

SDI Series Battery Powered Insert Style Flow Sensors Owner's Manual

By Data Industrial Corporation

Introduction

The Data Industrial SDI Series impeller flow sensor offers unparalleled performance for liquid flow measurement in closed pipe systems in an easy to install economical package. Impeller sensors offer a quick response to changes in flow rate and are well suited to flow control and batch type applications in addition to flow monitoring. The new four-bladed impeller design is rugged, non-fouling and does not require custom calibration.

Coupled with the proprietary patented digital detection circuit, the sensor measures flows from 1 fps to over 20 fps regardless of the conductivity or turbidity of the liquid.

The battery powered versions are a complete flow measuring system providing a programmable display of rate, total or both powered by a "C" sized lithium battery. Options include a scalable pulse output and a data logger.

Models Available

Direct insert sensor models are installed in piping configurations that are not in service or under pressure.

Hot tap insert sensor models feature isolation valves and mounting hardware to install or remove the sensor from a pipeline that would be difficult to shut down or drain. In a true "hot tap" installation the sensor is mounted in the pipe under pressure by attaching a service saddle or weld-on fitting to the pipe and mounting the isolating valve and nipple to the threaded connection. A hole is then cut in the wall of the pipe through the valve using a commercial tapping machine with a 1" size cutter. Once the hole is cut, the tapping machine is removed and the valve is shut. Then the sensor assembly is mounted to the isolation valve and extended into the pipeline to measure flow.

Even in new construction a hot tap sensor may be appropriate for service considerations.

The small stem diameter allows the sensor to be inserted into the pressurized pipeline by hand without the need for an installation tool. The mounting hardware holds the sensor firmly in place at the correct depth and alignment.



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Preliminary

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Electronic Outputs

Scaled Pulse Output

The scaled pulse is produced by an on-board micro-controller for precise, accurate outputs. This option may be programmed to produce a transistor closure scaled to any number of engineering units of measure. Sensors may be pre-programmed at the factory or field programmed using a Data Industrial A-303 connection cable and a Windows® based software program. All information is stored in non-volatile memory in the flow sensor.

SDI Battery Operated Ordering Matrix

| | | | | | | | | | | | |
|------------------------------------|-----|---|----|---|---|---|---|---|---|---|---|
| | SDI | 0 | XX | B | X | X | - | 0 | 2 | 0 | 0 |
| Material | | | | | | | | | | | |
| Stainless Steel | | 0 | | | | | | | | | |
| Brass | | 1 | | | | | | | | | |
| Type | | | | | | | | | | | |
| Direct Insert for Pipe 1½" - 10" * | D1 | | | | | | | | | | |
| Direct Insert for Pipe 12" - 36" * | D2 | | | | | | | | | | |
| Hot Tap for Pipe 1½" - 10" * | H1 | | | | | | | | | | |
| Hot Tap for Pipe 12" - 36" * | H2 | | | | | | | | | | |
| Hot Tap for Pipe 36" and UP * | H3 | | | | | | | | | | |
| Electronic Housing | | | | | | | | | | | |
| Battery Powered / NEMA 6 | | | B | | | | | | | | |
| Output | | | | | | | | | | | |
| No Output | | | | N | | | | | | | |
| Scaled Pulse | | | | 2 | | | | | | | |
| Scaled Pulse Data Logger | | | | 7 | | | | | | | |
| Display | | | | | | | | | | | |
| LCD Option | | | | | 1 | | | | | | |
| Remote Display / NEMA 4X | | | | | 2 | | | | | | |
| O-Ring | | | | | | | | | | | |
| Viton® | | | | | | | | 0 | | | |
| Shaft | | | | | | | | | | | |
| Tungsten Carbide | | | | | | | | | 2 | | |
| Impeller | | | | | | | | | | | |
| Stainless Steel | | | | | | | | | | 0 | |
| Bearing | | | | | | | | | | | |
| Torlon® | | | | | | | | | | | 0 |

* Pipe Sizes for reference only - Depending on pipe material, tapping saddle, or existing hardware longer sensor length may be required - Contact Factory.

Display Options:

The 8 character 3/8" LCD is mounted on the sensor visible through a lens at the top of the electronics housing. An optional remote display is available where the the LCD is located in a wall mount NEMA 4X enclosure. The remote may be connected to the flow sensor up to a maximum of 50 feet away using extension cables.

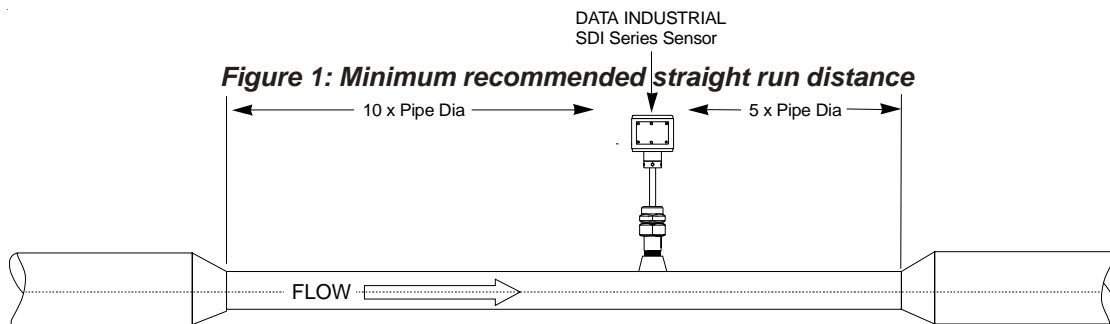
SDI Remote Cable Part Numbers

| | |
|-------|---------------------|
| 07101 | 5' Extension Cable |
| 07108 | 10' Extension Cable |
| 07102 | 20' Extension Cable |
| 07109 | 50' Extension Cable |

Mechanical Installation

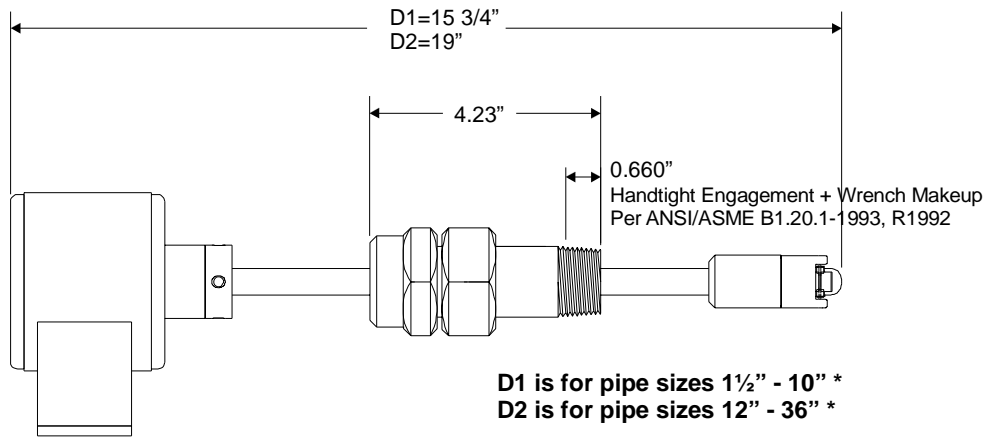
The accuracy of flow measurement for all insert type flow measuring devices is highly dependent on proper location of the sensor in the piping system. Irregular flow velocity profiles caused by valves, fittings, pipe bends, etc. can lead to inaccurate overall flow rate indications even though local flow velocity measurement may be accurate. A sensor located in the pipe that is partially full or where it can be affected by air bubbles, floating debris, or sediment may not achieve full accuracy and could be damaged.

