JMT Series

Magnetostrictive Transmitter IOM

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JERGUSON®
A Product of Clark-Reliance

Warranty

Seller warrants goods manufactured by it will be free from defects in material and workmanship for one (1) year following the date of shipment. If any of the Goods are found by Seller to be defective, such Goods will, at the Seller's option, be replaced or repaired at Seller's cost. The parties hereto expressly agree that Buyer's sole and exclusive remedy against the Seller shall be for the repair or replacement of defective Goods as provided herein. The exclusive remedy shall not be deemed to have failed of its essential purpose so long as the seller is willing and able to repair or replace defective Goods in the prescribed manner.

Contact Factory for full copy of Terms and Conditions/Warranty.

Table of Contents

Section 1: Unpacking

1.1 Storage and Handling

1. Upon receipt of materials, open crates / boxes and inspect all materials to ensure no damage has occurred during transit. If damage is noted, file claim with Clark-Reliance or the applicable freight carrier, depending on shipping terms.
2. Replace and fasten down lid of crate / box.
3. Materials shall remain inside of the crate / box until it is ready to be installed.
4. Store all materials in a dry, clean, indoor environment, protected from the elements, flooding, corrosive fumes or other physical damage.
5. Materials should be stored in a place where they can neither fall nor be struck by falling objects.
6. Storage area should be climate (humidity) controlled environment to prevent condensation and corrosion.
    a. Storage temperature for shipments that include transmitters should be 40°F to 104°F (4.5°C to 40°C).
7. Outdoor storage is not recommended. Damage caused by outdoor storage or other negligent storage is not covered by Clark-Reliance Warranty.
    a. JMT Transmitters ship with NPT type plugs to prevent water ingress. These plugs should not be considered watertight, nor are meant to prevent ingress from exposure to weather.

1.2 Factory Mounted on Jerguson® Magnicator®

Do not discard any packaging until unit is fully installed and operational*

Refer to Jerguson Magnicator IOM M500.01 for more information.

If your JMT Magnetostrictive comes pre-installed on a Jerguson Magnicator, please perform the following checks to ensure there was no damage during shipping.

1. Ensure brackets are secure and transmitter head and sensor probe are free from damage, including bends of impact damage.
2. Check the ‘4mA’ and ‘20mA’ stickers on the sensor probe are in place and line-up with the lower and upper side process connections. If your Magnicator is a configuration that does not have either one or both side connections or has a measuring range that does not match either one or both side process connections, ensure the ‘4mA’ lines up with the lowest point of the measuring range (whether inches, %, mm or otherwise) on the flag indicator and the ‘20mA’ corresponds with the span, i.e., full measuring range.

1.3 Notice of Pre-Configuration

Your JMT Magnetostrictive comes pre-configured from the factory to work as designed based on the application and parameters provided at time of order. This typically means the measurement range of the transmitter and MLI it is installed on match. If a shorter range is required, refer to the **Rerange** features in section 4.2.6. If it is necessary to reposition the head from the top to bottom or vice-versa, use the **Flip Transmitter** setting in 4.2.7 and perform the **Trim** command in section 4.2.8.

1.4 ESD Warning

See drawing CI-35152-XP or CI-35152-IS for ESD Warnings.

Section 2: Installation on Existing Magnetic Level Indicator (MLI)

2.1 Tools Required:

Pliers/Adjustable Wrench
#2 Phillips Screwdriver (24V terminals)
2mm Allen Key (enclosure set screw)
5/32 Allen Key (chamber brackets)
5/16 Nut Driver or equivalent tool (hose clamp)

2.2 Vibration Kit (if Required)

A special mounting kit with material to reduce the effects of vibration on the electronics is available. If you did not request this kit at time of purchase but feel it is needed, contact the factory for assistance. See section 2.5 for Installation Procedure.

2.3 Temperature/Insulation Safeguards

Sensor shall always be installed on the outside of an Insulation Blanket if one is present. Centerline of transmitter probe to be no more than 0.75 inches (19 mm) from outside surface of chamber.

If an existing gage has cryogenic insulation in place, transmitter must be installed in a thermowell, or other device, to protect unit from ice build-up which can damage transmitter. Factory supplied thermowell is available – consult Bulletin or Application Sheet for more information.

Existing Heat Tracing Installation

- Electrical and Steam Heat trace must be at least 1” from Magnetostrictive sensor and/or electronics housing.
- Refer to maximum ambient temperature rating in section 6.3.

2.4 General Preparation Tips

General Sensor Handling “Tips”:

- Do not bend sensor tubing.
- Do not strap/attach other devices to the transmitter probe or electronics enclosure.
- Only use factory provided mounting brackets to secure transmitter to chamber.

Site Preparation

- Verify no magnetic devices nearby (see heat trace note, section 2.3).
- Verify no carbon steel or magnetic material is near sensor probe. (Should not be within 5 inches [127mm] of either transmitter or Magnetic Level Gage Column.)
    - Some “stainless” clamps are low-grade stainless steel and are magnetic. Be careful only to use non-magnetic stainless-steel clamps.

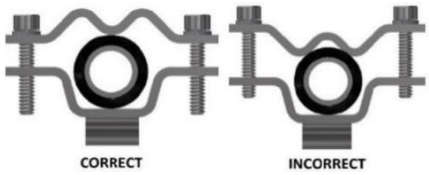
2.5 Installation Procedure – Gage Mount

1. Secure the brackets to the chamber using the supplied hardware kits. Place (1) bracket as close to the tee as possible. Place (1) bracket as close to the end of sensor as possible. Evenly space the rest of the supplied mounting brackets approximately (18) inches [457 mm] along the length of the sensor in between the top and bottom brackets. Do not exceed (24) inches [610 mm] bracket spacing.

2. Align the '4mA' and '20mA' level range markings on the sensor tube with the center of process connections or limits of measuring range. Once sensor is properly aligned, tighten the bracket screws using the 5/32" Nut Driver or equivalent tool. Assistance may be necessary to hold the sensor while tightening the screws. To test if the sensor is properly tightened, pull up or down on the electronics housing. The sensor should not move.

   Non-Vibration Mounting Bracket Orientation:

   Vibration Mounting Bracket Orientation:



3. See *Section 3* for wiring instructions.

4. Module (Display) Rotation

   If you decide to flip the transmitter (section 4.2.7) you will need to remove the module and rotate it 180° to the desired position. **The unit must be disconnected electrically before removing the module.** Remove the cover to access the module. Utilize the pull handle to gently rock and remove the entire module. Once removed, align to desired viewing orientation and line-up the connectors with the receptacles in the Base PCB. Gently press in on the board using the washers that hold the pull handle. Reconnect to the power supply; boot screen will appear on the display, signaling the module is fully installed. Replace cover.

2.6 Installation Procedure – Direct Insertion (In-Tank)

General Pre-Installation Checks

CAUTION: Do not bend the probe or allow the probe to contact internal vessel obstructions during handling or installation. Do not lift, carry, or support the transmitter using the electronics enclosure. Do not use the electronics enclosure to tighten the process connection fitting. Damage to the transmitter may result.

1. Unpack and inspect the transmitter and all associated components for damage that may have occurred during shipment or handling.

2. Installation, operation, and maintenance shall be performed only by qualified personnel in accordance with all applicable local, state/provincial, and national electrical and mechanical codes, manufacturer instructions, and agency requirements, where applicable.

3. Verify the following prior to installation: transmitter model, measuring range, process connection, float type and quantity, material of construction, and approval ratings are correct for the order and intended application.

4. In accordance with plant procedures, verify that the vessel is depressurized, isolated, drained as required, and in a safe condition to perform installation and maintenance activities.

