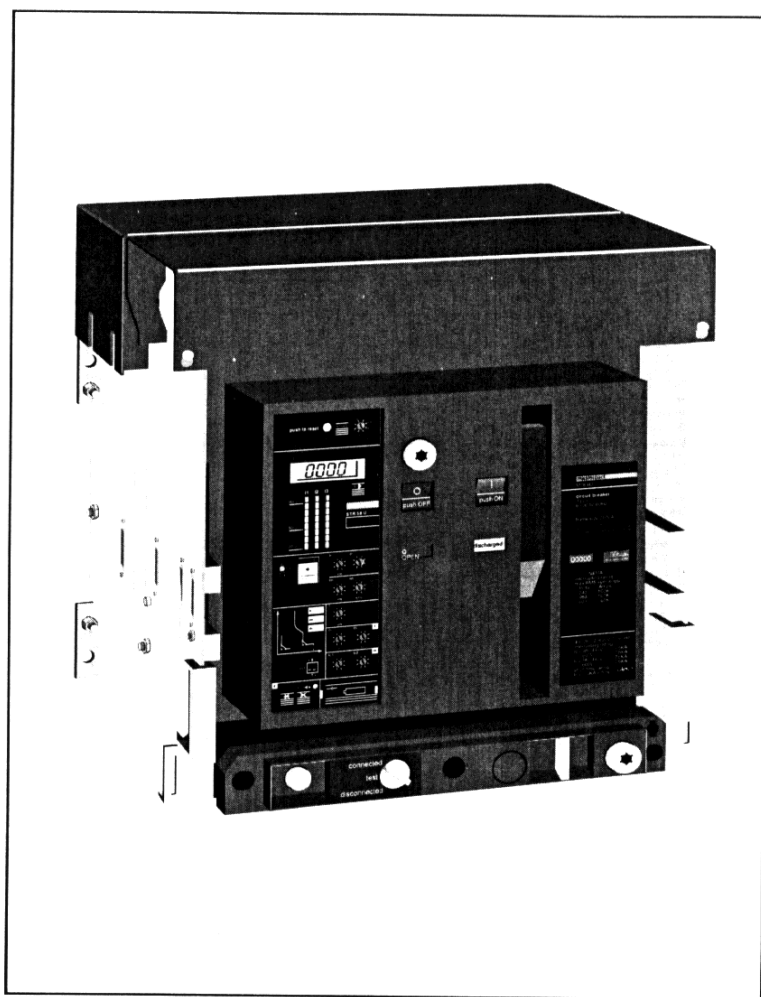
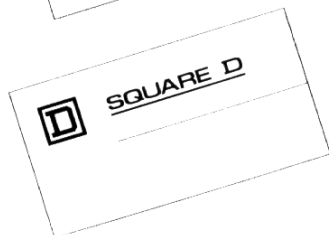
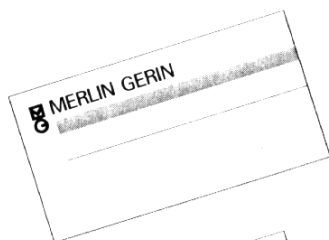


Masterpact® Universal Power Circuit Breaker Instruction Bulletin



Masterpact® MP-MC circuit breaker

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Masterpact® MP-MC circuit breaker installation

introduction

Electrical equipment should only be serviced by qualified electrical maintenance personnel, and this document should not be viewed as sufficient instruction for those who are not otherwise qualified to operate, service, or maintain the equipment discussed. Although reasonable care has been taken to provide accurate and authoritative information in this document, no responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

tools needed

- hex-head wrenches
- straight-blade screwdrivers (large and small)
- wire stripper

recommendations for storing

Do not store circuit breakers in a corrosive or salt-air environment.

Temperature limits:

from -60°F (-50°C) min. to +160°F (+70°C) max.

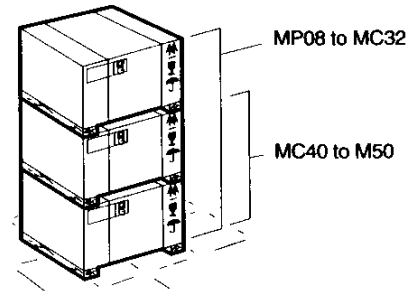
Circuit breaker status:

- main contacts open
- spring discharged
- connected position

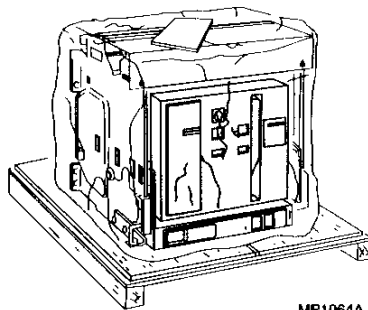
Store the circuit breaker only in the original shipping carton or other protective weatherproof covering.

Stacking:

maximum permitted:



MP1065A.1



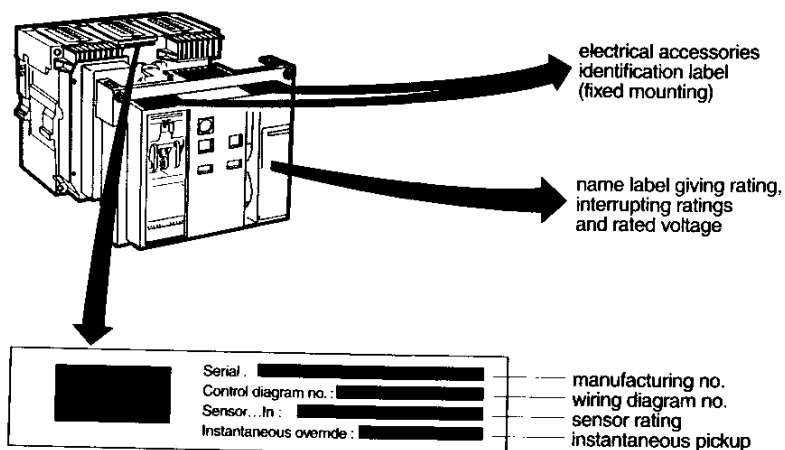
MP1064A.0

Masterpact® MP-MC circuit breaker installation

identifying the circuit breaker

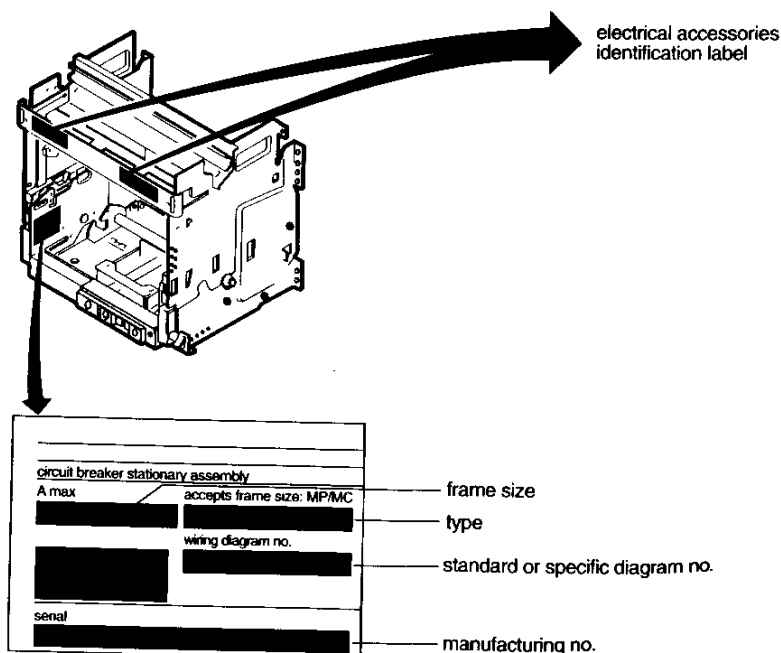
location of markings

circuit breaker frame



MP1066A.0

stationary assembly



MP1067A.0

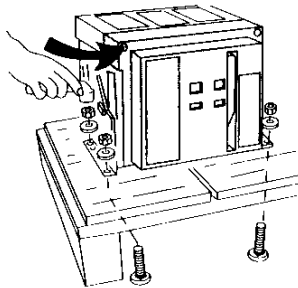
Masterpact® MP-MC circuit breaker installation

unpacking

MP08 to MP30 - MC08 to MC32

Circuit breakers are secured to their shipping pallet with four bolts, nuts, and washers. However, on the drawout mounting, withdrawal of the circuit breaker is required to access the hardware.

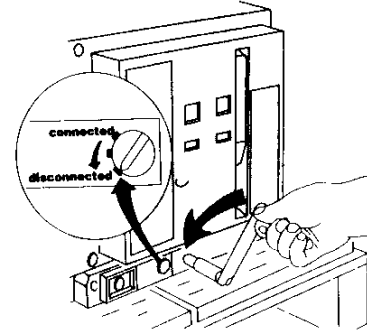
fixed-mounted



MP1068A.0

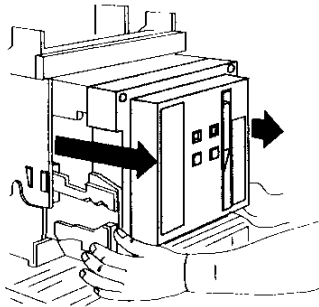
Remove four bolts, nuts, and washers.

drawout-mounted



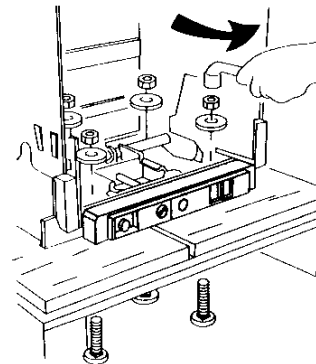
MP1069A.0

Disconnect and remove the circuit breaker from the stationary assembly (refer to **disconnecting instructions**, page 18).



MP1070A.0

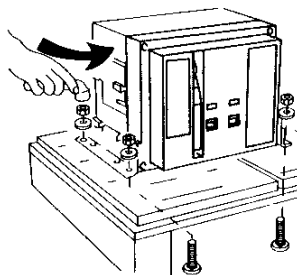
Pull the two handgrips to extract the circuit breaker.



MP1071A.0

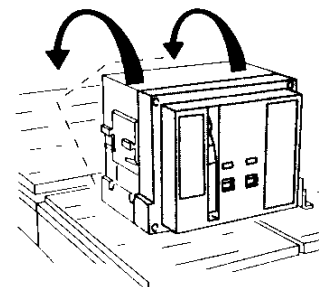
Remove four bolts, nuts, and washers.

drawout-mounted delivered without stationary assembly



MP1072A.0

Remove four bolts, nuts, and washers.



MP1073A.0

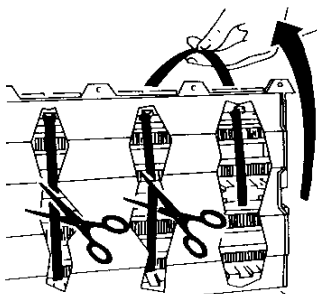
Circuit breaker is delivered upside down. Place another pallet next to shipping pallet. Rotate circuit breaker onto terminals, then onto its bottom on other pallet.

Masterpact® MP-MC circuit breaker installation

unpacking (continued)

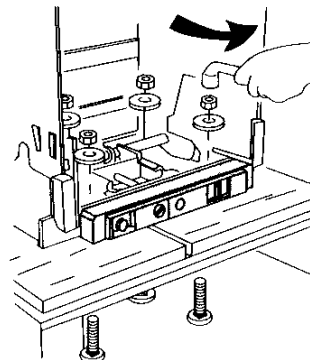
MP08 to MP30 - MC08 to MC32

stationary assembly only



MP1074A.0

If present, remove strapping tape holding the clusters.

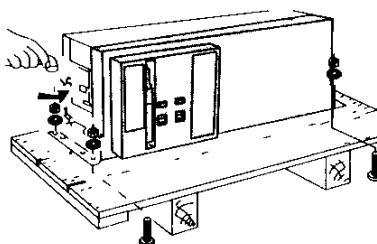


MP1075A.0

Remove four bolts, nuts, and washers.

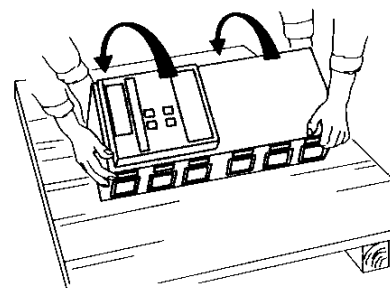
MP40 to MP63 drawout-mounted
MC40 to MC50 drawout-mounted

circuit breaker frame



MP1076A.0

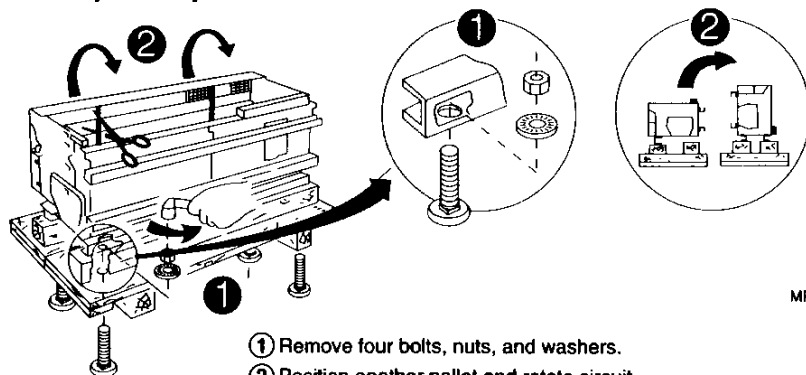
Remove four shipping bolts, nuts, and washers.



MP1077A.0

Circuit breaker is delivered upside down. Place another pallet next to shipping pallet. Rotate circuit breaker onto terminals, then onto its bottom on other pallet.

stationary assembly



MP1078A.0

- ① Remove four bolts, nuts, and washers.
- ② Position another pallet and rotate circuit breaker.
- ③ Remove plastic shipping caps.

Masterpack® MP-MC circuit breaker installation

handling

MP08 to MP30 - MC08 to MC20

Both the circuit breaker frame and stationary assembly have notched lifting flanges for lifting. To reduce the total weight and ease installation of the stationary assembly, remove the circuit breaker from the stationary assembly; refer to **disconnecting Instructions**, page 18. To lift the circuit breaker as shown, use an overhead lifting device attached to the lifting flanges.

⚠ DANGER

HAZARD OF CIRCUIT BREAKER FALLING

Be sure equipment has adequate lifting capacity for the unit being lifted. Follow manufacturer's instructions for use of lifting equipment. Wear hard hat, safety shoes, and heavy gloves.

Failure to follow these instructions will result in serious personal injury or equipment damage.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not let the forks of a fork lift protrude past the rear of the circuit breaker.

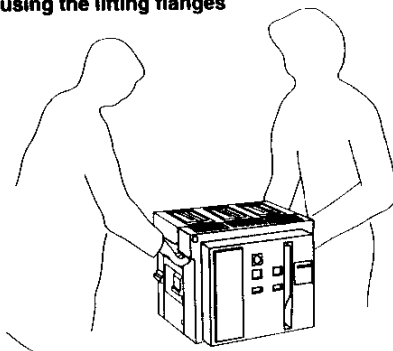
Failure to follow these instructions can result in damage to the equipment.

circuit breaker weights—lbs.(kg)

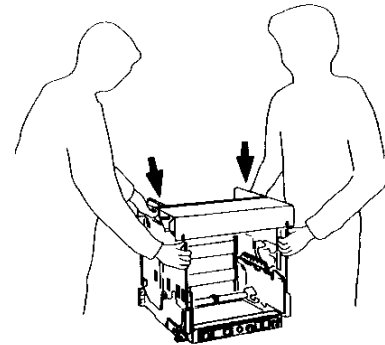
	stationary assembly	frame	terminals
MP08	51 (23)	102 (46)	13 (6)*
MP12	51 (23)	102 (46)	13 (6)*
MP16	51 (23)	102 (46)	13 (6)
MP20	60 (27)	121 (55)	36 (16)
MP25	110 (50)	176 (80)	89 (40)
MP30	110 (50)	176 (80)	89 (40)
MC08	51 (23)	102 (46)	13 (6)*
MC16	51 (23)	102 (46)	13 (6)
MC20	60 (27)	121 (55)	36 (16)

* optional terminals

using the lifting flanges



frame alone



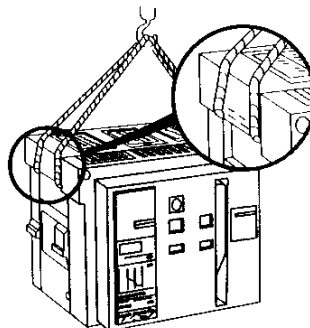
MP1079A.0

stationary assembly alone

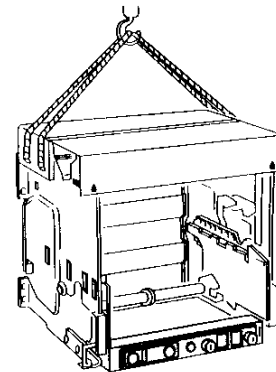
using a lifting sling

cable slings:

0.40 in. (10 mm) dia. max.



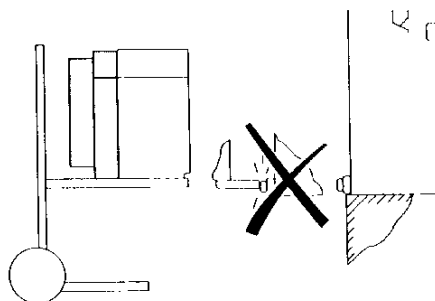
frame alone



MP1080A.0

stationary assembly alone

using an electrical or mechanical platform lift



frame alone

MP1081A.0

Masterpack® MP-MC circuit breaker installation

handling (continued)

MC32

The circuit breaker frame and its stationary assembly have lifting flanges for lifting. Before handling the circuit breaker, remove it from the stationary assembly. To lift the circuit breaker as shown, use an overhead lifting device attached to the notched lifting flanges.

⚠ DANGER

HAZARD OF CIRCUIT BREAKER FALLING

Be sure equipment has adequate lifting capacity for the unit being lifted. Follow manufacturer's instructions for use of lifting equipment. Wear hard hat, safety shoes, and heavy gloves.

Failure to follow these instructions will result in serious personal injury or equipment damage.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Clearance inside the switchboard is minimal. To avoid damage to the load terminals, be sure they clear the lower edge of the switchboard enclosure before attempting installation.

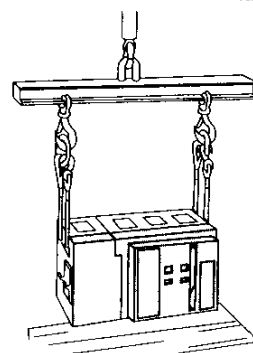
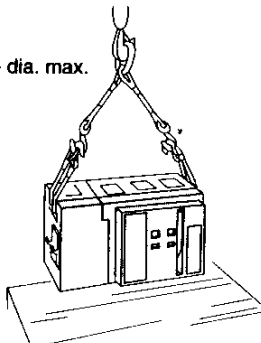
Failure to follow these instructions can result in damage to the equipment.

circuit breaker weights—lbs. (kg)

	stationary assembly	frame	terminals
MC32	132 (60)	198 (90)	88 (40)

using a lifting sling

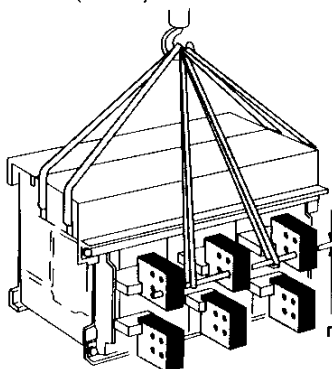
cable slings:
0.40 in. (10 mm) dia. max.



