11 RTD Temperature

The soft starter has one RTD / PT100 input, which can be installed with six other PT100 inputs through this RTD / PT100 and ground fault protection card.
When the temperature exceeds a specified point, these inputs trip the soft starter. You can set a different trip temperature for each input.
Only after installing the RTD / PT100 and ground fault protection card, can you use the PT100 to input B ~ G.

Range: 0-250°C   Default: 50°C

Explain: Set the RTD / PT100 input trip point.

- 11A   RTD A Trip temperature
- 11B   RTD B Trip temperature
- 11C   RTD C Trip temperature
- 11D   RTD D Trip temperature
- 11E   RTD E Trip temperature
- 11F   RTD F Trip temperature
- 11G   RTD G Trip temperature

12 Slip Ring Motor

You can use these parameters to configure the soft starter for use with slip ring motors.

12A 12B–Motor data 1 ramp and motor data 2 ramp

Options: Single slope (default)
Shuangpo

Explain: Select whether to use single current ramp or dual current ramp for soft start. Set a single slope for the non-slip ring induction motor and a double slope for the slip ring induction motor.
Parameter 12A selects the main motor ramp configuration, and parameter 12B selects the auxiliary motor ramp configuration.

12C—Conversion time

Options: 100-500 (ms）   Default: 150 ms

Explain: Set the delay from the closing of the rotor resistance relay to the start of the low resistance current ramp. Set the switching time so that the contactor has enough time to close, but the motor does not decelerate.

Parameter 12C only applies if parameter 12A or 12B is set to "Double Ramp" and an output relay is set to changeover contactor.

12D—Slip ring deceleration

Options: 10%-90%   Default: 50%

Explain: Set the conduction level when the rotor resistor is closed, as a percentage of full conduction.
Setting slip ring deceleration can avoid current pulse, but the motor has sufficient speed to start normally.

15 Advanced

15A—Access password

Options: 0000 - 9999   Default: 0000

Explain: Set an access password to control access to restricted sections of the menu.

Use ◀ and ▶ buttons to select the digit to be changed, and use the ▲ and ▼ buttons to change the value.
Note
If you forget the access password, please contact your local supplier to obtain the master access password.
You can use this to reset the new access password.

15B—Parameter write protection

Options: Read and write (default) allows the user to modify parameter values on the programming menu.
Read Only Does not allow the user to modify parameter values on the programming menu.
You can still view the parameter values.

Explain: Select whether the operator panel allows parameters to be changed via the programming menu.
Note
Any changes to the parameter write protection settings will take effect after the programming menu is closed.

15C—Emergency operation

Options: Disabled (default)
Enable

Explain: Select whether the soft starter allows emergency operation. In emergency running mode, the soft starter starts (if not already running) and continues to work until the end of emergency running, ignoring stop commands and trips. Emergency operation is controlled by programmable parameters.

Attention

It is not recommended to use emergency operation continuously. Emergency operation may damage the life of the starter because all protections and trips are disabled.
Using the starter in emergency operation mode will void the product warranty.

15D—Short-circuit thyristor action

Options: Three-phase control only (default)
Two-phase control

Explain: Select whether the soft starter allows two-phase control. For critical applications, if one phase of the soft starter is damaged, the soft starter is allowed to use two-phase control to control the motor. Two-phase control can only be used after the soft starter has tripped and reset due to "Lx-Tx short circuit".

Attention

Two-phase control can adopt two-phase soft-start technology, so special care must be taken when determining the specifications of the circuit breaker and protection. Contact your local supplier for assistance.

Attention

Only motors connected by star connection support two-phase control. If the soft starter is connected using a delta connection method, two-phase control does not work.

The next time the control power is applied, the starter will trip due to an Lx-Tx short circuit. If the control power is turned on again between two starts, the two-phase control does not work.

15E—Jogging torque

The soft starter can be jogged at low speed, which is convenient for precise adjustment of the belt position and flywheel position. Both jog forward and jog reverse.

Range: 20%-100%   Default: 50%

Explain: Set the jog operation current limit.

16 Protective measures

These parameters define how the soft starter responds to different protection events. The soft starter can trip, issue a warning or ignore different protection events as needed.
Writes all protection events to the event log. The default action for all protections is to trip the soft starter.
16N ground fault protection and 16P ~ 16U RTD / PT100 protection can only be used after installing the RTD / PT100 and ground fault protection card.

Attention

The removal of the protection mechanism may endanger the safety of the starter and the motor and should only be used in an emergency.

16A~16X — Protective measures

Options: Starter trip
(default)
Alarm and record
Record only

Explain: Select the response of the soft starter to each protection.