Threaded Vessel Connection

1. Remove the compression fitting nut from the fitting body and verify that the ferrule(s) are installed in the correct orientation. Reassemble the compression nut and finger-tighten only enough to retain the ferrule(s) in place.

2. Slide the compression fitting onto the probe, nut side first, and position the fitting at the insertion line label. Align the top of the compression nut with the insertion line. Hand-tighten the compression nut sufficiently to support the weight of the transmitter and prevent movement along the probe. Do not fully tighten the compression fitting at this time.

3. Verify that the float(s) will pass through the inside diameter (ID) of the vessel connection. If the float passes through the vessel connection, continue to Step 4. If the float will not pass through the vessel connection, proceed to Step 8.

4. Install the float(s) onto the probe in the correct orientation. The “TOP” marking, or equivalent orientation indicator, must face upward. For dual-float applications, install the floats in the correct order as specified for the application.

Note: Incorrect float orientation or float order may result in inaccurate level indication or loss of level

indication.

5. Verify that the float(s) moves freely along the full length of the probe.
6. If a centering disc is not required, install the cotter pin through the cross-hole in the probe tip and secure the cotter pin by bending the legs.

If a centering disc is required, slide the centering disc onto the probe, disc side first. Align the cross-hole in the centering disc collar with the cross-hole in the probe tip, install the cotter pin through both holes, and secure the cotter pin by bending the legs.

7. If a stilling well is required and not already installed, install the stilling well in accordance with the applicable installation drawing or site requirements.

8. Carefully support the probe during installation to prevent bending or damage. Do not lift or support the transmitter by the electronics enclosure. Insert the probe through the vessel connection, ensuring that the probe and float(s) have adequate clearance within the vessel and will not contact baffles, agitators, stilling wells, tank walls, or other internal obstructions.

9. If required by site procedures, apply an approved thread sealant to the transmitter process connection threads prior to installation.

10. Thread the compression fitting into the vessel connection by hand, ensuring the threads engage properly and are not cross-threaded. Tighten until hand-tight. If the float was not previously installed due to vessel connection size limitations, complete Steps 4 through 7 before proceeding to Step 11.

11. Using the appropriate wrench size, tighten the transmitter process connection in accordance with site requirements and applicable ASME specifications to ensure a proper pressure-tight seal.

12. Orient the electronics enclosure to provide proper visibility of the display, access to the conduit connection, and sufficient clearance for removal of the back enclosure cover during wiring and maintenance.

Note: It may be necessary to slightly loosen the compression nut to rotate the transmitter assembly for proper orientation. After the desired orientation is achieved, retighten the compression nut until it securely supports the weight of the transmitter assembly.

13. Tightening the compression fitting:
    a. With the compression nut hand tightened, mark the nut at the 6 0’clock position.
    b. While holding the fitting body hex securely with the correct wrench size, tighten the compression nut with the correct wrench size 1-1/4 turns to the 9 o’clock position. Verify the transmitter is securely supported and properly aligned after tightening.

14. For transmitter wiring instructions, refer to the applicable control drawing and wiring section of the applicable IOM.

Flanged Vessel Connection

Note: Flange gasket selection and bolting torque are the responsibility of the installer and shall be suitable for the process conditions, flange rating, gasket type, and applicable piping standards.
Complete Steps 1 through 7 of the “Threaded Vessel Connection” procedure, then proceed with the following steps.

8. Install the correct size, pressure class, and style flange gasket (not supplied).

9. Carefully support the probe during installation to prevent bending or damage. Do not lift or support the transmitter by the electronics enclosure. Insert the probe through the vessel connection, ensuring that the probe and float have adequate clearance within the vessel and will not contact baffles, agitators, stilling wells, tank walls, or other internal obstructions

10. Align the bolt holes of the transmitter flange with the bolt holes of the vessel connection flange.

11. Install and tighten the flange bolting using a cross-pattern sequence in accordance with applicable ASME standards and site procedures.

12. Complete Steps 12 through 14 of the “Threaded Vessel Connection” procedure.

Section 3: Wiring

3.1 Hazardous Location Safety:

See drawing CI-35152-XP or CI-35152-IS for all Hazardous Location installation safety information.

3.2 Proper Grounding:

NOTE: **Conduit is not an acceptable form of grounding.**

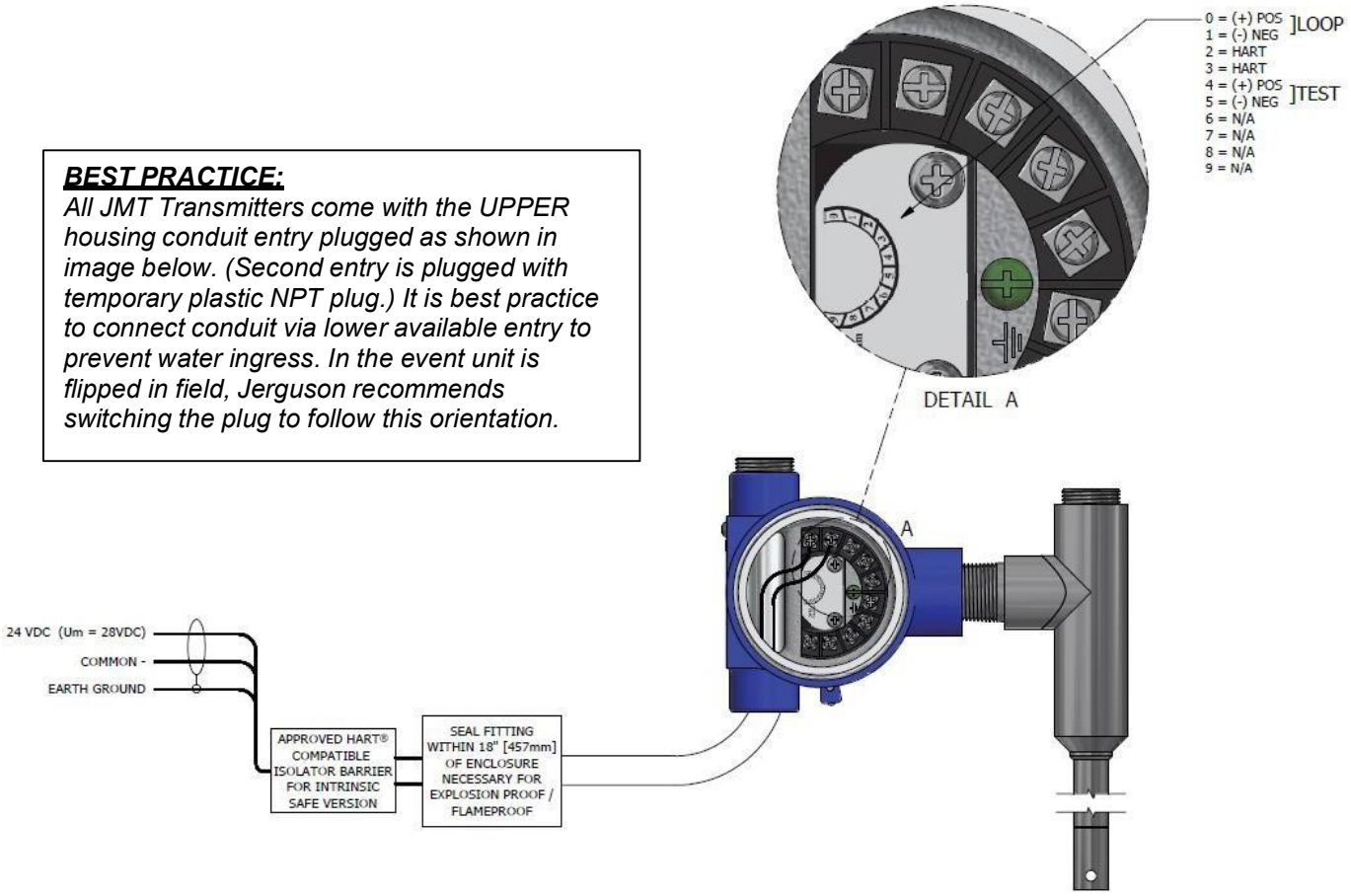
Proper grounding is required in hazardous locations to prevent damage to the equipment and the following:

- electrical faults to ground
- accumulation of electrostatic charges
- atmospheric discharges

The JMT is supplied with both an external and internal earth grounding screw. Either of these screws can be used to properly ground the device.

