HGQ & HGS Energy Meter

Installation and users manual

Brunata

Please read this before installation

This manual is intended for skilled personal having a formal knowledge to meters.

The Brunata HGQ / HGS energy meter must only be used and installed as described in the manual.

The working data of the meter are shown on the label of the meter. For further information we refer to the data sheet.

IMPORTANT: Seals and void labels must not be removed or damaged. This will infringe the warranty of the meter.

The meter contains of following parts:
1. Flow sensor
2. Display unit
3. Two paired temperature sensors
   - HGQ: Direct sensors with fittings
   - HGS: pocket sensors with pockets
4. Installation and users manual

When unpacking the meter, please check that all parts are enclosed. The serial numbers of the flow sensor, the electronic units, and the temperature sensors **must** be identical, since the parts are calibrated. The serial number is also programmed into the memory of the meter, the Service Menu.

Versions and ordering code

HGxx-yy-18z/ABCDEF

xx: Meter:
  Q1: 1,6 m³/h
  Q3: 3,0 m³/h
  S5: 5,0 m³/h
  S9: 9,0 m³/h
  S16: 16,0 m³/h
y: Connection size:
  R0: G¾B x 110 mm
  R3: G1B x 130 mm
  R4: G1B x 190 mm
  R6: G1¼B x 260 mm
z: Menu/display:
  182: Standardversion
  184: Standardversion
        with peak values
  185: Heat- / cooling meter
  188: Tariff meter

A: Power supply:
  1: 230 VAC
  2: 24 VAC
B: Display backlight:
  B: With/-: Without
C: External meters:
  0, 1 or **2**
D: Communication module:
  M-Bus / **L**onWorks / **R**S232
  / - ingen
E: No. of accounting periods:
  0 / 6 / 12 / 24
F: Programmered for **G**lycol
  (% in service menu)

Installation

Preparation for installation

Please note that the installation must be done in such a way that it meets the requirements for internal fitting, distances that have to be respected, etc. Straight pipe sections before or after the meter are not required.

NB! It is recommended that stop valves are fitted before and after the meter to make it easier to remove and re-install the meter if service and verification are required. To ensure that there are no foreign bodies in the pipe section, it is recommended that the pipes are flushed through before the meter is installed. A adapter pipe can be used for this purpose. After installation, the valves should be opened in the order which provides correct flow through the meter.

The HG-meter has been approved for installation in industrial areas, but it is recommended that installation close to components that may cause strong electro-magnetic interference is avoided.

Installation of the flow sensor

The flowsensor is installed **with the arrow in the flow direction.** The flow sensor can be installed in any direction (vertically, horizontally etc), only the flow sensor must always be filled with water when running. **Do not insulate the housing of the flow sensor.**

The meter's type label will indicate whether the flow sensor should be fitted on the return pipe (low temperature) or the supply pipe (high temperature). Please note that if the meter is used in a cooling system, the supply pipe is low temperature.

Fitting and connection of display unit

The display unit must be fitted on a flat surface with 3 screws. All connections to the meter must be fitted before mains voltage is connected.

The connection cable from the flow sensor is fitted with a 4-pole plug [1] in fig.1, which is connected with its opposite [1] in fig.1. Turn the plug the right way round. The cable is squeezed into the strain relief and the rubber cable guide on the cable is pushed into place in the box. The other cables that need to be connected are led through rubber membrane and bypass and connected with their respective terminals. Temperature sensors are connected with terminal [2] and [3], pulse inputs with terminal [9] and [10], and the remote read-ing with terminal [5] and [6]. A small screwdriver or the like can be used to perforate the rubber membrane.

