INTEGRA
METERING

Installation and operation manual

CALEC® ST II

Multi-protocol heating and cooling energy calculator

Table of contents

1 Safety

1.1 Intended use

The device CALEC® St II is exclusively designed for the collection, analysis, presentation and transmission of information.

Any improper or inappropriate use might result in a state in which the operational safety of the device cannot be guaranteed anymore. The manufacturer waives any liability for resulting damages of persons and materials.

1.2 Notes on safety instructions and symbols

The devices have been designed to fulfil modern safety requirements. They have been tested and delivered in a condition that ensures safe operation. However, improper or non-intended use of the device may result in it becoming dangerous. Please always pay attention to the safety instructions in this manual which are accompanied by the following symbols:

⚠	**WARNING** **WARNING** indicates an action or measure which, if performed incorrectly, can potentially cause life-threatening injuries and lead to a high safety risk.

⚠	**CAUTION** **CAUTION** indicates an action or measure which, if performed incorrectly, can cause minor to medium severe injuries.

☞	**NOTE** **NOTE** indicates an action or measure which, if performed incorrectly, may have an indirect effect on the operation of the device, or trigger an unexpected response.

✎	**COMMENT** **COMMENT** provides information and recommendations for efficient and trouble-free operation.

📖	See doc. VD 3-126 d,e,f	▦

1.3 Safety instructions and precautionary measures

The manufacturer takes over no responsibility if the following safety instructions and precautionary measures are disregarded:

Changes to the device, which are implemented without prior written approval of the manufacturer, lead to the immediate termination of product liability and warranty.

Installation, operation, maintenance, repair and decommissioning of this device must only be performed by specialists authorised by the manufacturer, operator or owner of the device. The specialist needs to read and understand the entire installation and operation manual and is obliged to follow these instructions.

Control the supply voltage and information given on the type plate, before the device is installed.

Check all connections, settings and technical specifications of any available peripheral devices.

Open the housing or parts of the housing, which contain electrical or electronic components, only if the electric energy is turned off.

Touch no electronic components (ESD sensitivity).

Expose the system concerning the mechanical load (pressure, temperature, IP protection etc.) maximally to the specified classification.

For works concerning mechanical components of the system, the pressure in the pipe system has to be released or the temperature of the medium needs to be brought to values harmless for humans.

No information stated here or anywhere else releases planners, engineers, fitters and operators from their personal careful and comprehensive evaluation of the respective system configuration in terms of functionality and operational safety.

The local working and safety standards and statutes need to be met.

1.4 About the operation manual

The manufacturer reserves the right to change the technical details without prior notice. The newest information and versions of this operation manual are available at your local subsidiary or representation.

⚠ **WARNING**

Any liability is waived if the instructions and procedures in this manual are not followed!

☞ **NOTE**

This installation instruction is intended for qualified personnel and contains thus no basic working steps. Before putting the device or the system into operation, the installation and operation manual needs to be read and understood completely.

Keep this manual for later reference!

✏ **COMMENT**

Adhere to requirements and recommendations for installation and operation.

- Adhere to EN1434 Part 6
  (installation, comissioning, monitoring and maintenance)
- Adhere to the recommendations of the professinal associations
  (leaflets of AGFW)
- Adhere to Requirements for control thermowells
  (France accord. to FDE 39-007)

2   Product description

We congratulate you for purchasing this high-quality heating and cooling energy calculator.

2.1   Areas of application

CALEC® ST II has been designed for the areas of commercial buildings / building technology, near and district heating / district cooling, residential construction / sanitary and can be used as follows:

System integration component

With the versatile interfaces CALEC® ST II has to offer you can integrate your energy data of all thermal applications in the simplest way in subordinate energy management and building control systems.

Heating/ cooling transmission station

The energy calculator CALEC® ST II offers together with the different flow transmitters of Aquametro AG the perfect combination for the determination of performance data in medium heating applications, in particular for distribution stations and larger buildings.

2.2   Structure of a measuring point

CAUTION

Loss of calibration validity due to changed calibration parameters or a damage of the calibration seal

Loss of calibration validity

- The calibration seal prevents the access to calibration-relevant parameters.
- Parameters related to the calibration of calibrated devices can only be adjusted by the manufacturer or by a designated calibration centre.
- The commissioning of a calibrated measuring point must be made by an authorised organisation according to the valid regulations.
- After commissioning the components of the measuring point must be sealed.

CAUTION

Wrong measuring points due to non-compliance with requirements

Danger of malfunction

- Check whether the information about temperature sensor, pulse value and installation side matches with the type plate on CALEC® ST II.

An entire measuring point for thermal energy consists of the energy calculator CALEC® ST II, paired with temperature sensors and a flow transmitter.
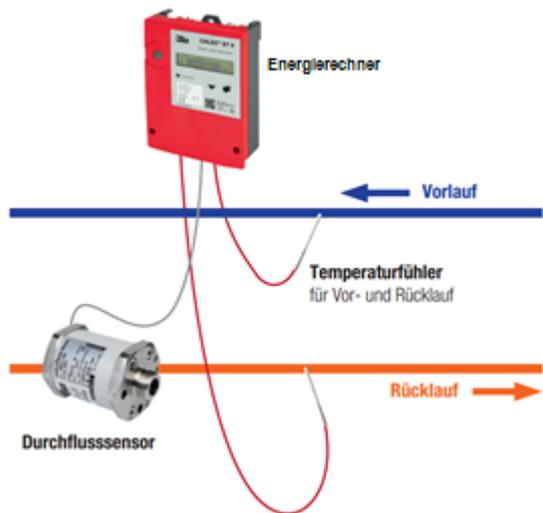
2.3 Device setup
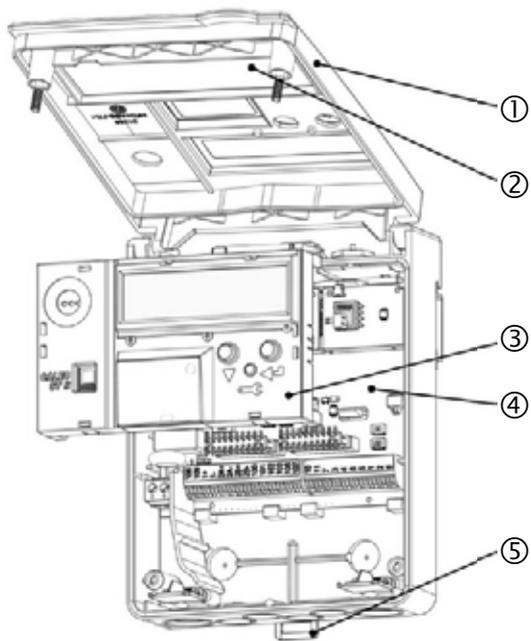
① Front cover

② Connection diagram (inside of front cover)

③ Plugable calculator

④ Motherboard with connection terminals and micro switches for configuration of the in- and outputs

⑤ Clip-on holder for top-hat rail

3 Scope of delivery and accessories

> **CAUTION**
>
> Damages might be caused by non-compliance with the required transportation / and ambient conditions
>
> Danger of malfunction
>
> - This precision measuring device can be damaged by heat, moisture, dirt and vibration
> - Store the device in a cool and dry place
> - removed from
> - Remove the packaging only immediately prior to installation

The scope of delivery is described on the delivery note and the content is shown on the packaging. Please check all components and delivered parts immediately after receiving the product. Transport damages must be reported immediately!

3.1.1 General
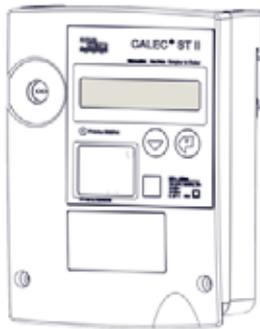
1. CALEC® ST II
2. Short operational manual

3.1.2 Installation and connection accessory
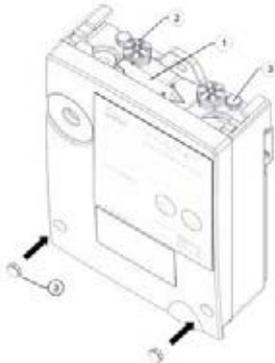
① Pricking awl
② Strain relief discs
⑤ Safety caps and front cover

4   Installation

CALEC® ST II can be mounted on a mounting rail or on a flat wall. Suitable mounting rails are available as an accessory.

Please refer to the last page of this document for a hole template for both installation types.

4.1   Device dimensions
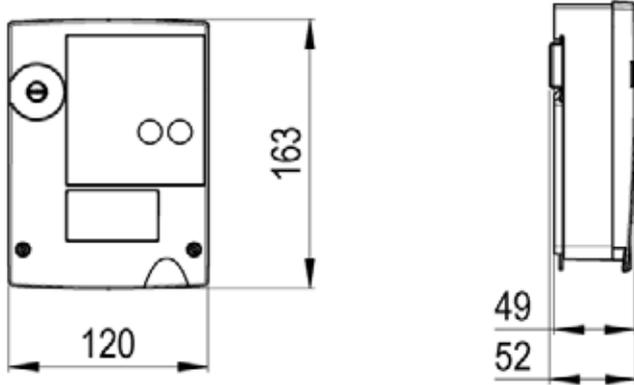
4.2   Hole dimensions for wall mounting
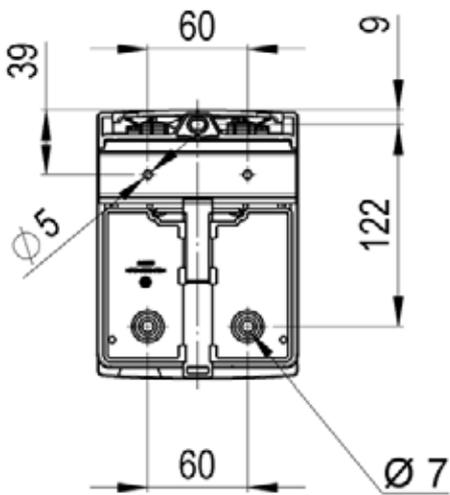
4.3   Clear height
(for clipping on the housing cover)
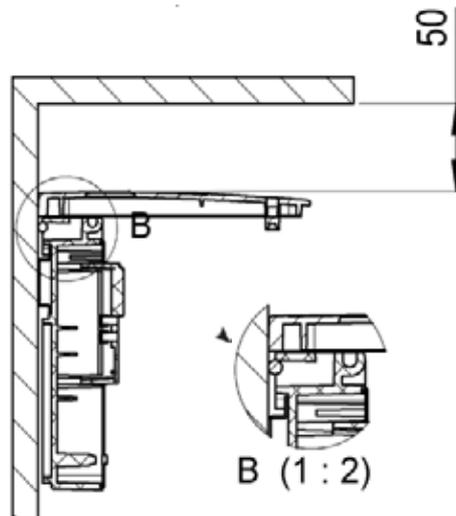
4.4 Tools, installation material

COMMENT

Installation material

- Not included in the delivery
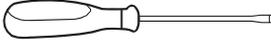
Flat screwdriver		⬤	3.5 x 0.6
Torx screwdriver		✩	TORX T15
Drill bit			Ø6
Screw			3 x Ø4
Dowel			3 x Ø6
Washer			3 x 4.3 x 12
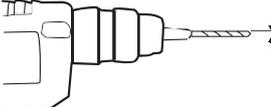
CAUTION

Material damage caused by neglected ambient conditions

<u>Danger of malfunction or damage!</u>

- Assuring accessibility for installation, operation and maintenance
- Protected, dry surroundings
- Avoid exposure to heat/sun
- Keep a safe distance to sources of electrical noise

