

- **For metering liquids, gases and steam**
- **Graphic, 2-line display**
- **Magnet stick operation**
  - Configuration also possible with closed housing
- **Easily adjustable for new operating conditions**
- **Approvals for explosion protection**
  - ATEX
    - Ex d, Ex ia, Ex nA, c, dust-ignition proof
  - IECEx
    - Ex d, Ex ia, Ex nA, dust-ignition proof







---

**Contents**

<b>1</b>	<b>Device designs</b> .....	<b>3</b>
<b>2</b>	<b>Introduction and basics</b> .....	<b>4</b>
2.1	Float shapes .....	4
2.2	Operating conditions .....	5
<b>3</b>	<b>Technical data for indicator / converter</b> .....	<b>6</b>
3.1	Analog display with/without limit signal transmitter .....	6
3.2	Analog indicator with converter with or without LCD display .....	7
<b>4</b>	<b>Standard version, model FAM541</b> .....	<b>9</b>
4.1	Technical data .....	9
4.2	Material loads for process connections .....	9
4.3	Flow range tables .....	10
4.4	Dimensioned drawings .....	11
4.5	Ordering information .....	12
<b>5</b>	<b>Hygienic version, model FAM544</b> .....	<b>14</b>
5.1	Technical data .....	14
5.2	Material load for process connections .....	14
5.3	Flow range tables .....	15
5.4	Dimensioned drawings .....	16
5.5	Ordering information .....	17
<b>6</b>	<b>Version with PTFE liner, model FAM545</b> .....	<b>19</b>
6.1	Technical data .....	19
6.2	Material loads for process connections .....	19
6.3	Flow range tables .....	20
6.4	Dimensioned drawings .....	21
6.5	Ordering information .....	22
<b>7</b>	<b>Version with heating jacket, model FAM546</b> .....	<b>24</b>
7.1	Technical data .....	24
7.2	Material loads for process connections .....	24
7.3	Flow range tables .....	25
7.4	Dimensioned drawings .....	26
7.5	Ordering information .....	28
<b>8</b>	<b>Explosion-protection relevant information</b> .....	<b>30</b>
8.1	Safety-relevant information ATEX / IECEx .....	30
<b>9</b>	<b>Questionnaire</b> .....	<b>36</b>

## 1 Device designs

	FAM541	FAM544	FAM545	FAM546
	 G00448	 G00449	 G00450	 G00451
<b>Design</b>	Standard	Hygienic	PTFE liner	Heating jacket
Measurement value deviation	Class 1.6 VDE / VDI 3513	Class 1.6 VDE / VDI 3513	Class 2.5 VDE / VDI 3513	Class 1.6 VDE / VDI 3513
Reproducibility	0.25% from measured value			
Process connection	Flange acc. to DIN, ASME, JIS	Threads DIN 11851	Flange acc. to DIN, ASME, JIS	Flange acc. to DIN, ASME, JIS
Connection meter sizes	DN 15 (1/2") ... DN 100 (4")	DN 25 (1") ... DN 80 (3")	DN 25 (1") ... DN 80 (3")	DN 25 (1") ... DN 100 (4")
Max. temperature of measured medium	400 °C (752 °F)	140 °C (284 °F)	120 °C (248 °F)	400 °C (752 °F)
Max. pressure rating	PN 400 / class 2500	PN 40	PN 40 / class 300	PN 100 / class 600
<b>Indicator / converter</b>				
Protection class EN 60529	IP 65 / 67; NEMA 4X			
Indicator, mechanical	Analog indicator without limit signal transmitter; analog indicator with limit signal transmitter			
Indicator, electronic	Analog indicator with converter 4 ... 20 mA, with or without LCD display			
Communication	HART protocol (with converter only)			
Power supply	Without, for analog indicator without limit signal transmitter 8 V DC via isolated switch amplifier, for analog indicator with limit signal transmitter 10 ... 46 V DC (Ex: 10 ...30 V DC), for analog indicator with converter			
Paint	Epoxy finish 80 ... 100 µm; housing color: RAL 7012, cover color: RAL 9002			
<b>Approvals / certificates</b>				
Explosion protection acc. to ATEX / IECEx	Zone 0 / 1 / 2 / 21, see section Explosion-protection relevant			
EMC protection	The meters comply with the EMC requirements of EN 61326 and NAMUR Recommendation NE21.			
Hygienic and sterile requirements	without	EHEDG, FDA, 3A, in preparation	without	without
SIL approvals	Analog display with limit signal transmitter SIL 2 Analog indicator with converter: FMEDA rating		without	see model FAM541 / FAM544
<b>Materials</b>				
Materials in contact with medium	CrNi steel 1.4404 / 1.4571	CrNi steel 1.4404 / 1.4571	PTFE	CrNi steel 1.4404 / 1.4571
Meter housing	CrNi steel 1.4404 CrNi steel 1.4571	CrNi steel 1.4404	CrNi steel 1.4571	CrNi steel 1.4404 / 1.4571
Gaskets	Viton A (DN 15 only)	Viton A (DN 25 only)	PTFE	Viton A (DN 25 only)
Indicator housing	Al Si 12 ; material number 3.2582 (copper content 0.1%)			
Ordering information	Page 12	Page 17	Page 22	Page 28

## 2 Introduction and basics

### 2.1 Float shapes

VA Master FAM540 variable area flowmeters are installed vertically in a pipeline. The flow must travel in an upward direction.

Keep the meter as far as possible from pipeline vibrations and powerful magnetic fields. The pipeline should be the same size as the connection size of the flowmeter. Inlet and outlet straight pipe length are not required.

#### Installation recommendations

Refer to VDI/VDE Directive 3513 sheet 3, Selection and Installation Recommendations for Variable Area Flowmeters.

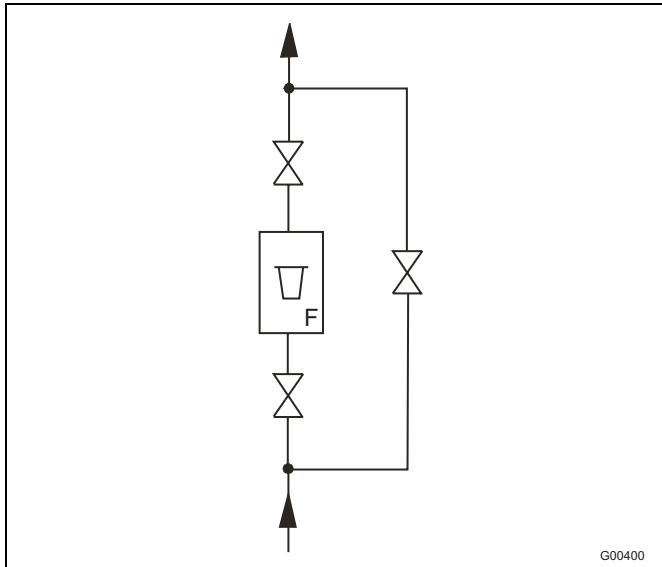


Fig. 1: Flowmeter installation

#### Float shape "S":

Basic shape of float.  
Lower flowrates, minimal pressure drops, essentially independent of viscosity; when metering gases, lower upstream pressure required.

#### Float shape "N":

Basic shape of float with "N" float head.  
Higher flow ranges, medium pressure drops, suitable for liquids with minimum viscosity; when metering gases, higher minimum upstream pressure requirements.

#### Float shape "X":

Basic shape of float with "X" float head.  
Highest flowrates, highest pressure drops, suitable for liquids with minimum viscosity; when metering gases, higher minimum upstream pressure requirements.

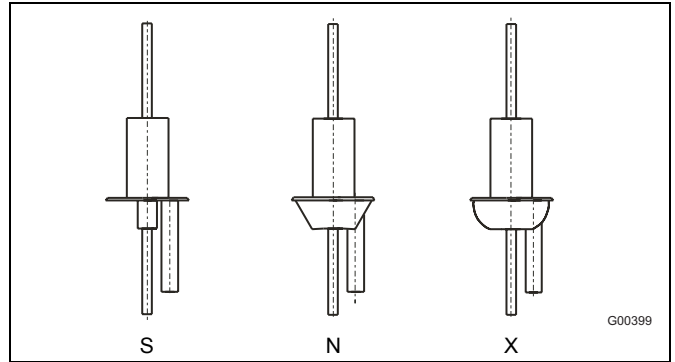


Fig. 2: Float shape overview

For range limits, based on meter size and float type, refer to the flow range tables.

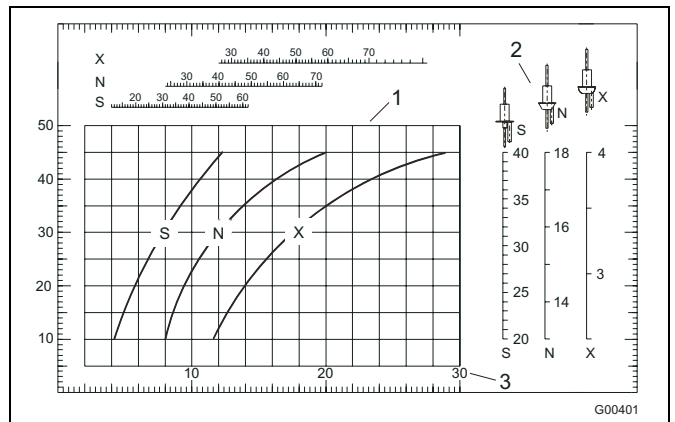


Fig. 3: Flowrate as a function of float shape and weight (example)

- 1 Pressure drop (dP in mbar)
- 2 Diameter of the float weight (mm)
- 3 x 1000 l/h water

## 2.2 Operating conditions

A variable area flowmeter is specified for a defined set of operating conditions. For liquids and gases, these are pressure and temperature-related properties (density and viscosity) under operating conditions. For gases, in particular, this means operating at a specific pressure and temperature. The specified accuracy of the instrument is always based on these operating conditions.

### Pressure drop

The available operating pressure at the flowmeter must be higher than the pressure drop listed for the flowmeter in these specifications. It is important to also consider the pressure drop downstream from the flowmeter due to losses in the pipeline and other fittings.

### Damping and compression oscillations when metering gases

If a specific critical volume is exceeded between the closest throttling locations up and downstream of the flowmeter, compression oscillations (float bounce) may occur when the operating pressure is low. If the minimum required upstream pressure listed in this specification is not maintained, then the flowmeter must include a gas damping option (see Fig. 4).

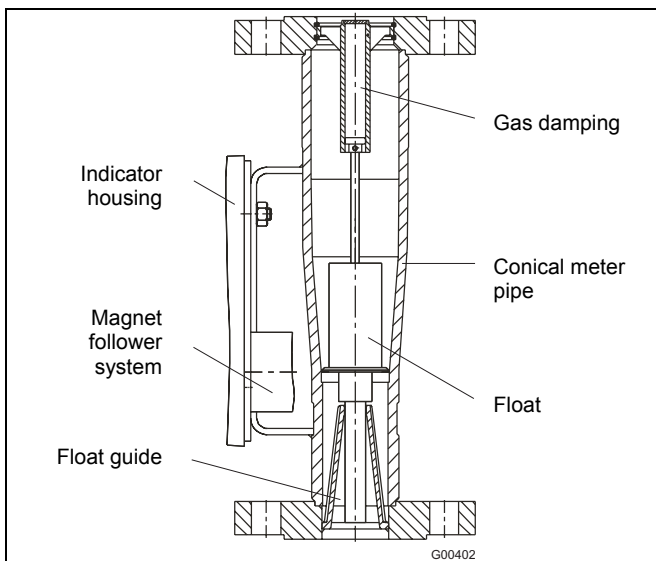


Fig. 4: Flowmeter with gas damping

To prevent self-generated compression oscillations, the following information should be taken into consideration:

- Select a flowmeter with the lowest possible pressure drop.
- Minimize the pipeline length between the flowmeter and the closest up or downstream throttling location.
- Increase the operating pressure, and consider its effect on the flowrate values due to the change in the gas density at the new operating conditions.

### Pressure shocks

Especially when metering gases, it is possible that pressure shock waves can occur when fast opening solenoid valves are employed and the pipeline volume is not throttled, or if there are gas bubbles in a liquid. As a result of the sudden expansion of the gas in the pipeline, the float is forcibly driven against the upper float stop. Under certain conditions, this can lead to destruction of the instrument. The installation of gas dampers will not compensate for such pressure shocks.

### Solids in the fluid

Variable area flowmeters can only be used under certain conditions for metering fluids containing solids. As a function of the concentration, particle size and type of solid, increased mechanical abrasion may occur especially at the critical metering edge of the float. In addition, solidified deposits on the float can change its weight and shape. These effects can, as a function of the float type, lead to erroneous measurement results. In general, the use of appropriate filters is recommended in such applications.

When metering fluids containing magnetic particles, we recommend the installation of a magnetic separator upstream of the flowmeter.

### Temperature diagram

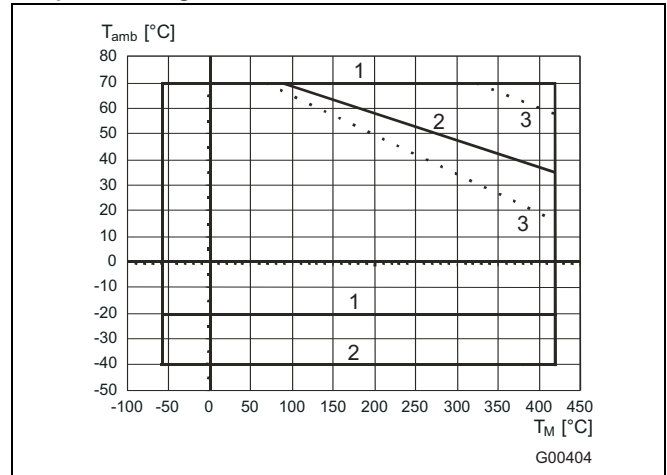


Fig. 5: Max. medium temperature ( $T_M$ ) and ambient temperature ( $T_{amb}$ )

- 1 Alarm output -20 ... 70 °C (-4 ... 158 °F)
- 2 Current output -40 ... 70 °C (-40 ... 158 °F)
- 3 With insulation

For Ex design, see chapter Explosion-protection relevant.

### Insulation

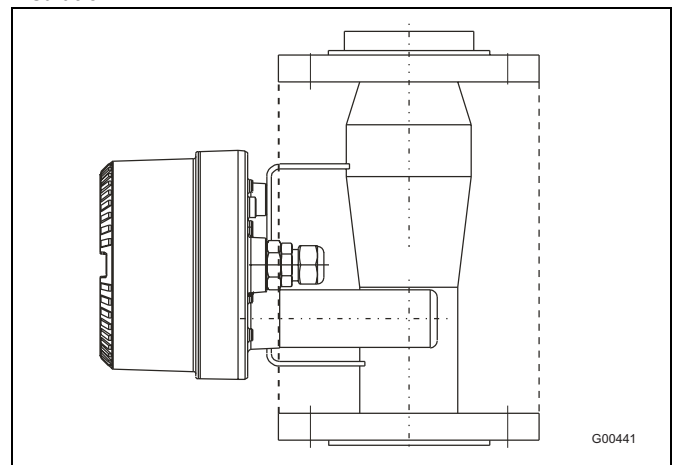


Fig. 6: Maximum insulation = Flange diameter

### 3 Technical data for indicator / converter

A magnet in the float translates the height of the float as a measurement for the flow to the decouple-proof magnet follower system of the flowmeter, which is directly connected to the indicator pointer.

For analog indicators, the flowrate is shown on the scale. For displays with intelligent dual wire converter, the indicator position is measured directly at the axis. A standard eddy-current brake is used to dampen indicator vibrations and ensure outstanding readability.

The indicator/converter unit is attached to the flowmeter with two screws in a reproducible manner. To facilitate installation, the indicator can be removed. A model plate on the flowmeter bracket allows you to assign the meter unique identifier.

#### 3.1 Analog display with/without limit signal transmitter

The mechanical analog indicators are available with or without limit signal transmitter. The limit signal transmitters are housed on an alarm module that can be subsequently added. It is available as single (min. or max. alarm) or dual alarm.



