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## Operating Instructions

### flowtherm NT

Software status from 1.03



**Multifunctional hand-held unit with data logger for measuring flow rate,  
flow velocity, temperature, pressure and other variables**



## Overview and brief introduction of controls and connections



Please ensure that the correct flow sensor (FA, VA or TA) is selected (see under 5.3.19)!



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## 1 Safety Instructions

Risk of death and injury, and cause of damages.

Read the Operating Instructions carefully before initial operation.

Observe general safety precautions and also those included in other sections of these Operating Instructions.

Hazard risks:

- non-observance of the Operating and Safety Instructions
- modifications to the device by the customer
- handling the device outside the specified operating conditions
- handling the sensors outside the specified operating conditions
- use of unsuitable power supplies and peripheral devices
- improper use of the device

Prevention of voltage hazards:

- use only the dedicated adapter plug for the mains supply
- make sure that the PC is correctly connected to the mains (earthed safety socket, earthing) when using a USB connection
- when connecting analog outputs or inputs to peripheral devices make sure that these are correctly connected to the mains (earthed safety socket, earthing)

Danger when installing the sensors in pressurized pipelines:

- sensors for use in pressurized pipelines are to be inserted or retracted in depressurized conditions only; non-observance may result in serious injuries to personnel
- when installing or removing under pressure, the appropriate protective equipment must be used, e.g. ball valve and probe guide pieces with chain guard or spindle probe guide pieces

Danger when using the device in explosive atmospheres:

- the unit and its sensors may only be used in areas specified for category 3G (zone 2 gas) equipment
- when sensors with category 1/2 G, 1/2 D or 2 G, 2 D or 3 D markings are connected to the device they may only be used in category 3G areas! (See also Instruction Manual Category 3G and Declaration of Conformity in Sections 8 and 9)



### 1.1 Specific information

- pay heed to the mains voltage when using voltage converters
- observe the maximum power rating when connecting sensors powered by more than 12 V supply
- when operating out of doors make sure that the battery compartment cover and sensor plug are screwed on tightly, the connector sockets not in use are firmly capped, and the USB connection cover is tightly sealed, otherwise the IP65 protection cannot be guaranteed



## 1.2 Handling batteries

- always change / charge all 4 batteries and check for correct polarity
- recharge batteries with a suitable charger away from the unit
- remove batteries when they are dead or if the device is not being used for any length of time to avoid leakage
- batteries contain hazardous substances and must never be disposed of in household waste

## 2 Scope of Delivery

- hand-held unit flowtherm NT
- Operating Instructions and Data Sheet flowtherm NT
- FA, VA or TA sensor(s) as ordered
- relevant Data Sheet for above
- other sensors such as Pt100, if ordered
- accessories for sensors, e.g. extension rod for FA sensor, if ordered
- CD-ROM with PC software HLOG II and USB cable (optional)
- adapter plug and USB cable (optional)
- various connection and extension cables, connectors (optional)
- carrying case (optional)

Please check that everything listed in the Delivery Note / Technical Data Sheet is included in the delivery.

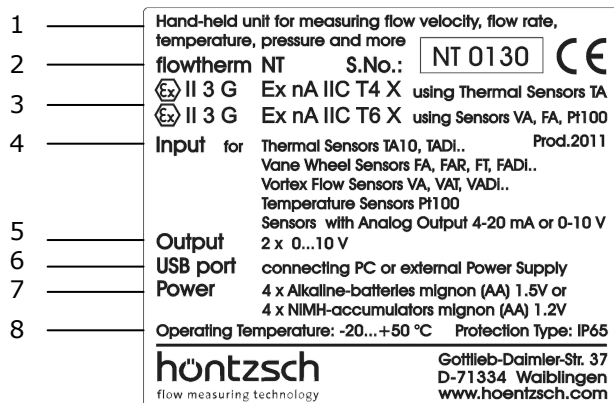
### 2.1 Description, type plate

The flowtherm NT is a multifunctional hand-held unit with data logger for measuring flow velocity, volume flow/flow rate, standard flow rate, mass flow, temperature, pressure and other variables, insofar as they are measurable / deducible with the connectable sensors:

- vane wheel sensors FA, FAR, FT, FADi, FARDi
- vortex sensors VA, VAT, VADi
- thermal sensors TA10, TADi
- temperature sensors Pt100
- 2-wire 4-20 mA sensors with 12 V supply
- 3 or 4-wire 4-20 mA sensors with output and 12 V supply
- 3 or 4-wire sensors with 0-10 V output and 12 V supply

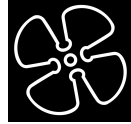


The following type plate is found on the back of the unit:



Description of type plate specifications:

- 1: Description  
see Section 2.1
- 2: Device and serial no.
- 3: Marking for Ex-applications category 3G  
see Safety Instructions Section 1  
see Instruction Manual Category3G Section 8  
see Declaration of Conformity Section 9
- 4: Inputs  
see Description Section 2.1  
see Connector sockets Section 4.1  
see Wiring diagrams Section 4.2 and 4.3
- 5: Outputs  
see Electrical data Section 3.3  
see Connector sockets Section 4.1  
see Wiring diagrams Section 4.3
- 6: USB connection  
see Electrical data Section 3.3  
see Connector sockets Section 4.1
- 7: Power supply  
see Safety Instructions Section 1  
see Electrical data Section 3.3
- 8: Operating Conditions  
see Safety Instructions Section 1  
see Operating conditions Section 3.1



### 3 Technical Specifications



#### 3.1 Operating conditions

Ambient temperature  
of the housing when in service : -20 ... +50 °C

Type of protection : IP65

#### 3.2 Housing and connection

Type of protection : IP65 with battery compartment cover and sensor plug screwed on tightly, connector sockets not in use firmly capped, and USB connection cover tightly sealed

Material : electrically conductive ABS plastic

External measurements, weight : W/H/L = 96/42/197 mm, approx. 520 g

Connections : 5-pin connector plug for thermal sensors  
: 8-pin connector plug for vane wheel, vortex or temperature sensors

12-pin connector plug for analog outputs or inputs

USB for data logger readout, configuration of the device and external power supply via PC or mains adapter

#### 3.3 Electrical data

**Power supply** : via 4 alkaline manganese Mignon (AA) 1.5V batteries  
running time (Duracell Plus) approx. 24 hours  
(using flow sensor FA without display light)  
or via 4 NiMH rechargeable Mignon (AA) 1.2V batteries  
running time (Ansmann Digital 2850 mAh) approx 26 hours  
(using flow sensor FA without display light)



Open the battery compartment on the back of the device with a screw driver. Always change all 4 batteries at the same time, checking for correct polarity. Only ever recharge batteries away from the unit using a suitable charger. Always ensure that all 4 rechargeable batteries are fully recharged before inserting. To close the compartment press it firmly in the seal (in the direction of the connector sockets) and screw down tightly.

**Mains supply** : via USB connection with PC or adapter plug

**Supply current** : via USB connection not less than 300 mA



The mains supply is not electrically isolated from the outputs. The "-" connection of the analog outputs and the earth of the USB connection have the same potential, i.e. for EMC reasons a peripheral device should have potential-free inputs for evaluation of the analog outputs when connecting to a PC.

**Analog outputs (2 x)** : 0 ... 10 V with internal resistance of 1000 Ohm  
Measured, initial and final values adjustable at any one time



**Analog input 4-20 mA** : for connection of sensors in 2-wire system with  $\leq 12$  V supply; allocation of unit, initial value and final value adjustable.

