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CE

MD-MODB

Vers. 1.01 EN

Supplementary manual
Modbus RTU module (RS485)
Table of contents

Principles

Together with the CAN bus converter CAN-BC2, this module provides the link between the CAN bus from Technische Alternative and the Modbus RTU. In addition, an M-Bus interface is available to connect up to 4 M-Bus meters.

It is programmed using TAPPS2 software.

The CAN-BC2 including MD-MODB can be operated via the UVR16x2 controller, CAN-MTx2 or the C.M.I. interface.

The same minimum system requirements apply as for the CAN bus converter CAN-BC2.

This manual describes only the features that are relevant to this module. The CAN-BC2 manual contains all other relevant information for the CAN bus converter.

Installation and connection

1. Attach the 2 supplied spacers to the PCB of the CAN-BC2.
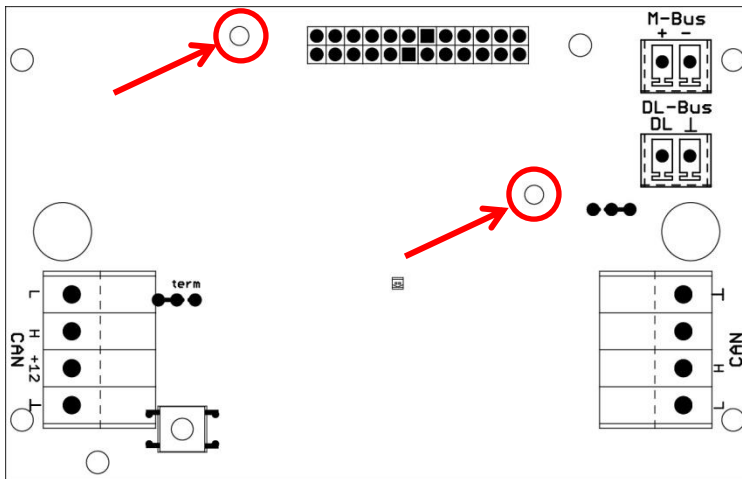
2. The module is attached to the pins provided on the PCB of the CAN-BC2. The spacers ensure the correct distance to the converter PCB. **The module may only be installed when the CAN-BC2 is switched off**.
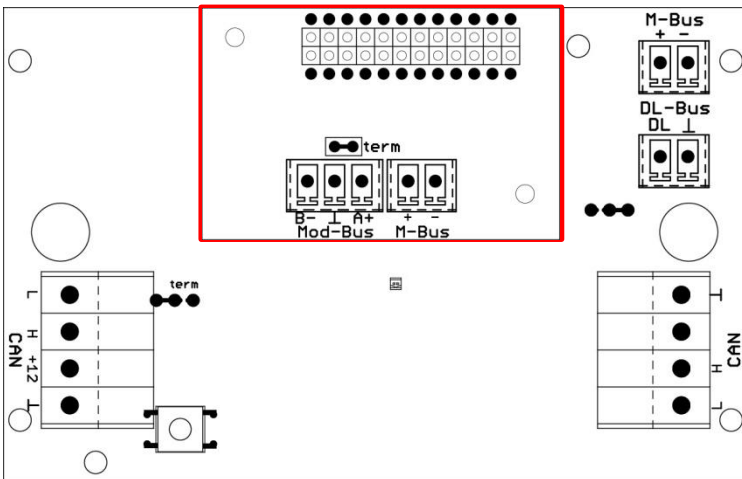
3. Connect the Modbus cable, taking note of the **polarity (A/+/1, B/-/2)** and/or connection of the M-Bus cable.
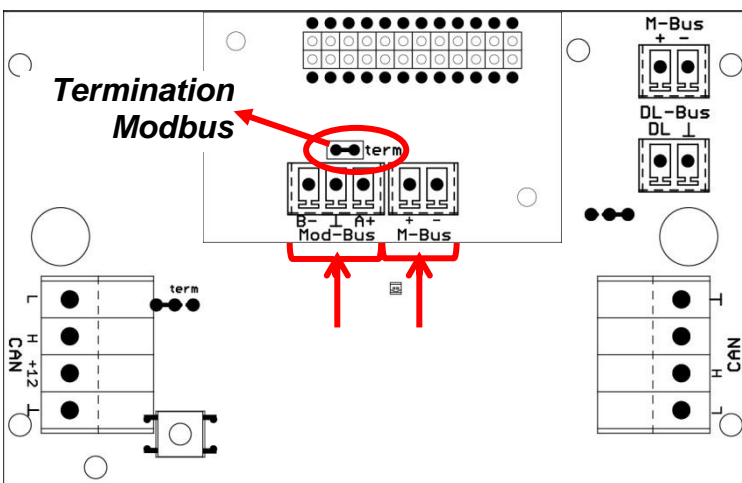
Each Modbus network must be provided with a 120 Ω bus terminator at the first and last network node (**termination with plug-in jumper**). A Modbus network therefore always has two terminators (one at each end).

