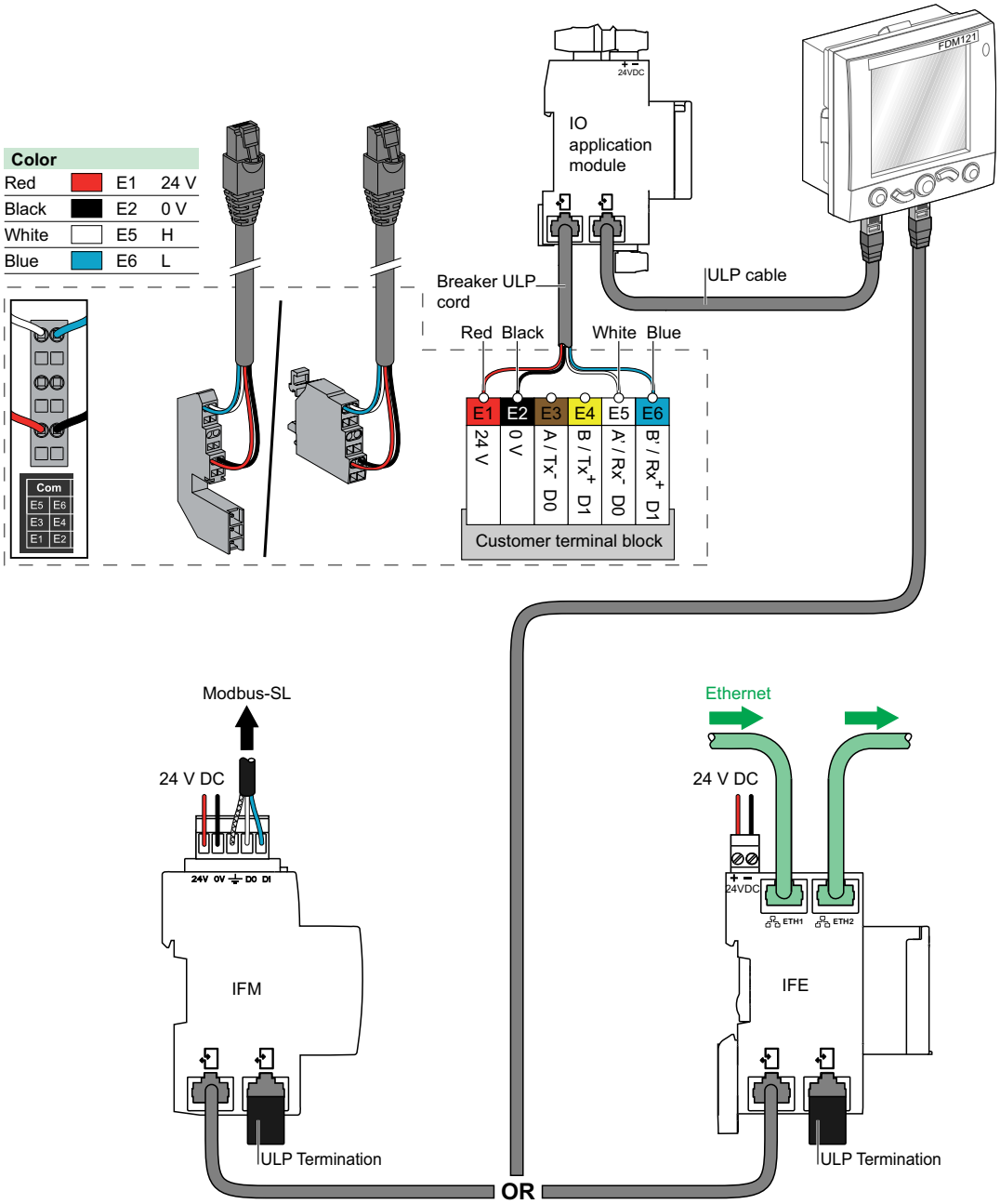



A. FDM121 (TRV00121)
B. IFE module master (LV434011)
C. IFE module (LV434010)
D. IFM module (TRV00210)
E. IO module (LV434063)
F. MasterPact NT/NW circuit breaker
G. PowerPact P/R circuit breaker
H. PowerPact H/J/L circuit breaker
I. ULP termination (TRV00880)
J. FDM128 (LV434128)
K. ULP cable
L. Circuit breaker ULP cord
M. NSX cord

# Fixed MasterPacT NT and NW Connection to the Communication Interface Module



# Drawout MasterPacT NT and NW Connection to the IO and Communication Interface Module



# Selection

## Selection Introduction

MasterPacT circuit breakers are available in three frame sizes:

- T-frame circuit breakers: rated up to 800 A (ANSI Certified), up to 1600 A (UL® Listed), and up to 1600 A (IEC Rated).
- W-frame circuit breakers: rated up to 4000 A (ANSI Certified), up to 3000 A (UL Listed), and up to 4000 A (IEC Rated).
- Y-frame circuit breakers: rated up to 5000 A (ANSI Certified), up to 6000 A (UL Listed), and up to 6300 A (IEC Rated).

Within each range, several sensor plugs are available to determine the maximum trip rating of each circuit breaker. In addition to a sensor plug, an adjustable rating plug is available to get lower ampacity than that available with the sensor plug.

MasterPacT circuit breakers can be equipped with a variety of MicroLogic electronic trip unit configurations, ranging from basic circuit protection to more advanced relay protection and power metering capabilities. Additionally all electronic trip units within the new MicroLogic family are field interchangeable and upgradeable. Each control unit is also equipped with an interchangeable and upgradeable adjustable rating plug which is used to select the long-time pickup setting of the circuit breaker.

MasterPacT circuit breakers are ordered by sensor plug rating, not ampere trip rating. The trip rating of the circuit breaker is determined by the setting of the adjustable rating plug. Sensor plugs and rating plugs are field replaceable.

## Overview of Selection Procedure

1. Select the completely assembled circuit breaker (circuit breaker frame plus trip unit):
   a. The frame ampere rating required
   b. The interrupting rating required
   c. The sensor plug rating required
   d. The connections
2. Select the trip unit, rating plug, and trip unit options.
3. Select circuit breaker frame options, if required.
4. Select cradle options, if required.

### Circuit Breaker Selection Options

| Model Number | NT | | | | NW | | | | NW | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Frame type | T | | | | W | | | | Y (wide-construction) | | |
| | ANSI | UL | UL | IEC | ANSI | ANSI | UL | IEC | ANSI | UL | IEC |
| Maximum frame rating | 800 A | 1200 A | 1600 A | 1600 A | 3200 A | 4000 A | 3000 A | 4000 A | 6000 A | 6000 A | 6300 A |
| **Maximum Interrupting Rating (kA, 50/60 Hz)** | | | | | | | | | | | |
| | 254 V 42 kA | 240 V 200 kA | 240 V 200 kA | 240 V 150 kA | 254 V 200 kA | 254 V 100 kA | 240 V 200 kA | 240 V 150 kA | 254 V 200 kA | 240 V 200 kA | 240 V 150 kA |
| | 508 V 42 kA | 480 V 100 kA | 480 V 100 kA | 440 V 130 kA | 508 V 200 kA | 508 V\ 100 kA | 480 V 150 kA | 440 V 150 kA | 508 V 200 kA | 480 V 150 kA | 440 V 150 kA |
| AC rating | 635 V N/A | 600 V 50 kA | 600 V 50 kA | 690 V 42 kA | 635 V 130 kA | 635 V 85 kA | 600 V 100 kA | 690 V 100 kA | 690 V 130 kA | 600 V 100 kA | 690 V 100 kA |
| **Construction** | | | | | | | | | | | |

## Circuit Breaker Selection Options (Continued)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Drawout | X | X | — | X | X | — | X | X | X | X | X |
| Fixed (UL Listed and IEC Rated only) | X | X | X | X | X | X | X | X | X | X | X |
| Termination | | | | | | | | | | | |
| Rotatable rear terminals | X | X | X | X | X | X | X | X | X | X | X |
| Front-connected terminals | X | X | X | X | X | X | X | X | X | X | X |
| Accessories Available for the Circuit Breaker and Cradle | | | | | | | | | | | |
| • Shunt close | | • Ready-to-close contact | | | | | | • Door interlock | | | |
| • Shunt trip | | • Overcurrent trip switch (standard) | | | | | | • Operations counter | | | |
| • Undervoltage trip | | • Rack in interlock | | | | | | • Safety Shutter | | | |
| • Fixed time delay | | • Key locks for circuit breaker and cradle | | | | | | • Cradle rejection kit (standard) | | | |
| • Adjustable time delay | | · Padlock attachment (circuit breaker + cradle) | | | | | | • Rail Padlocking | | | |
| • Spring-charging motor | | • Mechanical interlocks | | | | | | | | | |
| • Auxiliary contacts (standard) | | • Cradle position switches | | | | | | | | | |
| Electronic Trip Unit Features | | | | | | | | | | | |
| • True RMS sensing | | • Trip indication LED | | | | | | • Neutral protection | | | |
| • LSI | | • Zone-selective interlocking (ZSI) | | | | | | • Contact wear indication | | | |
| • Ground-fault alarm (no trip) | | • Communications | | | | | | • Incremental fine-tuning of settings | | | |
| • Ground-fault trip | | • LCD dot matrix display | | | | | | • Selectable long-time delay bands | | | |
| • Ground-fault trip and programmable alarm | | • Advanced user interface | | | | | | • Power measurement | | | |
| • Adjustable rating plugs | | • Protective relay functions | | | | | | • Expanded memory | | | |
| • Long-time pickup LED | | • Thermal imaging | | | | | | • Enhanced power quality measurement | | | |

