

# Magnetic Contactors and Starters

## SC and SW series

### Design features

**SC-03, 0, 05, 4-0, 4-1, 5-1**  
**SC-N1, N2, N2S, N3**

■ **Description**

Small frame contactors with new functions join the SC series. The SC line up, which is based on high level technology, now extends from the SC-03 to the SC-N16. The SC series contactors have such options as additional auxiliary contact blocks and operation counter unit with snap-on fittings, and coil surge suppressors. Modification can be made quickly and easily on site.

Improved contact materials and structure double the electrical life compared with existing contactors —2 million operations. Bifurcated type auxiliary contacts have a high degree of contact reliability. Therefore, they can be used in low-level circuits of 5V, 3mA and directly input to electronic equipment.

Long electrical life  
 2 million operations (AC-3 duty)

Easy-to-read front display  
 Type, ratings and terminal numbers

Manual operator for easy circuit checking  
 ON-OFF status indicator

Direct-fitted overload relay assures time-saving assembly

Manual reset button

Dial cover for protection against unauthorized current setting

Single-side-mounted coil terminal  
 The coil surge suppressor or coil drive unit can be easily added

Terminal numbers meet IEC standards

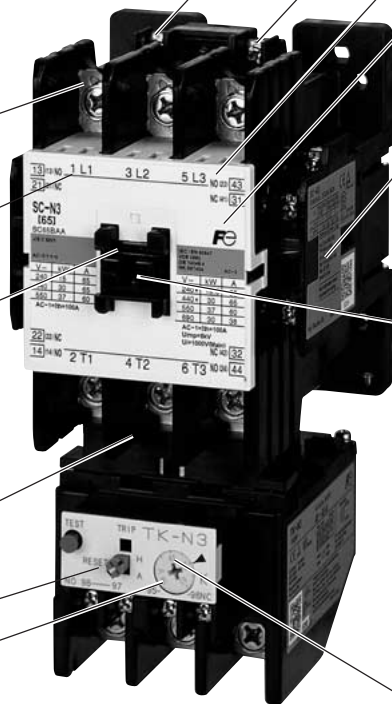
Meets international standards  
 IEC, NEMA, BS, JIS, VDE  
 UL, CSA, NK, BV and LR approved

Bifurcated auxiliary contact with high contact reliability

Optional function unit can be easily added to modify contactor immediately on site.

- Auxiliary contact block fits all size contactors(03 to N3)
- Snap-on mechanical interlock unit can be fixed to equal or unequal size contactors without tools.
- Front-mounted operation counter