The Modbus cable must be routed in accordance with Modbus specifications. Information about the M-Bus cable can be found in the CAN-BC2 manual.

Modbus RTU 485 interface

The Modbus RTU is designed to read data from or write data to defined data areas of a device. The information about which data is located in which data area varies from device to device. In order to be able to contact the Modbus RTU, the Modbus settings must first be defined (baud rate, parity and stop bits).

This module is only suitable for communication via RS485.

Communication then proceeds using the master/slave system. Communication always begins with the master sending a request. Every slave has an address that must only be assigned once. If a slave detects that its address has been contacted by the master, it sends a response. The slaves cannot communicate with one another. They cannot initiate communication with the master either.

It is possible to transmit 64 values in each direction (Modbus $\Rightarrow$ CAN and CAN $\Rightarrow$ Modbus).

Programming with TAPPS2
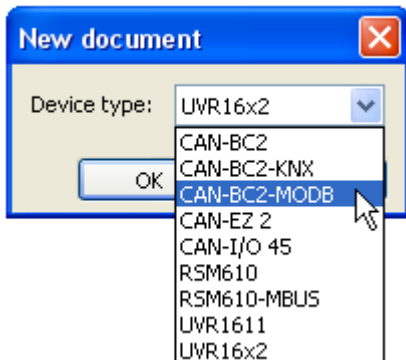
To program a bus converter with Modbus module, the right device type must be selected.

If the module is **retrofitted** to the bus converter and the bus converter (**without** module) has already been programmed, the following procedure must be followed to continue programming (**with** module):

1. Open the **existing** program (**without** module).
2. Create a **new drawing** for the device type with the relevant auxiliary module (CAN-BC2-MODB).
3. **Select** (Ctrl + a) and then **copy** (Ctrl + c) the whole content of the **existing** drawing.
4. **Paste** (Ctrl + v) the copied drawing into the **new** drawing (**with** module).
5. Create function data (*.dat file) for the **existing** program (**without** module) ("**Export**").
6. **Import** this function data into the **new** drawing (**with** module).

This will result in all settings from the original program being applied to the new drawing and you can then continue programming the auxiliary module.
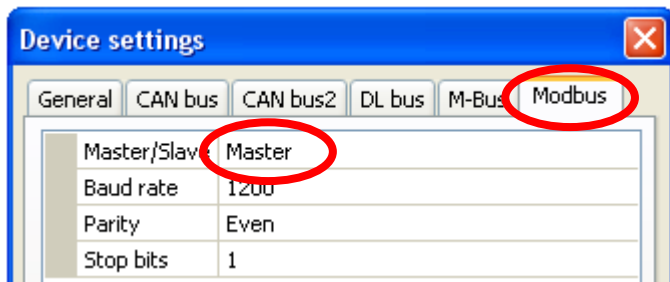
Settings for M-Bus inputs of the module

These settings are made together with the 4 inputs of the bus converter. The entire unit can therefore read data from up to 8 M-Bus meters. **The settings are described in the bus converter manual**.