- 16A Motor overload
- 16B Starting limit time
- 16C Under current
- 16D Instantaneous overcurrent
- 16E Current imbalance
- 16F Frequency
- 16G Input a tripped
- 16H Input b tripped
- 16I Motor thermistor
- 16J Starter communication

- 16K network communication failure
- 16L radiator overheating
- 16M battery / clock failure
- 16N ground fault
- 16O ~ 16U RTD A ~ G overheating
- 16V reserved
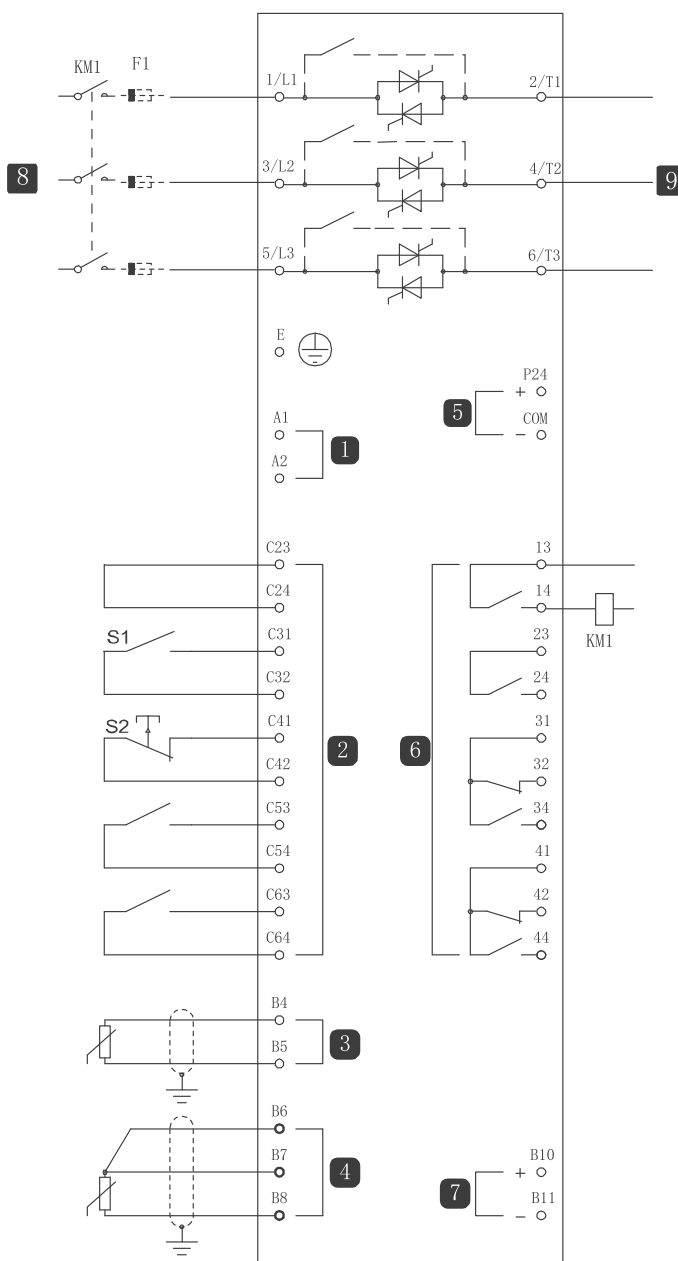- 16W reserved
- 16X low control voltage

Chapter 10 Application Examples

The following series of application notes can help you understand the advanced installation and configuration of soft starters under specific performance requirements. Application notes explain various application conditions, including brake operation, jog operation, pumping options, and advanced protection options.

10.1 Installation With Main Contactor

The soft starter is installed together with the main contactor (AC3 class). The control voltage must be input at the input of the contactor.

The main contactor is controlled by the soft contactor main contactor output. This output is assigned to output relay A (terminals 13, 14) by default.

|	
1	Control voltage (depending on model)
2	Remote control input
3	Motor thermistor input
4	RTD / PT100 input
5	24VDC output
6	Relay output
7	Analog output
8	Three-phase power
9	Motor terminal
KM1	Main contactor
F1	Semiconductor fuse (optional)
S1	Start / stop contact
S2	Reset contact
13, 14	Relay output A
23, 24	Run relay output
31, 32, 34	Relay output B
41, 42, 44	Relay output C

Parameter settings:
● parameter 7A relay A function
Select 'Main Contactor'-Assign relay output A as the main contactor function (default setting).

10.2 Installation With External Bypass Contactor

The soft starter is installed together with an external bypass contactor (AC1 class). The bypass contactor is controlled by the soft starter's running output (terminals 23, 24).