Data Industrial flow sensors are designed to operate reliably under adverse conditions, but the following recommendations should be followed to ensure maximum system accuracy:



- 1) Choose a location along the pipe where there is straight pipe for a distance of 10 pipe diameters upstream and 5 pipe diameters downstream of the sensor. Pipe bends, valves, other fittings, pipe enlargements and reductions or anything else that would cause a flow disturbance should not be present in this length of pipe.
- 2) The recommended tap location around the circumference of a horizontal pipe is on top. If trapped air or debris will interfere, then the sensor should be located around the pipe from the top preferably not more than 45 degrees from top dead center. The sensor should never be located at the bottom of the pipe, as sediment may collect there. Locations off top dead center cause the impeller friction to increase, which may affect performance at low flow rates. Any circumferential location is correct for installation in vertical pipes.
- 3) Insertion depth is critical to accuracy. The algorithm used to convert impeller motion into flow was developed through flow tests in an independent calibration laboratory. The impeller must be located in the same position in the pipe as it was in the calibration test for the impeller frequency to accurately describe the same liquid velocity. Detailed installation instructions on the following pages include methods for ensuring correct insertion depth.
- 4) Alignment of the sensor is also important. The impeller shaft must be perpendicular to the flow for accuracy. Alignment instructions are also included on the following pages.

Figure 2: Direct insertion sensor dimensions



* Pipe sizes are for reference only - Depending on pipe material, tapping saddle, or existing hardware a longer sensor length may be required, Consult Factory.

Installation for Direct insert models

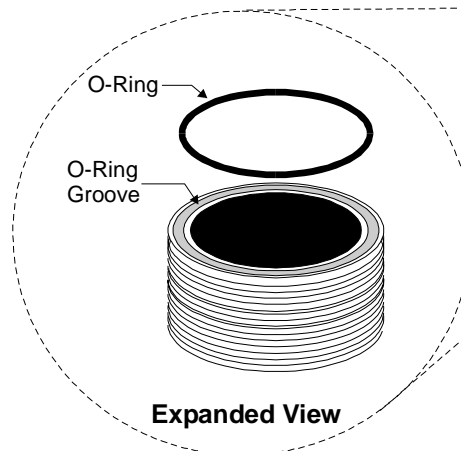
These instructions are for the installation of flow sensors into piping systems that are not under pressure at the time of installation. If the line must be tapped under pressure, a hot tap style sensor must be used. See following section for hot tap installation instructions.

The insertion depth and alignment of the sensor are critical to the accuracy of the flow measurement. The impeller must be at the same location in the pipe as it was during calibration. Data Industrial provides sensors with different stem lengths. Longer stems are intended for use in larger diameter pipes and shorter stems for use in smaller pipelines. However stem length has no effect on the operation of the sensor provided that the impeller is positioned correctly in the pipe.

Direct insert models are available in stem lengths designated D1 and D2. The D1 is intended for nominal pipe diameters from 1 1/2" to 10", and the D2 for pipe diameters from 12"-36". However, pipe with extra thick walls, existing linings, or unusual tapping hardware may require longer length sensors - Consult factory. For larger pipe sizes hot tap style sensors equipped with an isolation valves are recommended.

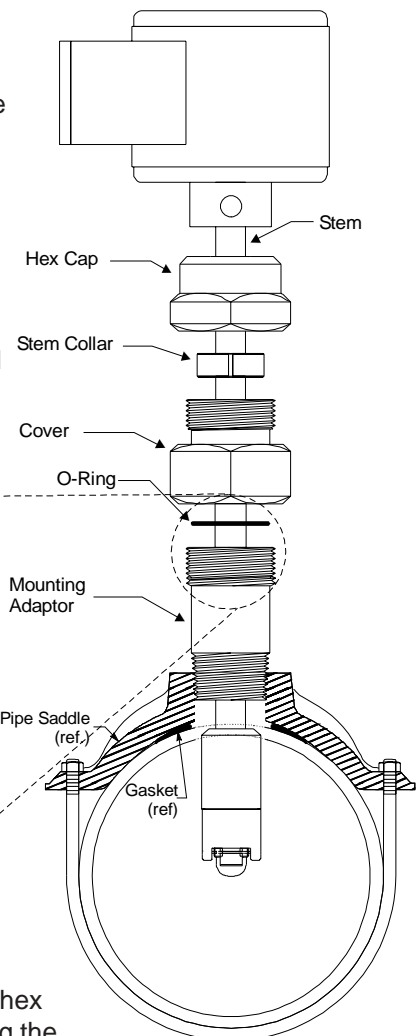
The preferred method of installation is by means of a saddle with 1" NPT outlet. On steel pipelines a weld-on type fitting may be substituted.

1. Attach the saddle to a section of pipe that has at least 10 diameters of straight pipe ahead and five diameters of straight pipe behind the saddle. Drill a minimum 1 1/8" diameter hole in the pipe.



2. Remove the sensor assembly from the mounting hardware by loosening the hex cap over the stem collar and the cover to the mounting adaptor and detaching the assembly. Set aside taking care not to damage impeller/shaft assembly.

Figure 3:



3. Attach the pipe thread end of the mounting adapter to the saddle/weld-o-let using a pipe joint compound and tighten the joint. *Do not apply sealing compound to the top thread of the mounting adapter. It is sealed with an o-ring.*
4. The sensor rotor assembly is to be located a fixed distance from the center of the pipe. To position the impeller at this depth, a reference measurement for the pipe size and schedule is used. Look up the pipe size and schedule number in **Table A** and note the reference number. Next, measure from the outside wall of the pipe to the top of the installed mounting adapter "B" in Figure 4. Add this number to the reference measurement.

