

# Magnetic Contactors and Starters

## SC and SW series

### Specifications

#### ■ Ratings

Conforming to IEC 60947-4-1, EN 60947-4-1, VDE 0660

Contactor Type	Starter Type	Max. motor capacity (kW)				Rated operational current (A)				Thermal current (A) *1
		200V   240V	380V   440V	500V   550V	600V   660V	200V   240V	380V   440V	500V   550V	600V   660V	
SC-03	SW-03/3H	2.5	4	4	4	11	9	7	5	20
SC-0	SW-0/3H	3.5	5.5	5.5	5.5	13	12	9	7	20
SC-05	SW-05/3H	3.5	5.5	5.5	5.5	13	12	9	7	20
SC-4-0	SW-4-0/3H	4.5	7.5	7.5	7.5	18	16	13	9	25
SC-4-1	SW-4-1/3H	5.5	11	11	7.5	22	22	17	9	32
SC-5-1	SW-5-1/3H	5.5	11	11	7.5	22	22	17	9	32
SC-N1	SW-N1/3H	7.5	15	15	11	32	32	24	15	50
SC-N2	SW-N2/3H	11	18.5	18.5	15	40	40	29	19	60
SC-N2S	SW-N2S/3H	15	22	25	22	50	50	38	26	80
SC-N3	SW-N3/3H	18.5	30	37	30	65	65	60	38	100
SC-N4	SW-N4/3H	22	40	37	37	80	80	60	44	135
SC-N5	SW-N5/3H	30	55	55	55	105	105	85	64	150
SC-N6	SW-N6/3H	37	60	60	60	125	125	90	72	150
SC-N7	SW-N7/3H	45	75	75	90	150	150	120	103	200
SC-N8	SW-N8/3H	55	90	130	132	180	180	180	150	260
SC-N10	SW-N10/3H	65	110	132	132	220	220	200	150	260
SC-N11	SW-N11/3H	90	160	160	200	300	300	230	230	350
SC-N12	SW-N12/3H	120	220	250	300	400	400	360	360	450
SC-N14	SW-N14/3H	180	315	400	480	600	600	600	600	660
SC-N16	—	220	440	500	500	800	800	720	630	800

Note: \*1 The values are applied to contactors.

#### ■ Making and breaking capacities

Utilization category	Typical applications	IEC 60947-4-1, EN 60947-4-1, VDE 0660, JIS C 8201-4-1						
		Making and breaking			Making			
		Ic/Ie	Ur/Ue	cosφ or L/R	I/Ie	U/Ue	cosφ or L/R	
AC-1	Non-inductive or slightly inductive loads, resistance furnaces	1.5	1.05	0.8	1.5	1.05	0.8	
AC-2	Slip-ring motors: Starting, switching off	4.0	1.05	0.65	4.0	1.05	0.65	
AC-3	Squirrel-cage motors: Starting, switching off during running	Ie 100A	8.0	1.05	0.45	10	1.05	0.45
		Ie > 100A	8.0	1.05	0.35	10	1.05	0.35
AC-4	Squirrel-cage motors: Starting, plugging, inching	Ie 100A	10	1.05	0.45	12	1.05	0.45
		Ie > 100A	10	1.05	0.35	12	1.05	0.35
AC-5a	Switching of electric discharge lamp controls	3.0	1.05	0.45	3.0	1.05	0.45	
AC-5b	Switching of incandescent lamps	1.5	1.05	*	1.5	1.05	*	

Note: \*Test to be carried out with an incandescent lamp load.

Ie: Rated operational current

Ue: Rated operational voltage

I: Current made

U: Voltage before make

Ur: Recovery voltage

Ic: Current broken

#### ■ Auxiliary contact ratings

Conforming to IEC 60947-5-1, EN 60947-5-1, VDE 0660

Type	Continuous current (A)	Make and break capacity at AC (A)	Rated operational current (A)						Minimum voltage and current
			AC Voltage (V)	AC-15 (Ind.load)	AC-12 (Res.load)	DC Voltage (V)	DC-13 (Ind.load)	DC-12 (Res.load)	
SC-03 to SC-N12	10	60	100–120	6	10	24	3	5	5V 3mA
		30	200–240	3	8	48	1.5	3	
		15	380–440	1.5	5	110	0.55	2.5	
		12	500–600	1.2	5	220	0.27	1	
SC-N14 to SC-16N	10	60	100–120	6	10	24	5	10	24V 10mA
		60	200–240	6	10	48	1.5	5	
		40	380–440	4	10	110	0.55	2.5	
		25	500–600	2.5	10	220	0.27	1	