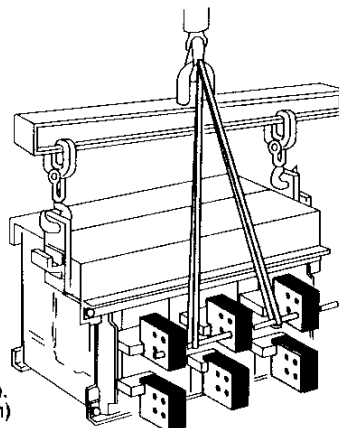
MP1082A.0

frame alone (compensation bar not supplied; hooks supplied upon request)

cable slings:
0.40 in. (10 mm) dia. max.



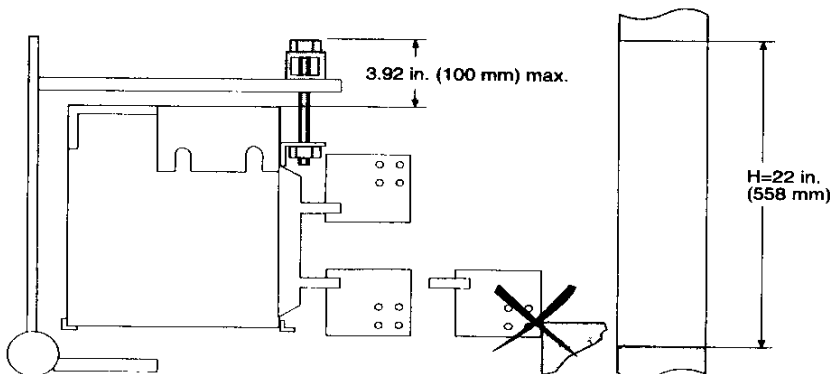
rod dia.: 0.48 in.
(12 mm)



MP1083A.0

stationary assembly alone (compensation bar not supplied; hooks supplied upon request)

using an electrical or mechanical platform lift



MP1084A.0

stationary assembly alone

Masterpact® MP-MC circuit breaker installation

handling (continued)

MP40 to MP 63 - MC40 to MC50

To lift the circuit breaker as shown, use an overhead lifting device attached to the notched lifting flanges.

DANGER

HAZARD OF CIRCUIT BREAKER FALLING

Be sure equipment has adequate lifting capacity for the unit being lifted. Follow manufacturer's instructions for use of lifting equipment. Wear hard hat, safety shoes, and heavy gloves.

Failure to follow these instructions will result in serious personal injury or equipment damage.

CAUTION

HAZARD OF EQUIPMENT DAMAGE

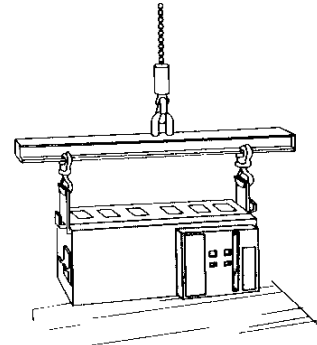
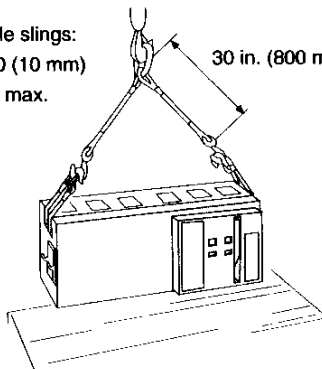
Do not let the forks of a fork lift protrude past the rear of the circuit breaker.

Place a chock as shown. Remove it as soon as the forks lean on the switchboard floor.

Failure to follow these instructions can result in damage to the equipment.

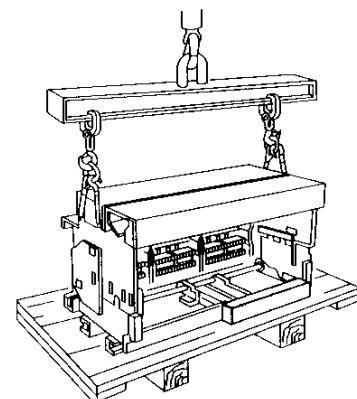
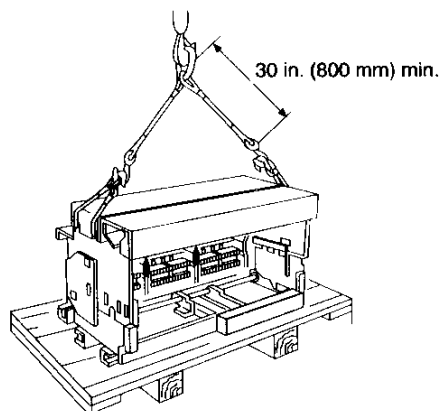
using a lifting sling

cable slings:
0.40 (10 mm)
dia. max.



MP1085A.0

frame alone (compensation bar not supplied; hooks can be supplied upon request)



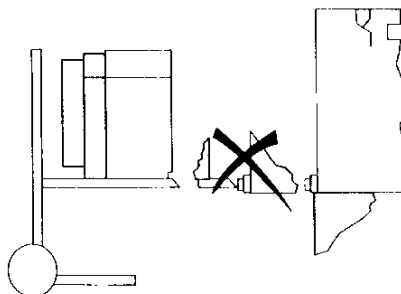
MP1086A.0

stationary assembly alone (compensation bar not supplied; hooks can be supplied upon request)

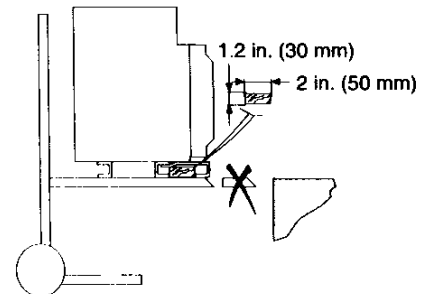
using an electrical or mechanical platform liftframe

circuit breaker weights—lbs. (kg)

	stationary assembly	frame	terminals
MP40	198 (90)	264 (120)	88 (40)
MP50	198 (90)	264 (120)	177 (80)
MP63	242 (110)	308 (140)	177 (80)
MC40	198 (90)	264 (120)	88 (40)
MC50	198 (90)	264 (120)	177 (80)



frame alone



stationary assembly alone

MP1087A.0

Masterpack® MP-MC circuit breaker installation

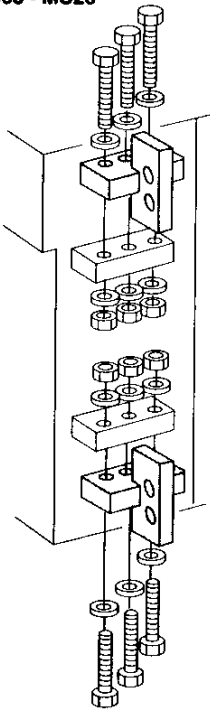
attaching rear terminals

note: Rear terminal must be installed on fixed-mounted and drawout-mounted circuit breakers rated 1600A and above.

The terminals provided with the circuit breaker must be mounted as indicated below:

MP08 - MP20

MC08 - MC20



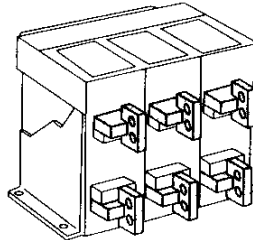
MP1088A.0

Screws: M10, 2-2/5 in. (60 mm) long.

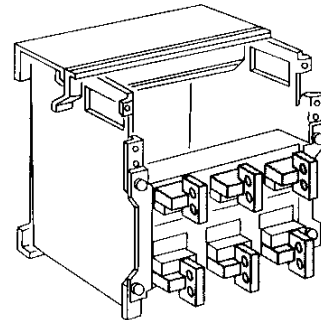
Tightening torque = 375 lb. in. (42 N•m).

Use 11/16 in. hex-head wrench.

MP08 - MP12 - MP16
fixed-mounted

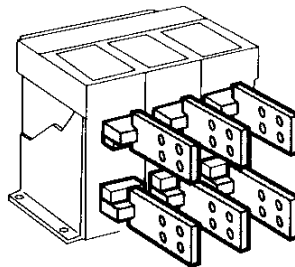


MP08 - MP12 - MP16 MC08 - MC16
drawout-mounted

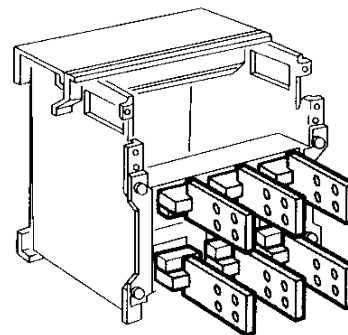


MP1089A.0

MP20
fixed-mounted

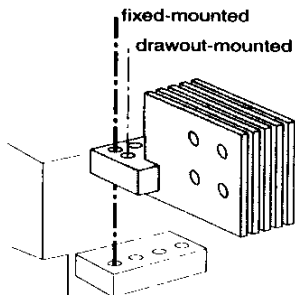


MP20 - MC20
drawout-mounted

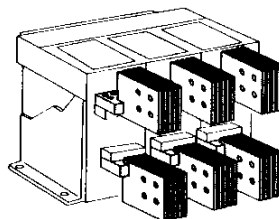


MP1090A.0

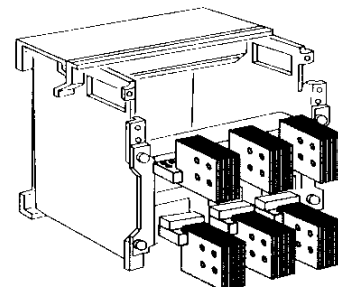
MP25 - MP30



MP25 - MP30
fixed-mounted



MP25 - MP30
drawout-mounted



MP1091A.0

Screws: M10, 2-2/5 in. (60 mm) long.

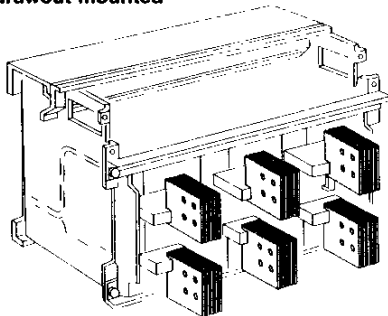
Tightening torque = 375 lb. in. (42 N•m).

Use 11/16 in. hex-head wrench.

Masterpact® MP-MC circuit breaker installation

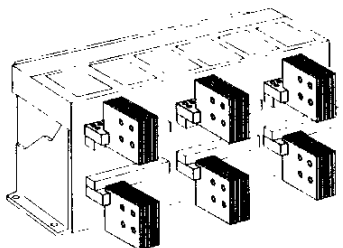
attaching rear terminals (continued)

MC32
drawout-mounted

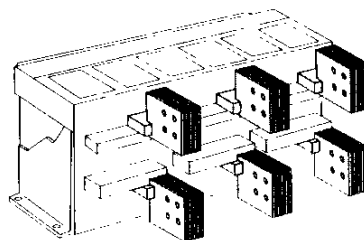


MP1092A.0

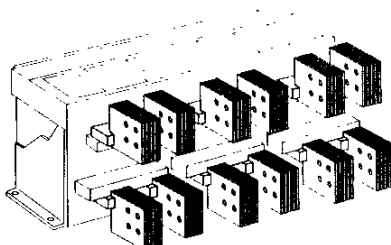
MP40
fixed-mounted



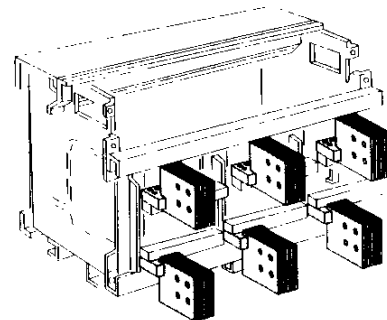
or



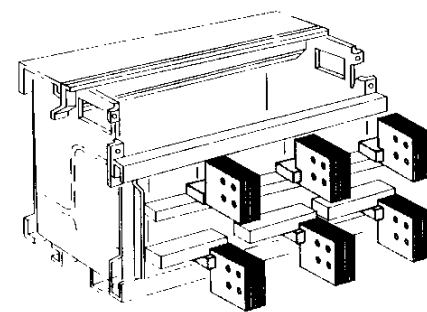
MP50
fixed-mounted



MP40 - MC40
drawout-mounted

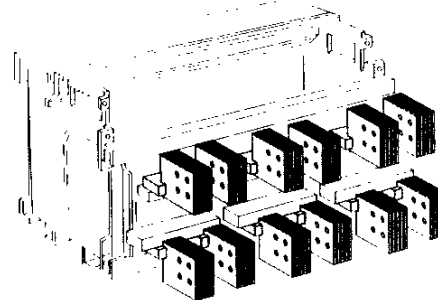


or



MP1093A.0

MP50 - MP63 - MC50
drawout-mounted



MP1094A.0

Masterpact® MP-MC circuit breaker installation

mounting

CAUTION

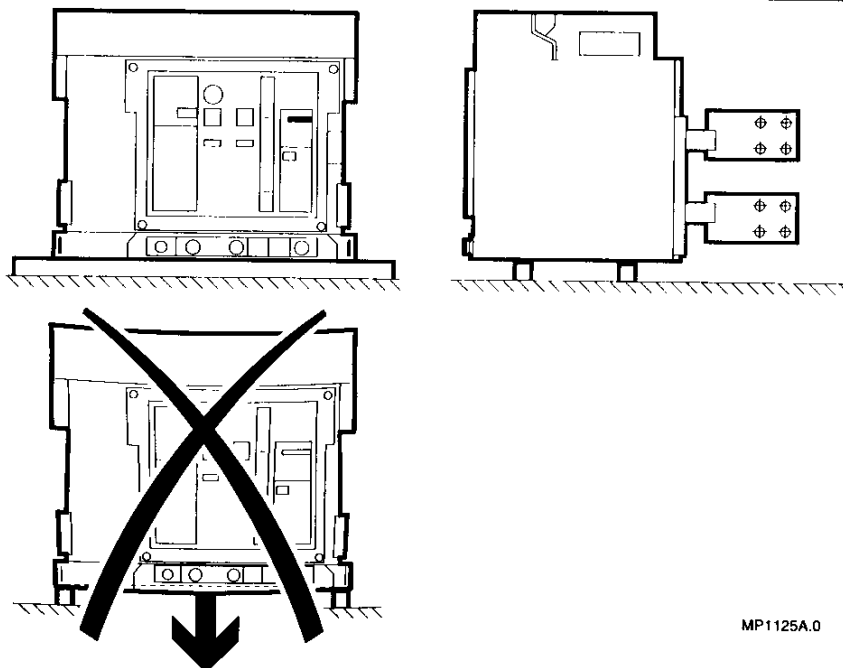
HAZARD OF EQUIPMENT DAMAGE

Distribute weight over a rigid mounting surface.

Failure to follow these instructions can result in damage to the equipment.

Distribute weight of the equipment uniformly over a rigid mounting surface (such as crossbeams or a metal floor).

The mounting plate should be perfectly flat. This eliminates any risk of deformation which could interfere with correct operation of the circuit breaker.



MP1125A.0

cable connection

CAUTION

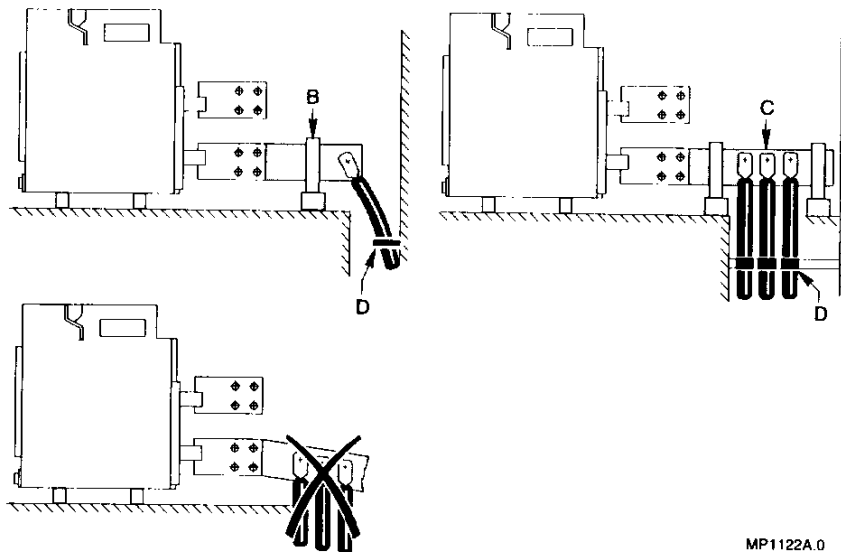
HAZARD OF EQUIPMENT DAMAGE

Carefully follow all instructions for making electrical connections and supporting and clamping bus bars.

Failure to follow these instructions can result in damage to the equipment.

It is essential that mechanical stresses are not applied to the circuit breaker terminal pads if a cable connection is used. Vertical terminal pads are recommended, and should be installed as indicated below:

- With bus bar extensions:
 - if the circuit has only a single cable, use method B.
 - if the circuit has several cables, use method similar to C.
- In all cases, the same general rules apply for cables that apply for bus bars:
 - position cable ends correctly before the bolts are inserted, and
 - attach cables securely to framework (D).



MP1122A.0

Masterpack® MP-MC circuit breaker installation

bus bar connection



CAUTION

HAZARD OF EQUIPMENT DAMAGE

Carefully follow all instructions for making electrical connections and supporting and clamping bus bars.

Failure to follow these instructions can result in damage to the equipment.

Bus bar dimensions shown in the table have been extrapolated from test data based on UL 891. They should be used only as a guide and not replace industrial experience or a temperature rise test.

Correct clamping of bus bars depends, among other things, on the torque used to tighten the nuts and bolts. Excessive torque may cause the same problems as insufficient torque.

The bus bars should be adjusted to ensure that the mounting holes (B) are aligned with the terminal pads before the bolts are inserted.

The bus bar is held by support (C) which is attached to the framework of the switchboard, so that the terminal pads do not have to support the weight of the bus bar.

Dimension A must be maintained to withstand the electrodynamic stresses between phases in the event of a short circuit.