Device settings for Modbus

These settings can also be made in the "File / Settings / Device settings..." menu:
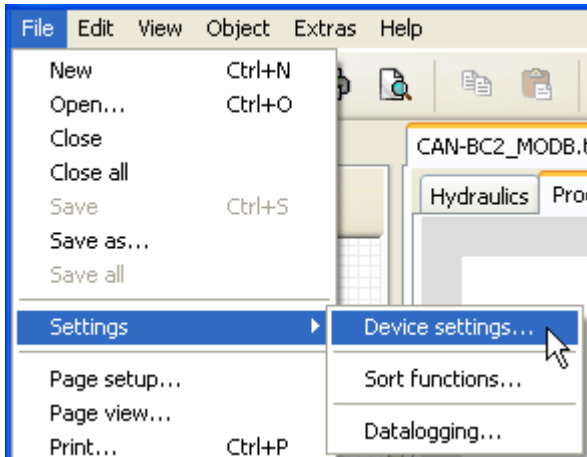
Master mode

|	
Master/Slave	Select **Master**
Baud rate	Adjustable from 1200 to 38400 Baud
Parity	Select: Even / Odd / None
Stop bits	Select: 1 or 2
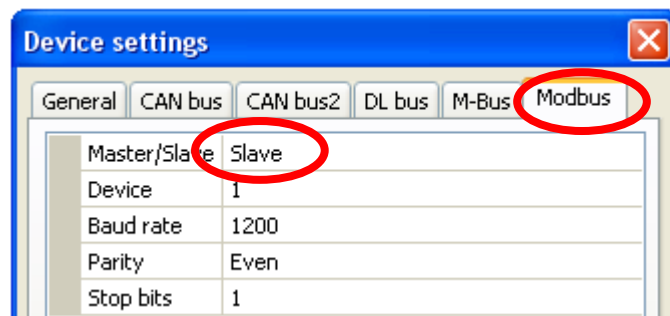
Slave mode

Master/Slave: Select **Slave**

Device: In **slave** mode, the **device number** (1-247) of the bus converter in the Modbus network must also be defined.
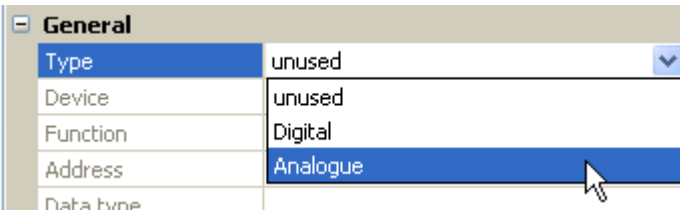
The structure of the connected Modbus network must be known to be able to make device settings.

Modbus inputs

Up to 64 Modbus inputs can be programmed. The Modbus inputs are then available as sources to the other bus outputs, the function input variables, visualisation or datalogging.
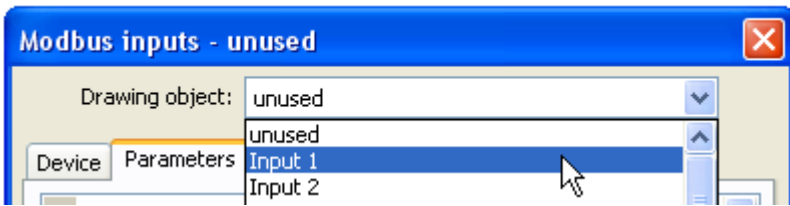
General – Type

Choose whether the value applied by the Modbus is analogue (numeric) or digital (ON/OFF).

Designation

Every Modbus input can be given its own designation. The designation can be selected from various designation groups or can be user defined.

Example:

General – information about Modbus source

Entry of the properties of a value that is to be applied by the bus converter. This requires precise knowledge of the Modbus properties of the source.

Device / Function / Address	**Master mode:** Details of the Modbus device (slave) from which the values are taken.
	Slave mode: The device's own number is given in the device settings. The function is defined according to the input type selected. The address of the module is issued automatically and counts upwards irrespective of the input number and type.
Data type / Byte sequence	Only for **analogue** values: Details about the data type of the device from which the value is applied.
Interval time	The readout intervals can be adjusted from 10 seconds to 30 minutes (only possible in **master** mode).
Divisor / Factor	Only for **analogue** values: Entry of a divisor or factor to adjust the applied value to the actual quantity (e.g. correct positioning of the decimal point).

Unit

Unit	
Unit	Temperature °C
Sensor correction	0,0 K
Start value	0,0 °C

Every Modbus input must be assigned a **unit** as the data is transmitted without dimensions. A wide range of units is available to choose from.

