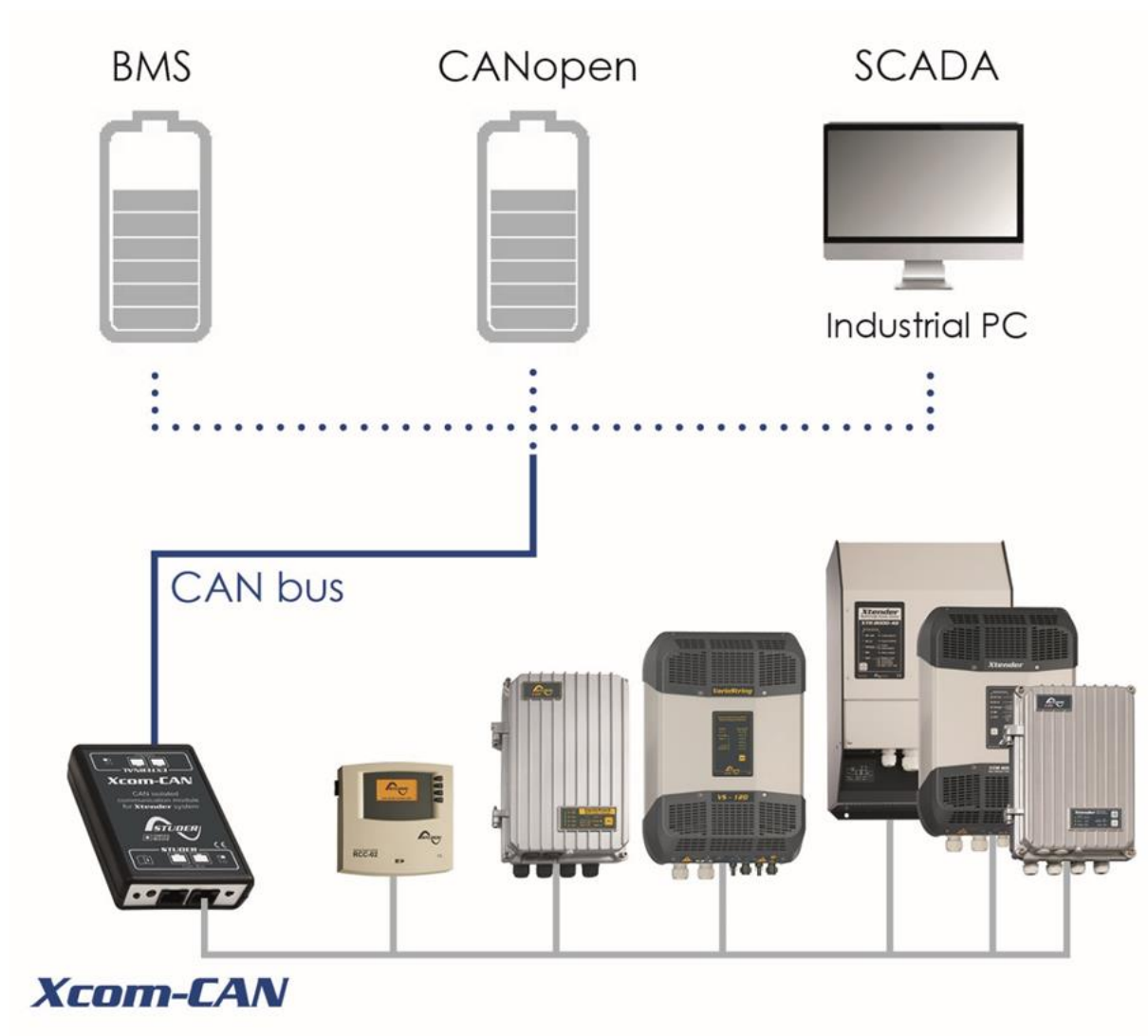


Xcom-CAN

Multi-protocol communication set
for Xtender and Vario-systems

User Manual



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1 INTRODUCTION

1.1 XCOM-CAN MULTI-PROTOCOL COMMUNICATION FOR XTENDER AND VARIO-SYSTEMS

This manual contains a complete description of the functionalities of the multi-protocol communication module Xcom-CAN.

The Xcom-CAN Module is a bridge between the proprietary Studer communication bus on one side and various CAN protocol on the other side, in order to access/control Studer Innotec devices or apply specific behaviour on the Studer system, notably with Lithium or specific batteries.

This document applies to software versions V1.6.16 or higher of the Xcom-CAN. It is possible to update the product with the latest software version available on www.studer-innotec.com/en/downloads/ and the use of a Remote control (RCC-02, RCC-03, Xcom-232i, and Xcom-SMS).



The Xcom-CAN operates in Xtender systems (with products such as Xtender, VarioTrack, VarioString, BSP, RCC-02/-03, Xcom-232i, Xcom-LAN, Xcom-GSM, and Xcom-SMS).

1.2 LEGAL NOTICE

The use of Studer Innotec SA devices is the responsibility of the customer in all cases. Studer Innotec SA reserves the right to make any modification to the product without prior notice.

1.3 CONVENTIONS

1.3.1 Symbols

	This symbol indicates a risk of material damage.
	This symbol indicates a procedure or function that is important for a safe and correct use of the equipment. Failure to respect these instructions may lead to the cancellation of the guarantee or to a non-compliant installation.

1.4 WARRANTY AND LIABILITY

During production and assembly, each Xcom-CAN undergoes several controls and tests. These are carried out in full respect of fixed procedures. Each Xcom-CAN is given a serial number allowing a perfect follow-up of the controls, in conformity with the specific data of every device. For this reason, it is very important to never remove the descriptive sticker with the serial number. The production, assembly and tests of each Xcom-CAN are entirely carried out in our factory in Sion (CH). The warranty of this product depends on the strict following of the instructions in this manual. The warranty period for the Xcom-CAN is 5 years as from the date of delivery ex-works.

