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INSTRUCTION MANUAL

PADDLE TYPE FLOW SWITCH

HFS Series



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Should be well-informed of the contents where WARNING is marked before carrying out the work.



Should be careful where CAUTION is marked to carry out the work.



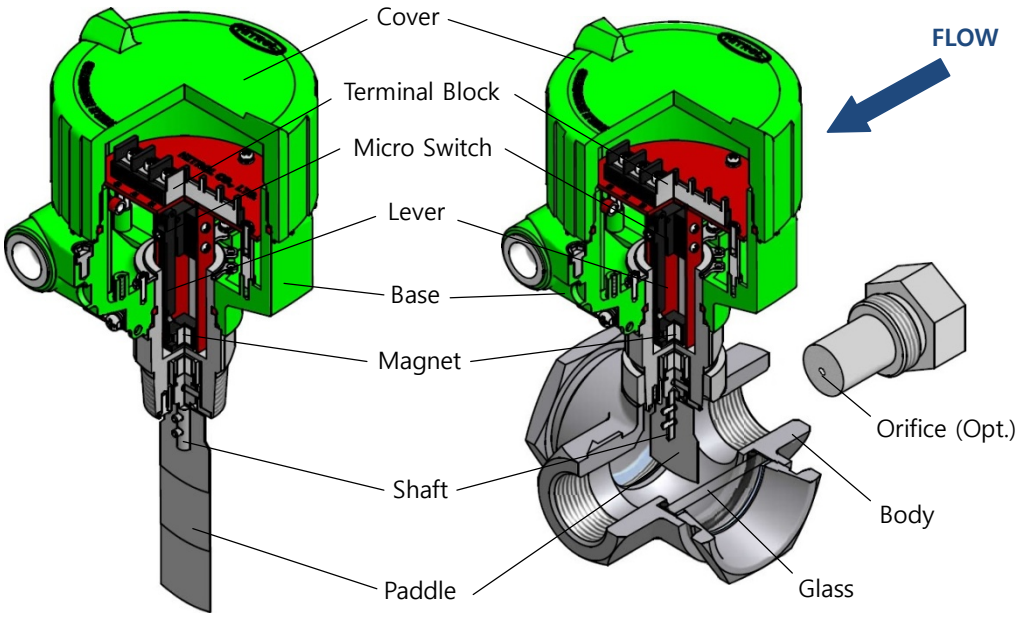
Should be aware of where NOTICE is marked to carry out the work.

Overview

HFS Series is a paddle type flow switch managing of piping systems by sensing of whether fluid is present in the piping line or not to control pump and motor, etc.

Operating Principle and Composition

When the fluid in the pipe line pushes the paddle, the angle of shaft attached to the paddle is changed and the lever connected to the magnet operates the micro switch, and it makes a contact signal. When there is no flow in the pipe line, the shaft returns to its original angle.



<HFS-2T> <HFS-2S>

Characteristic

- Easy installation and maintenance caused by simple structure.
- Insertion and Inline types are available.
- Low flow rate can be sensed using an orifice (Opt.)
- Applicable to use in high pressure pipe line caused by magnetic structure
- Applicable to explosion area (Ex-Proof Version)

