

SimpleStarter™

User manual SST130i-075 and SST130i-140 Softstarter / Inrush Current Limiter series with USB control



SST130i-075-M-ES



SST130i-075-S2



SST130i-075-S3

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2 Introduction

2.1 Safety guidelines



- Read this manual carefully before operating the equipment and follow the instructions.
- Installation, operation and maintenance should be carried out in strict accordance with this manual, national codes and good practice. Installation or operating not performed in strict accordance with these instructions will void manufacturer's warranty.
- Disconnect all power inputs before servicing the softstarter and/or the motor.
- Prior to the installation, check and verify that no parts (bolts, washers, etc) will fall into the starter.
- When this ⚡ symbol is shown in the manual, extra care must be taken concerning mains live voltages.
- Do not use insulation resistance- measuring instruments with insulation test voltages higher than 500V when the softstarter is connected with the motor.

Attention



- This product was designed and tested for compliance with IEC 60947-4-2.
- The SST130i- 075-M-ES model is VDE certified, other models are according to VDE safety rules.
- Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.
- Utilization category is AC-53a or AC-53b. Form 1.
- For further information see Technical Specification.

Warning



- A series contactor or switch will be required when in case of a starter switch-off malfunction it is necessary to switch off the load by a second switching device. This in order to prevent danger or damage. In case of a malfunction and the series contactor is not installed, warranty is voided and manufacturer is not responsible for the costs caused by the malfunction.
- Internal components and PCB's (Printed Circuit Boards) are at Mains potential when the softstarter is connected to the Mains. This voltage is dangerous and may cause death or severe injury if contacted.
- The SST130i-075 and SST130i-140 softstarters are an open board. The user has to care for a corresponding cabinet and a safe installation to avoid accidental contact with the parts which are conducting. Assembling in a closed cubicle or usage of a plastic coverage is recommended.
- When the softstarter is connected to Mains, even if a starting signal has not been issued, full voltage may appear on motor's terminals. This is also valid if the motor has been stopped or if no control voltage is connected.
- Starter must be properly grounded to ensure correct operation and safety.
- Check that Power Factor capacitors are not connected to the output side of the softstarter.
- Don't interchange the mains- and the motor- connections.
- Safety Guidelines require a proper circuit breaker and / or short circuit protection in front of the softstarter.
- **Grounding (PE) of the PCB is necessary. Therefore use the PE Fast-on clamp on the left side under the PCB.**

2.2 ESD Precautions and Handling:

The starter itself is not particular sensitive for Electro-Static Discharge (ESD); however precautions are still important and necessary.

The starter is produced in an ESD-safe environment.

The carton packaging box is made out of natural paper fibres without any charge collecting plastic particles or plastic top sheet.

- Before the starter is taken out of the carton, one need to discharge his body by touching or holding a conducting, not painted, metal part of the machine or installation where the starter must be built-in. A grounded metal part is very much preferred.
- Open now the starter's carton and take out the device by its aluminium heatsink block.
- Do not touch the sensitive vertical control board. The horizontal power board may be touched.
- Mount the starter into the machine or installation and hook up the wires.

2.3 Standards

SST130i: Complies with: Approval **VDE nr E850**

Directive 2014/35/EU (Low Voltage Directive)

EN 55014-1 (Electromagnetic compatibility - Requirements for household appliances, - Emission). Requirements for the appliance (Heat Pump), therefore the required validation tests will be done with the Heat Pump with EMC measures for the all components of the Heat Pump

EN 55014-2 (Electromagnetic compatibility - Requirements for household appliances, - Immunity)

EN 61000-3-2 (Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (current ≤ 16 A / phase))

EN 61000-3-3 (Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A / phase and not subject to conditional connection)

EN 61000-3-11 (Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection)

EN 61000-3-12 (Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A / phase)

EN60335-2-40: Household appliances, part heat pumps, air conditioners and similar equipment.
Safety and EMC Emission and Immunity (**CE**)

EN60335-1:2002 + A1:2004 + A11:2004 + A12:2006 + corrigendum:2006; A2:2006 + A13:2008

EN60335-2-40:2003 + A11:2004 + A12:2005 + A1:2006 + corrigendum: 2006

Restriction of Hazardous substances in Electrical and Electronic Equipment according to Directive RoHS 2011/65/EU (RoHS)

Directive 2006/1907/EU (REACH) Registration, Evaluation, Authorisation and Restriction of Chemicals.
Conformity declaration by supplier.

2.4 Environment and Sustainability

Where possible Intecma applies environmental friendly materials in the product and packing as well.

Intecma strongly advises that defective products should be sent for repair.

Repaired products can be returned or offered as refurbished devices.

End of life or destroyed products should be recycled to reduce waste and win back useful materials.

We use non-plastic packing materials and wooden pallets with plastic wrapping foil for shipping.

2.5 Characterization (according to EN60947-4-2)

General: Form 2 with bypass

Number of Poles: 1 phase regulated

Kind of current: AC

Rated impulse withstand voltage: U_{imp} 2.5kV (test voltage shape 1.2/50)

Thermal current: SST130i-075: I_{th} 30A, SST130i-140: I_{th} 30A

Rated current: 30A (11kW) for SST130i-075 / 63A (30kW) for SST130i-140

Rated uninterrupted current: 30A (11kW) for SST130i-075 / 63A (30kW) for SST130i-140

Rated Frequency: 42-70Hz

Normal overload: class 10, $x=40/I_e$, $T=3$

Interrupting medium: SCPD (no part of the softstarter device)

Method of operation: Anti-parallel thyristors

Method of control: Semi-automatic

Method of connection: Motor in delta or star, Thyristors in series with mains supply

Rated operational voltage: U_e 230Vac, +10%, -15%

Rated Insulation voltage: U_i 500Vac

Operating capability: 230/25/100%/AC53a / AC58a

Starting/Stopping: Off / starting / fully ON / Off

Thyristor I^2t : 350A²s for SST130i-075 / 8000 A²s for SST130i-140

Utilisation category: AC53a / AC58a

Control circuits: none / start-stop, isolated, potential-free switching contact: 0- /+5Vdc, referred to PE, Protective Ground level

Auxiliary circuits: None

Coordination with SCPD (Short Circuit Protection Device): class B 32A for SST130i-075/ 63A for SST130i-140, ie rating dependable

The "SimpleStarter" softstarters are supplied without short-circuit Protective Devices, e.g. fuses, MCB or a Thermal Electro-Dynamic Overload Relay for the 1- and 3-phase Mains.

- a) Manufactured in EC VDE approval pending
- b) Type: SimpleStarter SST130i, 1 Phase 230Vac bypassed Softstarter
Enhanced safety: redundant relay functions feature and redundant hardware start capacitor and temperature monitoring circuits
- c) Standard applied: EN60335-1 EN60335-2-40
- d) U_e : 230Vac (+10%, -15%)
- e) I_e : 30A/70°C: AC53a/AC58a: 1.2-3: 100-12
Type SST130i-075: I_{str} =47A Type SST130i-140: I_{str} =140A
- f) Rated frequency: 42-70Hz
- g) Duty rate: continuous operation
- h) Form designation: Form 2
- j) Rated insulation voltage: 500Vac
- k) Rated impulse withstand voltage: 2500Vpk (1.2/50 μ s)
- l) IP code: Open Frame IP00
- m) Pollution degree: 3 (industrial applications)
- n) Short circuit current: SST130i-075: 200A/10ms, I^2t : 350A²s
SST130i-140: 1000A/10ms, I^2t : 8000A²s
- p) Switching overvoltage: not applicable
- q) Rated control voltage: 230Vac-10mA / 24Vdc-10mA
- r) Rating auxiliary circuits: not applicable
- s) Characteristics overload relay: not applicable
- t) Emission: class B starting time <600ms, Class A >600ms*
- u) Immunity: no specific measures required
- z) RoHS conform

* Without input filter the product is Class A equipment; use of this product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation measures.