Exact current setting possible



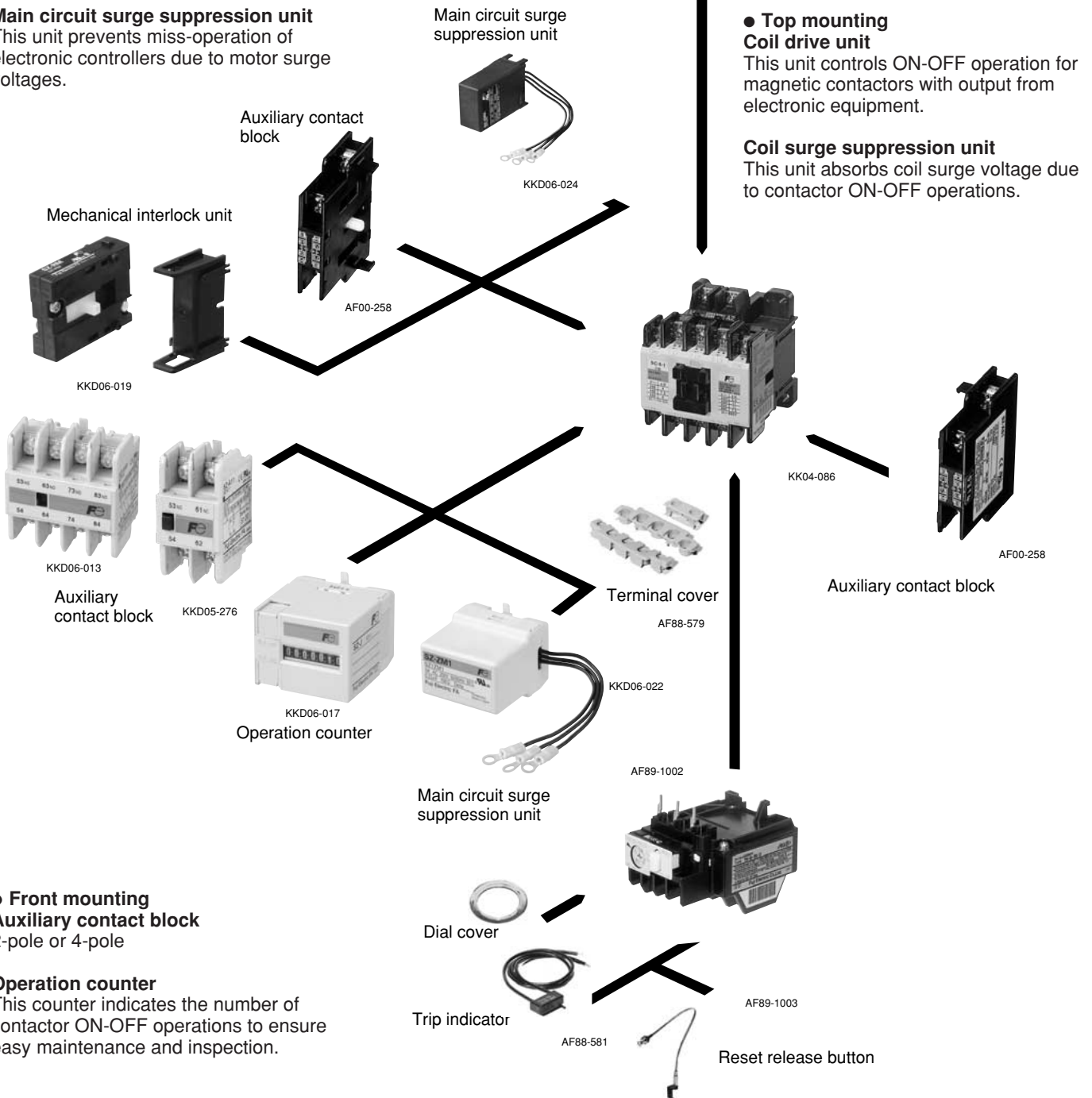
■ **Easy modular system**

- **Side mounting**  
 Auxiliary contact block  
 Single pole (1NO + 1NC)

**Mechanical interlock unit**  
 The mechanical interlock unit is used to interlock two contactors for reversing.  
 One size fits all contactors.

**Main circuit surge suppression unit**  
 This unit prevents miss-operation of electronic controllers due to motor surge voltages.

- **Top mounting**  
**Coil drive unit**  
 This unit controls ON-OFF operation for magnetic contactors with output from electronic equipment.
- **Coil surge suppression unit**  
 This unit absorbs coil surge voltage due to contactor ON-OFF operations.



- **Front mounting**  
**Auxiliary contact block**  
 2-pole or 4-pole

**Operation counter**  
 This counter indicates the number of contactor ON-OFF operations to ensure easy maintenance and inspection.

■ **Main circuit surge suppression unit**

■ **Further information**  
 See page 01/75

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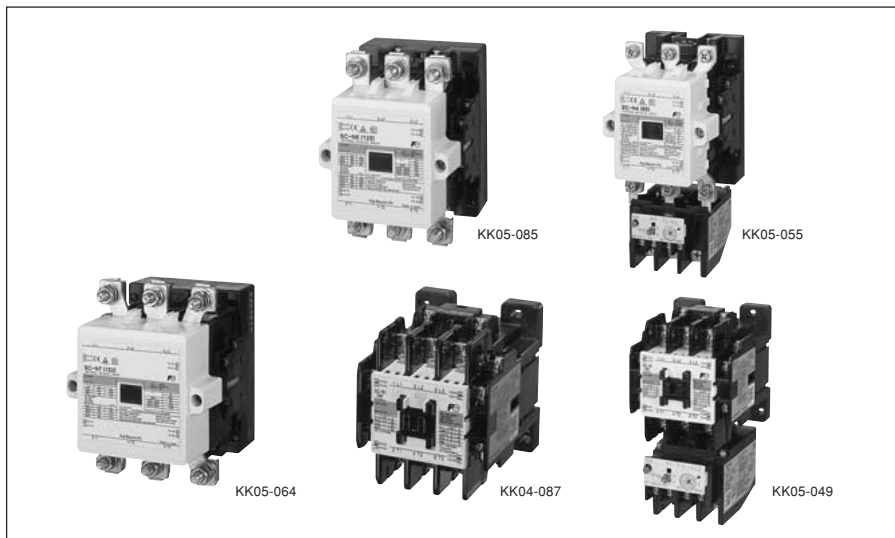
## SC and SW series