The resulting number, "C" in Figure 4 is the distance from the recess of the sensor tip to the bottom of the stem collar. Insert the metal tab of a tape measure into the recess of the flow sensor tip. Extend the tape up the stem and mark the shaft with a pencil. Slide the collar along the shaft until its bottom surface is at the mark on the stem. Tighten the cap screw on the collar. When the sensor is reassembled, this will set the insertion depth of the sensor.

5. Attach the sensor to the mounting adapter by gently pushing the flow sensor into the mounting adapter until the cover touches the mounting adapter. Tighten the cover against the o-ring seal. This will seal the sensor assembly.
6. Continue to insert the flow sensor stem until the stem collar meets the cover. Thread the hex cap onto the mounting adapter but don't tighten. Align the flow sensor with the pipe by using the flat cover on the electronics housing as a guide. Place a straightedge along the cover and rotate the sensor until the straightedge is parallel with the pipe. Tighten the hex cap over the collar approximately 10 foot pounds. The hex cap holds the sensor alignment but performs no sealing functions. **DO NOT OVERTIGHTEN.**
7. Pressurize pipeline and check for leaks.

Figure 4:

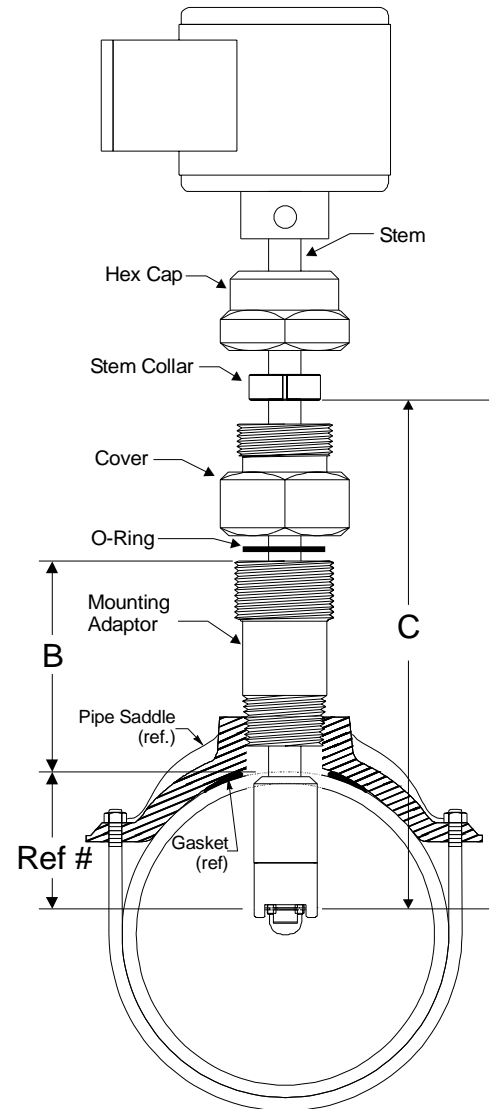
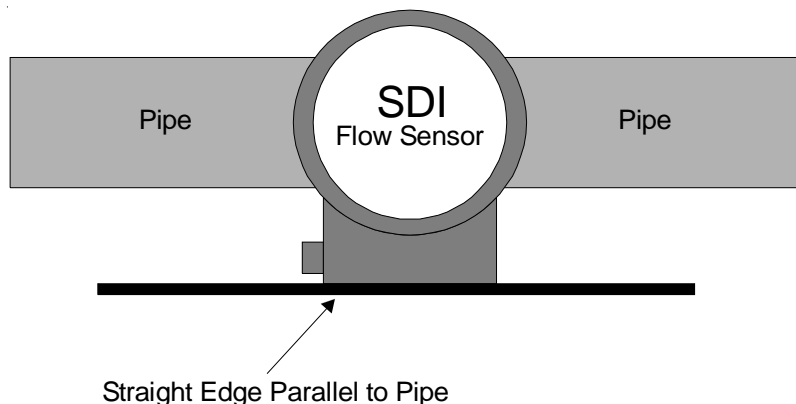


Figure 5:



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Installation for Hot Tap models

The insertion depth and alignment of the sensor are critical to the accuracy of the flow measurement. The impeller must be at the same location in the pipe as it was during calibration. Data Industrial provides sensors with three different stem lengths. Longer stems are intended for use in larger diameter pipes and shorter stems for use in smaller pipelines. However stem length has no effect on the operation of the sensor provided that the impeller is positioned correctly in the center of the pipe.

Stem length H1 is intended for use in nominal pipe diameters from 1 1/2" to 10", H2 is for nominal pipe diameters from 12" to 36", and stem length H3 is for nominal pipe diameters from 36" and up. However, pipe with extra thick walls, existing linings, or unusual tapping hardware may require longer length sensors - Consult factory.

The preferred method of installation is by means of a saddle with 1" NPT outlet. On steel pipelines a weld-on type fitting may be substituted.

1. Attach the saddle to a section of pipe that has at least 10 diameters of straight pipe ahead and five diameters of straight pipe behind the saddle.
2. Remove the sensor assembly from the mounting/isolation valve by loosening the hex cap over the stem collar and the cover to the mounting/isolation valve and detaching the assembly. Set aside taking care not to damage impeller/shaft assembly.
3. Attach the pipe thread end of the valve to the saddle using a pipe joint compound and tighten the joint. *Do not apply sealing compound to the top thread of the valve. It is sealed with an o-ring.*
4. Attach the tapping adapter, Data Industrial part number A-1027 to the top of the valve.
5. Any pipe tapping machine with a 1" pipe thread connection may be used. Use a cutter appropriate for the pipe material being tapped.
6. Attach the tapping machine to the tapping adapter. Ensure that all connections and seals are tight.
7. Slowly open the valve by rotating the handle 90° and lower the cutter past the valve ball to the pipe. Drill the 1" nominal hole according to the manufacturer's instructions. Withdraw the cutter past the valve ball, close the valve and remove the tapping tool.