Sensor correction

The value of the Modbus input can be corrected by applying a fixed differential value.

Start value

Definition of a start value which is shown after the bus converter is restarted until a new value is applied by the Modbus.

Sensor check

The sensor check can only be activated for **analogue** Modbus inputs.

If you set the sensor check to "**Yes**", the **sensor error** of the Modbus value is available as a digital input variable for a function.

This application is only useful if **user defined** threshold and output values are specified for the sensor error.

Sensor check	
Sensor check	Yes

Sensor error

This setting is only displayed if the **sensor check is active**.

Sensor error: Status "**No**" for a correct value **within** the threshold values and "**Yes**" for a value **outside** the thresholds. This allows the controller to react to the failure of a Modbus device, for example.

Sensor check	
Sensor check	Yes
Short circuit threshold	Standard
Threshold value	
Short circuit value	Standard
Output value	
Lead break threshold	Standard
Threshold value	
Lead break value	Standard
Output value	

In order to make good use of the sensor check, the short circuit and lead break thresholds should be changed from "Standard" to "**User defined**" and the required threshold values defined. The required short circuit and lead break values will subsequently also be defined by the user.

If the measurement read is **below** the defined **short circuit threshold** or **exceeds** the **lead break threshold**, the relevant **output values** will be applied instead of the measurement.

By selecting suitable thresholds and output values, a fixed value can be specified for the bus converter in the event of a measurement failure, to allow a function to continue operating in emergency mode (fixed hysteresis: 10 or 1.0 °C).

The short circuit threshold can only be defined **below** the lead break threshold.
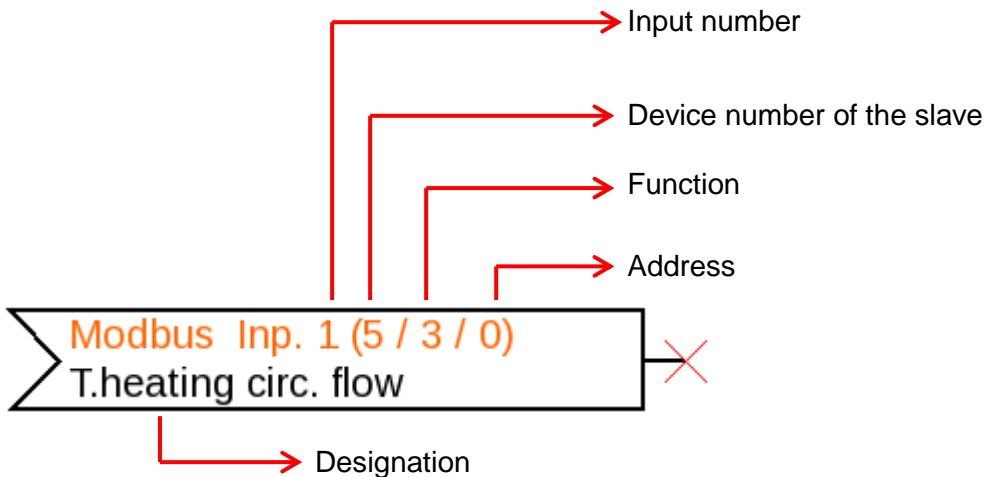
Example: Temperature

Sensor check	
Sensor check	Yes
Short circuit threshold	Standard ▾
Threshold value	Standard
Short circuit value	User def.
Output value	

⇓

Sensor check	
Sensor check	Yes
Short circuit threshold	User def.
Threshold value	5,0 °C
Short circuit value	User def.
Output value	20,0 °C
Lead break threshold	User def.
Threshold value	40,0 °C
Lead break value	User def.
Output value	20,0 °C

If the measurement is below 5 °C, 20 °C will be issued; if it exceeds 40 °C, 20 °C will also be issued.