1	Control voltage (depending on model)
2	Remote control input
3	Motor thermistor input
4	RTD / PT100 input
5	24VDC output
6	Relay output
7	Analog output
8	Three-phase power
9	Motor terminal
KM1	Main contactor
F1	Semiconductor fuse (optional)
S1	Start / stop contact
S2	Reset contact
13, 14	Relay output A
23, 24	Run relay output
31, 32, 34	Relay output B
41, 42, 44	Relay output C
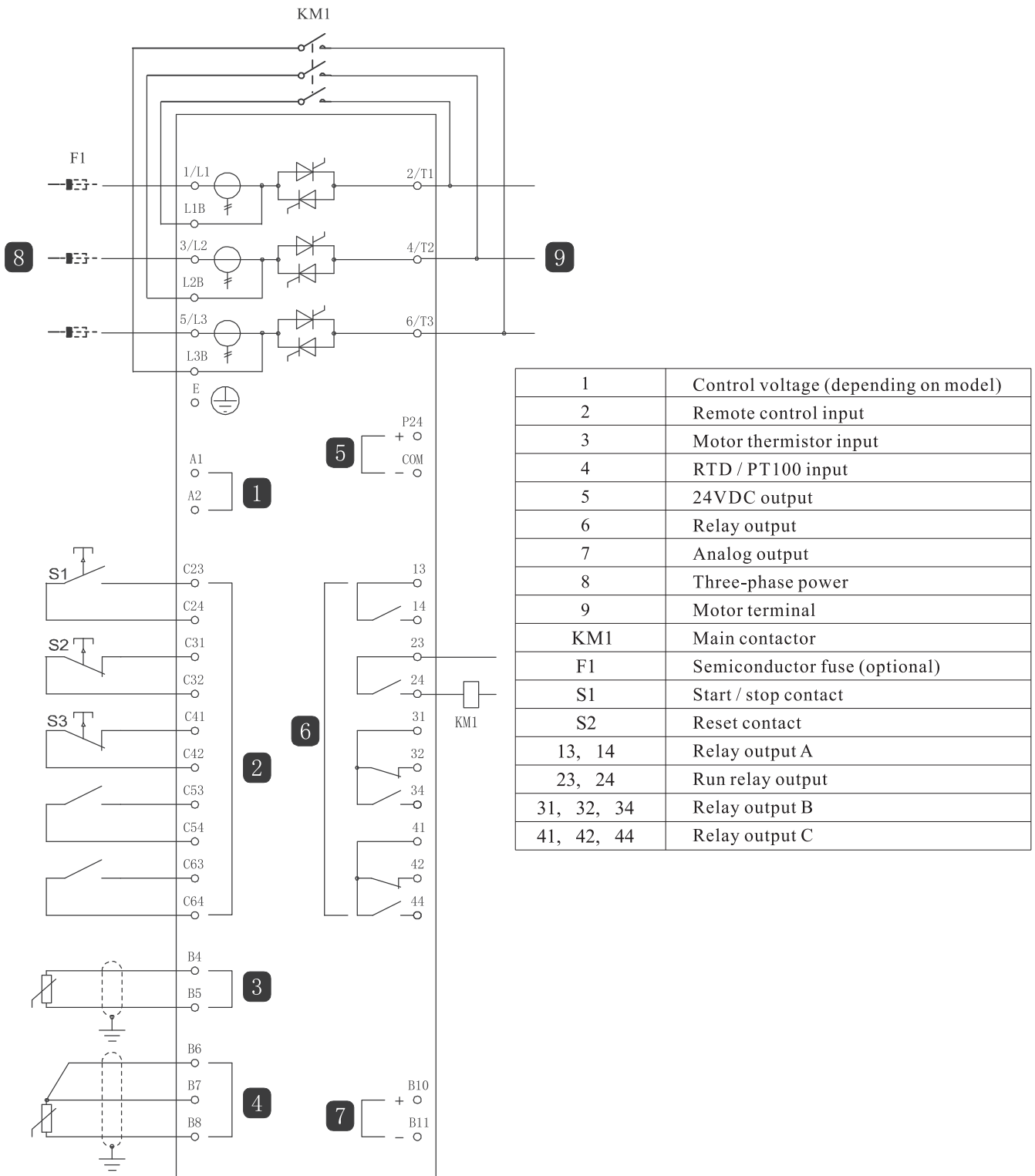
Parameter settings:
● No special settings are required.

10.3 Emergency Operation

During normal operation, the soft starter is controlled by two-wire remote control signals (terminals C31, C32).

Emergency operation is controlled by a two-wire circuit connected to input A (terminals C53, C54). When input A is closed, the soft starter will run the motor and ignore certain trip conditions.
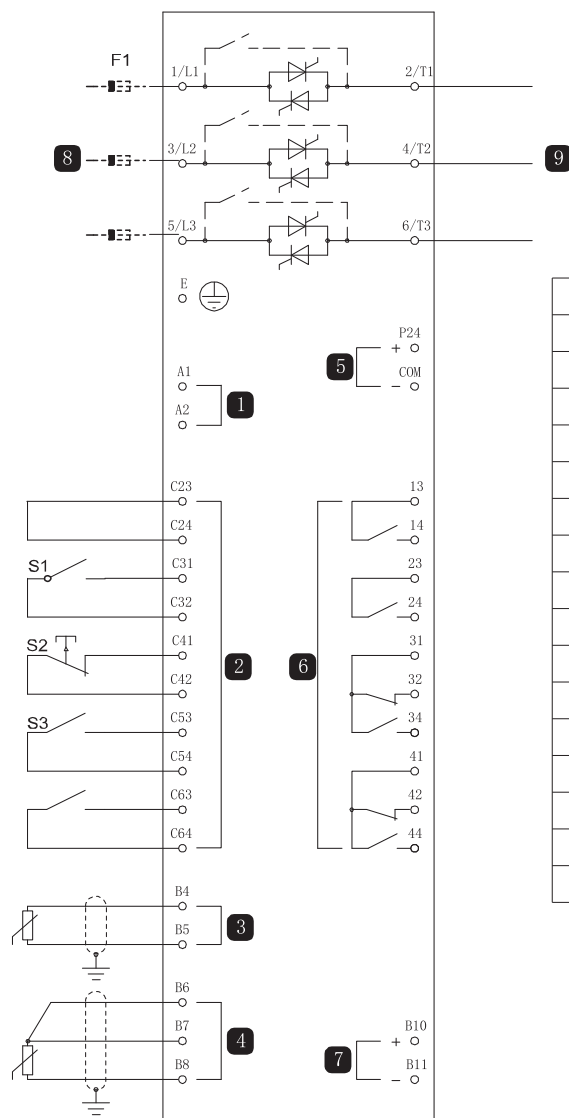
Attention

Although emergency operation meets the functional requirements of the fire mode, how it is applied is not certified and it is not recommended to use emergency operation in situations where testing and / or compliance with specific standards are required.

