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# Model 1050R Transmitter Installation & Operation Manual





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## SAFETY SYMBOLS



### WARNING:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS INJURY. RISK OF ELECTRICAL SHOCK.



### CAUTION:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS DAMAGE OR FAILURE OF THE EQUIPMENT.

# Model 1050R Transmitter Installation & Operation Manual

## I. HANDLING AND STORAGE

### SAVE THESE INSTRUCTIONS

#### INSPECTIONS AND HANDLING

Do not dispose of the carton or packing materials.

Each package should be inspected upon receipt for damage that may have occurred due to mishandling during shipping. If the unit is received damaged, notify the carrier or the factory for instructions. Failure to do so may void your warranty. If you have any problems or questions, consult Customer Support at 800-778-9251.

#### DISPOSAL AND RECYCLING

This product can be recycled by specialized companies and must not be disposed of in a municipal collection site. If you do not have the means to dispose of properly, please contact for return and disposal instructions or options.

#### STORAGE

If the device is not scheduled for immediate installation following delivery, the following steps should be observed:

1. Following inspection, repackage the unit into its original packaging.
2. Select a clean dry site, free of vibration, shock and impact hazards.
3. If storage will be extended longer than 30 days, the unit must be stored at temperatures between 32° and 104° F (0° to 40° C) in non-condensing atmosphere with humidity less than 85%.



**CAUTION: DO NOT STORE A NON-POWERED UNIT OUTDOORS FOR A PROLONGED PERIOD.**

## II. GENERAL SAFETY

### AUTHORIZED PERSONNEL

All instructions described in the document must be performed by authorized and qualified service personnel only. Before installing the unit, please read these instructions and familiarize yourself with the requirements and functions of the device. The required personal protective equipment must always be worn when servicing this device.

### USE

The device is solely intended for use as described in this manual. Reliable operation is ensured only if the instrument is used according to the specifications described in this document. For safety and warranty reasons, use of accessory equipment not recommended by the manufacturer or modification of this device is explicitly forbidden. All servicing of this equipment must be performed by qualified service personnel only. This device should be mounted in locations where it will not be subject to tampering by unauthorized personnel.

### MISUSE

Improper use or installation of this device may cause the following:

- Personal injury or harm
- Application specific hazards such as vessel overfill
- Damage to the device or system

If any questions or problems arise during installation of this equipment, please contact Customer Support at 800-778-9251.

### III. PRODUCT DESCRIPTION

#### FUNCTION

The Model 1050R transmitter is a 3-wire, fully programmable, microprocessor based rate indicator/totalizer with a 4-20mA output and HART communications. The 1050R transmitter is a direct replacement for the Mark V flow meter using the 1050 transmitter 4-20mA output. In addition to rate indication, totalization and HART, the turndown for most applications is 15:1, which allows for lower flow rates to be measured.

Mark V flow meters with integral 1050 transmitters require a change to a remote 1050R for greater readability of the display; the 1050R is a direct replacement for the 1050 transmitter used with the Mark V flow meter. The 1050R can be mounted up to 200 feet (61 m) away.

A blind display is also available if mass flow compensation is required.

#### TECHNICAL SPECIFICATIONS

Turn Down	15:1
Response Time	0.3 seconds
Damping	User adjustable settings 0 to 99 samples
Flow Direction	Unidirectional or bidirectional
Output	4-20mA, proportional to flow
Communications	HART® communication signal (superimposed on a 4-20 mA DC signal)
Power	18 to 36 VDC
Ambient Temperature	-4° to 158° F (-20° to 70° C)
Remote Distance	200 ft (61 m)
Enclosure Rating	NEMA 4X
Enclosure Dimensions (with tabs)	7 x 8.5 x 4.5 inches (17.8 x 21.5 x 11.4 cm)

