

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.

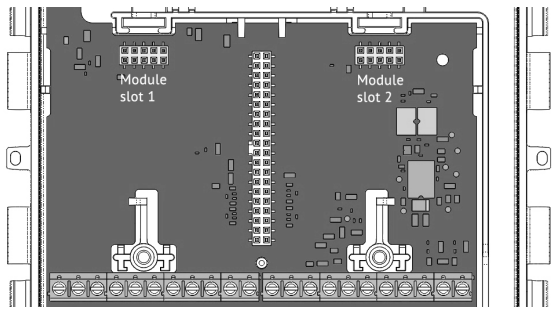
Safety Instructions
 In order to prevent electrostatic discharges hazards, only authorized people, trained in ESD standards and regulations, are allowed to perform the installation of modules.
 Wires or antennas provided with the modules are not exchangeable.

Mechanical installation of any available Modules into a Supercal 5

- ⚠ Disconnect the SC5 from mains power.
- Open the Supercal 5 housing: separate the upper part from the lower part.
- Plug the module in one of the two module slots by pressing on the upper part of the module.
NOTE: Modules, can generally be mounted in any of the two module slots (slot1 or slot2). The only exception is the LoRaWAN-Module, which can only be mounted in slot1.
- Add cabling according to the provided connection diagrams. All cables must be secured with strain reliefs.
- Close the SC5 carefully and reconnect to mains power (if no battery is used).
- The Supercal 5 will automatically detect and recognize newly installed modules, they will appear on the Display next to M1 (for modules added to slot1) and next to M2 (for modules added to slot2).
- The Modules parameters can then be configured using the latest version of Superprog Windows and an optical head or a M-Bus connection.



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.



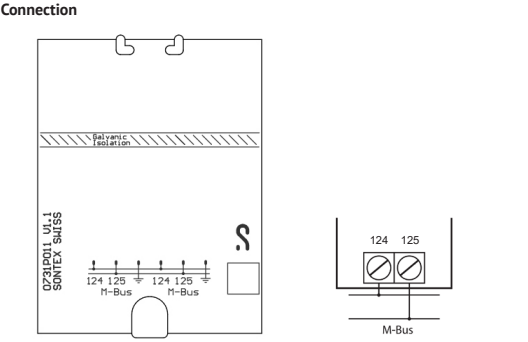
M-Bus Module SC5X00020

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'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.

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.



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

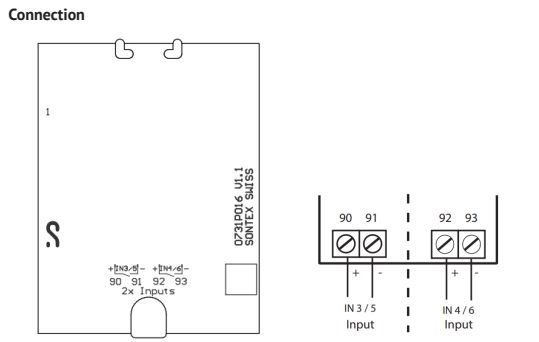
Digital Input Module SC5X00030

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'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. 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.



Designation	Description
2 Inputs	
Maximal input voltage	30 VDC

Relay Output Module SC5X00031

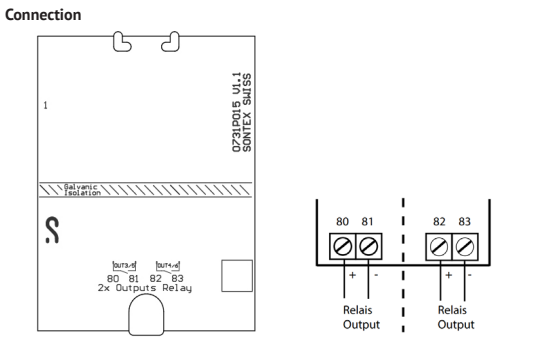
Installation
 In combination with a Relay Output Module, the Supercal 5 requires mains power supply.

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'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. 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.



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

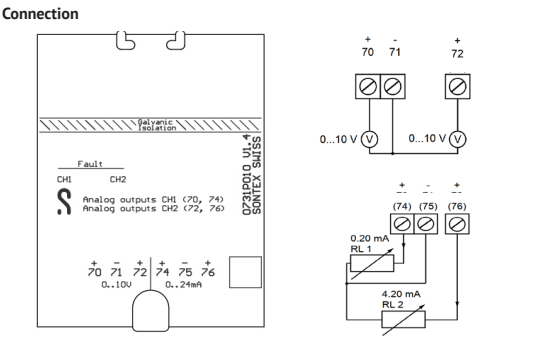
Analog Output Module SC5X00032

Installation
 In combination with a 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'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.

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.



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. Electricians 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 change with the software Superprog Windows or with the corresponding M-Bus command.

