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Installation and Operating Instructions

Series 506-7000
In-Line Fluid Detector
using 406-7000 Electronics

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EDO # 8-93-242
506-7000-LM

Series 506-7000
In-Line Fluid Detector
using 406-7000 Electronics

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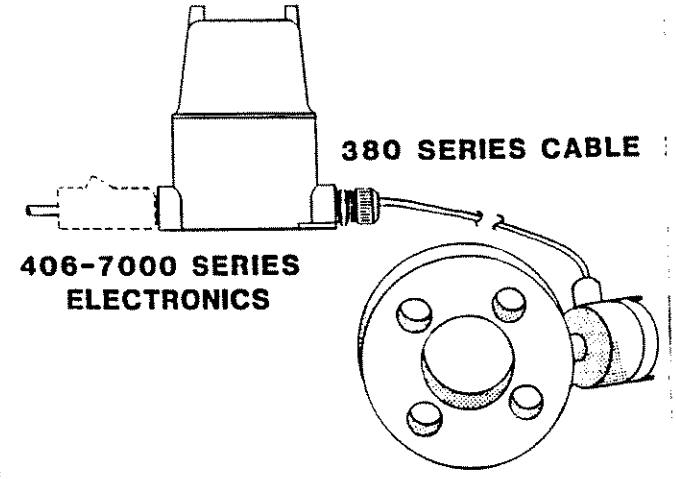

Fig. 1-1A
Typical system in a std. explosionproof housing
506-7030 Series

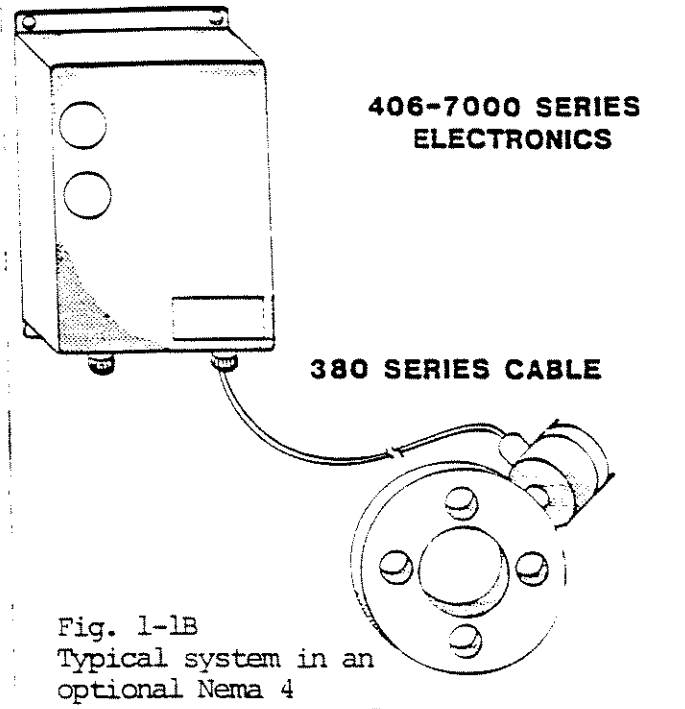

Fig. 1-1B
Typical system in an optional Nema 4 housing
506-7000 Series

1.0 Introduction

The instructions in this manual are for the Drexelbrook 506-7000 Series In-Line Fluid Detector, used to detect the presence or absence of material in a pipe. It provides relay operation when the normally full pipe is empty for a preset period of time.

1.1 System Description

The Drexelbrook 506-7000 Series control consists of three major components. The ring-shaped sensor mounts in a vertical pipe run between two standard 150# flat faced pipe flanges. The electronic unit includes the measuring circuit, customer connection terminals, and time delay. The sensor and remote electronic unit are connected by four-terminal cable. See Figure 1-1.

The 406-7000 Series electronic unit is a precision radio frequency (RF) relay output instrument. It provides double-pole, double-throw relay contact closure
when the process fluid has been absent in the pipe for a preset period of time.

This In-Line Fluid Detector features Cote-Shield™ electronics which enable the instrument to ignore the effects of material coatings or build-up on the sensor.

The ring sensor is mounted in a vertical pipe run at a point where the presence/absence detection is desired. It consists of three sections: a center measuring electrode, a ground electrode, and a Cote-Shield electrode inhibits the flow of current from the center electrode to ground. The only path to ground available to the current is through the material being measured. This prevents a "full-pipe" indication when only a coating is present.

electrode. See Figure 1-2. When a coating or build-up occurs on the sensing element, the Cote-Shield electrode inhibits the flow of current from the center electrode to ground. The only path to ground available for the current is through the material being measured. This prevents a "full-pipe" indication when only a coating is present.

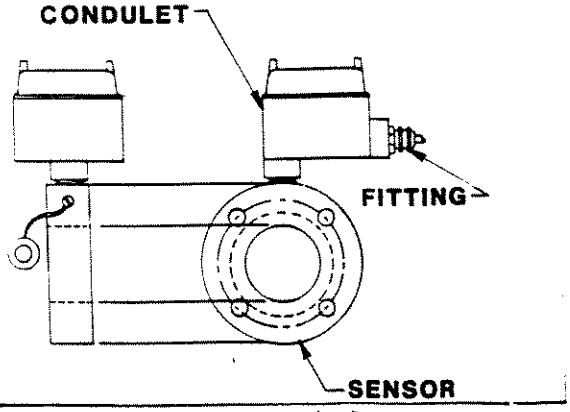

Fig.1-2
Three-Terminal Ring Sensor

Note: Sensor must be mounted in a grounded metal section of pipe. Non-metallic or lined metal pipe can adversely affect the performance of the unit.
Use flat-faced flanges only.

1.2 Models Available

1.2.1 System Number Description

The Drexelbrook In-Line Fluid Detector has a 10-digit system model number. The first three digits indicate an on/off control. The middle four digits indicate the electronic unit series, and the last three digits refer to the sensor size.

506-7030-XXX 406-7XXX Series electronics in standard explosionproof housing with 704 Series ring sensor.

