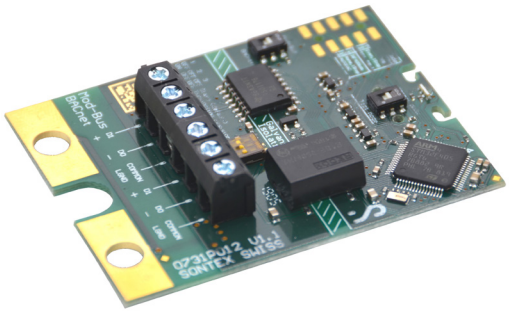


BACnet MS/TP module

for Supercal 5

Instructions for Use

Sontex
your link to innovative metering

- Read this manual thoroughly before installing the module.
- Be sure to read the “Safety” section (page 10) to ensure proper use of the module.
- After reading this manual, keep it in an easily accessible place so that it is ready for future reference.

Legal Provisions

Warranty

Please contact your local Sontex representative for warranty information.

Trademark

M-Bus is a European standard (EN 13757-2/3) for reading heat meters.

Modbus® is a registered trademark of Schneider Electric and is licensed by the Modbus Organization, Inc.

BACnet® is a registered trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Sontex SA is BACnet certified. The BACnet certificate is available at the following link:

https://www.bacnetinternational.net/btl/index.php?m=269

Table of Contents

1. Notes on This Document

This manual provides all the information required for the correct use of the equipment: From product identification, installation and commissioning to troubleshooting, maintenance and disposal.

1.1 Scope of Validity

This instrument documentation is valid for the module BACnet from Sontex.
The production version can be read off the nameplate.

1.2 Target Groups

This device documentation is intended for the system operator and the installer of the module.

1.3 Storage of Document

The system operator must ensure that this documentation is accessible to the responsible persons at all times. If the original document is lost, you can download an up-to-date version of this document from our extranet (https://extranet.sontex.ch/index/).

1.4 Further Information

Links to further information can be found at www.sontex.ch.

1.5 Symbols

Symbol	Significance
DANGER	**DANGER!** Warning, the non-observance of which leads **directly** to death or serious injury.
WARNING	**WARNING!** Warning, the non-observance of which may result in death or serious injury.
CAUTION	**CAUTION!** Warning, the non-observance of which may result in minor or moderate injury.
NOTICE	**NOTICE!** Warning, non-observance of which may result in damage to property.
	**Reference** Information that is important for a specific topic or goal, but not relevant to security.
	**Documentation** Reference to documentation.
	**Help** Help in case of problems.
	**Visual check** Check that the item is in order.
	**CE-Marking** The calculator meets the requirements of the European directives 2014/32/EU (MID) and RED 2014/53/EU.
	**Disposal** This symbol indicates that electrical and electronic equipment must be disposed of separately. Do not dispose of the calculator with household waste.

2. Safety Information

Safe and harmless operation of the calculator can only be guaranteed if the operating instructions have been read and the safety instructions contained therein have been observed.

Further information and data can be found in the products' catalogues and data sheets, through your local representative, and on the Sontex homepage at www.sontex.ch.

- All technical data without guarantee.
- Subject to technical changes at any time.
- In case of doubt, the text of the **English** Instructions for Use applies.

2.1 Personnel Qualification

The personnel responsible for installation, commissioning, diagnosis and maintenance must meet the following conditions:

- Trained personnel: Qualified to perform this function and activity.
- Authorized by the plant operator.
- Knowledge of the relevant standards and directives and familiar with national regulations.
- Before starting work: Read and understand instructions and additional documentation as well as certificates (depending on application).
- Follow instructions and general conditions.
- Training in the handling of hazards and risks during the installation and operation of electrical devices and systems.

The operating personnel must meet the following conditions:

- Instructed and authorized by the plant operator in accordance with the task requirements.
- Follow the instructions in this document.

2.2 Intended Use

The manufacturer is not liable for damage resulting from improper or improper use. Modifications and changes to the device must not be made.
The BACnet module may only be operated under the conditions stated in the technical specification.

2.3 Safety Instructions

2.3.1 Occupational Safety

When working on and with an electronic device:

- Wear the necessary personal protective equipment under national regulation.

2.3.2 Operational safety

Risk of injury!

- Operate the device only in a technically perfect and safe condition.
- The operator is responsible for the trouble-free operation of the device.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:

- If modifications are nevertheless necessary: Consult your local representative or Sontex SA.

Repair

To ensure continued operational safety:

- Only if repair is expressly permitted, carry it out on the electronic device.
- Observe the national regulations concerning the repair of electrical, electronic devices.
- Only use original Sontex spare parts and accessories.

Environmental requirements

If the plastic housing of the Supercal 5 is permanently exposed to certain vapour-air mixtures, the housing may be damaged.

- Contact your Sontex sales office for assistance.
- For use in areas subject to approval: See the information on the nameplate.

2.3.3 Product Safety

The BACnet MS/TP module is built and tested according to the state of the art and good engineering practice and has left the factory in perfect safety condition.

It meets the general safety requirements and legal requirements.

3. Retrofittable BACnet / Modbus Module

3.1 Application

The optional communication module BACnet/Modbus enables the Supercal 5 calculator to communicate via BACnet/Modbus system.

This allows to readout metrological data from the heat meter and transfer then via BACnet or Modbus to a billing management system.

3.2 BACnet Application

BACnet is a communication protocol for the exchange of information for optimum building automation between devices from different manufacturers.
The BACnet MS/TP module is used with the Supercal 5. The module is suitable for various applications; in public and commercial buildings, but also in residential buildings where intelligent building automation is required.

3.3 Features

This module combines BACnet and Modbus functions

- Switch between BACnet and Modbus
- Switch between Normal and Test Mode

3.4 Activate the BACnet Mode

	Please put the DIP Switch on the position BACnet to activate the module in BACnet mode.	

4. General Remarks

4.1 Introduction

Additional information on Supercal 5 as well as Software Superprog can be found in the instruction for use of those devices. The documents can be found on our extranet at: https://extranet.sontex.ch/index/.
Only authorised users have access to the extranet. Information and access rights for the Sontex extranet can be obtained from your local Sontex representative.

This instruction for use describes the installation procedure of the BACnet MS/TP module in the Supercal 5 calculator as standalone product or in combination with the Superstatic 440.
The BACnet module communicates as a slave device on RS-485. The BACnet module transfers a number of both actual data as well as accumulated data.

The technical data, the register list and the specifications of the BACnet MS/TP module are described in this document. It addresses the questions of both users and engineers.

4.2 BACnet Conformance Certificate

The BACnet MS/TP Module has been tested at a qualified BACnet Testing Laboratory and found to comply with all the necessary interoperability requirements in place on the published test date. This listing represents the tested capability of the Listed Products. For information on additional functionality that was not covered in the test process, refer to the Manufacturer's PICS statement on the BACnet International website: http://www.bacnetinternational.net/btl/search.php (search for: Sontex).
Certificates are available on chapter 17 Annex H.

4.3 Delivery of the Module

Before installing the BACnet MS/TP module check the items delivered.

Included in the delivery are:

- The BACnet MS/TP module
- A fixing clamp for strain relief
- This installation instruction

4.4 The PICS Information

The PICS information (Protocol Implementation Conformance Statement) is available at the end of this document, see chapter 10 Annex A.
These PICS data identify the particular options specified by BACnet, supported by the SC5I and the SC5S.

5. BACnet Module Configuration

5.1 Settings – Normal Mode / Test Mode

5.1.1 Default Settings – Normal Mode

When the BACnet MS/TP module is delivered, the DIP Switch is set on the position Normal Mode and the default setting of the module is:

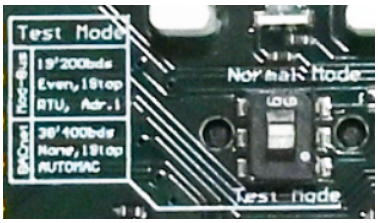
- Communication speed is to 38400 bits/sec.
- By default, the BACnet MS/TP module is addressed with MAC address corresponding to the last 2 digits of Supercal 5 serial number (automatic addressing AutoMAC). If the two last digits of the serial nummer are egual to 00 than the MAC address will be set to 100.

5.1.2 Test Mode

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

The optional BACnet module comprises:

- 38'400 bds
- Parity None
- 1 Stop
- Automac Address
- Device ID = 1234567



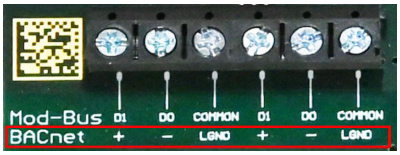
5.2 BACnet Connection

The optional BACnet module comprises of:

- 2x3 screw terminals (+ / - /LGND terminals for the RS-485 connection twisted pair).

Terminal connection:

- Terminal - : RS-485 Tx/Rx (-)
- Terminal + : RS-485 Tx/Rx (+)



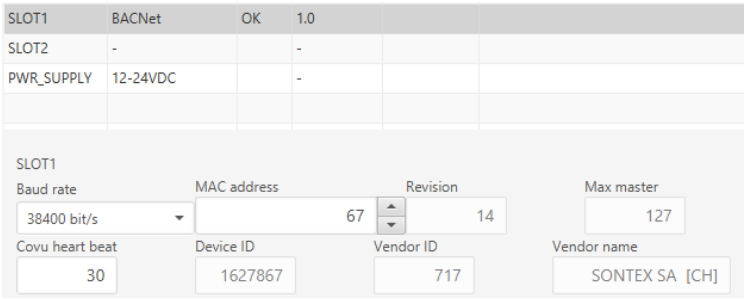
To implement a Daisy Chain, there is an internal connection between the two **+** connections. The same applies for the two **-** and the two LGND connections.
The name of the third terminal is called “Common” for the Modbus module and “LGND” for the BACnet module. The properties and functionalities are exactly the same, only the name is different.