4.5 Preparation for wall installation
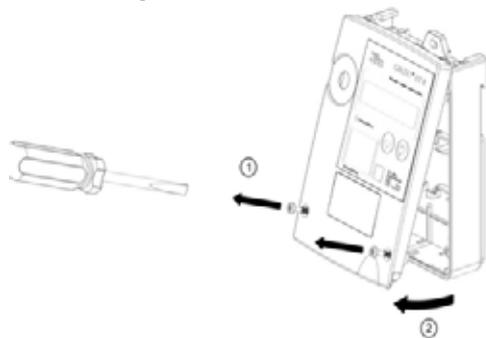
1. Loosen the screws
2. Open the housing

Wall installation rails are freely accessible

4.6 Wall installation
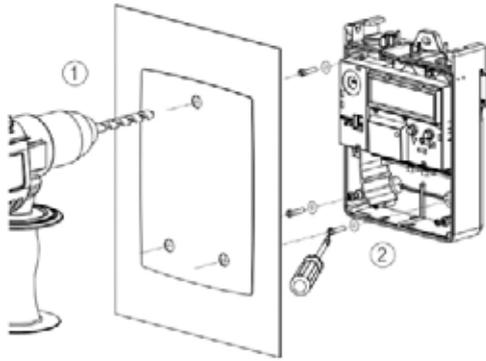
1. Drill holes Ø6mm
2. Screw the device on

Fix the device at the wall

4.7 Close the housing
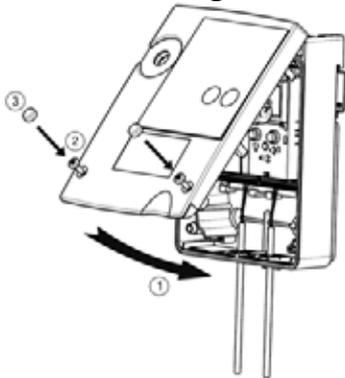
1. Insert the cover into the hinge and close it
2. Tighten the fixing screws
3. Affix the safety caps (sealing) (smooth side facing to the outside)

The housing is closed

4.8 Mounting on rail DIN-EN 50222
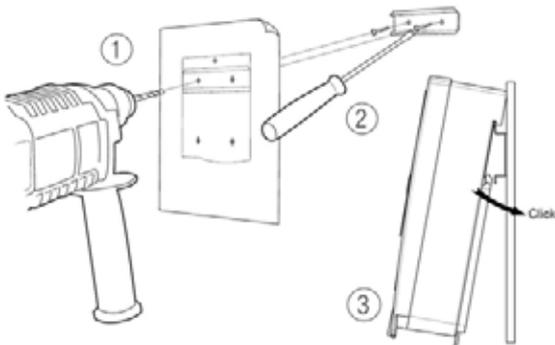
1. Drill holes Ø6mm
2. Screw in the mounting rail
3. Clip the device onto the mounting rail

Fix the device on the mounting rail

5   Installation

Carefully read the following calls for action and warning information to assure a trouble-free commissioning.

⚠️	**WARNING** Burns and paralysis resulting in death when touching or grabbing energised system parts. <u>Life hazard due to electrical shock!</u> • Perform installation and maintenance work only when the system is off power • Work on and with voltage shall only be performed by authorised spe-cialists under consideration of applicable regulations • Apply voltage only to the terminals intended

5.1   Connection diagram

The connection diagram is located on the inside of the front cover (see Fig. 5.1.1)

✏️	**COMMENT** The device is equipped with direct plug-in terminal connectors based on the "push-in" principle. • Stripped rigid conductors or flexible conductors with crimped ferrules (AEH) can be plugged directly into the spring terminal • Reliable, vibration-resistant and gas-tight connection • Use the "release button" to release the connection • Connectable conductors (single conductor connection):

○ Single-wire	$0.50…1.50mm^2$
○ Finely stranded wire	$0.50…1.50mm^2$
○ Finely stranded wire with AEH	$0.25…1.50mm^2$
○ AEH with plastic collar	$0.25…0.75mm^2$
○ Stripping length	8.0 + 1.0mm
○ AWG	24-16

✏️	**COMMENT** The functionality of different connections can be configured with microswitches S1 - S5. • The original factory status is documented on the connection diagram • If required, the alternative functionality shown in the connection diagram can be made available by switching the corresponding microswitch.

5.1.1 Sample connection diagram: analogue outputs in socket #1 and M-Bus in socket #2.
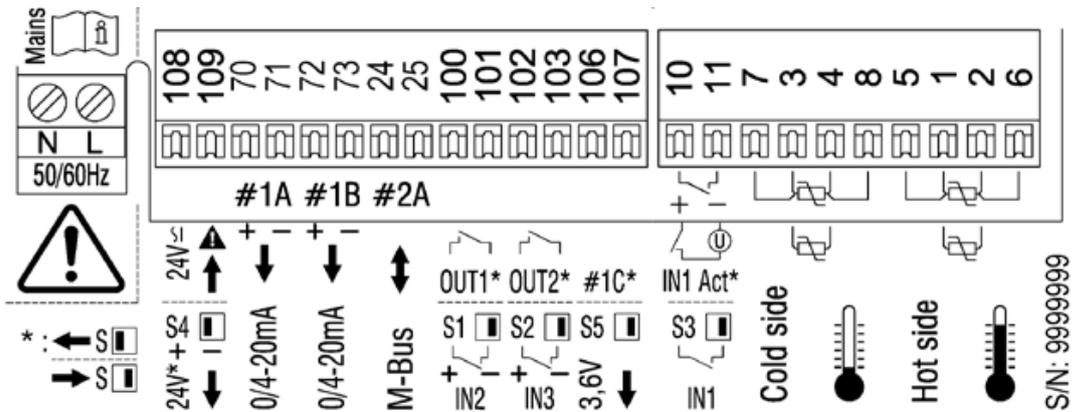
5.1.2 Overview of configuration options using microswitches

Terminals	Switch	Left function position *: ◀—S▮	Right function position —▶S▮
102 - 103	S2	OUTPUT#2	INPUT#3
10 - 11	S3	INPUT#1: Active transmitter signal (5 - 48 VDC)	INPUT#1: Passive transmitter signal (e.g. reed)
108 - 109	S4	Sensor supply voltage 24 VDC	Low voltage supply see note on low voltage supply (page 13)
106 - 107	S5	OUTPUT #1C	Sensor supply voltage 3.6 VDC

5.2 Power supply

> **WARNING**
>
> Burns and paralysis resulting in death when touching or grabbing energised system parts.
>
> <u>Life hazard due to electrical shock!</u>
>
> - Connection to the power circuit only with protection of max.10A and double-wire isolating element
> - Power supply:
>   - Voltage range   100 – 240VAC
>   - Frequency range   50 / 60Hz
>   - Power requirements max. 15VA

NOTE

Damages to the device caused by non-compliance with the installation conditions

<u>Faulty functions</u>

- Protect the power supply with an external overcurrent protection device (max. 10A), so that a safe shutoff is assured in case of an electrical error.
- Protect the power supply against manipulation and assure the option to turn it off for maintenance work.
- Use a double-wire separation unit or a double-wire overcurrent protection device. However, the circuit for the calculator shall not be separated from the network independantly from the heating or cooling system.
- Temperature resistance > 65°C for connection pipes.

COMMENT

Supply voltage connections L and N

- The supply voltage is connected via the two screw terminals in accordance with on-site regulations.
- The cable is passed through the diaphragm seal using the enclosed piercing awl.
- Connection wiring
  - Connection cross-section   max. 2.5mm^2
  - Cladding diameter   max. 8mm
  - Heat resistance   min. 65°C

5.2.1 CALEC® ST II supply voltage (100-240VAC, 50/60Hz)

F < 10 A

100 - 240 VAC
50 / 60 Hz
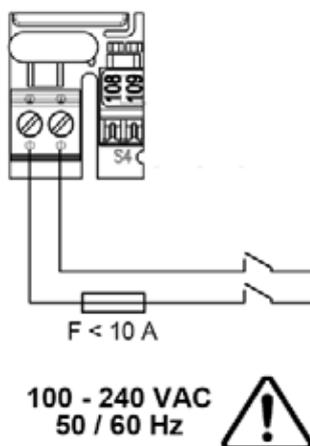
1. Assure that the power cable is voltage-free!
2. Take off the front cover (see 4.5)
3. Use the separation unit
4. Loosen the terminal connection (terminals L (240VAC) / N (GND))
5. Connect the power supply with the terminals L (240VAC) / N (GND)
6. Tighten the terminal connection
7. Close the front cover
8. Seal the front cover

CALEC® ST II is supplied with voltage.

5.2.2 Detailed illustration of the power supply
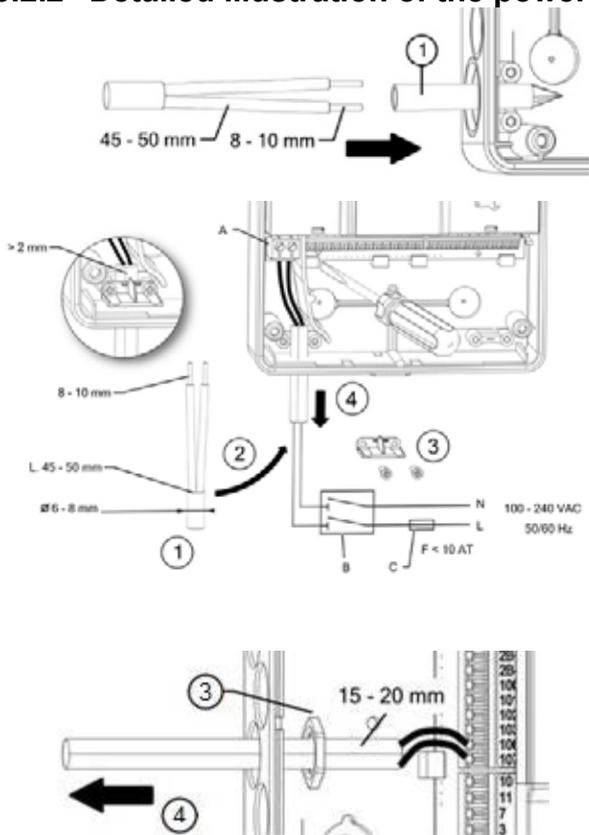
① Insert the piercing awl through the membrane seal

② Remove the isolaton from the cable and insert it with the piercing awl through the membrane seal

(A) Power connection terminal
(B) External separation unit
(C) External protection

④ Tighten strain relief discs (relieved cable)
④ Check strain relief

The power supply is connected.

WARNING

Burns and paralysis resulting in death when touching or grabbing energised system parts.

Life hazard due to electrical shock!

