INSTALLATION, OPERATION & CALIBRATION INSTRUCTIONS FOR THERMAL FLOW METER

MODEL:

926 REMOTE ELECTRONICS

220VAC
110VAC
24 VDC
Factory Set
FIGURE (5) IS AN OUTLINE DRAWING OF THE FLOW TRANSDUCER, SHOWING FLOW CONNECTIONS AND MOUNTING DIMENSIONS.

ALL FLOW WETTED PARTS ARE TYPE: ________________________________

THE FLOW TRANSDUCER CAN BE MOUNTED HORIZONTALLY OR VERTICALLY, HOWEVER, WHEN MOUNTED VERTICALLY FLOW DIRECTION MUST BE UPWARDS. THE FLOW SHOULD ENTER AT THE PORT MARKED "IN" AND EXIT AT THE PORT MARKED "OUT".

THE METER SHOULD BE INSTALLED IN A STRAIGHT LINE. THIS LINE SHOULD PREFERABLY BE THE SAME DIAMETER AS THE METER TUBE OR PIPE. THIS STRAIGHT LINE SHOULD HAVE A MINIMUM LENGTH OF TEN (10) DIAMETERS AHEAD OF THE METER. LIKEWISE, A STRAIGHT LENGTH OF THE PIPE OR TUBE AFTER THE METER SHOULD BE AT LEAST A LENGTH OF FIVE (5) PIPE DIAMETERS.

WHERE PHYSICAL CONDITIONS PREVENT THIS, INFORM US IN ADVANCE AND WE WILL CALIBRATE THIS METER UNDER ACTUAL OPERATING CONDITIONS.

ENCLOSED IS A ______FOOT LENGTH OF 4 CONDUCTOR SHIELDED CABLE FOR INTERCONNECTING THE SIGNAL CONDITIONER AND TRANSDUCER.

NOTE: THIS UNIT IS INDEPENDENT OF CABLE LENGTH.

FIGURE (6) IS A SKETCH SHOWING THE ELECTRONICSIGNAL CONDITIONER AND REQUIRED ELECTRICAL CONNECTIONS.

FIGURE (9) SHOWS THE OVERALL EXTERNAL WIRING CONNECTIONS.

THE SIGNAL CONDITIONER REQUIRES ______ VOLTS (50 to 60 CYCLES AC Only).

REGULATION IS VALID OVER ______ TO ______ VOLTS AC.

THE OUTPUT SIGNAL FOR FULL SCALE FLOW RATE IS 20 MA DC ISOLATED.
INSTALLATION - MODEL 62-9

FIGURE (5) IS AN OUTLINE DRAWING OF THE FLOW TRANSDUCER, SHOWING FLOW CONNECTIONS AND MOUNTING DIMENSIONS.

ALL FLOW WETTED PARTS ARE TYPE: ____________________________________________.

THE METER SHOULD BE INSTALLED INTO A STRAIGHT LINE. THIS STRAIGHT LINE SHOULD HAVE A MINIMUM LENGTH OF TEN (10) DIAMETERS AHEAD OF THE METER. LIKewise, A STRAIGHT LENGTH OF THE PIPE OR TUBE AFTER THE METER SHOULD BE AT LEAST A LENGTH OF FIVE (5) PIPE DIAMETERS.

WHERE PHYSICAL CONDITIONS PREVENT THIS, INFORM US IN ADVANCE AND WE WILL CALIBRATE THIS METER UNDER ACTUAL OPERATING CONDITIONS.

ROTATE INDEX ARROW TO FACE TOWARD FLOW.

ENCLOSED IS A __________ LENGTH OF 4 CONDUCTOR SHIELDED CABLE FOR INTERCONNECTING THE SIGNAL CONDITIONER AND TRANSDUCER.

NOTE: THIS UNIT IS INDEPENDENT OF CABLE LENGTH.

FIGURE (6) IS A SKETCH SHOWING THE ELECTRONIC SIGNAL CONDITIONER AND REQUIRED ELECTRICAL CONNECTIONS.

FIGURE (9) SHOWS THE OVERALL EXTERNAL WIRING CONNECTIONS.

THE SIGNAL CONDITIONER REQUIRES _____ VOLTS AC _____ CYCLES. (50 to 60 CYCLES AC Only)

REGULATION IS VALID OVER ________ TO ________ VOLTS AC.

THE OUTPUT SIGNAL FOR FULL SCALE FLOW RATE IS 20 MA DC ISOLATED.
OPERATION

MODEL 600-9 AND 62-9

WITH ALL CONNECTIONS HAVING BEEN COMPLETED AND TESTED, A SHORT BUT FAST FLOW RATE SHOULD BE OBTAINED IN ORDER TO CLEAN GAS Bubbles AND IMPURITIES FROM THE FLOW TUBE.