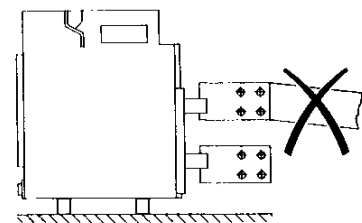
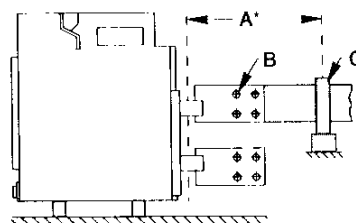
bus bars

circuit breaker	quantity	copper bus bars
		dimensions in (mm)
MP08, MC08	1	0.25 x 3.00 (6 x 76)
MP12, MC16	2	0.25 x 3.00 (6 x 76)
MP16, MC16	2	0.25 x 3.00 (6 x 76)
MP20, MC20	2	0.25 x 4.00 (6 x 102)
MP25	2	0.25 x 5.00 (6 x 127)
	or 4	0.25 x 2.50 (6 x 64)
MP30	4	0.25 x 4.00 (6 x 102)
	or 3	0.25 x 6.00 (6 x 152)
MC32	3	0.25 x 6.00 (6 x 152)
MP40, MC40	4	0.25 x 5.00 (6 x 127)
	or 5	0.25 x 4.00 (6 x 102)
MP50, MC50	6	0.25 x 5.00 (6 x 127)
	or 5	0.25 x 6.00 (6 x 152)
MP63	6	0.25 x 6.00 (6 x 152)

tightening torques

Values are for copper bus bars and high strength nuts and bolts.

bolt size	hole diameter	tightening torque	
		grooved or flat washer	Belleville washer
0.38 in (10 mm)	0.44 in (11 mm)	28 lb-ft (38 N•m)	31 lb-ft (43 N•m)



*Dimension A

Maximum distance between circuit breaker horizontal terminals (connection point of the extensions) and the first support or spacer, based on the expected short-circuit current.

MP1121A.0

	expected short-circuit current (kA rms)					
	30	50	65	80	100	150
circuit breaker MP08 to MP16, MC08 to MC16						
dimension A in	13.75	11.88	9.88	7.88	6.00	6.00
(mm)	(350)	(300)	(250)	(200)	(150)	(150)
circuit breaker MP20 to MP63, MC20 to MC50						
dimension A in	13.75	11.88	9.88	7.88	7.88	7.88
(mm)	(350)	(300)	(250)	(200)	(200)	(200)

Masterpact® MP-MC circuit breaker installation

control wiring

Connect each terminal using one stranded #18 to #14 AWG (0.6 to 2.5 mm²) copper wire. Cable strip length: 3/8 in. (9 mm)

⚠ CAUTION

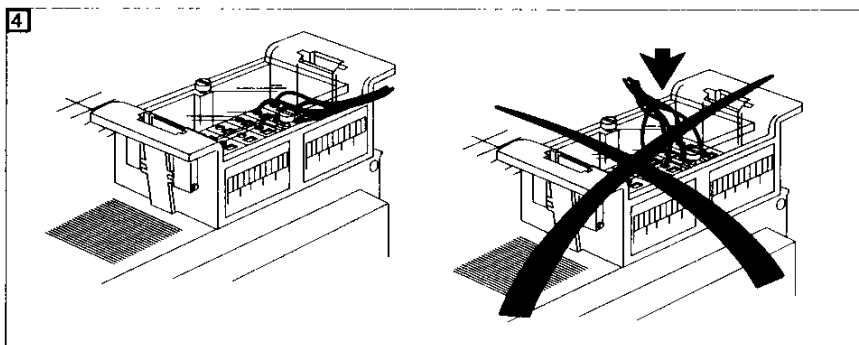
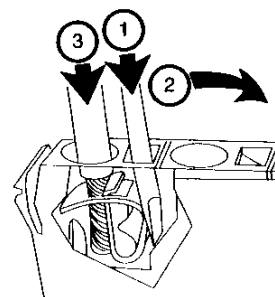
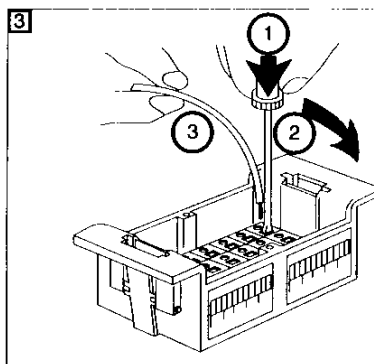
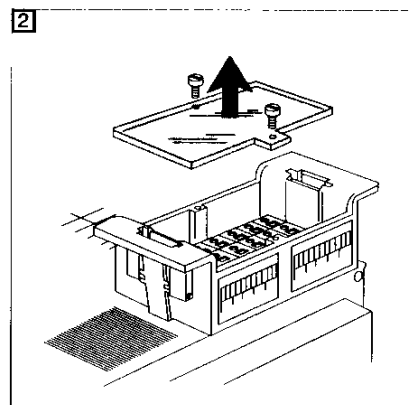
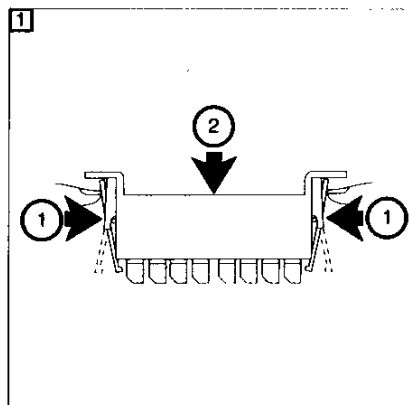
HAZARD OF EQUIPMENT DAMAGE

Do not route control wires close to the arc chutes.

Failure to follow these instructions can result in wire insulation melting and/or softening during circuit breaker interruption.

fixed mounting

- 1** Install conductor.
- 2** Remove transparent shield.
- 3** Connect control wires according to wiring diagrams shown on the label. Use a small screwdriver to open the spring clips and install wires. Wiring diagrams are also located at the end of this manual.
- 4** Route control wires away from the arc chutes. Replace the transparent cover.



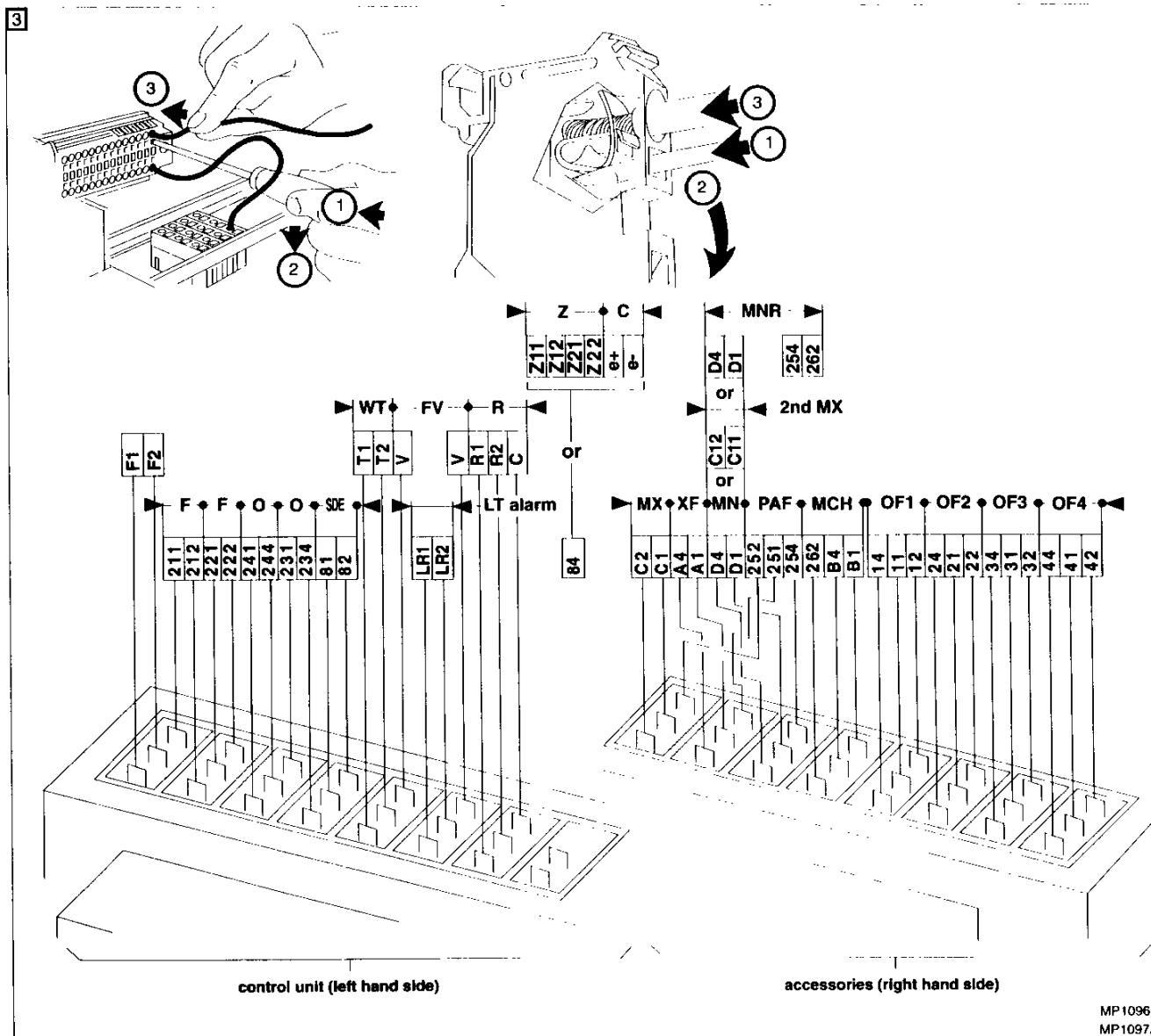
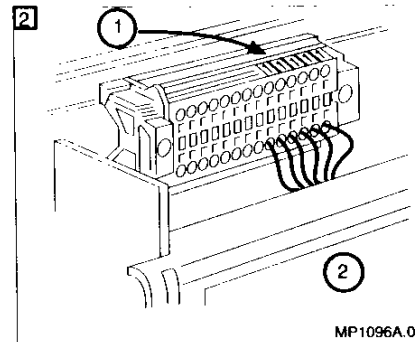
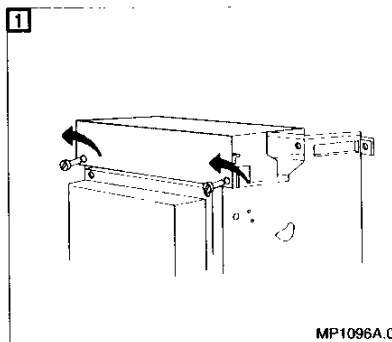
MP1095A 0

Masterpack® MP-MC circuit breaker installation

control wiring (continued)

drawout mounting

- 1 Remove the front terminal cover.
- 2 Determine the terminal number ① according to the wiring label ②. Wiring diagrams are also located at the end of this manual.
- 3 Connect the control wires using a small screwdriver and replace the front terminal cover.



MP1096A.0
MP1097A.0

Masterpact® MP-MC circuit breaker installation

control wiring (continued)



CAUTION

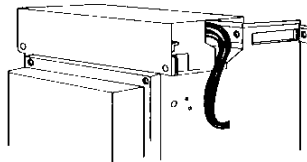
HAZARD OF EQUIPMENT DAMAGE

Do not let wires interfere with action
of the disconnecting block.

**Failure to follow these instructions
can result in damage to the
equipment.**

- 4** Route control wires away from arc chutes.

4



MP1095A 0

Masterpact® MP-MC circuit breaker operation

disconnecting and connecting instructions

The circuit breaker has four drawout positions and can be operated in all four positions. The circuit breaker is captive in all positions except WITHDRAWN.

note: A closed circuit breaker is automatically opened prior to being connected or disconnected during a racking in or racking out operation.

Connection or disconnection of the circuit breaker requires insertion of the racking crank.

Insertion of the racking crank can be prevented by the following stationary assembly accessories:

- padlock
- key lock
- racking interlock.

■ In the **CONNECTED** position, the primary and secondary disconnecting terminals are engaged, and the circuit breaker is ready for service.

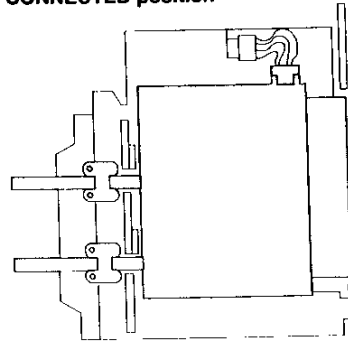
■ In the **TEST** position, the primary terminals are disengaged; however, control contacts are connected to permit operation of the circuit breaker. The TEST position is used for testing circuit breaker operation and control system functions as provided. In this position, the circuit breaker is not suitable for internal inspection or any maintenance function.

■ In the **DISCONNECTED** position, the primary and secondary disconnect terminals are disengaged and separated by a safe distance from the corresponding stationary terminals.

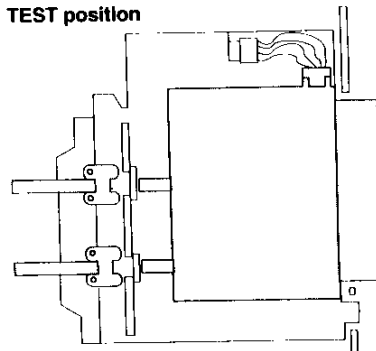
■ In the **WITHDRAWN** position, both primary and secondary contacts are disconnected. The circuit breaker may be removed for complete accessibility.

note: When a racking crank remains inserted or a circuit breaker is not completely disconnected, the extraction of the right rail is prevented.

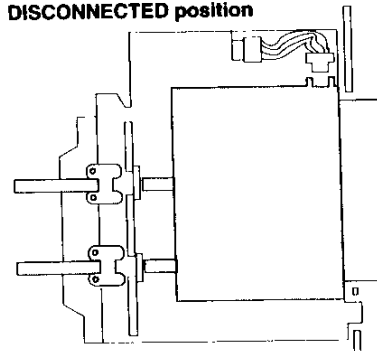
CONNECTED position



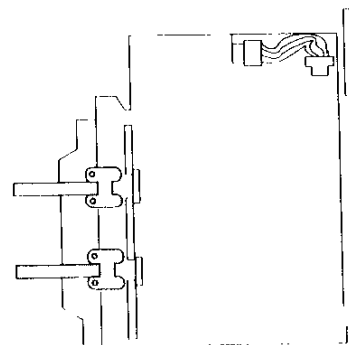
TEST position



DISCONNECTED position



WITHDRAWN position



MP1098A.0

Masterpact® MP-MC circuit breaker operation

disconnecting instructions

note: If the circuit breaker is not opened before disconnecting, it will open automatically during disconnection.

- 1** Remove the racking crank from its storage hole, insert it into the racking slot, and engage the mechanism.

note: In the case of a racking interlock, press the "compartment door closed" sensor located at the front of the drawout mechanism to simulate a closed door.

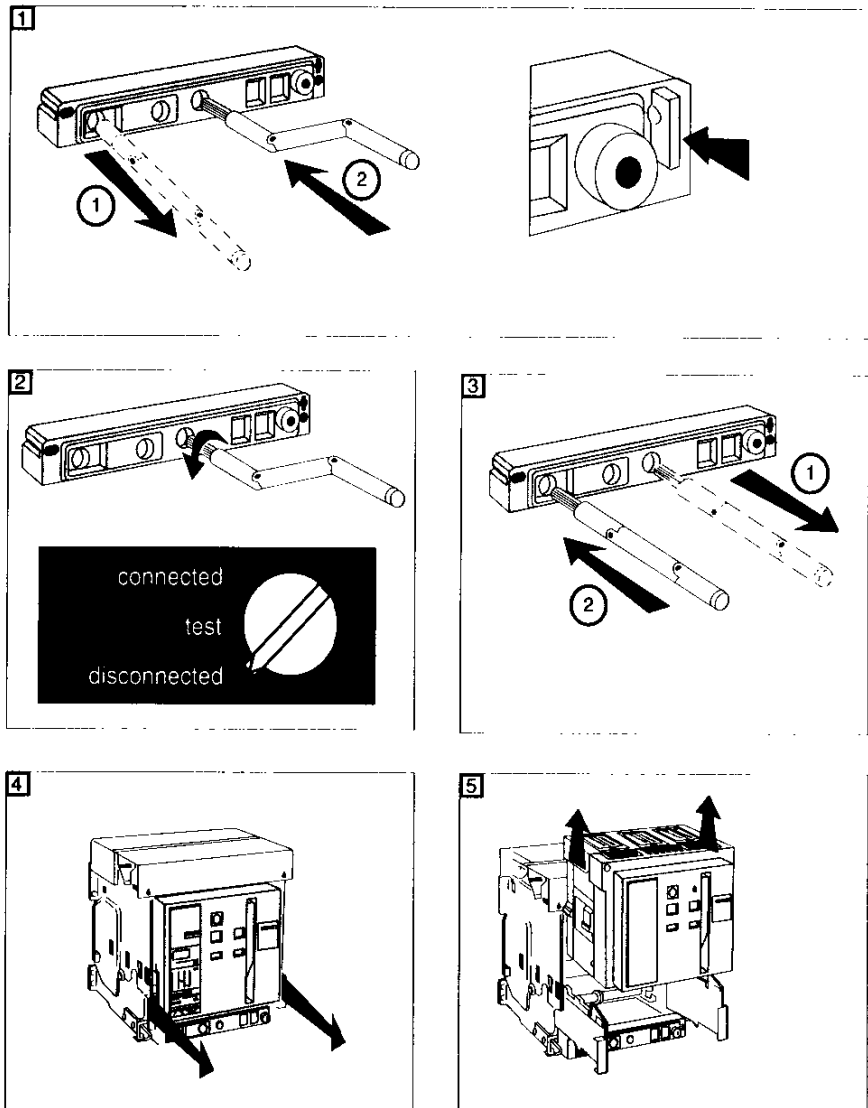
- 2** To reach the DISCONNECTED position, turn the racking crank counterclockwise until first the TEST, and then DISCONNECTED indication are shown on the position indicator.

- 3** Remove the racking crank and insert it into the storage hole.

note: If the racking crank is not removed, the right rail will not fully extend.

- 4** Using the two extension rail handles, pull the circuit breaker out.

- 5** Remove the circuit breaker using one of the lifting methods explained in **handling** on page 7.



MP1099A.0

Masterpact® MP-MC circuit breaker operation

installing the circuit breaker in the stationary assembly

- 1** Pull out the two extension rails by their handles.

note: When either the racking crank remains inserted in the racking slot or the circuit breaker is not fully disconnected, extraction of the right extension rail is not possible.

- 2** Install the circuit breaker onto both extension rails, being sure that the two circuit breaker supports located on either side are fully engaged in the rail slots. Refer to **handling**, page 7, for methods of lifting the circuit breaker.