Specification

Weather-Proof

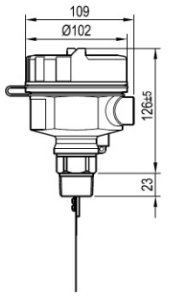
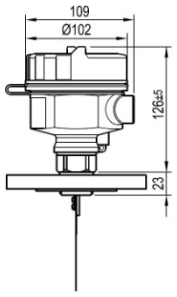
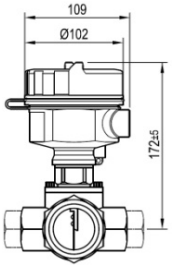
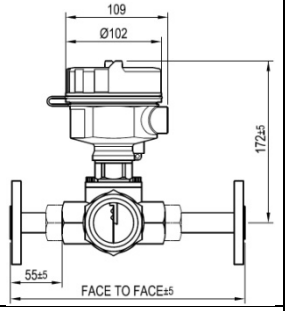
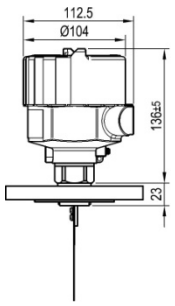
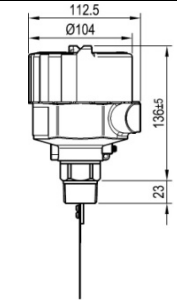
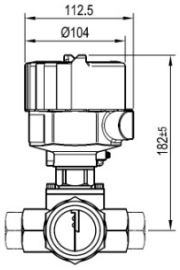
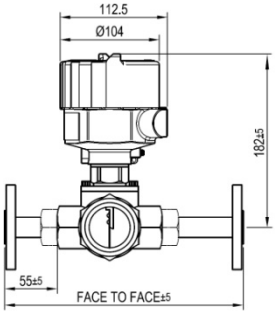
Model		HFS-2T	HFS-2S
Installation		Insertion	Inline
Type		Screw (Std.) or Flange	
Ambient Temperature		-20˚C ~ +60˚C	
Process Pressure		Up to 20kg/cm^2	
Process Temperature		PBT Housing : Max. 80˚C / AL.C Housing : Max. 120˚C	
Enclosure		Weather-Proof (PBT: IP65 / AL.C : IP66)	
Contact Rating		AC 250V, 10A / DC 30V, 5A	
Switch Form		1-DPDT	
Switch Type		Micro Switch	
Process Connection		PT 1" Screw (Std.)	
Material	Housing	PBT (Std.) / AL.C (Opt.)	
	Body	-	SCS14
	Process Conn.	316L SS	
	Paddle	316L SS	
Cable Entry		2-PF 1/2"(F) (Std.)	

Explosion-Proof

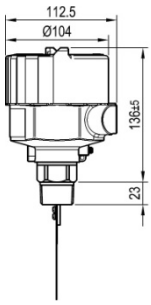
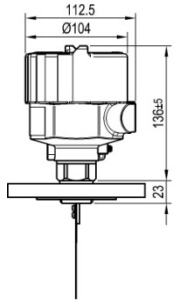
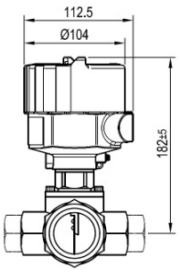
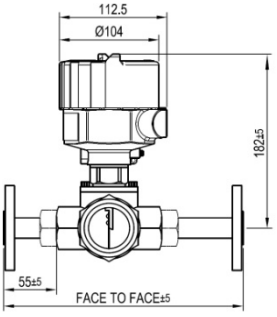
Model		HFS-2T-Ex	HFS-2S-Ex
Installation		Insertion	Inline
Type		Screw (Std.) or Flange	
Ambient Temperature		-20˚C ~ +60˚C	
Process Pressure		Up to 20kg/cm^2	
Enclosure & Process Temperature (Max.)		Ex-Proof (IP66)	
		Ex d IIC T6 (70˚C) Ex d IIC T5 (80˚C) Ex d IIC T4 (120˚C)	
Contact Rating		AC 250V, 10A / DC 30V, 5A	
Switch Form		1-DPDT	
Switch Type		Micro Switch	
Process Connection		PT 1" Screw (Std.)	
Material	Housing	AL.C	
	Body	-	SCS14
	Process Conn.	316L SS	
	Paddle	316L SS	
Cable Entry		2-PF 1/2"(F) (Std.)	

Dimension

Weather-Proof

	HFS-2T		HFS-2S	
	Screw Type	Flange Type	Screw Type	Flange Type
PBT Housing				
Aluminium Housing				

Explosion-Proof

HFS-2T-Ex		HFS-2S-Ex	
Screw Type	Flange Type	Screw Type	Flange Type
			

NOTICE **Actual product may have a tolerance slightly.**

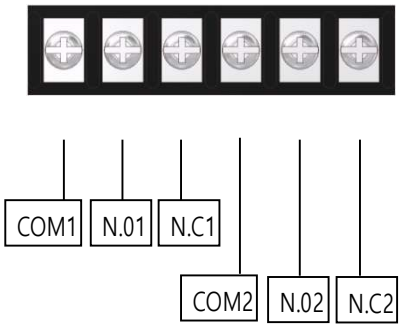
* Face to Face Length (mm)

Process Connection	Face to Face (mm)
15A JIS 10K RF	250
20A JIS 10K RF	300
25A JIS 10K RF	300
40A JIS 10K RF	350
50A JIS 10K RF	350
65A JIS 10K RF	350

NOTICE **Actual product may have a tolerance slightly.**

Wiring Method

- Insert the cable through the cable inlet after opening of the cover on the housing.
- Identify the desired contact point and connect the cable using the terminal lug.
- In case of Ex-Proof version, wiring to external / internal grounding terminal should be performed.



