Combination Motor Controllers

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Product Description

Eaton's ***XT*** IEC open non-reversing and reversing manual motor controllers combine a manual motor protector with an IEC contactor(s) to provide a complete motor protection solution by combining motor disconnect function, thermal overload protection, magnetic short-circuit protection and remote control operation in one compact, assembled unit. these assembled manual motor controllers cover motors with FLA ratings from 0.10A to 65A.

The UL 508 Type F or Type E labeled combination motor controller (CMC) includes a line side adapter (LSA). These assembled combination motor controllers cover motors with FLA ratings from 0.10A to 65A.

Application Description

The ***XT*** IEC non-reversing and reversing manual and combination motor controllers can be used in the following applications:

Group Motor Control

Manual motor controllers (MMCs) are ideal for group motor applications where an upstream breaker or fuse provides protection for two or more motors. ***XT*** manual motor controllers (MMC) combine a manual motor protector, a wiring connector link and IEC contactor.

Individual Branch Circuit for Motor Loads

Combination motor controller (CMC), consisting of a line side adapter, manual motor protector, wiring connector link and IEC contactor, provide an efficient means to build an entire branch circuit. The ***XT*** CMC is UL 508 Type F and Type E approved, meaning it is "self-protected" and doesn't require the use of an additional fuse or breaker for short circuit protection. This approval means CMC's can be used in place of a traditional fuse-starter and breaker-starter motor circuit.

Based around two key functional components (MMP and contactor), the CMC is a very cost effective means to build a branch circuit. Fuses and breakers must be oversized to prevent tripping during motor start up, and thus these oversized devices can no longer protect the motor. To compensate for this, a motor overload relay is necessary to protect the motor.

The manual motor protector was invented in Germany by Moeller to correct this inefficiency. The MMP operates similarly to a circuit breaker, except the inrush (magnetic) protection is set to 14 times the running current, thus accounting for motor start-up current without the necessity to oversize. A overcurrent dial was added to the face of the MMP to serve as the motor overload protection. This "motor protective circuit breaker", as it is referred to in Europe, now accomplishes all four key functions of a motor branch circuit: disconnect, short circuit, motor controller and motor overload protection. With the addition of a contactor, users have the ability to remotely control the starter device.

Whether a single motor application or a multiple motor application, CMC's are an ideal solution for machinery OEMs and panel builders.

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Features

- ON/OFF rotary handle with lockout provision
- Visible trip indication
- Test trip function
- Motor applications from 0.10A to 65A
- Class 10 overload protection
- Built-in heater and magnetic trip elements to protect the motor
- Phase loss sensitivity
- Type 2 coordination
- Ambient compensated up to 55°C [140°F]
- Control inputs located at front of starter for easy access and wiring
- Wide range of coils
- DIN rail mount—XTSC…BB_
- Mounting plates—XTSC…BC_, XTSC…D motor controllers
- Adjustment dial for setting motor FLA
- Short-circuit trip at 14 times the maximum setting of the FLA adjustment dial
- UL 508 Type F and Type E CMC high fault short-circuit ratings
- 1NO-1NC auxiliary contact as standard on manual motor controller and combination motor controller

Standards and Certifications

UL 508 Type F combination motor controller

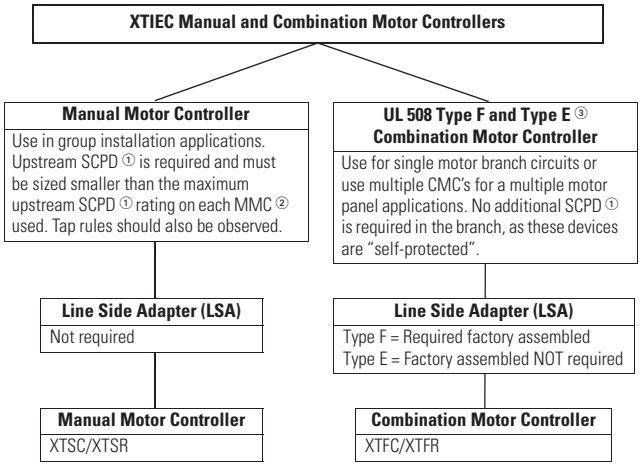
- IEC Type 2 Approved per IEC 60947-4-1
- UL Listed File No. E245398
- CE Mark

Note: For Type 2 Coordination of MMCs, see **Page V5-T1-237**. Protection in different controller types

UL 508 Type E self-protected combination motor controller

- UL Listed File No. E123500

MMC and CMC Applications



Notes

Technical Paper AP03402001E.

Line side adapters are not required for non-U.S. applications. Most countries outside of the U.S. classify the MMP as a motor-protective circuit breaker.

① SCPD = Short-circuit protective device (circuit breaker, fuses).
② MMC = Manual motor controller
③ Type E self-protected combination controller is the combination of a Type E self-protected device with a contactor.

