OPERATING INSTRUCTIONS

TORNATECH

GT-FluxFP

Orifice Plate Flowmeter

FM Approved

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1 SAFETY INSTRUCTIONS

1.1 Intended use

The orifice plate flowmeter GT-FluxFP is used to measure the volume of water in closed conduits. It is suitable for any point of installation, mounting position and flow direction (in compliance of the directional arrow).

The necessary FM Approval is available.

Warning!

The operator of these measuring devices is solely responsible for the suitability, intended use and corrosion resistance of the selected materials. It must be particularly ensured that the materials selected for the wetted parts of the flowmeter are suitable for the process media to be measured.

The manufacturer is not liable for any damage resulting from improper or unintended use of these devices.

The device may only be used in the operating instruction specified pressure and temperature limits.

1.2 Certifications

» FM Approval Class: 1046

1.3 Safety instructions from the manufacturer

The manufacturer is not liable for damages of any kind caused by the use of the device, including, but not limited to direct, indirect, incidental, punitive and consequential damages.

For every product purchased from the manufacturer warranty applies, according to the relevant product documentation and the valid terms and conditions.

The manufacturer reserves the right to revise the content of the documents, including this disclaimer, without notice, and is not liable in any way for possible consequences of such changes.

The responsibility that the instruments are suitable for the particular application rests solely with the operator. Tornatech Inc. assumes no liability for the consequences of misuse, modifications or repairs that were carried out by the customer without prior consultation.

In case of a complaint the contested elements must be cleaned of hazardous substances and to be returned to the manufacturer unless otherwise agree (see 7.3).

To prevent injury to the user or damage to the unit, it is necessary that you reading this operating instruction carefully before starting using the device.

The instruction is intended for both the correct installation, operation and maintenance of the equipment.

Special designs for special applications and custom models are not covered by this documentation.

2 DEVICE DESCRIPTION

2.1 Scope of delivery

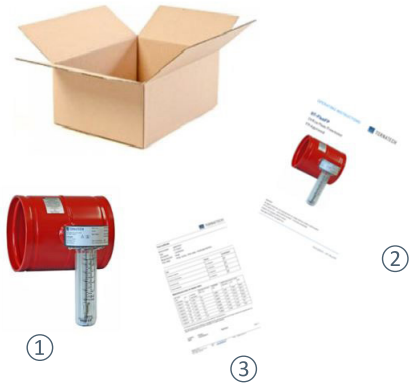


Fig. 1 Scope of delivery

① Orifice plate flowmeter GT-FluxFP
② Operating instructions
③ Certificate (partially optional)
Replacement gaskets (not shown here)

2.2 Nameplate

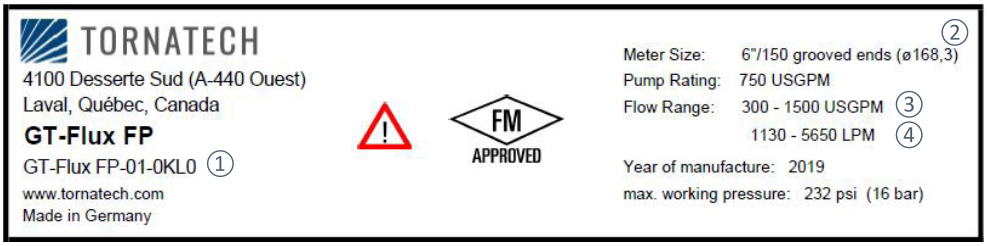
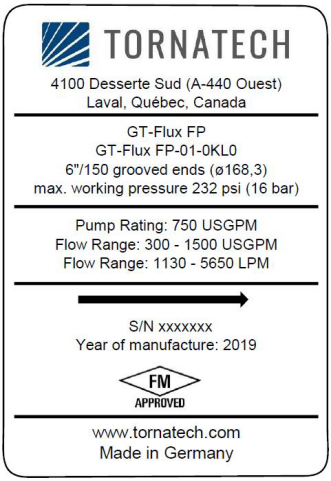


Fig. 2 Nameplate bypass meter Turbo-Lux® 3



① Description code / Order code
② Nominal size and process connection
③ Flow range (USGPM)
④ Flow range (LPM)

Fig. 3 Nameplate orifice plate

3 INSTALLATION AND MODE OF OPERATION

3.1 Installation notes

Information!