3 Ordering information

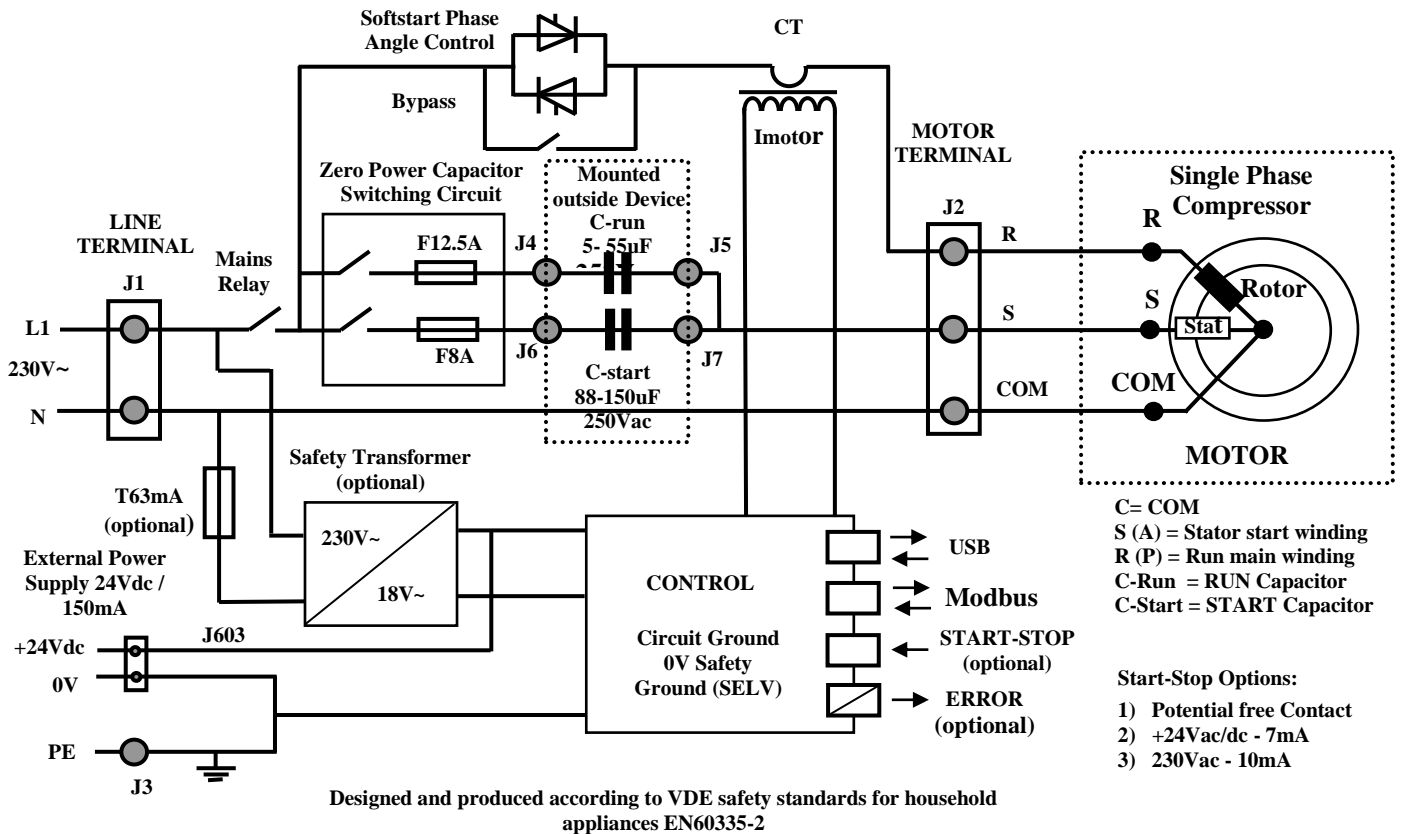
	SimpleStarter:	
	Model:	Specific Features:
1	SST130i-075-M-ES	<ul style="list-style-type: none"> - Max Starting current 75Arms/0.6s - USB for parameter setting and monitoring - MODBUS Serial Control# - Unit powering: External Supply + 24Vdc 150mA Minifit 2x2p connector - Run-Cap Terminal 6.3x0.8mm Vertical Faston Tab (J4, J5) - Start-Cap Terminal RAST7.5-Vertical- 2pole (J6+J7)
2	SST130i-075-M	<ul style="list-style-type: none"> - Max Starting current 75Arms/0.6s - USB for parameter setting and monitoring - MODBUS Serial Control* - Unit powering: Transformer 230V-50Hz-6VA - Start-Cap and Run Cap Terminals 6.3x0.8mm Vertical Faston Tab (J4, J5, J6, J7)
3 4 5	SST130i-075-*-ES	<ul style="list-style-type: none"> - Max Starting current 75Arms/0.6s - USB for parameter setting and monitoring - Physical Control (no MODBUS Control) - Unit powering: External Supply + 24Vdc 150mA Minifit 2x2p connector - Start-Cap and Run-Cap Terminals 6.3x0.8mm Vertical Faston Tab (J4, J5, J6, J7) - Error Relay - Start-Stop Input: <ul style="list-style-type: none"> * S1 not Isolated, Potential-Free Contact SST130i-075-S1-ES * S2 Isolated, Control Voltage 24Vac/dc-7mA SST130i-075-S2-ES * S3 Isolated, Control Voltage 230Vac-10mA SST130i-075-S3-ES
6 7 8	SST130i-075-*	<ul style="list-style-type: none"> - Max Starting current 75Arms/0.6s - USB for parameter setting and monitoring - Physical Control (no MODBUS Control) - Unit powering: On-Board Transformer 400Vac - Start-Cap and Run-Cap Terminals 6.3x0.8mm Vertical Faston Tab (J4, J5, J6, J7) - Error Relay - Start-Stop Input: <ul style="list-style-type: none"> * S1 not Isolated, Potential-Free Contact SST130i-075-S1 * S2 Isolated, Control Voltage 24Vac/dc-7mA SST130i-075-S2 * S3 Isolated, Control Voltage 230Vac-10mA SST130i-075-S3
9	SST130i-140-M-ES	<ul style="list-style-type: none"> - Max Starting current 140Arms/0.6s - USB for parameter setting and monitoring - MODBUS Serial Control# - Unit powering: External Supply + 24Vdc 150mA Minifit 2x2p connector - Run-Cap Terminal 6.3x0.8mm Vertical Faston Tab (J4, J5) - Start-Cap Terminal RAST7.5-Vertical- 2pole (J6+J7)
10	SST130i-140-M	<ul style="list-style-type: none"> - Max Starting current 140Arms/0.6s - USB for parameter setting and monitoring - MODBUS Serial Control* - Unit powering: Transformer 230V-50Hz-6VA - Start-Cap and Run-Cap Terminals 6.3x0.8mm Vertical Faston Tab (J4, J5, J6, J7)
11 12 13	SST130i-140-*-ES	<ul style="list-style-type: none"> - Max Starting current 140Arms/0.6s - USB for parameter setting and monitoring - Physical Control (no MODBUS Control) - Unit powering: External Supply + 24Vdc 150mA, Minifit 2x2p connector - Start-Cap and Run-Cap Terminals 6.3x0.8mm Vertical Faston Tab (J4, J5, J6, J7) - Error Relay - Start-Stop Input: <ul style="list-style-type: none"> * S1 not Isolated, Potential-Free Contact SST130i-140-S1-ES * S2 Isolated, Control Voltage 24Vac/dc-7mA SST130i-140-S2-ES

		* S3 Isolated,Control Voltage 230Vac-10mA SST130i-140-S3-ES
14 15 16	SST130i-140-*	<ul style="list-style-type: none"> - Max Starting current 140Arms/0.6s - USB for parameter setting and monitoring - Physical Control (no MODBUS Control) - Unit powering: On-Board Transformer 400Vac - Start-Cap and Run-Cap Terminals 6.3x0.8mm Vertical Faston Tab (J4, J5, J6, J7) - Error Relay - Start-Stop Input: <ul style="list-style-type: none"> * S1 not Isolated, Potential-Free Contact SST130i-140-S1 * S2 Isolated,Control Voltage 24Vac/dc-7mA SST130i-140-S2 * S3 Isolated,Control Voltage 230Vac-10mA SST130i-140-S3

Start-Stop / Error Messages / Parameter Settings / SN Reading

4 General description

4.1 Operation Principle and Wiring SimpleStarter SST130i-075 and SST130-140



4.2 "SimpleStarter" digital Softstarter

The SST130i is a start current limiting device, specially designed for reducing the inrush current of cooling compressors in heatpumps and airconditioners.

The starter is suited for both types of compressors, scroll and piston as well.

Several types are available with different starting currents and control topologies
 75Arms max. For the SST130i-075 model up to 140Arms max. For the SST130i-140.
 For all types the continuous current is 30Arms.

The starter input voltage range is from 190Vac up to 250Vac.

The device consists of a horizontal power board and a vertical control board and has no housing. Like the other devices of the SST family, the proposed unit also has USB communication with a computer for status reading, and device parameter setting.

There are 3 power relays on the board:

- Input relay: in the stand-by mode (no motor running), the starter, hence the run capacitor is isolated from the L connection of the mains.
- Start capacitor relay: disconnect the start capacitor, when the compressor is up to speed.
- Bypass relay: will close when the compressor is at speed, the power semiconductor that performs the start will be switched-off at that moment.

The device is developed according the VDE safety rules for the domestic (household) approval EN 60335-2-40 for single phase compressors with run- and starting capacitors.

Special attention is given for a safe and reliable switch-off of the starting capacitor.

According to the VDE requirements in this field, the detecting and switch-off of the start capacitor are carried out redundant (2 independent circuits and build with different hardware parts).

In case of a failure, one of the hardware detecting circuits will switch-off the compressor and remain latched until the mains is disconnected for 1 second and switched-on again.

All the required connections of the mains and the compressor and are present on the device itself, for fast and easy wiring.

For the start-stop input 3 types are available:

- not-isolated input, operated with an external switch contact that uses an internal +5V-10mA control voltage.
- Isolated input, with optocoupler galvanic isolation, operated with an external 24Vac/dc control voltage
- Isolated input, with optocoupler galvanic isolation, operated with an external 230Vac control voltage.

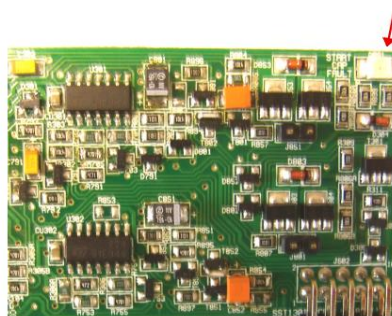
The power stage that performs the soft start is equipped with a high performance power semiconductor module and is (over)temperature controlled.