3.3 Recommended Loop Wiring (Diagram)

BEST PRACTICE:
All JMT Transmitters come with the UPPER housing conduit entry plugged as shown in image below. (Second entry is plugged with temporary plastic NPT plug.) It is best practice to connect conduit via lower available entry to prevent water ingress. In the event unit is flipped in field, Jerguson recommends switching the plug to follow this orientation.



Section 4: Configuration

4.1 Operation Screen

Push Button System Navigation

Up will advance the cursor *up* in the menu system.

Back will advance to the previous digit in a menu.

Down will advance the cursor *down* in the menu system.

Enter will select a menu option or advance to the next digit when entering a value.

4.1.1 Boot-Up / Welcome Screen

Software Version:	Ex.:	V 29.000
Hardware Version:	Ex.:	0
Serial #	Ex.:	456789-01A
Hart Dev ID	Ex.:	1001
Vessel Tag (if setup)	Ex.:	LT-1963
Production Date	Ex.:	04/14/2021

4.1.2 Standard Operating Screen

Engineering Units
Inches, Millimeter, etc. (Selected in **User Installation**)

Percent Output
Defined as % of Level 4-20 mA
The % Output given will correspond with the mA output current value between 4 and 20 mA

mA Output
Display of 4-20 mA analog output

Vessel Tag (if value is set – see **User Installation**)

WP
If Write Protect Jumper is removed, bottom right will display “WP” notification. *See section 4.1.4*.

4.1.3 Standard Operating Screen – DUAL FLOAT

If you have purchased a JMT with the dual float option enabled, it will be done so by default, and cannot be changed without factory assistance. The unit must have two (2) floats to function properly and will flash “LOST SIGNAL” if second float is not installed.

The **Standard Operation Screen** in dual float mode will display both the media level and the interface level, with the % of full scale and output current of the selected output in **Rerange** menu in section 4.2.6.

4.1.4 Write Protect Jumper

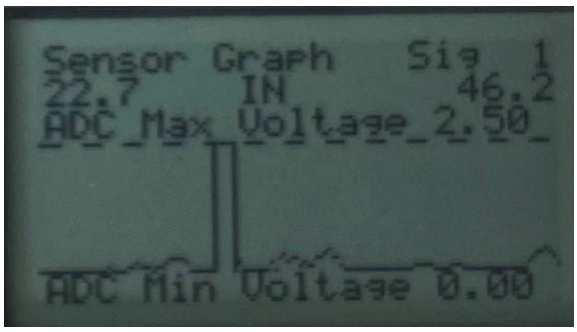
Jumper in place (shown at right)

Jumper removed (shown at left) and Write Protect enabled Menu is accessible, but will all non-information selections will display

Jumper Removed
Protection Enabled

on screen and revert back to **Standard Operating Screen**

4.1.5 Waveform View



Pressing **Back** from the **Standard Operating Screen** will display a graph of the signal measured by the instrument. If a float is detected it will center on the position of that float, showing the lowest and highest value on the graph, in units selected in user installation. This will always be in terms of distance from the tee/enclosure and not the reported level. Pressing **Up** and **Down** will move the graph further and closer to 0.0, respectively. The graph will always be scaled from 0-2.5V, with a horizontal dotted line indicating the trigger level (ADC Max Voltage). The detected signal must be above trigger level for the electronics to treat a reading as a valid level signal.

A detected float will be marked with a pair of solid vertical lines, indicating the time at which the signal went above, and then fell back below the trigger level. If a signal is detected that passes the trigger level, but is filtered out, a pair of dotted lines will be shown on that part of the signal. The number of signals detected will be shown in the upper right corner marked with a “Sig”. If no float is detected, the solid vertical lines of where the float was detected previously will be displayed.

Press **Back** again to exit this feature.

4.1.6 Signal Lost Screen

In the event the instrument is no longer detecting a magnetic field from the float (in single level or in dual level), “Signal Lost” will flash between black and white on the display. The output current is set to the NAMUR- 43 standard of either 3.5 mA, or 21 mA, based on user selection.

See **Alarms** in section 4.2.10 for alarm options.
See section 5 for troubleshooting lost signal.

4.2 Menu Screens

4.2.1 Accessing the Menu

Press **Enter** under the word “MENU” as shown here.
Push Button System Navigation

Enter will select a menu option or advance to the next digit when entering a value.
Up will advance the cursor *up* in the menu system.
Down will advance the cursor *down* in the menu system.
Back will advance to the previous digit in a menu. If in the **Standard Operation Screen** or **Signal Lost Screen** it will display the Sensor Output Graph of channel 3. (See Waveform View, section 4.1.5)

Entering Values

The total number of available leading digits and decimal places will be shown for each properties value. The cursor will begin in the *ones* place, indicated by the underline of the value.

For example: 001.00

When entering a property, the value displayed is the currently used value. Pressing on the **Up** button will increase this value by 1. If at 9, this would increase to 10.

For example: 009.00 -> 010.00.

Pressing on the **Down** button will decrease this value by 1. By pressing the **Back** button, the cursor will move to the next highest place value, the tens place. If cursor is in the tens place pressing back will move to the hundreds. For example, 010.00 => 010.00. Pressing **Enter** will move the cursor to the next lowest place value, from the tens place to the ones, or ones to Tenths.

For example: 001.00 => 001.00.

If in the tenths place, pressing **Down** will decrease the total value by 0.1.

For example: 100.0 => 099.9

Once an acceptable value has been entered, press **Enter** until the cursor is on the last available place. Press **Enter** again and the next property in that menu subsystem will be displayed. If too large or too small a value is entered for a parameter, it will be rejected with the maximum or minimum value in violation displayed.

Menu System Navigation

The Menu is accessed by pressing the **Enter** button. Details of each submenu are given in subsequent sections.

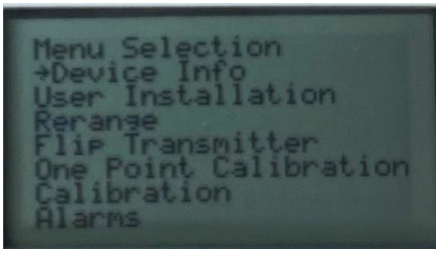
Once you have entered a submenu it is necessary to progress through the entire submenu before exiting it. **It is not possible to use the Back button to exit a Menu.**

If you leave the menu system open for 2 minutes with no inputs, it will automatically exit to the **Standard Operating Screen**.

WARNING

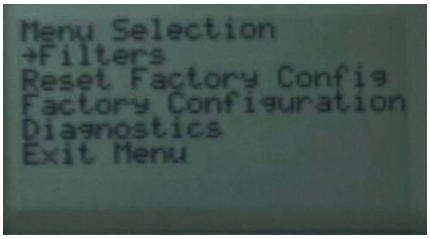
While in the Menu System HART commands will be disabled.