## IV. MECHANICAL INSTALLATION

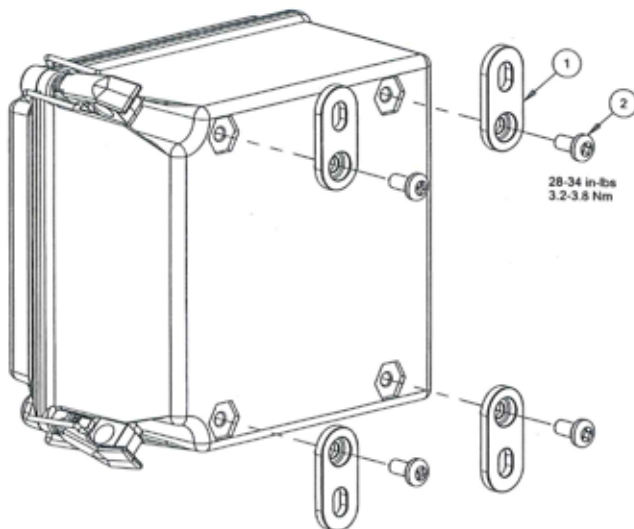


**WARNING: REMOVE POWER FROM THE UNIT BEFORE INSTALLING, REMOVING, OR MAKING ADJUSTMENTS.**

### MOUNTING

#### REMOTE ENCLOSURE MOUNTING

1. Determine and clean location of remote enclosure; space should be at least 7.5 inches wide by 9 inches high (19.05 x 22.86 cm). See Dimensional Drawings section for detailed diagrams.
2. Screw tabs into the back of the enclosure, using screws provided – turning them to the desired angle.
3. Mark hole location on mounting location.
4. Depending on material of mounting location, pre-drill holes.
5. Hold enclosure and screw into mounting location, using screws provided by user.



#### RETROFITTING UNITS

To replace Model 1050 transmitters, with the Model 1050R transmitter, follow the instructions below.

#### IF 1050 TRANSMITTER IS AN INTEGRAL UNIT:

1. Unscrew the cover.
2. Unplug the wiring terminal strip.
3. Remove the wires from the terminal strip; terminal strip can be discarded.
4. Remove the screw in the center of the board and then pull out the entire board set. The board set will not be reused; it may be discarded.
5. Unplug the strain gage connector.
6. Remove the wires from the connector; connector can be discarded.



7. Remove the bottom board and post.
8. Insert the 9-pin terminal board using the screws and standoffs, all provided with the unit.
9. Attach the meter sensing element wires to the terminal board; see Electrical section for wiring diagram.
10. Connect wires to the 1050R, using a customer supplied cable; see Electrical section for wiring diagram.  
Maximum remote distance is 200 ft (61 m)
11. Proceed to Electrical Section to wire the transmitter to the flow meter.

#### IF 1050 TRANSMITTER IS A REMOTE UNIT

The 1050R will be a direct replacement for a remote 1050; remove the 1050 and replace with the 1050R.

1. Remove terminal board from the junction box on the meter and replace with provided 9-pin terminal board.
2. Attach the meter sensing element wires to the terminal board; see Electrical section for wiring diagram.
3. Connect terminal strip wires to the 1050R, using a customer supplied cable; see Electrical section for wiring diagram. Maximum remote distance is 200 ft (61 m)
4. Proceed to Electrical Section to wire the transmitter to the flow meter.

#### FOR BI-DIRECTIONAL APPLICATIONS OF THE 1050

A two unit, bi-directional system using 1050 transmitters, can be replaced with a single 1050R transmitter, but requires special instruction and set-up. Please consult the factory for assistance.

## V. ELECTRICAL INSTALLATION



**WARNING: REMOVE POWER FROM THE UNIT BEFORE INSTALLING, REMOVING, OR MAKING ADJUSTMENTS**

### GENERAL SAFETY

When using electrical equipment, you should always follow basic safety precautions, including the following:

- The installation and wiring of this product must comply with all national, federal, state, municipal, and local codes that apply.
- Properly ground the enclosure to an adequate earth ground.
- Do not modify any factory wiring. Connections should only be made to the terminals described in this section.
- All connections to the unit must use conductors with an insulation rating of 300 V minimum, rated for 212° F (105° C), a minimum flammability rating of VW-1, and be of appropriate gauge for the voltage and current required (see specifications).
- Do not allow moisture to enter the electronics enclosure. Conduit should slope downward from the unit housing. Install drip loops and seal conduit with silicone rubber product.