The starting current can be adjusted and stored by means of the USB link and a computer or tablet.

The required application program is available, free of charge.

4.3 Protective Electronic Circuit (PEC)

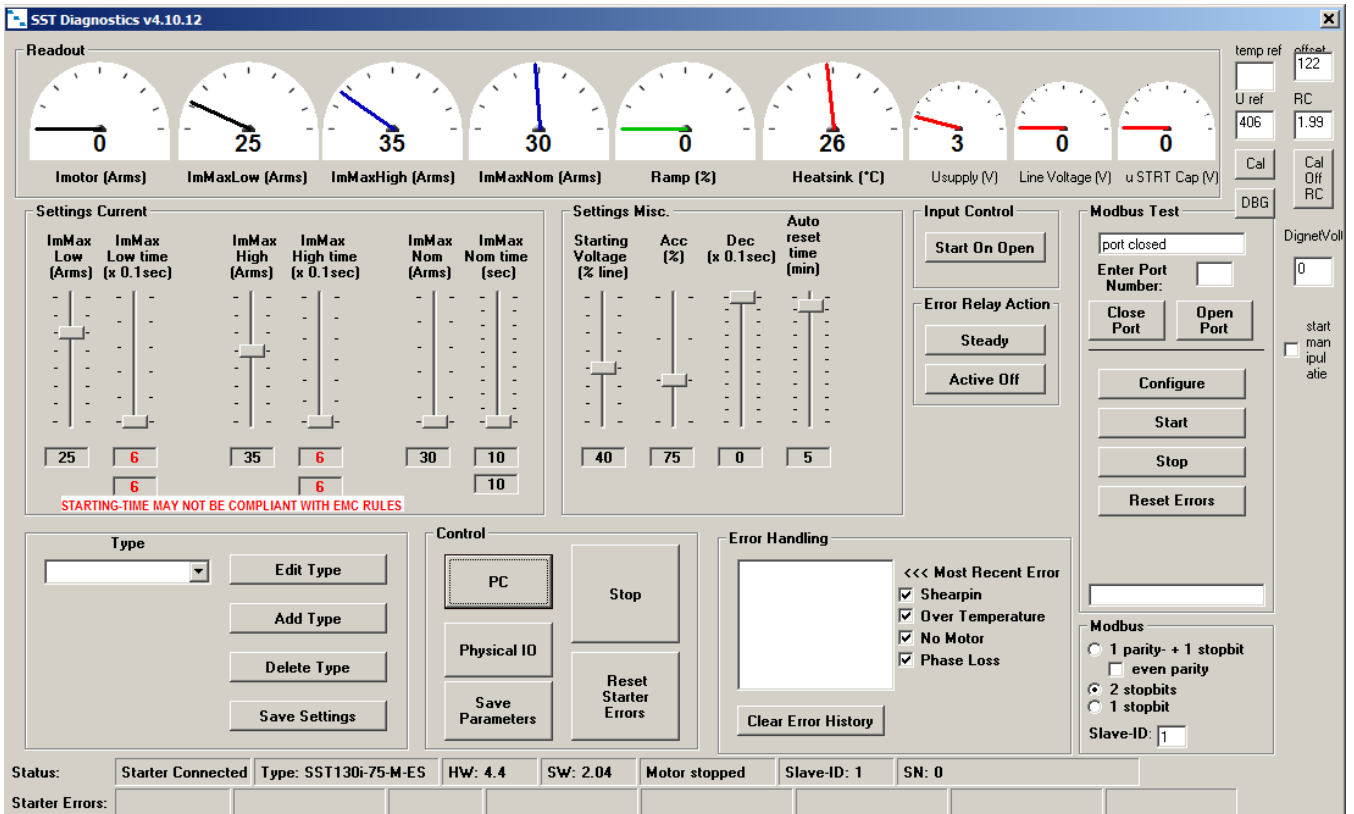
The SST130i-075 and SST130i-140 softstarters are equipped whit 2 independent PEC's. These are necessary to fulfil the VDE safety requirements. The PECs make sure that in case of a software- or hardware malfunction the current thru the start capacitor is stopped. When this happens the red LED at the right side of the vertical PCB lights up and the softstarter is no longer functional. The only way to reset the device is by switching-off the mains and removing the USB connection.



5 Control section description

5.1 USB Diagnostics program (examples taken from the SST130i-140 device)

Adjusting of the Starters parameters is done with the 'SST Diagnostics program'. This program 'SimpleStarterDiag.exe' comes together with 'SSTsettings.ima' and 'mcHID.dll'. The three of them should always be kept together in a single random chosen Windows folder.



Run the Diagnostics program 'SimpleStarterDiag.exe' and connect the PC with a proper USB cable (Type A to Mini B) to the SimpleStarter. The computer will supply the SST device with 5V; the control board will run the green LED will flash slowly, waiting for the 230V mains voltage. For full function, apply the mains voltage to the SimpleStarter.

Once the connection has been established the upper status bar shows some general information like Connection status, Company Name Hardware Version, Starter Type, Software Version and the motor status which can be: Motor Stopped; Motor Starting; Motor at speed; Motor Stopping.

To switch the control to the Diagnostics program click on the 'Starter' button. It will now show 'PC', all the controls on the screen become active. The settings that are made on the screen will be taken over by the Starter.

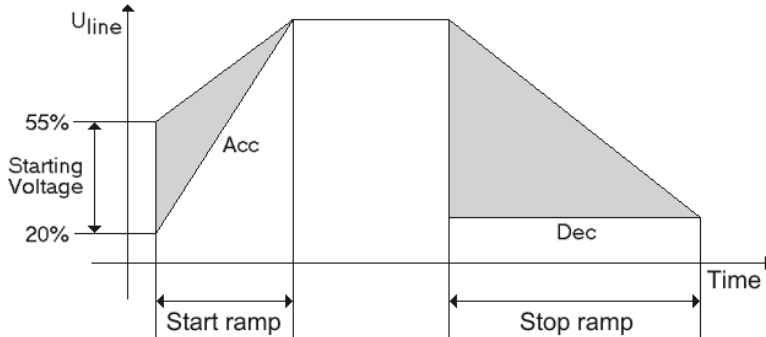


However, keep in mind that, once the control has been given back to the Starter, these new settings are lost and the previous setting will be used unless they were saved first by clicking the 'Save Parameters' button.



5.2 Starting

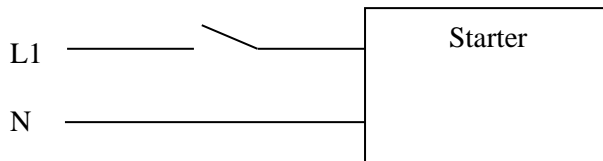
A general rule says the shorter the acceleration time the higher the starting current, the less the backup fuses are heated and the higher the mechanical stress will be. A longer starting time minimises the mechanical stress but will increase the energy loss in motor and starter.



There are three ways of starting the motor:

5.2.1 Auto Start

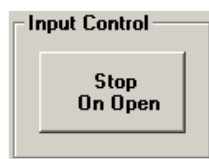
Use this way when the mains voltage is applied by switching an upstream contactor (external Start/Stop mode set to Start On-Open see 5.2.2).



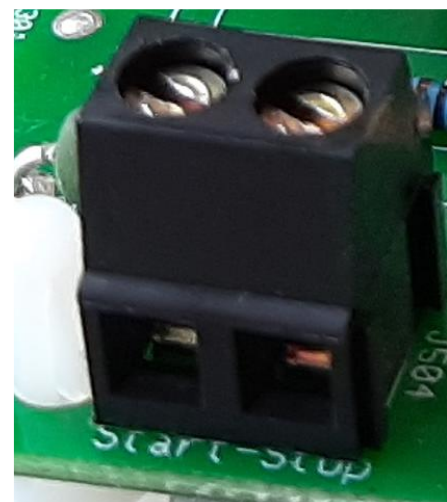
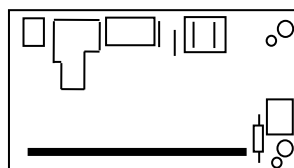
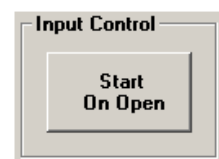
5.2.2 The external 'Start-Stop' switch

The physical I/O external 'Start-Stop' switch can be configured from firmware version 1.04 with diagnostics screen version v4.10.00 or higher.

The Starter will ramp down when the control voltage is not applied (Stop On Open).



The Starter will ramp up when the control voltage is applied (Start On Open).



5.2.3 Start/Stop button on the diagnostics screen

The motor can also be started by clicking the Start/Stop toggle button on the diagnostics screen.



With the Starting Voltage slider the initial voltage can be set from 20% to 55% of the line voltage.

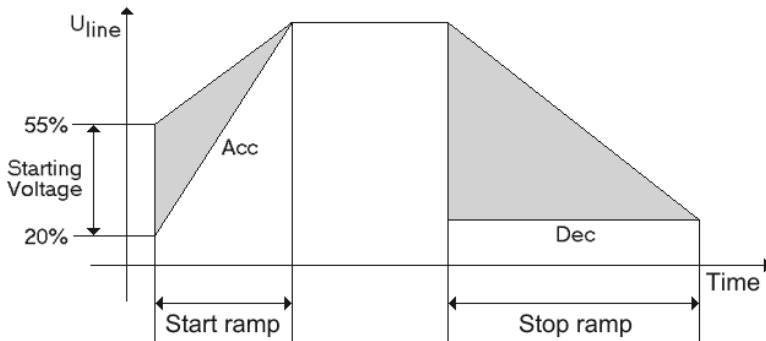


The start ramp can be set in 4 steps from 0 – 100% with the Acc slider.