4.2.2 Menu (First Screen)



Device Info
User Installation
Rerange
Flip Transmitter
One Point Calibration
Calibration
Alarms

4.2.3 Menu (Second Screen)

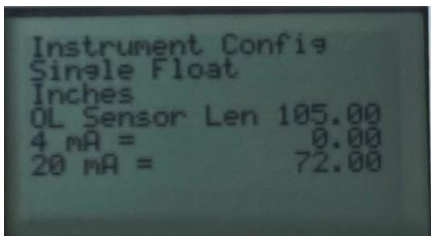


Filters
Reset Factory Configuration
Factory Configuration (Factory Password Protected)
Diagnostics
Exit Menu

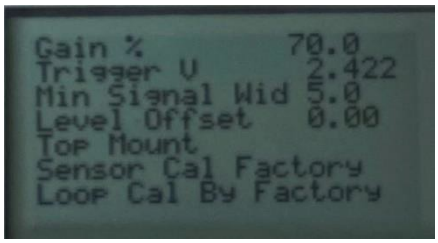
4.2.4 Device Info

This will display the device information and configuration data, as well as whether the calibration has been modified since being shipped from the factory.

Boot/Welcome Screen
Software Version
Hardware Version
Serial#
HART ID
Vessel Tag (if entered)
Production Date

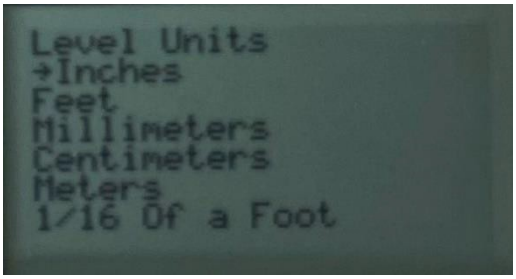


Instrument Config
Single/Dual Float
Engineering Units Selected
Sensor Length
4mA setting (LRV)
20mA setting (URV)



Gain %
Trigger V (Voltage)
Min Signal Width
Level Offset (if entered)
Top/Bottom Mount
Calibration Status (Sensor/Loop)

4.2.5 User Installation



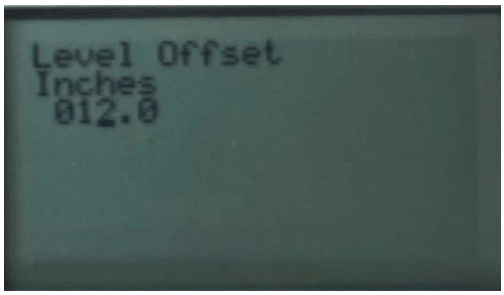
Level Units

The JMT will come preprogrammed to the desired user installation. If however it is desired to change any of these settings, they are done so through this menu.

Level Units
Selection between units, if this is changes it will propagate, and show the units across the values to be entered for all properties.

Inches	XXX.XX	(Two Decimal Places)
Feet	XX.XXX	(Three Decimal Places)
Millimeters	XXXXXX	(No Decimal Place)
Centimeters	XX.X	(One Decimal Place)
Meters	X.XXX	(Three Decimal Places)
1/16 Of a Foot	XXXX.XX	(Two Decimal Places)

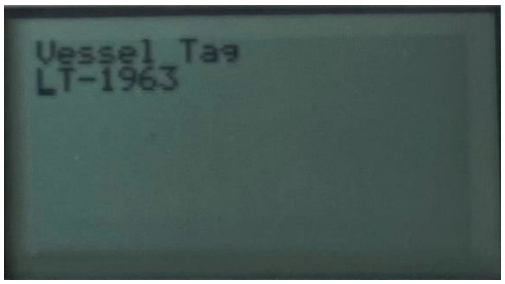
Use **Up** and **Down** to select desired Engineering Units to be displayed. Then press **Enter** to move to next screen.



Level Offset

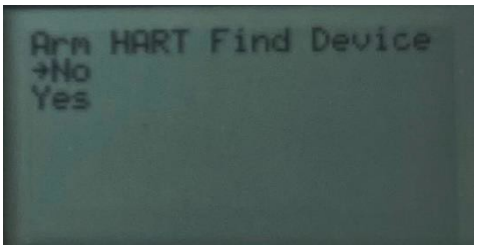
This is a user value for if they have a need to report a level offset from the measured level. Typically, this is the distance from the lowest point the sensor can measure, to the bottom of the tank, or any zero-reference point lower than end of the Magnetostrictive sensing element. Use **Up**/**Down** (or **Back** to change position) and **Enter** to move to next screen.

Note: Offset cannot be Sensor Length.



Vessel Tag

This is an 8-character tag that can be used to name the instrument for the operator. If set, this tag will be displayed on the **Main Operating Screen**. This is a distinct tag from the HART tag, which can only be set via HART.
Long press of the **Up** or **Down** buttons scrolls quickly through the alpha-numeric selection. **Enter** sets each place's value. Once tag is set, press **Enter** as needed to close out the screen, Note that the vessel tag will only be displayed if the first character is changed.

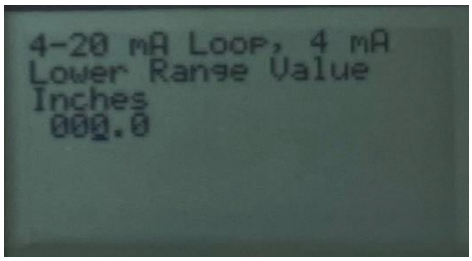


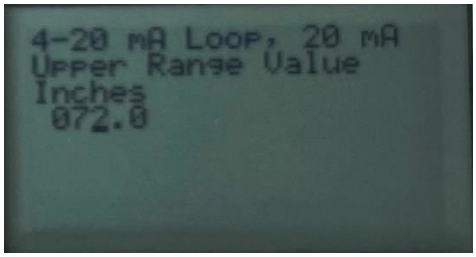
Arm HART Device

Standard HART Command to set bit to be “found” by MASTER/HOST.

4.2.6 Rerange

NOTE: If Dual Float setup, first screen will be choice between Interface and Media Level. Subsequent screens are the same.





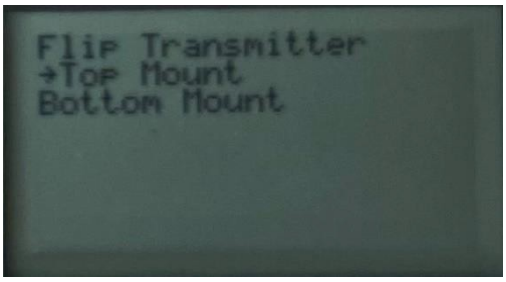
Enter the value desired for 4mA reading. Note this should be measured from the dead band set at the factory and marked on the sensor. Typically, the **Zero** is 000.0 for measuring the full (default) span.

A transmitter rerange can be done to change the measured level for which the output will be 4 and 20 mA. It will not affect the level measurement reported in engineering units selected (inches, millimeters, etc.), just the current and percentage output. The units for both will be based on those set in **User Installation**.

Enter the “span” for “full” value. Typically, this is equal to the measuring range as ordered.

Reminder: Reranging the 4mA/20mA will change the % and mA readings on the display, but NOT the engineering units. For example, on a 96” max measuring range unit, moving the 0” to 24” and the full/span from 96” to 84” would have the following effect: from 0” to 24”, the engineering units would rise as the float does, but the mA output would be 3.8mA (empty saturation) with a corresponding negative %. At 24”, the mA output and % would be 4mA and 0%, respectively, and begin to rise linearly until 20mA/100% at 84”. Above 84”, the mA output would rise to full saturation 20.5mA with a corresponding 100+% value. (Exact negative and 100+% driven by length of span and differ by unit.)