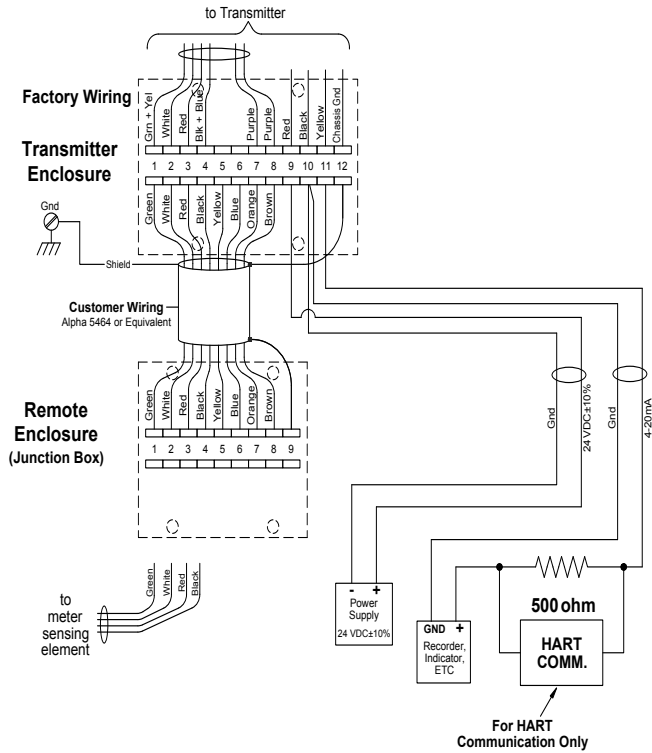
### DISCONNECT REQUIREMENTS FOR PERMANENTLY INSTALLED EQUIPMENT

A dedicated disconnecting device (circuit breaker) must be provided for the proper installation of the unit.

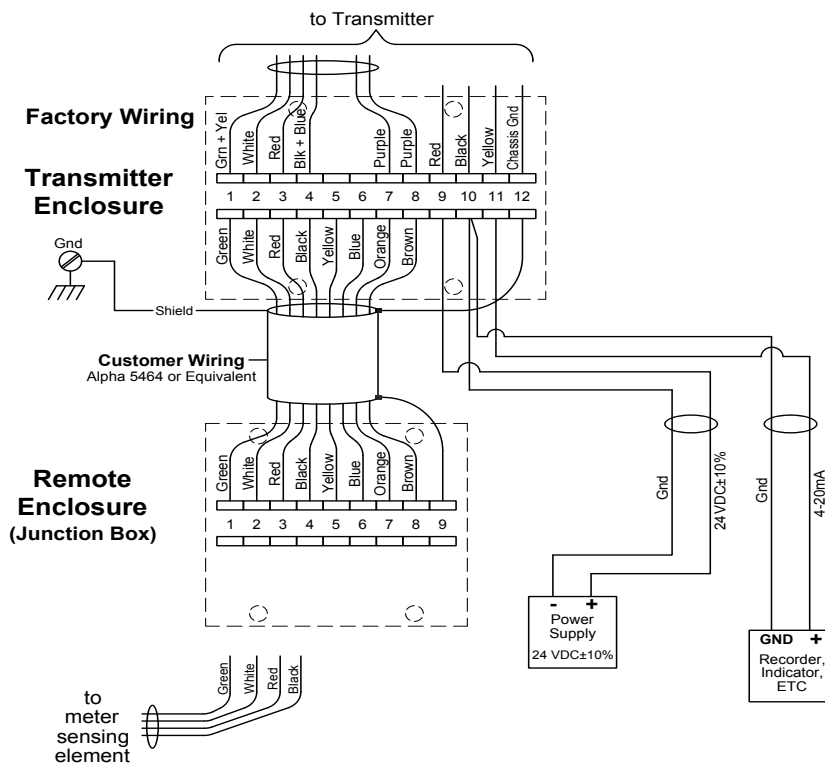
Disconnects must meet the following requirements:

- Located in close proximity to the device
- Easily accessible to the operator
- Appropriately marked as the disconnect for the device and associated circuit
- Sized appropriately to the requirements of the protected circuit (See specifications)