5.3 Stopping

There are three ways of stopping the motor:



5.3.1 Disconnecting the Mains supply

When a connected normally closed 'Start-Stop' switch is closed the Starter will ramp down the voltage by decreasing the phase angle of the thyristors.

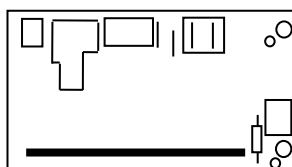
5.3.2 The external 'Start-Stop' switch

The external 'Start-Stop' mode switch can be configured from firmware version 1.04 with diagnostics screen version 1.3.

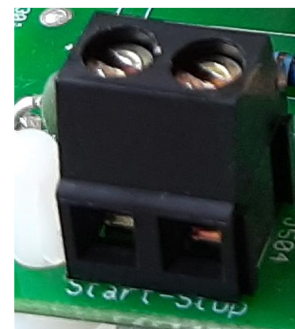
The Starter will ramp down when the switch is opened (Stop On Open).



The Starter will ramp up when the switch is opened (Start On Open)



Physical I/O Start-Stop Input



5.3.3 Start/Stop button on the diagnostics screen.

The motor can also be started by clicking the Start/Stop toggle button on the diagnostics screen.



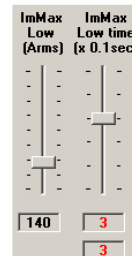
When using the external Start-Stop input or the Start/Stop button on the diagnostics program the deceleration time can be set with the 'Dec' slider between 0 - 100 seconds.



5.4 Current Settings

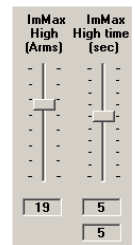
5.4.1 Starting current (first stage)

After giving the starting command the current increases till it reaches the first of a two stage current limit. The value of this limit is done with the ImMaxLow (5-75Arms for SST130i-075, 5-140Arms for SST130i-140) slider as where as the maximum duration of the current is done with ImMaxLow time (1-10sec) slider. The time that the current is stalled as the limit has been reached is counting down on the second textbox under the slider (this time will never count up during the starting process).



5.4.2 Starting current (second stage)

When the first stage of the current limit has elapsed and the motor is not yet at full speed the second stage becomes active. This one is set with the ImMaxHigh (5-75Arms for SST130i-075, 5-140Arms for SST130i-140) slider as where as the maximum duration of the current is done with ImMaxHigh time (1-10sec) slider. The time that the current is stalled as the limit has been reached is counting down on the second textbox under the slider (this time will never count up during the starting process).

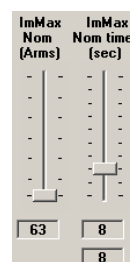


Note: when the level of the second stage is less then the first one the current will not drop but remain the level of the first stage. This is because the Starter will not ramp down during the starting period.

After the second time has elapsed and the motor is still not yet at full speed the Starter will now stop the motor immediately and generates an over current error.

5.4.3 Nominal current

As soon as the motor reaches full speed the bypass relays become active thus reducing the power dissipation of the Starter. With the ImMaxNom (5-30Arms) and the ImMaxNom time (5-10sec) sliders the nominal current and duration time can be set. When the nominal current becomes higher then the value set with the ImMaxNom slider the ImMaxNom time starts counting down, when it is less the timer will count up thus emulating a thermal protection of the motor.



Note: for a real thermal protection of the motor a Motor Protection Relay or PTC thermistors should be used.

The actual time can be monitored in the second textbox under the ImMaxNom time slider. When this time has reached 0 the Starter will stop the motor immediately and generates an over current error.

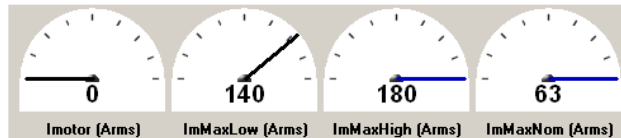
5.4.4 Shear pin function

When the thyristor current exceeds 55A for the SST130i-075 or 165A for the SST130i-140 the Starter switches off immediately and gives an over current error. This level is fixed.

5.4.5 The Motor Current readout screen

As far as the motor current settings are concerned this part shows in a more graphical way:

- The actual motor current, Imotor
- The first stage of the starting current, ImMaxLow
- The second stage of the starting current, ImMaxHigh
- The nominal motor current, ImMaxNom



5.4.6 LED indications

The unit is equipped with 3 LED's, placed on the vertical PCB.

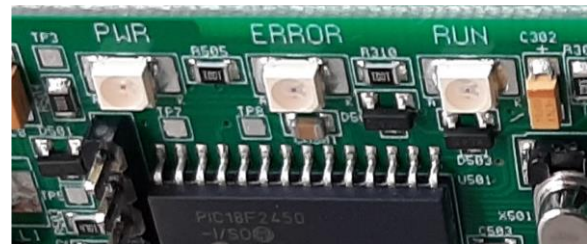
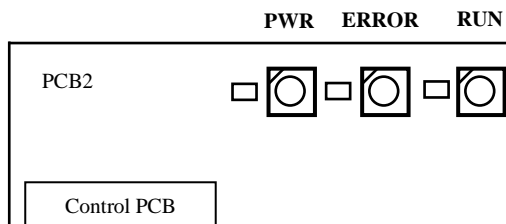


Fig. 5.4 LED Indication

Error detection and indication is active in standby mode (motor stopped) and in running mode as well. On the diagnostics program the indicated error will be displayed in the status bar.

Green LED on → Power-on.

Yellow LED on → Motor at speed, on board bypass relays are switched on.

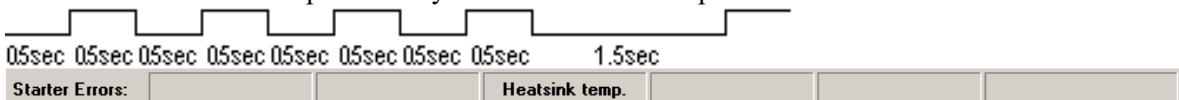
Red LED flashes 2 times periodically → Phase sequence fault. (not for STT130i Single phase model)



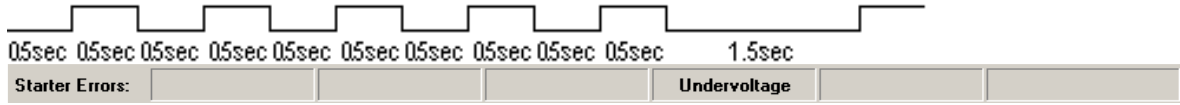
Red LED flashes 3 times periodically → Overcurrent during start and running.



Red LED flashes 4 times periodically → Heatsink overtemperature



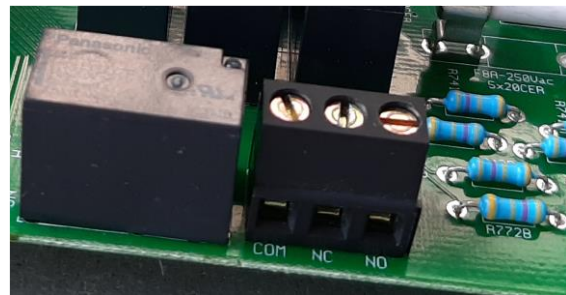
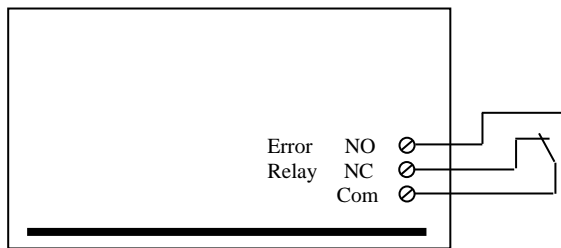
Red LED flashes 5 times periodically → Under voltage / phase loss /low voltage starter supply.



Red LED flashes 7 times periodically → Motor not connected or bad connection

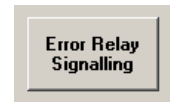


5.5 Error Relay



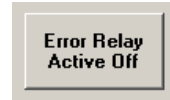
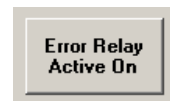
The softstarter is equipped with an Error Relay. The contacts are named: COM (Common), NC (Normally Closed) and NO (Normally Open). When an error occurs there are two possibilities in the Error relay behaviour

1. The upper button shows 'Error Relay Signalling' meaning that the error relay switches together with the Error LED.
2. The upper button on the 'Error Relay Action' of the Diagnostics program shows 'Error Relay Steady' which means that the error relay is switched over once from contact COM to NO. (See Fig. 5.5).



Clicking on the button toggles between the two.

1. When the lower button on the shows 'Error Relay Active On' this means that the error relay is in rest when no error is present.
2. When the lower button on the shows 'Error Relay Active Off' the error relay is switched on when no error is present.

