Electrical control using motorised operation

Time Constant

Transient voltages and currents, including those produced by switching, do not approximate their steady state values until 5 time constants have elapsed.

Fault currents occurring in circuits with high time constants are extremely difficult to interrupt due to the lagging voltage. All DC breaking capacities in this section are shown with the assumption that the time constant of the circuit is restricted to the values shown below.

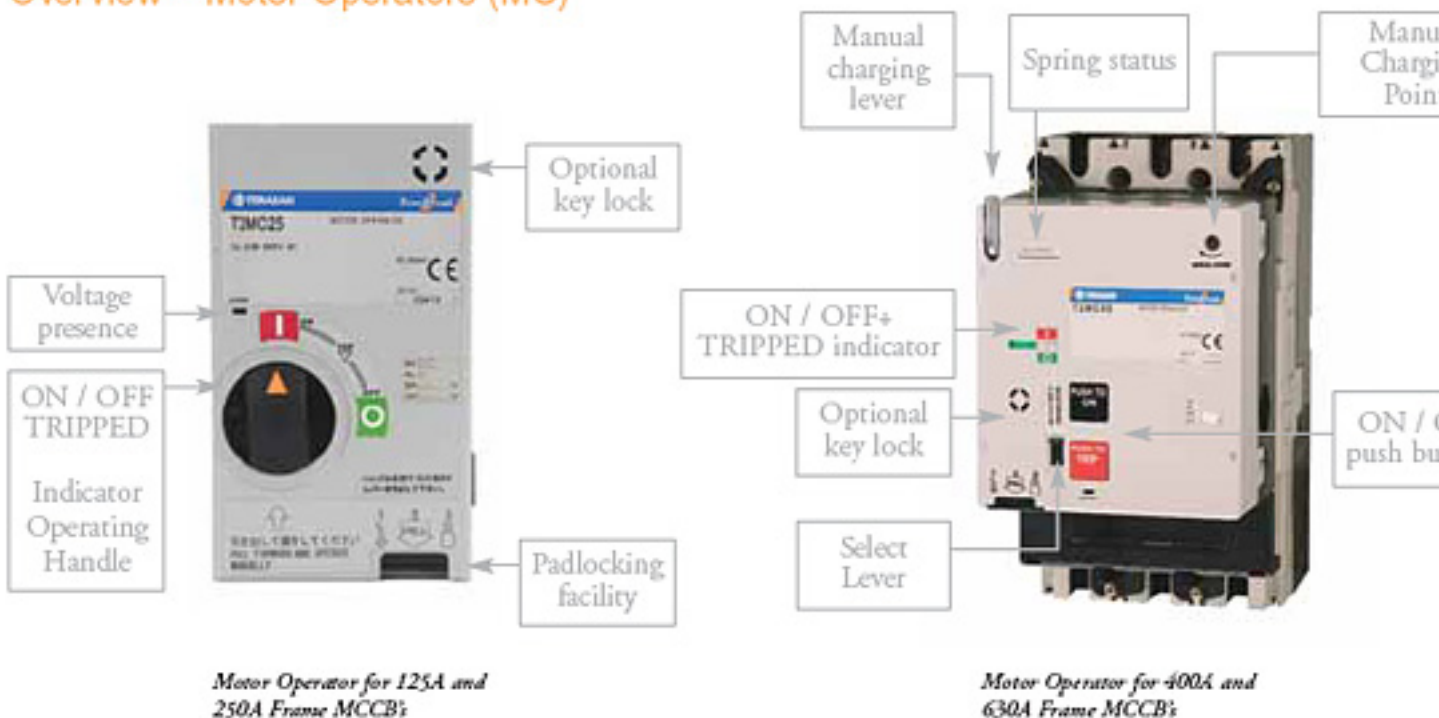| Fault Level	τ
Near the rated current, I_n, of the circuit breaker	<2.0ms
<2.5 x I_n	<2.5ms
<10kA	<7ms
>10kA	<15ms

Breaking Capacity

The short-circuit ratings of MCCBs suitable for DC installations are shown in the table below. In some cases, two or more poles must be connected in series to achieve the given rating, this is also indicated in the table.