- In case of multiple grounding in field installation an adapter needs to be up-stream
  - Grounding of the pulse input (e.g. pulser AMFLO® MAG Basic)
  - Grounding of the sensor supply 3.6V and / or 24V
  - Grounding of a low voltage power supply pole
- Low voltage power supply without adapter (isolated supply 24V-24V)
  - Voltage range 12 – 42VDC / 12 – 36VAC
  - Frequency range   50 / 60Hz
  - Power requirements max. 1VA
- Low voltage power supply with adapter (isolated supply 24V-24V)
  - Voltage range   24VDC ± 20%
  - Power requirements max. 1W

5.2.3 CALEC® ST II low voltage supply (12-24VDC)
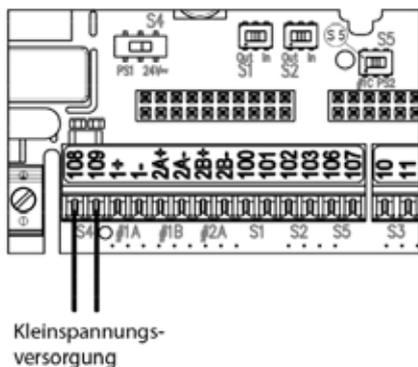
Kleinspannungs-
versorgung

1. Disconnect CALEC® ST II from power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S4 ➜ s▯ to 24V⎓
5. Connect the adapter on demand
   108+ on adapter to terminal 108 on CALEC® ST II
   109- on adapter to terminal 109 on CALEC® ST II
6. IN+ and IN- on the adapter to the external measuring unit power supply
7. Plug in the calculator
8. Close the front cover
9. Seal the front cover

CALEC® ST II is supplied with low voltage

or when using an adapter

CALEC® ST II is supplied with a low voltage and the sensor is supplied with low voltage

5.3 Sensor power supply

> **COMMENT**
>
> Sensor power supply with 24VDC
>
> - Sensor supply with terminals 108 / 109 can also be used for active supply of the power outlets, in case the sensor supply is not required.
> - When supplying several power outlets it has to be paid attention that they are electrically isolated.
> - Use AMFLO® MAG Smart for flow sensor.
> - Use switch S4 for configuration *:← S▯ PS1

5.3.1 Sensor power supply 24VDC
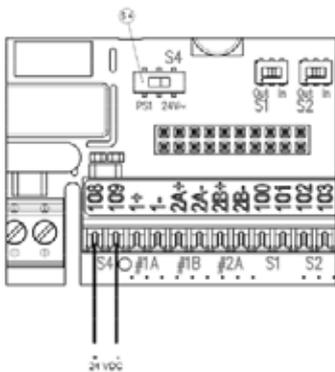
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S4 *:← S▯ PS1
5. Connect sensor with the terminals 108 and 109
6. Plug in the calculator
7. Close the front cover
8. Seal the front cover

The sensor is supplied with low voltage.

> **COMMENT**
>
> Sensor power supply with 3.6VDC
>
> - Sensor supply with terminals 106 / 107
> - The connection 107 is connected with the connection 11 and is the reference potential for the flow transmitter.
> - Use AMFLO® SONIC UFA113 for the flow transmitter.
> - Use switch S5 for configuration → S▯ PS2

5.3.2 Sensor power supply 3.6VDC

1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S5 ➔ S▮ PS2
5. Connect the sensor with the terminals 106 and 107
6. Plug in the calculator
7. Close the front cover
8. Seal the front cover

The sensor is supplied with low voltage.

5.4 Temperature sensor

NOTE

Damage or malfunction of the device caused by non-compliance with the installation conditions

Leading from faulty functions up to an defective device

- Check connections carefully.
- Place the temperature sensor not near to power cables or sources of electro-magnetic disturbances (min. 50cm distance).

COMMENT

Temperature sensor specifications for 4-wire principle

- Connection terminals 1 - 8 (at 4-wire principle)
- Connection wiring
  - Connection cross-section   min. 0,22mm^2
  - Cable length   max. 100m

5.4.1 4-wire temperature sensor
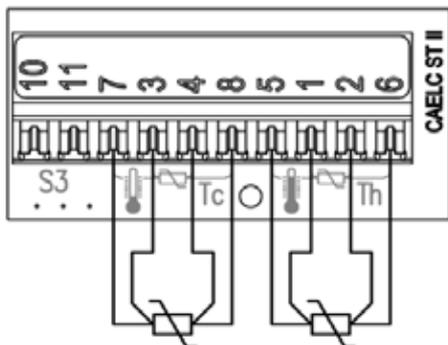
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect temperature sensor
   - T_{hot} terminals 1/5 and 2/6
   - T_{cold} terminals 3/7 and 4/8
4. Close the front cover

The temperature sensors are connected.

NOTE

Damage or malfunction of the device caused by non-compliance with the installation conditions

Leading from faulty functions up to an defective device

- Check connections carefully.
- Place the temperature sensor not near to power cables or sources of electro-magnetic disturbances (min. 50cm distance).
- The length of the delivered signal lines must not be changed.

COMMENT

Temperature sensor specifications for 2-wire principle

- Connection terminals T_{hot} 1 - 2 and T_{cold} 3 - 4 (at 2-wire principle)
- Connection wiring
  - Connection cross-section:
    Head sensor: min. $0.8mm^2$
    Cable sensor: min.$022mm^2$
    Cable length: < 50m
  - Maximum cable length according to EN1434-2

Cable cross-section	Cable length Pt100	Cable length Pt500
min. $0.22mm^2$	2.5m	12.5m
min. $0.50mm^2$	5.0m	25.0m
min. $0.75mm^2$	7.5m	37.5m
min. $1.5mm^2$	15.0m	75.0m

5.4.2 2-wire temperature sensor
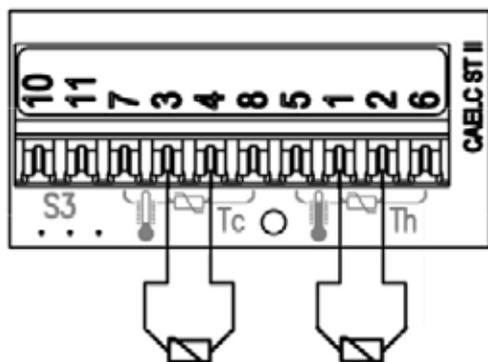
1. Disconnect CALEC® ST II from power supply
2. Take off front cover (see 4.5)
3. Connect temperature sensor
   - T_{hot} terminals 1/2
   - T_{cold} terminals 3/4
4. Close the front cover

The temperature sensors are connected.

5.5 Flow transmitter with pulse output

NOTE

Damage or malfunction of the device caused by non-compliance with the installation conditions

Leading from faulty functions up to an defective device

- Place the temperature sensor not near to power cables or sources of electro-magnetic disturbances (min. 50cm distance).

COMMENT

Flow transmitter with passive signal at pulse input #1

- Keeping the pulse signal specifications for placed flow transmitter
  - Open-circuit voltage: 8V
  - Short-circuit current: 8mA
  - Switching level: <1.5mA, >2.1mA
  - Input capacity: 20nF
  - Frequency range: 0…20Hz   0…200Hz
  - Min. OFF (toff):   20ms   2ms
  - Min. ON (ton):   3ms   300µs
- Use of a flow transmitter with passive pulse signals
  - Reed relay
  - SSR (solid state relay)
- Programming options for this input see INPUTS (p.39)
- Use switch S3 for configuration ➔ $▯ passive
- Diagram input circuit
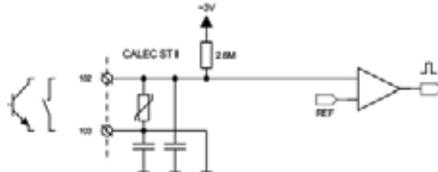
5.5.1 Flow transmitter with passive signal at pulse input #1
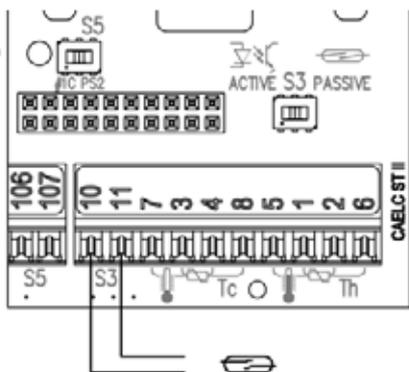
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S3 ➔ $▯ PASSIVE
5. Connect the flow transmitter with passive signal with the terminals 10 and 11
6. Plug in the calculator
7. Close the front cover

The flow transmitter with passive signal is connected.

COMMENT

Flow transmitter with active signal at pulse input #1

- Keeping the pulse signal specifications for placed flow transmitter
  - Voltage range: 3…48VDC
  - Current signal: >2mA
  - Reverse polarity protection: -48V
  - Electrical isolation: 48V
  - Frequency range: 0…20Hz 0..200Hz
  - Min. OFF (toff): 20ms 2ms
  - Min. ON (ton): 3ms 300µs
- Use of a flow transmitter with passive pulse signals
  - Reed relay
  - SSR (solid state relay)
- Programming options for this input see INPUTS (p.39)
- Use switch S3 for configuration ➔S❚ passive
- Diagram input circuit

5.5.2 Flow transmitter with active signal at pulse input #1
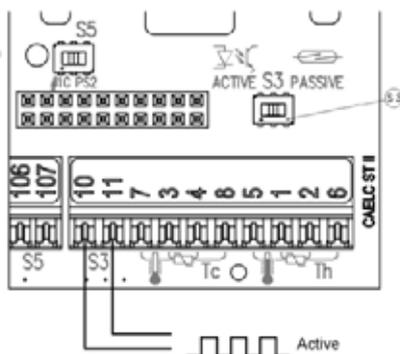
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S3 * :◄S❚ ACT
5. Connect the flow transmitter with active signal with the terminals 10 and 11
6. Plug in the calculator
7. Close the front cover

The flow transmitter with active signal is connected

5.6 Connection examples for flow transmitters on pulse input #1

The following examples refer to the above stated connections and shall illustrate application opportunities.

5.6.1 Flow transmitter TOPAS PMG/PMH

10 brown / braun / brun
11 blue / blau / bleu

100 240 VAC
50 / 60 Hz

1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S3 ➔ S⬛ Passive
5. Connect the flow transmitter with passive signal with the terminals 10 and 11
6. Plug in the calculator
7. Close the front cover

The flow transmitter with passive signal is connected.

COMMENT

Summary of the configuration of a flow transmiter with passive signal including power supply

- Switch S5 ➔ S⬛ (PS2)
  - Supplies the flow transmitter with 3.3VDC via connections 106 and 107
- Switch S3 ➔ S⬛ (PASSIVE)
  - Allows the receipt of passive pulse signals via the terminals 10 and 11
- The terminals 11 and 107 are internally connected, which allows the connection with 3-wires

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5.6.2 Flow transmitter AMFLO® SONIC UFA113 with power supply
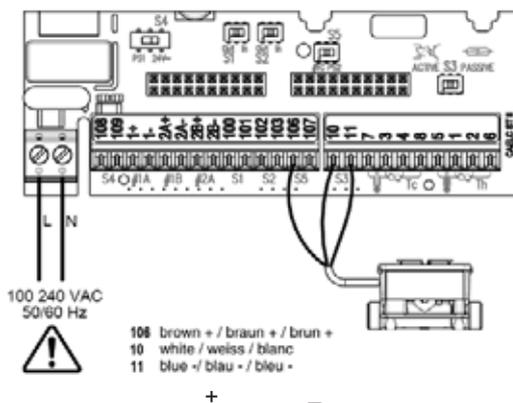
100 240 VAC
50/60 Hz

106 brown + / braun + / brun +
10   white / weiss / blanc
11   blue -/ blau - / bleu -

+   _

1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S3 ➔ S⬛ Passive
5. Switch over the switch ➔ S⬛ PS2
6. Connect the flow transmitter with passive signal with the terminals 10 (+) and 11 (-,GND)
7. Connect the flow transmitter with the power supply to the terminal 106 (+)
8. Plug in the calculator
9. Close the front cover

The flow transmitter with passive signal and power supply is connected.

5.6.3 Flow transmitter AMFLO® MAG Smart / MAG Basic with power supply and grounding (standard)
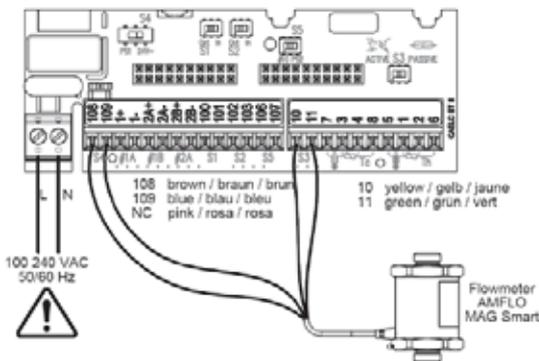
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S4 ⁎:◀S▮ PS1
5. Switch over the switch S3 ▶S▮ Passive
6. Connect the flow transmitter with passive signal with the terminals 10 (Imp.) and 11 (Imp. COM)
7. Connect the flow transmitter with power supply with the terminals 108 (+) and 109 (GND)
8. Plug in the calculator
9. Close the front cover

The flow transmitter with passive signal and power supply is connected.