4.2.7 Flip Transmitter



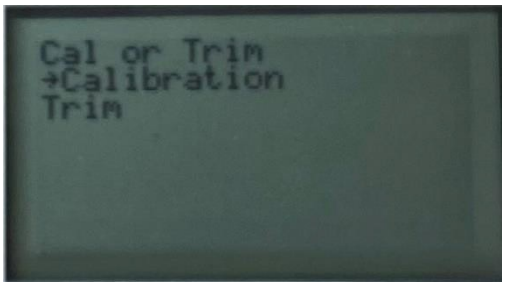
Select Top or Bottom Mount (Head Location)

CAUTION:

For accurate measurement, it is recommended you perform a **Trim** function as seen in section 4.2.8.

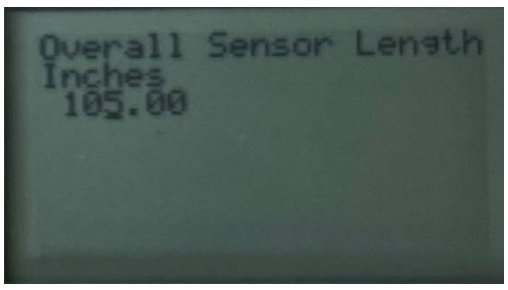
4.2.8 One Point Calibration

Note: The JMT is designed such that it should never require recalibration. The below actions are to be utilized for very specific reasons.



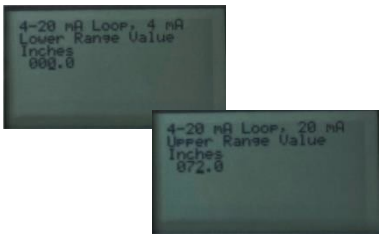
Two forms of One Point Calibration are available. **Calibration** is an emergency procedure *to be used only if moving the instrument electronics/module between two installations*. See **Calibration/Level Sensor 2Pt Cal** for more accurate calibration. **Trim** is used either after performing **Flip Transmitter**, or if the entire instrument and probe is being moved from one installation to another.

See section 5 for Troubleshooting.



Calibration

This is the overall length of the sensor. Only used if **Calibration** has been selected.

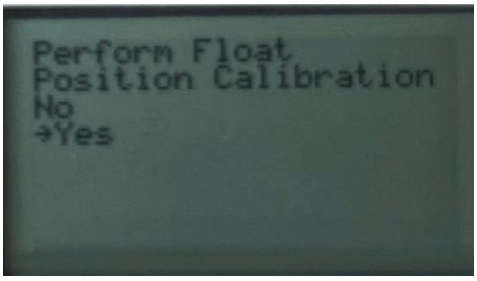


4-20 mA Loop, 4mA lower Range Value

This will set the measured level at which the output is 4mA. It will be done in the units set in **User Installation**.

4-20 mA Loop, 20mA upper range value

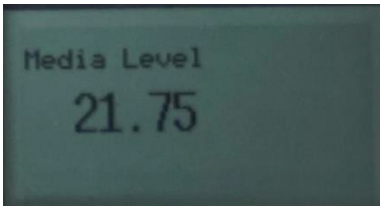
This will set the measured level at which the output in 20mA. The maximum value for this is the Sensor Length parameter.



Perform Float Position Calibration

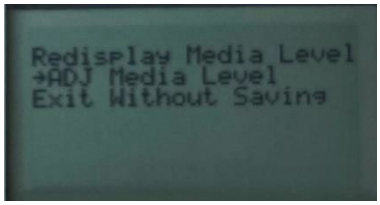
*Note: this is same as **Trim** command from upper menu.*

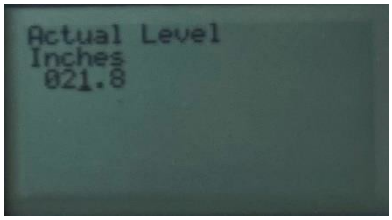
You will be prompted to decide if this step is necessary; **No** reverts back to menu.



If you select **Yes**, the currently measured level will be displayed, After a few seconds, the user will be prompted to **Redisplay Media Level**, **ADJ** (Adjust) **Media Level**, or **Exit Without Saving.**

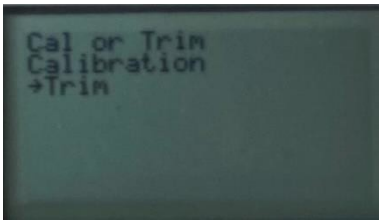
If you agree with the output, simply **Exit Without Saving**. To calibrate the output to a different measurement, select **ADJ Media Level.**





ADJ Media Level

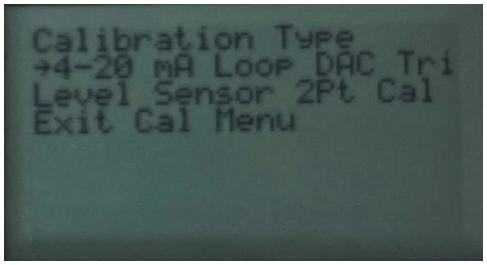
Unit will show current media level. Use buttons to change value to desired reading. **Enter** value. Upon completion, you will be reverted back to **Main Menu**.

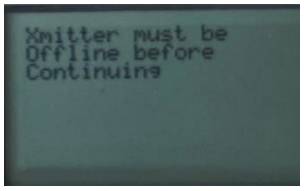


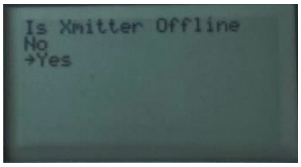
Trim

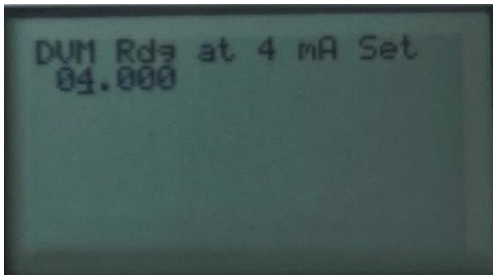
This function is required flipping the transmitter or is moving the entire unit from one installation (chamber) to another. See **Perform Float Calibration** above.

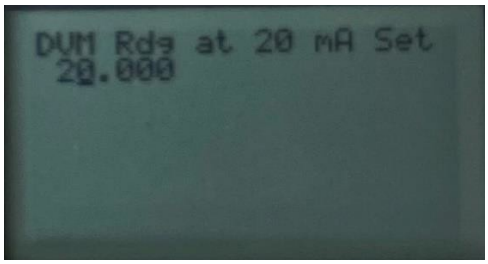
4.2.9 Calibration











DAC Trim (Digital to Analog Converter)

The purpose of the DAC trim is to calibrate the current output of the transmitter. This process should only be done with a NIST (National Instrument of Standard and Technology) traceable multimeter, AND the transmitter must be offline from any control processes.

First connect your NIST Traceable Multimeter **in series with the Loop power on the Negative side**. Select 4-20 mA Loop DAC Trim.

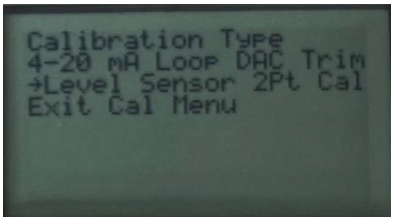
Press **Enter** and the transmitter output will go to 4mA, and prompt to enter the measured current output on the multimeter.