## MicroLogic Trip Unit Selection

| Design Platform Designation | Feature Type | Protection | Model Number |
|---|---|---|---|
| Basic Trip Unit | Basic | LS0 (IEC Rated) | 2 |
| | | LI (UL Listed/ANSI Certified) | 3 |
| | | LSI | 5 |
| Trip Unit with Ammeter | A | LS0 (IEC Rated) | 2.0A |
| | | LI (UL Listed/ANSI Certified) | 3.0A |
| | | LSI | 5.0A |
| | | LSIG | 6.0A |
| Trip Unit with Power Metering | P | LSI | 5.0P |
| | | LSIG | 6.0P |
| Trip Unit with Harmonic Metering | H | LSI | 5.0H |
| | | LSIG | 6.0H |

# Factory-Assembled Circuit Breakers and Switches

## T-Frame Circuit Breaker Selection

### ANSI C37 Certified/UL 1066 Listed T-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 800 A | NT08N1 | 42 kA | 42 kA | — | 100 A, 250 A, 400 A, 600 A, 800 A |

### UL 489 Listed T-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 800 A | NT08N | 50 kA | 50 kA | 35 kA | 100 A, 250 A, 400 A, 600 A, 800 A |
| | NT08H | 65 kA | 50 kA | 50 kA | 100 A, 250 A, 400 A, 600 A, 800 A |
| | NT08L(34) | 100 kA | 65 kA | — | 100 A, 250 A, 400 A, 600 A, 800 A |
| | NT08L(34) | 200 kA | 100 kA | — | 100 A, 250 A, 400 A, 600 A, 800 A |
| | NT08LF(34) | 200 kA | 100 kA | — | 100 A, 250 A, 400 A, 600 A, 800 A |
| 1200 A | NT12N | 50 kA | 50 kA | 35 kA | 600 A, 800 A, 1000 A, 1200 A |
| | NT12H | 65 kA | 50 kA | 50 kA | 600 A, 800 A, 1000 A, 1200 A |
| | NT12L1(34) | 100 kA | 65 kA | — | 600 A, 800 A, 1000 A, 1200 A |
| | NT12L(34) | 200 kA | 100 kA | — | 600 A, 800 A, 1000 A, 1200 A |
| | NT12LF(34) | 200 kA | 5100 kA | — | 600 A, 800 A, 1000 A, 1200 A |
| 1600 A(35) | NT16N | 50 kA | 50 kA | 35 kA | 800 A, 1000 A, 1200 A, 1600 A |
| | NT16H | 65 kA | 50 kA | 50 kA | 800 A, 1000 A, 1200 A, 1600 A |
| | NT16L(34) | 100 kA | 65 kA | — | 800 A, 1000 A, 1200 A, 1600 A |
| | NT16L(34) | 200 kA | 100 kA | — | 800 A, 1000 A, 1200 A, 1600 A |
| | NT16LF(34) | 200 kA | 5100 kA | — | 800 A, 1000 A, 1200 A, 1600 A |

### IEC 60947-2 Rated T-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating (kA) | | | | Sensor Plug Rating (A) |
|---|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | 1000 V | |
| 800 A | NT08H1 | 42 kA | 42 kA | 42 kA | — | 250 A, 400 A, 630 A, 800 A |
| | NT08L1 | 150 kA | 130 kA | 25 kA | — | 250 A, 400 A, 630 A, 800 A |
| 1000 A | NT10H1 | 42 kA | 42 kA | 42 kA | — | 400 A, 630 A, 800 A, 1000 A |
| | NT10L1 | 150 kA | 130 kA | 25 kA | — | 400 A, 630 A, 800 A, 1000 A |
| 1250 A | NT12H1 | 42 kA | 42 kA | 42 kA | — | 630 A, 800 A, 1000 A, 1250 A |
| 1600 A | NT16H1 | 42 kA | 42 kA | 42 kA | — | 800 A, 1000 A, 1250 A, 1600 A |

**NOTE:** L1F and LF circuit breakers are tested to show the arc flash hazard risk category as referenced by NFPA 70E.

(34) Not available in four-pole circuit breakers.
(35) Fixed-mount only. 1600A UL 489 drawout circuit breakers are not available.

# T-Frame Switch Selection

### ANSI C37 Certified/UL 1066 Listed, Non-Automatic T-Frame Switch

| Frame Rating | Model Number | Interrupting Rating[36] | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 800 A | NT08NA | 42 kA | 42 kA | NA | 42 kA |
| | NT08HA | 42 kA | 42 kA | 22 kA | 42 kA |

### UL 489 Listed, Automatic T-Frame Switches

| Frame Rating | Model Number | Withstand Rating[36] | | | Instantaneous Override |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 800 A | NT08HF | 65 kA | 50 kA | 50 kA | 40 kA |
| | NT08HB | 200 kA | 100 kA | N/A | 10 kA |
| 1200 A | NT12HF | 65 kA | 50 kA | 50 kA | 40 kA |
| | NT12HB[37] | 200 kA | 100 kA | N/A | 10 kA |
| 1600 A[38] | NT16HF | 65 kA | 50 kA | 50 kA | 40 kA |
| | NT16HB[37] | 200 kA | 100 kA | N/A | 10 kA |

### IEC 60947-3 Rated, Non-Automatic T-Frame Switches

| Frame Rating | Model Number | Interrupting Rating[39] | | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | 1000 V | |
| 800 A | NT08HA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| 1000 A | NT10HA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| 1250 A | NT12HA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| 1600 A | NT16HA | 42 kA | 42 kA | 42 kA | — | 42 kA |

# W-Frame Circuit Breaker Selection

### ANSI C37/UL 1066 Listed W-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 800 A | NW08N1 | 42 kA | 42 kA | 42 kA | 100 A, 250 A, 400 A, 600 A, 800 A |
| | NW08H1 | 65 kA | 65 kA | 65 kA | |
| | NW08H2 | 85 kA | 85 kA | 85 kA | |
| | NW08H3 | 100 kA | 100 kA | 85 kA | |
| | NW08L[40] | 200 kA | 200 kA | 130 kA | |
| | NW08L1F[40] | 200 kA | 200 kA | 130 kA | |
| 1600 A | NW16N1 | 42 kA | 42 kA | 42 kA | 800 A, 1000 A, 1200 A, 1600 A |

(36) The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.
(37) Not available in four-pole circuit breakers.
(38) Fixed-mount only. 1600A UL489 drawout switches are not available.
(39) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.
(40) Not available for fixed-mounted or four-pole circuit breakers.

### ANSI C37/UL 1066 Listed W-Frame Circuit Breakers (Continued)

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| | NW16H1 | 65 kA | 65 kA | 65 kA | |
| | NW16H2 | 85 kA | 85 kA | 85 kA | |
| | NW16H3 | 100 kA | 100 kA | 85 kA | |
| | NW16L1(41) | 200 kA | 200 kA | 130 kA | |
| | NW16L1F(41) | 200 kA | 200 kA | 130 kA | |
| 2000 A | NW20H1 | 65 kA | 65 kA | 65 kA | 1000 A, 1200 A, 1600 A, 2000 A |
| | NW20H2 | 85 kA | 85 kA | 85 kA | |
| | NW20H3 | 100 kA | 100 kA | 85 kA | |
| | NW20L1(41) | 100 kA | 200 kA | 130 kA | |
| | NW20L1F(41) | 200 kA | 200 kA | 130 kA | |
| 3200 A | NW32H1 | 65 kA | 65 kA | 65 kA | 1600 A, 2000 A, 2500 A, 3000 A, 3200 A |
| | NW32H2 | 85 kA | 85 kA | 85 kA | |
| | NW32H3 | 100 kA | 100 kA | 85 kA | |
| 4000 A (W-Frame) | NW40BH1 | 65 kA | 65 kA | 65 kA | 2000 A, 2500 A, 3000 A, 3200 A, 3600 A, 4000 A |
| | NW40BH2 | 85 kA | 85 kA | 85 kA | |
| | NW40BH3 | 100 kA | 100 kA | 85 kA | |

**NOTE:** L1F circuit breakers are tested to show the arc flash hazard risk category as referenced by NFPA 70E.

### UL 489 Listed W-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 800 A | NW08N | 65 kA | 65 kA | 50 kA | 100 A, 250 A, 400 A, 600 A, 800 A |
| | NW08H | 100 kA | 100 kA | 85 kA | |
| | NW08L(42) | 200 kA | 150 kA | 100 kA | |
| | NW08LF(42) | 200 kA | 150 kA | 100 kA | |
| 1200 A | NW12N | 65 kA | 65 kA | 50 kA | 600 A, 800 A, 1000 A, 1200 A |
| | NW12H | 100 kA | 100 kA | 85 kA | |
| | NW12L(42) | 200 kA | 150 kA | 100 kA | |
| | NW12LF(42) | 200 kA | 150 kA | 100 kA | |
| 1600 A | NW16N | 65 kA | 65 kA | 50 kA | 800 A, 1000 A, 1200 A, 1600 A |
| | NW16H | 100 kA | 100 kA | 85 kA | |
| | NW16L(42) | 200 kA | 150 kA | 100 kA | |
| | NW16LF(42) | 200 kA | 150 kA | 100 kA | |
| 2000 A | NW20N | 65 kA | 65 kA | 50 kA | 1000 A, 1200 A, 1600 A, 2000 A |
| | NW20H | 100 kA | 100 kA | 85 kA | |
| | NW20L(42) | 200 kA | 150 kA | 100 kA | |

(41) Not available for fixed-mounted or four-pole circuit breakers.
(42) Not available for fixed-mounted or four-pole drawout circuit breakers.

### UL 489 Listed W-Frame Circuit Breakers (Continued)

| | | | | | |
|---|---|---|---|---|---|
| | NW20LF(43) | 200 kA | 150 kA | 100 kA | |
| 2500 A | NW25H | 100 kA | 100 kA | 85 kA | 1200 A, 1600 A, 2000 A, 2500 A |
| | NW25L(43) | 200 kA | 150 kA | 100 kA | |
| 3000 A | NW30H | 100 kA | 100 kA | 85 kA | |
| | NW30L(43) | 200 kA | 150 kA | 100 kA | |

**NOTE:**

LF circuit breakers are tested to show the arc flash hazard risk category as referenced by

NFPA 70E.

