



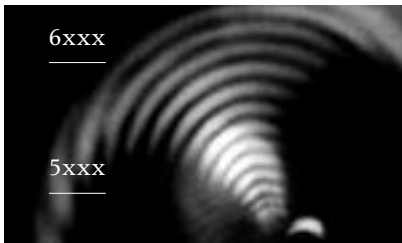
THERMATEL® TA2

Installation and Operating Manual

Thermal
Dispersion
Mass Flow
Transmitter

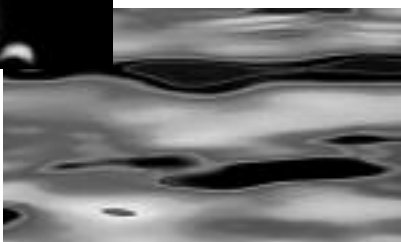


7xxx



6xxx

5xxx



4xxx

3xxx

2xxx

1xxx



UNPACKING

Unpack the instrument carefully. Make sure all components have been removed from the foam protection. Inspect all components for damage. Report any concealed damage to the carrier within 24 hours. Check the contents of the carton/crates against the packing slip and report any discrepancies to Magnetrol. Check the nameplate model number (Model number/approvals as per inserted separate sheet) to be sure it agrees with the packing slip and purchase order. Check and record the serial number for future reference when ordering parts.



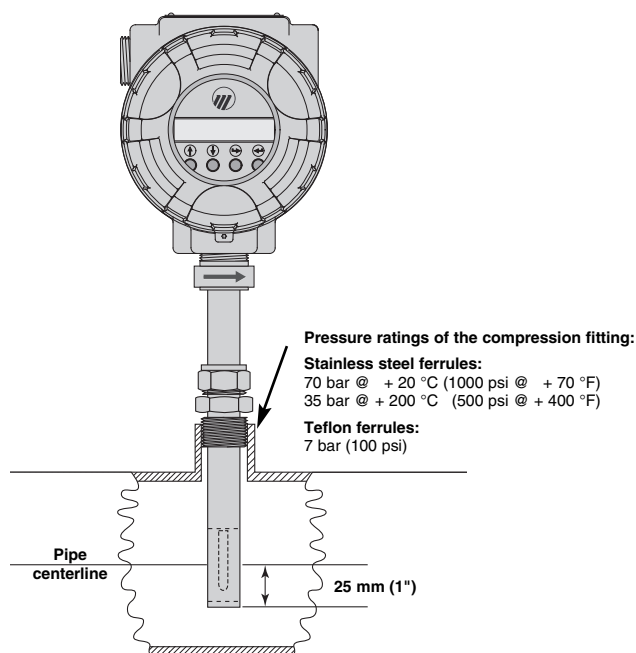
These units are in conformity with the provisions of:

1. The EMC Directive: 89/336/EEC.
The units have been tested to EN 61000-6-4/2001 and EN 61000-6-2/2001.

2. Directive 94/9/EC for Equipment or protective system for use in potentially explosive atmospheres. EC-type examination certificate number ISSeP02ATEX021X (EEx d units).
3. The PED directive 97/23/EC (pressure equipment directive). Safety accessories per category IV module H1.



MOUNTING



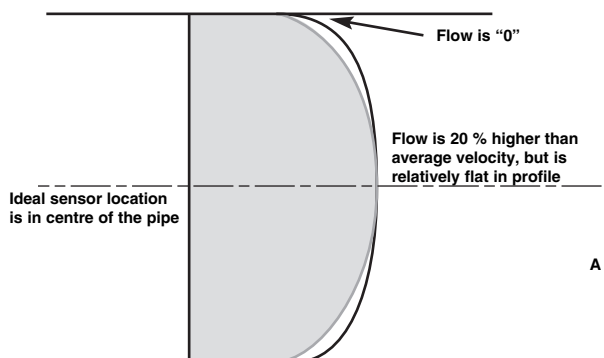
CAUTION: When loosening a compression fitting – beware of the pressure in the pipe. The probe may blow out of the pipe causing injury and/or damage.

NOTE: Do not install the probe in locations where condensed moisture can be present. The unit may cause a false high flow indication. In some cases heat tracing or insulation of the pipe must be considered to avoid moisture condensation.

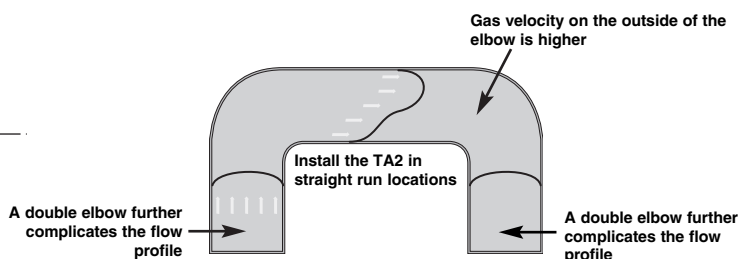


Install the TA2 sensor at a 45° angle to minimize moisture drip. Use of different TA2's as shown at left is recommended to optimize the accuracy in a larger pipe dia.

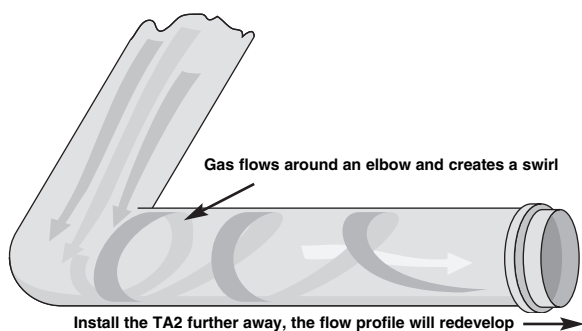
Flow profiles



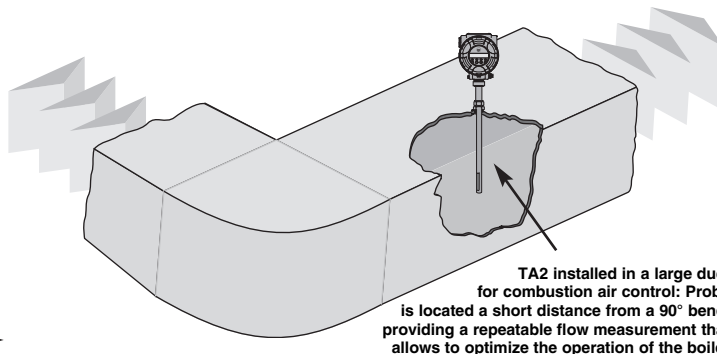
Turbulent flow profile



Flow profile following single elbow

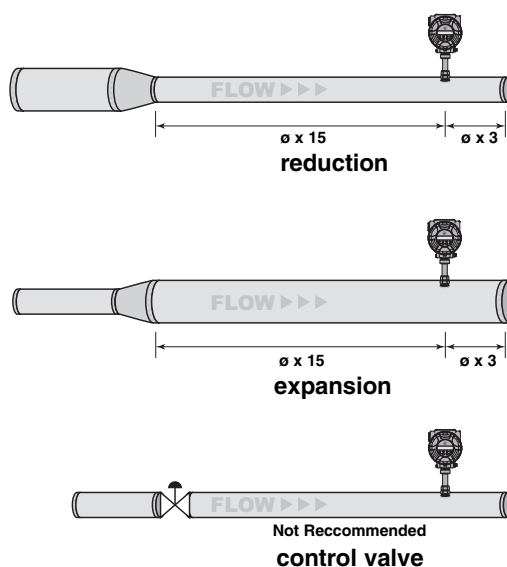
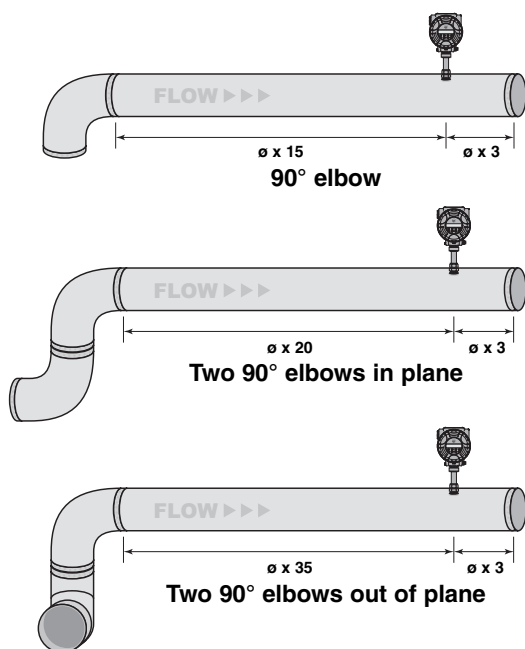


Swirl patterns in a pipe

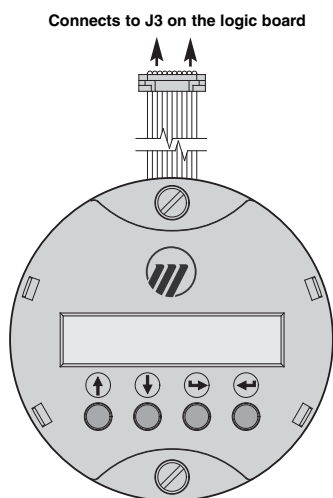


Probe in a duct downstream of elbow

Mounting recommendations

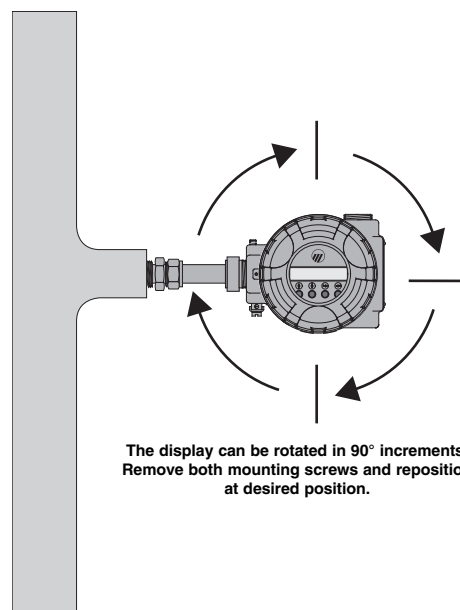


Display



CAUTION: Switch power off when connecting/disconnecting the display

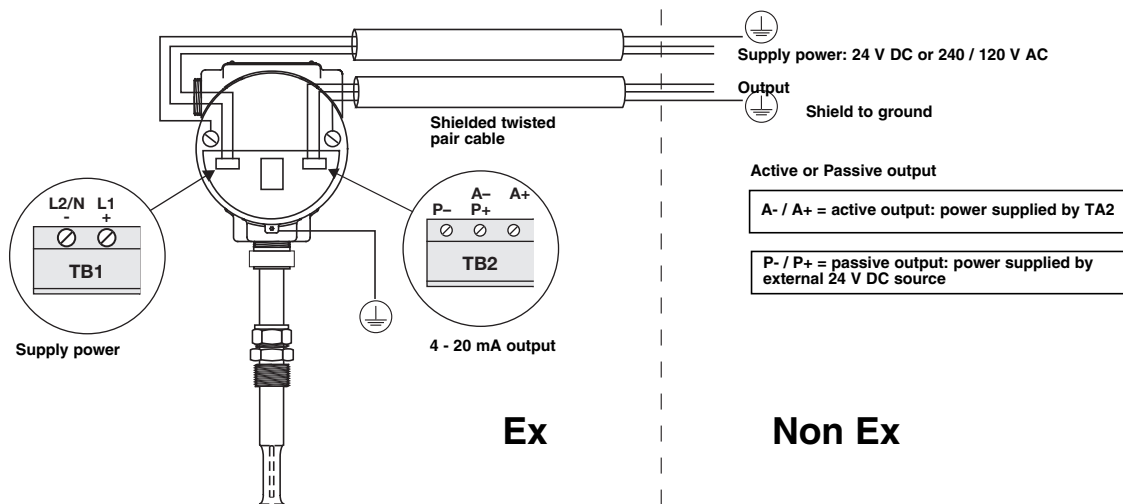
The TA2 has a plug in display (ordered with the unit or separately). The display resists -40 °C (-40 °F), lower temperature will cause permanent damage to the display. The display will go blank below -20 °C (-4 °F) but will recover again once above -20 °C (-4 °F)



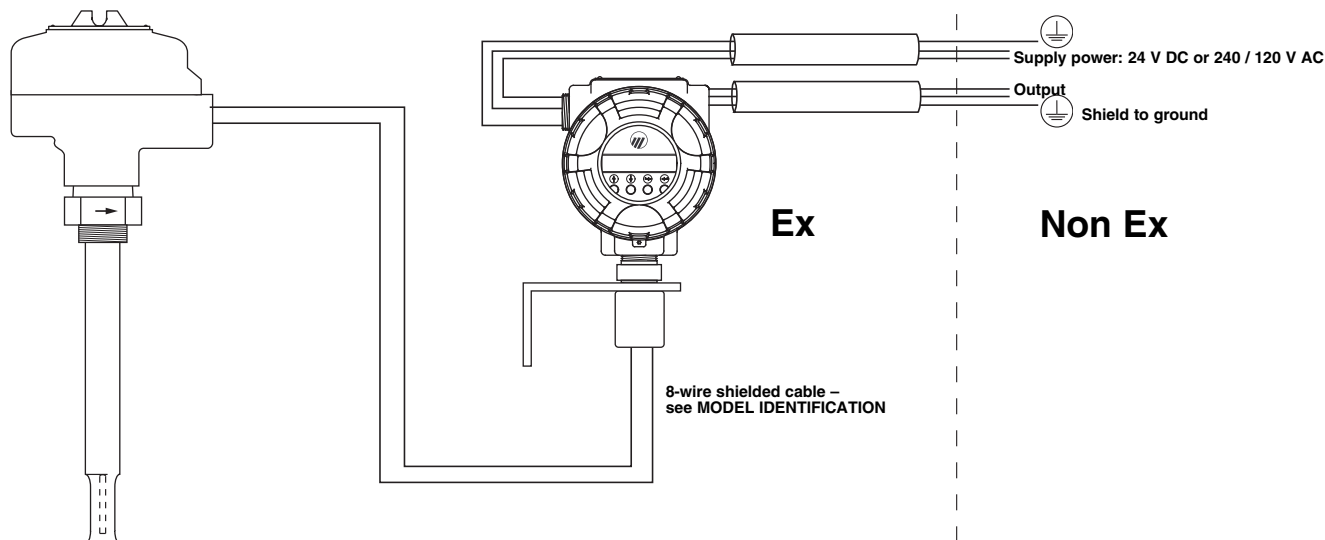
WIRING

CAUTION: In hazardous area, do NOT power the unit until the cable gland is sealed and the housing cover of the wiring compartment is screwed down securely / housing locking screw is fastened – disabling the removal of the cover.

