High-torque Intelligent Soft Starter SJR-5000

Operation manual

Shanghai shanyu electronics equipment co.,ltd

As a rule, the SJR2- 5000 control (CL1 - CL2) and power (1/L1 - 3/L2 - 5/L3) supplies must be disconnected before any operation on either the electrical or mechanical parts of the installation or machine.
During operation the motor can be stopped by cancelling the run command. The starter remains powered up. If personnel safety requires prevention of sudden restarts, this electronic locking system is not sufficient: fit a breaker on the power circuit.

The starter is fitted with safety devices which, in the event of a fault, can stop the starter and consequently the motor. The motor itself may be stopped by a mechanical blockage. Finally, voltage variations or line supply failures can also cause shutdowns.
If the cause of the shutdown disappears, there is a risk of restarting which may endanger certain machines or installations, especially those which must conform to safety regulations.
In this case the user must take precautions against the possibility of restarts, in particular by using a low speed detector to cut off power to the starter if the motor performs an unprogrammed shutdown.

The products and equipment described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

This starter must be installed and set up in accordance with both international and national standards. Bringing the device into conformity is the responsibility of the systems integrator who must observe the EMC directive among others within the European Union.
The specifications contained in this document must be applied in order to comply with the essential requirements of the EMC directive.

The SJR2- 5000 must be considered as a component: it is neither a machine nor a device ready for use in accordance with European directives (machinery directive and electromagnetic compatibility directive). It is the responsibility of the final integrator to guarantee conformity to the relevant standards.

Contents

Specification nameplate

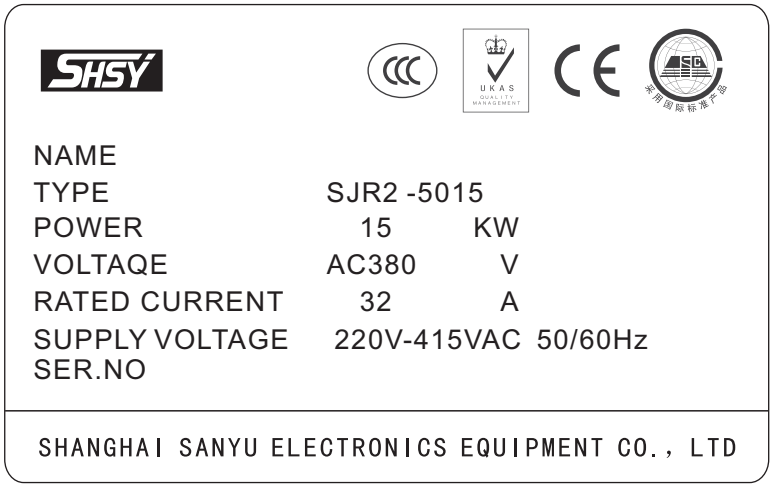
Delivery of soft starter

Please check the starter model printed on the label with the model of the order corresponding to the BL are consistent.

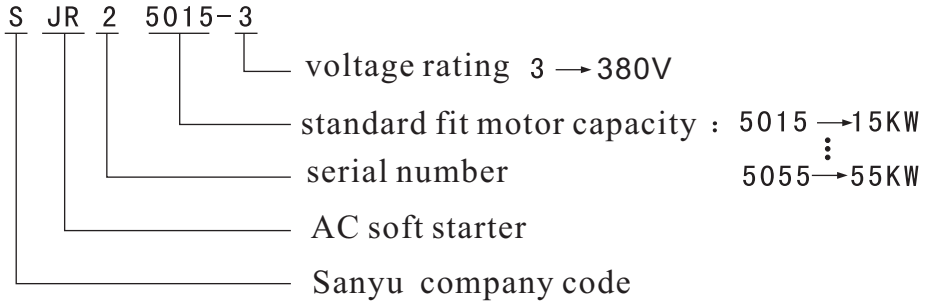
Open the packaging of the soft starter and confirm that no damage occurred during transport.

Please check the box if a product is found defective or does not meet your specification, and please contact your agent of ordering equipment or the nearest Sanyu office.

Check the nameplate on the soft starter to confirm your order specifications.



soft starter model



Check if there is any damage in the appearance during transport, such as the shell and fuselage bending and the damage or loss of the other components.

In addition to the soft starter, there is also a operation instruction in the box..

It must promote the body of the soft starter in handling. It can not promote the circuit board control box, or it may cause damage or personal injury.

Technical specifications

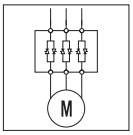
Environment

Degree of protection	IP 20 for SJR2- 5000-7.5KW to -55KW IP00 for SJR2- 5000-75KW to -630KW (1)
Vibration resistance	Conforming to IEC 68-2-6: 1.5 mm peak from 2 to 13 Hz 1 gn from 13 to 200 Hz
Shock resistance	Conforming to IEC 68-2-27: 15 g, 11 ms
Maximum ambient pollution	Degree 3 conforming to IEC 947-4-2
Maximum relative humidity	93% without condensation or dripping water conforming to IEC 68-2-3
Ambient temperature around the unit	Storage: -25° C to +70° Operation: -10° C to +40° C without derating up to +60° C, derating the current by 2% for each ° C above 40° C
Maximum operating altitude	1000 m without derating (above this, derate the current by 0.5% for each additional 100 m)
Operating position	Vertical at ± 10°

(1) SJR2- 5000 starters with degree of protection IP00 must be fitted with a protective bar to protect personnel against electrical contact

Starter-motor combinations

Standard application, 230/415 V supply, starter with line connection



Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		current in class 10 rating		Starter reference
230V	400V	Max. permanent	ICL	
kW	kW	A	A	
4	7.5	17	14.8	SJR2-5007
5.5	11	22	21	SJR2-5011
7.5	15	32	28.5	SJR2-5015
9	18.5	38	35	SJR2-5018
11	22	47	42	SJR2-5022
15	30	62	57	SJR2-5030
18.5	37	75	69	SJR2-5037
22	45	88	81	SJR2-5045
30	55	110	100	SJR2-5055
37	75	140	131	SJR2-5075
45	90	170	162	SJR2-5090
55	110	210	195	SJR2-5110
75	132	250	233	SJR2-5132
90	160	320	285	SJR2-5160
110	220	410	388	SJR2-5220
132	250	480	437	SJR2-5250
160	315	590	560	SJR2-5315
—	355	660	605	SJR2-5355
220	400	790	675	SJR2-5400
250	500	1000	855	SJR2-5500
355	630	1200	1045	SJR2-5630

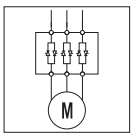
The nominal motor current In must not exceed the max. permanent current in class 10.
(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40° C.
The SJR2- 5000 can be used up to an ambient temperature of 60° C as long as the max. permanent current in class 10 is derated by 2% for each degree above 40° C.
Example: SJR2- 5000-15KWQ at 50° derated by 10 x 2% = 20%, 32 A becomes 32 x 0.8 = 25.6 A (max. nominal motor current).

Starter-motor combinations

Severe application, 230/415 V supply, starter with line connection



Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		Max. permanent current in class 20	ICL rating	Starter reference
230V	400V			
kW	kW	A	A	
3	5. 5	12	14.8	SJR2-5007
4	7. 5	17	21	SJR2-5011
5.5	11	22	28.5	SJR2-5015
7.5	15	32	35	SJR2-5018
9	18. 5	38	42	SJR2-5022
11	22	47	57	SJR2-5030
15	30	62	69	SJR2-5037
18.5	37	75	81	SJR2-5045
22	45	88	100	SJR2-5055
30	55	110	131	SJR2-5075
37	75	140	162	SJR2-5090
45	90	170	195	SJR2-5110
55	110	210	233	SJR2-5132
75	132	250	285	SJR2-5160
90	160	320	388	SJR2-5220
110	220	410	437	SJR2-5250
132	250	480	560	SJR2-5315
160	315	590	605	SJR2-5355
—	355	660	675	SJR2-5400
220	400	790	855	SJR2-5500
250	500	1000	1045	SJR2-5630

The nominal motor current In must not exceed the max. permanent current in class 20.
(1) Value not indicated when there is no corresponding standardised motor.

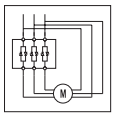
Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40° C.
The SJR2- 5000 can be used up to an ambient temperature of 60° C as long as the max. permanent current in class

20 is derated by 2% for each degree above 40° C.
Example: SJR2- 5000-15KWQ at 50° C derated by 10 x 2% = 20%, 22 A becomes 22 x 0.8 = 17.6 A (max. nominal motor current).

Starter-motor combinations

Standard application, 230/415 V supply, starter with delta connection



Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		Max. permanent current in class 10	ICL rating	Starter reference
230V	400V			
kW	kW	A	A	
7.5	15	29	14.8	SJR2-5007
9	18.5	38	21	SJR2-5011
15	22	55	28.5	SJR2-5015
18.5	30	66	35	SJR2-5018
22	45	81	42	SJR2-5022
30	55	107	57	SJR2-5030
37	55	130	69	SJR2-5037
45	75	152	81	SJR2-5045
55	90	191	100	SJR2-5055
75	110	242	131	SJR2-5075
90	132	294	162	SJR2-5090
110	160	364	195	SJR2-5110
132	220	433	233	SJR2-5132
160	250	554	285	SJR2-5160
220	315	710	388	SJR2-5220
250	355	831	437	SJR2-5250
—	400	1022	560	SJR2-5315
315	500	1143	605	SJR2-5355
355	630	1368	675	SJR2-5400
—	710	1732	855	SJR2-5500
500	—	2078	1045	SJR2-5630

The nominal motor current In must not exceed the max. permanent current in class 10.
(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

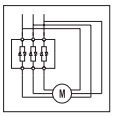
The information in the table above is based on operation at a maximum ambient temperature of 40° C.
The SJR2- 5000 can be used up to an ambient temperature of 60° C as long as the max. permanent current in class

10 is derated by 2% for each degree above 40° C.

Example: SJR2- 5000-15KWQ at 50° C derated by 10 x 2% = 20%, 55 A becomes 55 x 0.8 = 44 A (max. nominal motor current).

Starter-motor combinations

Severe application, 230/415 V supply, starter with delta connection



Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power 230V	400V	Max. permanent current in class 20	ICL rating	Starter reference
kW	kW	A	A	SJR2-5000
5.5	11	22	14.8	SJR2-5007
7.5	15	29	21	SJR2-5011
9	18.5	38	28.5	SJR2-5015
15	22	55	35	SJR2-5018
18.5	30	66	42	SJR2-5022
22	45	81	57	SJR2-5030
30	55	107	69	SJR2-5037
37	55	130	81	SJR2-5045
45	75	152	100	SJR2-5055
55	90	191	131	SJR2-5075
75	110	242	162	SJR2-5090
90	132	294	195	SJR2-5110
110	160	364	233	SJR2-5132
132	220	433	285	SJR2-5160
160	250	554	388	SJR2-5220
220	315	710	437	SJR2-5250
250	355	831	560	SJR2-5315
—	400	1022	605	SJR2-5355
315	500	1143	675	SJR2-5400
355	630	1368	855	SJR2-5500
—	710	1732	1045	SJR2-5630

The nominal motor current In must not exceed the max. permanent current in class 20.
(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40° C.
The SJR2- 5000 can be used up to an ambient temperature of 60° C as long as the max. permanent current in class
20 is derated by 2% for each degree above 40° C.
Example: SJR2- 5000-15KW at 50° C derated by 10 x 2% = 20%, 38 A becomes 38 x 0.8 = 30.4 A (max. nominal motor current).

Steps for setting up the starter

1 - Delivery of the SJR2- 5000

Check that the starter reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
Remove the SJR2- 5000 from its packaging and check that it has not been damaged in transit.

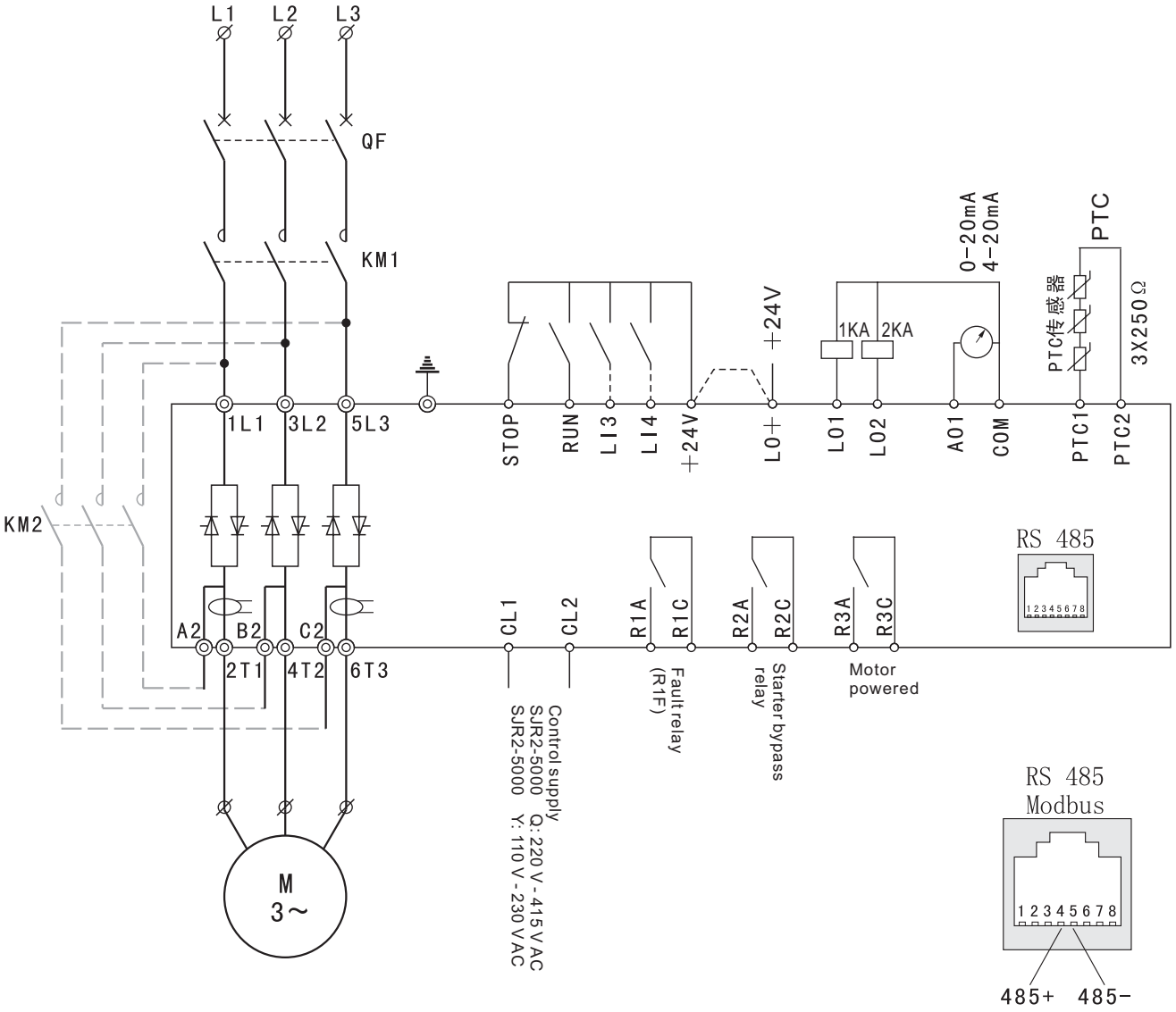
2 - Fit the SJR2- 5000 in accordance with the recommendations on page 12

3 - Connect the following to the SJR2- 5000:

The control line supply (CL1 - CL2), ensuring that it is off
The power line supply (1/L1 - 3/L2 - 5/L3), ensuring that it is off
The motor (2/T1 - 4/T2 - 6/T3), ensuring that its coupling corresponds to the supply voltage

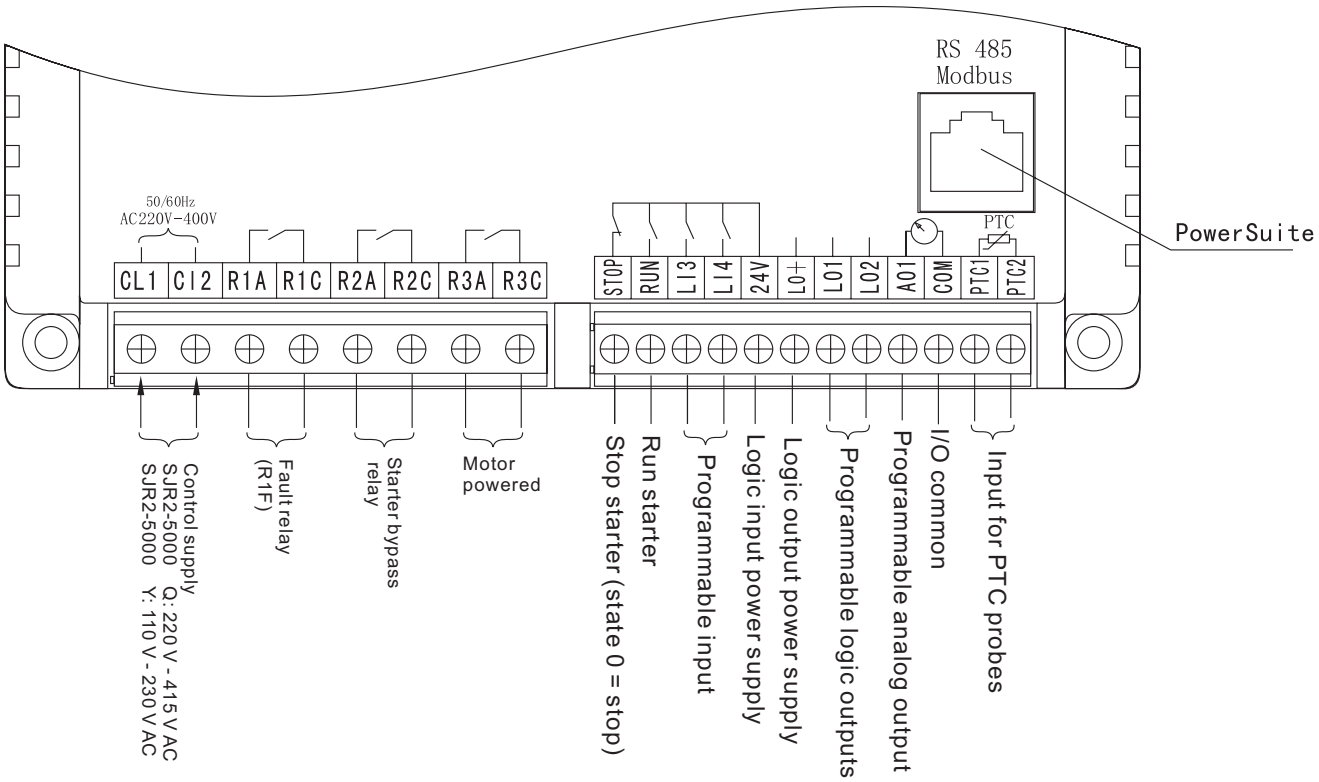
Note: If a bypass contactor is used, connect it to L1 L2 L3 on the line supply side and to terminals A2 B2 C2 provided for this purpose on the SJR2- 5000. See the diagrams on page 30.
If the SJR2-5000 is used in the motor delta windings, follow the recommendations on page 15, the diagrams on page 16.