5.6.4 Flow transmitter AMFLO® MAG Smart / MAG Basic with power supply and two groundings

brown / braun / brun OUT2+
blue / blau / bleu OUT2-
yellow / gelb / jaune 10
green / grün / vert 11

Flowmeter
AMFLO
MAG Smart

1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S4 ➡ S▯ 24 V⁓
5. Switch over the switch S3 ➡ S▯ Passive
6. Connect the flow transmitter with passive signal with the terminals 10 (Imp.) and 11 (Imp. COM)
7. Connect the flow transmitter with power supply to the adapter with the terminals OUT2+ (+) and OUT2- (GND)
8. Connect the adapter with the terminals 108 (OUT1+) and 109 (OUT1-)
9. Connect the isolated power supply 24V-24V to the adapter with the terminals IN+ (+) and IN- (GND)
10. Plug in the calculator
11. Close the front cover

The flow transmitter with passive signal and power supply and two groundings is connected.

5.7 Pulse inputs

COMMENT

Pulse input #2

- Keeping the pulse signal specifications for placed flow transmitter
    - Open-circuit voltage: 8V
    - Short-circuit current: 8mA
    - Switching level: <1.5mA, >2.1mA
    - Input capacity: 20nF
    - Frequency range: 0…20Hz   0…200Hz
    - Min. OFF (toff):   20ms   2ms
    - Min. ON (ton):   3ms   300µs
- Use of a flow transmitter with passive pulse signals
    - Reed relay
    - SSR (solid state relay)
- Use switch S1 for configuration P ➔ S▯ In
- Programming options for this input see INPUTS (p.39)
- Diagram input circuit
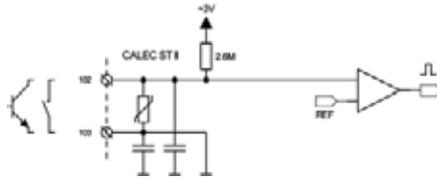
5.7.1 Pulse input #2
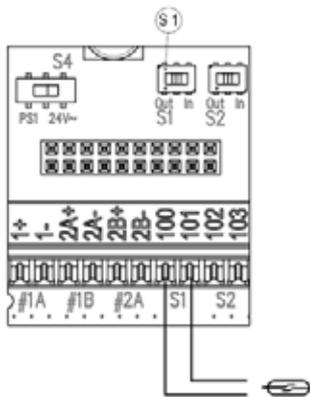
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S1 ➔ S▯ In
5. Connect the pulse signal with the terminals 100 and 101
6. Plug in the calculator
7. Close the front cover

The pulse signal is connected.

COMMENT

Pulse input #3

- Keeping the pulse singal specifications for the placed pulse signal
  - Frequency range: 0…20Hz
  - Min. OFF (toff): ≥50µs
  - Min. ON (ton): ≥50µs
  - Switching treshold R_{ON}: ≤20Ω
  - Switching treshold R_{OFF}: ≥1MΩ
- Use switch S2 for configuration P ➜ S▮ In
- Programming options for this input see INPUTS (p.39)
- Diagram input circuit
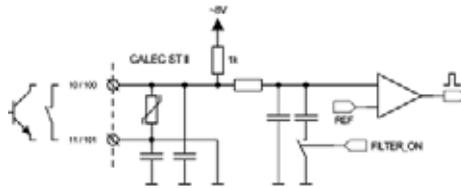
5.7.2 Pulse input #3
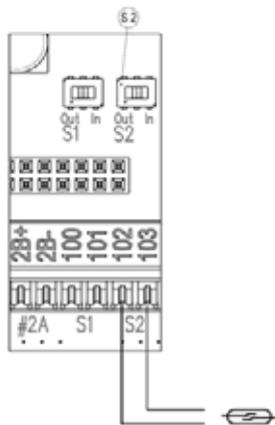
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over the switch S2 ➜ S▮ In
5. Connet the pulse signal with the terminals 102 and 103
6. Plug in the calculator
7. Close the front cover

The pulse signal is connected.

5.8 Digital outputs / status signals / alarms

COMMENT

Digital output (pulse, status, alarm) #1 and #2

- Keeping the pulse singal specifications for the placed pulse signal
  - Switching voltage: max. 48VDC, 36VAC
  - Switching current: max. 100mA
  - Switching treshold R_{ON}: $\leq 25\Omega$
  - Switching treshold R_{OFF}: $\geq 1M\Omega$
  - Electrical isolation: max.48V
  - Pulse frequency: max.4Hz
  - Pulse width: 100ms
- Use switch S1 for configuration P * : ◄S▌ Out
- Programming options for this output see OUTPUTS (p.39)
- Diagram output circuit
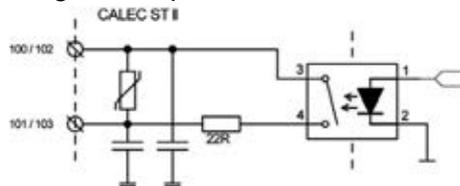
5.8.1 Digital output (pulse, status, alarm) #1


1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over switch S1 * : ◄S▌ Out
5. Connect the pulse signal with the terminals 100 and 101
6. Plug in the calculator
7. Close the front cover

The digital signal #1 can be used.

5.8.2 Digital output (pulse, status, alarm) #2

1. CALEC® ST II spannungsfrei schalten
2. Take off the front cover (see 4.5)
3. Take off the calculator
4. Switch over switch S2 * : ◄S▌ Out
5. Connect the pulse signal with the terminals 102 and 103
6. Plug in the calculator
7. Close the front cover

The digital signal #2 can be used.

5.9 Module sockets (communication and functional modules)

CALEC® ST II is equipped with 2 independant sockets for optional communication or functional modules. Depending on equipping these 2 sockets lead to different connection opportunities at the outputs #1A, #1B and #2A. Which optional communication and functional modules are equipped in the device is shown in the connection diagram and the terminal numbering.

5.9.1 Function overview outputs #1A, #1B and #2A

COMMENT

Socket of the optional communication and functional modules

- Communication modules can be inserted in socket #1 or #2
- The functional module with 2 analogue outputs is preferably placed in socket #1
    - In socket #1 both channels are available on the terminals
    - In socket #2 only one channel is available on the terminal
- Socket #2 is thus preferably used for communication modules
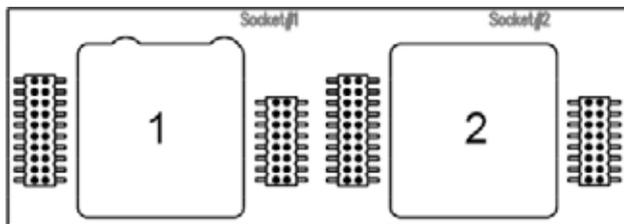
Terminals	Function	Available at output / module socket
24 - 25	M-Bus	#2A and / or #1A
90a - 91b	Modbus RTU (RS 485)	#2A and / or #1A
90a - 91b	BACnet MS/TP (RS 485)	#2A and / or #1A
90a - 91b	N2Open (RS 485)	#2A and / or #1A
96a - 97b	LON	#1A
98a – 99b (red – black)	KNX	#1A
70 - 71	4 - 20 mA / 0 - 20 mA	#1A and / or #2A
72 - 73	4 - 20 mA / 0 - 20 mA	#1B

5.9.2 Analogue module in socket #1

1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect passive analogue signal 1 with terminals 70 (+) and 71 (-)
4. Connect passive analogue signal 2 with terminals 72 (+) and 73 (-)
5. Close the front cover
6. Apply voltage

The analogue module can be used.

COMMENT

Analogue module in socket #2
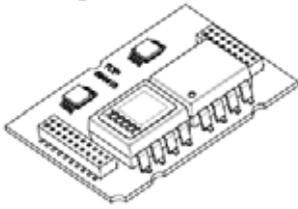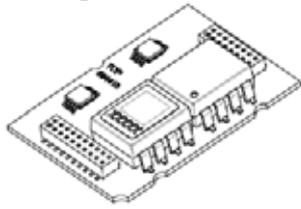
- The use of a passive analogue output via terminals 70/71 (#1A)
- Analogue outputs are electrically isolated
- Module specifications
    - Current range   4…20mA   0…20mA
    - Supply voltage   6…24VDC
    - Electronical isolation   max. 48VDC
    - Resistance   ≤ 837Ω bei 24VDC
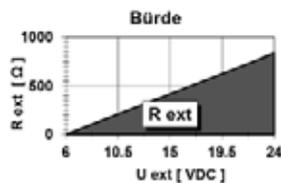
- The programming options for this output are described in I-Out (from p.39)

5.9.3 Analogue module in socket #2
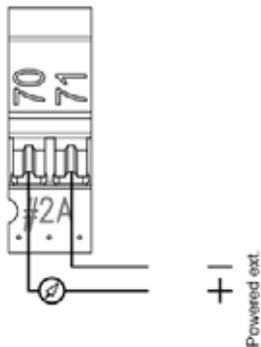
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect passive analogue signal 1 with terminals 70 (+) and 71 (-)
4. Close the front cover
5. Apply voltage

The analogue module can be used.

COMMENT

M-Bus module in socket #2 / socket #1
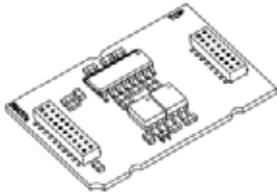
- The use via terminals 24/25 (#2A) / 24/25 (#1A)
- Analogue outputs are electrically isolated
- The use of primary and secondary addresses is possible
- Setting the baud rate is possible
- Factory settings
  - Primary address   0
  - Secondary address   serial number
  - Baud rate   2,400 Baud
- For the programming options to this module see M-Bus (from p. 39)
- The settings for the first and second M-Bus can be programmed independently.

5.9.4 M-Bus module in socket #2A
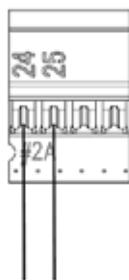
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect M-Bus with the terminals 24 and 25 (#2A)
4. Close the front cover
5. Apply voltage

The M-Bus can be used.

5.9.5 M-Bus module in socket #1A
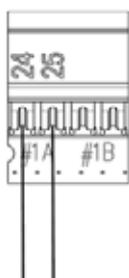
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect M-Bus with the terminals 24 and 25 (#1A)
4. Close the front cover
5. Apply voltage

The M-Bus can be used.

COMMENT

LON module in socket #1

Wink LED
Service PIN
Service LED

- Twisted pair wiring via terminals 96a/97b (#1A)
  is possible (non-poled)
- The interface is electrically isolated.
- The service PIN and the Wink LED are available for identification
  on the LON network.
- The service LED provides information about the system condition.
- The programming options for this module are described in LON (from p. 39)

5.9.6 LON module in socket #1A

Twisted - Pair
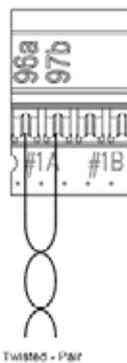
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect LON with the terminals 96a and 97b (#1A)
4. Close the front cover
5. Apply voltage

The LON can be used.

COMMENT

BACnet MS/TP-Modul in socket #2 / socket #1
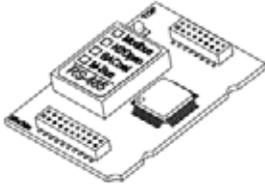
- Twisted pair wiring via terminals 90a/91b (#2A) / 90a/91b (#1A)
- The interface is electrically isolated.
- When installing CALEC® ST II at the end of the BACnet segment the internal termination resistor can be used.
- The programming options for this module are described in BACnet (from p.39) Factory settings:

  - Manufacturer ID: 431
  - BACnet device profile: B-ASC
  - BACnet MAC address: Last 2 digits of the serial number
  - Device instance number: Last 5 digits of the serial number
 - Mode: Master
  - Baud rate: Automatic

5.9.7   BACnet MS/TP module in socket #1A
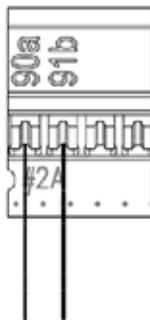
1. Disconnect from the power supply
2. Take off the front cover (see 4.5)
3. Connect BACnet with the terminals 90a (+) and 91b (-) (#1A)
4. Close the front cover
5. Apply voltage

The BACnet can be used.