**Analog input 0-10 V** : for connection of sensors with voltage output; input resistance 5 MOhm.  $\leq 12$  V power supply for sensors, max. 100 mA; allocation of unit, initial value and final value adjustable.

### 3.4 Measuring Uncertainty

**Input FA** : +/- 1 Hz

**Input VA** : +/- 1 Hz

**Input TA** : +/- 1 (0.7 % of meas. value + 0.02 % of full scale)  
Temperature display : +/- 1 Kelvin

**Analog input 0-10 V** : +/- 1 (0.3 % of meas. value + 0.02 % of full scale)

**Analog input 4-20 mA** : +/- 1 (0.3 % of meas. value + 0.02 % of full scale)

**Input Pt100** : +/- 0.2 Kelvin

**Analog output 1+2, 0-10 V** : +/- 1 (0.2 % of meas. value + 0.02 % of full scale)

All values are valid for adjusted damping of 30 seconds while measurement. The measuring uncertainties of the used sensors have to be considered additionally.



## 4 Initial Operation / Startup

For installation and operation of the system, especially in category 3G, the national regulations currently in force, the recognised standards of good practice and these Operating Instructions are decisive.

### 4.1 Connector sockets



5-pin connector socket:  
for thermal sensors TA10 and TADi measuring tubes



8-pin connector socket:  
for vane wheel sensors FA, FAR, FT and FADi measuring tubes  
for vortex sensors VA, VAT and VADi measuring tubes  
for temperature sensors Pt100



Always connect just one sensor at a time!





12-pin connector socket:  
for analog outputs 2 x 0-10 V  
for analog input 4-20 mA  
for analog input 0-10 V



USB connector socket type B  
data logger readout, hardware configuration  
for external power supply via PC or adapter plug



Always make sure that the connector sockets not in use are firmly capped, the sensor plug is screwed on tightly and the USB connection cover is tightly sealed, otherwise the IP65 protection cannot be guaranteed



## 4.2 Wiring diagram for the 8-pin connector plug

Electrical connection must be carried out according to the relevant wiring diagram.  
**Incorrect connection can cause serious damage to the electronics.**

Wiring diagram with view of solder contacts:

### Pin assignment

pin 1: v/FA+FAR signal 1  $\square\square$  or v/VA signal  $\square\square$

pin 2: ground  $\perp$

pin 3: PT100

pin 4: PT100

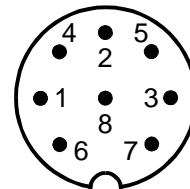
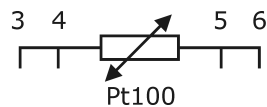
pin 5: PT100

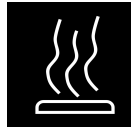
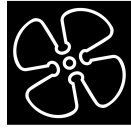
pin 6: PT100

pin 7: v/FAR signal 2  $\square\square$

pin 8: V+

housing: shield





### 4.3 Wiring diagrams for the 12-pin connector plug

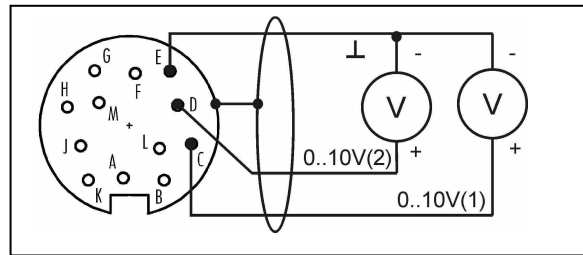
Electrical connection must be carried out according to the relevant wiring diagram.  
**Incorrect connection can cause serious damage to the electronics.**

Wiring diagrams with view of solder contacts:

#### 4.3.1 Analog outputs 0-10 V

C = analog output port 1  
D = analog output port 2  
E = earth (0 V)

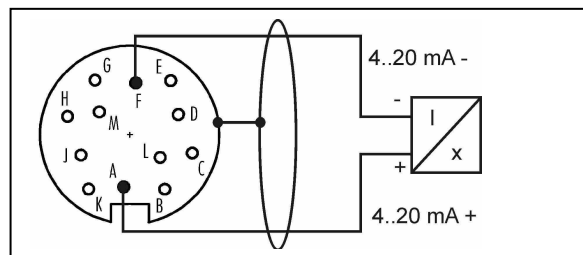
plug shell = shielding



#### 4.3.2 Analog input 4-20 mA (2-wire system current for 12V supply)

A = power supply + (12V)  
F = power supply -

plug shell = shielding

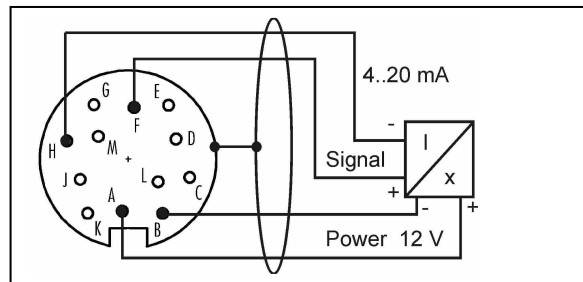


#### 4.3.3 Analog input 4-20 mA (3 or 4-wire system current for 12V supply)

A = power supply + (12V)  
B = power supply - (0V)  
F = signal +

H = signal - (0V)

plug shell = shielding

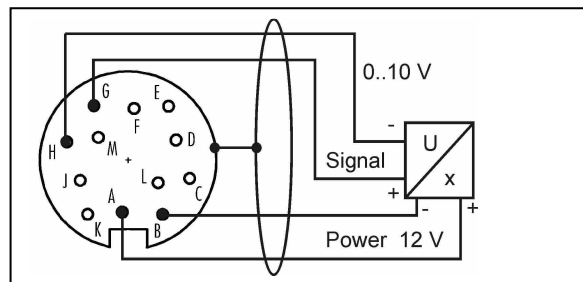


#### 4.3.4 Analog input 0-10 V (3 or 4-wire system voltage for 12V supply)

A = power supply + (12V)  
B = power supply - (0V)  
G = signal +

H = signal - (0V)

plug shell = shielding







## 5 Operation



### 5.1 Key functions



**Switch on:** with the **ok** key (also  symbol)  
hold the key down until text appears in the display.





**Switch off:** with the **f4** key (also  symbol)  
press the key briefly and wait until the display goes off.

 **Reset!** Should the unit no longer react to key operation, switch off can be enforced by pressing the off key for more than 10 seconds.

**Control keys:** **f1**, **f2** and **f3** are control keys with variable functions, which are identified in the lowermost row of the display depending on operation menu.

**Arrow keys:** **in the measured value display / view after switch on:**  
during measured value display the arrow keys have the following function:  
 and  : shift the display. Definition whether the values from 1, 2 or 3 input channels are displayed simultaneously. Depending on selection, the character size of the display values changes.

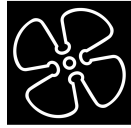
 and  : is the display so set that only measured values from 1 or 2 input channels are displayed simultaneously, then scrolling with these keys through the input channels can be carried out.

**In the menus and input boxes:**  
, ,  and  are control keys for navigating within the various menus and menu levels.

**ok key:** **In the measured value display / view after switch on:**  
**ok** is a control key for switching the display light on or off.

**In the menus and input boxes:**  
**ok** is a control key to select and save.

Refer to the following examples for a detailed description of the respective functions.



**Examples for key functions in the menus:**

**Menu selection list:**

With up or down in the list; the selected element is highlighted.