506-7000-XXX 406-7000 Series electronics in optional 6 X 6 inch Nema 4 housing with lights and 704 Series ring sensor.

1.2.2 Electronic Unit

406-70XX 120 VAC powered

406-71XX 12-30 VDC powered

406-73XX 240 VAC powered

406-7X0X for sensor sizes from 3 inch to 10 inch diameter

406-7X2X For sensor sizes up to 2½ inch diameter

406-7XX1 with adjustable (0-90sec.) time delay on transition to empty pipe

1.2.3 Sensor

(See Section 2.2 for materials of construction).

704-200-010 1"ANSI flg.(150#)
704-200-015 1.5"ANSI flg.(150#)
704-200-020 2"ANSI flg. (150#)

704-200-025 2.5"ANSI flg.(150#)
704-200-030 3"ANSI flg. (150#)
704-200-040 4"ANSI flg. (150#)

704-200-060 6"ANSI flg. (150#)
704-200-080 8"ANSI flg. (150#)
704-200-100 10"ANSI flg. (150#)

Sensor includes 10ft. cable and condulet integrally mounted to unit.

1.2.4 Housings

The 406-7000 Series electronics come standard in an explosionproof housing, without lights. An optional Nema 4 housing with red/green indicator lights available.

2.0 Specifications

2.1 Electronics

A. Power Requirements

120 ± 25 VAC, 50/60 Hz, 1 Watt (406-7000)

230 ± 50 VAC, 50/60 Hz, 1 Watt (406-7300)

12-30 VDC, 1 Watt (406-7100)

B. Ambient Temperature

-40° to 140° F

C. Sensitivity

Designed to sense presence/ absence of liquids and liquid based slurries.

D. Hazardous Areas

Standard Explosionproof Housing meets Nema Classifications 1-5 and 12, and is explosionproof for Class I, Groups A,B,C,D and Class II, Groups E,F,G (Div. 1 & 2).

Optional NEMA 4 housing is suitable for non-hazardous areas.

E. RFI Protection (built-in)

The operating point for unit in an explosionproof or Nema 4 housing is unaffected by 5 w field @ 27 MHz, 150 MHz, or 450 MHz at a distance of 5 feet from exposed sensor, cable, or power line.

F. Temperature Effect

No measurable effect within ambient and process temperature limits (see specs B and C).

G. Output DPDT (relay contact rating)

120 Vac: 5A non-inductive, 3A inductive
230 Vac: 5A non-inductive, 2A inductive

H. Fail-Safe

Empty-pipe Fail-Safe (factory set) Relay will deenergize under empty-pipe conditions (indicating empty pipe upon loss of power).

I. Measuring Cable

4-terminal coaxial cable, up to 20 feet (10 feet standard). 160°F max temp limit; less than 5/8 inch O.D. at largest point.

J. Time Delay

Adjustable 0-90 sec, for pump start and shut off.

2.2 Sensing Elements

A. Model Specifications

Sensing Element Model (System #)	Nominal Pipe Size	ANSI Flange Size	Press/Temp Limits	Process Wetted Parts
704-200-010 (506-70X0-010)	1"	1" 150#	50 psi @ 120°F (49°C)	PVC/316SS/ Epoxy
704-200-015 (506-70X0-015)	1.5"	1.5" 150#	50 psi @ 120°F (49°C)	PVC/316SS/ Epoxy
704-200-020 (506-70X0-020)	2"	2" 150#	50 psi @ 120°F (49°C)	PVC/316SS/ Epoxy
704-200-025 (506-70X0-025)	2.5"	2.5" 150#	50 psi @ 120°F (49°C)	PVC/316SS/ Epoxy
704-200-030 (506-70X0-030)	3"	3" 150#	50 psi @ 230°F (110°C)	CPVC/316SS
704-200-040 (506-70X0-040)	4"	4" 150#	50 psi @ 230°F (110°C)	CPVC/316SS
704-200-060 (506-70X0-060)	6"	6" 150#	50 psi @ 230°F (110°C)	CPVC/316SS
704-200-080 (506-70X0-080)	8"	8" 150#	50 psi @ 230°F (110°C)	CPVC/316SS
704-200-100 (506-70X0-100)	10"	10" 150#	50 psi @ 120°F (49°C)	PVC/316SS

B. Mounting

Sensing element must be mounted in a vertical run of grounded metal pipe.

Note: Mount sensing element between flat faced flanges only. Use of raised faced flanges may damage the sensing element.

C. Hazardous Areas

Sensing element and cable are intrinsically safe for Class I, Groups A,B,C,D (Div. 1 and 2) and suitable for Class II, Groups E,F,G (Div. 1 and 2).

3.0 Installation

3.1 Unpacking

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing material. If there is any shortage or damage, report it immediately to the factory.

3.2 Wiring the Electronic Unit

All power and relay connections are made to the terminal strips inside the electronic unit housing. Due to the low power consumption of the instrument (1 Watt), wiring need only follow local electrical codes.

The power connections on the standard explosion-proof units are made to terminals 1 and 2 on the electronic chassis. See Figure 3-1.A Power requirements are determined by the transmitter model type. 406-7000 requires 120 VAC, 406-7100 requires 12-30 VDC, and 406-7300 requires 240 VAC.

The power connections on the optional Nema 4 unit are made to the terminal strip to the left of the electronic unit chassis. It has terminals for ground (gnd), neutral (neut), hot, and start. See Figure 3-1.B. For wiring to customer-supplied motor starter, see Figures 3-2A and 3-2B.

The relay connections for both housing types are made to the terminal strips on the front of the electronic unit chassis.

The relay used has double-pole, double-throw contacts. See Figure 3-3. On the explosion-proof unit, both sets of contacts are available to the customer. See Figure 3-1A. The relay is a dry contact closure and cannot provide sufficient current to activate motors or heavy equipment (See specifications.)

On the optional Nema 4 unit, relay terminals 3, 4, and 5 are pre-wired to the alarm lights by the factory. For customer relay connections (terminals, 7,8, and 9), see Figures 3-1A and 3-1B.

