

Single phase OEM Softstarter for 230Vac-50Hz heatpumps and airco's.

Technical Specifications: Status: 17-09-15 (Rev 17-09-15, 03-07-15, 28-05-15, 22-05-15)

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SimpleStarter SST130i (Hardware production version-4.4)

Available Models and ordering information:

SST130i-075-M-ES	75A/0.6s starting current, Modbus and USB communication, External power supply +24V
SST130i-140-M-ES	140A/0.6s starting current, Modbus and USB communication, External power supply +24V
SST130i-075-M	75A/0.6s starting current, Modbus and USB communication, 230Vac Transformer power supply
SST130i-140-M	140A/0.6s starting current, Modbus and USB communication, 230Vac Transformer power supply
SST130i-075-S1	75A/0.6s Starting current, USB communication, 230Vac Transformer, Error relay, Start-Stop input : +5V Potential Free contact
SST130i-075-S2	75A/0.6s Starting current, USB communication, 230Vac Transformer, Error relay, Start-Stop input: 24Vac-dc
SST130i-075-S3	75A/0.6s Starting current, USB communication, 230Vac Transformer, Error relay, Start-Stop input: 230Vac
SST130i-140-S1	140A/0.6s Starting current, USB communication, 230Vac Transformer, Error relay, Start-Stop input: +5V Potential Free contact
SST130i-140-S2	140A/0.6s Starting current, USB communication, 230Vac Transformer, Error relay, Start-Stop input: 24Vac-dc
SST130i-140-S3	140A/0.6s Starting current, USB communication, 230Vac Transformer, Error relay, Start-Stop input: 230Vac

For all models, the continuous current is 30Arms @ 70°C.

General description and features

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

The starter is suited for scroll- and piston compressors as well and standard single phase 230Vac motors.

Several types are available with 2 different starting currents, 75A and up to 140A.

The continuous current of all models is 30Arms

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

The unit is equipped with an unique Zero Power Switching (ZPS) feature of the RUN- and START Capacitor, during the switch-on and switch-off event as well, for reducing contact stress and switching EMI, improving reliability.

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 parameter setting.

The unit has 2, 30A power relays and 3 small 10A power relays:

- 30A Main relay: in stand-by mode (no motor running), the starter, is disconnected from the L1 line connection.
- 30A Bypass relay: will close when the compressor is at speed, the power semiconductors that performs the start will be switched-off at that moment, eliminating conducted EMI.
- Each of the 2 single phase capacitors has its own small power relay, that switches on- and off without load (ZPS)
 - Run capacitor relay: connects the RUN capacitor at start and will disconnect the run capacitor when stopped
 - Start capacitor relay: connects the START capacitor at start and when the compressor is up to speed it disconnects

the start capacitor.

- A third small power relay is used for the Zero Power Switching circuit.

The device is developed according the VDE safety rules for domestic (household) approval EN 60335-2-40 for single phase compressors with run- and start capacitors. According to the EN 60335-2-40 standard, the detecting and switch-off of the start capacitor is carried out redundant (2 independent circuits, build with 100% hardware parts).

In case of a failure, one of the hardware detecting circuits or both, will switch-off the compressor and remain latched off, until the line voltage is disconnected and switched-on again, marked by the red LED on the right side of the control board. The presence and the condition of the starting capacitor is constantly monitored.

When the starting capacitor is not connected or is shortcircuited (internally or externally) the compressor load will be switched off and stay disconnected from the Line voltage (L1).

In case the microcontroller and the redundant analog control circuits do not respond, a fast acting fuse will blow and disconnect the faulty capacitor.

All the required connections of the line, the compressor run- and start capacitors are present on the device itself, for fast and easy wiring, no 'flying' wire connections.

For the start-stop input, 3 modes are available:

- potential-free switching contact (non-isolated input)
- 24Vac/dc control voltage (isolated input)
- 230Vac control voltage (isolated input)

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

Parameter settings and adjustments can be made with Intecma SST Diagnostics, by means of a USB link and a computer. The required PC-application program (Intecma SST Diagnostics) is available, free of charge, use v4.10.7 or higher.

Disclaimer: Always use a controlled breaking contact in serial connection with the power connection (L1-N). Intecma assumes no responsibility or liability for any harm or damage due to a device failure when this guideline is not followed.

Note: the Run- and Start Capacitor is no part of the softstarter at the moment Intecma do not supply such parts. Capacitors without discharge resistors can be used.