Block diagram of the power part of the SJR2-5000:



Steps for setting up the starter

Factory configuration of the control terminals:



Wire the fault relay in the line contactor power supply sequence in order to open the electrical circuit in the event of a fault.
For further details refer to the application diagrams.

Connect the RUN and STOP commands and if necessary the other terminal inputs/outputs.

Stop at 1 (on) and RUN at 1 (on): start command.
Stop at 0 (off) and RUN at 1 or at 0: stop command.

4 - Essential information before starting up the SJR2- 5000:

Read the information on the motor rating plate. The values will be used to set parameter (In) in the SEt menu.

5 - Powering up the control part (CL1-CL2) without the power part and without giving the run command

The starter displays: nLP (to indicate that the power is switched off).

The SJR2- 5000 starter is factory-configured for a standard application which does not require specific functions. It has motor protection class 10.

The settings can be changed by accessing the parameters as described on page 18.

In all cases the In parameter must be set to the current value indicated on the motor rating plate.

Control terminals

The control terminals are fitted with one way plug-in connectors.
Maximum connection capacity : 2.5 mm2 (12 AWG)
Maximum tightening torque : 0.4 N.m (3.5 lb.in)

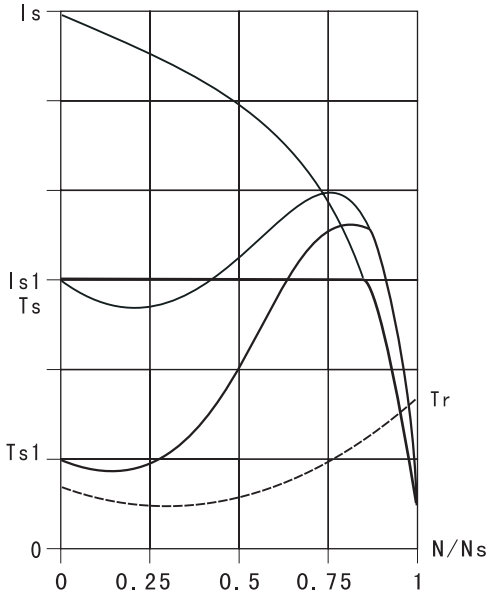
In order to access the control terminals on SJR2- 5000-90KW to -630KW starters, the protective cover must be removed.

Electrical characteristics

Terminals	Function	Characteristics
CL1 CI2	SJR2- control power supply	SJR2- 5000 : 220 to 415 V + 10% - 15%, 50/60 Hz : 110 to 230 V + 10% - 15%, 50/60 Hz Consumption see page 103.
R1A R1C	Normally open (N/O) contact of programmable relay r1	Min. switching capacity 10 mA for 6 V a Max. switching capacity on inductive load (cos ? = 0.5 and L/R = 20 ms): 1.8 A for 230 V c and 30 V a Max. voltage 400 V
R2A R2C	Normally open (N/O) contact of end of starting relay r2	
R3A R3C	Normally open (N/O) contact of programmable relay r3	
STOP RUN LI3 LI4	Stop starter (state 0 = stop) Run starter (state 1 = run if STOP is at 1) Programmable input Programmable input	4 x 24 V logic inputs with 4.3 kΩ impedance Umax = 30 V, Imax = 8 mA state 1: U > 11 V - I > 5 mA state 0: U < 5 V - I < 2 mA
24V	Logic input power supply	+24 V ±25% isolated and protected against short-circuits and overloads, maximum current: 200 mA
LO+	Logic output power supply	To be connected to 24 V or an external source
LO1 LO2	Programmable logic outputs	2 open collector outputs, compatible with level 1 PLC, IEC 65A-68 standard. Power supply +24 V (min. 12 V, max. 30 V) Max. current 200 mA per output with an external source
AO1	Programmable analog output	Output can be configured as 0 - 20 mA or 4 - 20 mA accuracy±5% of the max. value, max. load impedance 500Ω
COM	I/O common	0 V
PTC1 PTC2	Input for PTC probes	Total resistance of probe circuit 750Ω at 25° C (3 x 250Ω probes in series, for example)
RS485	Connector for remote terminal PowerSuite communication bus	RS 485 Modbus

Operating recommendations

Available torque



Curves Ts and Is represent the direct line starting of an asynchronous motor.

Curve Ta1 indicates the total torque range available with an SJR2- 5000, which is dependent on the limiting current ILt. The progression of the starter is controlled by the motor torque within this range.

Tr: Resistive torque, which must always be less than the Ts1 torque.

Selecting the soft start - soft stop unit

S1 motor duty corresponds to starting followed by operation at constant load enabling the thermal equilibrium to be reached.
S4 motor duty corresponds to a cycle comprising starting, operation at constant load and an idle period. This cycle is characterised by a load factor.

The SJR2- 5000 must be selected depending on the type of application ("standard" or "severe") and the nominal power of the motor. "Standard" or "severe" applications define the limiting values of the current and the cycle for motor duties S1 and S4.

Caution: Do not use the SJR2- 5000 upstream of loads other than motors (for example transformers and resistors are forbidden). Do not connect power factor correction capacitors to the terminals of a motor controlled by an SJR2- 5000

Standard application

Example: centrifugal pump
In standard applications, the SJR2- 5000 is designed to provide:
in S1 duty: starting at 4 In for 23 seconds or starting at 3 In for 46 seconds from a cold state.
in S4 duty: a load factor of 50% and 10 starts per hour, with 3 In for 23 seconds or 4 In for 12 seconds or an equivalent thermal cycle.
In this case, the motor thermal protection must conform to protection class 10.

Severe application

Example: grinder
In severe applications, the SJR2- 5000 is designed for S4 duty with a load factor of 50% and 5 starts per hour at 4 In for 23 seconds or an equivalent thermal cycle.
In this case, the motor thermal protection must conform to protection class 20. Current **In must not remain at its factory setting** but must be set to the value indicated on the motor rating plate.

Note: The starter can be oversized by one rating, for example by selecting an SJR2- 5000-7.5KWQ for an 11 kW - 400 V motor in motor duty S4.
To do this, short-circuit the SJR2- at the end of starting. This permits 10 starts per hour at 3 times In for 23 seconds maximum or equivalent and the thermal motor protection must conform to class 10.

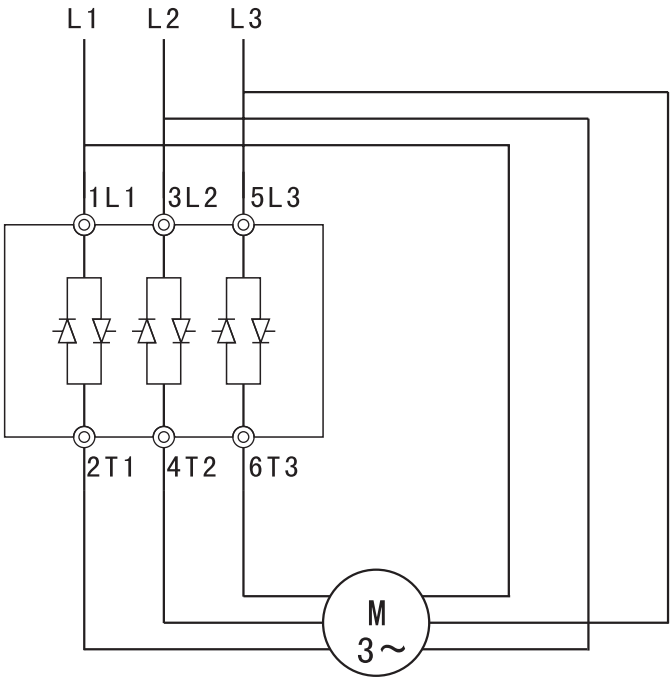
Operating recommendations

The SJR2- 5000 connected in the motor delta winding in series with each winding

SJR2-5000 starters connected to motors with delta connections can be inserted in series in the motor windings. They are powered by a current which is less than the line current by a factor of $1/\sqrt{3}$, which enables a starter with a lower rating to be used.

This option can be configured in the Advanced settings menu (dLt = On).
The nominal current and limiting current settings as well as the current displayed during operation are on-line values and so do not have to be calculated by the user.
The SJR2- 5000 can only be connected in the motor delta winding for SJR2-5000
means that:
- only freewheel stopping is possible
- cascading is not possible
- preheating is not possible

See the tables on page 94 for more information about starter-motor combinations.



Connection in the motor delta winding

Example:
A 400 V - 110 kW motor with a line current of 195 A (nominal current for the delta connection).
The current in each winding is equal to 195/1.7 or 114 A.
The rating is determined by selecting the starter with a maximum permanent nominal current just above this current, i.e. 140 A (SJR2-5000-75KWQ for a standard application).
To avoid having to calculate the rating in this way, use the tables on page 96 and 97 which indicate the rating of the starter corresponding to the motor power for each application type.

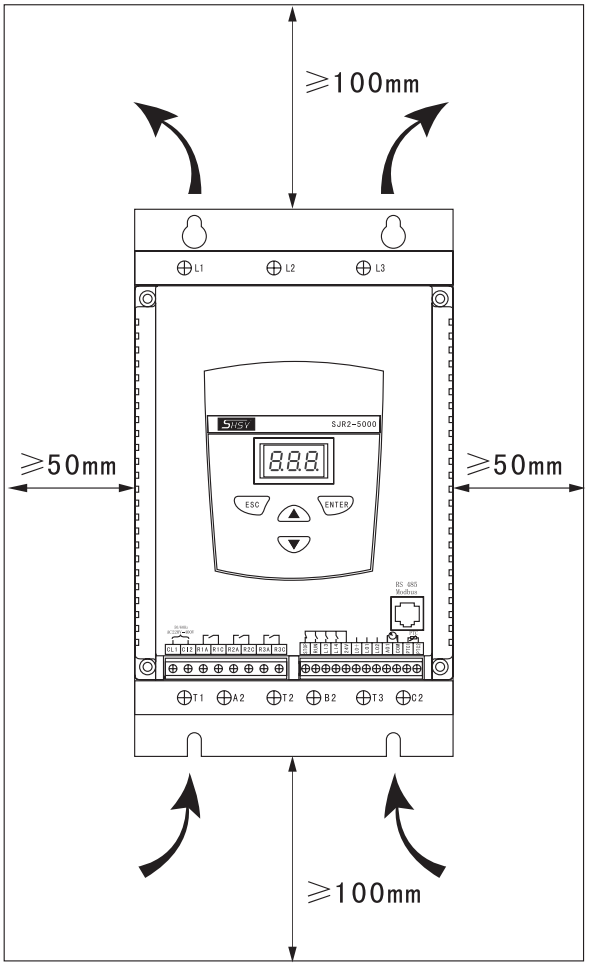
Mounting recommendations

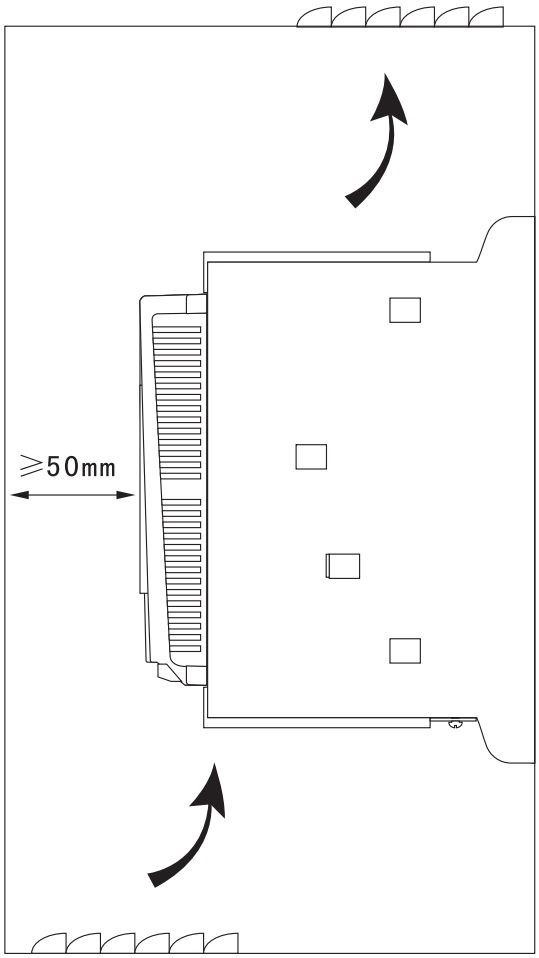
Install the unit vertically, at±10° .

Do not install the unit close to, especially above, heating elements.

Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

Check that no liquids, dust or conductive objects can fall into the starter (degree of protection IP00 from above)





Starter ventilation

On starters fitted with a cooling fan, the fan is switched on automatically as soon as the heSJR2-ink temperature reaches 50° C. It is switched off when the temperature falls back to 40° C.

Fan flow rate:

SJR2- 5000 -15KW and -18.5KW : 14 m ³/hour
SJR2- 5000 -22KW : 28 m ³/hour
SJR2- 5000 -30KW to -55KW : 86 m ³/hour
SJR2- 5000 -75KW and -90KW : 138 m ³/hour
SJR2- 5000 -110KW to -160KW : 280 m ³/hour
SJR2- 5000 -220KW to -3-55KW : 600 m ³/hour
SJR2- 5000 -400KW to -630KW : 1,200 m³/hour

Wiring/RUN - STOP commands

Wiring recommendations

Power
Observe the cable cross-sectional areas recommended in the standards.

The starter must be earthed to conform to the regulations concerning leakage currents. When the use of an upstream "residual current device" for protection is required by the installation standards, an A-Si type device must be used (to avoid accidental tripping during power up). Check its compatibility with the other protective devices. If the installation involves several starters on the same line, each starter must be earthed separately. If necessary, fit a line choke (consult the catalogue).

Keep the power cables separate from circuits in the installation with low-level signals (detectors, PLCs, measuring apparatus, video, telephone).

Control
Keep the control circuits away from the power cables.

Functions of the RUN and STOP logic inputs

page 112)

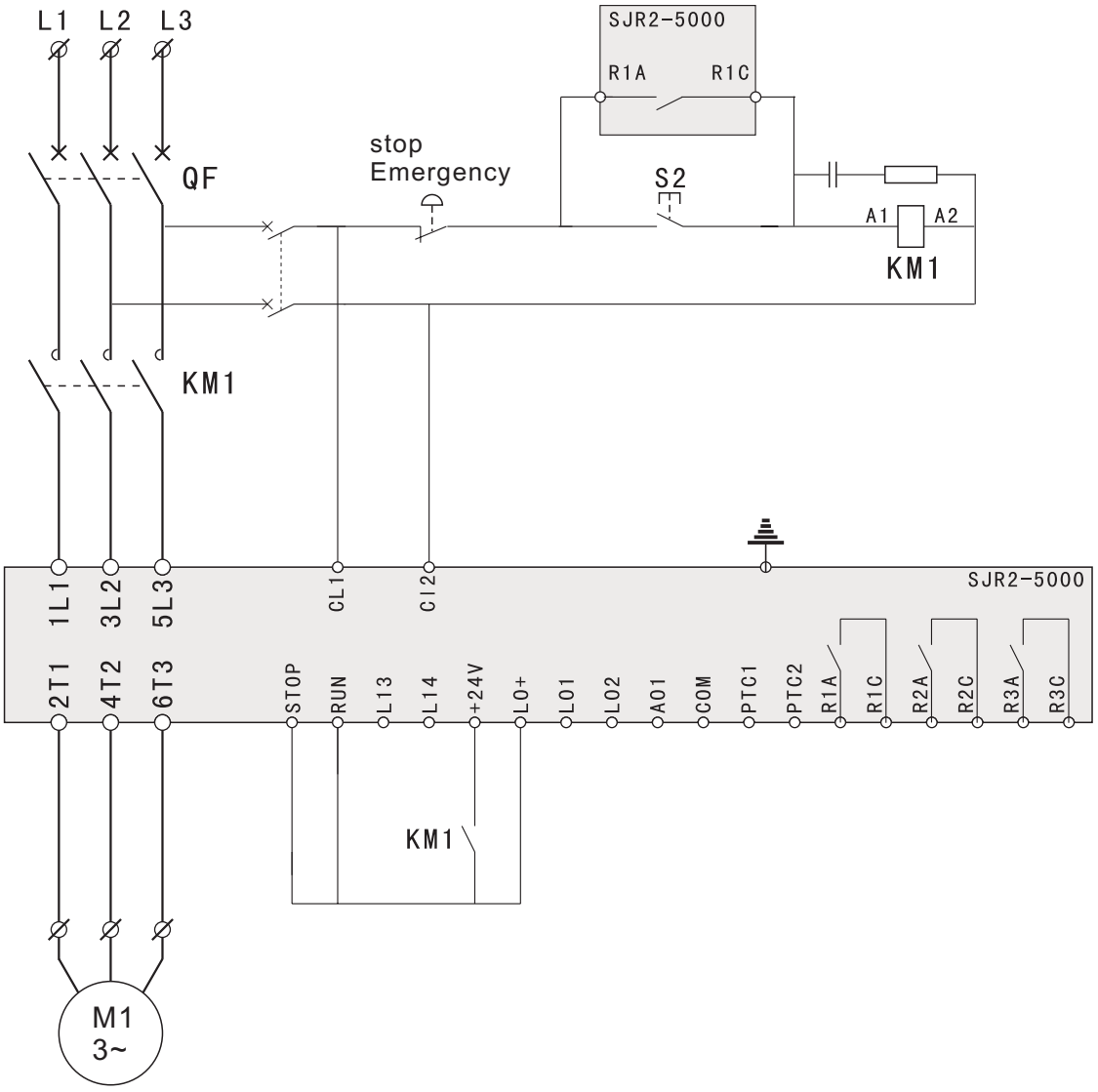
2-wire control
(See application diagram see
Run and stop are controlled by state 1 (run) or 0 (stop), which is taken into account at the same time on the RUN and STOP inputs.