5.9.8   BACnet MS/TP module in socket #2A
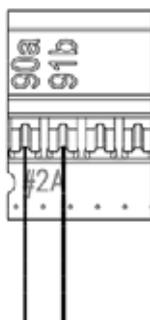
1. Disconnect from power supply
2. Take off the front cover (see 4.5)
3. Connect BACnet with the terminals 90a (+) and 91b (-) (#2A)
4. Close the front cover
5. Apply voltage

The BACnet can be used.

	COMMENT	
	Description of the Modbus RTU module	
	• http://www.integra-metering.com/en/1481/CALEC%C2%AE-ST-II.htm?id=21900	

COMMENT

Modbus RTU module in socket #2 / socket #1
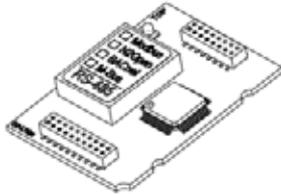
- Twisted pair wiring via terminals 90a/91b (#2A) / 90a/91b (#1A) is possible
- The interface is electrically isolated.
- When installing CALEC® ST II at the end of the Modbus segment the internal termination resistor can be used.
- The programming options for this module are described in Modbus (from p.39)
- Factory settings:
    - Modbus address: 1
    - Baud rate: 19,200 Baud
    - Parity: Even

5.9.9 Modbus RTU-Modul in Socket #1A
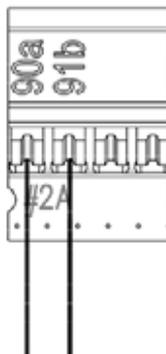
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect Modbus with the terminals 90a (+) and 91b (-) (12A)
4. Close the front cover
5. Apply voltage

The RTU can be used.

5.9.10 Modbus RTU module in socket #2A
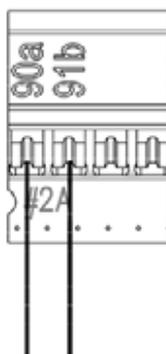
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect Modbus with the terminals 90a (+) and 91b (-) (#2A)
4. Close the front cover
5. Apply voltage

The RTU can be used.

<table>
<tr><td>

COMMENT

Description METASYS® N2Open module

- http://www.integra-metering.com/en/1481/CALEC%C2%AE-ST-II.htm?id=21900

</td></tr>
</table>

<table>
<tr><td>

COMMENT

METASYS® N2Open module in socket #2 / socket #1

- Twisted pair wiring via terminals 90a/91b (#2A) / 90a/91b (#1A) is possible
- The interface is electrically isolated.
- When installing CALEC® ST II at the end of the N2Open segment the internal termination resistor can be used.
- The programming options for this module are described in N2-bus (from p.39)
- Factory settings:
  - o N2Open address: 1
  - o Baud rate: 9,600 Baud

</td></tr>
</table>
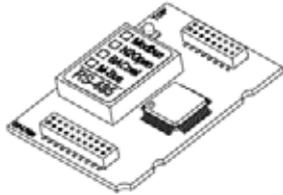
5.9.11 METASYS® N2Open-Modul in Socket #1A
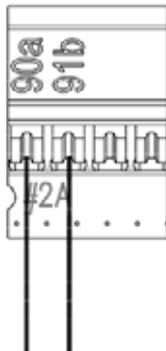
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect Modbus with the terminals 90a (+) and 91b (-) (#1A)
4. Close the front cover
5. Apply voltage

The N2Open can be used.

5.9.12 METASYS® N2Open module in socket #2A
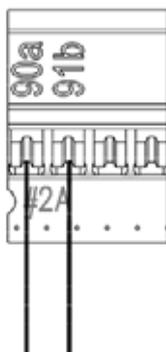
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect Modbus with the terminals 90a (+) and 91b (-) (#2A)
4. Close the front cover
5. Apply voltage

The N2Open can be used.

COMMENT

KNX module in socket #1
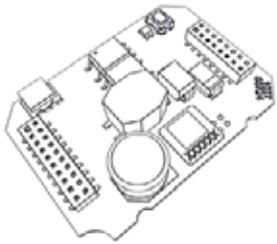
- Twisted pair wiring via terminals 98a/99b, red/black (#1A) is possible
- Daisy chain wiring is possible (#1A / #1B)
- The interface is electrically isolated.
- Factory settings:
  - Max. current consumption: 10mA
  - Baud rate: 9,600 Baud

5.9.13 KNX module in socket #1A
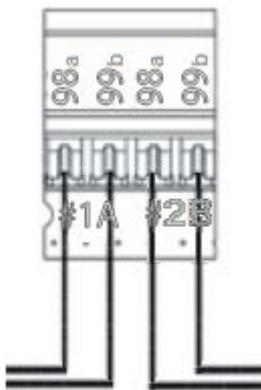
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Connect KNX with the terminals 98a/99b, red/black (#1A)
4. Connect KNX with the terminals 98a/99b, red/black (#2B) for daisy chain
5. Close the front cover
6. Apply voltage

The KNX can be used.

6 Commissioning

In this instruction only the operating steps required for a functional control are described.

	COMMENT	
✏️	Continuative documents • http://www.integra-metering.com/en/1481/CALEC%C2%AE-ST-II.htm?id=21900	[QR code]

WARNING

Burns and paralysis resulting in death when touching or grabbing energised system parts.

⚠️ Life hazard due to electrical shock!

- Perform installation and maintenance work only when the system is off power
- Work on and with voltage shall only be performed by authorised spe-cialists under consideration of applicable regulations
- Apply voltage only to the terminals intended

6.1 Starting CALEC® ST II
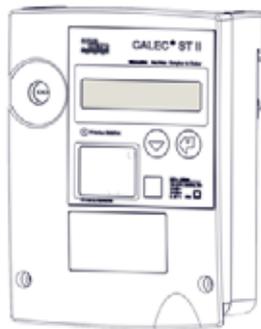
1. Check the electrical connections
2. Turn on the power supply
3. If an alarm is displayed, it needs to be fixed
4. Check the pulse value (Imp) of the flow transmitter
5. Check the installation side (Sid) of the flow transmitter
6. Close the housing after commissioning
7. Plae the safety caps on the front cover (sealing of calibrated measuring points)

CALEC® ST II can be used.

6.2 Functional control
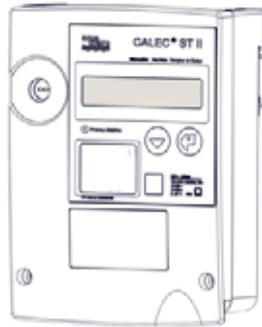
1. Check the unit of the main input (set the auxiliary meter)
2. Check the pulse value of the main input (set the auxiliary meter)
3. Check date and time
4. If there is a flow the flow indicator blinks
5. Check the current values during operation on their plausibility
6. Check the reset time of the display
7. Set the filter settings for current values of Q and P

The functions are checked and correctly set.

6.3 Display

COMMENT

Operational modes

- With the operating keys and the display all relevant settings can be made without additional devices. The adjustable values are assigned to 3 safety levels (lock levels).

- User mode
  - When the housing is closed the freely accessible data can be displayed by using the keys.
- Service mode
  - Can be activated with the service key while the cover is open. Allows the setting of all parameters that are not required to be calibrated for commissioning and the display of all settings.
- Programming mode
  - Complete parameterisation, including calibration-relevant values. Can only be activated by destroying the calibration seal. Not described in this manual.
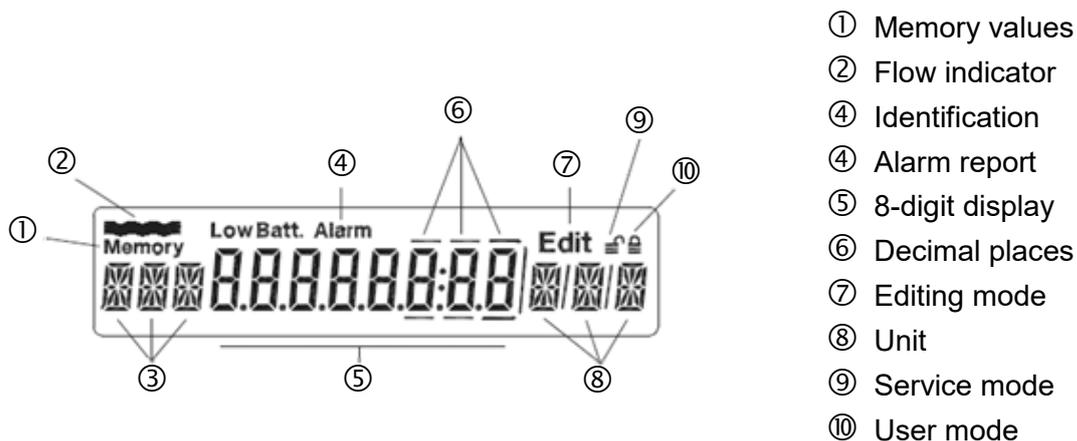
① Memory values
② Flow indicator
④ Identification
④ Alarm report
⑤ 8-digit display
⑥ Decimal places
⑦ Editing mode
⑧ Unit
⑨ Service mode
⑩ User mode

6.4 Operation
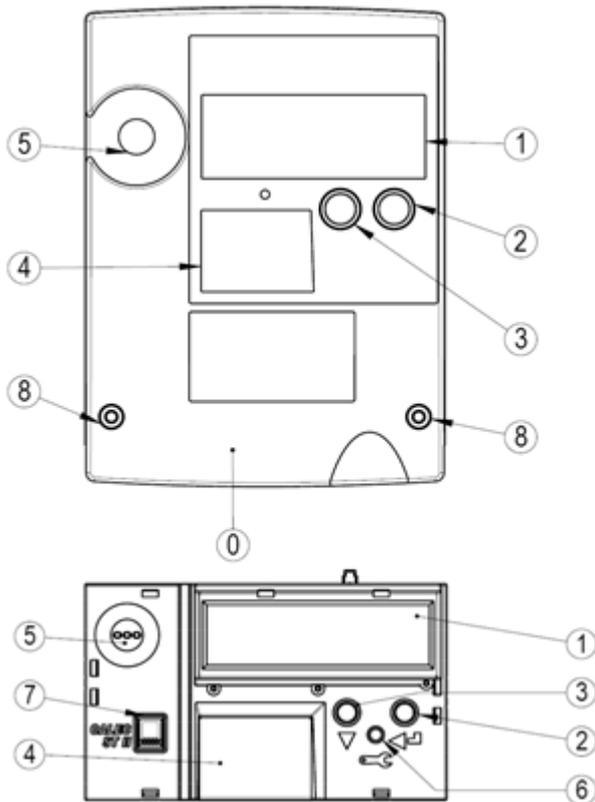
⓪ Cover
① LCD display
② Enter key
④ Selection key
④ Type plate (calibration seal in case of calibration)
⑤ Optical M-Bus interface / signalling or alarm messages (red blinking)
⑥ Service key
⑦ Type plate calculator module
⑧ Housing screws, covered by safety caps

6.5 Key functions

Keys	Functions
⊙	• Next field • Larger value
⊛	• Accept set value • Accept selected value
⊙ + ⊛ holding longer than 1s	• Back to standard display "counter"
⊙ hold, ⊛ press	• High-resolution display
⊛ hold, ⊙ press	• Prior field • Smaller value
⚲	• Service key activates the edit mode