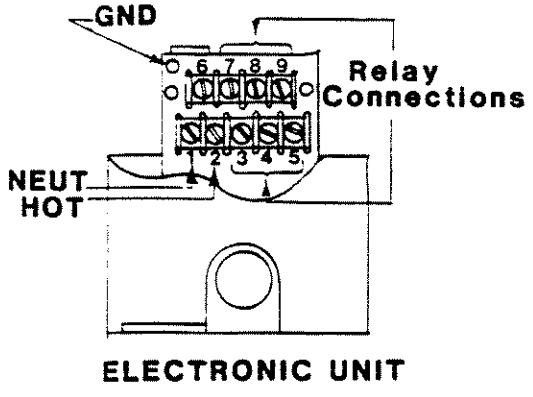

Fig. 3-1A
Customer connections to std. explosionproof unit.

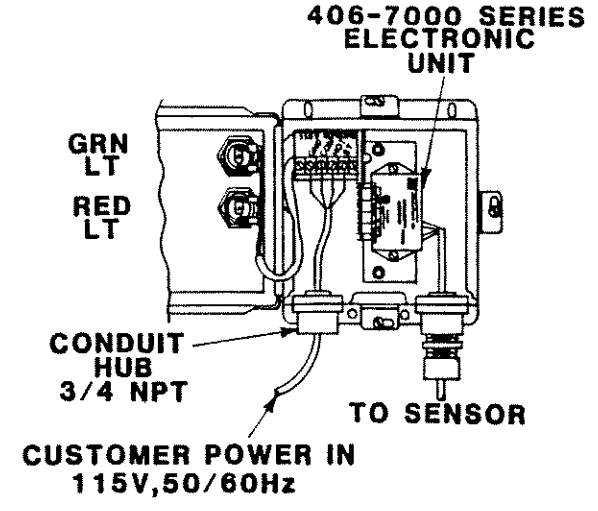

Fig. 3-1B
Customer connections to optional NEMA 4 unit.

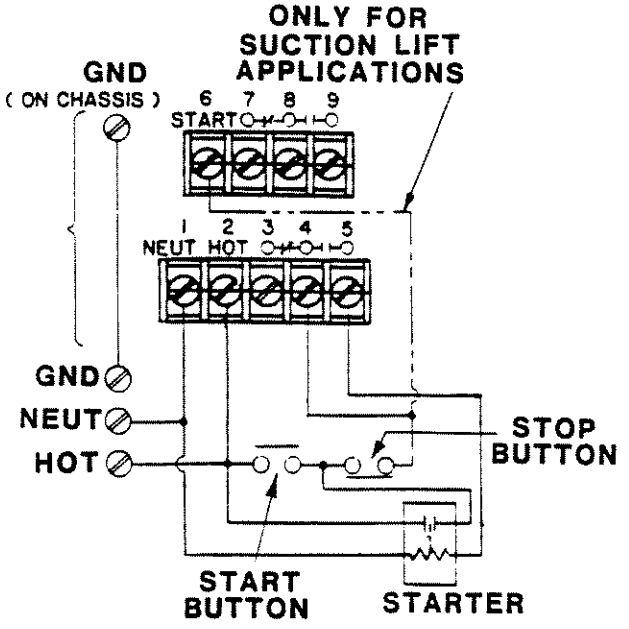

Fig. 3-2A
Wiring for customer-supplied pump starter (std. explosion-proof unit).