CAUTION

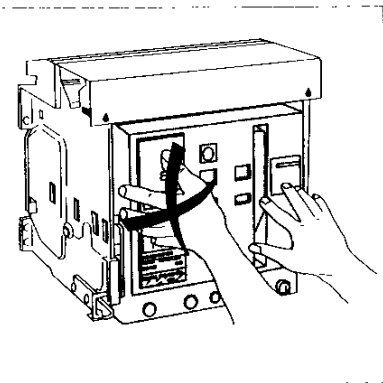
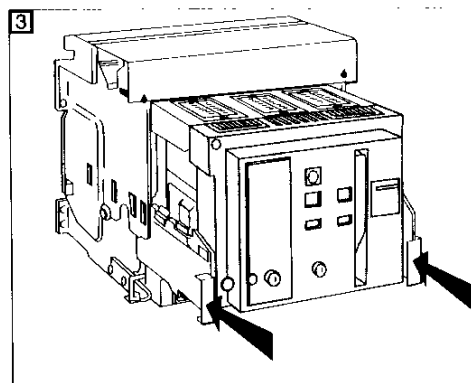
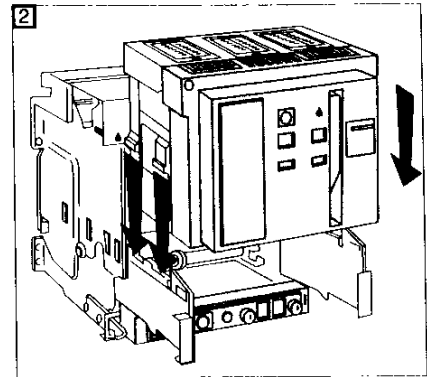
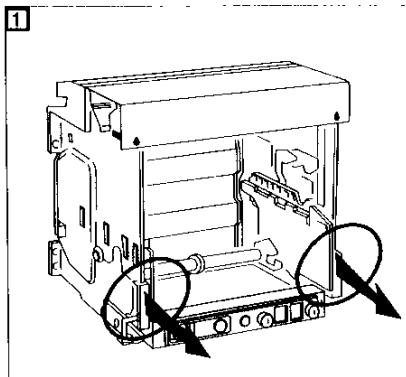
HAZARD OF EQUIPMENT DAMAGE

Do not let the forks of a fork lift protrude past the rear of the circuit breaker.

Do not press on the control unit while pushing the circuit breaker into the stationary assembly.

Failure to follow these instructions can result in damage to the equipment.

- 3** To move the circuit breaker from the **WITHDRAWN** position to the **DISCONNECTED** position, push the extension rail handles into the stationary assembly until they stop.



MP1100A 0

Masterpact® MP-MC circuit breaker operation

connecting instructions

1 Insert and engage racking crank into its racking slot.

note: This procedure is possible only if:

- circuit breaker is in DISCONNECTED position
- drawout mechanism padlocks have been removed
- key interlock has been unlocked
- compartment door is closed.

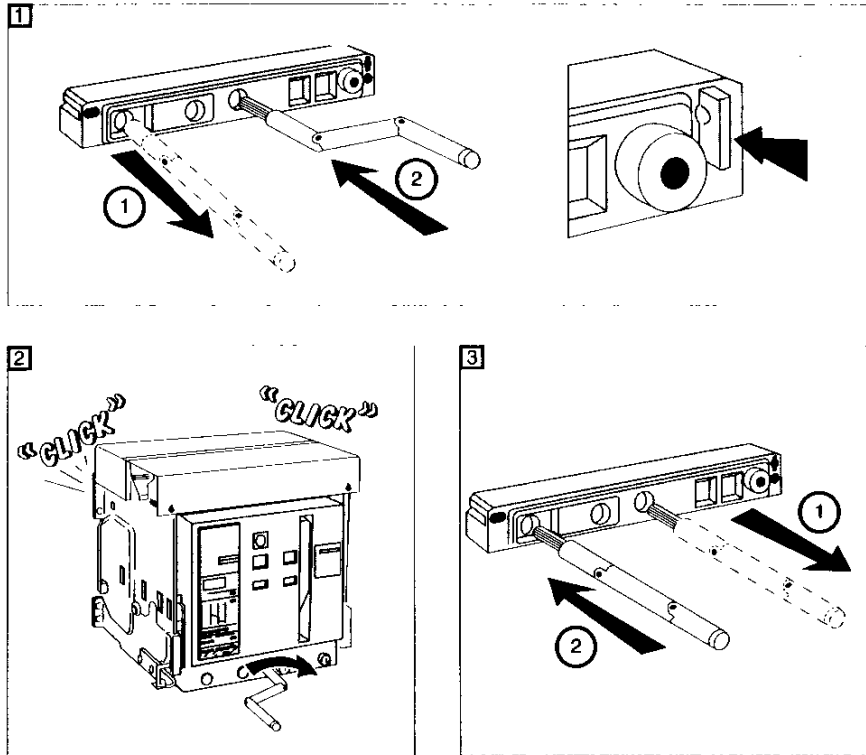
note: In case of racking interlock, press the "compartment door closed" sensor located at the drawout mechanism to simulate a closed door.

2 Turn the racking crank clockwise until the CONNECTED position is reached on the position indicator.

Continue cranking until two "click" sounds are heard indicating the circuit breaker is locked in the connected position.

note: As the CONNECTED position is neared, more effort will be required to turn the crank.

3 Remove the racking crank and insert it back into the storage hole.



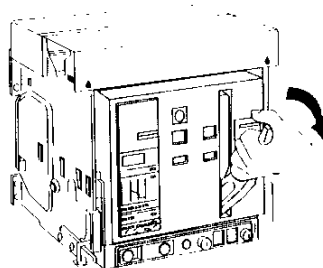
MP1101A.0

Masterpact® MP-MC circuit breaker operation

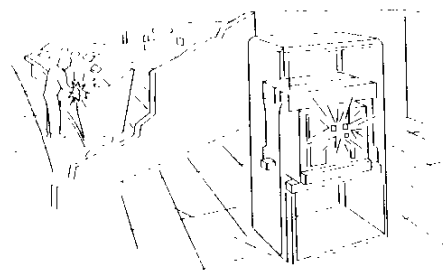
charging instructions

All basic circuit breaker and drawout operations can be performed from the front of the circuit breaker. Suitable electrical and mechanical interlocks are provided to prevent incorrect operation of the circuit breaker. To manually charge an electrically- or manually-operated circuit breaker, push or pull down on the charging handle; six full strokes should be used. When the spring is fully charged, the yellow "charged" indicator will appear in the stored-energy window on the circuit breaker front cover, the handle stops, and it will return to normal position when released.

Manual charging



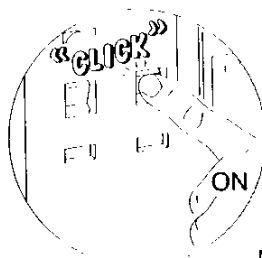
Electrical charging



MP1102A.0

closing instructions

All that is required to close the circuit breaker locally is to push the mechanical **push ON** switch. Pre-charged circuit breakers may be closed remotely via a spring-released solenoid which is standard for electrically-operated circuit breakers and optional for manually-operated circuit breakers. Before attempting to close the circuit breaker locally, the stored-energy indicator window must show a yellow "charged."



MP1103A.0

Circuit breaker can be closed only if:

- it is opened
- it is charged
- pop-out type fault indicator is correctly reset
- no remote opening order is intended.

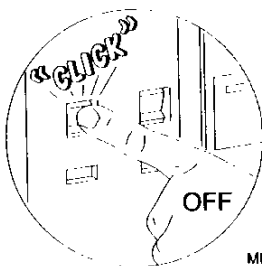
note: The closing coil (XF) withstands a continuous voltage, providing anti-pumping function. If the circuit breaker is not ready to close when the closing order is intended, inhibit it and try again as soon as the circuit breaker is ready to close.

To inhibit the anti-pumping function, wire in series the ready-to-close switch (terminals 251-252) with the closing coil.

opening instructions

Opening the circuit breaker locally is accomplished by pushing the mechanical **push OFF** switch on the circuit breaker front cover.

Circuit breakers may be opened remotely via either a shunt trip or an undervoltage trip device depending upon the application requirements.



MP1104A.0

resetting instructions

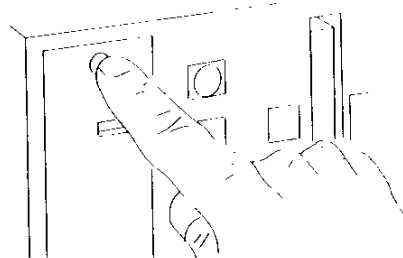
CAUTION

HAZARD OF EQUIPMENT DAMAGE

Resetting the circuit breaker with an existing overcurrent or ground-fault condition can result in destructive arcing. Be sure any existing faults are cleared prior to resetting.

Failure to follow these instructions can result in damage to the equipment.

The mechanical fault indicator (push to reset button) extends to indicate that an overcurrent has occurred and prevents closure of the circuit breaker until reset.



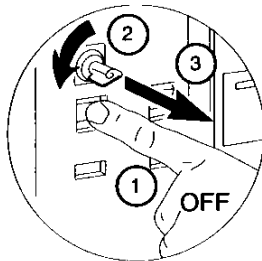
MP1105A.0

Masterpack® MP-MC circuit breaker operation

locking

circuit breaker frame

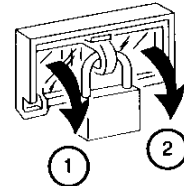
■ Locking by key interlock (VSKA).



MP1106A.0

■ Locking using a device (VBP).

Access to either **push OFF** switch (open) 1 or **push ON** switch (close) 2 of the circuit breaker can be prevented by attaching a



MP1107A.0

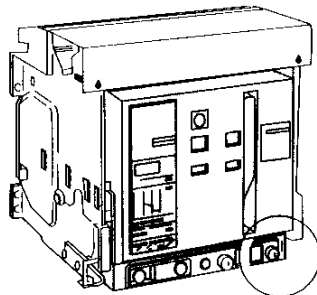
Locking in open position:

- ① push the **push OFF** switch
- ② insert and turn the key counterclockwise
- ③ remove the key.

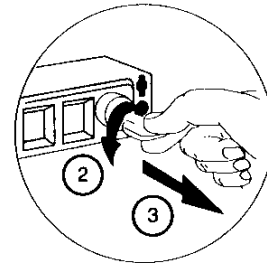
shackle diameter: 1/4 to 5/16 in. (6 to 8 mm)

stationary assembly

■ Locking by key interlock (VSKC).



MP1108A.0



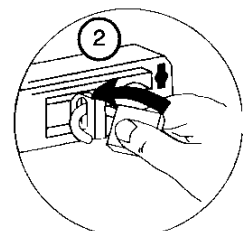
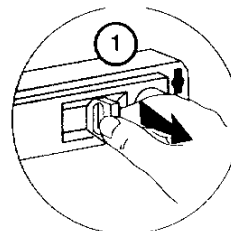
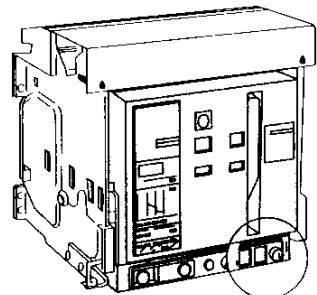
MP1109A.0

note: This locking can be in DISCONNECTED position or in all positions: CONNECTED, TEST, and DISCONNECTED (upon request).

Locking in the DISCONNECTED position:

- ① disconnect the circuit breaker
- ② insert key and turn counterclockwise
- ③ remove the key.

■ Locking by padlocking device (standard).



MP1110A.0

shackle diameter: 1/4 to 5/16 in. (6 to 8 mm)

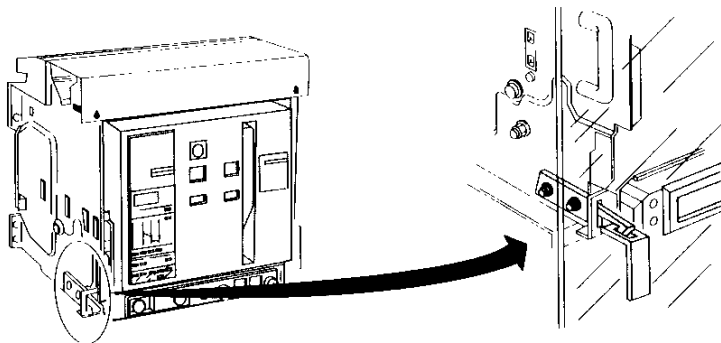
note: This locking prevents insertion of the racking crank and racking the circuit breaker into its stationary assembly.

Masterpact® MP-MC circuit breaker operation

locking (continued)

door

- Locking by door interlock (VDP).

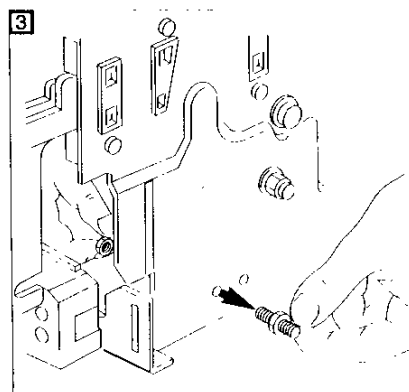
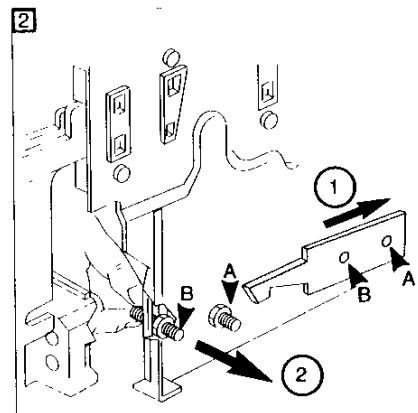
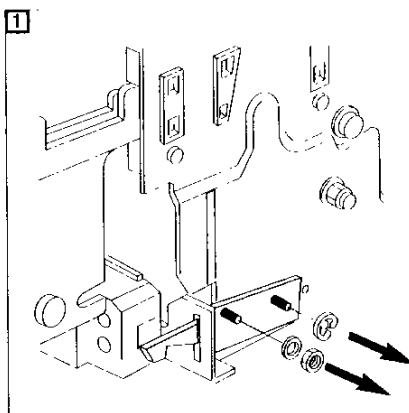


MP1111A.0

Prevents the door from opening when the circuit breaker is in the CONNECTED and TEST positions.

note: The hook can be mounted on either side.

To change hook location:



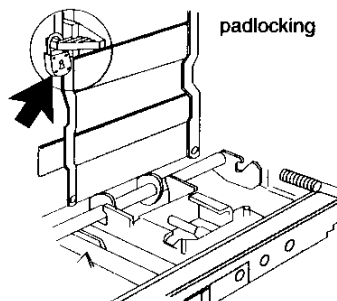
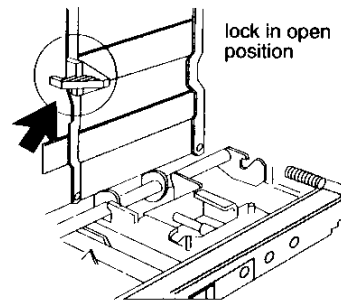
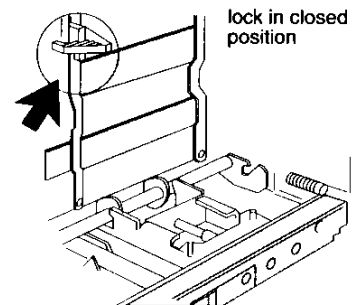
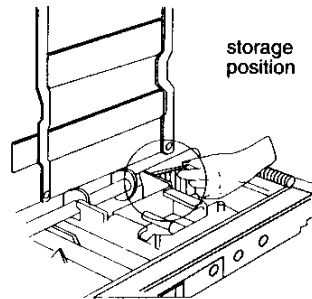
MP1112A.0

Masterpact® MP-MC circuit breaker operation

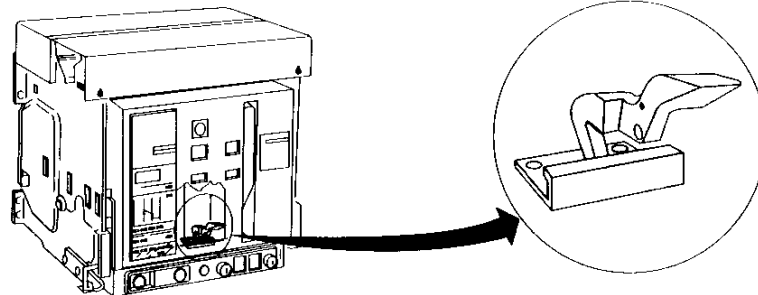
locking (continued)

shutters

- Locking by padlocking device.



spring charged



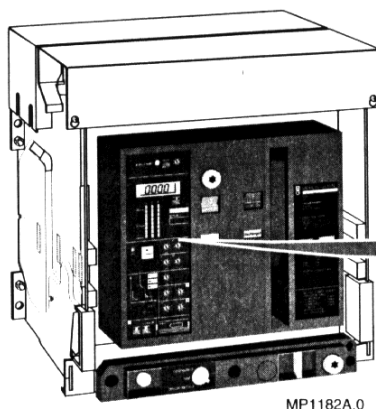
MP1113A.0

Before pulling out the circuit breaker, discharge the spring by pressing the **push ON** switch, then the **push OFF** switch.

note: When the closing springs are charged, this interlock prevents the circuit breaker from being disconnected by latching it in the stationary assembly. Use of this locking method is not suitable with an undervoltage trip device.