- COM1 : Common 1
- N.01 : Normal Open 1
- N.C1 : Normal Close 1

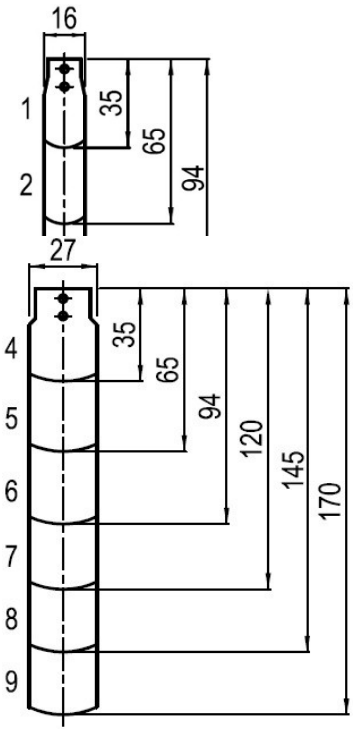
- COM2 : Common 2
- N.O2 : Normal Open 2
- N.C2 : Normal Close 2

Paddle Standard Table

The following table shows numbers and sizes of paddles that are generally used as per connection sizes and pipe line sizes

■HFS-2T

Connection Size	Pipe Line Size	Paddle No.
PT 1/2″	3/4″	1
	1″, 1-1/2″	1
	2″	1, 2
	3″	1, 2, 3
PT 3/4″	3/4″, 1″, 1-1/2″	1
	2″	1, 2
	3″	1, 2, 3
PT 1″	1″	1
	2″	4, 5
	3″ (Std.)	4, 5, 6 (Std.)
	4″	5, 6, 7
	5″	5, 6, 7, 8
	6″	6, 7, 8, 9

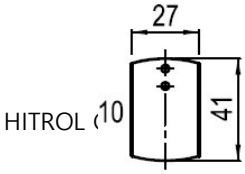


NOTICE **Please contact to Hitrol in case of non-standard.**
(Height of the nozzle on the pipe should be provided)

NOTICE **Paddle can be used after cutting as per the site condition.**

■ HFS-2S

Connection Size	Pipe Line Size	Paddle No.
PT 1″ (Std.)	1″	10



Flow Characteristic Table

The following table shows the minimum flow rate values measured in experiments as per pipe line size.

■ HFS-2T

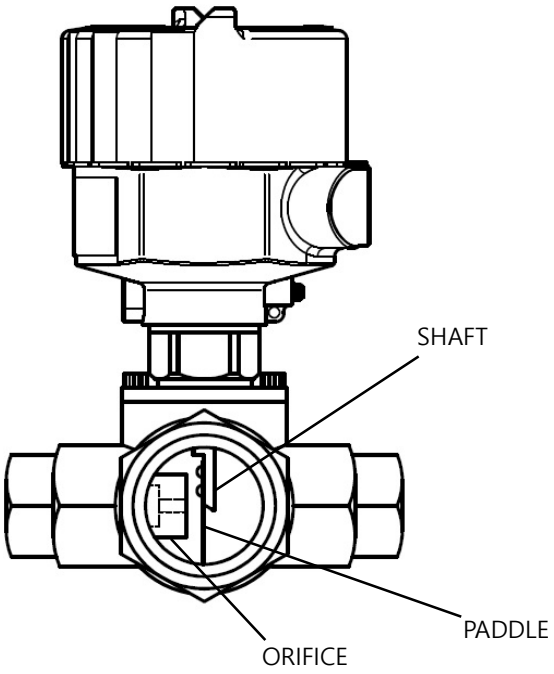
Line Size	LPM (±10%)		Setting Velocity for Flow "ON" (m/s)
	ON	OFF	
1″	17	15	0.53
1-1/4″	31	26	0.54
1-1/2″	43	37	0.55
2	35	24	0.27
2-1/2″	64	49	0.35
3″	60	37	0.21
4″	143	103	0.29
5″	263	201	0.34
6″	425	335	0.38