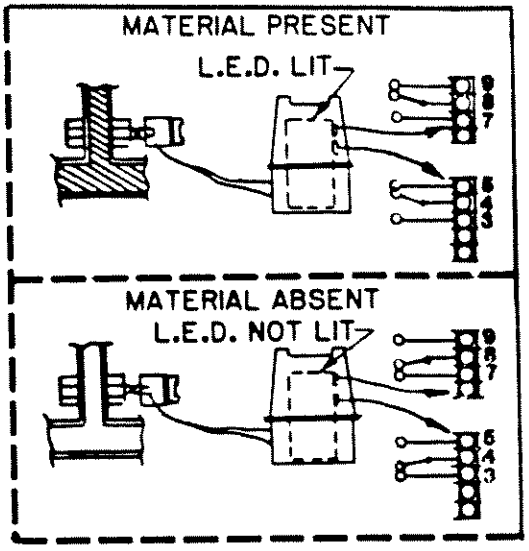

Fig. 3-3
Relay Contact Position for Empty Pipe Fail-Safe

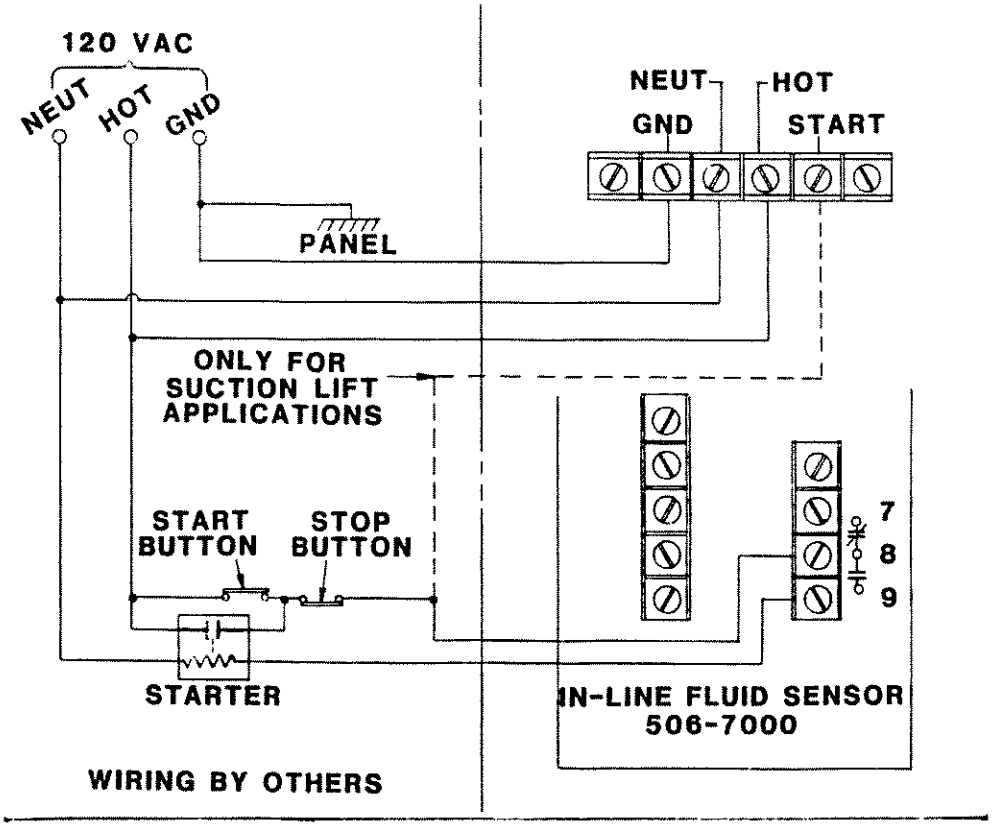

Fig. 3-2B
Wiring for customer-supplied pump starter (optional NEMA 4 unit).

All sensing element cable connections to the electronic chassis are made to the individual terminals on the side opposite the relay terminal strips. Be sure to match the colors on the terminals to the colors on the cable. See Figure 3-4.

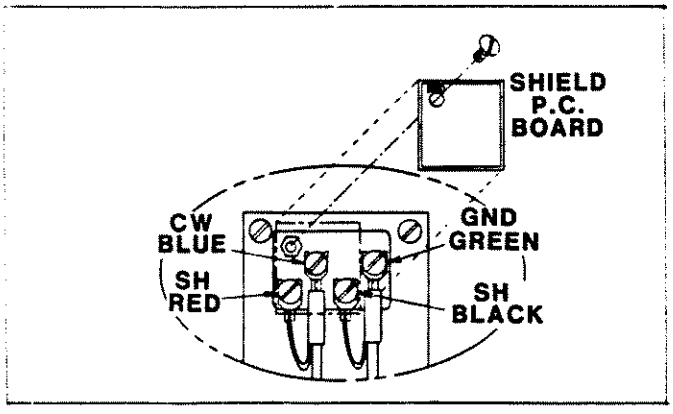

Fig.3-4
Cable Connections to
Electronic Unit

3.3 Wiring the Sensing Element

The cable connections to the sensor have been prewired at the factory. If those connections come loose or the cable is being replaced, see Figure 3-5 and use the following procedure for proper wiring.

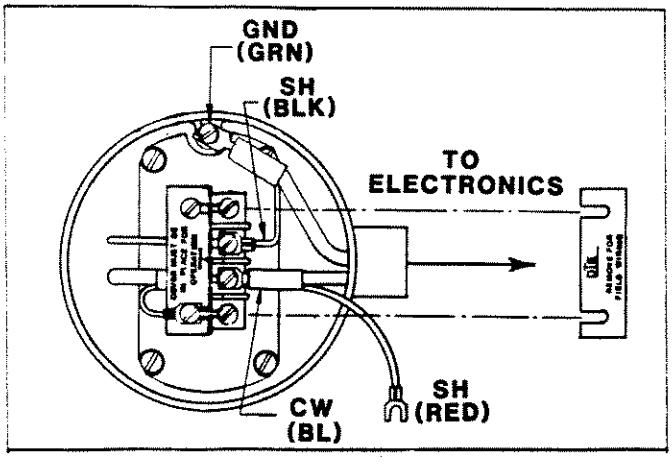

Fig.3-5
Cable Connections to
Sensing Element

A. Remove the condulet cover.

B. Loosen the two screws and remove the cover plate labeled "remove for field wiring".

C. Wire the green, black and blue cable leads to the corresponding color-coded screws as shown in Figure 3-5.

D. Slip the cover plate back under the two hold down screws. Slip the red (SH) lug under the red screw and tighten both screws.

E. Replace the condulet cover.

3.4 Mounting the Electric Unit

The electronic unit is designed for wall mounting, and it should be mounted in a location that is as free as possible from vibration, corrosive atmospheres, and any possibility of mechanical damage. Ambient temperatures should be between -40° F and 140° F. For convenience at start-up, it is best to install the instrument in a reasonably accessible location. See Figures 3-6A and 3-6B.

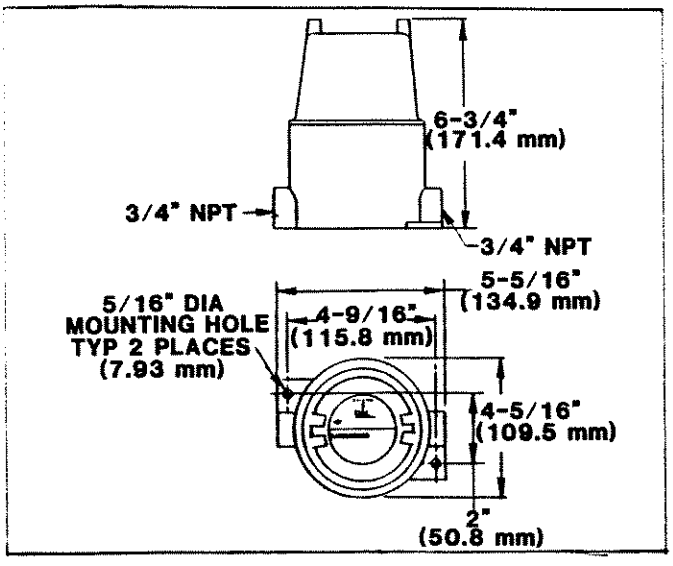

Fig. 3-6A
Mounting dimensions for std.
explosionproof housing.