6.6 Menu structure

Field	Function
☐	Field visible
┆ ┆ (dashed box)	Field visible for certain functions or options
grey 15%	Field editable in service mode
grey 35%	Field editable in programming mode
grey 55%	Field only editable on bus
white	Field editable in init mode
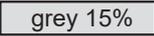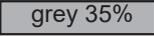
COMMENT

The depiction of fields in the menu structure depends on the respective options

- The fields marked with * are only visible, if the device features the respective options (Mass, BDE, TGR, Tarif & BDV, Flow, GLY).
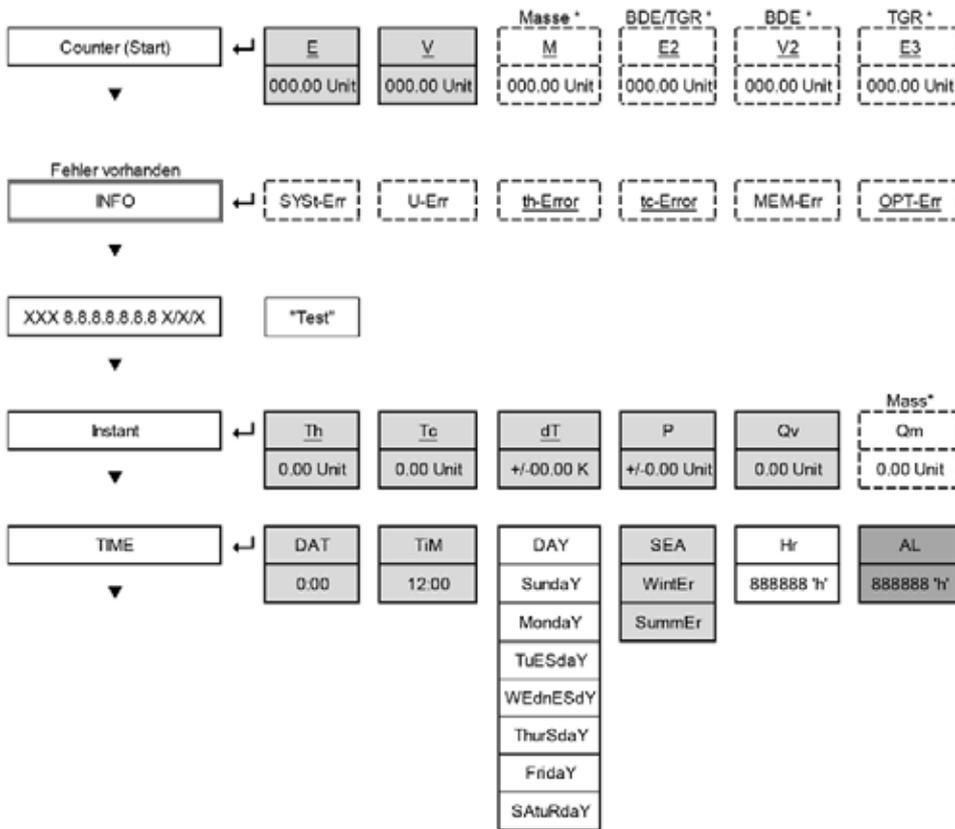
Display	Meaning		Display	Meaning
Counter	Counters		**INFO**	Error messages
E	Energy meter reading		SYSt-Err	Error system
V	Volume meter reading		U-Err	Error supply
M	Mass meter reading (optional)		th-Error	Error temperature sensor hot side
E2	Energy meter 2 reading (optional BDE/TGR)		tc-Error	Error temperature sensor cold side
			MEM-Err	Memory error(HW)
V2	Volume meter 2 reading (optional BDE)		OPT-Err	Error on one of the option modules (HW)
E3	Energy meter 3 reading (optional TGR)		th-ALArM	Temperature on hot side outside the permitted range
H1	Auxiliary counter 1 reading (optional Flow)		tc-ALArM	Temperature on cold side outside the permitted range
H2	Auxiliary counter 2 reading		dt-ALArM	Temperature difference outside the permitted range
H3	Auxiliary counter 3 reading		Ext-AL	External alarm
Imp	Pulse value flowmeter			
Sid	Installation side flowmeter		XX888XXX	Display test

Flow*				
H1	**H2**	**H3**	**Imp**	**Sid**
0	0:00	0:00	000.00 Unit	hot
				cold

th-ALArM	tc-ALArM	dt-ALArM	EXt-AL

KF	**DEN**
0.00	0.00 Kg/l

Err	**Pb**
888888 'h'	2012

Display	Meaning		Display	Meaning
Instant	Current values		**TIME**	Time parameters
Th	Current temperature hot side		DAT	Date
	(for cooling = return flow)		TiM	Time
Tc	Current temperature cold side		DAY	Day
	(for cooling = forward flow)		SEA	Winter/summer time
dT	Temperature difference		Hr	Operating hours
P	Performance		AL	Hours of alarm
Qv	Flow		Err	Hours of error
Qm	Mass flow		Pb	Calibration year
KF	Specific heat factor			
DEN	Density			
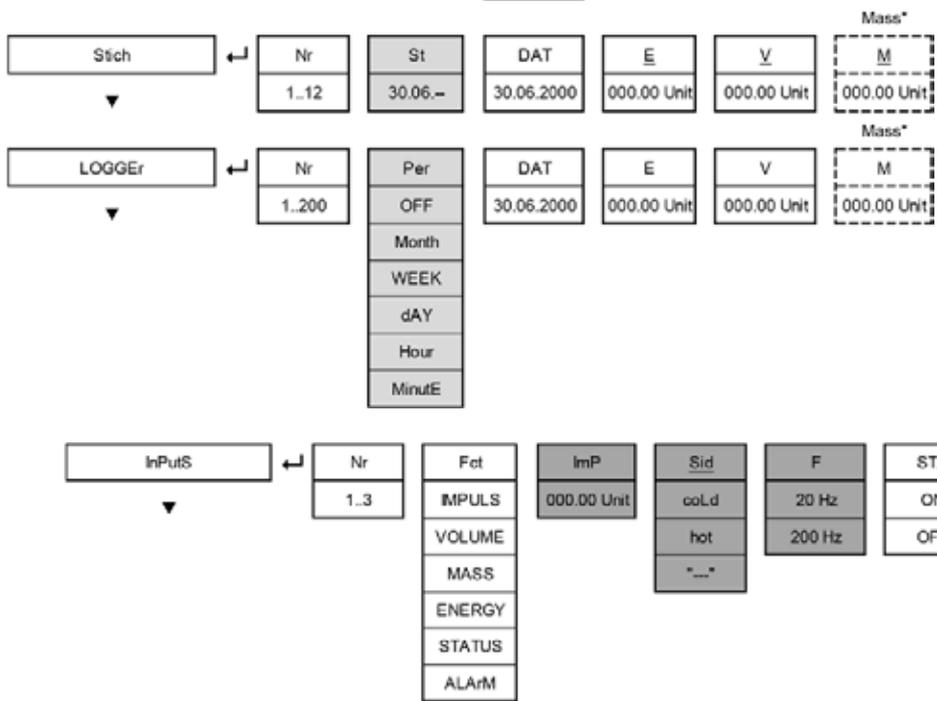
Display	Meaning	Display	Meaning
Stich	Billing date value	**LOGGEr**	Logger data
Nr	Billing date number 1 - 12	Nr	Logger number
St	Billing date 1 - 12	Per	Memory interval
DAT	Date	DAT	Date
E	Energy meter reading	E	Energy meter reading
V	Volume meter reading	V	Volume meter reading
M	Mass meter reading	M	Mass meter reading
E2	Energy meter reading 2, in options BDE / BDV	E2	Energy meter reading 2 in options BDE / BDV
V2	Volume meter reading 2, in options BDE / BDV	V2	Volume meter reading 2 in options BDE / BDV
E3	Energy meter reading 3, in option TGR	E3	Energy meter reading 3 in option TGR
H1	Auxiliary meters reading 1, in option Flow	H1	Auxiliary meters reading 1, in option Flow
H2	Auxiliary meters reading 2	H2	Auxiliary meters reading 2
H3	Auxiliary meters reading 3	H3	Auxiliary meters reading 3
AL	Alarm hours		
ERR	Error hours		

BDE*   BDE*   TGR*   Flow*

E2	V2	E3	H1	H2	H3	AL	Err
000.00 Unit	000.00 Unit	000.00 Unit	0	00000000	00000000	888888 'h'	888888 'h'

BDE*   BDE*   TGR*   Flow*

E2	V2	E3	H1	H2	H3	Pm	AL	Err
000.00 Unit	000.00 Unit	000.00 Unit	0	00000000	00000000	+/-0.00 Unit	888888 'h'	888888 'h'

                     TGR*

MAX	MiN	Tr
000.00 Unit	000.00 Unit	000.00 Unit

Display	Meaning
Inputs	Parameter for input signals
Nr	Input number
Fct	Function
ImP	Pulse value of the pulser
Sid	Installation side of the flow transmitter (th = hot side, tc = cold side)
F	Maximum input frequency
STA	Actual status
MAX	Upper limit for th / tc alarm
MiN	Lower limit for th / tc alarm
Tr	Threshold for return temperature in option TGR Overstepping: register E2 Undercutting: register E3

OutPutS ▼

Nr	Fct	SIG	ImP	SIG	GW1	GW2	Hys	Cnt	Act	STA
1..2	OFF	EnErGY1	000.00 Unit	t-hot	000.00 Unit	000.00 Unit	0..10%	88888888	on	on
	IMPULS	VOLUME1		t-cold					off	off
	LiMit 1	MASS		t-diFF						
	LiMit 2	EnErGY2		POUEr						
	ALArM	VOLUME2		FLOW						
	M-bUS	EnErGY3		MAS-FLOW						
	TEST	H1		C-Factor						
		H2		dEnSitY						
		H3								

I-Out Hardware

I-OUT ▼

Nr	Fct	SIG	0/4	20	do	Err	STA
1..3	OFF	t-hot	000.00 Unit	000.00 Unit	12.50 mA	cont	6.50 mA
	0-20 mA	t-cold				Hi Curr	
	4-20 mA	t-diFF				LO Curr	
	TEST	POUEr					
		FLOW					
		MAS-FLOW					
		C-Factor					
		dEnSitY					

Display	Meaning
Outputs	Parameters for digital output signals
Nr	Output number
Fct	Output function
SIG	Signal type of the output
ImP	Pulse value for the function of the output
GW1	Limit value 1
GW2	Limit value 2
Hys	Hysteresis of the output
Cnt	Pulse counter/seconds overstepped
Act	Effective direction of the output
STA	Actual status

Display	Meaning
I-Out	Parameters for analogue output signals
Nr	Output number
Fct	Output function
SIG	Type of analogue output
0/4	Value at 0 mA
20	Value at 20 mA
do	Simulation mA value
Err	Current output in case of error
STA	Current value

UnitS ↵

Eu	Ed	V	M	P	Q	T	EP	VP
kWh	0.001	0.001 - 1m3	0.001 - 1 t	0.001 W	0.001 L/S	0.1 °C	0.001 Wh	0.001 mL
MWh	0.01	0.1- 1 GAL		0.001 KW	0.001 L/m	0.1 °F	0.001 KWh	0.001 L
MJ	0.1			0.001 MW	0.001 L/h		0.001 MJ	0.001 m3
GJ	1			0.001 MJ/h	0.001 m3/h		0.001 KBT	0.001 GAL
KBT				0.001 GJ/h	0.001 GA/h			
MBT				0.001 KB/h				
				0.001 MB/h				