All instruments are carefully checked for proper function before shipment. Check immediately on receipt, the outer packing carefully for damage or signs of improper handling.

Report damage to the carrier and your locale sale staff. In such cases, a description of the defect, the type and the serial number of the device is indicated.

Unpack the unit carefully to avoid damage.

Check the completeness of the delivery against the packing list. Check the name plate, if the delivered flow meter according to your order.

3.2 Installation instructions

Installation of the orifice plate

Before and after the orifice plate a straight calming section is provided as a function of the nominal diameter (D).

With an installation of an one quarter pipe (independend of the direction) the distance of the inlet path of min. 5 x D and an outflow zone of 2 x D is required. The connected pipes have to be of the same size as the orifice plate.

» An inlet path of 5 x D requires a mounted quarter pipe before.

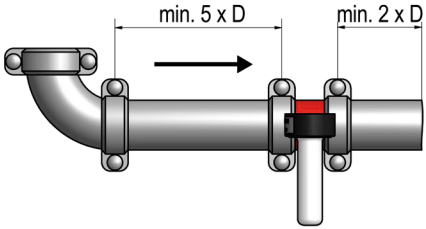


Fig. 4 Inlet path and outflow zone at 5 x D with an one quarter pipe

The installation can be in any line routing - horizontal to vertical - place (fig. 6). However, it is important to ensure that the flow direction of the arrow marked on the device and corresponds to the differential pressure sampling tube (fig. 9/10, pos. 7) is in the horizontal position.

For attachment of the bypass meter, sufficient clearance must be provided. Important for the compliance of the measuring tolerance is the central mounting of the pipeline. The center offset must not exceed 0.5 mm.

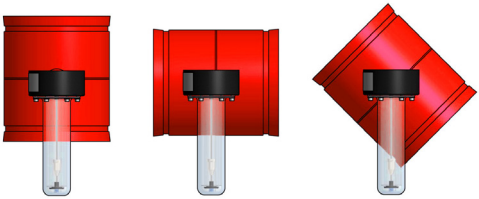


Fig. 6 Examples of installation

Mounting the bypass meter

The bypass meter is only compatible with the delivered orifice plate. Please make sure that the serial number of the orifice plate and the bypass meter are similar before installation. Before loosening the cap (fig. 9/10, pos. 10), the pipeline must be emptied to prevent the escape of liquids. The meter is plugged and screwed with a nut (fig. 9, pos. 9).

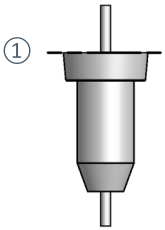
It must always be mounted vertically so that the float (fig. 9, pos. 4) can move freely in the tube. About foreign bodies that have come behind the filter must be removed (see 7.2). The tightening of the nut or the cap should be done by hand as possible. The threads must - for example be slippery - by fat. To avoid air strikes, the tube should be slowly filled with water.

3.3 Mode of operation

The orifice plate flowmeter GT-FluxFP consists of an orifice plate (fig. 9/10, pos. 1) for stationary installation and a portable bypass meter (fig. 9, pos. 2). The bypass meter contains a conical glass tube (fig. 9, pos. 3) with float (fig. 9, pos. 4). The water flows vertically from top to bottom through the flow tube at the upper end of a side panel (fig. 9, pos. 5) is arranged. A filter (fig. 9, pos. 13) at the inlet largely prevents the ingress of foreign bodies. Inlet and outlet port for the bypass to be measured are arranged concentrically, so that an easy to combine with the stationary primary element.

4 START-UP

Read the exact value when a consistent flow has been attained and the float has reached a stable position. The pipeline must always be filled. Read the value at the greatest diameter (upper edge) of the float:



① Reference point

Fig. 7 Float

For the bypass meter it is important that when starting up the pump, the shut-off-/control valve of the bypass orifice is opened min. 30 % to avoid hydraulic shocks or pressure surges that could damage the bypass meter.

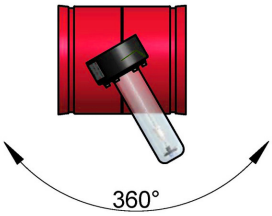


Fig. 8 Rotation bypass meter

When the bypass meter is commissioned or set into operation, bubbles of air will initially accumulate at the top part, which must be removed. For this purpose, the union nut (fig. 9, pos. 9) must be somewhat loosened during operation and the device must be rotated by 360°, so that the air bubbles can escape. Then the bypass meter has to be positioned vertically and the union nut has to be tightened once again.