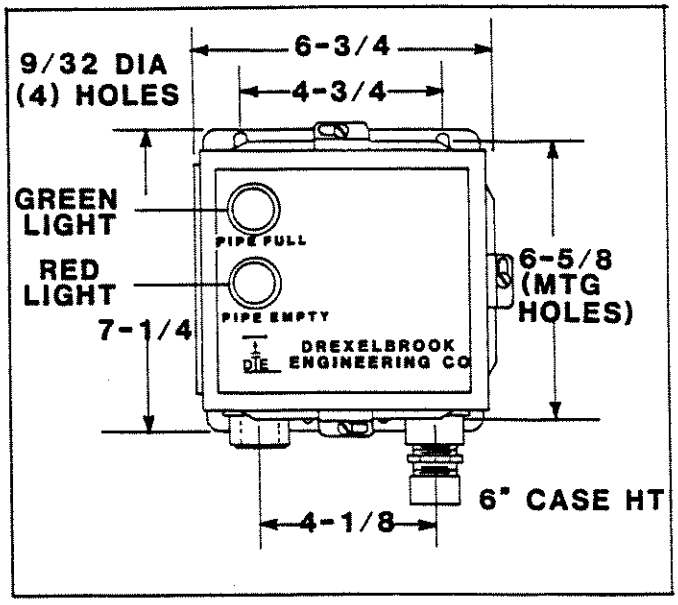

Fig. 3-6B
Mounting dimensions for optional NEMA 4 housing.

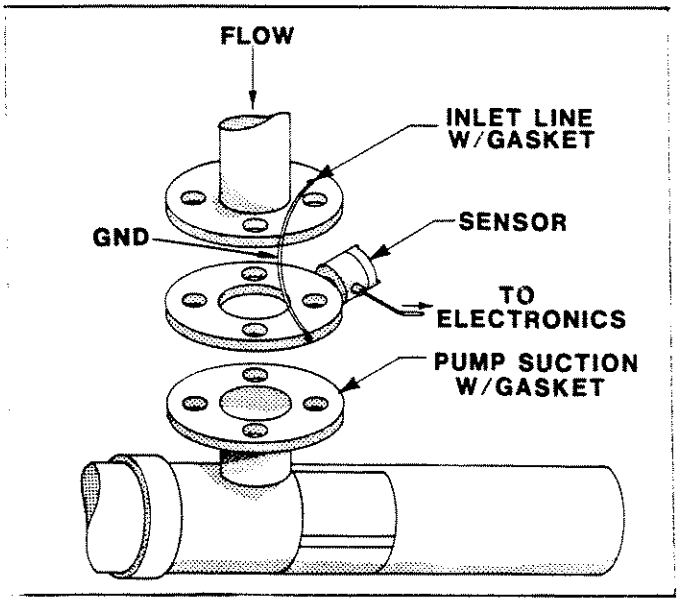

Fig.3-7
Mounting the Sensor

3.5 Mounting the Sensing Element

Sensor dimensions depend on sensor model. See Section 1.2.3.

Before mounting the sensing element, do a quick operational check to be sure the system is working properly. With power on and the lid removed (perform test in a non-hazardous area), and cable connected between the sensor and the electronic unit, touch the center element of the sensor. The little green LED on the top of the unit will light. Remove your hand from the sensor and, after the set delay time has passed, the LED will go out.

A. Be sure to mount the sensor in a vertical run of grounded metal pipe. This will allow the process fluid to drain away whenever the flow is interrupted. See Figure 3-7. Non-metallic or lined pipe will adversely affect the performance of the unit. Consult factory.

B. Mount the sensor between *two 150# flat-faced flanges* only. For use with other flange types, consult factory.

C. Use full-faces gaskets, compatible with the process fluid.

D. Install the ground strap under the flange bolt nearest the sensor condulet (see Figure 3-7) to insure proper electrical contact. (See Figure 3-1B.)

E. Tighten the flange bolts evenly to insure a proper seal. Check to make sure there is slack in the ground strap and reposition the ground washer if necessary.

- *All bolts should be put in place and hand tightened evenly.*
- *All bolts should be tightened in 10 ft-LB increments using a star pattern.*
- *Torque all bolts to 50 ft-LBs max.*

It is important that the sensor be torqued gradually and evenly to prevent cracking.

Caution: Nominal sensor size must be the same or smaller than the diameter of the mating pipe run. This should allow the sensor to be full during normal pump operation.

4.0 Operation

4.1 Start-Up

Before applying power to the instrument, be sure that the wiring connections are correct. See Sections 3.2 and 3.3.

Warning - Units in Hazardous Areas

Before an explosionproof housing cover can be removed, the area must be checked and known to be non-hazardous. The area must remain non-hazardous until the cover is replaced.

Each connection to an explosion-proof housing in a hazardous area must be equipped with an approved seal fitting.

4.2 Controls

The 506-70X0 Series in-line fluid detector is factory calibrated for proper operation. No calibration adjustments are normally needed. For specific applications using modification 91-22, see Appendix A.

4.2.1 Fail-Safe

Fail-safe describes the relay contact position when power to the unit is lost. The 406-7000 Series electronic unit is available only with empty-pipe Fail-Safe. This means the relay will de-energize with an empty pipe, or upon loss of instrument power.

4.2.2 Time Delay

The time delay adjustment is located on top of the electronic unit chassis. See Figure 4-1. The standard time delay is adjustable from 0-90 seconds.

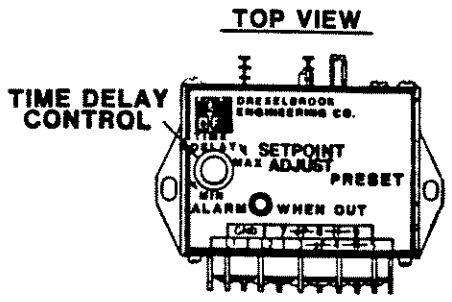

Fig.4-1
Time Delay Control

The purpose of the time delay is to allow the pump to prime itself or ignore voids in the process stream for a preset time period. Turning the adjustment clockwise (CW) will increase the time delay, and turning it counterclockwise (CCW) will decrease the time delay. See Figure 4-1.

The time delay period can be initiated by the momentary introduction of line voltage to the start terminal. This allows the pump to prime itself in "suction lift" installations.

5.0 Troubleshooting

5.1 Introduction

The 506-70X0 Series instruments are designed to give years of unattended service. No periodic or scheduled maintenance is required.

There are no specific spare parts that we recommend be stocked by the user. However, if the application is critical, it is best to have a spare electronic unit chassis available in the event of a component failure. The electronic unit chassis should be returned to the factory for repair.