DC Breaking Capacity, Icu (kA), Protection and Reference								
Voltage	250V DC	350V DC	500V DC		600V DC		Protection	
Poles in Series	2	3	3	4	3	4	Overload	Short Circuit
E125-NJ	25	-	-	-	-	-	Thermal, adjustable	Magnetic, adjustable
S125-ND	25	10	-	7.5	-	5	Thermal, adjustable	Magnetic, adjustable
S125-GJ	40	-	-	-	-	-	Thermal, adjustable	Magnetic, adjustable
S160-ND	40 (30†)	10	-	7.5	-	5	Thermal, adjustable	Magnetic, adjustable
E250-NJ	25	-	-	-	-	-	Thermal, adjustable	Magnetic, adjustable
S250-ND	40	10	-	7.5	-	5	Thermal, adjustable	Magnetic, adjustable
E400-NJ	25	-	-	-	-	-	Thermal, adjustable	Magnetic, adjustable
S400-CJ	40	-	-	-	-	-	Thermal, adjustable	Magnetic, adjustable
S400-ND	40	20	15	15	15	15	Thermal, adjustable	Magnetic, adjustable
XS800NJ	50	30	20	20	20	20	Thermal, adjustable	Magnetic, adjustable
XS1000ND	50	30	20	20	20	20	Thermal, fixed	Magnetic, adjustable
XS1250ND	50	50	50	50	20	20	-	Magnetic, adjustable
XS1600ND	50	50	50	50	20	20	-	Magnetic, adjustable
XS2000ND	50	50	50	50	20	20	-	Magnetic, adjustable
XS2500ND	50	50	50	50	20	20	-	Magnetic, adjustable

Overview – Motor Operators (MC)

- Voltage presence
- ON / OFF TRIPPED Indicator Operating Handle
- Optional key lock
- Padlocking facility

Motor Operator for 125A and 250A Frame MCCB's

- Manual charging lever
- Spring status
- Manu Chargi Poin
- ON / OFF÷ TRIPPED indicator
- Optional key lock
- Select Lever
- ON / C push bu

Motor Operator for 400A and 630A Frame MCCB's

Motor operators provide the possibility of opening and closing an MCCB on application of electrical control signals. TemBreak 2 motor operators are extremely reliable, having been designed to endure the same switching duty as the host MCCB.

- Easy field-installation.
- Fast operation (≤100ms).
- Positive contact indication.
- Padlocking facility as standard (Maximum 3, hasp diameter 8mm).
- Optional keylock.
- Versions available with automatic reset function.
- Voltage presence indication.

- Round Peg
- Square Peg

Motor Operator for 125A and 250A frame MCCB's

- Mounting screws

Motor Operator for 400A and 630A frame MCCB's
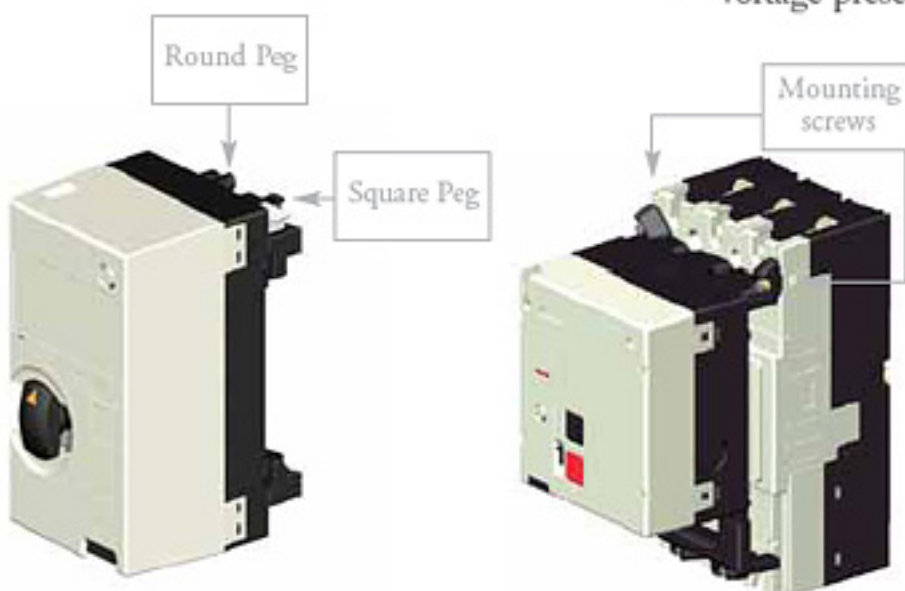
Motor operators for 125A and 250A frame are mounted on the front of the breaker. They can rapidly fitted by locating the pegs and square pegs on the into corresponding round and square holes on the breaker. I less than 10 seconds to secure motor to the MCCB. Two leve securely lock the motor into position. No tools are needed to fit the motor operator.

400A frame and 630A frame operators are held in place wi mounting screws. They can b

Indication of ON, OFF or TRIPPED Status

The handle of 125A and 250A frame motor operators has dual functions:

1. Indication of ON, OFF or TRIPPED status as shown in the photographs below;

2. Manual operation when handle is pulled out. The supply to electrical control circuits inside the motor operator is cut when the handle is pulled out.

MCCB on

MCCB off

MCCB tripped

Motor operators for 400A and 630A frame MCCBs incorporate mechanical flag which indicates the ON, OFF and TRIPPED status of the MCCB. They can be manually charged using the lever provided.