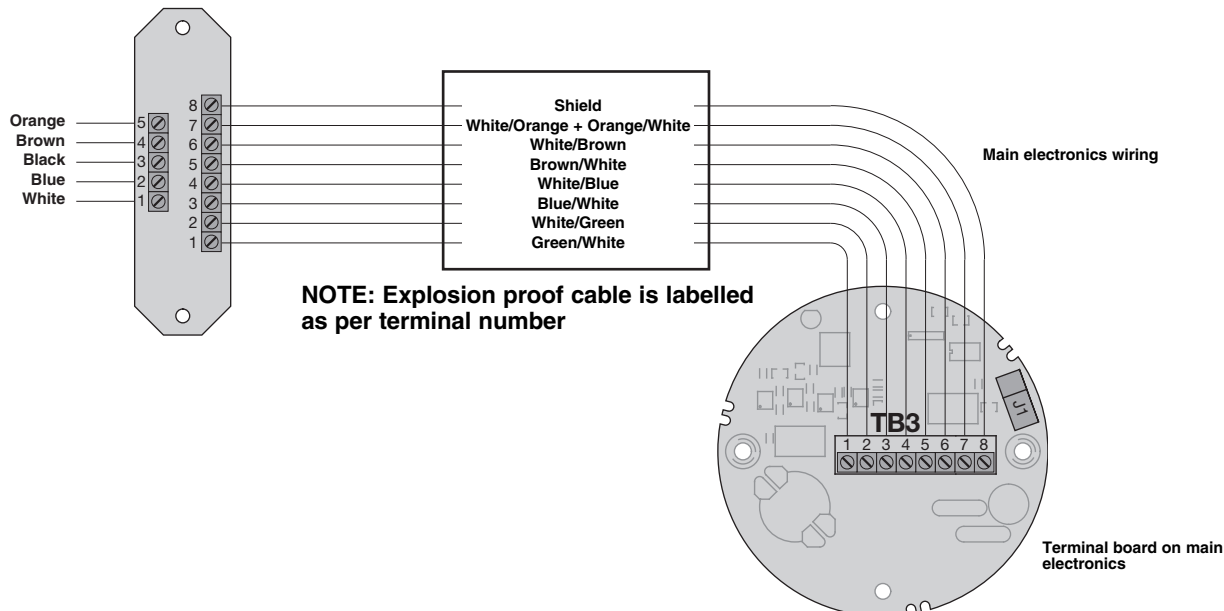
Integral electronics



Remote electronics



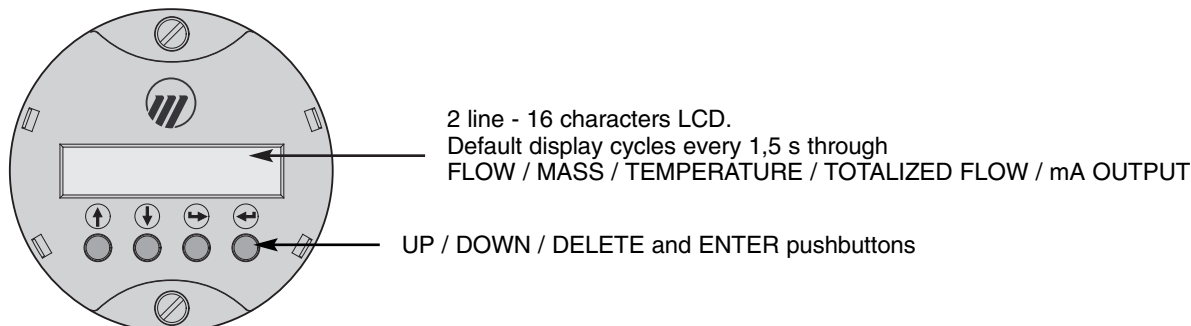
Remote probe wiring



CONFIGURATION

IMPORTANT: TA2 units are pre-configured from factory (as per order specifications). Only modify configuration settings in case needed.

NOTE: When power is first applied to the TA2 there is an initialization period for the sensor to reach stabilization. During this time the TA2 will output a 4 mA signal and the display (if provided) will read «Initializing TA2». Only after the sensor has stabilized and a valid flow measurement is obtained will the display show a flow measurement, the output signal will be active and the totalizer will begin counting.



Keys	Comment
↑ (Up)	Scroll to the previous selection in the list or increase a value (behind decimal / negative values show "-") or scroll forward through graphical characters. Hold the key for 1,5 s and the display will scroll faster.
↓ (Down)	Scroll to the next selection in the list or decrease a value (behind decimal / negative values show "-") or scroll backward through graphical characters. Hold the key for 1,5 s and the display will scroll faster.
➡ (Delete)	Exit the current item/menu level without changes or moves the cursor to the left to delete an entry
⬅ (Enter)	Enter the next menu eg. «System Config» or enter information for the present selection eg. «Volume Flow» or Moves the cursor to the right to quit/save a selection (cursor must be in a blank position)

PASSWORD

Acces Menu

When attempting to enter a selection setting, the unit will display:

Display	Item	Action
«Usr Passwd Req'd» «Prb Passwd Req'd»	User password required Probe password required*	Unit shows an encrypted value. Enter "200" (factory default password or any modified user password (001 - 999))

* only needed when original probe was replaced – factory default is "2200"

Select a new Password

Move to «Adv Config» menu-selection

Display	Item	Action
«Change Password» ⬅ to select	Change password	Enter old password «Enter old password» Enter new password «Enter new password» (any value between 001 - 999)

Add new Password for probe replacement

Move to «Factory Config» menu-selection

Display	Item	Action
«Probe Params» ⬅ to select	Probe parameters	Scroll through entries (factors are provided with the new probe)

Password forgotten/lost – consult factory for assistance, your password can be recooped via the encrypted value displayed when the Password is asked for (see Acces Menu.)

Main Menu

The main menu is used to access the various subroutines. From the Run mode, press any key to enter the Main Menu. The following chart defines the various selections available.

Display		Item	Action if ↵ is pressed
«Measured Value»	↓	Measured value	Enter Measured Values menu
«System Config»	↓	System configuration	Enter System Configuration menu
«I/O Config»	↓	I/O configuration	Enter Input/Output Configuration menu
«Adv Config»	↓	Advanced configuration	Enter Advanced Configuration menu
«Diagnostics»	↓	Diagnostics	Enter Diagnostic menu
«Factory Config»	↓	Factory configuration	Enter Factory Configuration menu
«Run Mode»	↓	Run mode	Return to Run Mode

Measured Values

The Measured Values menu is used to display the current values measured by the TA2 and determine which parameters will be shown on the display during run mode. Enter this section by pressing $\leftarrow$ when «Measured Values $\uparrow$ » is displayed from the Main Menu.

Display	Item	Action	Comments
«Volume Flow» xxxx units	Volume Flow	Press $\uparrow$ or $\downarrow$ to cycle between On main display «On Main Display» and Off Main Display «Off Main Display»; press $\leftarrow$	
«Mass Flow» xxxx units	Mass Flow	Press $\uparrow$ or $\downarrow$ to cycle between On main display «On Main Display» and Off Main Display «Off Main Display»; press $\leftarrow$	
«Temperature» xxxx units	Temperature	Press $\uparrow$ or $\downarrow$ to cycle between On main display «On Main Display» and Off Main Display «Off Main Display»; press $\leftarrow$	Temperature measurements are not accurate at velocity below 0,25 Nm/s
«Loop Current» xxxx units	Loop Current	Press $\uparrow$ or $\downarrow$ to cycle between On main display «On Main Display» and Off Main Display «Off Main Display»; press $\leftarrow$	
«Totalized Flow» xxxx units	Totalized Flow	Press $\uparrow$ or $\downarrow$ to cycle between On main display «On Main Display» and Off Main Display «Off Main Display»; press $\leftarrow$	
«Previous Menu» $\leftarrow$ to select	Previous Menu		Returns to previous menu or cycle through measured values

CONFIGURATION

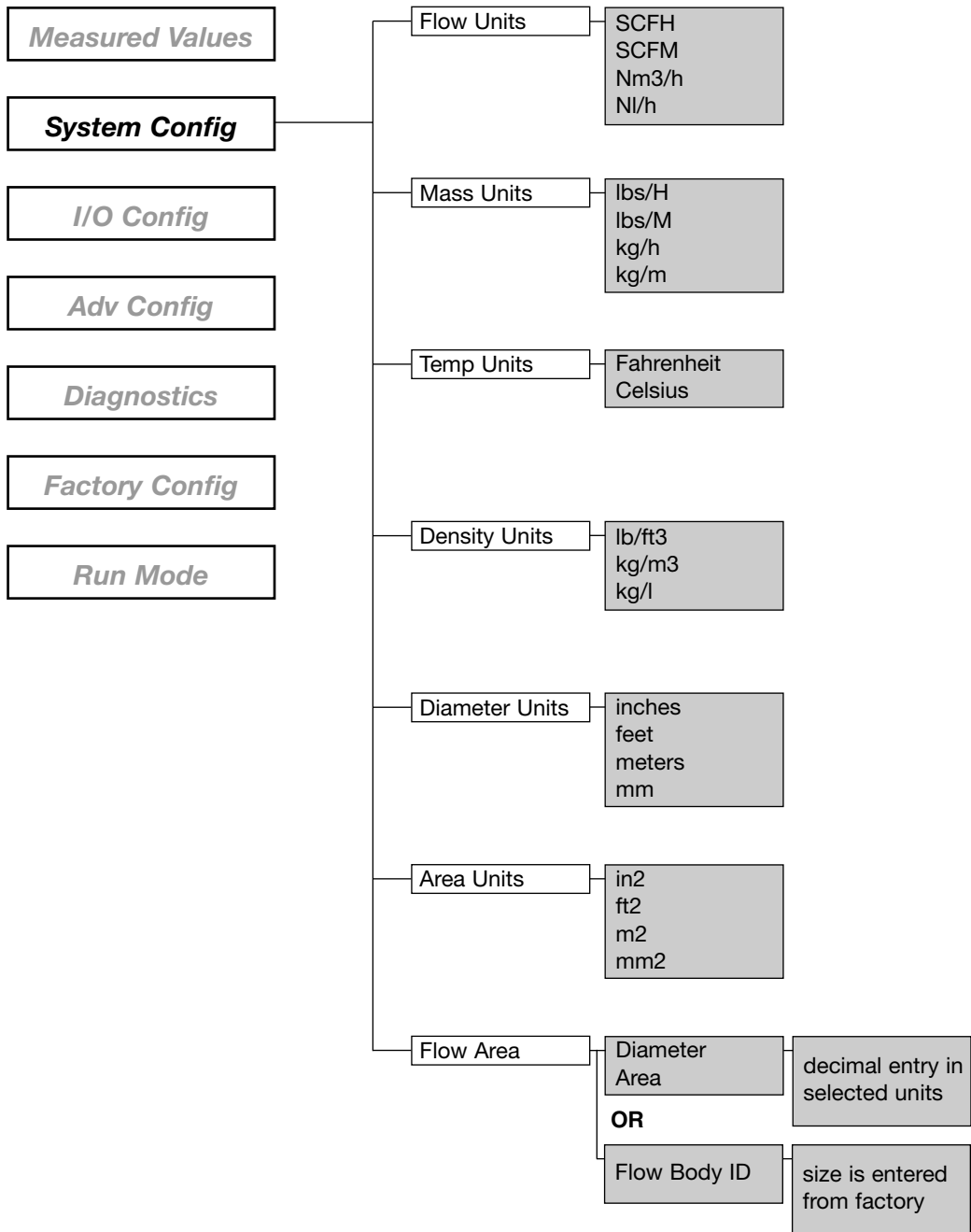
System Configuration Menu

The System Configuration menu is used to select the display units and enter specific information for the application. Access this section by pushing $\leftarrow$ when System Config $\uparrow$ is displayed from the Main Menu.