5.3 Communication Speed

All the devices on the MS/TP segment must communicate at the same baud rate.
The BACnet MS/TP modules are capable of automatically configuring the baud rate upon detection of the network speed. The module supports baud rates from 9'600 to 115'200 bit/s. The setting of the communication speed is set to 38'400 bits/sec.

The baud rate is to be selected as one of the following for:

- None
- 9600 bit/s
- 19200 bit/s
- 38400 bit/s (by default)
- 57600 bit/s
- 115200 bit/s
- Auto Baud Detection



5.4 Addressing the Device ID

The Device ID (or Device Object Identifier) is used in a BACnet network as the unique identifier of a specific device. The device ID for each device must be unique on the entire BACnet network.

Sontex has implemented the use of the Fabrication Number (or Serial Number) to be sent over the BACnet for identification of the device. As BACnet Standard specifies for this purpose only 22 bits and not 32 as we would need to be able to represent the complete Fabrication Number.
The Device ID of the BACnet module is the Fabrication Number of the Supercal 5, encoded within 22bits. The last 6 digits of the Fabrication Number are always available, the 2nd digit will be truncated and the 1st digit will be totally ignored. See example Figure 2 below.
The Device ID (22bits Binary) is also called Object ID.

With 22bits, the range will only be between 0 and 4'194'303 (0x3FFFFF). The last value (4'194'303) is dedicated for a BACnet special function and this value is called Value_max.
The Fabrication Number is compared to the Value_max. Then 1 bit is subtracted from the fabrica-tion number. Always the most significant bit (MSB).

The BACnet Object ID has a length of 22bits.
The complete Fabrication Number (32bits) is always readable in the Object Name.

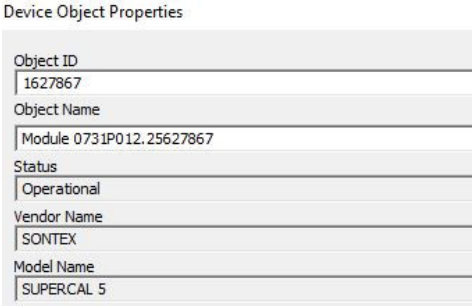
The Device ID address can only be changed with a BACnet browser like - "BACeye" software.

5.4.1 Procedure used to convert the Fab Number to the Device ID

Example:

Fab Number =	25'627'867	>	4'194'303 ?	Yes, subtraction of 10'000'000
	15'627'867	>	4'194'303 ?	Yes, subtraction of 10'000'000
	5'627'867	>	4'194'303 ?	Yes, subtraction of 4'000'000
	1'627'867	>	4'194'303 ?	NO, operation finished

The Device ID stored is 1'627'867



Example of converstion Fabrication Number to BACnet Object ID:

Fabrication Number	BACnet Object ID	Remark, if the 2nd digit of the Fab Num starts with :
2**0**461375, 5**4**461375, 3**8**461375	**00**461375	x**0**/x**4**/x**8**, the two first digits of the Object ID start with **00**
4**1**998877, 1**5**998877, 6**9**998877	**01**998877	x**1**/x**5**/x**9**, the two first digits of the Object ID start with **01**
1**2**234569, 3**6**234569	**02**234569	x**2**/x**6**, the two first digits of the Object ID start with **02**
3**3**001123, 5**7**001123	**03**001123	x**3**/x**7**, the two first digits of the Object ID start with **03**

5.5 MAC Address of the BACnet MS/TP Module

The MAC Address must be unique on a BACnet MS/TP segment. A MAC Address cannot be duplicated on a single MS/TP trunk. The MAC Address must be unique for each device connected to the same RS-485 communication network.
The MAC Address can be set via the Superprog software (see chapter 5.7.1 Changing the MAC Address with Software Supers prog).
The BACnet MS/TP module can be addressed as master/slave in the MAC Address range 1-127.
The MAC Address value 255 is used to denote broadcast when used as a destination address but is not allowed as a value (Chapter 9.5.2 of the ANSI/ASHRAE Standard 135-2016).
By default the BACnet MS/TP module MAC Address is set in the range 1-127. The MAC Address value is addressed with MAC address corresponding to the last 2 digits of Supercal 5 serial number. If the two last digits of the serial nummer are egual to 00 than theMAC address will be set to 100.

5.5.1 Changing the MAC Address by Means of a Gateway

As explained in chapter 5.5, the default MAC Address configured is set in the range 1-127. The MAC Address value is addressed with MAC address corresponding to the last 2 digits of Supercal 5 serial number during the module manufacture. If the two last digits of the serial nummer are egual to 00 than theMAC address will be set to 100.
If the MAC Address configured is 255, this means that if the BACnet Controller is implemented with an automatic addressing function, the BACnet Controller will assign a new MAC Address to the module, as soon as it recognizes the module.
If the BACnet Controller is not implemented with an automatic addressing function, the MAC Address (255) doesn't change and the device will not be visible.

5.6 Installing the BACnet Module

DANGER

Danger to life from electrical voltage!
If the equipment has not previously been isolated from the mains supply, live components may be exposed when the cover is opened.
If module replacement whilst the equipment is open and live is unavoidable, then this should only be undertaken by specialist technicians who are familiar with the associated hazards and the applicable regulations.

WARNING

Removal of the module must only be carried out with the equipment isolated from the electrical supply!
Removal of the module or insertion of the module must be done when there is no current present.
Avoid electrostatic discharges!
Avoid electrostatic discharges during installation or handling while manipulating the Modbus module. For this purpose, before touching the calculator or the BACnet module, you are advised to touch a grounded conductor (for example a water pipe or hot water pipe) to discharge electricity.

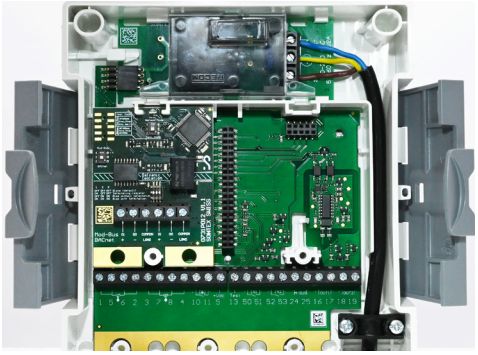
For a BACnet application, the DIP Switch must be set on the BACnet position to activate the BACnet mode.

The BACnet module, as all other modules to retrofit to the SC5 calculator, is mounted in one of the two module slots on the mother board of the SC5 calculator.
The following procedure must be respected:

- Disconnect the power supply of the calculator
- Separate the cover (MET) from the housing (MIO)
- Place the BACnet module in one of the module slots of the calculator
- Connect the BACnet EIA-485 network (+, - and LGND, the latter if available) with the BACnet module
- Close the calculator carefully
- Reconnect the power supply cable

The calculator Supercal 5 will automatically detect and recognize the new module. No other action is required. The SC5 I / SC5 S are now ready to communicate via the BACnet module.

The default setting is: Communication speed is 38400 bds and MAC Address value is addressed with MAC address corresponding to the last 2 digits of Supercal 5 serial number during the module manufacture.
If the two last digits of the serial nummer are egual to 00 than the MAC address will be set to 100.

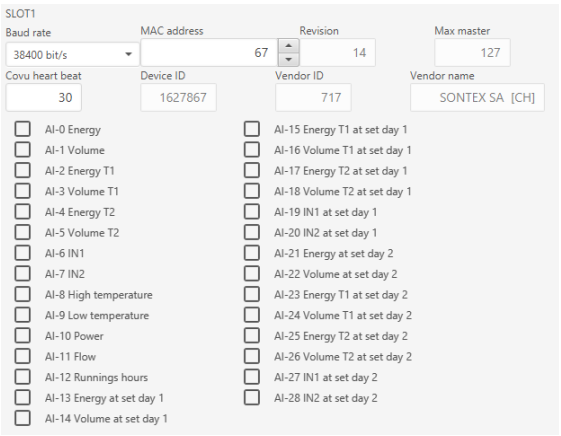


5.7 Detection of the BACnet Module with the Software Superprog

The software Superprog allows detecting the BACnet module and to read its parameters:

BACnet tab:

- The firmware release of the BACnet module
- The Module revision (14 corresponds to the revision of the BACnet protocol)
- The BACnet revision
- The Device ID, see more explanation below (1)
- The Baudrate
- The BACnet Address
- The Max master (fix to 127)
- The Vendor ID (717 = Sontex)
- The Vendor Name = Sontex SA [CH]



COVU config tab:

- Analog input selection

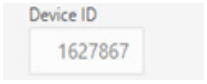
The software Superprog allows to change the following parameters:

- The MAC address
- The Baudrate
- Set the Analog input selection for the COVU configuration
- Set the HeartBeat time for selected Analog input of the COVU

COVU = Change Of Value Unsolicited

- Other parameters can be set with the DIP switch. The bias resistors and the terminating resistor.

(1):



The displayed name “Device ID” in the Superprog software shows the Device ID (Device Object Identifier) used in a BACnet network as the unique identifier of a specific device.
In this example, the Device ID is: 1627867

NOTICE

The BACnet module is compatible with Supercal 5 calculators with firmware release FW 01.00.00 or higher.

5.7.1 Changing the MAC Address with Superprog Software

After programming a new MAC Address with the optical probe via the Superprog software, it’s not necessary to restart the BACnet module.
After programming the new communication parameters with the optical probe via the software Superprog, it’s necessary to wait a refreshment period before the new communication parameters are activated. The refreshment period can last up to 10 seconds. During this period, the module will not communicate and not answer to the BACnet commands.