APPLY POWER AND ALLOW A TEN (10) MINUTE WARM-UP PERIOD.

FIGURE 6 (SEE SPECIFIC CURVE DOCUMENT VIA METER MANUAL) IS A CALIBRATION CURVE CORRELATING FLOW VERSUS INDICATION. THE OUTPUT SIGNAL FOR FULL FLOW RATE IS 20 MA DC. WHEN A FACTORY CALIBRATION IS PROVIDED, IT SHOULD NOT BE NECESSARY TO PERFORM A FIELD CALIBRATION. IF, HOWEVER, IN THE FUTURE IT SHOULD BE DECIDED TO USE THE METER WITH FLUIDS FOR WHICH THE DEVICE HAS NOT BEEN CALIBRATED, FIELD CALIBRATION INSTRUCTIONS ARE INCLUDED.

IN THE CASE OF MULTIPLE CALIBRATIONS IT IS NECESSARY TO SET THE CALIBRATION DIALS AND SWITCHES FOR THE FLUID AND/OR RANGE DESIRED, IN ACCORDANCE WITH THE SETTINGS PROVIDED ON THE CALIBRATION CURVES.
**FIELD CALIBRATION CHECK THREE TERMINAL STRIP MODEL 926**

The three terminal strip 926 electronic signal conditioner output can be calibrated by simulating the voltage output of the flow element with an external variable D.C. voltage source.

1. Turn power off at electronics.

2. Disconnect flow transducer cable from electronics terminal 1, 2, 3, 4 & 5. Note the wiring labeling and/or colors for placing back on correctly later.

3. Connect an external variable DC voltage source to terminals “2” and "3" (negative) and "4" (positive) of electronics.  
**NOTE:** Terminals “2” and “3” must be connected together.

4. Apply power to electronics.

5. With 0 Volts from the DC Voltage source, the mA should be clamped at 4.00 mA. If it is not correct, Adjust I Zero Potentiometer R4 until 4.00 mA. R4 is located above the 7-pin terminal strip to the far right.


7. Turn on the DC Voltage source and set the voltage beyond the full scale EXC voltage (1 volt higher for example). The mA output should clamp at 20.00 mA. If it is not correct, then Adjust I Span Potentiometer R6 until 20.00 mA. R6 is located above the 7-pin terminal strip to the far right.

8. You may have to go back to step 5 and repeat the procedure due to the I Zero and the I Span offset each other a little.

9. Set the DC Voltage source for 10% transducer output (EXC Voltage). Milliamp output should be 10%, 5.6 mA. If it is not correct, Adjust F Zero Potentiometer R35 until 5.6 mA. R35 is located on the Range Board, which is to the left of the Main Board and above the 3-pin terminal strip (110 VAC connection).

10. Set the DC Voltage source for 90% transducer output (EXC Voltage). The mA output should be 18.4 mA. If it is not correct, Adjust F Span Potentiometer R33 until 18.4 mA. R33 is also located on the Range Board.

11. You may have to go back to step 9 and repeat the procedure due to the F Zero and the F Span offset each other a little.

12. After 10% and 90% are set check 0, 20, 30, 40, 50, 60, 70, 80, and 100%.

13. If the output is satisfactory, continue to next step, otherwise recheck steps taken and if necessary contact Thermal Instrument Company for further instructions.

14. Turn power off at electronics.

15. Remove the DC Voltage source and reconnect the transducer cable.

16. Apply power to the electronics. The meter should now be in normal operation.
FIELD CALIBRATION CHECK TWO TERMINAL STRIP MODEL 926

The two terminal strip 926 electronic signal conditioner output can be calibrated by simulating the voltage output of the flow element with an external variable D.C. voltage source.

