ATTENTION:

THE TOTALIZER CABINET AND FLOWMETER HAVE BEEN CHANGED!

PLEASE CONSULT THE FOLLOWING SERVICE MANUAL ADDENDUM FOR INFORMATION REGARDING THESE CHANGES AND THEIR AFFECT ON THE TOTALIZER FLUID MONITORING SYSTEM!

WARNING!

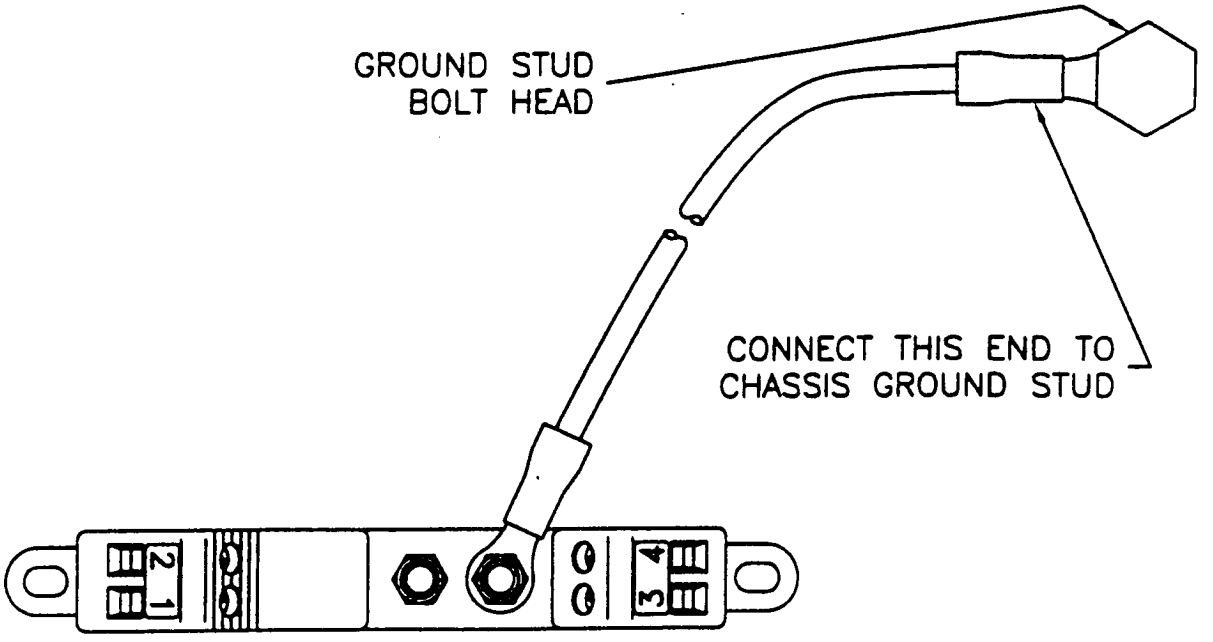
Older Totalizer systems incorporated an intrinsic safety barrier that was grounded through its connection to the chassis. The new barrier supplied in this kit IS NOT grounded in this manner. Thus, with the new barrier, the other end of the ground wire supplied MUST be connected to the chassis ground stud (as shown below) to ground the barrier.

The chassis ground stud typically consist of a 1/4–20 bolt and associated hardware mounted to the chassis. It is labeled with a sticker indicating the ground symbol.

To connect wire to ground stud, remove ground stud nuts, slip terminal over bolt, and reinstall ground stud in same manner it was removed.

Failure to connect this wire to the ground stud could lead to a hazardous situation leading to fire, personal injury and/or equipment damage.

Ensure that external 12 AWG ground wire (LSME0075, supplied with Totalizer) is connected from ground stud to true earth ground.



FT-94-01 SERVICE MANUAL ADDENDUM

The cabinetry for the Totalizer Fluid Monitoring System has been changed to allow installation of Totalizer modules in the ITW Ransburg 9040 Cascade Control Unit. This change in cabinetry does not affect the performance or function of the Totalizer system. It does, however, result in the following new part numbers for Totalizer systems:

Domestic Versions:

76581-101	(1) Intrinsically safe Totalizer system in half rack enclosure
76581-102	(2) Intrinsically safe Totalizer systems in half rack enclosure
76580-01103	(3) Intrinsically safe Totalizer systems in full rack enclosure
76580-01104	(4) Intrinsically safe Totalizer systems in full rack enclosure
76581-301	(1) Fiber Optic Totalizer system in half rack enclosure
76581-302	(2) Fiber Optic Totalizer systems in half rack enclosure
76580-01203	(3) Fiber Optic Totalizer systems in full rack enclosure
76580-01204	(4) Fiber Optic Totalizer systems in full rack enclosure

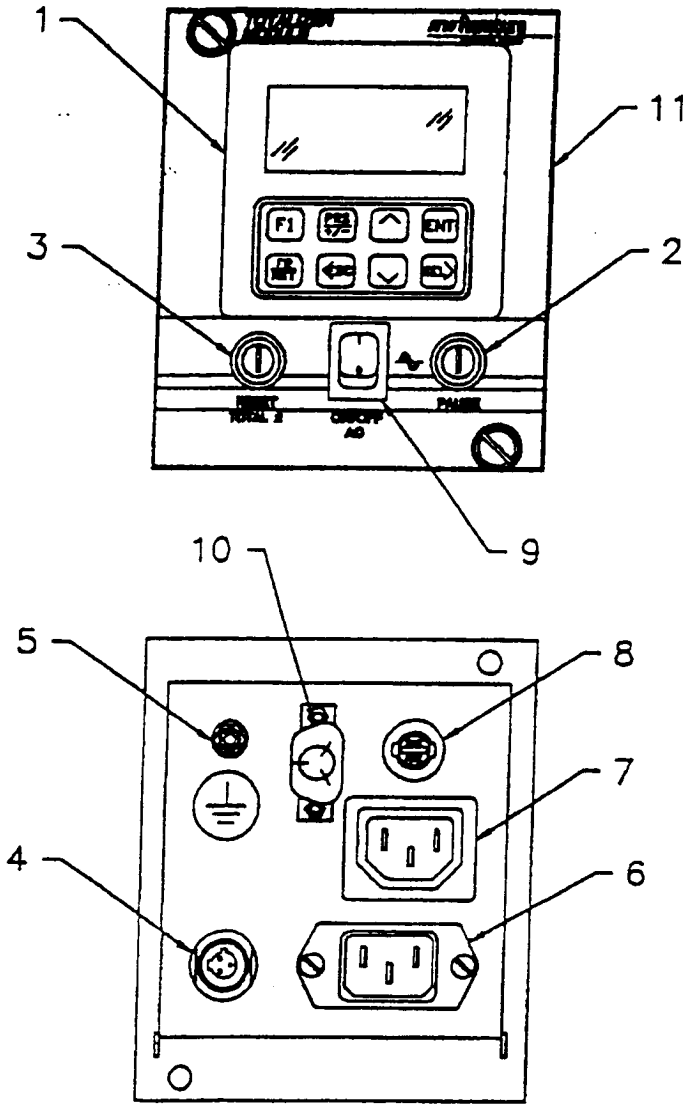
Export Versions:

76581-201	(1) Intrinsically safe Totalizer system in half rack enclosure
76581-202	(2) Intrinsically safe Totalizer systems in half rack enclosure
76580-02103	(3) Intrinsically safe Totalizer systems in full rack enclosure
76580-02104	(4) Intrinsically safe Totalizer systems in full rack enclosure
76581-401	(1) Fiber Optic Totalizer system in half rack enclosure
76581-402	(2) Fiber Optic Totalizer systems in half rack enclosure
76580-02203	(3) Fiber Optic Totalizer systems in full rack enclosure
76580-02204	(4) Fiber Optic Totalizer systems in full rack enclosure

In addition, a new flowmeter (p/n 76251) has been developed for use with the Totalizer Fluid Monitoring System. This new flowmeter provides the following advantages:

* The pressure rating has been increased from 1500 psig to 5000 psig.
* The accuracy has been improved to ± 1 % over the standard flow range (+ 0.5% when calibrated at a specific flow rate).
* The resolution has been increased from 2250 pulses per gallon (ppg) to 31,500 ppg.
* The standard low flow performance has been improved from 100 cc's/min down to 40 cc's/min.
* The temperature rating has been increased from 125°F standard to 180°F.
* Improved meter wear by making carbide shafts and gears with carbide inserts standard.

The following details the FT-94-01 service manual differences for the above changes. All other details of operation are as described in the service manual.



1. Display module
2. Pause keyswitch
3. Reset Total 2 keyswitch
4. Flowmeter cable connector
5. Ground stud (non fiber optic units only)
6. AC inlet
7. AC outlet
8. Fuse
9. AC power on/off switch
10. Printer connection
11. Totalizer module

INSTALLATION (cont.)