5.8 Changing the Device ID by BACnet Command

It’s possible to change the Device ID (or the Device Object Identifier) by BACnet command.
As soon as the Device ID is changed by BACnet command, the new Device ID is recognized and available on the BACnet network.
To activate the new Device ID, it’s not necessary to restart the BACnet module.
The restarting period can last up to 10 seconds. During this period, the module will not communicate and not answer to the Modbus commands.

5.9 Changing the Object Name by BACnet Command Temporarily

It’s possible to change the Object Name by BACnet command. As soon as the Object Name is changed by BACnet command, the new Object Name is recognized and available on the BACnet network.
If for any reason, the Supercal 5 is powered down. By either removing the main power cable or open/separate the upper part with the lower part of the calculator, the new Object Name will be replaced by the previous (or original) Object Name.

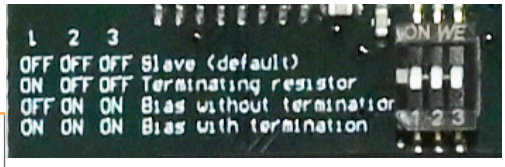
5.10 Setting of the Line Terminating Resistor and the Bias Resistors with the DIP Switch

To correctly set up an RS-485 line is of utmost importance to avoid disturbances and failures on the bus and lack of required data altogether.
At delivery the default position of the DIP switch is: [OFF OFF OFF], this indicates that there is a light polarisation induced by 2 47 k Ω resistors.

If the BACnet module is at the end of the bus line, it is necessary to terminate the line, by adding a terminating resistor 120 Ω. This can be done either by means of the DIP switch on the module itself or by adding an external resistor between + and – to close the line.

Additionally it might be necessary to add a bias resistor to further stabilise the line, also this can be done by means of the DIP switch as shows the table hereafter.

5.10.1 Settings with DIP Switch



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)

0 = OFF; 1 = ON

See chapter 11 Annex B for detailed information for RS485 lines

For DIP Switch, the position is defined as follows: Pos.1 Pos. 2 Pos. 3

5.11 BACnet Module Addressing

When the BACnet MS/TP module is delivered, the default setting of the module is:

- Communication speed is 38’400 bits/sec.
- MAC Address is set in the range 1-127. The MAC Address value is set addressed with MAC address corresponding to the last 2 digits of Supercal 5 serial number during the module manufacture. If the two last digits of the serial nummer are egual to 00 than the MAC address will be set to 100.

6. Technical Data BACnet MS/TP Module

General	
Operating temperature	5° to 55°C
Storage temperature	-10° to 55°C (dry environment)
Dimension	
Dimensions	50 x 66.2 mm
Mounting	in one of both module slots of the SC5 calculator
Power supply	please refer to the chapter 7 Power Supply for BACnet Modules
Art N° SC5X00011	12 - 24 VDC or 12 – 36 VAC
Art N° SC5X00012	110 - 230 VAC - 50/60 Hz
Network transmission and technical details	
Bus communication	RS-485 twisted pair
RS-485 connection	Plug-screw terminal for +, - and LGND (2x3-pin)
Bus termination	Through DIP Switch or with an external resistor
Communication speed:	9600, 19200, 38400, 57600, 76800 or 115200 bits/s
Firmware compatibility	
	The BACnet module is compatible with Supercal 5 calculators with firmware release FW 01.00.00 or higher.

6.1 Reliability

The RS-485 port of the BACnet module is galvanically separated from the meter's voltage potential, thereby improving the security for smooth operations. At the same time, the risk of influencing the meter due to influences of the RS485 port is reduced to a minimum.

6.2 Precautions – Safety Instructions

General notes: the BACnet module works with the specific characteristics described in this document. The manufacturer declines all liability if they are not respected. The manufacturer is not responsible if the BACnet module is incorrectly installed or used. The electrical connection must be established by an authorized person acting in compliance with the international and national standards in force and in conformity with local safety regulations. On the installation side, the main power supply must be protected by a 1A circuit-breaker device. The power supply cable for the Supercal 5 calculator must be installed in such a way that no hot parts (e.g. pipes, conduits at over 70°C) come into contact with the cable and no cable insulation will be damaged. The power supply connection terminals are designed for the connection of wires with a cross-section of between 0.75 mm2 and 1.5 mm2.

7. Power Supply for BACnet Modules

⚠ DANGER

Danger to life from electrical voltage!
If the equipment has not previously been isolated from the mains supply, live components may be exposed when the cover is opened.
If module replacement whilst the equipment is open and live is unavoidable, then this should only be undertaken by specialist technicians who are familiar with the associated hazards and the applicable regulations.

⚠ WARNING

Removal of the module must only be carried out with the equipment isolated from the electrical supply!
Removal of the module or insertion of the module must be done when there is no current present.
Avoid electrostatic discharges!
Avoid electrostatic discharges during installation or handling while manipulating the Modbus module. For this purpose, before touching the calculator or the Modbus module, you are advised to touch a grounded conductor (for example a water pipe or hot water pipe) to discharge electricity.

7.1 Mains - Power Supply Modules

Two types of main power supply modules are available for the calculator Supercal 5:

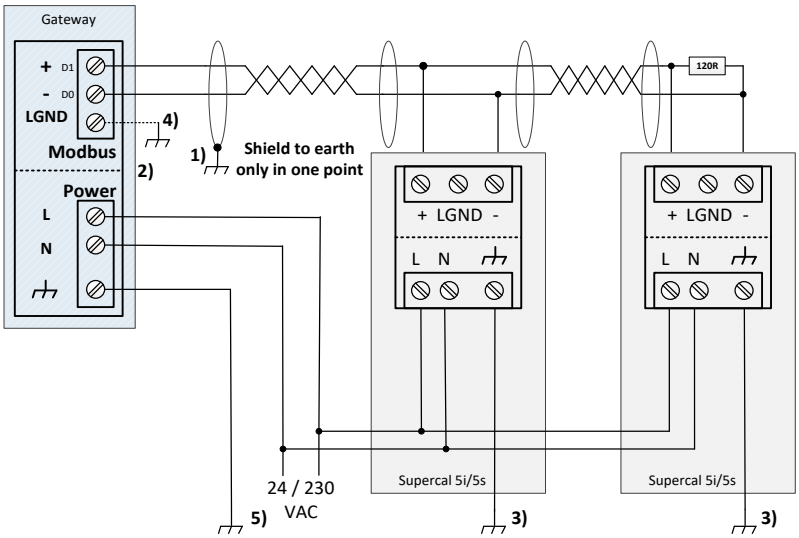
- Power Supply Module for 230 VAC – 50/60 Hz (range 110-240VAC), Art N°: SC5X00012
- Power Supply Module for 24 VDC / 24 VAC (range 12 to 42 VDC / 12 to 36 VAC), Art N°: SC5X00011

Those two models of power supply are completely electrically isolated and can be used for any communication module of the calculator Supercal 5.

7.2 Two-Wires Bus Connections

The BACnet module has a terminal called “LGND”, the Modbus module one that is called “Common”. The properties and functionalities are exactly the same for both, only the name is different.

7.2.1 Two-Wires Bus with a Gateway with a Galvanic Isolation



1) The screen (shield) of the complete cable must be connected to earth (or) in one point only.

2) As the gateway is built with a galvanic isolation, the earth (or) of the gateway 5) can, but does not need to, be connected to the earth. In general, the gateway is earthed by an earth cable.

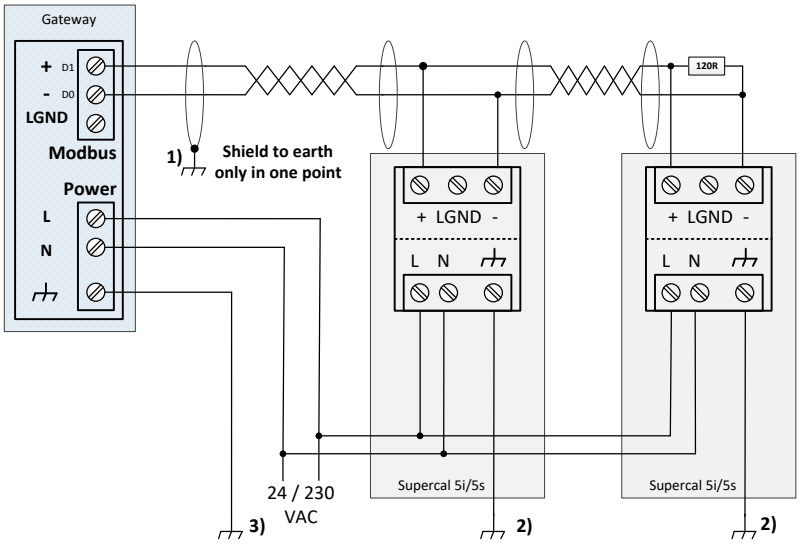
3) Connect each power supply module to the earth (or).

4) Check if the voltage between the LGND (Common) and the electrical earth is in the range of -7 and +12VDC, as per specified in the EIA-485 requirements. Then connect the LGND (Common) terminal to the earth (or).

Remarks:
In the case where others devices are connected on the BUS, these others devices must be built with a galvanic isolation to ensure proper working of the bus.
In the case where others devices are connected on the BUS, these others devices are built without a galvanic isolation, don’t connect the LGND (Common) terminal to the earth (or), point 4).

The resistor 120 Ohm in drawing is built into the module and can be set via a dip switch.

7.2.2 Two-Wires Bus with a Gateway WITHOUT a Galvanic Isolation



1) The screen (shield) of the complete cable must be connected to earth (or) in one point only.