Depiction of an analogue Modbus input in **master** mode once the parameter entries have been completed by pressing **OK** in **TAPPS2**

Input number

Device number of the slave

Function

Address

Modbus Inp. 1 (5 / 3 / 0)
T.heating circ. flow

Designation

Depiction of an analogue Modbus input in **slave** mode
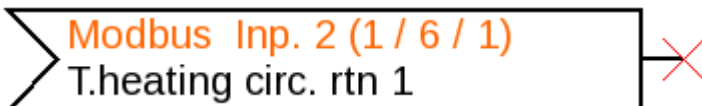
Modbus Inp. 2 (1 / 6 / 1)
T.heating circ. rtn 1

Device number 1 of the module was defined in the device settings. The function and address of the input are issued automatically. Input 2 is an analogue input (function 6) and is given address 1.

Modbus outputs

Up to 64 Modbus outputs can be programmed. They are defined by specifying the source in the bus converter, the type and the Modbus properties.
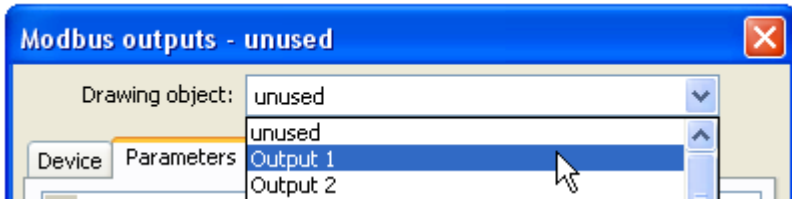
General – Type
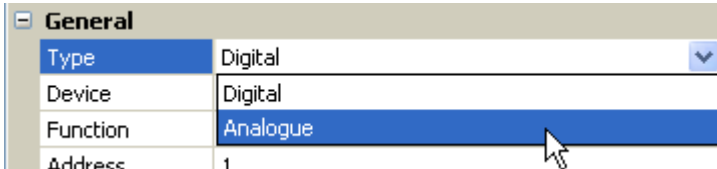
Choose whether the value is analogue (numeric) or digital (ON/OFF).

Designation

Every Modbus output can be given its own designation. The designation can be selected from various designation groups or can be user defined.
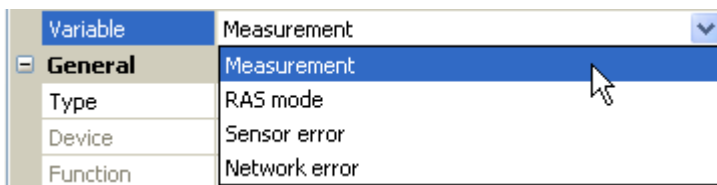
Example:

Input variable

After the source has been linked to the input variables in TAPPS2, the source type, source and variable will be shown.

Variable

4 different source variables can be selected for **analogue** values. For **digital** values, only the measurement (ON/OFF) and the network error are available.

- **Measurement** – the value captured by the sensor
- **RAS mode** – subject to the setting of the switch on the room sensor (RAS, RASPT, RAS-PLUS, RAS-F), the following analogue values will be issued:

Automatic	0
Standard	1
Lowered	2
Standby	3

- **Sensor error** – digital value; ON if a sensor error occurs
- **Network error** – digital value; ON if a timeout is active (= error).

General – information about properties

General	
Type	Analogue
Device	1
Function	6 - Preset single register
Address	1
Data type	16-bit signed integer
Byte sequence	Big-endian
Divisor	1
Factor	1

Entry of the properties of the **target device** which the value from the bus converter will be issued to (**Master mode**), and definition of the data type (**analogue** only). This requires precise knowledge of the Modbus properties of the target device.

Device / Function / Address	**Master mode:** These details relate to the target device (slave) and are therefore only available in **master** mode.
	Slave mode: The device's own number is given in the device settings. The function is defined according to the input type selected. The address of the module is issued automatically and counts upwards irrespective of the input number and type.
Data type / Byte sequence	Only for **analogue** values: Details on the data type of the value issued in the bus converter (matched to the target device)
Divisor / Factor	Only for **analogue** values: Entry of a divisor or factor to adjust the value issued to the target device. Only whole numbers without a unit can be issued to the Modbus. Example: "375" is issued for 37.5 °C. If only "37" is to be issued, a divisor of 10 should be entered.

Transmission conditions

These details apply to the conditions under which values are issued to the target device.

