

Installation guide for optional modules for the Supercal 5 Calculator

This manual describes the installation procedure of the different communication modules for the Supercal 5. The technical data and specifications of every modules can be found in their datasheet.

Safety references

In order to minimize dangers from electrostatic discharges, before you touch the printed circuit board, you should touch a grounded part (e.g., a heating pipe). When connecting you should pay attention to the correct order of the connecting cable.

The wires are not exchangeable. The mounting is to be made considering the enclosed installation guide.

Plug and play communication modules: Installing any communication modules.

Any module can be mounted in any of the two module slots on the mother board of the Supercal 5.

Before the installation make sure that you have the latest version of the Software Superprog Windows and an optical head or a M-Bus connection for set up and programming.

- Disconnect the power supply of the calculator (in case a mains power supply is being used)
- Open the Supercal 5 housing: separate the upper part (MET) from the lower part (MIO)
- Plug the optional module in one of the two module slots into the calculator
- Put the upper part on the lower part again and close carefully
- Reconnect the calculator to the mains (if not battery supplied)

The Supercal 5 will automatically detect and recognize the new communication module. No other action is required.

M-Bus Module SC5X00020

Installation

You can use the M-Bus Module with a battery powered Supercal 5. The module is powered via the bus.

To mount the M-Bus module, the upper part of the housing must be removed. This requires the removal of the user seals. The installation must be carried out by an authorised person. Electric basic protection must be ensured via the house installation.

The wiring must be carried out according to the wiring diagram in the datasheet. Secure the cables with the strain relief. Pull the cables through the cable sleeves of the Supercal 5. We recommend twisting the connections and providing them with cable lugs. This prevents the danger of short circuits. Grounding is optional if the chosen cable is shielded.

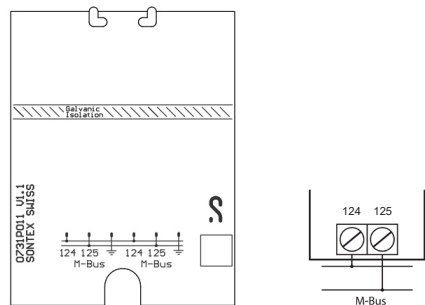
We recommend the following cables for the signal line: U72 1x4x0.8mm² or U72M 1x4x0.6m².

Operating

Superprog Windows supports the initial setup of the module and its customization.

The Supercal 5 calculator automatically detects the inserted optional modules, then the module is already up and running.

Connection



Technical data

Designation	Description
Interface definition	According to EN-1434-1
Interface	Potential free, reverse polarity protected
Transmission speed	300 ... 4800 Bauds
Data structure	Variably

Digital Input Module SC5X00030

Installation

In combination with a Digital Input Module, the Supercal 5 requires mains power supply.

Each input of the module can be programmed separately either as pulse or state input. The maximal input voltage is 30 VDC

To mount the Input module, the upper part of the housing must be removed. This requires the removal of the user seals. The installation must be carried out by an authorised person. Electric basic protection must be ensured via the house installation.

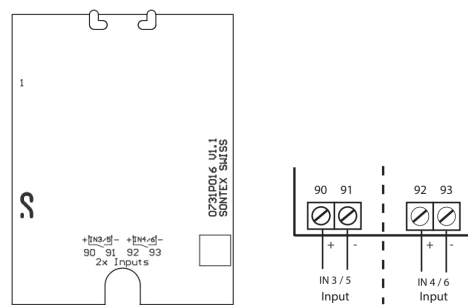
The wiring must be carried out according to the wiring diagram in the datasheet. Secure the cables with the strain relief. Pull the cables through the cable sleeves of the Supercal 5. We recommend twisting the connections and providing them with cable lugs. This prevents the danger of short circuits. The inputs are programmable as state or input with the Software Superprog Windows.

Operating

Superprog Windows supports the initial setup of the module and its customization.

The Supercal 5 calculator automatically detects the inserted optional modules, then the module is already up and running.