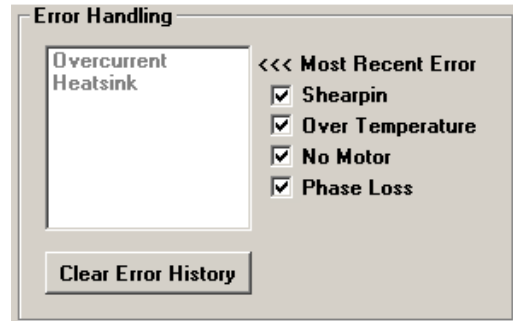
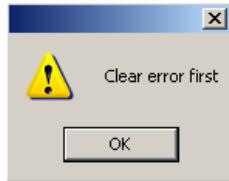


Clicking on the button toggles between the two.

5.6 Error handling

The error handling screen consists of two parts. The left part shows the eight most recent errors, one the right part one can enable or disable the possible errors.

With the Clear Error History button the error list can be cleared. Make sure that there are no recent errors before you try to clear the list. In that case there will be a pop-up screen that gives a message that the present error needs to be cleared first.



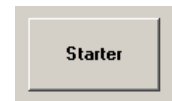
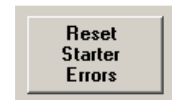
After enable or disable errors it's important to save the setting(s).

5.7 Resetting

After an error the SimpleStarter can be reset in three several ways:

1. By removing and re-applying the mains supply.
2. By clicking on the 'Reset Starter Errors' button
3. Automatically, after the Auto Reset time (1-60 min) has elapsed. Above 60 minutes the Auto Reset is disabled (indication: Off). Only resetting as described by point 1 and 2 then will apply. The Auto Reset time will only be active when the control has been to the SimpleStarter.

In that case the actual auto reset countdown can be followed in the lower textbox in the 'SettingsMisc' part of the Diagnostics screen.



6 Protective functions

6.1 Overcurrent

During a start the motor current is measured and the level is kept equal to the adjusted maximum current level, with an average accuracy of about 3%. The current detection is active during motorstart and continuous operation as well (motor overload error).

6.2 Phase loss / low voltage detection

Phase loss:

Missing phase L1 at continuous operation with USB connected:

the starter remains powered via USB and will after a delay of 3 seconds display the "undervoltage" + "no motor".

Missing phase L1 at continuous operation without USB connected:

The starter is no longer powered.

Low voltage:

For correct operation the minimum line voltage must be at least 190V~.

If the line voltage is below this value, an undervoltage error will be displayed.

To proceed, the starter has to be reset by switching the feeding mains voltage off and on.

6.3 Starter overtemperature protection

The SimpleStarter power semiconductor module is protected against overtemperature. Most heat is generated during starting. In the running mode the only heat is generated by the bypass relays and the wiring. Because of this one should keep in mind the amount of motor starts is not only limited by the height and duration of the starting current but also by the ambient temperature and how fast the heatsink can loose its excessive temperature.

Temperature sensor lead interruption and sensor lead short-circuit to the grounded heatsink will be sensed also, resulting in a temperature error message.

6.4 Mains frequency

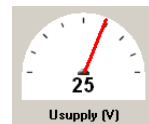
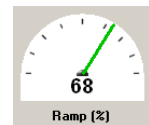
The rated mains frequency is 42-50Hz.

6.5 No Motor detection

When the motor wire R is not connected to the motor, this will be sensed, resulting in a "no motor" error after 3 sec. The motor can be started again after resetting the fault (mains off-on, or with the PC program "Reset Errors") and restoring the lost motor connection.

6.6 The miscellaneous readout screen

1. The 'Ramp' gauge shows the progress of the phase angle between 0 (stopped) and 100% (maximum voltage).
2. 'Usupply' is the on-board voltage which supplies all internal circuitry (merely a control function).
3. The 'Heatsink' gauge shows the temperature of the heatsink in degrees centigrade. When it reaches 75°C the motor is stopped and the Starter generates an over-temperature error.'

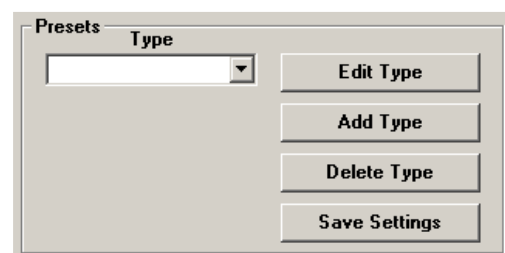


6.7 Presets

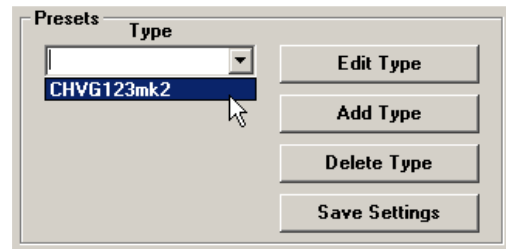
The user can and manipulates store preferred settings of all parameter under a self named preset.

First the Starter must be hooked-up and powered. Also the control must be given to the diagnostics program as described in section [5.1](#).

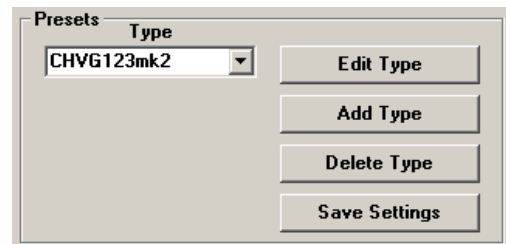
Then this default screen appears fully activated.



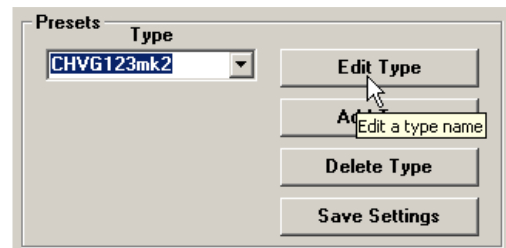
By clicking on the arrow of the combo box a list of available, if any, appears. Choosing one also updates the parameters (ImMaxlow, ImMaxlow time, etc.).



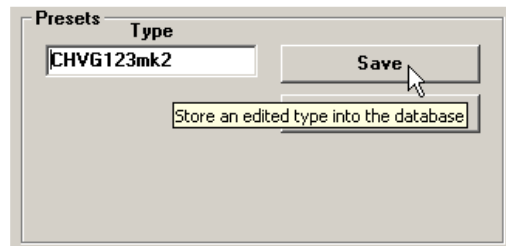
With the name in the box the following actions can be done: Editing, Deleting or Saving the parameters.



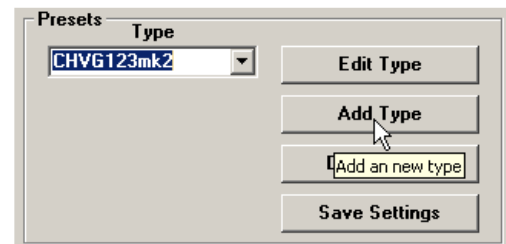
First make sure the proper type has been chosen in the combo box. Then the name can be edited by clicking the 'Edit Type' button.



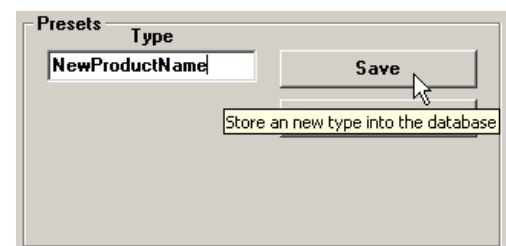
After clicking the 'Edit Type' button this screen appears. Edit the name here. Click on 'Save' for storing into the database', or click 'Cancel' to return to the default screen.



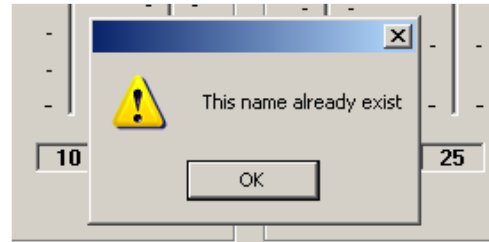
Adding the name of a type in the database can be done by clicking the 'Add Type' button.



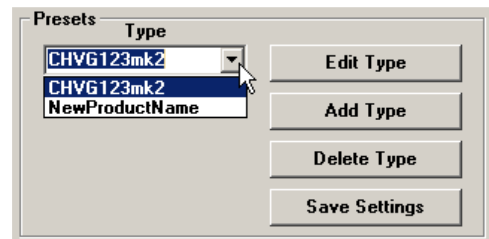
After clicking the 'Add Type' button this screen appears. Enter new name here. Click on 'Save' for storing into the database', or click 'Cancel' to return to the default screen.



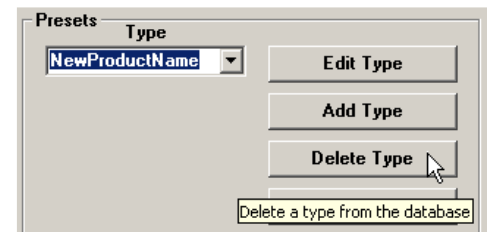
Make sure the new type has a unique name. Double entries are not allowed.



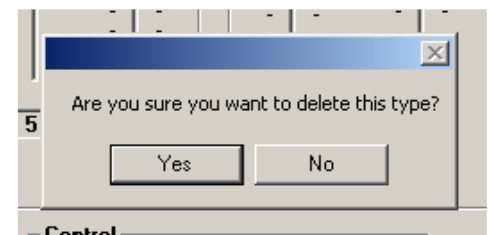
When clicking on arrow of the combo box the new type will show up in the list.