Fig. 7

##### Product highlights

- Limit signal transmitter can be added via compact slide-in module.
- The position of the limit signal settings is visible externally.
- Limit signals can be set on the scale.
- Decouple-proof and hysteresis-free magnet follower system.
- Meter conforms to NAMUR Recommendations NE43, NE53, NE107
- Install and deinstall the secondary portion on the primary flowmeter without opening the indicator housing.
- Reproducibility  $\pm 0.25\%$  of scale end value.

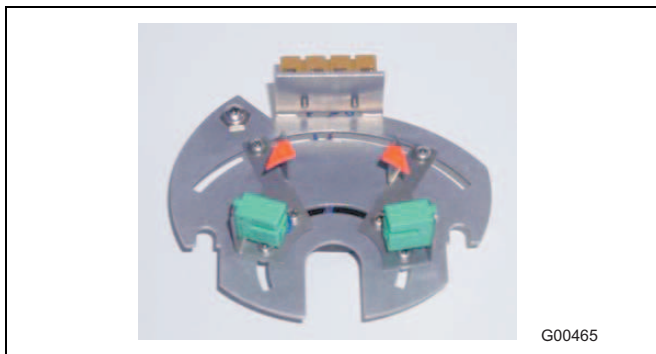


Fig. 8: Alarm module

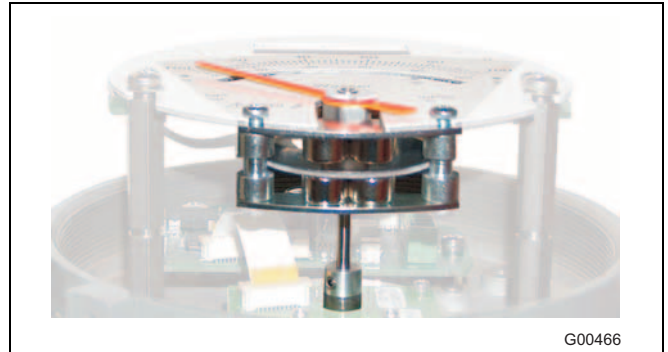


Fig. 9: Standard eddy-current brake

##### Version with limit signal transmitter

The alarm signal is triggered when the contact disc enters the slot initiator (contact opens). The alarms can be shifted without repositioning or removing the scale and are visible from the front.

Operating mode	bistable
Reproducibility	$\pm 0.5\%$ of scale end value
Nominal voltage	8 V DC (Ri approx. 1 k $\Omega$ )
Operating voltage	5 ... 25 V DC
Switching frequency, max	3 kHz

An isolated switch amplifier is required for limit signal transmitters:

Type	Auxiliary power	Channel
KFD2-SR2-Ex1.W No. D163A011U03	24 V, DC	1
KFA5-SR2-Ex1.W No. D163A011U01	115 V, AC	1
KFA6-SR2-Ex1.W No. D163A011U02	230 V, AC	1
KFD5-SR2-Ex2.W No. D163A011U06	24 V, DC	2
KFA5-SR2-Ex2.W No. D163A011U04	115 V, AC	2
KFA6-SR2-Ex2.W No. D163A011U05	230 V, AC	2

The isolated switch amplifiers from Pepperl & Fuchs are provided as examples; other amplifiers can also be used.

##### Terminal connection diagram

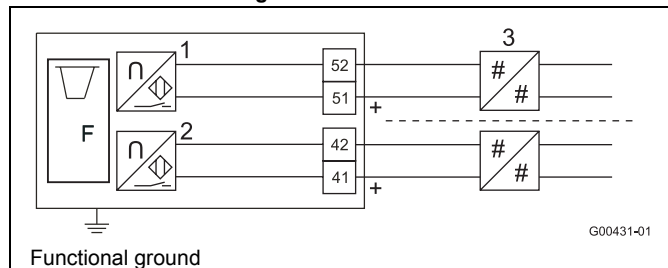


Fig. 10

- 1 Max. limit signal transmitter
- 2 Min. limit signal transmitter
- 3 Isolated switch amplifier
- F Flowmeter

### 3.2 Analog indicator with converter with or without LCD display

The electronic indicator with intelligent microprocessor converter is designed for 2-wire operation. An optional LCD display enables users to make local adjustments based on new measurement parameters. For models with LCD display, ABB recommends that you use a bar graph scale to avoid differences between a product scale and the flowrate shown on the display.



Fig. 11

#### Product highlights

- Display can be added later.
- Electronic min/max device alarms or pulse output.
- Configuration using HART communication via handheld terminal or DSV401 (SMART VISION).
- Measurement parameters can be made at any time (pressure and temperature influence, density, units, etc.).

Design with LCD display:

- flowrate and flow totalizer value display.
- Menu-guided configuration.
- Configuration using a magnet stick without opening the housing.

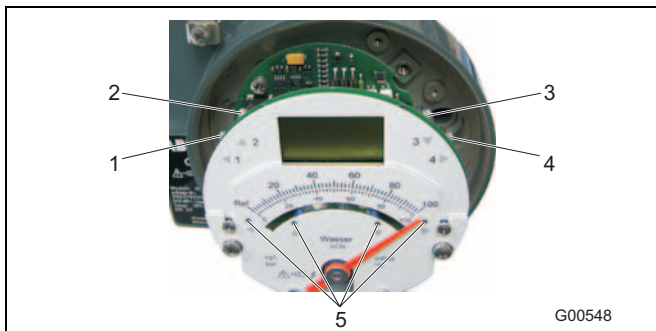


Fig. 12: Display with control buttons and magnet stick markings

- 1 Control button ◀
- 2 Control button ▲
- 3 Control button ▼
- 4 Control button ▶
- 5 Position for magnet stick operation

#### Note:

When the housing cover is open, the EMC protection is suspended.

#### Replacing the electronic unit

The electronic unit can be replaced in the event of a malfunction. Settings are updated immediately when the device is turned on.

#### LCD display

High contrast LCD display provides real-time flowrate and totalized flow.

Use 4 control buttons on device or externally via magnet stick with closed housing.

Enter information in the plain text dialog screen of the LCD display or by digital communication using HART protocol.

#### Current output terminals 31 / 32

The auxiliary power is connected to these terminals (10 ... 46 V DC). The 4 ... 20 mA output signal is also routed over these terminals.

In addition, terminals 31 / 32 support digital communication. An AC signal is superimposed on the analog output signal.

#### Programmable output terminals 41 / 42

The programmable output can be assigned a variety of functions.

The following options can be selected via the "Prog Output" software:

##### 1. Pulse output

The scaled pulse output (passive) can be designed either as a NAMUR contact (DIN 19234) or standard optocoupler ( $U_H = 16 \dots 30 \text{ V DC}$ ). The internal resistance for an open contact  $> 10 \text{ k}\Omega$  NAMUR. The pulse width can be configured between 5 ... 256 ms, but with max. 50% of the period. Max. frequency  $f_{max} = 50 \text{ Hz}$ .

##### 2. General Alarm

The error status for the meter and min/max alarms are collected and output. Configurable as normally closed or normally open contacts.

##### 3. Max-Min alarm

Configurable as normally closed or normally open contacts.

##### 4. No function (factory default)

This output has no function.

The following limits apply:

Max. allowable switching current 15 mA

Min. output voltage  $U_S 2 \text{ V DC}$

$U_S =$  Voltage for auxiliary power source

#### Damping

Configurable from 1 ... 100 s, corresponds to 5  $\tau$ .

#### Low flow cutoff

0 ... 5% for current and pulse output.

#### Function tests

Function tests can be used to test individual internal components. For commissioning and inspection, the current output can be simulated to match selected flowrates (manual process control). The binary output can also be controlled for functional checks.

#### Current output for alarm

Set the current output in case of alarm using the menu item "I out at Alarm" to 21 ... 23 mA (NAMUR NE43).

**Error message on the LCD display**

Automatic system monitoring with error diagnostics in plain text on the LCD display.

**Data security**

Automatic saving of the totalizer values and application conditions using EEPROM at shutdown or when supply voltage fails (over 10 years).

**3.2.1 Electrical connection**

**Terminal connection diagram**

**a) Auxiliary power from central power supply**

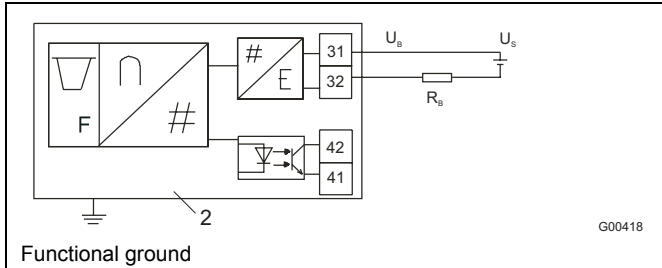


Fig. 13

**b) Auxiliary power from power supply**

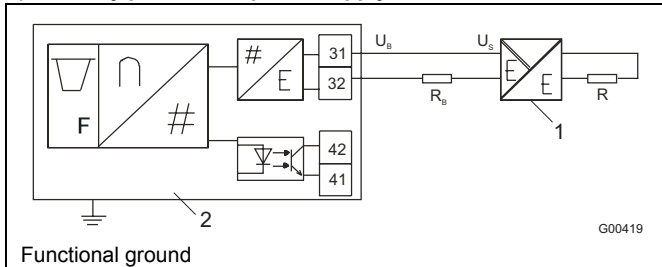


Fig. 14

- 1 Power supply
- 2 FAM540
- $U_B$  = Operating voltage
- $U_S$  = Supply voltage
- $R_B$  = Max. allowable load for power supply (e.g., indicator)
- $R$  = Max. allowable load for output circuit is determined by the power supply

**Auxiliary power (supply voltage)**

Standard: 10 ... 46 V DC  
 Ex design: 10 ... 30 V DC (see chapter **Explosion-protection relevant**)  
 Residual ripple: max. 5% or  $\pm 1.5 V_{SS}$

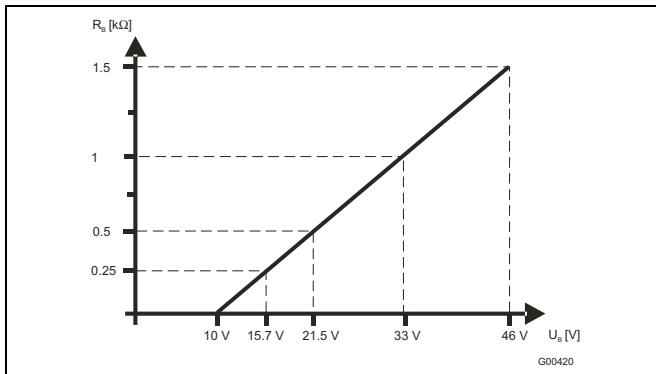


Fig. 15: Current output load diagram

**Current output load**

Min. > 250  $\Omega$ , max. 1500  $\Omega$  (with I on alarm = 23.0 mA)  
 Max. cable length 1500 m, AWG 24 twisted and shielded

**Power**

< 1 W

**Temperature influence on current output**

$\leq 8 \mu A/K$

For Ex design, see chapter Explosion-protection relevant.

**3.2.2 Digital communication**

**Communication HART protocol**

The HART® protocol is used for digital communication between a process control system or PC, a handheld terminal and the FAM540. All meter and measuring point parameters can be transmitted. In reverse direction, the integrated converter can also be configured in this manner.

The digital communication utilizes an AC signal superimposed on the analog current output (4-20 mA) that does not affect any meters connected to the output. To operate and configure the meter, the program DSV401 (SMART VISION) can be used.

DSV401 (SMART VISION) is a universal communication software for intelligent field devices that uses a variety of communication methods to enable full data transfer to a complete range of field devices. The main applications include parameter display, configuration, diagnostics, recording and data management for all intelligent field devices.

HART communication is performed via FSK modem with point-to-point or multidrop operation.

**Transmission method**

FSK modulation at current output of 4 ... 20 mA based on the Bell 202 standard. Max. signal amplitude 1.2 mA<sub>SS</sub>.

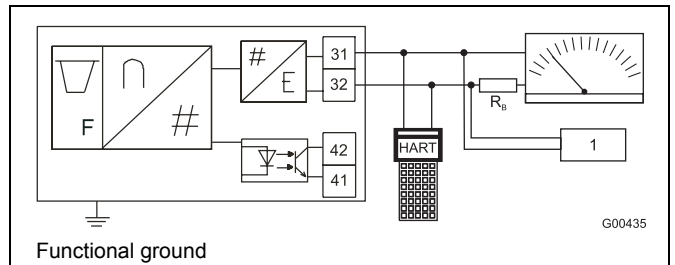


Fig. 16

- 1 Bell 202 modem
- $R_B$  Min. = 250  $\Omega$ , max. = 1500  $\Omega$

## 4 Standard version, model FAM541

### 4.1 Technical data

<b>Design</b>	Standard version in stainless steel					
<b>Measuring range</b> See 4.3 "Flow range tables"	Water at 20 °C (68 °F): 28 l/h ... 120 m <sup>3</sup> /h / 0.125 ... 540 gpm Air at 0 °C and 1013 mbar: 0.83 ... 1550 m <sup>3</sup> /h Qn / Air at 70 °F and 14.7 psia: 0.62 ... 960 scfm					
<b>Flow span</b>	10:1					
<b>Scales</b>	Percentage scale Direct reading scale					
<b>Accuracy</b>	Standard class 1.6 acc. to VDI 3513 page 2, optionally 1 % of full scale					
<b>Connections</b>	Flange acc. to EN 1092-1 (PN 16, PN 40), acc. to DIN 2501 (PN 63, PN 100) Flange with groove acc. to DIN 2501 Flange acc. to ASME B16.5					
<b>Pressure rating</b> See 4.2 "Material loads"	Standard pressure rating: PN 40 (PN 16 for DN 100 [4"]) Flange acc. to DIN / EN: PN 16, PN 40, PN 63, PN 100 Flange acc. to ASME: CL 150, CL 300, CL 600 Other designs and pressure ratings are available upon request					
<b>Max. perm. operating pressure</b>	64 bar, 100 bar, 160 bar, 250 bar (CL 600 / 900 / 1500 / 2500)					
<b>Installation length</b>	Flange design: 250 mm (9.84") DN 15 ... DN 100 (1/2 ... 4") Threaded connector: 300 mm (11.81") DN 15 ... DN 80 (1/2 ... 3")					
<b>Materials</b>	Metering tube: Stainless Steel 1.4404 (316 L) Insertion cone: Stainless Steel 1.4571 (316 Ti), DN 15 (1/2") only Flange: Stainless Steel 1.4404 (316 L) Float: Stainless Steel 1.4571 (316 Ti) standard Stainless Steel 1.4571 (316 Ti) / float head: Hastelloy C 2.4610, optionally Gas damping: Stainless Steel 1.4571 (316 Ti) Indicator housing: epoxy-coated aluminium alloy Housing gasket (O-ring): Buna N Viewing window: Shatterproof glass					
<b>Temperature ranges</b>	Permissible temperature of measured medium: -55 ... 400 °C (-67 ... 752 °F) Permissible ambient temperature: -40 ... 70 °C (-40 ... 158 °F) Refer to the temperature diagram on page 5. For Ex designs, see chapter Explosion-protection relevant.					
<b>Gas damping</b>	Prevents compression oscillations in case of gas measurements with low operating pressure					
<b>Weight (kg)</b>	Model	Meter size				
		DN 15 (1/2")	DN 25 (1")	DN 50 (2")	DN 80 (3")	DN 100 (4")
	Display with/without alarm	4.5	5.8	9.5	15.7	34.0
	4 ... 20 mA without display	4.5	5.8	9.5	15.7	34.1
	4 ... 20 mA with display	4.6	5.9	9.6	15.8	34.2
<b>SIL classifications</b>	SIL2 declaration of conformity for meters with alarm function Manufacturer's declaration (SIL1) acc. to IEC 61508 / IEC61511 for meters with 4 ... 20 mA current output					