Grounding from the enclosure to the module is provided via the front panel screws. Ensure that the front panel screws are fastened when operating the Totalizer system. If it becomes necessary to slide the module out and operate it for testing purposes, use a jumper to ground the module to the enclosure.

The optional mounting method shown in Figure 2 of the service manual is **not** possible with the new meter. The recommended mounting position for the new meter is such that the fluid flow path is perpendicular to the plane of the earth with the outlet at the top of the meter. Other mounting positions are acceptable, however it is recommended that the meter **not** be mounted in a flat position.

The new flowmeter is **not** bi-directional. The fluid must flow from inlet to outlet as indicated by the arrow on the flowmeter label.

The sensor on the new meter is different than the old meter. The new sensor attaches to the meter using two wrench-tightened, recessed, allen-head screws. It is **not** necessary to use a removable thread sealant when removing the new sensor.

OPERATION

A fourth display window has been added that shows Total 1 on the top line and the flow rate on the bottom line.

The pause and reset Total 2 keyswitches require separate keys for operation. This allows for different levels of supervisory control. To operate either keyswitch insert the proper key and turn to the right. Turn the key back to the upright position and remove, after the desired function has been performed.

CALIBRATION

The new meter is factory calibrated using a viscosity of 50 centipoise at a flow rate of 100 cc's/min. This calibration point provides $\pm$ 1% accuracy over the entire viscosity and flow rate ranges listed above. If this accuracy is not sufficient, accuracies in the range of $\pm$ 0.5% can be achieved if the Totalizer system is recalibrated for the specific flow rate it will see during operation. Recalibration may also allow better accuracies when the flowmeter is operated at flow rate and viscosity ranges below those listed above.

The calibration procedure in the manual has been revised. A copy of the new calibration procedure follows.

HIGH RESOLUTION CALIBRATION PROCEDURE

To perform a High Resolution Calibration it is first necessary to convert the display totals from gallons (liters for European version) to cc's. Since the rate is already in cc's/min, the rate scale factor can be used to determine the *new count scale factor* for cc's. To obtain more accurate display readings a factor of 2 has been included with the count scale factor. Therefore, the *new count scale factor* for cc's can be determined by dividing the rate scale factor by 2. The high resolution calibration is performed as follows:

1. Following the flowchart in Figure 7 of the manual, record the current COUNT and RATE SF's.

2. *new count scale factor* for cc's = RATE SF ÷ 2.

3. Following the flowchart in Figure 7 of the manual, move to the COUNT SF calibration window and press SEL>.

Note

The rightmost digit of the COUNT SF should now be flashing. If it is not, press the SEL> button again.

4. Using the <ESC, SEL>, ^, and v buttons, change the COUNT SF to the *new count scale factor*.

Note

The ^ and v buttons increase or decrease the flashing digit. The <ESC and SEL> buttons make the next digit to the left or right flash.

5. Following the flowchart in Figure 7 of the manual, move to the TOT1 display window and press F1 to reset.

The totals are now in cc's. The decimal point and the "gal" (or "lit" for European versions) indicator should be disregarded during the calibration procedure.

Example: 21.13 gal (lit) should be read as 2113 cc's.

6. Dispense approximately 500 cc's of material into a graduated beaker.

7. Calculate the *change ratio* as follows:

   change ratio = beaker volume ÷ TOT1 display reading

Note

When calculating the *change ratio*, the beaker volume and TOT1 display reading should both be in cc's for the High Resolution Calibration and oz's (lit's for European version) for the Quick and Easy Calibration.

8. Multiply the RATE SF recorded in step 1 by the *change ratio*. Enter the result as the *new rate scale factor* by following steps 9 and 10 below.

9. Following the flowchart in Figure 7 of the manual, move to the RATE SF calibration window and press SEL>.

Note

The rightmost digit of the RATE SF should now be flashing. If it is not, press the SEL> button again.

10. Using the <ESC, SEL>, ^, and v buttons, change the RATE SF to the *new rate scale factor*.

11. Using the following equations calculate the *new count scale factor:*

    U.S. version:

    new count scale factor = 0.01321 x *new rate scale factor* from step 8.

    European Version:

    new count scale factor = 0.05 x *new rate scale factor* from step 8.