Before pressure test in pipes, the bypass meter has to be disassembled and the connection of the orifice plate has to be screwed pressure-tight with the cap.

Read the exact value

On the scale the flow is printed in lpm (liters per minute respectively dm³/min.), USgpm (U.S. gallons per minute) and as percentage (100 % = rated power of the pump) for each nominal size and range. The following table provides more information about the scale display.

Nominal Size	**Pump rating** (USgpm)	**Flow range** (USgpm)	**Step** (USgpm)	**Graduation** (USgpm)	**Flow range** (lpm)	**Step** (lpm)	**Graduation** (lpm)
2"/DN 50	50	20 - 100	10	5	75 - 375	50	5
2½"/DN 65	100	40 - 200	20	4	150 - 750	100	5
3"/DN 80	150	60 - 300	50	5	220 - 1 100	200	4
3"/DN 80	200	80 - 400	50	5	300 - 1 500	200	4
4"/DN 100	250	100 - 500	50	5	380 - 1 900	200	4
4"/DN 100	300	120 - 600	100	5	460 - 2 300	200	4
4"/DN 100	400	160 - 800	100	5	600 - 3 000	500	5
4"/DN 100	450	180 - 900	100	5	680 - 3 400	500	5
6"/DN 150	500	200 - 1 000	100	5	760 - 3 800	500	5
6"/DN 150	750	300 - 1 500	200	4	1 130 - 5 650	1 000	5
6"/DN 150	1 000	400 - 2 000	200	4	1 500 - 7 500	1 000	5
6"/DN 150	1 250	500 - 2 500	500	5	1 900 - 9 500	1 000	5
8"/DN 200	1 500	600 - 3 000	500	5	2 200 - 11 000	2 000	4
8"/DN 200	2 000	800 - 4 000	500	5	3 000 - 15 000	2 000	4
8"/DN 200	2 500	1 000 - 5 000	1 000	5	3 800 - 19 000	2 000	4
8"/DN 200	3 000	1 200 - 6 000	1 000	5	4 500 - 22 500	2 000	4
10"/DN 250	3 500	1 400 - 7 000	1 000	5	5 300 - 26 500	5 000	5
10"/DN 250	4 000	1 600 - 8 000	1 000	5	6 000 - 30 000	5 000	5
10"/DN 250	4 500	1 800 - 9 000	1 000	5	6 800 - 34 000	5 000	5
12"/DN 300	5 000	2 000 - 10 000	1 000	5	7 600 - 38 000	5 000	5

Tab. 1 Scale graduation

After device usage

After measurements have been taken it is recommended that the measuring tube is either drained by inverting it or removed from the flow meter body. If removed the measurement tube must be drained and stored in the supplied packaging. The open orifice on the flow meter body must be sealed pressure tight with the cap (incl. seal) supplied.

5 TECHNICAL DATA

Measuring principle	Orifice plate flowmeter with variable flowmeter as indication
Input	
» Nominal Size	2"/DN 50 grooved ends (Ø60.3 mm) 2½"/DN 65 grooved ends (Ø73.0 mm) 2½"/DN 65 grooved ends (Ø76.1 mm) 3"/DN 80 grooved ends (Ø88.9 mm) 4"/DN 100 grooved ends (Ø114.3 mm) 6"/DN 150 grooved ends (Ø165.1 mm) 6"/DN 150 grooved ends (Ø168.3 mm) 8"/DN 200 grooved ends (Ø219.1 mm) 10"/DN 250 grooved ends (Ø273.0 mm) 12"/DN 300 grooved ends (Ø323.9 mm)
» Pressure limit	PN 16 (232 psig)
» Hydrostatically strength/ Pressure strength	64 bar (928 psig) for 5 min. (FM)
Measuring accuracy	±2.0 % of full scale value (FM)
Application conditions	
» Temperature limit	+4 °C to +50 °C (+39 °F to +122 °F)
» Medium	Water
Design/Material	
» Orifice plate • 2"/DN 50 - 4"/DN 100 • 6"/DN 150 - 12"/DN 300	Housing tube in Stainless steel with turned grooved connection Coated steel with rolled grooved connection[1)]
» Differential pressure tube	Brass
» Float	Stainless steel
» Bypass orifice	Stainless steel
» Filter	Stainless steel
» Seal	NBR
Certifications	FM Approval 3056052