### 4.2 Material loads for process connections

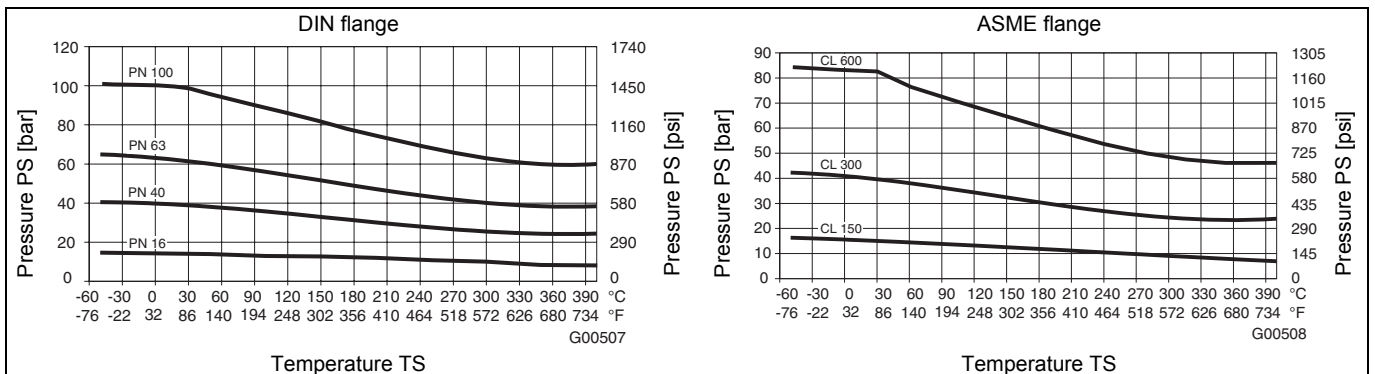


Fig. 17

## 4.3 Flow range tables

DN	Meas. range end value <sup>1)</sup> l/h water 1 kg/dm <sup>3</sup> , 1 mPa s	Qn m <sup>3</sup> /h air at 0 °C (32 °F); 1013 mbar (14.7 psia) <sup>2)</sup>	Metering tube / float combination	VIC <sup>3)</sup>	Pressure drop <sup>4)</sup> (mbar)	Min. req. upstream press. for gas meas- urement (bar abs) <sup>5)</sup>	
						without	with <sup>6)</sup>
<b>Installation length 250 mm (9.84")</b>							
15	28 ... 32	0.83 ... 0.95	1/2 in-30	6	80	4.0	1.0
	37 ... 43	1.10 ... 1.28	1/2 in-40	6	80	4.0	1.0
	44 ... 55	1.30 ... 1.63	1/2 in-50	6	80	4.0	1.0
	56 ... 64	1.66 ... 1.90	1/2 in-60	6	80	4.0	1.0
15	77 ... 83	2.29 ... 2.47	1/2 in-80	16	40	3.0	1.0
	96 ... 104	2.85 ... 3.09	1/2 in-100	16	45	3.2	1.0
	115 ... 125	3.42 ... 3.72	1/2 in-120	16	50	3.5	1.0
	144 ... 156	4.28 ... 4.64	1/2 in-150	16	60	3.8	1.0
	188 ... 212	5.59 ... 6.30	1/2 in-200	16	60	4.0	1.0
	235 ... 265	6.98 ... 7.88	1/2 in-250	16	65	4.2	1.0
	282 ... 318	8.38 ... 9.45	1/2 in-300	16	70	4.4	1.0
	376 ... 424	11.17 ... 12.60	1/2 in-400	16	75	4.6	1.0
	470 ... 530	13.97 ... 15.75	1/2 in-500	16	75	4.8	1.0
	565 ... 635	16.79 ... 18.87	1/2 in-600	16	80	5.0	1.0
750 ... 850	22.29 ... 25.26	1/2 in-800	16	85	5.4	1.0	
25	280 ... 656	8.32 ... 19.50	1 in-400 (1.050-S)	13 ... 21	20 ... 76	2.9 ... 3.1	3.0 ... 2.4
	393 ... 870	11.70 ... 25.85	1 in-600 (1.050-N)	7 ... 10	27 ... 76	3.0 ... 3.4	2.5 ... 2.3
	660 ... 1600	19.38 ... 50.80	1 in-1000 (1.113-S)	16 ... 22	20 ... 76	3.3 ... 4.3	2.4 ... 1.6
	975 ... 2370	28.98 ... 70.44	1 in-1600 (1.113-N)	8 ... 10	27 ... 82	3.3 ... 5.3	2.1 ... 1.9
	1650 ... 4020	49.04 ... 119.50	1 in-2500 (1.263-S)	17 ... 6	20 ... 76	4.2 ... 6.4	1.9 ... 1.7
	2585 ... 6170	76.83 ... 183.50	1 in-4000 (1.263-N)	8 ... 10	27 ... 82	5.2 ... 8.0	1.8 ... 1.6
50	4220 ... 12130	125.40 ... 360.50	2 in-8000 (1.330-S)	21 ... 38	11 ... 62	3.1 ... 4.5	1.6 ... 1.8
	7940 ... 18460	236.00 ... 548.60	2 in-12000 (1.330-N)	13 ... 17	24 ... 74	3.8 ... 6.2	1.8 ... 2.2
	11760 ... 24200	349.50 ... 720.00	2 in-18000 (1.330-X)	3 ... 4	28 ... 72	4.4 ... 7.5	2.0 ... 2.6
80	7000 ... 21010	208.00 ... 624.40	3 in-12000 (1.315-S)	22 ... 54	6 ... 48	3.4 ... 5.4	1.4 ... 2.0
	18090 ... 35010	537.70 ... 1040.00	3 in-25000 (1.315-N)	18 ... 25	24 ... 65	4.8 ... 7.4	1.6 ... 3.2
	26750 ... 53810	795.00 ... 1600.00	3 in-40000 (1.315-X)	4 ... 5	26 ... 68	6.0 ... 9.2	2.4 ... 4.0
100	25000 ... 50000		4 in-40000 (1.310-S)	60 ... 81	28 ... 74		
	50000 ... 120000		4 in-80000 (1.310-N)	24	42 ... 95		

1) The flowrate end value can be selected anywhere within these limits. The flow span is 10:1.

Example: Flowrate end value 12 m<sup>3</sup>/h water, flow span of meter 1.2 to 12 m<sup>3</sup>/h water.

2) Conversion factor (reference value) from l/h water to m<sup>3</sup>/h air at 0 °C (32 °F) and 1013 mbar (14.7 psia) = 0.03

3) Viscosity immunity ceiling (VIC). If the calculated VIC is less than or equal to the VIC value listed in the flow range table, then the viscosity does not affect the measurements.

$$VIC = \eta \cdot \sqrt{\frac{(\rho_{s-1}) \cdot 1}{(\rho_{s1} - \rho_1) \cdot \rho_1}}$$

$\eta$  = Dyn. viscosity of the measured medium [mPa s]

$\rho_s$  = density of the float acc. to table ( $r = 8.02$  g/cm<sup>3</sup>)

$\rho_{s1}$  = density of the float that is being used.

$\rho_1$  = Density of the measured medium.

If the calculated value is higher than the listed VIC value, then the flowmeters are provided with a scale at our factory to take into account the viscosity of the fluid.

4) The listed pressure drop values are based on the listed flowrate end value.

5) The minimum required pressure (abs) required to prevent compression oscillations (float bounce) in the meter pipe. The specifications with and without dampers are based on average installation conditions.

The values may be lower depending on the quality of the installation. The pressure drop in such cases must be considered as the minimum value. Some installations may have higher values.

6) Cylinder / piston damping. For meter sizes DN 15 ... DN 80 (1/2 ... 3").

4.4 Dimensioned drawings

FAM541 with current and/or alarm output

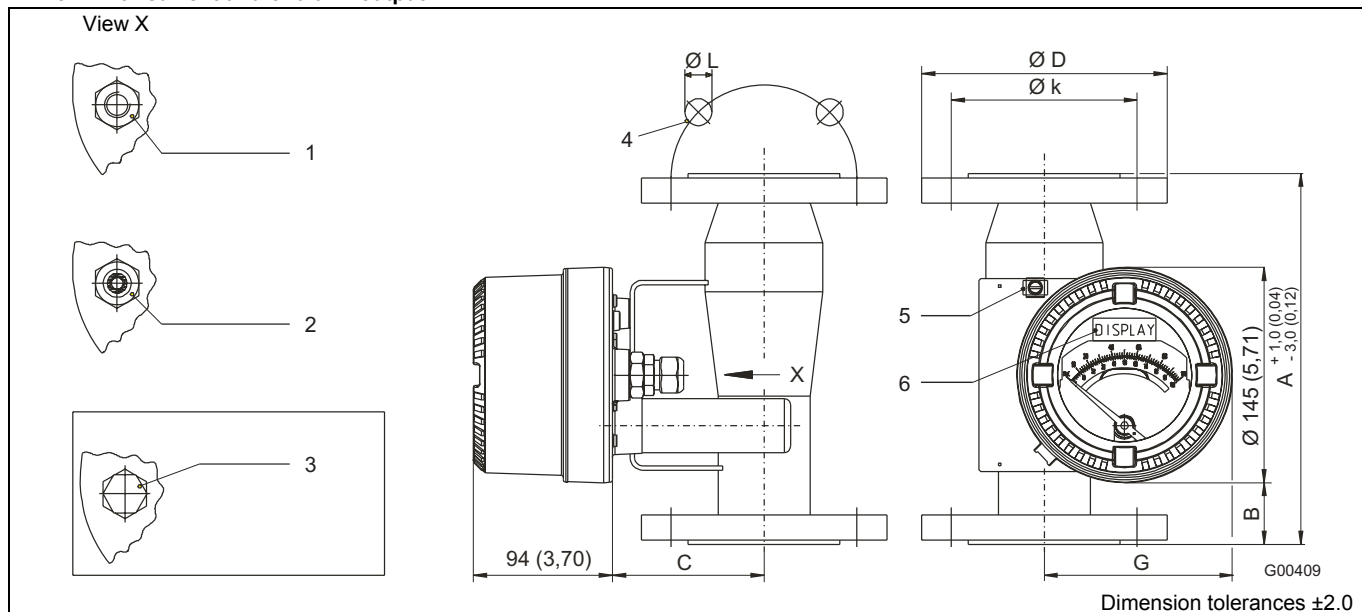


Fig. 18: All dimensions in mm

- 1 Threaded socket 1/2" NPT
- 2 Cable entry M20 x 1.5
- 3 Threaded plug M25 x 1.5 (FAM541-A only)
- 4 N number of holes
- 5 Protective conductor
- 6 FAM541-F only

Meter size	Press. rating		Standard design						
	PN	DN	Ø D	Ø k	Ø L	N	A	C	G
1/2"	40	15	95.0 (3.74)	65.0 (2.56)	14.0 (0.55)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
	63	15	105.0 (4.13)	75.0 (2.95)	14.0 (0.55)	4	258.0 (10.16)	87.0 (3.43)	118.0 (4.65)
	100	15	105.0 (4.13)	75.0 (2.95)	14.0 (0.55)	4	258.0 (10.16)	87.0 (3.43)	118.0 (4.65)
	CL 150	1/2"	89.0 (3.50)	60.3 (2.37)	15.9 (0.63)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
	CL 300	1/2"	95.2 (3.75)	66.7 (2.63)	15.9 (0.63)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
	CL 600	1/2"	95.2 (3.75)	66.5 (2.62)	15.7 (0.62)	4	260.0 (10.24)	87.0 (3.43)	118.0 (4.65)
1"	40	25	115.0 (4.53)	85.0 (3.35)	14.0 (0.55)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
	63	25	140.0 (5.51)	100.0 (3.94)	18.0 (0.71)	4	262.0 (10.31)	87.0 (3.43)	118.0 (4.65)
	100	25	140.0 (5.51)	100.0 (3.94)	18.0 (0.71)	4	262.0 (10.31)	87.0 (3.43)	118.0 (4.65)
	CL 150	1"	107.9 (4.25)	79.4 (3.13)	15.9 (0.63)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
	CL 300	1"	123.8 (4.87)	88.9 (3.50)	19.0 (0.75)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
	CL 600	1"	124.0 (4.88)	88.9 (3.50)	19.0 (0.75)	4	250.0 (9.84)	87.0 (3.43)	118.0 (4.65)
2"	40	50	165.0 (6.50)	125.0 (4.92)	18.0 (0.71)	4	250.0 (9.84)	102.0 (4.02)	130.0 (5.12)
	63	50	180.0 (7.09)	135.0 (5.31)	22.0 (0.87)	4	262.0 (10.31)	102.0 (4.02)	130.0 (5.12)
	100	50	195.0 (7.68)	145.0 (5.71)	26.0 (1.02)	4	266.0 (10.47)	102.0 (4.02)	130.0 (5.12)
	CL 150	2"	152.4 (6.00)	120.6 (4.75)	19.0 (0.75)	4	250.0 (9.84)	102.0 (4.02)	130.0 (5.12)
	CL 300	2"	165.1 (6.50)	127.0 (5.00)	19.0 (0.75)	8	250.0 (9.84)	102.0 (4.02)	130.0 (5.12)
	CL 600	2"	165.1 (6.50)	127.0 (5.00)	19.0 (0.75)	8	274.0 (10.79)	102.0 (4.02)	130.0 (5.12)
3"	40	80	200.0 (7.87)	160.0 (6.30)	18.0 (0.71)	8	250.0 (9.84)	132.0 (5.20)	144.0 (5.67)
	63	80	215.0 (8.46)	170.0 (6.69)	22.0 (0.87)	8	258.0 (10.16)	132.0 (5.20)	144.0 (5.67)
	100	80	230.0 (9.06)	180.0 (7.09)	26.0 (1.02)	8	272.0 (10.71)	132.0 (5.20)	144.0 (5.67)
	CL 150	3"	190.5 (7.50)	152.4 (6.00)	19.0 (0.75)	4	250.0 (9.84)	132.0 (5.20)	144.0 (5.67)
	CL 300	3"	209.5 (8.25)	168.3 (6.63)	22.2 (0.87)	8	250.0 (9.84)	132.0 (5.20)	144.0 (5.67)
	CL 600	3"	209.5 (8.25)	168.1 (6.62)	22.2 (0.87)	8	278.0 (10.94)	132.0 (5.20)	144.0 (5.67)
4"	16	100	220.0 (8.66)	180.0 (7.09)	18.0 (0.71)	8	250.0 (9.84)	147.0 (5.79)	158.0 (6.22)
	40	100	235.0 (9.25)	190.0 (7.48)	22.0 (0.87)	8	250.0 (9.84)	147.0 (5.79)	158.0 (6.22)
	63	100	250.0 (9.84)	200.0 (7.87)	26.0 (1.02)	8	262.0 (10.31)	147.0 (5.79)	158.0 (6.22)
	CL 150	4"	228.6 (9.00)	190.5 (7.50)	19.0 (0.75)	8	250.0 (9.84)	147.0 (5.79)	158.0 (6.22)
	CL 300	4"	254.0 (10.00)	200.0 (7.87)	22.2 (0.87)	8	266.0 (10.47)	147.0 (5.79)	158.0 (6.22)

All dimensions in mm

4.5 Ordering information

		Main Code																Add. Code	
Variant digit No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	XX
<b>Metal Cone Variable Area Flowmeter VA Master</b>		<b>FAM541</b>																	
<b>Display Type / Output Signal</b>																			
Analog indicator / Without																			
Analog indicator / Min-alarm																			
Analog indicator / Max-alarm																			
Analog Indicator / Min- and max-alarm																			
Analog indicator / 4 ... 20 mA with HART protocol																			
Analog indicator with LCD display / 4 ... 20 mA with HART protocol																			
<b>Housing Material / Cable Entry</b>																			
Aluminium / Cable gland M20 x 1.5																			
Aluminium / Thread 1/2 in NPT (Ex d with cable gland)																			
<b>Explosion Protection</b>																			
Without																			
ATEX / IECEx (Zone 2/21), Ex nA, c, Ex tD																			
ATEX / IECEx (Zone 1/21), Ex ia, Ex nA, c, Ex tD																			
ATEX / IECEx (Zone 1/21), Ex d, Ex ia, Ex nA, c, Ex tD																			
<b>Process Connection</b>																			
Flange																			
Flange with groove (DIN 2512)																			
<b>Meter Size</b>																			
DN 15 (1/2 in.)																			
DN 25 (1 in.)																			
DN 40 (1 1/2 in.)																			
DN 50 (2 in.)																			
DN 80 (3 in.)																			
DN 100 (4 in.)																			
<b>Float Design</b>																			
Standard																			
With gas damping																			
<b>Pressure Rating</b>																			
PN 16																			
PN 40																			
PN 63																			
PN 100																			
ASME CL 150																			
ASME CL 300																			
ASME CL 600																			
JIS K10																			
<b>Design Level</b>																			
(Specified by ABB)																			

see next page

- 1) Version with analog Display without output signal Type of Protection "c" not with IECEx possible
- 2) Only with cable entry 1/2 in. NPT
- 3) With Ex d cable gland