12. Enter the result of step 11 as the *new count scale factor* by following steps 3 and 4 above.

Record the new count and rate scale factors in a safe place should they be required for future reference.

Note

For the LTOT4000 flowmeter typical values for the COUNT SF are 0.02 to 0.025 (US Version) and 0.076 to 0.095 (European Version). Typical values for the RATE SF are 1.5000 to 1.7000 for both versions.

For the LTOT4005 and 76251 flowmeters typical values for the COUNT SF are 0.015 to 0.017 (US Version) and 0.058 to 0.064 (European Version). Typical values for the RATE SF are 1.1000 to 1.3000 for both versions.

Example:

From step 1: COUNT SF = 0.0165
RATE SF = 1.2500

From step 2: *new count scale factor* for cc's = RATE SF ÷ 2
= 1.25 ÷ 2 = 0.6250

From step 6: beaker volume = 505 cc's
TOT1 display reading = "4.85 gal" = 485 cc's

From step 7: *change ratio* = beaker volume ÷ TOT1 display
= 505 ÷ 485 = 1.0412

From step 8: *new rate scale factor* = RATE SF x *change ratio*
= 1.2500 x 1.0412 = 1.3015

From step 11: *new count scale factor* = 0.0132 x *new rate SF*
= 0.01321 x 1.3015 = 0.0172

QUICK AND EASY CALIBRATION PROCEDURE

1. Following the flowchart in Figure 7 of the manual, record the COUNT and RATE SF. Then return to the TOT1 display window and press F1 to reset.

2. For US version, dispense approximately 64 oz. [1/2 gallon] of material into a graduated beaker (to convert display reading from gallons to ounces multiply by 128).

   For European version, dispense approximately 1 liter into a graduated beaker.

3. Follow steps 7 through 12 above to calculate and enter the new count and rate scale factors.

MAINTENANCE AND SERVICE

Totalizer Module Removal

To remove the Totalizer module from the rack simply loosen the two front panel screws and slide out. For complete removal, first disconnect all connections to the back of the module.

Flowmeter Disassembly

1. Move the display enclosure ON/OFF toggle switch to the OFF position and remove the fuse.
2. Flush the fluid line. Turn fluid supply off and relieve fluid pressure. Close inlet and outlet fluid shut off valves, if installed.

WARNING

Always de-pressurize the fluid system before servicing. Never remove the sensor while the flowmeter is pressurized.

3. Disconnect the flowmeter cable from the sensor.
4. Loosen fittings and disconnect fluid lines from flowmeter. Remove flowmeter from the bracket.

CAUTION

A small amount of fluid will remain in the flowmeter and will leak out when it is removed and/or opened. Take the necessary precautions to deal with this fluid.

5. Remove the flowmeter cover bolts. Carefully remove the front cover, gears, and shafts.

Note

If flowmeter cover bolts are lost or damaged replace only with Grade 8, 1/4-20 UNC, alloy steel, socket head cap screw, 1 1/4" in length.

6. If O-ring is still set in flowmeter body, remove it. The O-ring must be replaced whenever the flowmeter is disassembled.
7. Clean all parts with appropriate solvent. Inspect parts for wear and replace if necessary.

Flowmeter Reassembly

1. Place shafts and gears back in flowmeter. It does not matter which shaft/gear goes in which position. It also does not matter which surface of the gear faces up.
2. Insert new O-ring in flowmeter body.
3. Place the front cover over the flowmeter body. The front cover is pinned so that it will only fit on the body in the proper position.
4. Ensure the O-ring is properly set in the groove. Install cover bolts and tighten to 156 in. lbs. (13 ft. lbs.; 17.5 N-m).

CAUTION

Damage to O-ring will occur if it is not properly seated and cover bolts are tightened.

5. Install flowmeter back on bracket and reconnect flowmeter cable to sensor.
6. Reconnect fluid lines to flowmeter inlet and outlet. Open fluid shut off valves if installed. Reinstall fuse in display enclosure and move toggle switch to ON position.

