



Fig. 1 F I Intra flap flowmeter for transparent liquids



Fig. 2 F I Prima flap flowmeter for opaque liquids

### Application

The F I Intra/Prima flap flowmeter is used to check and display the flow of liquids in closed pipelines. The device can be optionally fitted with an inductive contact for remote transmission of switching points.

The main applications for the FI can be found in the following fields:

- Chemical industry
- Water, waste water
- Building installations

### Special features

- Extremely robust design
- Suitable for transparent and turbid liquids
- Vertical or horizontal installation
- Simple, maintenance-friendly design
- Liquid temperatures up to 250 °C (482 °F)
- Inductive contact for flow monitoring (option).

### Design and mode of operation (Fig.3)

The F I operates according to the flap principle. The fitting (1) contains a measuring flap (2) which can be rotated around an axis (3). At rest (i.e. no flow), the flap closes the pipeline by its own weight. As soon as there is a flow, the flap is lifted depending on the flow velocity. The respective flow quantity can be read directly in transparent liquids from the position of the flap. The bottom edge of the flap is the reference edge.

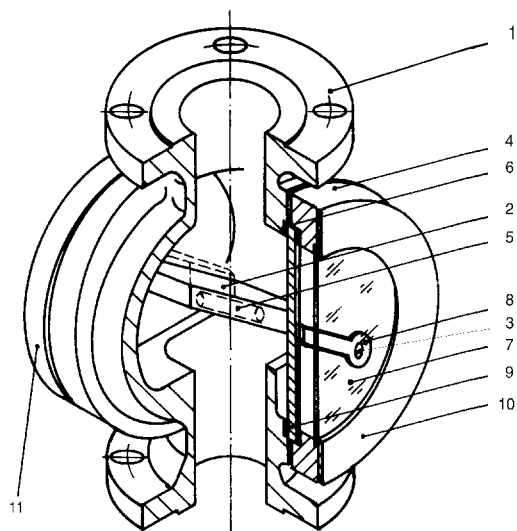
In turbid or opaque liquids, the movement of the flap is transmitted by a magnet (5) mounted on the flap to an external mechanical pointer (8), and the flow is displayed on a scale. The scale and pointer are protected against external effects and contamination by a Plexiglass or glass pane (7).

The scale has the standard dimension m<sup>3</sup>/h, and can be calculated for an application-specific medium and operating pressure/temperature if the density differs from 1 kg/l (62,43 lb/cu.ft). Special scales are available at extra charge.

An inductive contact is triggered by a contact lug mounted on the pointer.

Intra: - for transparent liquids  
- with plexiglass or glass pane to be read directly

Prima: - for turbid or opaque liquids  
- with external mechanical pointer



- |                        |  |
|------------------------|--|
| 1 Fitting              | 7 Plexiglass or glass pane <sup>1)</sup> |
| 2 Measuring flap       | 8 Pointer <sup>1)</sup>                  |
| 3 Flap axis            | 9 Scale pane <sup>1)2)</sup>             |
| 4 Pressure ring        | 10 Front ring <sup>1)</sup>              |
| 5 Magnet <sup>1)</sup> | 11 Dummy flange                          |
| 6 Gasket               |  |

<sup>1)</sup> Only with SITRANS F I Prima.

<sup>2)</sup> With Intra: glass pane.

<sup>1)</sup> Only with F I Prima

<sup>2)</sup> With Intra glass pane

Fig. 3 flap flowmeter, design

### Note of application

The operator of these measuring instruments is responsible for suitability, proper use and corrosion resistance of the used materials with regard to the measuring material. It must be ensured that the materials selected for the flowmeter parts in contact with the medium are suitable for the used process media. No external loads may act on the meter. Provide a touch guard for surface temperatures of > 70°C (158°F). This touch guard must be designed in a way that the max. allowable ambient temperature on the unit is not exceeded. The flowmeter may only be used within the pressure and voltage limits specified in the operating instructions. Before replacing the measuring tubes, check that the unit is free of hazardous media and pressures. The flowmeter meets the requirements of the PED 97/23/EG, article 3, paragraph 3. The most hazardous allowable media are liquids of fluid group 1.