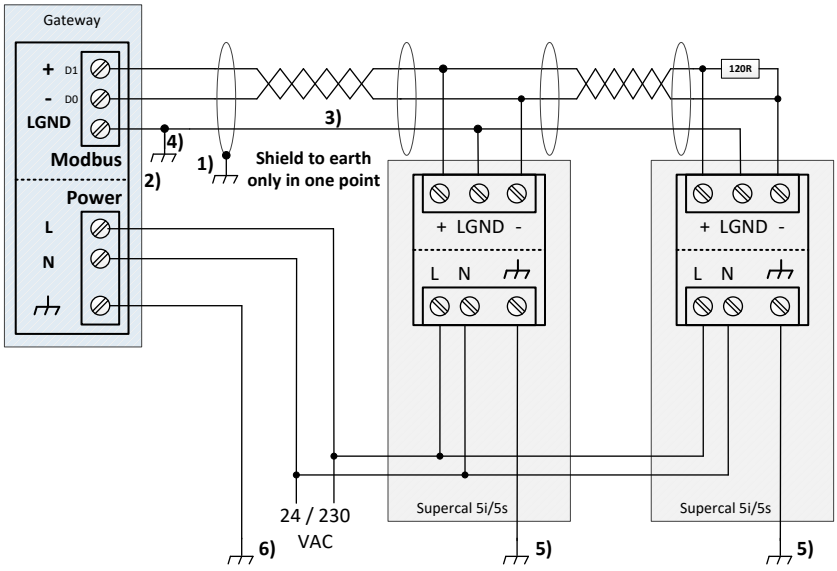
2) Connect each power supply module to the earth (or).

Remarks:
As the gateway is built without a galvanic isolation, DON'T CONNECT the LGND to earth (or).

The resistor 120 Ohm in drawing is built into the module and can be set via a dip switch.

7.3 Three-Wire Bus Connections

7.3.1 Three-Wires Bus with a Gateway with a Galvanic Isolation



1) The screen (shield) of the complete cable must be connected to earth (or) in one point.

2) As the gateway is built with a full isolation 2), the earth (or) of the gateway 6) can, but does not need to, be connected to the earth. In general, the gateway is earthed by an earth cable.

3) The line LGND is used to connect all modules mounted on the Bus with the gateway.

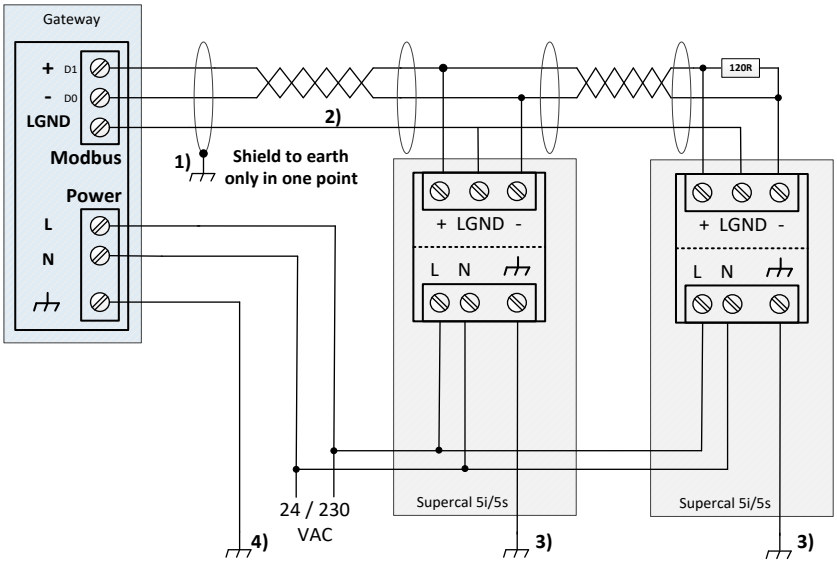
4) Check if the voltage between the LGND (Common) and the electrical earth is in the range of -7 and +12VDC, as per specified in the EIA-485 requirements. Then connect the LGND (Common) termi-nal to the earth (⏚ or ⏚).

Remarks:
In the case where others devices are connected on the BUS, these others devices must be built with a galvanic isolation to ensure proper working of the bus.
In the case where others devices are connected on the BUS, these others devices are built without a galvanic isolation, don't connect the LGND (Common) terminal to the earth (⏚ or ⏚), point 4).

5) Connect each power supply module to the earth (⏚ or ⏚).

The resistor 120 Ohm in drawing is built into the module and can be set via a dip switch.

7.3.2 Three-Wires Bus with a Gateway WITHOUT a Galvanic Isolation



1) The screen (shield) of the complete cable must be connected to earth (⏚ or ⏚) in one point.

2) The line LGND is used to connect all modules mounted on the Bus with the gateway.
Do not connect this line to earth when there is no galvanic isolation.

3) Connect each power supply module to the earth (⏚ or ⏚).

3) As the gateway is built without a galvanic isolation, the earth (⏚ or ⏚) of the gateway 4) must be connected to the earth.

Remark:
As the gateway is built without a galvanic isolation, DON'T CONNECT the LGND to earth (⏚ or ⏚).

The resistor 120 Ohm in drawing is built into the module and can be set via a dip switch.

8. General Bus Considerations

8.1 Wire Routing

BACnet MS/TP or Modbus EIA-485 networks must be wired in a daisy chain configuration. A daisy chain means that there is only one main cable, and every network device is connected directly along its path. This type of network is low bandwidth, but reliable and good for long distance multi-drop runs.
Other methods of wiring a MS/TP BACnet or EIA-485 Modbus network may give unreliable and unpredictable results. DO NOT use Star, Bus, "T", or any other type of network configuration. Any of these other network configurations will result in an unreliable network, and make troubleshooting almost impossible.

8.2 Cable Specifications

A Modbus or BACnet over Serial Line Cable must be shielded, typically either one or two twisted pair.
Please refer to chapter 15 Annex F, chapter 15.3 for all technical specifications.

8.3 Electrical Noise

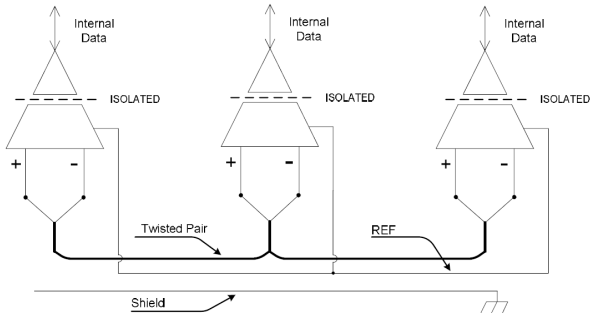
Electrical noise can affect both analogue signal and digital communications such as BACnet or Modbus. Therefore do not route high voltage lines next to the BACnet / Modbus network! Avoid noisy electrical sources such as:

- Variable Frequency Drives
- High current power lines (main panel feeds)
- Fluorescent light fixtures

If you must pass near noisy electrical lines cross at right angles. This will help reduce the amount of noise coupled to the network wires.

8.3.1 Earth, Shield

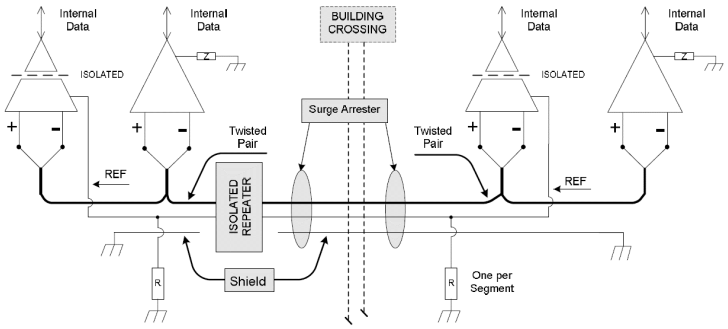
If the installation exclusively uses EIA-485 devices with third-wire reference connections, electrical noise rejection is best if a third conductor in the same cable is used to connect all of the reference connections together as shown in Figure below:



This nearly eliminates earth-ground voltage differences and allows the differential input of each EIA-485 device to float with the electrical noise and stray fields picked up by the signal cable, result-ing in better noise rejection. If there are more than three wires in the cable chosen, the third conductor shall be made up of all of the extra wires (outside of the twisted pair used for signaling) connected together. If desired, the third-wire reference conductor may be tied to earth ground at one point where electrical noise is low through a 100-ohm current-limiting resistor in order to limit voltage ex-cursions and to simplify adding two-wire devices in the future.

8.3.2 Building Crossing

If the installation includes a mixture of three-wire isolated and two-wire non-isolated devices in each of two buildings on a single communications line, it is possible to connect the buildings using an iso-lated repeater so that each building is electrically isolated from the other building as shown in Figure below.



The isolated repeater must provide complete three-way electrical isolation between the wiring on either side and ground. In this case, the communication wiring within each building is configured like that of a single building since the isolated repeater provides the required 1500-volt electrical isolation. The cable connecting the buildings is an extension of the cable in one of the buildings and shall be electrically isolated from the other building by the isolated repeater and shall not have any connections to other devices or to ground within the other building.
An isolated repeater may also be used on both sides of the cable connecting the buildings. This may be needed for extra isolation or for cable length. In this case the cable connecting the buildings shall be separately shielded, terminated, and biased and shall not have any connections to other devices within either building. If the pair of isolated repeaters provides a reference connection, the two ref-erence connections shall be joined by a third conductor within the cable connecting the buildings and shall not be connected to any other device or to ground.
The use of surge arrestors near each building's cable entrance to protect all of the conductors is recommended.

9. Shutting Down

9.1 Exchange and return

In case of repair, factory calibration, incorrect delivery or order, the calculator must be returned. As an ISO-certified company and in accordance with legal requirements, Sontex is obliged to handle all returned products that come into contact with the medium in a certain way.
To ensure a safe, professional and fast return of your device, please inform yourself about the procedure and general conditions on the Sontex website and use our form for the return of goods. See also sontex.ch/wp-content/uploads/2019/10/sontex-product-return-form-en.pdf

9.2 Disposal

In order to preserve and protect the environment, and to reduce the waste of natural resources and pollution, the European Commission has adopted a directive under which electrical and electronic equipment is taken back from the manufacturer for proper disposal or recycling.
If you dispose of the Module, it must be disposed of in accordance with the applicable local environmen tal regulations. Find out about recycling opportunities in your region.