PARTS

Following is a parts list for the new flowmeter (see Figure on following page for reference):

Item	Description	Part Number
A	New Flowmeter Assembly (includes items B, G and I)	76267
B	New Flowmeter (w/sensor)	76251
C	O-Ring Kit (includes 5 O-rings)	76272
D	Gear (one gear)	76270
E	Shaft (one shaft)	76271
**	Rebuild Kit (includes 2 gears, 2 shafts and 5 O-rings)	76273
F	Sensor	76252
G	Mounting Bracket	LSMM0011
H	40 Foot Flowmeter Cable Assembly	76268
**	40 Foot Flowmeter Extension Cable (maximum total flowmeter cable length not to exceed 120 feet)	LTOT0002
I	Ground Wire Assembly	70539
J	Display Module (Domestic)	LTOT4002-03
	Display Module (Export)	LTOT4002-04
K	Pause Switch	76643-02
L	Reset Total 2 Switch	76643-01
**	AC Line Cord	76449-00
**	AC Jumper Cord	76449-01
M	Fuse Holder	76469-00
	Fuse, 1A, Fast Acting	72771-06
N	AC Power ON/OFF Switch	76434-01

** - designates item not shown in parts breakdown diagram

SAFETY PRECAUTIONS

The 76580-XX1XX, 76581-1XX and 76581-2XX Totalizer systems include an intrinsic safety barrier for installation of the flowmeter in a Class I, Division I, Group D location. When using these Totalizer systems, always ensure proper grounding of the barrier by connecting the 12 AWG ground wire assembly (supplied) from the Totalizer module ground stud to true earth ground. The resistance from true earth ground to the ground stud **MUST** measure less than 1 ohm.

SPECIFICATIONS

Operating Pressure	
Flowmeter Maximum Fluid Pressure	5000 psig (350 bar)
Max. Pressure Drop Across Flowmeter	25 psig (7 bar)
Physical	
Wetted Parts	303 and 17-4PH stainless steel, carbide, teflon
Flow Range*	40 to 1900 cc's/min
Viscosity*	20 to 1500 centipoise
Accuracy	±1 % uncalibrated, ±0.5 % calibrated
Fluid Inlet/Outlet Size	1/4"-18 NPT (F)
Meter Bolt Torque	156 in. lbs. (13 ft. lbs.; 17.5 N-m) minimum
Environment	
Maximum Fluid Temperature*	180°F

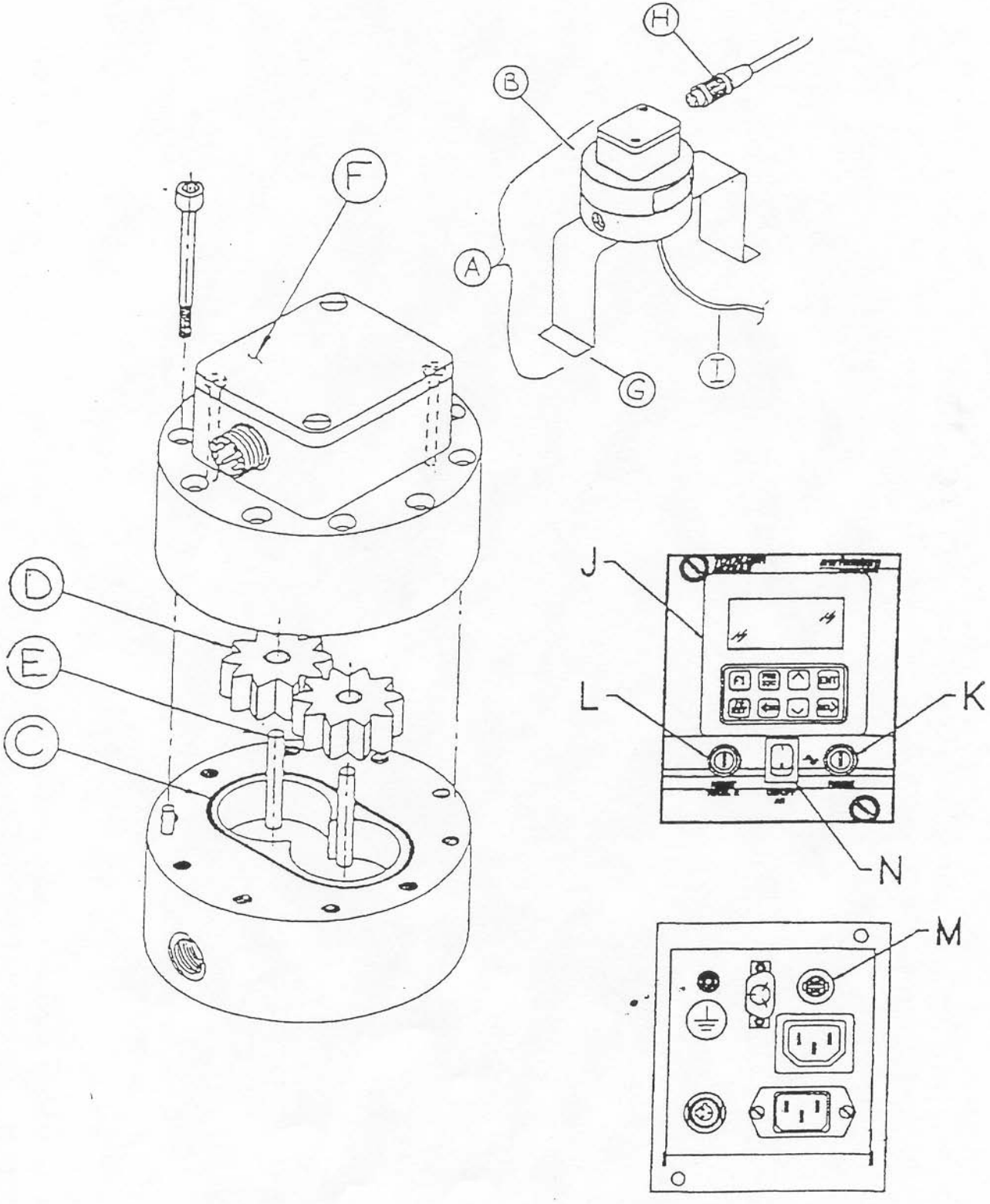
* For operation outside listed ranges consult factory.