Wiring Diagram A. 3-Wire with HART



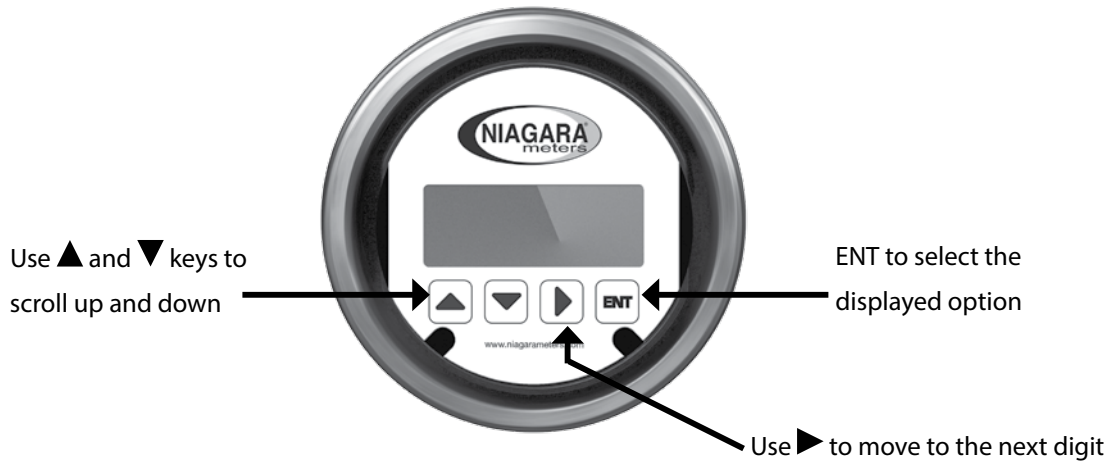
Wiring Diagram B. 3-Wire



## VI. SET-UP

### TRANSMITTER OPTIONS

### DISPLAY DESCRIPTION



### ACCESSING THE MENU

1. Press ENT and ▲ simultaneously
2. Enter password. Please Note: Default password is 8960
3. Use the ▲ and ▼ keys to increment or decrement the selected digit
4. Use the ► key to select the next digit
5. Press ENT to accept the password

### ZEROING MODE

1. Press ENT and ▲
2. Enter password and press ENT
3. Menu will display:

**MAIN MENU**  
**EXIT**

4. Use the ▲ and ▼ keys until ZERO METER is displayed then press ENT
5. Menu will display:

**FLOW = ZERO?**  
**NO**

6. Use ▲ to select YES
7. Press ENT
8. Menu will display:

**SET ZERO?  
NO**

9. Use ▲ to select YES
10. Press ENT
11. Once the meter is zeroed the menu will display:

**SET ZERO  
COMPLETE**

12. Menu will return to display:

**MAIN MENU  
ZERO METER**

13. Use the ▲ to scroll up for EXIT, then press ENT
14. Display will return to operation mode

#### RESETTING TOTAL MODE

In order to reset the total for the flow meter, access the Main Menu by entering the password information.

See ACCESSING THE MENU section in this manual.

**MAIN MENU  
RST TOTAL**

Once the RST TOTAL option is selected by pressing ENT the meter will ask you to verify by selecting YES or NO.

Use the scroll arrows to select YES or NO and then press ENT to accept the selection.

If NO is selected the meter will return to the main menu where another selection can be made.

If YES is selected the meter will perform the reset and display RST TOTAL COMPLETED on the display before returning to the main menu.

#### ACCESSING SIMULATE MODE

In order to enter simulation mode for the flow meter, begin by accessing the Main Menu by entering the password information.

See ACCESSING THE MENU section in this manual.

**MAIN MENU  
SIMULATE**

Press ENT to select simulate mode. The SIMULATE menu options are:

- 4 mA to force 4 mA output
- 8 mA to force 8 mA output

- 12 mA to force 12 mA output
- 16 mA to force 16 mA output
- 20 mA to force 20 mA output

Once the output is selected press ENT.

An asterisk ( \* ) will be placed by that output signal indicating this is the chosen signal.

To end simulation, press the arrow keys until BACK is available and press ENT.

### ACCESSING PROGRAM MODE

Please consult manufacturer before changing program settings.

In order to enter program mode for the flow meter, begin by accessing Main Menu by entering the password information. See ACCESSING THE MENU section in this manual.

In Program Mode change Flow Type, Units, Range settings, Calibration, Display options, etc.