To calculate the flow or mass, it is necessary to accurately enter the area of the pipe or duct. If the pipe or duct is circular, simply enter the value of the inside diameter; the cross sectional area of the pipe is automatically calculated. If the duct is rectangular, skip over the entry of diameter, and directly enter the cross sectional area in the area section. The instrument will then back calculate an equivalent diameter.

Display	Item	Action	Comments
«Flow Units Nm ³ /h» $\uparrow$	Flow Units	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Choice of standard cubic feet per minute «SCFM», standard cubic feet per hour «SCFH», normal cubic meters per hour «Nm ³ /h», normal liters per hour «NI/h»
«Mass Units kg/h» $\uparrow$	Mass Units	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Choice of pounds per minute, «lbs/M» pounds per hour «lbs/H», kilograms per minute «kg/m», kilograms per hour «kg/h»
«Temp Units Celsius» $\uparrow$	Temperature Units	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Choice of «Fahrenheit», «Celsius»
«Density Units kg/m ³ » $\uparrow$	Density Units	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Choice of pounds per cubic foot «lb/ft ³ », kilograms per liter «kg/l», kilograms per cubic meter «kg/m ³ »
«Diameter Units mm» $\uparrow$	Diameter Units	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Choice of inches «inches», feet «feet», meters «meters», millimeters «mm»
«Area Units m ² » $\uparrow$	Area Units	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Choice of square inches «in ² », square feet «ft ² », meters squared «m ² », millimeters squared «mm ² »
«Flow Area» $\leftarrow$ to select $\uparrow$	Flow Area	Press $\uparrow$ or $\downarrow$ to scroll between selections; press $\leftarrow$	Enter the cross sectional area of the pipe or duct, or the inside diameter
	Diameter «Diameter» xxx units		Enter the inside diameter (if circular), press $\leftarrow$ to accept or press $\uparrow$ or $\downarrow$
	Area «Area» xxx units		The cross sectional area is calculated based on the diameter. If rectangular enter the flow area
Previous Menu $\leftarrow$ to select $\uparrow$			Returns to previous menu or cycle through System Configuration

CONFIGURATION



CONFIGURATION

I/O Configuration Menu

The I/O Configuration menu is used to set up the operations of 4–20 mA output, the totalizer, and the HART Poll Address. Access this section by pushing $\leftarrow$ when «I/O Config $\uparrow$ » is displayed.

4-20 mA

To access the 4-20 mA signal, scroll $\uparrow$ or $\downarrow$ until the display shows «4-20 mA Config $\uparrow$ », press $\leftarrow$.

Display	Item	Action	Comments
«Controlled by Flow» $\downarrow$	Controlled by flow	Press $\uparrow$ or $\downarrow$ to cycle between options	Choice is Flow «Flow» or Mass «Mass»
«4 mA Set Point xxxxx units» $\downarrow$	4 mA set point xxxxx units	Set mA point using keypad	Enter value for 4 mA point. Units are based upon selection «Controlled by»
«20 mA Set Point xxxx units» $\downarrow$	20 mA set point xxxxx units	Set mA point using keypad	Enter value for 20 mA point
«Fault Mode xx mA» $\downarrow$	Fault mode xx mA	Press $\uparrow$ or $\downarrow$ to cycle between «22 mA», «3.6 mA» or «Hold»	Select status of 4-20 mA loop in event of fault
«Previous Menu» $\leftarrow$ to select	Previous menu		Returns to previous menu or cycle through 4-20 mA

Totalizer

The totalizer maintains a continuous, running total of the flow in selectable units. It also provides elapsed time since the last totalizer reset. The totalizer utilizes eeprom memory, eliminating the need for a battery backup. The totalizer can be reset to zero via the software configuration menu or by the HART communication. When power is interrupted, the totalizer will restore to its last saved value.

To configure the Totalizer operation, scroll $\uparrow$ or $\downarrow$ until the display shows «Totalizer $\uparrow$ », press $\leftarrow$.

Display	Item	Action	Comments
«Totalizer Mode Disable» $\downarrow$	Totalizer mode disabled	Press $\uparrow$ or $\downarrow$ to cycle through options	Enables or disables totalizer operation
«Totalizer Units xxxxx units» $\downarrow$	Totalizer units xxxxx units	Press $\uparrow$ or $\downarrow$ to cycle through options	Cycles between «SCF», «Nm3», «NI», «lbs», «kg»
«Totalized Flow xxxxx units» $\downarrow$	Totalizer flow xxxxx units		Displays the totalized flow since last reset
«Elapsed Time xx.x hours» $\downarrow$	Elapsed time xx.x hours		Displays the elapsed time since the totalizer was last reset
«Rst Total to 0» $\leftarrow$ to select	Reset total to 0	Press $\leftarrow$ to reset or to return	Resets the totalizer to «0000»
«Previous Menu» $\leftarrow$ to select	Previous menu		Returns to previous menu or cycle through Totalizer operation

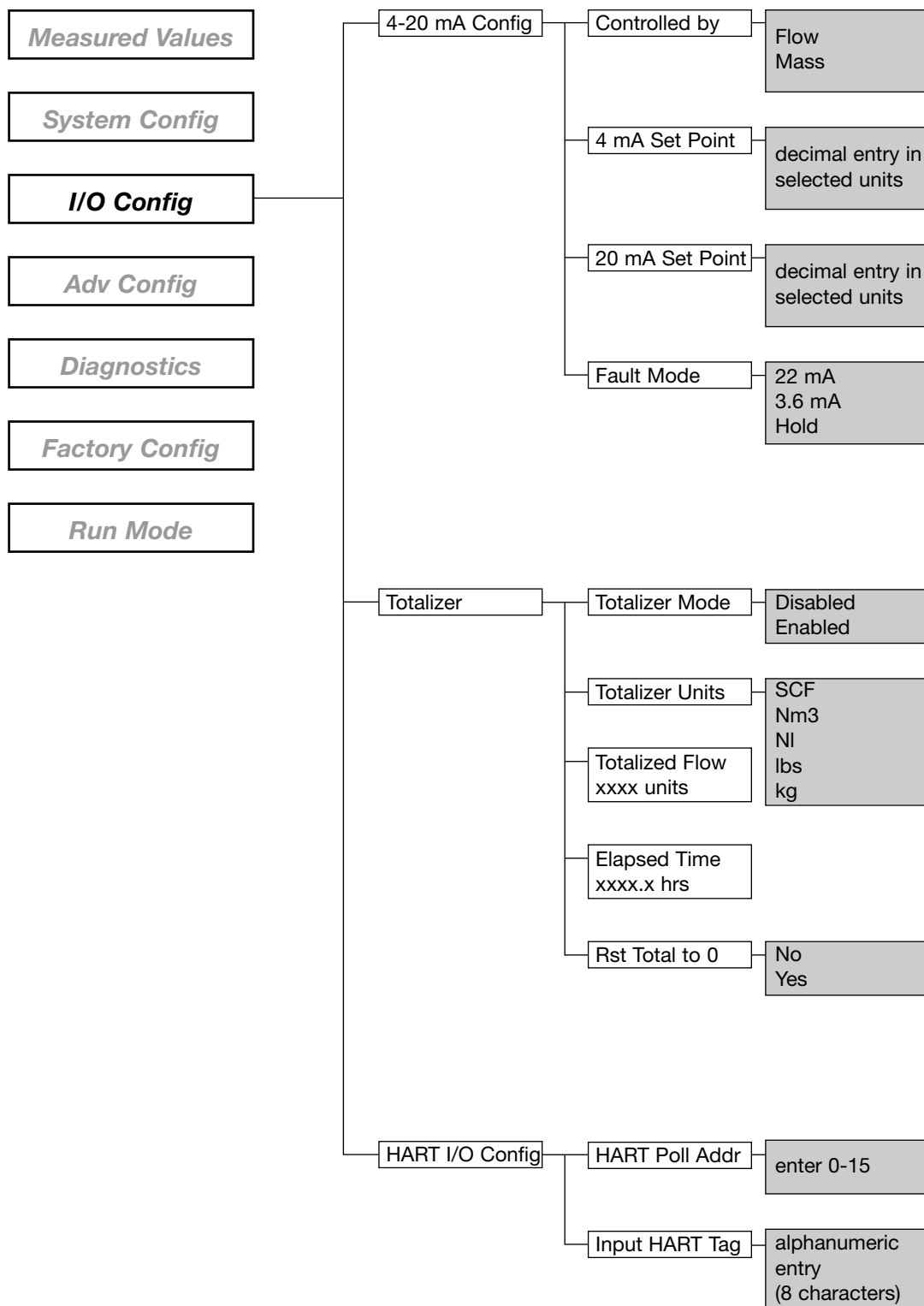
HART Configuration

To configure the HART address, scroll $\uparrow$ or $\downarrow$ until the display shows «HART I/O config $\uparrow$ », press $\leftarrow$. Note that this menu selection will appear even on units that are not equipped with HART. If HART communication is desired, ensure that the correct model is ordered.

NOTE: A non-zero polling address should only be used for multipoint network configuration. In this situation, loop current is held at 4 mA regardless of the flow rate.

Display	Item	Action	Comments
«HART Poll Addr 0» $\downarrow$	HART poll address	Enter value of 0-15 using keypad	
«Input HART Tag» $\leftarrow$ to select	Input HART tag	Enter alphanumeric entry for HART display title	See section “CONFIGURATION” - page 5 for information on alphanumeric entry
«Previous Menu» $\leftarrow$ to select	Previous menu		Returns to previous menu or cycle through HART Configuration selection

CONFIGURATION



CONFIGURATION

Advanced Configuration

The Advanced configuration menu sets advance parameters not normally used in the operation of the instrument. To access Advanced Configuration, scroll ↑ or ↓ until the display shows «Adv Config ↑ », press ←.

Display	Item	Action	Comments
«Change Password» ↑ ← to select	Change password	Enter Old Password Enter New Password	Change the instrument password
«Damping (0-15) 0.0 secs» ↑	Damping 0,0 seconds	Using the key pad, enter new Damping value 0.0 to 15.0 sec.	Damping factor is given in time constants
«STP Conditions» ↑ ← to select	Standard temperature and pressure conditions	Enter value for Standard Temperature and select Standard Pressure value	Permits user to change STP (Standard Temperature and Pressure) conditions
«Install Factors» ↑ ← to select	Install factors	Enter new values for A, B & C	Permits user to adjust flow mea- surement. *
«Low Flow Cutoff» ↑	Low dropout	Enter new low flow dropout value in selected units of measurement	The TA2 will ignore flow readings below this value; See Section “MAINTENANCE” - Troubleshooting - Hardware/Application
«Adj Loop Curr» ↑ ← to select	Adjustment loop current		
		«4 mA Offset»	Use ↑ or ↓ to adjust loop out- put until 4 mA is exact
		«20 mA Offset»	Use ↑ or ↓ to adjust loop out- put until 20 mA is exact
«Home Menu Title» ↑ ← to select	Home menu title	Press ← then ↑ or ↓ to cycle between local tag and HART tag.	The display will show either a local tag or the HART tag.
		Press ↓ to input «Local Tag»	See section “CONFIGURATION” - page 5 for information on alphanumeric entry.
«Previous Menu» ↑ ← to select	Previous menu		Returns to previous menu or cycle through Advanced Configuration