### ■ Inching and plugging operations (Conforming to IEC 60947-4-1)

In applications where inching and plugging operations are included the contact wear will be increased. Therefore, it is necessary to select ones having larger frame sizes than in standard applications so as to minimize the needs of maintenance and replacement.

Voltage	Motor ratings		50% inching operation	
	Capacity (kW)	Full load current (A)	Electrical durability 100,000 operations	Electrical durability 500,000 operations
200V   240V	0.2	1.8	SC-03	SC-03
	0.4	3.2	SC-03	SC-03
	0.75	4.8	SC-03	SC-0, 05
	1.5	8.0	SC-03	SC-4-1, 5-1
	2.2	11.1	SC-4-0	SC-N1
	3.7	17.4	SC-4-1, 5-1	SC-N2
	5.5	26	SC-N1	SC-N3
	7.5	34	SC-N2	SC-N5
	11	48	SC-N2S	SC-N7
	15	65	SC-N4	SC-N8
380V   440V	18.5	79	SC-N5	SC-N10
	22	93	SC-N6	SC-N11
	30	124	SC-N7	SC-N14
	37	152	SC-N8	SC-N14
	45	180	SC-N10	—
	55	220	SC-N11	—
	75	300	SC-N14	—
	0.75	2.4	SC-03	SC-03
	1.5	4.0	SC-03	SC-03
	2.2	5.6	SC-03	SC-4-0
3.7	8.7	SC-03	SC-4-1, 5-1	
5.5	13	SC-4-0	SC-N1	
7.5	17	SC-4-1, 5-1	SC-N2S	
11	24	SC-N1	SC-N3	
15	32.5	SC-N2	SC-N5	
18.5	39.5	SC-N2S	SC-N6	
22	46.5	SC-N3	SC-N7	
30	62	SC-N4	SC-N8	
37	76	SC-N5	SC-N10	
45	90	SC-N6	SC-N11	
55	110	SC-N8	SC-N12	
75	150	SC-N10	SC-N14	
90	180	SC-N11	—	
110	220	SC-N12	—	
132	264	SC-N14	—	
150	300	SC-N14	—	
160	320	SC-N14	—	

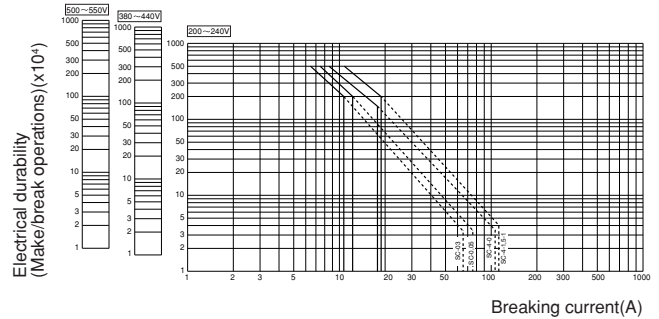
Notes: 1. Inching % =  $\frac{\text{No. of inching operations}}{\text{Total No. of switching operations}} \times 100\%$

2. Light inching: 50%  
 Printing machine and similar equipment  
 Heavy inching: 75 – 100%  
 Machine tool, hoist and similar equipment (In cases when there are frequent on/off operations involving starting rush current).