### Design features

#### SC-N1 to N16

##### ■ Description

FUJI SC series (SC-N5 to N16) contactors have been developed and manufactured using FUJI's most advanced electronic technologies. They employ an electronically-controlled SUPER MAGNET which is provided with a built-in IC, thus enhancing their performance and reliability. The SUPER MAGNET is based on an "AC-input, DC-operated concept", thus allowing the coil to be energized by both AC and DC input. Moreover, once closed, sealed current is controlled by switching circuit. This permits a great reduction in power consumption – a cost-effective feature. The SC-N1 to SC-N4 are without SUPER MAGNET. These contactors feature compact size, arc extinguishing mechanisms having a high breaking efficiency, low power consumption, operational ease and ratings up to 660 volts.



##### ■ Features of the SUPER MAGNET

- Operates on both AC and DC power supply
  - Has a wide operational voltage range
  - No tendency to "chatter"
  - Eliminates contact welding or coil burning
  - Reduces power consumption
- In addition the FUJI SC-N series contactors employ bifurcated auxiliary

contacts which improve contact performance and permit them to be used in conjunction with programmable logic controllers. FUJI SC-N series contactors are the most suitable for new FA age applications which require the most advanced electronic technologies and maximum dependability.

■ The FUJI SC series conforms to and has been approved by various international standards.

Specifications			Contactors		Starters(open)	
			Non-reversing	reversing	Non-reversing	reversing
No. of thermal overload relay heater elements			-	-	3	3
Type			SC-□	SC-□RM	SW-□/3H	SW-□RM/3H
Conformed	New JIS	Japan	○	○	○	○
	IEC	International	○	○	○	○
	BS	UK	○	○	○	○
	EN	Europe	○	○	○	○
Approved	UL	USA	○	○	○	○
	CSA	Canada	○	○	○	○
	CCC	China	○ *	○ *	-	-
EC Directives	CE Marking	Europe	○	○	○	○
Inspection Institute	TÜV	Germany	○	○	○	○

Notes ○ : Conforming to Standard

UL<sub>us</sub> : A new certification mark that indicates compliance with both Canadian and U.S. requirements.

□ : Frame size N1 to N14 and N16(Contact only)

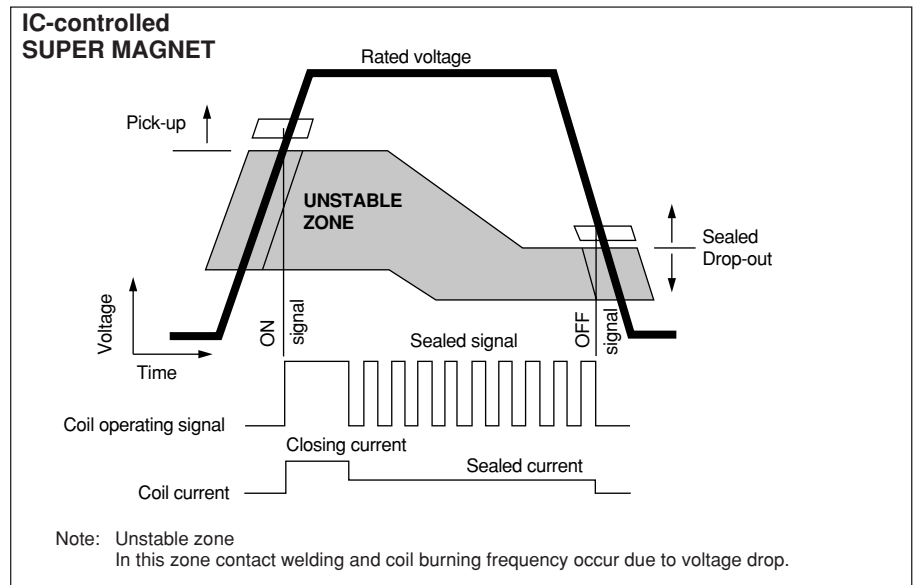
\* : When ordering the ccc standard type, add(ccc)suffix to the type number.