### IEC 60947-2 Rated W-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | | Sensor Plug Rating |
|---|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | 1150 V | |
| 800 A | NW08N1 | 42 kA | 42 kA | 42 kA | — | 400 A, 630 A, 800 A |
| | NW08H1 | 65 kA | 65 kA | 65 kA | — | |
| | NW08H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW08L(44) | 150 kA | 150 kA | 100 kA | — | |
| | NW08H10(44) | — | — | — | 50 kA | |
| 1000 A | NW10N1 | 42 kA | 42 kA | 42 kA | — | 400 A, 630 A, 800 A, 1000 A |
| | NW10H1 | 65 kA | 65 kA | 65 kA | — | |
| | NW10H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW10L1(44) | 150 kA | 150 kA | 100 kA | — | |
| | NW10H1(44) | — | — | — | 50 kA | |
| 1250 A | NW12N1 | 42 kA | 42 kA | 42 kA | — | 630 A, 800 A, 1000 A 1250 A |
| | NW12H1 | 65 kA | 65 kA | 65 kA | — | |
| | NW12H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW12L1(44) | 150 kA | 150 kA | 100 kA | — | |
| | NW12H10(44) | — | — | — | 50 kA | |
| 1600 A | NW16N1 | 42 kA | 42 kA | 42 kA | — | 800 A, 1000 A, 1250 A, 1600 A |
| | NW16H1 | 65 kA | 65 kA | 65 kA | — | |
| | NW16H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW16L1(44) | 150 kA | 150 kA | 100 kA | — | |
| | NW16H10(44) | — | — | — | 50 kA | |
| 2000 A | NW20H1 | 65 kA | 65 kA | 65 kA | — | 1000 A, 1250 A, 1600 A, 2000 A |
| | NW20H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW20H3(44) | 150 kA | 150 kA | 100 kA | — | |
| | NW20L1(44) | 150 kA | 150 kA | 100 kA | — | |
| | NW20H10(44) | — | — | — | 50 kA | |

(43) Not available for fixed-mounted or four-pole drawout circuit breakers.
(44) Not available for fixed-mounted circuit breakers.

### IEC 60947-2 Rated W-Frame Circuit Breakers (Continued)

| Frame Rating | Model Number | Interrupting Rating | | | | Sensor Plug Rating |
|---|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | 1150 V | |
| 2500 A | NW25H1 | 65 kA | 65 kA | 65 | — | 1250 A, 1600 A, 2000 A, 2500 A |
| | NW25H2 | 100 kA | 100 kA | 85 | — | |
| | NW25H3(45) | 150 kA | 150 kA | 100 | — | |
| | NW25H10(45) | — | — | — | 50 kA | |
| 3200 A | NW32H1 | 65 kA | 65 kA | 65 kA | — | 1600 A, 2000 A, 2500 A, 3200 A |
| | NW32H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW32H3(45) | 150 kA | 150 kA | 100 kA | — | |
| | NW32H10(45) | — | — | — | 50 kA | |
| 4000 A | NW40H1 | 65 kA | 65 kA | 65 kA | — | 2000 A, 2500 A, 3200 A, 4000 A |
| | NW40H2 | 100 kA | 100 kA | 85 kA | — | |
| | NW40H3(45) | 150 kA | 150 kA | 100 kA | — | |
| | NW40H10(45) | — | — | — | 50 kA | |

# W-Frame Switch Selection

### ANSI C37 Certified/UL 1066 Listed, Non-Automatic Switch

| Frame Rating | Model Number | Interrupting Rating(46) | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 800 A | NW08HA | 65 kA | 65 kA | 65 kA | 65 kA |
| 1600 A | NW16HA | 65 kA | 65 kA | 65 kA | 65 kA |
| 2000 A | NW20HA | 65 kA | 65 kA | 65 kA | 65 kA |
| 3200 A | NW32HA | 65 kA | 65 kA | 65 kA | 65 kA |

| Frame Rating (W-Frame) | Model Number | Interrupting Rating(46) | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 800 A | NW08HF | 100 kA | 100 kA | 85 kA | 85 kA |
| | NW08HC(47) | 200 kA | 200 kA | 130 kA | 30 kA |
| 1600 A | NW16HF | 100 kA | 100 kA | 85 kA | 85 kA |
| | NW16HC(47) | 200 kA | 200 kA | 130 kA | 30 kA |
| 2000 A | NW20HF | 100 kA | 100 kA | 85 kA | 85 kA |
| | NW20HC(47) | 200 kA | 200 kA | 130 kA | 30 kA |
| 3200 A | NW32HF | 100 kA | 100 kA | 85 kA | 85 kA |

(45) Not available for fixed-mounted circuit breakers.
(46) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.
(47) Not available in 4P.

| Frame Rating | Model Number | Interrupting Rating[48] | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 800 A | NW08HF | 100 kA | 100 kA | 85 kA | 85 kA |
| 1600 A | NW16HF | 100 kA | 100 kA | 85 kA | 85 kA |
| 2000 A | NW20HF | 100 kA | 100 kA | 85 kA | 85 kA |
| 3200 A | NW32HF | 100 kA | 100 kA | 85 kA | 85 kA |

### UL 489 Listed, Fixed Automatic Switch

| Frame Rating | Model Number | Withstand Rating[49] | | | Instantaneous Override |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 800 A | NW08HF | 100 kA | 100 kA | 85 kA | 40 kA |
| 1200 A | NW12HF | 100 kA | 100 kA | 85 kA | 40 kA |
| 1600 A | NW16HF | 100 kA | 100 kA | 85 kA | 40 kA |
| 2000 A | NW20HF | 100 kA | 100 kA | 85 kA | 40 kA |
| 2500 A | NW25HF | 100 kA | 100 kA | 85 kA | 65 kA |
| 3000 A | NW30HF | 100 kA | 100 kA | 85 kA | 65 kA |

### UL 489 Listed, Drawout Automatic Switch

| Frame Rating | Model Number | Withstand Rating[49] | | | Instantaneous Override |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 800 A | NW08HF | 100 kA | 100 kA | 85 kA | 40 kA |
| | NW08HB[49] | 200 kA | 150 kA | 100 kA | 35 kA |
| 1200 A | NW12HF | 100 kA | 100 kA | 85 kA | 40 kA |
| | NW12HB[49] | 200 kA | 150 kA | 100 kA | 35 kA |
| 1600 A | NW16HF | 100 kA | 100 kA | 85 kA | 40 kA |
| | NW16HB[49] | 200 kA | 150 kA | 100 kA | 35 kA |
| 2000 A | NW20HF | 100 kA | 100 kA | 85 kA | 40 kA |
| | NW20HB[49] | 200 kA | 150 kA | 100 kA | 35 kA |
| 2500 A | NW25HF | 100 kA | 100 kA | 85 kA | 65 kA |
| | NW25HB[49] | 200 kA | 150 kA | 100 kA | 65 kA |
| 3000 A | NW30HF | 100 kA | 100 kA | 85 kA | 65 kA |
| | NW30HB[49] | 200 kA | 150 kA | 100 kA | 65 kA |

### IEC 60947-3 Rated, Automatic Switch

| Frame Rating | Model Number | Withstand Rating[49] | | | Instantaneous Override |
|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | |
| 800 A | NW08HF | 85 kA | 85 kA | 85 kA | 85 kA |
| 1000 A | NW10HF | 85 kA | 85 kA | 85 kA | 85 kA |
| 1250 A | NW12HF | 85 kA | 85 kA | 85 kA | 85 kA |
| 1600 A | NW16HF | 85 kA | 85 kA | 85 kA | 85 kA |
| 2000 A | NW20HF | 85 kA | 85 kA | 85 kA | 85 kA |

(48) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.
(49) The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

## IEC 60947-3 Rated, Automatic Switch (Continued)

| Frame Rating | Model Number | Withstand Rating[50] | | | Instantaneous Override |
|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | |
| 2500 A | NW25HF | 85 kA | 85 kA | 85 kA | 85 kA |
| 3200 A | NW32HF | 85 kA | 85 kA | 85 kA | 85 kA |
| 4000 A | NW40HF | 85 kA | 85 kA | 85 kA | 85 kA |

| Frame Rating | Model Number | Interrupting Rating[51] | | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | 1150 V | |
| 800 A | NW08NA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| | NW08HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW08HA10 (52) | — | — | — | 50 kA | 50 kA |
| 1000 A | NW10NA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| | NW10HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW10HA10 (52) | — | — | — | 50 kA | 50 kA |
| 1250 A | NW12NA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| | NW12HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW12HA10 (52) | — | — | — | 50 kA | 50 kA |
| 1600 A | NW16NA | 42 kA | 42 kA | 42 kA | — | 42 kA |
| | NW16HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW16HA10 (52) | — | — | — | 50 kA | 50 kA |
| 2000 A | NW20HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW20HA10 (52) | — | — | — | 50 kA | 50 kA |
| 2500 A | NW25HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW25HA10 (52) | — | — | — | 50 kA | 50 kA |
| 3200 A | NW32HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW32HA10 (52) | — | — | — | 50 kA | 50 kA |
| 4000 A | NW40HA | 50 kA | 50 kA | 50 kA | — | 50 kA |
| | NW40HA10 (52) | — | — | — | 50 kA | 50 kA |

(50) The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.
(51) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.
(52) Not available for fixed-mounted circuit breakers.