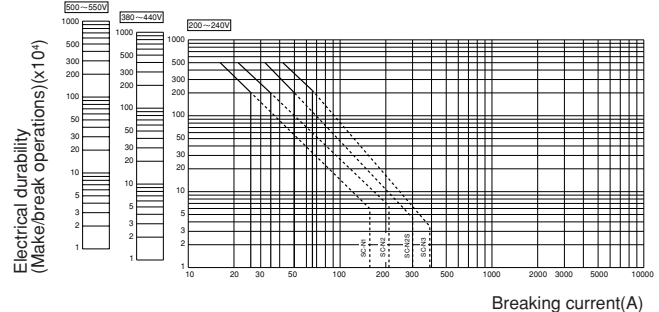
### ■ Standard conditions for operation in service

- Temperature range:  
 Operating: -5°C to +40°C  
 (-5°C to +55°C inside panel box)  
 Storage: -40°C to +65°C
- Humidity: 45 to 85% RH
- Vibration: 10 to 55Hz, 15m/s<sup>2</sup>
- Shock: 50m/s<sup>2</sup>
- Altitude: 2000m (6600ft) or lower
- IP40

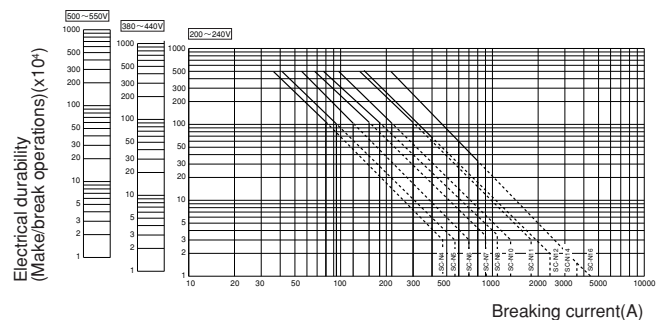
### ■ Breaking current and electrical durability SC-03 to 5-1



### SC-N1 to N3

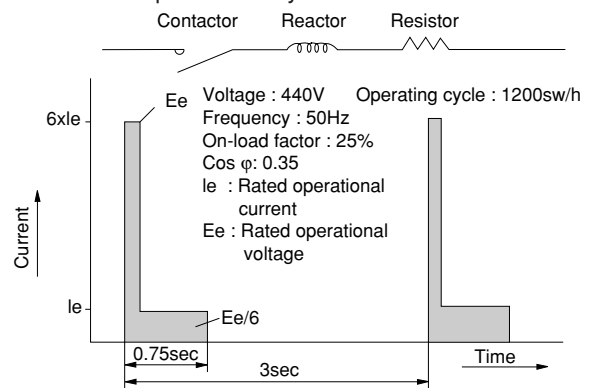


### SC-N4 to N16



### ■ Testing method—Category AC-3

The method of determining the life expectancy and performance is prescribed by IEC as below.



A current equal to six times that of the rated operational current of the starter is applied to the terminals the switch is closed and the current immediately reduced to the rated operational current and then interrupted.

# Magnetic Contactors and Starters

## SC and SW series

### Specifications

#### ■ Performance data

Frame size	Making capacity I/le	Breaking capacity I/le	Operating cycles per hour	Voltage	Durability (operations)	
					Electrical *	Mechanical
<b>03, 0, 05</b>	12	10	1,800	200/240V AC 380/440V AC	2 million	10 million
<b>4-0</b>	12	10	1,800	200/240V AC 380/440V AC	1.5 million	10 million
<b>4-1, 5-1</b>	12	10	1,800	200/240V AC 380/440V AC	2 million	10 million
<b>N1 to N3</b>	12	10	1,200	200/240V AC 380/440V AC	2 million	10 million (N1, N2) 5 million (N2S, N3)
<b>N4 to N11</b>	12	10	1,200	200/240V AC 380/440V AC	1 million	5 million
<b>N12, N14</b>	12	10	1,200	200/240V AC 380/440V AC	500,000	5 million
<b>N16</b>	12	10	1,200	200/240V AC 380/440V AC	250,000	2.5 million

Ie: Rated operational current. I: Making or breaking current \* For details, refer to page 01/29