10. Annex A

10.1 BACnet Protocol Implementation Conformance Statement (PICS)

Date:
Vendor Name: Sontex SA
Product Name: SUPERCAL 5
Product Model Number: Module SC5X0021
Applications Software Version: since Vx.xx.x.xx (not available now)
Firmware Revision: Vx.x (not available now)
BACnet Protocol Revision: Rev. xx (not available now)

10.2 Product Description

The thermal energy meter Supercal 5 can be used in various commercial building and apartments, mainly for cooling and heating applications. The system based on signal inputs of two matched temperature sensors and any of e.g. Sontex flow meters.
Supercal 5 provide high accuracy e.g. energy, volume, power, flow, and temperature data via the local LCD display and various communication protocols, like Modbus, BACnet MS/TP, LON FFT-10A and M-Bus.

10.3 BACnet Standardized Device Profile

- BACnet Application Specific Controller (B-ASC)

10.3.1 List all BACnet Interoperability Building Blocks Supported

Data Sharing	
BIBB	**Name**
DS-RP-B	Data Sharing Read-Property-B
DS-RPM-B	Data Sharing Read-Property-Multiple-B
DS-WP-B	Data Sharing Write-Property-B
DS-WPM-B	Data Sharing Write-Property-Multiple-B
DS-COV-B	Data Sharing Change-of-Value-B
DS-COVU-B	Data Sharing Change-of-Value-Unsolicited-B

Device Management	
BIBB	**Name**
DM-DDB-B	Device Management-Dynamic Device Binding-B
DM-DOB-B	Device Management-Dynamic Object Binding-B
DM-DCC-B	Device Management-DeviceCommunicationControl-B
DM-RD-B	Device Management-ReinitializeDevice-B

10.3.2 Standard Object Types Supported

Object Name	Allowed Units
AI-0-Energy	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-1-Volume	L, m3, USGallon, KUSGallon
AI-2-Energy-T1	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-3-Volume-T1	L, m3, USGallon, KUSGallon
AI-4-Energy-T2	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-5-Volume-T2	L, m3, USGallon, KUSGallon
AI-6-Auxiliary-A1	No-units, KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal, L, m3, USGallon, KUSGallon
AI-7-Auxiliary-A2	No-units, KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal, L, m3, USGallon, KUSGallon
AI-8–High-temperature	°C
AI-9–Low-temperature	°C
AI-10-Power	W-
AI-11-Flow	m3/h
AI-12-Runnings-hours	Hours
CA-0-Set-Day1	BACnet Date year, month, day (wday = always wildcard)
AI-13-Energy-stored-ST1	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-14-Volume-stored ST1	L, m3, USGallon, KUSGallon
AI-15-Energy-T1-stored ST1	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-16-Volume-T1-stored-ST1	L, m3, USGallon, KUSGallon
AI-17-Energy-T2-stored ST1	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-18-Volume-T2-stored-ST1	L, m3, USGallon, KUSGallon
AI-19-Auxiliary-A1-stored-ST1	No-units, KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal, L, m3, USGallon, KUSGallon
AI-20-Auxiliary-A2-stored-ST1	No-units, KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal, L, m3, USGallon, KUSGallon
CA-0-Set-Day2	BACnet Date year, month, day (wday = always wildcard)
AI-21-Energy-stored-ST2	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-22-Volume-stored ST2	L, m3, USGallon, KUSGallon
AI-23-Energy-T1-stored ST2	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-24-Volume-T1-stored-ST2	L, m3, USGallon, KUSGallon
AI-25-Energy-T2-stored ST2	KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal
AI-26-Volume-T2-stored-ST2	L, m3, USGallon, KUSGallon
AI-27-Auxiliary-A1-stored-ST2	No-units, KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal, L, m3, USGallon, KUSGallon
AI-28-Auxiliary-A2-stored-ST2	No-units, KWh, MWh, MJ, GJ, KBtu, MBtu, Mcal, Gcal, L, m3, USGallon, KUSGallon
AI-29–Difference -temperature	°K

10.3.3 Device Object Identifier

Device Object Type Property Identifier	Property Data Type	1	2
Object_Identifier	BACnetObjectIdentifier	R	R
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
System_Status	BACnetDeviceStatus	R	R
Vendor_Name	CharacterString	R	R
Vendor_Identifier	Unsigned16	R	R
Model_Name	CharacterString	R	R
Firmware_Revision	CharacterString	R	R
Application_Software_Version	CharacterString	R	R
Location	CharacterString	O	-
Description	CharacterString	O	-
Protocol_Version	Unsigned	R	R
Protocol_Revision	Unsigned	R	R
Protocol_Services_Supported	BACnetServicesSupported	R	R
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R	R
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	R	R
Max_APDU_Length_Accepted	Unsigned (max. 480)	R	R
Segmentation_Supported	BACnetSegmentation	R	R
Local_Time	STX531 Time	O	W
Local_Date	STX531 Date	O	W
Daylight_Savings_Status	BOOLEAN	O	-
APDU_Timeout	Unsigned (10.000 ms)	R	R
Number_Of_APDU_Retries	Unsigned (5)	R	R
Max_Master	Unsigned (127)	O	R
Max_Info_Frames	Unsigned (1)	O	R
Device_Address_Binding	List of BACnetAddressBinding (empty)	R	R
Database_Revision	Unsigned (1)	R	R

10.3.4 Calendar Object Identifier

Calendar Object Type Property Identifier	Property Data Type	1	2
Object_Identifier	BACnetObjectIdentifier (1-24)	R	R
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
Present_Value	BOOLEAN	R	R
Description	CharacterString (max. 16 characters)	O	W
Date_List	List of BACnetCalenderEntry	R	W
Profile_Name	CharacterString (max. 16 characters)	O	W

1 = BACnet Conformance Code 135-2004
2 = BACnet Conformance Code Stx531 BACnet

W = Writable
O =Optional

R = Required + Readable
- = Not supported

10.3.5 Analogue-Input Object Identifier:

Analogue-Input Object Type Property Identifier	Property Data Type	1	2
Object_Identifier	BACnetObjectIdentifier (1-24)	R	R
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
Present_Value	REAL	R	R
Description	CharacterString (max. 16 characters)	O	W
Status_Flags	BACnetStatusFlags	R	R
Event_State	BACnetEventState	R	R
Reliability	*BACnetReliability*	O	-
Out_Of_Service	BOOLEAN	R	W
Update_Interval	*Unsigned*	O	-
Units	BACnetEngineeringUnits	R	R
COV_Increment	*REAL*	O	-

1 = BACnet Conformance Code 135-2004 W = Writable R = Required + Readable
2 = BACnet Conformance Code Stx531 BACnet O =Optional - = Not supported

10.3.6 Data Link Layer Options:

- MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200, Auto Baud

10.3.7 Character Sets Supported:

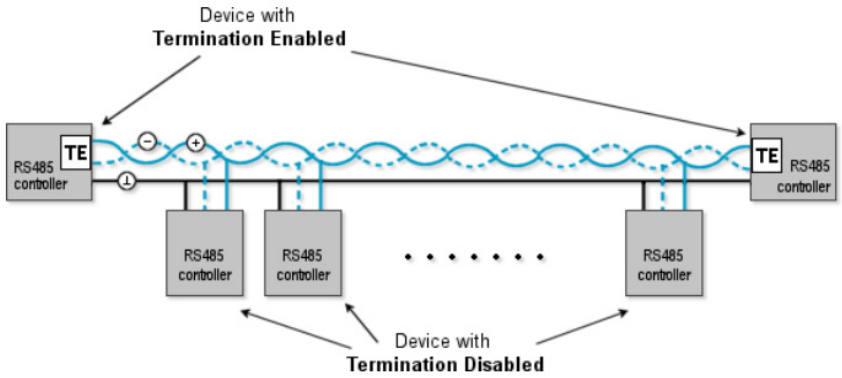
- ANSI X3.4 / UTF-8*
  * Enumeration 0 = ANSI X3.4 was replaced by UTF-8, introduced in BACnet Addendum-H, approved January 2010

11. Annex B

11.1 RS485 Lines

11.2 Termination or Line Terminating

BACnet MS/TP or Modbus EIA-485 networks must be terminated to ensure proper operation. A network should be terminated twice, once at the beginning and once at the end.



Termination helps reduce reflections and noise. The terminating can be done with a 120 ohm resistor across the terminals + and – (BACnet) or D0 and D1 (Modbus) and lines. The BACnet and Modbus modules have the option for enabling termination via a DIP Switch.
If the gateway/router has built in termination and it is enabled by default (since the gateway / router is typically the beginning of the entire BACnet MS/TP or Modbus EIA-485 network, now you only have to go and find/terminate that last device.

11.3 Line Polarization or Bias Resistors

When there is no data activity on an RS-485 balanced pair, the lines are not driven and, thus sus-ceptible to external noise or interference. To insure that its receiver stays in a constant state, when no data signal is present, some devices need to bias the network.
In this case, a polarization of the pair must be implemented at one location for the whole Serial Bus. Generally this point is to choose on the master device or on its Tap. Other devices must not imple-ment any polarization.
The BACnet and Modbus modules have the option for enabling polarization via a DIP Switch.
See chapter 5.10 Setting of the Line Terminating Resistor and the Bias Resistors with the DIP Switch for explanations.