## Technical specifications

<b>Application</b>	See page 1
<b>Design and mode of operation</b>	See page 1
Measuring principle	Flap principle
<b>Input</b>	
Measuring range	See table on page 4
Pressure rating	Connection PN 10 to 16 Permissible operating pressure 8 to 16bar/116 - 232psi (depending on design (see Tables below))
<b>Rated operating conditions</b>	
Mounting position	Vertical or horizontal
Ambient temperature	< 80 °C / 176 °F (with contact displays: see there)
<u>Medium conditions</u>	
• Accuracy	± 5 % of full-scale value
<u>Temperature of medium</u>	Dependent on gasket material and design
<b>For SITRANS FI Intra</b>	
• Gasket: Buna N, scale pane: hard glass	≤ 90 °C / 194 °F
• Gasket: Viton, scale pane: borosilicate glass	≤ 150 °C / 302 °F
<b>For SITRANS FI Prima</b>	
• Gasket: Klinger-SIL-C 8200, scale pane: W. No. 1.4571	≤ 150 °C (302°F)
• Gasket: Klinger-SIL-C 4500, scale pane: W. No. 1.4571	≤ 250 °C (482°F)
<b>Viscosity limits</b>	
	viscosity
• $Q_{max}$ [m <sup>3</sup> /h]	[mPa · s]
≤ 0,1	1,0
> 0,1 to 0,5	1,0 to 3,0
> 0,5 to 3	1,0 to 5,0
> 3 to 10	1,0 to 8,0
> 10 to 25	1,0 to 10
> 25 to 50	1,0 to 15
> 50 to 100	1,0 to 25
> 100	1,0 to 50
• $Q_{max}$ [USgpm]	[cp]
≤ 0,44	1,0
> 0,44 to 2,2	1,0 to 3,0
> 2,2 to 13,2	1,0 to 5,0
> 13,2 to 44	1,0 to 8,0
> 44 to 110	1,0 to 10
> 110 to 220	1,0 to 15
> 220 to 440	1,0 to 25
> 440	1,0 to 50
<b>Design</b>	
Flanges	DIN 2501 PN 10 to 16 (DN 65 with 4-hole-flange) ANSI B 16.5 RF 150 lb/sq.in
Material	
• Fitting	EN-GJL-250 (GG25), EN-GJL-250 (GG25) rubbercoated stainless steel mat.No. 1.4581
• Flap	stainless steel mat.No.1.4571/ 316Ti
• Flap axis	stainless steel mat.No.1.4571/ 316Ti
Degree of protection (display unit)	Design with contact: IP54
<b>Certificates and approvals</b>	
Classification according to PED 97/23/EC	For liquids of fluid group 1; complies with requirements of article 3, § 3 (sound engineering practice SEP)

## Technical specifications data of contacts

<b>Prima</b>	
<u>Switching principle</u>	Inductive contact, single contact Power supply via disconnecter unit (relay)
Connection	PG 11
Rated voltage	DC 8 V
Self-inductance	160 µF
Self-capacitance	20 nF
Ambient temperature	-20 to +70 °C (-4 to 158 °F)

## Installation and operating instructions

The main information for installation and startup is listed below.

### Installation

The flowmeter is delivered protected in a PVC sleeve, and is ready for operation. It has been checked for correct functioning prior to delivery. Before installing, check that the flap moves freely. Inlet and outlet pipe sections are not required.

### Startup

When starting up new plants, material residues are carried over in the medium and could be deposited on the transmission magnets (measuring flap). The flowmeter must be cleaned in such cases.

To prevent pressure surges resulting from gas bubbles, start with a closed valve which is then slowly regulated to the operating pressure. The valve can be mounted either upstream or downstream of the flowmeter.

If the magnetic coupling between the flap and the pointer is interrupted, the pointer can be lifted again using a separate magnet. Alternatively, the flap can be fully opened and then closed again. The magnetic coupling is then effective again.