Catalog Number Selection

Combination Motor Controllers

XT SC 012 B B M A

Designation
XT = ***XT*** IEC power control

Type	
SC	= Manual motor controller—FVNR
SR	= Manual motor controller—FVR
FC	= Combination motor controller, UL 508 Type F and Type E—FVNR
FR	= Combination motor controller, UL 508 Type F and Type E—FVR

Rated Current of MMP	
Frame B	**Frame D**
P16 = 0.16A	**016** = 16A
P25 = 0.25A	**025** = 25A
P40 = 0.40A	**032** = 32A
P63 = 0.63A	**040** = 40A
001 = 1A	**050** = 50A
1P6 = 1.6A	**058** = 58A
2P5 = 2.5A	**063** = 63A
004 = 4A	
6P3 = 6.3A	
010 = 10A	
012 = 12A	
016 = 16A	
020 = 20A	
025 = 25A	
032 = 32A	

Frame Size—Contactor
B = 45 mm, 7 to 15A
C = 45 mm, 18 to 32A
D = 55 mm, 40 to 65A

Frame Size—MMP
B = 45 mm, 0.1 to 32A
D = 55 mm, 16 to 63A

Connector Type
Blank = XTPAXTPCB
M = XTPAXEMCB (only non-reversing)

Coil Voltage	
A	= 110V 50 Hz, 120V 60 Hz
B	= 220V 50 Hz, 240V 60 Hz
C	= 415V 50 Hz, 480V 60 Hz
D	= 600V 60 Hz
E	= 208V 50 Hz
F	= 230V 50 Hz
G	= 190V 50 Hz, 220V 60 Hz
H	= 240V 50 Hz, 277V 60 Hz
L	= 380V 50 Hz, 440V 60 Hz
N	= 400V 50 Hz
P	= 380V 60 Hz
R	= 12V 50/60 Hz
T	= 24V 50/60 Hz
W	= 42V 50 Hz, 48V 60 Hz
Y	= 48V 50 Hz
AD	= 120 Vdc
BD	= 220 Vdc
RD	= 12 Vdc
TD	= 24 Vdc
WD	= 48 Vdc

Product Selection

XTSC and XTSR Manual Motor Controllers (MMC)/Starter Combinations

Frame B MMP + Frame B Contactor

Factory-Assembled Manual Motor Controller—Frame B MMP + Frame B Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number ③	Reversing Catalog Number
0.1–0.16	3.2	—	—	—	0.06	**XTSCP16BB_**	**XTSRP16BB_**
0.16–0.25	3.5	—	0.06	0.06	0.12	**XTSCP25BB_**	**XTSRP25BB_**
0.25–0.4	5.6	0.06	0.09	0.12	0.18	**XTSCP40BB_**	**XTSRP40BB_**
0.4–0.63	8.82	0.09	0.18	0.25	0.25	**XTSCP63BB_**	**XTSRP63BB_**
0.63–1	14	0.12	0.25	0.37	0.55	**XTSC001BB_**	**XTSR001BB_**
1–1.6	22.4	0.25	0.55	0.75	1.1	**XTSC1P6BB_**	**XTSR1P6BB_**
1.6–2.5	35	0.37	0.75	1.1	1.5	**XTSC2P5BB_**	**XTSR2P5BB_**
2.5–4	56	0.75	1.5	2.2	3	**XTSC004BB_**	**XTSR004BB_**
4–6.3	88.2	1.1	2.2	3	4	**XTSC6P3BB_**	**XTSR6P3BB_**
6.3–10	140	2.2	4	4	7.5	**XTSC010BB_**	**XTSR010BB_**
8–12	168	3	5.5	5.5	11	**XTSC012BB_**	**XTSR012BB_**
10–16	224	4	7.5	9	12.5	**XTSC016BB_**	—

Notes

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198**.

③ "M" prior to (_) coil suffix will be assembled with standard connector XTPAXEMCB, non-reversing only.

Frame B MMP + Frame B Contactor

Factory-Assembled Motor Protective Device with Thermal and Magnetic Trip + Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	500V	660–690V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
0.1–0.16	3.2	③	③	1/2	1/2	**XTSCP16BB_**	**XTSRP16BB_**
0.16–0.25	3.5	③	③	1/2	1/2	**XTSCP25BB_**	**XTSRP25BB_**
0.25–0.4	5.6	③	③	1/2	1/2	**XTSCP40BB_**	**XTSRP40BB_**
0.4–0.63	8.82	③	③	1/2	1/2	**XTSCP63BB_**	**XTSRP63BB_**
0.63–1	14	③	③	1/2	1/2	**XTSC001BB_**	**XTSR001BB_**
1–1.6	22.4	③	③	3/4	1	**XTSC1P6BB_**	**XTSR1P6BB_**
1.6–2.5	35	1/2	1/2	1	1-1/2	**XTSC2P5BB_**	**XTSR2P5BB_**
2.5–4	56	1	1	2	3	**XTSC004BB_**	**XTSR004BB_**
4–6.3	88.2	1-1/2	1-1/2	3	5	**XTSC6P3BB_**	**XTSR6P3BB_**
6.3–10	140	3	3	7-1/2	7.5	**XTSC010BB_**	**XTSR010BB_**
8–12	168	3	3	7-1/2	7.5	**XTSC012BB_**	**XTSR012BB_**
10–16	224	3	3	10	7.5	**XTSC016BB_**	—