■ **Advantages of SUPER MAGNET**

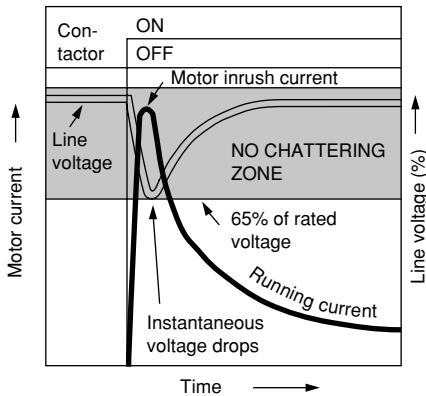
● **Positive pick-up and drop-out**

The SUPER MAGNET operation is electronically controlled. There is no unstable zone as will be seen in the diagram—an outstanding feature that other contactors can not provide. Chattering is a phenomenon which occurs when the gravitational force of the starter magnet decreases through the line voltage drop at the time of motor starting. This may cause damage such as contact welding or coil burning.

The SUPER MAGNET holds without chattering even if the line voltage drops to 65% of its rated value, so preventing this type of trouble.



**Motor starting**



Note: No chattering occurs even if instantaneous voltage drops to 65% of rated voltage.

● **Operation on both AC and DC inputs**

The rated operational voltage range of the SC-N series contactors has been greatly expanded. They operate on both AC (50/60Hz) and DC inputs.

**Coils (SC-N5 to SC-N16)**

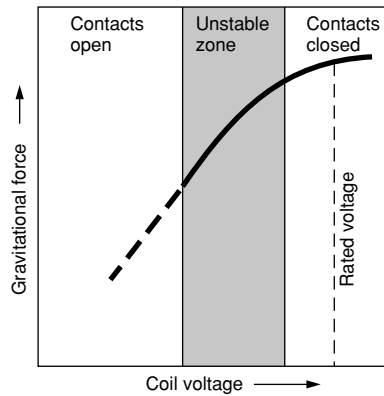
Rated voltage	Rated coil voltage, frequency	
	AC	DC
24V	24–25V 50/60 Hz	24V
48V	48–50V 50/60 Hz	48V
100V	100–127V 50/60 Hz	100–120V *1
200V	200–250V 50/60 Hz	200–240V *2
300V	265–347V 50/60 Hz	—
400V	380–450V 50/60 Hz	—
500V	460–575V 50/60 Hz	—

Notes: SC-N5 to N12: 24V–575V  
 SC-N14 to N16: 100V–575V

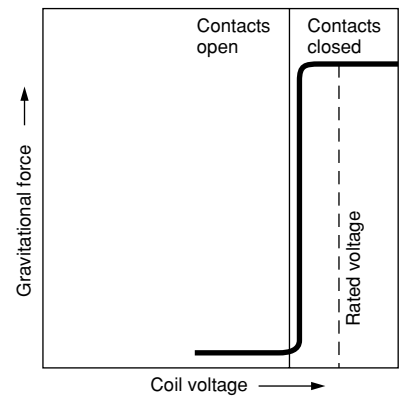
\*1: The coil voltage from a DC power supply with single phase full-wave rectification will be 100 to 110 V.

\*2: The coil voltage from a DC power supply with single phase full-wave rectification will be 200 to 220 V.

