



## Flow Rate Transmitter HFT 3100

**ATEX, IECEx**  
Intrinsically safe  
Dustproof housing  
Non-sparking  
With **HART** Interface



### Description:

HFT 3100 with HART interface is a compact flow rate transmitter with intrinsically safe specially developed for applications in hydraulic systems and other fluid power systems. The double approval in accordance with ATEX and IECEx enables universal, almost world-wide utilisation of the devices in potentially explosive atmospheres.

The current flow is determined by means of a sensor according to the turbine principle. In addition with the analogue 4-20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The main fields of application are in the oil & gas industry, gas turbines. The device is also used in mining applications as well as in areas with high dust loads.

Two additional threaded bore holes in the turbine housing provide the flow rate transmitter with additional connection options, e.g. for temperature and pressure sensors.

### Protection types and applications

<b>ATEX</b>	I M1	Ex ia I Ma
	II 1G	Ex ia IIC T6, T5 Ga
	II 1/2 G	Ex ia IIC T6, T5 Ga/Gb
	II 2 G	Ex ia IIC T6, T5 Gb
	II 1D	Ex ia IIIC T85°C/T95°C Da
	II 1D	Ex ta IIIC T80/90/100°C T <sub>500</sub> T90/ T <sub>500</sub> T100/ T <sub>500</sub> T110°C Da
	II 2D	Ex tb IIIC T80/T90/T100°C Db
	II 3G	Ex nA IIC T6, T5, T4 Gc
	II 3G	Ex ic IIC T6, T5, T4 Gc
	II 3D	Ex tc IIIC T80/T90/T100°C Dc
	II 3D	Ex ic IIIC T80/T90/T100°C Dc

<b>IECEx</b>	Ex ia I Ma
	Ex ia IIC T6, T5 Ga
	Ex ia IIC T6, T5 Ga/Gb
	Ex ia IIC T6, T5 Gb
	Ex ia IIIC T85/T95°C Da
	Ex ta IIIC T80/T90/T100°C Da T <sub>500</sub> T90/ T <sub>500</sub> T100/ T <sub>500</sub> T110°C Da
	Ex tb IIIC T80/T90/T100°C Db
	Ex nA IIC T6, T5, T4 Gc
	Ex ic IIC T6, T5, T4 Gc
	Ex tc IIIC T80/T90/T100°C Dc
	Ex ic IIIC T80/T90/T100°C Dc

### Technical Details

Input data	
Measuring range and operating pressure	
HFT 31XX- F21-0020	0.32 .. 5.28 gpm 6090psi
HFT 31XX- F21-0060	1.59 .. 15.85 gpm 6090psi
HFT 31XX- F21-0300	3.96 .. 79.25 gpm 6090 psi
HFT 311X- F21-0600	10.57 .. 158.5 gpm 6090 psi
Additional connection options <sup>1)</sup>	2 x SAE6 female threads for pressure or temperature sensors with relevant approvals
Parts in contact with fluid	Stainless steel: 316L, 329, tungsten carbid
output data	
Output signal, max. load resistance	4...20 mA, 2 conductor, with HART Protocol R <sub>Lmax</sub> =(U <sub>B</sub> - 12 V) / 20 mA [kΩ] With HART communication min. 250 Ω
HART Communication	According to HART 7 specifications
HART Common Practice Commands i.e.	Altering of measuring range limits (see table)
Accuracy	≤ 2 % of the actual value
Ambient conditions	
Compensated temperature range	-40 .. +158 °F
Operating temperature range	T6, T80, T85°C, T <sub>500</sub> 90: Ta = -13 .. 140°F T5, T90, T95°C, T <sub>500</sub> 100: Ta = -13 .. 158°F T100, T <sub>500</sub> 110 : Ta = -13 .. 176°F T4 : Ta = -13 .. 185°F
Storage temperature range	-40 .. +212 °F
Fluid temperature range	T6, T80, T85°C, T <sub>500</sub> 90: Ta = -13 .. 140°F T5, T90, T95°C, T <sub>500</sub> 100: Ta = -13 .. 158°F T100, T <sub>500</sub> 110 : Ta = -13 .. 176°F T4 : Ta = -13 .. 185°F
CE-mark	EN 61000-6-1/-2/-3/-4, EN 61079-0/11/15/26/31, EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500Hz	10 g
Protection class to IEC 60529	IP 67
Relevant data for Ex-applications	
Supply voltage	U <sub>i</sub> = 12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA
Maximum input power	P <sub>i</sub> = 0.7W
Connection capacitance of the sensor	C <sub>i</sub> = ≤ 22 nF
Inductance of the sensor	L <sub>i</sub> = 0 mH
Isolation voltage	50 V AC, with integrated overvoltage protection according to EN 61000-6-2
Other data	
Residual ripple of supply voltage	46 to 125 Hz: < 0.2 V <sub>pp</sub> > 125 Hz: < 1.2 mVRMS
Current consumption	≤ 25 mA
Measuring medium	Hydraulic oil, water based fluid
Viscosity range	1 .. 100 cSt
Calibration viscosity	30 cSt
Weight:	
HFT 311X- F21-0020	2.5 kg
HFT 311X- F21-0060	4.0 kg
HFT 311X- F21-0300	5.7 kg
HFT 311X- F21-0600	7.0 kg