1.4.1 Exclusion of warranty

No warranty will be applied for damages caused by handling, operation or actions that are not described in this manual. Damages arisen from the following events are not covered by the warranty:

- Overvoltage on the device.
- Liquid in the device or oxidation due to condensation.
- Failures due to a fall or to a mechanical shock.
- Modifications made without the explicit authorization of Studer Innotec SA.
- Nuts or screws partially or insufficiently tightened during installation or maintenance.
- Damages due to atmospheric overvoltage (lightning).
- Damages due to transport or improper packaging.
- Disappearance of original marking items.

1.4.2 Disclaimer of liability

Installation, commissioning, use and maintenance of this device cannot be supervised by the company Studer Innotec SA. For this reason, we do not accept any liability for damages, costs or losses generated either by an installation that is not conforming to the prescriptions, by a defective operation or by poor maintenance. The use of this device is under the responsibility of the end-user. This device is neither designed nor guaranteed for the supply of life support applications or any other critical application with potential risks for human beings or for the environment. We shall assume no liability for patent infringement or other third party rights involved in the use of this device.

1.4.3 Compatibility

Studer Innotec SA guarantees the compatibility of the software updates with the hardware for one year, starting from the date of purchase. The updates are no longer guaranteed beyond this date and a hardware upgrade may be required. Please contact your reseller for any additional information on compatibility.

1.5 SAFETY PRECAUTIONS

1.5.1 Generalities

Carefully read all safety instructions before proceeding with the installation and commissioning of the device. Failure to follow these instructions might constitute a lethal physical danger but can also damage the functionalities of the device. Therefore this manual should always be kept close to the device.

	For any installation, the local and national norms and regulations in force must be strictly followed.
---	--

1.5.2 Warnings

- Wherever the system is, the person in charge of installation and commissioning must know the safety measures and the prescriptions in force in the country. Therefore, the whole maintenance must be carried out by qualified personnel.
- All components connected to this device must be conforming to the laws and regulations in force. Persons without a written authorization from Studer Innotec SA are forbidden to do any changes, modifications or repairs whatsoever. Regarding authorized modifications and replacements, only genuine components shall be used.
- This device is meant for indoor use only and must under no circumstances be exposed to rain, snow or any other humid or dusty environment.

1.6 PRODUCT RECYCLING

The Xcom-CAN meets the European RoHS directive 2011/65/EU on hazardous substances and does not contain the following elements: lead, cadmium, mercury, hexavalent chromium, PBB or PBDE.

To dispose of this product, please use the service for collection of electrical waste and observe all obligations in force in the place of purchase.



2 EU DECLARATION OF CONFORMITY

The multi-protocol communication module Xcom-CAN described in this manual meets the requirements specified in the following EU directives and standards:

Low Voltage Directive (LVD) 2014/35/EU

- EN 62368-1:2014

Electromagnetic Compliance (EMC) Directive 2014/30/EU

- EN 61000-6-2:2005

- EN 61000-6-4:2007/A1:2011



CH - 1950 Sion, May 2017

Studer Innotec SA (R. Studer)

A handwritten signature in black ink, appearing to read "R. Studer". The signature is fluid and cursive, written over a white background.

2.1 CONTACT INFORMATION

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3 MATERIAL NEEDED FOR THE INSTALLATION

3.1 CONTENTS OF THE XCOM-CAN MULTI-PROTOCOL COMMUNICATION SET


The multi-protocol communication set Xcom-CAN contains the following material:

One Xcom-CAN module	
Two 2 meters communication cables, to connect the Xcom-CAN to Studer and external devices	
Mounting plate	
2 DIN rail clips and screws	
SD card with manual	

3.2 OTHER REQUIRED MATERIAL

In addition to the material delivered with the communication set the use of an Xcom-CAN necessitates a Phillips screwdriver #1 (P1).

Since the Xcom-CAN is dedicated to communicate with a third party system (Battery, SCADA, PLC etc.) you will need a specific cable crafted with the proper connector and pinning on each side. See chapter 5.1.4.

	<p>This device should not be used for any purpose not described in this manual. The device is using RJ45 connectors frequently used and standard for LAN (Local Area Network). The Xcom-CAN should never be used or plugged into communication networks other than the ones specified in this manual. This will seriously damage the product.</p>
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4 FUNCTIONALITIES OF THE XCOM-CAN

There are several functionalities (applications) listed below that can be achieved with the Xcom-CAN module. These functionalities (applications) can be selected by the proper setting of the DIP switches located inside the module. See chap. 5.1.

4.1 CONNECTION OF AN XTENDER-VARIO SYSTEM TO LITHIUM BATTERIES

An optimal management of Lithium batteries requires communication between the battery and the whole system, like inverters, chargers, display, SCADA and so on. Most Lithium batteries use a CAN bus (as physical layer) but must have specific protocols implemented to communicate. The Xcom-CAN has several protocols implemented for battery management.

These protocols are compatible with specific batteries, as listed in chap. 5.1.1.

4.2 ACCESS/CONTROL OF STUDER DEVICES FROM A THIRD PARTY SYSTEM (PLC, SCADA)

The Xcom-CAN can be used to interface a Studer Xtender/Vario system with a third party device via a CAN communication bus (SCADA system, PLC, etc.) with the Studer Public protocol. The technical specification of this protocol is available on Studer's web site, www.studer-innotec.com, and will allow the third party device to read and write data, get alarm or messages and fully control the Xtender/Vario system.

5 INSTALLATION OF THE XCOM-CAN

This device was designed for indoor use only and must under no circumstances be exposed to rain, snow or any other humid or dusty environment.

As far as possible, reduce exposure to sudden temperature variation: important heat variation may create undesired and harmful condensation inside the equipment.

Before installing the module, the configuration of the function and the selection of pin out connection must be achieved.

5.1 SELECTION OF FUNCTIONALITY AND PINOUT ARRANGEMENT

To access the DIP switches and jumpers array, the module must be opened. First disconnect your Xcom-CAN module from all devices (installation, battery, etc.) then open the Xcom-CAN with a Phillips screwdriver #1 (2 screws).

On the electronic board inside the device there are two elements to select the chosen configuration:

- (1) Jumper array for RJ-45 (third party side) pinout arrangement.
- (2) DIP switches to select the protocol, the battery model (switch 1 to 5) and the bus speed (whenever the protocol requires it).