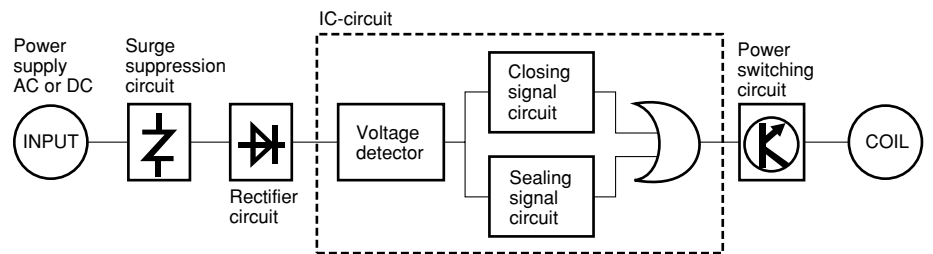
**Existing series**



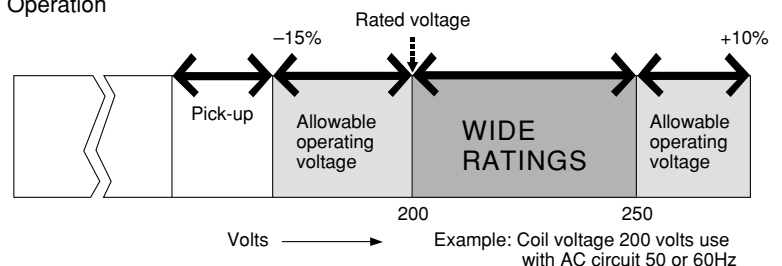
**SC-N series**



Note: Since SC series contactors are electronically controlled there is no unstable zone.



**Operation**



For further information, see page 01/30.

# Magnetic Contactors and Starters

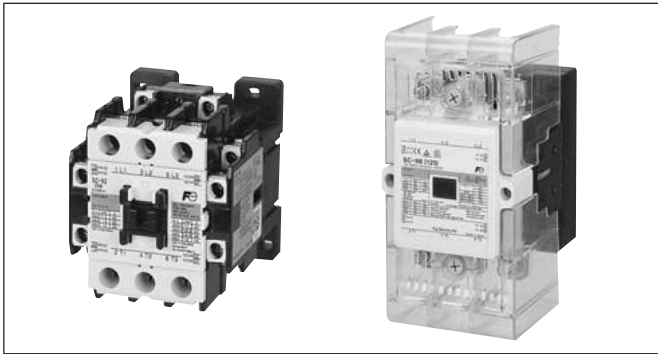
## SC and SW series

### Design features

#### ■ Other advantages

##### ● Terminal cover for finger protection

These optional terminal covers comply with VBG4 (German Rules of Accident Prevention), IEC60529, DIN57106, VDE0106 Teil100, which are recommendations for preventing exposure to live parts. The terminal cover satisfies the requirements of Machinery Directive EN60204-1 "Direct Contact Prevention" concerning mechanical safety.



##### ● Insulation barrier

These optional insulation barriers prevent accidental short-circuits caused by metallic objects falling onto the terminals.



##### ● Live-section cover

An optional live-section cover that completely encloses the front of a contactor or starter for increased worker safety during maintenance and inspection.



##### ● Insulation

##### Improved tracking resistance

Tracking resistance of the molded parts comprising of the conductive block has been improved.

Comparative Tracking Index (CTI) : 175V or higher

Tracking : It means the route of the leak electric current caused on the surface of the isolation body.

##### ● Standard heat-proof material

The molded parts used are made of heat-proof materials specified in UL94

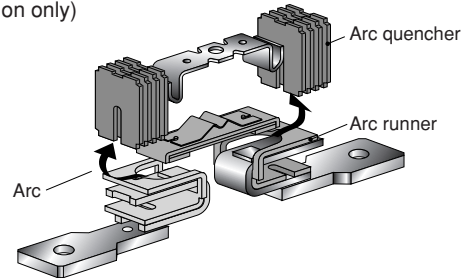
(UL94 : STANDARD FOR SAFETY FOR TESTS FOR FLAMMABILITY OF PLASTIC MATERIALS FOR PARTS IN DEVICES AND APPLIANCES).