Masterpact® MP-MC circuit breaker control unit

control unit types



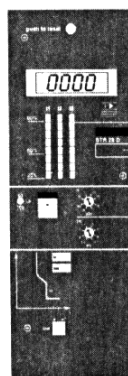
STR 18 M

overcurrent protection

- instantaneous

option

- none



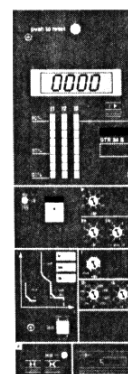
STR 28 D

overcurrent protection

- long-time
- instantaneous

option

- ammeter



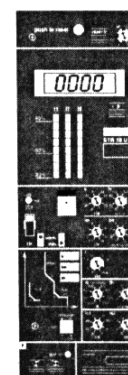
STR 38 S

overcurrent protection

- long-time
- short-time
- instantaneous

option

- ammeter
- fault indicators
- ground-fault protection



STR 58 U

overcurrent protection

- long-time
- short-time
- instantaneous

option

- ammeter
- fault indicators
- ground-fault protection
- zone-selective interlocking
- load monitoring
- communication

Masterpact® MP-MC circuit breaker control unit

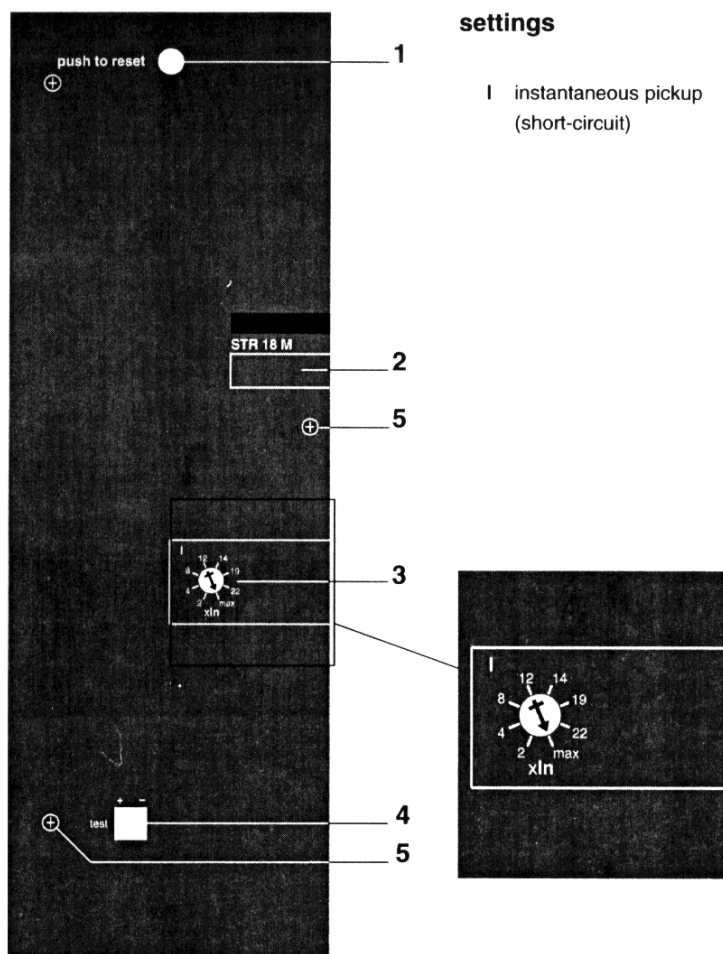
control unit - STR 18 M

description

- 1 fault trip indicator reset button prevents reclosing the circuit breaker after fault until reset
- 2 current sensor rating (I_n)
- 3 instantaneous setting (can be turned OFF on N1 and H1 circuit breakers)
- 4 test the receptacle (BU ME)
- 5 lock the control unit settings (PBD)

settings

- I instantaneous pickup (short-circuit)



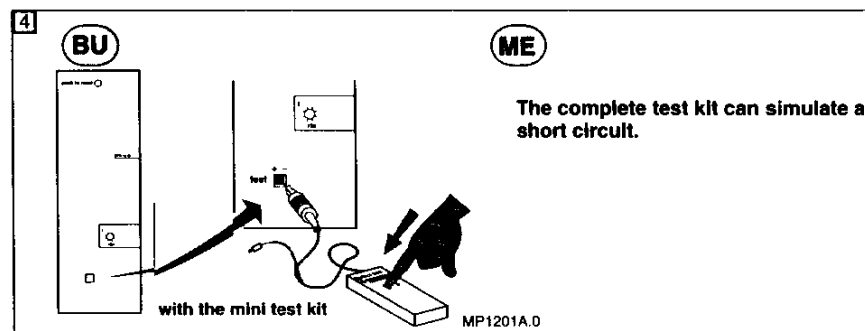
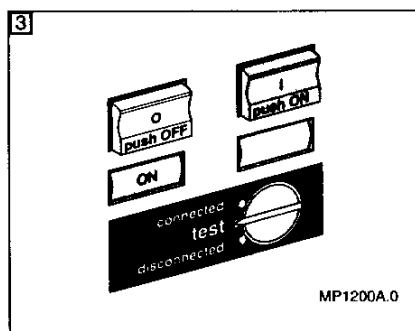
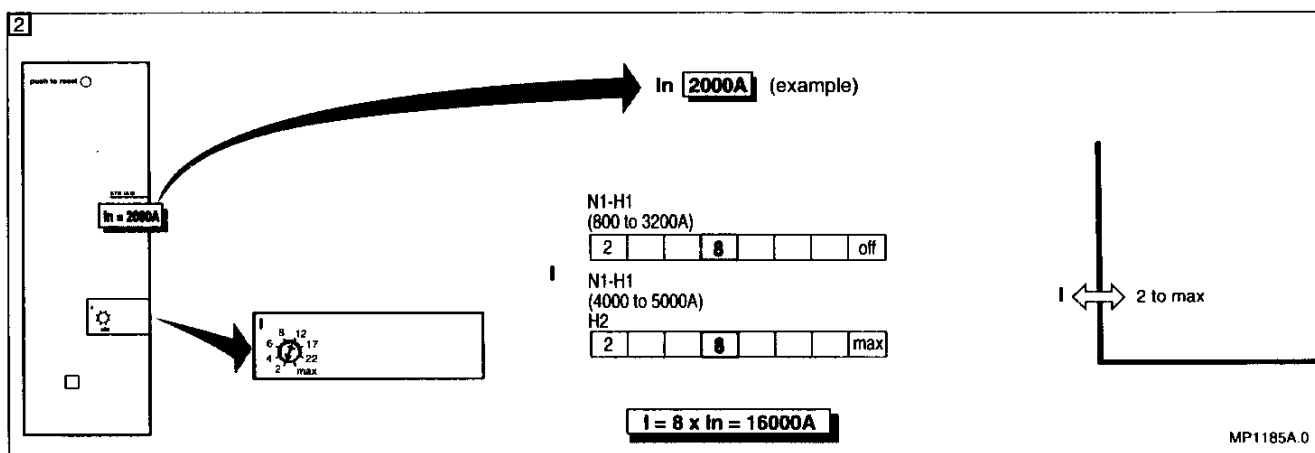
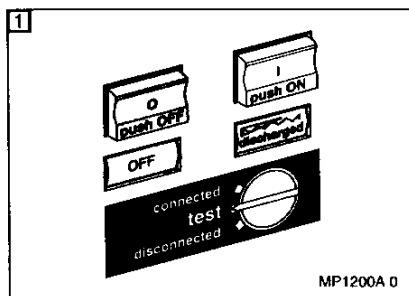
MP1183A.0

Masterpack® MP-MC circuit breaker control unit

control unit - STR 18 M (continued)

before energizing main circuits

- 1 Open circuit breaker, have discharged.
- 2 Adjust control unit.
- 3 Close circuit breaker.
- 4 Test the control unit.

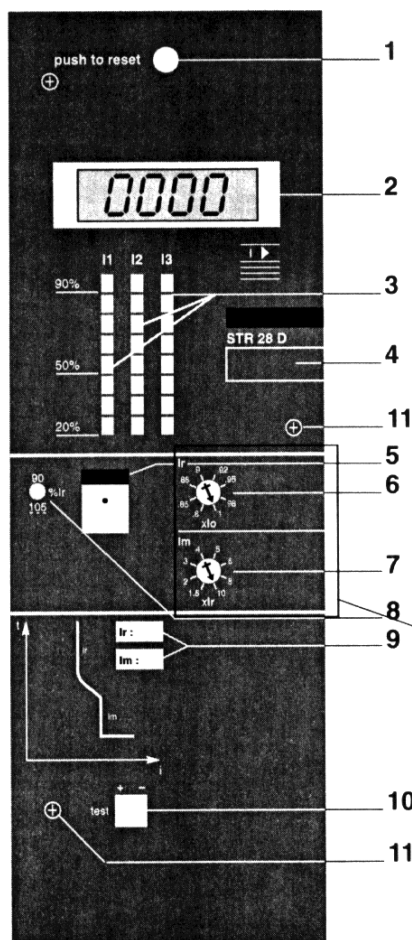


Masterpact® MP-MC circuit breaker control unit

control unit - STR 28 D

description

- 1 fault trip indicator reset button
prevents reclosing circuit breaker after
fault until reset
- 2 measure the current
- 3 indicates the rate of load (% Ir)
- 4 current sensor rating (In)
- 5 rating plug (Io)
- 6 adjust Ir (long-time setting)
- 7 adjust Im (instantaneous)
- 8 overload indicator
- 9 control unit setting values
- 10 test the control unit
- 11 lock the control unit settings



settings

adjustable

- Ir long-time setting
(overload)
- Im instantaneous setting
(short circuit)

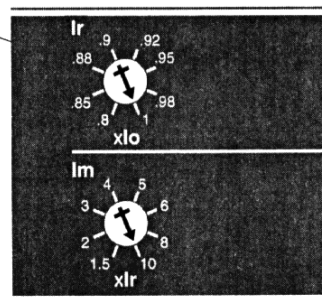
fixed

- tr long-time delay

options

- option I

see page 35



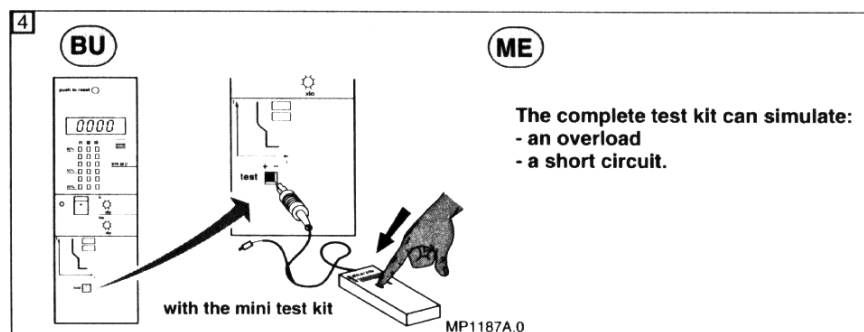
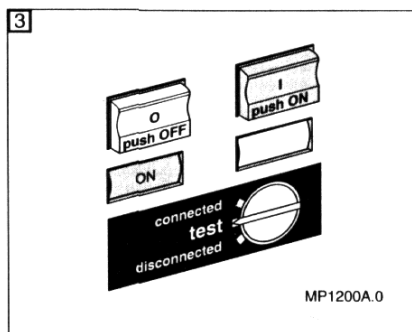
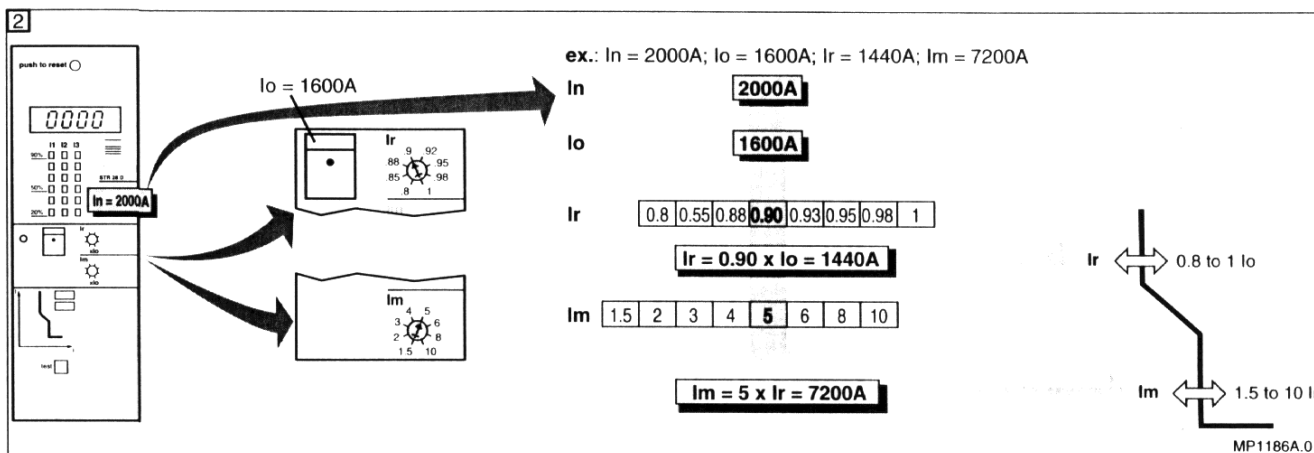
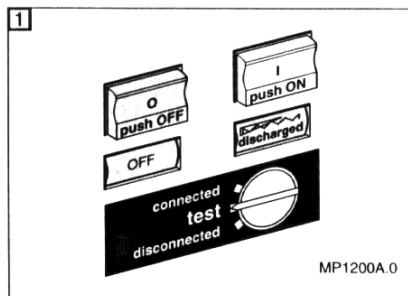
MP1021A.0

Masterpact® MP-MC circuit breaker control unit

control unit - STR 28 D (continued)

before energizing main circuits

- 1 Open circuit breaker, have discharged.
- 2 Adjust control unit.
- 3 Close circuit breaker.
- 4 Test the control unit.

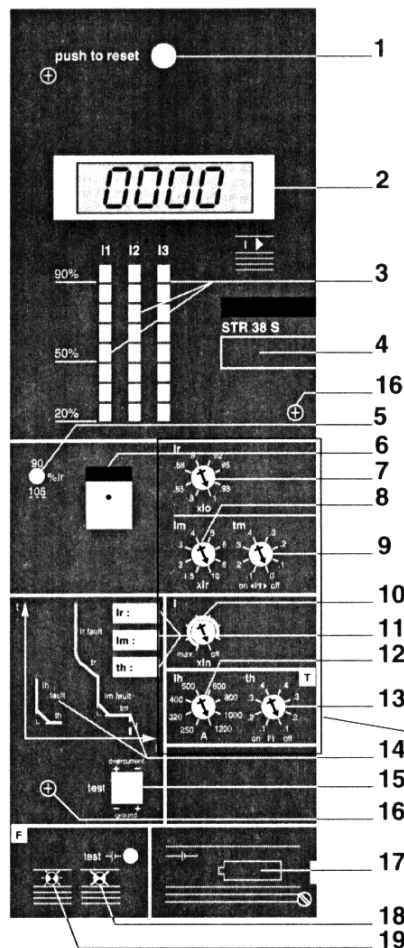


Masterpact® MP-MC circuit breaker control unit

control unit - STR 38 S

description

- 1 fault trip indicator reset button
prevents reclosing circuit breaker after
fault until reset
- 2 measure the current (I)
- 3 indicates the rate of load (% Ir) (I)
- 4 current sensor rating (In)
- 5 overload indicator (ALR)
- 6 rating plug (Io)
- 7 adjust Ir (long-time setting)
- 8 adjust Im (short-time setting)
- 9 adjust tm (short-time delay)
- 10 control unit setting values
- 11 switch on or off the instantaneous
protection (N1 / H1 type only)
- 12 adjust lh (T) (W)
(ground-fault protection)
- 13 adjust th (T) (W)
(ground-fault protection delay)
- 14 fault trip indicator (F)
- 15 test the control unit (BU) (ME)
- 16 lock the control unit settings (PBD)
- 17 save fault trip indicator (PIL)
- 18 clear fault trip indicator
and/or check battery level (F) + (PIL)
- 19 recall the latest fault
trip indicator (F) + (PIL)



MP1022A.0

settings

adjustable

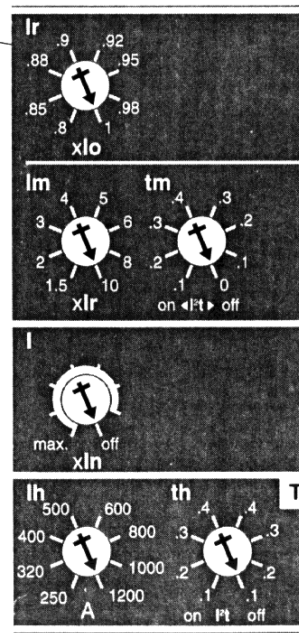
- Ir long-time setting
(overload)
- Im short-time setting
(short circuit)
- tm short-time delay
I²t on or off

fixed

- tr long-time delay
- I instantaneous pickup
(short-circuit)

options

- option (I) see page 35
- option (F) see page 36
- option (T) see page 37
- option (W) see page 37

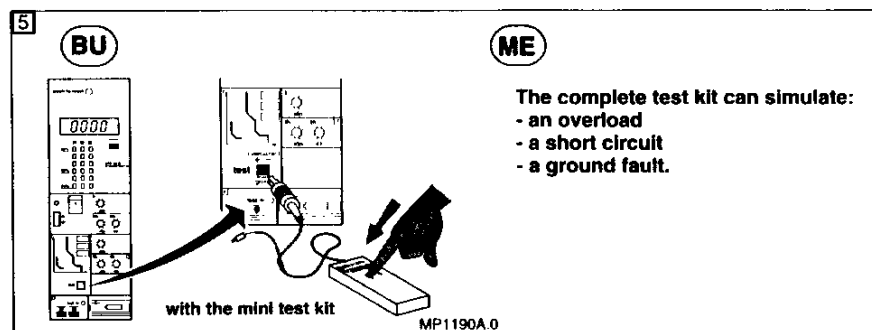
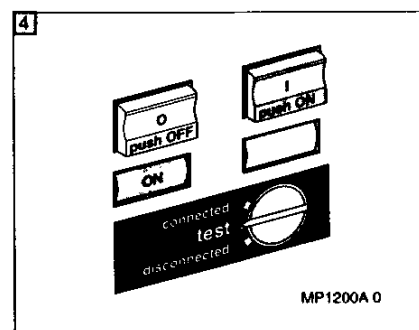
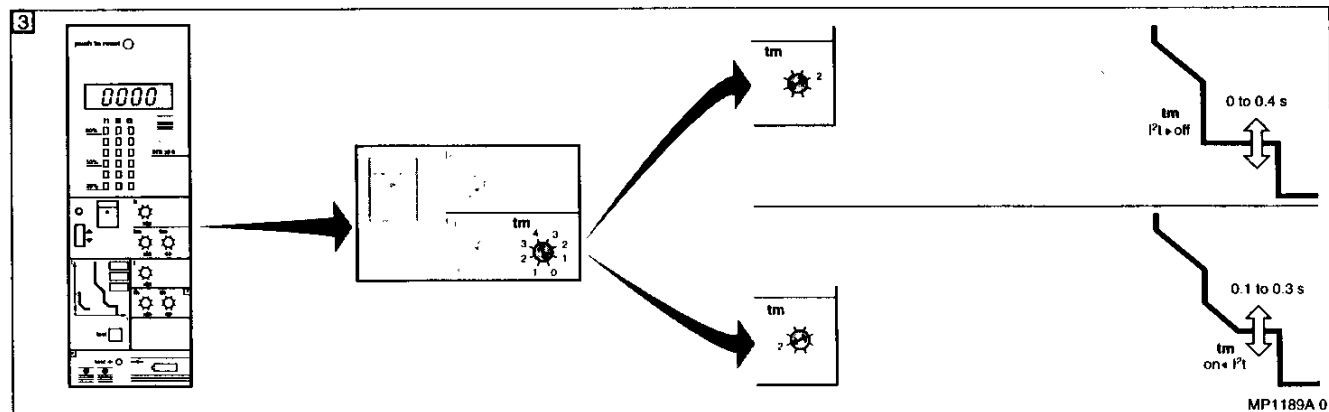
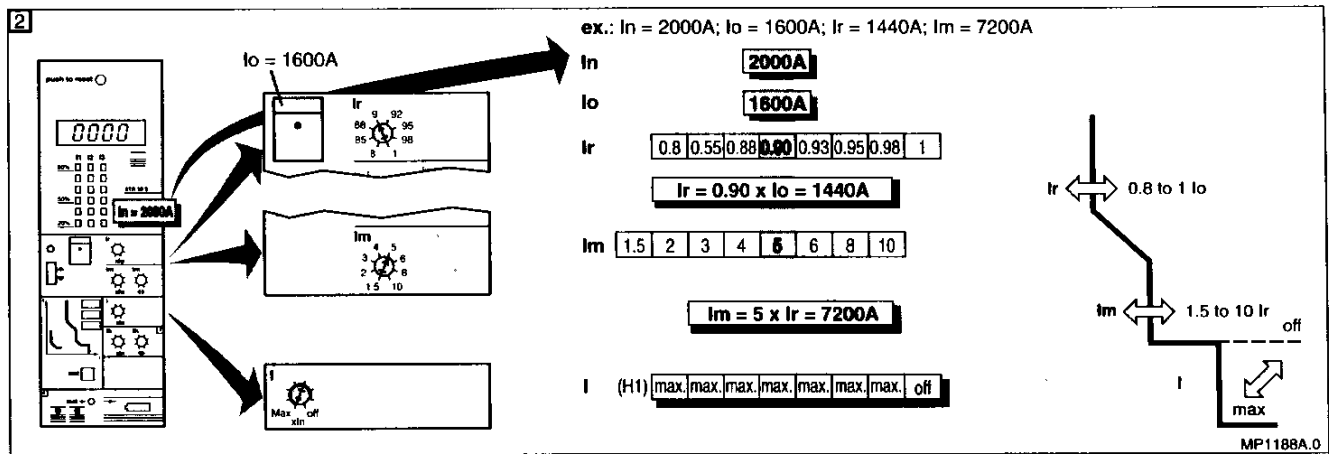
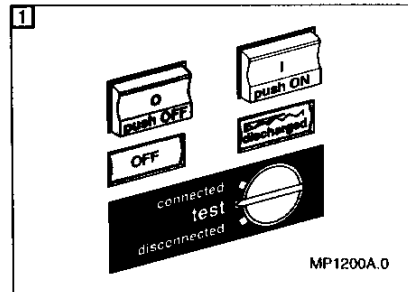


Masterpack® MP-MC circuit breaker control unit

control unit - STR 38S (continued)

before energizing main circuits

- 1 Open circuit breaker, have discharged.
- 2 Adjust control unit.
- 3 Close circuit breaker.
- 4 Test the control unit.