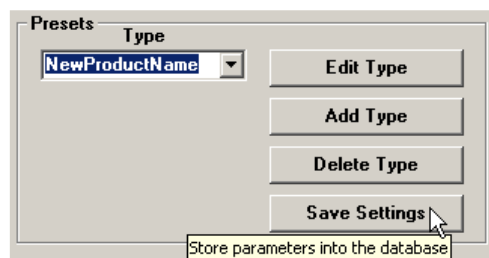
Deleting the name of a type that is already in the database can be done by clicking the 'Delete Type' button. Verify that the correct type has been chosen in the combo box.



A confirmation screen appears. Clicking 'Yes' will permanently delete the chosen name from the database. Clicking 'Yes' will return to the default screen.

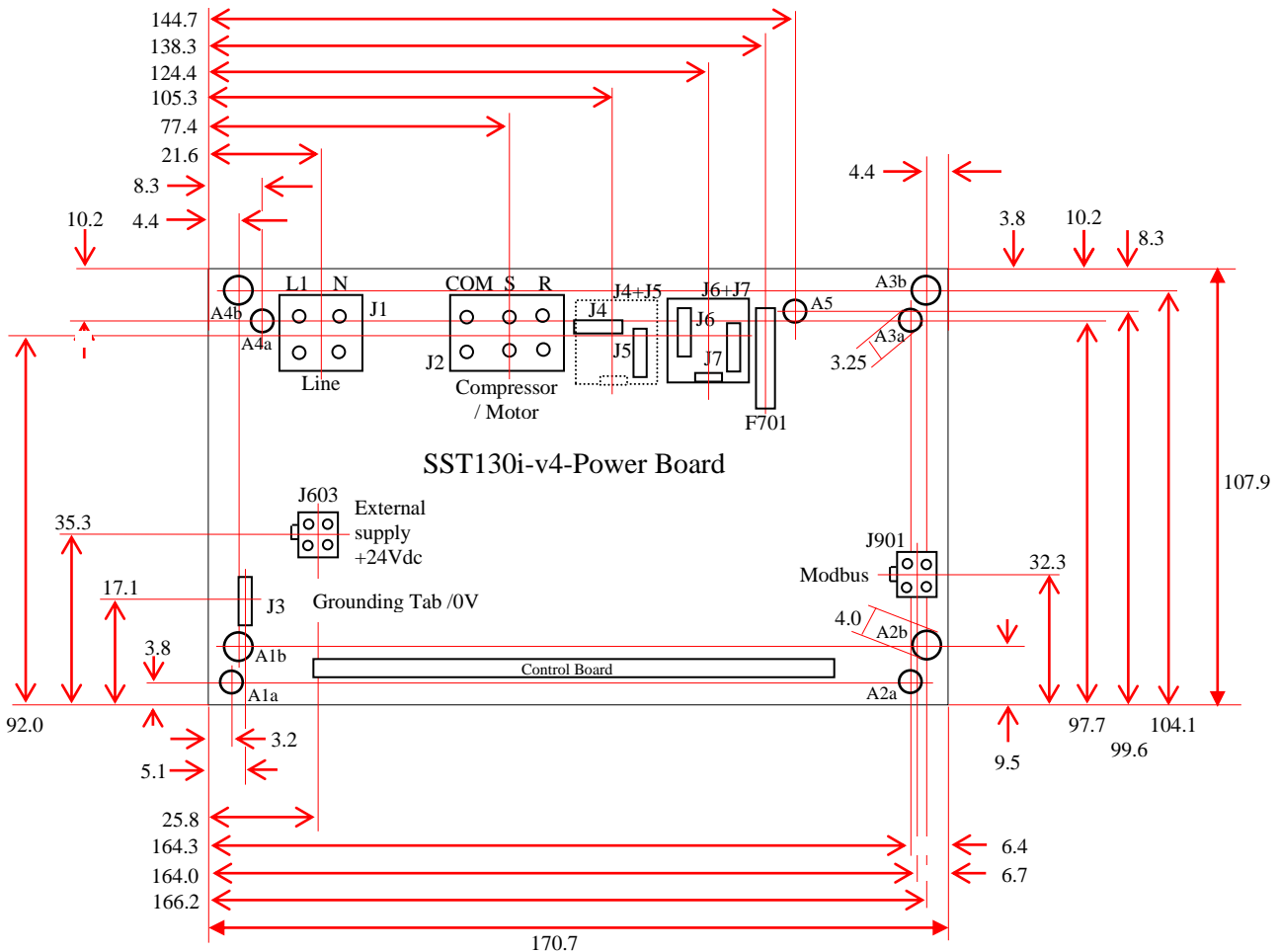


The 'Save Settings' button will store all adjustable parameters into the database (Note: not the Starters internal; memory).



7 Installation, Maintenance & Service

7.1 Drill plan mounting holes and other dimensions



Top view

Unit Dimensions LxWxH = 171x108.x50mm .tol: ± 0,20mm

Drawing not to scale

Measures in mm

Mounting holes:
Drill size A1a, A2a, A3a, A4a, A5 = 3.2mm
Drill size A1b, A2b, A3b, A4b = 4.0mm
Spacer hole Tol. ±0.076mm

SST Mounting:
Nylon M3 or M4 (nylon) spacers
Minimal spacer length without Isolation
Sheet: 12mm

7.2 Mounting instructions

⚠ The "SimpleStarter" is an open frame OEM device, proper shielding against touching is strongly advised. The "SimpleStarter" is standard equipped with 4 nylon Snap-in locking PCB supports for easy and fast mounting. When build in a housing, special care must be taken for sufficient free space for cooling airflow to circulate. A full metal cabinet with cable glands for mains and motor wires is recommended. The size of the cabinet is to be chosen with regard to motor current rating, ambient temperature and number of starts per hour and the efficiency of the cabinet in transporting the generated heat to the ambient. Ventilation slots must be implemented for sufficient air flow. Be sure that the cabinet air temperature does not exceed 55°C, when this can happen forced cooling should be applied. Recommended general-purpose minimum cabinet size: LxWxH = 250x110x100 mm.

Free space around the starter should be 2.5cm.

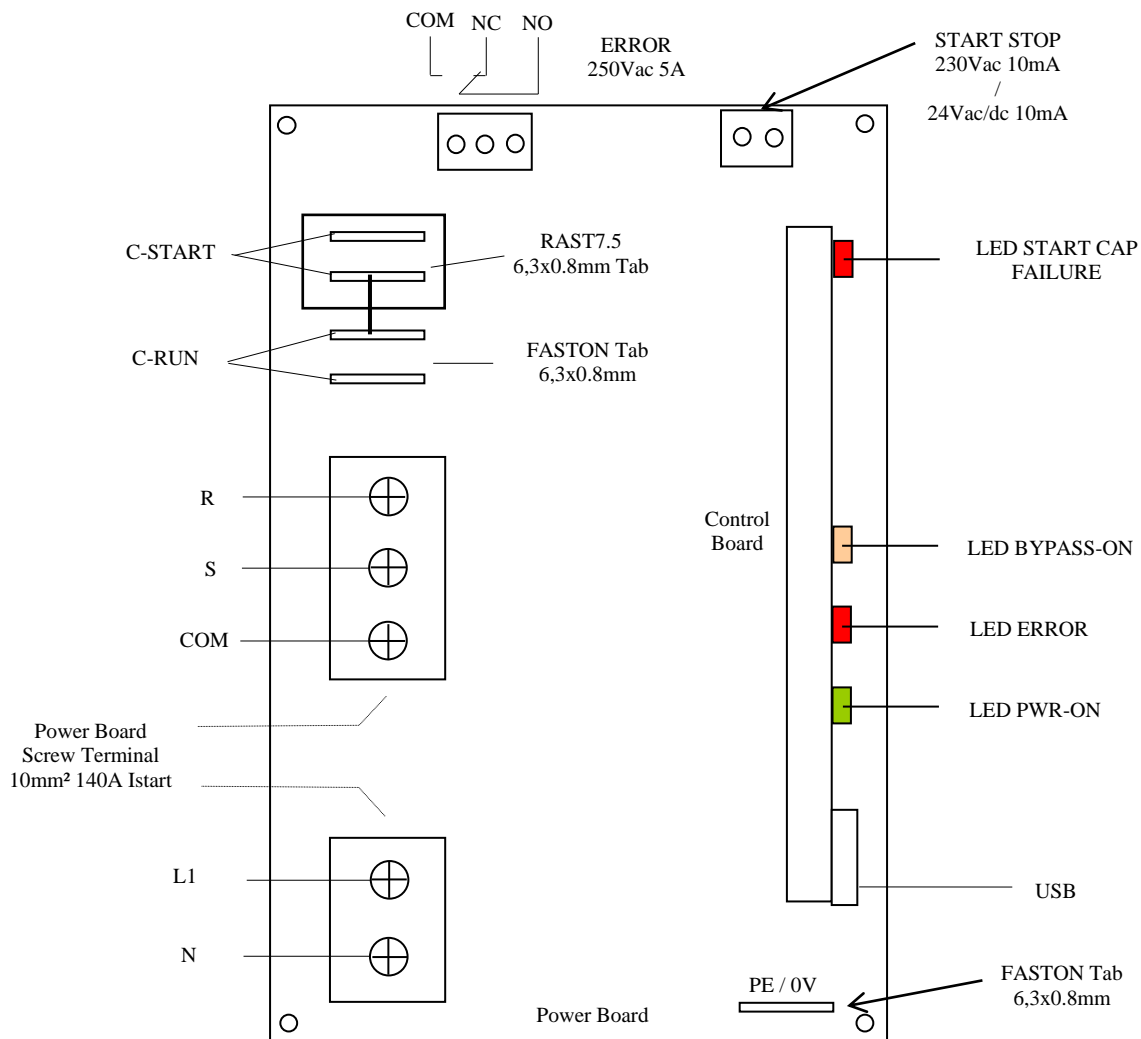
For the wiring 105°C high performance equipment wire with sufficient current rating should be used.