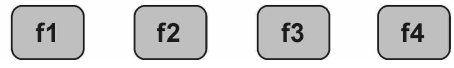
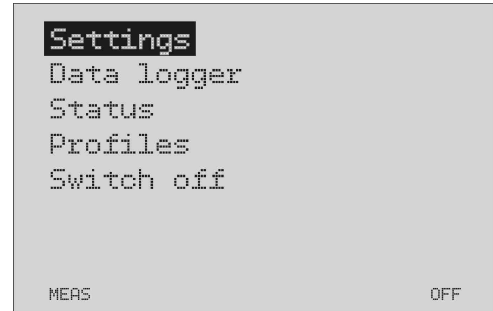
With a menu level higher (backwards).

With a menu level lower (forwards) = select.

With select = a menu level lower (forwards).

With return to measured value display.

With switch off.



**Parameter value selection window:**

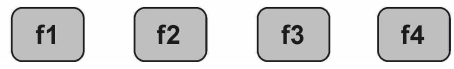
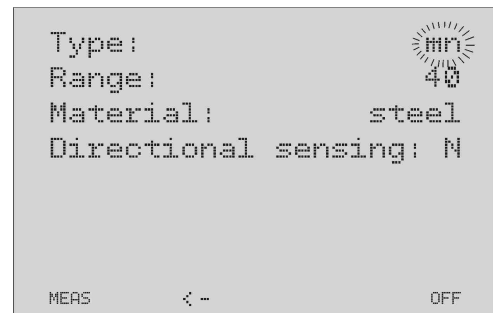
With new selection element; the selected element flashes (here "mn").

With select and save and return to selection list.

With return to measured value display without saving.

With return to selection list without saving.

With switch off.



**Parameter value digit (numeric/text) setting:**

With change digit; the selected and editable digit flashes (here "1").

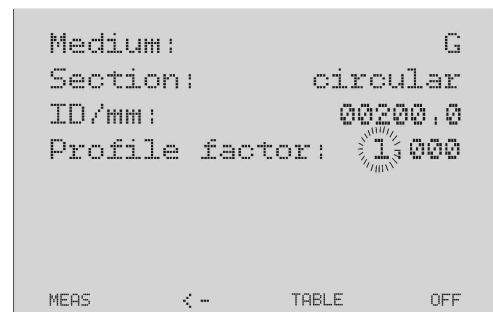
With 1 digit to the left or right respectively.

With select and save and return to selection list.

With return to measured value display without saving.

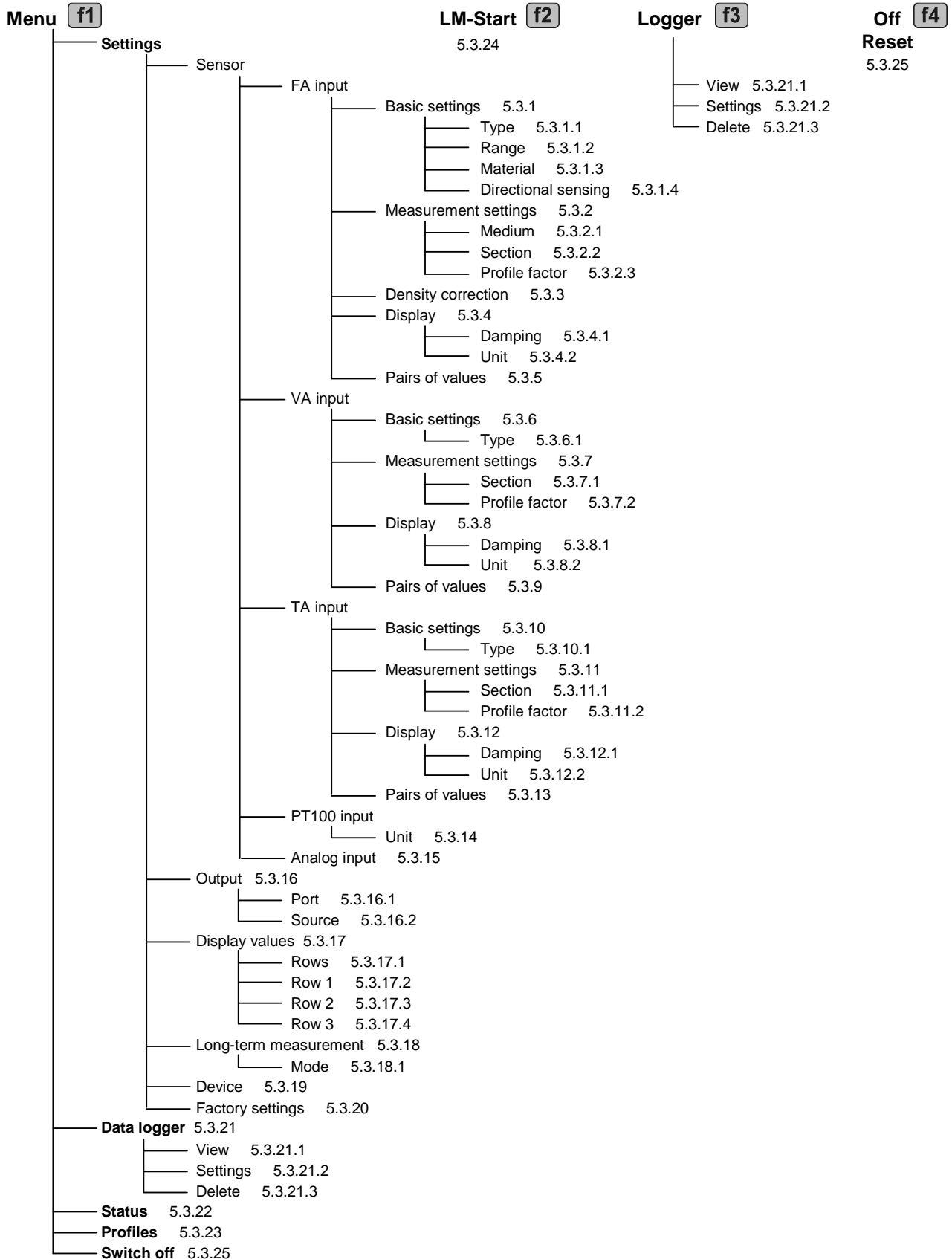
With return to selection list without saving.

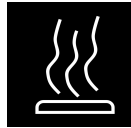
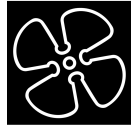
With switch off.





## 5.2 Setup menu after switch on:





## 5.3 Parameter settings

### Settings for vane wheel sensors FA:

#### 5.3.1 Menu -> Settings -> Sensor -> FA input -> Basic settings

The connected **vane wheel sensor** determines the parameter type, measuring range, material and directional sensing to be set.

##### 5.3.1.1 Type

Setting the vane wheel type:

The vane wheel type can be determined from the serial no. on the sensor.

Selection:	<b>mc</b>	= vane wheel type <b>micro</b> for use in e.g.: cylinder probes with OD 14, 16, 18 mm measuring tubes with ID 9.7 mm
	<b>mn</b>	= vane wheel type <b>mini</b> for use in e.g.: cylinder probes with OD 25 mm measuring tubes with ID 18.2 mm
	<b>md</b>	= vane wheel type <b>midi</b> for use in e.g.: cylinder probes with OD 30 mm
	<b>md3</b>	= vane wheel type <b>midi md3</b> for use in e.g.: cylinder probes with OD 30 mm, optimized for velocities up to max. 3 m/s
	<b>pairs of values</b>	= special calibration characteristic specifically matched to the measuring task based on up to 30 supporting points. Entering or changing the points, see under 5.3.5.

##### 5.3.1.2 Measuring range

Setting the vane wheel measuring range:

The measuring range can be determined from the serial no. on the sensor.