# Y-Frame Circuit Breaker Selection

### ANSI C37 Certified/UL 1066 Listed Y-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating (kA) | | | Sensor Plug Rating (A) |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 3200 A to 4000 A | NW32L1(53) | 200 kA | 200 kA | 130 kA | 2000 A, 2500 A, 3000 A, 3200 A |
| | NW40H2 | 85 kA | 85 kA | 85 kA | 2000 A, 2500 A, 3000 A, 3200 A, 4000 A |
| | NW40H3 | 100 kA | 100 kA | 85 kA | 2000 A, 2500 A, 3000 A, 3200 A, 4000 A |
| | NW40L1(53) | 200 kA | 200 kA | 130 kA | 2000 A, 2500 A, 3000 A, 3200 A, 4000 A |
| 5000 A | NW50H2 | 85 kA | 85 kA | 85 kA | 2500 A, 3000 A, 3200 A, 4000 A, 5000 A |
| | NW50H3 | 100 kA | 100 kA | 85 kA | 2500 A, 3000 A, 3200 A, 4000 A, 5000 A |
| | NW50L1(53) | 200 kA | 200 kA | 130 kA | 2500 A, 3000 A, 3200 A, 4000 A, 5000 A |

### UL 489 Listed Y-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 4000 A | NW40H | 100 kA | 100 kA | 85 kA | 2000 A, 2500 A, 3000 A, 4000 A |
| | NW40L(53) | 200 kA | 150 kA | 100 kA | 2000 A, 2500 A, 3000 A, 4000 A |
| 5000 A | NW50H | 100 kA | 100 kA | 85 kA | 2500 A, 3000 A, 4000 A, 5000 A |
| | NW50L(53) | 200 kA | 150 kA | 100 kA | 2500 A, 3000 A, 4000 A, 5000 A |
| 6000 A | NW60H | 100 kA | 100 kA | 85 kA | 3000 A, 4000 A, 5000 A, 6000 A |
| | NW60L(53) | 200 kA | 150 kA | 100 kA | 3000 A, 4000 A, 5000 A, 6000 A |

### IEC 60947-2 Rated Y-Frame Circuit Breakers

| Frame Rating | Model Number | Interrupting Rating | | | Sensor Plug Rating |
|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | |
| 4000 A | NW40B-H1 | 100 kA | 100 kA | 100 kA | 2000 A, 2500 A, 3200 A, 4000 A |
| | NW40B-H2 | 150 kA | 150 kA | 100 kA | 2000 A, 2500 A, 3200 A, 4000 A |
| 5000 A | NW50H1 | 100 kA | 100 kA | 100 kA | 2500 A, 3200 A, 4000 A, 5000 A |
| | NW50H2 | 150 kA | 150 kA | 100 kA | 2500 A, 3200 A, 4000 A, 5000 A |
| 6300 A | NW63H1 | 100 kA | 100 kA | 100 kA | 3200 A, 4000 A, 5000 A, 6300 A |
| | NW63H2 | 150 kA | 150 kA | 100 kA | 3200 A, 4000 A, 5000 A, 6300 A |

# Y-Frame Switch Selection

| Frame Rating | Model Number | Interrupting Rating (kA)(54) | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 4000 A | NW40HA | 85 kA | 85 kA | 85 kA | 85 kA |
| 5000 A | NW50HA | 85 kA | 85 kA | 85 kA | 85 kA |

(53) Not available for fixed-mounted or four-pole drawout circuit breakers.
(54) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

### ANSI C37 Certified/UL 1066 Listed, Drawout Automatic Switches

| Frame Rating (Y-Frame) | Model Number | Interrupting Rating[55] | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 3200 A | NW32HC[56] | 200 kA | 200 kA | 130 kA | 100 kA |
| 4000 A | NW40HF | 100 kA | 100 kA | 85 kA | 85 kA |
| | NW40HC[56] | 200 kA | 200 kA | 130 kA | 100 kA |
| 5000 A | NW50HF | 100 kA | 100 kA | 85 kA | 85 kA |
| | NW50HC[56] | 200 kA | 200 kA | 130 kA | 100 kA |

### ANSI C37 Certified/UL 1066 Listed, Fixed Automatic Switches

| Frame Rating (Y-Frame) | Model Number | Interrupting Rating[57] | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 254 V | 508 V | 635 V | |
| 4000 A | NW40HF | 100 kA | 100 kA | 85 kA | 85 kA |
| 5000 A | NW50HF | 100 kA | 100 kA | 85 kA | 85 kA |

### UL 489 Listed, Fixed Automatic Switches

| Frame Rating | Model Number | Withstand Rating[58] | | | Instantaneous Override |
|---|---|---|---|---|---|
| | | 240 V | 480 V | 600 V | |
| 4000 A | NW40HF | 100 kA | 100 kA | 85 kA | 75 kA |
| 5000 A | NW50HF | 100 kA | 100 kA | 85 kA | 75 kA |
| 6000 A | NW60HF | 100 kA | 100 kA | 85 kA | 75 kA |

### IEC 60947-3 Rated, Non-Automatic Switches

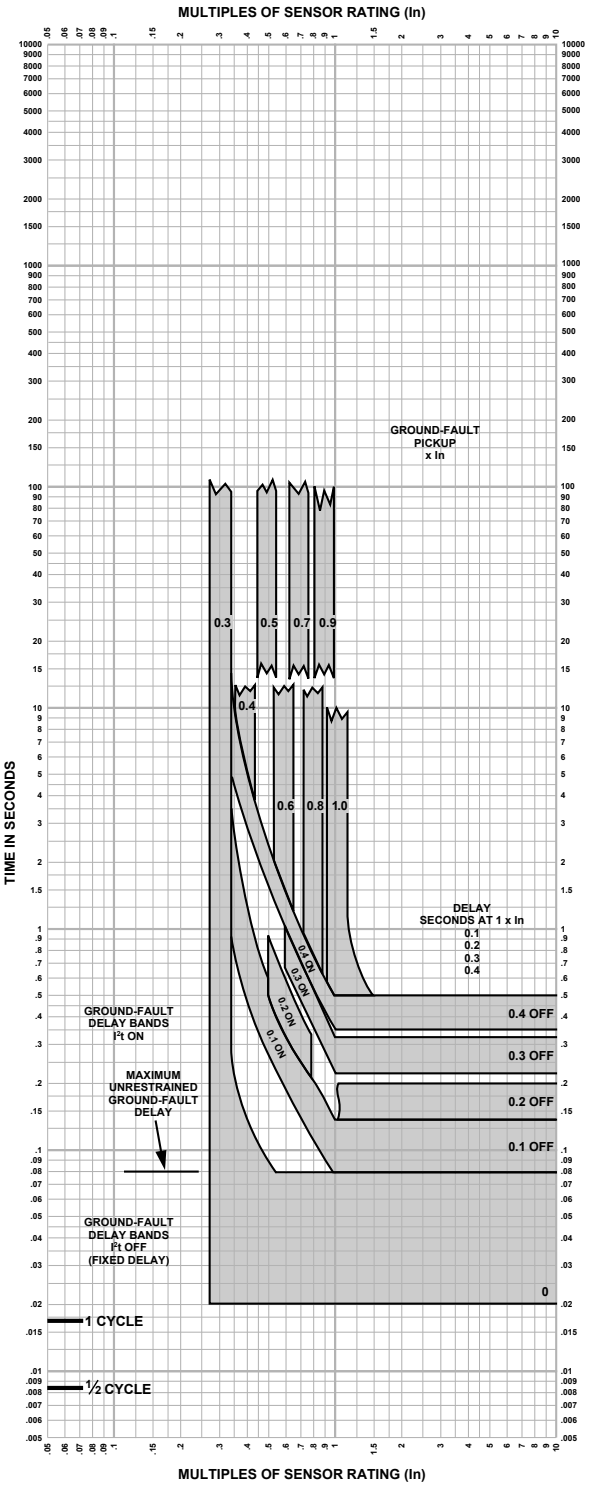
| Frame Rating | Model Number | Interrupting Rating[55] | | | Short-Time (0.5 s) Rating |
|---|---|---|---|---|---|
| | | 240 V | 440 V | 690 V | |
| 4000 A | NW40BHA | 85 kA | 85 kA | 85 kA | 85 kA |
| 5000 A | NW50HA | 85 kA | 85 kA | 85 kA | 85 kA |
| 6300 A | NW63HA | 85 kA | 85 kA | 85 kA | 85 kA |

(55) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.
(56) Not available in 4P.
(57) When used in conjunction with an overcurrent relay, circuit breaker, or fuse.
(58) The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