On power-up or a manual fault reset the motor will restart if the RUN command is present.

3-wire control
Run and stop are controlled by 2 different logic inputs.
A stop is obtained on opening (state 0) the STOP input.
The pulse on the RUN input is stored until the stop input opens.

Application diagram

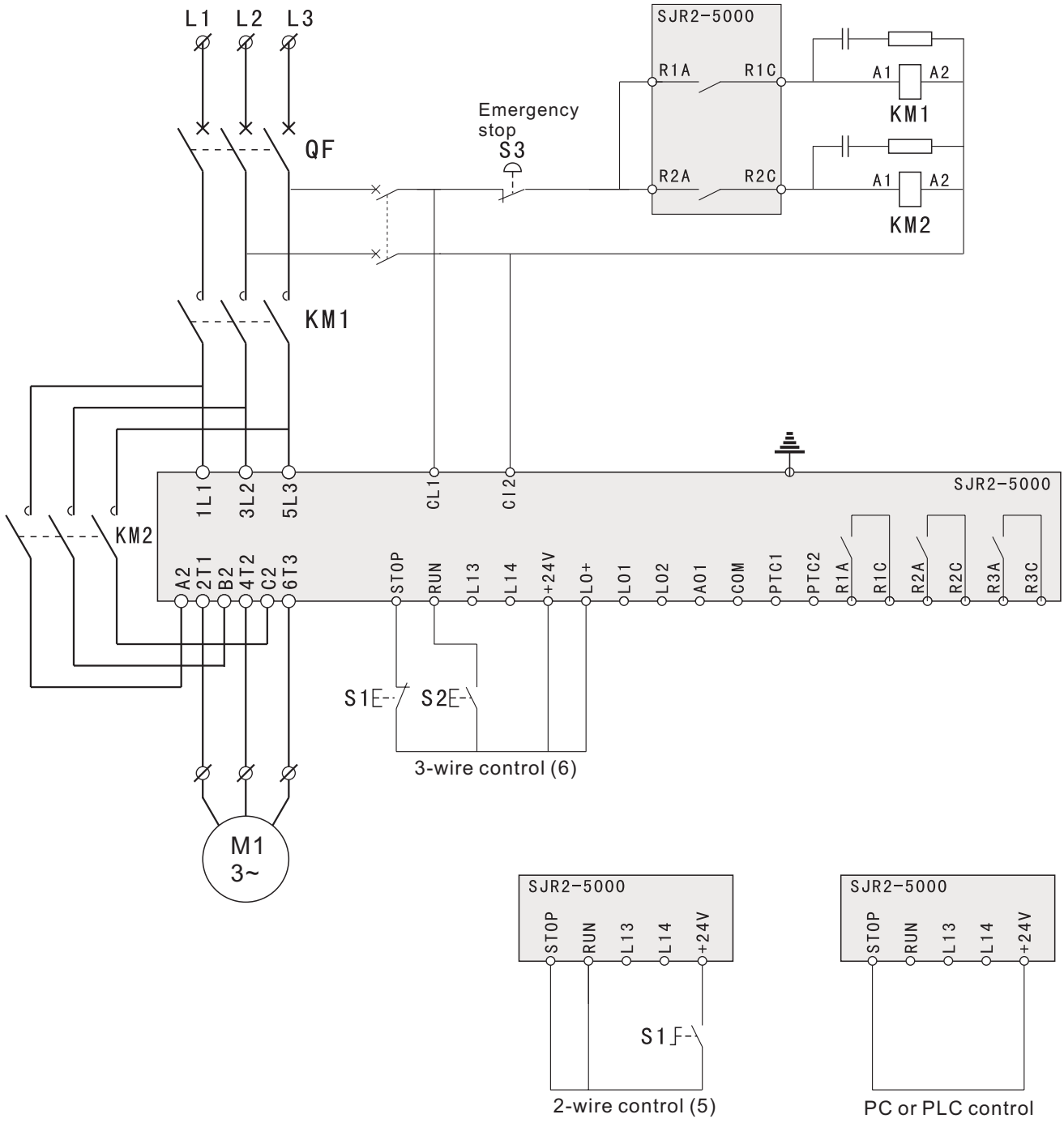
SJR2- 5000: Non-reversing, with line contactor, freewheel stop, type 1 coordination



1) Installation of fast-acting fuses for type 2 coordination (conforming to IEC 60 947-4-2)
(2) Assignment of relay R1: isolating relay (r1I). See "Electrical characteristics", page 9. Beware of the operating limits of the contact, for example when connecting to high rating contactors.
(3) Insert a transformer if the supply voltage is different to that permitted by the SJR2- 5000 control. See " Electrical characteristics", page 9.

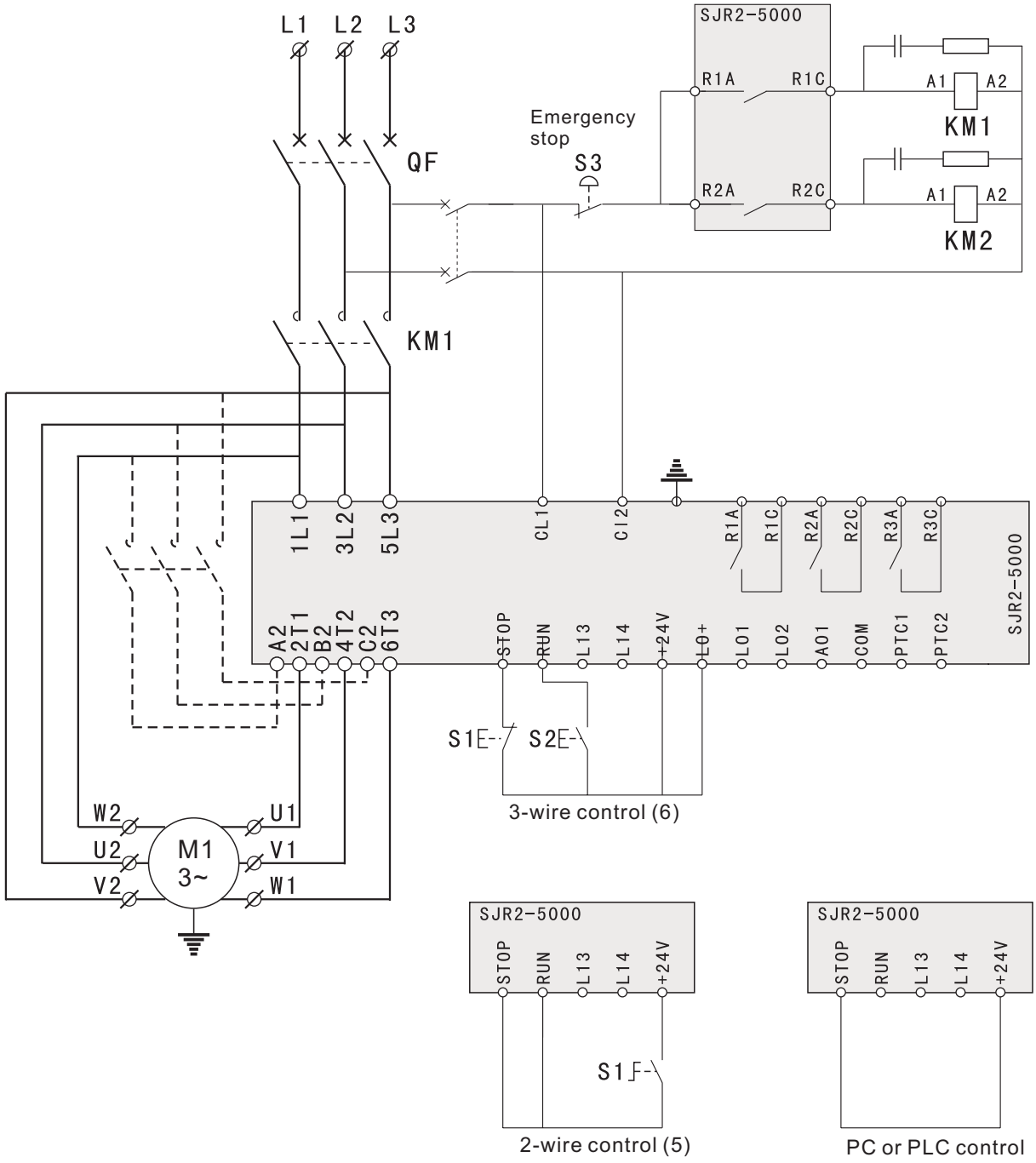
Application diagram

SJR2- 5000: Non-reversing with line contactor, bypass, freewheel or controlled stop, type 1 coordination



Application diagram

SJR2- 5000: Non-reversing, freewheel stop, type 1 coordination, with line contactor, bypass, connection to delta in the motor, SJR2- 5000 only



(1) Installation of fast-acting fuses for type 2 coordination (conforming to IEC 60 947-4-2).
(2) It is mandatory to use KM1. External differential thermal protection will need to be added.
(3) Assignment of relay R1: isolating relay (r1I). Beware of the operating limits of the contact, for example when connecting to high rating contactors. See "Electrical characteristics", page 9.
(4) Beware of the operating limits of the contact, for example when connecting to high rating contactors. See "Electrical characteristics", page 9.
(5) Insert a transformer if the supply voltage is different to that permissible by the SJR2- 5000 control. See "Electrical characteristics", page 109.
(6) See "2-wire control", page 7.
(7) See "3-wire control", page7.

If the bypass contactor is used, "PHF" fault detection can be extended.

Thermal protection

Starter thermal protection

Thermal protection is provided by the PTC probe fitted on the heSJR2-ink and by calculating the temperature rise of the thyristors.

Motor thermal protection

The starter continuously calculates the temperature rise of the motor based on the controlled nominal current In and the actual current absorbed.

Temperature rises can be caused by a low or high overload with a long or short duration. The tripping curves on the following pages are based on the relationship between the starting current Is and the (adjustable) motor current In.

Standard IEC60947-4-2 defines the protection classes giving the starting capacities of the motor (warm or cold start) without thermal faults. Different protection classes are given for a COLD state (corresponding to a stabilised motor thermal state, switched off) and for a WARM state (corresponding to a stabilised motor thermal state, at nominal power).

The starter is factory-set to protection class 10.
This protection class can be modified using the PrO menu.

The thermal protection displayed by the starter corresponds to the iron time constant.
- An overload alarm is activated if the motor exceeds its nominal temperature rise threshold (motor thermal state = 110%).
- A thermal fault stops the motor if it exceeds the critical temperature rise threshold (motor thermal state = 125%).

In the event of a prolonged start, the starter can trip on a fault or thermal alarm even if the value displayed is less than the trip value.

The thermal fault can be indicated by relay R1 if thermal protection has not been disabled.

After the motor has stopped or the starter has been switched off, the thermal state is calculated even if the control circuit is not powered. The SJR2- thermal control prevents the motor from restarting if the temperature rise is too high.

If a special motor is used (flameproof, submersible, etc.) thermal protection should be provided by PTC probes.

Motor thermal protection with PTC probes

PTC probes integrated in the motor to measure its temperature can be connected to the control card terminals. This analog value is managed by the starter.

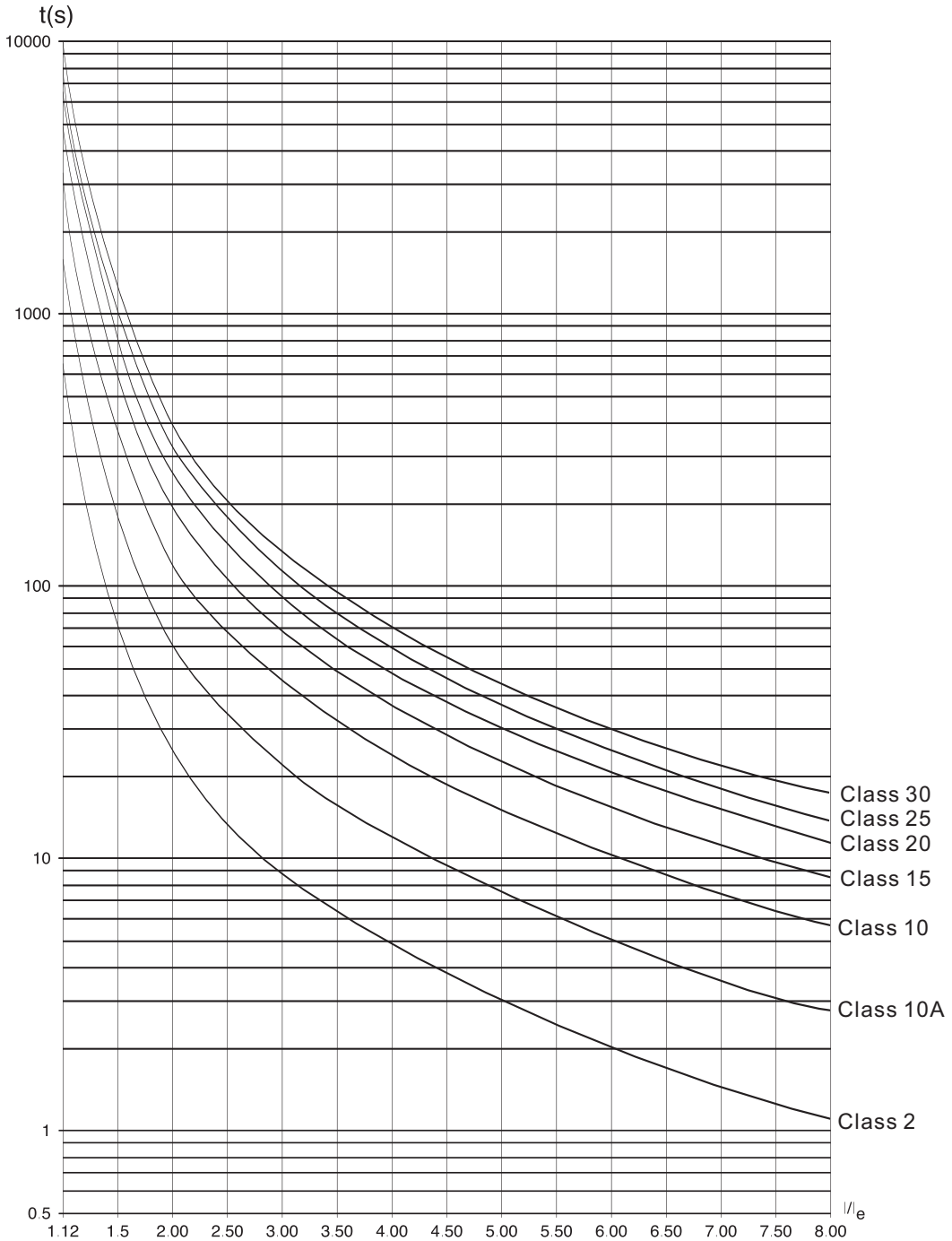
The "PTC probe thermal overshoot" value can be processed and used in two ways:
- stop in the event of a fault if the signal is active
- activate an alarm if the signal is active. This alarm can be displayed in a starter status word (serial link) or on a configurable logic output.

Note:
PTC probe protection does not deactivate the motor thermal protection provided by the calculation. Both types of protection can operate in parallel.