Selection:	<b>20</b>	= measuring range up to <b>20 m/s</b>
	<b>40</b>	= measuring range up to <b>40 m/s</b>
	<b>80</b>	= measuring range up to <b>80 m/s</b>
	<b>120</b>	= measuring range up to <b>120 m/s</b>



The measuring range must not be exceeded; otherwise the vane wheel can be permanently damaged!

##### 5.3.1.3 Material

Setting the vane wheel sensor material:

The material can be determined from the serial no. on the sensor.

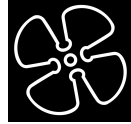
Selection:	<b>steel</b>	= <b>E</b>
	<b>aluminium</b>	= <b>A</b>
	<b>titanium</b>	= <b>T</b>

##### 5.3.1.4 Directional sensing

Setting for the directional sensing function:

Such sensors can be identified by an "R" in the serial number.

Selection:	<b>Y</b>	= directional sensing <b>yes</b> , measured value display <b>with prefix</b>
	<b>N</b>	= directional sensing <b>no</b> , measured value display <b>without prefix</b>



### 5.3.2 Menu -> Settings -> Sensor -> FA Input -> Measurement settings

The measuring task to be carried out determines the parameter medium, section and profile factor to be set here for the vane wheel sensor.

#### 5.3.2.1 Medium

Setting the medium:

Should pairs of values or md3 be selected in the basic settings (5.3.1.1), this setting has no impact on the measurement.

Selection:     **G**                     = **Gases**, the characteristic for air/gases is applied  
                  **F**                     = **Liquids (Fluids)**, the characteristic for water/liquids is applied



Only vane wheel sensors "GF" may be used in liquids; otherwise the sensor can be permanently damaged!

#### 5.3.2.2 Section

Setting the measuring section for measuring in pipelines for flow rate display:

Selection:     **Circular**             = for pipes with circular section  
  **di/mm**: enter the ID in mm  
                  **Rectangular**       = for pipes with rectangular section  
  **a/mm**: enter the inner surface a in mm  
  **b/mm**: enter of the inner surface b in mm

#### 5.3.2.3 Profile factor

The profile factor PF specifies the ratio of mean flow velocity in the measuring section and the flow velocity measured from the sensor. Requirements are: centric sensor positioning, non-rotational inlet flow and adequate dimensioned input/output sections. (See also Documents U117 and U205)

Following profile factors are to be set for vane wheel cylinder probes (ZS..) according to pipe diameter:

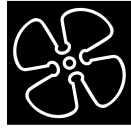
Pipe ID in mm	PF for ZS16 (mc)	PF for ZS18 (mc)	PF for ZS25 (mn) and ZS30 (md and md3)
40	0.914	0.898	
50	0.933	0.916	0.735
60	0.950	0.932	0.760
70	0.964	0.948	0.784
80	0.976	0.962	0.807
90	0.987	0.975	0.829
100	0.994	0.986	0.849
120	1.004	1.004	0.882
170	1.008	1.021	0.935
180	1.008	1.021	0.945
220	1.008	1.021	0.955
...	1.008	1.021	0.955

For measuring in larger free jet as well as larger ducts or measuring tubes, with setting PF = 1.000 the local/punctual velocity will be displayed.

With **f3** TABLE a profile factor subject to the set vane wheel type (5.3.1.1) and diameter of the measuring surface (5.3.2.2) is recommended. This value can be verified or also amended before saving. With rectangular selected as measuring surface, the surface is converted to circular for the proposed value and this value is approximate. If the sensor is a ZS18 (mc), the value must be corrected according to the table above.



PF = 1.000 must always be set for FADi.. measuring tubes calibrated with pairs of values!



### 5.3.3 Menu -> Settings -> Sensor -> FA Input -> Density correction

#### Liquids:

Liquids are virtually density resistant. No density correction needed.

#### Gases and vapours:

The density of gases and vapours can be strongly modified against pressure and temperature. Such a severe modification leads to a minor impact on the measured value of a vane wheel sensor. This impact manifests itself in a determinable correction value, which is added to or subtracted from the measured value. The percentaged impact of this correction value is however negligible with average to high velocity flow. With low and very low values, consideration of the density correction becomes more expedient.

To determine this correction value the measuring range initial value (starting value) of a vane wheel is examined. The specified starting value in the vane wheel sensor documents arises from a medium density of 1.204 kg/m<sup>3</sup> (calibration conditions). The only slightly deviating actual starting value, even with considerably different working density of the medium (in the actual application) ensues in good approximation of the following:

actual starting value = specified starting value x root of (density during calibration / working density of the medium).

The correction value is now the difference between the real and the specified starting value. The characteristic of the sensor is displaced by this value.

If the operating density of the medium is greater than the calibration density of 1.204 kg/m<sup>3</sup>, then the determined correction value must be deducted from the measured value. If it is less than the calibration density of 1.204 kg/m<sup>3</sup>, then the determined correction value must be added to the measured value.

The working medium density is needed to calculate the correction value.

#### Example:

A ZS25GE-mn40/100/p10 sensor with a specified starting value of 0.5 m/s is used in air at 1.013 bar and 100 °C, i.e. with a working medium density of 0.946 kg/m<sup>3</sup>.

#### Entered in formula:

actual starting value = 0.5 m/s x root of (1.204 kg/m<sup>3</sup> / 0.946 kg/m<sup>3</sup>) = 0.5 m/s x 1.128  
= 0.564 m/s

correction value = 0.564 m/s – 0.5 m/s  
= 0.064 m/s

With a displayed value of 15.00 m/s (without correction) and with density correction on, the correction value of 0.064 m/s would be allowed for and a corrected value of 15.06 m/s would be displayed.

#### Setting:

Selection: **N** = density correction **no**  
**Y** = density correction **yes** then enter the density of the sample gas:  
**W-density/kg/m3:** enter the working medium density in kg/m<sup>3</sup>

If the working medium density is not known, it can be determined with the formula:

$$W\text{-density} = P / (R * T)$$

where P = absolute pressure in Pa, R = specified gas constant in J/(kg\*K), T = temperature in K.

Here the specified gas constants of some gases:

sample gas	spec. gas constant in J/(kg*K)	sample gas	spec. gas constant in J/(kg*K)
dry air	287	hydrogen H <sub>2</sub>	4124
steam H <sub>2</sub> O	462	methane CH <sub>4</sub>	518
argon Ar	208	nitrogen N <sub>2</sub>	297
carbon dioxide CO <sub>2</sub>	189	oxygen O <sub>2</sub>	260
carbon monoxide CO	297	propane C <sub>3</sub> H <sub>8</sub>	189
helium He	2077	sulphur dioxide SO <sub>2</sub>	130





### 5.3.4 Menu -> Settings -> Sensor -> FA input -> Display

The parameters damping and unit to be set here affect the measured value display, when FA is selected as sensor (see 5.3.19). Damping affects the analog output, if FA is selected as the source (see 5.3.16).

#### 5.3.4.1 Damping

**Damping/s:** enter the damping time of 01 to 99 seconds

Example 10 seconds: after every second the arithmetical average of the last 10 seconds is displayed.