**MAIN MENU  
PROGRAM**

MAIN MENU			
PROGRAM	BI-DIRECT	FACTORY SET	
	SPECIAL	FAILSAFE	
		DISPLAY	
		DAMPING	
		TRIM	
		CLR FAULT	
		FAULT HIST	
		DEFAULT	
		CHANGE PW	
		METER INFO	
		BACK	
	DECIMAL	RATE DECIMAL PLACE SELECTION	
	SET CAL	FACTORY SET	
	CUST SCALE		
	RANGE SET		
	TOTAL UNIT		
	RATE UNIT		
	FLOW TYPE	FACTORY SET	
BACK	BACK ONE LEVEL		

Please consult factory before attempting changing the Calibration values, Flow direction or Flow type.

## PROGRAM MODE INFORMATION

### FLOW TYPE

To change Flow Type from volumetric or mass flow, scroll to MASS or VOLUME and press ENT. Once a selection is made an asterisk ( \* ) will appear next to that selection made indicating which flow type has been selected. Once a selection has been made, scroll to the BACK option and press ENT to go back to the Main Menu.

### RATE UNIT

The Rate Unit is the engineering units to be displayed for flow rate on the meter. Selection choices for rate unit vary based on flow type. Scroll to the desired units and press ENT. The meter will place an asterisk ( \* ) next to the selected option. Scroll to BACK option once a selection has been made to return to the main menu.

#### Rate Options For Volumetric Flow

UNIT	DESCRIPTION	UNIT	DESCRIPTION
GPS	gallons/second	CFH	cubic feet/hour
GPM	gallons/minute	CFD	cubic feet/day
GPH	gallons/hour	BPS	barrels/second
GPD	gallons/day	BPM	barrels/minute
MGD	mega gallons/day	BPH	barrels/hour
LPS	liters/second	BPD	barrels/day
LPM	liters/minute	IGS	imperial gallons/second
LPH	liters/hour	IGM	imperial gallons/minute
MLD	mega liters/day	IGH	imperial gallons/hour
CMS	cubic meters/second	IGD	imperial gallons/day
CMM	cubic meters/minute	NCH	normal cubic meter/hour
CMH	cubic meters/hour	NLH	normal liter/hour
CMD	cubic meters/day	%	percentage
CFS	cubic feet/second	SCM	standard cubic feet/minute
CFM	cubic feet/minute		

#### Rate Options for Mass Flow

UNIT	DESCRIPTION	UNIT	DESCRIPTION
GPS	grams/second	PPS	pounds/second
GPM	grams/minute	PPM	pounds/minute
GPH	grams/hour	PPH	pounds/hour
KPS	kilograms/second	PPD	pounds/day
KPM	kilograms/minute	STM	short tons/minute
KPH	kilograms/hour	STH	short tons/hour
KPD	kilograms/day	STD	short tons/day
MTM	metric tons/minute	LTH	long tons/hour
MTH	metric tons/hour	LTD	long tons/day
MTD	metric tons/day	%	percentage

## TOTAL UNIT

The Total Unit is the engineering units to be displayed for the Totalizer on the meter. Selection choices for the Total Unit vary based on Flow Type. Scroll to the desired units and press ENT. The meter will place an asterisk ( \* ) next to the selected option. Scroll to BACK option once a selection has been made to return to the PROGRAM menu.

### Total Options for Volumetric Flow

UNIT	DESCRIPTION	UNIT	DESCRIPTION
GAL	gallon	CF	cubic feet
LIT	liter	CL	cubic liter
IGL	imperial gallon	BBL	bbl liquid
CM	cubic meter	NCM	normal cubic meter
BL	barrel	NL	normal liter
BSL	bushel	SCF	standard cubic feet
CY	cubic yard	HL	hectoliters

### Total Options for Mass Flow

UNIT	DESCRIPTION	UNIT	DESCRIPTION
G	grams	ST	short tons
KG	kilograms	LT	long tons
MT	metric tons	OZ	ounces
LB	pounds		

## RANGE SET

The Range Set option scales the 4-20 mA output to the process variable. In order to set the Range Set scroll to the Range Set option on the Program Menu and press ENT. Use the arrow keys to display the options. Selection choices for Range Set vary based on the direction of the meter.

### Unidirectional Meter Options:

- 4 mA
- 20 mA
- CUT OFF

Initial range values are 4 mA = 0 flow and 20 mA = Full Scale flow designated by the invoice and application process. For a Unidirectional Meter the Cut Off will be the minimum flow that can be reported by the meter.