### Cleaning

Remove the dummy flange at the rear or the glass pane including the gasket. The fitting can then be cleaned; in the process, check that the measuring flap moves freely. Remove the flap if necessary, and clean its bearing. To prevent coating with residues, always clean the flowmeter if the plant is to be shut down for a longer period. The glass panes can be carefully cleaned using a gentle solvent.

### Sealing and replacing the hard glass plate

The hard glass plate is secured between two gaskets by a pressure ring on the housing, and can be removed by unscrewing the ring. When refitting the plate, ensure that the zero mark on the scale coincides with the rest position of the flap (bottom edge). It is recommendable to check the gasket following installation or an extended operating period. If necessary, gently tighten the pressure ring screws with uniform distribution of the pressure.

The gaskets must be replaced each time the flowmeter is taken apart.

### Versions

#### F I Intra

Version	Type A	Type AA	Type C	Type D
Fitting	EN-GJL-250 (GG 25)		EN-GJL-250 (GG 25) rubber-coated	Stainless steel mat.No. 1.4581
Pressure ring	GG 25			
Rear cover	Dummy flange GG 25	Hard glass (at temp. > 90°C (194°F): borosilicate glass)		
Scale pane	Hard glass (at temp. > 90°C (194°F): borosilicate glass)			
Max. temperature of medium	150°C (302°F) dependent on gasket and scale pane		90°C (194°F)	150°C (302°F) Dependent on gasket and scalepane
Max. operating pressure	DN 25: 16 bar		DN 40 to 50: 10 bar	DN 25: 16 bar
Connection DIN 2501, PN 10 to 16	DN 40 to 50: 10 bar		DN 65 to 150: 8 bar	DN 40 to 50: 10 bar
ANSI B 16.5 RF	DN 65 to 150: 8 bar			DN 65 to 150: 8 bar
150 lb/sq.inch	1": 232 psi		1 1/2 to 2": 145 psi	1": 232 psi
	1 1/2 to 2": 145 psi		2 1/2 to 6": 116 psi	1 1/2 to 2": 145 psi
	2 1/2 to 6": 116 psi			2 1/2 to 6": 116 psi

Standard designs for clear and transparent liquids

#### F I Prima

Version	Type A	Type C	Type D
Fitting		EN-GJL-250 (GG 25) rubber coated	Stainless steel mat.No. 1.4581
Pressure rings	EN-GJL-250 (GG 25)	EN-GJL-250 (GG 25)	EN-GJL-250 (GG 25)
Dummy flange, rear		EN-GJL-250 (GG 25) rubber coated	Stainless steel mat.No. 1.4571/316Ti
Scale cover		Temperature <= 70°C (158°F): acrylic glass Temperature > 70°C (158°F): safety glass	
Scale Pane		Stainless steel, mat.No. 1.4571/316 Ti	
Max. temperature of medium	250 °C (482°F), dependent on gasket	90 °C (194°F)	250 °C (482°F), dependent on gasket
Max. operating pressure			
Connection DIN 2501, PN 10 to 16	DN 25 to 150: 16 bar	DN 40 to 150: 16 bar	DN 25 to 150: 16 bar
ANSI B 16.5 RF	1 to 6": 232 psi	1 1/2" to 6": 232 psi	1 to 6": 232 psi
145 to 232 psi			

Design versions for turbid and opaque liquids; transmission of flap movement via magnetic coupling