	Main Code											Add. Code	
	Variant digit No.												
	1 - 6	7	8	9	10	11	12	13	14	15	16	17	
	FAM541	X	X	X	X	X	X	X	X	X	X	X	XX
<b>Primary</b>													
Without, secondary only												4)	Y0
Standard													Y1
<b>Measuring Deviation</b>													
1 % of full scale													AA
4 % of full scale (high viscosity, without calculation)													AK
4 % of full scale (high viscosity, with calculation)													AL
<b>Certificates</b>													
Material monitoring with inspection certificate 3.1 acc. EN 10204													C2
Material monitoring with inspection certificate 3.2 acc. EN 10204													C3
Declaration of compliance with the order 2.1 acc. to EN 10204													C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test													C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI													CA
Pressure test acc. AD2000													CB
Declaration of compliance for accuracy 2.1 acc. to EN 10204													CM
Inspection certificate 3.1 acc. EN 10204 for calibration, with test report													CE
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204													CN
Test package (pressure test, non-destructive test, welder and welding procedure certificate)													CP
<b>Language of Documentation</b>													
German													M1
English													M5
West European or Scandinavian													MW
East European													ME
<b>Applications</b>													
Degreased for oxygen applications													P1
<b>Device Identification Plate</b>													
Stainless steel plate with TAG no.													T0
Adhesive label with TAG no.													TC
<b>Float Material</b>													
AISI 316Ti SST (1.4571)													F1
Hastelloy C-276													F3
<b>Scale Design</b>													
Direct reading scale													SD
Percentage scale													SP
Bargraph												5)	SB
<b>Ambient Temperature Range</b>													
Extended -40 ... 70 °C (-40 ... 158 °F) / -40 ... 60 °C (-40 ... 140 °F) with Ex protection Exd + Ex tD												6)	R5
Standard -20 ... 70 °C (-4 ... 158 °F) / -20 ... 60 °C (-4 ... 140 °F) with Ex protection Exd + Ex tD													R6

4) For Ex devices upon request only

5) Only with analog Display with LCD display possible

6) Not available with analog Display with alarms (code B, C, D)

## 5 Hygienic version, model FAM544

### 5.1 Technical data

<b>Design</b>	Hygienic design				
<b>Measuring range</b> See 5.3 "Flow range tables"	Water at 20 °C (68 °F): 28 l/h ... 53 m <sup>3</sup> /h / 0.125 ... 235 gpm Air at 0 °C and 1013 mbar: 0.83 ... 1550 m <sup>3</sup> /h Qn / Air at 70 °F and 14.7 psia: 0.62 ... 960 scfm				
<b>Flow range ratio</b>	10:1				
<b>Scales</b>	Percentage scale Direct reading scale				
<b>Accuracy</b>	Standard class 1.6 acc. to VDI 3513 page 2, optionally 1 % of full scale				
<b>Connections</b>	Threaded connector DIN 11851 (SC 25 ... SC 80)				
<b>Pressure rating</b> See 5.2 "Material loads"	Standard pressure rating: PN 25 at DN 50 ... DN 80 (2 ... 3"); PN 40 at DN 25 ... DN 40 (1 ... 1 1/2")				
<b>Max. perm. operating pressure</b>	40 bar (higher pressures available upon request)				
<b>Installation length</b>	Threaded connector DIN 11851: 270/272 mm (10.63/10.71") DN 50 ... DN 80 (2" ... 3") DN 15 (1/2") and DN 25 (1") available upon request Food industry design with threaded connector DIN 11851 (suitable for CIP cleaning, available upon request): 315 mm (12.40") DN 50 (2") 451 mm (17.76") DN 80 (3")				
<b>Materials</b>	Metering tube: Stainless Steel 1.4404 (316 L) Insertion cone: Stainless Steel 1.4571 (DN 15 [1/2"]: 316 Ti) only Float: Stainless Steel 1.4571 (316 Ti) standard Gas damping: Stainless Steel 1.4571 (316 Ti) Indicator housing: epoxy-coated aluminium alloy Housing gasket (O-ring): Buna N Viewing window: Shatterproof glass				
<b>Temperature ranges</b>	Permissible temperature of measured medium: -40 ... 140 °C (-40 ... 284 °F) Permissible ambient temperature: -40 ... 70 °C (-40 ... 158 °F) Refer to the temperature diagram on page 5. For Ex designs, see chapter Explosion-protection relevant.				
<b>Gas damping</b>	Prevents compression oscillations in case of gas measurements with low operating pressure				
<b>Weight (kg)</b>	Model	Meter size			
		DN 15 (1/2")	DN 25 (1")	DN 50 (2")	DN 80 (3")
	Display with/without alarm	4.5	5.8	9.0	15.7
	4 ... 20 mA without display	4.5	5.8	9.0	15.7
4 ... 20 mA with display	4.6	5.9	9.1	15.8	
<b>SIL classifications</b>	SIL2 declaration of conformity for meters with alarm function Manufacturer's declaration (SIL1) acc. to IEC 61508 / IEC61511 for meters with 4 ... 20 mA current output				

### 5.2 Material load for process connections

Process connection	Nominal size DN	PS <sub>max</sub>	TS <sub>max</sub>	TS <sub>min</sub>
Threaded pipe connection acc. to DIN 11851	15 ... 40 (1/2 ... 1 1/2")	40 bar (580 psi)	140 °C (284 °F)	-40 °C (-40 °F)
	50 ... 100 (2 ... 4")	25 bar (362 psi)	140 °C (284 °F)	-40 °C (-40 °F)

### 5.3 Flow range tables

This version has been specially constructed with threaded connections acc. to DIN 11851 to meet the demands of the food and beverage industry, and provides cleaning options to help meet biological requirements.

All parts that come into contact with the measured medium are welded and polished. There are no gaps or other dead areas. The meter is suitable for cleaning or sterilization with steam, acids and alkali. The meter is also suitable for CIP cleaning.

DN SC	Maximum flowrate l/h water <sup>1)</sup> 1 kg/dm <sup>3</sup> , 1 mPa s	VIN <sup>2)</sup>	Pressure drop <sup>3)</sup> (mbar)
50	3000	36	20
	4000	36	30
	6000	36	50
	10000	10	70
	15000	10	100
	20000 30000	12 12	60 100
80	34000 ... 50000	12	60 ... 100

- 1) Conversion factor (reference value) from l/h water to m<sup>3</sup>/h air at 0 °C (32 °F) and 1013 mbar (14.7 psia) = 0.03
- 2) Viscosity influence number (VIN). If the calculated VIN is less than or equal to the VIN value listed in the flow range table, then the viscosity does not affect the measurements.

$$VIN = \eta \cdot \sqrt{\frac{(\rho_s - 1) \cdot 1}{(\rho_{s1} - \rho_1) \cdot \rho_1}}$$

$\eta$  = Dyn. viscosity of the measured medium [mPa s]

$\rho_s$  = density of the float acc. to table ( $r = 8.02 \text{ g/cm}^3$ )

$\rho_{s1}$  = density of the float that is being used.

$\rho_1$  = Density of the measured medium.

If the calculated value is higher than the listed VIN value, then the flowmeters are provided with a scale at our factory to take into account the viscosity of the fluid.

- 3) The listed pressure drop values are based on the listed flowrate end value.

### 5.4 Dimensioned drawings

#### FAM544 with current and/or alarm output

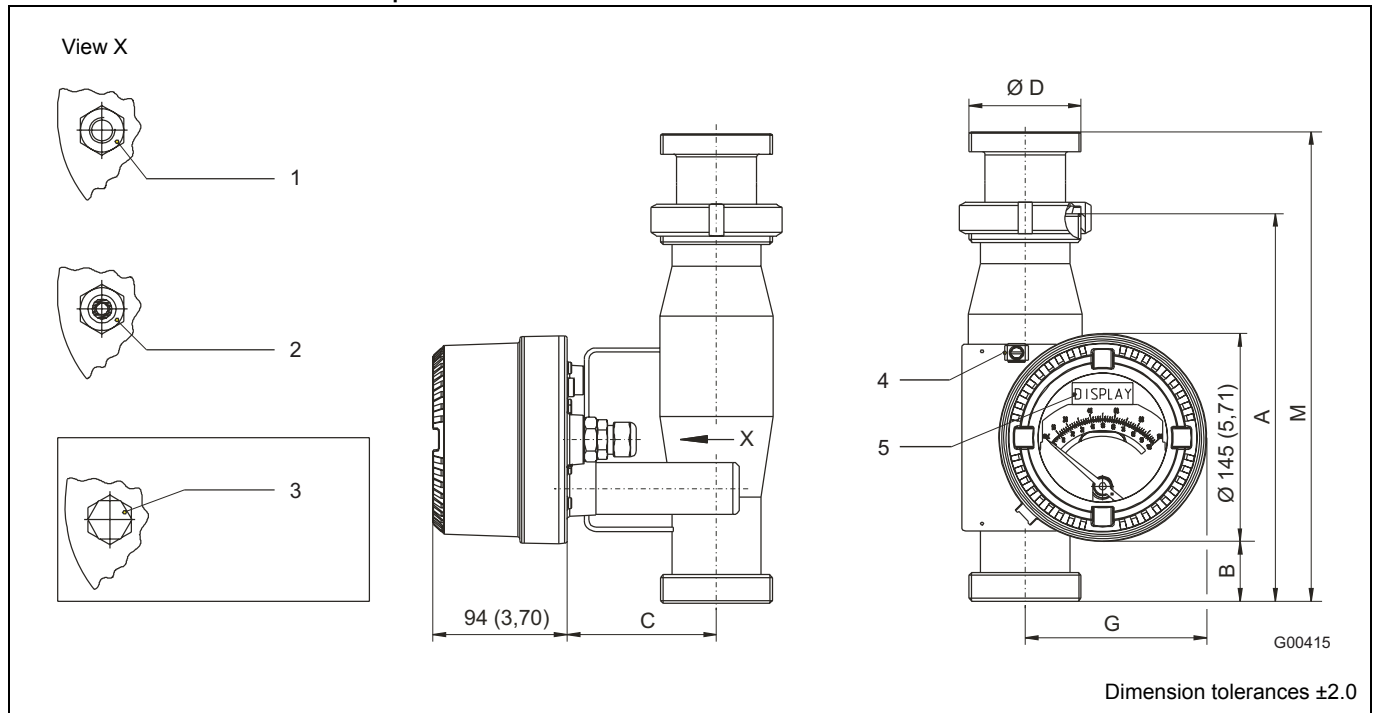


Fig. 19: All dimensions in mm

- 1 Threaded socket 1/2" NPT
- 2 Cable entry M20 x 1.5
- 3 Threaded plug M25 x 1.5 (FAM544-A only)
- 4 Protective conductor
- 5 FAM544-F only

Meter size	DN	PN	Ø D	A	B	C	G	M <sup>1)</sup>
1/2"	SC 25 (1")	<b>40</b>	Rd 52 x 1/6"	270.0 (10.63)	51.5 (2.03)	87.0 (3.43)	118.0 (4.65)	-
1"	SC 40 (1½")	<b>40</b>	Rd 65 x 1/6"	270.0 (10.63)	51.5 (2.03)	87.0 (3.43)	118.0 (4.65)	315.0 (12.40)
2"	SC 50 (2")	<b>25</b>	Rd 78 x 1/6"	270.0 (10.63)	51.5 (2.03)	102.0 (4.02)	130.0 (5.12)	315.0 (12.40)
3"	SC 80 (3")	<b>25</b>	Rd 110 x 1/6"	272.0 (10.71)	52.5 (2.07)	132.0 (5.20)	144.0 (5.67)	326.0 (12.83)

All dimensions in mm

1) Dimension A: Version with threaded connector DIN 11851  
 Dimension M: Hygienic version with threaded connectors acc. DIN 11851 (available upon request)

5.5 Ordering information

		Main Code																Add. Code	
Variant digit No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	XX
<b>Metal Cone Variable Area Flowmeter VA Master</b>		<b>FAM544</b>																	
<b>Display Type / Output Signal</b>																			
Analog indicator / Without																			
Analog indicator / Min-alarm																			
Analog indicator / Max-alarm																			
Analog Indicator / Min- and max-alarm																			
Analog indicator / 4 ... 20 mA with HART protocol																			
Analog indicator with LCD display / 4 ... 20 mA with HART protocol																			
<b>Housing Material / Cable Entry</b>																			
Aluminium / Cable gland M20 x 1.5																			
Aluminium / Thread 1/2 in NPT (Ex d with cable gland)																			
<b>Explosion Protection</b>																			
Without																			
ATEX / IECEx (Zone 2/21), Ex nA, c, Ex tD																			
ATEX / IECEx (Zone 1/21), Ex ia, Ex nA, c, Ex tD																			
ATEX / IECEx (Zone 1/21), Ex d, Ex ia, Ex nA, c, Ex tD																			
<b>Process Connection</b>																			
Thread DIN 11851																			
<b>Meter Size</b>																			
DN 25 (1 in.)																			
DN 40 (1 1/2 in.)																			
DN 50 (2 in.)																			
DN 80 (3 in.)																			
<b>Float Design</b>																			
Standard																			
With gas damping																			
<b>Pressure Rating</b>																			
PN 25																			
PN 40																			
<b>Design Level</b>																			
(Specified by ABB)																			

see next page

- 1) Version with analog Display without output signal Type of Protection "c" not with IECEx possible
- 2) Only with cable entry 1/2 in. NPT
- 3) With Ex d cable gland
- 4) Meter size DN 25 and 40 only possible with pressure rating PN 40  
 Meter size DN 50 and 80 only possible with pressure rating PN 25

	Main Code											Add. Code	
	Variant digit No.												
	1 - 6	7	8	9	10	11	12	13	14	15	16		17
	FAM544	X	X	X	X	X	X	X	X	X	X	X	XX
<b>Primary</b>													
Without, secondary only												5)	Y0
Standard													Y1
<b>Measuring Deviation</b>													
1 % of full scale													AA
4 % of full scale (high viscosity, without calculation)													AK
4 % of full scale (high viscosity, with calculation)													AL
<b>Certificates</b>													
Material monitoring with inspection certificate 3.1 acc. EN 10204													C2
Material monitoring with inspection certificate 3.2 acc. EN 10204													C3
Declaration of compliance with the order 2.1 acc. to EN 10204													C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test													C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI													CA
Pressure test acc. AD2000													CB
Declaration of compliance for accuracy 2.1 acc. to EN 10204													CM
Inspection certificate 3.1 acc. EN 10204 for calibration, with test report													CE
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204													CN
Test package (pressure test, non-destructive test, welder and welding procedure certificate)													CP
<b>Language of Documentation</b>													
German													M1
English													M5
West European or Scandinavian													MW
East European													ME
<b>Applications</b>													
Degreased for oxygen applications													P1
<b>Device Identification Plate</b>													
Stainless steel plate with TAG no.													T0
Adhesive label with TAG no.													TC
<b>Float Material</b>													
AISI 316Ti SST (1.4571)													F1
<b>Scale Design</b>													
Direct reading scale													SD
Percentage scale													SP
Bargraph												6)	SB
<b>Ambient Temperature Range</b>													
Extended -40 ... 70 °C (-40 ... 158 °F) / -40 ... 60 °C (-40 ... 140 °F) with Ex protection Exd + Ex tD												7)	R5
Standard -20 ... 70 °C (-4 ... 158 °F) / -20 ... 60 °C (-4 ... 140 °F) with Ex protection Exd + Ex tD													R6

5) For Ex devices upon request only

6) Only with analog Display with LCD display possible

7) Not available with analog Display with alarms (code B, C, D)

## 6 Version with PTFE liner, model FAM545

### 6.1 Technical data

<b>Design</b>	Version with PTFE liner			
<b>Measuring range</b> See 6.3 "Flow range tables"	Water at 20 °C (68 °F): 270 l/h ... 27 m <sup>3</sup> /h / 0.118 ... 118 gpm Air at 0°C and 1013 mbar: 9.4 ... 880 m <sup>3</sup> /h Qn / Air at 70°F and 14.7 psia: 5.7 ... 540 scfm			
<b>Flow range ratio</b>	10:1			
<b>Scales</b>	Percentage scale Direct reading scale			
<b>Accuracy</b>	Standard class 2.5 acc. to VDI 3513 page 2			
<b>Connections</b>	Flange acc. to DIN 2501 (DN 25 ... DN 80) Flange acc. to ASME B16.5			
<b>Pressure rating</b> See 6.2 "Material loads"	Standard pressure rating: PN 40 Flange acc. to DIN 2501: PN 40, PN 63 Flange acc. to ASME CL 150, CL 300			
<b>Max. perm. operating pressure</b>	50 bar (CL 600), (higher pressures available upon request)			
<b>Installation length</b>	260 mm (10.24") DN 25 (1") 375 mm (14.76") DN 50 (2") and DN 80 (3")			
<b>Materials</b>	Metering tube:	Stainless Steel 1.4571 (316 Ti)		
	Insertion cone:	PTFE		
	Flange:	Stainless Steel 1.4571 (316 Ti)		
	Float:	PTFE		
	Indicator housing:	epoxy-coated aluminium alloy		
	Housing gasket (O-ring):	Buna N		
	Viewing window:	Shatterproof glass		
<b>Temperature ranges</b>	Permissible temperature of measured medium: -20 ... 125 °C (-4 ... 257 °F) Permissible ambient temperature: -40 ... 70 °C (-40 ... 158 °F) Refer to the temperature diagram on page 5. For Ex designs, see chapter Explosion-protection relevant.			
<b>Gas damping</b>	Not supported			
<b>Weight (kg)</b>	Model	Meter size		
		DN 25 (1")	DN 50 (2")	DN 80 (3")
	Display with/without alarm	5.8	10.7	16.7
	4 ... 20 mA without display	5.8	10.7	16.7
	4 ... 20 mA with display	5.9	10.8	16.8



**Important**

For Ex devices in PTFE design, the minimum conductivity of the medium must be > 10<sup>-8</sup> S/m.  
(See chapter Explosion-protection relevant.)