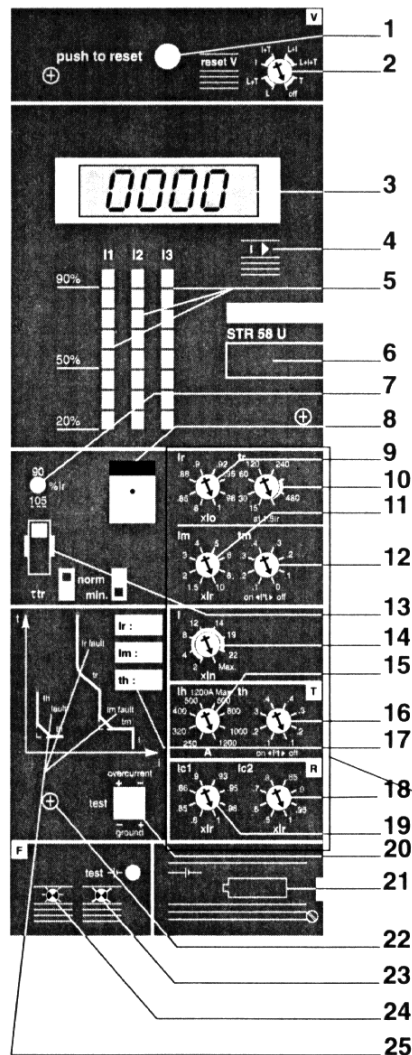


Masterpact® MP-MC circuit breaker control unit

control unit - STR 58 U

description

- 1 fault trip indicator reset button prevents reclosing circuit breaker after fault until reset
- 2 select the remote indicated fault trip (FV)
- 3 measure the current (I)
- 4 select phase to measure (I)
- 5 indicates the rate of load (% Ir) (I)
- 6 maximum protection rating
- 8 overload indicator (ALR)
- 9 rating plug (Io)
- 9 adjust Ir (long-time setting)
- 10 adjust tr (long-time delay)
- 11 adjust Im (short-time setting)
- 12 adjust tm (short-time delay)
- 13 decrease thermal memory after tripping
- 14 adjust I (instantaneous) (T) (W)
- 15 adjust lh (ground-fault protection) (T) (W)
- 16 adjust th (ground-fault protection delay) (T) (W)
- 17 control unit setting values
- 18 adjust Ic2 (load monitoring) (R)
- 19 adjust Ic1 (load monitoring) (R)
- 20 test the control unit (BU) (ME)
- 21 save fault trip indicator (PIL)
- 22 lock the control unit settings (PBD)
- 23 clear fault trip indicator and/or check battery level (F) + (PIL)
- 24 recall the latest fault trip indicator (F) + (PIL)
- 25 fault trip indicator (F)



MP1023A.0

settings

adjustable

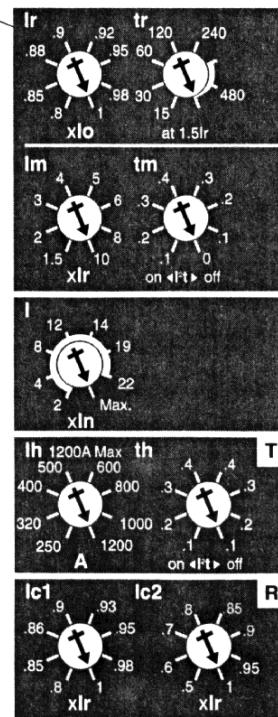
- Ir long-time setting (overload)
- tr long-time delay
- Im short-time setting (short circuit)
- tm short-time delay
- I²t on or off
- I instantaneous setting (short-circuit)

options

thermal memory limitation function

see page 34

- option (I) see page 35
- option (F) see page 36
- option (FV) see page 37
- option (T) see page 37
- option (W) see page 37
- option (R) see page 37
- option (C) see page 39
- option (Z) see page 38

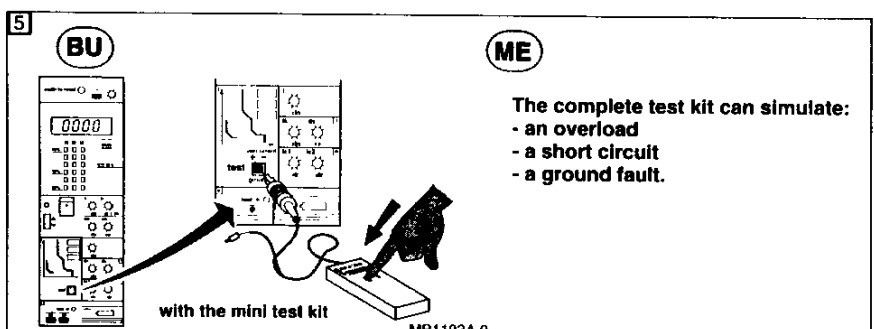
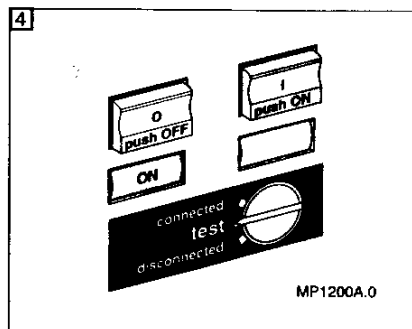
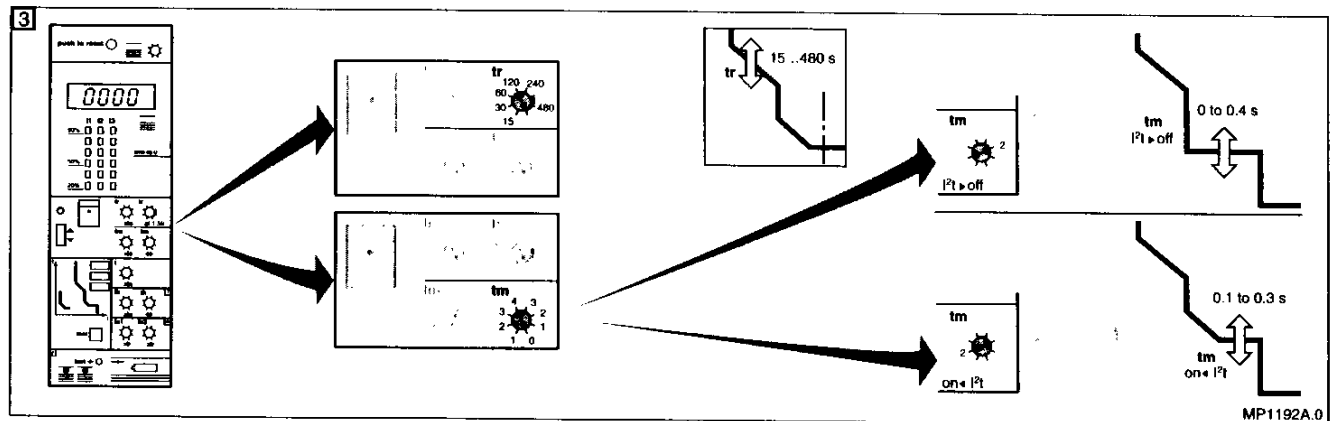
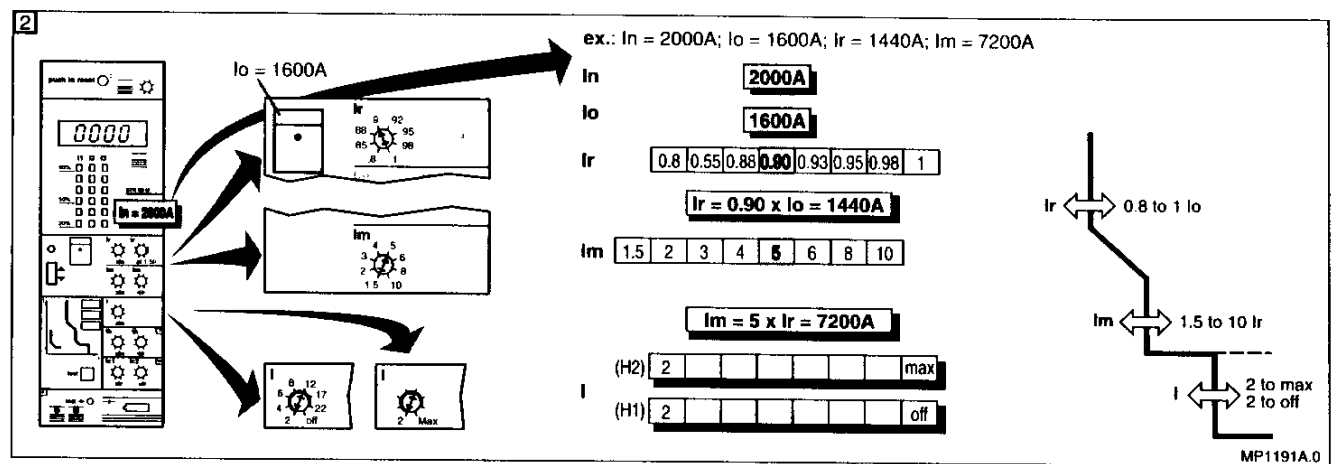
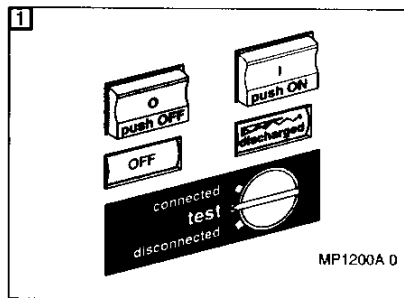


Masterpack® MP-MC circuit breaker control unit

control unit - STR 58 U (continued)

before energizing main circuits

- 1 Open circuit breaker, have discharged.
- 2 Adjust control unit.
- 3 Close circuit breaker.
- 4 Test the control unit.



Masterpack® MP-MC circuit breaker control unit

control unit options

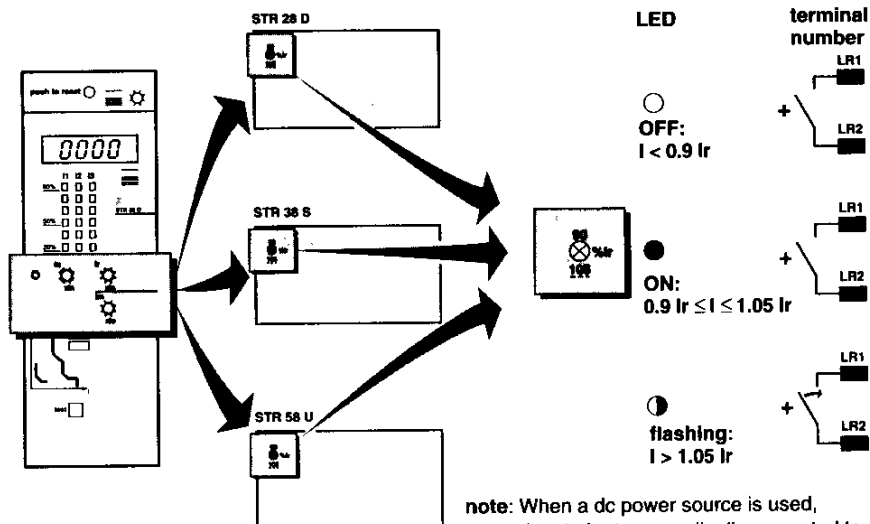
pre-trip and overload indication - option (ALR)

The pre-trip and overload indication is standard with all control units except STR18M.

The overload indicator is a light-emitting diode (LED) which is:

- on when the current exceeds 90% of the current setting.
- flashing on overload: according to time-current curves, 105–120% of current setting.

The pre-trip alarm switch is a contact (LR1–LR2) which closes when the circuit breaker is in the overload zone. It opens if the load decreases below the overload zone or if the circuit breaker trips.



note: When a dc power source is used, power has to be temporarily disconnected to reset the optical triac contacts.

MP1182A.0

For wiring diagram, see page 43.

thermal memory limitation

The STR 38S and STR 58U trip units have the thermal memory as standard.

The thermal memory function remembers the thermal heating from each time the pickup setting is exceeded. It operates:

- before tripping on long-time and ground-fault protection (if provided).
- after tripping on long-time protection only, the time-constant depends on the internal temperature of the circuit breaker.

Any temporary overload generates an overheating which is stored. A series of temporary overloads will be integrated into this overheating value. Storing of this value results in reduced tripping time so the reaction of the trip unit will be closer to the real heating seen by the system.

The internal temperature rise of the circuit breaker is measured by thermal resistors. The cooling time constant of the memory depends on the over-temperature condition.

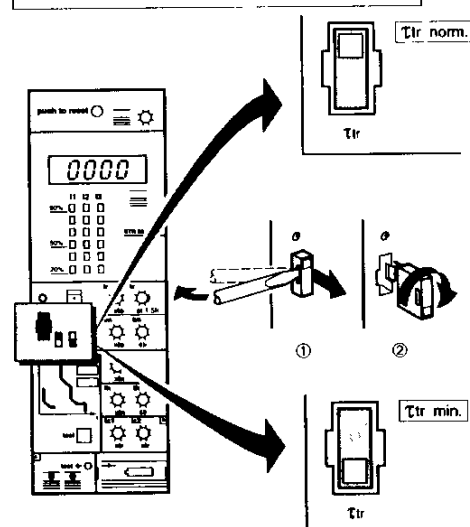
Standard version of the control unit STR58 is fitted with a min/max position switch.

⚠ WARNING

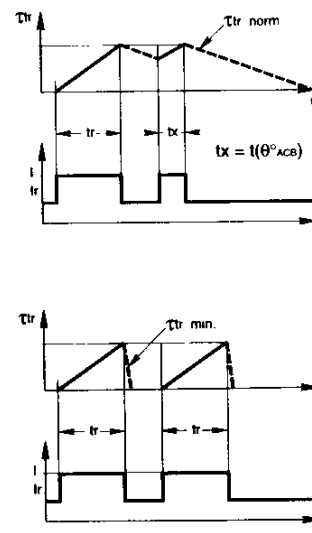
HAZARD OF EQUIPMENT DAMAGE

Use "min" position only for emergency, when reclosing on fault is absolutely necessary.

Failure to follow these instructions can result in serious personal injury or equipment damage.



The min position cancels the thermal memory and must only be used in emergencies where reclosing on a fault is essential.



MP1194A.0

Masterpact® MP-MC circuit breaker control unit

control unit options (continued)

ammeter - option **I**

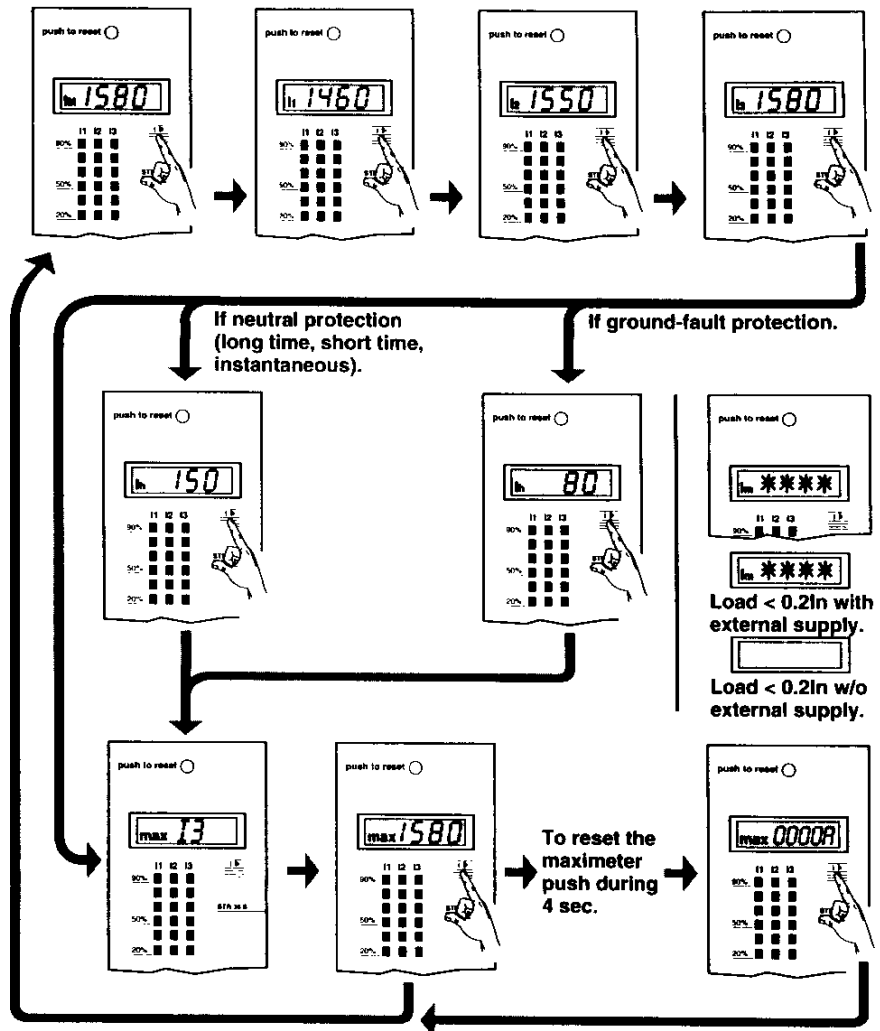
I1, I2, I3: phase current

Im: maximum instantaneous current

max: max current stored since the last reset

Ih: ground-fault current

For wiring diagram see page 43.