Be careful

It is not recommended to use emergency operation continuously. Emergency operation may damage the life of the starter because all protections and trips are disabled.
Using the starter in emergency operation mode will void the product warranty.

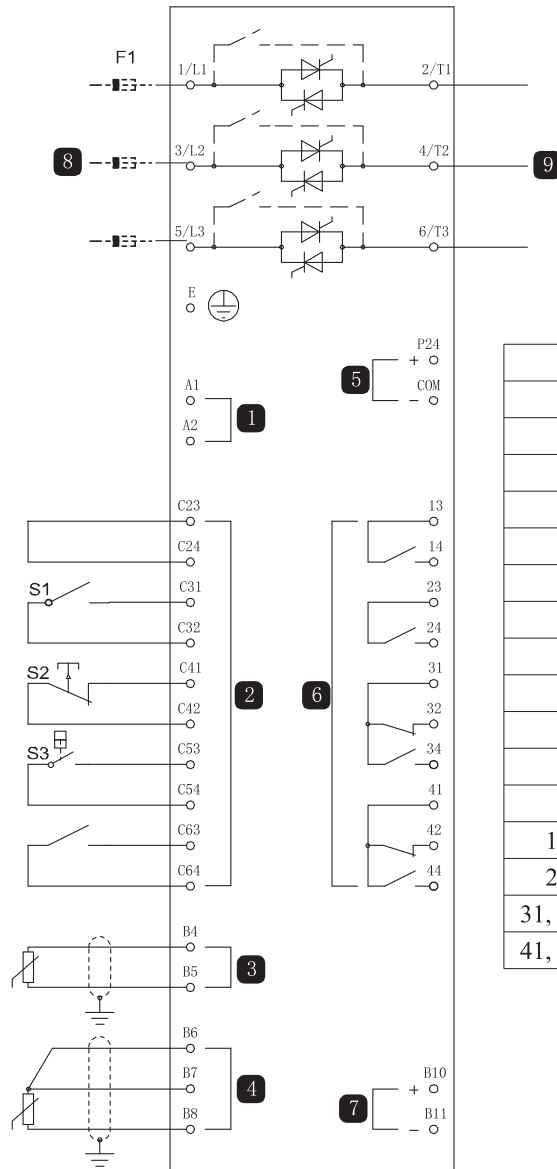|	
1	Control voltage (depending on model)
2	Remote control input
3	Motor thermistor input
4	RTD / PT100 input
5	24VDC output
6	Relay output
7	Analog output
8	Three-phase power
9	Motor terminal
KM1	Main contactor
F1	Semiconductor fuse (optional)
S1	Start / stop contact
S2	Reset contact
13, 14	Relay output A
23, 24	Run relay output
31, 32, 34	Relay output B
41, 42, 44	Relay output C

Parameter settings:

● Parameter 6A input A function

Select "Emergency Run"-Specify input A for the emergency run function.

● Parameter 15C emergency operation

Select "Enable"-enable emergency running mode. .

10.4 Auxiliary Trip Circuit

During normal operation, the soft starter is controlled by two-wire remote control signals (terminals C31, C32).

Input A (terminals C53, C54) is connected to an external trip circuit (such as the low-voltage alarm switch of a pumping system). When the external circuit is activated, the soft starter trips to stop the motor.

1	Control voltage (depending on model)
2	Remote control input
3	Motor thermistor input
4	RTD / PT100 input
5	24VDC output
6	Relay output
7	Analog output
8	Three-phase power
9	Motor terminal
KM1	Main contactor
F1	Semiconductor fuse (optional)
S1	Start / stop contact
S2	Reset contact
13，14	Relay output A
23，24	Run relay output
31，32，34	Relay output B
41，42，44	Relay output C

Parameter settings:

● Parameter 6A input A function

Select "Input Trip (N / 0)". Assign input A for auxiliary trip (normally open) function

● Parameter 6B enter A name

Select a name, such as "Low Voltage". Specify a name for the input A.

● Parameter 6C input A trip

Set as required. For example, the "Only Run" limit input trip is valid only when the soft starter is running.

● Parameter 6D input A trip delay

Set as required. Set the delay from input activation until the soft starter trips.

● Parameter 6E input A initial delay

Set it to about 120 seconds. Limit the input trip to 120 seconds after the start signal. This way, the pipeline has enough time to increase the water pressure before activating the low pressure input.

10.5 DC Braking With External Zero Speed Sensor

If the load may change during braking, the advantage of using an external zero speed sensor is that the soft starter brake can be turned off. This control method ensures that the soft starter brake is always turned off after the motor is stationary, thereby avoiding unnecessary motor heating.