They are only available in **master** mode.
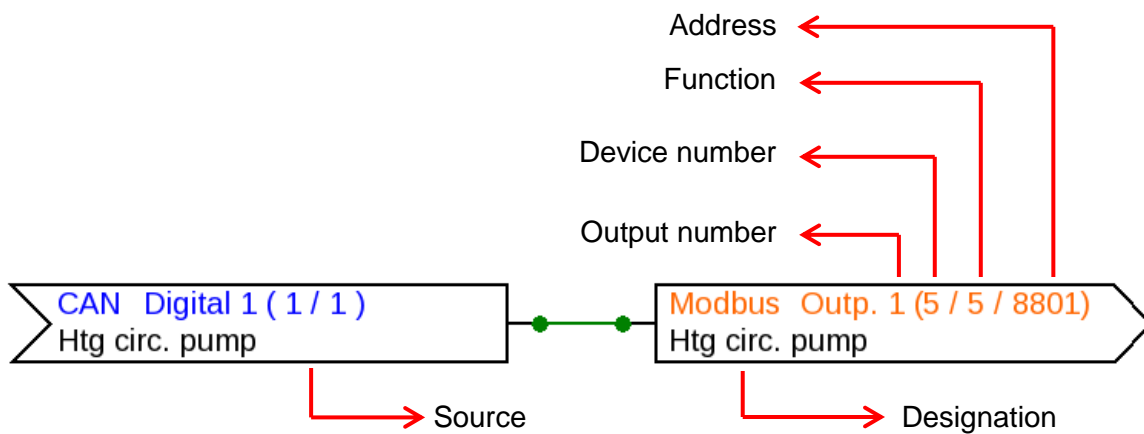
Analogue values:

Transmission conditions	
If change >	10
Blocking time	00:10 [mm:ss]
Send in intervals	Yes
Interval time	5 min

Digital values:

Transmission conditions	
If change	Yes
Blocking time	00:10 [mm:ss]
Send in intervals	Yes
Interval time	5 min

If change > 10	A new transmission will be made if the current value has changed by more than the quantity specified (1.0 K in this example) compared to the last transmitted value. In the converter, the unit of the source is applied together with the corresponding decimal place. (Minimum value: 1)
If change Yes/No	Transmission of the value if a status change occurs
Blocking time 00:10 [mm:ss]	If the value changes within 10 seconds of the last transmission by more than 1.0 K, the value is nevertheless only transmitted again after 10 seconds. (Minimum value: 1 sec)
Send in intervals Yes	The value is transmitted every 5 minutes even if it has not changed by more than 1.0 K since the last transmission (minimum setting: 1 minute).
Interval time 5 min	Setting range: 1 to 59 min

Depiction of the digital Modbus output in **master** mode once the parameter entries have been completed by pressing **OK** in **TAPPS2**

Address ←

Function ←

Device number ←

Output number ←

```
┌─────────────────────────┐        ┌──────────────────────────────────┐
│ CAN  Digital 1 ( 1 / 1 )│ ●───●  │ Modbus  Outp. 1 (5 / 5 / 8801)   │
│ Htg circ. pump          │        │ Htg circ. pump                   │
└─────────────────────────┘        └──────────────────────────────────┘
```

Source →

Designation →

Depiction of an analogue Modbus output in **slave** mode

```
   ┌──────────────────────────────┐
✕  │ Modbus  Outp. 2 (1 / 4 / 2)  │
   │ T.DHW                        │
   └──────────────────────────────┘
```