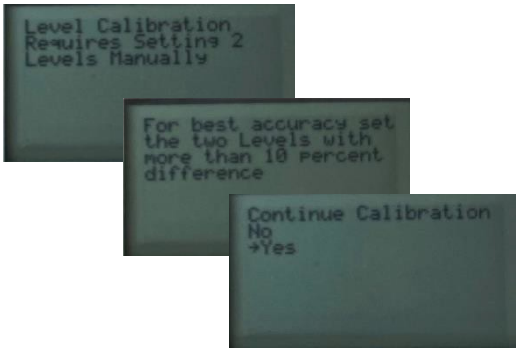
NOTE: These should be very subtle changes, ex 4.000 may read 4.004 (requiring 4.004 to be entered)

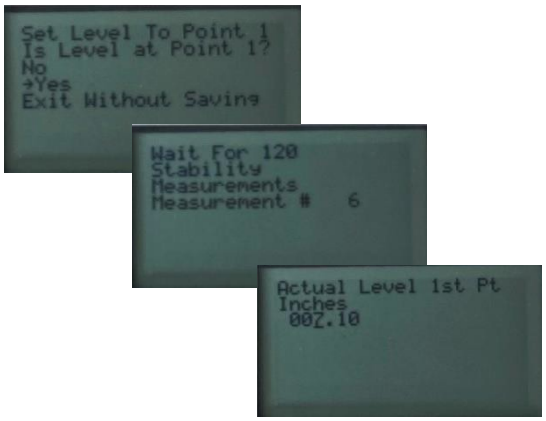
Large changes would indicate a problem with set up or even possible damage to the JMT

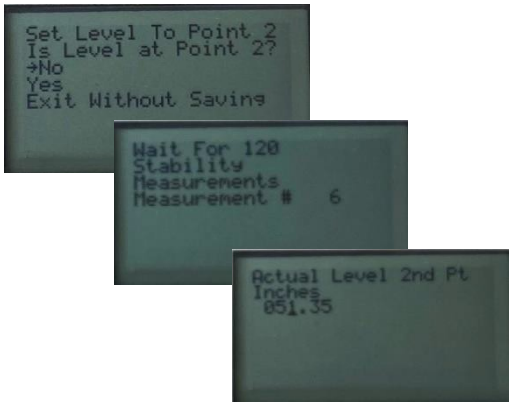
Once complete, the transmitter output will go to 20mA, and prompt to enter the measured current output on the multimeter.

Once complete, it will revert back to the **Calibration** menu.









Level Sensor 2Pt Cal

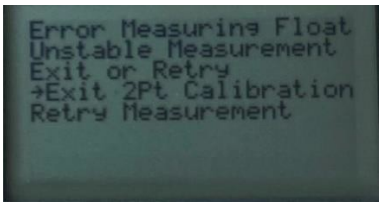
The instrument will come calibrated from the factory and should not require a two-point calibration. However, it may become necessary if the instrument is installed in an area with a very high *ambient* air temperature at the probe. This requires the ability to move the float level.

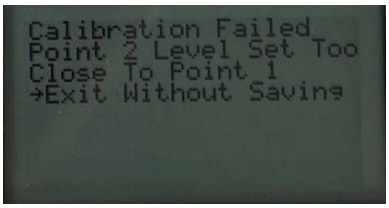
A **Two Point Calibration** may be accessed through the **Calibration** Menu. You will be prompted to verify that the transmitter is offline, and that the process is most accurate if the two points used are greater than 10% of the probe length apart. The two points can go in order from higher to lower, or lower to higher levels.

It will ask if you want to continue. **No** reverts to the **Calibration** menu. **Yes** will have you set the float at point #1. You will need to know the position of the float and it must be stable. When the float is at point #1 and stable, press **Yes**. (120) Measurements will be taken to provide the highest possible accuracy calibration. If a stable signal is not detected, you will be prompted to set the **Gain** and **Trigger Level**. (See section 5 Troubleshooting)
If a stable signal is detected, you will be prompted to enter the actual level of the float.

Do so and then move the float to point #2 and repeat the process. Remember it must be at least 10% the Overall Length of the sensor different from point #1. If the points are too close, the calibration will fail.

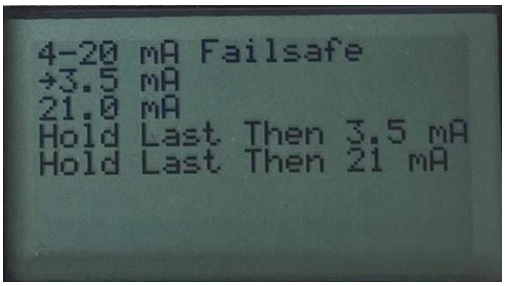
After entering the float position at the second point, a verification process will begin. If the values are too close together the calibration will fail. If the verification of the calibration is correct, you may exit the process finishing calibration. This verification process is used to prevent incorrect calibrations from entering the instrument. If not you may re-attempt verification, or redo the calibration.





4.2.10 Alarms

There are four possible alarm conditions available in the event that the float is not detected.



3.5 mA – Current output will go to 3.5 mA if a float is not detected.

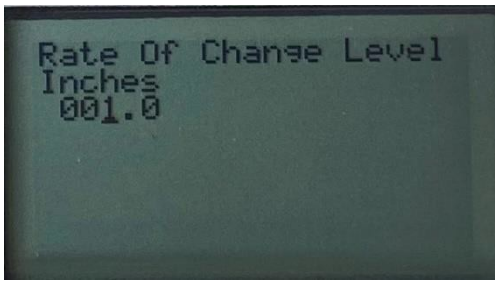
21.0 mA – Current output will go to 21.0 mA if a float is not detected.

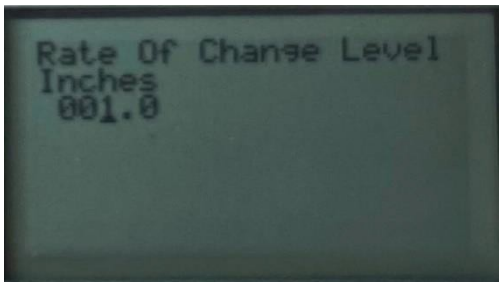
Hold last then 3.5 mA – Current output will go to 3.5 mA if a float is not detected after waiting a user specified number of second (Up to 1000 seconds).

Hold last then 21.0 mA – Current output will go to 21.0 mA if a float is not detected after waiting a user specified number of seconds (Up to 1000 seconds).

4.2.11 Filters

Several filters are automatically used by the JMT to prevent erroneous signal measurement. These filters may be adjusted as described in the **Measurement Troubleshooting** section in Section 5 **Troubleshooting.** There is no need to do so under normal operation.