Frame B MMP + Frame C Contactor

Factory-Assembled Manual Motor Controller—Frame B MMP + Frame C Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase 200V	240V	480V	600V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	3	3	10	10	**XTSC016BC_**	**XTSR016BC_**
16–20	280	5	5	10	15	**XTSC020BC_**	**XTSR020BC_**
20–25	350	5	7-1/2	15	20	**XTSC025BC_**	**XTSR025BC_**
25–32	448	7-1/2	10	20	25	**XTSC032BC_**	**XTSR032BC_**

Frame B MMP + Frame C Contactor

Factory-Assembled Manual Motor Controller—Frame B MMP + Frame C Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	500V	660–690V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	4	7.5	9	12.5	**XTSC016BC_**	**XTSR016BC_**
16–20	280	5.5	9	12.5	15	**XTSC020BC_**	**XTSR020BC_**
20–25	350	5.5	11	15	22	**XTSC025BC_**	**XTSR025BC_**
25–32	448	7.5	15	22	30	**XTSC032BC_**	**XTSR032BC_**

Notes

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198**.

③ In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

Frame D MMP + Frame D Contactor

Factory-Assembled Manual Motor Controller—Frame D MMP + Frame D Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	500V	660–690V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
32–40	560	11	20	22	30	**XTSC040DD_**	**XTSR040DD_**
40–50	700	14	25	30	45	**XTSC050DD_**	**XTSR050DD_**
50–58	812	17	30	37	55	**XTSC058DD_**	**XTSR058DD_**
55–65	882	18.5	34	37	55	**XTSC063DD_**	**XTSR063DD_**

AC and DC Coil Suffixes

Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
Frame B Contactors				**Frame C and D Contactors**			
110V 50 Hz, 120V 60 Hz	**A**	380V 50 Hz, 440V 60 Hz	**L**	110V 50 Hz, 120V 60 Hz	**A**	380V 50 Hz, 440V 60 Hz	**L**
220V 50 Hz, 240V 60 Hz	**B**	400V 50 Hz	**N**	220V 50 Hz, 240V 60 Hz	**B**	400V 50 Hz	**N**
230V 50 Hz	**F**	380V 60 Hz	**P**	230V 50 Hz	**F**	380V 60 Hz	**P**
24V 50/60 Hz	**T**	12V 50/60 Hz	**R**	24V 50/60 Hz	**T**	12V 50/60 Hz	**R**
24 Vdc	**TD** ③	42V 50 Hz, 48V 60 Hz	**W**	24–27 Vdc	**TD** ③	42V 50 Hz, 48V 60 Hz	**W**
415V 50 Hz, 480V 60 Hz	**C**	48V 50 Hz	**Y**	415V 50 Hz, 480V 60 Hz	**C**	48V 50 Hz	**Y**
600V 60 Hz	**D**	120 Vdc	**AD** ③	550V 50 Hz, 600V 60 Hz	**D**	110–130 Vdc	**AD** ③
208V 60 Hz	**E**	220 Vdc	**BD** ③	208V 60 Hz	**E**	200–240 Vdc	**BD** ③
190V 50 Hz, 220V 60 Hz	**G**	12 Vdc	**RD** ③	190V 50 Hz, 220V 60 Hz	**G**	12–14 Vdc	**RD** ③
240V 50 Hz, 277V 60 Hz	**H**	48 Vdc	**WD** ③	240V 50 Hz, 277V 60 Hz	**H**	48–60 Vdc	**WD** ③

Notes

The assembled manual motor controller (MMC) consists of an XTPR manual motor protector (MMP) and an XTCE contactor. For Frame B MMP + Frame B contactor assemblies, the XTSC and XTSR can be mounted directly on DIN rail without an adapter. The contactors are supported mechanically with a mechanical connection element (included in XTPAXTPCB, XTPAXRPCRB). For MMCs using a Frame C or Frame D contactor, the assembly is mounted via a DIN rail adapter plate (XTPAXTPCPC, XTPAXTPCPD) and the electrical connection is made with electrical contact modules (XTPAXECMC, XTPAXECMD), both included in XTPAXTPCC and XTPAXTPCD.

Service Factor (SF)—Setting Ir of current scale in dependence of load factor:

SF = 1.15 → $I_r = 1 \times I_{n\ mot}$

SF = 1 → $I_r = 0.9 \times I_{n\ mot}$

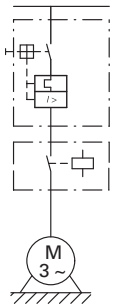
Single-phasing sensitivity to IEC/EN 60947-4-1, VDE 0660 Part 102.

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See AC and DC coil suffixes above.

③ With DC operation: Integrated diode-resistor combination, coil rating 2.6W.

Non-Reversing Manual Motor Controller Power Circuit



Reversing Manual Motor Controller Power Circuit