

# Building a Fuji Duo Series Combination Starter

The Fuji SC-E series contactors work with the MMS to create starters for particular applications. The MMS combination starters can accommodate motors up to 40 horsepower at 480 VAC or 60 horsepower at 600 VAC.

**1/2 to 40 hp at 480 V  
when used with SC-E contactor**

## Combination starters used for:

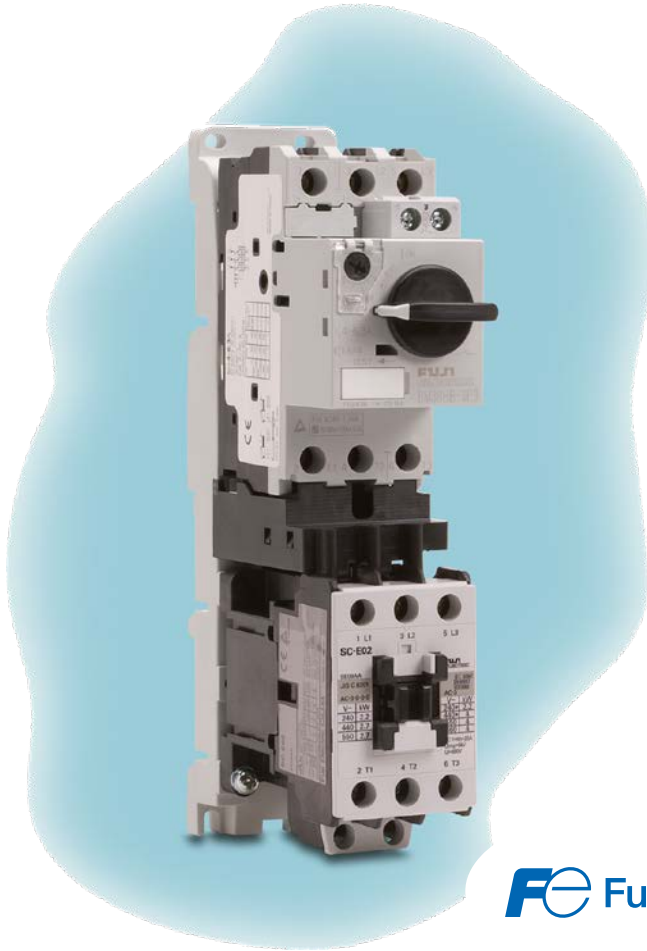
- Induction motor starting and control
- Fulfillment of NEC 430
- UL508E, type 2 coordination for group motor rating installation (See parts list for details)

## SC-E Series Contactor Features

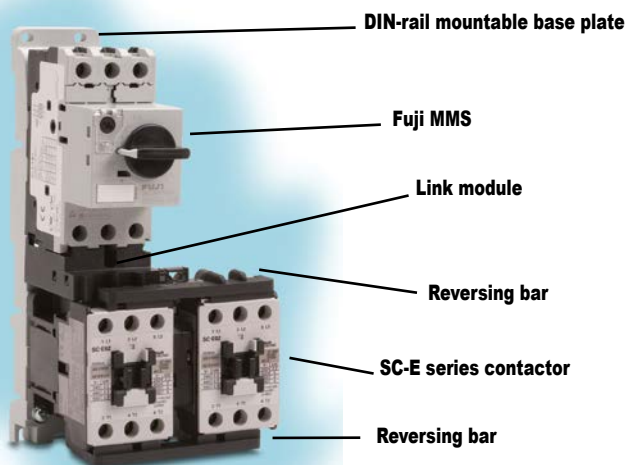
- 1/2 to 40 hp at 480 V
- AC and DC coils with a wide range of voltages
- Finger protection terminals
- Compact frame sizes (45 mm and 55 mm)
- IEC-947, UL, CSA, CE

## Manual Motor Starter Features

- Circuit breaker functions plus overload relay functions in a highly compact unit
- Two frame sizes up to 63A
- Multiple coil voltages
- IEC-947
- UL listed, file E211710, Standard 508
- cUL listed, file E211710, Standard CSA C22.2 No. 14



**Fuji Electric**



## MMS Reversing Starter

Build your MMS reversing starter from these Fuji components. Reversing busbars and mechanical interlocks are designed to integrate with the MMS and SC-E series contactors.

# Fuji Duo Series Combination Starters

## General information

### Description

The user can assemble a combination starter by combining a BM3 series manual motor starter and an SC-E series magnetic contactor to achieve a compact motor control that minimizes enclosure space requirements.

The manual motor starter provides overload, phase-loss, and short-circuit protection for the motor circuit, and incorporates a dial for flexible adjustment to match the full load current of the motor.