A power supply cable for 230 Volt (possibly 24 Volt) is led through the rubber membrane and connected with terminal [4] in fig.1, then the strain relief is tightened moderately. Earth connection is not required.
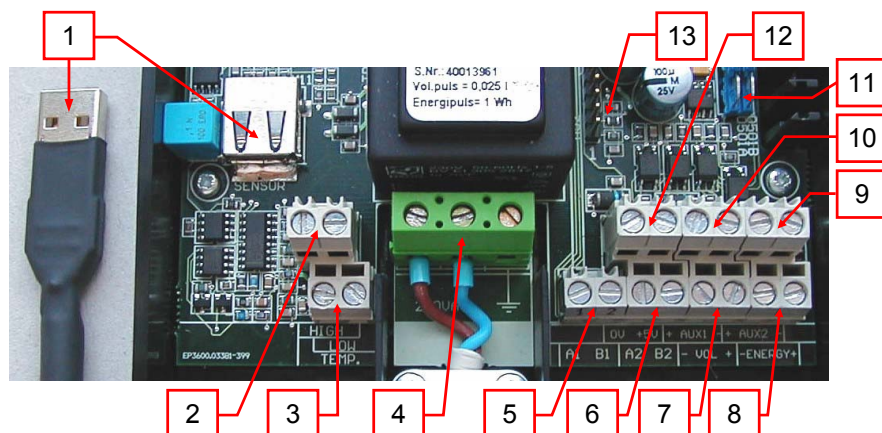
Connecting terminals

Display unit

Fig. 1 Connecting terminals Display Unit

No.	Indication	Installation
1	FLOWSENSOR	4-legged shielded plug for flow sensor cable
2	HIGH TEMP.	Temp. sensor, high
3	LOW TEMP.	Temp. sensor, low
4	230 V AC.	Power (24VAC is possible)
5	A1 B1.	1st Installation of datacommunication, MBus, Lon or RS232
6	A2 B2.	2nd Installation of datacommunication, MBus, Lon or RS232
7	- VOL. +.	Open collector pulse out, volume
8	- ENERGI +.	Open collector pulse out, energy
9	- AUX2 +.	External incoming pulse from f.inst. electricity meter
10	- AUX1 +.	External incoming pulse from f.inst. cold water meter
11	Kontakter 1 & 2	Switches for connection of internal +5V to AUX terminals
12	0 V +5 V.	Common zero and +5V DC exit
13	M52.	Connector for data communication module, MBus, Lon or RS232

Values of pulse

The pulse value depends on size of the meter. Please consult the type sign.
Energy pulse has the same value as the last digit in display.
F.inst. MWh-display shows 3 digits after comma, the value is 1 kWh/pulse

Pulse output for volume and energy

The open collector pulse out is power supplied with load resistance R, which is dimensioned according to table below.

Setting of external voltage supply (from meter: 5 VDC)	
+V	R for I=5 mA
5	700 Ω
10	1,7 k Ω
15	2,7 k Ω
20	3,7 k Ω
24	4,5 k Ω
28	5,3 k Ω

$$R = \frac{+V - 1.5V}{5mA}$$

+V$_{max}$	28 V
I$_{max}$	20 mA
V$_{on\,max}$	1,5 V

$t_{on}=t_{off}=140$ ms is standardconfig., pulse period $T = t_{on} + t_{off} = 280$ ms.

+V$_{off}$

V$_{on}$ t_{off} t_{on}
GND (0V)
Pulse periods from 40 to 1560 ms may occure
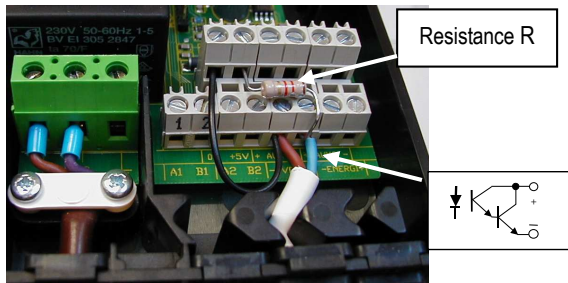

Resistance R

Fig. 2 Example of connection for volume pulse out with internal 5V

Insertion of communication module

A communication module RS262, M-Bus or LON is plugged into the display unit, and the signal cable is con-nected to the terminals A1+B1 and A2+B2, [5] and [6] in fig 1.
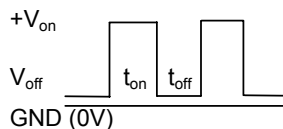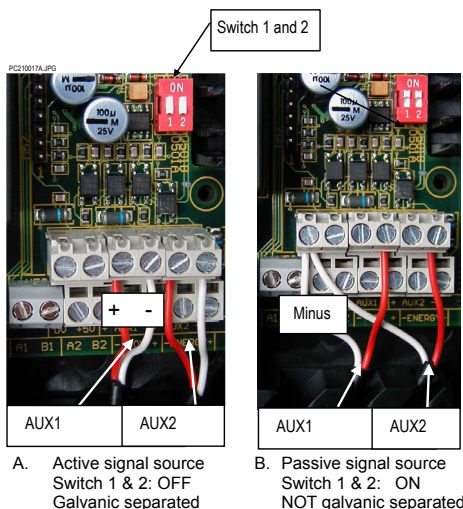
Connection of external meters with pulse outlet
(only valid for meters, which has been programmed for connection of external meters)

The meter accepts active as well as passive signal source. The most common is passive signal source, which are connected to the terminals AUX 1 or AUX 2 and the switch in position ON as shown in picture B, fig. 3.