MP1203A 0

Masterpact® MP-MC circuit breaker control unit

control unit options (continued)

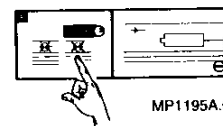
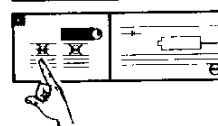
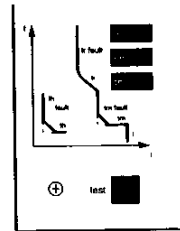
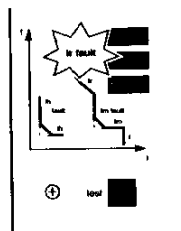
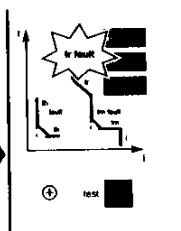
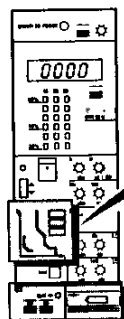
fault indication - option **F**

In addition to the mechanical fault indicator, this indicator shows the cause of tripping: overload, short circuit or ground fault, if any.

Three light-emitting diodes (LEDs) indicate separately long-time, short-time/instantaneous and ground-fault trip. A flat push button allows resetting of the indicator after tripping.

A separate power supply is required to maintain the fault indication after the circuit breaker trips. Two options are offered:

- connecting a reliable 24 Vdc control voltage on F1-F2. Auxiliary power module (AD) is used for other voltages. When the control source is unreliable, a battery pack (BAT) is added to an AD power module.
- from a built-in battery module. When no external control source is available, a built-in battery module may be ordered (option PIL). This module integrates battery testing and indicator resetting buttons.

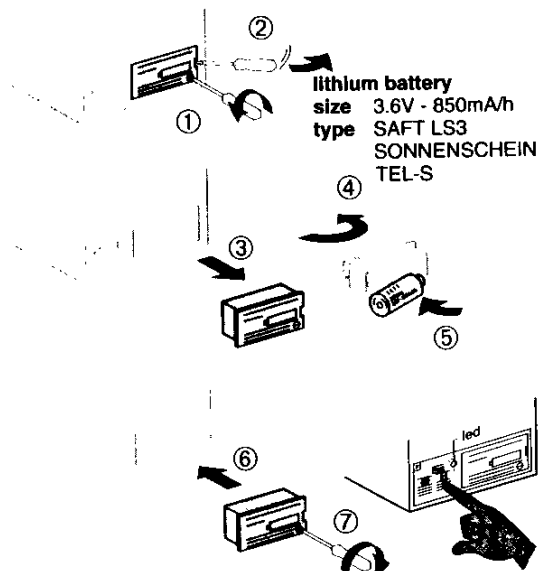
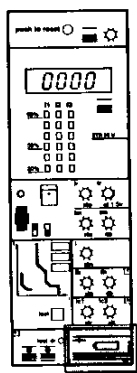


MP1195A.0

Turns off
after 2 minutes
(if internal
battery power
supply).

Call it back then reset it.

battery - option **PIL**



battery test

MP1196A.0

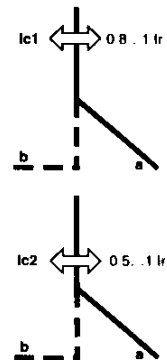
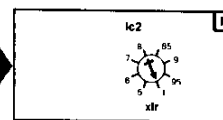
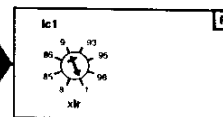
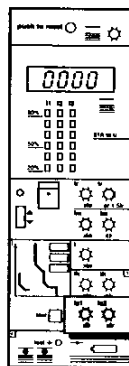
Masterpack® MP-MC circuit breaker control unit

control unit options (continued)

load monitoring - option **R**

The option R provides two independent static contacts which operate when the current exceeds adjustable pickup limits.

- When the current exceeds the limit Ic1 (or Ic2) the contact C-R1 (or C-R2) closes, following an inverse time characteristic a.
- When the current drops below the limit Ic1 (or Ic2) the contact C-R1 (or C-R2) opens with constant time delay (10 seconds) b.

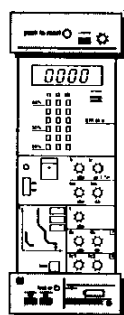


MP1197A.0

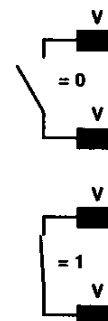
For wiring diagram see page 43.

segregated alarm switch - option **FV**

This switch works like the standard overcurrent trip switch (SDE) except a selector switch on the control unit is used to choose the type of fault which will operate the contact: overload, short-circuit, ground-fault, or any combination of these types. This option can be used in addition to the SDE switch for remote signalling of particular types of faults.

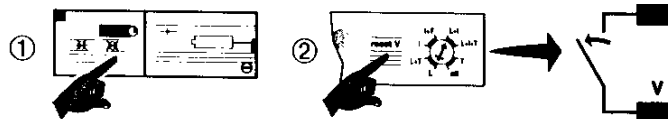


selector switch	fault type		
	overload	short-circuit	ground-fault
L	1	0	0
L + T	1	0	1
I	0	1	0
I + T	0	1	1
L + I	1	1	0
L + I + T	1	1	1
T	0	0	1
off	0	0	0



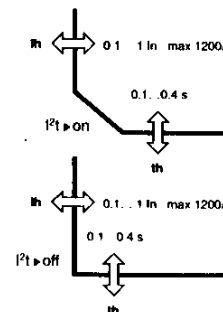
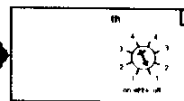
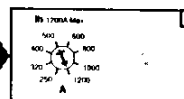
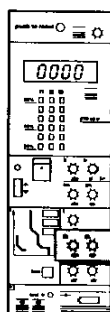
A flat push button allows resetting of the indicator after tripping.

to reset remote indicator contact (V output)



MP1198A.0

ground-fault protection - option **T** or **W**



MP1199A.0

Masterpact® MP-MC circuit breaker control unit

control unit options (continued)

zone-selective interlocking - option **Z**

Option Z on the STR 58U trip unit provides selective interlocking of short-time or ground-fault tripping.

A control wire links several trip units in the distribution network, as shown in the figure. In the event of a fault, the trip unit will obey the pre-set delay only if receiving a signal from the downstream unit. If not receiving a signal, tripping will be instantaneous (time delay corresponding to 0.1 setting of short-time protection).

- The fault is cleared instantaneously by the nearest circuit breaker:

- Thermal stresses (I^2t) in the network are minimized, without any affect on the correct time delay coordination in the installation.

Note:

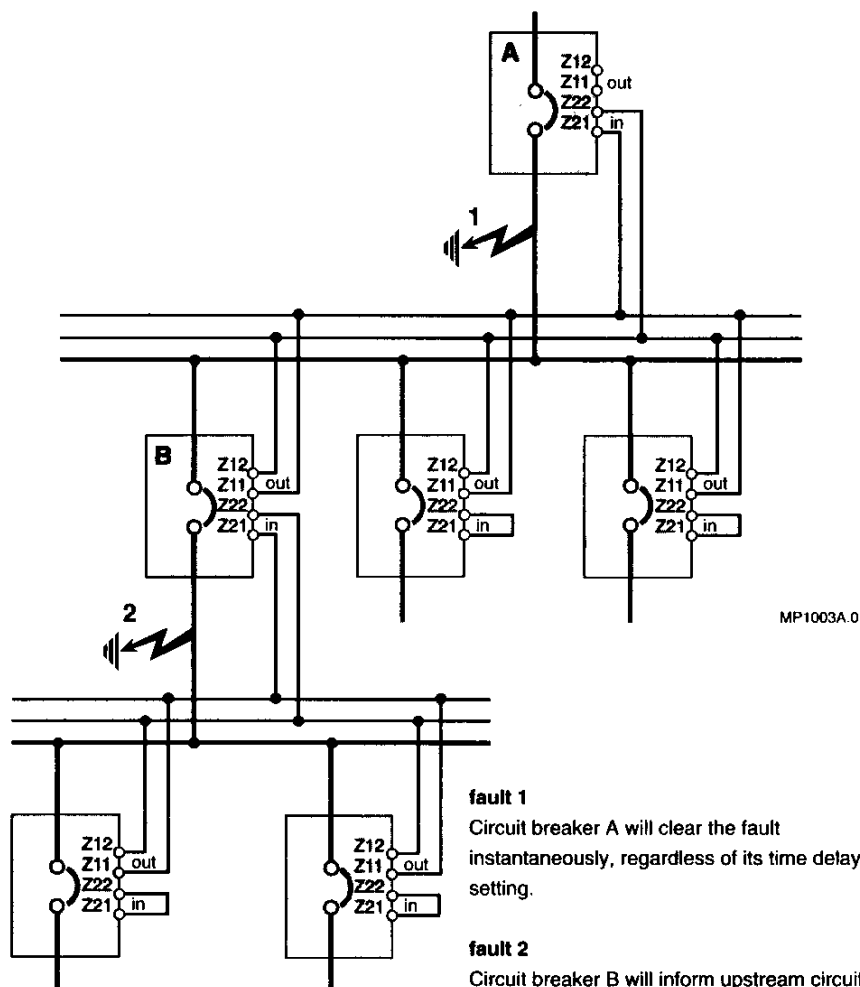
- Circuit breaker terminals are delivered with "in" terminals jumpered. Remove the jumper when interlocking with a downstream circuit breaker.

- The Masterpact circuit breaker may also be interlocked with Compact™ CK type molded case circuit breakers with zone-selective interlocking option.

- Do not ground.

control cable

cable size	#18-#14 AWG/1.5 mm ²
max. length	60 ft./20 m
wiring	twisted in pairs one turn per 4 in./10 cm
no. of circuit breakers	upstream: 2 downstream: no limit



MP1003A.0

fault 1

Circuit breaker A will clear the fault instantaneously, regardless of its time delay setting.

fault 2

Circuit breaker B will inform upstream circuit breaker A that it is clearing the fault, so circuit breaker A does not trip instantaneously.

Circuit breaker A will trip at the end of its time delay setting if the fault is not cleared during this time.

Masterpack® MP-MC circuit breaker control unit

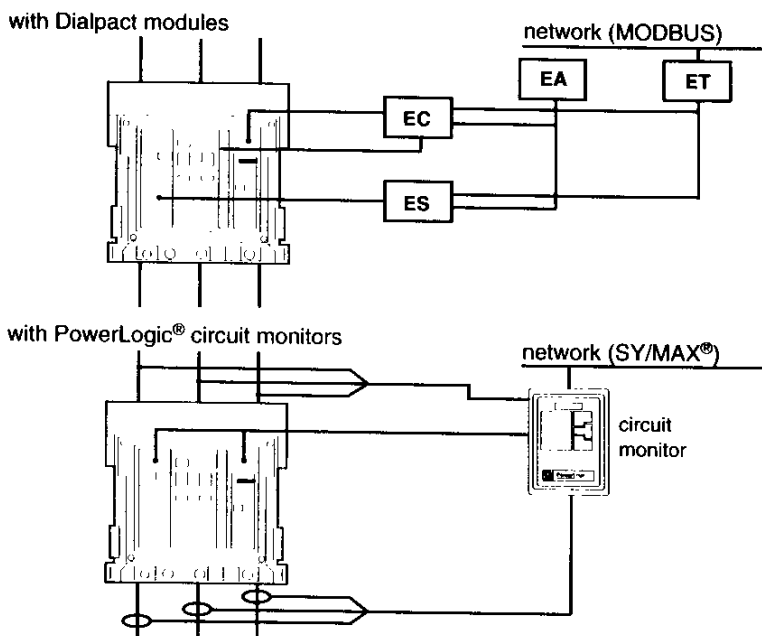
control unit options (continued)

transmit data from trip unit - option **C**

The Dialpact connections communicate over MODBUS™ (J Bus) and require the STR 58U control unit with option C (communications) and modules:

- EA for 24 Vdc power
- ET to interface to J BUS
- ES and/or EC as called out in the table.

Circuit monitor units integrate seamlessly with the Square D PowerLogic® System Manager software over the SY/MAX® network, and require the designated circuit monitor with digital input/output modules, appropriate current transformers mounted in the equipment bus work and the OF (auxiliary switches), SDE (overcurrent trip switch) and FV (segregated alarm switch).



MP1219A 0

Masterpack® communications functions

function	Dialpact modules	PowerLogic® circuit monitors			
		2050	2150	2250	2350
basic protection & switching					
circuit breaker status (open/closed/tripped)	ES	■	■	■	■
remote control (open/closed)	EC	■	■	■	■
trip indication	ES	■	■	■	■
trip time/date			■	■	■
trip type (L-S/I/G)	ES	■	■	■	■
long-time alarm	ES	■	■	■	■
magnitude of current interrupted	-	-	1	1	1
trip history	-	-	■	■	■
trip unit settings	ES	-	-	-	-
metering					
amps—instantaneous	ES	■	■	■	■
amps—peak demand	-	■	■	■	■
volts (I-I & L-G)	-	■	■	■	■
power—instantaneous (VA, VAR, W)	-	■	■	■	■
power—demand (VA, VAR, W)	-	■	■	■	■
advanced protection					
voltage imbalance	-	■	■	■	■
current imbalance	-	■	■	■	■
reverse power flow	-	■	■	■	■
reverse phase	-	■	■	■	■
frequency out of limits	-	■	■	■	■
power quality					
thd (amps & volts)	-	■	■	■	■
harmonics (amps & volts)	-	-	-	■	■
waveform (amps & volts)	-	-	-	■	■
sags/swells	-	-	-	-	■
voltage disturbance	-	■	■	■	■

¹The circuit monitor input current is limited to 7.5 amps. To obtain magnitude of current interrupted, the current transformers must be oversized appropriately.

Masterpact® MP-MC circuit breaker maintenance

routine inspections

Perform routine external inspection:

- annually for normal operating conditions and
- after every 1000 operations for harsh operating conditions

by:

- opening and closing the circuit breaker manually
- opening and closing the circuit breaker remotely, using the different auxiliaries successively
- testing operation of the control unit with the mini test kit or the complete test kit

Perform routine internal inspection:

- after circuit breaker opens on a short circuit
- or
- every two years for normal operating conditions
- or
- annually for harsh operating conditions

by checking:

- condition of arc chutes
- condition of contacts
- tightness of connections
- condition of clusters

maintenance

Perform electrical maintenance:

- when the maximum allowable electrical operation without maintenance is reached

by replacing:

- arc chutes

- when the maximum allowable electrical operation with maintenance is reached

- arc chutes
- main contacts

Perform electrical maintenance:

- when the maximum allowable mechanical endurance without maintenance is reached

by replacing:

- the electrical charging mechanism
 - the main contacts
 - the two toggle return springs
 - mechanical interlocking
-

Masterpack® MP-MC circuit breaker maintenance

check arc chutes

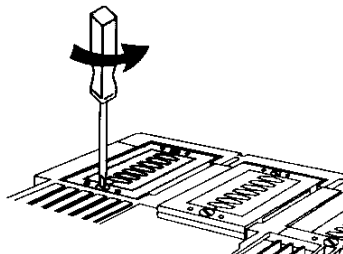
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

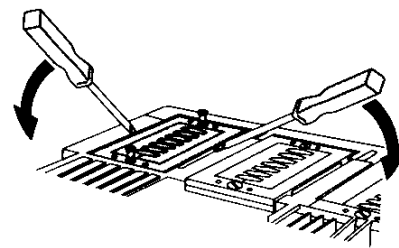
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Disconnect power and loosen screws.

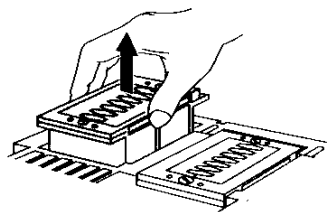


Pry up arc chute.



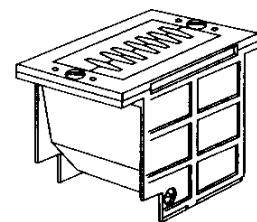
MP1202A.0

Lift out of circuit breaker.



Check the condition of the arc chute :

- arc chute body not broken,
 - separators not corroded.
- If necessary, replace the arc chute.



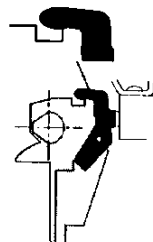
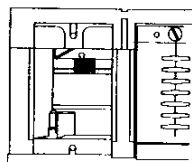
MP1205A.0

check contacts

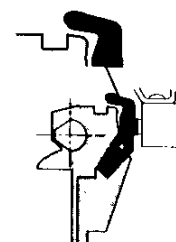
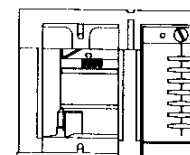
Close the circuit breaker to check the wear of the contacts.

■ $\leq 4000A \times 3$

good contacts



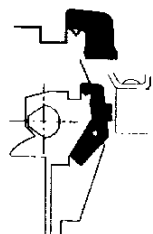
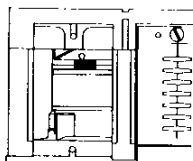
worn contacts



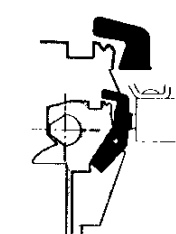
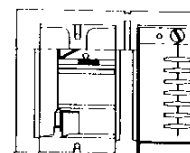
MP1206A.0