1. Turn power off at electronics.
2. Disconnect flow transducer cable from electronics terminal 1, 2, 3, 4 & 5. Note the wiring labeling and/or colors for placing back on correctly later.
3. Connect an external variable DC voltage source to terminals "3" (negative) and "4" (positive) of electronics.
4. Apply power to electronics.
5. With 0 Volts from the DC Voltage source, the mA should be clamped at 4.00 mA. If it is not correct, Adjust I Zero Potentiometer R30 until 4.00 mA.
7. Turn on the DC Voltage source and set the voltage beyond the full scale EXC voltage (1 volt higher for example). The mA output should clamp at 20.00 mA. If it is not correct, then Adjust I Span Potentiometer R32 until 20.00 mA.
8. You may have to go back to step 5 and repeat the procedure due to the I Zero and the I Span offset each other a little.
9. Set the DC Voltage source for 10% transducer output (EXC Voltage). The mA output should be 10%, 5.6 mA. If it is not correct, Adjust F Zero Potentiometer R13 until 5.6 mA.
10. Set the DC Voltage source for 90% transducer output (EXC Voltage). The mA output should be 18.4 mA. If it is not correct, Adjust F Span Potentiometer R11 until 18.4 mA.
11. You may have to go back to step 9 and repeat the procedure due to the F Zero and the F Span offset each other a little.
12. After 10% and 90% are set check 0, 20, 30, 40, 50, 60, 70, 80, and 100%.
13. If the output is satisfactory, continue to next step, otherwise recheck steps taken and if necessary contact Thermal Instrument Company for further instructions.
14. Turn power off at electronics.
15. Remove the DC Voltage source and reconnect the transducer cable.
16. Apply power to the electronics. The meter should now be in normal operation.
Troubleshooting

Troubleshooting of a malfunctioning flow meter is a process of isolating the particular circuit area which is out of range and then finding the components causing the failure. Before looking into possible circuit problems it will be profitable in most cases to first determine that the problem is not internal to the electronics. As odd as it may sound, most apparent flow meter malfunctions are a result of incorrect installation or changes in process operating conditions.

Typical installation problems are:
- Fluid not flowing.
- Flow rate or temperature out of calibration range.
- Fluid not identical to calibration fluid.  
  *(Ex: Air instead of CO2 or Water instead of Glycol)*
- Fluid has coated flow element.  
  *(Ex: Very dirty gas or liquid that leaves a film or layers)*
- Flow element installed too close to upstream or downstream flow disturbance.  
  *(Minimum 10 pipe diameters upstream and 5 pipe diameters downstream)*
- Power not on or incorrect voltage.  
  *(Ex: Connecting 24 VDC in place of 110 VAC)*
- Flow element wiring incorrect.
- Output wiring incorrect.
**Figure #1**

THE FLOW TRANSUDER CAN BE MOUNTED HORIZONTALLY OR VERTICALLY. HOWEVER, WHEN MOUNTED VERTICALLY FLOW DIRECTION MUST BE UPWARDS. THE FLOW SHOULD ENTER AT THE PORT MARKED "IN" AND EXIT AT THE PORT MARKED "OUT".

THE METER SHOULD BE INSTALLED IN A STRAIGHT LINE. THIS STRAIGHT LINE SHOULD HAVE A MINIMUM LENGTH OF 10 PIPE OR TUBE DIAMETERS AHEAD OF THE METER AND 5 AFTER THE METER.

**DIMENSIONS:**

"A"  
"B"  
"C"

**FLANGES:**

FLOW WETTED PARTS MATERIAL:

<table>
<thead>
<tr>
<th>MODEL: 630-9</th>
<th>PHYSICAL DIMENSION DRAWING FOR EXPLOSION PROOF METER</th>
<th>THERMAL INSTRUMENT CO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/N</td>
<td></td>
<td>TREVOS, PA.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DATE: 4/14/08</td>
</tr>
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</table>

Revision: 7/10/2008
THE METER SHOULD BE INSTALLED IN A STRAIGHT LINE. THIS STRAIGHT LINE SHOULD HAVE A MINIMUM LENGTH OF 10 PIPE OR TUBE DIAMETERS AHEAD OF THE METER AND 5 AFTER THE METER.

DIMENSIONS:
A: ___________
B: ___________

PACKING GLAND:
MATERIAL: Stainless Steel
INSERT: Teflon
THREADS: ___________

MODEL: 62-9
S/N

PHYSICAL DIMENSIONS OF FLOWPROBE

THERMAL INSTRUMENT CO.
TREVOSE, PA.

DATE: REV.1
TIC3419
Figure #3

ELECTRICAL CONDULET

<table>
<thead>
<tr>
<th>Probe Size</th>
<th>O.D.</th>
<th>O.D.</th>
<th>O.D.</th>
<th>O.D.</th>
<th>O.D.</th>
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<tr>
<td>1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>3/4&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2&quot;</td>
<td></td>
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Thread Size MNPT

<table>
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<th>3/4&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Recommended Torque

50-100 50-100 300-325 consult factory

High Pressure Packing Gland for Probe Type Flow Meter

Thermal Instrument Company
Trevose, PA
Phone: 215-355-8400
Fax: 215-355-1789

Revision: 7/10/2008
The meter should be installed in a straight line. This straight line should have a minimum length of 10 pipe or tube diameters ahead of the meter and 5 after the meter.