Figure 6:

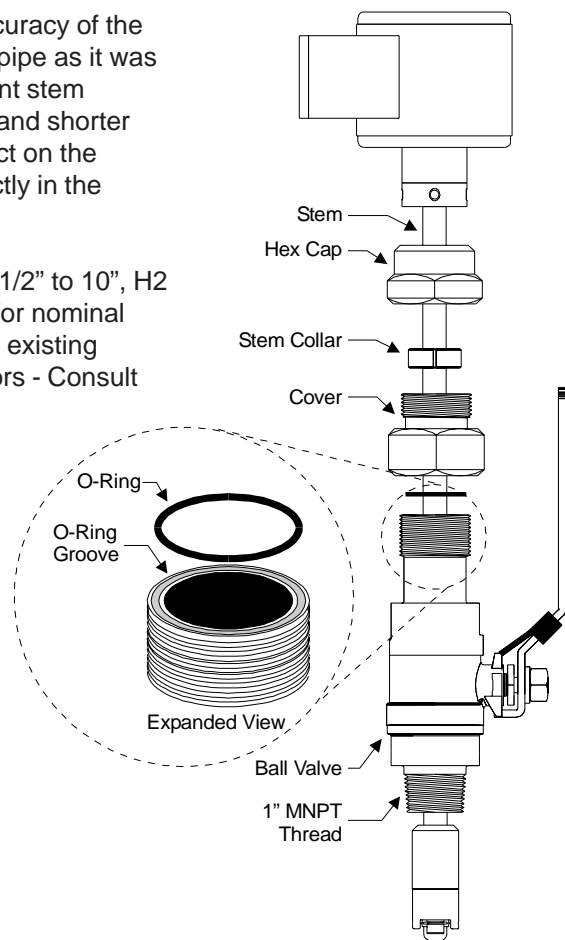
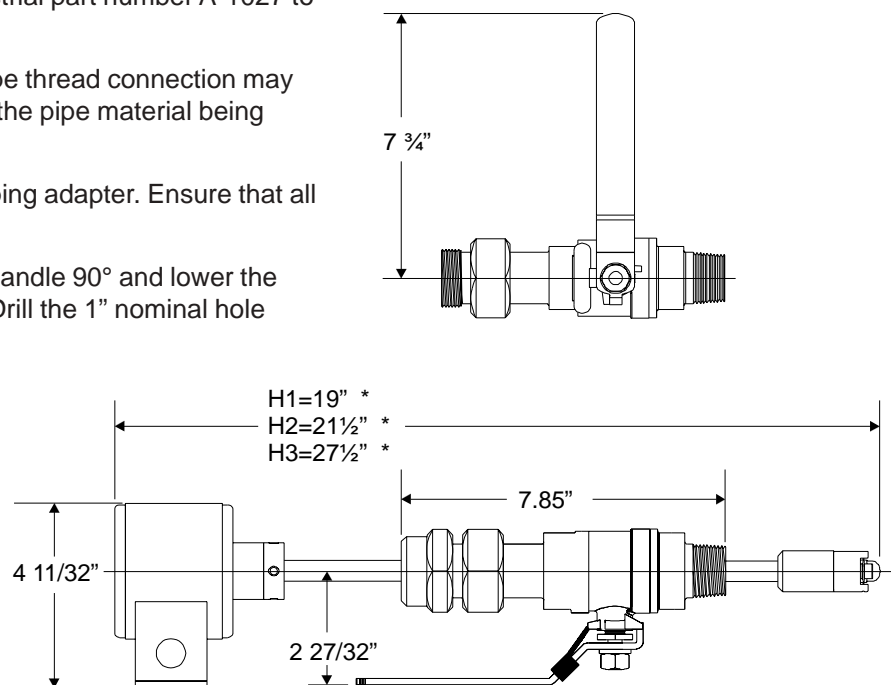


Figure 7: Hot Tap sensor dimensions



* Pipe Sizes for reference only - Depending on pipe material, tapping saddle, or existing hardware longer sensor length may be required - Contact Factory.

8. Remove the Data Industrial tapping adapter from the top of the valve.
9. The sensor rotor assembly is to be located a fixed distance from the center of the pipe. To position the impeller at this depth, a reference measurement for the pipe size and schedule is used. Look up the pipe size and schedule number in **Table A** and note the reference number. Next, measure from the outside wall of the pipe to the top of the ball valve "B" in Figure 8. Add this number to the reference measurement.

The resulting number is the distance from the recess of the sensor tip to the bottom of the stem collar "C" in Figure 8. Insert the metal tab of a tape measure into the recess of the flow sensor tip. Extend the tape up the stem and mark the shaft with a pencil. Slide the collar along the shaft until its bottom surface is at the mark on the stem. Tighten the cap screw on the collar. When the sensor is reassembled, this will set the insertion depth of the sensor.

10. Slide the cover down the stem until it stops. Attach the sensor to the valve by inserting the impeller end of the stem into the valve until the cover touches the top of the valve. The sensor tip and impeller will be in the section of the valve above the ball. Tighten the cover against the o-ring in the top of the valve. This will seal the sensor assembly. Open the ball valve again by slowly rotating the handle 90°. If the cover was not at the bottom of the sensor stem, water pressure from the pipe would now push it out until it stops. However, the sensor cannot be ejected from the pipe if the cover is secured to the valve. Check to make sure all joints are tight.
11. Insert the flow sensor stem into the pipe by pushing against the top of the electronics housing with a slight twisting motion until the stem collar meets the cover. The force required to push the sensor into the pipeline is approximately 20% of the line pressure. Be aware of the close spacing between the diameter of the flow sensor, the bore of the ball valve and the hole in the pipe. If the sensor stops or "catches" before the stem collar meets the cover, apply a gentle rocking/twisting motion to the sensor to continue its travel. While holding the flow sensor collar against the cover, thread the hex cap onto the cover to hold the flow sensor in place but do not tighten. Align the flow sensor with the pipe by using the flat side cover of the electronics housing as a guide. Place a straightedge along the cover and rotate the sensor until the straightedge is parallel to the pipe. Tighten the hex cap to the cover to approximately 10 foot pounds. The hex cap holds the sensor alignment and depth but performs no sealing functions. **DO NOT OVERTIGHTEN.**

12. Pressurize pipeline and check for leaks.

Figure 8:

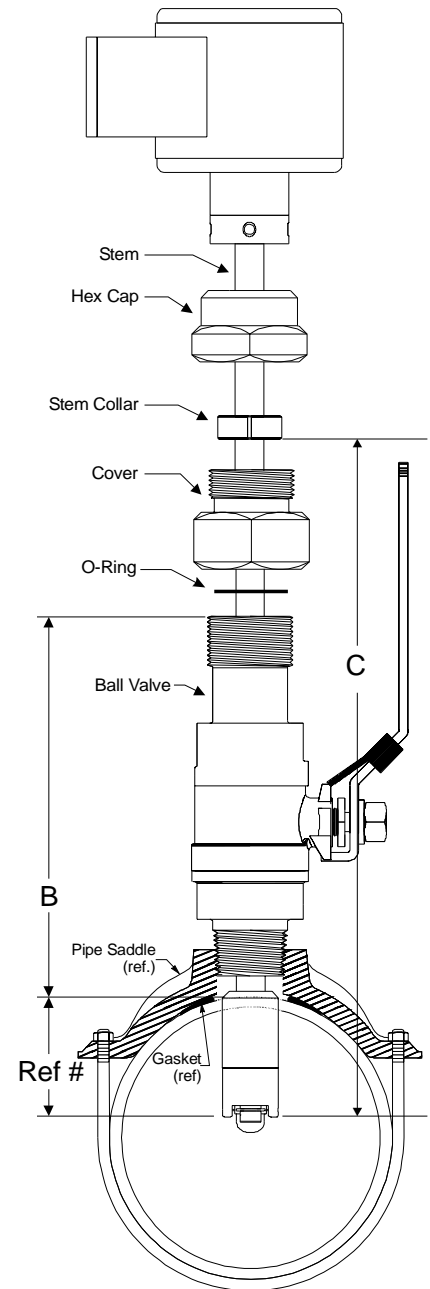
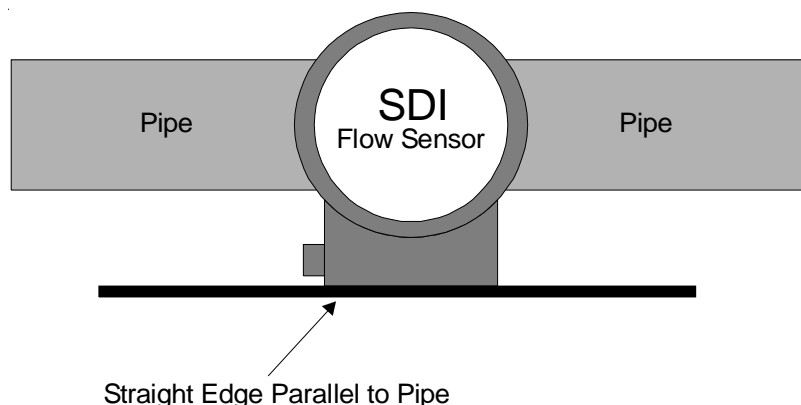


Figure 9:



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Removing Side Cover

There are six screws to remove the side cover / battery holder. To remove the side cover use a screwdriver to unscrew each cover screw counterclockwise. These screws are captive so they will not fall out of the cover. Use care when replacing side cover to insure that the o-ring is in place.

DO NOT REMOVE CIRCULAR COVER from top of sensor. You may disturb seal and label alignment.

Battery Replacement - Local display option

Although the Battery Powered SDI has up to a 5 year battery life there will be a time when the battery needs to be replaced. The battery is located inside the blue housing on the end of the flow sensor accessible by removing the side cover / battery holder. The battery is held in a spring clip attached to the cover. The required battery is a 3V lithium "C" size that can be purchased through Data Industrial. The battery supplied by Data Industrial has the connector required to plug it into the power header. Reference figure 12 for the power header location.

Figure 11

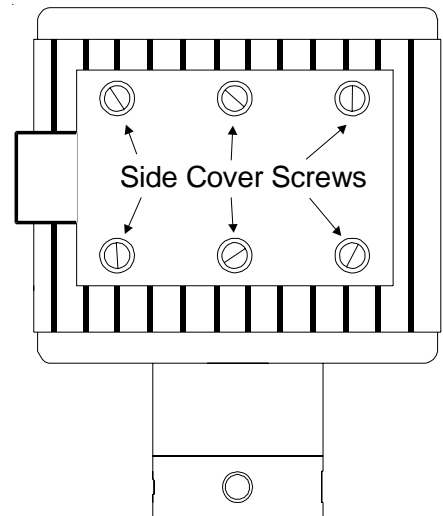
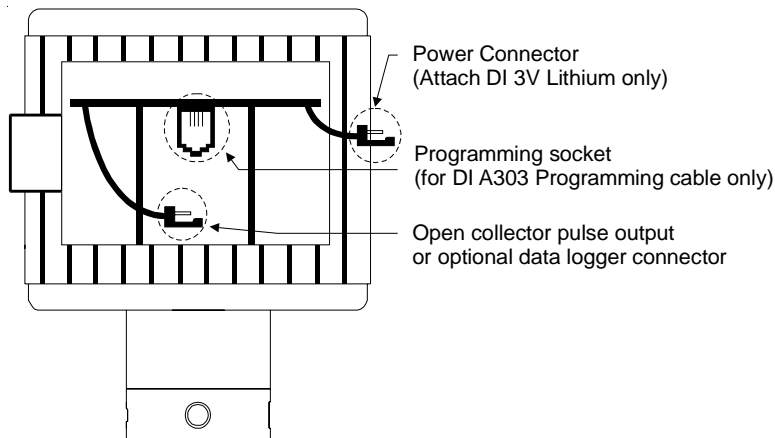


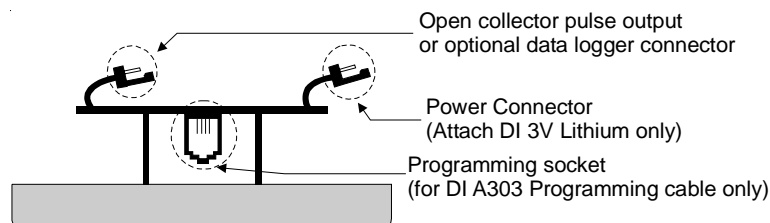
Figure 12



Battery Replacement - Remote display option

The battery is located inside the remote display housing. Loosen the 1/4 turn fasteners at the corners of the cover. Open the enclosure to locate the "C" size lithium battery held on by a spring clip. Disconnect the battery from the header and remove battery from clip. Reverse this procedure to install new battery. Reference figure 13 for the power header location.

Figure 13



Wiring Pulse Output

The optional pulse output of the Battery Powered SDI is a scaled pulse output that is set in the programming software. The output type is an open collector transistor closure with a maximum sinking current of 100mA. If the optional data logger option is chosen the pulse output cannot be used independently.

Programming

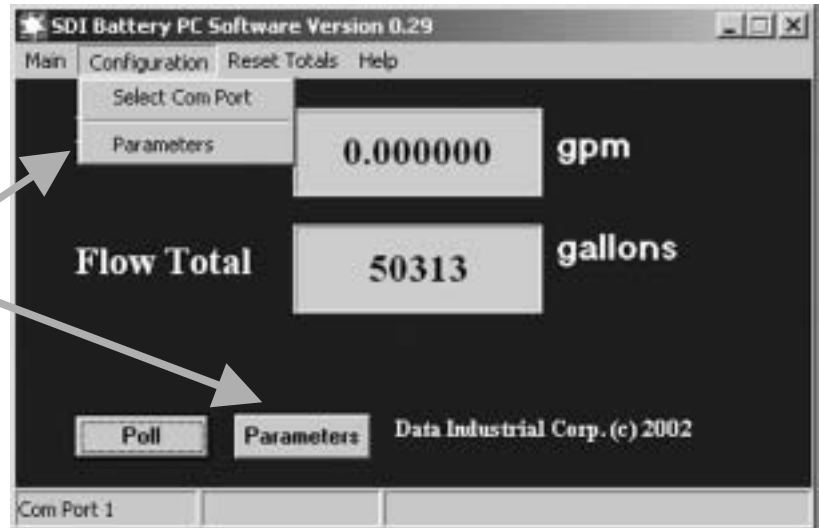
Programming the Series SDI is accomplished by installing the Data Industrial programming software on a computer and entering data on templates of the Windows® based program.