Hermal protection

Motor thermal protection

Cold curves



Trip time for a standard application (class 10)

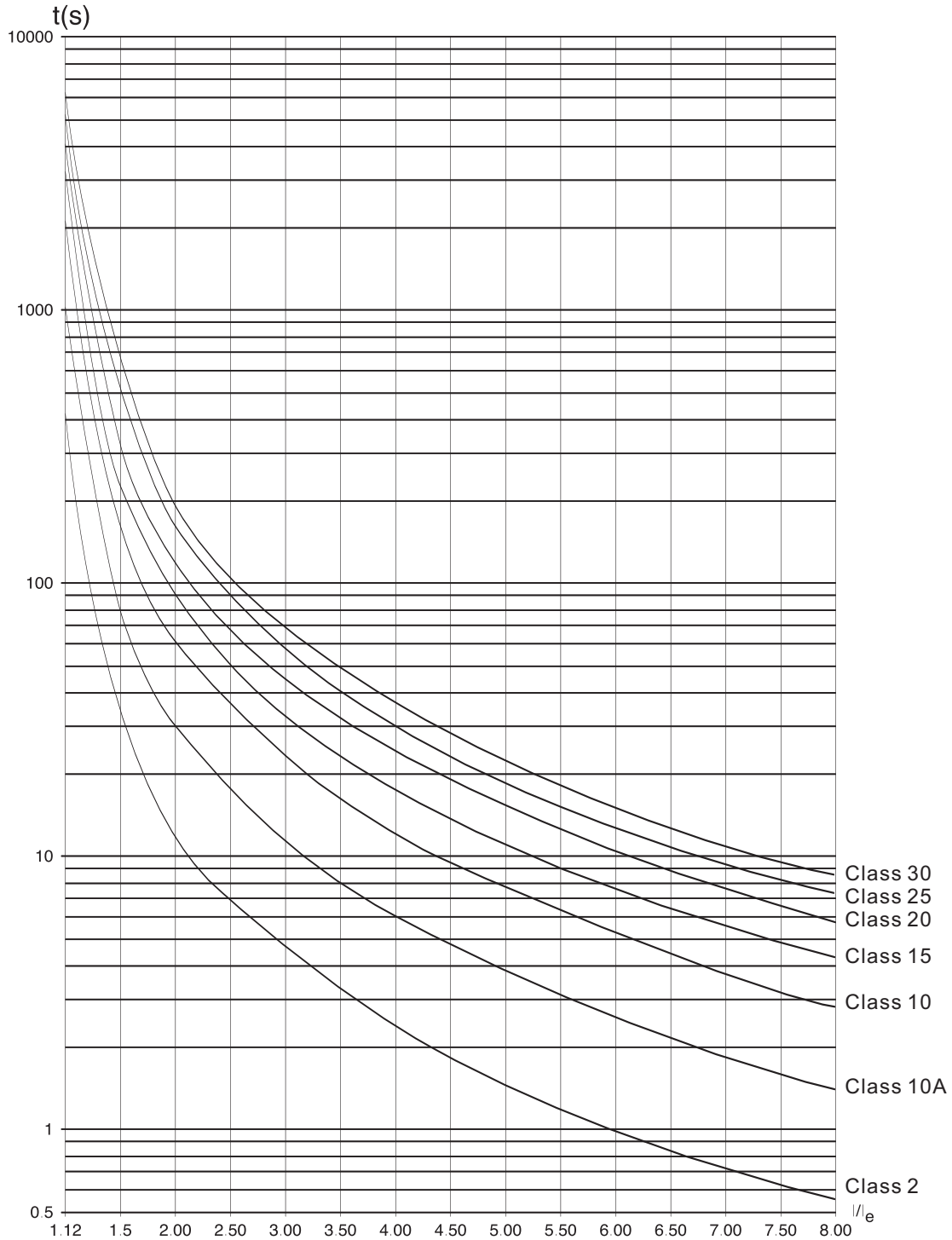
3In	5In
46s	15s

Trip time for a severe application (class 20)

3.5In	5In
63s	29s

Motor thermal protection

Warm curves



Trip time for a standard application (class 10)

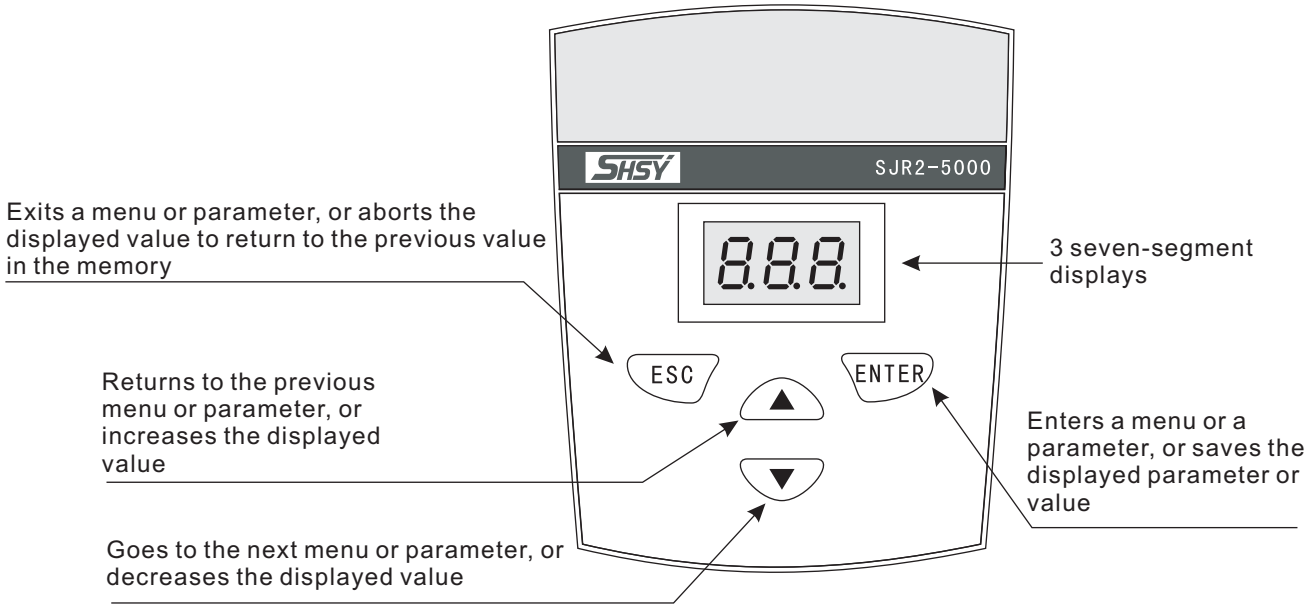
3In	5In
23s	7.5s

Trip time for a severe application (class 20)

3.5In	5In
32s	15s

Display unit and programming

Functions of the keys and the display



Pressing ▲ or ▼ does not store the choices.

Store, save the displayed choice: ENTER

The display flashes when a value is stored.

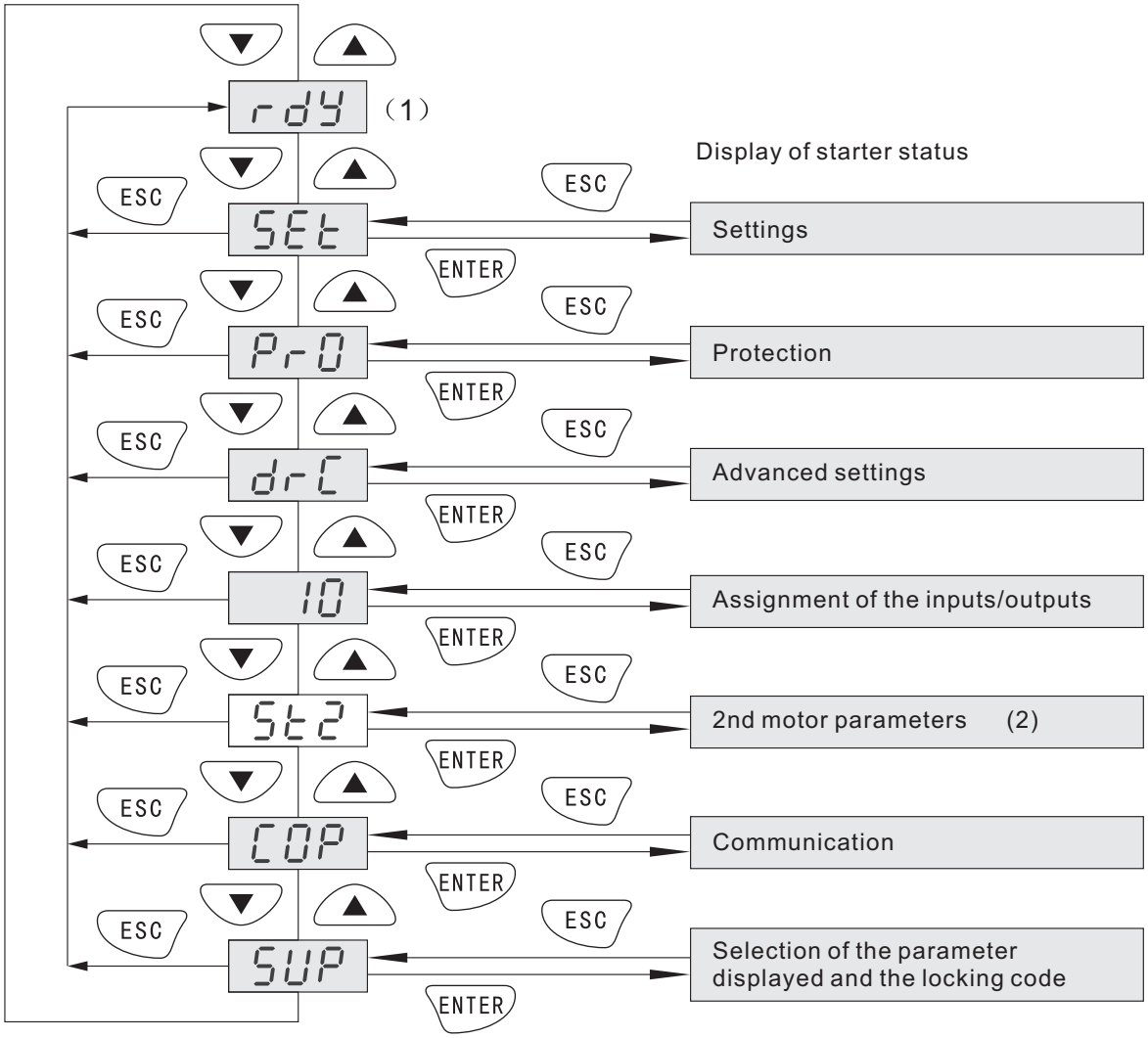
Display principle

The display principle for numbers differs depending on the maximum scale of the parameter and its value.
Max. scale 9990:
- values 0.1 to 99.9 (examples: 05.5 = 5.5; 55.0 = 55; 55.5 = 55.5)
- values 100 to 999 (example: 555 = 555)
- values 1000 to 9990 (example: 5.55 = 5550)

Max. scale 99900:
- values 1 to 999 (examples: 005 = 5; 055 = 55; 550 = 550)
- values 1000 to 9990 (example: 5.55 = 5550)
- values 10000 to 99900 (example: 55.5 = 55500)

Display unit and programming

Accessing menus



(1) Management of the displayed value "XXX" is given in the table on the next page.
(2) Menu St2. is only visible if the "second set of motor parameters" function is configured.

Display of starter status

The displayed value "XXX" follows the following rules:

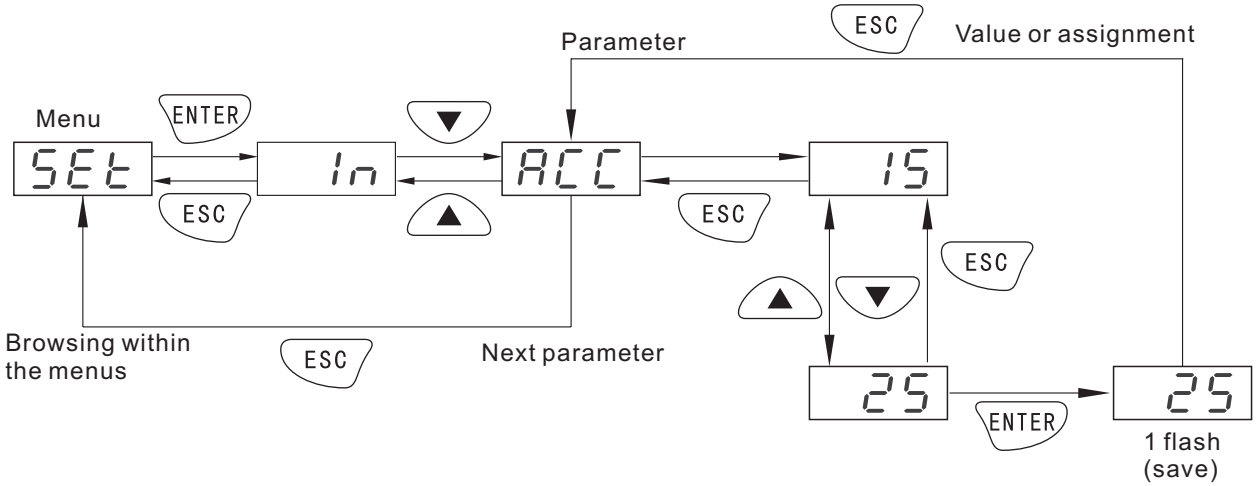
Value displayed	Condition
Fault code	Faulty starter
nLP	Starter without run command and: Power not supplied
rdY	Power supplied
tbS	Starting time delay not elapsed
HEA	Motor heating in progress
Monitoring parameter selected by the user (SUP menu). Factory setting: motor current	Starter with run command
brL	Starter braking
Stb	Waiting for a command (RUN or STOP) in cascade mode

When current limiting is applied to the starter, the displayed value "XXX" flashes.
It is still possible to modify the parameters even if a fault occurs on the starter.

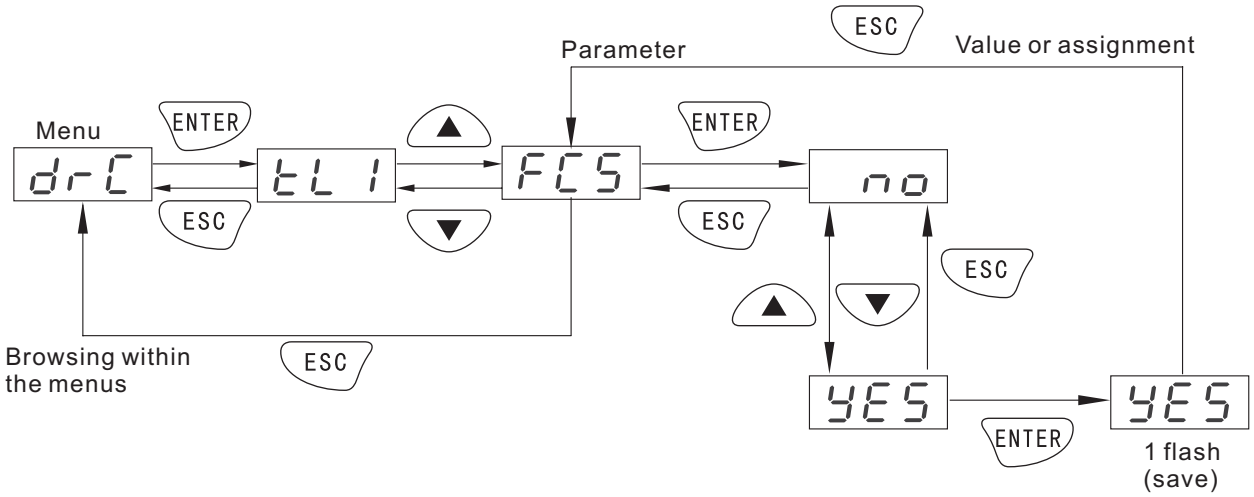
Display unit and programming

Accessing parameters

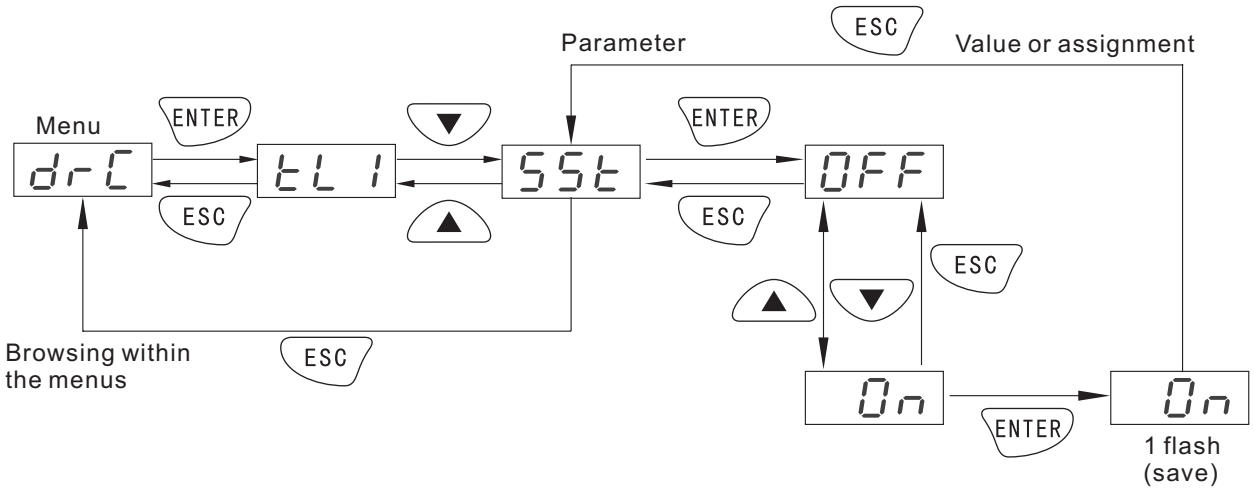
Store, save the displayed choice: ENTER
The display flashes when a value is stored.
Example: 1: **Acceleration ramp time**



Example: 2 : **Return to factory settings**



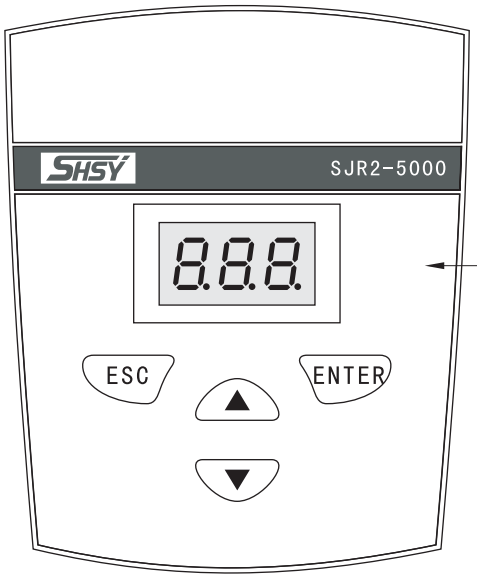
Example: 3: **Tests on small motor**



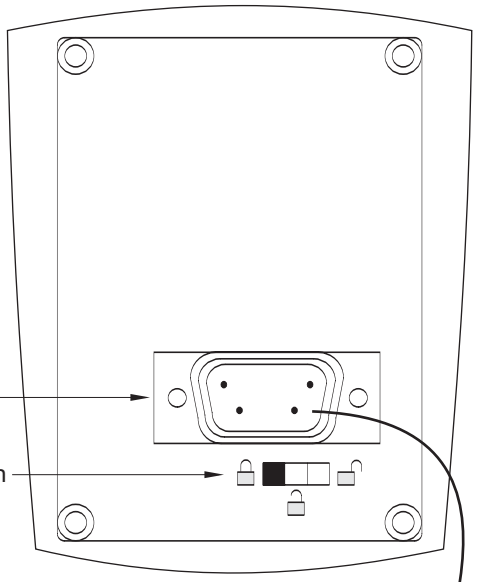
Remote terminal option

The remote terminal can be mounted on the door of the wall-mounted or floor-standing enclosure with a seal which offers IP 65 protection. It has a 3 m cable with connectors and communication is via the RJ45/ Modbus connection on the starter (**see the manual supplied with the terminal**). It has the same display and the same programming buttons as the with the addition of a menu access locking switch.