5.1 Dimensions and weights

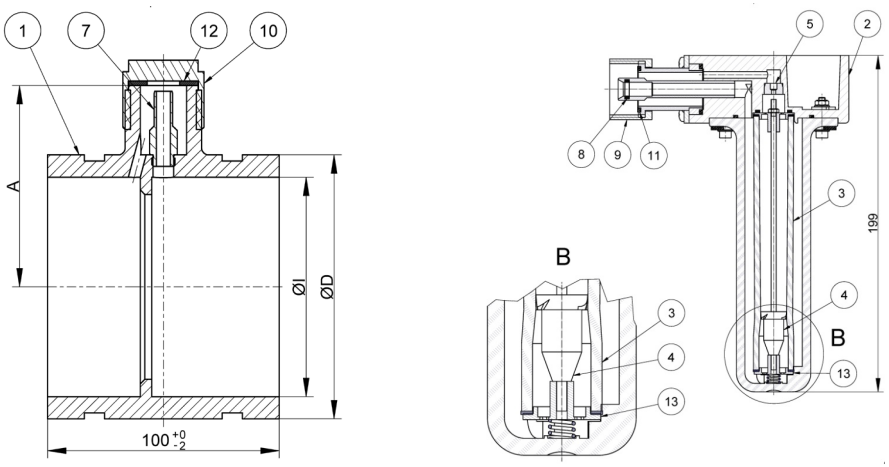
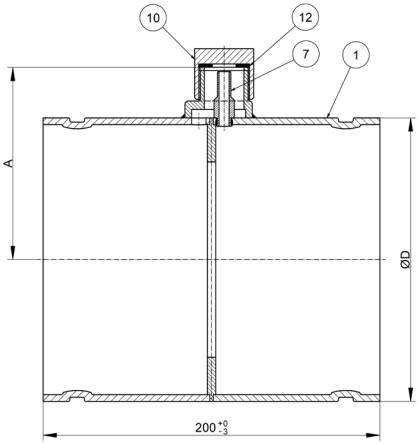


Fig. 9 GT-FluxFP orifice plate and bypass meter, Drawing and dimensions 2"/DN 50 - 4"/DN 100



① Housing tube
② Bypass meter
③ Measuring tube
④ Float
⑤ Bypass orifice
⑦ Differential pressure
⑧ O-Ring
⑨ Screw cap
⑩ Cap
⑪ O-Ring
⑫ Seal
⑬ Filter

Fig. 10 GT-FluxFP orifice plate, Drawing and dimensions 6"/DN 150 - 12"/DN 300

Nominal size	Dimensions mm (inch)			Weight
	A (approx.)	ØD	Ød	incl. packing kg (lbs)
2"/DN 50	60 (2.362)	60.3 (2.375)	53 (2.087)	2.0 (4.409)
2½"/DN 65	68 (2.677)	73.0 (2.875)	66 (2.598)	2.1 (4:630)
2½"/DN 65	68 (2.677)	76.1 (3.000)	66 (2.598)	2.1 (4:630)
3"/DN 80	75 (2.952)	88.9 (3.500)	80 (3.150)	2.3 (5.071)
4"/DN 100	87 (3.425)	114.3 (4.500)	100 (3.937)	3.2 (7.055)
6"/DN 150	113 (4.449)	165.1 (6.500)	-	4.9 (10.803)
6"/DN 150	114 (4.488)	168.3 (6.625)	-	4.9 (10.803)
8"/DN 200	140 (5.511)	219.1 (8.625)	-	6.4 (14.110)
10"/DN 250	166 (6.535)	273.0 (10.750)	-	8.5 (18.739)
12"/DN 300	192 (7.559)	323.9 (12.750)	-	11.0 (24.251)