# MasterPacT NT/NW Trip Curves

## MicroLogic 6.0 A/P/H Trip Units

### MicroLogic 6.0 A/P/H Trip Units: $I_n \leq 400$ A



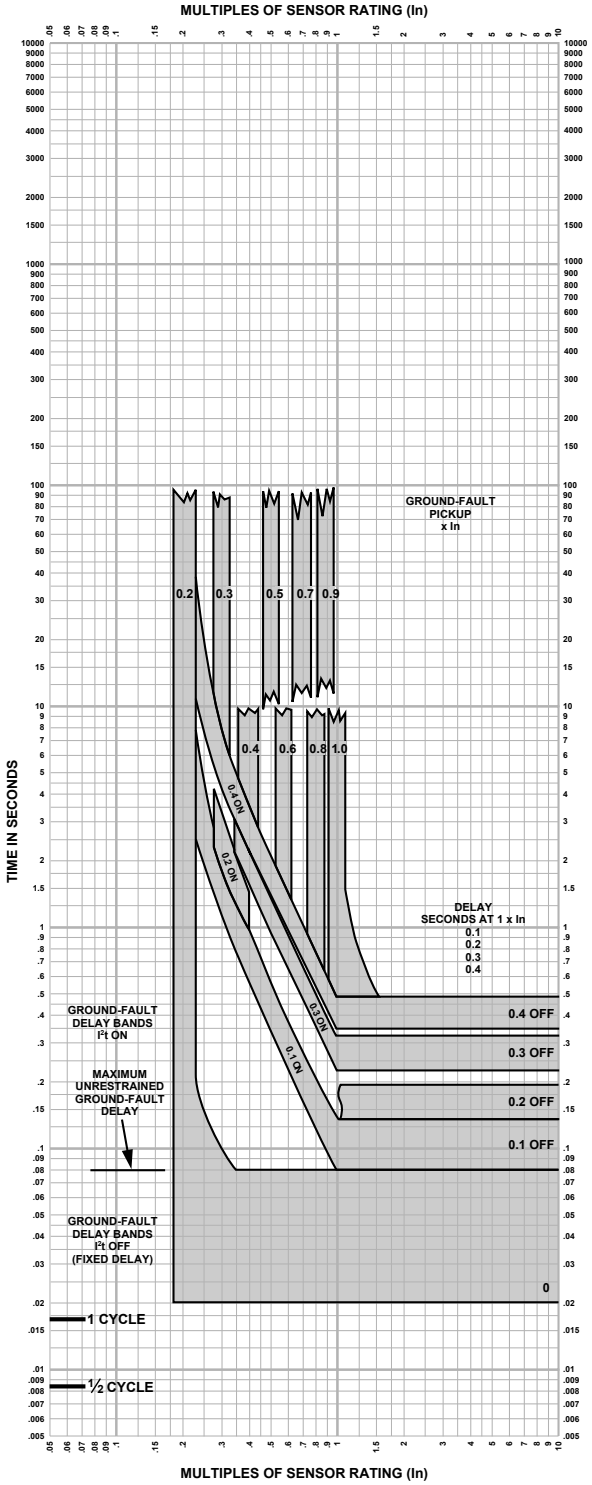

**MicroLogic 6.0 A/P/H Trip Unit With Adjustable Ground-Fault Pickup and Delay Characterstic Trip Curve No. 613-1**

Ground-fault $I^2t$ OFF and ON
In ≤ 400 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

# MicroLogic 6.0 A/P/H Trip Units: 400 A < $I_n$ ≤ 1200 A



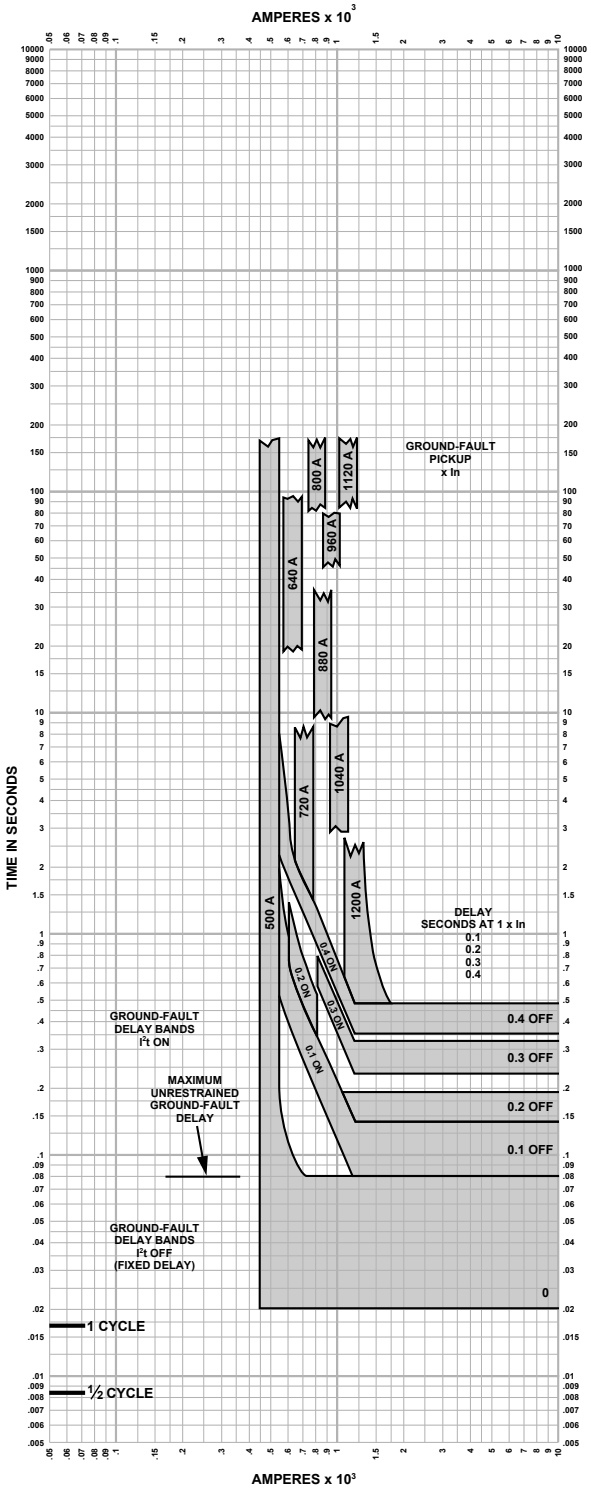

**MicroLogic® 6.0 A/P/H Trip Unit With Adjustable Ground-Fault Plickup and Delay Characteristic Trip Curve No. 613-2**

Ground-fault $I^2t$ OFF and ON
400 A < In ≤ 1200 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

# MicroLogic 6.0 A/P/H Trip Units: $I_n$ > 1200 A




**MicroLogic® 6.0 A/P/H Trip Unit With Adjustable Ground-Fault Pickup and Delsy Characteristic Trip Curve No. 613-3**

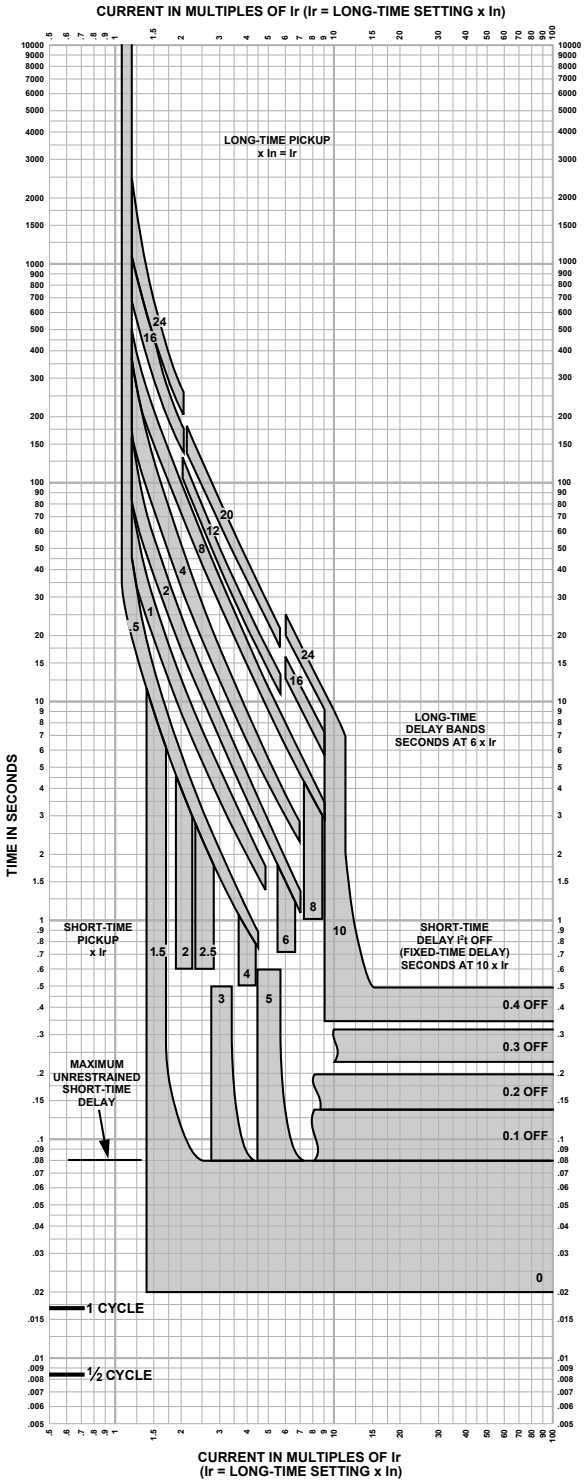
Ground-fault $I^2t$ OFF and ON
In > 1200 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

# MicroLogic 5.0/6.0 A/P/H Trip Units

## MicroLogic 5.0/6.0 A/P/H Trip Units: Long-Time Pickup and Delay, Short-Time Pickup, and I2t OFF Delay




**MicroLogic® 5.0/6.0 A/P/H Trip Unit Characteristic Trip Curve No. 613-4**

Long-time Pickup and Delay
Short-time Pickup and $I^2t$ OFF Delay

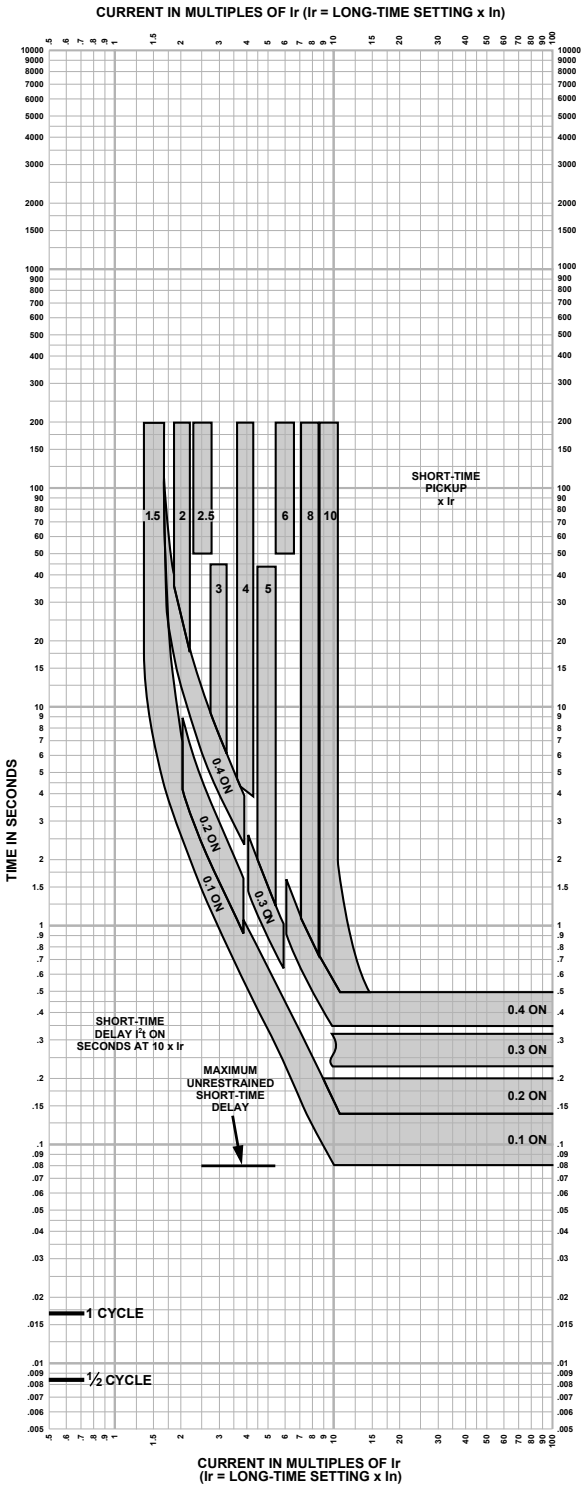
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