### 6.2 Material loads for process connections

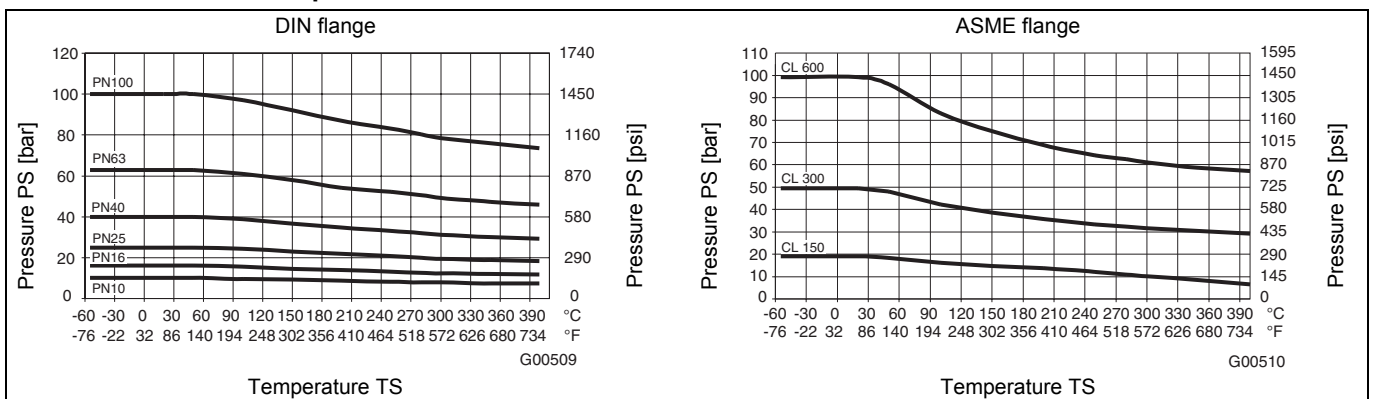


Fig. 20

### 6.3 Flow range tables

DN	Meas. range end value <sup>1)</sup> l/h water 1 kg/dm <sup>3</sup> , 1 mPa s	Qn m <sup>3</sup> /h air at 0 °C (32 °F); 1013 mbar (14.7 psia) <sup>2)</sup>	Metering tube / float combination	VIC <sup>3)</sup>	Pressure drop <sup>4)</sup> (mbar)
25	270 ... 370	8.02 ... 11.00	1 in-300	18	30 ... 55
	370 ... 530	11.00 ... 15.75	1 in-500	18	35 ... 60
	530 ... 750	15.75 ... 22.29	1 in-600	18	40 ... 65
	750 ... 1050	22.29 ... 31.21	1 in-900	18	45 ... 70
	1050 ... 1500	31.21 ... 44.58	1 in-1300	18	55 ... 80
	1500 ... 2100	44.58 ... 62.41	1 in-1800	18	65 ... 90
	2100 ... 3000	62.41 ... 89.16	1 in-2500	18	75 ... 100
50	2850 ... 3550	84.70 ... 105.50	2 in-3200	26	40 ... 80
	3550 ... 4450	105.50 ... 132.20	2 in-4000	26	45 ... 85
	4450 ... 5450	132.20 ... 162.00	2 in-5000	26	50 ... 90
	5450 ... 6750	162.00 ... 200.60	2 in-6000	26	60 ... 100
	6750 ... 8250	200.60 ... 245.20	2 in-7500	26	70 ... 110
	8250 ... 10000	245.20 ... 297.20	2 in-9100	26	90 ... 130
80	10000 ... 14000	294.20 ... 416.10	3 in-12000	36	40 ... 70
	14000 ... 19000	416.10 ... 564.70	3 in-16500	36	60 ... 90
	19000 ... 27000	564.70 ... 802.40	3 in-23000	20	80 ... 110

1) The flowrate end value can be selected anywhere within these limits. The flow span is 10:1.

Example: Flowrate end value 12 m<sup>3</sup>/h water. flow span of meter 1.2 to 12 m<sup>3</sup>/h water.

2) Conversion factor (reference value) from l/h water to m<sup>3</sup>/h air at 0 °C (32 °F) and 1013 mbar (14.7 psia) = 0.03

3) Viscosity influence number (VIC). If the calculated VIC is less than or equal to the VIC value listed in the flow range table. then the viscosity does not affect the measurements.

$$VIC = \eta \cdot \sqrt{\frac{(\rho_{s1} - \rho_1) \cdot 1}{(\rho_{s1} - \rho_1) \cdot \rho_1}}$$

$\eta$  = Dyn. viscosity of the measured medium [mPa s]

$\rho_s$  = density of the float acc. to table ( $r = 8.02 \text{ g/cm}^3$ )

$\rho_{s1}$  = density of the float that is being used.

$\rho_1$  = Density of the measured medium.

If the calculated value is higher than the listed VIC value. then the flowmeters are provided with a scale at our factory to take into account the viscosity of the fluid.

4) The listed pressure drop values are based on the listed flowrate end value.

### 6.4 Dimensioned drawings

#### FAM545 with current and/or alarm output

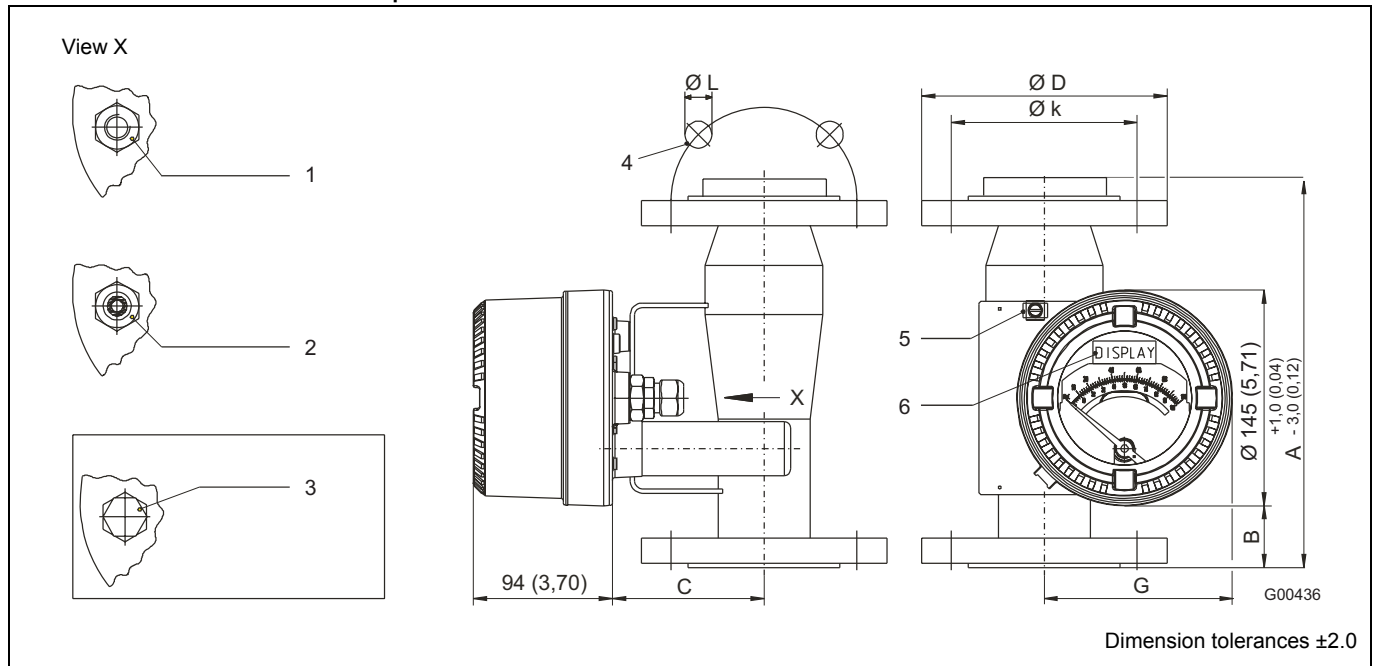


Fig. 21: All dimensions in mm

- 1 Threaded socket 1/2" NPT
- 2 Cable entry M20 x 1.5
- 3 Threaded plug M25 x 1.5 (FAM545-A only)
- 4 N number of holes
- 5 Protective conductor
- 6 FAM545-F only

Meter size	Press. rating	Standard design							
	PN	DN	Ø D	Ø k	Ø L	N	A	C	G
1"	40	25	115.0 (4.53)	85.0 (3.35)	14.0 (0.55)	4	260.0 (10.24)	87.0 (3.43)	118.0 (4.65)
	CL 150	1"	107.9 (4.25)	79.4 (3.13)	15.9 (0.63)	4	260.0 (10.24)	87.0 (3.43)	118.0 (4.65)
	CL 300	1"	123.8 (4.87)	88.9 (3.50)	19.0 (0.75)	4	260.0 (10.24)	87.0 (3.43)	118.0 (4.65)
2"	40	50	165.0 (6.50)	125.0 (4.92)	18.0 (0.71)	4	375.0 (14.76)	102.0 (4.02)	130.0 (5.12)
	CL 150	2"	152.4 (6.00)	120.6 (4.75)	19.0 (0.75)	4	375.0 (14.76)	102.0 (4.02)	130.0 (5.12)
	CL 300	2"	165.1 (6.50)	127.0 (5.00)	19.0 (0.75)	8	375.0 (14.76)	102.0 (4.02)	130.0 (5.12)
3"	40	80	200.0 (7.87)	160.0 (6.30)	18.0 (0.71)	8	375.0 (14.76)	132.0 (5.20)	144.0 (5.67)
	CL 150	3"	190.5 (7.50)	152.4 (6.00)	19.0 (0.75)	4	375.0 (14.76)	132.0 (5.20)	144.0 (5.67)
	CL 300	3"	209.5 (8.25)	168.3 (6.63)	22.2 (0.87)	8	375.0 (14.76)	132.0 (5.20)	144.0 (5.67)

All dimensions in mm

6.5 Ordering information

		Main Code																Add. Code	
Variant digit No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
<b>Metal Cone Variable Area Flowmeter VA Master</b>		<b>FAM545</b>																XX	
<b>Display Type / Output Signal</b>																			
Analog indicator / Without																			
Analog indicator / Min-alarm																			
Analog indicator / Max-alarm																			
Analog Indicator / Min- and max-alarm																			
Analog indicator / 4 ... 20 mA with HART protocol																			
Analog indicator with LCD display / 4 ... 20 mA with HART protocol																			
<b>Housing Material / Cable Entry</b>																			
Aluminium / Cable gland M20 x 1.5																			
Aluminium / Thread 1/2 in NPT (Ex d with cable gland)																			
<b>Explosion Protection</b>																			
Without																			
ATEX / IECEx, (Zone 2/21), Ex nA, c, Ex tD																			
ATEX / IECEx, (Zone 1/21), Ex ia, Ex nA, c, Ex tD																			
ATEX / IECEx, (Zone 1/21), Ex d, Ex ia, Ex nA, c, Ex tD																			
<b>Process Connection</b>																			
Flange																			
<b>Meter Size</b>																			
DN 25 (1 in.)																			
DN 50 (2 in.)																			
DN 80 (3 in.)																			
<b>Float Design</b>																			
Standard																			
<b>Pressure Rating</b>																			
PN 40																			
ASME CL 150																			
ASME CL 300																			
<b>Design Level</b>																			
(Specified by ABB)																			

see next page

- 1) Version with analog Display without output signal Type of Protection "c" not with IECEx possible
- 2) Only with cable entry 1/2 in. NPT
- 3) With Ex d cable gland

	Main Code											Add. Code	
	Variant digit No.												
	1 - 6	7	8	9	10	11	12	13	14	15	16		17
	FAM545	X	X	X	X	X	X	X	X	X	X	X	XX
<b>Primary</b>													
Without, secondary only												4)	Y0
Standard													Y1
<b>Measuring Deviation</b>													
4 % of full scale (high viscosity, without calculation)													AK
<b>Certificates</b>													
Material monitoring with inspection certificate 3.1 acc. EN 10204													C2
Material monitoring with inspection certificate 3.2 acc. EN 10204													C3
Declaration of compliance with the order 2.1 acc. to EN 10204													C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test													C6
Pressure test acc. AD2000													CB
Declaration of compliance for accuracy 2.1 acc. to EN 10204													CM
Inspection certificate 3.1 acc. EN 10204 for calibration, with test report													CE
Test package (pressure test, non-destructive test, welder and welding procedure certificate)													CP
<b>Language of Documentation</b>													
German													M1
English													M5
West European or Scandinavian													MW
East European													ME
<b>Applications</b>													
Degreased for oxygen applications													P1
<b>Device Identification Plate</b>													
Stainless steel plate with TAG no.													T0
Adhesive label with TAG no.													TC
<b>Float Material</b>													
PTFE													F2
<b>Scale Design</b>													
Direct reading scale													SD
Percentage scale													SP
Bargraph												5)	SB
<b>Ambient Temperature Range</b>													
Extended -40 ... 70 °C (-40 ... 158 °F) / -40 ... 60 °C (-40 ... 140 °F) with Ex protection Exd + Ex tD												6)	R5
Standard -20 ... 70 °C (-4 ... 158 °F) / -20 ... 60 °C (-4 ... 140 °F) with Ex protection Exd + Ex tD													R6

4) For Ex devices upon request only

5) Only with analog Display with LCD display possible

6) Not available with analog Display with alarms (code B, C, D)