#### 5.3.4.2 Unit

Selection of the unit for measured value display and data logger

Selection:	<b>m/s</b>	= flow velocity in meter / second
	<b>ft/min</b>	= flow velocity in feet / minute
	<b>m<sup>3</sup>/h</b>	= flow rate in m <sup>3</sup> / hour calculated from flow velocity and entered measured section (see 5.3.2.2)
	<b>l/s</b>	= flow rate in litre / second calculated from flow velocity and entered measured section (see 5.3.2.2)
	<b>l/min</b>	= flow rate in litre / minute calculated from flow velocity and entered measured section (see 5.3.2.2)
	<b>cfm</b>	= flow rate in cubic feet / minute calculated from flow velocity and entered measured section (see 5.3.2.2)
	<b>kg/h</b>	= mass flow in kg / hour calculated from flow velocity and entered measured section (see 5.3.2.2), the measured or entered working temperature and working pressure, and the entered standard density (standard conditions: 0 °C and 1013 hPa). With the selection "measure" for temperature and pressure the respective input channel must be selected and set (see 5.3.15)
	<b>N-m<sup>3</sup>/h</b>	= standard flow rate in standard-m <sup>3</sup> / hour calculated from flow velocity and entered measurement section (see 5.3.2.2), measured or entered working temperature and pressure (standard conditions: 0 °C and 1013 hPa). With the selection "measure" for temperature and pressure the respective input channel must be selected and set (see 5.3.15)

### 5.3.5 Menu -> Settings -> Sensor -> FA Input -> Pairs of values

If pairs of values is selected (see 5.3.1.1), then the here alterable values for determining the measured value are applied as a calibration curve.

Selection:	<b>Configuration</b>	= enter the <b>quantity</b> of pairs of values (maximal 30) for processing and display
	<b>Pairs of values</b>	= display and change of pairs of values. A pair of values always consists of a velocity value in m/s and a frequency value in Hz. The condition being: the pairs of values must be ever increasing, i.e. the next velocity or frequency value must always be greater than the previous one.



Example for quantity = 03  
01:000.50m/s, 00010Hz  
02:010.00m/s, 00350Hz  
03:040.00m/s, 01770Hz



If the frequency measured value is greater than in the last pair of values, then the velocity value is calculated. However, this means that the measurement uncertainty increases as this value is then outside the calibrated range. With vane wheel sensors, the measuring range found in the serial no. and technical data sheet must not be exceeded, as this may cause permanent damage to the vane wheel! (For further information refer to 5.3.1.2/Page 13 of these Operating Instructions).

## Settings for vortex sensors VA:

### 5.3.6 Menu -> Settings -> Sensor -> VA Input -> Basic settings

The connected **vortex sensor** determines the parameter type.

#### 5.3.6.1 Type

Setting the type of vortex sensor:

Refer to the relevant technical documents for selection options.

Selection: **KKZ** = the **calibration number (KKZ)** is individually determined for each sensor and modifies the basic characteristics.

**KKZ:** enter as an 8-digit figure, in which each digit has a 0..9..A..F range (hexadecimal = 16 possible variables).

The actual KKZ can be found in the technical data sheet, calibration certificate or directly on the sensor

**pairs of values** = special calibration characteristic specifically matched to the measuring task based on up to 30 supporting points. Entering or changing the points, see under 5.3.9.  
The actual pairs of values are documented in the technical documents.

### 5.3.7 Menu -> Settings -> Sensor -> VA Input -> Measurement settings

The measuring task to be carried out determines the parameter section and profile factor to be set here for the vortex sensor.

#### 5.3.7.1 Section

Setting the measuring section for measuring in pipelines for flow rate display:

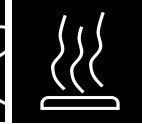
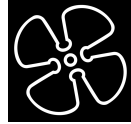
Selection: **Circular** = for pipes with circular section

**di/mm:** enter the ID in mm

**Rectangular** = for pipes with rectangular section

**a/mm:** enter the inner surface a in mm

**b/mm:** enter the inner surface b in mm



### 5.3.7.2 Profile factor

The profile factor PF specifies the ratio of mean flow velocity in the measuring section and the flow velocity measured from the sensor. Requirements are: centric sensor positioning, non-rotational inlet flow and adequate dimensioned input/output sections. (See also Documents U155 and U206).

Following profile factors are to be set for vortex sensors VA40 subject to the pipe diameter:

Pipe ID in mm	PF for VA40	Pipe ID in mm	PF for VA40
80	0.719	160	0.808
90	0.729	170	0.819
100	0.738	180	0.830
110	0.750	190	0.839
120	0.761	200	0.842
130	0.773	300	0.845
140	0.784	400	0.850
150	0.796	...	0.850

For measuring in larger free jet as well as larger ducts or measuring tubes with setting PF = 1.000 the local/punctual velocity will be displayed.

With **f3** TABLE a profile factor subject to the set diameter of the measuring surface (5.3.7.1) is recommended. This value can be verified or also amended before saving. With rectangular selected as measuring surface, the surface is converted to circular for the proposed value and this value is approximate.



PF = 1.000 must always be set for VADi.. measuring tubes calibrated with pairs of values!

### 5.3.8 Menu -> Settings -> Sensor -> VA Input -> Display

The parameters damping and unit to be set here affect the measured value display, when VA is selected as sensor (see 5.3.19). Damping affects the analog output, if VA is selected as the source (see 5.3.16).

#### 5.3.8.1 Damping

**Damping/s:** enter the damping time from 01 to 99 seconds

Example 10 seconds: after every second the arithmetical average from the last 10 seconds is displayed.



### 5.3.8.2 Unit:

Selection of the unit for the measured value display and data logger

Selection:	<b>m/s</b>	= flow velocity in meter / second
	<b>ft/min</b>	= flow velocity in feet / minute
	<b>m<sup>3</sup>/h</b>	= flow rate in m <sup>3</sup> / hour calculated from flow velocity and entered measured section (see 5.3.7.1)
	<b>l/s</b>	= flow rate in litre / second calculated from flow velocity and entered measured section (see 5.3.7.1)
	<b>l/min</b>	= flow rate in litre / minute calculated from flow velocity and entered measured section (see 5.3.7.1)
	<b>cfm</b>	= flow rate in cubic feet / minute calculated from flow velocity and entered measured section (see 5.3.7.1)
	<b>kg/h</b>	= mass flow in kg / hour calculated from flow velocity and entered measured section (see 5.3.7.1), the measured or entered working temperature and working pressure, and the entered standard density (standard conditions: 0 °C and 1013 hPa). With the selection "measure" for temperature and pressure the respective input channel must be selected and set (see 5.3.15)
	<b>N-m<sup>3</sup>/h</b>	= standard flow rate in standard-m <sup>3</sup> / hour calculated from flow velocity and entered measured section (5.3.7.1), measured or entered working temperature and pressure (standard conditions: 0 °C and 1013 hPa). With the selection "measure" for temperature and pressure the respective input channel must be selected and set (see 5.3.15)

### 5.3.9 Menu -> Settings -> Sensor -> VA Input -> Pairs of values

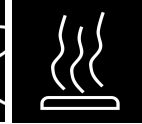
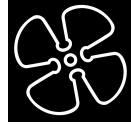
If pairs of values is selected (see 5.3.6.1), then the here alterable pairs of values for determining the measured value is applied as a calibration curve.

Selection:	<b>Configuration</b>	= enter the <b>quantity</b> of pairs of values (maximal 30) for processing and display
	<b>Pairs of values</b>	= display and change of pairs of values. A pair of values always consists of a velocity value in m/s and a frequency value in Hz. The condition being: the pairs of values must be ever increasing, i.e. the next velocity or frequency value must always be greater than the previous one.

Example for quantity = 03  
01:000.50m/s, 00010Hz  
02:010.00m/s, 00350Hz  
03:040.00m/s, 01770Hz



If the frequency measured value is greater than in the last pair of values, then the velocity value is calculated. However, this means that the measurement uncertainty increases as this value is then outside the calibrated range.