INSTALLATION

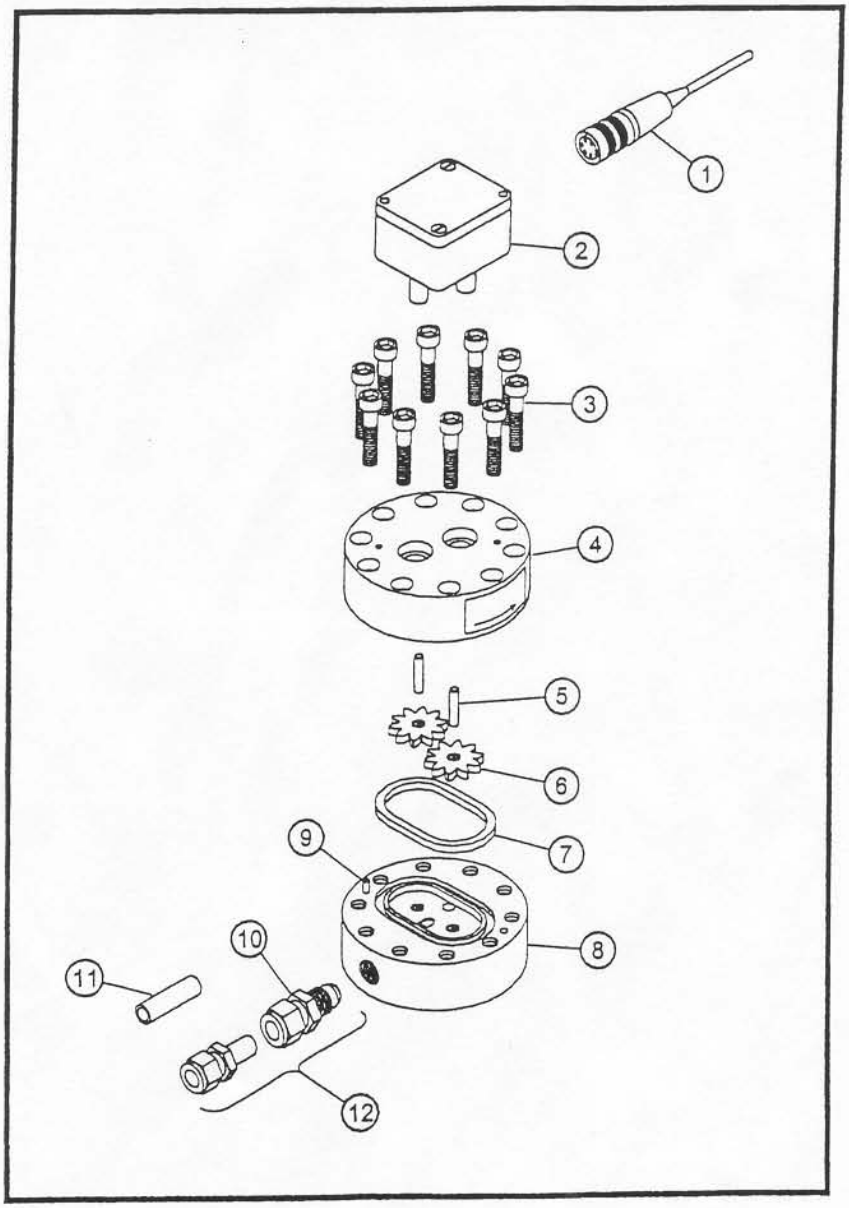
The display enclosure has a removable AC line cord. First plug the line cord into the AC inlet on the back of the Totalizer and then plug the other end of the line cord into a properly grounded AC outlet. Note that the Totalizer now also includes an AC outlet. Using the AC jumper cord (supplied) in this outlet, power can be transferred to other Totalizers or 9040 control units. Thus multiple units can be operated from a single wall outlet.