Preliminary Technical specifications

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 L1 Line 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 remanent magnetism of the motor and motor noise at stop
- Starting capacitor discharge time: approx. 15s, monitored by the sofstarter 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 rarting : 80uFmax-8.5Arms
Fuse START-Cap F8A Ceramic 5x20mm. Max capacitor size for the specified fuse rarting : 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.
- 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.

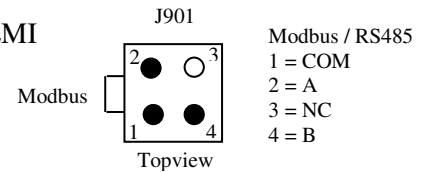
Starter control

- 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 version 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:
 - USB: Mini USB-B
 - MODBUS : Minifit Wire to Board vertical 2x2 pole
 - External Start-Stop input: Screw terminal 2-pole 1mm², 10A 250Vac, nominal Torque 0,5Nm, max 0.8Nm
 - Error Relay terminal: Screw terminal 3-pole 1mm², 10A 250Vac, nominal Torque 0,5Nm, max 0.8Nm

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 lines configuration: RL= 150Ohms, twisted pair idle load D1: Rpu =680Ohms - ∞, D0 Rpd= 680Ohms - ∞.
- Default configuration: Resistors not placed (can be placed on request, PO QTY >1000pcs/order).
- 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



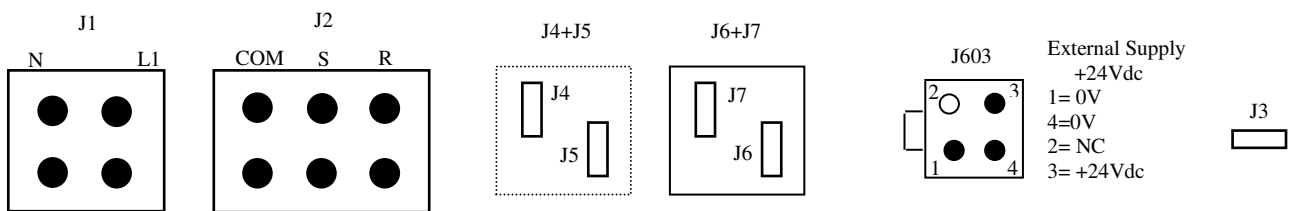
Power

SST130i-75A 140A Starting current

- Supply: single phase, 230Vac, +10%, -15%, 50Hz
- Maximum allowed RMS line voltage: 253Vrms
- Maximum allowed peak line voltage: 650Vp
- Maximum allowed surge voltage of the start capacitor: 650Vp, max. surge time 0.5s
- Motor maximum starting current limit level: 75Arms resp. -140Arms.
- Motor maximum continuous current level: 30Arms.
- Rating integrated input and bypass relay: 30Arms.
- Device power supply: +24Vdc/150mA. Option: single phase, 230Vac, +10%, -15%, fusing glass 5x20mm T80mA
- Power consumption Starter: External +24Vdc: switch-on surge 8.4VA, I_{nom} running 3.6VA., Idle: 0.85VA
- Power loss during start approx. 40W, (Ue 230Vac, Ie 30Arms).
- Powerloss in continuous mode approx. 7W, Ie 30Arms.
- 24V supply under voltage lockout 18Vdc, hysteresis 2V.
- 230V Line undervoltage lockout: Switch-off at voltage level < 190V/1s (motor running)
- Device PE grounding (Common /0V) is a SELV (Safe Extra Low Voltage)

Wiring:

- Line (L1-N): J1- Screw terminal 10mm², nominal Torque 1,2Nm, max 1.3Nm
on request: vertical Faston Tabs 6.3x0.8mm
- Compressor (R-S-COM): J2- Screw terminal 10mm², nominal Torque 1,2Nm, max 1.3Nm
on request: vertical Faston Tabs 6.3x0.8mm
- Run capacitor: J4+J5- Vertical Faston Tabs 6.3x0.8mm
- Start capacitor: J6+J7- Rast7.5 Connector for IDT and locking cable part.
option: vert. Faston Tabs 6.3x0.8mm
- 24V external supply: J603- Minifit Wire to Board vertical 2x2 pole
- PE/Ground: J3- Vertical Faston Tab 6.3x0.8mm



External Supply
+24Vdc
1= 0V
4=0V
2= NC
3= +24Vdc

Topview