## Settings for thermal sensors TA:

### 5.3.10 Menu -> Settings -> Sensor -> TA Input -> Basic settings

The connected **thermal sensor** determines the parameter type.

#### 5.3.10.1 Type

Setting the type of thermal sensor:

Refer to the relevant technical documents for selection options.

Selection: **KKZ** = the **calibration number (KKZ)** is individually determined for each sensor and modifies the basic characteristics.

**KKZ:** enter as a 14-digit figure, in which each digit has a 0..9..A..F range (hexadecimal = 16 possible variables).

The actual KKZ can be found in the technical data sheet, calibration certificate or directly on the sensor

**pairs of values** = special calibration characteristic specifically matched to the measuring task based on up to 30 supporting points. Entering or changing the points, see under 5.3.13.  
The actual pairs of values can be found in the technical documents.

### 5.3.11 Menu -> Settings -> Sensor -> TA Input -> Measurement Settings

The measuring task to be carried out determines the parameter section and profile factor to be set here for the thermal sensor.

#### 5.3.11.1 Section

Setting the measuring section for measuring in pipelines for flow rate display:

Selection: **Circular** = for pipes with circular section

**di/mm:** enter the ID in mm

**Rectangular** = for pipes with rectangular section

**a/mm:** enter the inner surface a in mm

**b/mm:** enter the inner surface b in mm

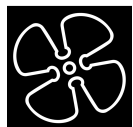
#### 5.3.11.2 Profile factor

The profile factor PF specifies the ratio of mean flow velocity in the measuring section and the flow velocity measured from the sensor. Requirements are: centric sensor positioning, non-rotational inlet flow and adequate dimensioned input/output sections. (See also Documents U232 and U234).

Following profile factors are to be set for thermal flow sensors TA10 subject to the pipe diameter:

Pipe ID in mm	PF for thermal sensors TA10
25	0.725
27.2	0.740
35.9	0.790
40	0.810
41.8	0.820
50	0.840
...	0.840

For measuring in larger free jet as well as larger ducts or measuring tubes with setting PF = 1.000 the local/punctual velocity will be displayed.



with **f3** TABLE a profile factor subject to the set diameter of the measuring surface (5.3.11.1) is recommended. This value can be verified or also amended before saving. With rectangular selected as measuring surface, the surface is converted to circular for the proposed value and this value is approximate.



PF = 1.000 must always be set for TADi.. measuring tubes calibrated with pairs of values!

### 5.3.12 Menu -> Settings -> Sensor -> TA Input -> Display

The parameters damping and unit to be set here affect the measured value display, when TA is selected as sensor (see 5.3.19). Damping affects the analog output, if TA is selected as the source (see 5.3.16).

#### 5.3.12.1 Damping

**Damping/s:** enter the damping time of 01 to 99 seconds

Example 10 seconds: after every second the arithmetical average of the last 10 seconds is displayed.

#### 5.3.12.2 Unit:

Selection of the unit for the measured value display and data logger

Selection:

- N-m/s** = standard flow velocity in meter / second  
(standard conditions: 21°C and 1014 hPa).
- N-ft/min** = standard flow velocity in feet / minute  
(standard conditions: 21°C and 1014 hPa).
- N-m<sup>3</sup>/h** = standard flow rate in m<sup>3</sup>/ hour calculated from flow velocity and entered measured section (see 5.3.11.1)  
(standard conditions: 21°C and 1014 hPa).
- N-l/s** = standard flow rate in litre / second calculated from flow velocity and entered measured section (see 5.11.1)  
(standard conditions: 21°C and 1014 hPa).
- N-l/min** = standard flow rate in litre / minute calculated from flow velocity and entered measured section (see 5.3.11.1)  
(standard conditions: 21°C and 1014 hPa).
- N-cfm** = standard flow rate in cubic feet / minute calculated from flow velocity and entered measured section (see 5.3.11.1)  
(standard conditions: 21°C and 1014 hPa).
- kg/h** = mass flow in kg / hour calculated from flow velocity and entered measured section (see 5.3.11.1) and entered standard density  
(standard conditions: 21°C and 1014 hPa).



### 5.3.13 Menu -> Settings -> Sensor -> TA Input -> Pairs of values

If pairs of values is selected (see 5.3.10.1), then the here alterable pairs of values for determining the measured value is applied as a calibration curve.

- Selection:     **Configuration**           = enter the **quantity** of pairs of values (maximal 30) for processing and display
- Pairs of values**       = display and change of the pairs of values.  
  A pair of values always consists of a velocity value in m/s and a frequency value in Hz.  
  The condition being: the pairs of values must be ever increasing, i.e. the next velocity or frequency value must always be greater than the previous one.

Example for quantity = 03  
01:000.50m/s, 06000Hz  
02:010.00m/s, 08350Hz  
03:040.00m/s, 12770Hz

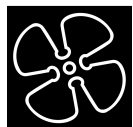


If the frequency measured value is greater than in the last pair of values, the the velocity value is calculated. However, this means that the measurement uncertainty increases as this value is then outside the calibrated range.

**Note:** For switching between different calibration gases with a thermal sensor each pair of values calibration for the respective calibration gas can be saved in its own device profile (see 5.3.23)



Resetting the factory settings (see 5.3.20) has no impact on the saved profile. Changing the pairs of values for the various calibration gases can only be reconstructed via the documentation in the Technical Data Sheet and calibration certificate.



## Settings for the Pt100 input for temperature measurement:

### 5.3.14 Menu -> Settings -> Sensor -> PT100 Input -> Unit

The parameter unit to be set here affects the measured value display

Selection:    °C       = display of **temperature** in °C  
                 °F       = display of **temperature** in °F

## Settings for the analog inputs:

### 5.3.15 Menu -> Settings -> Sensor -> Analog input

**Input:**        Selection:    **4-20mA** = **current input** 4-20 mA is selected  
                                     **0-10V**  = **voltage input** 0-10 V is selected

**Designation:**       for each of the two inputs a designation of up to 13 digits for the sensor can be entered.  
Example: pressure sensor

**Equivalent:**         for each of the two inputs a display equivalent can be defined. For this purpose the desired initial value at 4 mA or 0 V and the desired final value at 20 mA or 10 V is entered respectively.  
Example: 4 ... 20 mA -> 900 ... 1600 hPA

**Unit:**             for each of the two inputs a unit of up to 5 digits for measured value display can be entered.  
Example: hPa  
(unused digits are marked with a "\*" and are not shown in the display and data logger)

## Settings for the analog outputs:

### 5.3.16 Menu -> Settings -> Output

Settings for both analog output ports 1 and 2

#### 5.3.16.1 Port

Selection of the **analog output port** 1 or 2. Setting of the selected port under (5.3.16.2)

#### 5.3.16.2 Source

Setting the source and the measured value-equivalent for the **analog output port** selected under (5.3.16.1).

Selection:    **FA, VA, TA**   = **flow sensor** depending on selection under (5.3.19)  
                                     **Equivalent:**       initial value analog output at 0 V in m/s  
  final value analog output at 10 V in m/s  
  example:        0 ... 10 V -> 0 ... 40 m/s  
  or:                0 ... 10 V -> 5 ... 20 m/s

**Pt100**        = **temperature sensor** Pt100  
                                     **Equivalent:**       initial value analog output at 0 V in °C  
  final value analog output at 10 V in °C  
  example: 0 ... 10 V -> -20 ... +100 °C





## Settings for display values:

### 5.3.17 Menu -> Settings -> Display values

Settings for the display values. Determining the quantity of the simultaneously displayed values / input channels and the allocation of these values to the 3 input channels.