Totalizer systems 76580-XX1XX, 76581-1XX and 76581-2XX include an intrinsic safety barrier for hazardous location mounting of the flowmeter. To ensure safe operation of this unit, the 12 AWG ground wire assembly supplied with the unit **MUST** be connected from the ground stud of the Totalizer module to true earth ground.

Flowmeters used with all 76580-XXXXX and 76581-XXX Totalizer systems can be mounted in a Class I, Division I, hazardous location. However, the display enclosure **MUST** still be mounted outside the hazardous location.


H
B
A
F
G
I
D
E
C
J
L
K
N
M

RF-1 FLOWMETER (P/N 76251-01)



DESCRIPTION

The RF-1 Flowmeter has been developed for precise metering and monitoring of fluid flows. The flowmeter in many cases, surpasses the performance of meters currently used.

FLOW RATE ACCURACY

Flow rate accuracies of 0.5% are not uncommon with many fluids if the flowmeters are calibrated at or near the expected flow rates. Even with wide flow rate swings (such as when used with robots under analog control) accuracies of +/- 2% are achievable.

REVERSE FLOW DETECTION

Sensors are of the quadrature type, which allows reverse flow detection, if necessary. Under conditions where reverse flow detection is not necessary, only one sensor output is used, leaving the second sensor output as a spare output that can be used if the first sensor should ever fail or to drive remote flow displays, etc.

FLUID PASSAGES

The RF-1 uses a 3/8 AN female fitting. This style fitting eliminates flow "dead space" or exposed threads, and also eliminates the need for specially designed fittings or Teflon inserts. By creating a streamline fluid passage, color change time of the meter is improved.

SPECIFICATIONS

Material Viscosity Range:

Flow Rate:	.01 - .50 GPM (.04 to 1.9 LPM)
Accuracy:	+/- 0.5%(system dependent)
Working Pressure:	5000 PSI (345 Bar) MWP @ 100°F
Temperature:	180°F (85°C)
Signal Output:	2 Channel Quadrature 30,000 PPG (8100 PPL)
Power:	8-24 VDC

Materials:

Body:	303 Stainless Steel
Gears:	Stainless Steel (Hardened)
Bushings:	Carbide
Shafts:	Carbide
Seal:	Teflon
Filtration:	100 Mesh (maximum)
Connections:	Threaded 3/8 AN (F)
Weight:	4.5 lbs. (2.0 kg)

INSTALLATION

The unit may be mounted using the bolt pattern shown in Figure 2. (2) 1/4 - 20 bolts should be used. The meter body must be grounded to true earth ground. Always mount the flowmeter with the gear faces perpendicular to the horizon of the earth. (i.e., Vertical). This minimizes the effect of gravity on the gears. The Direction of flow must be as marked on the side label of the meter. The fluid meter is opposite the sensor connection.

⚠ WARNING

➤ This meter may be installed in Class I, Division I, Group D locations when used in conjunction with the proper Zenner Barrier.

FLOWMETER SERVICING

Flowmeter problems can be caused by improperly filtered fluid. Particulates in the fluid can cause gear binding, resulting in improper signals for the actual flow rate. Maintain the fluid filters according to the instructions from the filter manufacturer. If repeated disassembly and cleaning for removal of solids and particulates occurs, inspect the entire fluid supply system and evaluate the system cleaning cycle. A 100 mesh filter is recomended in the system.

Fluid back-up, that is reverse flow, can cause reacted/catalyzed material to enter the flowmeter. Reverse flow will be detected by the controls and the system will shut down. The flowmeter should be cleaned immediately, before the fluid sets-up.