### Dimensions, weights

Flange connections (to DIN 2501, PN 16)	Dimensions in mm (inch)						Flange DIN	Max. pressure				Approx. weight	
	With attached contact							Prima		Intra		Intra	
	DN (inch)	A	B	B	C	E		D	bar	(psi)	bar	(psi)	ca. kg (lb)
25 (1")	160 (6,30)	136 (5,35)	127 (5,00)	107 (4,21)	68 (2,68)	115 (4,25)	16 (232)	16 (232)	16 (232)	6,0 (13,22)	5,5 (12,12)		
40 (1 1/2")	200 (7,87)	157 (6,18)	147 (5,79)	140 (5,51)	94 (3,70)	150 (5,00)	16 (232)	10 (145)	11,5 (25,35)	12,5 (27,55)			
50 (2")	230 (9,06)	172 (6,77)	169 (6,65)	170 (6,69)	122 (4,80)	165 (6,00)			15,5 (34,17)	14,0 (30,86)			
65 (2 1/2")	290 (11,42)	192 (7,56)	194 (7,64)	210 (8,27)	144 (5,67)	185 (7,00)			27,0 (59,52)	20,0 (44,09)			
80 (3")	310 (12,20)	217 (8,54)	240 (9,45)	235 (9,25)	170 (6,69)	200 (7,50)			40,0 (88,18)	27,0 (59,52)			
100 (4")	350 (13,78)	243 (9,57)	276 (10,87)	280 (11,02)	210 (8,27)	220 (9,00)	16 (232)	8 (116)	54,0 (119,04)	48,0 (105,82)			
125 (5")	400 (15,75)	258 (10,16)	291 (11,46)	300 (11,81)	219 (8,62)	250 (10,00)			64,0 (141,09)	64,0 (141,09)			
150 (6")	400 (15,75)	291 (11,46)	322 (12,68)	300 (11,81)	219 (8,62)	285 (11,00)			71,0 (156,52)	71,0 (156,52)			

F I Prima / F I Intra, dimensions and weights

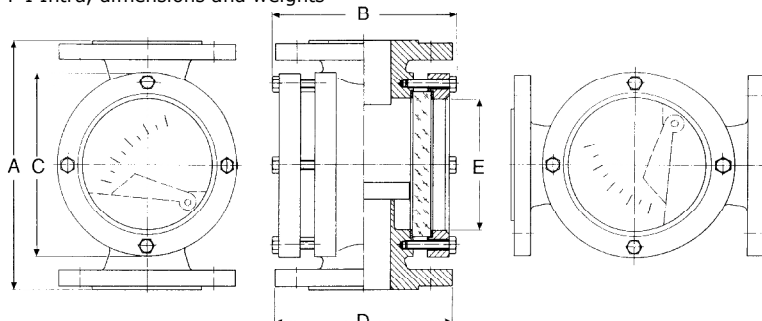


Fig. 4 F I Intra / F I Prima, dimensions

## Measuring ranges and pressure losses

### Connection DIN 1092-1 measuring ranges in m<sup>3</sup>/h

Connection DIN 2501	Measuring ranges in m <sup>3</sup> /h for the selected flow directions for liquids with density $\rho = 1 \pm 0,05$ kg/l (pressure loss in mbar shown in brackets)						
	Vertical flow			Horizontal flow			
	Small measuring range Column A	Large measuring range Column B	Measuring range for rubber coated design	Small measuring range Column A	Large measuring range Column B	Measuring range for rubber coated design	
DN 25	0,5 to 2,5 (16)	1,0 to 5,0 (60)	-	0,5 to 2,5 (8)	0,5 to 5,0 (58)	-	
DN 40	1,0 to 6,0 (14)	1,2 to 12,0 (35)	2 to 10 (35)	1,0 to 6,0 (13)	1,2 to 12 (16)	1 to 10 (16)	
DN 50	2,0 to 12 (26)	2,0 to 20 (50)	2 to 16 (50)	1,2 to 12 (8)	3,0 to 30 (69)	2 to 20 (69)	
DN 65 <sup>1)</sup>	3,0 to 20 (28)	5,0 to 40 (46)	2,2 to 22 (46)	2,5 to 25 (36)	5,0 to 50 (146)	3,5 to 35 (146)	
DN 80	5,0 to 30 (24)	5,0 to 50 (58)	5 to 40 (58)	5,0 to 50 (50)	7,0 to 70 (118)	5 to 50 (118)	
DN 100	7,0 to 50 (32)	10 to 100 (83)	10 to 80 (83)	5,0 to 50 (19)	10 to 120 (147)	10 to 100 (147)	
DN 125	8 to 60 (13)	12 to 120 (91)	10 to 100 (91)	5,0 to 50 (10)	10 to 140 (92)	10 to 120 (92)	
DN 150	10 to 70 (10)	15 to 160 (24)	15 to 140 (24)	5,0 to 60 (5)	10 to 160 (39)	15 to 140 (39)	