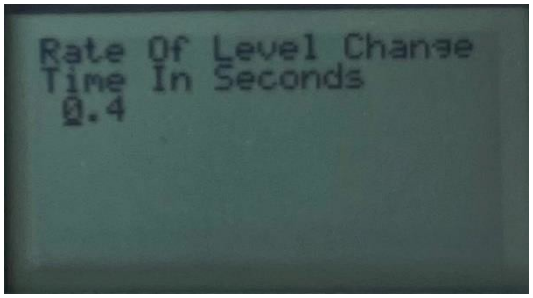


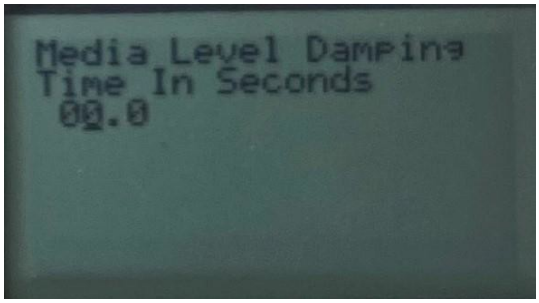


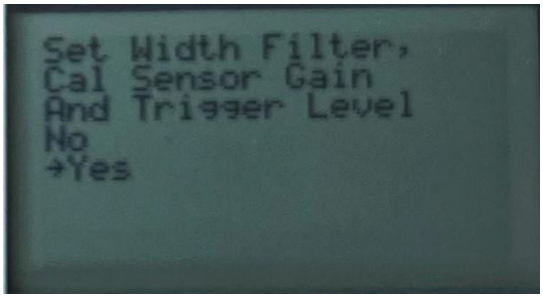
Rate of Change Filter

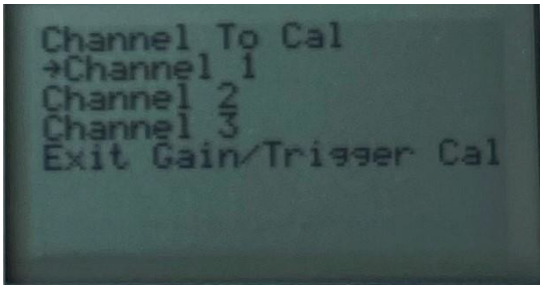
The **Rate of Change Filter** is designed to remove random noise the sensor may detect from vibrations or electromagnetic interference. The operating principle is that there is a maximum speed at which the float can move, meaning the measured level can only change so much between each measurement. Each measurement is compared to the one before it, and if a signal is detected outside what this filter would allow it is ignored, allowing the true signal from the float to be detected.

The **Rate of Change Filter** is set with both a distance measurement, and time requirement.









Smart Smoothing

The **Smart Smoothing Filter** is designed to smooth out variations in the measured level from the float rotating or leaning in the chamber. It works by averaging the previous measurements over the specified # of seconds and calculating that as the measured level. The factory default setting of 3 seconds.

If the float were to move extremely rapidly (for example by hand) this would show some delay in updating measured level.

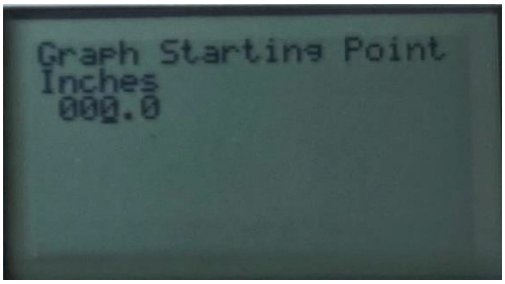
Media Level Dampening

Damping is available on the Current Output, this will damp the change in output current, not in the actual measurements.

Pulse Width, Gain and Trigger Level Filter

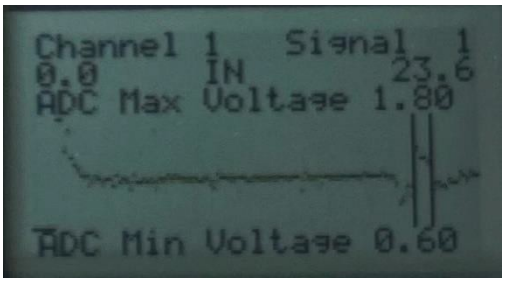
The pulse width filter is designed to remove signals detected by the sensor that do not match the signature of the float of the instrument. A float will provide a large, long signal, while something like spurious electrical noise will provide a short signal. The pulse width filter calculates the amount of time the signal is above the specified trigger voltage and rejects it if it is too short. This, in combination with the **Rate of Change Filter** makes it extremely difficult for any electromagnetic noise to affect the instrument.

Three channels will be available. Channel 1 and Channel 2 are the output of the two individual crystals in sensor. Channel 3 is their combined input which is what is used by the level measurement instrument.

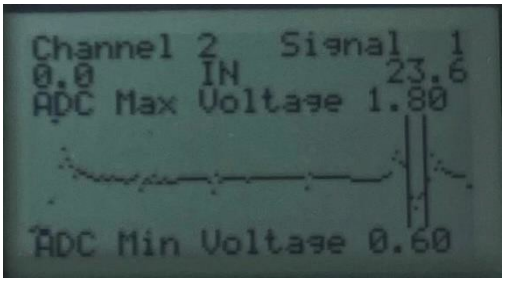


The graphs will show 23.6 inches of the graph of the sensor, measured in distance from the instrument head. When opening a graph, it is possible to change the starting point of the graph.

Channels 1 and 2 can be used to verify that the crystals are each working properly.

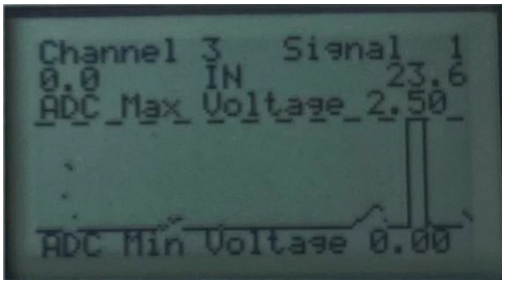


Channels 1 and 2 graphs are always scaled to a max voltage of 1.8 V and minimum of 0.6 V. An example of Channel 1 shown here, the sensor is working properly with the detected edge shown by the solid vertical bars. In this instance the graph is shown of the sensor probe from 0.0” to 23.6” from the sensor head. The other signal detected is marked with a dotted line.

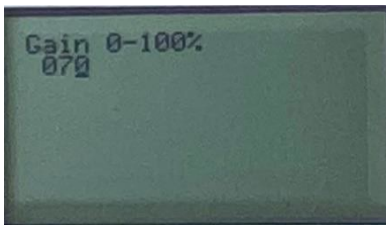


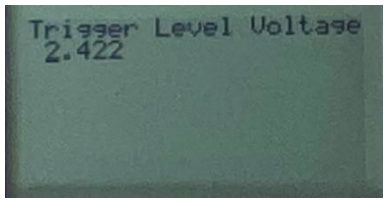
To exit the view of the graph, press **Back**.

Channel 3 is scaled to a max voltage of 2.5 V Channel 3 is what is used by the instrument to determine level. Pressing **Enter** when in channel 3 will allow you to set the **Minimum Signal Width** (uS).



Press **Enter** when the cursor is in tenths of a microsecond to bring up the **Gain** setting.



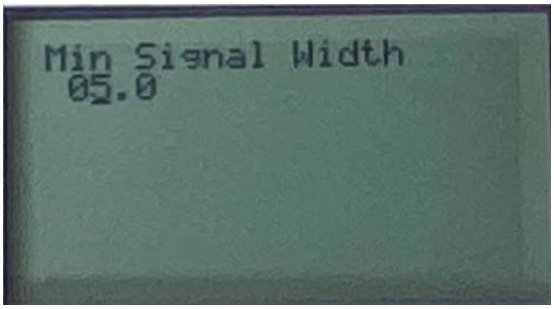


Gain is scaled 0-100. A zero gain is the lowest gain setting possible. It does not mean there will be no gain applied.

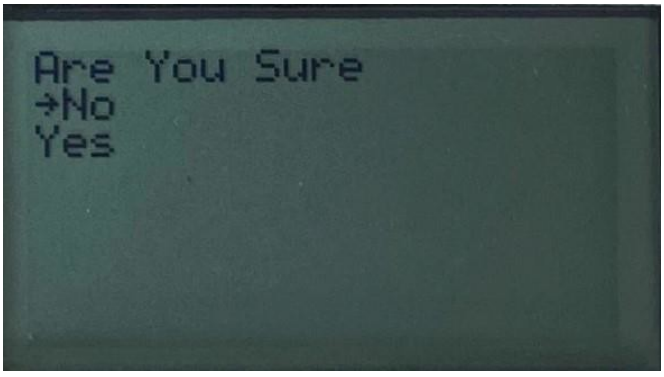
Finally, **Trigger Level** is set. This is a rarely changed value. Consult Factory for guidance.