Connection of meters with active signal source is done as illustrated in picture B, fig. 6 with the switch in position OFF.

Each of the 2 input AUX1 and AUX2 can be set separately. **Please note the polarity, see fig. 3.**

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Input-specifikation	
V_{on}	>2,5 V
V_{off}	<0,9 V
$+V_{max}$	<48 V
t_{on}	>50 ms
t_{off}	>50 ms

A. Active signal source
    Switch 1 & 2: OFF
    Galvanic separated

B. Passive signal source
    Switch 1 & 2: ON
    NOT galvanic separated

Fig. 3 Connection of external meters

Sealing

The flow electronic unit is from the factory sealed through the transparent lid and the screw allowing access to the terminals. After mounting and connecting the unit the black lid is screwed on and the unit can be sealed using sealing wire and a seal.

The display unit is sealed electronically when delivered. The box is closed and sealed with Brunata special seal made of plastic, which is pushed into the narrow hole on the bottom of the box. The seal can be removed with a screwdriver. The broken piece of the seal is to be pushed into the box with the screwdriver and hereafter the box can be opened. Alternatively the box can be closed with the enclosed screw and sealed with thread through the hole next to the screw for the lid.

The temperature sensors are sealed in their pockets using sealing wire and a seal. Head sensors are sealed through the hole in the locking screw.

Putting the meter into operation

Mains voltage is connected and the meters starts registration at once if you have flow. The meter does not sustain damage if there is no water in the system, but it may register a random flow in case the flow sensor is not completely filled with water.

When the meter is connected and water is running through the flow sensor a square in the display is flashing concurrently with the water pulses.

Attention: The meter's counter cannot be zeroed after delivery.

Operating manual

The menu of the meter is structured in 3-4 menus, and you navigate from one display to another using the push button on the display unit. The following illustration shows the standard menu structure on a Brunata HG energy meter

3) **File menu 24**

File menu 2

User menu	Extended user menu	Storage menu 1	Service menu
(Error messsage)	2) Tariff [$] Energy MWh	Date/time for storing	Actual date and time
Energy counter MWh	2) Tariff [$] Volume m³	Energy counter MWh	Display test
Volume counter m³	Peak power kW + time	Volume counter m³	Actual error code
Operating hours h	Peak flow m³/h + time	Operating hours h	Latest error code & date
Temperature t_H & t_L °C	Peak Delta t °C+ time	1) External meter 1 AC 1	Akkumulated error time
Temperature Delta t mess-	Peak temp. t_L °C	1) External meter 2 AC 2	Accum. Flow sensor volume
Actual power kW	Mean temp. t_H °C	2) Tariff [$] Energy MWh	2) Tariff criteria
Actual Flow m³/h	Mean temp. t_L °C	2) Tariff [$] Volume m³	Flow sensor location t_H or t_L
1) External meter 1 AC 1	Mean temp. Delta t °C	Peak power kW + time	Volume pulse value
1) External meter 2 AC 2		Peak flow m³/h + time	Stored data frequency
4) Latest time remote read		Peak Delta t °C+ time	Chosen mean temp. stored
		Peak temp. t_L °C	HG-serial number
		Mean temp. Delta t °C	4) Communcation address
		Latest error code + time	
		Accumulated error time	
		Accum. Flow sensor volume	

Fig. 4 Display structure

Remarks

1) Only in meter programmed for pulse input from external meters
2) Only in meter type -188 programmed with tariff functions
3) File menu is included only if meter is programmed for storage of data
4) Only in meter programmed for remote reading

Operating the meter

Introduction

The meter is operated using the push button on the front of the electronic unit. Pressing once you step down in the actual menu you are in. By pressing the button in a few seconds, you can step from one menu to the next.