The magnetic contactor allows remote ON/OFF operation of the motor circuit with high frequency, and features an electrical durability of one million operations.

The manual motor starter and magnetic contactor are connected with a link module and mounted to a base plate.

### Features

- Consists of a manual motor starter and magnetic contactor that can be assembled by the user to achieve a compact motor control circuit.
- Protects the motor from short-circuit and overcurrent accidents in the three-phase motor circuit within a range between 20 hp at 240 VAC and 30 hp at 415 VAC, up to a current level of 50A.
- Conforms to IEC 60947 requirements for magnetic motor starters and circuit breakers of protective coordination types 1 and 2, greatly reducing the possibility of an accident causing damage to other equipment.
- Can be mounted to IEC top hat rail using the base plate.
- Modular wiring system requires less wiring, shortens required mounting time, and decreases the mounting area.



### IEC 60947-4-1

#### UL Type E Self-Protected Manual Motor Starter and Contactor

#### Type 1:

Coordination requires that, under short-circuit conditions, the contactor or starter shall cause no danger to persons or installation and may not be suitable for further service without repair and replacement of parts.

#### Type 2:

Coordination requires that, under short-circuit conditions, the contactor or starter shall cause no danger to persons or installation and shall be suitable for further use. The risk of contact welding is recognized, in which case the manufacturer shall indicate the measures to be taken regarding the maintenance of the equipment.

NOTE: Refer to UL 508E and UL 508F for more information.



## Choosing 45mm or 55mm frame width

The Fuji MMS is available in 45mm and 55mm frame widths. The 45mm frame size is capable of controlling motors up to 20 horsepower while the 55mm frame size can handle motors up to 40 horsepower at 480 volts AC. The frame sizes overlap in motor sizing though the breaking capacity remains the same.

For controlling a group of motors up to 20 horsepower, the 45mm frame size is the perfect answer. For motor sizes 20 to 40 horsepower @480 VAC, the 55mm frame is specified.

If your motors range from below 20 horsepower to 40 horsepower, consider using the 55mm frame. Though the individual costs per unit is more expensive for the 55mm frame width in sizes below 20 horsepower, construction cost's are reduced by standardizing on the same frame size.



# Fuji Duo Series Combination Starter Selection Table - 45mm

Use this selection table to select 45mm frame width (A) Manual Motor Starter, (B) Contactor, (C) Link Module, and (D) Base Plate for a Combination Starter

Combination Starter Selection Table - 45mm									
Three Phase Motor					A	B	C	D	
220-240 Volt		440-480 Volt				Contactor			
Motor Horsepower (hp) See Note 1 below	Motor Full-Load Amperage (FLA) See Note 4 below	Motor Horsepower (hp) See Note 1 below	Motor Full-Load Amperage (FLA) See Note 4 below	Manual Motor Starter Adjustable Current Range (A)	Manual Motor Starter See Note 2 below for UL Type E applications.	The contactor part number needs the coil voltage suffix. See Note 3 below.	Link Module	Base Plate	SCCR at 480Y/277 VAC (kA) type F coordination
-	-	-	-	0.1 to 0.16	<a href="#">BM3RHB-P16</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>	<a href="#">BZ0BPRE22A</a>	65
-	-	-	-	0.16 to 0.25	<a href="#">BM3RHB-P25</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
-	-	-	-	0.25 to 0.4	<a href="#">BM3RHB-P40</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
-	-	-	-	0.4 to 0.63	<a href="#">BM3RHB-P63</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
-	-	-	-	0.63 to 1.0	<a href="#">BM3RHB-001</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
-	-	0.75	1.6	1.0 to 1.6	<a href="#">BM3RHB-1P6</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
0.5	2.2	1	2.1	1.6 to 2.5	<a href="#">BM3RHB-2P5</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
0.75	3.2	2	3.4	2.5 to 4.0	<a href="#">BM3RHB-004</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
1.5	6	3	4.8	4.0 to 6.3	<a href="#">BM3RHB-6P3</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
-	-	5	7.6	6.3 to 10	<a href="#">BM3RHB-010</a>	<a href="#">SC-E02-110VAC</a> <a href="#">SC-E02G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
3	9.6	7.5	11	9 to 13	<a href="#">BM3RHB-013</a>	<a href="#">SC-E03-110VAC</a> <a href="#">SC-E03G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
5	15.2	10	14	11 to 16	<a href="#">BM3RHB-016</a>	<a href="#">SC-E04-110VAC</a> <a href="#">SC-E04G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
5	15.2	10	14	14 to 20	<a href="#">BM3RHB-020</a>	<a href="#">SC-E04-110VAC</a> <a href="#">SC-E04G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		65
7.5	22	15	21	19 to 25	<a href="#">BM3RHB-025</a>	<a href="#">SC-E05-110VAC</a> <a href="#">SC-E05G-24VDC</a>	<a href="#">BZ0LRE22AA</a> <a href="#">BZ0LRE22GA</a>		50
10	28	20	27	24 to 32	<a href="#">BM3RHB-032</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LRE32AA</a> <a href="#">BZ0LRE32GA</a>	<a href="#">BZ0BPRE32A</a>	50