## 7 Version with heating jacket, model FAM546

### 7.1 Technical data

<b>Design</b>	Heating jacket design				
<b>Measuring range</b> See 7.3 "Flow range tables"	Water at 20 °C (68 °F): 28 l/h ... 53 m <sup>3</sup> /h / 0.125 ... 235 gpm Air at 0°C and 1013 mbar: 0.83 ... 1550 m <sup>3</sup> /h Qn / Air at 70°F and 14.7 psia: 0.62 ... 960 scfm				
<b>Flow range ratio</b>	10:1				
<b>Scales</b>	Percentage scale Direct reading scale				
<b>Accuracy</b>	Standard class 1.6 acc. to VDI 3513 page 2, optionally 1 % of full scale				
<b>Connections</b>	Flange acc. to DIN 2501 (DN 50 [2"] ... DN 100 [4"]); acc. to EN 1092-1 (DN 25 [1"]) Flange acc. to ASME B16.5				
<b>Heating jacket connection</b>	Internal thread G 1/4, at the back of the flowmeter				
<b>Pressure rating</b> See 7.2 "Material loads"	Standard pressure rating: PN 40 (PN 16 for DN 100 [4"]) Flange acc. to DIN / EN: PN 16, PN 40, PN 63, PN 100 Flange acc. to ASME CL 150, CL 300, CL 600				
<b>Max. perm. operating pressure</b>	100 bar (CL 600), (higher pressures available upon request)				
<b>Installation length</b>	Heating jacket design: 250 mm (9.84"), meter size DN 15 ... DN 80 (1/2 ... 3")				
<b>Materials</b>	Metering tube:	Stainless Steel 1.4571 (316 Ti)			
	Insertion cone:	Stainless Steel 1 4571 (316 Ti), DN 15 (1/2") only			
	Flange:	Stainless Steel 1 4571 (316 Ti)			
	Float:	Stainless Steel 1 4571 (316 Ti) standard Stainless Steel 1 4571 (316 Ti) / float head: Hastelloy C (2.4610), optionally			
	Gas damping:	Stainless Steel 1.4571 (316 Ti)			
	Indicator housing:	epoxy-coated aluminium alloy			
	Housing gasket (O-ring):	Buna N			
	Viewing window:	Shatterproof glass			
<b>Temperature ranges</b>	Permissible temperature of measured medium: -55 ... 400 °C (-67 ... 752 °F) Permissible ambient temperature: -40 ... 70 °C (-40 ... 158 °F) Refer to the temperature diagram on page 5. For Ex designs, see chapter Explosion-protection relevant.				
<b>Gas damping</b>	Prevents compression oscillations in case of gas measurements with low operating pressure				
<b>Weight (kg)</b>	Model	Meter size			
		DN 25 (1")	DN 50 (2")	DN 80 (3")	DN 100 (4")
	Display with/without alarm	6.8	10.7	15.7	34
	4 ... 20 mA without display	6.8	10.7	15.7	34.1
4 ... 20 mA with display	6.9	10.8	15.8	34.2	
<b>SIL classifications</b>	SIL2 declaration of conformity for meters with alarm function Manufacturer's declaration (SIL1) acc. to IEC 61508 / IEC61511 for meters with 4 ... 20 mA current output				

### 7.2 Material loads for process connections

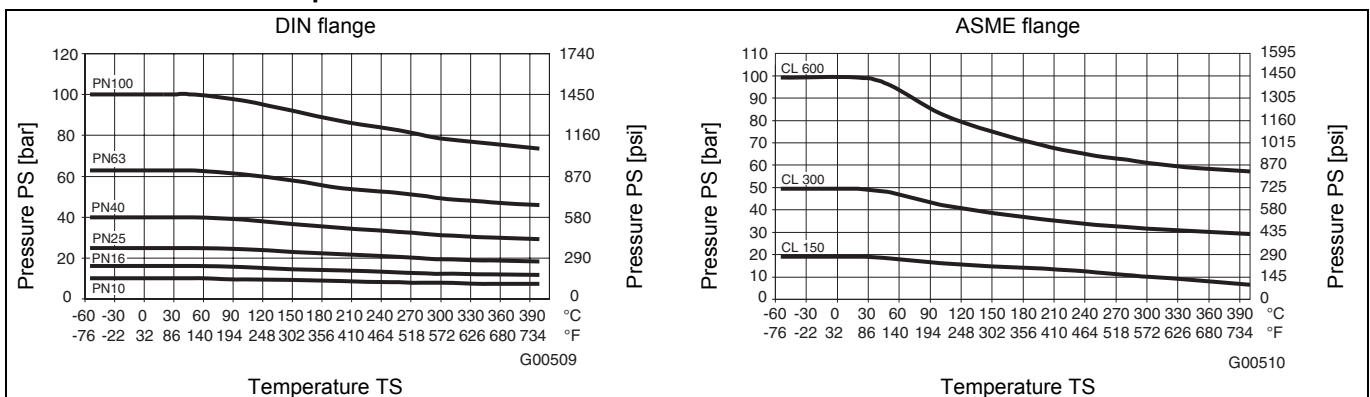


Fig. 22

7.3 Flow range tables

DN	Meas. range end value <sup>1)</sup> l/h water 1 kg/dm <sup>3</sup> , 1 mPa s	Qn m <sup>3</sup> /h air at 0 °C (32 °F); 1013 mbar (14.7 psia) <sup>2)</sup>	Metering tube / float combination	VIC <sup>3)</sup>	Pressure drop <sup>4)</sup> (mbar)	Min. req. upstream press. for gas meas- urement (bar abs) <sup>5)</sup> without                  with <sup>6)</sup>	
<b>Installation length 250 mm (9.84")</b>							
25 (1")	28 ... 32	0.83 ... 0.95	1/2 in-30	6	80	4.0	1.0
	37 ... 43	1.10 ... 1.28	1/2 in-40	6	80	4.0	1.0
	44 ... 55	1.30 ... 1.63	1/2 in-50	6	80	4.0	1.0
	56 ... 64	1.66 ... 1.90	1/2 in-60	6	80	4.0	1.0
25 (1")	77 ... 83	2.29 ... 2.47	1/2 in-80	16	40	3.0	1.0
	96 ... 104	2.85 ... 3.09	1/2 in-100	16	45	3.2	1.0
	115 ... 125	3.42 ... 3.72	1/2 in-120	16	50	3.5	1.0
	144 ... 156	4.28 ... 4.64	1/2 in-150	16	60	3.8	1.0
	188 ... 212	5.59 ... 6.30	1/2 in-200	16	60	4.0	1.0
	235 ... 265	6.98 ... 7.88	1/2 in-250	16	65	4.2	1.0
	282 ... 318	8.38 ... 9.45	1/2 in-300	16	70	4.4	1.0
	376 ... 424	11.17 ... 12.60	1/2 in-400	16	75	4.6	1.0
	470 ... 530	13.97 ... 15.75	1/2 in-500	16	75	4.8	1.0
	565 ... 635	16.79 ... 18.87	1/2 in-600	16	80	5.0	1.0
750 ... 850	22.29 ... 25.26	1/2 in-800	16	85	5.4	1.0	
50 (2")	280 ... 656	8.32 ... 19.50	1 in-400 (1.050-S)	13 ... 21	20 ... 76	2.9 ... 3.1	3.0 ... 2.4
	393 ... 870	11.70 ... 25.85	1 in-600 (1.050-N)	7 ... 10	27 ... 76	3.0 ... 3.4	2.5 ... 2.3
	660 ... 1600	19.38 ... 50.80	1 in-1000 (1.113-S)	16 ... 22	20 ... 76	3.3 ... 4.3	2.4 ... 1.6
	975 ... 2370	28.98 ... 70.44	1 in-1600 (1.113-N)	8 ... 10	27 ... 82	3.3 ... 5.3	2.1 ... 1.9
	1650 ... 4020	49.04 ... 119.50	1 in-2500 (1.263-S)	17 ... 6	20 ... 76	4.2 ... 6.4	1.9 ... 1.7
	2585 ... 6170	76.83 ... 183.50	1 in-4000 (1.263-N)	8 ... 10	27 ... 82	5.2 ... 8.0	1.8 ... 1.6
80 (3")	4220 ... 12130	125.40 ... 360.50	2 in-8000 (1.330-S)	21 ... 38	11 ... 62	3.1 ... 4.5	1.6 ... 1.8
	7940 ... 18460	236.00 ... 548.60	2 in-12000 (1.330-N)	13 ... 17	24 ... 74	3.8 ... 6.2	1.8 ... 2.2
	11760 ... 24200	349.50 ... 720.00	2 in-18000 (1.330-X)	3 ... 4	28 ... 72	4.4 ... 7.5	2.0 ... 2.6
100 (4")	7000 ... 21010	208.00 ... 624.40	3 in-12000 (1.315-S)	22 ... 54	6 ... 48	3.4 ... 5.4	1.4 ... 2.0
	18090 ... 35010	537.70 ... 1040.00	3 in-25000 (1.315-N)	18 ... 25	24 ... 65	4.8 ... 7.4	1.6 ... 3.2
	26750 ... 53810	795.00 ... 1600.00	3 in-40000 (1.315-X)	4 ... 5	26 ... 68	6.0 ... 9.2	2.4 ... 4.0

- 1) The flowrate end value can be selected anywhere within these limits. The flow span is 10:1.  
Example: Flowrate end value 12 m<sup>3</sup>/h water. flow span of meter 1.2 to 12 m<sup>3</sup>/h water.
- 2) Conversion factor (reference value) from l/h water to m<sup>3</sup>/h air at 0 °C (32 °F) and 1013 mbar (14.7 psia) = 0.03
- 3) Viscosity influence number (VIC). If the calculated VIC is less than or equal to the VIC value listed in the flow range table. then the viscosity does not affect the measurements.

$$VIC = \eta \cdot \sqrt{\frac{(\rho_{s-1}) \cdot 1}{(\rho_{s1} - \rho_1) \cdot \rho_1}}$$

- η = Dyn. viscosity of the measured medium [mPa s]
- ρ<sub>s</sub> = density of the float acc. to table (r = 8.02 g/cm<sup>3</sup>)
- ρ<sub>s1</sub> = density of the float that is being used.
- ρ<sub>1</sub> = Density of the measured medium.

If the calculated value is higher than the listed VIC value. then the flowmeters are provided with a scale at our factory to take into account the viscosity of the fluid.

- 4) The listed pressure drop values are based on the listed flowrate end value.
- 5) The minimum required pressure (abs) required to prevent compression oscillations (float bounce) in the meter pipe. The specifications with and without dampers are based on average installation conditions.  
The values may be lower depending on the quality of the installation. The pressure drop in such cases must be considered as the minimum value. Some installations may have higher values.
- 6) Cylinder / piston damping. For meter sizes DN 15 ... DN 80 (1/2 ... 3").

7.4 Dimensioned drawings

FAM546 with current and/or alarm output

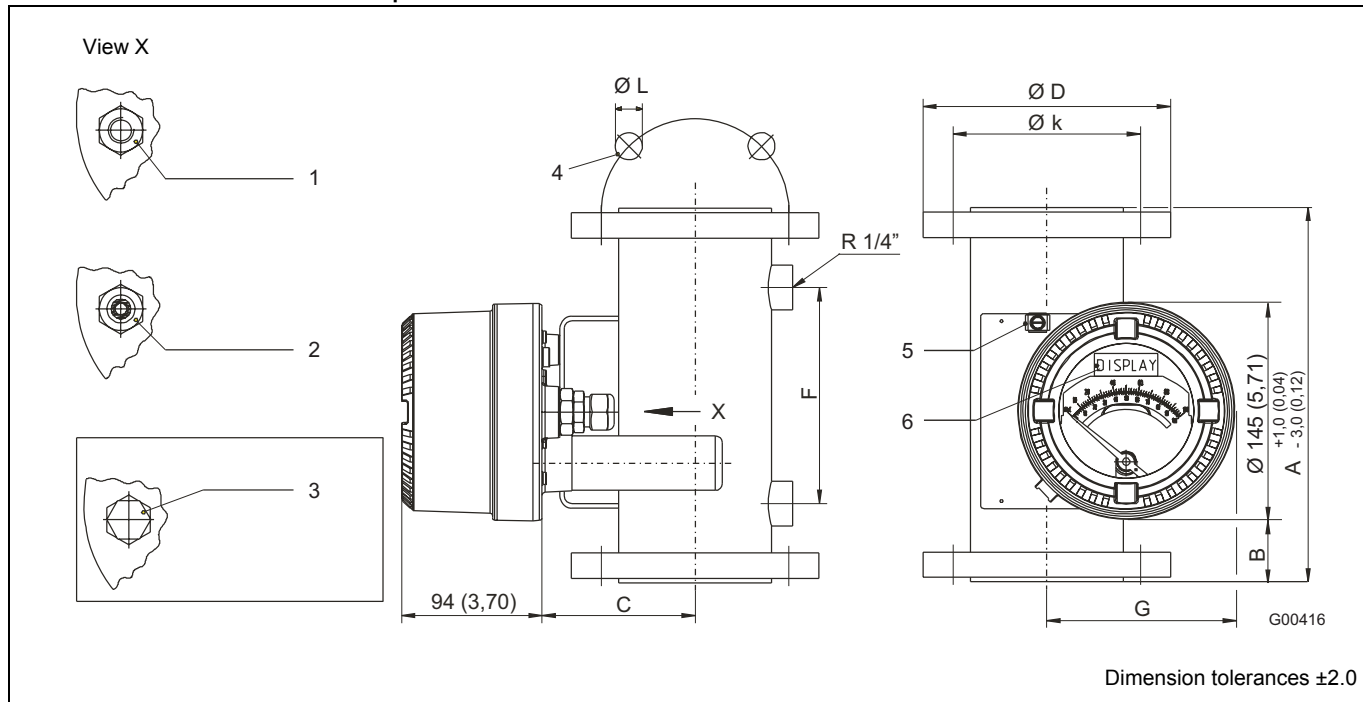


Fig. 23: All dimensions in mm

- 1 Threaded socket 1/2" NPT
- 2 Cable entry M20 x 1.5
- 3 Threaded plug M25 x 1.5 (FAM546-A only)
- 4 N number of holes
- 5 Protective conductor
- 6 FAM546-F only