NOTICE **Above table is the values tested in the optimal environment.**

NOTICE **Adjustment of fine flow rate is possible.**

■ HFS-2S

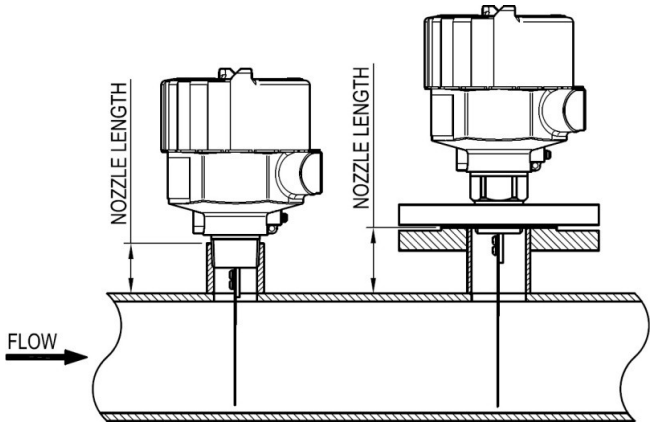
- Minimum flow rate can be measured: ON 16LPM / OFF 14LPM (±10%)
- The HFS-2S can detect flow rates below the minimum flow rate using orifice. When the orifice is used, flow rate down to 3LPM can be sensed.



Precaution for Installation

- Install the product to match the flow direction marked on the product housing.
- Be careful to prevent the paddle from coming into contact with the bottom of the pipe. (Information on the height of pipe nozzle should be provided to select a suitable paddle accurately.

■ HFS-2T



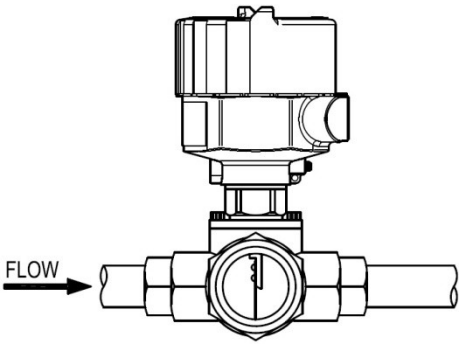
<Screw Type> <Flange Type>

CAUTION **Paddle length should be selected as per criteria after confirming of nozzle length and pipe I.D**

CAUTION **If you twist the head to install product, it may cause product defects, so you must hold the connector to install it.**

WARNING **The user should judge the Ex-Proof area of the relevant product and use the suitable product.**

■ HFS-2S



- Use the same standard flange or bolt.
- Make sure to insert washers between bolts and nuts to prevent loosening.
- Make sure to insert gaskets between flanges.
  (Select the gaskets in consideration of temperature of content and pressure of vessel.)
- Power should be applied, after the installation and wiring are completed.

CAUTION **Do not shock the product when it is moved or transported.**

WARNING **The user should judge the Ex-Proof area of the relevant product and use the suitable product.**

Maintenance

The lifespan of the main parts depends on the user's environment and can be used optimally through periodic inspection. Therefore, the used should maintain it through periodic inspection at least once a year.

CAUTION **When maintenance, checkup should be carried out after power is completely cutting off.**

WARNING **Do not disassemble the product when the power is applying in explosion district.**

Precaution for Separation

- Separate the product after ensuring that the measure object in the piping does not flow.
- In the case of piping for high temperature, use gloves, etc., to separate the product as you may be scalded.
- Separate the product after turning off the power.
- If there is explosive gas atmosphere, do not open the cover.
- In case of Ex-Proof version, unlock the lock key (Set screw) before removing the cover.
- When opening or closing the cover, be careful not to damage to the O-ring or the gasket.

Precaution for Inserted External Wire (Ex-Proof)

■ Use the cable gland connection or metal pipe line lead-in on the wire inlet, and use a product with equivalent Ex-proof certificate to connect it with the external line lead-in method.