1. Load the interface software into the computer.
2. Connect the PC to the SDI with the Data Industrial A-303 communications cable. Plug in the RJ11 plug on the A-303 cable to the RJ11 socket on Battery Powered SDI. Connect the DB9 connector of the A-303 cable to the PC com port to a PC that has the SDI software installed.
3. Open the interface software and select the appropriate COM PORT as shown in the dialog box below.



4. Open the Parameters Screen as shown below.

To calibrate select
"parameters" from
either place shown.



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5. Program parameters using diagram below as a reference.

Step #1

Enter in a "K" number found in **Table B**.

Step #2

Enter in a "offset" number found in **Table B**.

Step #3

Enter in a Reference number found in **Table A**.

Step #6

Optional setting, Enter in the gallons/pulse and select pulse width. Skip this step if not using the Scaled pulse output

Step #7

Press Send to transmit calibration data to the SDI Sensor. **See Note #1**

Step #4

Select the desired flow rate and total units.

Step #5

Select the desired display readout mode.

Press to reset all parameters back to factory defaults. Send must be pressed to send this data to the SDI.

Step #8

Press to exit parameters screen and to go back to the main screen. **See Note #2**

The screenshot shows the 'SDI Battery Parameters' window with the following fields and buttons:

- Flow Sensor Configuration:**
 - K = 1.800000
 - Offset = 0.000000
 - Ref. # = 2001.888
- Flow Total Units:**
 - Gallons
 - Total units determine flow units. Flow is in gallons per minute.
- Scaled Pulse Output:**
 - Gallons/Pulse = 56
 - Pulse Width = 50 ms
- Sensor Display Readout:**
 - Toggle Rate/Flow
- Buttons:** Send, Refresh, Defaults, Exit
- Status Bar:** Com Port 1, Updated

Press to retrieve calibration data from SDI.

Note #1

After the "send" button is pressed it could take up to one and a half minutes to program the Battery Powered SDI. The illustration below shows the programming process bar. When the programming process bar disappears and the status bar says "updated" the Battery Powered SDI is programmed.

The screenshot shows the 'SDI Battery Parameters' window during the programming process. The status bar at the bottom indicates 'Com Port 1' and 'Updating'. A dashed oval highlights the 'Programming Progress' bar, which is partially filled with black bars. The 'Send' button is highlighted with a dashed oval. The 'Status Bar' is also highlighted with a dashed oval.

Note #2

After the "exit" button is pressed it takes about 10 seconds to go back to the operating display and refresh flow rate and flow total.

Table A
Customer Reference Number

| Pipe | | | Pipe Schedules | | | | | |
|-------|--------|--|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Size | O.D. | | 10 | 10s | 40 | 40s/Std | 80 | SDR21 (200) |
| 1 1/2 | 1.900 | Wall Insertion Depth Customer Ref # | .109 .58 1 9/16 | .109 .58 1 9/16 | .145 .54 1 9/16 | .145 .54 1 9/16 | .200 .49 1 9/16 | |
| 2 | 2.375 | Wall Insertion Depth Customer Ref # | .109 .81 1 13/16 | .109 .81 1 13/16 | .154 .77 1 13/16 | .154 .77 1 13/16 | .218 .71 1 13/16 | .113 .81 1 13/16 |
| 2 1/2 | 2.875 | Wall Insertion Depth Customer Ref # | .120 1.05 2 1/16 | .120 1.05 2 1/16 | .203 .97 2 1/16 | .203 .97 2 1/16 | .276 .90 2 1/16 | .137 1.04 2 1/16 |
| 3 | 3.500 | Wall Insertion Depth Customer Ref # | .120 1.37 2 3/8 | .120 1.37 2 3/8 | .216 1.27 2 3/8 | .216 1.27 2 3/8 | .300 1.19 2 3/8 | .167 1.32 2 3/8 |
| 4 | 4.500 | Wall Insertion Depth Customer Ref # | .120 1.70 2 11/16 | .120 1.70 2 11/16 | .237 1.61 2 23/32 | .237 1.61 2 23/32 | .337 1.53 2 3/4 | .214 1.63 3 1/8 |
| 5 | 5.563 | Wall Insertion Depth Customer Ref # | .134 1.59 2 5/8 | .134 1.59 2 5/8 | .258 1.51 2 21/32 | .258 1.51 2 21/32 | .375 1.44 2 11/16 | |
| 6 | 6.625 | Wall Insertion Depth Customer Ref # | .134 1.91 2 29/32 | .134 1.91 2 29/32 | .280 1.82 2 31/32 | .280 1.82 2 31/32 | .432 1.73 3 1/32 | .316 1.83 3 1/32 |
| 8 | 8.625 | Wall Insertion Depth Customer Ref # | .148 2.50 3 17/32 | .148 2.50 3 17/32 | .322 2.39 3 19/32 | .322 2.39 3 19/32 | .500 2.29 3 21/32 | .410 2.40 3 11/16 |
| 10 | 10.750 | Wall Insertion Depth Customer Ref # | .165 3.13 4 5/32 | .165 3.13 4 5/32 | .365 3.01 4 1/4 | .365 3.01 4 1/4 | .594 2.87 4 11/32 | .511 2.98 4 3/8 |
| 12 | 12.750 | Wall Insertion Depth Customer Ref # | .180 3.72 4 25/32 | .180 3.72 4 25/32 | .406 3.58 4 7/8 | .375 3.60 4 27/32 | .688 3.41 5 | .606 3.52 5 |
| 14 | 14.000 | Wall Insertion Depth Customer Ref # | .250 2.03 3 5/32 | .188 2.04 3 3/32 | .438 1.97 3 9/32 | .375 1.99 3 1/4 | .750 1.88 3 1/2 | |
| 16 | 16.000 | Wall Insertion Depth Customer Ref # | .250 2.33 3 7/16 | .188 2.34 3 13/32 | .500 2.25 3 5/8 | .375 2.29 3 17/32 | .844 2.15 3 7/8 | |
| 18 | 18.000 | Wall Insertion Depth Customer Ref # | .250 2.63 3 3/4 | .188 2.64 3 23/32 | .562 2.53 3 31/32 | .375 2.59 3 27/32 | .938 2.42 4 1/4 | |