##### ● Free arc space

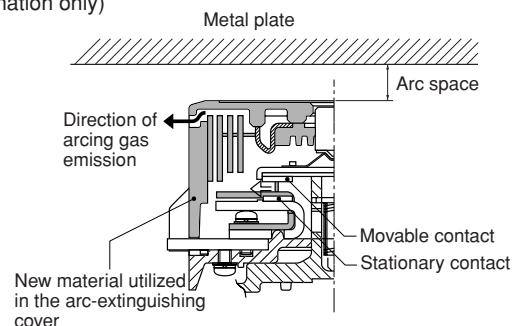
A new arc-extinguishing method, which makes full use of magnetic field analysis technology, and a new material (UL94V-0) that has been incorporated into the design of this new type of arc-extinguishing chamber to provide a free arc space. This new method and design reduces the depth size, not only of the main body, but also that of the board (Types SC-N1 to N12).

Free arc space : It means arc space is not needed on making and breaking condition according to IEC 60947-4-1. (Refer to chart Arcing gas cooling block.)

##### Arc driving system (explanation only)



##### Arc gas cooling system (explanation only)



##### ● Mirror contacts (Positively safety contacts)

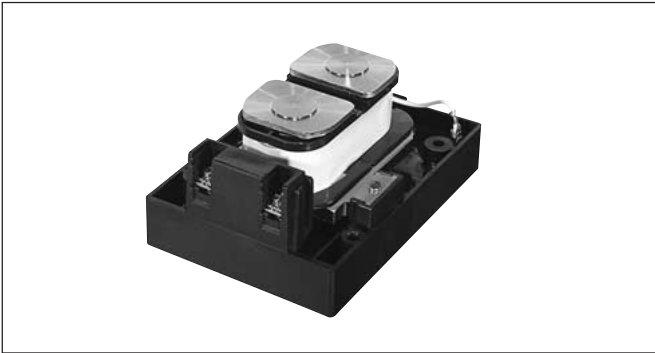
The contactor with mirror contacts has been certified by TÜV.

Mirror contact conforms to the requirement for auxiliary contact that is intended to be included in the future amendment to IEC 60947-4-1.

Mirror contact : Normally closed auxiliary contact, which cannot be in closed position simultaneously with the normally open main contact.

● **SUPER MAGNET with higher service reliability**

Employing a electronically controlled SUPER MAGNET(AC input DC operated) with an IC on its operating circuit, allows the FUJI SC series contactor to achieve higher service reliability.



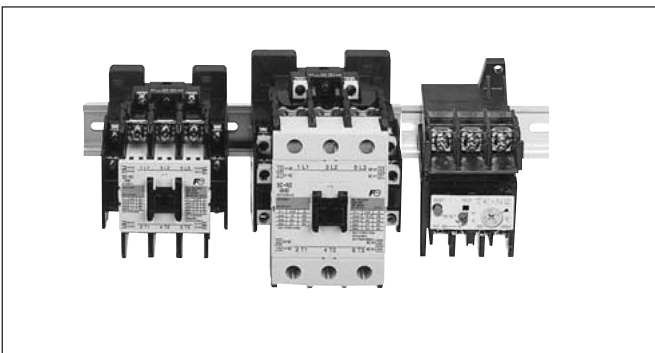
- There is no unstable zone as seen in the diagram on page 01/5. The SUPER MAGNET holds without chattering which may cause damage such as contact welding or coil burning.
- Since normal rated voltage is applied when power is on, the contactor may be used without failure, even if the line voltage drops to 65% of the rated value when the main contacts are closed.
- The motor is prevented from starting if there is insufficient voltage.
- The power consumption and operating VA for the operating coil have been largely reduced.
- The rating range of the coil has been widened, and it may even be used as an AC/DC coil.
- A surge suppression function has been incorporated.
- Comforming to EMC.

● **Ambient operating temperature improved to 55°C**

The allowable ambient operating temperature was raised up to 55°C, considering the use on more compact control board and the higher mounting density.

● **Rail mounting**

Types SC-N1 to-N3, TR-N2H and -N3H incorporate snap-on mounting on 35mm-wide rails (conforming to IEC and DIN Standards).