Connection

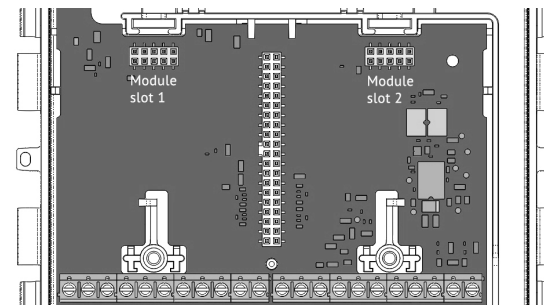


Technical data

Designation	Description
2 Inputs	
Maximal input voltage	30 VDC



In case the Analog Output or the BACnet / Modbus module is disconnected from its slot and replaced with any other module, its configuration parameters will be lost.



Relay Output Module SC5X00031

Installation

In combination with a Relay Output Module, the Supercal 5 requires mains power supply.

Each output of the module can be programmed separately either as pulse or state output. The maximal switching voltage is 60 VAC/DC and the maximal switching current is 0,5 A.

To mount the Relay output module, the upper part of the housing must be removed. This requires the removal of the user seals. The installation must be carried out by an authorised person. Electric basic protection must be ensured via the house installation.

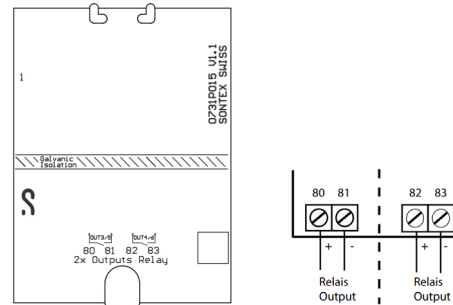
The wiring must be carried out according to the wiring diagram in the datasheet. Secure the cables with the strain relief. Pull the cables through the cable sleeves of the Supercal 5. We recommend twisting the connections and providing them with cable lugs. This prevents the danger of short circuits. The outputs are freely programmable.

Operating

Superprog Windows supports the initial setup of the module and its customization.

The Supercal 5 calculator automatically detects the inserted optional modules, then the module is already up and running.

Connection



Technical data

Designation	Description
2 Outputs	
Maximal output voltage	60 VAC / VDC
Maximal output current	0.5 A

Analog Output Module SC5X00032

Installation

In combination with an Analog Output Module, the Supercal 5 requires mains power supply.

To mount the Analog Output module, the upper part of the housing must be removed. This requires the removal of the user seals. The installation must be carried out by an authorised person. Electric basic protection must be ensured via the house installation.

The wiring must be carried out according to the wiring diagram in the datasheet. Secure the cables with the strain relief. Pull the cables through the cable sleeves of the Supercal 5. We recommend twisting the connections and providing them with cable lugs. This prevents the danger of short circuits. Grounding is optional if the chosen cable is shielded.

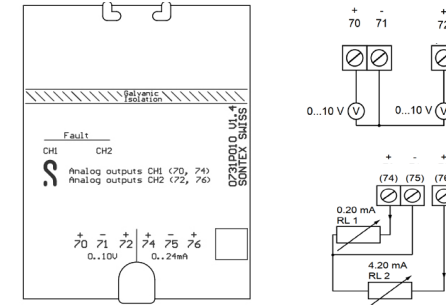
We recommend the following cables for the signal line: U72 1x4x0.8mm² or U72M 1x4x0.6m².

Operating

Superprog Windows supports the initial setup of the module and its customization.

The Supercal 5 calculator automatically detects the inserted optional modules, then the module is already up and running.

Connection



Technical data

Designation	Description
2 Outputs	
Current signal (4 options)	0.20 mA 4.20 mA 0.24 mA 4.24 mA
Voltage signal (2 options)	0...10 VDC 2...10 VDC
Load	RL (max.) = 350 Ω at 12 VDC
Disbandment	16 bits (in overflow 15 bit)
Maximum transducer error	0.02 % of final value

BACnet / Modbus Module SC5X00021

Installation

In combination with an optional BACnet / Modbus Module the Supercal 5 requires mains supply.

To mount the BACnet / Modbus module, the upper part of the housing must be removed. This requires the removal of the user seals. The installation must be carried out by an authorised person. Electrician's basic protection must be ensured via the house installation.