In the cabinet; only starter wiring wires are allowed.

7.3 Installation

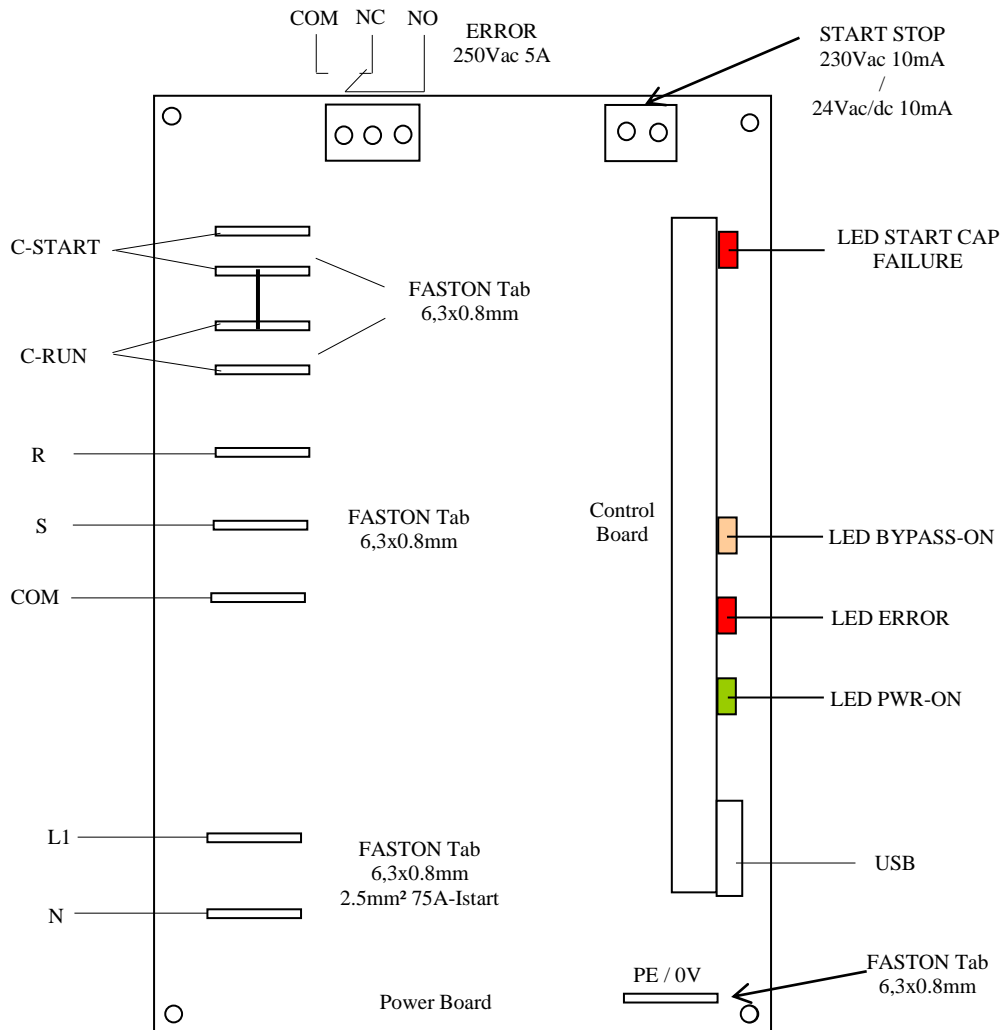
SST130i-075: Mains and motor Fast-on terminals L1-N and R, S, Com 2.5mm² /14AWG, depending on motor current rating.

SST130i-140: Mains and motor screw block L1-N and R, S, Com 6mm² /10AWG, depending on motor current rating. The PE ground must be connected to the terminal tab J3 (in front left) Fast-on Tab 4.8x0.8mm. Be sure that the Fast-on crimp terminal is connected to the wire with the appropriate tooling. Use 2.5 mm² - 250V~ type stranded copper wire, temp. rating: min. 85°C.



Terminal Torques:

- Line (L1-N): J1- Screw terminal 10mm², nominal Torque 1,2Nm, max 1.3Nm
- Compressor (R-S-COM): J2- Screw terminal 10mm², nominal Torque 1,2Nm, max 1.3Nm
- External Start-Stop input: Screw terminal 2-pole 1mm², 10A 250Vac, nominal Torque 0,5Nm, max 0.8Nm
- Error Relay output: Screw terminal 3-pole 1mm², 10A 250Vac, nominal Torque 0,5Nm, max 0.8Nm



The rated wire gauge of the ERROR relay terminals is 1.0mm².

Use 250V~, stranded 0.75-1.0mm², copper wires, temperature rating: min. 85°C.

When the softstarter is to be build-in into a cabinet, take care that all wires are leaded straight to and from its terminal blocks, not too long and not too short. When necessary tighten the wires with wire clips to the cabinet bottom or sides, to prevent that the wires contact internal parts of the device.

Any mounting position is allowed as long as sufficient cooling is guaranteed.

Do not mount the starter near heat sources.

Protect the starter against corrosive atmospheres and dust.

Warning:

Incorrect starter application or operation may cause overload and damage the power semi-conductor module before the heatsink over-temperature protection will trip the device!


7.4 Service

Retighten the screws of the terminal blocks after the some running hours of the machine or installation, use min. 0.5Nm tightening torque.

When proper installed, the softstarter needs no servicing or maintenance during its working life.

The on-board power supply transformer primary winding has 1 protection fuse: T63mA-glass type, 250V, size 5x20mm. A service engineer has to replace the fuse.

When servicing the device be sure that the mains supply is switched off and disconnect the wires of the mains input terminal. Then replace the fuse. Reconnect the mains input terminal wires and switch on the power.

 Installing and Operation of this product not executed in correspondence with this manual voids any guarantee.

8 Fuse selection mains

Starter Type	Istart max.	MCB B-char. VDE 0641 Breaking capacity 10KA	fuse class gL/gG gL acc. VDE 0636/21 gG acc. IEC 60269-1,2-1
SST130i-075	75A	32A	32A
SST130i-140	140A	50A	50A

9 Technical specifications

9.1 General

- Designed to comply with EN 60335-2-40 standard (household appliances).
- Starting current Model SST130-075: 75A, resp. SST130-140: 140A, max starting time 0.6s at normal conditions.
- Zero Power Switching of Run – and Start Capacitor, eliminating contact wear and damage.
(no capacitive inrush currents at switch-on, no inductive sparks at switch-off)
- Load is disconnected from L-phase in standby mode
- Detection of no starting capacitor connected or failed (short-circuited) capacitor, switch-off within 1s
- On-board discharge resistors of both run- and start capacitor
- Active discharge of the run capacitor within 1s, reducing motor remanent magnetism and motor noise at stop
- Starting capacitor discharge time: approx. 15s, monitored by the softstarter and displayed with SST Diagnostics
- On-board fuses for protection against RUN- and START Capacitor overload.
Fuse RUN-Cap F12.5A Ceramic 5x20mm. Max capacitor size for the specified fuse rating: 80uFmax-8.5Arms
Fuse START-Cap F8A Ceramic 5x20mm. Max capacitor size for the specified fuse rating: 140uFmax-14Arms
Fuses for other capacitor values: consult Intecma.
- Printed Circuit Board for power part, vertical PCB for control functions. Board quality: FR-4.
- Dimensions PCB: approx. 171 x 108 x 50mm, 9 holes for mounting stand-offs M3 or M4.
- Horizontal PCB bottom side shielded with polyester sheet (Option).
- PCB trace clearance/creepage: >5.0mm (Pollution degree: 3) 3.7kV Isolation between control circuit and power circuit (SELV), (use the PE, grounding tab as long as the device is connected to a PC or laptop).
- Protection class: IP00.
- Weight: approx. 300gr without Transformer, 550gr with transformer (Option).
- Error relay (Option): single pole; dual transition rated for 250Vac - 5A; contact material: silver alloy.
- Mounting: user has to provide a proper housing, safe, dry and with sufficient coolant air circulation.
- Operating temperature: -20 to +70° C: depending on the type of the enclosure.
- Storage temperature: -40 to +85° C, relative humidity <90 %, condensation not allowed.
- Humidity: 98% at 20°C, 85% at 55°C.
- Altitude: max. 1000m. for devices to be used at higher altitudes consult your supplier.