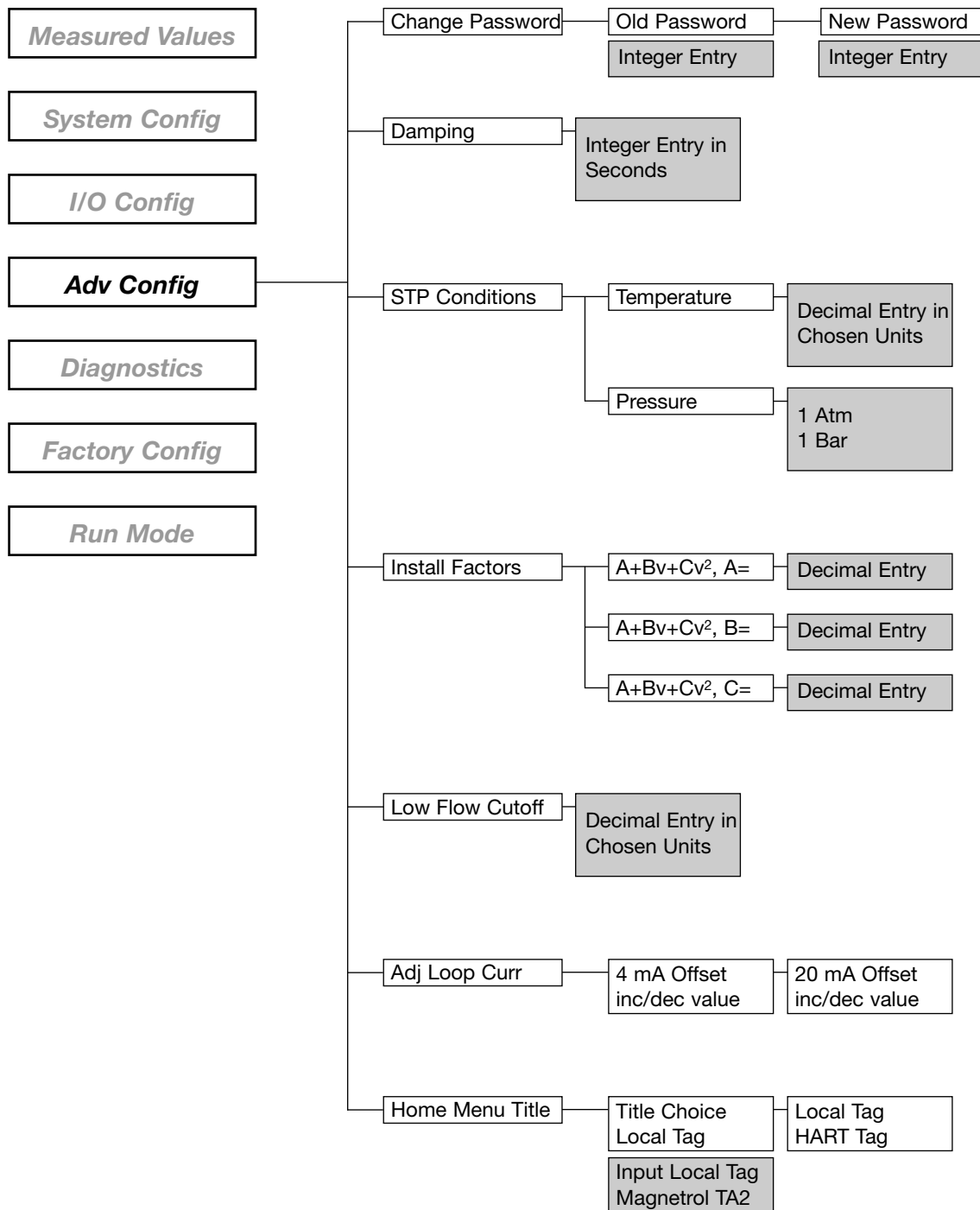
* **Installation factor:** Changes in flow profile will affect the measurements of the TA2. Advanced users have the ability to adjust the measurements for changes in flow profile using a polynomial relationship in the form of:

$$\text{Corrected flow} = A + Bv + Cv^2$$

v = velocity in SFPM (Standard feet/min.). Contact Magnetrol for calculations to determine these factors.

The default is B = 1; and A and C = 0. To use the correction factor, develop a relationship between the flow measured by the TA2 and the flow measured by a second flowmeter. Curve fit the second order polynomial (above) using the output of the TA2 and the output of the second flowmeter for corrected flow. Then enter the appropriate values in the Advanced Configuration menu.

CONFIGURATION

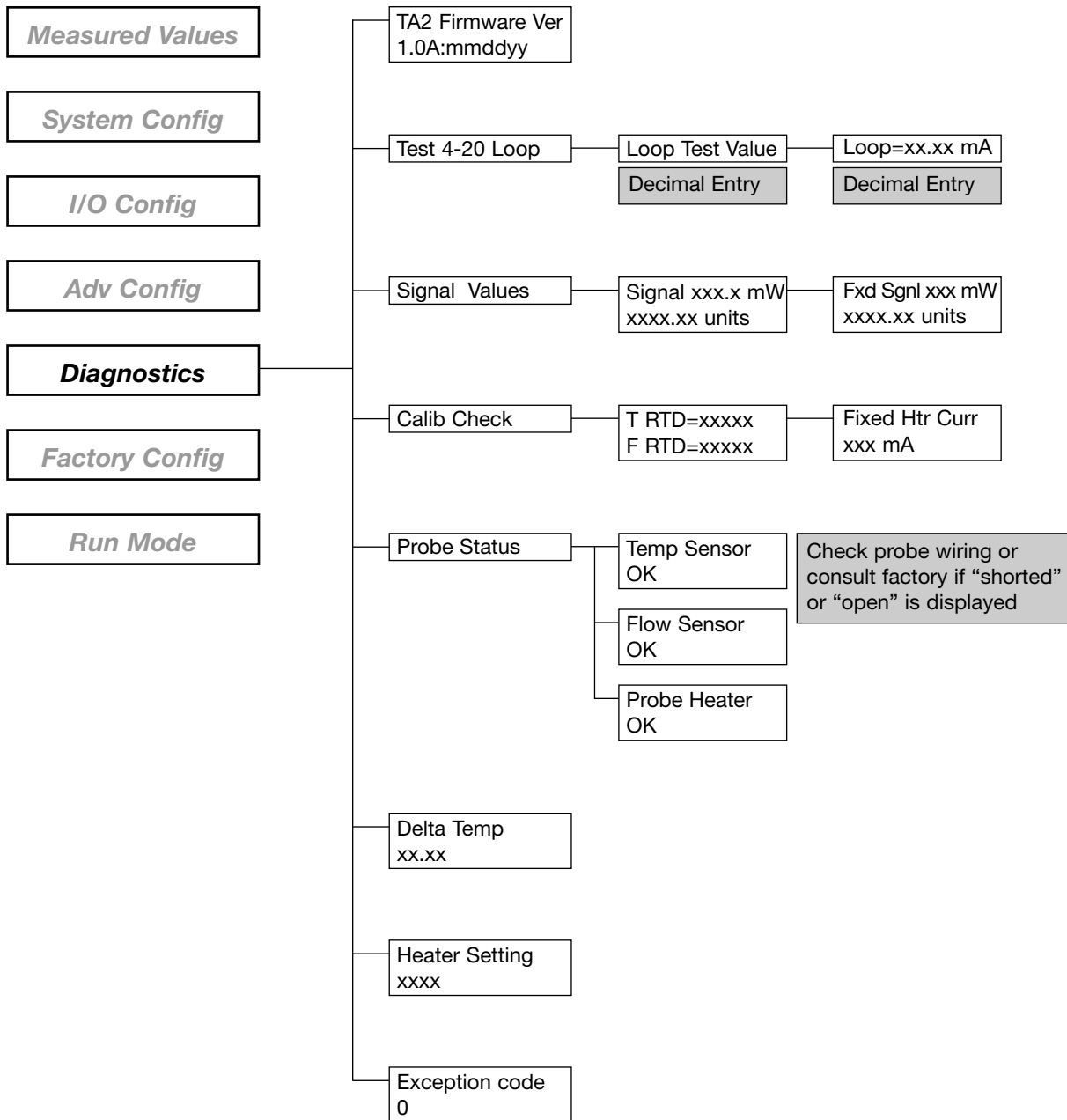


Diagnostics Menu

The Diagnostics menu provides a method of testing the instrument's functionality. It also has useful information for troubleshooting. To access Diagnostics, scroll ↑ or ↓ until the display shows «Diagnostics ↑ », press ←.

Display	Item	Action	Comments
«TA2 Firmware Ver x.x mmddyy» ↑	TA2 firmware version x.x month/day/year		Display firmware version number and date
«Test 4-20 Loop» ↑ ← to select	Test 4-20 loop	Enter desired current output	Allows user to output desired 4-20 mA signal. Press ← when complete to return to normal operation.
«Signal Value» ↑ ← to select	Signal value	Displays Sensor signal strength and corresponding flow rate. ↑ or ↓ permits user to change signal strength and view calculated flow rate	Allows user to vary signal strength and view flow rate. Press any button when complete to return to normal operation. Compare readings with original calibration certificate.
«Calib Check» ↑ ← to select	Calibration check	Displays various A/D values. Press ← to view Heater Current, press ← to exit	This is used with the Probe Simulation Module.
«Probe Status» ↑ ← to select	Probe status	Press ↑ or ↓ to cycle between the temperature sensor, flow sensor and heater	Displays status of the sensors and the heater. Status will be either «OK», «Shorted», or «Open». Consult Magnetrol if a problem is noted.
«Delta Temp nn.mm» ↑	Delta temperature nn.mm		Displays the measured temperature difference between the reference and heated sensor.
«Heater Setting aaaa» ↑	Heater setting AAAA		Displays the heater setting used to obtain the desired temperature difference. Ranges between 0 and 4095.
«Exception Code 0» ↑	Exception code		Magnetrol use only. Advise Magnetrol if other than 0.
«Previous Menu» ↑ ← to select	Previous menu		Returns to previous menu or cycle through Diagnostics Menu.

CONFIGURATION



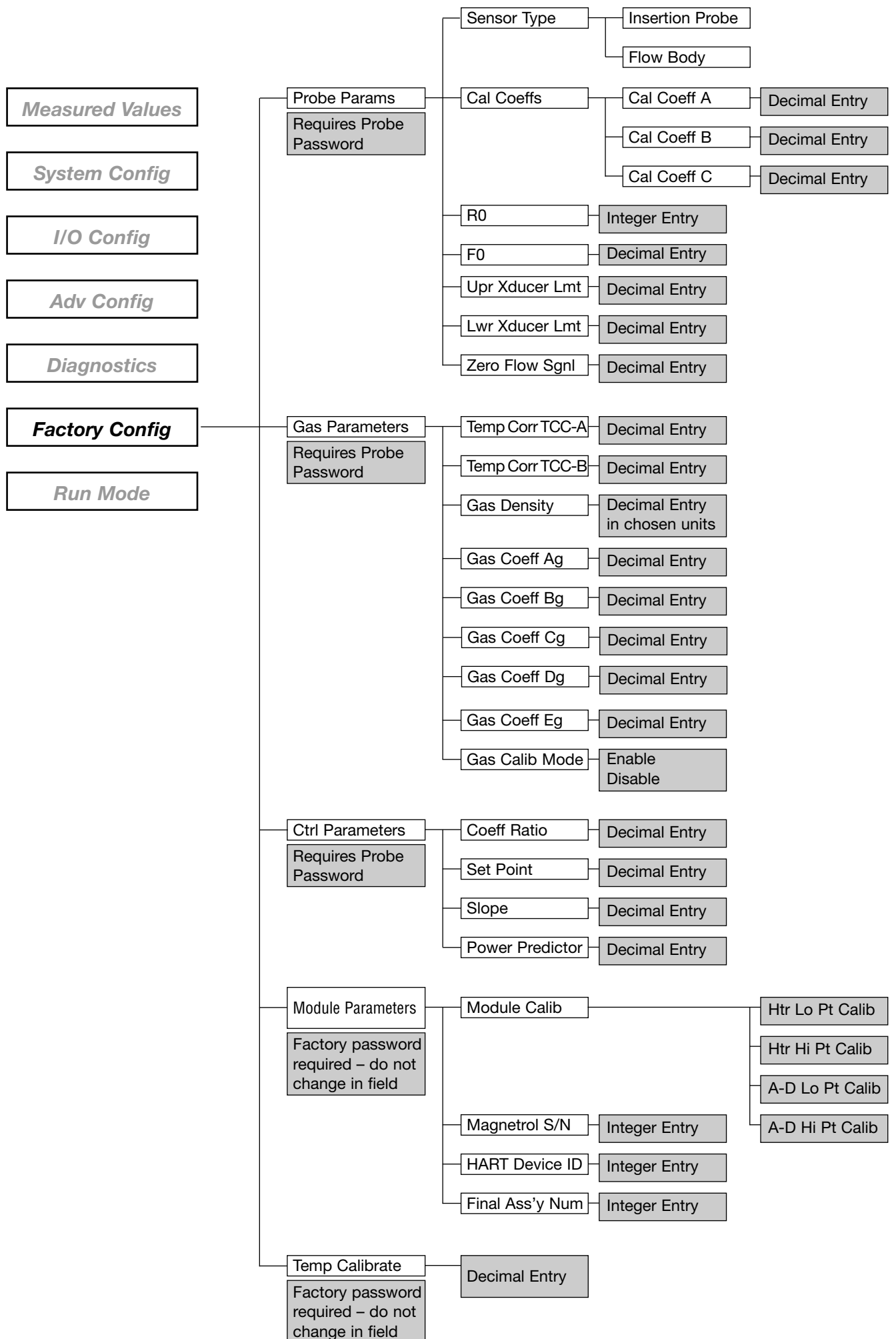
Factory Configuration

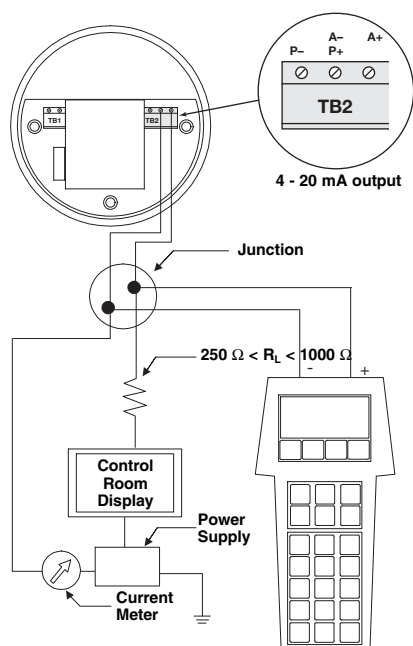
The Factory Configuration is used during initial calibration of the instrument; access to this section is generally only required for review of the information.