Table A (cont.)
Customer Reference Number

| Pipe | | | Pipe Schedules | | | | |
|------|--------|--|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| Size | O.D. | | 10 | 10s | 40 | 40s/Std | 80 |
| 20 | 20.000 | Wall Insertion Depth Customer Ref # | .250 2.93 4 1/16 | .218 2.94 4 1/32 | .594 2.82 4 9/32 | .375 2.89 4 1/8 | 1.031 2.69 4 19/32 |
| 22 | 22.000 | Wall Insertion Depth Customer Ref # | .250 3.23 4 11/32 | | | .375 3.19 4 7/16 | 1.125 2.96 4 31/32 |
| 24 | 24.000 | Wall Insertion Depth Customer Ref # | .250 3.53 4 21/32 | .250 3.53 4 21/32 | .688 3.39 4 31/32 | .375 3.49 4 3/4 | 1.219 3.23 5 5/16 |
| 26 | 26.000 | Wall Insertion Depth Customer Ref # | | .312 3.81 5 | | .375 3.79 5 1/32 | |
| 28 | 28.000 | Wall Insertion Depth Customer Ref # | | .312 4.11 5 9/32 | | .375 4.09 5 11/32 | |
| 30 | 30.000 | Wall Insertion Depth Customer Ref # | .312 4.41 5 19/32 | .312 4.41 5 19/32 | | .375 4.39 5 5/8 | |

For sizes above 30", consult factory. Pipe O.D. & Schedule, or pipe O.D. & I.D., or pipe O.D. & wall thickness is required.

| Copper Tube | | | Type | | | |
|-------------|-------|--|--------------------------------|-------------------------------|--------------------------------|--------------------------------|
| Size | O.D. | | K | L | M | DWV |
| 1 1/2 | 1.625 | Wall Insertion Depth Customer Ref # | .072 .48 1 7/16 | .060 .49 1 7/16 | .049 .50 1 7/16 | .042 .51 1 7/16 |
| 2 | 2.125 | Wall Insertion Depth Customer Ref # | .083 .72 1 11/16 | .070 .73 1 11/16 | .058 .74 1 11/16 | .042 .76 1 11/16 |
| 2 1/2 | 2.625 | Wall Insertion Depth Customer Ref # | .095 .95 1 29/32 | .080 .97 1 29/32 | .065 .98 1 29/32 | |
| 3 | 3.125 | Wall Insertion Depth Customer Ref # | .109 1.19 2 3/16 | .090 1.21 2 3/16 | .072 1.23 2 3/16 | .045 1.25 2 3/16 |
| 4 | 4.125 | Wall Insertion Depth Customer Ref # | .134 1.54 2 9/16 | .110 1.56 2 9/16 | .095 1.57 2 17/32 | .058 1.60 2 17/32 |
| 6 | 6.125 | Wall Insertion Depth Customer Ref # | .192 1.72 2 25/32 | .140 1.75 2 3/4 | .122 1.76 2 3/4 | .083 1.79 2 3/4 |

Table A (cont.)
Customer Reference Number

| |
|---------------------|
| Ductile Iron |
|---------------------|

Because of the variety of iron pipe classes, sizes, and wall thicknesses, consult factory for customer reference number. Pipe O.D. & Schedule, or pipe O.D. & I.D., or pipe O.D. & wall thickness is required.

| PVC AWWA C900 | | | |
|---------------|--------|--|--------------------------------|
| Size | O.D. | | CL100 |
| 4 | 4.800 | Wall Insertion Depth Customer Ref # | .192 1.77 2 27/32 |
| 6 | 6.900 | Wall Insertion Depth Customer Ref # | .276 1.90 3 1/16 |
| 8 | 9.050 | Wall Insertion Depth Customer Ref # | .362 2.50 3 23/32 |
| 10 | 11.100 | Wall Insertion Depth Customer Ref # | .444 3.06 4 3/8 |
| 12 | 13.200 | Wall Insertion Depth Customer Ref # | .528 3.64 5 1/16 |

For other types of pipe not listed above, consult factory. Pipe O.D. & Schedule, or pipe O.D. & I.D., or pipe O.D. & wall thickness is required.

Table B
k & Offset

| Pipe | | | Pipe Schedules | | | | | |
|-------|--------|-------------|----------------------|------------------------|------------------------|------------------------|-----------------------|----------------------|
| Size | O.D. | | 10 | 10s | 40 | 40s/Std | 80 | SDR21 (200) |
| 1 1/2 | 1.900 | K Offset | | | 0.297315 0.859353 | 0.297315 0.859353 | 0.244927 0.859353 | |
| 2 | 2.375 | K Offset | 0.801632 1.813024 | 0.801632 1.813024 | 0.498124 1.523850 | 0.498124 1.523850 | | |
| 2 1/2 | 2.875 | K Offset | 0.801632 1.813024 | 0.801632 1.813024 | 0.699870 1.111784 | 0.699870 1.111784 | 0.654225 1.307587 | |
| 3 | 3.500 | K Offset | 1.317775 1.756472 | 1.317775 1.756472 | 1.169137 1.609184 | 1.169137 1.609184 | 1.070953 1.307587 | 1.212446 1.056965 |
| 3 1/2 | 3.500 | K Offset | | | 1.612333 1.609184 | 1.612333 1.609184 | | |
| 4 | 4.500 | K Offset | 2.110168 4.142096 | 2.110168 4.142096 | 1.872713 4.142096 | 1.872713 4.142096 | 1.964629 1.307587 | |
| 5 | 5.563 | K Offset | | | 3.251260 2.093849 | 3.251260 2.093849 | | |
| 6 | 6.625 | K Offset | 5.144059 3.295640 | 5.144059 3.295640 | 4.642584 3.295640 | 4.642584 3.295640 | 4.237085 2.093849 | |
| 8 | 8.625 | K Offset | | | 8.730561 2.793790 | 8.730561 2.793790 | | |
| 10 | 10.750 | K Offset | | | 13.737621 2.937799 | 13.737621 2.937799 | 12.476283 2.937799 | |
| 12 | 12.750 | K Offset | | | 19.830912 2.768877 | 20.041272 2.768877 | 17.796906 2.937799 | |
| 14 | 14.000 | K Offset | | | 24.238528 2.768877 | 24.702144 2.768877 | | |
| 16 | 16.000 | K Offset | | | 31.728175 2.768877 | 32.804463 2.768877 | 28.663241 2.768877 | |
| 18 | 18.000 | K Offset | | | 41.579656 3.715358 | 43.462537 3.715358 | 37.706693 3.715358 | |
| 20 | 20.000 | K Offset | | | 51.751173 3.715358 | | 46.771847 3.715358 | |
| 22 | 22.000 | K Offset | | | | | | |
| 24 | 24.000 | K Offset | | | 74.0284944 3.155189 | 78.201801 3.155189 | 67.789784 3.715358 | |
| 26 | 26.000 | K Offset | | | | | | |
| 28 | 28.000 | K Offset | | 123.735118 3.155189 | | | | |
| 30 | 30.000 | K Offset | | | | 123.735118 3.155189 | | |

For sizes above 30", consult factory. Pipe O.D. & Schedule, or pipe O.D. & I.D., or pipe O.D. & wall thickness is required.