### Bidirectional Meter Options:

- MaxRange
- CUT OFF

The 4 mA option will be the output when flow reaches this value in reverse direction. The Max Range option is the output when flow reaches this value in the positive direction. CUT OFF which is a process variable that allows the meter to report zero flow in both forward and reverse flow.



## CUSTOM SCALE

The Custom Scale option is a percentage between 90 and 110, which can be selected to change the output factor to be displayed and transmitted. Select the desired option and press ENT to return to the PROGRAM menu.

## SET CAL

The Set Cal option is set at the factory to match the transmitter to the target meter. This must not be changed without first consulting the factory.

## DECIMAL

This option allows the decimal location that is displayed to be selected. The options are:

- 000000
- 0000.0
- 000.00

NOTE: The number of decimal digits will be limited by the full-scale value.

Scroll to the desired display option and press ENT. The meter will place an asterisk ( \* ) next to the selected option. Scroll to BACK option once a selection has been made to return to the PROGRAM menu.

## SPECIAL

- METER INFO will sequence through the serial number, firmware version, and model numbers, etc. that are assigned to the meter.
- CHANGE PW is the option to change the password for the meter
- DEFAULT resets the meter back to the original factory defaults set when the meter was shipped.
- FAULT HIST shows all the faults and warnings history that had occurred in meter during operation.
- CLR FAULT clears all active faults stored in the meter.
- TRIM provides an option to trim 4 mA and 20 mA output independent of flow.
- DAMPING provides an option to manage the displayed flow rate and mA output caused by severe turbulence or other conditions. Possible settings are 0 - 99 where 1 = 0.333 seconds, 2 = 0.666 seconds, 3 = 0.999 seconds, 90 = 29.97 seconds. The default setting is 3.
- DISPLAY provides the option to select the parameters to display on the meter. Standard is Flow Rate and Total. Options include Rate Only and Total Only.
- FAILSAFE provides the option to select the value the 4-20 mA is to transmit in the case there is a failure. Starting value is always ON LOW. Possible values are ON LOW, ON HIGH, and ON OTHER. Where ON LOW is 3.5 mA, ON HIGH is 22.5 mA, and ON OTHER is between 4 mA and 20 mA.

## BIDIRECT

The Bidirect mode allows the meter to be set in unidirectional or bidirectional flow. Scroll to NO for unidirectional and YES for bidirectional flow. Scroll to the desired display option and press ENT. The meter will place an asterisk ( \* ) next to the selected option. Scroll to BACK option once a selection has been made to return to the PROGRAM menu. This option is only available with a bidirectional meter. Please consult order information.

## CALIBRATION\*

Except for extreme conditions, no calibration is required.

Due to fast response of the Mark V, flow fluctuations and transients may be seen which cannot be detected by other systems of flow measurement. What may appear to be instability in the Mark V may actually be instability in the fluid system. The flow range of any instrument may be altered, within certain limits, by the installation of a new target. Do not disassemble the sealed sensing element, as any unauthorized repairs will void the manufacturer's warranty.

## FIELD CALIBRATION\*

NOTE: This is for unidirectional meters; for bidirectional, consult factory.

An important feature of the Mark V is the ease with which the retention of calibration accuracy can be verified in the field. By removing the Mark V from the line and making two simple checks, it can readily be determined whether the calibration is unchanged. In addition to the normal components of the flow system, the following is required: (a) a digital multimeter capable of reading milliamps, (b) a precision vernier caliper or micrometer and (c) a weight of known mass.

At the time the Mark V is calibrated by the manufacturer, the calibration parameters (including the target diameter and the full scale force) are recorded on the data sheet and supplied with the meter. These are also stored in the transmitter (Special Menu/Meter Info). If these measurements are unchanged, the calibration is unchanged. The sensor body (disc-shaped target) is sized and the edge contoured to obtain a desired drag in the moving stream of fluid. Comparison of the diameter of the disc at its edge with the diameter as measured when calibrated will show whether the drag is unchanged. The effect of the drag is to produce a force on the target support rod, resulting in an electrical output signal from the strain gage transducer in the Mark V. The relationship of the force on the rod to the signal is called the force factor and is a measure of the system sensitivity. A comparison of the force factor to that recorded when calibrated will show whether the sensitivity is unchanged.