Measuring ranges and pressure losses with vertical and horizontal flows

<sup>1)</sup> DN 65 with 4-hole-flange

### Connection ANSI B16.5 RF measuring ranges in USGpm

Connection ANSI B16.5 RF	Measuring ranges in USGpm for the selected flow directions for liquids with density $\rho = 62,43$ lb/cu.ft $\pm 3,12$ lb/cu.ft (pressure loss in psi shown in brackets)					
	Vertical flow			Horizontal flow		
	Small measuring range Column A	Large measuring range Column B	Measuring range for rubber coated design	Small measuring range Column A	Large measuring range Column B	Measuring range for rubber coated design
1"	2,2 to 11 (0,23)	4,4 to 22 (0,87)	-	2,2 to 11 (0,12)	2,2 to 22 (0,84)	-
1 1/2"	4,4 to 26 (0,20)	5,3 to 53 (0,51)	8,8 to 44 (0,51)	4,4 to 26 (0,19)	5,3 to 53 (0,23)	4,4 to 44 (0,23)
2"	8,8 to 53 (0,38)	8,8 to 88 (0,73)	8,8 to 70 (0,73)	5,3 to 53 (0,12)	13 to 132 (1,00)	8,8 to 88 (1,00)
2 1/2"	13 to 88 (0,41)	22 to 176 (0,67)	9,7 to 97 (0,67)	11 to 110 (0,52)	22 to 220 (2,12)	15 to 154 (2,12)
3"	22 to 132 (0,35)	22 to 220 (0,87)	22 to 176 (0,84)	22 to 220 (0,73)	31 to 310 (1,71)	22 to 220 (1,71)
4"	31 to 220 (0,46)	44 to 440 (1,20)	44 to 352 (1,20)	22 to 220 (0,28)	44 to 530 (2,13)	44 to 440 (2,13)
5"	35 to 264 (0,19)	53 to 530 (1,32)	44 to 440 (1,32)	22 to 220 (0,15)	44 to 616 (1,33)	44 to 530 (1,33)
6"	44 to 308 (0,15)	66 to 704 (0,35)	66 to 618 (0,34)	22 to 264 (0,07)	44 to 704 (0,57)	66 to 616 (0,57)

Measuring ranges and pressure losses with vertical and horizontal flows

### selection and Ordering data flap flowmeter for clear, transparent liquids

#### F I Intra

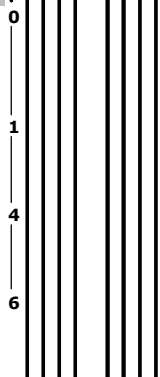
(max. oper. pressure 8 to 16 bar (116 to 232 psi), dependent on nominal diameter according page 4)

Order No.

7 M E 5 8 4 0 -

#### Version (see Table on page 3)

- Type A  
Fitting and pressure rings:  
gray cast iron (GG25)  
Rear dummy flange:  
gray cast iron (GG25)
- Type AA  
Fitting and pressure rings:  
gray cast iron (GG25)  
Rear pressure plate: hard glass
- Type C  
Fitting (rubber-coated) and pressure rings: gray cast iron (GG25)  
Rear pressure plate: hard glass
- Type D  
Fitting: stainless steel (1.4581)  
Press.rings: gray cast iron (GG25)  
Rear pressure plate: hard glass



#### Nominal diameter

- DN 25 (1") AA
- DN 40 (1 1/2") BB
- DN 50 (2") CC
- DN 65 (2 1/2"); 4-hole-flange with DIN 2501 DD
- DN 80 (3") EE
- DN 100 (4") FF
- DN 125 (5") GG
- DN 150 (6") HH

#### Glass panes (scale pane and pressure plate)

- Hard glass 0
- Borosilicate glass (temperature of medium > 90°C (194 °F)) 1
- Borosilicate glass scale pane (only version type A) 2