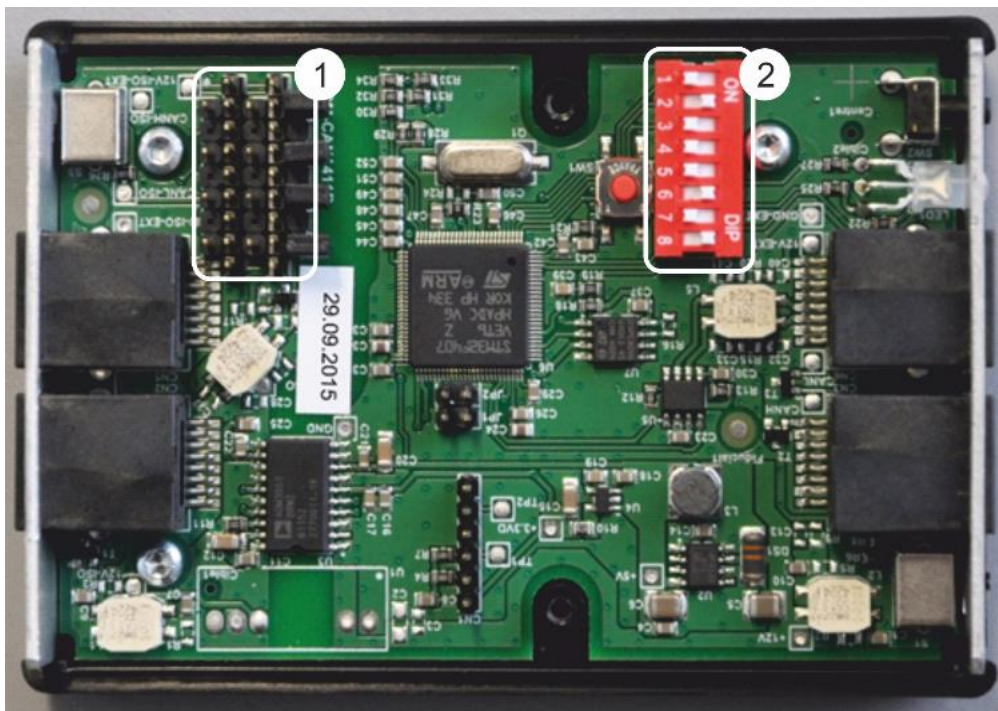
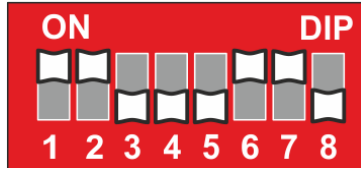
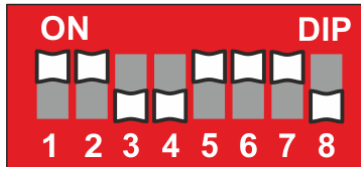
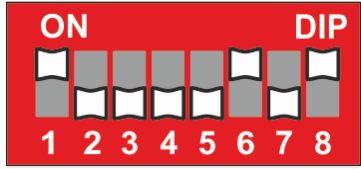
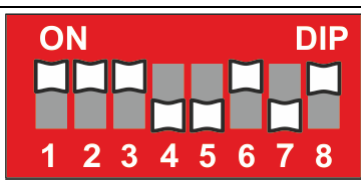




Figure 1: Electronic board inside the Xcom-CAN

5.1.1 DIP switch configuration for use with lithium batteries

Battery Brand	DIP switch settings	Comments
BMZ ESS 3.0 – ESS 7.0 BYD B-Box2.5 – B-Box10.0 Leclanché Appollion Cube		48V battery only! CAN bus speed not accessible
Leclanché TiBox		48V battery only! CAN bus speed not accessible
Super-B 12V 160 Ah		CAN bus speed: 250 kbs selectable See chap. 5.1.3
Reserved for further batteries		CAN bus speed: 250 kbs selectable See chap. 5.1.3

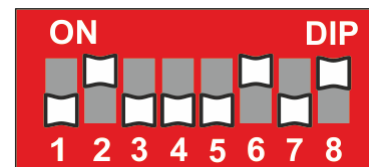
Note: The list of compatibility is subject to change. Please contact Studer Innotec to get the updated list.

	All the listed batteries are compatible with the Xcom-CAN in terms of protocol. Studer Innotec is not responsible for performance and compliance to system size and requirements.
	When working with Lithium batteries, the Xcom-CAN will automatically change the Xtender system parameters related to the battery management (Xtender, VarioTrack & VarioString).

5.1.2 DIP switch configuration for use with third party PLC or SCADA system

To access third party devices to interact with Xtender/Vario system, you have to select the "Studer Public protocol", set the DIP switches according to the figure aside.

The default CAN speed for this protocol is set to 250 kbps. However, you can adjust it depending on your needs. See chapter 5.1.3.



5.1.3 CAN bus speed

The Studer public protocol and some batteries allow different CAN bus speed. This choice must be done in accordance with the third party device speed.

Select the communication speed with the DIP switches in position 6 to 8 according to the aside table.

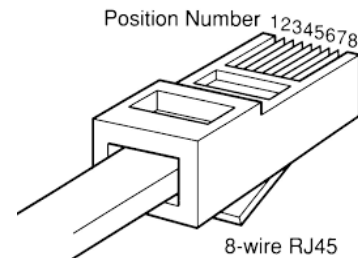
The default setting is 250kbps.

Position			CAN bus speed
6	7	8	
OFF	OFF	OFF	10 kbps
		ON	20 kbps
	ON	OFF	50 kbps
ON	ON	ON	100 kbps
		OFF	125 kbps
	OFF	ON	250 kbps
ON	ON	OFF	500 kbps
	ON	ON	1 Mbps

5.1.4 Cable between Xcom-CAN and third party device or battery

Most communication devices provide a specific connector and pin assignment. A specific cable having on one side an RJ-45 connector and on the other side the third party devices connector is required. This cable is either supplied by the manufacturer or must be crafted by the installer.

The Xcom-CAN package provides 2 cables with RJ-45 connectors on both ends. One of the two can be used to craft the proper cable.