**Figure #4**

**Recommended Insertion Lengths**

<table>
<thead>
<tr>
<th>Line Size I.D.</th>
<th>Probe Tip Insertion Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2”</td>
<td>1 3/4&quot;</td>
</tr>
<tr>
<td>3”</td>
<td>2 3/4&quot;</td>
</tr>
<tr>
<td>4”</td>
<td>3 3/4&quot;</td>
</tr>
<tr>
<td>5”</td>
<td>4 3/4&quot;</td>
</tr>
<tr>
<td>6”</td>
<td>5 3/4&quot;</td>
</tr>
<tr>
<td>7”</td>
<td>6 3/4”</td>
</tr>
<tr>
<td>8”</td>
<td>7 1/2”</td>
</tr>
<tr>
<td>10”</td>
<td>8 1/2”</td>
</tr>
<tr>
<td>12”</td>
<td>9 1/2”</td>
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<td>18”</td>
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<tr>
<td>24”</td>
<td>15 1/2”</td>
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<tr>
<td>30”</td>
<td>18 1/2”</td>
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<tr>
<td>36”</td>
<td>21 1/2”</td>
</tr>
<tr>
<td>48”</td>
<td>27 1/2”</td>
</tr>
</tbody>
</table>

**Packing Gland:**
- Material: Stainless Steel
- Insert: Teflon
- Threads: 3/4” MNPT

**Probe Diameter:** 1/2” O.D.

**Probe Material:** 316 S.S.

**Model:** 62-9

**Probe Installation**

**Thermal Instrument Co.**
**Trevose, PA.**

**Date:** 4/14/08

Revision: 7/10/2008
Figure #5

CONNECTING WIRES TO TERMINAL STRIP
DO NOT REMOVE BOARD
INSTEAD, GENTLY REMOVE GREEN TERMINAL STRIP

CONDULET

1/2" PIPE

1/2" NPTF

TRANSUDER TYPE: ________________
TRANSUDER SIZE: ________________
TRANSUDER MOUNTING: ________________
TRANSUDER ROTATION: ________________

CONDULET TYPE: XIXX SERIES
CONDUIT SIZE: 1/2" NPTF

CABLE TYPE: ________________
CABLE LENGTH: ________________

SENSOR RESISTANCE @ AT 75°F
A-B 50 ___
A-B1 50 ___ SPARE FLOW
C-D 100 ___ WITH_________ SHUNT
C1-D 100 ___ SPARE TEMP.

ALL GROUND ___

TO CONNECT SPARE FLOW
MOVE BLUE JUMPER FROM B TO B1
TO CONNECT SPARE TEMP.
MOVE YELLOW JUMPER FROM C TO C1

NOTE:
MAKE SURE TRANSUDER BODY IS GROUNDED.

MODEL:

FLOW TRANSUDER ELECTRICAL CONNECTIONS
FOR MODEL 026 AND 0200 ELECTRONICS

THERMAL INSTRUMENT CO.
TREVOSOE, PA

S/N

DATE: 4/14/08 REV. 1

Revision: 7/10/2008
Figure #6

Model: THREE TERMINAL STRIP
926 ELECTRONICS WITH BACK PLATE
(NEW STYLE)

Revision: 7/10/2008
Figure #7

BACK PLATE

6 3/16"

POWER IS FACTORY SET

110 VAC (220 VAC OPTIONAL)
@ 60 HZ

OR

24V (OPTIONAL)

MODEL:

TWO TERMINAL STRIP
926 ELECTRONICS WITH BACK PLATE
(OLD STYLE)

S/N

THERMAL INSTRUMENT CO.
TREVOS PA

DATE: 4/14/03
TIC-535DST-9

Revision: 7/10/2008
INDUSTRY STANDARD

NEMA Type 4, Type 4X, Type 12, and Type 13
UL 50 Type 4 and Type 4X
JIC standard ECP-1-1967
GSA Enclosure 4 (Specify GSA label when ordering)
IEC 529, IP65

SHOWN WITHOUT WINDOW OPTION

SECTION U-U

NOTE: 1. Panels are 14 gauge steel.
2. Panel screws are # 10-32 pan head.
3. External mounting feet are 12 gauge steel.