Under normal operation the magnetic sensors or electrical connections will not require replacement.

SERVICE

Disconnect sensor cable [1] from the flowmeter sensor [2]. Remove meter for service to a suitable area to perform maintenance. Using a 3/16" Allen wrench, remove all (10) bolts. Pull the sensor section STRAIGHT apart from the gear pocket section. Pull the gears and pins from the gear pocket section. Clean and replace worn parts as necessary. Install all parts the order they were

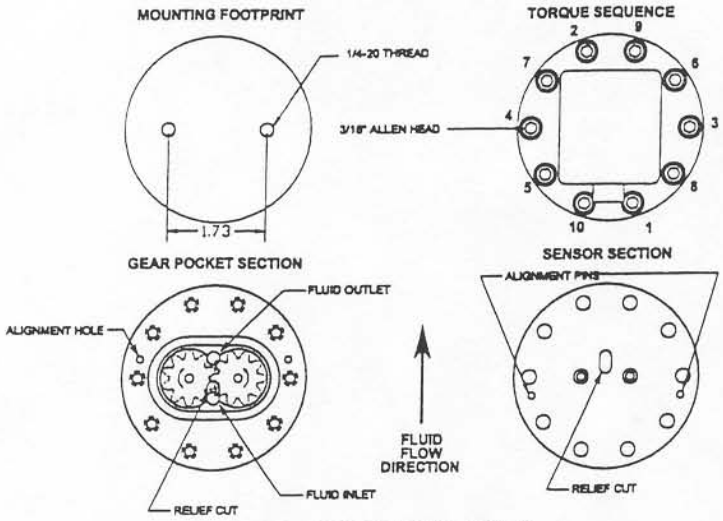


FIGURE 2 VIEWS OF FLOW METER BODY

removed. Push the two covers together, aligning the pins and holes.

NOTE

There is only one way to install the sensor section and the gear pocket

Snug all screws down. Tighten the screws in the sequence pattern shown in Figure 2 to 13lbs. / ft. torque. This is a cross pattern to insure proper gasket setting.

CALIBRATION

Refer to appropriate associated equipment for calibration procedure.

AUTOMATIC CLEANING OF THE FLOWMETER

Fluid Line Air Purges

Air purges are often used in automatic coating operations for rapid color changes and to minimize the amount of solvent required to flush-out the old color. Special considerations must be made when using air purges through the flowmeter.

1. Air purges do not provide the lubrication the flowmeter gears require. Lubrication is normally provided by the metered fluid or solvent.

2. Air purges can cause some coating materials to "dry" on the flowmeter shafts and gears thus affecting the performance characteristics of the flowmeter, especially when water-based materials are used.

3. Excessively long air purges will cause premature gear and shaft failure.

4. All clean cycles should begin with a solvent push to prevent drying of coating material on flowmeter parts.

5. Solvent and air 'chop' cycles are recommended as the most efficient way of flushing flowmeters.

7. Air purge cycles are not recommended in water-based applications.

RF-1 FLOWMETER - PARTS LIST (REFER TO DRAWING ON FRONT COVER)

Item#	Part #	Description	Notes
1	TR-SSEH-585	Electrical Connector	Same connection as TR-SSEH series flowmeters
2	76252-00	Sensor Assembly	See Serivce Bulletin #98-11 (revised) for interchangeability with TR-SSEH-793-2 sensors
3	1/4" -20 x 1 1/4" L.	Socket Hd. Cap Screw	Must be grade 8 or better
4	N/A	Upper Housing	Cannot be purchased seperately
5	76271-00	Shaft	Interchangeable with TR-SSEH-604
6	76270-00	Gear	Stamped with an 'F' or 'G' to distinguish from TR-SSEH-603 gears
7	76272-00	Teflon O-Ring	
8	N/A	Lower Housing	Cannot be purchased seperately
9	N/A	Alignment Pin	Pins press fitted in and cannot be removed or replaced.
10	LSF10033-00	3/8" AN x 3/8" ODT Fit.	
	77104-00	3/8" AN x 3/8" NPSM (m)	Optional fitting
	77105-00	3/8" AN x 1/4" NPSM (m)	Optional fitting
11	76804-00 (-01)	3/8" OD SS Tubing	Used when replacing TR-SSEH series flowmeters on 2k Controls (or 2k880) fluid panels.
12	76850-00	Fitting Kit	Used when 1/4" OD tubing is required or preferred