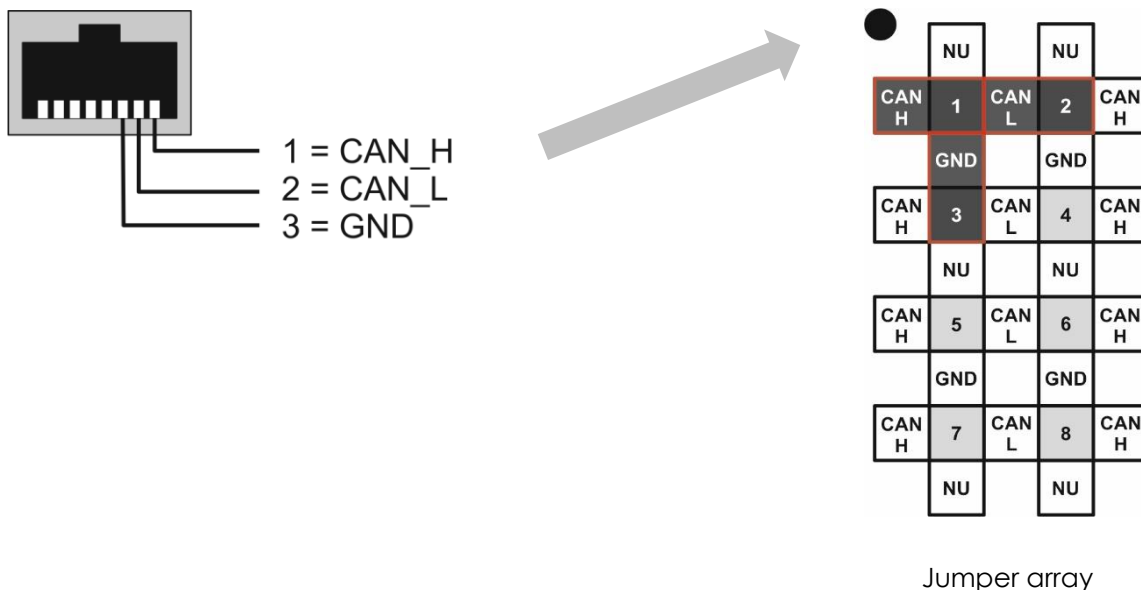


5.1.5 Selection of the PIN assignment of the CAN bus connection

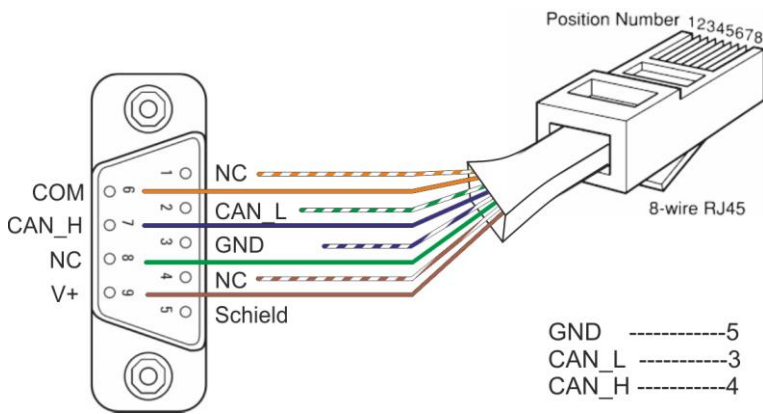
Any communication signal can be assigned to any pin of the RJ-45 connector by using the jumper array (1) in Figure 1.

The grey cells in the figure aside show the pin number of RJ-45 connector which can be connected to any signal of the communication line (GND, CAN-H, CAN-L) using the jumpers. By default, no connexion is done inside the module, so you have to open it and configure it manually.

Here as an example, the pin assignment according to CIA-303-1:

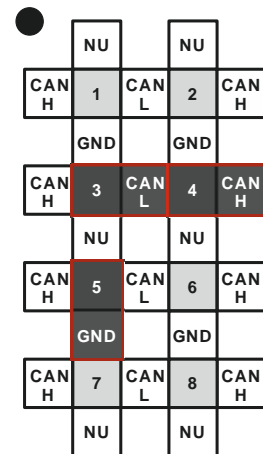


5.1.5.1 Example of cable and jumper selection



Third party connector

RJ-45



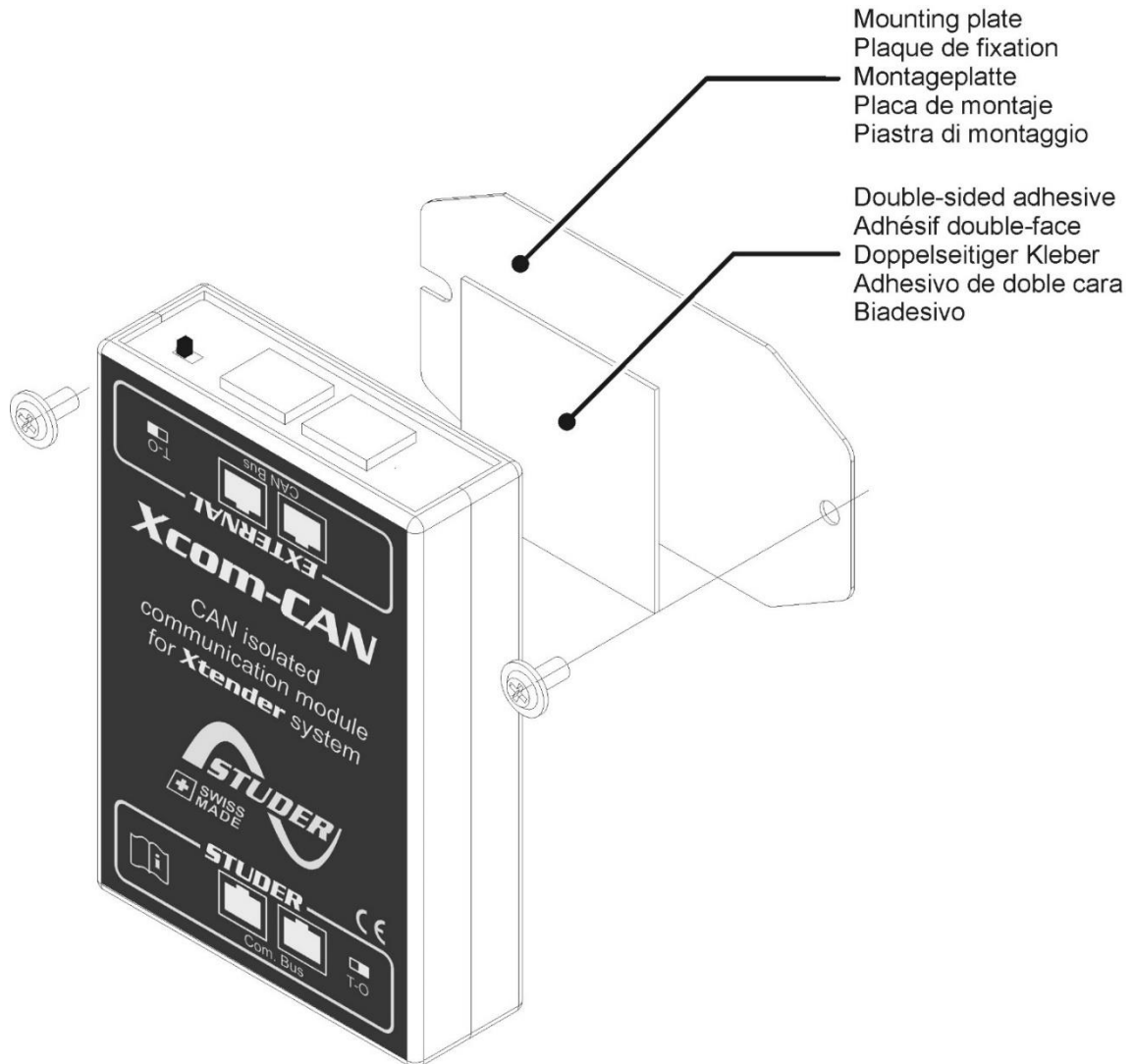
Jumper array

5.1.5.2 Jumper configuration according to listed batteries

BMZ ESS 3.0 – ESS 7.0 BYD B-Box2.5 – B-Box10.0 Leclanché Appollion Cube Leclanché TiBox	Super-B 12V 160 Ah	Reserved for other batteries
<p>2 = GND 4 = CAN_H 5 = CAN_L</p>	<p>1 = CAN_H 2 = CAN_L 3 = GND</p>	


5.2 MOUNTING



The Xcom-CAN can be mounted directly on any support by means of the supplied fixing plate, on a smooth surface with double-side adhesive or on DIN rail using the DIN rail clips (part of the Xcom-CAN communication set).



5.3 CONNECTION OF THE COMMUNICATION BUS (STUDER SIDE)

The Studer bus is daisy chained to the other XT/VT/VS Studer components and is powered by the communication plug as soon as the upfront device is powered. The Xcom-CAN module should not be installed between 2 devices powered by the battery. Connect the Xcom-CAN module with the supplied cable (2m). This cable should not be extended.

	<p>Do not connect the Xcom-CAN between devices connected to the battery. Do not connect the module to a device not connected to the battery (RCC or other Xcom).</p>
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	<p>With more than two devices in the system, all Studer devices should be put to O as "Open" apart from the devices at the ends of the communication chain (with one cable). These devices should be put to T as "Terminated".</p> <p>An incorrect setting of the link ends can lead to an erratic running of the system or impede its updating process.</p>
	<p>By default, the termination is set to terminated (position T) on each Studer product.</p>

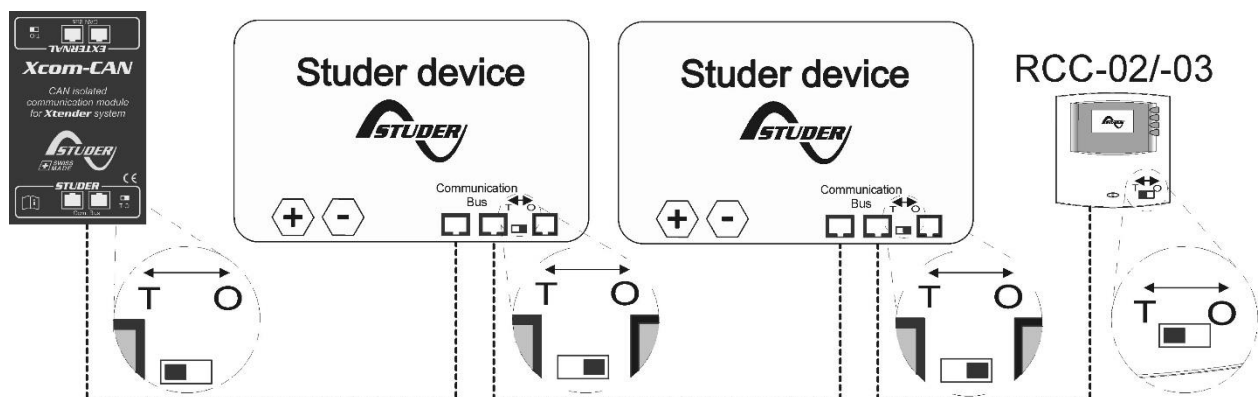


Figure 2: Connection schematic for Xcom-CAN

5.4 CONNECTION OF THIRD PARTY DEVICES

In most cases, a specific cable must be crafted by the installer according to chap. 5.1.5 – p. 9. This cable will have on the Battery BMS side the appropriate connector supplied or recommended by the third party device manufacturer (Battery, SCADA, PLC etc.) and on the Xcom-CAN side an RJ-45 connector.