View of the front panel:



View of the rear panel:



Control of the remote terminal switch

The 3-position switch on the terminal is used as follows:

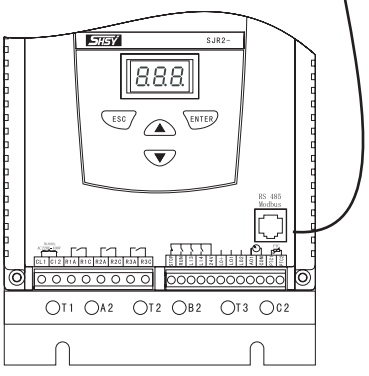
locked position : only the monitoring parameters can be accessed.
When the starter is running, it is
not possible to select a different parameter to be displayed.

Partly locked position : limited access to the SEt, PrO and SUP menu parameters.

unlocked position : all parameters can be accessed.

Any display restrictions applied to the starter by the remote terminal switch will still be in force once the starter has been disconnected and even after it has been switched off.

9-pin Sub D



SJR2- 5000

Factory configuration

Factory settings

The SJR2- 5000 is factory-set for the most common operating conditions:

The SJR2- 5000 is used on the motor line supply (it is not inserted as a delta connection in the motor windings)

Nominal motor current In:
- SJR2- 5000 : preset for a standard 400 V 4-pole motor
- SJR2- 5000 : preset for NEC current, 460 V motor

Limiting current (ILt): 400% of the motor current In

Acceleration ramp (ACC): 15 seconds

Initial torque on starting (tq0): 20% of the nominal torque

Stop (StY): Freewheel stop (-F-)

Motor thermal protection (tHP): class 10 protection curve

Display: rdY (starter ready) with power and control voltage present, motor current operating

Logic inputs:
- LI1: STOP
- LI2: RUN
- LI3: Forced freewheel stop (LIA)
- LI4: Forced local mode (LIL)

Logic outputs:
- LO1: Motor thermal alarm (tA1)
- LO2: Motor powered (mI)

Relay outputs:
- R1: Fault relay (r1I)
- R2: Bypass relay at the end of starting
- R3: Motor powered (mI)

Analog output:
- AO: Motor current (OCr, 0 - 20 mA)

Communication parameters:
- Connected via the serial link, the starter has the logic address (Add) = "0"
- Transmission speed (tbr): 19200 bits per second
- Communication format (FOr): 8 bits, no parity, 1 stop bit (8nI)

If the above values are compatible with the application, the starter can be used without changing the settings.

Configuration/Settings tables

SEt Settings menu (Set)

	Code	Description	Setting range	Factory setting
1	In	Nominal motor current	0.4 and 1.3 ICL	1 ICL
2	ILt	Limiting current	150 to 700% of In, limited to 500% of ICL	400% of In
3	ACC	Acceleration ramp time	1 to 60 s	15s
4	t90	Initial starting torque	0 to 100% of Tn	20%
5	StY	Selection of the type of stop	d， b， F	F
6	dEC	Deceleration ramp time	1 to 60 s	15s
7	EdC	Threshold for changing to freewheel stop mode at the end of deceleration	0 to 100%	20%
8	brC	Internal braking torque level	0 to 100%	50%
9	EbA	Pseudo-continuous braking time	20 to 100%	20%

PrO Protection menu (PrO)

10	tHP	Motor thermal protection	2，10A，10，15，20，25，30，OFF	10
11	ULL	Activation of motor underload	ALA， dEF，0FF	0FF
12	LUL	Motor underload threshold	20% to 100% of Tn	60%
13	tUL	Motor underload time	1 to 60 s	60s
14	tLS	Excessive starting time	10 to 999 s or OFF	0FF
15	OIL	Activation of current overload	ALA，dEF，OFF	OFF
16	LOC	Current overload threshold	50% to 300% of In	80%
17	tOL	Current overload time	0.1 to 60 s	10s
18	PHr	Protection against line phase inversion	321 or 123 or	no
19	tbS	Time before starting	0 to 999 s	2s
20	PHL	Phase loss threshold	5 to 10%	10%
21	PtC	Activation of motor monitoring] by PTC probes	ALA，dEF，OFF:	OFF
22	ArS	Automatic restart	On，OFF	OFF
23	rtH	Reset motor thermal state calculated by the starter	MES	no

drC Advanced settings menu (drC)

24	tL1	Torque limit	10 to 200% or OFF	OFF
25	bSt	Voltage boost level	50 to 100% or OFF OFF	OFF
26	dLt	Starter with delta winding connection	On，OFF	OFF
27	SSt	Tests on small motor	On，OFF	OFF
28	CLP	Torque control (type of control)	On，OFF	On
29	LSC	Stator loss compensation	0 to 90%	50%
30	t1G	Deceleration gain (for torque control)	10 to 50%	450%
31	CSC	Activation of the cascade function	On，OFF	OFF

Configuration/Settings tables

drC

	Code	Description	Setting range	Factory setting
32	ULn	Line voltage	170 to 460 V	400V
33	FrC	Line frequency	50，60，Aut	Aut
34	rPr	Reset kWh or the operating time	No，APH， trE	no
35	FCS	Return to factory settings	No，YES	no
	IO	**I/O menu (IO)**		
36	L I3	Logic inputs	No，LIA，LIE，LIH，LIL，LII，LIt，LIC，LIr，LIS	LIA
37	L I4			LIL
38	IPr	Preheating level	0 to 100%	0%
39	tPr	Time delay before preheating	0 to 999 mn	5s
40	LO1	Logic outputs	No，tAI，rnI，AIL，AUL，APC，As2	tAI
41	LO2			rnI
42	r 1	Relay R1	- r1F: fault relay - r1I: isolating relay.	rIF
43	r 3	Relay R3	no，tAI，rnI，AIL，AUL，APC，AS2	rnI
44	AO	Analog output	no，OCr，Otr，OtH，OCO，OPr，	OCr
45	0-4	Configuration of the type of signal supplied by output AO	020（0-20mA），420（4-20mA）	020
46	ASC	Scale setting of max. signal of the analog output		200
	St2	**2nd motor parameters menu (St2)**		
47	In2	Nominal motor current	0.4 to 1.3 ICL	1 ICL
48	IL2	Limiting current	150 to 700% of In, limited to 500% of ICL	400%
49	AC2	Acceleration ramp time	1 to 60 s	15s
50	t92	Initial starting torque	0 to 100% of Tn	20%
51	dE2	Deceleration ramp time	1 to 60 s	15s
52	Ed2	Threshold for changing to freewheel stop mode at the end of deceleration	0 to 100%	20%
53	tL2	Maximum torque limit	10 to 200% or OFF	OFF
54	t I2	Deceleration gain (for torque control)	10 to 50%	40%
	COP	**Communication menu (COP)**		
55	Add	Starter address by the Rs485 serial link	0 to 31	0
56	tbr	Communication speed in kbps.	4.8，9.6，19.2	19.2
57	FOr	Communication format	8o1，8E1，8n1，8n2	8n1
58	tLP	Serial link timeout setting (1)	0.1 to 60 s	5s
59	PCt		On，OFF	OFF

Parameters in menu Can be selected

Settings menu (Set)

The settings parameters can only be modified when the motor is stopped.

Code		Description	Setting range	Factory setting
1	In	**Nominal motor current**	0.4 and 1.3 ICL	1 ICL (1)

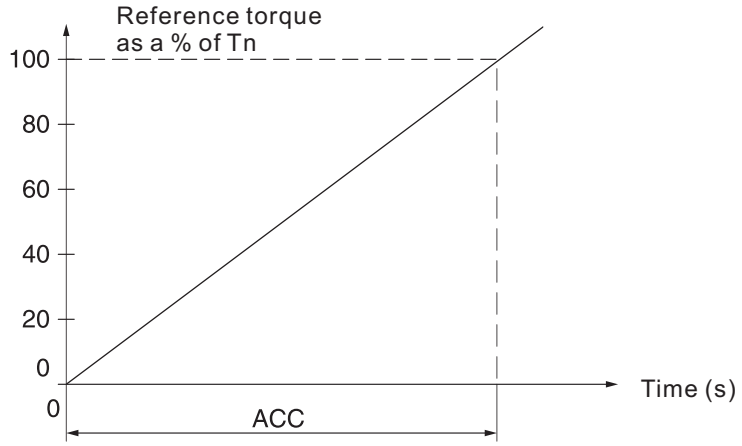
Adjust the value of the nominal motor current indicated on the rating plate, even if the starter is connected in the motor delta winding (dLt in the dYC menu).
Check that the current is between 0.4 and 1.3 ICL (ICL: starter rating).

2	ILt	**Limiting current**	150 to 700% of In, limited to 500% of ICL	400% of In

The limiting current ILt is expressed as a % of In.
It is limited to 500% of ICL (starter rating, see "Starter-motor combinations", page 3.
Limiting current = ILt x In.
Example 1: In = 22 A, ILt = 300%, limiting current = 300% x 22 A = 66 A
Example 2: SJR2- 5000-110KWQ, with ICL = 210 A
In = 195 A, ILt = 700%, limiting current = 700% x 195 = 1365,
limited to 500% x 210 = 1050 A

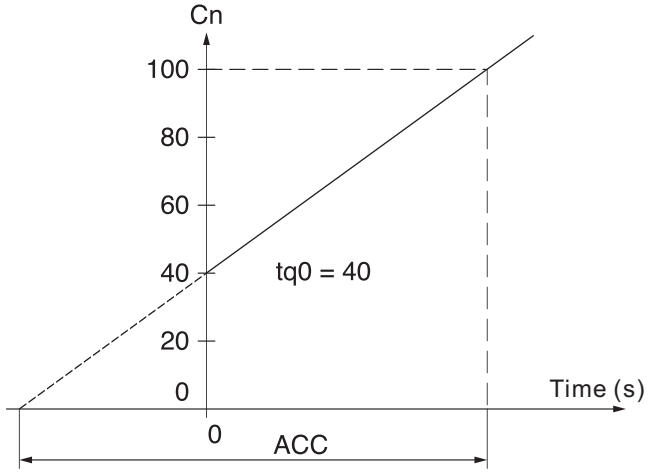
3	ACC	**Acceleration ramp time**	1 to 60 s	15s

This is the rise time of the starter torque between 0 and the nominal torque Tn, i.e. the gradient of the torque ramp on acceleration.



4	t90	**Initial starting torque**	0 to 100% of Tn	20%

Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque.



(1) Factory setting of In corresponding to the usual value of a 4-pole 400 V standardised motor with class 10 protection (for SJR2- 5000).
Factory setting of In corresponding to the usual value of a 460 V standardised motor in accordance with NEC and with class 10 protection (for SJR2- 5000).

Settings menu (Set)

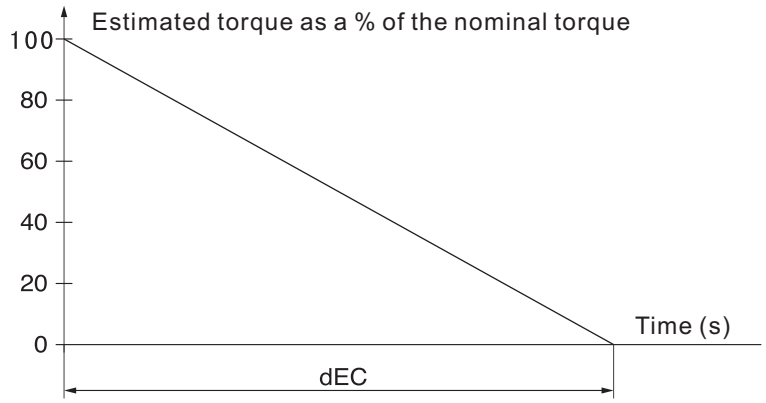
Code		Description	Setting range	Factory setting
5	StY	**Selection of the type of stop**	d, b, F	F

Three types of stop are possible:
- d -: Soft stopping by control of torque. The starter applies a motor torque in order to decelerate prgressively on the ramp, avoiding a rapid stop. This type of stop reduces the risk of water hammer on a pump.
- b -: Dynamic braking stop: The starter generates a braking torque in the motor which will slow the motor down if there is considerable inertia.
- F -: Freewheel stop: No torque is applied to the motor by the starter.

If the starter is connected to "delta in the motor", only stop type F is permitt

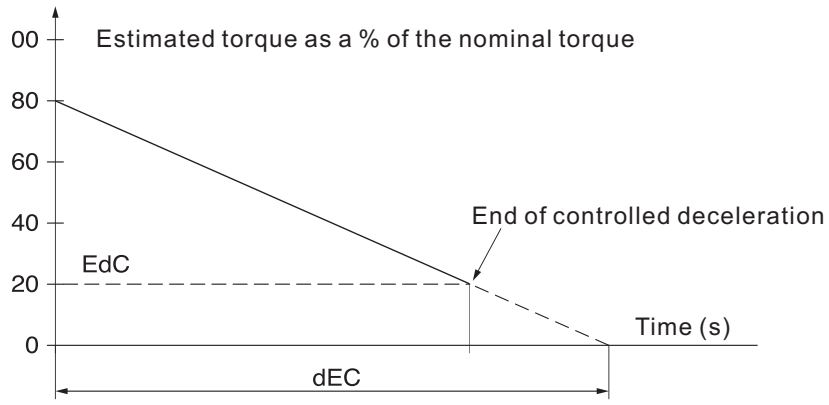
6	dEC	**Deceleration ramp time**	1 to 60 s	15s

This parameter can only be accessed if StY = -d-.
Can be used to set a time between 1 to 60 s to switch from the estimated torque to zero torque (= gradient of the torque ramp on deceleration when a -d- stop is applied).
This modifies the progression of the deceleration and avoids hydraulic shocks in pump applications by modifying the gradient of the torque reference.



7	EdC	**Threshold for changing to freewheel stop mode at the end of deceleration**	0 to 100%	20%

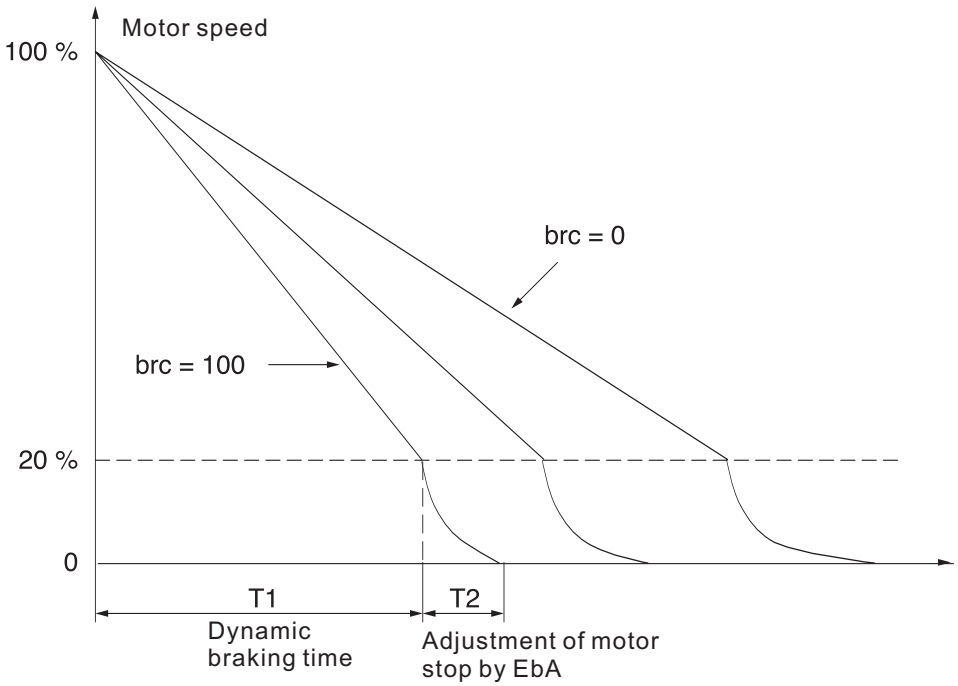
This parameter can only be accessed if StY = -d- and if the CLP parameter in the drive menu (drC) is still set to the factory setting (On).
Can be used to set the final torque level between 0 and 100% of the estimated torque at the start of deceleration.
In pump applications, deceleration control is not necessarily below a load level set by Edc.
If the estimated torque at the start of deceleration is below 20, i.e. 20% of the nominal torque, controlled deceleration is not activated, and the motor changes to freewheel mode.