● **Bifurcated auxiliary contact system**

By employing a bifurcated contact system, higher contact reliability is achieved for service at 5V DC, 3mA (Types SC-N1 to N12).

● **Special type "/G" for DC operation added to SC-N1 to N3 series**

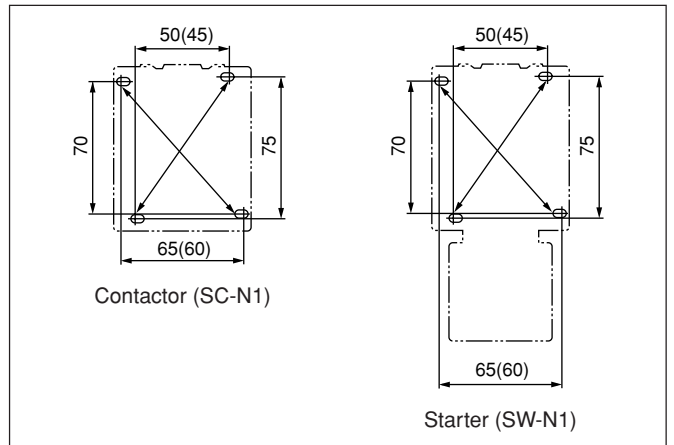
A new type of "/G" has been added to SC-N1 to N3 types for DC operation.

Power input and consumption have been considerably reduced by introducing a full voltage-applying coil.



● **Unified mounting hole pitch of contactors and motor starters**

The mounting hole pitches of contactors and motor starters have been standardized. This enables the contactor and the motor starter to be fixed to the same mounting holes. (The holes for SC-N1 to N7 are as same as those for SW-N1/3H to N7/3H respectively.)



Note: Use the two mounting holes on a diagonal line to mount a contactor.

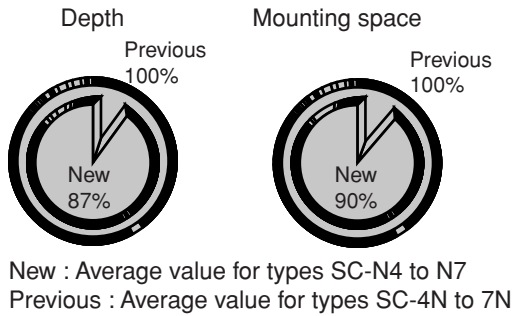
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## SC and SW series

### Design features

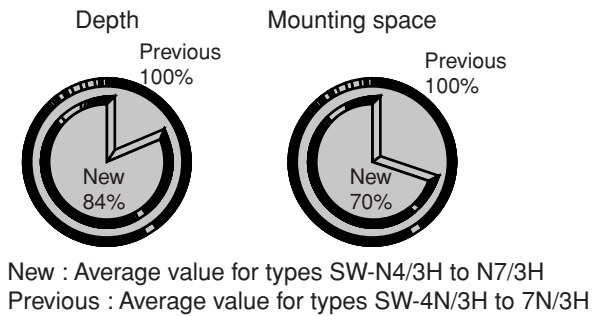
#### ● Reduced size and space of contactor

By employing a highly efficient electromagnet (Using 3D magnetic field analysis technology), the depth and mounting space of the contactor has been reduced.



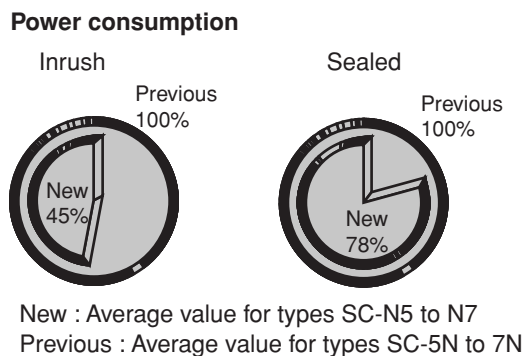
#### ● Reduced size and space of motor starter

The depth and mounting spaces of the contactors and thermal overload relays have been reduced by combining them into one unit without a mounting plate.



#### ● Reduced power consumption

By introducing a new type of SUPER MAGNET (Using 3D magnetic field analysis technology), power consumption have been greatly reduced.