**Notes:**

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

## MicroLogic 5.0/6.0 A/P/H Trip Units: Short-Time Pickup and I2t ON Delay




**MicroLogic ® 5.0/6.0 A/P/H Trip Unit**
**Characteristic Trip Cirve No. 613-5**

Short-time Pickup and I ²t ON Delay

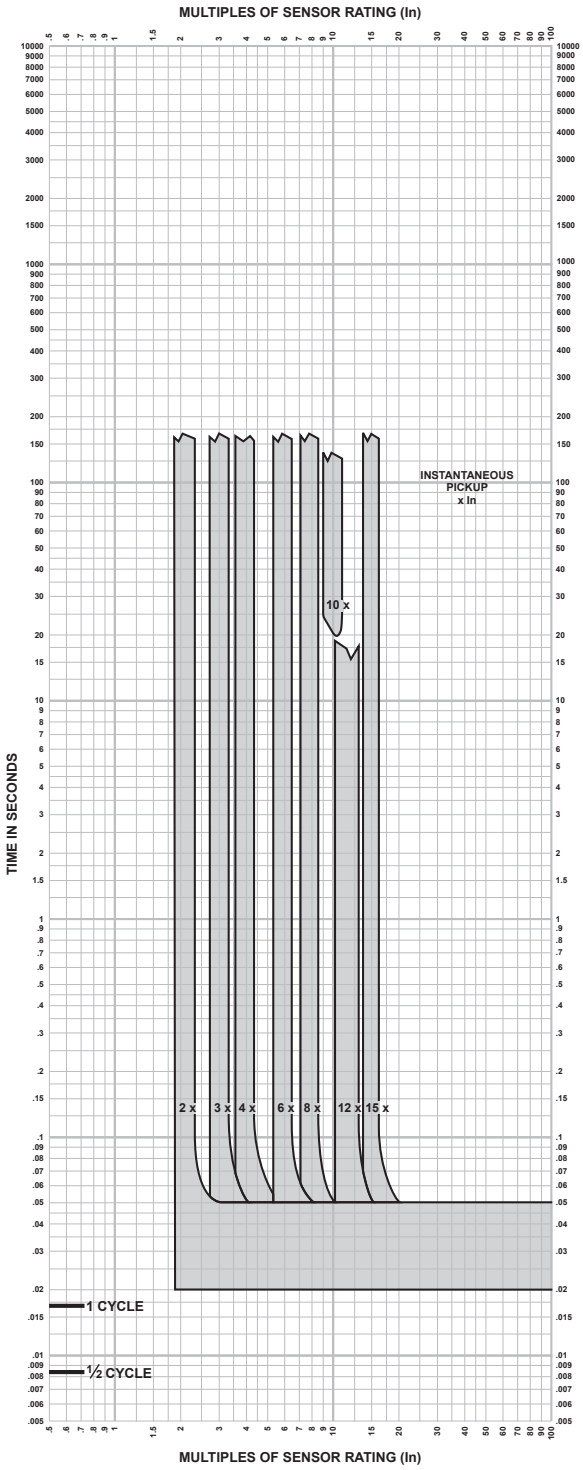
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

**Notes:**

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. See 613-4 for long-time pickup and delay trip curve.

## MicroLogic 5.0/6.0 Trip Units: Instantaneous Pickup, 2x to 15x and OFF




MicroLogic® 5.0/6.0 A/P/H Trip Unit
Characteristics Trip Curve No. 613-7
Instantaneous Pickup
2x–15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

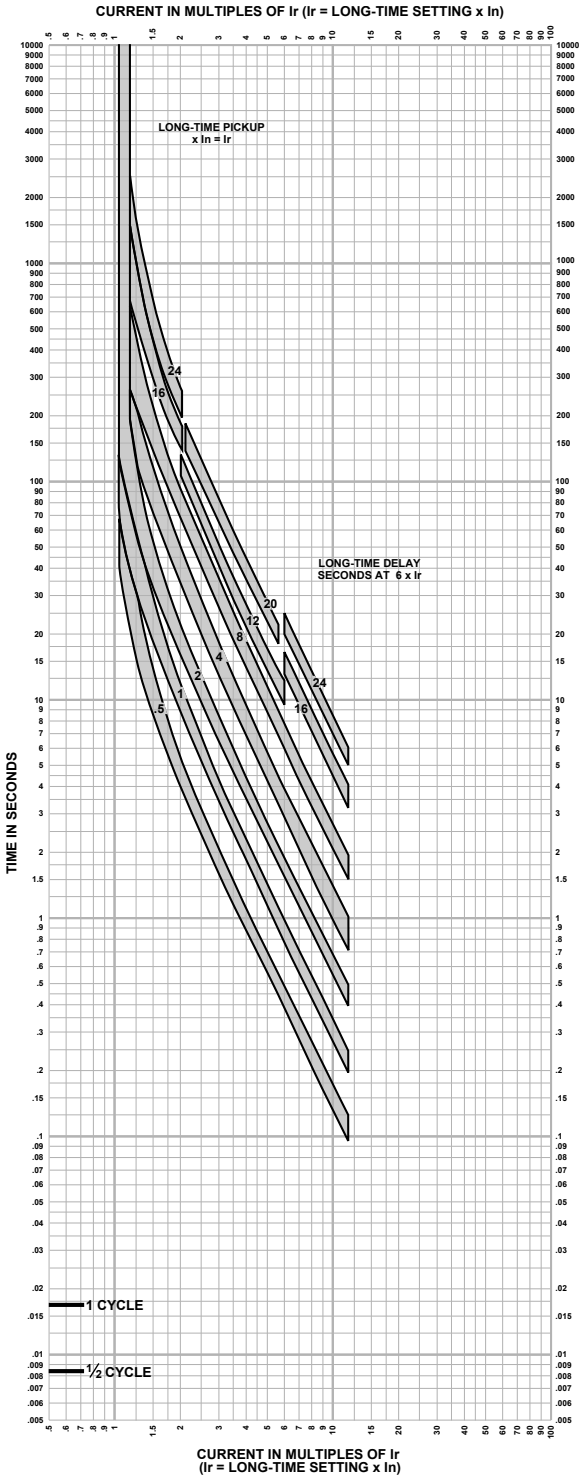
Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
5. See 613-4 and 613-5 for long-time pickup, long-time delay, short-time pickup, and short-time delay trip curves.

# MicroLogic 3.0A Trip Units

## MicroLogic 3.0A Trip Unit: Long-Time Pickup and Delay




**MicroLogic® 3.0 A Trip Unit**
**Characteristic Trip Curve No. 613-6**

Long-time Pickup and Delay

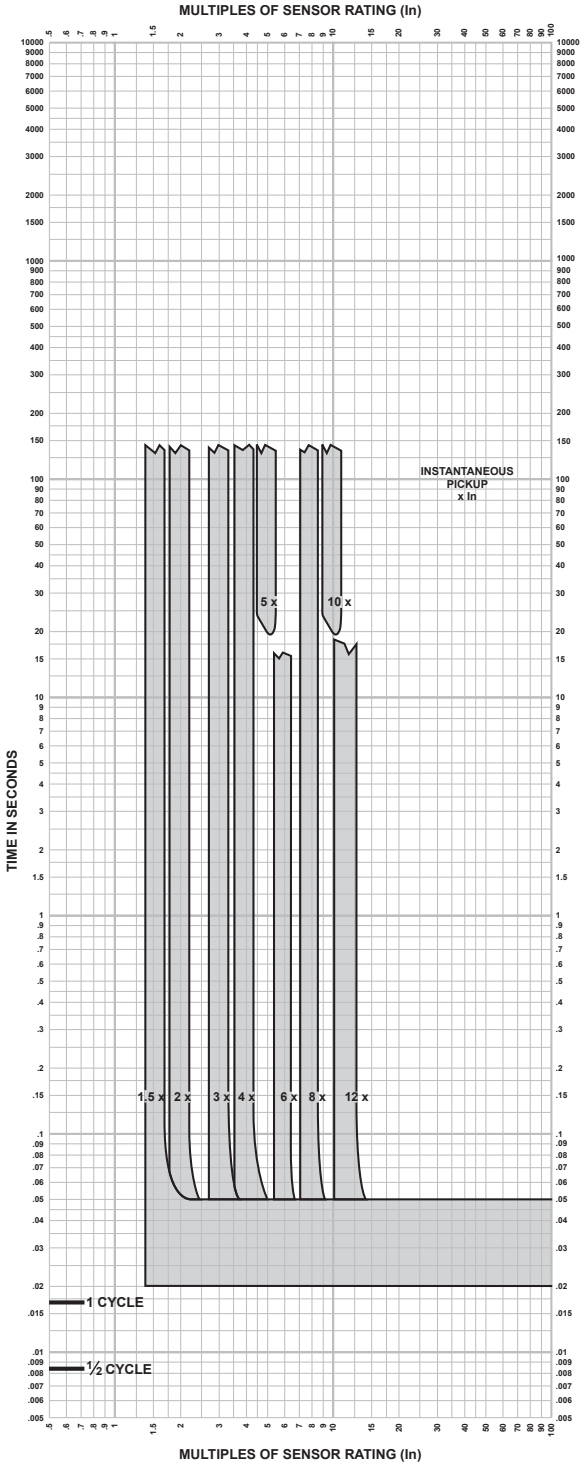
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

**Notes:**

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the instantaneous setting.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
4. See 613-8 for instantaneous pickup trip curve.