Meter size	Pressure rating	Heating jacket design: Sheathing PN 16									
	PN	DN	Ø D	Ø k	Ø L	N	A	B	C	F	G
1/2"	40	25	115.0 (4.53)	85.0 (3.35)	14.0 (0.55)	4	258.0 (10.16)	45.5 (1.79)	87.0 (3.43)	170.0 (6.69)	118.0 (4.65)
	63 / 100	25	140.0 (5.51)	100.0 (3.94)	18.0 (0.71)	4	270.0 (10.63)	51.5 (2.03)	87.0 (3.43)	170.0 (6.69)	118.0 (4.65)
	CL 150	1"	107.9 (4.25)	79.4 (3.13)	15.9 (0.63)	4	258.0 (10.16)	45.5 (1.79)	87.0 (3.43)	170.0 (6.69)	118.0 (4.65)
	CL 300	1"	123.8 (4.87)	88.9 (3.50)	19.0 (0.75)	4	258.0 (10.16)	45.5 (1.79)	87.0 (3.43)	170.0 (6.69)	118.0 (4.65)
	CL 600	1"	124.0 (4.88)	88.9 (3.50)	19.0 (0.75)	4	270.0 (10.63)	51.5 (2.03)	87.0 (3.43)	170.0 (6.69)	118.0 (4.65)
1"	40	50	165.0 (6.50)	125.0 (4.92)	18.0 (0.71)	4	258.0 (10.16)	45.5 (1.79)	102.0 (4.02)	170.0 (6.69)	118.0 (4.65)
	63	50	180.8 (7.12)	135.0 (5.31)	22.0 (0.87)	4	270.0 (10.63)	51.5 (2.03)	102.0 (4.02)	170.0 (6.69)	118.0 (4.65)
	100	50	195.0 (7.68)	145.0 (5.71)	26.0 (1.02)	4	274.0 (10.79)	53.5 (2.11)	102.0 (4.02)	170.0 (6.69)	118.0 (4.65)
	CL 150	2"	152.4 (6.00)	120.7 (4.75)	19.0 (0.75)	4	258.0 (10.16)	45.5 (1.79)	102.0 (4.02)	170.0 (6.69)	118.0 (4.65)
	CL 300	2"	165.1 (6.50)	127.0 (5.00)	19.0 (0.75)	8	263.0 (10.35)	48.0 (1.89)	102.0 (4.02)	170.0 (6.69)	118.0 (4.65)
	CL 600	2"	165.1 (6.50)	127.0 (5.00)	19.0 (0.75)	8	284.0 (11.18)	58.5 (2.30)	102.0 (4.02)	170.0 (6.69)	118.0 (4.65)
2"	40	80	200.0 (7.87)	160.0 (6.30)	18.0 (0.71)	8	262.0 (10.31)	47.5 (1.87)	117.0 (4.61)	166.0 (6.54)	130.0 (5.12)
	63	80	215.0 (8.46)	170.0 (6.69)	22.0 (0.87)	8	270.0 (10.63)	51.5 (2.03)	117.0 (4.61)	166.0 (6.54)	130.0 (5.12)
	100	80	230.0 (9.06)	180.0 (7.09)	26.0 (1.02)	8	282.0 (11.10)	57.5 (2.26)	117.0 (4.61)	166.0 (6.54)	130.0 (5.12)
	CL 150	3"	190.5 (7.50)	152.4 (6.00)	19.0 (0.75)	4	262.0 (10.31)	47.5 (1.87)	117.0 (4.61)	166.0 (6.54)	130.0 (5.12)
	CL 300	3"	209.5 (8.25)	168.1 (6.62)	22.3 (0.88)	8	271.0 (10.67)	52.0 (2.05)	117.0 (4.61)	166.0 (6.54)	130.0 (5.12)
	CL 600	3"	209.5 (8.25)	168.1 (6.62)	22.2 (0.87)	8	292.0 (11.50)	58.5 (2.30)	117.0 (4.61)	166.0 (6.54)	130.0 (5.12)
3"	40	100	235.0 (9.25)	190.0 (7.48)	22.0 (0.87)	8	254.0 (10.00)	43.5 (1.71)	132.0 (5.20)	168.0 (6.61)	144.0 (5.67)
	63	100	250.0 (9.84)	200.0 (7.87)	26.0 (1.02)	8	266.0 (10.47)	49.5 (1.95)	132.0 (5.20)	168.0 (6.61)	144.0 (5.67)
	100	100	265.0 (10.43)	210.0 (8.27)	30.0 (1.18)	8	278.0 (10.94)	55.5 (2.19)	132.0 (5.20)	168.0 (6.61)	144.0 (5.67)
	CL 150	4"	228.6 (9.00)	190.5 (7.50)	19.0 (0.75)	8	254.0 (10.00)	43.5 (1.71)	132.0 (5.20)	168.0 (6.61)	144.0 (5.67)
	CL 300	4"	254.0 (10.00)	200.1 (7.88)	22.2 (0.87)	8	270.0 (10.63)	51.5 (2.03)	132.0 (5.20)	168.0 (6.61)	144.0 (5.67)
	CL 600	4"	273.0 (10.75)	215.9 (8.50)	25.4 (1.00)	8	290.0 (11.42)	61.5 (2.42)	132.0 (5.20)	168.0 (6.61)	144.0 (5.67)

All dimensions in mm



	Main Code											Add. Code	
	Variant digit No.												
	1 - 6	7	8	9	10	11	12	13	14	15	16		17
	FAM546	X	X	X	X	X	X	X	X	X	X	X	XX
<b>Primary</b>													
Without, secondary only												4)	Y0
Standard													Y1
<b>Measuring Deviation</b>													
1 % of full scale													AA
4 % of full scale (high viscosity, without calculation)													AK
4 % of full scale (high viscosity, with calculation)													AL
<b>Certificates</b>													
Material monitoring with inspection certificate 3.1 acc. EN 10204													C2
Material monitoring with inspection certificate 3.2 acc. EN 10204													C3
Declaration of compliance with the order 2.1 acc. to EN 10204													C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test													C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI													CA
Pressure test acc. AD2000													CB
Declaration of compliance for accuracy 2.1 acc. to EN 10204													CD
Inspection certificate 3.1 acc. EN 10204 for calibration, with test report													CE
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204													CN
Test package (pressure test, non-destructive test, welder and welding procedure certificate)													CP
<b>Language of Documentation</b>													
German													M1
English													M5
West European or Scandinavian													MW
East European													ME
<b>Applications</b>													
Degreased for oxygen applications													P1
<b>Device Identification Plate</b>													
Stainless steel plate with TAG no.													T0
Adhesive label with TAG no.													TC
<b>Float Material</b>													
AISI 316Ti SST (1.4571)													F1
Hastelloy C-276													F3
<b>Scale Design</b>													
Direct reading scale													SD
Percentage scale													SP
Bargraph												5)	SB
<b>Ambient Temperature Range</b>													
Extended -40 ... 70 °C (-40 ... 158 °F) / -40 ... 60 °C (-40 ... 140 °F) with Ex protection Exd + Ex tD												6)	R5
Standard -20 ... 70 °C (-4 ... 158 °F) / -20 ... 60 °C (-4 ... 140 °F) with Ex protection Exd + Ex tD													R6

4) For Ex devices upon request only

5) Only with analog Display with LCD display possible

6) Not available with analog Display with alarms (code B, C, D)

## 8 Explosion-protection relevant information

### 8.1 Safety-relevant information ATEX / IECEx

The meters are designed for maximum versatility. Each meter provides a combination of explosion protection types. All meters are suitable for use in areas with combustible dust.

#### 8.1.1 Approved installation sites

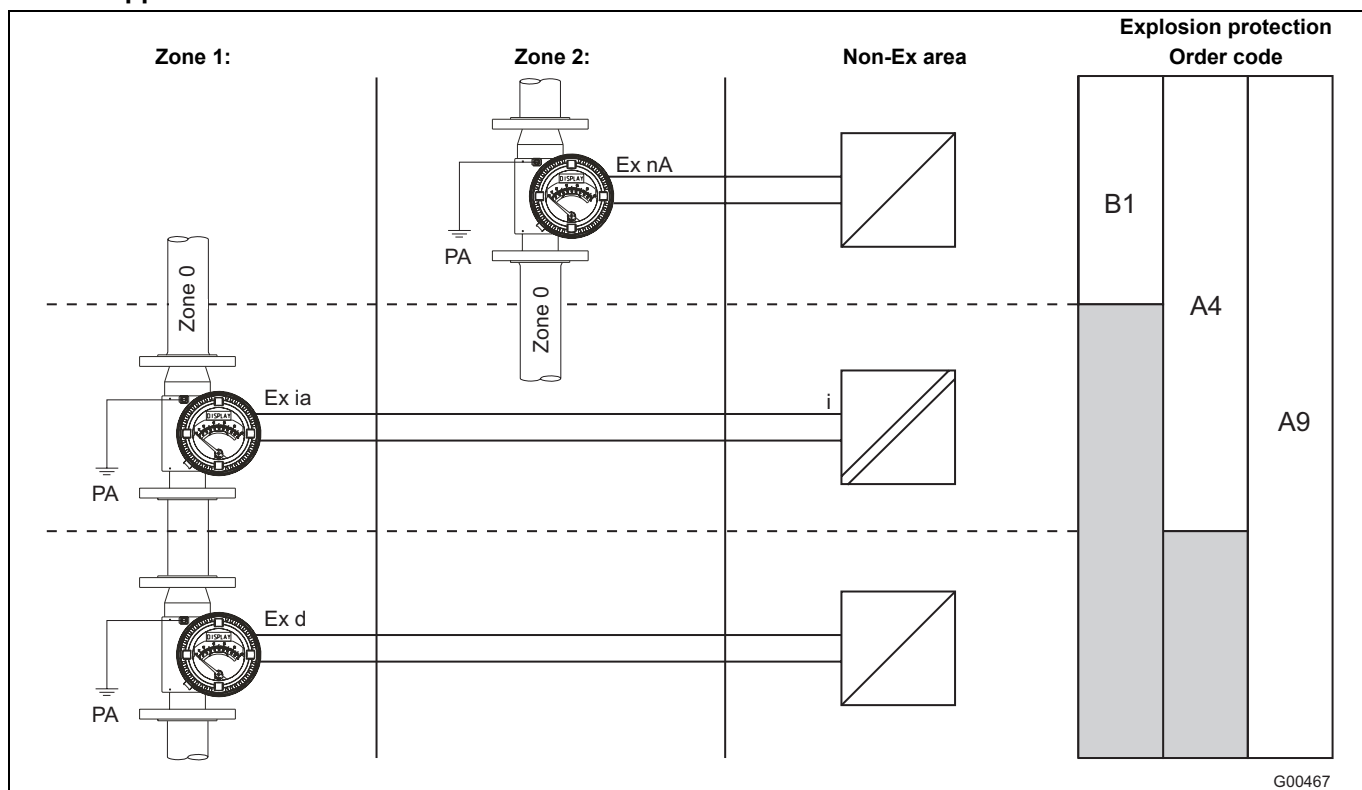


Fig. 24

PA Potential equalization

For detailed information and terminal assignments, see chapters Analog display with/without limit signal transmitter, page 6 and Electrical connection, page 8.

#### 8.1.2 Identification and protection classes

##### Analog indicator without limit signal transmitter

FAM54\_A\_

	Designation	Explosion protection type	Certificate	Ignition protection Order code	Limit value table no.
ATEX	II 1/2G c II T6 ... T1	Mechanical safety	KEMA 07ATEX0104X	A4	4
	II 2D c T85 °C ... T <sub>Medium</sub>	Mechanical safety		A9	
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)		B1	

T<sub>amb</sub> = -40 °C ... 60 °C (combustible dusts)

T<sub>amb</sub> = -40 °C ... 70 °C

## Analog indicator with limit signal transmitter

## FAM54\_B/C/D\_

	Designation	Explosion protection type	Certificate	Ignition protection Order code	Limit value table no.
ATEX	II 1/2G Ex c ia IIC T6 ... T1	Intrinsic safety	KEMA 07ATEX0104X	A4	2
	II 1/3G Ex c nA II T6 ... T1	nA (non-incendive component)			4
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			2, 4
IECEX	Ex ia IIC T6 ... T1	Intrinsic safety	IECEX KEM07.0037X	A4	2
	Ex nA II T6 ... T1	nA (non-incendive component)			4
	Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			2, 4
ATEX	II 1/2G Ex c d IIC T6 ... T1	Flameproof protection	KEMA 07ATEX0104X	A9	3
	II 1/2G Ex c ia IIC T6 ... T1	Intrinsic safety			2
	II 1/3G Ex c nA II T6 ... T1	nA (non-incendive component)			4
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			2, 3, 4
IECEX	Ex d IIC T6 ... T1	Flameproof protection	IECEX KEM07.0037X	A9	3
	Ex ia IIC T6 ... T1	Intrinsic safety			2
	Ex nA II T6 ... T1	nA (non-incendive component)			4
	Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			2, 3, 4
ATEX	II 1/3G Ex c nA II T6 ... T1	nA (non-incendive component)	KEMA 07ATEX0104X	B1	4
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			4
IECEX	Ex nA II T6 ... T1	nA (non-incendive component)	IECEX KEM07.0037X	B1	4
	Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			4

T<sub>amb</sub> = - 20 °C (-40 °C) ... 60 °C (combustible dusts)T<sub>amb</sub> = - 20 °C (-40 °C) ... 70 °C

## Analog indicator with transmitter with or without LCD display

## FAM54\_E/F\_

	Designation	Explosion protection type	Certificate	Ignition protection Order code	Limit value Table no.
ATEX	II 1/2G Ex c ia IIC T4 ... T1	Intrinsic safety	KEMA 07ATEX0104X	A4	1
	II 1/3G Ex c nA [nL] IIC T6 ... T1	nA (non-incendive component)			
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			
IECEX	Ex ia IIC T4 ... T1	Intrinsic safety	IECEX KEM07.0037X	A4	1
	Ex nA [nL] IIC T6 ... T1	nA (non-incendive component)			
	Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			
ATEX	II 1/2G Ex c d IIC T6 ... T1	Flameproof protection	KEMA 07ATEX0104X	A9	1
	II 1/2G Ex c ia IIC T4 ... T1	Intrinsic safety			
	II 1/3G Ex c nA [nL] IIC T6 ... T1	nA (non-incendive component)			
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			
IECEX	Ex d IIC T6 ... T1	Flameproof protection	IECEX KEM07.0037X	A9	1
	Ex ia IIC T4 ... T1	Intrinsic safety			
	Ex nA [nL] IIC T6 ... T1	nA (non-incendive component)			
	Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			
ATEX	II 1/3G Ex c nA [nL] IIC T6 ... T1	nA (non-incendive component)	KEMA 07ATEX0104X	B1	1
	II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			
IECEX	Ex nA [nL] IIC T6 ... T1	nA (non-incendive component)	IECEX KEM07.0037X	B1	1
	Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	Encapsulated device (dust-ignition proof)			

T<sub>amb</sub> = -40 °C ... 60 °C (combustible dusts)T<sub>amb</sub> = -40 °C ... 70 °C

8.1.3 Limit value tables

Table 1: Analog indicator with converter with or without LCD display

Explosion protection type: Hermetically sealed, intrinsically safe "nA" (non-incendive component), encapsulated device (dust-ignition proof)

Order code	Designation	Connection terminals	Input values	T <sub>amb</sub> -20 °C (-40 °C) ...	Temp. class	Max. Medium temp.	Therm. isolation	Heating jacket				
A4 A9	ATEX: II 1/2G Ex c ia IIC T4 ... T1 II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	31 / 32 for connection with an intrinsically safe circuit	U <sub>i</sub> = 30 V I <sub>i</sub> = 110 mA P <sub>i</sub> = 770 mW C <sub>i</sub> = 5.3 nF L <sub>i</sub> = 266 µH	40 °C	T1	440 °C	no	no				
				40 °C	T1	375 °C	yes	no				
				40 °C	T1	260 °C	yes	yes				
				50 °C	T1	300 °C	yes	no				
				50 °C	T2	290 °C	yes	no				
				50 °C	T2	220°C	yes	yes				
				60 °C	T2	320 °C	no	no				
	IECEX: Ex ia IIC T4 ... T1 Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	41 / 42 for connection with an intrinsically safe circuit	U <sub>i</sub> = 30 V I <sub>i</sub> = 30 mA P <sub>i</sub> = 115 mW C <sub>i</sub> = 4,8 nF L <sub>i</sub> = 133 µH	60 °C	T2	230 °C	yes	no				
				60 °C	T3	170 °C	yes	yes				
				70 °C	T3	195 °C	no	no				
				70 °C	T3	150 °C	yes	no				
				70 °C	T4	125 °C	yes	yes				
				A9	ATEX: II 1/2G Ex c d IIC T6 ... T1 II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	31 / 32 for connection with a non-intrinsically safe circuit <sup>1)</sup>	U <sub>max</sub> = 46 V	40 °C	T1	440 °C	no	no
								40 °C	T1	375 °C	yes	no
40 °C	T1	260 °C	yes					yes				
50 °C	T1	300 °C	yes					no				
50 °C	T2	290 °C	yes					no				
50 °C	T2	220°C	yes					yes				
60 °C	T2	320 °C	no					no				
IECEX: Ex d IIC T6 ... T1 Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	41 / 42 for connection with a non-intrinsically safe circuit <sup>1)</sup>	U <sub>max</sub> = 30 V I <sub>max</sub> = 30 mA P <sub>max</sub> = 115 mW	60 °C		T2	230 °C	yes	no				
			60 °C		T3	170 °C	yes	yes				
			60 °C		T4	130 °C	yes	yes				
			60 °C		T5	95 °C	yes	yes				
			60 °C		T6	80 °C	yes	yes				
			A4 A9 B1		ATEX: II 1/3G Ex c nA [nL] IIC T6 ... T1 II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	31 / 32 for connection with a non-intrinsically safe circuit <sup>1)</sup>	U <sub>max</sub> = 46 V	40 °C	T1	440 °C	no	no
								40 °C	T1	375 °C	yes	no
40 °C	T1	260 °C		yes				yes				
50 °C	T1	300 °C		yes				no				
50 °C	T2	290 °C		yes				no				
50 °C	T2	220°C		yes				yes				
60 °C	T2	320 °C		no				no				
IECEX: Ex nA [nL] IIC T6 ... T1 Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	41 / 42 for connection with a non-intrinsically safe circuit <sup>1)</sup>	U <sub>max</sub> = 30 V I <sub>max</sub> = 30 mA P <sub>max</sub> = 115 mW		60 °C	T2	230 °C	yes	no				
				60 °C	T3	170 °C	yes	yes				
				70 °C	T3	195 °C	no	no				
				70 °C	T3	150 °C	yes	no				
				70 °C	T4	130 °C	yes	yes				
				70 °C	T5	95 °C	yes	yes				
				30 °C	T6	25 °C	yes	yes				

Special conditions for explosion protection type "Encapsulated device" (dust-ignition proof) for the models with Ex protection (A4 and B1):

T<sub>Medium</sub> ≤ 250°C at T<sub>amb</sub> = -40 ... 60 °C

T<sub>Medium</sub> ≤ 340°C at T<sub>amb</sub> = -40 ... 40 °C

T<sub>Medium</sub> ≤ 430°C at T<sub>amb</sub> = -40 ... 20 °C

1) If the meter will be operated subsequently with explosion protection type "intrinsically safe", then U<sub>max</sub> = 60 V may not be exceeded.