Note 1: When a horsepower rating is listed on two rows, the motor full-load amperage must be known so you can select the MMS with the best adjustable current range for your application. For example, if you have a 230V, 5 hp, 15.2A motor, you can select a MMS with either a 11-16A range or a 14-20A range. Consult the motor data plate or motor manufacturer.

Note 2: When using BM3RHB-xxx MMS in a UL Type E application, you must also use part numbers [BZ0TKUAB](#) (short-circuit contact block) and [BZ0TCRE](#) (line side terminal cover).

Note 3: For AC coil voltages other than 110VAC, substitute the "110VAC" in the part number with "220VAC" for 220/240VAC coils or "24VAC" for 24VAC coils. For example, if the table lists a SC-E02-110VAC contactor for your application and you need a contactor with a 220VAC coil, use contactor SC-E02-220VAC.

Note 4: Per NEC 2005 Table 430.250

Note 5: The table above also include the Fuji part numbers with (P). Example: SC-E02-110VAC = SC-E02P-110VAC.

# Fuji Duo Series Combination Starter Selection Table - 55mm



Use this selection table to select 55mm frame width (A) Manual Motor Starter, (B) Contactor, (C) Link Module, and (D) Base Plate for a Combination Starter

Combination Starter Selection Table - 55mm									
Three Phase Motor					A	B	C	D	
220-240 Volt		440-480 Volt			Manual Motor Starter	Contactor	Link Module	Base Plate	SCCR at 480Y/277 VAC (kA) type F coordination
Motor horsepower (hp) See Note 1 below	Motor Full-Load Amperage (FLA) See Note 4 below	Motor Horsepower (hp) See Note 1 below	Motor Full-Load Amperage (FLA) See Note 4 below	Manual Motor Starter Adjustable Current Range (A)	See Note 2 below for UL Type E applications.	The contactor part number needs the coil voltage suffix. See Note 3 below.			
3	9.6	5	7.6	6.3 to 10	<a href="#">BM3VHB-010</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>	<a href="#">BZ0BPVE51A</a>	65
3	9.6	7.5	11	9 to 13	<a href="#">BM3VHB-013</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
5	15.2	10	14	11 to 16	<a href="#">BM3VHB-016</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
5	15.2	10	14	14 to 20	<a href="#">BM3VHB-020</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
7.5	22	15	21	19 to 25	<a href="#">BM3VHB-025</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
10	28	20	27	24 to 32	<a href="#">BM3VHB-032</a>	<a href="#">SC-E1-110VAC</a> <a href="#">SC-E1G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
10	28	30	40	28 to 40	<a href="#">BM3VHB-040</a>	<a href="#">SC-E2-110VAC</a> <a href="#">SC-E2G-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
15	42	30	40	35 to 50	<a href="#">BM3VHB-050</a>	<a href="#">SC-E2S-110VAC</a> <a href="#">SC-E2SG-24VDC</a>	<a href="#">BZ0LVE51AA</a> <a href="#">BZ0LVE51GA</a>		65
20	54	40	52	45 to 63	<a href="#">BM3VHB-063</a>	<a href="#">SC-E3-110VAC</a> <a href="#">SC-E3G-24VDC</a>	<a href="#">BZ0LVE65AA</a> <a href="#">BZ0LVE65GA</a>	<a href="#">BZ0BPVE65A</a>	65

Note 1: When a horsepower rating is listed on two rows, the motor full-load amperage must be known so you can select the MMS with the best adjustable current range for your application. For example, if you have a 230V, 10 hp, 28A motor, you can select a MMS with either a 24-32A range or a 28-40A range. Consult the motor data plate or motor manufacturer.

Note 2: When using BM3VHB-xxx MMS in a UL Type E application, you must also use part number [BZ0TKUAB](#) (short-circuit contact block).

Note 3: For AC coil voltages other than 110VAC, substitute the "110VAC" in the part number with "220VAC" for 220/240VAC coils or "24VAC" for 24VAC coils. For example, if the table lists a SC-E1-110VAC contactor for your application and you need a contactor with a 220VAC coil, use contactor SC-E1-220VAC.

Note 4: Per NEC 2005 Table 430.250