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

<sup>1)</sup> not available for size 1.2 .. 20 l/min

## Measuring Range Limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring ranges:

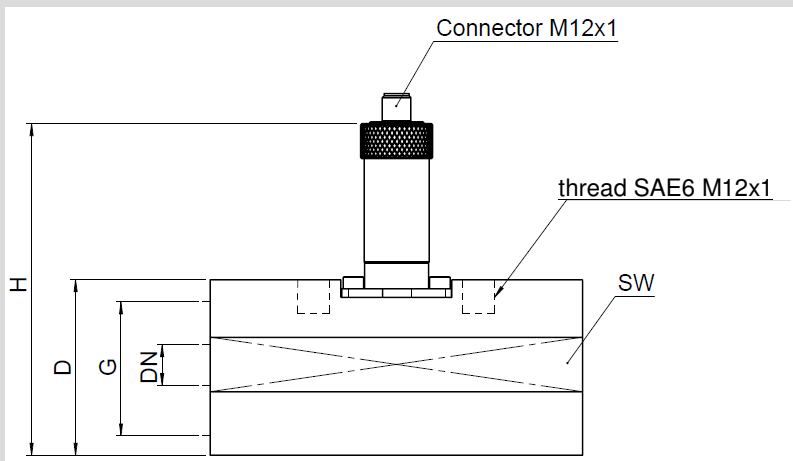
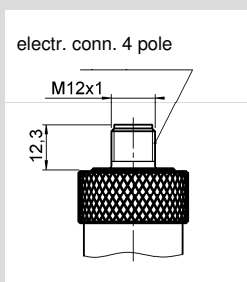
Lower measuring range limit		Upper measuring range limit		Measuring range	
min	max	min	max	min	max
0 % FS	75 % FS	25% FS	100 % FS	25% FS	100 % FS

## Applications:

Code for use in model code	1		9	A	C	
<b>ATEX</b> <b>DEKRA</b> <b>13ATEX0031X</b> <b>DEKRA</b> <b>13ATEX0032</b>	I M1 Ex ia I Ma	II 1G Ex ia IIC T6, T5 Ga II 1/2G Ex ia IIC T6, T5 Ga/Gb II 1D Ex ia IIIC T85/T95°C Da	II 2G Ex ia IIC T6, T5 Gb	II 3G Ex nA IIC T6, T5 Gc	II 1D Ex ta IIIC T80/T90°C T <sub>500</sub> T90/T <sub>500</sub> T100°C Da II 2D Ex tb IIIC T80/T90°C Db	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90°C Dc
<b>IECEx</b> <b>DEK 14.0011X</b>	Ex ia I Ma	Ex ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga/Gb Ex ia IIIC T85/T95°C Da	Ex ia IIC T6, T5 Gb	Ex nA IIC T6, T5 Gc	Ex ta IIIC T80/T90°C T <sub>500</sub> T90/T <sub>500</sub> T100°C Da Ex tb IIIC T80/T90°C Db	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90°C Dc
<b>Application areas</b>	Mining  Protection class: Intrinsically safe ia with barrier	Gases conductive dust  Protection class: Intrinsically safe ia with barrier	Gases  Protection class: Intrinsically safe ia with barrier	Gases  Protection class: Non-sparking nA	Conductive dust  Protection class: Dustproof enclosure	Gases Conductive dust  Protection class: Intrinsically safe ic with barrier
<b>Electrical connection</b> (See model code)	6	6	6	6	6	6

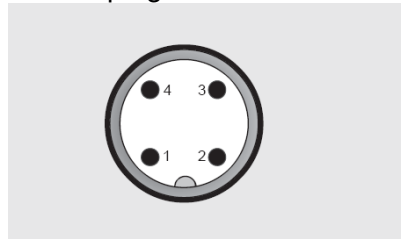
Instruments for other protection types and zones are available upon request (see also page 1).