Device number 1 of the module was defined in the device settings. The function and address of the output are issued automatically. Output 2 is an analogue output (function 4) and is given address 2.
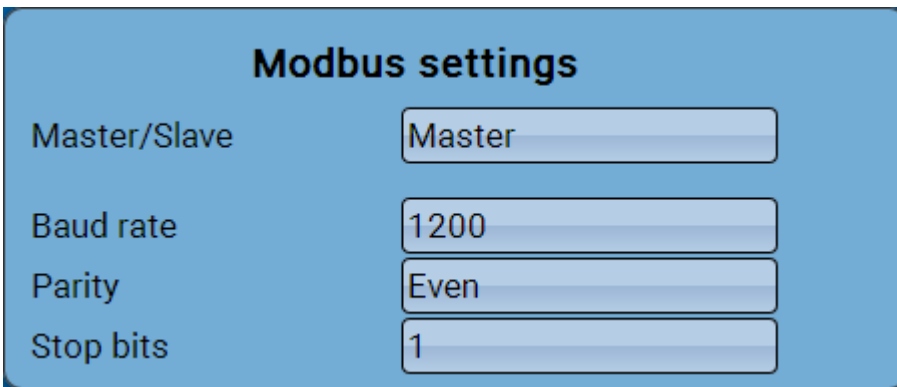
C.M.I. menu
Modbus
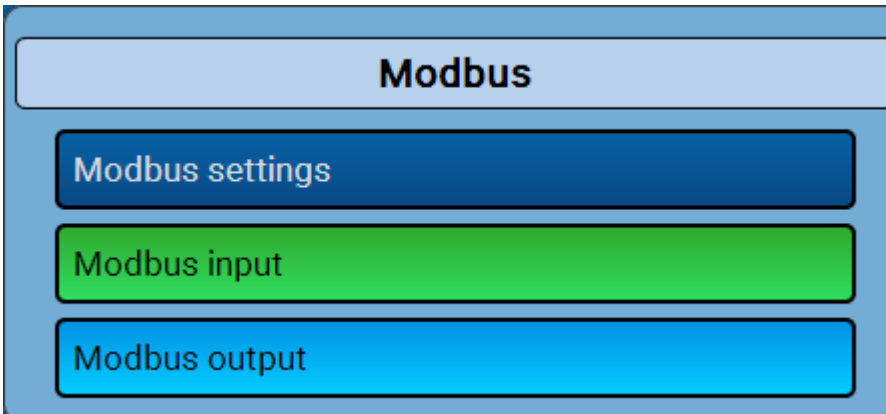
Modbus settings

The structure of the connected Modbus network must be known to be able to make device settings. The CAN-BC2 can be operated in master or slave mode.
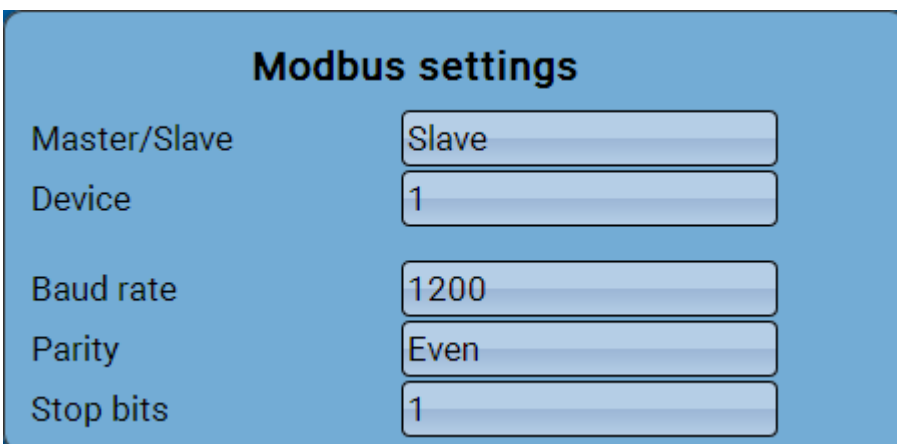
Master mode

Baud rate   Adjustable from 1200 to 19,200 Bd
Parity   Select: Even / Odd / None
Stop bits   Select: 1 or 2

Slave mode

Device: In **slave** mode, the **device number** (1-247) of the bus converter in the Modbus network must also be defined.

Modbus input in master mode

Modbus input 1

Type	Analogue
Device	1
Function	3 - Read holding register
Address	0
Data type	8-bit signed integer
Byte sequence	Big-endian

Designation

Temperature actual value

T.boiler flow

Interval time	10s
Divisor	1
Factor	1
Unit	dimensionless
Sensor correction	0
Start value	0
Sensor check	No
Exception Code	OK

The setting options are described in chapter "**Programming with TAPPS2**".

Exception Code

Fault code for retrieval problems with the slave device. The code is not renewed until the interval time has expired.