The wiring must be carried out according to the wiring diagram in the datasheet. Secure the cables with the strain relief. Pull the cables through the cable sleeves of the Supercal 5. We recommend twisting the connections and providing them with cable lugs. This prevents the danger of short circuits. Grounding is optional if the chosen cable is shielded. We recommend the following cables for the signal line: U72 1x4x0.8mm² or U72M 1x4x0.6mm².

If the Test Mode is selected, connection parameters for Modbus should be the setup as follows:

- 19'200 bds
- Parity : Even
- 1 Stop
- RTU
- ADR=1

If the Test Mode is selected, connection parameters for BACnet should be the setup as follows:

- 38'400 bds
- Parity : None
- 1 Stop
- AutoMAC
- Device ID= 1234567

Setup the three position DIP switch for the bus termination for each module

Pos 1	Pos 2	Pos 3	
OFF	OFF	OFF	No Line Terminating resistor LT and no Bias resistor, only a polarisation with 2x 47 kΩ (default)
ON	OFF	OFF	Line Terminating resistor: LT = 120 Ω + 1nF
OFF	ON	ON	Bias resistors (2x510 Ω) without termination (120 Ω)
ON	ON	ON	Bias resistors (2x510 Ω) with LT termination (120 Ω + 1 nF)

BACnet Addressing

- The BACnet MS/TP module communicates via network via RS-485 and can be addressed as master/slave or as slave.
- Current data, accumulated data, temperatures or errors are transmitted to the BACnet Controller module via the BACnet MS/TP module.
- The BACnet module can be addressed as master/slave in the MAC address range from 1 to 127. The MAC address 255 is used for Broadcast.
- The MAC address must be unique for all connected devices on the same RS485 network segment.
- By default, the BACnet MS/TP module is addressed with MAC address corresponding to the last 2 digits of Supercal 5 serial number (automatic addressing AutoMAC). If the last 2 digits are equal to 00, the MAC address will be set to 100
- The MAC address of the module can be changed with the Superprog Windows.
- The device number (DIN = Device Instance Number) of the module consists of a unique ID number generated by the microcontroller of the BACnet module. This address can also be read with the software Superprog Windows.

Modbus Addressing

- The Modbus module distinguishes between master and slave devices

- The Modbus module can be addressed as a slave in the address range 1-247. The address 0 is used as broadcast
- By default, the Modbus module is addressed with MAC address (or Modbus address) corresponding to the last 2 digits of Supercal 5 serial number. If the last 2 digits are equal to 00, the MAC address will be set to 100
- The Modbus address of the module can be changed with the software Superprog Windows or with the corresponding M-Bus command.

Operating

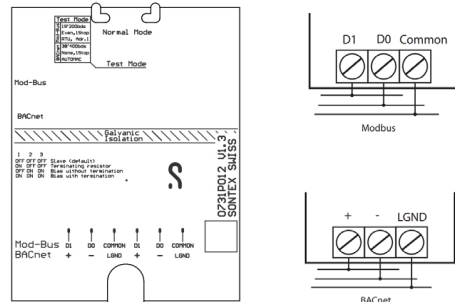
Superprog Windows supports the initial setup of the module and its customization.

The Supercal 5 calculator automatically detects the inserted optional communication modules, then the module is already up and running.

LED functions:

- Red and Violet are reserved for booting process
- Only Red is reserved for errors.
- For ModBus: Yellow: data reception and Green: data transmission.
- For BACnet: Cyan: data reception and Blue: data transmission

Connection



Technical data

General

Operating temperature	5° to 55°C
Storage temperature	-10° to 55°C (dry environment)

Transmission & network technology

Bus communication	Twisted pair RS-485
RS-485 cable connection Modbus	Terminal D1, D0 and common (2 x 3 pins)
RS-485 cable connection BACnet	Terminal +, - and LGND (2 x 3 pins)
Bus termination	By three position DIP switch or an external resistor
Modbus parity	Odd / Even / None
BACnet parity	None
BACnet supplier N°	SONTEX ID: 717
Compound layer	According to MS/TP Master/ Slave
Data protocol	According to BACnet MS/TP Master/Slave
BACnet device profil	B-ASC
Transmission speed BACnet	OFF, 9600, 19200, 57600, 76800, 115200, Auto Baud, default 38400 bits/sec
Transmission speed Modbus	OFF, 1200, 2400, 9600, 38400, 57600, 115'200, Auto Baud, default 19200 bits/sec

LoRaWAN® Module SC5X00022

Installation

LoRaWAN module can be **ONLY** mounted in the left slot on the mother board of the Supercal 5. Before the installation make sure that you have the latest version of the Software Superprog Windows and an optical head or NFC in order to set up and program the module.