STANDARD SIZES

<table>
<thead>
<tr>
<th>BOX CATALOG NUMBER</th>
<th>GAUGE</th>
<th>BOX SIZE A X B X C</th>
<th>PANEL CATALOG NUMBER</th>
<th>PANEL SIZE D X E</th>
<th>MOUNTING G X H</th>
<th>OVERALL L X W</th>
<th>F</th>
<th>J</th>
<th>T</th>
<th>V</th>
<th>Y</th>
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<tbody>
<tr>
<td>A-12120HNF</td>
<td>14</td>
<td>12.00 x 12.00 x 8.00</td>
<td>A-12P12</td>
<td>10.75 x 10.88</td>
<td>12.75 x 10.00</td>
<td>13.50 x 12.94</td>
<td>5.50</td>
<td>5.56</td>
<td>11.00</td>
<td>0.25</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(305 x 305 x 203)</td>
<td></td>
<td>(273 x 279)</td>
<td>(324 x 264)</td>
<td>(343 x 329)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.00 x 12.00 x 8.00</td>
<td>A-15P14</td>
<td>14.75 x 12.95</td>
<td>16.75 x 12.00</td>
<td>17.50 x 14.24</td>
<td>5.52</td>
<td>5.55</td>
<td>13.00</td>
<td>0.25</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(370 x 327)</td>
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<td>(425 x 306)</td>
<td>(445 x 379)</td>
<td>(440 x 330)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Millimeter dimensions (mm) are for reference only: do not convert metric dimensions to inch. Panels must be ordered separately. Optional stainless steel and aluminum panels are also available for most sizes.

MODEL: 926 ELECTRONIC HOUSING
SPECIFICATION

THERMAL INSTRUMENT COMPANY
DATE: 4/14/08

S/N: TIC-279-900

Revision: 7/10/2008
Figure #9

926 ELECTRONIC SIGNAL CONDITIONER

OPTIONAL HIGH/LOW ALARM
C 6
NC 5
NO 4
C 3
NC 2
NO 1

SHIELD

J2B
+ 5
- 4

SHIELD

J2A
+ 3
- 2
+ 1

J1
1 2 3

FACTORY SET

OR

L N G

POWER INPUT (220 VAC OPTIONAL)
110 VAC
50 / 60 HZ

OR

+ - G
24 VDC (OPTIONAL)
@ 1 AMP
POWER INPUT

OPTIONAL PULSE OUTPUT

4-20 MA OUTPUT
(600 OHM MAX LOAD SELF POWERED)

CONNECTING WIRES TO TERMINAL STRIP DO NOT REMOVE BOARD INSTEAD, GENTLY REMOVE GREEN TERMINAL STRIP

FLOW TRANSDUCER

GREEN
BLACK
RED
WHITE

MODEL: THREE TERMINAL STRIP 926 EXTERNAL WIRING DIAGRAM (NEW STYLE)

S/N

THERMAL INSTRUMENT CO.
TREVOSE, PA.

DATE: 4/1/08

REV. 1

Revision: 7/10/2008
Figure #10

926
ELECTRONIC SIGNAL CONDITIONER

SHIELD
+  PULSE OUTPUT OPTION
-  

SHIELD
+  4-20 MA OUTPUT (600 OHM MAX LOAD SELF POWERED)
-  

SHIELD
+  
-  

FLOW TRANSUDCER

J1
1 2 3
FACTORY SET
L1 L2 G
POWER INPUT (220 VAC OPTIONAL)
110 VAC
50/60 HZ

J2
1 2 3
+  OR
-  

+ - G
24 VDC (OPTIONAL)
@ 1 AMP
POWER INPUT

THERMAL INSTRUMENT CO.
TREVOSE, PA.

DATE: 4/14/08  TIC-437-9

MODEL:  
S/N  

TWO TERMINAL STRIP 926
EXTERNAL WIRING DIAGRAM
(OLD STYLE)

Revision: 7/10/2008
Figure #11

BASIC FLOW TRANSDUCER AND ELECTRONIC'S BLOCK DIAGRAM

FLOW ELEMENT
WITH FLOW BRIDGE CONTROLLER

BRIDGE VOLTAGE CONTROLLER

INTERCONNECTING CABLE

RAW POWER SUPPLY
FOR BRIDGE CONTROLLER

FLOW SIGNAL
A/D CONVERTER

LINEARIZING
NETWORK

FLOW 4-20 MA
DC

ISOLATED
OUTPUT

OPTIONS

OPTIONS
4-20MA
TEMPERATURE
OUTPUT

6 DIGIT
FLOW DISPLAY

HI/LO
ALARMS

8 DIGIT
TOTALIZER

PULSE
OUTPUT

MODEL:

FLOWMETER BLOCK DIAGRAM / 926

S/N

THERMAL INSTRUMENT CO. TREVOR, PA.

DATE: 4/3/08 REV. 1

TiC-479-1

Revision: 7/10/2008