#### Connection standard

- DIN 2501 (BS 4504) 1
- ANSI B 16.5 RF 2

#### Measuring flap/flap axis

- Stainless steel mat.No. 1.4571/316Ti 1
- Hastelloy 2

#### Gasket material

- Buna N A
- Viton B

#### Flow direction

#### Small measuring range <sup>1)</sup> see column A in Table on page 3

- Upwards (vertical pipeline) A
- From left to right (horizontal pipeline) B
- From right to left (horizontal pipeline) C

#### Large measuring range <sup>1)</sup> see column B in Table on page 3

- Upwards (vertical pipeline) D
- From left to right (horizontal pipeline) E
- From right to left (horizontal pipeline) F

#### Rear scale (only with glass pressure plate)

- Without scale 0
- With scale on the glass pane 1

#### Further designs

Order Codes

Please add "-Z" to Order No. and specify Order code(s)

- Measured medium Y 0 1  
(always required with density odd 1 kg/l (62,43 lb/cu.ft))  
Specify in plain text:  
Medium, measuring range, dimension, density, density dimension, viscosity, viscosity dimension, operating temperature, operating pressure
- Silicone-free version Y 0 4
- Water as measured medium Y 0 5
- Viscosity: 1mPas (cp)
- Density: 1 kg/l (62,43 lb/cu.ft)
- Special version, specify in plain text Y 9 9

### selection and Ordering data flap flowmeter for opaque liquids

#### F I Prima

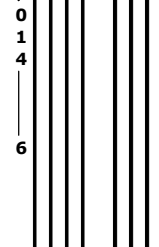
(max. oper. pressure 8 to 16 bar (116 to 232 psi), dependent on nominal diameter according page 3)

Order No.

7 M E 5 8 4 1 -

#### Version (see Table on page 3)

- Type A  
Fitting and pressure rings:  
gray cast iron (GG25)  
Rear dummy flange:  
gray cast iron (GG25)  
- Standard measuring range  
- Special measuring range
- Type C  
Fitting (rubber-coated) and pressure rings: gray cast iron (GG25)  
Rear pressure plate: GG, rubber coated
- Type D  
Fitting: stainless steel 1.4581  
pressure rings: gray cast iron (GG25)  
rear pressure plate:  
stainless steel (1.4571/316Ti)



#### Nominal diameter

- DN 25 (1") AA
- DN 40 (1 1/2") BB
- DN 50 (2") CC
- DN 65 (2 1/2"); 4-hole-flange with DIN 2501 DD
- DN 80 (3") EE
- DN 100 (4") FF
- DN 125 (5") GG
- DN 150 (6") HH

#### Scale cover

- Acrylic glass 0
- Hard glass 1

#### Connection standard

- DIN 2501 (BS 4504) 1
- ANSI B 16.5 RF 2

#### Measuring flap/flap axis

- Stainless steel, mat. No. 1.4571/316Ti 1
- Hastelloy 2

#### Gasket material

- Klinger-Sil-C 8200 A
- Klinger-Sil-C 4500 B

#### Flow direction

#### Small measuring range <sup>1)</sup> see column A in Table on page 3

- Upwards (vertical pipeline) A
- From left to right (horizontal pipeline) B
- From right to left (horizontal pipeline) C

#### Large measuring range <sup>1)</sup> see column B in Table on page 3

- Upwards (vertical pipeline) D
- From left to right (horizontal pipeline) E
- From right to left (horizontal pipeline) F

#### Contacts

- Without 0
- Inductive contact type SJ3.5-N (max. temperature of medium 90°C (194°F)) 1
- Inductive contact type SJ3.5-SN (max. temperature of medium 120°C (248°F)) 2

#### Further designs

Order Codes

Please add "-Z" to order No. and specify Order code(s)

- Measured medium Y 0 1  
(always required with density odd 1kg/l (62,43 lb/cu.ft))  
Specify in plain text:  
Medium, measuring range, dimension, operating temperature, operating pressure
- Silicone-free version Y 0 4
- Water as measured medium Y 0 5
- Viscosity: 1mPas (cp)
- Density: 1kg/l (62,43 lb/cu.ft)
- Special version, specify in plain text Y 9 9

<sup>1)</sup> The small and large measuring ranges are identical for the rubber-coated version (type C)