**Table 2: Analog indicator with limit signal transmitter**

Explosion protection type: Intrinsic safety, encapsulated device (dust-ignition proof)

Order code	Designation	Connection terminals	Input values	T <sub>amb</sub> -20 °C (-40 °C) ...	Temp. class	Max. Medium temp.	Therm. isolation	Heating jacket
A4 A9	ATEX: II 1/2G Ex c ia IIC T6 ... T1 II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>  IECEX: Ex ia IIC T6 ... T1 Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	41 / 42 and 51 / 52 for connection with an intrinsically safe circuit	For each circuit  U <sub>i</sub> = 16 V I <sub>i</sub> = 25 mA P <sub>i</sub> = 64 mW C <sub>i</sub> = 50 nF L <sub>i</sub> = 250 µH	40 °C	T1	440 °C	no	no
				40 °C	T1	375 °C	yes	no
				40 °C	T1	260 °C	yes	yes
				50 °C	T1	300 °C	yes	no
				50 °C	T2	290 °C	yes	no
				50 °C	T2	220°C	yes	yes
				60 °C	T2	320 °C	no	no
				60 °C	T2	230 °C	yes	no
				60 °C	T3	170 °C	yes	yes
				70 °C	T3	195 °C	no	no
				70 °C	T3	150 °C	yes	no
				70 °C	T4	130 °C	yes	yes
		70 °C	T5	95 °C	yes	yes		
		60 °C	T6	80 °C	yes	yes		
		40 °C	T1	440 °C	no	no		
		40 °C	T1	375 °C	yes	no		
		40 °C	T1	260 °C	yes	yes		
		50 °C	T1	300 °C	yes	no		
		50 °C	T2	290 °C	yes	no		
		50 °C	T2	220°C	yes	yes		
		60 °C	T2	320 °C	no	no		
		60 °C	T2	230 °C	yes	no		
		60 °C	T3	170 °C	yes	yes		
		70 °C	T3	195 °C	no	no		
		70 °C	T3	150 °C	yes	no		
		70 °C	T4	130 °C	yes	yes		
		60 °C	T5	60 °C	yes	yes		
		50 °C	T5	90 °C	no	yes		
		40 °C	T6	60 °C	yes	yes		
		40 °C	T1	440 °C	no	no		
		40 °C	T1	310 °C	yes	no		
		40 °C	T2	190 °C	yes	yes		
		50 °C	T2	340 °C	no	no		
		50 °C	T2	230 °C	yes	yes		
		60 °C	T2	230°C	no	no		
		60 °C	T3	160 °C	yes	yes		
70 °C	T4	120 °C	no	no				
70 °C	T4	100 °C	yes	yes				
40 °C	T5	60 °C	yes	yes				
30 °C	T6	30 °C	yes	yes				

Special conditions for explosion protection type "Encapsulated device" (dust-ignition proof) for the models with Ex protection (A4 and B1):

T<sub>Medium</sub> ≤ 250°C at T<sub>amb</sub> = -20 ... 60 °C

T<sub>Medium</sub> ≤ 340°C at T<sub>amb</sub> = -20 ... 40 °C

T<sub>Medium</sub> ≤ 430°C at T<sub>amb</sub> = -20 ... 20 °C

**Table 3: Analog indicator with limit signal transmitter**

Explosion protection type: Hermetically sealed, encapsulated device (dust-ignition proof)

Order code	Designation	Connection terminals	Input values	T <sub>amb</sub> -20 °C (-40 °C) ...	Temp. class	Max. Medium temp.	Therm. isolation	Heating jacket
A9	ATEX: II 1/2G Ex c d IIC T6 ... T1 II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>  IECEX: Ex d IIC T6 ... T1 Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	41 / 42 and 51 / 52 for connection with a non-intrinsically safe circuit <sup>1)</sup>	For each circuit  U <sub>max</sub> = 16 V I <sub>max</sub> = 25 mA P <sub>max</sub> = 64 mW	40 °C	T1	440 °C	no	no
				40 °C	T1	375 °C	yes	no
				40 °C	T1	260 °C	yes	yes
				50 °C	T1	300 °C	yes	no
				50 °C	T2	290 °C	yes	no
				50 °C	T2	220 °C	yes	yes
				60 °C	T2	320 °C	no	no
				60 °C	T2	230 °C	yes	no
				60 °C	T3	170 °C	yes	yes
				70 °C	T3	195 °C	no	no
				70 °C	T3	150 °C	yes	no
				70 °C	T4	130 °C	yes	yes
		70 °C	T5	95 °C	yes	yes		
		60 °C	T6	80 °C	yes	yes		
		41 / 42 and 51 / 52 for connection with a non-intrinsically safe circuit <sup>1)</sup>	For each circuit  U <sub>max</sub> = 16 V I <sub>max</sub> = 52 mA P <sub>max</sub> = 169 mW	40 °C	T1	440 °C	no	no
				40 °C	T1	375 °C	yes	no
				40 °C	T1	260 °C	yes	yes
				50 °C	T1	300 °C	yes	no
				50 °C	T2	290 °C	yes	no
				50 °C	T2	220 °C	yes	yes
				60 °C	T2	320 °C	no	no
				60 °C	T2	230 °C	yes	no
				60 °C	T3	170 °C	yes	yes
				70 °C	T3	195 °C	no	no
				70 °C	T3	150 °C	yes	no
				70 °C	T4	130 °C	yes	yes
		60 °C	T5	60 °C	yes	yes		
		50 °C	T5	90 °C	no	yes		
		40 °C	T6	60 °C	yes	yes		
		41 / 42 and 51 / 52 for connection with a non-intrinsically safe circuit <sup>1)</sup>	For each circuit  U <sub>max</sub> = 16 V I <sub>max</sub> = 76 mA P <sub>max</sub> = 242 mW	40 °C	T1	440 °C	no	no
				40 °C	T1	310 °C	yes	no
				40 °C	T2	190 °C	yes	yes
				50 °C	T2	340 °C	no	no
				50 °C	T2	230 °C	yes	yes
				60 °C	T2	230 °C	no	no
				60 °C	T3	160 °C	yes	yes
70 °C	T4			120 °C	no	no		
70 °C	T4			100 °C	yes	yes		
40 °C	T5			60 °C	yes	yes		
30 °C	T6			30 °C	yes	yes		

Special conditions for explosion protection type "Encapsulated device" (dust-ignition proof) for the models with Ex protection (A9):

T<sub>Medium</sub> ≤ 250 °C at T<sub>amb</sub> = -20 ... 60 °C

T<sub>Medium</sub> ≤ 340 °C at T<sub>amb</sub> = -20 ... 40 °C

T<sub>Medium</sub> ≤ 430 °C at T<sub>amb</sub> = -20 ... 20 °C

<sup>1)</sup> If the meter will be operated subsequently with explosion protection type "intrinsically safe", then U<sub>max</sub> may not be exceeded.

**Table 4: Analog display with/without limit signal transmitter**

Explosion protection type: "nA" (non-incendive component), encapsulated device (dust-ignition proof)

Order code	Designation	Connection terminals	Input values	T <sub>amb</sub> -20 °C (-40 °C) ...	Temp. class	Max. Medium temp.	Therm. isolation	Heating jacket
A4 A9 B1	ATEX: II 1/3G Ex c nA II T6 ... T1 II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>  IECEX: Ex nA II T6 ... T1 Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>	41 / 42 and 51 / 52 for connection with a non-intrinsically safe circuit <sup>1)</sup>	For each circuit  U <sub>max</sub> = 16 V I <sub>max</sub> = 25 mA P <sub>max</sub> = 64 mW	40 °C	T1	440 °C	no	no
				40 °C	T1	375 °C	yes	no
				40 °C	T1	260 °C	yes	yes
				50 °C	T1	300 °C	yes	no
				50 °C	T2	290 °C	yes	no
				50 °C	T2	220 °C	yes	yes
				60 °C	T2	320 °C	no	no
				60 °C	T2	230 °C	yes	no
				60 °C	T3	170 °C	yes	yes
				70 °C	T3	195 °C	no	no
				70 °C	T3	150 °C	yes	no
				70 °C	T4	130 °C	yes	yes
		70 °C	T5	95 °C	yes	yes		
		60 °C	T6	80 °C	yes	yes		
		41 / 42 and 51 / 52 for connection with a non-intrinsically safe circuit <sup>1)</sup>	For each circuit  U <sub>max</sub> = 16 V I <sub>max</sub> = 52 mA P <sub>max</sub> = 169 mW	40 °C	T1	440 °C	no	no
				40 °C	T1	375 °C	yes	no
				40 °C	T1	260 °C	yes	yes
				50 °C	T1	300 °C	yes	no
				50 °C	T2	290 °C	yes	no
				50 °C	T2	220 °C	yes	yes
				60 °C	T2	320 °C	no	no
				60 °C	T2	230 °C	yes	no
				60 °C	T3	170 °C	yes	yes
				70 °C	T3	195 °C	no	no
				70 °C	T3	150 °C	yes	no
				70 °C	T4	130 °C	yes	yes
		60 °C	T5	60 °C	yes	yes		
		50 °C	T5	90 °C	no	yes		
		40 °C	T6	60 °C	yes	yes		
		41 / 42 and 51 / 52 for connection with a non-intrinsically safe circuit <sup>1)</sup>	For each circuit  U <sub>max</sub> = 16 V I <sub>max</sub> = 76 mA P <sub>max</sub> = 242 mW	40 °C	T1	440 °C	no	no
				40 °C	T1	310 °C	yes	no
				40 °C	T2	190 °C	yes	yes
				50 °C	T2	340 °C	no	no
				50 °C	T2	230 °C	yes	yes
				60 °C	T2	230 °C	no	no
				60 °C	T3	160 °C	yes	yes
70 °C	T4			120 °C	no	no		
70 °C	T4			100 °C	yes	yes		
40 °C	T5			60 °C	yes	yes		
30 °C	T6			30 °C	yes	yes		
A4 A9 B1	ATEX: II 1/2G c II T6 ... T1 II 2D c T85 °C ... T <sub>Medium</sub> II 2D Ex tD A21 IP6X T85 °C ... T <sub>Medium</sub>			n.a.	n.a.	70 °C	T1	440 °C
		70 °C	T2			290 °C	yes	yes
		70 °C	T3			190 °C	yes	yes
		70 °C	T4			130 °C	yes	yes
		70 °C	T5			95 °C	yes	yes
		70 °C	T6			80 °C	yes	yes

Special conditions for explosion protection type "Encapsulated device" (dust-ignition proof) for the models with Ex protection (A4, A9 and B1):

T<sub>Medium</sub> ≤ 250 °C at T<sub>amb</sub> = -40 ... 60 °C

T<sub>Medium</sub> ≤ 340 °C at T<sub>amb</sub> = -40 ... 40 °C

T<sub>Medium</sub> ≤ 430 °C at T<sub>amb</sub> = -40 ... 20 °C

1) If the meter will be operated subsequently with explosion protection type "intrinsically safe", then U<sub>max</sub> may not be exceeded.

**9 Questionnaire**

<b>Customer:</b>	<b>Date:</b>
<b>Ms./Mr.:</b>	<b>Department</b>
<b>Telephone:</b>	<b>Fax:</b>

**Description of material to be measured:**  \_\_\_\_\_

<input type="checkbox"/> liquid	purified	<input type="checkbox"/> yes
<input type="checkbox"/> gaseous		<input type="checkbox"/> no
<input type="checkbox"/> transparent	Solids	<input type="checkbox"/> yes
<input type="checkbox"/> non-transparent		<input type="checkbox"/> no
<input type="checkbox"/> translucent	Size _____	

**Flowrate:**

min. _____	norm. _____	max. _____
<input type="checkbox"/> l/min	<input type="checkbox"/> l/h	<input type="checkbox"/> m <sup>3</sup> /min
<input type="checkbox"/> cm <sup>3</sup> /min	<input type="checkbox"/> kg/min	<input type="checkbox"/> g/min
<input type="checkbox"/> other _____		<input type="checkbox"/> m <sup>3</sup> /min
		<input type="checkbox"/> kg/h

If a vol. gas measurement refers to standard state, (Qv)s should be added to the flowrate unit.

Operating temperature: normal \_\_\_\_\_ max. \_\_\_\_\_

Operating pressure: Upstream pressure (P1) \_\_\_\_\_ Downstream pressure (P1) \_\_\_\_\_ max. \_\_\_\_\_

Gases: Standard density (ρn) \_\_\_\_\_ kg/m<sup>3</sup> Viscosity \_\_\_\_\_ mPa s

Fluid: Concentration \_\_\_\_\_ Vol. % \_\_\_\_\_ Wgt. %

Density at operating temperature \_\_\_\_\_ kg/dm<sup>3</sup>

Viscosity at operating temperature \_\_\_\_\_ mPa s

**Materials:**

Metering tube \_\_\_\_\_

Float \_\_\_\_\_

Gaskets \_\_\_\_\_

Other metal parts that come into contact with metered materials \_\_\_\_\_

**Connections:**

	<b>Inlet</b>	<input type="checkbox"/> left	<input type="checkbox"/> right	<input type="checkbox"/> front	<input type="checkbox"/> rear	<input type="checkbox"/> from below
	<b>Outlet</b>	<input type="checkbox"/> left	<input type="checkbox"/> right	<input type="checkbox"/> front	<input type="checkbox"/> rear	<input type="checkbox"/> from above
		<input type="checkbox"/> Threads		<input type="checkbox"/> Flange		<input type="checkbox"/> Hose nozzle
		<input type="checkbox"/> Threaded connector acc. to DIN 11851				other _____

**Installation type:**

<input type="checkbox"/> Cable assembly	<input type="checkbox"/> Wall mount
<input type="checkbox"/> Panel mount	<input type="checkbox"/> Flush mounting

**Display on meter:**

<input type="checkbox"/> % scale	<input type="checkbox"/> Dk/Ds up to 1/4" size with flowrate table
	<input type="checkbox"/> Directly readable product scale

Converter, electrical:

<input type="checkbox"/> 0 ... 20 mA	<input type="checkbox"/> 4 ... 20 mA	<input type="checkbox"/> Ex	<input type="checkbox"/> non-Ex
--------------------------------------	--------------------------------------	-----------------------------	---------------------------------

Limit switch

<input type="checkbox"/> Min. contact	<input type="checkbox"/> Max. contact	<input type="checkbox"/> Min. and max. contact
---------------------------------------	---------------------------------------	--

**Notes:**

---



---

ABB has Sales & Customer Support  
expertise in over 100 countries worldwide.

[www.abb.com/flow](http://www.abb.com/flow)

The Company's policy is one of continuous product  
improvement and the right is reserved to modify the  
information contained herein without notice.

Printed in the Fed. Rep. of Germany (02.2008)

© ABB 2008

3KXF154001R1001



**ABB Limited**  
Oldends Lane, Stonehouse  
Gloucestershire, GL10 3TA  
UK  
Tel: +44 (0)1453 826661  
Fax: +44 (0)1453 829671

**ABB Inc.**  
125 E. County Line  
Road  
Warminster, PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

**ABB Automation Products GmbH**  
Dransfelder Str. 2  
37079 Goettingen  
Germany  
Tel: +49 551 905-534  
Fax: +49 551 905-555  
CCC-support.deapr@de.abb.com