You can use the LoRaWAN module with at least a D Battery powered Supercal 5.

To mount the LoRaWAN module, the cover of the housing must be removed. This requires the removal of the user seals. The installation must be carried out by an authorised person. Electrician's basic protection must be ensured via the house installation.

Operating

Superprog Windows supports the initial setup of the module and its customization.

The Supercal 5 integrator automatically detects the LoRaWAN module, then the module is already up and running.

LoRaWAN network parameters

To establish a LoRaWAN communication with the network server, following parameters must be configured. They must be configured on both device and network side before starting the join process. An exact matching is required between the device and the network server! Any difference will prevent the network join process from succeeding.

DevEUI

This is the unique ID of the device on 8 bytes (Device Extended Unique Identifier), assigned by the manufacturer.

- This parameter can be read but not modified in Superprog Windows

JoinEUI

Formerly called AppEUI, this is the unique ID of the network server, also on 8 bytes. It might be unnecessary depending on the network provider.

- This parameter can be read and modified in Superprog Windows

AppKey

Encryption key on 16 bytes, needed to calculate the derived keys. It usually needs to be different from zero depending on the network provider. In case of a wrong key, most of network providers will display an error message: "MIC mismatch error".

- This parameter can not be read but can be modified in Superprog Windows

Remark: when a new LoRaWAN module is installed in a SC5 where a previous Module was running, the new module will take the old configuration parameters except for DevEUI, JoinEUI and APPKey. These three are stored in each Module.

Network join

Once the LoRaWAN module has been correctly installed in the SC5 and the SC5 has been successfully initialized, the device will attempt to connect to the LoRaWAN network.

The join attempt cycle starts from spreading factor 7 (SF7) going up to spreading factor 12 (SF12). The join process can take up to 15 minutes for devices which are far away from the gateway.

You can follow the join process on the display.

- When the SC5's display show the letters LOJ just next to M1.; it means that the module is trying to join the LoRaWAN network.
- When the SC5's display show the letters LOF just next to M1.; it means that the module has failed to join the LoRaWAN network.
- When the SC5's display show the letters LOR just next to M1.; it means that the module has succeeded to join the LoRaWAN network.

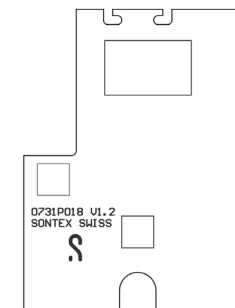
Rejoin

To enhance communication security, a rejoin procedure is periodically performed at the specified rejoin interval (minimum 5 days). Every time a rejoin occurs, new session keys (used to encrypt the data) are generated. The rejoin is done at the next uplink with the current spreading factor.

To avoid transmission collisions on site with multiples LoRaWAN devices, the rejoin interval is randomized for each device with a period ranging from -1 day to + 1 day.

- This parameter can be read and modified in Superprog Windows.

Connection



Technical data

Designation	Description
Frequency	EU868, acc. ETS (EN300.220)
Communication	Bidirectional class A
Protocol	LoRaWAN
Encryption	AES-128
Transmission power	25 mW (14 dBm)
Transmission interval	From 15 min to 9 h depending on the network. Automatic switching between long (SF 7-9) and short (SF 10-12) telegrams depending on the range.
Uplink / Downlink	Data coded according to EN60870-5 (M-Bus)

For more information about LoRaWAN settings please refer to the dedicated Application Note available by Sontex.

CE Conformity

according to Directive MID 2014/32/EU according to RED 2014/53/EU

Technical Support

For technical support, please contact your local Sontex agent or Sontex SA directly.

Sontex Hotline

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Specifications are subject to change without notice.



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