Replacement of either the probe or the logic circuit board will require re-entry of calibration data. This is accomplished using the probe password of 2200. A replacement probe will be accompanied with a new calibration certificate which will provide the new calibration information. Replacement of the logic circuit board will require re-entry of the original calibration data from the initial calibration certificate. Data under Probe Params, Gas Params, and Ctrl Params will need to be verified or re-entered. See Section 3.6.

To access Factory Configurations, scroll ↑ or ↓ until the display shows «Factory Config ↑», press ←.

Display	Item	Action	Comments
«Probe Params» ↑ ← to select	Probe parameters	Scroll through entries	These factors will require changing if probe is replaced.
«Gas Parameters» ← to select	Gas parameters	Scroll through entries and compare against data on the calibration certificate	These factors will require changing if probe is replaced. «Gas Calib» mode is used during factory calibration.
«Ctrl Parameters» ↑ ← to select	Control parameters	Scroll through entries and compare against data on Calibration Certificate	These factors will require changing if probe is replaced.
«Module Params» ↑ ← to select	Module parameters	Scroll through entries	These are factory set values and should not be changed.
«Temp Calibrate» ↑ xxx.xx»	Temperature calibrate xxx.xx	Used by Magnetrol during initial calibration	This value should not be changed in field.
«Previous menu» ↑ ← to select	Previous menu		Returns to previous menu or cycle through Factory Configuration.





CONNECTIONS

Connection of your Hart communicator:

- at TB2 terminals (A+) and (A-) in wiring compartment
- at first junction box between unit and control room.

IMPORTANT: The digital HART® communication is superimposed on the 4-20 mA output and requires a min. load resistance of 250 Ω and a max load resistance of 1000 Ω.

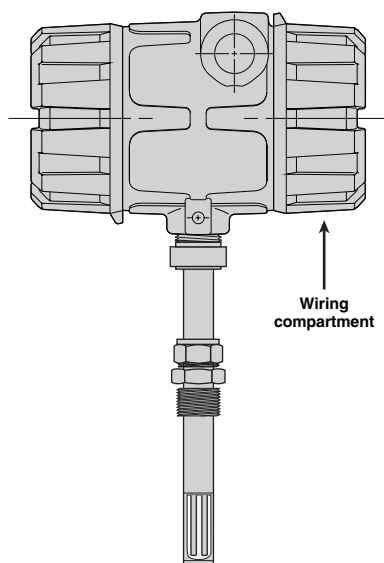
CHECK HART®

Before starting the HART® configuration procedure – check if your HART® communicator is equipped with the proper TA2 Device Descriptors (DD's).

I/O start up the communicator
 Select NO: go offline
 Select 4: utility
 Select 5: simulation
 Check manufacturer: Magnetrol

HFC Release date	Hart Version	Compatible with software
July 2002	Dev V1 DD V2	Version 1.0B and earlier
September 2002	Dev V2 DD V1	Version 1.1A
June 2004	Dev V3 DD V1	Version 1.2 and later

See «Configuration» in diagnostics menu for the TA2 firmware version. When the proper HART® software version of the HHU is not found, consult your local HART® Service Center to load the correct TA2 DD's.



When the proper software version is not found, consult your local HART® Service Center to load the correct Thermatel TA2 DD's.

HART MENU

I/O Start up the device

1 Enter DEVICE SET UP

Press one of the following alphanumeric keys (if no key is sensed after 5 s, the unit will automatically jump to RUN mode and alternatively show Level/% Output and Loop signal)

- 1 for entering the Basic Setup «Basic Setup»
- 2 for entering Advanced Setup «Advanced Setup»
- 3 for entering Diagnostics «Diagnostics»
- 4 for entering Device Description «Device Description»
- 5 for entering Review «Review»
- 6 for entering Calibration Factors «Cal Factors»



1. Basic Setup

1. System Units

- 1. Flow
 - SCFM
 - Nm³/h
 - NI/h
- 2. Mass
 - lbs/hr
 - lbs/m
 - kg/h
 - kg/m
- 3. Temperature
 - C
 - F
- 4. Density
 - lb/ft³
 - kg/m³
 - kg/l
- 5. Totalized Flow
 - SCF
 - Nm³
 - NI
 - lbs
 - kg
- 6. Diameter
 - inches
 - feet
 - meters
 - mm
- 7. Area
 - in²
 - ft²
 - m²
 - mm²
- 8. Velocity
 - SF/M
 - SF/S
 - Nm/s

5. Review

- | | |
|------------------------|------------------------|
| 1. Model | 33. Install Factor – A |
| 2. Manufacturer | 34. Install Factor – B |
| 3. Magnetrol S/N | 35. Install Factor – C |
| 4. Firmware Version | 36. STP Pressure |
| 5. Tag | 37. STP Temperature |
| 6. Descriptor | 38. Ro |
| 7. Date | 39. Fo |
| 8. Message | 40. Cal Coeff – A |
| 9. Final Assembly Num | 41. Cal Coeff – B |
| 10. Device ID | 42. Cal Coeff – C |
| 11. Poll address | 43. Lower Xducer Limit |
| 12. Flow Units | 44. Upper Xducer Limit |
| 13. Mass Units | 45. Zero Flow Signal |
| 14. Temperature Units | 46. TCC – A |
| 15. Density Units | 47. TCC – B |
| 16. Totalizer Units | 48. Density |
| 17. Diameter Units | 49. Gas Coeff – Ag |
| 18. Area Units | 50. Gas Coeff – Bg |
| 19. Sensor Type | 51. Gas Coeff – Cg |
| 20. Pipe ID | 52. Gas Coeff – Dg |
| 21. Flow Area | 53. Gas Coeff – Eg |
| 22. PV is | 54. Gas Calibrate Mode |
| 23. SV is | 55. Coeff Ratio |
| 24. TV is | 56. Set Point |
| 25. 4V is | 57. Slope |
| 26. 4 mA Set Point | 58. Power Predictor |
| 27. 20 mA Set Point | 59. 4 mA Trim Value |
| 28. Fault State | 60. 20 mA Trim Value |
| 29. Damping | 61. Universal rev |
| 30. Totalizer Mode | 62. Field dev rev |
| 31. Date/Time/Initials | 63. Software rev |
| 32. Low Flow cutoff | 64. Num req preams |

6. Cal Factors

- 1. Enter Password
- 2. Probe Parameters
 - 1. Sensor Type
 - Insertion Probe
 - Flow Body
 - 2. Ro
 - 3. Fo
 - 4. Calibration Coeff
 - 1. A
 - 2. B
 - 3. C
 - 5. Lower Xducer Limit
 - 6. Upper Xducer Limit
 - 7. Zero Flow Signal
- 3. Gas Parameters
 - 1. TCC – A
 - 2. TCC – B
 - 3. Density
 - 4. Gas Coefficients
 - 1. Ag
 - 2. Bg
 - 3. Cg
 - 4. Dg
 - 5. Eg
 - 5. Gas Calibrate Mode
- 4. Control Parameters
 - 1. Coeff Ratio
 - 2. Set Point
 - 3. Slope
 - 4. Power Predictor

Error Messages

Message	Action
User password required «Usr Passwd Req'd» Probe password required «Prb Passwd Req'd»	Re-enter data and correct password Contact Magnetrol Technical Support for assistance
Error new password failed «Err New Pwd Failed»	When changing the password, the second entry of the new password does not match the first entry
Error:max «Error:max»	Entry of numeric data is outside the acceptable range. Maximum allowed value is displayed
Error:min «Error:min»	Entry of numeric data is outside the acceptable range. Minimum allowed value is displayed
Factory password required «Fct Passwd Req'd»	You are attempting to access Factory Calibration data. This requires the Factory Password. This data should not be changed in the field.

The TA2 has continuous self diagnostics which detect many specific faults. In the unlikely event of a fault, one or more of the following messages may appear on the display. If there is more than one error message, the messages will rotate. During the time a fault is detected, the loop current is held at the fault level (selected under I/O Configuration) and the totalizer does not accumulate.

Message	Action
No Probe Signals «No Probe Signals»	Check Probe Status section of Diagnostics to determine cause of problem.
Probe Hardware Fault «Probe Hdw Fault»	Check probe wiring

The following displays will occur on re-initialization or in the event of non-volatile memory error. The instrument may need to be reconfigured following the procedure in System Configuration Menu – see page 7 & 8.

Message	Action
Probe Parameters Reset «Prb Params Reset»	Re-enter the probe calibration data using the probe password
User Parameters Reset «Usr Params Reset»	Reconfigure the instrument for flow area and 4-20 mA setup
Initializing TA2 «Initializing TA2»	The TA2 is going through initialization. Flow measurement will begin after completion of the initialization.
Module Calibration Required «Module Cal Req'd»	The TA2 electronics require re-calibration. The instrument continues to operate at reduced accuracy, contact Magnetrol Technical Support.

Troubleshooting - Hardware/Application

Symptom	Problem	Solution
No output signal No display	No input power	Verify that LED D6 on the wiring board is on. Check connection TB1 on input wiring board. Check wiring connection to J1 on power supply board.
No output signal	4-20 mA not operational	Verify 4-20 mA connections are made to the active terminals – see wiring page 4
Flow Rate too high or too low	Instrument configuration does not match customer set up	Check value entered for Flow Area under System Configuration Check STP conditions under Advanced Configuration
Flow Rate too high	Flow Profile Considerations	User can correct for variations in flow profile using the “Install Factors” under Advanced Configuration – See page 12.
	Moisture in the Gas	Condensed moisture will cool the sensor more than gas flow. This will temporarily indicate a higher than expected flow rate. Relocate the probe to another location.
Flow rate too low	Probe incorrectly oriented	Check orientation of the probe in the pipe. Flow arrow on probe must be pointed in the direction of flow
	Sensor is dirty	Build up on the sensor will reduce heat transfer and produce lower than expected signal. Clean the sensor
Flow is measured under a no flow condition	Increased heat transfer (can occur under no flow and high pressure conditions)	Increase the Low Flow Cutoff «Low Flow Cutoff» to a value > the displayed flow rate. The TA2 will ignore flow readings below this value.

Troubleshooting Guide - Firmware

Symptom	Problem	Solution
Password Invalid	User changed password, but does not remember new password	Go to Change Password «Change Password» under Advanced configuration «Advanced Configuration». Press ↵ . Enter any value under Enter old password “Enter Old Passw” and press ↵ . The display will give an encrypted number. Notify Magnetrol of the encrypted number. We can then con- vert the encrypted number to the password which the user previously selected.
Totalizer not operating	Totalizer not Enabled	Insure that the totalizer operation is enabled under the Totalizer section of the I/O Configuration Menu – See page 10
Flow measurement on display is correct but Output signal always 4 mA	HART Poll Address is not 0	Change HART Poll Address to 0. – See page 10.
HART devices only: handheld will only read Universal Commands	The most current Device Descriptions (DDs) are not installed in the handheld.	Contact local HART service center for the latest DDs.

Resistance Values - Integral electronics

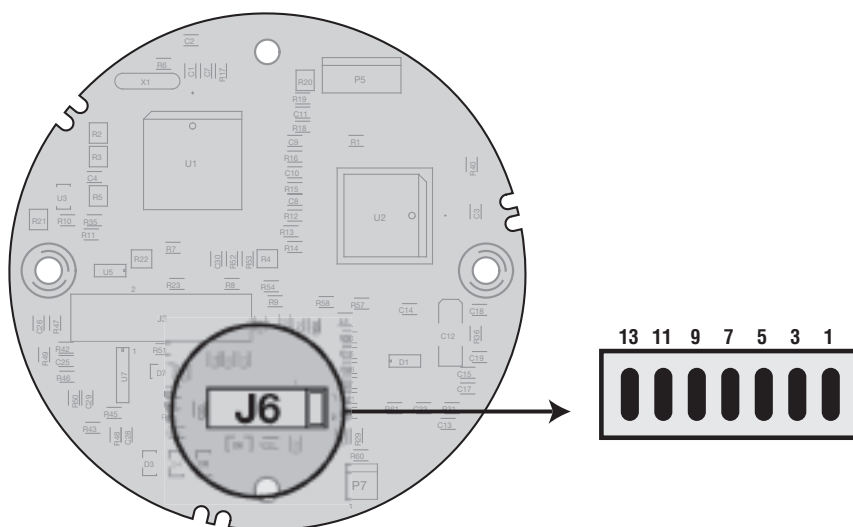
The resistance values for the probe can be checked using J6 on the logic board. To check resistances, turn off power and open the enclosure. Remove the plug in display board if provided. The following table gives the expected resistances. Refer to Figure for pin locations.