Ratings and Specifications

Frame size of host MCCB (A)		125, 160, 250	400, 630
Rated operating voltage	100-110 V AC	■	■
	200-220 V AC	■	■
	230-240 V AC	■	■
	24 V DC	■	■
	48 V DC	■	■
	100-110 V DC	■	■
Operating current/ Starting current Peak value (A)	100-110 V AC	4.5/8	ON ---/1.9; OFF, RESET 1.3/3
	200-220 V AC	4/8	ON ---/3.3; OFF, RESET 0.9/3
	230-240 V AC	3.5/7	ON ---/3.3; OFF, RESET 0.9/3
	24 V DC	18/26	ON ---/9.2; OFF, RESET 4.3/9
	48 V DC	12/18	ON ---/3.8; OFF/RESET 2.0/5.
	100-110 V DC	2/6	ON ---/1.3; OFF/RESET 1.2/2.
	200-220 V DC	2.2/5.5	—
Operating method		Direct drive	Spring charging
Operating time (s)	ON	0.1	0.1
	OFF	0.1	1.5
	RESET	0.1	1.5
Operating switch rating		100V, 0.1 A, Opening voltage 44V, current 4mA	100V, 0.1 A, Opening voltage current 1mA
Power supply required		300 VA minimum	300VA minimum
Dielectric properties (1 min)		1500 V AC (1000V AC for 24V DC and 48V DC motors)	
Weight		1.4 kg	3.5kg

■= Available

Note: Operating times shown in the above table apply only when the rated operational voltage is supplied to the motor operator. The voltage supplied to the motor operator must be within the range of 85% and 110% of the rated operating voltage.
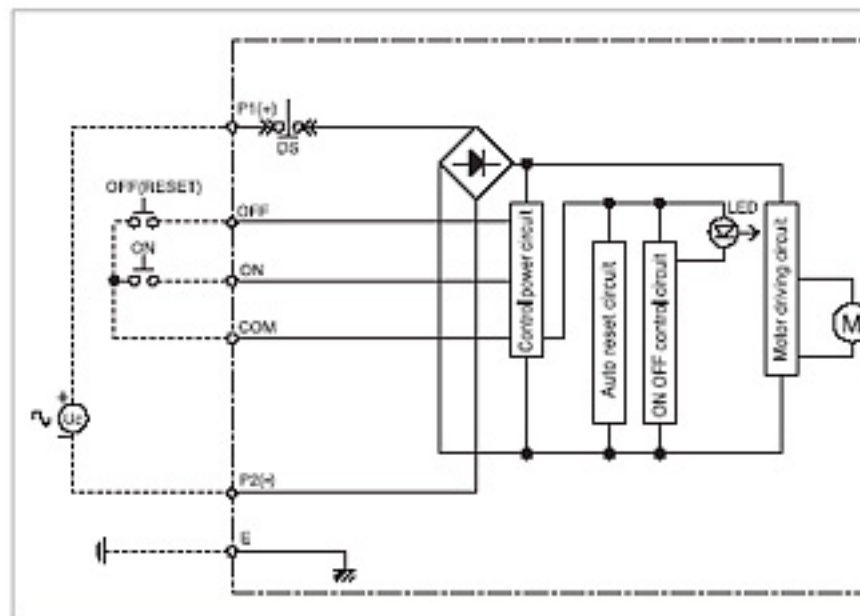
Motor Operator Control Circuits

Control Wiring Plug

MCCB and Motor Operator Showing Control Wiring Socket

The Control circuits for Motor Operators are connected using a simple plug and socket system.

Control circuit for Motor Operators

Operation

The motor operator incorporates a self-hold circuit for the closing and opening signals. Therefore a momentary open or close signal will ensure a complete operation.

When the breaker trips, the breaker is reset by applying a signal to the OFF terminals of the motor.

When a UVT is used with a motor operator, design the control circuit so that the UVT is energised **before** a reset or close signal is sent to the motor operator. A 40ms time delay in the reset and close signals is sufficient to allow the UVT to energise.

When a shunt trip is used with a motor operator, design the control circuit so that the shunt trip is de-energised before a reset or close signal is sent to the motor operator.

When a mechanical interlock is used with m operators, design the control circuit to provie electrical interlocking between the motor operators. The electrical interlocking should prevent a close signal being sent to a motor operator unless the other motor operator and circuit breaker are in the OFF position.

Auto- reset

Two types of motor operator are available: motor operators without auto-reset and moto operators with auto-reset. The correct type of motor operator should be selected for the application. MCCB auxiliary and alarm switc do not have to be used in the control circuits for motor operators whether they have auto-reset or not, saving cost and space.