- Maximum complete switching cycles: 12/hour, depending on temperature and load conditions.
- Minimum number of switching cycles over lifetime: Bypassrelay >1.000.000, semiconductors.>10.000.000.
- Maximum complete switching cycles: 12/hour, depending on temperature, motor temperature and load conditions.
- Maximum peak line voltage: 800V.
- Critical rate of rise of on state voltage (dV/dt):1000V/μs.
- Critical rate of rise of on-state current (dI/dt): 50A/μs.
- Insulation voltage of the power semiconductor: 3kV~/1sec.
- Warranty period 24 months after purchase.

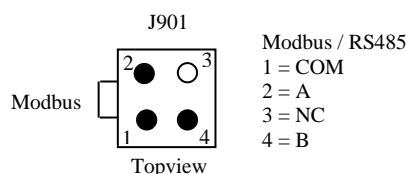
9.2 Starter control

- LED indication for power-On: Green, Bypass relay on: Yellow, Error: Red
- Starting time: current controlled start, within 0.60s (step1), incidentally + 0.6s (step2)
- Control inputs: Modbus, USB, Manual Start-Stop (Option: Potential free contact +5V/0V, 24Vac/dc, 230Vac)
- Control outputs: Modbus, USB, Error relay, 250V-5A, SPDT, Wiring: flexible wire 250Vac, 1mm²
- Mains frequency: 50 Hz, maximum frequency variation: 20 Hz/s
- Overcurrent protection: during starting and continuous operation.
- Overtemperature protection above 75°C of the heatsink power semiconductor
- Minimal circuit recovering time switching mains Off-On: 0.3s.
- USB 1.0 Interface for communication with Intecma's "SST Diagnostics" HID interface program v4.10.7 or higher, the controller part of the device can be operated with the USB 5V supply, no external supply required for status reading and parameter settings
- - starting current adjustable in 1A steps, for step1 and step2 each
- - starting time adjustable in 0.1s steps, for step1 and step2 each up to 0.6s
- - starting voltage from 20-55% of line voltage
- - nominal motor current adjusting range: 5-30A, with 1 to 10s. overload time
- - ACC. in 4 steps (skipped steps of the starting event)
- - DEC. time: 60s in 0.1s steps
- - auto reset time: 0 to 59 min
- - displaying starting capacitor voltage
- - input control (Option): Start on open or Stop on open
- - error relay action (Option): steady or signalling and active on / active off
- - enter device Serial Number by hand typing or Barcode scanning
- - database for storing one or more parameter settings under a specific name
- MODBUS-RTU communication Port, all USB functions can be used by MODBUS (for detailed MODBUS control functions: see separate MODBUS specification)
- Wiring:
 - Line (L1-N): J1- Screw terminal 10mm², nominal Torque 1,2Nm, max 1.3Nm
 - Compressor (R-S-COM): J2- Screw terminal 10mm², nominal Torque 1,2Nm, max 1.3Nm
 - External Start-Stop input: Screw terminal 2-pole 1mm² , 10A 250Vac, nominal Torque 0,5Nm, max 0.8Nm
 - Error Relay output: Screw terminal 3-pole 1mm² , 10A 250Vac, nominal Torque 0,5Nm, max 0.8Nm
 - USB: Mini USB-B, horizontal insert, left side
 - MODBUS: Minifit Wire to Board vertical 2x2 pole, vertical insert, right side

MODBUS –RTU Serial Port

- RTU data transfer mode (max. 32 receivers over the network)

- Half Duplex bus, single transceiver (1 transmitter and 1 receiver)
- EIA/TIA-RS485 balanced (complementary) bi-directional Multi-point MODBUS Serial Line
- 2 wire twisted pair communications with separate ground wire/shielding (D+, D-, 0V) or 0V over PE frame.
- RS485 data line configuration: $R_L = 150\Omega$, twisted pair idle load D1: $R_{pu} = 680\Omega - \infty$, D0: $R_{pd} = 680\Omega - \infty$.
- Default configuration: Resistors not placed (can be placed on request).
- RS485 twisted pair connection: 4 pole male crimp contact terminal (Minifit), vertical outgoing
- Discharge voltage peaks up to 4kV on D1(+) and D0(-) pins, +/-18Vdc max.
- Twisted pair shielded cable, AWG24 wires.
- Galvanic connection between Master and Slave; common Ground
- Temperature range -40 : +85°C
- Voltage supply +4.5 : + 5.5Vdc
- Bus speed 9600 bits/s baudrate, 3% oscillator dividing speed tolerance
- Data range RS485 transceiver: 250Kbit/s, slew rate limited driver for reduced EMI
- Default Data Transfer: 1 Start bit, 8 Data bits, 2 Stop bits, No Parity bit
- Terminal connection:



9.3 Power

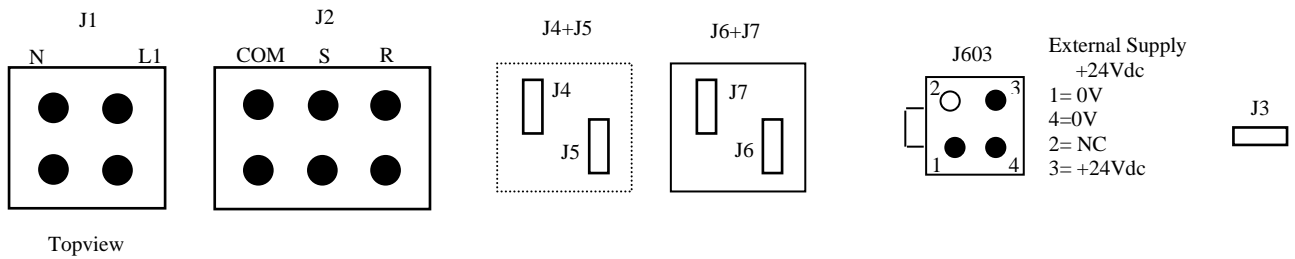
9.3.1 SST130i-075

- Motor maximum starting current limit level: 75Arms.
- Motor maximum continuous current level: 30Arms.
- Rating integrated bypass relay: 30Arms.
- Mains supply: 3 phase, 230Vac, +10%, -15%.
- 1 phase mains phase sequence detection.
- Power loss during start typ. 52W I_e 75Arms.
- Power loss in continuous mode typ. 12W / phases, I_e 30Arms.
- Power consumption Starter: 3.6W.
- Transformer fuse T63mA-glass type, 250V, size 5x20mm.
- Mains undervoltage lockout: Switch-off at voltage level < 190V.
- Mains and motor Fast-on terminals L1-N and R, S, Com 2.5mm² / 14AWG, depending on motor current rating.
- PE grounding of the device to be carried out with a 4.8x0.8mm Fast-on terminal.

9.3.2 SST130i-140

- Motor maximum starting current limit level: 140Arms.
- Motor maximum continuous current level: 30Arms.
- Rating integrated bypass relay: 30Arms.

- Mains supply: 1 phase, 230Vac, +10%, -15%.
- 1 phase mains phase sequence detection.
- Power loss during start typ. 155W Ie 140Arms.
- Power loss in continuous mode typ. 12W / phases, ie 63Arms.
- Power consumption Starter: 3.6W.
- Transformer fuse T63mA-glass type, 250V, size 5x20mm.
- Mains undervoltage lockout: Switch-off at voltage level < 190V.
- Mains and motor screw block L1-N and R, S, Com 6mm² / 10AWG, depending on motor current rating.
- PE grounding of the device to be carried out with a 4.8x0.8mm Fast-on terminal.



10 Frequently Asked Questions

Main Contactor

Q: Is there any requirement to put a main contactor in series before the softstarter?

A: Yes, because VDE requires it and because in case of a softstarter malfunction it is necessary.

Ambient temperature

Q: Can I use a softstarter when the ambient temperature is higher than the recommended value during operation?

A: The softstarter can normally be operated at a higher ambient temperature if the rated current for the unit is derated according to the manufacturer's recommendation

Soft Stop applications

Q: Which applications are suitable for a soft stop?

A: Pumps and conveyor belts loaded with fragile products are the two main applications for soft stop.

Utilisation Category

Q: What utilisation category should be used for the main contactor and by-pass contactor?

A: Main contactor: always use AC-3. Bypass contactor is built-in.

Test without motor

Q: Can I test a softstarter without using a motor?

A: No that is not possible since there will be no current going through the softstarter and the softstarter will also indicate that no motor is connected.

Overload relay trips during start

Q: Why do I have an overload trip during start?

A: Possible reasons can be one of these:

- too low current limit
- too long ramp time
- too low initial voltage
- wrong setting of the overload times

Different frequency

Q: Can I use the same softstarters at both 50 as well as 60 Hz?

A: Yes the SST130i-075 and SST130i-140 softstarters work with 42-70Hz sinusoidal.

Voltage fluctuations

Q: Which voltage fluctuations are allowed for the softstarters?

A: The minimum- and maximum value where we can guarantee full function is -15 % to +10 % of the rated value. This is also stated in the IEC-standard.

Example: 400 V - 15 % to +10 %. Range 340 V - 440 V.

Semi-conductor fuses

Q: Do I have to use semi-conductor fuses?

A: No, fuses with a type C characteristic are recommended.

Use in high altitudes

Q: Can I use the softstarter at high altitudes and what do I have to consider?

A: It is possible. When using softstarters at high altitudes the rated current for the unit has to be derated due to less cooling. In some cases a larger softstarter is required to be able to cope with the motor current when used at high altitudes. For questions, please consult factory!