Select **Exit Gain/Trigger Cal** to get back to menu. Selected **Yes** to save trigger/gain adjustment, or **No** to revert to previous setting.

4.2.12 Reset Factory Configuration



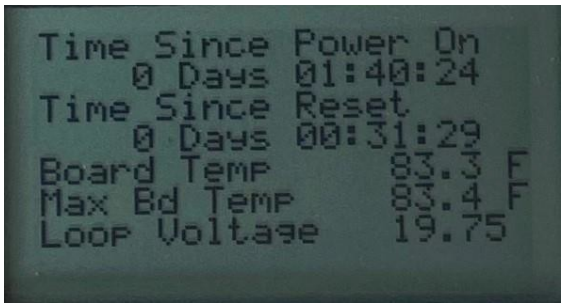
It may become necessary to reset the unit to the factory setting. Select **Reset Factory Config** from menu. When prompted **Are You Sure?, Yes** will reset the gain/trigger settings to factory configuration. This does NOT change other modified values like **Overall Sensor Length** of span (**Rerange**) settings. **No** reverts to menu.



4.2.13 Factory Configuration

Password Protected – Factory Use Only

4.2.14 Diagnostics



Diagnostics will show information regarding the transmitters operating temperature, loop voltage, and time since last reset or power on.

This information may be useful in helping diagnose/troubleshoot your JMT Series Magnetostrictive.

Enter exits back to menu.

4.2.15 Exit Menu

Exits back to **Operating Screen.**

5. Troubleshooting

5.1 Theory of Operation

The Jerguson JMT Magnetostrictive's electronics send a low-power pulse down the sensing wire. Where the Magnicator float's magnetic field intersects the magneto-elastic sensing wire. A torsional return "pulse" results, and travels back towards the electronics, where it is measured. The "time of flight" is used to determine the position of the float compared to the electronics.

5.2 Transmitter Adjustment and Sources of Malfunction

Transmitter Adjustment

Adjusting 4-20mA values

If it is desired to move the level measurement that will give a 4 mA or 20 mA value, i.e. 20mA to correspond to lower measurement than full span, simply use the **Rerange** function.

Adjusting 0" for Process Connection

If it is necessary to move the actual level at which the instrument will report 0", for example to report the level based on a process connection, a **One-Point Calibration** is necessary. This type of arrangement is shown below. In effect it is a negative level offset.

Potential Source of Malfunction

Physical Damage

Most commonly this will be a kink in the probe itself. This may lead to erratic output or only one level being reported that is not the float position. See Measurement Troubleshooting (Section 5) to verify if the probe has been damaged.

Water Damage

Water ingress (usually from an improperly installed conduit connection) can lead to the instrument display failing to turn on, or erratic current output as the electronics have been damaged. Contact the factory for possible repair/replacement.

Magnetic Indentation

Residual magnetism on the sensor probe may lead to multiple signals being detected. This would be shown by an unmoving signal on the graph and may be removed by running a bar magnet on the length of the sensor tube in an even motion.

Power Troubleshooting

The JMT is reverse polarity protected.

For details on acceptable voltages, see corresponding drawings:

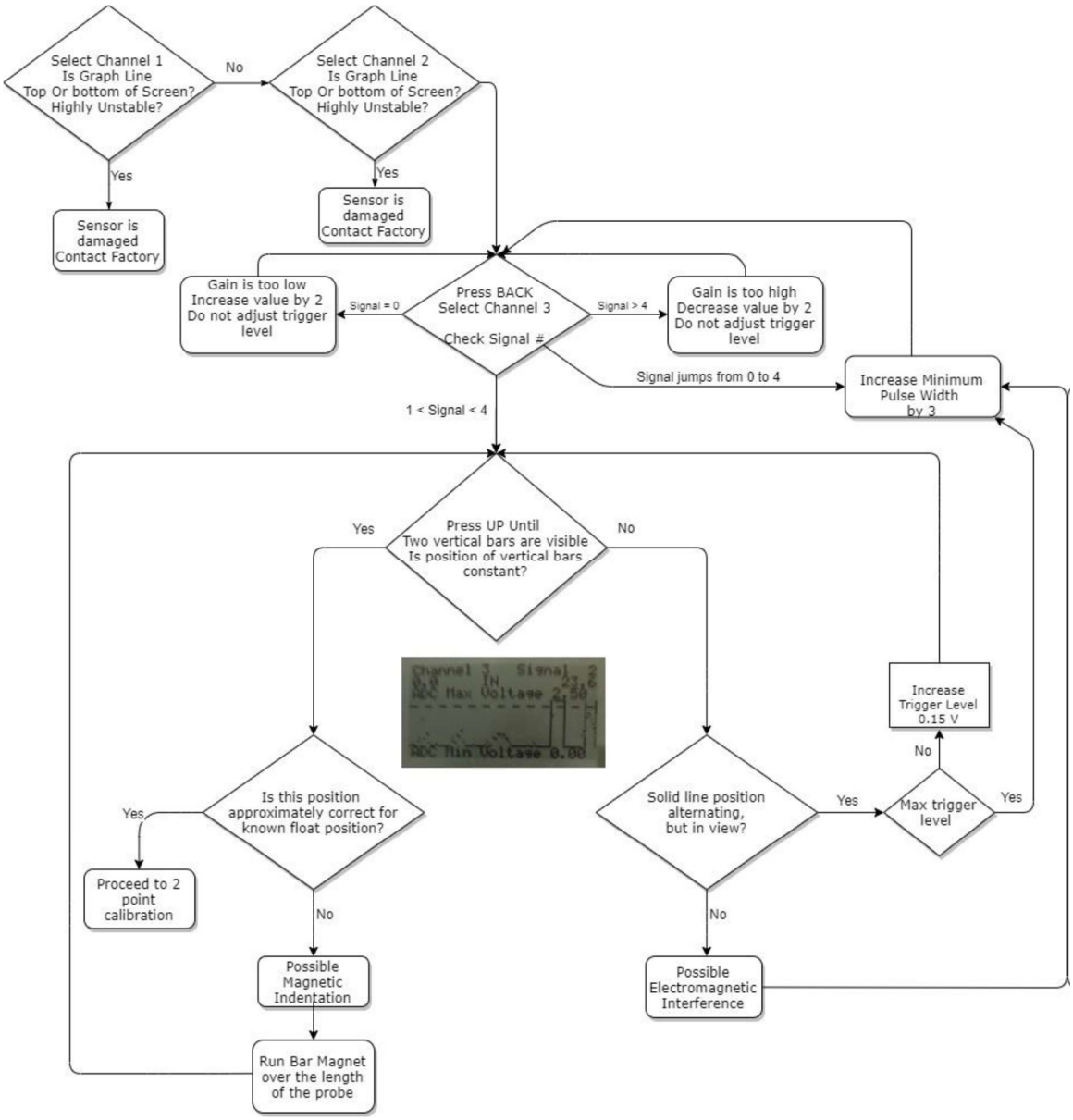
CI-35152-IS (Intrinsic Safety Unit)
CI-35152-XP (Explosion Proof Unit)

5.3 Spare Parts

S25318	Electronics Assembly (Module, includes display)
V22403	Base PCB
S25213-2.0	Kit – