



## SAFETY INSTRUCTIONS

1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Do not install/service without following installation instructions (see sensor manual).
4. Wear safety goggles and faceshield during installation/service.
5. Do not alter product construction.
6. Failure to follow safety instructions could result in severe personal injury!

• Pipe fittings **MUST** be installed by a certified welder only. +GF+ SIGNET will not assume liability of any kind for improper fitting installations.



• The 2540 Hot-Tap system's overall specifications and limitations depend on the lowest maximum rating of the components associated with the system. In other words, the Hot-Tap system is only as strong as its weakest link. For example, a ball valve, a component of the system, is rated at a maximum 100 psi @ 175 °F, limiting the entire system's maximum pressure/temperature rating to 100 psi @ 175 °F. All higher maximum specifications **MUST** yield to the component with the lowest maximum specification.



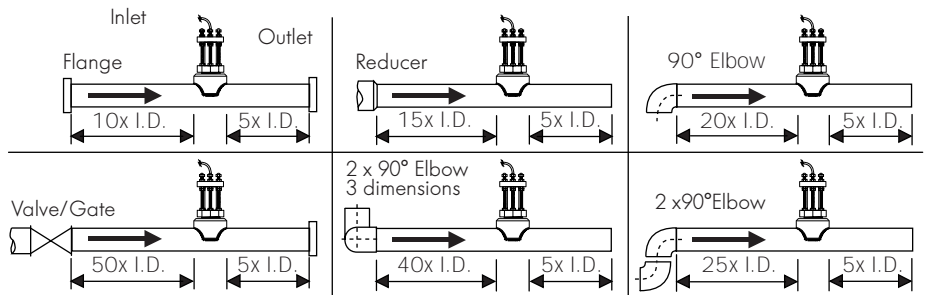
## Maximum Operating Pressure/Temperature:

- 17 bar (250 psi) @ 82 °C (180 °F) with standard Viton® sensor fitting O-rings.
- 17 bar (250 psi) @ 100 °C ( 212 °F) with optional EPR sensor fitting O-rings.



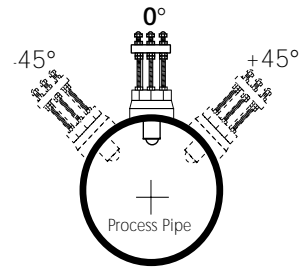
## 1. Location of Fitting

Recommended sensor upstream/downstream mounting requirements.



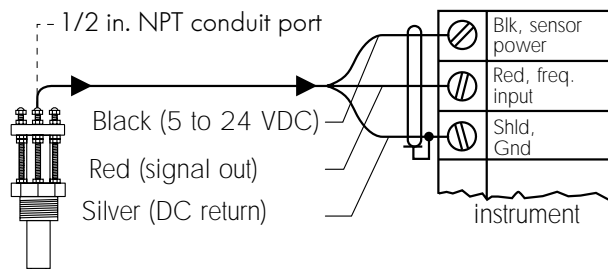
## 2. Sensor Mounting Position

Vertical mounting is recommended for best overall performance. Mount at a maximum of 45° when air bubbles are present. **DO NOT** mount on the bottom of the pipe when sediments are present.

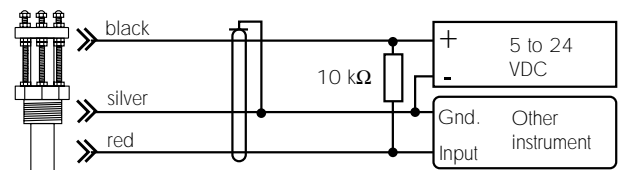


## 3. Sensor Wiring

### +GF+ SIGNET Instruments



### Other Brands



- pull-up resistor required (10 kΩ recommended).
- Use 2-conductor shielded cable for cable extensions up to 300m (1000 ft.)
- Maintain cable shield through splice.

- Use 2-conductor shielded cable for cable extensions up to 300m (1000 ft.)
- Maintain cable shield through splice.

## 4. Installation

The following items are required to properly install +GF+ SIGNET 2540 Standard and Hot-Tap Sensors.

### 4.1 Hardware, Standard Sensor

- Female pipe fitting (weld-on or saddle) with 1.5 in. NPT or ISO 7/1-Rc 1.5 threads
- 32 mm (1.25 in.) diameter drill
- Pipe thread sealant
- Tape measure

### 4.2 Hardware, Hot-Tap Sensor

The Hot-Tap sensor requires all the standard sensor items plus:

- Hot-Tap drilling machine (e.g. Mueller drilling machine or equivalent)
- Female ball or gate valve (full port only) with 1.5 in. NPT or ISO 7/1-Rc 1.5 threads
- Male pipe nipple, 32 x 50 mm (1.5 x 2 in.) with 1.5 in. NPT or ISO 7/1-R 1.5 threads
- Hot-Tap installation tool (purchased separately)

### 4.3 Standard Fitting Installation

- Depressurize and drain pipe.
- Wearing safety face protection, drill a 32 mm (1.25 in.) diameter hole in the pipe.
- Install the pipe fitting on the outside of the pipe according to the manufacturer's instructions. Failure to follow these instructions may result in serious bodily injury and/or product failure.
- Remove sensor fitting from sensor assembly.
- Thread sensor fitting into pipe fitting. (Fig. 1)

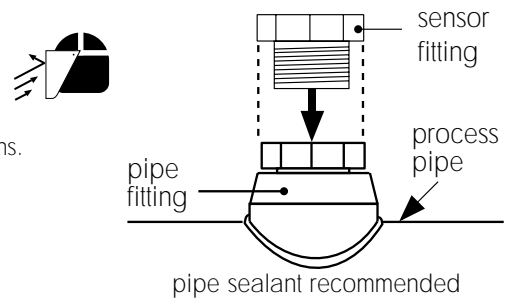


Fig. 1

### 4.4 Hot-Tap Fitting Installation

- Install the pipe fitting on the outside diameter of the pipe according to the manufacturer's instructions. Failure to follow these instructions may result in serious bodily injury and/or product failure.
- Install the pipe nipple and isolation valve (ball or gate valve) onto the external pipe fitting using pipe sealant on the threads. (Fig. 2)
- Wearing safety face protection, install an appropriate hole cutting tool per manufacturer's instructions (e.g. Mueller drilling machine) with a 32 mm (1.25 in.) drill onto the top of the isolation valve, ensuring a tight fit. **Use the recommended drill bit size or damage to the isolation valve may occur.**
- Open the isolation valve and insert the drill through the valve and cut the sensor clearance hole. After the hole is cut, withdraw the drill from the isolation valve and close the valve. Remove the drilling machine per manufacturer's instructions. (Fig. 3)
- Install the sensor fitting/bleed valve into the top of the isolation valve. Make sure the bleed valve clears the handle of the isolation valve during operation.

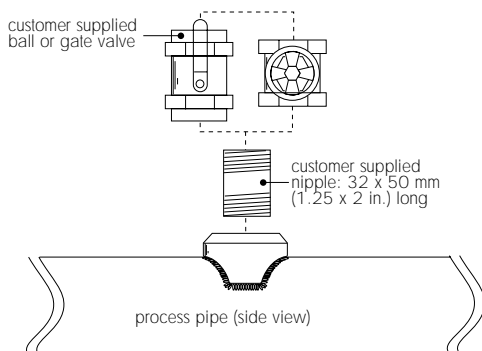
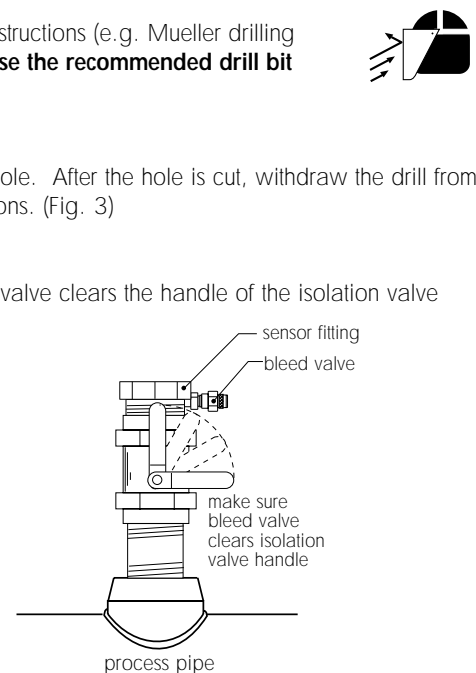


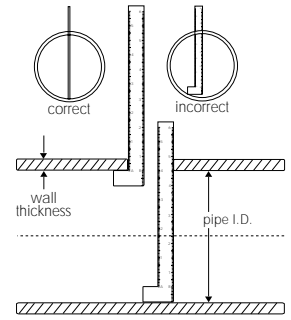
Fig. 2

Fig. 3



**4.5 Calculating the H Dimension**

Before installing the sensor some critical dimensions must be established (for Hot-Tap installations, we assume the pipe dimensions are known). The rotor shaft must be located 10% inside the pipe I.D. to ensure accurate calibration capability. To accomplish this, the "H" dimension is measured from the outside surface of the pipe to the bottom of the sensor flange.



Nominal "H" dimensions for standard pipes are listed in section 9. For non-standard pipe dimensions, calculate the "H" dimension using the formula listed below. Your pipe's wall thickness and inside diameter (I.D.) is required for the "H" dimension calculation.

The 6 inch ruler (included) may be used to measure your pipe I.D. and wall thickness up to 5 inches (standard sensors only).

Pipe wall thickness: \_\_\_\_\_ Pipe I.D.: \_\_\_\_\_

**Standard Sensors**

$H = 5.23 \cdot \text{pipe wall thickness} - (0.10 \times \text{I.D.})$

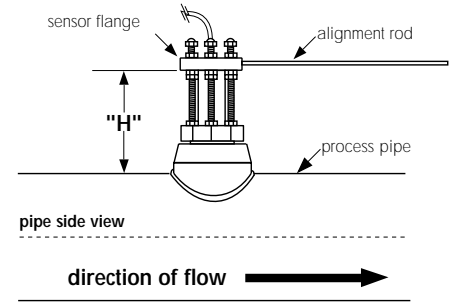
Example:

3.0 inch schedule 80 wrought steel;  
Wall thickness= 0.3 in. / Inside diameter = 2.9 in.

$H = 5.23 \cdot 0.3 - (0.10 \times 2.9) / H = 117.86 \text{ mm (4.64 in.)}$

Record your sensor's "H" dimension for future reference:

H= \_\_\_\_\_



**Hot-Tap Sensors**

$H = 15.39 \text{ in.} \cdot \text{pipe wall thickness} - (0.10 \times \text{I.D.})$

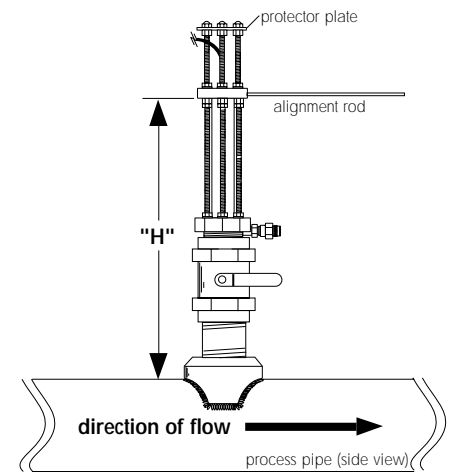
Example:

10 inch schedule 40 wrought steel;  
Wall thickness= 0.365 in. / Inside diameter = 10.02 in.

$H = 15.39 \cdot 0.365 - (0.10 \times 10.02) / H = 356.18 \text{ mm (14.023 in.)}$

Record your sensor's "H" dimension for future reference:

H= \_\_\_\_\_



After correct dimensions are calculated and recorded, the sensor can be installed in the fitting. The Standard and Hot-Tap versions require substantially different procedures.

**4.6 Standard Sensor Installation**

**A.** Thread one hex nut onto each of the three threaded rods included in package. Install threaded rod with a lock washer onto the sensor fitting. Secure rods in place by tightening each hex nut against the sensor fitting. (Fig. 4)

**B.** Thread one jam nut and lower hex nut onto each threaded rod so that the top surface of each nut is at the proper "H" dimension for your pipe. Secure each hex nut with a jam nut. (Fig. 5)

**C.** Insert the flow sensor into the sensor fitting, making sure the alignment hole on the sensor flange is pointing downstream.

Fig. 4

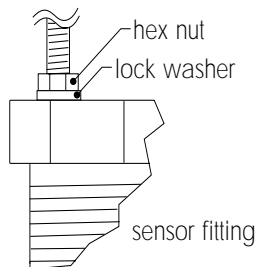
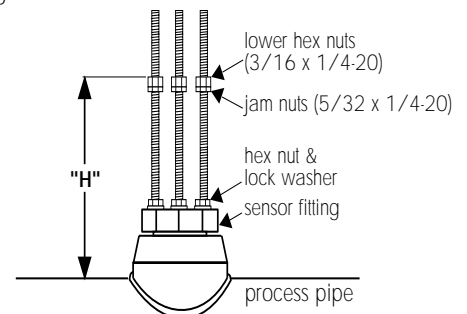


Fig. 5



D. Place the alignment rod in the alignment hole on the sensor flange. Align the flange so rod is parallel to the process pipe. (Fig. 6)

E. Thread upper hex nuts with lock washers until they contact the sensor flange and tighten. Check for proper "H" dimension and readjust if necessary. (Fig. 7)

#### 4.7 Hot-Tap Sensor Installation

A. Thread one hex nut onto each of the three threaded rods included in package. Install threaded rod with a lock washer onto the sensor fitting. Secure rods in place by tightening each hex nut against the sensor fitting. (Fig. 8)

B. Thread one jam nut and lower hex nut onto each threaded rod so that the top surface of each nut is 359 mm (14.14 in.) from the top surface of the sensor fitting. Secure each hex nut with a jam nut. (Fig. 9)

**CAUTION: This setting is critical to ensure an adequate sensor seal and to prevent the rotor from hitting the isolation valve orifice during installation.**

C. Wipe the sensor body with a dry, clean cloth. Orient the alignment hole on the sensor flange to point **downstream**. Place the slotted flange over the threaded rods. Lower the sensor into the fitting until the sensor flange rests on the lower hex and jam nuts. (Fig. 10 & Fig. 11)

D. Secure the sensor with lock washers and upper hex nuts on the top of the flange. Before tightening, align the sensor flange so that the alignment rod is parallel and level with the process pipe. (Fig. 10 & Fig. 11)

E. Make sure the bleed valve is closed (full clockwise position).

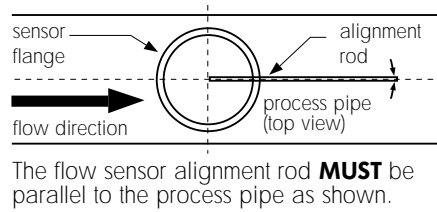


Fig. 6

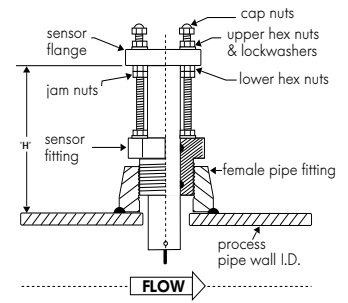


Fig. 7

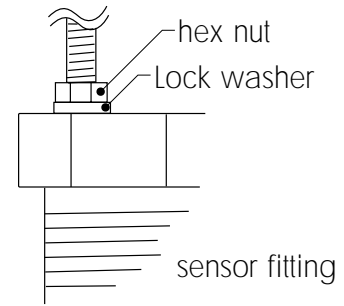


Fig. 8

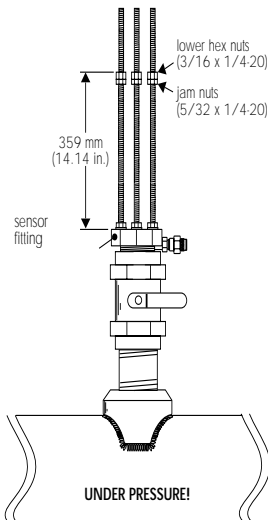


Fig. 9

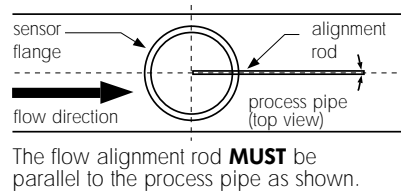


Fig. 10

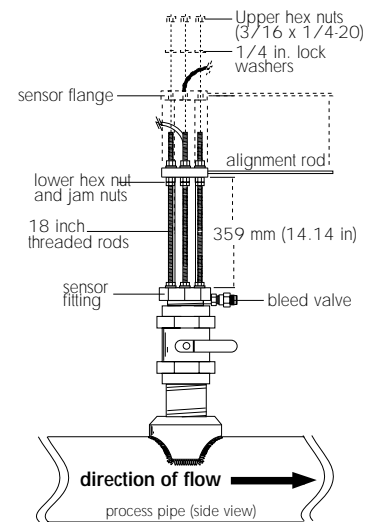


Fig. 11

F. Thread protector plate hex nuts onto each of the three threaded rods. Adjust each hex nut to a height of approximately 25 mm (1 in.) from the top of each rod. Remove the black plastic cable grommet in top of sensor with a screwdriver. Slide the grommet up the cable away from sensor. (Fig. 12)

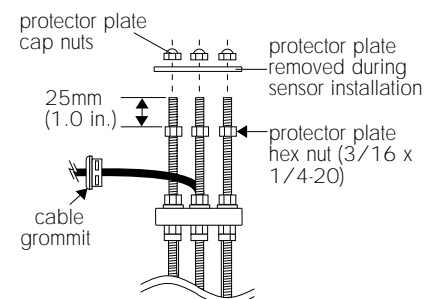


Fig. 12

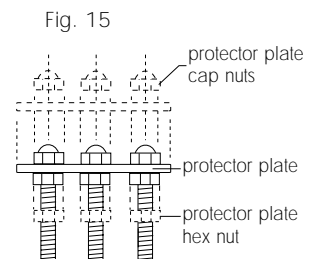
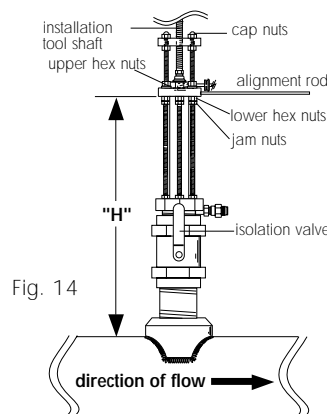
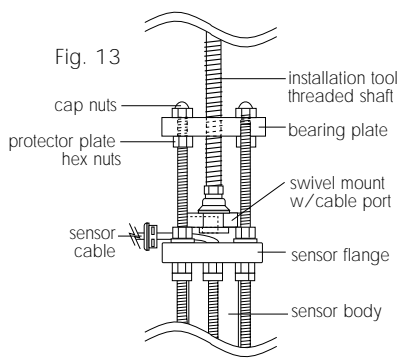
## Hot-Tap Sensor Installation - Continued

**G.** Position the installation tool bearing plate by rotating it so that it is approximately 40 mm (1.6 in.) from the swivel mount. Mount the installation tool by placing the threaded rods through the holes in the tool's bearing plate, resting the bearing plate on top of the protector plate hex nuts. Make sure the swivel mount's ears are mounted **between** the threaded rods (not over the rods). Install the bearing plate cap nuts. Tighten the bearing plate cap nuts to secure the installation tool in place. (Fig. 13)

**H.** Align the sensor cable with the swivel mount cable port to prevent cable pinching. Use a 3/8 inch wrench or socket to turn the installation tool shaft clockwise until it is seated in the hole at the top of the sensor flange.

**I.** Wearing safety face protection, **slowly open the isolation valve to the full open position.** Loosen the lower hex and jam nuts and move them to the proper "H" dimension. Turn the installation tool shaft **clockwise** until the sensor flange contacts the lower hex and jam nuts. Thread the upper hex nuts down until they contact the sensor flange. Tighten the upper hex nuts to secure the sensor. (Fig. 14)

**J.** Remove cap nuts and withdraw the installation tool. Be careful to not damage cable. Snap cable grommet into top of sensor and replace protector plate and cap nuts. (Fig. 15)



## 5. Standard Sensor Removal

To remove the sensor from a **depressurized empty pipe**, simply remove the cap nuts and upper hex nuts located above the sensor flange. Pull up on sensor flange with twisting motion.

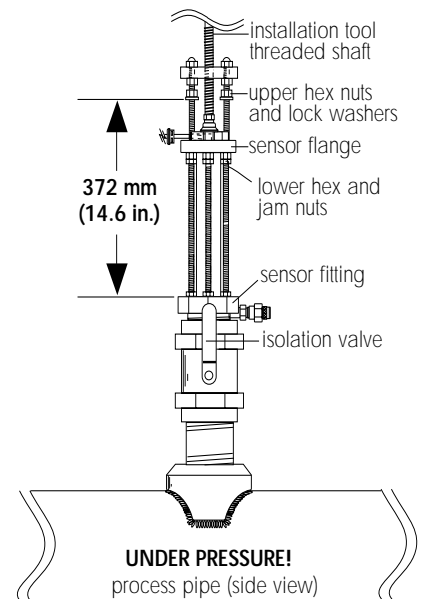
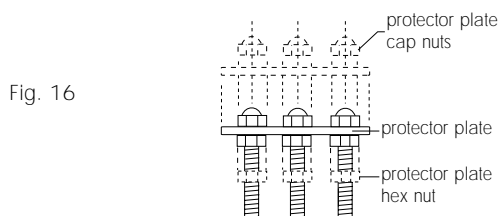
## 6. Hot-Tap Sensor Removal

To remove the Hot-Tap sensor safely from a pressurized active pipe, the entire installation process must be reversed.

**A.** Remove the cap nuts, protector plate, protector plate hex nuts, and sensor cable grommet. (Fig. 16)

**B.** Thread installation tool in place and secure bearing plate in place of sensor protector plate. (Fig. 17)

**C.** Turn shaft of installation tool **clockwise** to lower tool into opening in sensor flange. Guide cable into the port to prevent damage.



## 6. Hot-Tap Removal - Continued

D. Wearing safety face protection, loosen the upper hex nuts and raise to 372 mm (14.6 in.) from top of sensor fitting to bottom of upper hex nuts/lock washers. **CAUTION! This measurement is critical to maintain watertight seal in sensor while allowing clearance to close the isolation valve.**



E. Wearing safety face protection, turn the installation tool shaft **counterclockwise** to withdraw sensor until the sensor flange contacts the upper hex nuts. (Fig. 18)



F. Raise **one** lower hex and jam nut to bottom of sensor flange.

G. Close isolation valve, remove bearing plate and tool.

H. Wearing safety face protection, cover the bleed valve with suitable protection (rag, towel, etc.) and open the bleed valve (ccw rotation) to relieve internal pressure. Pull sensor up until bleed valve purges some fluid (indicating sensor is past 1st o-ring seal inside sensor fitting).



**CAUTION:** In case of a leaky isolation valve, the sensor will be under a slight amount of pressure. Care should be taken when removing the sensor. Use the bleed valve to relieve this pressure taking care not to spray fluid on yourself or others.

**Sensor can now be safely removed. When reinstalling the sensor:** leave one lower hex nut in position to guide sensor to proper isolation valve clearance height before opening isolation valve. Return to "H" dimension height after valve is opened.

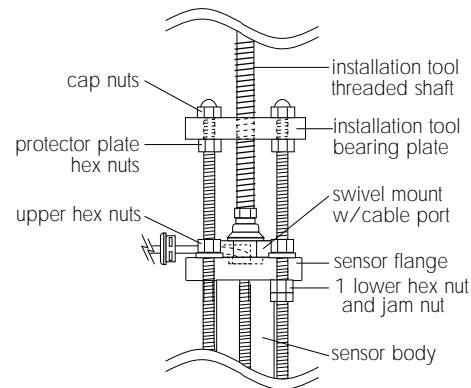


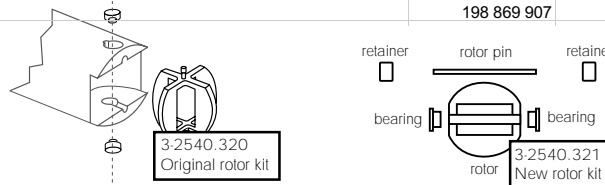
Fig. 18

## 7. Maintenance

Your sensor requires little or no maintenance of any kind, with the exception of an occasional sensor/paddlewheel cleaning.

## 8. Sensor Parts

2540 Sensor Assemblies				Accessories		
Order no.	Sensor type	Fitting type	Code	Order no.	Description	Code
3-2540-1	Standard	1.5 in. NPT	198 840 035	3-1500.663	Hot-Tap installation tool	198 820 039
3-2540-2	Standard	ISO 7/1-R 1.5	198 840 036	3-2540.320	Rotor kit w/integral shaft and PEEK bearings (original design)	198 820 040
3-2540-3	Hot-Tap	1.5 in. NPT	198 840 037	3-2540.321	rotor kit w/Tungsten Carbide pin Fluoroloy-B bearings, 316 ss retainers	152 000 623
3-2540-4	Hot-Tap	ISO 7/1-R 1.5	198 840 038	1220-0021*	Standard Viton® sensor - fitting O-ring	198 820 041
				1224-0021*	Optional EPR sensor - fitting O-ring	198 820 042
				P52504-1	Replacement rotor pin, 316 ss	198 801 500
				P52504-2	Replacement rotor pin, tungsten carbide	198 820 023
				*1 O-ring required for standard sensor, *2 for Hot-Tap		
				3-2540.090-1	Instruction manual	198 869 907



## 9. H Dimensions, Standard & Hot-Tap Sensors

### Standard Sensors

Wrought Steel Pipe Per ANSI 36.10				
NPS	SCH 40	SCH 80	STD	XS
inches	inches	inches	inches	inches
1-1/2	4.924	4.880	4.924	4.880
2	4.869	4.818	4.869	4.818
2-1/2	4.780	4.722	4.780	4.722
3	4.707	4.640	4.707	4.640
3-1/2	4.649	4.576	4.649	4.576
4	4.590	4.510	4.590	4.510
5	4.467	4.374	4.467	4.374
6	4.344	4.222	4.344	4.222
8	4.110	3.968	4.110	3.968
10	3.863	3.680	3.863	3.755
12	3.630	3.405	3.655	3.555
14	3.480	3.230	3.530	3.430
16	3.230	2.955	3.330	3.230
18	2.980	2.680	3.130	3.030
20	2.755	2.405	2.930	2.830
22	---	2.130	2.730	2.630
24	2.280	1.855	2.530	2.430

(---) represents values currently unavailable

Stainless Steel Pipe Per ANSI B36.19				
NPS	SCH 5S	SCH 10S	SCH 40S	SCH 80S
inches	inches	inches	inches	inches
1-1/2	4.988	4.953	4.924	4.880
2	4.940	4.905	4.869	4.818
2-1/2	4.876	4.847	4.780	4.722
3	4.814	4.784	4.707	4.640
3-1/2	4.764	4.734	4.649	4.576
4	4.714	4.684	4.590	4.510
5	4.586	4.567	4.467	4.374
6	4.480	4.460	4.344	4.222
8	4.280	4.249	4.110	3.968
10	4.048	4.023	3.863	3.755
12	3.830	3.811	3.655	3.555
14	3.705	3.680	---	---
16	3.498	3.480	---	---
18	3.298	3.280	---	---
20	3.080	3.056	---	---
22	2.880	2.856	---	---
24	2.656	2.630	---	---

(---) represents values currently unavailable

### Hot-Tap Sensors

Wrought Steel Pipe Per ANSI 36.10				
NPS	SCH 40	SCH 80	STD	XS
inches	inches	inches	inches	inches
1-1/2	15.084	15.040	15.084	15.040
2	15.029	14.978	15.029	14.978
2-1/2	14.940	14.882	14.940	14.882
3	14.867	14.800	14.867	14.800
3-1/2	14.809	14.736	14.809	14.736
4	14.750	14.670	14.750	14.670
5	14.627	14.534	14.627	14.534
6	14.534	14.382	14.534	14.382
8	14.270	14.128	14.270	14.128
10	14.023	13.840	14.023	13.915
12	13.790	13.565	13.815	13.715
14	13.640	13.390	13.690	13.590
16	13.390	13.115	13.490	13.390
18	13.140	12.840	13.290	13.190
20	12.915	12.565	13.090	12.990
22	---	12.290	12.890	12.790
24	12.440	12.015	12.690	12.590

(---) represents values currently unavailable

Stainless Steel Pipe Per ANSI B36.19				
NPS	SCH 5S	SCH 10S	SCH 40S	SCH 80S
inches	inches	inches	inches	inches
1-1/2	15.148	15.113	15.084	15.040
2	15.101	15.065	15.029	14.978
2-1/2	15.036	15.007	14.940	14.882
3	14.974	14.944	14.867	14.800
3-1/2	14.924	14.894	14.809	14.736
4	14.874	14.844	14.750	14.670
5	14.747	14.727	14.627	14.534
6	14.640	14.620	14.534	14.382
8	14.440	14.409	14.270	14.128
10	14.208	14.183	14.023	13.915
12	13.990	13.971	13.815	13.715
14	13.865	13.840	---	---
16	13.658	13.640	---	---
18	13.458	13.440	---	---
20	13.240	13.216	---	---
22	13.040	13.016	---	---
24	12.816	12.790	---	---

(---) represents values currently unavailable

# 10. K-Factors (Stainless Steel, Wrought Steel & Plastic Pipe)

SCH 5S STAINLESS STEEL PIPE PER ANSI B36.19					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	115.1900	30.433	0.521	1.972	
2 in.	71.3960	18.863	0.840	3.181	
2-1/2 in.	49.263	13.015	1.218	4.610	
3 in.	32.636	8.622	1.838	6.959	
3-1/2 in.	24.537	6.483	2.445	9.255	
4 in.	19.1350	5.055	3.136	11.868	
5 in.	12.4490	3.289	4.820	18.242	
6 in.	8.4602	2.235	7.092	26.843	
8 in.	4.9137	1.298	12.211	46.218	
10 in.	3.1228	0.825	19.214	72.723	
12 in.	2.1772	0.575	27.558	104.308	
14 in.	1.7977	0.475	33.376	126.328	
16 in.	1.3717	0.362	43.741	165.561	
18 in.	1.0855	0.287	55.274	209.212	
20 in.	0.8801	0.233	68.174	258.039	
22 in.	0.7293	0.193	82.271	311.394	
24 in.	0.6141	0.162	97.704	369.809	

XS WROUGHT STEEL PIPE PER ANSI B36.10					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	161.79	42.745	0.371	1.404	
2 in.	95.713	25.287	0.627	2.373	
2-1/2 in.	66.686	17.618	0.900	3.406	
3 in.	42.986	11.357	1.396	5.283	
3-1/2 in.	31.983	8.450	1.876	7.101	
4 in.	24.668	6.517	2.432	9.206	
5 in.	15.480	4.090	3.876	14.671	
6 in.	10.691	2.825	5.612	21.242	
8 in.	5.9733	1.578	10.045	38.019	
10 in.	3.6489	0.964	16.443	62.238	
12 in.	2.4548	0.649	24.442	92.513	
14 in.	1.9931	0.527	30.104	113.943	
16 in.	1.4970	0.396	40.080	151.703	
18 in.	1.1727	0.310	51.164	193.656	
20 in.	0.9388	0.248	63.911	241.905	
22 in.	0.7685	0.203	78.074	295.511	
24 in.	0.6446	0.170	93.081	352.312	

SCH 40 Plastic pipe per ASTM-D-1785					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	139.850	36.948	0.429	1.624	
2 in.	82.968	21.920	0.723	2.737	
2-1/2 in.	60.194	15.903	0.997	3.773	
3 in.	39.513	10.439	1.518	5.747	
3-1/2 in.	29.295	7.740	2.048	7.752	
4 in.	22.565	5.962	2.659	10.064	
5 in.	14.308	3.780	4.193	15.872	
6 in.	9.8630	2.606	6.083	23.025	
8 in.	5.6400	1.490	10.638	40.266	
10 in.	3.4476	0.911	17.403	65.872	
12 in.	2.3786	0.628	25.225	95.476	

SCH 10S STAINLESS STEEL PIPE PER ANSI B36.19					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	127.930	33.799	0.469	1.775	
2 in.	76.439	20.195	0.785	2.971	
2-1/2 in.	51.946	13.724	1.155	4.372	
3 in.	34.174	9.029	1.756	6.645	
3-1/2 in.	25.571	6.756	2.346	8.881	
4 in.	19.829	5.239	3.026	11.453	
5 in.	12.730	3.363	4.713	17.840	
6 in.	8.5938	2.270	6.982	26.426	
8 in.	5.0062	1.323	11.985	45.364	
10 in.	3.1793	0.840	18.872	71.431	
12 in.	2.1914	0.579	27.380	103.632	
14 in.	1.8147	0.479	33.063	125.145	
16 in.	1.3798	0.365	43.485	164.589	
18 in.	1.0912	0.288	54.985	208.120	
20 in.	0.8855	0.234	67.758	256.465	
22 in.	0.7334	0.194	81.811	309.654	
24 in.	0.6175	0.163	97.166	367.773	

STD WROUGHT STEEL PIPE PER ANSI B36.10					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	140.030	36.996	0.428	1.622	
2 in.	83.240	21.992	0.721	2.728	
2-1/2 in.	59.034	15.597	1.016	3.847	
3 in.	38.674	10.218	1.551	5.872	
3-1/2 in.	28.752	7.596	2.087	7.899	
4 in.	22.226	5.872	2.700	10.218	
5 in.	14.061	3.715	4.267	16.151	
6 in.	9.5160	2.514	6.305	23.865	
8 in.	5.4523	1.441	11.005	41.652	
10 in.	3.4507	0.912	17.388	65.813	
12 in.	2.3318	0.616	25.731	97.393	
14 in.	1.9186	0.507	31.273	118.368	
16 in.	1.4483	0.383	41.428	156.805	
18 in.	1.1390	0.301	52.678	199.385	
20 in.	0.9146	0.242	65.602	248.305	
22 in.	0.7506	0.198	79.936	302.558	
24 in.	0.6311	0.167	95.072	359.848	

SCH 80 Plastic pipe per ASTM-D-1785					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	162.290	42.877	0.370	1.399	
2 in.	97.186	25.677	0.617	2.337	
2-1/2 in.	68.559	18.113	0.875	3.312	
3 in.	43.870	11.590	1.368	5.177	
3-1/2 in.	32.831	8.674	1.828	6.917	
4 in.	25.250	6.671	2.376	8.994	
5 in.	15.835	4.184	3.789	14.342	
6 in.	11.041	2.917	5.434	20.569	
8 in.	6.2877	1.661	9.542	36.118	
10 in.	3.8529	1.018	15.573	58.943	
12 in.	2.6407	0.698	22.721	86.000	

SCH 40S STAINLESS STEEL PIPE PER ANSI B36.19					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	140.030	36.996	0.428	1.622	
2 in.	83.240	21.992	0.721	2.728	
2-1/2 in.	59.034	15.597	1.016	3.847	
3 in.	38.675	10.218	1.551	5.872	
3-1/2 in.	28.752	7.596	2.087	7.899	
4 in.	22.226	5.872	2.700	10.218	
5 in.	14.061	3.715	4.267	16.151	
6 in.	9.5160	2.514	6.305	23.865	
8 in.	5.4523	1.441	11.005	41.652	
10 in.	3.4507	0.912	17.388	65.813	
12 in.	2.3318	0.616	25.731	97.393	

SCH 40 WROUGHT STEEL PIPE PER ANSI B36.10					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	140.030	36.996	0.428	1.622	
2 in.	83.240	21.992	0.721	2.728	
2-1/2 in.	59.034	15.597	1.016	3.847	
3 in.	38.674	10.218	1.551	5.872	
3-1/2 in.	28.752	7.596	2.087	7.899	
4 in.	22.226	5.872	2.700	10.218	
5 in.	14.061	3.715	4.267	16.151	
6 in.	9.5160	2.514	6.305	23.865	
8 in.	5.4523	1.441	11.005	41.652	
10 in.	3.4507	0.912	17.388	65.813	
12 in.	2.3517	0.621	25.513	96.568	
14 in.	1.9556	0.517	30.681	116.128	
16 in.	1.4970	0.396	40.080	151.703	
18 in.	1.1900	0.314	50.420	190.840	
20 in.	0.9577	0.253	62.650	237.131	
24 in.	0.6662	0.176	90.063	340.889	

SCH 40 STAINLESS STEEL PIPE					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
14 in.	1.9556	0.517	30.681	116.128	
16 in.	1.4970	0.396	40.080	151.703	
18 in.	1.1900	0.314	50.420	190.840	
20 in.	0.9577	0.253	62.650	237.131	
24 in.	0.6662	0.176	90.063	340.889	

SCH 80S STAINLESS STEEL PIPE PER ANSI B36.19					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	161.790	42.745	0.371	1.404	
2 in.	95.710	25.287	0.627	2.373	
2-1/2 in.	66.686	17.618	0.900	3.406	
3 in.	42.986	11.357	1.396	5.283	
3-1/2 in.	31.983	8.450	1.876	7.101	
4 in.	24.668	6.517	2.432	9.206	
5 in.	15.480	4.090	3.876	14.671	
6 in.	10.691	2.825	5.612	21.242	
8 in.	5.9733	1.578	10.045	38.019	
10 in.	3.6489	0.964	16.443	62.238	
12 in.	2.4548	0.649	24.442	92.513	

SCH 80 WROUGHT STEEL PIPE PER ANSI B36.10					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
1-1/2 in.	161.790	42.745	0.371	1.404	
2 in.	95.713	25.287	0.627	2.373	
2-1/2 in.	66.686	17.618	0.900	3.406	
3 in.	42.986	11.357	1.396	5.283	
3-1/2 in.	31.983	8.450	1.876	7.101	
4 in.	24.668	6.517	2.432	9.206	
5 in.	15.480	4.090	3.876	14.671	
6 in.	10.691	2.825	5.612	21.242	
8 in.	5.9733	1.578	10.045	38.019	
10 in.	3.7983	1.004	15.797	59.790	
12 in.	2.6198	0.692	22.903	86.686	
14 in.	2.1557	0.570	27.833	105.349	
16 in.	1.6444	0.434	36.487	138.105	
18 in.	1.3036	0.344	46.026	174.210	
20 in.	1.0533	0.278	56.964	215.608	
22 in.	0.8689	0.230	69.053	261.365	
24 in.	0.7335	0.194	81.800	309.611	

SCH 80 STAINLESS STEEL PIPE					
PIPE SIZE	K-Factor	K-Factor	A-Factor	A-Factor	
	PULSES/ U.S. GAL	PULSES/ LITER	U.S. GPM/HZ	LPM/HZ	
14 in.	2.1557	0.570	27.833	105.349	
16 in.	1.6444	0.434	36.487	138.105	
18 in.	1.3036	0.344	46.026	174.210	
20 in.	1.0533	0.278	56.964	215.608	
22 in.	0.8689	0.230	69.053	261.365	
24 in.	0.7335	0.194	81.800	309.611	



If the serial number on your sensor looks like this, use the data on this page.



If the serial number on your sensor looks like this, divide the values on this page by 0.9253.

K-factors and A-factors are listed in U.S. gallons and in liters. Conversion formulas for other engineering units are listed below.

• **K = 60/A**

The K-factor is the number of pulses generated by the 2540 paddlewheel per unit of liquid in a specific pipe size.

• **A = 60/K**

The A-factor is the flow rate (per minute) represented by 1 Hz output from the

# 11. Specifications

## General Data

Flow velocity range:	0.1 to 6 m/s (0.3 to 20 ft/s)
Linearity:	±1% of full range
Repeatability:	±0.5% of full range
Pipe range:	
• Standard version:	38 to 610 mm (1.5 to 24 in.)
• Hot-Tap version:	38 to 914 mm (1.5 to 36 in.)
Sensor fitting options:	316 SS with 1.5 in. NPT threads, <b>OR</b> 316 SS with ISO 7/1-R 1.5 threads
Cable length:	7.6 m (25 ft.), can splice up to 300 m (1000 ft.)
Cable type:	2-conductor twisted-pair with shield

## Fluid Conditions

Maximum operating pressure/temperature:	
• Sensor with standard Viton® sensor fitting O-rings:	17 bar (250 psi) @ 82 °C (180 °F)
• Sensor with optional EPR sensor fitting O-rings:	17 bar (250 psi) @ 100 °C (212 °F)

## Wetted Materials

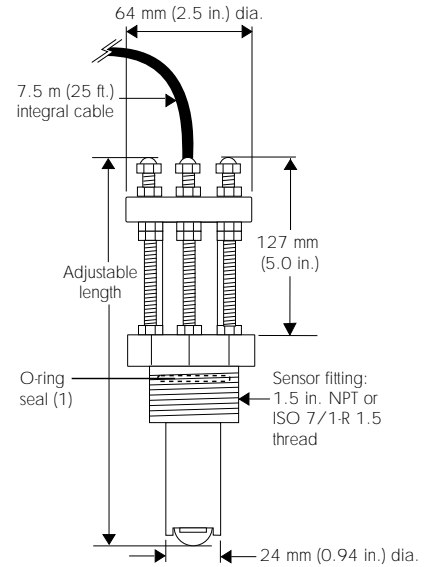
Sensor body:	316 stainless steel
Sensor fitting:	316 stainless steel
Sensor fitting O-rings:	Standard Viton®, optional EPR
Rotor:	CD4MCu stainless steel
Rotor shaft:	Tungsten carbide (standard) 316 stainless steel (option)
Shaft retainers (2):	316 stainless steel
Rotor bearings (2):	Fluoroloy B®

## Electrical Data

Supply voltage:	5 to 24 VDC
Supply current:	1.5 mA max.
Output type:	Open collector, sinking
Output current:	10.0 mA max.

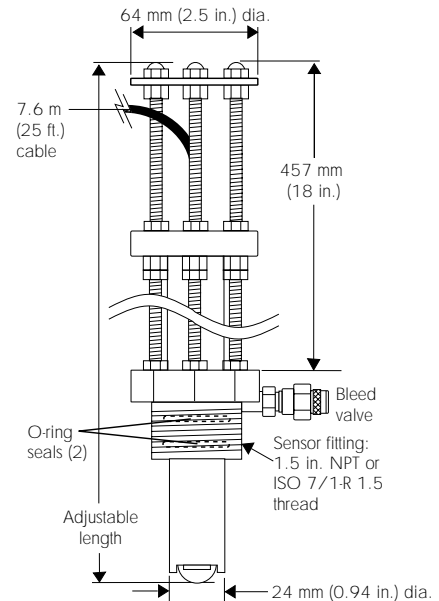
**Caution:** The 2540 Hot-Tap system's overall specifications and limitations depend on the lowest maximum rating of the components associated with the system. In other words, the Hot-Tap system is only as strong as its weakest link. For example, a ball valve, a component of the system, is rated at a maximum 100 psi @ 175 °F, limiting the entire system's maximum pressure/temperature rating to 100 psi @ 175 °F. All higher maximum specifications **MUST** yield to the component with the lowest maximum specification.

**Note:** Pressure/temperature specifications refer to sensor performance in water. Certain chemical limitations may apply. Chemical compatibility should be verified.



## Standard Sensor Dimensions:

- 2540-1 = 1.5 in. NPT fitting
- 2540-2 = ISO 7/1-R 1.5 fitting



## Hot-Tap Sensor Dimensions:

- 2540-3 = 1.5 in. NPT fitting
- 2540-4 = ISO 7/1-R 1.5 fitting

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