Table B (cont.)

| Copper Tube | | | Type | | | |
|-------------|-------|-------------|----------------------|-----------------------|---|-----|
| Size | O.D. | | K | L | M | DWV |
| 1 1/2 | 1.625 | K Offset | | 0.277993 0.063685 | | |
| 2 | 2.125 | K Offset | | 0.509285 -0.043054 | | |
| 2 1/2 | 2.625 | K Offset | | 0.784450 -0.126200 | | |
| 3 | 3.125 | K Offset | | 1.177171 0.198965 | | |
| 4 | 4.125 | K Offset | | 1.750507 4.142096 | | |
| 5 | 5.125 | K Offset | | 3.587835 0.198965 | | |
| 6 | 6.125 | K Offset | 5.041780 0.198965 | 4.298570 3.295640 | | |

Ductile Iron

Because of the variety of iron pipe classes, sizes, and wall thicknesses, consult factory for customer reference number. Pipe O.D. & Schedule, or pipe O.D. & I.D., or pipe O.D. & wall thickness is required.

| PVC Municipal C900 | | | Schedules |
|--------------------|--------|-------------|-----------|
| Size | O.D. | | 100 |
| 4 | 4.800 | K Offset | |
| 6 | 6.900 | K Offset | |
| 8 | 9.050 | K Offset | |
| 10 | 11.100 | K Offset | |
| 12 | 13.200 | K Offset | |

For other types of pipe not listed above, consult factory. Pipe O.D. & Schedule, or pipe O.D. & I.D., or pipe O.D. & wall thickness is required.

Blank boxes indicate no data at time of printing.

SPECIFICATIONS

Wetted Materials

Sensor stem, mounting adapter, isolation valve, and nipple:

- 316 Stainless steel
- Brass, B16, UNS C36000

Sensor Tip:

- GF polyphenylene sulfide (PPS)

O-rings, bearings, shaft:

- see ordering matrix

Operating temperature: Electronics:

- 150°F (65°C)

Operating Temperature: LCD:

- 150°F (65°C)

Maximum Pressure Rating:

Stainless Steel

- 1000 psi (68.9 bar) @ 70°F (21°C)*
- 900 psi (62 bar) @ 100°F (37.8°C)*
- 670 psi (46.1 bar) @ 140°F (60°C)*
- 225 psi (15.5 bar) @ 180°F (82°C)*

Brass

- 600 psi (41.3bar) @ up to 140°F(60°C)*
- 225 psi (15.5bar) @ 180°F(82°C)*

* Non-Shock

Recommended Design Flow Range:

- 1 to 20 ft/sec
- Extended flow range < 0.3 to 20 fps

Pressure Drop:

- 0.5 psi or less @ 10 ft/sec for all pipe sizes 1.5" dia and up.

Accuracy:

- Standard: to +/- 1% of rate over optimum flow range
- Custom wet calibration: On request

Straight Pipe Requirement:

- install sensor in straight pipe section with a minimum distance of 10 diameters upstream and 5 diameters downstream to any bend, transition, or obstruction.

Repeatability:

+/- 0.5%

Enclosure - Sensor:

- Polypropylene with Viton® sealed acrylic cover. Meets NEMA 6P specifications

Enclosure - Remote:

- Polycarbonate w/ Neoprene® sealed cover. Meets NEMA 4X specifications.

Programming:

- all programmable models utilize Data Industrial A-303 connector cable and SDI Series software

Display:

- 8 character, 3/8" LCD
- STN (Super twisted Nematic) display
- annunciators for:
rate, total, input, output flow direction for Bi-directional models

Accessories:

- ASDIB Programming Kit
- A1027 Hot Tap Adapter Nipple
- 07101 5' Extension Cable
- 07102 20' Extension Cable
- 07108 10' Extension Cable
- 07109 50' Extension Cable

Options:

- Pulse Output
- Data Logger

Warranty

Data Industrial Corporation ("Seller") of 11 Industrial Drive, Mattapoisett, Massachusetts 02739-0740, U.S.A., warrants to the original purchaser of its product that such product manufactured by Data Industrial Corporation shall be free from defects in materials or workmanship when installed, serviced and operated according to Data Industrial Corporation instructions or in other such normal use. This warranty is effective for a period of 12 months from the date of installation by the Purchaser or 18 months from the date of shipment by the "Seller" whichever occurs or terminates first. This limited warranty does not cover damage or loss resulting from corrosion or erosion caused by acids or other chemicals or by severe environmental conditions or negligent or improper installation or improper operation, misuse, accident, unauthorized repair or substitution of components other than those provided by the "Seller", and does not cover limited life components such as bearings, shafts, impellers where wear rate is a function of application and environment. Any component not manufactured by the "Seller" but included in its products shall not be covered by this warranty and is sold only under such warranty as the manufacturer may provide.

If Buyer or Purchaser wishes to make a claim hereunder, he shall send written notice of any defect within the warranty period, to "Seller" at the above address. "Seller" may at its sole option instruct Buyer to ship subject part, postage prepaid, to the "Seller" at above address or authorize a representative to inspect the part on site. "Seller" will at its sole option repair or replace any defective product covered by this warranty. If Buyer makes repairs or alterations to any product or part covered by this warranty without "Sellers" prior written approval, this warranty shall be null and void.

The foregoing shall constitute Buyers or Purchasers sole and exclusive remedy against "Seller", and no other remedy, including but not limited to, incidental or consequential damages for personal injury, loss of fluids, gases or other substances or for loss of profits or injury to property or person shall be available to the Buyer or Purchaser. The warranty extended herein shall be in lieu of any other implied warranty of merchantability or fitness for a particular purpose, and seller shall bear no liability for representatives or retail sellers. In no event shall Data Industrial Corporation be liable for any contingent, incidental, or consequential damage or expenses due to partial or complete inoperability of its product.

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