#### ■ Coil voltage

##### ● Frame size 03 to N4

Frame size	Coil operating voltage and frequency (AC)			Order voltage	Coil voltage code	Identification by coil color	Wiring
	AC	DC	Frequency				
<b>03</b>	24V	50Hz/24–26V	60Hz	AC24V	<b>E</b>	White	
<b>0</b>	48V	50Hz/48–52V	60Hz	AC48V	<b>F</b>	White	
<b>05</b>	100V	50Hz/100–110V	60Hz	AC100V	<b>1</b>	Green (Standard voltage)	
<b>4-0</b>	100–110V	50Hz/110–120V	60Hz	AC110V	<b>H</b>	White	
<b>4-1</b>	110–120V	50Hz/120–130V	60Hz	AC120V	<b>K</b>	White	
<b>5-1</b>	200V	50Hz/200–220V	60Hz	AC200V	<b>2</b>	Yellow (Standard voltage)	
<b>N1</b>	200–220V	50Hz/220–240V	60Hz	AC220V	<b>M</b>	White	
<b>N2</b>	220–240V	50Hz/240–260V	60Hz	AC240V	<b>P</b>	White	
<b>N2S</b>	346–380V	50Hz/380–420V	60Hz	AC380V	<b>S</b>	White	
<b>N3</b>	380–400V	50Hz/400–440V	60Hz	AC400V	<b>4</b>	Purple (Standard voltage)	
<b>N4</b>	415–440V	50Hz/440–480V	60Hz	AC440V	<b>T</b>	White	
	480–500V	50Hz/500–550V	60Hz	AC500V	<b>5</b>	White	

Notes: • Other voltages are available in 24 to 600V ranges on request.  
 • For frame size N1/SE to N4/SE, 24V to 250V AC (24V to 240V DC) is available.  
 • Use the coil voltage code, not specifying your actual voltage when ordering. Contactors with coil voltage range which corresponds to the voltage code you specified will be shipped from factory.  
 The above coil operating voltage and frequency (not voltage code) are shown on the products.

##### ● Frame size N5 to N16

Frame size	Coil operating voltage and frequency		Order voltage	Coil voltage code	Identification by coil color	Wiring	
	AC	DC					
<b>N5</b>	24–25V	50/60Hz	24V	AC24V * <sup>3</sup>	<b>E</b>	White	
<b>N6</b>	48–50V	50/60Hz	48V	AC48V * <sup>3</sup>	<b>F</b>	White	
<b>N7</b>	100–127V	50/60Hz	100–120V * <sup>1</sup>	AC100V	<b>1</b>	Green (Standard voltage)	
<b>N8</b>							
<b>N10</b>	200–250V	50/60Hz	200–240V * <sup>2</sup>	AC200V	<b>2</b>	Yellow (Standard voltage)	
<b>N11</b>	265–347V	50/60Hz	–	AC300V	<b>3</b>	White	
<b>N12</b>	380–450V	50/60Hz	–	AC400V	<b>4</b>	Purple (Standard voltage)	
<b>N14</b>	460–575V	50/60Hz	–	AC500V	<b>5</b>	White	
<b>N16</b>							

Notes: • The coils are AC/DC common use (rated voltage 200V or less)  
 • Standard rated voltages are 100V, 200V and 400V.  
 Other voltages are available in 24V to 575V AC (24V to 240V DC) in frame size N5 to N12, also available in 100V to 575V AC (100V to 240V DC) in frame size N14 to N16.  
 • Use the coil voltage code, not specifying your actual voltage when ordering. Contactors with coil voltage range which corresponds to the voltage code you specified will be shipped from factory.  
 The above coil operating voltage and frequency (not voltage code) are shown on the products.  
<sup>\*1</sup> The coil voltage from a DC power supply with single phase full-wave rectification will be 100 to 110 V.  
<sup>\*2</sup> The coil voltage from a DC power supply with single phase full-wave rectification will be 200 to 220 V.  
<sup>\*3</sup> The coil voltage 24V and 48V are not available in frame size N14 to N16.