M-BuS ↵

Nr	Adr	SEK	BAU	Acc	APP
1..3	0..250	99999999	300	0..255	APP
			2400		CANCEL
			9600		RESET
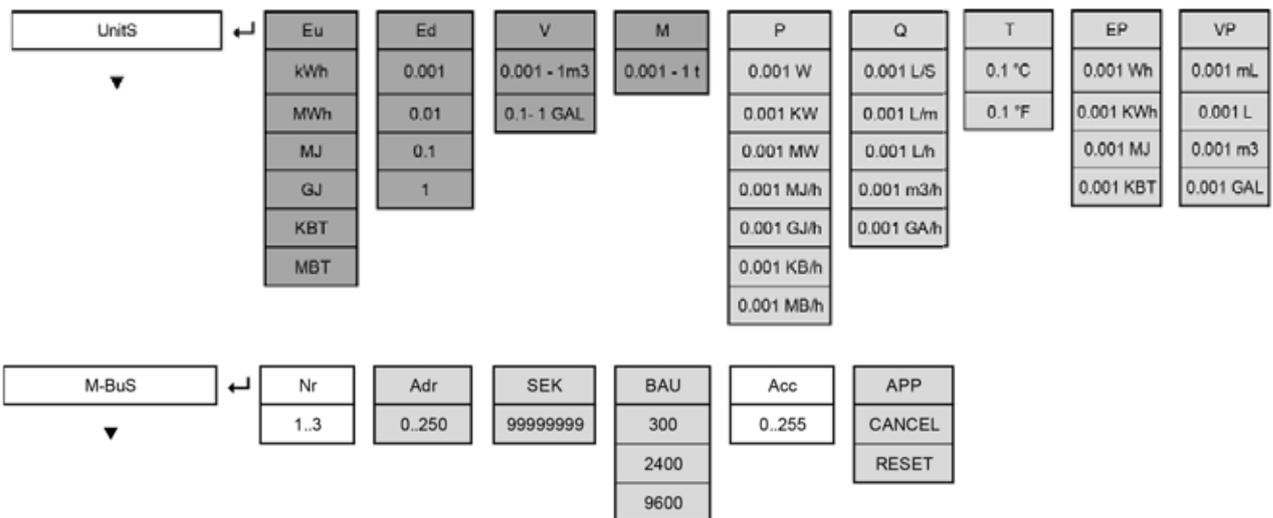
Display	Meaning
UnitS	Units
Eu	Energy unit
Ed	Number of decimal places for energy unit
V	Number of decimal places for volumes
M	Number of decimal places for mass
P	Power unit
Q	Volume flow unit
T	Temperature unit
EP	Pulse value for energy pulse output
VP	Pulse value for volume pulse output

Display	Meaning
M-BuS	M-Bus parameter
Nr	M-Bus number (1 = socket #1, 2 = socket #2, 3 = optical interface)
Adr	Primary M-Bus address
SEK	Secondary M-Bus address
BAU	Baud rate
Acc	Meter reading prompt
APP	M-Bus application reset
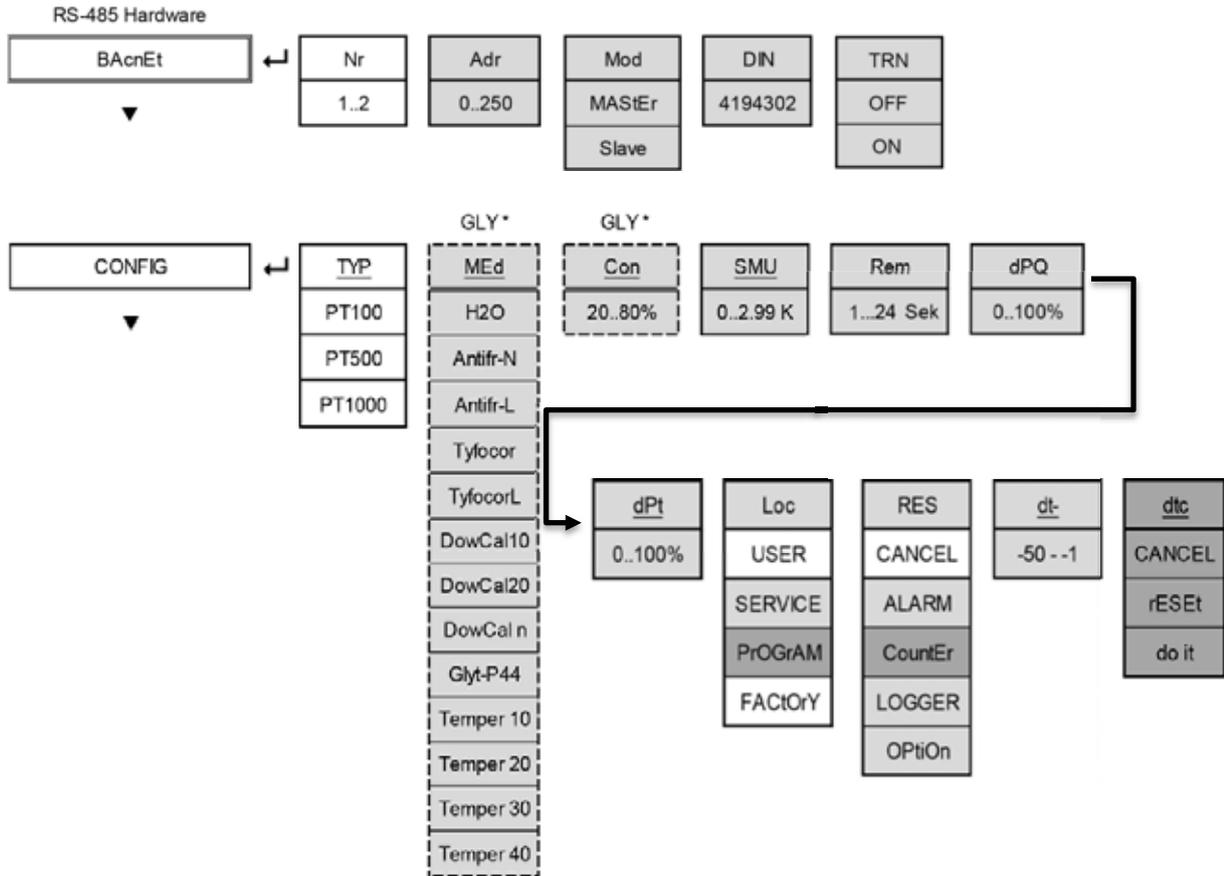
Display	Meaning
BACnet	BACnet parameter
Nr	Number of BACnet 1 = socket #1, 2 = socket #2)
Adr	Address of BACnet
Mod	Mode (Master/Slave)
DIN	BACnet device instance number
TRN	Turn termination resistor on/off

Display	Meaning
CONFIG	General parameters
TYP	Type of temperature sensor (Pt 100 etc.)
MEd	Type of glycol mixture (option GLY)
Con	Concentration in % of the glycol mixture (option GLY)
SMU	Creeping quantity surpression
Rem	Remanence time for the actual flow (keeping time of display)
dpQ	Damping factor for actual performance/flow value
dPt	Damping factor for actual temperature value
Loc	Safety level user
RES	Reset counter and other values
dt-	Limit value for dispay of dT-shortfall
dtc	Automatic sensor adjustment
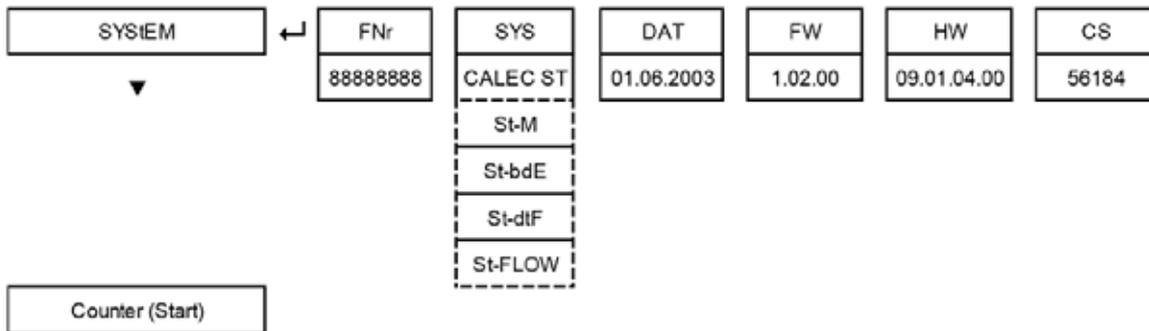
Display	Meaning
SYStEM	System parameters
FNr	Fabrication number
SYS	Calculator function
DAT	Fabrication date
FW	Firmware version
HW	Hardware version
CS	Checksum of firmware

COMMENT

One-time on-site setting of the calibration-relevant input values "IMP EBS"

- Assure that with the selected unit the accumulative energy amount can be handled without counter overflow.
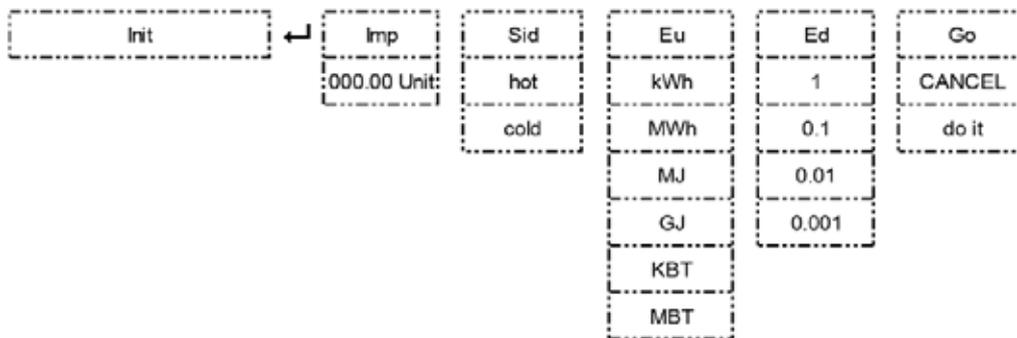
Display	Meaning
Init	Allows the one-time setting of the values ImP/Sid/Eu/Ed During commissioning on site
Go	Confirms the one-time setting at commissioning

7 Maintenance and repair

7.1 Calibration

COMMENT

Devices in commercial use

- Periodic recalibration according to national calibration law is required
- For energy meters the calibration interval is usually 5 years
- All calibration-relevant functionalities are located on the pluggable calculator module
- Easy exchange of the calculator module is sufficient for calibration
- The disassembly of the lower housing part with field wiring is not required for calibration
- Device-specific settings are redundantly stored in the the lower housing part
- A new calculator automatically updates itself after plugging it in
- In case of processing after calibration the meter readings of the new calculator module need to be reset to 0

7.1.1 Exchange the calculator
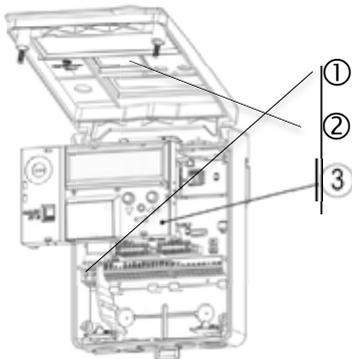
1. Disconnect CALEC® ST II from the power supply
2. Take off the front cover (see 4.5)
3. Take off the calculator

The calculator can be calibrated.