The following schematic shows how to use the zero speed sensor with a soft starter to turn off the braking function when the motor is stopped. The zero speed sensor (A2) is often called the underspeed detector. Its internal contacts open at zero speed and close when the speed is greater than zero. When the motor reaches the stop state, C53, C54 will be disconnected and the starter will be disabled. After the next start command is issued (ie the next application of Ka1), C53, C54 are closed and the soft starter is enabled.

The soft starter must work in remote mode. Parameter 6A input A function must be set to disable the starter.
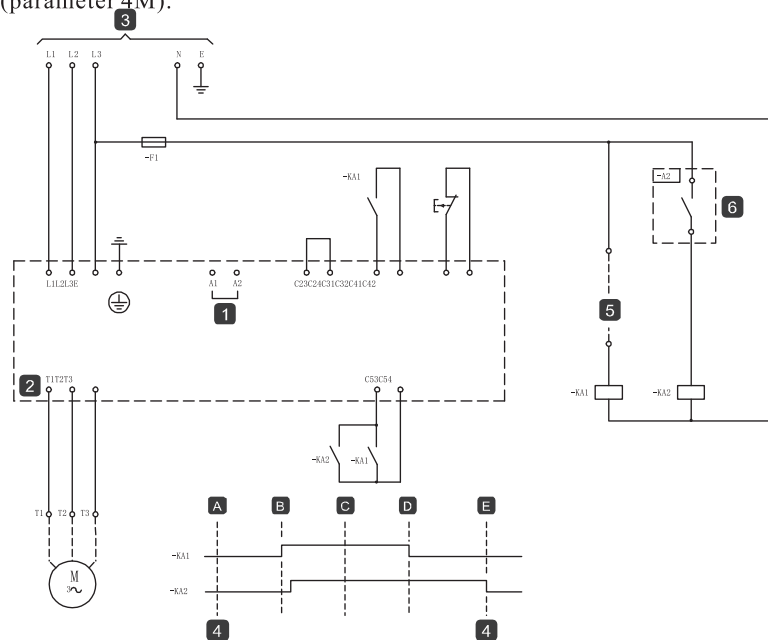
⚠ **Attention**

If the braking torque is set too large, the motor will stop before the braking time is over, and the motor generates excessive heat, which may cause damage to the motor. The braking torque must be carefully configured to ensure the safe operation of the starter and motor.

Setting the braking torque too large will cause the peak current to start directly when the motor is stopped. Make sure that the fuses installed in the motor branch circuit are correctly selected.

⚠ **Attention**

The braking operation caused the motor to heat faster than the speed calculated using the motor thermal protection model. If using brake operation, install a motor thermistor or set a sufficiently long restart delay (parameter 4M).

1	Control power		A	Off (ready)
C23, C24	Start		B	Start
C31, C32	Stop		C	Run
C41, C42	Reset		D	Stop
C53, C54	Programmable input A (starter disabled)		E	Zero speed
2	Motor terminal		5	Start signal
3	Three-phase power		6	Zero speed sensor
4	Disable starter (shown on starter screen)			

For details on how to configure DC braking, see Braking on page 27.

⚠ **Be careful**

When using DC braking, the power supply and the soft starter (input terminals L1, L2, L3) must be connected in positive phase sequence, and the parameter is 4G.

The phase sequence must be set to forward.

⚠ **Be careful**

If the braking torque is set too large, the motor will stop before the braking time is over, and the motor generates excessive heat, which may cause damage to the motor. The braking torque must be carefully configured to ensure the safe operation of the starter and motor.

Setting the braking torque too large will cause the peak current to start directly when the motor is stopped. Ensure that the fuses installed in the motor branch circuit are selected correctly

10.6 Soft Braking

For large inertia load applications and / or variable load applications, a soft starter can be configured for soft braking.
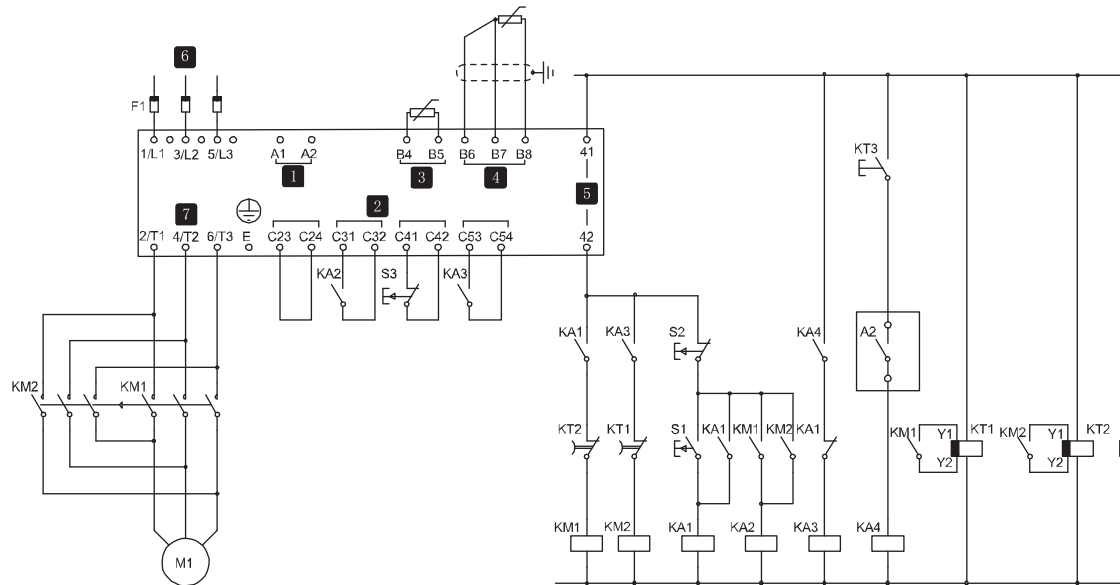In this application, soft starters are used with forward and brake contactors. When the soft starter receives the start signal (button S1), close the forward rotation
Contactor (KM1), set control motor according to the programmed group motor.
When the soft starter receives the stop signal (button S2), open the forward contactor (KM1), and close the brake contactor (KM2) after a delay of about 2-3 seconds (kt1).
The KA3 is also closed to activate the second set of motor settings programmed by the user for the desired stop performance characteristics.
When the motor speed is close to zero, the zero speed sensor (A2) stops the soft starter and disconnects the brake contactor (KM2).