Push button

Except for the User Menu the No. of the actual menu is shown in the display.

In case the meter is delivered with Storage Menu, the meter read itself and stores data as default on the 1st each month or at an optional selected date, see the order confirmation or consult the Service Menu. Until the first date occur the menu will be empty, displaying _ _._ _._ _._ _ Peak values are registered in the period from the 1st in actual month. Values are reset (zeroed) at each turn of the storing date e.g. for standard meters each month.

In addition to registration of the highest return temperature (Peak tL) the concurrent flow temperature (Peak tH) is registered.

With meters supplied with module for remote reading, the user himself in the User Menu can check the time where the meter has been read. The communication address of the meter appears in the Service Menu.

Normal operation – User menu

By pushing the button once there will be light in the display, and you will see the accumulated energy (MWh). When pushing once again the display will change to different pictures (see above). After the last display picture in the menu the display will show the accumulated energy (MWh) again.

When the pushbutton has not been activated for approx. 1 minute the display will automatically return to accumulated volume (MWh) and the light will turn off.

Advanced operation – all menus

When holding down the button for a short while, the display will change from one menu to the next. The menu reached is indicated in the upper part of the display (except Menu 1). The order of the menus is therefore [none], ▶2, ▶3 and ▶4

When you reach the needed menu, release the pushbutton and the menu is now activated. By pushing once the different display pictures in the chosen menu will show (as mentioned above).

Display pictures containing peak values - f.inst. peak flow, peak power etc., will automatically alternate be-tween peak value and date/time of registration.

For meters delivered with tariff function the consumption is displayed in Tariff Energy $ and Tariff volume $, according to the criteria's selected. The selected criteria can be seen in the service menu.

Stored data menu

If the meter is programmed for storage of data, in menu 3 you find data stored for 24 accounting periods, and you can step through the different periods by pressing the button quickly twice. The date and time when the data has been stored is shown as first display in each accounting period. The first period showed are the most recent. You can step through the information stored by pressing the button once.

By pressing the button quickly twice you step to the next period, and after having reached the latest reading (register 24) you will again see the most recent readings.

Information and error codes

Should an error occur in the meter, the display will be flashing "Error" followed by one of following error codes:

1. Interruption of power supply. The information is logged in the error register, and not showed in the display.

2. No registration of flow pulses within the last 24 hours, provided that the temperature difference has exceeded 20 °C.

3. Error, temperature sensorT_H, warmest pipe [-30 °C > T_H > 200 °C].

4. Error, temperature sensor T_L, coldest pipe [-30 °C > T_L > 200 °C].

5. Low voltage in back-up battery [$V_{Bat} < V_{Treshold}$].

6. Short circuit of magnet coil in the flowsensor [Coil current exceeds limit value for more than 8 sec].

7. Error in the programming of the meter [RAM not initialised].

8. The temperature sensors in flow pipe and return pipe are reversed [Negative temperature difference exceeds limit value for more than 10 sec].

9. Wrong time/date in the meter (see Service Menu) – clock must be adjusted.

In case of error the meter automatically will registers when (date and time) the error has occurred and also the accumulated error time.

When two errors occur at the same time, both codes are shown. **Example**: Error code 36 indicates problems with the temperature sensor in the warmest pipe and with the flow sensor.

At code nos. 2, 3, 4, 6 and 8 the error message is shown in the display as long as the error occurs. The hours with error are registered in the register for Accumulated error

hours. If the power supply is terminated, the time without power is registered in the error hours register.

At code 5, 7 and 9 the error message is shown in the display as long as the error occurs, but will not be reg-istered in the register for Accumulated error hours.

By interruption of the power supply the display will be blank. When the power is re-established the meter will immediately start registering again.

By error code 5, low battery-supply, the meter will continue the normal registration as long as it is powered but the battery must be replaced as soon as possible.

By error code 9, the meter has been without power supply, and battery-supply. The meter will continue the normal registration when power is restored, but the internal clock should be adjusted.

At temperature difference below 0.1 K, the energy calculation will seize. The register "Accumulated flow sen-sor volume" will continue registering the flow.

The meter's operating hours counter starts registration as soon as the meter is con-nected to the mains.

In case of questions, you are always welcome to contact your local Brunata ser-vice department, or send an e-mail to service@brunata.dk.

Notes

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