Code		Description	Setting range	Factory setting
8	brC	**Internal braking torque level**	0 to 100%	50%

This parameter can only be accessed if StY = -b-.
For stop type -b-, used to adjust the braking intensity.

Braking is active up to 20% of the nominal speed. The total stop of the motor is configured by adjusting the injection time of the pseudo-continuous current in the motor (on two phases). See the next parameter EbA.



Pseudo-continuous injection time: T2 = T1 x EbA

Note: Time T1 is not determined by brC. T1 is the time required in seconds for the motor to fall from 100% of the nominal speed to 20% (depends on the motor and application characteristics).

9	EbA	**Pseudo-continuous braking time**	20 to 100%	20%

For stop type -b-, adjustment of the current injection time at the end of braking.
Can be used to adjust the current injection time.
Can be set at 20 to 100% of the dynamic braking time (T1).

Example:
Dynamic braking = 10 s (T1)
The stopping time can vary from 2 to 10 s (T2)

EbA = 20 Corresponds to an injection time of 2 s

EbA = 100 Corresponds to an injection time of 10 s

Factory setting: 20

Protection menu (PrO)

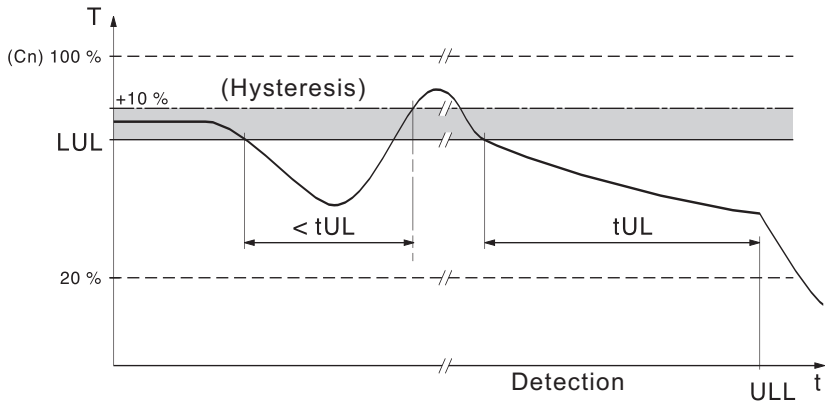
The protection parameters can only be modified when the motor is stopped.

Code		Description	Setting range	Factory setting
10	tHP	**Motor thermal protection**	2, 10A, 10, 15, 20, 25, 30, OFF	10

See "Thermal protection", page 15.
30: class 30
25: class 25
20: class 20 (severe application)
15: class 15
10: class 10 (standard application)
10A: class 10A
2: sub-class 2
OFF: no protection

11	ULL	**Activation of motor underload**	ALA, dEF, OFF	OFF

If the motor torque is less than an adjustable threshold LUL for a period of time longer than an adjustable value tUL:
- ALA: an alarm is activated (internal bit and configurable logic output)
- dEF: the starter is locked and the ULF fault is displayed
- OFF: no protection



12	LUL	**Motor underload threshold**	20% to 100% of Tn	60%

This parameter is not available if ULL = OFF.
LUL can be set at between 20% and 100% of the nominal motor torque.

13	tUL	**Motor underload time**	1 to 60 s	60s

This parameter is not available if ULL = OFF.
Time delay tUL is activated as soon as the motor torque falls below threshold LUL. It is reset to zero if the torque rises above this threshold LUL by + 10% (hysteresis).

14	tLS	**Excessive starting time**	10 to 999 s or OFF	OFF

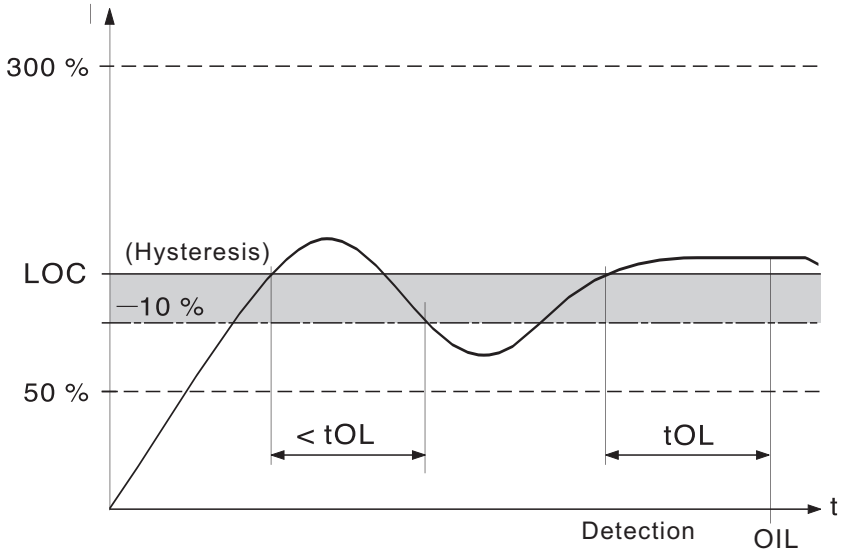
If the starting time exceeds the value of tLS, the starter is locked and displays the fault StF. The conditions for the end of starting are: line voltage applied to the motor (min. firing angle) and motor current less than 1.3 In.
- OFF: no protection

The configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation

Protection menu (PrO)

Code		Description	Setting range	Factory setting
15	OIL	**Activation of current overload**	ALA，dEF，OFF	OFF

Function active only in steady state
If the motor current exceeds an adjustable threshold LOC for a period of time longer than an adjustable value tOL:
- ALA: an alarm is activated (internal bit and configurable logic output)
- dEF: the starter is locked and the OLC fault is displayed
- OFF: no protection



16	LOC	**Current overload threshold**	50% to 300% of In	80%

This parameter is not available if OIL = OFF.
LOC can be set at between 50% and 300% of the nominal motor current.

17	tOL	**Current overload time**	0.1 to 60 s	10s

This parameter is not available if OIL = OFF.
Time delay tOL is activated as soon as the motor current rises above threshold LOC. It is reset to zero if the current falls below this threshold LOC again by at least 10% (hysteresis).

The factory configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation

Protection menu (PrO)

The protection parameters can only be modified when the motor is stopped.

Code		Description	Setting range	Factory setting
18	PHr	**Protection against line phase inversion**	321 or 123 or	no

If the line phases are not in the order configured, the starter locks and displays the fault PIF.
- 321: reverse (L3 - L2 - L1)
- 123: forward (L1 - L2 - L3)
- no: no monitoring

19	tbS	**Time before starting**	0 to 999 s	2s

Avoids starts in quick succession which may overheat the motor. The time delay starts when the motor changes to freewheel mode.
In 2-wire control, the motor is restarted after the time delay if the RUN command input is still activated.
In 3-wire control, the motor is restarted after the time delay if a new RUN command is sent (rising edge).
The starter displays "tbS" during the time delay.

20	PHL	**Phase loss threshold**	5 to 10%	10%

If the motor current falls below this threshold in one phase for 0.5 s or in all three phases for 0.2 s, the starter locks and displays the fault PHF.
Can be set at between 5 and 10% of the ICL starter rating.

21	PtC	**Activation of motor monitoring by PTC probes**	ALA，dEF，OFF:	OFF

The PTC probes on the motor must be connected to the correct analog input. This protection is independent of the calculated thermal protection (tHP parameter). Both types of protection can be used simultaneously.
- ALA: an alarm is activated (internal bit and assignable logic output)
- dEF: the starter is locked and the OtF fault is displayed
- OFF: no protection

22	Ar S	**Automatic restart**	On ， OFF	OFF

After locking on a fault, if the fault has disappeared and the other operating conditions permit the restart.
A series of automatic attempts are made to restart the starter at intervals of 60 s. If a restart has not been possible after 6 attempts, the procedure is abandoned and the starter remains locked until it is switched off then switched on again or reset manually (see "Faults - causes - remedies"). The following faults permit this function: PHF, FrF, CLF, USF. The starter fault relay remains activated if this function is active. The run command must be maintained.
This function can only be used in 2-wire control.
- OFF: Function inactive
- On: Function active

Check that an accidental start will not endanger personnel or equipment in any way

23	rtH	**Reset motor thermal state calculated by the starter**	no - YES	no

- no: Function inactive
- YES: Function active

The factory configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation

Advanced settings menu (drC)

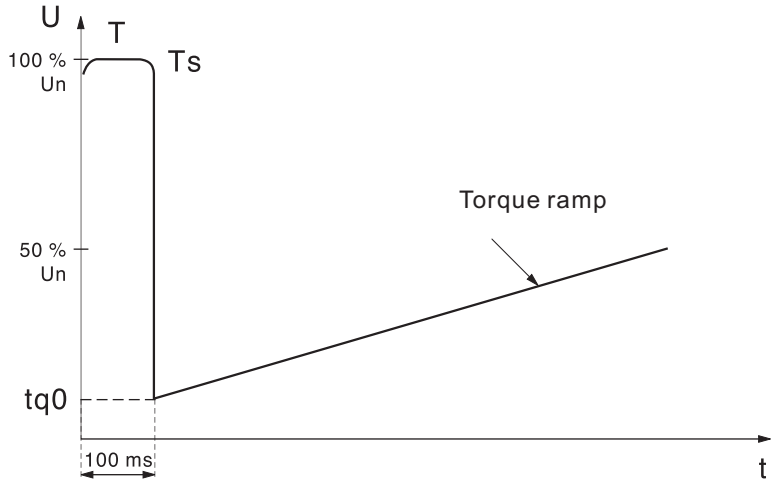
The Advanced setting parameters can only be modified when the motor is stopped.

Code		Description	Setting range	Factory setting
24	tL 1	**Torque limit**	10 to 200% or OFF	OFF

Can be used to limit the torque reference to avoid regenerative behaviour in applications with high inertia. Can be used for constant torque starting if tqO = tLI.
- OFF: no limit
- 10 to 200: limit set as a % of the nominal torque

25	bSt	**Voltage boost level**	50 to 100% or OFF OFF	OFF

An adjustable voltage can be applied when a run command is present for 100 ms. Once this time has elapsed, the starter follows a standard acceleration ramp starting at the initial torque value set (tq0).
This function can be used to avoid any "starting" torque (phenomenon caused by friction on stopping or by mechanical play).
- OFF: Function inactive
- 50 to 100: setting as a % of the nominal motor voltage



In the case of overrating the starter (Im motor> Im SJR2-5000), a value of the parameter bSt too high can cause the starter to trip in OCF

26	dLt	**Starter with delta winding connection**	On，OFF	OFF

This configuration will permit a rating increase of 1.7 in the starter power but does not permit braking or deceleration.
- OFF: normal line torque
- On: motor with delta winding connection

The nominal motor current In is the same as that specified on the motor rating plate and the current displayed corresponds to the line current of the line supply. The nominal current value In (SEt menu) is the same as that specified on the motor rating plate for the delta connection. The starter carries out the conversion itself to control the current in the windings.
This parameter can only be accessed for SJR2- 5000 starters.

With this function, only freewheel type stopping is possible
Cascading is not possible
Preheating is not possible

Advanced settings menu (drC)

Code		Description	Setting range	Factory setting
27	SSt	**Tests on small motor**	On，OF F	OFF

To check the starter in a testing or maintenance environment, on a motor whose power is very much lower than the starter rating (in particular for high power starters).
The torque control parameter CLP is automatically deactivated.
- OFF: function inactive
- On: function active

SSt returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the PHF fault and the CLP parameter return to their initial configuration.

28	CLP	**Torque control** (type of control)	On，OFF	On

- OFF: function inactive
- On: function active

In the On position, starting and deceleration follow the torque ramp.
In the OFF position, starting and deceleration are controlled by voltage variation.
Voltage control is recommended for applications which use motors in parallel on one starter or a motor whose power is very low in relation to the starter rating (use of an undersized motor to test the starter) (CLP = OFF).

29	LSC	**Stator loss compensation**	0 to 90%	

Parameter active in acceleration phases (and deceleration phases if StY = -d-).
In the event of torque oscillations, reduce this parameter gradually until the device is functioning correctly.
Oscillations are most common if the starter is connected in the motor delta winding or in motors with excessive slip.

30	tIG	**Deceleration gain** (for torque control)	10 to 50%	

This parameter can only be accessed if CLP = On and if the StY parameter (SEt Settings menu) = -d-.
Can be used to eliminate instability during deceleration.
Adjust the parameter in accordance with the oscillations.

31	CSC	**Activation of the cascade function**	On，OFF	OFF

- On: function active
- OFF: function inactive

This parameter can only be accessed if relay R1 has previously been assigned to the "isolating relay" function and if the "forced freewheel stop", "starter in the motor delta winding" and "preheating" functions are not configured.
Assign an input LI = LIC.
255 motors max.

32	ULn	**Line voltage**	170 to 460 V	400V

This parameter is used to calculate the power displayed (LPr and LAP parameters from the SUP menu). The display will only be accurate if this parameter has been set correctly.

Advanced settings menu (drC)

Code		Description	Setting range	Factory setting
33	FrC	**Line frequency**	50，60，Aut	Aut

- 50: 50 Hz (monitoring tolerance of frequency fault FrF = ± 20%).
- 60: 60 Hz (monitoring tolerance of frequency fault FrF = ± 20%).
- AUt: automatic recognition of the line frequency by the starter with frequency fault monitoring tolerance FrF =± 5%.

Selections 50 and 60 are recommended if the power supply is provided by a generating set, given their high tolerance.

34	rPr	**Reset kWh or the operating time**	No，APH， trE	no

- no: function inactive
- APH: kWh reset to zero
- trE: operating time reset to zero

The reset command must be confirmed with ENT. APH and trE take effect immediately. The parameter then automatically returns to number

35	FCS	**Return to factory settings**	No，YES	no

Used to reset all parameters to their factory settings.
- no: function inactive
- YES: function active, must be pressed and held down (for approx. 2 s) in order to be taken into account. The display flashes to confirm. The FCS parameter is then automatically reset to no by pressing ESC.

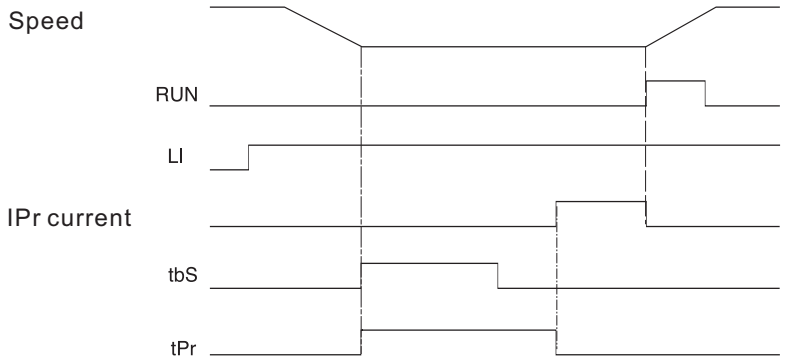
This parameter cannot be modified via the remote terminal.

I/O menu (IO)

The I/O parameters can only be modified when the motor is stopped.

Code		Description	Setting range	Factory setting
36	LI3	**Logic inputs**	no, LIA , LIE, LIH, LIL, LII , LIt, LIC, LIr, LIS,	LIA
37	LI4			LIL

The selected function is active if the input is powered up.
- no: not assigned.
- LIA: forced freewheel stop as soon as a STOP command is received. This selection does not appear if the CSC parameter in the drC menu is set to "On". Forces the configuration of a freewheel type stop, but does not control the stop.
- LIE: external fault. Enables the starter to detect an external user fault (level, pressure, etc.). The motor comes to a freewheel stop and the starter displays EtF.
- LIH: (1) motor preheating. This selection does not appear if the CSC parameter in the drC menu is set to "On". Used to prevent the motor from freezing or to prevent temperature deviations which may cause condensation. Once the motor has stopped an adjustable current IPr flows through it after an adjustable time delay tPr, if the input is active. This current heSJR2- the motor without causing it to rotate. IPr and tbr must be adjusted (see below).



Preheating starts when the input is activated and the motor has stopped, after time delays tPr and tbS (PrO menu) have elapsed. Preheating stops if the input is deactivated, if a run command is sent or if the STOP input is activated.
- LIL: force to local control mode. If a serial link is used, changes from line mode (control via serial link) to local mode (control via terminals).
- LII: (1) inhibits all protection. Warning: This type of use invalidates the starter warranty. Used to override the starter in the event of an emergency (smoke extraction system for example).
- LIt: reset motor thermal fault
- LIC: activation of the cascade function. In this case motor thermal protection is disabled and relay R1 must be configured as an isolating relay. Can be used to start and decelerate several identical motors one after the other with a single starter (see application diagram).
- LIr: reset faults which can be reset
- LIS: activation of second set of motor parameters. Used to start and decelerate two different motors one after the other or one motor with two different configurations using a single starter.