1	Control voltage (depending on model)	KA3	Brake relay
2	Remote control input	KA4	Zero speed sensing relay
3	Motor thermistor input	KM1	Line contactor (operation)
4	RTD / PT100 input	KM2	Line contactor (brake)
5	Relay output	KT1	Run delay timer
6	Three-phase power	KT2	Braking delay timer
7	Motor terminal	KT3	Zero speed sensing delay relay *.
A2	Zero speed sensor.	S1	Starting contact
F1	Semiconductor fuse (optional)	S2	Stop contact
KA1	Running relay	S3	Reset contact
KA2	Starting relay		

* The KT3 timer is required only if the zero-speed sensor is a relay type that performs a self-test after power-on and then immediately disconnects the output.

parameter settings:
● Parameter 6A input A function. (Terminals C53, C54)
● Select "Motor parameter selection"-specify input A for motor parameter selection.
● Use the first group of motor parameters to set the starting performance characteristics.
● Use the second set of motor settings to set the braking performance characteristics.
● Parameter 7G relay C function
● Select "Trip"-specify the trip function for relay output C.

> **Note**
> If the soft starter trips due to the power frequency (parameter 16F frequency) when the brake contactor KM2 is opened, modify the frequency protection setting.

10.7 Two-speed Motor

High-speed contactor (Km1), low-speed contactor (KM2) and star contactor (KM3) can be used, and a soft starter can be configured for two-speed Dahlander motor control.

Be careful
Pole amplitude modulation (PAM) motors use external winding configuration to effectively change the rotor frequency, thus changing the speed. Soft starters are not suitable for use with such two speed motors.

When the soft starter receives the high-speed start signal, close the high-speed contactor (KM1) and star contactor (Km3), and then set the control motor according to the first group of motors.

When the soft starter receives the low speed start signal, close the low speed contactor (km2). Input a is closed and the soft starter sets the control motor according to the second set of motors.
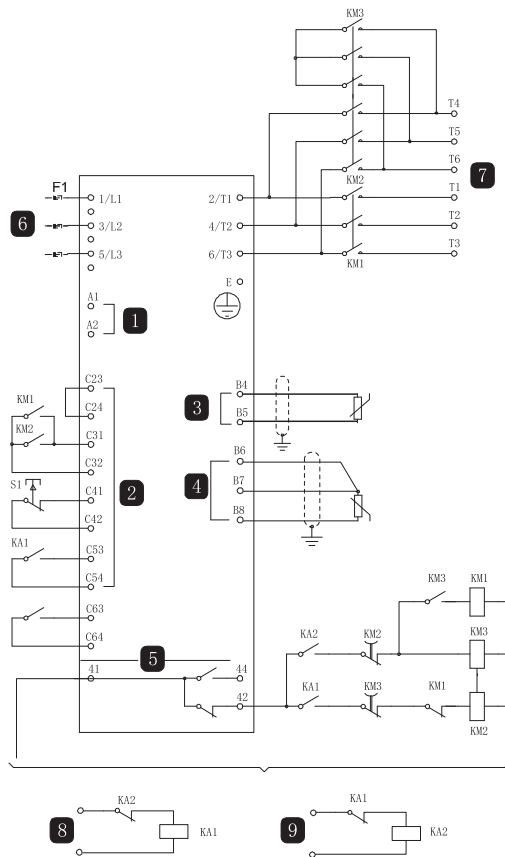
1	Control power
2	Remote control input
3	Motor thermistor input
4	RTD / PT100 input
5	Relay output
6	Three-phase power
7	Motor terminal
8	Remote control low speed start input
9	Remote control high speed start input
F1	Semiconductor fuse (optional)
KA1	Remote start relay (low speed)
KA2	Remote start relay (high speed)
KM1	Line contactor (high speed)
KM2	Line contactor(Low speed)
KM3	Starting contactor (high speed)
S1	Reset contact
41, 42, 44	Relay output C

Be careful
Contactors KM2 and KM3 must be mechanically interlocked.