Pin	Function	Expected Resistance
1-9	Reference PT1000	1000 to 1770 Ω^*
3-9	Reference PT1000	1000 to 1770 Ω^*
5-9	Heated PT1000	1000 to 1770 Ω^*
7-9	Heated PT1000	1000 to 1770 Ω^*
13-9	Heater	20 Ω

* The resistance can be calculated using the formula

$$R = 1000 \times (1 + 0.00385 \times \text{Temperature})$$

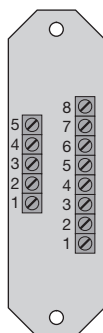
Temperature is in $^{\circ}\text{C}$. Resistance on the other pins will be dependent upon wire length but will be less than 3 Ω .



J6 Terminal Block Pin Location

Resistance Values - Remote electronics

The table below shows the expected resistance values in case remote electronics are used.



Pin	Function	Expected Resistance
1-3	Reference RTD	1000 to 1770 Ω
2-3	Heated RTD	1000 to 1770 Ω
4-5	Heater	20 Ω

Heater Power

Measuring the voltage between pins 13 and 9 can approximate the power to the heated sensor. The power can be estimated by the following formula:

$$\text{Power} = \text{Voltage}^2 (\text{Volt}^2) / 20 (\Omega)$$

This value can be compared against the Signal Strength measured in the Diagnostics menu. – See section “CONFIGURATION”.

PROBE SIMULATION MODULE

The Magnetrol Probe Simulation Module (089-5220-001) can be used with the TA2 Thermal Dispersion Mass Flow Meter to compare the readings of the transmitter against a reference.

Using the Probe Simulation Module requires the use of the Display in the TA2.

Connecting the probe simulation module

1. Unscrew cover and remove the screws attaching the display. Do not disconnect the display from the circuit board.
2. Remove the jumper from J6. See figure below.
3. Plug in the cable from the probe simulation module into J6. This removes the probe from the circuit and readings are now from the module (TA2 display will read «Probe Hdwe Fault»).
4. Put the switch to the High position.
5. Using the TA2 display, move to Diagnostics/Calib Check and record the values of T RTD and F RTD below.
6. Put the switch to the Low position and record the values of T RTD and F RTD below.

NOTE: If there is little change between readings in the High and Low position, turn the plug in J6 over and try again.

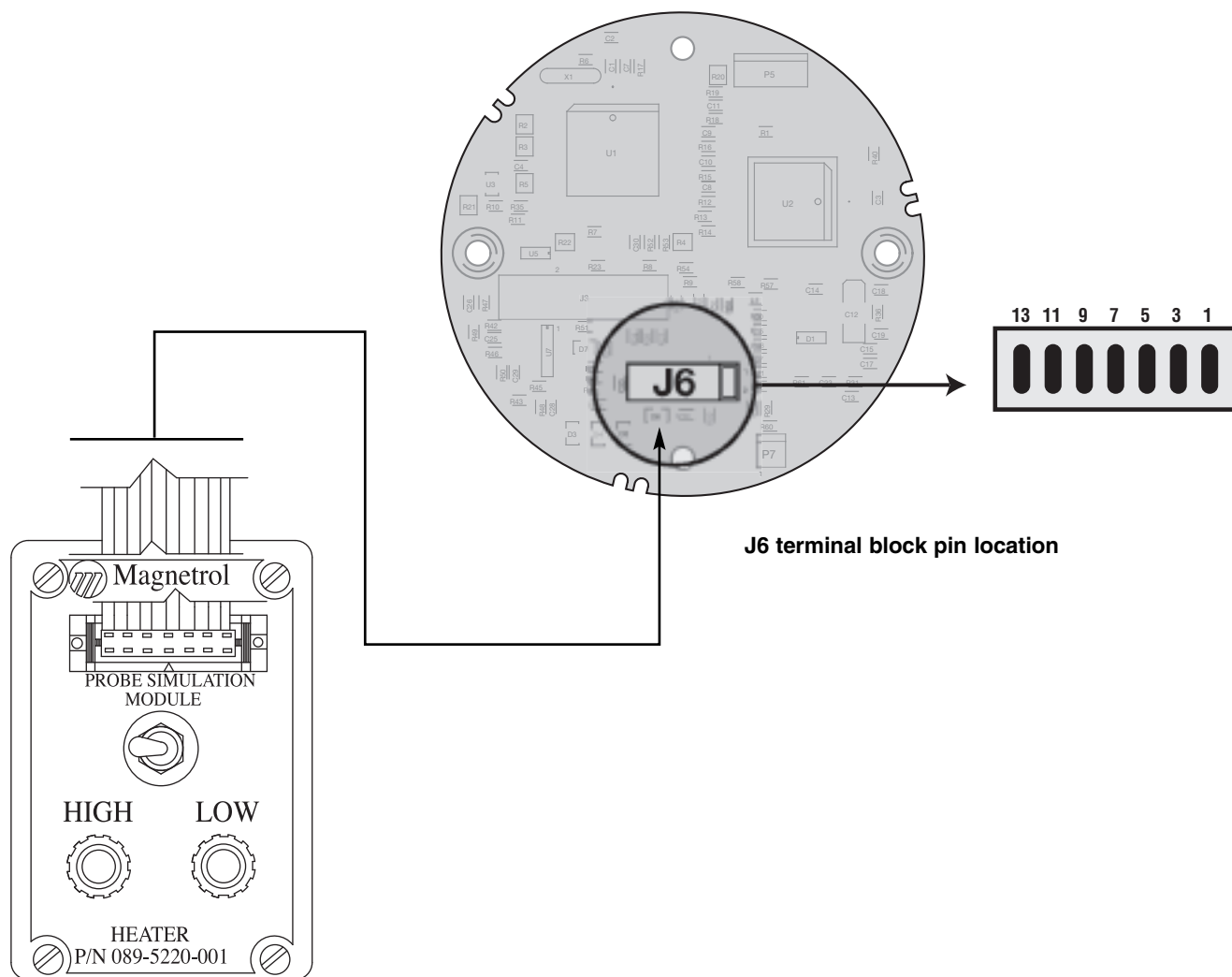
7. Press Enter and the display will read:

«Fixed Htr Curr
Xxx mA»

Record these values below.

	High	Low
T RTD		
F TRD		
Fixed Htr Curr		
Voltage		

8. Measure and record the voltage between the two pins on the probe simulation module.
9. At a future date compare the readings with the values recorded above.



TA2 probe simulation module

PROBE REPLACEMENT

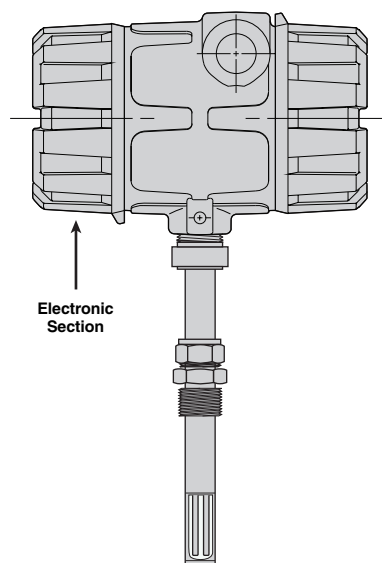
The probe and the electronics are calibrated together to form a matched set. However, if a probe needs to be replaced, Magnetrol can provide a replacement probe and probe calibration information which the user can configure into the instrument. Each probe has a serial number; when originally provided with the electronics, the electronics and the probe will have the same serial number; if the probe is later replaced, it will have a different serial number than the electronics.

NOTE: When replacing the probe in the field, the accuracy may be slightly effected.

Integral Electronics

1. Make sure the power source is turned off.
2. Remove and unplug the display module if provided.
3. Remove the board set consisting of the logic board and the power supply board.
4. Probe wiring connections are made on the back side of the logic board at TB3. – See wiring section, page 4.
5. Disconnect the electrical wires at J1.
6. Disconnect the wires at TB3.
7. Disconnect the probe from the enclosure.
8. Reinstall the new probe making sure that the flow arrow is in the direction of flow.
9. Re-connect the probe wiring to the terminal block using the following connections:
10. Reconnect the electrical wires at J1.
11. Reinstall the circuit boards in the enclosure and the display module if provided.
12. Apply power.
13. Proceed to Programming.

Wire Color	Terminal
White	1
Blue	3
Black	5
Brown	6
Orange	7

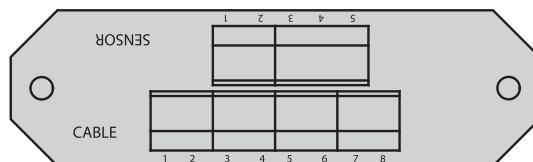


Remote Electronics

1. Make sure the power source is turned off.
2. Remove the wires connecting the probe to the five position sensor terminal block.
3. Remove the probe from the enclosure and carefully pull out the wires from the bottom of the enclosure. Optionally, it may be easier to temporarily remove the terminal block from the enclosure by removing the two attachment screws.
4. Install new probe and make probe connections as shown in "WIRING" section.

Wiring Color Code

Wire	Terminal	Sensor
White	Sensor 1	Temp Sensor
Blue	Sensor 2	Flow Sensor
Black	Sensor 3	Ground
Brown	Sensor 4	Heater Ground
Orange	Sensor 5	Heater



Remote Probe Wiring Connection

PROBE REPLACEMENT

Programming

At this point, the TA2 needs to be reconfigured with the new probe calibration information; this can be done with either the display module or via HART.

Before reprogramming the TA2, first record the value for Zero Flow Signal. This is obtainable from either the original calibration certificate or from the value presently stored in the instrument under «Factory Config» / «Probe Params» / «Zero Flow Sgnl». If using HART, this value is found under «Device Setup» / «Cal Factors» / «Probe Parameters» / «Zero Flow Signal».

Display Module

1. Press $\downarrow$ until the display shows «Factory Config $\uparrow$ », press $\leftarrow$.
2. Press $\downarrow$ until the display shows «Probe Params $\uparrow$ », press $\leftarrow$.
3. Press $\downarrow$ and enter the information under Probe Params listed in Table 1. This information is provided on the Probe Calibration Certificate which is included with the replacement probe. The password is 2200; it is also specified on the Probe Calibration Certificate. This password cannot be changed.
4. Repeat for entry of data for «Gas Parameters» and «Ctrl Parameters» shown in Table 1.

NOTE: For more information on firmware menu, see Diagnostics Menu – section “CONFIGURATION”.

5. Skip to “Complete the programming”.

«Probe Params»	«Gas Parameters»	«Ctrl Parameters»
«Cal Coeffs A, B, C»	«TCC-A»	«Coeff Ratio»
«R0»	«TCC-B»	«Set Point»
«F0»	«Gas Density»	«Slope»
«Upr Xducer»	«Gas Coeff Ag, Bg, Cg»	«Power Predictor»
«Lwr Xducer Lmt»		
«Zero Flow Sgnl»		

Table 1

HART

Using the HART handheld, from the Main Menu go to «Device Setup» / «Cal Factors». Then enter the probe password of 2200. Then enter the new calibration data from the Calibration Certificate into the appropriate sections of Probe Parameters «Probe Parameters», Gas Parameters «Gas Parameters», and Control Parameters «Control Parameters» / Zero Flow Signal «Zero Flow Signal». See **Table 1** for list of new parameters.

Complete the Programming

To complete the reconfiguration, a new set point must be calculated.

1. Place the probe in ambient temperature air where there is no flow across the sensor. This can be accomplished by wrapping the sensor tip with a piece of paper.
2. Display Module – Go to «Diagnostics» / «Signal value». HART – Go to the «Device» / «Setup» / «Diagnostics» / «Signal PV». Allow time for the signal to stabilize to within ± 1 mW. Record the signal.
3. Calculate a new Set Point value by using the following formula:

$$\text{«New Set Point»} = \text{Set Point} * (\text{Zero Flow Signal} / \text{Signal})$$
 - The «Set Point» is the value on the new cal cert
 - «Zero Flow Signal» is the original value obtained in Display Menu – page 19/20.
 - Signal is the value measured under step 2.

NOTE: If the TA2 is calibrated for a gas other than air, there are two ZFS (Zero Flow Signal) values on the certificate. One is ZFS-air and the second is ZFS-gas. Use the ZFS-air value when making an adjustment in air.

4. Enter this New set point value «New Set Point Value» (instead of the value on the calibration certificate) into the TA2 under «Factory Config» / «Ctrl Parameters» or if using HART at «Device Setup» / «Cal Factors» / «Control Parameters» / «Set Point».
5. Return to the Signal value as shown in step 2 ensuring that there is no flow over the sensor. The signal value «Signal Value» should now agree with the original Zero Flow Signal within 1%. If desired, steps 2 through 5 can be repeated.