11.4 General Explanation if DIP Switch

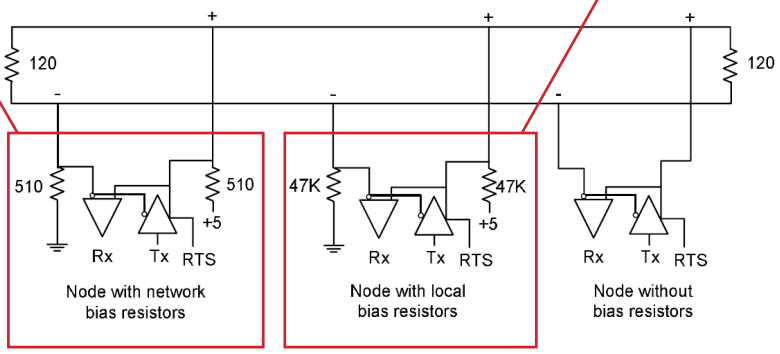
A 510 Ω polarization of the pair must be implemented at one location for the whole bus.
By default, BACnet and Modbus module are built with 2x47K polarization resistors (DIP Switch position: OFF – OFF – OFF), there is no termination and no bias resistors activated by de-fault.

These following features are only enabled with the DIP Switch:

Pos. 1	Pos. 2	Pos. 3	
OFF	OFF	OFF	No Line Terminating resistor LT and no Bias resistor, only a polari-sation 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)

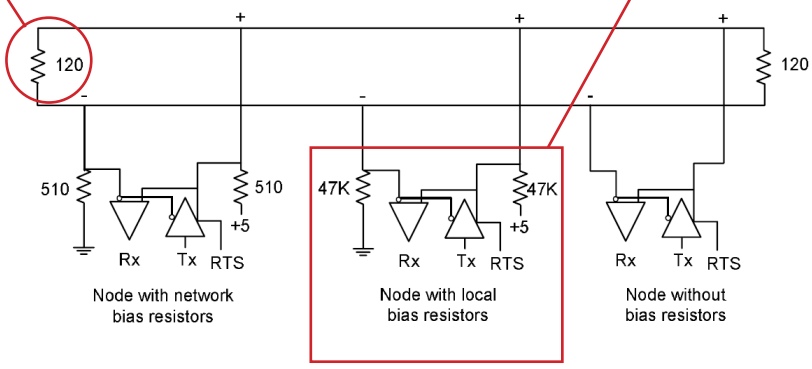
OFF OFF OFF

OFF ON ON



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)

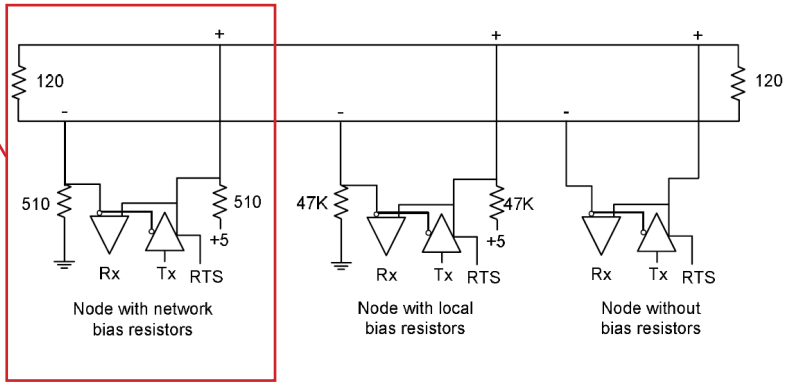
ON OFF OFF



For DIP Switch, the position is defined as follows: Pos.1 Pos. 2 Pos. 3

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)

ON ON ON



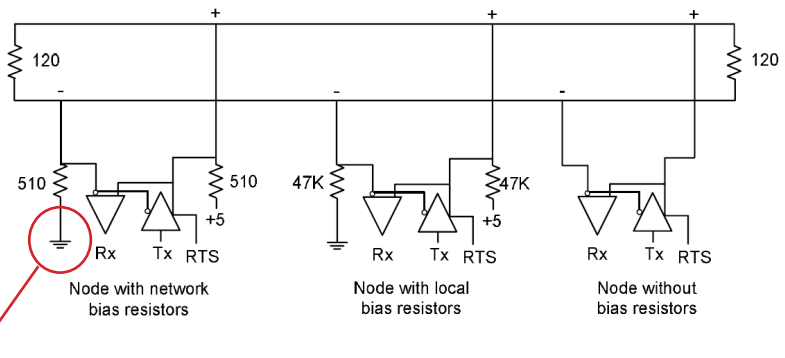
For DIP Switch, the position is defined as follows: Pos.1 Pos. 2 Pos. 3

11.4.1 Summary

	Modbus	BACnet
Line termination	120 Ω + 1nF	120 Ω only
Bias resistors	2x 510 Ω	2x 510 Ω
Default	2x 47 kΩ, no termination	2x 47 kΩ, no termination

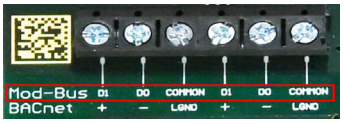
11.5 Cable & Length

The maximum number of devices authorized on such a Modbus/BACnet Serial Line is reduced by 4 without a 510 Ω polarization!
A figure of 32 devices is always authorized on any EIA-485 system without repeater.
A Modbus or BACnet over Serial Line Cable must be shielded.
Characteristic Impedance with a value higher than 100 Ohms may be preferred, especially for 19200 and higher baud rates.
AWG 24 is always sufficient for the EIA-485 data.

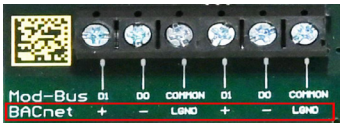


These points are described as “Common” (for Modbus) or “LGND” (for BACnet) on the modules and on the gateway interface.

Modbus:



BACnet:



Remark:

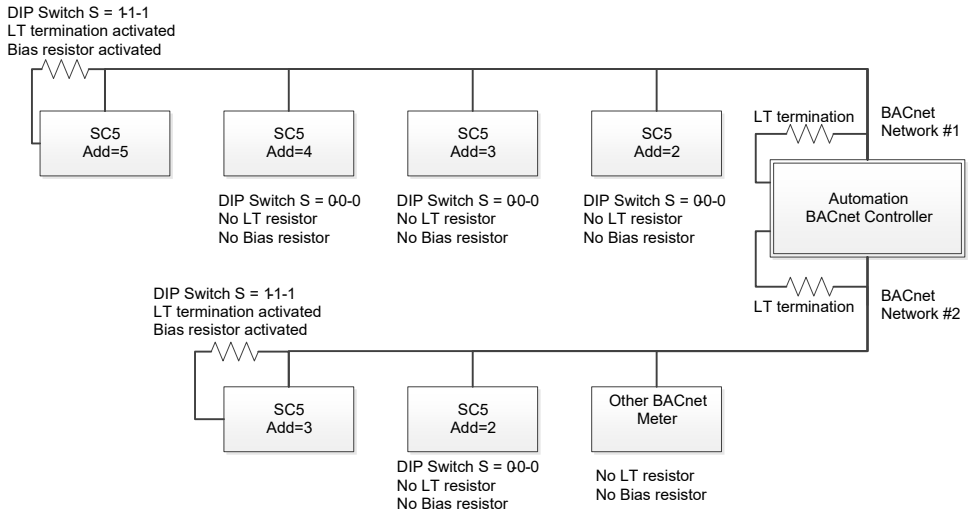
- If a fully isolation is performed from all devices (SC5 and Gateway) connected on the Bus, only one point of this line must be connected to earth (or)!
- If a fully isolation is not performed, in case where the gateway/router or another is not isolated, this line must not be connected to earth !

Please refer to chapter 7.2 Two-Wires Bus Connections and 7.3 Three-Wire Bus Connections for more explanations.