#### 5.3.17.1 Rows

The number of rows determines in how many input channels (1, 2 or 3) the measured values are displayed simultaneously after switch on.

#### 5.3.17.2 Row 1

Selection of which measured value is allocated to input channel 1 and displayed as Row 1.

Selection:	<b>Date</b>	= display of the <b>actual date</b>
	<b>Time</b>	= display of the <b>actual time</b>
	<b>FA, VA, TA input</b>	= display of the <b>flow sensor</b> depending on selection (see 5.3.19)
	<b>Pt100 input</b>	= display of the <b>temperature sensor Pt100</b>
	<b>20mA input</b>	= display of the <b>analog input 4-20 mA</b>
	<b>10V input</b>	= display of the <b>analog input 0-10 V</b>
	<b>TAT input</b>	= display of the <b>temperature measurement of the thermal sensor TA</b> (only relevant if a TA sensor is selected under 5.3.19)

#### 5.3.17.3 Row 2

Selection of which measured value is allocated to input channel 2 and displayed as Row 2.

Selection: (see 5.3.17.2)

#### 5.3.17.4 Row 3

Selection of which measured value is allocated to input channel 3 and displayed as Row 3.

Selection: (see 5.3.17.2)

## Settings for long-term measurement:

### 5.3.18 Menu -> Settings -> Long-term measurement

Settings for long-term measurement

#### 5.3.18.1 Mode

Setting the measuring mode for long-term measurement

Selection:	<b>Start/Stop</b>	= <b>Start/Stop mode</b> for long-term measurement
	<b>Start</b>	= <b>Start mode</b> long-term measurement also enter: <b>interval/s</b> = length of measurement in seconds
	<b>Auto</b>	= <b>Automatic mode</b> for long-term measurement also enter: <b>interval/s</b> = length of measurement in seconds <b>repetition</b> = amount of repetitions
	<b>Single measure</b>	= <b>single mode</b> with averaging via the single saved values



## Description of the long-term measurement with selection of the various measuring modes:

### LM Start/Stop mode is set:

1. press **f2** LM-START to start long-term measurement. The instantaneous value is displayed and the measurement period in seconds (e.g. S00010) is continuously displayed in the status field (above right).
2. press **f2** LM-STOP to stop long-term measurement, the display is frozen and the average value is displayed above the measurement period in seconds (e.g. S00030).
3. press **f2** LM-OK to exit display of the average value, the instantaneous value is once again displayed and is ready for a new measurement. Start a new measurement as described under 1.

### LM Start mode is set:

1. press **f2** LM-START to start long-term measurement. The instantaneous value is displayed and the measurement period in seconds (e.g. S00010) is continuously displayed. The bar above the control key description shows the progress of the measurement period in relation to the set interval.
2. press **f2** LM-STOP before reaching the set interval and long-term measurement stops, the display is frozen and the average value is displayed above the measurement period in seconds (e.g. S00020).  
If LM-STOP is not activated, the measurement period runs up to the set interval, then long-term measurement is stopped, the display is frozen and the average value is displayed above the measurement period in seconds (e.g. S00030).
3. press **f2** LM-OK to exit display of the average value, the instantaneous value is once again displayed and is ready for a new measurement. Start a new measurement as described under 1.

### LM Automatic mode is set:

1. press **f2** LM-START to start the long-term measurement. In the 1<sup>st</sup> interval the instantaneous value is displayed and the measurement period in seconds (e.g. S00010) is continuously displayed in the status field (above right). The number of repetitions (R00001) is displayed under it. The bar above the control key description shows the progress of the measurement period in relation to the set interval. After the 1<sup>st</sup> interval has elapsed the display is frozen and the next interval starts automatically. Displayed is the average of the previous interval during the set length. The measurement period in seconds is continuously displayed in the status field and below it the number of repetitions (R00002), ...
2. press **f2** LM-AUTO before the set number of repetitions of long-term measurement are reached, then long-term measurement is cancelled and waits for a new entry as under 1.  
If LM-AUTO is not activated, the measurement period runs to the end of the set number of the intervals, then long-term measurement is stopped, the display is frozen and the last average value is displayed above the measurement period in seconds, and below it the number of expired repetitions of the of the interval.
3. press **f2** LM-OK to exit display of the average value, the instantaneous value is once again displayed and is ready for a new measurement. Start a new measurement as described under 1.



With data logger on (see 5.3.21.2), in the 3 modes described above, the displayed average is saved to the data logger with time stamp after each progress of an interval.



### SM single measurement mode is set:

1. by pressing **f2** SM + displayed instantaneous value is buffered as a single measurement and the number of the buffered values (e.g. +00010) is displayed in the status field (above right).
2. by pressing **f1** SM / the average value of the buffered single measurements is calculated and shown on the frozen display and the number of single measurements used for averaging are displayed in the status field.
3. by pressing **f2** SM-OK display of the average value is exited, the instantaneous value is once again displayed and is ready for a new measurement. Start a new measurement as described under 1.



Is the data logger on (see 5.3.21.2), then the average is saved to the data logger with time stamp by pressing **f1** SM /.

### Settings for the device:

#### 5.3.19 Menu -> Settings -> Device

The parameter to be set here affects the flowtherm NT

- Selection:
- Date:** = setting the **actual date**
  - Time:** = setting the **actual time**  
When changing the batteries the date and time are buffered for several hours.
  - Supply:** = **battery:** 4 Alkali-Mangan Mignon (AA)  
**rechargeable:** 4 NiMh Mignon (AA)  
this setting exerts influence on the battery charging level display
  - Light:** = display light **On** or **Off** after switching on the device
  - Language:** = selection of the dialogue language **German** or **English**
  - Sensor:** = selection of the flow sensor  
**FA:** = **vane wheel sensor FA**  
**VA:** = **vortex sensor VA**  
**TA:** = **thermal sensor TA**  
Only ever connect the selected sensor!

### Factory settings:

#### 5.3.20 Menu -> Settings -> Factory settings

The flowtherm NT is reset to factory settings, all settings are lost if they have not been previously saved to a profile of its own (see 5.3.23)

The factory settings are preset as those found in the shipping documents. The values of customer or application-specific measuring tasks are defined in the documents.

Before resetting to factory settings the following confirmation prompt appears:

**Factory setting?** Confirm with **ok** . Cancel with  or **f1** MESS.



Before resetting to factory settings save the actual settings to a profile (see 5.3.23), otherwise they will be lost.

Cancelling the factory settings does not affect the saved profile.



## Data logger:

### 5.3.21 Menu -> Data logger or **f3** LOGGER

The data logger is for saving measured values generated in various measuring modes of long-term or single measurement (see 5.3.18.1). The contents of the data logger can be viewed on the device or downloaded, saved and subsequently processed via the USB port on a Windows PC with help of the optional HLOG II software.

The measured values, defined under (5.3.17) for rows 1...3 are saved to the data logger. Date and time are not logged separately, if these have been selected for measurement display.

Note: In this way the possible number of data records to be logged can be increased, as the length of the data record is thus reduced. This has no impact on the time stamp for the logged values.

#### 5.3.21.1 View

The contents of the data logger are shown on the display:

With **▼** to the next data set

With **◀** back to menu

With **ok** or **f1** MESS back to measured value display

#### 5.3.21.2 Settings

Settings for the data logger:

Selection: **Data logger:** = **On** or **Off**

Switch data logger on or off

With data logger on the data for long-term measurement (see 5.3.18) is saved to the data logger

The data logger can also be switched on from the measured value display with **f3** LOGGER (via Selection: Settings -> Data logger)

or with **f3** LOGGER-OFF switched off.