#### ● Material designation indication

Recyclable thermoplastic resin is used for plastic parts, and the names of materials are indicated on all major parts to facilitate their recycling.



#### ● Motor starter manufactured at ISO9001 and ISO14001-certified factory

Fuji Electric has been certified for both ISO9000 series and ISO14000 series compliance. Both standards are established by the International Organization for Standardization (ISO). The former is for quality control and quality assurance, while the latter is for environmental management systems. Certified for ISO9001 and ISO14001, our Fukiage Factory, which manufactures motor starters, puts great effort into establishing a highly reliable quality assurance system and a development and production structure which takes environmental protection into account.

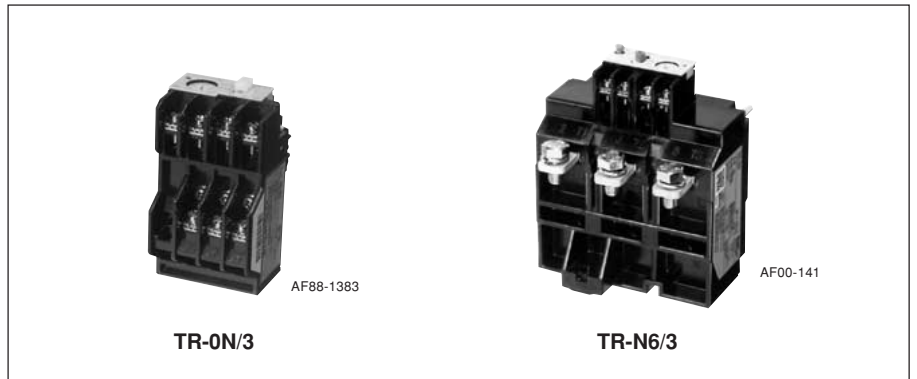
**Highly reliable thermal overload relays**

■ **Description**

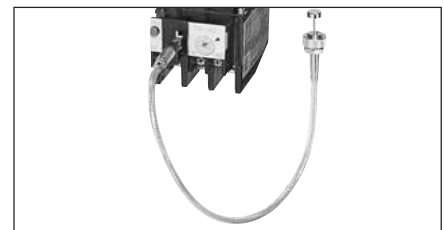
● FUJI thermal overload relays are designed to provide overload protection to meet the thermal characteristics of low voltage induction motors. Adjustable thermal overload relays give motors positive overcurrent protection. The starter contacts are so arranged that they cannot be held closing under overload conditions. However, once the bimetal element has cooled, the reset button can be depressed and the motor can be restarted in the normal manner. Ordinary this reset is carried out manually but the starter can be changed over to "automatic reset" by means of a screw-driver.

● FUJI relays are extremely accurate. Each thermal overload relay is subjected to stringent testing in the factory to check performance and actual values are calibrated with the marking on the adjustable dial. Consequently, they are extremely accurate and provide a positive protection.

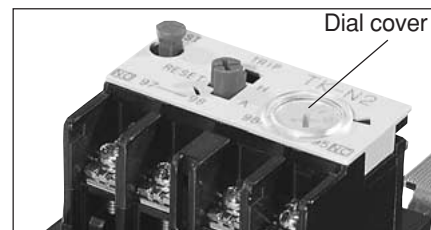
● Relays are also provided with ambient temperature compensators, so that their performance will be maintained in spite of temperature changes. The ambient temperature is regulated for 20°C.



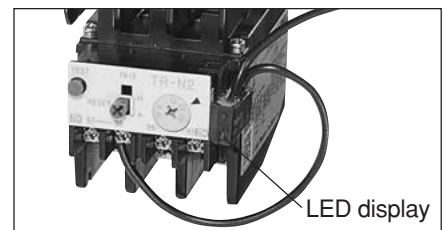
**Auxiliary contact**  
 Isolated NO and NC contacts can be used with different potential.



**Reset release button**  
 Reset a thermal overload relay from the rear side of the board or a distant location.



**Dial cover**  
 Protects the setting current value of a thermal overload relay from being changed unintentionally.



**Trip indicator**  
 Indicates any trip operation through its LED display.



**Type number indication**  
 Type number printed on front side for easy looking.