Tab. 2 Dimensions and weights

Nominal size	Ø D	Min. thickness	
	mm (inch)	min. mm (inch)	max. mm (inch)
2"/DN 50	60,3 (2.375)	2.6 (0.102)	3.6 (0.142)
2½"/DN 65	73.0 (2.875)	2.6 (0.102)	2.9 (0.114)
2½"/DN 65	76,1 (3.000)	2.6 (0.102)	2.9 (0.114)
3"/DN 80	88.9 (3.500)	2.9 (0.114)	4.0 (0.157)
4"/DN 100	114.3 (4.500)	3.2 (0.126)	4.5 (0.177)
6"/DN 150	165.1 (6.500)	4.0 (0.157)	5.0 (0.177)
6"/DN 150	168.3 (6.625)	4.0 (0.157)	4.5 (0.177)
8"/DN 200	219.1 (8.625)	4.5 (0.177)	4.5 (0.177)
10"/DN 250	273.0 (10.750)	5.0 (0.197)	5.0 (0.197)
12"/DN 300	323.9 (12.750)	5.6 (0.220)	5.6 (0.220)

Tab. 3 Dimensions tube of inlet path and outflow zone (special requirement VdS)

6 DESCRIPTION CODE

GTFluxFP - 01 - □□□□

① ②

1	FM Approved
2	Model (from table on page 15)

② Nominal size/Pump rating

Model	Nominal size grooved ends	Pump rating USgpm	Flow range		Approval
			USgpm	LPM	FM
0EB0	2"/DN 50 (Ø60.3)	50	20 - 100	75 - 375	X
0UC0	2½"/DN 65 (Ø73.0)	100	40 - 200	150 - 750	X
0FC0	2½"/DN 65 (Ø76.1)	100	40 - 200	150 - 750	X
0GD0	3"/DN 80 (Ø88.9)	150	60 - 300	220 - 1 100	X
0GE0	3"/DN 80 (Ø88.9)	200	80 - 400	300 - 1 500	X
0HF0	4"/DN 100 (Ø114.3)	250	100 - 500	380 - 1 900	X
0HG0	4"/DN 100 (Ø114.3)	300	120 - 600	460 - 2 300	X
0HH0	4"/DN 100 (Ø114.3)	400	160 - 800	600 - 3 000	X
0HJ0	4"/DN 100 (Ø114.3)	450	180 - 900	680 - 3 400	X
0XK0	6"/DN 150 (Ø165.1)	500	200 - 1 000	760 - 3 800	X
0XL0	6"/DN 150 (Ø165.1)	750	300 - 1 500	1 130 - 5 650	X
0XM0	6"/DN 150 (Ø165.1)	1 000	400 - 2 000	1 500 - 7 500	X
0XN0	6"/DN 150 (Ø165.1)	1 250	500 - 2 500	1 900 - 9 500	X
0KK0	6"/DN 150 (Ø168.3)	500	200 - 1 000	760 - 3 800	X
0KL0	6"/DN 150 (Ø168.3)	750	300 – 1 500	1 130 - 5 650	X
0KM0	6"/DN 150 (Ø168.3)	1 000	400 - 2 000	1 500 - 7 500	X
0KN0	6"/DN 150 (Ø168.3)	1 250	500 - 2 500	1 900 - 9 500	X
0LP0	8"/DN 200 (Ø219,1)	1 500	600 - 3 000	2 200 - 11 000	X
0LQ0	8"/DN 200 (Ø219.1)	2 000	800 - 4 000	3 000 - 15 000	X
0LR0	8"/DN 200 (Ø219.1)	2 500	1 000 - 5 000	3 800 - 19 000	X
0LS0	8"/DN 200 (Ø219.1)	3 000	1 200 - 6 000	4 500 - 22 500	X
0MT0	10"/DN 250 (Ø273.0)	3 500	1 400 - 7 000	5 300 - 26 500	X
0MU0	10"/DN 250 (Ø273.0)	4 000	1 600 - 8 000	6 000 - 30 000	X
0MV0	10"/DN 250 (Ø273.0)	4 500	1 800 - 9 000	6 800 - 34 000	X
0NW0	12"/DN 300 (Ø323.9)	5 000	2 000 - 10 000	7 600 - 38 000	X

7 SERVICE

7.1 Storage

Store the emptied device in a dry and dust-free place. Keep away from direct and permanent sun and heat. The storage temperature range is -20 to +60 °C (-4 °F to +140 °F). Keep away from direct external load to the device.

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