Operating

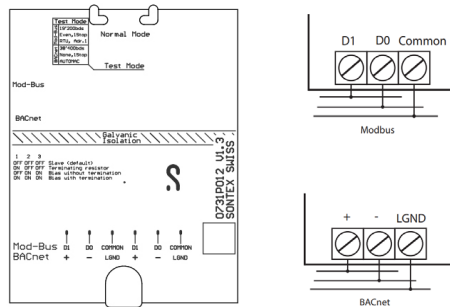
Superprog Windows supports the initial setup of the module and its customization.

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

For the mechanical installation of the LoRaWAN Module into a Supercal 5, please follow the Safety Instruction and step-by-step description provided in the beginning, in the general part of this document.

NOTE:

- The LoRaWAN-Module can only be inserted in slot1 (due to mechanical restrictions of the antenna).
- The LoRaWAN-Module can be used either with a battery D or a mains powered Supercal 5.
- Verify that the antenna is securely fastened to the module's antenna port. If it is loose, it may be tightened using an adjustable torque wrench set to approximately 2 Nm.

A successful installation of the Module is indicated on the display by showing M1: LOD (LoRaWAN-Module Disabled). This means that the Module has been correctly detected, but it is not yet joined to a LoRaWAN-Network.

Parametrization

The LoRaWAN-Module is now ready to be configured using the software Superprog Windows Version 1.2.0 or higher. Most important is the correct setting of the available LoRaWAN-Parameters and the definition of the Payload transmitted in short and long LoRaWAN-Telegrams.

Setting LoRaWAN-Parameters:

1. Read the SC5 with Superprog Windows and navigate to the menu Device / Hardware, then click on SLOT1 LoRa.
2. Transmission Intervals: The transmission intervals can be defined for two spreading factor groups (SF7/SF8/SF9) and (SF10/SF11/SF12) and are limited to a range of 30-44640 minutes.
3. DevEUI & AppKey: The device identification number (DevEUI) and the AppKey need to be shared with the LoRa-Network Server in order to accept the join-request of the device. DevEUI and AppKey can be downloaded from the Sonexa Device (Key) Management Platform. For detailed information see: <https://sontex.atlassian.net/l/cp/2A751VD0>
4. Check and adapt all other available parameters according to your needs. For detailed description and further explanations please see: <https://sontex.atlassian.net/l/cp/LVNaDhdB>

Configuring Payload:

1. Read the SC5 with Superprog Windows and navigate to the menu Device / Dataset.
2. Configuring Custom Frame: It is recommended to use Custom Frame 4 for the LoRaWAN-Payload configuration.
3. Configuring Default Frame: Select Interface Module LoRa slot 1, then make sure that ONLY Custom frame 4 is selected.
4. To save all parameter to the device, click on write.

Joining your LoRaWAN-Network

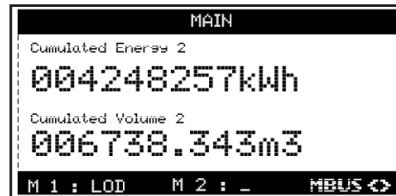
The join attempt cycle starts automatically after the SC5 is closed and has been sealed at least once. However, the joining can be delayed by a defined time, this can be set in the LoRaWAN-Parameter "Join Delay".

There are two ways to bring the SC5 into a sealed status:

- Using Superprog: When you save the configured parameters to the device by clicking on write, you can tick the checkbox called Seal device after write.
- Sealing on display: If unsealed is shown on the top line of the display (and it is blinking), push the the left orange button for at least 3 seconds, then confirm the sealing by pushing the same button again for 3 seconds.

The device is correctly sealed if the blinking of the display stopped and the top line of the display now shows main menu.

The status of you LoRaWAN-Network will be visible on the Display next to M1:

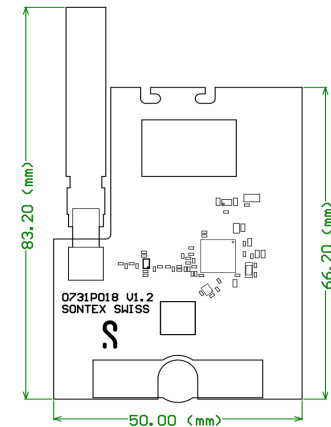


Integration into Sonexa

Described in: <https://sontex.atlassian.net/l/cp/x91jVsyI>

Display	Description
M1:LOD	Disabled : Module has just been recognized and the Join process is not still started.
M1:LOJ	Joining : The radio is activated and the device is closed. Join process is in progress. It can take several minutes, depending on how far away the device is from the gateway.
M1:LOR	Reached : Join process is successful connected to the network.
M1:LOF	Failed : Join process has failed and it is not connected to the network.

Layout



Technical data

Designation	Description
LoRaWAN Certified product	According to LoRaWAN Specification V1.0.2
ISM Frequency Band	EU863-870
Max. Transmission power	25 mW (14 dBm)
Max. Payload	Short Telegram: 39 byte (for SF7-SF9) Long Telegram: 103 byte (for SF10-SF12)

The online version of this guide can be found here:



CE Conformity

Directive RoHS 2011/65/EU
RED 2014/53/EU

Technical Support

For technical support, please contact your local Sontex agent on www.sontex.ch

Specifications are subject to change without notice.