# MicroLogic 3.0A Trip Unit: Instantaneous Pickup, 1.5X to 12X




**MicroLogic® 3.0 A Trip Unit**
**Characteristic Trip Curve No. 613-8**

Instantaneous Pickup
1.5x-12x

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

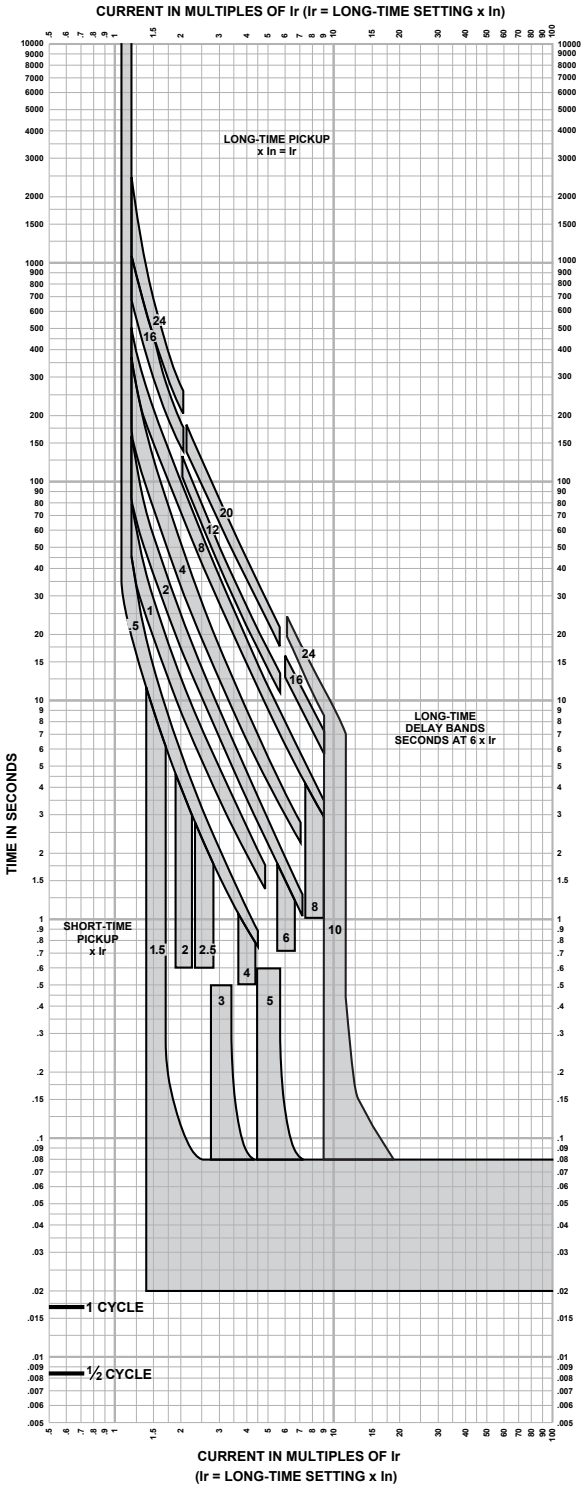
Instantaneous override values are given on 613-10.

**Notes:**

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. See 613-6 for long-time pickup and delay trip curves.

# MicroLogic 2.0A Trip Unit

## MicroLogic 2.0A Trip Unit




**MicroLogic® 2.0 A Trip Unit**
**Characteristic Trip Curve No. 613-9**

Long-time Pickup and Delay
Short-time Pickup with No Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C (-13°F to +158°F) ambient temperature.

Instantaneous override values are given on 613-10.

**Notes:**

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the short-time setting.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
4. Overload indicator illuminates at 100%.

# MasterPacT NT/NW MicroLogic Trip Unit Instantaneous Override Values

### ANSI and UL MasterPacT NW/NT MicroLogic Trip Unit Instantaneous Override Values

| ANSI CB Model No. | Inst. Override (kA Peak) +/- 10% |
|---|---|
| NW08N1(59) | 55 |
| NW08N1 | None |
| NW0816N1 | None |
| NW08H1(59) | 55= |
| NW08H1 | None |
| NW16H1 | None |
| NW20H1 | None |
| NW32H1 | None |
| NW08H2(59) | 55 |
| NW08H2 | None |
| NW16H2 | None |
| NW20H2 | None |
| NW32H2 | None |
| NW40H2 | None |
| NW50H2 | None |
| NW60H2 | None |
| NW08H3(59) | 55 |
| NW08H3 | 190 |
| NW16H3 | 190 |
| NW20H3 | 190 |
| NW32H3 | 190 |
| NW40H3 | 190 |
| NW50H3 | 190 |
| NW60H3 | 190 |
| NW08L1(59) | 55 |
| NW08L1 | 80 |
| NW08L1F | 55 |
| NW16L1 | 80 |
| NW16L1F | 55 |
| NW20L1 | 80 |
| NW20L1F | 55 |
| NW32L1 | 270 |
| NW40L1 | 270 |
| NW50L1 | 270 |
| NW60L1 | 270 |

| ANSI CB Model No. | Inst. Override (kA Peak) +/- 10% |
|---|---|
| NW08HA | None |
| NW16HA | None |
| NW20HA | None |
| NW32HA | None |
| NW40HA | None |
| NW50HA | None |
| NW60HA | None |
| NW08HF | 190 |
| NW16HF | 190 |
| NW20HF | 190 |
| NW32HF | 190 |
| NW40HF | 190 |
| NW50HF | 190 |
| NW60HF | 190 |
| NW08HC | 80 |
| NW16HC | 90 |
| NW20HC | 90 |
| NW32HC | 270 |
| NW40HC | 270 |
| NW50HC | 270 |
| NW60HC | 270 |
| NT08N1(59) | None |
| NT08N1 | 55 |
| NT08H1(59) | 55 |
| NT08H1 | None |
| NT08L1F | 2 |
| NT08NA | None |
| NT08LHF | 90 |
| NT12HF | 90 |

| UL CB Model No. | Inst. Override (kA Peak) +/- 10% |
|---|---|
| NW08N(59) | 55 |
| NW08N | 90 |
| NW12N | 90 |
| NW16N | 90 |
| NW20N | 90 |
| NW08H(59) | 55 |
| NW08H | 90 |
| NW12H | 90 |
| NW16H | 90 |
| NW20H | 90 |
| NW25H | 150 |
| NW30H | 150 |
| NW40H | 170 |
| NW50H | 170 |
| NW60H | 170 |
| NW08L(59) | 55 |
| NW08L | 80 |
| NW08LF | 55 |
| NW12L | 80 |
| NW12LF | 55 |
| NW16L | 80 |
| NW16LF | 55 |
| NW20L | 150 |
| NW20LF | 55 |
| NW25L | 150 |
| NW30L | 150 |
| NW40L | 170 |
| NW50L | 170 |
| NW60L | 170 |

| UL CB Model No. | Inst. Override (kA Peak) +/- 10% |
|---|---|
| NW08HF | 90 |
| NW12HF | 90 |
| NW16HF | 90 |
| NW20HF | 90 |
| NW25HF | 150 |
| NW30HF | 150 |
| NW40HF | 170 |
| NW50HF | 170 |
| NW60HF | 170 |
| NW08HB | 80 |
| NW12HB | 80 |
| NW16HB | 80 |
| NW20HB | 150 |
| NW25HB | 150 |
| NW30HB | 150 |
| NW40HB | 170 |
| NW50HB | 170 |
| NW60HB | 170 |
| NT08N(59) | 55 |
| NT08N | 90 |
| NT12N | 90 |
| NT16N | 90 |
| NT08L1 | 22 |
| NT12L1 | 22 |
| NT16L1 | 22 |
| NT08L | 22 |
| NT08LF | 22 |
| NT12L | 22 |
| NT12LF | 22 |
| NT16L | 22 |
| NT08L | 22 |
| NT08LF | 22 |
| NT12L | 22 |
| NT12LF | 22 |
| NT16L | 22 |