Parameter setting:
● parameter 6A input a function (terminal C53, C54)
Select "motor parameter selection" one to specify input a for motor parameter selection.
Set the high-speed performance characteristics with the - Group Motor settings.
Use the second set of motor settings to set the low speed performance characteristics.
● parameter 7g relay C function
Select "trip" - specify trip function for relay output C

Attention
If the soft starter trips due to the power frequency (parameter 16F frequency) when the high-speed start signal (9) is disconnected, the frequency protection setting shall be modified.

10.8 Slip Ring Motor

A soft starter can be used to control the slip ring motor using the rotor resistance.
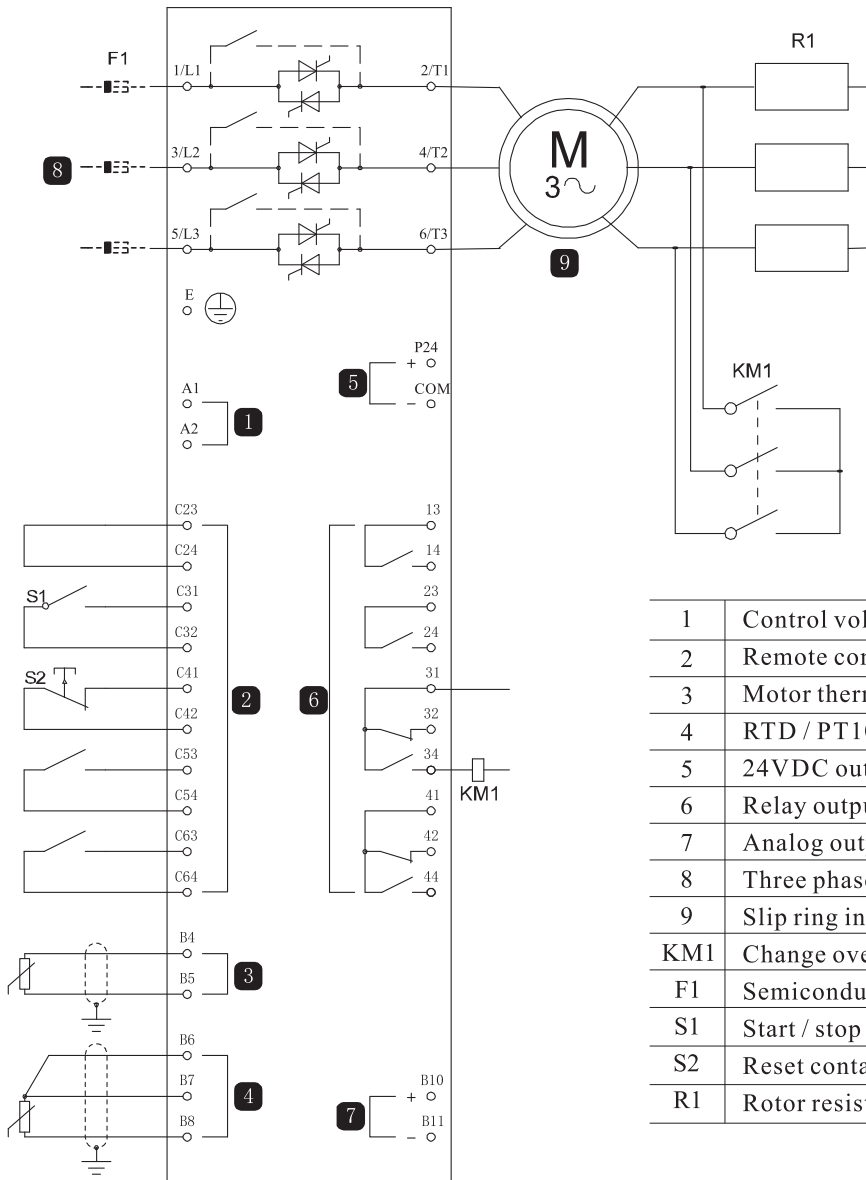
1	Control voltage (depending on model)
2	Remote control input
3	Motor thermistor input
4	RTD / PT100 input
5	24VDC output
6	Relay output
7	Analog output
8	Three phase power supply
9	Slip ring induction motor
KM1	Change over contactor
F1	Semiconductor fuse (optional)
S1	Start / stop contact
S2	Reset contact
R1	Rotor resistance (external)

Debugging

1. Configure the soft starter as follows:
   Parameter setting: parameter 7d relay B function
   Select 'change over contactor'
   ● parameter 7e relay B open delay
   Set this parameter to the maximum time (5 minutes: 00 seconds).
   ● parameter 12a motor data 1 ramp
   Select 'double slope' (for slip ring induction motor control)
   ● parameter 12C conversion time
   The default setting is 150 milliseconds. Set this value to a value greater than the phase closing time of the change-over contactor (KM1).
   ● valuepoint 12D slip ring reduction
   The default setting is 50%. Set this parameter large enough to allow the motor to accelerate immediately after the rotor resistance (R1) is bypassed, if set Small enough to avoid motor current pulse.

2. Start the motor under normal load and record the time required for the motor to reach a constant speed when the circuit has external rotor resistance (R1).
   Stop the motor as soon as it reaches a constant speed. Change parameter 7e to the recorded time value.