## Dimensions:



## connections:

M12x1 plug



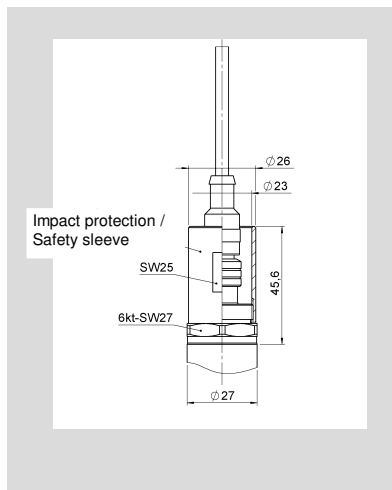
HFT 31x6-F21

1	Signal+
2	n.c.
3	Signal-
4	n.c.

## Impact protection / Safety sleeve:

Protection types and applications:  
(code): 9, A

The impact protection / safety sleeve is included in the scope of supply. A straight female connector is required for electrical connection. E.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part.no. 6098243



Without threaded holes for temperature and pressure sensors:

Model	Measurement range	L	H	D / SW	G	Tightening torque	DN
HFT 31XX-F21-0020	0.32 .. 5.28 gpm	117 mm	158 mm	60 / 56 mm	SAE 8 (3/4 -16 UNF 2B)	60 Nm	7 mm

With threaded holes for temperature and pressure sensors:

Model	Measurement range	L	H	D / SW	G	Tightening torque	DN	Thread
HFT 31XX- F21-0060	1.59 .. 15.85 gpm	144 mm	160 mm	63 / 60 mm	SAE 14 (1 3/16 -12 UN 2B)	140 Nm	11 mm	SAE 6
HFT 31XX- F21-0300	3.96 .. 79.25 gpm	155 mm	173 mm	75.5 / 72 mm	SAE 20 (1 5/8 -12 UN 2B)	290 Nm	22 mm	SAE 6
HFT 31XX- F21-0600	10.57 ..158.5 gpm	181 mm	178 mm	81 / 76 mm	SAE 24 (1 7/8 -12 UN 2B)	325 Nm	30 mm	SAE 6

### Model code:

**HFT 31 X X – F21 – XXXX – S- X-XXX-XXX**

#### Mechanical Process Connection

- 8 = 3/4 -16 UNF 2B (SAE8 female)  
only for mr: 1.2 .. 20 l/min
- 9 = 1 3/16 -12 UN 2B (SAE14 female)  
only for mr: 6 .. 60 l/min
- H = 1 5/8 -12 UN 2B (SAE 20 female)  
only for mr: 15 .. 300 l/min
- B = 1 7/8 -12 UN 2B (SAE24 female)  
only for mr: 40 .. 600 l/min

#### Electrical connection

- 6 = M12x1, 4 pole, male

#### Signal

- F21 = 4 .. 20 mA ( with HART Interface)

#### Measuring ranges

- 0020 = 1.2 .. 20 l/min (0.32 .. 5.28 gpm)
- 0060 = 6.0 .. 60 l/min (1.59 .. 15.85 gpm)
- 0300 = 15.0 .. 300 l/min (3.96 .. 79.25 gpm)
- 0600 = 40.0 .. 600 l/min (10.57 .. 158.5 gpm)

#### Housing material

- S = Stainless steel

#### Housing design

- 1 = without threaded bore (measuring ranges 0020)
- 3 = with two additional female threads 9/16-18 UNF 2B (SAE 6),  
(measuring ranges (0060, 0300, 0600)

#### Approval

- E = ATEX and IECEx see Applications/ Protection Types (Overview)

#### Isolation voltage

- N = 50 V AC

#### Protection types and applications: (code)

	ATEX	IECEX
1 =	I M1 Ex ia I Ma II 1G Ex ia IIC T6,T5 Ga II 1/2 G Ex ia IIC T6,T5 Ga/Gb II 2 G Ex ia IIC T6, T5 Gb II 1D Ex ia IIIC T85°C/T95°C Da	Ex ia I Ma Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIC T6, T5 Gb Ex ia IIIC T85°C/T95°C Da
9 =	II 3G Ex nA IIC T6, T5 Gc only in conjunction with electr. connection "6"	Ex nA IIC T6, T5 Gc
A =	II 1D Ex ta IIIC T80/T90°C T <sub>500</sub> T90/ T <sub>500</sub> T100 Da II 2D Ex tb IIIC T80/T90°C Db only in conjunction with electr. connection "6"	Ex ta IIIC T80/T90°C Da T <sub>500</sub> T90/ T <sub>500</sub> T100°C Da Ex tb IIIC T80/T90°C Db
C =	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90°C Dc	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90°C Dc

#### Modification number

- 000 = standard

### Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described please contact the relevant technical department.  
Subject to technical modifications.

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