If difficulty should occur when operating your in-line fluid detector, divide the system into its component parts and test each part individually for proper operation.

The following troubleshooting procedures should be used in checking out your system. If attempts to solve the difficulty fail, notify our local representative or call the factory direct and ask for the service department.

5.2 Checking the Electronic Unit

Before checking the components separately, check all wiring connections to both the electronic unit and sensing element. See Sections 3.2 and 3.3. Be sure to match the cable wire sleeve colors to the terminal screw colors on the electronic unit.

A. Disconnect the sensor cable from the electronic unit. Leave the power connected. See Figure 5-1.

B. Put a capacitor, any value from 10 pF to 12 pF, across the blue center (CW) connection and the green ground (gnd).

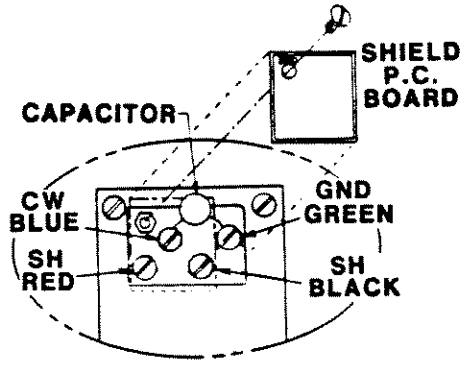

Fig.5-1
Testing the Electronic Unit

C. With the capacitor attached, the relay will change state, the LED on top of the electronic unit will come on, and the green light on the housing door will be lit (optional Nema 4 housing only).

D. Remove the capacitor, and after a delay time of 0-90 seconds*, the relay will switch; the LED on the top of the unit will go off, and the red light on the housing door will be lit (optional Nema 4 housing only).

*Note: To disengage the time delay, mark the original position of the adjustment, then turn to the full counter-clockwise (CCW) position. Be sure to reset the time delay to its original position after checking the electronic unit. See Section 4.2.2.

E. To check the integrity of the push-to-start function, remove the wire from the start terminal (See Figure 5-2) and add a jumper wire from the "hot" terminal to the "start" terminal.

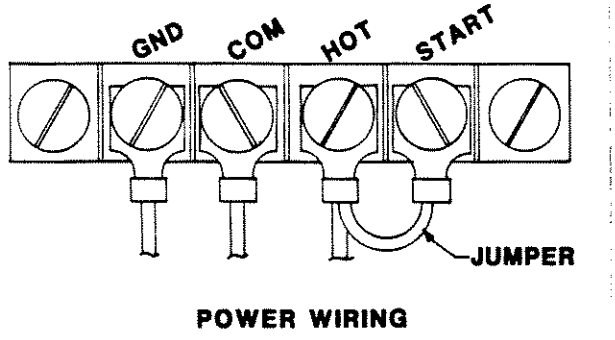

Fig.5-2
Checking the "Start" Circuit

F. Again, the relay will switch; the LED will come on and the green light on the housing door will be lit (optional Nema 4 housing only). After the preset time delay period has passed*, the relay will switch again; the LED will go out and the red light on the housing door will be lit (optional Nema 4 housing only).

*Note: To disengage the time delay function, first mark the original position of the adjustment, then turn to the full counterclockwise (CCW) position. Be sure to reset the time delay to its original position after checking the electronic unit. See Section 4.2.2.

5.3 Checking the Relay

A. The relay output circuit consists of double-pole double-throw relay contacts brought out to a terminal strip. When the relay is operating properly, the following conditions will apply:

1. The LED on the top of the electronic unit chassis should be lit when relay contacts 4 and 5, and 8 and 9 are closed.

2. The LED should be out when relay contacts 3 and 4, and 7 and 8 are closed. See Figure 5-3.

RELAY IN ENERGIZED CONDITION	5 4 3 9 8 7
RELAY IN DE-ENERGIZED CONDITION	5 4 3 9 8 7

Fig.5-3
Relay Contact Chart

B. Relay operation may be heard as an audible click when the background noise is not too high. Use one of the methods shown in Figure 5-4 to determine if the relay contacts are switching.

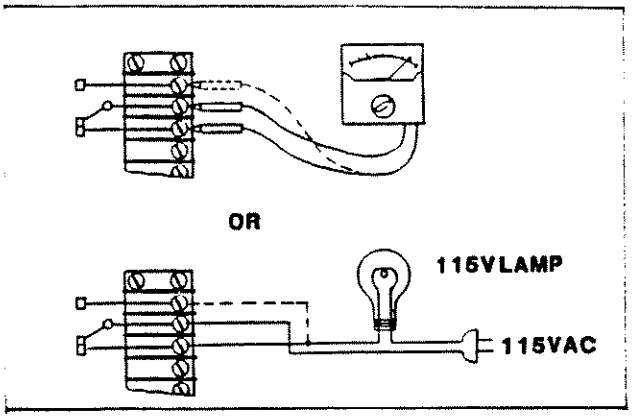

Fig.5-4
Checking the Relay Circuits

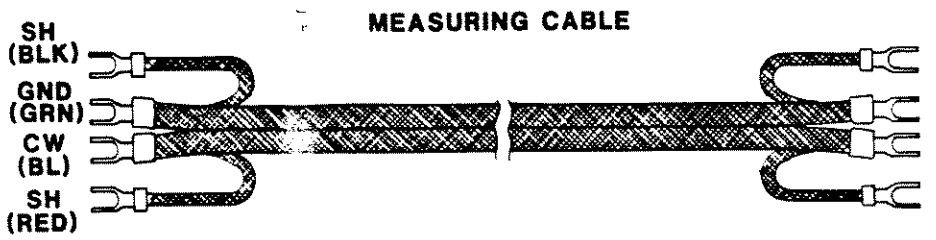

Fig.5-5
Checking the Cable

5.4 Checking the Cable

A. Disconnect the cable at both ends. Be sure all terminals are standing clear. See Figure 5-5.

B. With an analog ohmmeter, measure the resistance between the CW (Blue) and the SH (Red). Resistance should be infinite (open circuit). With the CW (Blue) and SH (Red) shorted together at the other end, the resistance should be near zero.