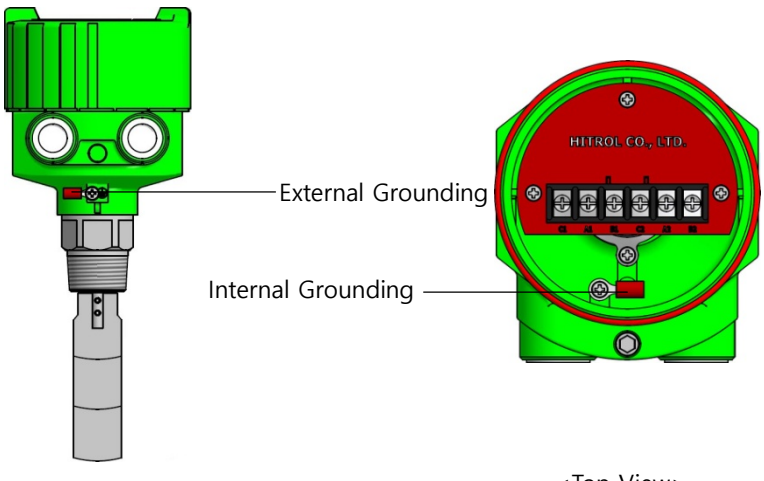
■ For non-use external wire inlet, use a closed plug that passes safety certificate above equivalent performance with the product.

Precaution for Grounding

■ The grounding has an external and an internal grounding. Wire size for external grounding shall be 4㎟ (4mmSQ) and 3.1㎟ (3.1mmSQ) for internal grounding.

■ Terminal lug sized same with the cable shall be used.

WARNING **Make sure to insert a washer if the terminal lug is removed from ground terminal and then re- connected. (Loosening prevention)**



<Front View> <Top View>

Matters on Safety and Environment

■ Precaution for use

- When fastening the product the piping, make sure to use tools to ensure maximum fastening.
- Do not apply excessive impact to the product.
- The user should judge the Ex-Proof area of the relevant product and use the suitable product.
- Do not bend or arbitrarily cut or extend the sensor.
- Power should be applied after installation is completed and cover of the product is closed.
- Do not use when the ambient temperature around installation area is exceeded -20ºC ~ +60ºC.
- It should not be used for the area above the qualified protection grade.
- Do not use it on where there is vibration.

■ Precaution for product wiring

- Wiring should be made according to the purpose.
- Pay attention to safety because there is a risk of electric shock.

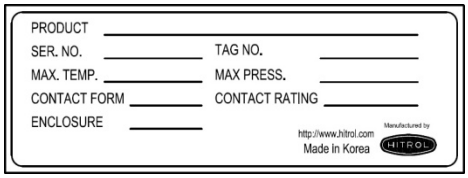
■ Disposal of product

- When disposing of the product because the product cannot be used any further, separate the switch and the body in the product housing. Because there is no accessory (e.g., mercury switch) that affects environments, no special care is necessary.

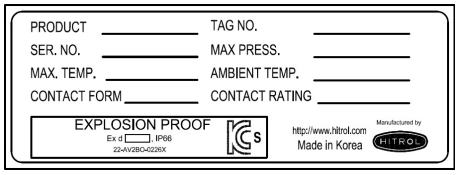
Marking

■ Product identification mark

- The product identification mark is attached to the top of the product housing and indicates product model name, serial number, working temperature, working pressure, and output. The serial number is the unique manufacturing number to identify the product.



<Weather-Proof>



<Explosion-Proof>

Model Notation

The model configuration of the HFS-Series-Ex is shown below.

HFS – 2 a - Ex

T : Vertical installation to the pipe

S : Horizontal installation to the pipe

Matters on User Education

The above matters should be fully understood and the temperature of the fluid the in the pipe line on which the product is used should not exceed the maximum available temperature. And, the ambient temperature around the product housing should be within -20°C to +60°C.
In case of Ex-Proof version, do not open the cover during the operation. Ex-Proof version are designed according to Article 34 of the Industry Safety and Health Act and the Ministry of Employment and Labor Notice No. 2020-33.



Do not apply with the Non Ex-Proof version to explosive zone and Ex-Proof version can be only used for zone 1 and 2 on where the explosive gas atmosphere is exist.
It should be installed complying with the Ex-Proof temperature grade and liquid temperature applied.

Warranty and Contact

■ Warranty and service

The warranty period of this product is two years after shipment and free sevcice can be provided for troubles ocuured during normal use during this period. If service is requested when the product has no trouble, charges may be requested regardless of the warranty period. A/S may be requested through the home page or the head office.

■ Head office · Factory · Laboratory Contact Number

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