8 Malfunctions and error messages

> **COMMENT**
>
> Signalisation of the alarm
>
> - If a fault occurs, the message "Alarm" will appear on the display
> - The optical M-Bus interface also flashes red to indicate the alarm message
> - The short message in the information loop gives details of the reason for the fault/alarm

Message	Error / alarm	Possible cause	Corrective measures
th-ERROR	Temperature error on hot side, no measurement possible	• Sensor connected incorrectly • Interruption/short circuit in sensor cables	• Check wiring • Check disconnected sensor wires with ohm meter • If OK check the input with a resistor: Pt 100: 100 - 150Ω Pt 500: 500 - 620Ω
tc-ERROR	Temperature error on cold side, no measurement possible	As above	As above
SYSt-Error	EEPROM memory error	Component/device error	Send the device to be checked
th-ALArM	Temperature on the hot side is outside the permitted measuring range	Temperature of the heat cycle is too high or too low	Check the current temperature in the **InStAnt** submmenu
tc-ALArM	Temperature on the cold side is outside the permitted measuring range	As above	As above
dt-ALArM	Temperature difference is outside the permitted measuring range	• Temperature difference in the heat cycle is too large or is negative • Sensor problem	Check the current temperature difference in the **InStAnt** submenu

9 Decommissioning, disassembly and disposal

9.1 Decommissioning
Disconnect from all sources of energy.
Remove the device from the system.
Consider in particular the instructions in section 9.3.

9.2 Disposal
 At the end of the life cycle this product must be recycled or disposed according to the local provisions. Remove batteries and accumulators and dispose them separately.
The separate collection and recycling of old devices helps to preserve natural resources and assures that they are disposed in a way that the protection of the environment and nature is assured.

10 Technical data

The following tables contain information on the technical data of the available functions. Please refer to the price list for possible combinations.

Standards	
CE guidelines	2014/32/EU (MID) Measuring Instruments Directive
	2014/30/EU (EMC) Electromagnetic compatibility
	2014/35/EU (LVP) Low-Voltage Products
	2012/19/EU Waste Electrical and Electronic Equimpent (WEEE) Directive
Standards	EN 1434, EN 61000-6-1, EN 61000-6-2, EN 61010, DIN 43863-5

Housing and operating conditions	
Dimensions	W x H x D = 120 x 163 x 49 mm
Ambient temperature	+5 ... +55 °C, EN 1434 class C
Storage temperature	0...60 °C
Humidity	Max. 95 % rel. humidity (non-condensing)
Operating altitude	Up to 2,000 m above sea level
Protection class	IP 54
Terminals	1.5 mm^2 spring terminals, power connection 2.5 mm^2 screw terminals

Basic data for calculator	
Temperature measuring range	0...+200 °C (heat carrier: water) -40...+180 °C (special heat carrier)
Temperature difference	0...190 K, type approval 3...190 K on demand 2...190 K
Temperatur sensor	Pt 100 or Pt 500 according to IEC 751 paired in accordance with EN 1434, 2-wire or 4-wire connection. Max. sensor cable length 2-wire connection 10 m, 4-wire connection 15 m.
Temperature measurement resolution	20-bit resolution, typical Å}0.005 K (Ta = 5...55 ÅãC)
Installation side	Hot or cold side
Pulse value of the flow sensor	0.001...9999.999 litres
Pulse values and units for auxiliary inputs and contact outputs	Volume: 0.001...9999.999 ml, l, m^3 , GAL Energy: 0.001...9999.999 Wh, kWh, MWh, MJ, KBTU
Error limits	Better than those required for calculators in accordance with EN 1434-1. Suitable for combined class 2 heat meters in accordance with EN 1434-1 when used with suitable volume metering units.
Optical interface	IEC 870-5, M-Bus protocol

Display	
Display units: volume	m^3, USGal
Display units: energy	kWh, MWh, MJ, GJ, KBTU, MBTU
Data backup in the event of a poer failure	In EERPOM >10 Jahre
Data logger	500 values from all readings with a time stamp, stored in ring memory, logger interval: 1 min, 1 hour, 1 day, 1 week, 1 month

Additional functions	
Adjustable low flow cut-off (LFCO)	Function for stopping the energy calculation when the temperature difference is too low, ΔT LFCO adjustable ΔT = 0 - 2.99 K
Limit value monitoring	One-sided or two-sided, hysteresis 0 - 10%, action of the output signal is selectable

Mains version	
Power supply	100 - 240 VAC, 50/60 Hz, max. 5W (according to EN 1434) 12 - 42 VDC or 12 - 36 VAC, max. 1 VA (according to EN 1434). *When supplying via adapter "isolated supply 24V-24V" (art. no. 80828)* 24 VDC ±20%, max. 7 Watt (at the adapter)
Calculation cycle	1 s
Backup battery real-time clock	3.6 V lithium battery

Low-voltage power supply for flow transmitter		
	Terminals 108 / 109 (depending on the version)	Terminals 106 / 107
Supply voltage	24 VDC, max.150 mA, electr. isolation max.48V VDC	3.6 VDC, max. 2 mA
Flow transmitter	e.g. AMFLO® MAG Smart or active sensors	e.g. AMFLO® SONIC UFA 113

Pulse inputs and outputs				
Main input #1 (10/11)	Connecting a pulse generator according to NAMUR, with potential-free contact (reed relay) or SSR (solid state relay), or for active sensors with the following values.			
	Input passive		**Input active**	
	Open circuit voltage	8 V	Voltage range	3…48 VDC
	Switching level	8 mA	Current signal	>2 mA
	Min. OFF /t off)	<1.5 mA, >2.1 mA	Reverse polarity protection	48 V
	Min. ON (t on)	20 Hz 20 ms	Electrical isolation	48 V
	Min. OFF (t off)	20 Hz 3 ms	Min. OFF /t off)	20 Hz 20 ms
	Min. ON (t on)	200 Hz 2 ms	Min. ON (t on)	20 Hz 3 ms
	Input capacity	200 Hz 300 μs	Min. OFF (t off)	200 Hz 2 ms
	Open circuit voltage	20 nF	Min. ON (t on)	200 Hz 300 μs
Switchable input and output output #1 / input #2 (100/101)	**Input**		**Output**	
	Open circuit voltage	8 V max	Contact rating	48 VDC, 100 mA
	Switching level	<1.5 mA, >2.1 mA	Electrical isolation	48 V
	Min. OFF /t off)	20 Hz 20 ms	Contact resistance on	<30 Ω
	Min. ON (t on)	20 Hz 3 ms	Contact resistance off	>10 MΩ
	Min. OFF (t off)	200 Hz 2 ms	Pulse frequency	max. 4 Hz
	Min. ON (t on)	200 Hz 300 μs	Pulse width	100 ms
	Input capacity	20 nF		
Switchable input and output output #2 / input #3 (102/103)	**Input**		**Output**	
	Open-circuit voltage	8 V	Contact rating	45 VDC, 100 mA
	Short-circuit current	800 μA	Electrical isolation	48 V
	Switching level	<1.4, >3.2 kΩ	Contact resistance on	<30 Ω
	Pulse length t off	20 ms	Contact resistance off	>10 MΩ
	Pulse length t on	3 ms	Pulse frequency	max. 4 Hz
	Max. frequency	20 Hz	Pulse width	100 ms
	Input capacity	20 nF		

Option M-Bus	Factory settings
M-Bus interface	According to EN 13757-2/-3
Addresses	Primary address: 0
	Secondary address: serial number
Baud rate	2400 Baud

Option Modbus RTU	Factory settings
Physical layer and address	RS 485, / address: 1
Baud rate	19200
Address range (slave)	1...247
Parity	Even
Function code	03: Read holding register

Option LON interface	Factory settings
Type	LON TP-FT 10, free topology (2-wire twisted pair), certified in accordance with LONMARK® 3.4
Baud rate	78 kBaud
Max. bus length	500 m / 2700 m with/without termination resistors, 64 nodes per segment

Option BACnet MS/TP	Factory settings
Physical layer and AMT ID	RS 485 / ID: 431
BACnet device profile and instance	B - ASC / the last 5 digits of the serial number
BACnet MAC address	The last 2 digits of the serial number
Baud rate and mode	Automatic / master

Option N2Open	Factory settings
Physical layer and address	RS 485 / address: 1
Baud rate	9600

Option 2 analogue outputs	
Output signal	4...20 mA or 0...20 mA
Supply voltage	6...24 VDC
Electrical isolation	max. 48 VDC
Maximum resistance	≤ 837 Ohm at 24 VDC, 0 Ohm at 6 V
Maximum transformer error	0.15% of measured value + 0.15% of end value

Option KNX	
Type	TP1 (2-wire twisted pair), certified according to KNX standard 2.1
Max. power consumption	10 mA
Baud rate	9600

11 Annexes

11.1 CE certificate

> **COMMENT**
>
> CE Declaration of Conformity
>
> - The CE Declaration of Conformity is available at
>   http://www.integra-metering.com/en/1481/CALEC%C2%AE-ST-
>   II.htm?id=21900

Konformitätserklärung
Declaration of conformity
Déclaration de conformité
Dichiarazione di conformità

INTEGRA METERING

INTEGRA METERING AG, Ringstrasse 75, CH-4106 Therwil

| erklärt, dass das Produkt
declares that the product
déclare que le produit
dichiara che i prodotti | Energie-Rechenwerk
Energy calculator
Calculateur d'énergie
Calcolatore d'energia | **CALEC®ST II** |

mit den Vorschriften folgenden EU - Richtlinien übereinstimmt :
conforms with the regulations of the following European Council Directives :
est conforme aux prescriptions et directives Européennes suivantes :
é conforme alle seguenti prescrizioni e direttive Europee :

CE Konformität/ CE compliance/ Conformité CE/ Conformità CE

Richtlinie Directive Directive Direttiva	Beurteilungsverfahren Method of assessment Méthode d'évaluation Metodo di valutazione	Benannte Stelle Notified body Organisme notifié Organizzazione notificata	
LVD 2014/35/EU CE Niederspannungsrichtlinie Low voltage directive Directive sur la tension basse Direttiva bassa tensione	Report: **13-EL-0323** Normen/Standards IEC 61010-1:2010	Electrosuisse Luppmenstr.1 CH – 8320 Fehraltdorf	
EMC 2014/30/EU EMV Richtlinie EMC directive Directive CEM Direttiva CEM	Report: **E1903-06-14** Normen/Standards: EN 1434-4:2007 IEC EN 61000-6-2:2005 IEC EN 61000-6-3:2005	Quinel AG Grundstrasse 2 CH-6343 Rotkreuz	
MID 2014/32/EU Messgeräterichtlinie Measurement Instruments Directive Directive sur les instruments de métrologie Strumenti di misura direttiva	Modul B: **CH-MI004-14020** METAS, Bern-Wabern Normen/Standards: EN 1434:2007 OIML R75 2002 METAS-Cert (1259) Lindenweg 50 CH-3003 Bern-Wabern	Modul D: METAS-Cert (1259) Lindenweg 50 CH-3003 Bern-Wabern	Modul F: N/A

Weitere Konformitäten/ Additional conformities/ Autres conformités/ Altre conformità

Richtlinie Directive Directive Direttiva	Beurteilungsverfahren Method of assessment Méthode d'évaluation Metodo di valutazione	Benannte Stelle Notified body Organisme notifié Organizzazione notificata
Zulassung national: Deutschland Mess- und Eichverordnung - MessEV vom 11.12.2014	RL K7.2 **DE-18-M-PTB-0006** PTB, Abbestrasse 2-12 D - 10587 Berlin	Modul D: Physikalisch-Technische Bundesanstalt (0102) Bundesallee 100 D - 38116 Braunschweig
Zulassung national: Schweiz Messmittelverordnung - MessMV vom 15.02.2006	SR 941.231 **CH-T2-18766** METAS, Lindenweg 50 CH-3003 Bern-Wabern	METAS, Lindenweg 50 CH-3003 Bern-Wabern

Unterzeichnet für und im Namen von:
Signed on behalf of:
Signé pour et au nom de :
Firmato per e al nome di:

INTEGRA METERING AG

Therwil, 16.08.2018

Andrea Bianchin
Leiter Qualitätsmanagement
Head of Quality Management
Responsable Qualité
Responsabile Qualità

11.2 Drilling hole template

122

60

TOP

19838

2 x Ø 6

60

3 x Ø 6