5.5 ELEMENTS ON THE STUDER SIDE OF THE MODULE

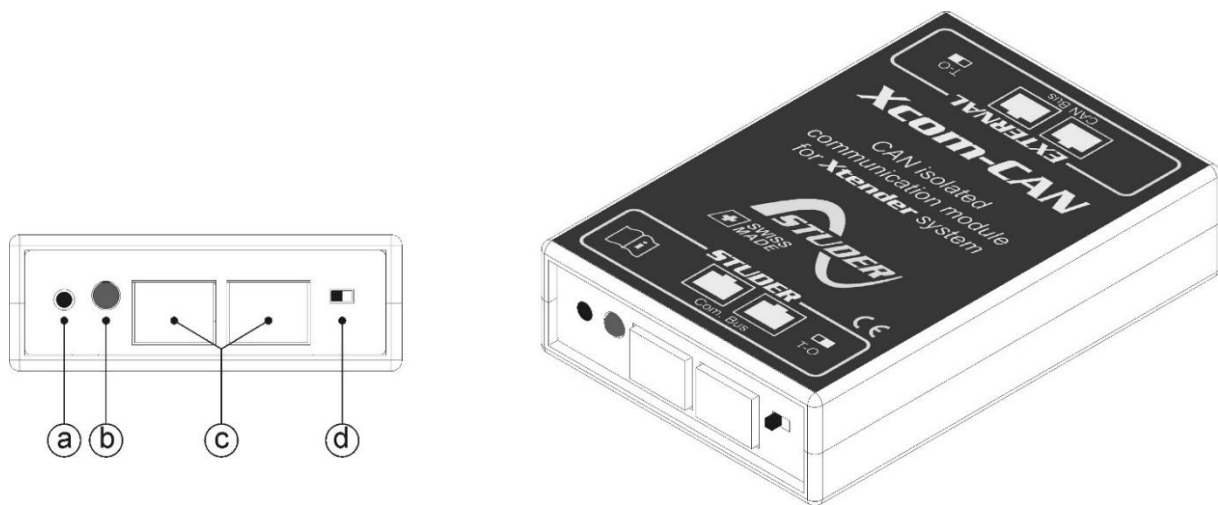


Figure 3: Front and isometric view of the Xcom-CAN

Key	Description
(a)	Push button (Not used / reserved for future use)
(b)	Bicoloured signalisation LED (green/red) The signalisation LED indicates different functions using colour and frequency of blinking. It is explained in chapter 5.5.1.
(c)	Studer devices communication connectors These connectors allow the Xcom-CAN to be connected with an Xtender system. This is the Studer communication side of the device.
(d)	Switch for communication line ending This switch activates or deactivates the communication bus termination. The termination is by default activated (terminated). In Figure 3, the termination is activated. Place the switch to the correct side: if there is only one cable connected on port c (com bus) put the switch in T (terminated) position. If there are two cables connected on port c (Xcom-CAN connected to two other devices) place the switch in position O (open).

5.5.1 Signalisation LEDs

Bicolour LED	Meaning
Blink 2x repeatedly in GREEN	The Xcom-CAN is running without any error.
Blink 1x repeatedly in ORANGE	The Xcom-CAN is currently starting up.
Blink 2x repeatedly in RED	The Xcom-CAN is in error. See chap. 7.

5.6 ELEMENTS ON THE EXTERNAL CAN BUS SIDE OF THE MODULE

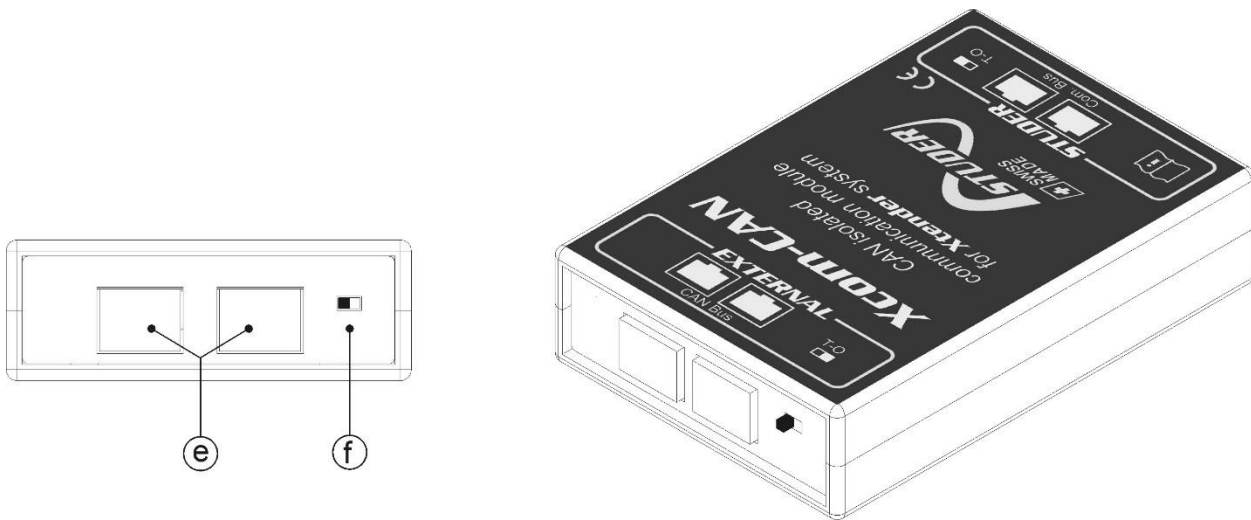



Figure 4: Back and isometric view of the Xcom-CAN


Key	Description
(e)	<p>CAN connectors for an external network</p> <p>These connectors allow the Xcom-CAN to be connected to a third party system like battery BMS or a SCADA/PLC system.</p> <p>To communicate with the third party system, a specific cable with a specific connector must be crafted according to chap. 5.1.5 - p.9.</p> <p>The cable pinning must be carefully checked before connecting any device at this point.</p>
(f)	<p>Switch for CAN termination</p> <p>This switch activates or deactivates the communication bus termination. The termination is by default activated. In Figure 4, the termination is activated (T). Place the switch to the correct side: if there is only one cable connected on port e put the switch in T (terminated) position. If there are two cables connected on port e (Xcom-CAN connected to two other devices) place the switch in position O (open).</p>

6 USING XCOM-CAN WITH LITHIUM BATTERIES

The Xcom-CAN module enables the use of Lithium batteries with your Xtender/Vario installation. Lithium batteries are more complicated to handle compared to simple lead acid batteries. Lithium batteries usually embed a BMS (Battery Monitoring System) which is responsible of cell monitoring and battery safety. The BMS knows the status of each cell, and it computes maximum charging/discharging current and maximum/minimum target voltage. These values, that change dynamically, are known as set points or limits and must be respected. The Xtender/Vario systems will take in account and follow these set points. If one of these set points/limits is exceeded, the BMS will first raise a warning/alarm. The Xtender/Vario system will take this warning/alarm into account and try to solve the problem (e.g. reducing the charge current). If the problem persists and if there is a danger for the battery's safety, the battery's BMS will open the battery's relays in order to guarantee the safety of the system.