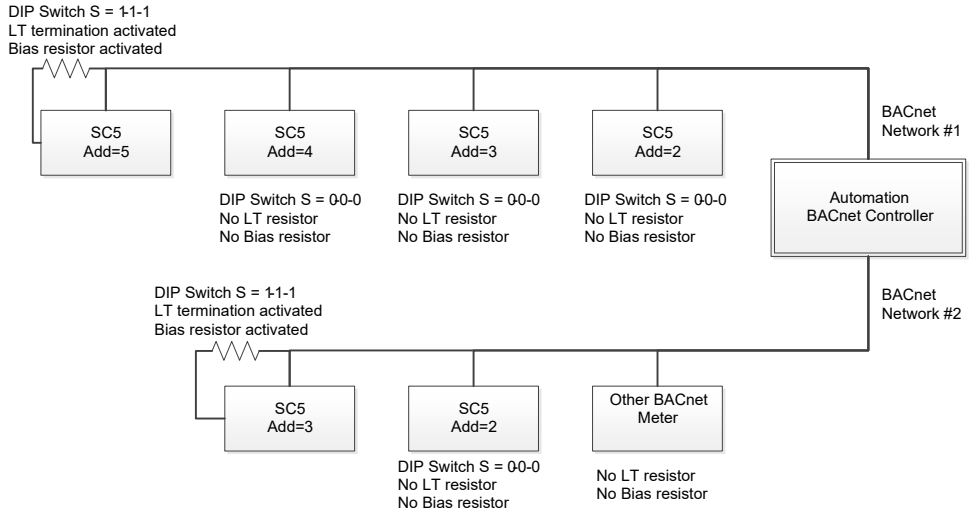
12. Annex C

12.1 Examples of BACnet MS/TP Network with Line Terminating and Bias Resistors

12.1.1 Example 1

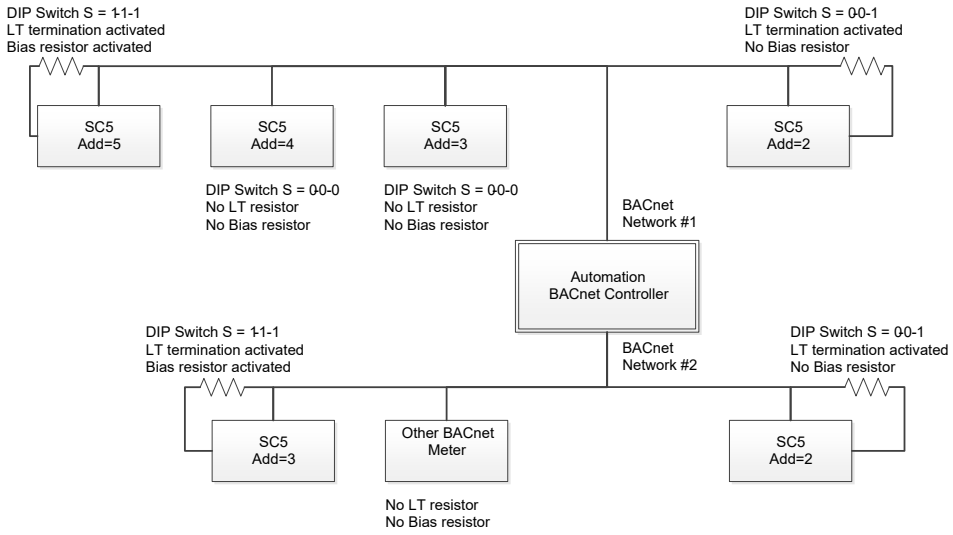


This setting is correct

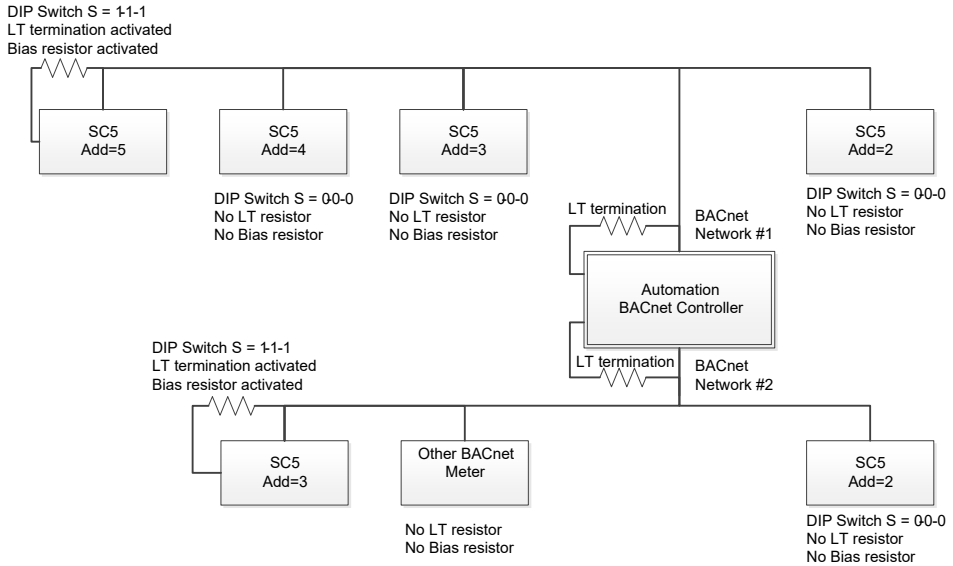


This setting isn't correct. The line termination isn't connected on the BACnet Controller

12.1.2 Example 2



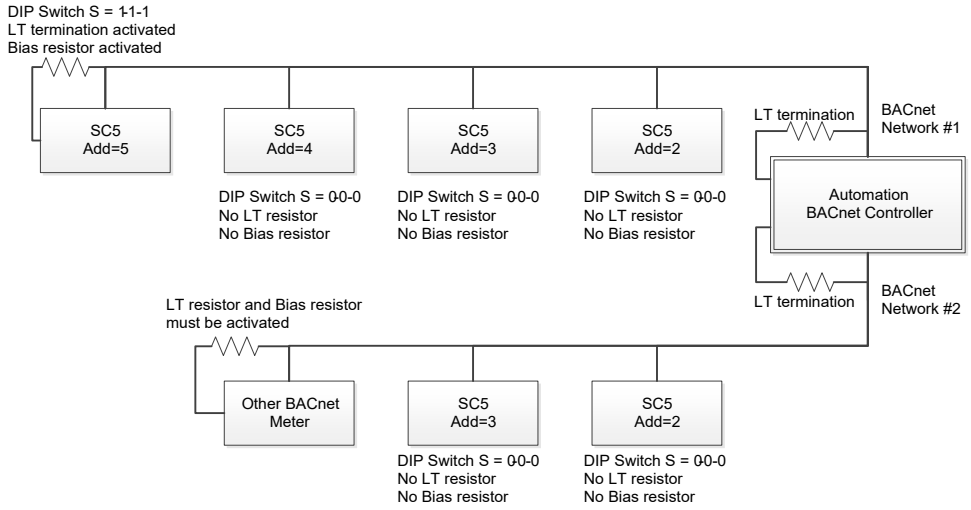
This setting is correct. The LT termination is mounted twice, once at the beginning and once at the end of the EIA-485 network.



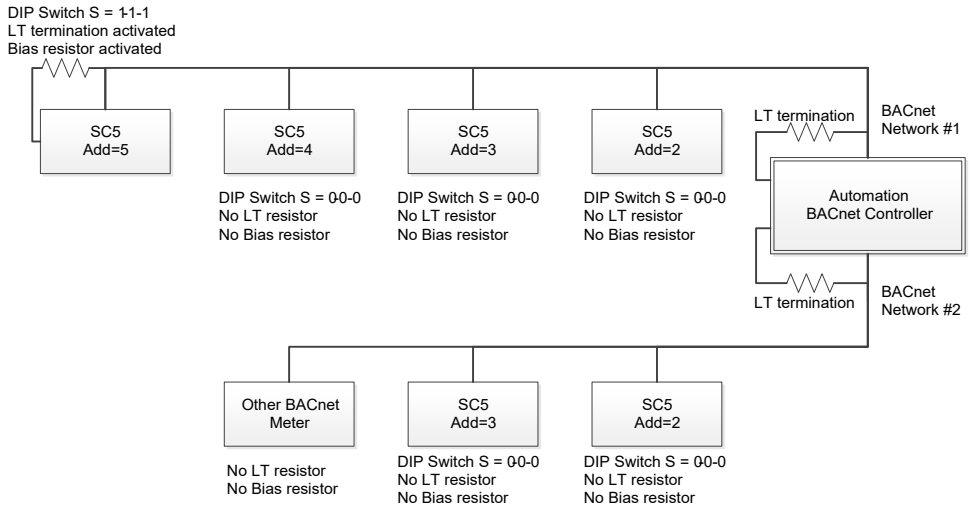
This setting is not correct. The LT termination should be mounted at the end of each side of the EIA-485 network and not directly on the BACnet Controller.

12.1.3 Example 3

Other BACnet Meter connected at the end of the EIA-485 Network



This setting is correct. The LT termination is mounted twice, once at the beginning and once at the end of the EIA-485 network.



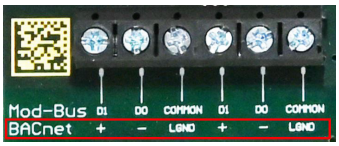
This setting is not correct for the Network #2. The LT termination and the Bias resistors are not mounted on the last BACnet meter.

13. Annex D

13.1 Voltage control

13.1.1 Voltage control during the BACnet communication

Between terminals :		Measured voltage	Remark
LGND	-	0,2 – 4,8 VDC	Positive value
LGND	+	-0,2 – -4,8 VDC	Negative value
LGND	Electrical earth or ground	0 – 0,2 VDC	



Depending on the BACnet communication, the measured voltage can fluctuate between 0,2 VDC and 4,8 VDC (positive and negative value).

13.1.2 Voltage control WITHOUT any BACnet communication

Between terminals		Measured voltage	Remark
+	-	> 0 VDC	Difference must be higher than 0 VDC

Without any BACnet communication, the measured voltage must be higher than 0 VDC

14. Annex E

14.1 Firmware Version Vx.x

The BACnet Module with the Firmware Version VX.X has been tested at a qualified BACnet Testing Laboratory and found to comply with all the necessary interoperability requirements in place on the published test date.
The BACnet Conformance Certificates are available on chapter 17.1 BACnet Conformance Certificate and chapter 17.2 BACnet Testing Laboratories Product Listing.

15. Annex F

15.1 BACnet specifications

15.2 Data Link/Physical Layers: Master-Slave / Token Passing (MS/TP) LAN

This clause describes a Master-Slave/Token-Passing (MS/TP) data link protocol, which provides the same services to the network layer as ISO 8802-2 Logical Link Control. It uses services provided by the EIA-485 physical layer. Relevant clauses of EIA-485 are deemed to be included in this standard by reference. The following hardware is assumed:

- A UART (Universal Asynchronous Receiver/Transmitter) capable of transmitting and re-ceiving eight data bits with one stop bit and no parity.
- An EIA-485 transceiver whose driver may be disabled.
- A timer with a resolution of five milliseconds or less.