LOGIC BOARD REPLACEMENT

Replacement of the Logic circuit board also requires re-entry of the calibration data from the original calibration certificate. Follow the procedure as described in programming (see above).

REPLACEMENT PARTS

NOTE: Replacement of the Logic Circuit Board or the Probe requires entry of configuration data from the Calibration Certificate.

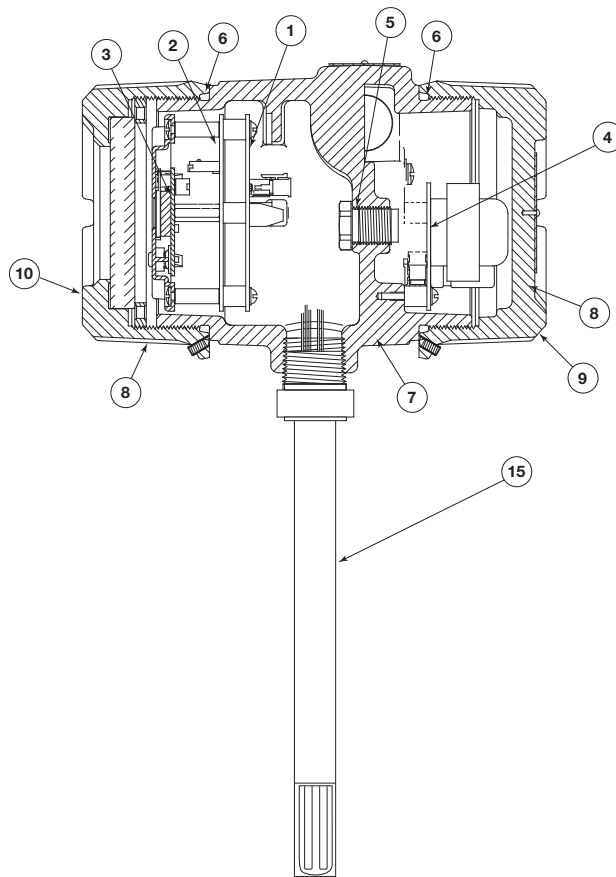
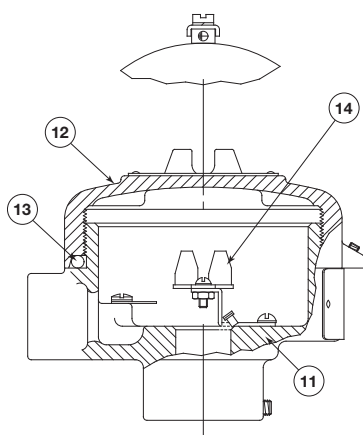
CAUTION: EXPLOSION HAZARD

Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous

Item	Description		Part Number
1	Power Supply Board	Integral electronics	Z30-2226-001
		Remote electronics	Z30-2226-003
2	Logic Board	English Version	Z30-2227-001
		German Version	Z30-2227-002
		French Version	Z30-2227-003
3	Display Module		Z30-2228-001
4	Input Wiring Board	120 VAC	Z30-2230-001
		240 VAC	Z30-2230-002
		24 VDC	Z30-2230-003
5	Feed Through		037-3312-001
6	Enclosure O-ring		012-2201-240
7	Enclosure Base		004-9207-XXX
8	Short Enclosure Cover *		004-9197-005
9	Tall Enclosure Cover		004-9206-008
10	Enclosure Cover with Window **		036-4411-001
11	Probe Enclosure Base		004-9104-001
12	Probe Enclosure Cover		004-9105-001
13	Probe Enclosure O-ring		012-2101-345
14	Remote PC Board		030-2231-001
15	Probe		See Probe / Flow body Model Number

* Short enclosure cover used with units without display

** Enclosure cover with window used with units with display



SPECIFICATIONS

Functional/physical

Description		Specification
Power supply		19 – 29 V DC 204 – 260 V AC, 50-60 Hz 102 – 132 V AC, 50-60 Hz
Power consumption		6 W – 9 V A
Signal Output	Active	4-20 mA isolated (3,8 – 20,5 mA useable as per NAMUR NE 43) - max 1000 Ω loop resistance
	Passive	4-20 mA isolated (3,8 – 20,5 mA useable as per NAMUR NE 43) - max loop resistance depending power supply
Resolution	Analog	0,01 mA
	Display	0,01 Nm/s
Calibration		Pre-calibrated from factory - NIST traceable
Damping		Adjustable 0-15 s time constant
Diagnostic Alarm		Adjustable 3,6 mA, 22 mA or Hold
User Interface		4-button keypad and/or HART® communicator
Display		2-line x 16-character LCD
Displayed values		Flow (eg. Nm ³ /h, NI/h) and/or mass flow (eg. kg/h) and/or temperature (°C/°F) and/or loop current (mA) and/or totalized flow (eg. Nm ³ /h, NI/h)
Menu Language		English, French or German
Housing Material		IP 66, Aluminium A 356 (< 0,2 % copper) dual compartment
Approvals		ATEX II 2G EEx d IIC T6, explosion proof FM, explosion proof (Groups B, C and D) and non incensive CSA, explosion proof (Groups B, C and D) RosTechnadzor/GOST-R, Russian authorisation standards
SIL (Safety Integrity Level)		Functional safety to SIL1/SIL2 in accordance to IEC 61508 – SFF: 69 %. Full FMEDA report and declaration sheets available at request.
Net and gross weight		3,3 kg (7.3 lbs) net; 4,0 kg (8.8 lbs) gross (amplifier with 25 cm threaded probe)

Performance

Description		Specification
Turn down ratio		100:1 typical (depending upon calibration)
Flow range	Max	0,13 - 200 Nm/s (25 - 40,000 SFPM) reference of air at STP conditions
	Min	0,13 - 2,5 Nm/s (25 - 500 SFPM) reference of air at STP conditions
Linearity		Included in flow accuracy
Accuracy	Flow	± 1 % of reading + 0,5 % of calibrated full scale
	Temperature	± 1 °C (2 °F)
Repeatability		± 0,5 % of reading
Response time		Time constant of 1 to 2 s
Remote electronics		Max 15 m (50') away from probe - for longer lengths, consult factory
Ambient temperature		-40 °C up to +70 °C (-40 °F up to +160 °F) – display not readable below -20 °C (-4 °F)
Operating temp. effect		± 0,04 % per °C
Humidity		99 %, non-condensing
Electromagnetic Compatibility		Meets CE requirements (EN-61000-6-4, EN 61000-6-2) and are in compliance with EMC directive 89/336/EEC

Probe specifications

Description	Insertion probe	Sensor with flow body
Materials – wetted parts	316/316L (1.4401/1.4404) or Hastelloy C (2.4819)	Sensor: 316/316L (1.4401/1.4404) Flow body: stainless steel or carbon steel
Mounting	Threaded, compression fitting, ANSI-DIN flanged or with Retractable probe assembly	Threaded or flanged
Probe length	From 70 mm up to 2530 mm (2.6" up to 100")	Flow body sizes from 1/2" up to 4"
Max. process temperature	Integral electronics:	-45 °C up to +120 °C -45 °C up to +200 °C with 100 mm (4") longer probe serving as heat extension
	Remote electronics:	-45 °C up to +200 °C
Max pressure rating	103 bar (1500 psi) @ +20 °C (+70 °F) 95 bar (1375 psi) @ +200 °C (+400 °F) – direct insertion 75 bar (1100 psi) @ +200 °C (+400 °F) – with flow body	

MODEL IDENTIFICATION

A complete measuring system consists of:

1. Thermatel® TA2 mass flow electronics.
Thermatel® TA2 mass flow transmitters require an application report for performing pre-calibration from factory. Ask your magnetrol® contact for assistance when specifying a device.
2. Thermatel® TA2 mass flow insertion probe or Thermatel® TA2 mass flow sensor with flow body.
3. Connecting cable for remote mount Thermatel® TA2 mass flow transmitters
4. Options:
 - portable display module – order number: **089-5219-001**
 - probe simulation module – order number: **089-5220-001** (for more details see page 24)
 - retractable probe assembly (RPA) – (for order code see page 32)
 - valve and compression fitting – order number: **089-5218-001** (for more details see page 32)
 - duct mounting bracket – order number: **089-7247-001** (for more details see page 33)
 - compression fittings – (for order code see page 33).

1. Code for Thermatel® TA2 Mass Flow transmitter

BASIC MODEL NUMBER

T	A	2	Thermatel® TA2 Mass Flow transmitter										
INPUT VOLTAGE													
2	24 V DC												
1	240 V AC												
0	120 V AC												
SIGNAL OUTPUT													
1	4-20 mA with HART communication												
ACCESSORIES													
0	Blind transmitter (can receive the plug in display as future option)												
B	Plug in digital display and keypad												
MENU LANGUAGE (HART communication is only available in English language)													
1	English												
3	French												
4	German												
ACTUAL GAS CALIBRATION													
For TA2 with insertion probe													
0	Special. Specify medium separately					4	Natural gas						
1	Air					5	Methane						
2	Nitrogen or Oxygen					6	Digester gas						
3	Hydrogen					7	Propane						
For TA2 with sensor with flow body													
A	Special. Specify medium separately					E	Natural gas						
B	Air					F	Methane						
C	Nitrogen or Oxygen					G	Digester gas						
D	Hydrogen					H	Propane						
AIR EQUIVALENCY CALIBRATION													
Air equivalency values are available for various gases, consult factory for gases and flow rates.													
9	For TA2 with insertion probe												
K	For TA2 with sensor with flow body												
MOUNTING/CLASSIFICATION (Consult factory for FM/CSA approvals)													
3	Integral, General Purpose (FM/CSA explosion proof)												
4	Remote, General Purpose (FM/CSA explosion proof)*												
C	Integral, ATEX II 2G EEx d II C T6, explosion proof												
D	Remote, ATEX II 2G EEx d II C T6, explosion proof*												
* Bracket for electronics and probe housing included													
HOUSING MATERIAL / CABLE ENTRY													
1	IP 66, Cast aluminium - M20 x 1,5 cable entry (2 entries - one plugged)												
0	IP 66, Cast aluminium - 3/4" NPT cable entry (2 entries - one plugged)												
T	A	2	1										complete code for Thermatel® TA2 Mass Flow transmitter

MODEL IDENTIFICATION

2. Code for Thermatel® TA2 Mass Flow probe

T	M	R	Thermatel® TA2 Mass Flow probe
---	---	---	--------------------------------

MATERIALS OF CONSTRUCTION

A	316/316L (1.4401/14404) stainless steel
B	Hastelloy C (2.4819) - not available with compression fitting

PROCESS CONNECTION

0	0	0	Compression fitting - min 11 cm insertion length (compression fittings are not included, for proper order numbers – see page 6). Only available with 316/316L (1.4401/1.4404). Consult factory for Hastelloy C (2.4819)
---	---	---	---

Threaded

1	1	0	3/4" NPT - default selection in combination with a retractable probe assembly (RPA) see page 32
2	1	0	1" NPT
2	2	0	1" BSP (G1)

ANSI flanges

2	3	0	1"	150 lbs - RF flange
2	4	0	1"	300 lbs - RF flange
3	3	0	1 1/2"	150 lbs - RF flange
3	4	0	1 1/2"	300 lbs - RF flange
4	3	0	2"	150 lbs - RF flange
4	4	0	2"	300 lbs - RF flange

EN/DIN flanges

B	A	0	DN 25	PN 16	EN 1092-1 Type A
B	B	0	DN 25	PN 25/40	EN 1092-1 Type A
C	A	0	DN 40	PN 16	EN 1092-1 Type A
C	B	0	DN 40	PN 25/40	EN 1092-1 Type A
D	A	0	DN 50	PN 16	EN 1092-1 Type A
D	B	0	DN 50	PN 25/40	EN 1092-1 Type A

INSERTION LENGTH - consider process connections

Min probe length

0	0	7	7 cm (2,6") fix length - for NPT threaded
0	0	9	9 cm (3,5") fix length - for BSP threaded

Selectable probe length - specify per 1 cm (0,39") increments

0	0	9	min. 9 cm (3,5") - for NPT threaded and flanged
0	1	1	min. 11 cm (4,5") - for BSP threaded and compression fitting
0	2	5	min. 25 cm (10") - for use with RPA (Retractable Probe Assembly)
2	5	3	max. 253 cm (99,9") - for all probe connections

T	M	R				0			
---	---	---	--	--	--	---	--	--	--

complete code for Thermatel® TA2 mass flow insertion probe

MODEL IDENTIFICATION

2. Code for Thermatel® TA2 sensor with flow body

BASIC MODEL NUMBER

T	F	T	Thermatel® TA2 sensor with mass flow body
---	---	---	---

MATERIALS OF CONSTRUCTION

A	316/316L (1.4401/1.4404) stainless steel body and sensor
1	Carbon steel body / stainless steel sensor