■ Coil characteristics  
● Frame size 03 to N4

Frame size	Power consumption		Watt loss (W)		Pick-up voltage (V)		Drop-out voltage (V)		Operating time (ms)	
	Inrush (VA)	Sealed (VA)	200V 50Hz	220V 60Hz	200V 50Hz	220V 60Hz	200V 50Hz	220V 60Hz	Coil ON→ Contact ON	Coil OFF→ Contact OFF
<b>03</b>	95	9	2.7	2.8	105-125	116-136	70-98	80-110	9-20	5-16
<b>0</b>	95	9	2.7	2.8	105-125	116-136	70-98	80-110	9-20	5-16
<b>05</b>	95	9	2.7	2.8	105-125	116-136	70-98	80-110	9-20	5-16
<b>4-0</b>	95	9	2.7	2.8	118-136	130-146	75-106	88-120	9-20	5-16
<b>4-1</b>	95	9	2.7	2.8	118-136	130-146	75-106	88-120	9-20	5-16
<b>5-1</b>	95	9	2.7	2.8	118-136	130-146	75-106	88-120	9-20	5-16
<b>N1</b>	135	12.7	3.6	3.8	110-130	120-140	75-105	85-115	10-17	6-17
<b>N2</b>	135	12.7	3.6	3.8	110-130	120-140	75-105	85-115	10-17	6-17
<b>N2S</b>	190	13.4	4.5	5	115-135	130-150	85-110	100-125	10-18	8-18
<b>N3</b>	190	13.4	4.5	5	115-135	130-150	85-110	100-125	10-18	8-18
<b>N4</b>	210	14.4	4.8	5.3	120-140	135-155	70-95	95-120	16-23	7-17

Note: Coil ratings 200V 50Hz, 200 to 220V 60Hz. Operating time is based on 200V 50Hz.

● Frame size N5 to N16, N1/SE to N4/SE (contactor only)

AC operating

Frame size	Power consumption		Watt loss (W)		Pick-up voltage (V) 200V 50/60Hz	Drop-out voltage (V) 200V 50/60Hz	Operating time (ms)	
	Inrush (VA)	Sealed (VA)	200V 50Hz	220V 60Hz			Coil ON→ Contact ON	Coil OFF→ Contact OFF
<b>N5</b>	95	4.6	3.2	3.6	140-150	60-100	39-45	27-33
<b>N6</b>	230	5.8	3.4	3.7	140-150	60-100	31-37	30-36
<b>N7</b>	230	5.8	3.4	3.7	140-150	60-100	31-37	30-36
<b>N8</b>	255	6.2	4.7	5.2	140-150	60-100	38-44	31-37
<b>N10</b>	255	6.2	4.7	5.2	140-150	60-100	38-44	31-37
<b>N11</b>	320	6.5	5.6	6	140-150	60-100	43-49	41-47
<b>N12</b>	320	6.5	5.6	6	140-150	60-100	43-49	41-47
<b>N14</b>	460	11	7.8	8.6	140-160	60-100	69-75	56-62
<b>N16</b>	460	11	7.8	8.6	140-160	60-100	69-75	56-62
<b>N1/SE</b>	130	4.2	2.8	3.2	140-150	60-100	21-27	18-24
<b>N2/SE</b>	130	4.2	2.8	3.2	140-150	60-100	21-27	18-24
<b>N2S/SE</b>	160	4.3	2.9	3.3	140-150	60-100	24-30	24-32
<b>N3/SE</b>	160	4.3	2.9	3.3	140-150	60-100	24-30	24-32
<b>N4/SE</b>	95	4.6	3.2	3.6	140-150	60-100	39-45	26-33

Note: Coil ratings 200 to 250V 50/60Hz, 200 to 220V DC. Operating time is based on 200V 50/60Hz.

DC operating

Frame size	Power consumption		Time constant (ms) Sealed	Pick-up voltage (V) 200V DC	Drop-out voltage (V) 200V DC	Operating time (ms)	
	Inrush (W)	Sealed (W)				Coil ON→ Contact ON	Coil OFF→ Contact OFF
<b>N5</b>	110	3	1	140-160	40-100	35-41	26-32
<b>N6</b>	275	4	1	140-160	40-100	28-34	27-33
<b>N7</b>	275	4	1	140-160	40-100	28-34	27-33
<b>N8</b>	300	4.5	1	140-160	40-100	33-39	31-37
<b>N10</b>	300	4.5	1	140-160	40-100	33-39	31-37
<b>N11</b>	410	4.6	1	140-160	40-100	38-44	41-47
<b>N12</b>	410	4.6	1	140-160	40-100	38-44	41-47
<b>N14</b>	500	8.8	1	140-160	40-100	64-70	52-57
<b>N16</b>	500	8.8	1	140-160	40-100	64-70	52-57

Note: Coil ratings 200 to 250V 50/60Hz, 200 to 220V DC. Operating time is based on 200V DC.