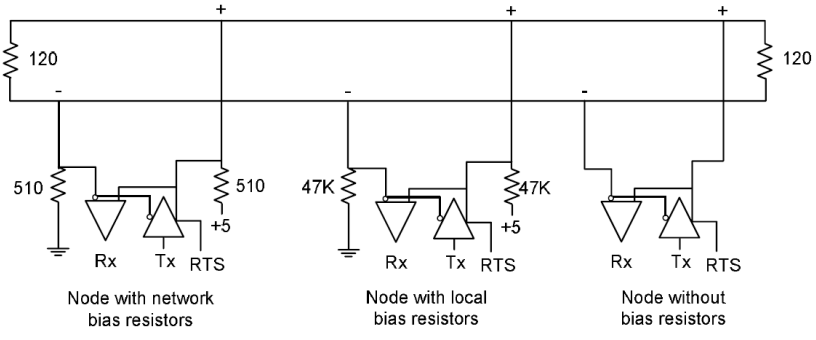
15.3 Physical Layer

15.3.1 Medium

An MS/TP EIA-485 network shall use shielded, twisted-pair cable for data signaling with character-istic impedance between 100 and 130 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot). Distributed capacitance between conductors and shield shall be less than 200 pF per meter (60 pF per foot). Foil or braided shields are acceptable. The maximum recommended length of an MS/TP segment with AWG 18 (0.82 mm2 conductor area) cable is specified in Clause 9.2.3. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.

15.3.2 Connections and Terminations

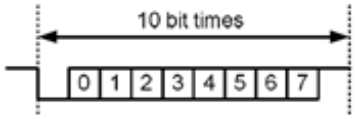
The maximum number of nodes per segment shall be 32 (as specified by the EIA-485 standard). Additional nodes may be accommodated by the use of repeaters, as described in Clause 9.9.
Because MS/TP uses NRZ encoding, the polarity of the connection to the cable is important. The non-inverting input of the EIA-485 transceiver is designated in this specification as "plus" or "+" and the inverting input as "minus" or "-". It is recommended, but not required, that the black or red insu-lated wire of the twisted pair be designated as "plus" and the white, clear, or green insulated wire be designated as "minus." The method of connection between the interface and the cable is not part of this specification.
An MS/TP EIA-485 network shall have no T connections. A termination resistance of 120 ohms plus or minus 5% shall be connected at each of the two ends of the segment medium. No other termination resistors are allowed at intermediate nodes.
Each MS/TP segment shall be provided with network bias resistors, connected as shown in Figure below, such that an undriven communications line will be held in a guaranteed logical one state.



The bias provides a reliable way for stations to detect the presence or absence of signals on the line. An unbiased line will take an indeterminate state in the absence of any driving node.
Under some conditions, noise or cross-talk might result in some nodes receiving spurious octets from the undriven idle line. At least one set, and no more than two sets, of network bias resistors shall exist for each segment. Each set of network bias resistors shall consist of two resistors, each having a value of 510 ohms, plus or minus 5%, connected as shown in Figure 9-1. If two sets of network bias resistors are pro-vided, they shall be placed at two distinct nodes, preferably at the ends of the segment, so that proper bias levels can be maintained even if one of the bias nodes loses power. Other nodes may be provided with local bias resistors as long as each local bias resistor value is 47K ohms or greater. The use of local bias resistors is optional.
For any physical segment that runs between buildings there shall be at least 1500 V of electrical isolation between the EIA-485 signal conductors and the digital ground of any node on that physical segment.
The shield shall be grounded at one end only to prevent ground currents from being created.

15.3.3 Timing

Octets shall be transmitted using non-return to zero (NRZ) encoding with one start bit, eight data bits, no parity, and one stop bit.
The start bit shall have a value of zero, while the stop bit shall have a value of one. The data bits shall be transmitted with the least significant bit first. This is illustrated in Figure below:



Although asynchronous framing is used, there shall be no more than T_{frame_gap} of idle line (logical ones or stop bits) between any two octets of a frame.
The standard baud rates are shown in the table below.

Baud Rate	Requirement	Recommanded maximum distance
9600	Required	1200 meters (4000 feets)
19200	Optional	1200 meters (4000 feets)
38400	Required	1200 meters (4000 feets)
57600	Optional	1200 meters (4000 feets)
76800	Optional	1200 meters (4000 feets)
115200	Optional	1000 meters (3280 feets)

The required baud rates, plus or minus 1%, shall be supported. Any or all of the optional baud rates, plus or minus 1%, may be supported at the vendor's option.
Transmitter enable: A node shall enable its EIA-485 driver before it generates the leading edge of the first start bit of a frame. The node shall drive the line to the logical one state during the time between the enable and the leading edge of the first start bit of a frame.
Transmitter disable: A node shall not disable its EIA-485 driver until the stop bit of the final octet of a frame has been generated.
The node shall disable its EIA-485 driver within $T_{postdrive}$ after the beginning of the stop bit of the final octet of a frame in order that it not interfere with any subsequent frame transmitted by another node. This specification allows, but does not encourage, the use of a "padding" octet after the final octet of a frame in order to facilitate the use of common UART transmit interrupts for driver disable control. If a "padding" octet is used, its value shall be X'FF'. The "padding" octet is not considered part of the frame, that is, it shall be included within $T_{postdrive}$.
Receive to Transmit turn-around: A node shall not enable its EIA-485 driver for at least $T_{turnaround}$ after the node receives the final stop bit of any octet.

16. Annex G

16.1 Troubleshooting procedure

16.1.1 Procedure for BACnet module

1. Ensure all BACnet addresses are unique for that BACnet segment. If you have 2 addresses that are the same that means 2 devices are talking at the same time.
2. Ensure all devices are running at the same baud rate. Confirm this someone may have changed it.
3. Ensure all devices are running at the same communication parameters. Confirm this someone may have changed it.
4. Ensure the communication parameters are the same on Master and on the devices Slaves.
5. Check wiring and power.
6. Bad ground connection between Master and Slaves.
7. Check for reversed polarity on RS485 lines. If uncertain, just try swapping them.
8. With RS485, check termination. Ensure only 2 devices in total are terminated for that BACnet segment.
9. With RS485, check if the bias resistors are used on the BACnet segment.
10. Chop network in half. Does it start to work? Keep chopping until network comes online. This will help narrow down the problem.
11. Have more than 32 BACnet devices on one segment? Not recommended. Break up that segment into separate ones.
12. Do you have other BACnet devices on the network? Remove them while troubleshooting. If they are causing issues put them on a separate BACnet segment.

17. Annex H

17.1 BACnet Conformance Certificate

BACnet
CONFORMANCE
CERTIFICATE

No. BTL-30739

WSPCert attests the conformance of the following BACnet implementation to the BACnet standard ISO 16484-5 protocol revision 1.14. The attested conformance refers to the BACnet Interoperability Building Blocks (BIBBs) listed on the BTL Listing bearing the above-mentioned BTL-number.

The BACnet implementation has fulfilled the requirements according to the test standard ISO 16484-6, the BTL Test Plan 18.1 and the BTL Testing Policies, see Test Report number 21.717.001.004 of iHomeLab.

Product name (B-ASC)
SUPERCAL 5i/5S
Model(s) Module SC5X00021
Firmware version
1.0.0
Vendor
Sontex SA
Rue de la Gare 27
2605 Sonceboz, Switzerland

This certificate is valid until **31-Mar-2027**.

05-Jul-2021
Date of Initial Certification

Dipl.-Ing. G. Weinmann
Head of Certification Body

Issued on behalf of BACnet International
2900 Delk Road, Suite 700, PMB 321
Marietta, GA 30067, USA

Certification by WSPCert
Dr.-Ing. Frank Bitter
Kapuzinerweg 7, 70374 Stuttgart, Germany
Phone: +49 (0)711 9535220, email: info@wspcert.de

17.2 BACnet Testing Laboratories Product Listing

BACnet is a registered trademark of ASHRAE. ASHRAE does not endorse, approve or test products for compliance with ASHRAE standards. Compliance of listed products to the requirements of ASHRAE Standard 135 is the responsibility of BACnet International. BTL is a registered trademark of BACnet International.

BACnet Testing Laboratories Product Listing

BACnet functionality in each Listed product has been successfully tested at a Recognized BACnet Testing Organization utilizing the industry standard BTL test suite and test policies that were current at the time it was tested. For Listings with multiple products, some products may have less functionality than is indicated by the Listing document. The PICS document provides information on the specific functionality of each product. Note that PICS documents on the BTL Listings site are provided by the manufacturer and are not independently verified by BTL.

Listing Information (BTL-30739)

Vendor		Listing Status
Sontex SA Rue de la Gare 27 2605 Sonceboz Switzerland		Listed Product
Test Requirements	BACnet Protocol Revision	Date Tested
Requirements as of February 2021	Revision 14 (135-2012)	June 2021

Product Name	Model Numbers	Firmware version
SUPERCAL 5i/5S	Module SC5X00021	1.0.0

Device Profiles

Profile	Model Numbers
BACnet Application Specific Controller (B-ASC)	All models

BIBBs Supported

Data Sharing	ReadProperty-B	DS-RP-B
	ReadPropertyMultiple-B	DS-RPM-B
	WriteProperty-B	DS-WP-B
	WritePropertyMultiple-B	DS-WPM-B
	Change Of Value Unsubscribed-B	DS-COVU-B

Device Management	Dynamic Device Binding-B	DM-DDB-B
	Dynamic Object Binding-B	DM-DOB-B
	DeviceCommunicationControl-B	DM-DCC-B
	TimeSynchronization-B	DM-TS-B
	ReinitializeDevice-B	DM-RD-B

Page 1 of 2

Object Type Support

Analog Input	Calendar	Device

Data Link Layer Options

Media	Options
MS/TP Master	9600, 19200, 38400, 57600, 115200

Character Set Support

ISO 10646 (UTF-8) ISO 8859-1

Page 2 of 2

Declaration of Conformity

Sontex hereby declares that the Supercal 5
complies with MID 2014/32/EU and RED 2014/53EU.

The full text of the EU Declaration of Conformity is available at the following Internet address:
https://www.sontex.ch/download/konformitaetserklaerung-12/?wpdmdl=820

Technical support

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

Hotline Sontex:

support@sontex.ch
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Technical modifications subject to change without notice