**NOTE:** Faults at or above instantaneous override value will be cleared at 25 msec or less.

(59) Maximum sensor plug 250 A

## IEC MasterPacT NW/NT MicroLogic Trip Unit Instantaneous Override Values

| IEC CB Model No. | Inst. Override (kA Peak) +/- 10% | IEC CB Model No. | Inst. Override (kA Peak) +/- 10% | IEC CB Model No. | Inst. Override (kA Peak) +/- 10% | IEC CB Model No. | Inst. Override (kA Peak) +/- 10% |
|---|---|---|---|---|---|---|---|
| NW08N1 | None | NW08H2(60) | 55 | NW08L1(60) | 55 | NT08H1 | None |
| NW10N1 | None | NW08H2 | 190 | NW08L1 | 80 | NT10H1 | None |
| NW12N1 | None | NW10H2 | 190 | NW10L1 | 80 | NT12H1 | None |
| NW16N1 | None | NW16H2 | 190 | NW12L1 | 80 | NT16H1 | None |
| NW08H1 | None | NW20H2 | 190 | NW16L1 | 80 | NT08L1 | 22 |
| NW10H1 | None | NW25H2 | 190 | NW20L1 | 80 | NT08H10 | None |
| NW12H1 | None | NW32H2 | 190 | NW08H10 | None | NT10H10 | None |
| NW16H1 | None | NW40H2 | 190 | NW10H10 | None | NT12H10 | None |
| NW20H1 | None | NW40bH2 | 190 | NW12H10 | None | NT16H10 | None |
| NW25H1 | None | NW50H2 | 270 | NW16H10 | None | NT08HA | None |
| NW32H1 | None | NW63H2 | 270 | NW20H10 | None | NT10HA | None |
| NW40H1 | None | NW20H3 | 150 | NW25H10 | None | NT12HA | None |
| NW40bH1 | None | NW25H3 | 150 | NW32H10 | None | NT16HA | None |
| NW50H1 | None | NW32H3 | 150 | NW40H10 | None | NT08HA10 | None |
| NW63H1 | None | NW40H3 | 150 | NW08NA | None | NT10HA10 | None |
| NW08HF | 190 | NW08HA10 | None | NW10NA | None | NT12HA10 | None |
| NW10HF | 190 | NW10HA10 | None | NW16NA | None | NT16HA10 | None |
| NW12HF | 190 | NW12HA10 | None | | | | |
| NW16HF | 190 | NW16HA10 | None | | | | |
| NW20HF | 190 | NW20HA10 | None | | | | |
| NW25HF | 190 | NW25HA10 | None | | | | |
| NW32HF | 190 | NW32HA10 | None | | | | |
| NW40HF | 190 | NW40HA10 | None | | | | |

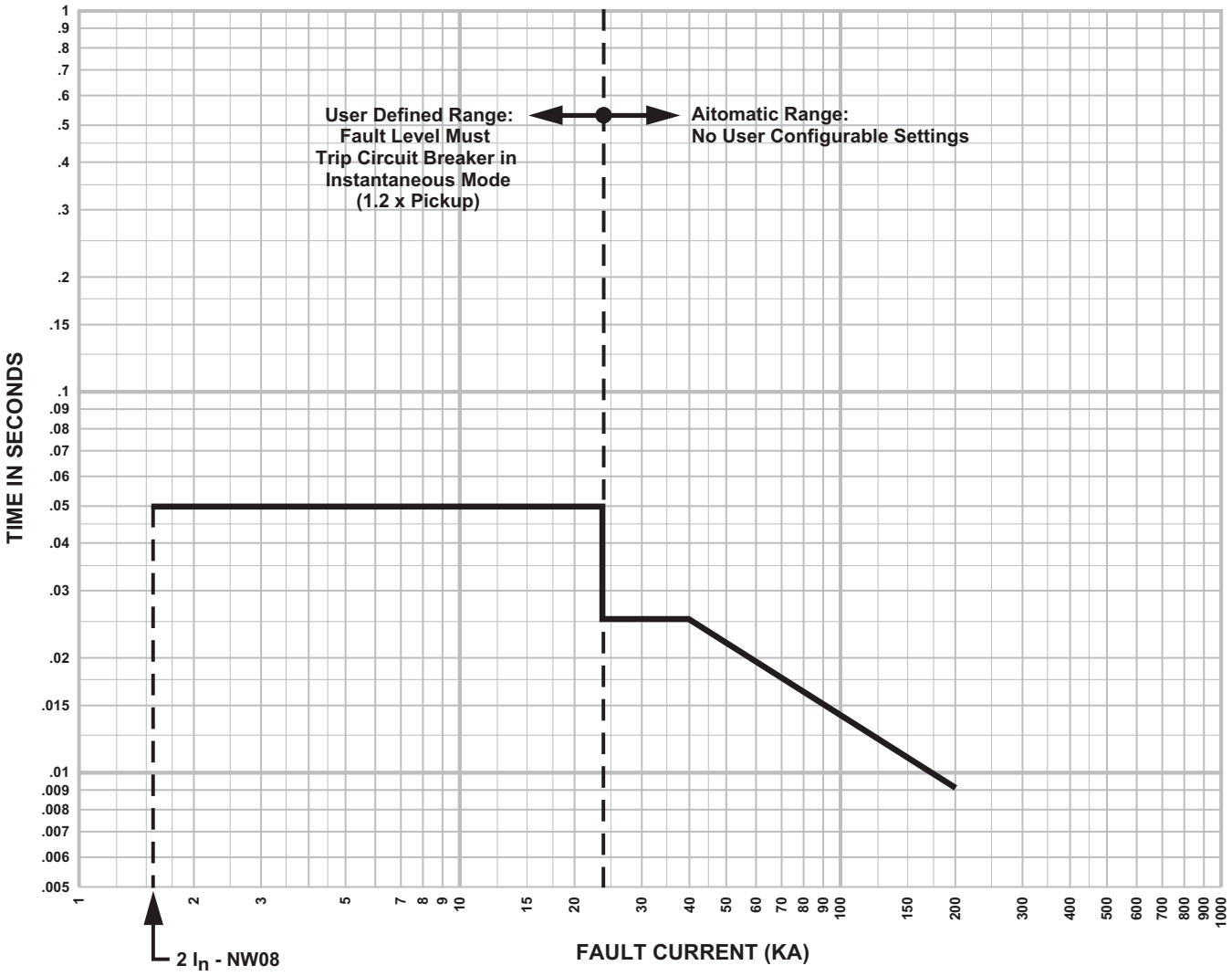
**NOTE:** Faults at or above instantaneous override value will be cleared at 25 msec or less.

(60) Maximum sensor plug 250 A

# MasterPacT NW/NT Low Arc Flash L1F and LF Circuit Breakers

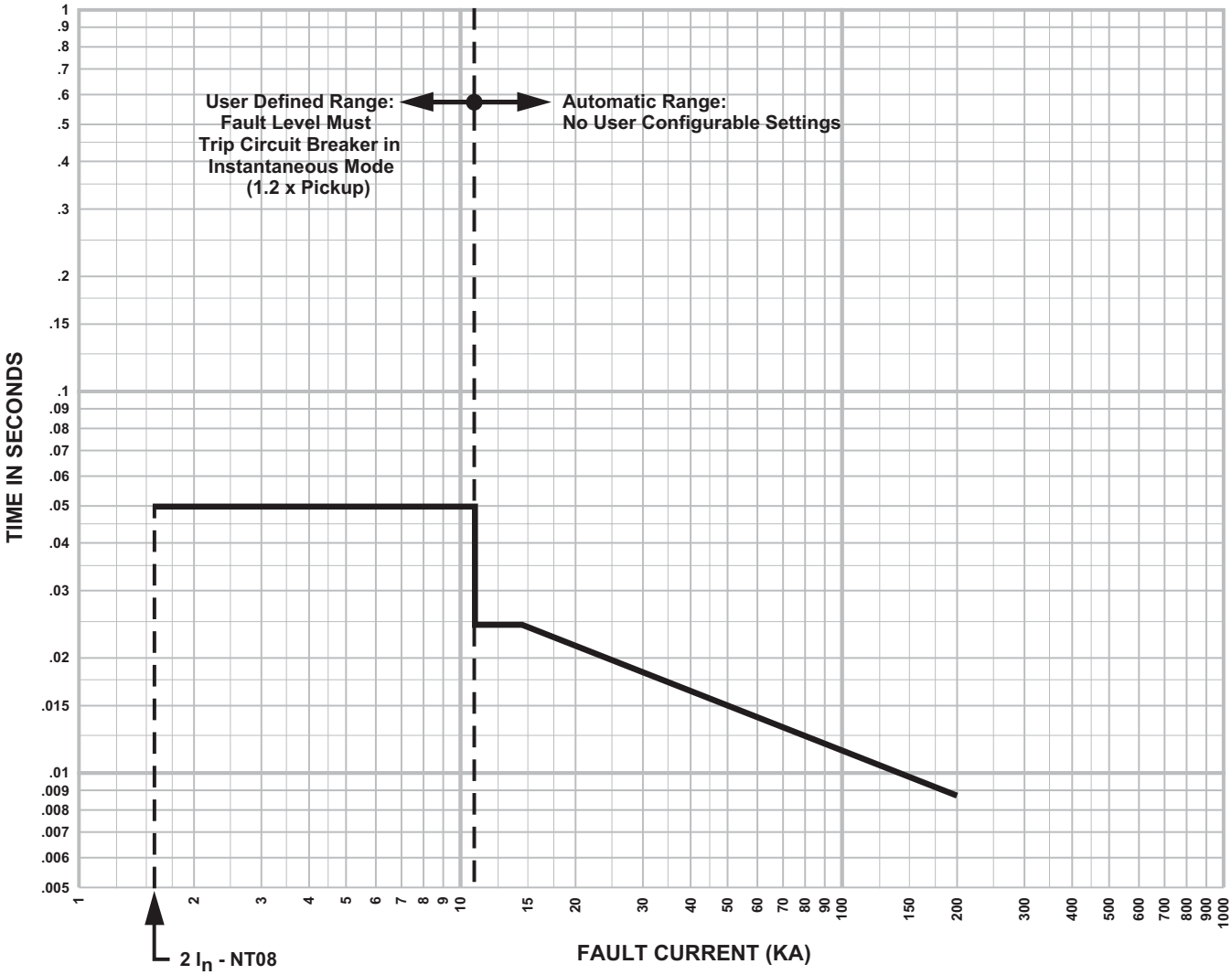
### MasterPacT NW Low Arc Flash Circuit Breaker: L1F and LF

**MasterPacT® NW Low Arc Flash Circuit Breaker**
**Characteristic Trip Curve No. 613-15**
**(L1F AND LF) 800–2000 A, 60 Hz**



## MasterPacT NT Low Arc Flash Circuit Breaker: L1F and LF

**MasterPact® NT Low Arc Flash Circuit Breaker**
**Characteristic Trip Curve No. 613-16**
**(LF) 800–1200 A, 60 Hz**



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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.



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