To make the field checks, the Mark V should be removed from the line and the target removed from the support rod that is the upstream face of the target. At this time, the diameter can be measured using a vernier caliper or micrometer. Note: On bi-directional targets, both the upstream and downstream edges should be measured if the Target Type is SPIR. The target size listed on the data sheet includes a number which is the diameter of the target in thousandths of an inch. For example ACR-405 is a target with a diameter of 0.405". Note: On inline units it is advisable to carefully replace the o-ring when reassembling the meter into its housing.

With the target still removed, fasten a thin wire to the rod at the point where the center of the target would be. Then clamp the Mark V so that the forward flow direction is truly vertical and acting downward. Connect the 1050R per the wiring instructions in section ELECTRICAL. Connect the digital multimeter and apply power.

Before hanging a weight, record the programmed settings for Custom Scale and Cal 1 through Cal 8. These will need to be returned to their initial values after performing the field calibration test.

Refer to Accessing the Menu programming section CUSTOM SCALE and SET CAL. Custom Scale = \_\_\_\_\_

**CHANGE CUSTOM SCALE TO 100\***

Do not change Cal 1 through Cal 8

Cal 1 = \_\_\_\_\_

Cal 2 = \_\_\_\_\_

Cal 3 =   500  

Cal 4 =   500  

Cal 5 = \_\_\_\_\_

Cal 6 =   500  

Cal 7 = \_\_\_\_\_

Cal 8 =   500  

Zero the meter using the procedure in the section ZEROING THE METER. Using the digital multimeter, 4 mA should be displayed. This output signal is the zero load output. Hang a known weight, the full-scale weight, from the thin wire. Record the resulting test load output signal as indicated on the digital multimeter.

- If equal to the full-scale weight the milliamp output should read 20 mA DC.
- If less than the full-scale weight calculate the theoretical mA DC output:

$$\left( \sqrt{\frac{\text{Weight Used}}{\text{Full-Scale Weight}} \times 16} \right) + 4$$

If this reading is within 2-3% of that given, then the Mark V is operating with its original calibration. Small variances in calibration can be due to differences in measuring equipment, positioning compared to factory, etc. If readings are greater than 3%, or if you prefer specific settings, please refer to Appendix 5.

Return Custom Scale and Cals 1- 8 to the recorded numbers.

## VII. MAINTENANCE AND REPAIR

The Model 1050R is not designed to be serviced by customers. Please consult the manufacturer.

## VIII. TROUBLESHOOTING

### 3 WIRE FAULT CODES

FAULT CODES	DESCRIPTION	ACTION TO TAKE
1	Timer A error	Check whether stable DC power is connected to transmitter. Clear fault from Failsafe to RUN mode. If fault appears again after clearing then contact manufacturer.
2	Timer B error	See Action for Fault Code 1.
3	System Zero Scale error	See Action for Fault Code 1.
4	System Full Scale error	See Action for Fault Code 1.
5	Bridge connector not plugged in	Connect Bridge to Transmitter. Please clear fault to switch from Failsafe to RUN mode.
6	Bridge element fault (open/short)	See Action for Fault Code 1.
7	ADC7730 Continuous Conversion	See Action for Fault Code 1.
8	AD12 communication	See Action for Fault Code 1.
9	System is not calibrated	See Action for Fault Code 1.
10	Not Used	-
11	AD7730 stored parameter error	See Action for Fault Code 1.
12	Not Used	-
13	Not Used	-
14	Not Used	-
15	Not Used	-
16	Not Used	-
17	Processor main clock failure	See Action for Fault Code 1.
18	Processor aux. Clock failure	See Action for Fault Code 1.
19	Not Used	-
20	Not Used	-
21	Core Temp is over 150C	Electronic temperature is out of specification.
22	Bridge operating temperature over/under range	Device detected fluid temperature more than it can handle. Please refer specification of device.
23	Process variable over/under flow	Device detected flow range more/below than Transmitter can handle. Please refer specification of device. Please clear fault to switch from Failsafe to RUN mode.
24	Bridge RTD failure	See Action for Fault Code 1.
25	Active Slew mode error	See Action for Fault Code 1.
26	Error on Iout pin is detected	See Action for Fault Code 1.

NOTES:

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MEASUREMENT

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