THREADED FLOW BODY - ø size and connection

0	1	1/2"	NPT
1	1	3/4"	NPT
2	1	1"	NPT
3	1	1 1/2"	NPT
4	1	2"	NPT

FLANGED FLOW BODY - ø size and connection

0	3	1/2"	150 lbs RF flange
1	3	3/4"	150 lbs RF flange
2	3	1"	150 lbs RF flange
3	3	1 1/2"	150 lbs RF flange
4	3	2"	150 lbs RF flange
5	3	3"	150 lbs RF flange
6	3	4"	150 lbs RF flange

Accessoires

0	None
1	Stainless steel flow conditioning plate - for flow body sizes ≥ 1 1/2"

T	F	T					0	0	0
---	---	---	--	--	--	--	---	---	---

complete code for Thermatel® TA2 sensor with flow body

3. Code for connecting cable remote mount Thermatel® TA2 Mass Flow transmitter

0	3	7	-	3	3	1	4	General purpose connecting cable - 8 wire shielded instrument cable
0	0	9	-	8	2	7	0	ATEX explosion proof connecting cable - 8 wire shielded instrument cable

CABLE LENGTH - specify per 1 cm (0,39") increments

0	0	3	min 3 m (10') length
0	1	5	max 15 m (50') length

0									
---	--	--	--	--	--	--	--	--	--

complete code for connecting cable

MODEL IDENTIFICATION

4. Code for retractable probe assembly

BASIC MODEL NUMBER

R	P	A	Retractable probe assembly
---	---	---	----------------------------

DESIGN TYPE

E	Low pressure - up to 5,5 bar (80 psi)
F	High pressure - up to 300 lbs / service

MATERIALS OF CONSTRUCTION

1	Carbon steel with 316 SST (1.4401) seal gland
4	316 SST (1.4401)

PROCESS CONNECTION

0	1 1/2" NPT	– not available for RPA-E1
1	1 1/2" - 150 lbs RF flange	
2	1 1/2" - 300 lbs RF flange	

BALL VALVE

0	No ball valve supplied	
1	Carbon steel ball valve	– select material code 1
2	Stainless steel ball valve	– select material code 4

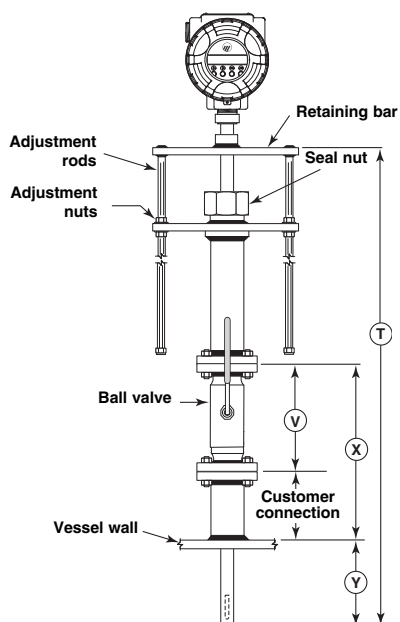
PROBE LENGTH

0	2	5	min 25 cm (10")
2	5	3	max 253 cm (99,9")

R	P	A							
---	---	---	--	--	--	--	--	--	--

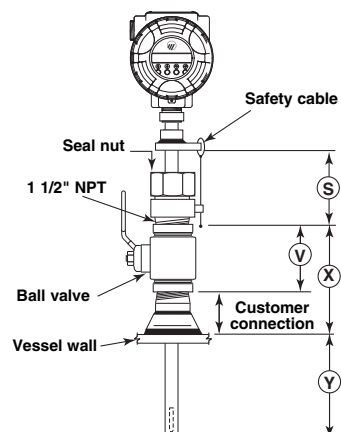
complete code for retractable probe assembly

DIMENSIONS IN mm (inches)



**Hot tap
Model RPA-FX12-XXX**

minimum probe length: $T = 2 (X + Y)$



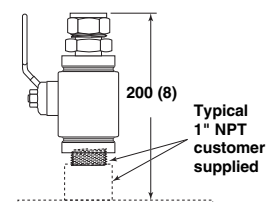
**Hot tap
Model RPA-E402-XXX**

minimum probe length: $S + X + Y$

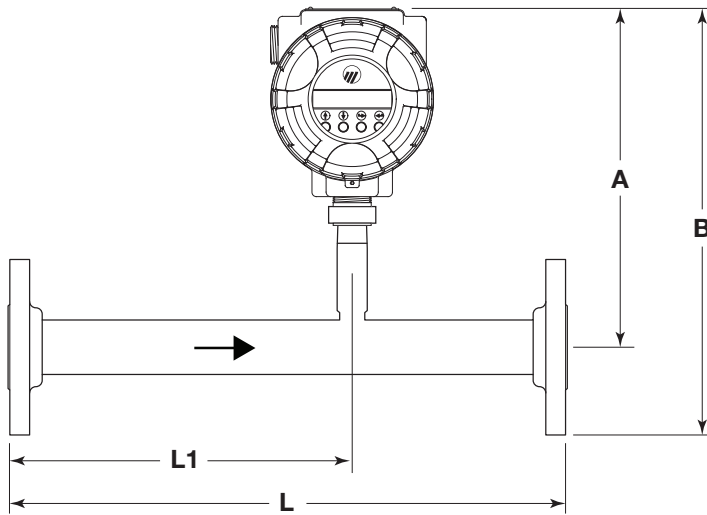
S Dimension	
Threaded connection	102 (4.00)
Flanged connection	127 (5.00)

Ball Valve Dimensions*	
Size	V
1 1/2" NPT	112 (4.4)
1 1/2" 150# flange	165 (6.5)
1 1/2" 300# flange	190 (7.5)

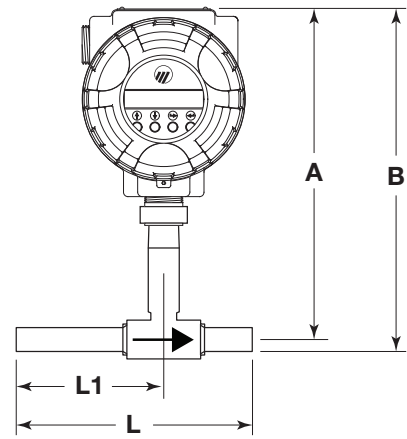
*Dimension of ball valve if supplied by the factory.



**Valve with compression fitting
(089-5218-001)**



Flanged flow body



Threaded flow body

Code	Size	Length (L)		L1		Height to Centerline (A) mm (inches)	Overall Height (B)	
		With Flow Conditioning mm (inches)	Without Flow Conditioning mm (inches)	With Flow Conditioning mm (inches)	Without Flow Conditioning mm (inches)		NPT-F mm (inches)	Flange mm (inches)
0	1/2"	203 (8) ^①	—	127 (5) ^①	—	203 (8.0)	221 (8.7)	248 (9.75)
1	3/4"	286 (11.25) ^①	—	190 (7.5) ^①	—	203 (8.0)	221 (8.7)	251 (9.9)
2	1"	381 (15) ^①	—	254 (10) ^①	—	203 (8.0)	221 (8.7)	257 (10.1)
3	1 1/2"	495 (19.5)	191 (7.5)	305 (12)	95 (3.75)	212 (8.35)	236 (9.3)	276 (10.85)
4	2"	660 (26)	191 (7.5)	406 (16)	95 (3.75)	235 (9.25)	264 (10.4)	311 (12.25)
5	3"	991 (39)	254 (10)	610 (24)	127 (5)	235 (9.25)	N/A	330 (13.0)
6	4"	1321 (52)	305 (12)	914 (36)	152 (6)	235 (9.25)	N/A	349 (13.75)

^① The upstream length in pipe sizes < 1 1/2" dia. is sufficient to create the flow conditioning effect without need for a flow conditioning plate.

Flow body sizing

The following table is a general guide on flow sizing. Contact your Magnetrol contact for specific application information.

Code	Size	Max flow rate					
		Air, N ₂ , O ₂	Natural Gas, Methane	Digester Gas	Propane	Hydrogen	CO ₂ , Argon
0	1/2"	110 NM ³ /h 65 SCFM	76 NM ³ /h 45 SCFM	42 NM ³ /h 25 SCFM	51 NM ³ /h 30 SCFM	27 NM ³ /h 15 SCFM	105 NM ³ /h 60 SCFM
1	3/4"	204 NM ³ /h 120 SCFM	140 NM ³ /h 85 SCFM	76 NM ³ /h 45 SCFM	93 NM ³ /h 55 SCFM	52 NM ³ /h 30 SCFM	190 NM ³ /h 110 SCFM
2	1"	340 NM ³ /h 200 SCFM	238 NM ³ /h 140 SCFM	127 NM ³ /h 75 SCFM	161 NM ³ /h 95 SCFM	85 NM ³ /h 50 SCFM	320 NM ³ /h 190 SCFM
3	1 1/2"	833 NM ³ /h 490 SCFM	580 NM ³ /h 340 SCFM	310 NM ³ /h 180 SCFM	395 NM ³ /h 230 SCFM	208 NM ³ /h 120 SCFM	790 NM ³ /h 465 SCFM
4	2"	1220 NM ³ /h 715 SCFM	855 NM ³ /h 505 SCFM	480 NM ³ /h 280 SCFM	600 NM ³ /h 350 SCFM	332 NM ³ /h 195 SCFM	1155 NM ³ /h 680 SCFM
5	3"	3000 NM ³ /h 1765 SCFM	2110 NM ³ /h 1240 SCFM	1180 NM ³ /h 695 SCFM	1470 NM ³ /h 860 SCFM	812 NM ³ /h 475 SCFM	2855 NM ³ /h 1680 SCFM
6	4"	5490 NM ³ /h 3230 SCFM	3845 NM ³ /h 2260 SCFM	2145 NM ³ /h 1265 SCFM	2675 NM ³ /h 1575 SCFM	1478 NM ³ /h 865 SCFM	5210 NM ³ /h 3060 SCFM



Thermatel Model TA2

Thermal Dispersion Mass Flow Transmitter

Configuration Data Sheet

Flow Reference	
Gas Type	
Tag Number	
Electronics Serial #	
Probe Serial #	
Flow Units	
Mass Units	
Temp Units	
Density Units	
Diameter Units	
Area Units	
Diameter	
Area	
4-20 Controlled by	
4 mA Set Point	
20 mA Set Point	
Fault State	
Totalizer Mode	
Totalizer Units	
Totalized Flow	
Elapsed Time	
HART Poll Address	
HART Tag	
Damping	
STP Temperature	
STP Pressure	
Install Factor A	
Install Factor B	
Install Factor C	
Low Vel Dropout	
4mA offset	

20 mA offset	
Local Tag	
Firmware Version	
Signal Value	
Temperature Sensor	
Flow Sensor	
Probe Heater	
Delta Temp	
Heater Setting	
Exception code	
Sensor Type	
Cal Coeff A	
Cal Coeff B	
Cal Coeff C	
Ro	
Fo	
Upr Xducer Lmt	
Lwr Xducer Lmt	
Zero Flow Signal	
TCC-A	
TCC-B	
Gas Density	
Gas Coeff Ag	
Gas Coeff Bg	
Gas Coeff Cg	
Gas Coeff Dg	
Gas Coeff Eg	
Gas Calibrate Mode	
Coeff Ratio	
Set Point	
Slope	
Power Predictor	

IMPORTANT

SERVICE POLICY

Owners of Magnetrol products may request the return of a control; or, any part of a control for complete rebuilding or replacement. They will be rebuilt or replaced promptly. Magnetrol International will repair or replace the control, at no cost to the purchaser, (or owner) ***other than transportation cost*** if:

- a. Returned within the warranty period; and,
- b. The factory inspection finds the cause of the malfunction to be defective material or workmanship.

If the trouble is the result of conditions beyond our control; or, is **NOT** covered by the warranty, there will be charges for labour and the parts required to rebuild or replace the equipment.

In some cases, it may be expedient to ship replacement parts; or, in extreme cases a complete new control, to replace the original equipment before it is returned. If this is desired, notify the factory of both the model and serial numbers of the control to be replaced. In such cases, credit for the materials returned, will be determined on the basis of the applicability of our warranty.

No claims for misapplication, labour, direct or consequential damage will be allowed.

RETURNED MATERIAL PROCEDURE

So that we may efficiently process any materials that are returned, it is essential that a "Return Material Authorisation" (RMA) form will be obtained from the factory. It is mandatory that this form will be attached to each material returned. This form is available through Magnetrol's local representative or by contacting the factory. Please supply the following information:

1. Purchaser Name
2. Description of Material
3. Serial Number and Ref Number
4. Desired Action
5. Reason for Return
6. Process details

All shipments returned to the factory must be by prepaid transportation. Magnetrol ***will not accept*** collect shipments.

All replacements will be shipped FOB factory.

UNDER RESERVE OF MODIFICATIONS

BULLETIN N°: BE 54-630.3
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SUPERSEDES: November 2004



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