# Magnetic Contactors and Starters

## SC and SW series

### Specifications

#### DC applications of magnetic contactors

##### ■ Description

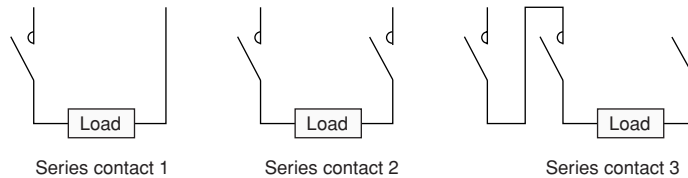
FUJI magnetic contactors in the SC series are normally used in AC circuit applications. However, they may also be used in DC circuits, and in this case their contacts must be connected in series as shown in the diagram.

When used in this manner they will be found to be more economical than using contactors exclusively designed for DC applications. Coils are available for both AC and DC.

If the following ratings are observed the equipment will have an electrical durability of approx. 500,000 operations.

##### ■ Wiring connection

Contacts must be connected in series when the contactors are used in DC applications.



##### ■ Ratings

Type	No. of contacts connected in series	Rated operational current (A)							
		Class DC-1(JEM1038) (Resistive, L/R ≤ 1ms.)				Class DC2, 4,(JEM1038) (DC motor, L/R ≤ 15ms.)			
		24V	48V	110V	220V	24V	48V	110V	220V
SC-03	1	13	13	10	1.2	6	3	2	0.35
	2	13	13	10	6	12	6	4	1.2
	3	15	15	15	15	15	10	8	4
SC-0	1	13	13	10	1.2	6	3	2	0.35
	2	13	13	10	6	12	6	4	1.2
	3	15	15	15	15	15	10	8	4
SC-05	1	13	13	10	1.2	6	3	2	0.35
	2	13	13	10	6	12	6	4	1.2
	3	15	15	15	15	15	10	8	4
SC-4-0	1	16	13	10	1.5	8	6	2	0.35
	2	16	16	12	8	16	12	6	1.5
	3	18	18	18	15	18	18	12	6
SC-4-1	1	20	15	12	2	10	8	3	0.35
	2	20	20	15	10	20	15	8	2
	3	22	22	20	15	22	22	15	8
SC-5-1	1	20	15	12	2	10	8	3	0.35
	2	20	20	15	10	20	15	8	2
	3	22	22	20	15	22	22	15	8
SC-N1	1	25	25	15	2	15	8	3	0.35
	2	25	25	25	20	25	15	8	2
	3	35	35	30	25	35	25	20	8
SC-N2	1	30	30	20	2	20	15	4	0.35
	2	30	30	30	20	30	20	15	3
	3	45	45	40	35	35	30	30	8
SC-N2S	2	60	60	40	20	60	30	20	3.5
	3	60	60	60	40	60	60	60	13
SC-N3	2	80	80	50	20	80	40	20	4
	3	80	80	80	60	80	80	80	20
SC-N4	2	80	80	50	20	80	40	20	4
	3	80	80	80	60	80	80	80	20
SC-N5	2	120	120	80	40	120	80	40	15
	3	120	120	120	120	120	120	120	80
SC-N6	2	120	120	80	40	120	80	40	15
	3	120	120	120	120	120	120	120	80
SC-N7	2	160	160	100	80	160	120	80	40
	3	160	160	160	160	160	160	160	160
SC-N8	2	200	200	160	160	200	160	120	60
	3	200	200	200	200	200	200	200	200
SC-N10	2	200	200	160	160	200	160	120	60
	3	200	200	200	200	200	200	200	200
SC-N11	2	300	300	200	200	300	200	160	80
	3	300	300	300	300	300	300	300	300
SC-N12	2	400	400	330	300	400	300	200	100
	3	400	400	400	400	400	400	400	400
SC-N14	2	600	500	420	300	-	-	-	-
	3	600	600	600	420	-	-	-	-