C. Measure the resistance from the CW (Blue) to the SH (Black). Resistance should be the same as above.

D. Measure the resistance from CW (Blue) to gnd (Green). Resistance should be infinite (open circuit). With the CW (Blue) and the gnd (Green) shorted together at the other end, the resistance should be near zero.

E. Measure the resistance from the SH (Red) to the gnd (Green). Resistance should be infinite. If the two are shorted together at the other end, the resistance should be near zero.

F. Measure the resistance from the SH (Black) to the gnd (Green). Resistance should be the same as above.

G. If measured resistances are not acceptable, replace cable.*

*Note: Only coaxial cables supplied by Drexelbrook Engineering Company should be used to connect the control unit to the sensor.

5.5 Checking the Sensing Element

A thorough check of the sensor requires factory service equipment. However, the following test can be done with only an ohmmeter to help determine the cause of a possible malfunction. If this test indicates the sensor is not functioning properly, or if none of the checkout procedures indicate a problem but the system is still not operating properly, please call the factory Service Department.

A. Disconnect the measuring cable from the sensor terminals. See Figure 5-6.

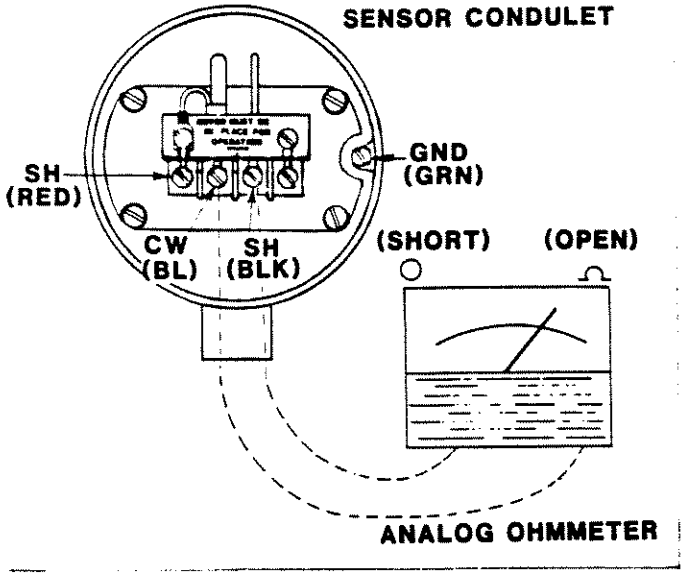

Fig.5-6
Checking the Sensor

B. Use an ohmmeter to measure the resistance between the sensor terminals. See the chart below.

Terminals	Resistance
Red(SH) to black(SH)	Near zero (short circuit)
Blue(CW) to red(SH)	Infinite (open circuit)
Blue(CW) to black(SH)	Infinite (open circuit)
Blue(CW) to green(gnd)	Infinite (open circuit)
Green(gnd) to either mounting flange	near zero (short circuit)
Red (SH) to both outer rings on the sensor	near zero (short circuit)

5.6 Possible Problems and Solutions

Symptoms	Possible Cause	Solution
1. Both red and green lights on the optional Nema 4 housing are out on cover door.	a. No voltage between 'Hot' and 'Neutral' terminals.	a. Check wiring. See Sec. 3.2
	b. One or both light bulbs are 'burnt out'.	b. Replace defective bulb(s).
	c. Electronic unit malfunction.	c. See sec. 5.2 and 5.3.
2. LED on chassis or Green cover light is on, even when pipe is known to be empty.	a. Defect in cable.	a. See Sec. 5.5.
	b. Electronic unit malfunction.	b. See Sec. 5.2 and 5.3.
	c. Sensor malfunction.	c. See Sec. 5.6.
	d. Sensor not mounted properly.	d. Mount sensor in vertical run of pipe. See Sec. 3.5.
	e. Heavy coating build-up on sensor.	e. Consult factory. See Appendix A.

Symptoms	Possible Cause	Solution
3. LED on chassis is out or Red cover light is on even when pipe is known to be full.	a. Defect in cable.	a. See Sec. 5.5.
	b. Electronic unit malfunction.	b. See Sec 5.2 and 5.3.
	c. Sensor malfunction	c. See Sec. 5.6.
	d. Adjoining pipe not grounded.	d. Ground pipe using ground stop on sensor. See Sec. 3.5.
	e. Adjoining pipe not metallic.	e. Mount sensor only in nonlined metal pipe.
4. Push-to-start (motor starter) does not respond as intended.	a. Incorrect customer wiring to pipe-line fluid sensor.	a. Check wiring. See Sec. 3.2.
	b. No power at either customer supplied starter or pipe-line fluid sensor.	b. Check power wiring. See Sec. 3.2.
	c. Time delay set for too short or too long a period.	c. Adjust time delay. See Sec. 4.2.2.
	d. Electronic unit malfunction.	d. See Sec. 5.2 and 5.3.
5. Instrument operates intermittently	a. Loose wiring.	a. Check wiring. See Sec 3.2.
	b. Ground strap not connected properly.	b. See Sec. 3.5.
	c. Electronic unit malfunction.	c. See Sec. 5.2 and 5.3.
	d. Voids in the process stream are longer than the time delay period.	d. Increase the time delay period. See Sec. 4.2.2.
	e. Sensor malfunction.	e. See Sec. 5.5.

6.0 Factory and Field Service Assistance

6.1 Telephone Assistance

If you are having difficulty with your Drexelbrook equipment, and attempts to locate the problem have failed, notify your local Drexelbrook representative, or call the factory direct and ask for the service department. Drexelbrook Engineering Company is located at 205 Keith Valley Road, Horsham, PA 19044. The telephone number is (215) 674-1234. To help us solve your problem quickly, please have as much of the following information as possible when you call:

Instrument Model #_____

_____

P.O.#_____

& Date_____

Cable Length_____

Material being measured_____

_____

Temperature_____

Pressure_____

Brief description of the problem

_____

_____

_____

Checkout procedures that failed

_____

_____

_____

6.2 Equipment Return

Do not return equipment without first contacting the factory for a return authorization number. Any equipment being returned must include the following information in addition to the above.