38	IPr	**Preheating level**	0 to 100%	0%

This parameter appears after LI3 or LI4 have been assigned to function LIH: motor preheating. It can be used to set the preheating current. Use a true value current reading ammeter to set the current level.
Parameter In has no effect on the current Ipr.

39	tPr	**Time delay before preheating**	0 to 999 mn	5s

This parameter appears after LI3 or LI4 have been assigned to function LIH: motor preheating. Preheating starts when the input is activated, after time delays tPr and tbS (PrO menu) have elapsed.

(1) In order for this assignment o take effect, ENT must be pressed for 10 s (confirmed by flashing display).
This parameter cannot be modified via the remote terminal.

I/O menu (IO)

Code		Description	Setting range	Factory setting
40	LO1	**Logic outputs**		tAI
41	LO2			RnI

- no: not assigned.
- tAI: motor thermal alarm. See page 17
- rnI: motor powered (indicates that there may be current in the motor).
- AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See "Function active only in steady state", page 30.
- AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 30.
- APC: motor PTC probe alarm. See "Activation of motor monitoring by PTC probes", page 32.
- AS2: second set of motor parameters activated. See LIS "Logic inputs", page 36.

42	r 1	**Relay R1**		rIF

- r1F: fault relay. Relay R1 is activated when the starter is powered up (minimum CL1/CL2 control). Relay R1 is deactivated when a fault occurs and the motor switches to freewheel mode. See the special case when the automatic restart function is activated and Faults - causes - remedies.
- r1I: isolating relay. Relay R1 is designed to control the line contactor on the basis of the RUN and STOP commands and to indicate faults. Relay R1 is activated by a RUN command (or a preheating command). It is deactivated at the end of braking or deceleration or when the motor switches to freewheel mode after a STOP command. It is also deactivated when a fault occurs. The motor switches to freewheel mode at this point.

43	r 3	**Relay R3**		rnI

- no: not assigned.
- tAI: motor thermal alarm. See page 15.
- rnI: motor powered (indicates that there may be current in the motor).
- AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See "Function active only in steady state", page30.
- AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 30.
- APC: motor PTC probe alarm. See "Activation of motor monitoring by PTC probes", page 32.
- AS2: second set of motor parameters activated. See LIS "Logic inputs", 36.

End of starting relay R2

(cannot be assigned)
The end of starting relay R2 is activated when the starter is powered up, no faults are present and the motor has completed the start-up phase. It is deactivated in the event of a stop request or a fault. It has one normally open contact (N/O).

It can be used to bypass the SJR2- 5000 at the end of the starting phase.

44	AO	**Analog output**		OCr

- no: not assigned
- OCr: motor current
- Otr: motor torque
- OtH: motor thermal state
- OCO: cosine φ
- OPr: active power

45	0-4	**Configuration of the type of signal supplied by output AO**	020 - 420	020

- 020: 0 - 20 mA signal
- 420: 4 - 20 mA signal

46	ASC	**Scale setting of max. signal of the analog output**	50 to 500%	200

As a percentage of the nominal value of the parameter configured or of 1 for the cosine φ.

2nd motor parameters menu (St2)

This menu is only visible if a logic input is assigned to the function for activating a second set of motor parameters (LIS) in the I/O menu.

Code		Description	Setting range	Factory setting
47	In2	**Nominal motor current**	0.4 to 1.3 ICL	1 ICL (1)

Adjust the value of the nominal motor current indicated on the rating plate, even if the starter is connected in the motor delta winding (PrO).
Check that the current is between 0.4 and 1.3 ICL (ICL: starter rating). See "Starter-motor combinations", page 3.

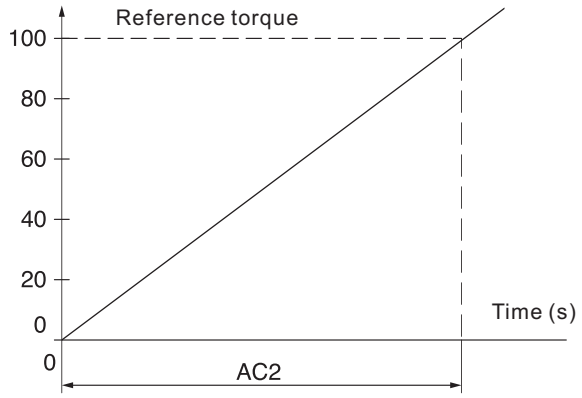
48	IL2	**Limiting current**	150 to 700% of In, limited to 500% of ICL	400%

The limiting current IL2 is expressed as a % of In2.
It is limited to 500% of ICL (starter rating, see "Starter-motor combinations", page 94).
Limiting current = IL2 x In2

Example 1: In2 = 21 A, IL2 = 300%, limiting current = 300% x 22 A = 66 A
Example 2: SJR2- 5000-110KWQ, with ICL = 210 A
In2 = 195 A, IL2 = 700%, limiting current = 700% x 195 = 1365,
limited to 500% x 210 = 1050 A

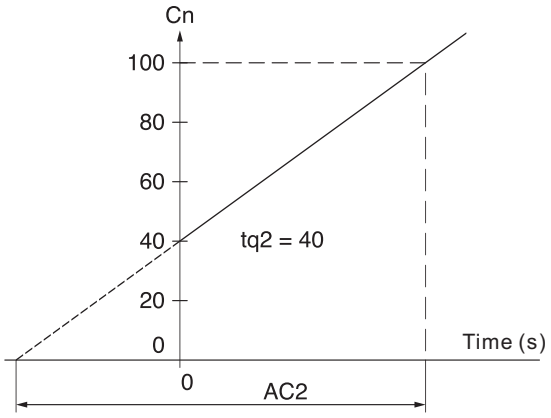
49	AC2	**Acceleration ramp time**	1 to 60 s	15s

This is the rise time of the starter torque between 0 and the nominal torque Tn, i.e. the gradient of the torque ramp on acceleration.



50	tq2	**Initial starting torque**	0 to 100% of Tn	20%

Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque.

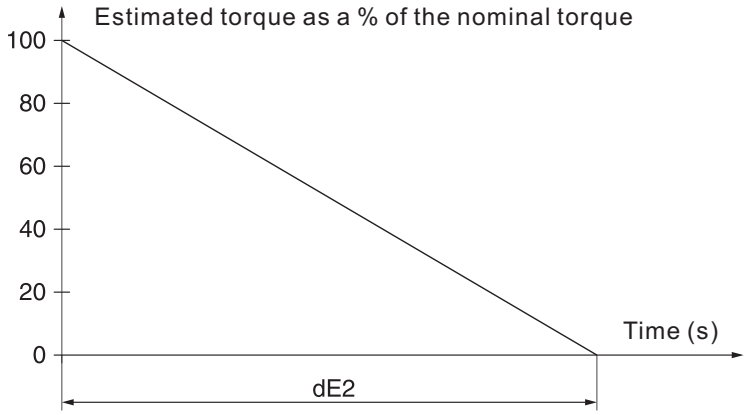


(1) Factory setting of In2 corresponding to the usual value of a 4-pole 400 V standardised motor with class 10 protection (for SJR2- 5000).
Factory setting of In2 corresponding to the usual value of a 460 V standardised motor in accordance with NEC and with class 10 protection (for SJR2- 5000).

2nd motor parameters menu (St2)

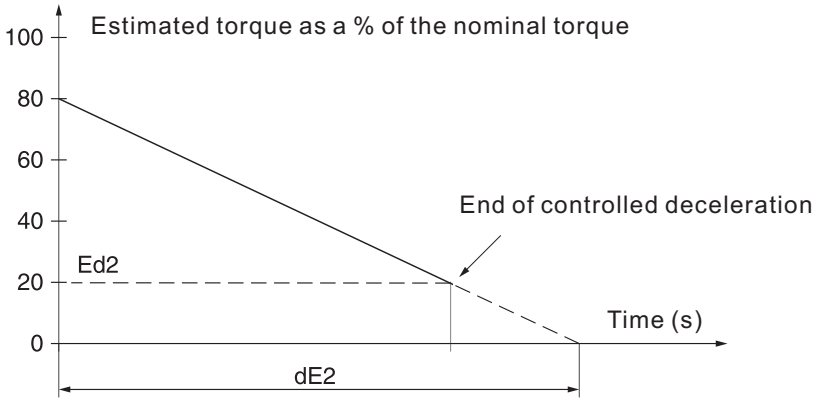
Code		Description	Setting range	Factory setting
51	dE2	**Deceleration ramp time**	1 to 60 s	15s

This parameter can only be accessed if StY = -d-.
Used to set a time between 1 to 60 s to switch from the estimated torque to zero torque (= gradient of the torque ramp on deceleration when a -d- stop is applied).
This modifies the progression of the deceleration and avoids hydraulic shocks in pump applications by modifying the gradient of the torque reference.



52	Ed2	**Threshold for changing to freewheel stop mode at the end of deceleration**	0 to 100%	20%

This parameter can only be accessed if StY = -d- and if the CLP parameter in the drive menu (drC) is still set to the factory setting (On).
Used to set the final torque level between 0 and 100% of the torque estimated at the beginning of deceleration.
In pump applications, deceleration control is not necessarily below a load level set by Ed2.
If the estimated torque at the start of deceleration is below 20, i.e. 20% of the nominal torque, controlled deceleration is not activated, and the motor changes to freewheel mode.



53	tL2	**Maximum torque limit**	10 to 200% or OFF	OFF

Used to limit the torque reference to avoid regenerative behaviour in applications with high inertia.
Can be used for constant torque starting if tq2 = tL2.
- OFF: no limit
- 10 to 200: limit set as a % of the nominal torque

54	t 12	**Deceleration gain** (for torque control)	10 to 50%	40%

This parameter can only be accessed if CLP = On and if the StY parameter (SEt Settings menu) = -d-.
Used to eliminate instability during deceleration.
Adjust the parameter in accordance with the oscillations.

Communication menu COP

The communication menu parameters can only be modified when the motor is stopped.
The internal protocol used is Modbus.

Code		Description	Setting range	Factory setting
55	Add	**Starter address** by the RS485 serial link	0 to 31	0
56	tbr	**Communication speed** in kbps.	4.8，9.6，19.2	19.2
57	FOr	**Communication format**	8o1，8E1，8n1，8n2	8n1

8o1: 8 data bits, odd parity, 1 stop bit
8E1: 8 data bits, even parity, 1 stop bit
8n1: 8 data bits, no parity, 1 stop bit
8n2: 8 data bits, no parity, 2 stop bits

58	tLP	**Serial link timeout setting** (1)	0.1 to 60 s	5s
59	PCt		On，OFF	OFF

Configuration of the serial link for communication with the remote terminal
On: function active. Temporarily configures the starter (tbr and FOr) for communication with the remote terminal.
OFF: function inactive
PCT returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the tbr and FOr parameters return to their initial configuration.

(1) Check that the time set will not interfere with the safe operation of the machine

Parameter displayed menu (SUP)

The parameter to be displayed can be modified with the motor stopped or running.
The factory setting displays the motor current (parameter LCr).
The display chosen is saved by:
- Pressing the ENTER key once: the choice is temporary, it will be cleared at the next power up.
- Pressing the ENTER key again for 2 seconds: the display flashes, the choice is permanent and cannot be modified.

	Code	Parameter	Unit
1	COS	**Cosine φ**	0.01

2	tHr	**Motor thermal state**	%

Varies from 0 to 125%
100% corresponds to the nominal thermal state for the current In set.

3	LCr	**Motor current**	A or kA

In amperes up to 999 A (examples: 01.5 = 1.5 A; 15.0 = 15 A; 150 = 150 A)
In kiloamperes starting at 1000 A (examples: 1.50 = 1500 A; 1.15 = 1150 A)

4	rnt	**Operating time** in hours since the last reset.	h or kh

In hours up to 999 hrs (examples: 001 = 1 hr; 111 = 111 hrs)
In kilo-hours from 1000 to 65535 (examples: 1.11 = 1110 hrs; 11.1 = 11100 hrs)
Above 65535 hrs (65.5) the display is reset to zero.
Operating time is counted when the motor is not stopped, i.e. when the thyristors are fired (heating, acceleration, steady state, deceleration, braking) and in continuous bypass operation.
The hour counter can be reset in line mode using the control word or via the terminal with the motor stopped. When the control part is switched off the hour counter is saved in the EEPROM.

5	LPr	**Active power**	%

Varies from 0 to 255%
100% corresponds to the power at nominal current and at full voltage.

6	LTr	**Motor torque**	%

Varies from 0 to 255%
100% corresponds to the nominal torque.

7	LAP	**Active power in kW**	kw

This parameter requires configuration of the exact value of the line voltage ULn in the drC menu.

8	EtA	**Display of the current state**	

- nLP: starter without run command and power not supplied
- rdY: starter without run command and power supplied
- tbS: starting time delay not elapsed
- ACC: acceleration in progress
- dEC: deceleration in progress
- rUn: steady state operation
- brL: braking in progress
- CLI: starter in current limiting mode
- nSt : force to freewheel stop by serial link

Parameter displayed menu (SUP)

Code		Parameter	Unit
9	LFt	**Last fault detected** (see page 43).	

If no faults have been saved, the display shows nOF.

10	PHE	**Phase rotation direction** viewed from the starter	

- 123: forward (L1 - L2 - L3)
- 321: reverse (L3 - L2 - L1)

11	COd	**Terminal locking code**	

Enables the starter configuration to be protected using an access code.

Caution: Before entering a code, do not forget to make a careful note of it

OFF: no access locking codes
- To lock access, enter a code (2 to 999). The display can be incremented using the ▲ key.

Now press ENTER "On" appears on the screen to indicate that the parameters have been locked.

On: a code is locking access (2 to 999)
- **To unlock access**, enter the code (incrementing the display using the ▲ key) and press ENTER. The code remains on the display and access is unlocked until the next power down.

Parameter access will be locked again on the next power-up.
- **If an incorrect code is entered**, the display changes to "On" and the parameters remain locked.

XXX: parameter access is unlocked (the code remains on the screen).
- **To reactivate locking with the same code** when the parameters have been unlocked, return to "On" using the ▼ button then press ENTER. "On" appears on the screen to indicate that the parameters have been locked.
- **To lock access with a new code** when the parameters have been unlocked, enter a new code (increment the display using the ▲ or ▼ keys) and press ENTER. "On" appears on the screen to indicate that the parameters have been locked.
- **To clear locking** when the parameters have been unlocked, return to "OFF" using the ▼ button and press ENTER. "OFF" remains on the screen. The parameters are unlocked and will remain unlocked until the next restart.

When access is locked using a code, only the monitoring parameters can be accessed, with only a temporary choice of parameter displayed.

Maintenance

Servicing

The SJR2- 5000 does not require any preventative maintenance. It is nevertheless advisable to perform the following regularly:
- Check the condition and tightness of connections
- Ensure that the temperature around the unit remains at an acceptable level and that ventilation is effective (average service life of fans: 3 to 5 years depending on the operating conditions)
- Remove any dust from the heSJR2-ink if necessary

Assistance with maintenance

If a problem arises during setup or operation, ensure that the recommendations relating to the environment, mounting and connections have been observed.

The first fault detected is memorized and displayed on the screen: the starter locks and relays R1 and R2 change state according to their assignment.

Clearing the fault

Switch off the starter power supply in the event of a fault which cannot be reset.
Wait for the display to go off completely.
Find the cause of the fault in order to correct it.
Restore the power supply: this clears the fault if it has disappeared.

In some cases there may be an automatic restart once the fault has disappeared if this function has been programmed.

Monitoring menu

This is used to prevent and find the causes of faults by displaying the starter status and its current values.

Spares and repairs

Consult Schneider Electric product support.

Faults - causes - remedies

Fault displayed		Probable cause	Procedure, remedy
1	InF	**Internal fault**	Disconnect and reconnect the control
2	OCF	**Overcurrent:**	Switch the starter off.
3	PIF	**Phase inversion**	Invert two line phases or set PHr = no
4	EEF	**Internal memory fault**	Disconnect and reconnect the control
5	CFF	**Invalid configuration** on power-up	Revert to the factory setting in the drive menu drC.
6	CFI	**Invalid configuration**	Previously.
7	PHF	**Loss of a line phase**	Check the line, the connection to the
8	FrF	**Line frequency, out of tolerance**	Check the line.
9	USF	**Power supply fault** on a run command	Check the power supply circuit and voltage.
10	CLF	**Control line failure**	Loss of CL1/CL2 for more than 200 ms
11	SLF	**Serial link fault**	Check the RS485 connection.
12	EtF	**External fault**	Check the fault taken into account.
13	StF	**Excessive starting time**	Check the mechanism
14	OLC	**Current overload**	Check the mechanism
15	OLF	**Motor thermal fault**	Check the mechanism
16	OHF	**Starter thermal fault**	Check the mechanism
17	OtF	**Motor thermal fault detected by the PTC probes**	Check the mechanism
18	ULF	**Motor underload**	Check the hydraulic circuit.
19	LrF	**Locked rotor** in steady state	Check the mechanism

Faults - causes - remedies

As a general rule, if a problem arises when the starter is started, it is advisable to return to the factory settings and repeat your settings step by step.

Starter does not start, no fault displayed

No display: check that the line supply is present on the control supply CL1/CL2 (see page 9).
Check that the code displayed does not correspond to the normal state of the starter (see page 21).
Check for the presence of the RUN/STOP commands (see page 7).