The Xcom-CAN module supports Lithium batteries with BMS communicating on the CAN bus. See chapter 5.1.1 for a complete list of compatible brands. The Xcom-CAN should not be used with lithium batteries that are not on this list.

	The use of Lithium batteries require special care. It is the responsibility of the installer to handle the battery correctly and to conform to the safety requirements of the battery manufacturer. Studer Innotec will not be responsible for any damage done to the battery and/or to the installation in case of wrong/bad handling of the Lithium battery.
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	The use of an Xcom-CAN with Lithium batteries is incompatible with the use of a BSP. Therefore it is not possible to have an Xcom-CAN working in BMS mode together with a BSP on the same Studer CAN bus.
---	---

6.1 BATTERY POWER UP

Follow the battery manufacturer start-up procedure. Some batteries have a pre-load system unable to pre-charge all the devices connected to the battery. In this case, disconnect all devices connected to the battery. Repeat the start-up procedure and after a few seconds, reconnect the devices.

6.2 SYSTEM POWER UP

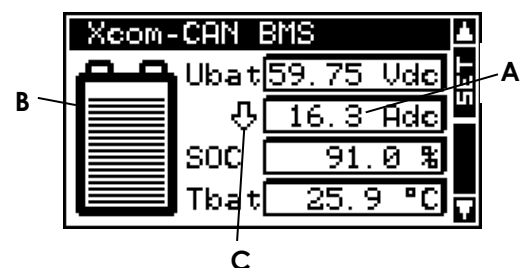
Once the Xcom-CAN is connected and powered by the Studer system it will perform different sequences indicated by the bi-coloured LED (b) according to chapter 5.5.1.

6.3 BATTERY MONITORING ON THE RCC

If an RCC is present in the system, several information are available in a specific screen dedicated to the battery.

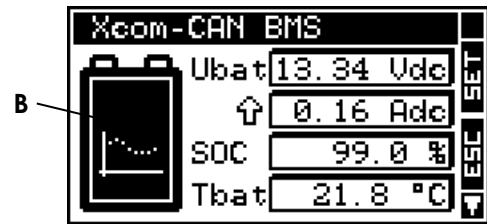
6.3.1 Displayed values

In area (A), the Xcom-CAN displays four values. The information to be displayed can be selected with the key "SET" and arrow up/down to select the field, and then "SET" again + arrow up/down to select the info among the one listed in chap. 6.3.3. When the current is displayed, the direction of the current is given in (C): an arrow upwards means the charge, an arrow downwards means the discharge. The battery symbol (B) gives a quick overview of the battery's state of charge (SOC).

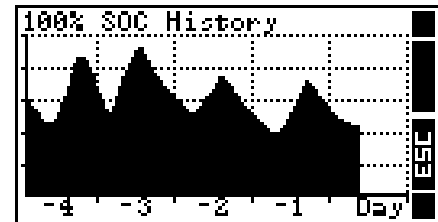


6.3.2 SOC history

When the battery symbol field (B) is selected you can access the last 5 days SOC history, with the "SET" key.



On the horizontal axis are indicated today and the last 4 days. Each horizontal pixel represents one hour. The vertical axis gives the state of charge of the battery. The graduations indicate 20, 40, 60, 80 and 100 % and one pixel represents 2 %.



6.3.3 Battery information

The table below shows the available information to display.

Info. no.	Name	Unit	Description
7000	Ubat	Vdc	Battery voltage
7001	Ibat	Adc	Battery current
7002	SOC	%	State of Charge
7003	Pbat	W	Power
7007	0d<	Ah	Ah charged today
7008	0d>	Ah	Ah discharged today
7029	Tbat	°C	Battery temperature
7053	bTyp		Battery Type
7054	BMSv		BMS Version
7055	bCap	Ah	Battery Capacity
7056	bmId		Reserved Manufacturer ID
7057	SOH	%	State Of Health
7058	hSOC	%	High resolution State of Charge
7061	UChL	Vdc	Charge voltage limit
7062	UDiL	Vdc	Discharge voltage limit
7063	IChL	Adc	Charge current limit
7064	IDiL	Adc	Discharge current limit

6.4 SYSTEM BEHAVIOUR WITH XCOM-CAN AND LITHIUM BATTERIES

When the Xcom-CAN is used as an interface between a compatible battery, see chapter 5.1.1, and the Xtender/Vario system, it plays the following role:

- Communicates the battery status (voltage, current, SOC, etc.), either to the local monitoring or data log system (RCC) or to the communication devices for remote or third party access via Xcom-LAN/ /Xcom-GSM/Xcom-SMS.
- Manages and computes various battery information to ensure a safe behaviour of the system and a safe operation of the battery.
- Drives the behaviour of the system according to the data provided by the battery, basically the real time voltage and current limit to apply to the battery. This third "role" is running only if the control mode is activated.

Note: It is possible to have some information or values not displayed and replaced by the value "NA" when the battery is not providing the information.

6.4.1 Xtender/Vario system settings

The Xcom-CAN will automatically initialize the DC voltage/current parameter of your system. All other parameters, non-related to battery management and/or specific to the installation, must be set as described in the user manual of the various XT-VT-VS appliances in the system. For example: the input limit of the Xtender {1107}, the AC output voltage {1286} or the behaviour of the auxiliary relays.

The Xcom-CAN will always react on alarms and warnings provided by the battery: if for some reason alarms or warnings are raised by the battery's BMS, the Xcom-CAN will take control of the installation and turn off the functionality that create the problem (charging or discharging the battery). To protect the battery from deep discharge the following Xtender functionalities (inverter {1124}, smart boost {1126}, grid-feeding {1127}) will be disabled. In this case those "discharging functions" will not be re-enabled before the battery has reached at least 20% of the communicated state of charge.