3. Start the motor under normal load conditions and monitor the speed characteristics and motor current of the motor after the switching contactor (KM1) is switched and the stator resistance (R1) is shorted.
   If the motor does not accelerate immediately after the conversion, increase the setting of parameter 12D.
   If the motor current changes abruptly after the conversion, the setting of parameter 12D needs to be reduced.
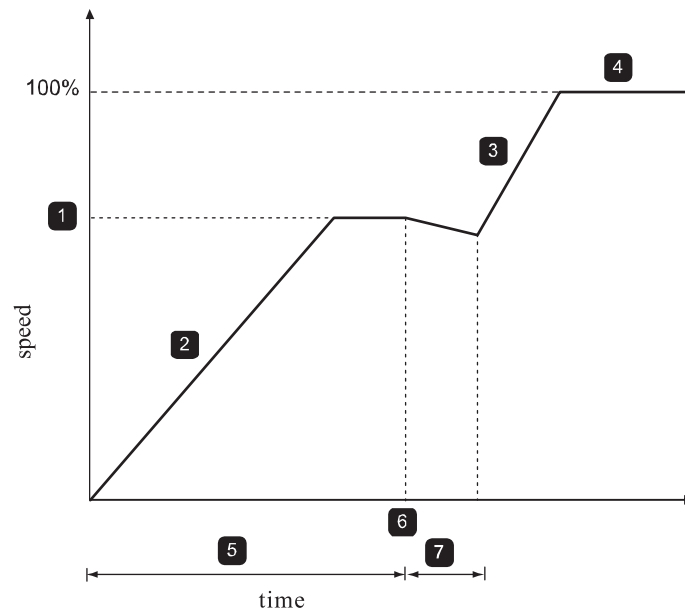
1	R1 constant speed	5	Parameter 7E Relay B Open Delay
2	First slope	6	KM1 closed
3	Second slope	7	Parameter 12C conversion time
4	Operating mode (I <120% of motor rated current)		

Note
In order for this device to work properly, only the motor settings of group-are used. Use only constant current starting method (parameter 2A starting method).

Chapter 11 Fault Resolution

11.1 Protection Response

When a protection condition is detected, the soft starter writes the protection condition to the event log. It may trip and may issue a warning. The soft starter response depends on the protective measures setting (parameter setting 16).

The user cannot adjust one or more of the protection responses. These trips are usually caused by external events (such as phase loss), or they may be caused by internal faults of the soft starter. These trips have no related parameters and cannot be set as warnings or logs.

If the soft starter trips, you need to identify and clear the conditions that triggered the trip, reset the soft starter, and then restart. To reset the starter, press the RESET button on the control panel-or activate the "Reset remote input".

If the soft starter alarms, the soft starter will reset automatically after the cause of the alarm is eliminated.

11.2 Trip Message

The following table lists the protection mechanisms and possible trip causes of the soft starter. Some settings can be adjusted with parameter settings 4 protection settings and parameter settings 16 protection measures, while other settings are built-in system protection and cannot be set or adjusted.

Display	Possible cause / suggested solution
Analog input trip	Determine and exclude activation conditions for analog input A. Related parameters: 6N, 6O, 6P
Waiting for data	The operation board did not receive data from the control PCB. Check that the cables on the starter are properly connected and installed.
Battery / clock	A real-time clock verification error has occurred, or the backup battery voltage is too low. If the battery voltage is too low and the power is off, the date / time setting will be lost. Reset the clock. Related parameters: 16M
Controller	This is the name chosen for the programmable input. See Input Trip.
Current imbalance	Current imbalances can be caused by motor problems, environmental problems, or installation problems, such as: ● Unbalanced supply voltage ● Motor winding problem ● Small motor load ● Input terminals L1, L2, or L3 lack phase in operating mode The thyristor has an open circuit. Only by replacing the thyristor and checking the performance of the starter can the diagnosis be clearly determined. Whether the thyristor is malfunctioning. Related parameters: 4H, 4I, 16E
Current read error LX	Where X is 1, 2 or 3. Internal fault (PCB failure). When the thyristor power is cut off, the current transformer circuit output does not reach zero. Contact your local supplier for advice. This trip cannot be adjusted. Related parameters: None
Starting limit time	Trip limit time trips can occur in the following situations: ● Parameter 1A motor rated current is not suitable for this motor ● The parameter 2D current limit is set too small ● Parameter 2B start ramp time is set to be larger than the 4A setting start limit time ● Parameter 2B The starting ramp time is set too short, it is not suitable for large inertia loads when using adaptive control Related parameters: 1A, 2B, 2D, 4A, 4B, 9B, 10B, 10D, 16B
Trigger failed PX	Where X is phase 1, phase 2, or phase 3. The thyristor does not trigger as expected. The thyristor may be malfunctioning, or the internal wiring may be malfunctioning. This trip cannot be adjusted. Related parameters: None
Excessive rated current (Rated current is out of range)	This trip cannot be adjusted. If the soft starter uses a delta connection instead of a star connection to connect the motor, it can support larger motor rated current values. If the soft starter is connected using the star connection method, but the programmed setting of parameter 1A motor rated current exceeds the maximum value of the star connection method, the soft starter will trip when starting (see Minimum and Maximum Current Setting on page 71). If the soft starter is connected to the motor using a delta connection method, the soft starter may not detect the connection correctly. Contact your local supplier for advice. Related parameters: 1A and 9B