**Designation:** = freely adjustable **measuring point designation** with max. 8 digits for all subsequently saved data logger values until entering a new measuring point designation.

#### 5.3.21.3 Delete

Delete the contents of the data logger:

Before deleting a prompt appears:

**Delete data logger?** Confirm with **ok**. Cancel with **◀** or **f1** MESS.

All the values saved to the data logger are deleted accordingly.



Before deleting the data logger contents these should be downloaded and saved via the USB port to a Windows PC with the help of the optional HLOG II software, otherwise they will be lost.



## Device status:

### 5.3.22 Menu -> Status

Display of status:

**Software:** = **software versions**

**S.No.:** = **serial no.**

**Memory/%:** = display of the **free space for the data logger** in %

**Battery/%:** = display of the **battery capacity** in %  
 "0" is displayed when supply is via the USB connection.  
 When the battery symbol appears for the first time on the top right in the measured value display there is still approx. 10 % battery capacity available.



When using rechargeable batteries "rechargeable" must be selected in the settings (5.3.19) otherwise the battery capacity display will be incorrect!

## Device profiles:

### 5.3.23 Menu -> Profiles

In the profiles the complete parameter inputs of the device can be saved under a freely definable name with up to 8 characters and subsequently reloaded.

For example, all parameter entries for a specific sensor can be saved to a profile or also to an appointed measuring point.

Up to 100 different profiles can be saved. Available profile storage locations are marked with a \* behind the profile name. Profiles cannot be deleted but may be overwritten.



Returning to the factory settings (5.3.20) has no impact on the saved profiles.

Selection: **Load:** = **loading a saved profile** by selecting from the list

**Save:** = **saving the active parameter settings** to a profile by selecting from the list in an available profile storage field and entry of a new name or in an already occupied profile storage location by overwriting and changing or retaining the name

## Keys:

### 5.3.24 LM-Start

**f2** Funktion key for operating the long-term measurement (see 5.3.18)

### 5.3.25 Switch off / OFF (reset)

**f4** Funktion key for switching off the device; active in all menus.

If the device no longer reacts to keypad entry, press this key for more than 10 seconds to switch off the device and reset.



## 6 Troubleshooting

<b>Fault</b>	<b>Cause</b>	<b>Troubleshooting</b>
<b>Device cannot be switched on</b>	Dead batteries	Insert new / re-charged batteries
	Faulty electronics	Return to Höntzsch
<b>No measured value display or analog output = 0V no value</b>	Sensor contaminated	Clean according to instructions
	Profile factor set at 0.000	Set profile factor to the corresponding value of nominal diameter and sensor type
	Unit setting (5.3.19) does not correspond to the connected flow sensor	Adjust the setting (5.3.19) to the connected sensor or connect compatible sensor
<b>Analog output = 0V no value</b>	Output setting does not match the port or source (5.3.16)	Amend output setting port or source (5.3.16)
<b>Measured value too low</b>	Sensor type or KKZ set incorrectly	Compare and correct settings according to details in the Technical Data Sheet
	Sensor contaminated	Clean according to instructions
	Profile factor set too low	Set profile factor to the corresponding value of nominal diameter and sensor type
	Input/output section too short	Change sensor position; improve flow conditions with a flow rectifier
	Rotational flow	Reposition sensor in flow direction; use flow rectifier
	Vortex VA sensors: reduced acoustic coupling in the sensor elements as a result of vibration or impact	Return sensor to Höntzsch for checking
<b>Measured value too high</b>	Sensor type or KKZ set incorrectly	Compare and correct settings according to details in the Technical Data Sheet
	Incorrect scaling of analog output	Check settings and amend if necessary
	Profile factor set too high	Set profile factor to the corresponding value of nominal diameter and sensor type
	EMC problem	See reference to electromagnetic compatibility (EMC) in the sensor documents

## 7 Replacement Parts

- upper housing with keypad
- lower housing
- battery compartment cover
- seal for upper housing
- connector socket cap
- USB connection cover
- 12-pin connector plug



## 8 Instruction Manual Category 3G flowtherm NT

### 8.1 Equipment

Hand-held unit flowtherm NT for connection of vane wheel flow sensors FA as probe and measuring tube, vortex flow sensors VA40 or VADi, thermal flow sensors TA10 or TADi, as well as temperature probes Pt100.

#### Use in compliance with regulations

The flowtherm NT with above-mentioned Ex-version category 3G sensors is used for measuring the flow velocity, the volume flow and the temperature of gases, and also of liquids with specified vane wheel flow sensors FA and Pt100. It is designed for application in areas in which category 3G equipment is required. During normal operation within the limits of the technical specifications the equipment does not generate sparks and there is no intrinsic heating.

#### The flowtherm NT with respective sensors may not be used

- in areas in which category 1G or 2G equipment is required
- in areas in which category 1D, 2D or 3D equipment is required



### 8.2 Safety Instructions

Read the Instruction Manual carefully before initial operation! Failure to do so may cause an explosion!

The flowtherm NT with Ex-version sensors for category 3G and 3D is to be used only in areas in which the ambient temperature range of the housing does not exceed 0°C to +50°C. See also details on the type plate of the flowtherm NT or sensor as well as the relevant technical documents.

The maximum permissible **temperature of the medium** in categorie 3G areas corresponds to the temperature class. See also details on the type plate as well as the relevant technical documents.

The holding tank for the measuring gas is to be insulated in such a way as to guarantee that the device housing does not reach a higher temperature than the afore-mentioned max. ambient temperature; also taking radiant and convective heat into consideration.

The Ex-version equipment category 3G listed under Section 8.1 is to be used solely in areas in which the temperature of the measured gas, the ambient temperature and the max. permissible pressure overload stated on the type plate is not exceeded.

Sensors for use in pressurized pipelines are to be inserted or retracted in depressurized conditions only. Non-observance may result in serious injuries to personnel.

Switch off the supply voltage before disconnecting the cable socket.



### 8.3 Conformity with Standards

The equipment meets the requirements of the following European Standards:

EN 60079-0 : 2007 General Requirements  
EN 60079-15 : 2006 Type of Protection "n"

### 8.4 Technical Data

Explosion protection: vane wheel sensors FA, vortex sensors VA and temperature probes Pt100  
**Ex nA IIC T6**

Explosion protection: thermal sensors TA  
**Ex nA IIC T4**

Marking



### 8.5 Installation

The European Specifications for Assembly EN 60079-14: 2009 as well as the general rules of technology and this Instruction Manual are authoritative when installing the measuring equipment.



### 8.6 Maintenance

Maintenance and repairs are to be carried out solely by Höntzsch GmbH.





## 9 Declaration of Conformity for hand-held unit flowtherm NT category 3G

We, Höntzsch GmbH  
Gottlieb-Daimler-Str. 37  
D-71334 Waiblingen

declare under sole responsibility, that the product

hand-held unit  
**flowtherm NT**

to which this declaration relates is in conformity with the provisions of the following standards or normative documents:

Provisions of the Directive	Reference no. and date of issue
<b>94/9/EG:</b> Equipment and Protective Systems in Potentially Explosive Atmospheres	EN 60079-0: 2007 EN 60079-15: 2006
<b>2004/108/EG:</b> Electromagnetic Compatibility	EN 61000-6-4: 2007 EN 61000-6-2: 2005
<b>97/23/EG:</b> Pressure Equipment	29.05.1997

Waiblingen, 27.10.2010

Thomas Itte  
legally binding signature

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Subject to alteration

**Effective from November 2010**