7 TROUBLESHOOTING


There are different problems that may cause the Xcom-CAN to malfunction. This list presents known irregularities and the procedures to follow to address them.

Symptom	Description
All LEDs are off	Your Xcom-CAN is not powered correctly. Check that the module is correctly connected to your Xtender system with the appropriate cable. See chapter 5.3.
Red LED blinking	An emergency stop occurred or the communication with the battery or third party device is lost. The RCC screen will help you find the source of the problem. In case of an emergency stop: <ol style="list-style-type: none"> 1. Restart the battery system if it has stopped (switched off) or changed to limited power source (preload mode). See also chap. 6.1. 2. Check whether the battery is correctly connected with the Xcom-CAN module. 3. Check that the CAN communication speed of the Xcom-CAN module is corresponding to the one of the battery. The communication speed is indicated on the RCC under the menu "System info". Use the arrows to find and select the Xcom-CAN. 4. Check that the jumpers are correctly positioned. See chap.5.1.5. 5. When the LED is blinking normally again (Blink 2x green), turn on the Studer devices that were turned off by the emergency stop, one by one.




8 SOFTWARE UPDATES

In case of requirement of software upgrade of the system through the RCC unit, the Xcom-CAN is automatically upgraded. The software updates are available in the download area of the website www.studer-innotec.com/en/downloads/.

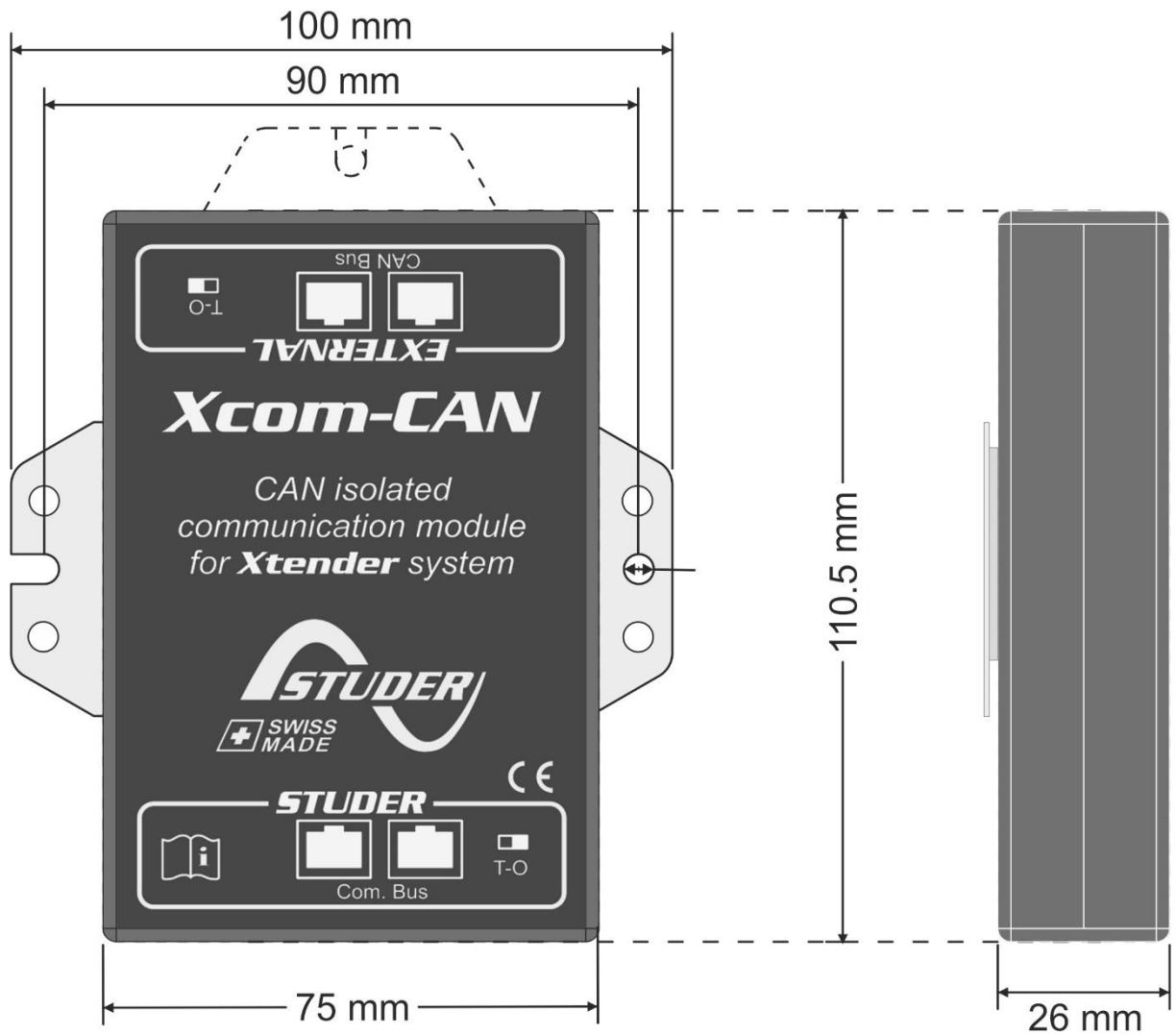
8.1 UPDATING PROCESS

	Turn off all inverter units before making the update. If not manually done, the updating process will automatically stop all Xtender connected to the communication bus.
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To carry out an update, insert the micro SD card (containing the latest software version) in the RCC's micro SD card reader. Before starting the updating process, the system automatically checks the compatibility between the devices and the software present on the micro SD card. The micro SD card must **not** be removed until the end of the updating process. If for some reason the updating process is interrupted, reinsert the SD card to let the process finish.

	The latest software versions are available on our website www.studer-innotec.com/en/downloads/ under the heading "Softwares and Updates".
	The updating process can take between 3 and 15 minutes. During this period, it is possible that the signalisation LED does not respect exactly the cyclical ratio described.
	The updating of a remote control RCC-02/-03, Xcom-232i/-SMS/-LAN/-GSM must be done directly on the connected device.

9 DIMENSIONS





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