■ $\geq 4000A \times 4$

good contacts



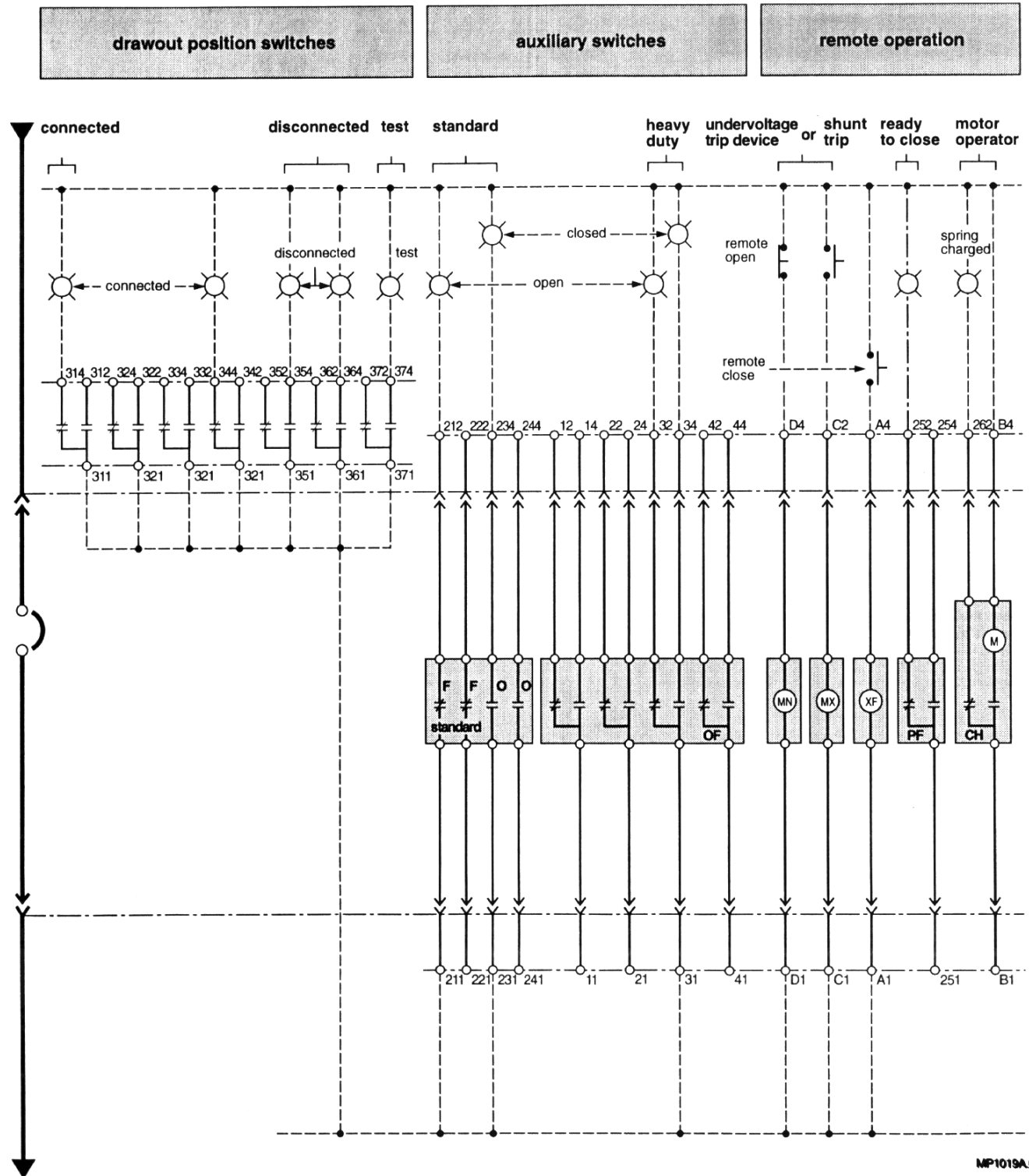
worn contacts



MP1207A.0

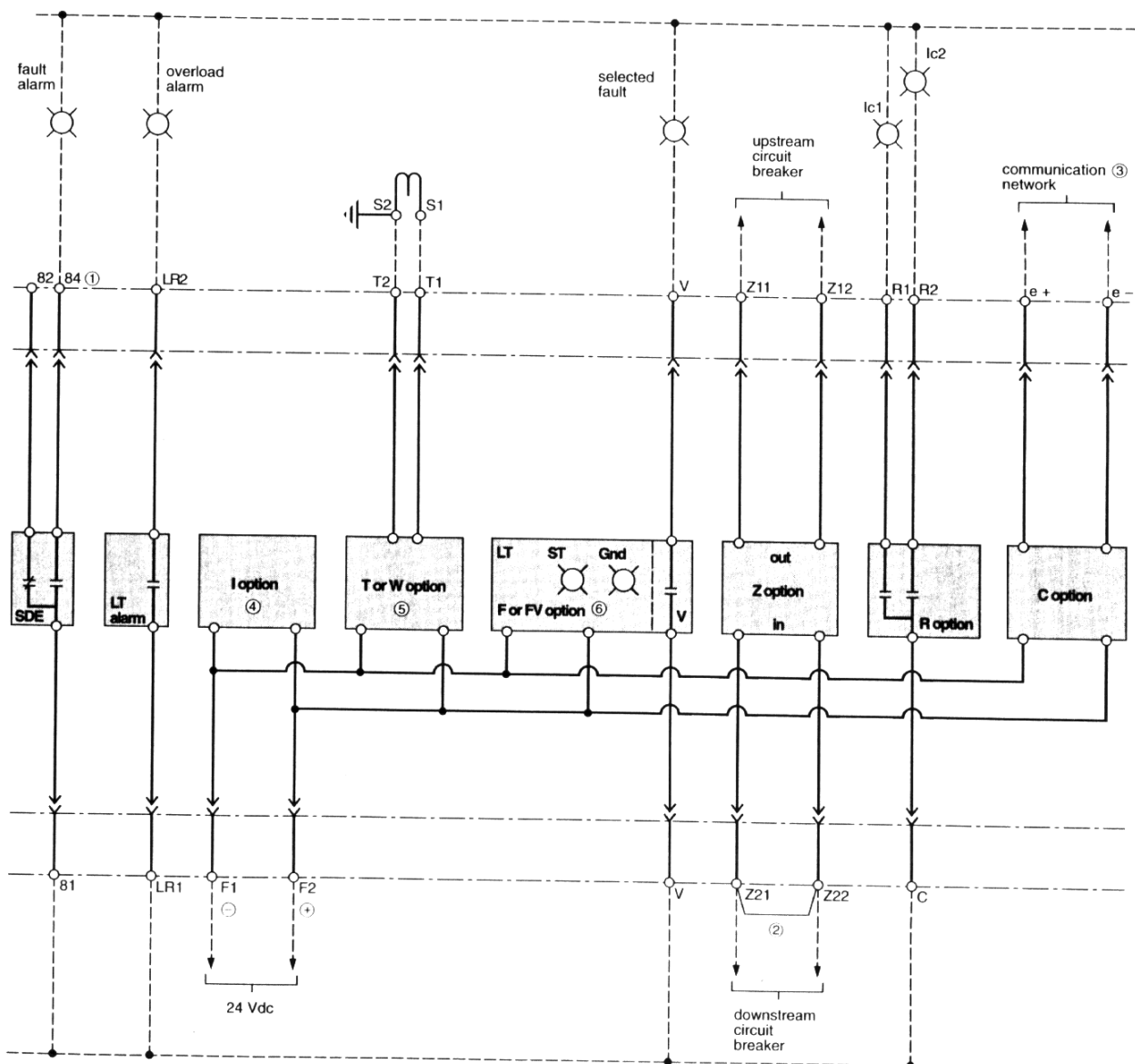
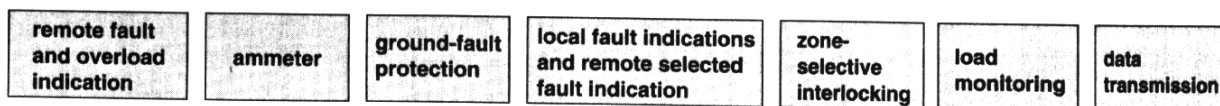
Masterpact® MP-MC circuit breaker wiring diagram

wiring diagram



Masterpact® MP-MC circuit breaker wiring diagram

wiring diagram



- ① 84 terminal not available with Z or C option
- ② zone-selective interlocking with downstream circuit breaker requires removal of jumper
- ③ communication output through Dialpac® module
- ④ use 24 Vdc supply if I max. information is to be retained after the circuit breaker has tripped
- ⑤ use 24 Vdc supply if I max. information is to be retained after the circuit breaker has tripped

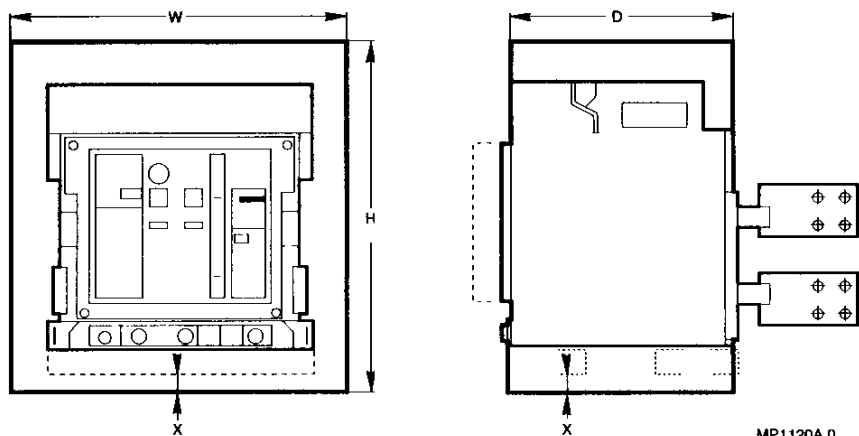
Masterpact® MP-MC circuit breaker set-up guide

minimum enclosure

The following tables indicate the minimum compartment size in which the circuit breaker has been tested and is suitable for continuous operation at 100% rating.

In some cases, ventilation both at the top and bottom of the compartment is required. Dimension X helps to determine the position of the circuit breaker in the compartment.

drawout circuit breaker (with arc chute cover)



dimensions

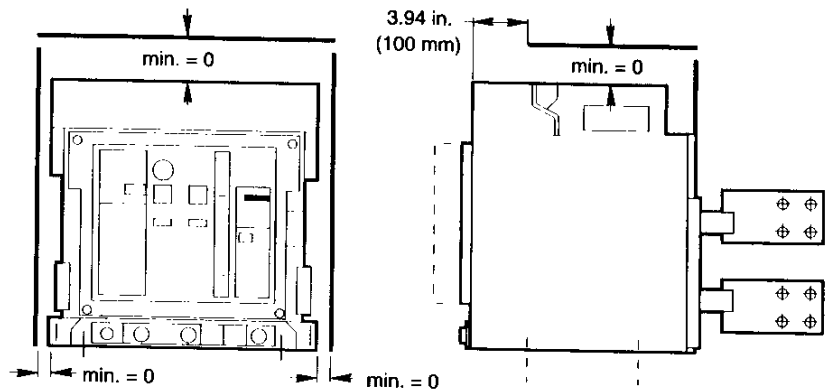
dimension		circuit breaker type					
		MP 08 to MP 20	MP 25 to MP 30	MP 40 to MP50	MC 08 to MC 20	MC 32	MC 40 to MC 50
H	in.	17.50	26.00	26.00	17.50	22.00	26.00
	mm	440	660	660	440	560	660
W	in.	21.00	21.00	34.00	21.00	25.25	34.00
	mm	530	530	870	530	650	870
D	in.	14.25	14.25	14.25	14.25	14.25	14.25
	mm	360	360	360	360	360	360
X minimum	in.	0	0	4.30	0	4.30	4.30
	mm	0	0	110	0	110	110
ventilation (both top and bottom)	sq. in.	none	30.00	30.00	none	30.00	30.00
	cm ²	none	200	200	none	200	200

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clearance information

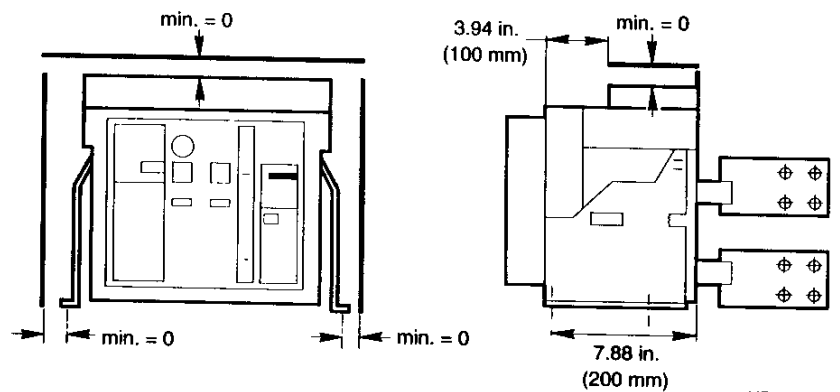
Dimensions shown are for the maximum interrupting current of the circuit breaker.

drawout circuit breaker (with arc chute cover)



MP1118A.0

fixed circuit breaker (with arc chute cover)

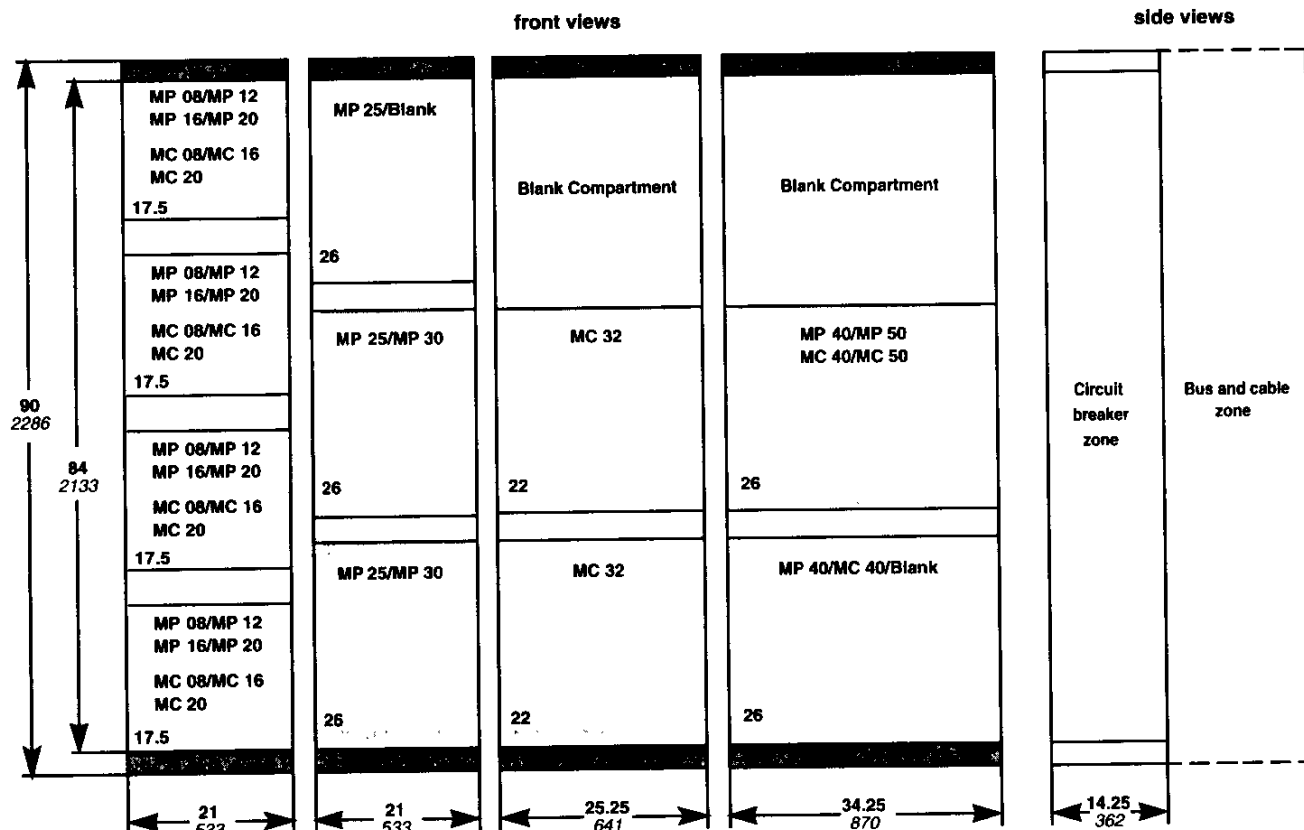


MP1119A.0

Masterpact® MP-MC circuit breaker set-up guide

stacking configurations

The following table shows some possible circuit breaker stacking configurations. These examples apply when the circuit breaker is used either as a main, a tie or a feeder circuit breaker.



in.
mm

MP1218A.0

Note: The depth of the circuit breaker zone (14.25 in. (360 mm)) is equal to the depth of the circuit breaker compartment.

■ NEC 380-8 requires all switches and circuit breakers used as switches to be located so that they may be operated from a readily accessible location. They shall be installed so that the center of the switch or circuit breaker operating handle grip, when in its highest position, will not be more than 6.5 ft. (1.98 m) above the floor or working platform.

■ Customer allowable cumulative loading is as recommended in ANSI C 37.20.1.

■ Type MP, which is UL Listed under UL 489, is intended to be mounted in switchboards.

■ Type MC, which is UL Listed under UL1066, is intended to be mounted in switchgear.

Masterpact® MP-MC circuit breaker set-up guide

cumulative loading

Note: Allowable cumulative loading can be based on equal loading or higher loading in the lowest compartment.

allowable cumulative loading values per compartment section

circuit breaker type	frame size (A)	number of circuit breakers carrying load	allowable cumulative load
MP 08, MC 08	800	1	800*
		2	1300*
		3	1800*
		4	2200*
MP 12	1200	1	1200
		2	1900
		3	2700
		4	3400
MP 16, MC 16	1600	1	1600*
		2	2600*
		3	3600*
		4	4500*
MP 20, MC 20	2000	1	2000*
		2	3200*
		3	4500
		4	5600
MP 25	2500	1	2500
		2	4000
		3	5600
MP 30	3000	1	3000*
		2	4800*
MC 32	3200	1	3200
		2	5100
MP 40, MC 40	4000	1	4000*
		2	6400
MP 50, MC 50	5000	1	5000

*ANSI C37.20.1 values

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temperature derating

The continuous current rating is based on use in a 40°C ambient temperature environment, inside an enclosure. Continuous current ratings must be derated for ambient temperatures above 40°C as indicated in the following tables.

continuous current rating based on temperature ambient

mounting	ambient temperature	circuit breaker								
		MP 08H	MP 12H	MP 16H	MP 20H	MP 25H	MP 30H	MP 40H	MP 50H	MP 63H
drawout	40°C	800	1200	1600	2000	2500	3000	4000	5000	6300
	45°C	800	1200	1600	2000	2500	2900	3900	5000	6000
	50°C	800	1200	1550	2000	2500	2750	3700	4800	5700
	55°C	800	1150	1450	1900	2400	2600	3500	4500	5400
	60°C	800	1100	1350	1800	2300	2450	3300	4200	5100
fixed	40°C	800	1200	1600	2000	2500	3000	4000	5000	
	45°C	800	1200	1600	2000	2500	3000	4000	5000	
	50°C	800	1200	1600	2000	2500	2900	3900	5000	
	55°C	800	1200	1550	2000	2500	2600	3700	4800	
	60°C	800	1150	1450	1900	2400	2450	3300	4500	
		MC 08N	MC 08H	MC 16H	MC 20H	MC 32H	MC 40H	MC 50H		
drawout	40°C	800	800	1600	2000	3200	3750	5000		
	45°C	800	800	1500	2000	3000	3550	4800		
	50°C	800	800	1400	1900	2800	3350	4500		
	55°C	750	750	1300	1500	2600	3050	4200		
	60°C	700	700	1200	1700	2420	2850	3800		

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power dissipation

power dissipation measured* in watts

mounting	circuit breaker type								
	MP 08	MP 12	MP 16	MP 20	MP 25	MP 30	MP 40	MP 50	MP 63
fixed	43	95	170	166	305	440	448	700	
drawout	97	220	390	333	490	705	736	1150	1200
	MC 08	MC 16	MC 20	MC 32	MC 40	MC 50			
drawout	97	390	333	800	736	1150			

*Measured values for 3-pole circuit breakers at rated current, 40°C ambient temperature.

note: These values were obtained by extensive heat run testing and represent the total heating effect rather than the heating caused by I²R losses alone.

resistance

resistance between line and load terminals, measured per pole in micro-ohms

mounting	circuit breaker type								
	MP 08	MP 12	MP 16	MP 20	MP 25	MP 30	MP 40	MP 50	MP 63
fixed	14	14	14	8	10	10	10	10	
drawout	32	32	32	17	15	15	9	9	9
	MC 08	MC 16	MC 20	MC 32	MC 40	MC 50			
drawout	32	32	17	15	9	9			

altitude correction factors

■ When applying circuit breakers at altitudes greater than 6600 ft. (2000 m), their voltage and continuous current ratings must be modified.

Breaking capacities remain unchanged.

correction factors


	altitude ft (m)		
	6600 (2000)	9900 (3000)	13200 (4000)
continuous current correction factor	1.00	0.99	0.96
voltage correction factor	1.00	0.89	0.79

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