Exception code displays

OK	The value was successfully retrieved from the slave device
No respond	No response from the slave device. Causes: Modbus settings do not match the slave device, incorrect slave device number, incorrect wiring or termination
Other displays	Slave device fault messages

Modbus output in master mode

Modbus output 1

CAN bus analogue

2: T.cylinder bottom

Measurement

73.9 °C

| Type | Analogue |

Designation

Temperature actual value

T.cylinder bottom

Device	1
Function	6 - Preset single register
Address	0
Data type	8-bit signed integer
Byte sequence	Big-endian
Divisor	1
Factor	1

Transmission condition

If change >	1.0 K
Blocking time	10s
Send in intervals	Yes
Interval time	5m

| Exception Code | No Respond |

The setting options are described in chapter "**Programming with TAPPS2**".

Exception Code

Fault code for retrieval problems with the slave device. The code is not renewed until the interval time has expired.

Exception code displays

OK   The value was successfully retrieved from the slave device

No respond   No response from the slave device. Causes: Modbus settings do not match the slave device, incorrect slave device number, incorrect wiring or termination

Other displays Slave device fault messages

Special case: If "**Acknowledge**" is displayed, the slave device needs more time to process the value but is showing that value has been received. This display is therefore not really a fault message.

Modbus input and output in slave mode

Apart from the exception code and the device setting options, the displays in slave mode are identical to those in master mode.

EU Declaration of Conformity

Document number / Date: TA17067 / 23/03/2017

Manufacturer: Technische Alternative RT GmbH

Address: A-3872 Amaliendorf, Langestrasse 124

The manufacturer bears sole responsibility for issuing this Declaration of Conformity.

Product designation: MD-MODB

Brand names: Technische Alternative RT GmbH

Product description: Modbus module for CAN bus converter

The item described above complies with the following directives:

2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic compatibility
2011/65/EU	RoHS directive on restricting the use of certain hazardous substances

The following harmonised standards have been applied:

EN 60730-1: 2011	Automatic electrical controls for household and similar use. Part 1: General requirements
EN 61000-6-3: 2007 +A1: 2011 + AC2012	Electromagnetic compatibility (EMC). Part 6-3: Generic standards. Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2: 2005 + AC2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Noise immunity for industrial environments
EN 50581: 2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Attachment of CE label: On packaging, operating instructions and type plate

$$C\!\!\in$$

Issued by: Technische Alternative RT GmbH
A-3872 Amaliendorf, Langestrasse 124

Authorised signature

Dipl.-Ing. Andreas Schneider, Managing Director,
23/03/2017

This declaration certifies conformity with the listed directives, but does not guarantee any properties. The safety instructions in the product documents supplied must be observed.

Guarantee conditions

Note: The following guarantee conditions do not limit statutory rights to a warranty, but rather expand your consumer rights.

1. Technische Alternative RT GmbH provides a two-year guarantee from the date of purchase to the end user for all devices and parts it sells. Defects must be reported immediately upon detection and within the guarantee period. Technical support can supply the correct solution no matter what the issue. In this respect, contacting us immediately will help to avoid unnecessary expense and effort in troubleshooting.

2. The guarantee includes free repair (but not the cost of on-site fault finding, removal, refitting and shipping) due to processing and material defects which impair operation. Goods will be replaced in the event that a repair is uneconomical in the opinion of Technische Alternative for reasons of cost.

3. Excluded are losses resulting from the effects of a voltage surge or abnormal ambient conditions. Likewise, no liability can be accepted if the device defect is due to: transport damage for which we are not responsible, incorrect assembly and installation, incorrect use, failure to observe the operating and installation instructions or incorrect maintenance.

4. The guarantee will become void if repairs or actions are carried out by people who are not authorised to perform them or have not been so authorised by us, or if our devices are operated with spare parts, auxiliary parts or accessories that are not considered to be original parts.

5. Faulty parts must be returned to our factory with a copy of the proof of purchase and a precise fault description. Processing is accelerated if an RMA number is requested via our homepage www.ta.co.at. The defect must be clarified with our technical support beforehand.

6. Services provided under guarantee result neither in an extension of the guarantee period nor in a commencement of a new guarantee period. The guarantee period for fitted parts ends with the guarantee period of the whole device.

7. Further or other claims, especially those for compensation for losses other than to the device itself, insofar as such liability is not required by statute, are excluded.