Reason for return_____

_____

Return Authorization #_____

_____

Person to contact at your company

_____

"Ship To" address_____

_____

If available, please also include the original P.O. # and the original Drexelbrook #.

To keep the paperwork in order, you must include a purchase order with returned equipment, even though it may be coming back for warranty repair. You will not be charged if the equipment is covered under warranty. Please return your equipment with freight charges prepaid. We regret that we cannot accept collect shipments.

Spare instruments are generally in factory stock. If the application is critical, a spare chassis should be kept on hand.

6.3 Field Service

Trained field servicemen are available on a time-plus-expense basis to assist in start-ups, diagnosing difficult application problems, or in-plant training of personnel. Contact the service department for further details.

6.4 Customer Training

Periodically, Drexelbrook instrument training seminars for customers are held at the factory. These sessions are guided by Drexelbrook engineers and specialists, and provide detailed information on all aspects of level measurement, including theory and practice of instrument operation. For more information about these valuable workshops, write to Drexelbrook Engineering, attn: Communications/Training Group, or call direct (215) 674-1234.

B. Using the tuning wrench supplied, (red plastic tube with the nail sticking out for a pointer) back out the setpoint adjustment nut until it is fully counterclockwise (CCW). See Figure 7-2.

Caution: Use a light touch when the adjustment reaches its mechanical stop. Excess torque can break the setpoint adjustment.

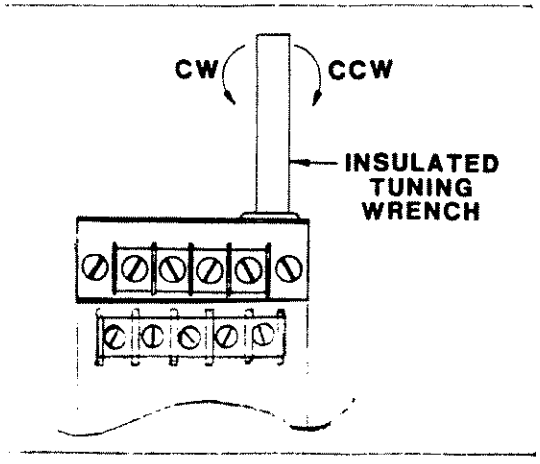

Fig.7-2
Calibrations Tool

C. When the sensor is known to be flooded and power is applied to the system, slowly advance the setpoint adjustment clockwise (CW) until the LED on the unit is out or the indicating lights on the Nema 4 housing door trip from green to red. Please count and record the number of turns required in this step with the use of the pointer on the red tuning wrench.

D. Back off the setpoint adjustment 1 full turn counterclockwise (CCW). Remove the tuning wrench and secure it somewhere in the housing. The 506-70X0 Series In-Line Fluid Detector should have its LED or green indicating light lit; corresponding to the flooded/full pipe condition.

Recalibration is complete.

Note: To verify proper system operation, the pipe should then be emptied. After the passage of the time delay period, the system should switch and indicate an empty pipe. To reduce pump wear during the test, the time delay control can be reset to its shortest period (approx. .5 seconds). To do this, simply turn the adjustment to its full counterclockwise (CCW) position. Do not forget to reset the time delay after the empty pipe test.

7.0 Appendix A Special Applications Using Modif. 91-22

7.1 Introduction

The 506-70X0 Series In-Line Fluid Detector is factory calibrated for proper operation. No field calibration adjustments are needed. The standard units (406-7001 Series for 3-inch to 10-inch pipes and 406-7021 Series for 1-inch to 2 1/2-inch pipes) are calibrated for use in both insula ting and conducting fluids, with the ability to ignore most residual fluid coatings on the sensor even when the pipe is empty. The electronic units used for sewage applications (406-7001 modif. 91-22) are calibrated differently. Because the fluids in waste treatment applications are always conductive, these units are calibrated specifically for conductive liquids. This increases the unit's ability to ignore conductive fluid coatings on the sensor when the pipe is empty.

Under special circumstances, the factory calibration for the water and waste treatment applications may prove, over an extended period of time, to be inadequate. Occasionally, a permanent coating of different character than the bulk material being pumped will develop on the inside of the sensor and pipe. This coating may be either greasy or dry and crusty. In any case, it is not washed away by the fluid flow and tends to build up over time. When this permanent coating reaches a critical thickness, it will interfere with the unit's ability to ignore a wet coating of the bulk material when the pipe is actually empty. This can result in a false "full" indication when the pipe is empty, which could possibly cause pump damage. The "critical" thickness is difficult to specify because it is dependent on the highly variable electrical properties of both the bulk material and the permanent coating.

If the previously described coating is typical in your application, a periodic empty-pipe simulation is recommended to ensure the unit is operating properly.

There are two corrective steps available when a false "full" indication occurs.

1. Periodic cleaning of the sensor will help to increase the reliability of the sensor signal. When the sensor is clean, it will function properly as calibrated.

2. It may be necessary to recalibrate the unit. See Section 7.2.

7.2 Recalibration Procedure for Modif 91-22

A. Pry off the "preset" label on the top of the electronic unit for access to the setpoint adjustment assembly (this is the hex nut visible inside the chassis after the label has been removed). See Figure 7-1.

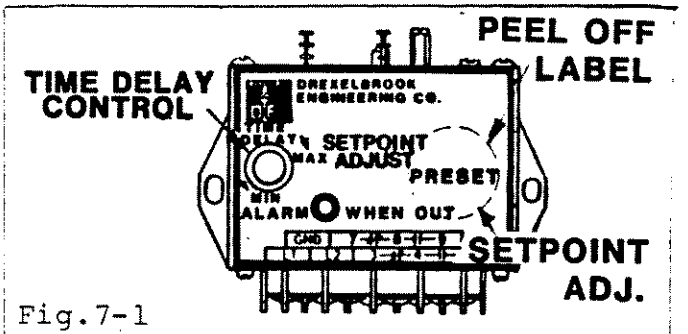

Fig.7-1
Setpoint Adjustment for Modif. 91-22

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