Faults which cannot be reset

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling:
Opening of end of starting relay R2
Opening of relay R1 (following starter locking)
Fault code flashes on the display
Storing of the last 5 faults, visible with the PowerSuite software workshop

Restart conditions:
Disappearance of the causes of the fault
Disconnection and reconnection of the control supply

Fault displayed		Probable cause	Procedure, remedy
1	InF	**Internal fault**	Disconnect and reconnect the control supply. If the fault persists, contact Schneider Electric product support.
2	OCF	**Overcurrent:** impeding short-circuit on starter output internal short-circuit bypass contactor stuck overrate starter	Switch the starter off. Check the connecting cables and the motor isolation Check the thyristors Check the bypass contactor (contact stuck) Check the parameter value bSt in the menu drC page 33
3	PIF	**Phase inversion** Line phase inversion does not conform to the selection made by PHr in the Protection menu.	Invert two line phases or set PHr = no
4	EEF	**Internal memory fault**	Disconnect and reconnect the control supply. If the fault persists, contact Schneider Electric product support.

Faults which can be reset as soon as their causes disappear

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling:
Opening of end of starting relay R2.
Opening of relay R1 only if it is configured as an isolating relay.
The fault code flashes on the display as long as the fault is present.
Storing of the last 5 faults, visible with the PowerSuite software workshop.

Restart conditions:
Disappearance of the causes of the fault.
In 2-wire control the run command must be maintained on the RUN input.
In 3-wire control a new run command (rising edge) is required on the RUN input.

Fault displayed		Probable cause	Procedure, remedy
5	CFF	**Invalid configuration** on power-up	Revert to the factory setting in the drive menu drC. Reconfigure the starter.
6	CFI	**Invalid configuration** The configuration loaded in the starter via the serial link is incompatible.	Check the configuration loaded previously. Load a compatible configuration.

Faults - causes - remedies

Faults which can be reset and can generate an automatic restart (1)

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling with automatic restart:
Opening of end of starting relay R2
Opening of relay R1 only if it is configured as an isolating relay. R1 remains closed if it is configured as a fault relay, see page 37
The fault code flashes on the display as long as the fault is present
Storing of the last 5 faults, visible with the PowerSuite software workshop

Restart conditions for the following faults with automatic restarting (in 2-wire control only):
Disappearance of the causes of the fault
Run command maintained on the RUN input
6 restart attemps are carried out at intervals of 60 seconds. At the 6th attempt if the fault is still present it trips requiring a manual reset (see following page) and R1 opens if it is configured as a fault relay

Fault displayed		Probable cause	Procedure, remedy
7	PHF	**Loss of a line phase** **Loss of a motor phase** If the motor current falls below an adjustable threshold PHL in one phase for 0.5 s or in the three phases for 0.2 s. This fault can be configured in the Protection menu PrO, parameter PHL. FrF	Check the line, the connection to the starter and any isolating devices located between the line and the starter (contactor, fuses, circuit-breaker, etc.). Check the motor connection and any isolating devices located between the starter and the motor (contactors, circuit-breakers, etc.). Check the motor state. Check that the configuration of the PHL parameter is compatible with the motor used.
8	FrF	**Line frequency, out of tolerance** This fault can be configured in the Advanced settings menu drC, parameter	Check the line. Check that the configuration of the FrC parameter is compatible with the line used (generating set for example).

Restart conditions for the following faults:
Disappearance of the causes of the fault
Run command maintained (2-wire control only)

Fault displayed		Probable cause	Procedure, remedy
9	USF	**Power supply fault** on a run command	Check the power supply circuit and voltage.
10	CLF	**Control line failure**	Loss of CL1/CL2 for more than 200 ms

(1) If the automatic restart function is not selected, see page 46 for the signalling and restart conditions of these faults.

Faults - causes - remedies

Faults which can be manually reset

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling:
Opening of end of starting relay R2
Opening of relay R1
The fault code flashes on the display as long as the fault is present
Storing of the last 5 faults, visible with the PowerSuite software workshop

Restart conditions:
Disappearance of the causes of the fault
A run command (2 or 3-wire control, requires a rising edge on the RUN input) to reset the fault (1)
Another run command (2 or 3-wire control, requires a rising edge on the RUN input) to restart the motor

Fault displayed		Probable cause	Procedure, remedy
11	SLF	**Serial link fault**	Check the RS485 connection.
12	EtF	**External fault**	Check the fault taken into account.
13	StF	**Excessive starting time**	Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). Check the value of the tLs setting in the PrO menu page 30 Check the sizing of the starter-motor in relation to the mechanical requirement.
14	OLC	**Current overload**	Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). Check the value of the LOC and tOL parameters in the PrO menu page 31.
15	OLF	**Motor thermal fault**	Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). Check the sizing of the starter-motor in relation to the mechanical requirement. Check the value of the tHP parameter in the PrO menu page 30 and that of the In parameter in the SEt menu page 27. Check the electrical isolation of the motor. Wait for the motor to cool before restarting.
16	OHF	**Starter thermal fault**	Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). Check the sizing of the starter in relation to the motor and the mechanical requirement. Check the operation of the fan (if the SJR2-5000 used has one), ensuring that the air passage is not obstructed in any way and the heSJR2-ink is clean. Ensure that the mounting recommendations are observed. Wait for the SJR2-5000 to cool before restarting.

(1) A reset will not take place on a run command if LI is assigned to the "fault reset (LIr)" function.

Faults - causes - remedies

Faults which can be manually reset

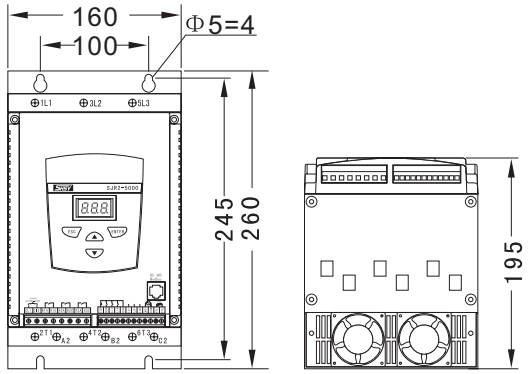
Fault displayed		Probable cause	Procedure, remedy
17	OtF	**Motor thermal fault detected by the PTC probes**	Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). Check the sizing of the starter-motor in relation to the mechanical requirement. Check the value of the PtC setting in the PrO menu page 32. Wait for the motor to cool before restarting.
18	ULF	**Motor underload**	Check the hydraulic circuit. Check the value of the LUL and tUL parameters in the Pro protection menu page 30.
19	LrF	**Locked rotor** in steady state This fault is only active in steady state with starter bypass contactor. It is detected if the current in a phase is greater than or equal to 5 In for more than 0.2 s.	Check the mechanism (wear, mechanical play, lubrication, blockages, etc.).

Reset faults using a logic input

If a logic input LI is configured as "reset motor thermal fault" or "reset faults which can be reset", the following conditions must be met:
A pulse on logic input LI
In 2-wire control the motor will restart if the run command is maintained on the RUN input
In 3-wire control the motor will restart on a new run command (rising edge) on the RUN input

Dimensions

SJR2-5007-5045



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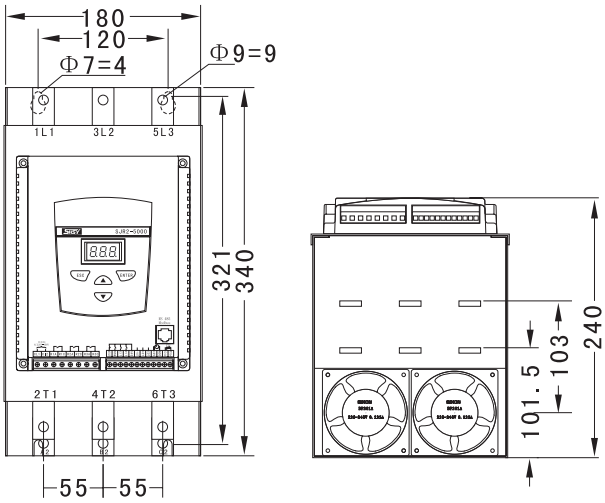

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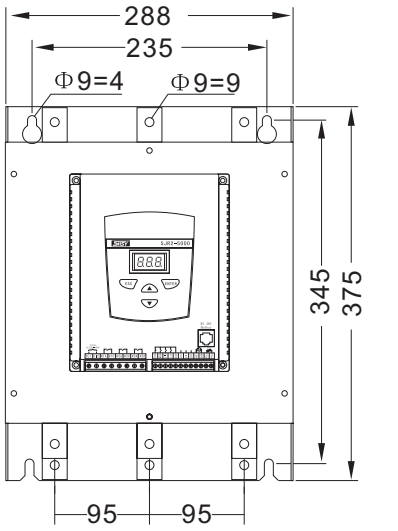

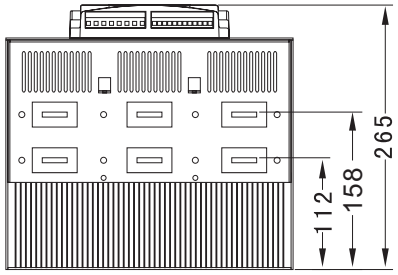

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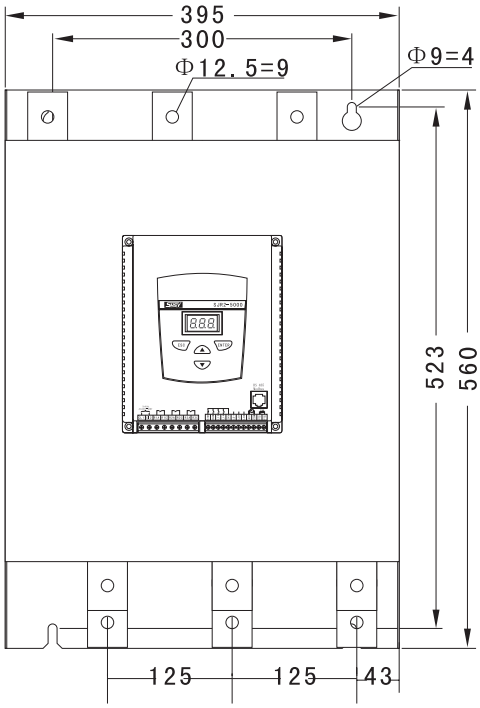
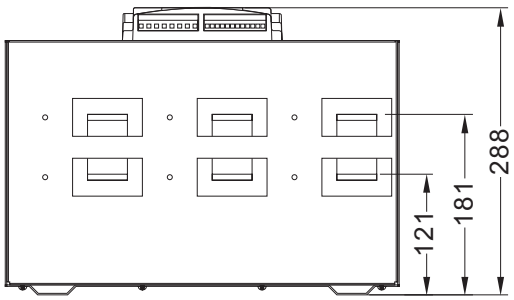
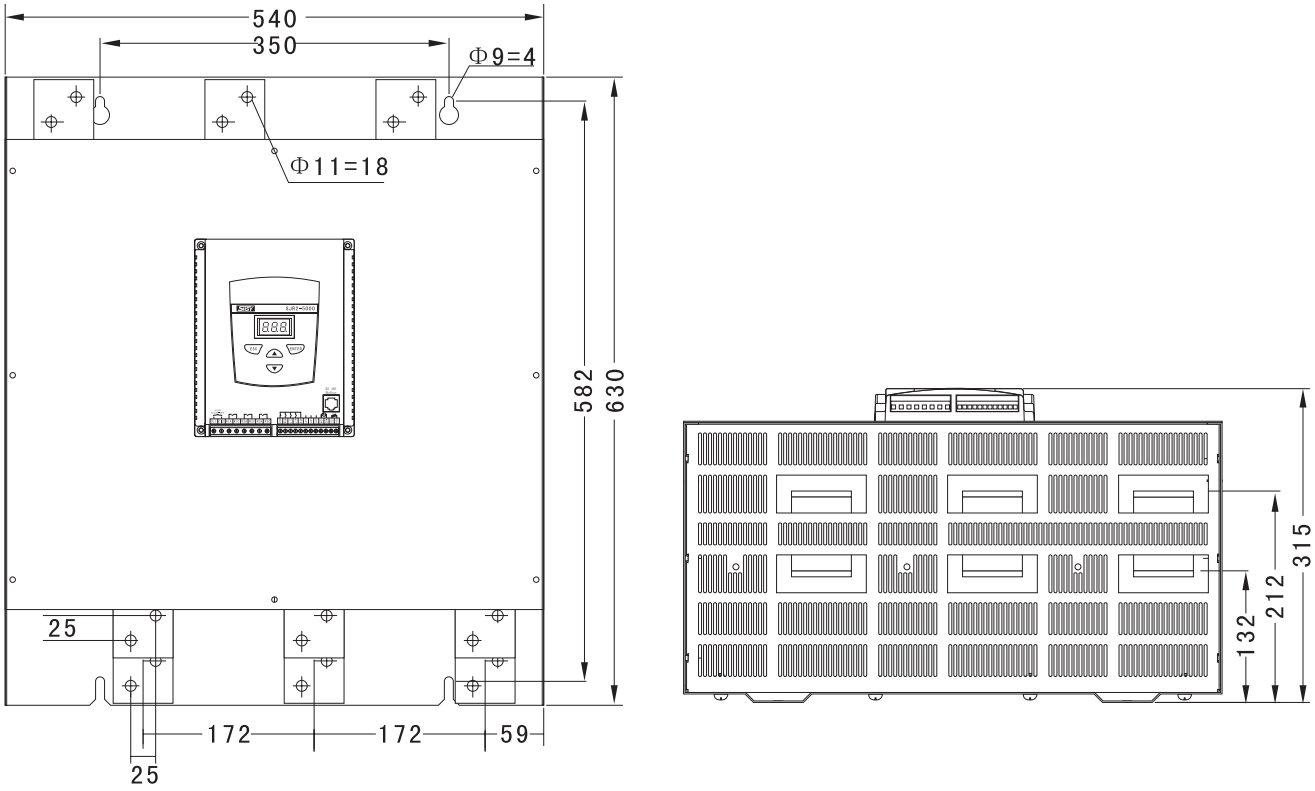




Dimensions

SJR2-5400-5500



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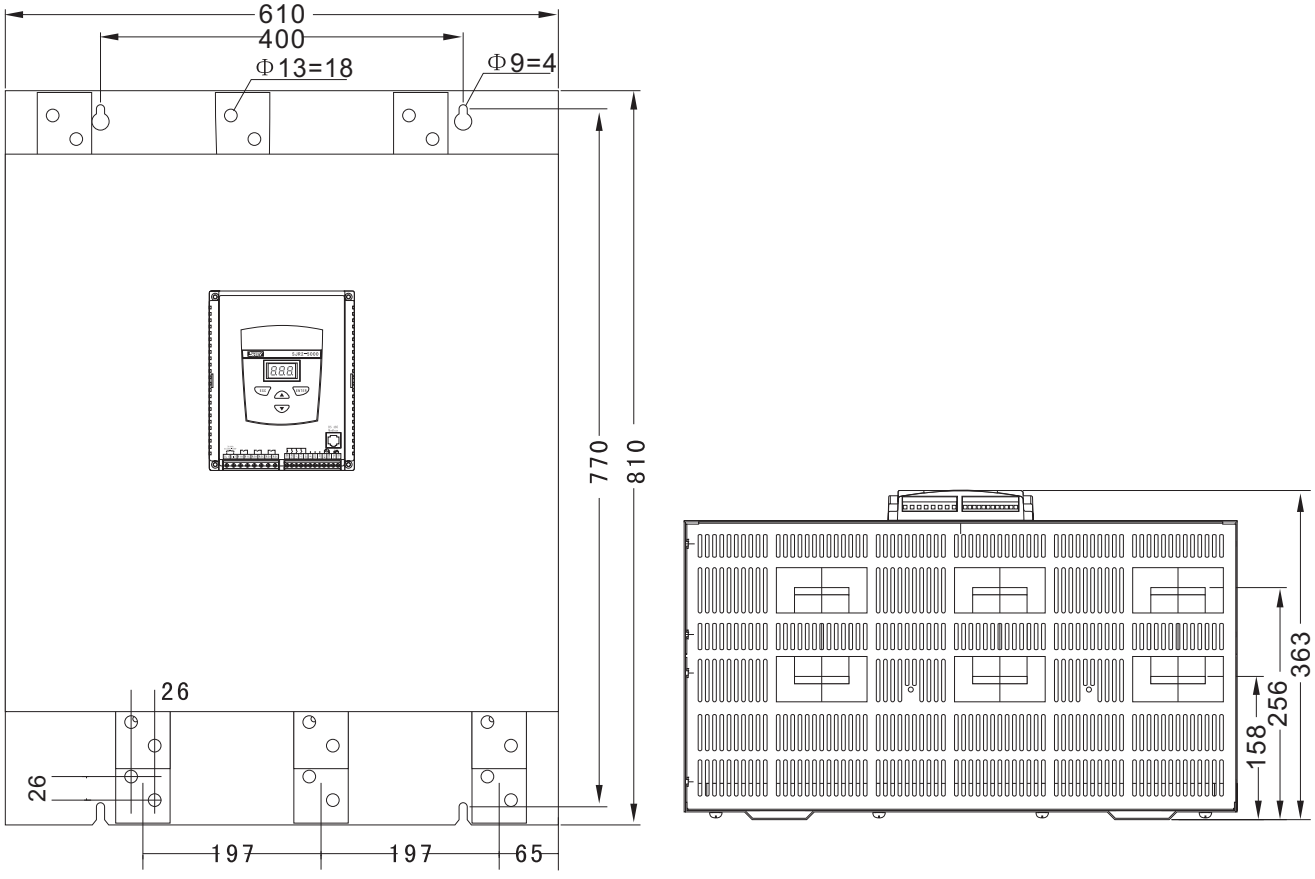

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