Type 515 Rotor-X Paddlewheel Flow Sensor



Standard Sensor (with red cap) | Integral Sensor | Wet-Tap Sensor

Product description

Simple to install with time-honored reliable performance, type 515 Rotor-X Paddlewheel Flow Sensors are highly repeatable, rugged sensors that offer exceptional value with little or no maintenance. The wide dynamic flow range of 0.3 to 6 m/s (1 to 20 ft/s) allows the sensor to measure liquid flow rates in full pipes and can be used in low pressure systems.

The type 515 sensors are offered in a variety of materials for a wide range of pipe sizes and insertion configurations. The many material choices including PP and PVDF make this type highly versatile and chemically compatible to many liquid process solutions. Sensors can be installed in up to DN900 (36 in.) pipes using GF 's comprehensive line of custom fittings. These custom fittings, which include tees, saddles, and weldolets, seat the sensor to the proper insertion depth into the process flow. The sensors are also offered in configurations for wet-tap installation requirements.

Features

- Operating range 0.3 to 6 m/s (1 to 20 ft/s)
- Wide turndown ratio of 20:1
- Highly repeatable output
- Simple, economical design
- Installs into pipe sizes DN15 to DN900 (½ to 36 in.)
- Self-powered/no external power required
- Test certificate included for -X0, -X1
- Chemically resistant materials

(P51530-PX version only)

Applications

- Pure Water Production
- Filtration Systems
- Chemical Production
- Liquid Delivery Systems
- Pump Protection
- Scrubber Systems
- Water Monitoring
- Not suitable for gases

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Technical Data

General		
Operating Range	0.3 to 6 m/s	1 to 20 ft/s
Pipe Size Range	DN15 to DN900	½ to 36 in.
Linearity	±1% of max. range @ 25 °C (77 °F)	
Repeatability	±0.5% of max. range @ 25 °C (77 °F)	
Min. Reynolds Number Required	4'500	

Wetted Materials	
Sensor Body	Glass-filled PP (black) or PVDF (natural)
O-rings	FKM (std), optional EPR (EPDM) or FFKM
Rotor Shaft	Titanium, Hastelloy-C or PVDF; optional Ceramic, Tantalum, or Stainless Steel
Rotor	Black PVDF or Natural PVDF; optional ETFE, with or without carbon fiber reinforced PTFE sleeve

Electrical		
Frequency	19.7 Hz per m/s nominal	6 Hz per ft/s sinusoidal
Amplitude	3.3 V p/p per m/s nominal	1 V p/p per ft/s
Source Impedance	8 KΩ	
Cable type	2-conductor twisted pair with shield, 22 AWG	
Cable Length	7.6 m (25 ft) can be extended up to 60 m (200 ft) maximum	

Max. Temperature/Pressure Rating - Standard and Integral Sensor		
PP	12.5 bar @ 20 °C	181 psi @ 68 °F
	1.7 bar @ 90 °C	25 psi @ 194 °F
PVDF	14 bar @ 20 °C	203 psi @ 68 °F
	1.4 bar @ 100 °C	20 psi @ 212 °F
Operating Temperature		
PP	-18 °C to 90 °C	0 °F to 194 °F
PVDF	-18 °C to 100 °C	0 °F to 212 °F

Max. Temperature/Pressure Rating - Wet-Tap Sensor		
PP	7 bar @ 20 °C	102 psi @ 68 °F
	1.4 bar @ 66 °C	20 psi @ 150 °F
Operating Temperature		
	-18 °C to 66 °C	0 °F to 150 °F
Max. Wet-Tap Sensor Removal Rating		
	1.7 bar @ 22 °C	25 psi @ 72 °F

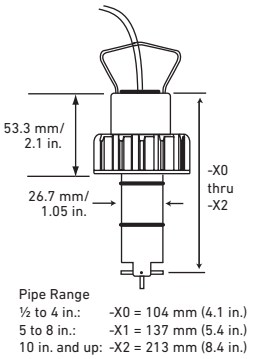
Shipping Weight		
P51530-X0	0.454 kg	1.00 lb
P51530-X1	0.476 kg	1.05 lb
P51530-X2	0.680 kg	1.50 lb
P51530-X3	0.780 kg	1.72 lb
P51530-X4	0.800 kg	1.76 lb
P51530-X5	0.880 kg	1.94 lb
3-8510-X0	0.23 kg	0.50 lb
3-8510-X1	0.23 kg	0.50 lb

Standards and Approvals
RoHS compliant, China RoHS
Lloyd's Register type Approval , NSF (P51530-PX version only)
Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety

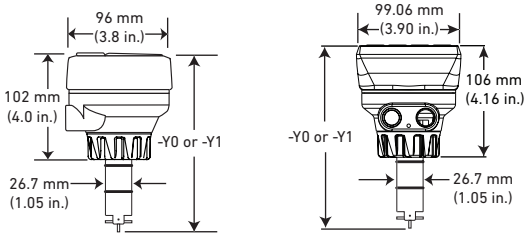
See pressure-temperature diagrams for more information

Dimensions

Standard Mount

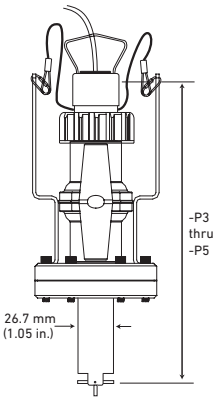


Field (Integral) Mount



(shown with Transmitter, sold separately)

Wet-Tap Mount Sensor with 3519 Wet-Tap Valve



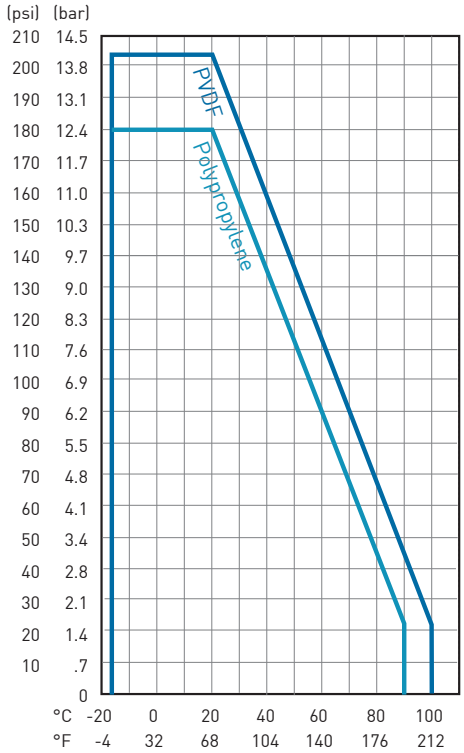
(See 3519 product page for more information).

Pipe range		Pipe range		Pipe range	
0.5 to 4 in.	-X0 = 104 mm (4.1 in.)	0.5 to 4 in.	-Y0 = 152 mm (6.0 in.)	0.5 to 4 in.	-P3 = 297 mm (11.7 in.)
5 to 8 in.	-X1 = 137 mm (5.4 in.)	5 to 8 in.	-Y1 = 185 mm (7.3 in.)	5 to 8 in.	-P4 = 333 mm (13.1 in.)
10 in. and up	-X2 = 213 mm (8.4 in.)			10 in. and up	-P5 = 409 mm (16.1 in.)

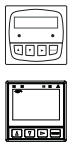
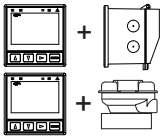
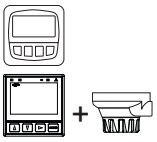
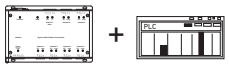
Pressure-temperature diagrams

Note

The pressure-temperature diagrams are specifically for the GF sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.



System Overview

Panel Mount	Pipe, Tank, Wall Mount		Field (Integral) Mount	Automation System
GF Instruments - 8150 - 9900 - 9900-1BC - 9950 	GF Instruments - 9900-1P with Rear Enclosure - 9900-1BC with Rear Enclosure - 9900 with 3-8050-1 Universal Mount Kit or 3-8052-1 Integral Mount Kit		GF Instruments - 8150 - 9900-1 with 3-8051-X Integral Mount Kit 	- 0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or - Programmable Automation Controller 
Type 515 Standard, Wet-Tap or 8510 Integral Mount Flow Sensors				
GF Fittings				All sold separately

For overview of Wet-Tap System, see 3519 product page

Application Tips

- Use the Conduit Adapter Kit to protect the cable-to-sensor connection when used in outdoor environments. See Accessories section for more information.
- Use a sleeved rotor in abrasive liquids to reduce wear.
- Sensor plug can be used to plug installation fitting after extraction of sensor from pipe.
- For liquids containing ferrous particles, use GF Magmeters.
- For systems with components of more than one material, the maximum temperature/pressure specification must always be referenced to the component with the lowest rating.

Ordering Information

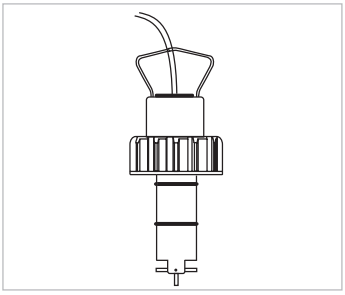
Ordering notes

1. Most common part number combinations shown. For all other combinations contact factory.
2. Other rotor and shaft materials are available for purchase from the factory and can be easily replaced in the field. See Accessories section.

Type 515 Standard Mount Paddlewheel

When choosing this style of sensor, the instrument is mounted directly onto the sensor for a local display. See guideline below for instructions.

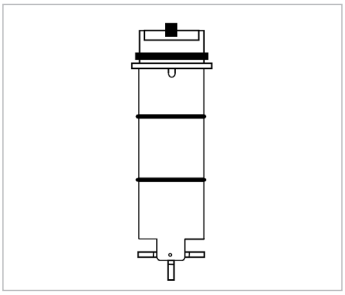
Mfr. Part No.	Code	Body	Rotor	Shaft Material
Paddlewheel Flow Sensor for use with remote mount instrument				
DN15 to DN100 - ½ to 4 in.				
P51530-H0	198 801 659	Polypropylene	Black PVDF	Hastelloy-C
P51530-P0	198 801 620	Polypropylene	Black PVDF	Titanium
P51530-S0	198 801 661	Polypropylene	Black PVDF	Natural PVDF
P51530-T0	198 801 663	Natural PVDF	Natural PVDF	Natural PVDF
P51530-V0	198 801 623	Natural PVDF	Natural PVDF	Hastelloy-C
Pipe size DN125 to DN200 - 5 to 8 in.				
P51530-P1	198 801 621	Polypropylene	Black PVDF	Titanium
P51530-T1	198 801 664	Natural PVDF	Natural PVDF	Natural PVDF
P51530-V1	198 801 624	Natural PVDF	Natural PVDF	Hastelloy-C
Pipe size DN250 - DN900 - 10 to 36 in.				
P51530-P2	198 801 622	Polypropylene	Black PVDF	Titanium
P51530-V2	198 801 625	Natural PVDF	Natural PVDF	Hastelloy-C



Type 515 Integral Mount Paddlewheel

When choosing this style of sensor, the instrument is mounted directly onto the sensor for a local display. See guideline below for instructions.

Mfr. Part No.	Code	Body	Rotor	Shaft Material
Flow sensor for integral mounting on the 8150, 8850 or 9900 instrument using the 3-8051-X flow sensor integral mounting kit (sold separately)				
DN15 to DN100 - ½ to 4 in.				
3-8510-P0	198 864 504	Polypropylene	Black PVDF	Titanium
3-8510-T0	159 000 622	Natural PVDF**	Natural PVDF	Natural PVDF**
3-8510-V0	198 864 506	Natural PVDF**	Natural PVDF**	Hastelloy-C**
DN125 to DN200 - 5 to 8 in.				
3-8510-P1	198 864 505	Polypropylene	Black PVDF	Titanium



** PVDF available ½ in. to 4 in. only

Combining a 515 Integral mount flow sensor with an integrally mounted instrument

Option 1

Once an integral mount sensor is chosen, it can be mounted directly to a field mount transmitter by following these guidelines:

1. Order the 3-8051-X flow sensor integral mounting kit (sold separately) to connect the sensor to an instrument.
2. Order a field mount transmitter (sold separately). The following part numbers are compatible: 3-8150-1, 3-9900-1.
3. Assembling the sensor with the integral adapter and instrument is quick and simple.

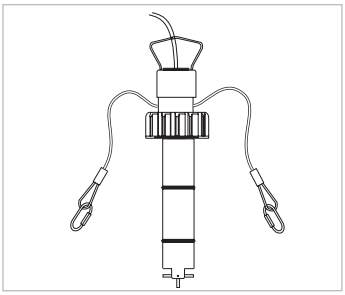
Option 2

These parts can also be ordered as an assembled part. See “Integral Mount”.

Type 515 Wet-Tap Mount Paddlewheel Flow Sensor

When choosing this style of sensor, the instrument can be mounted nearby on a pipe or wall or in a remote location up to 61 m (200 ft) by connecting the sensor through a standard 3-8050-1 universal junction box. Standard cable length is 7.6 m (25 ft). This style of sensor uses the 3519 Wet-Tap valve only (see individual product page for more information).

Mfr. Part No.	Code	Body	Rotor	Shaft Material
Flow Sensor for wet-tap mounting with the 3519 Wet-Tap Valve (sold separately)				
DN15 to DN100 - ½ to 4 in.				
P51530-P3	198 840 310	Polypropylene	Black PVDF	Titanium
DN125 to DN200 - 5 to 8 in.				
P51530-P4	198 840 311	Polypropylene	Black PVDF	Titanium
DN250 to DN900 - 10 to 36 in.				
P51530-P5	198 840 312	Polypropylene	Black PVDF	Titanium



Combining a 515 Wet-Tap Sensor with a 3519 Wet-Tap Valve:

1. Sensor can be mounted in a 3519 Wet-Tap Valve (sold separately)
2. Assembling a sensor with a 3519 Wet-Tap valve is quick and simple. These parts can also be ordered as complete assemblies. See 3519 product page.

Please refer to Wiring, Installation, Accessories and Fitting section for more information.

Additional ordering information

Additional possible configurations are listed below. For variants, combinations, and orders, please contact the local GF sales company.

Example Part Number **P51530-2231-025-1**	Sensor Body Material	Rotor Material	Pin Material	O-ring Material		Cable Length		Sensor Length
P51530-					-		-	
Sensor Body Material								
Black Polypropylene	1							
PVDF	2							
Rotor Material								
PVDF, black		1						
PVDF, natural		2						
ETFE		3						
Sleeved Black PVDF		4						
Sleeved Natural PVDF		5						
Sleeved ETFE		6						
Pin Material								
Titanium			1					
Hastelloy-C			2					
Stainless Steel			3					
Tantalum			4					
Ceramic			5					
PVDF, natural*			6					
O-ring Material								
FPM (FKM)				1				
EPR (EPDM)				2				
FFKM				3				
Cable Length								
7.6 m (25 ft)						025		
15.2 m (50 ft)						050		
22.8 m (75 ft)						075		
30.5 m (100 ft)						100		
Sensor Length								
DN15 to DN100 (0.5 to 4 in.)								0
DN125 to DN200 (5 to 8 in.)								1
DN250 to DN900 (10 to 36 in.)								2

* Only available with Natural PVDF Rotors

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Rotors		
M1538-2	198 801 181	Rotor, PVDF Black
M1538-4	198 820 018	Rotor, ETFE
3-0515.322-1	198 820 059	Sleeved rotor, PVDF Black
3-0515.322-2	198 820 060	Sleeved rotor, PVDF Natural
3-0515.322-3	198 820 017	Sleeved rotor, ETFE
Rotor Shafts		
M1546-1	198 801 182	Shaft, Titanium
M1546-2	198 801 183	Shaft, Hastelloy-C
M1546-3	198 820 014	Shaft, Tantalum
M1546-4	198 820 015	Shaft, Stainless Steel
P51545	198 820 016	Shaft, Ceramic
O-Rings		
1220-0021	198 801 000	O-ring, FKM (2 required per sensor)
1224-0021	198 820 006	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	198 820 007	O-ring, FFKM (2 required per sensor)
Miscellaneous		
P31536	198 840 201	Sensor plug, Polypropylene
P31542	198 801 630	Sensor cap, Red
P31934	159 000 466	Conduit cap
P51589	159 000 476	Conduit adapter kit
P51550-3	198 820 043	Rotor kit, PVDF natural, (rotor and shaft)
5523-0222	159 000 392	Cable (per foot), 2 cond. w/shield, 22 AWG
3-8050	159 000 184	Universal mounting kit
3-8050-1	159 001 753	Universal mount junction box
3-8050.390-1	159 001 702	Retaining nut replacement kit, NPT, Valox (for use with 8510 and 8512)
3-8050.390-3	159 310 116	Retaining nut replacement kit, NPT, PP (for use with 8510 and 8512)
3-8050.390-4	159 310 117	Retaining nut replacement kit, NPT, PVDF (for use with 8510 and 8512)
3-8051	159 000 187	Transmitter integral adapter (for use with 8510 and 8512)
3-8051-1	159 001 755	Transmitter integral mount kit, NPT, PP (for use with 8510 and 8512)
3-8051-2	159 001 756	Transmitter integral mount kit, NPT, PVDF (for use with 8510 and 8512)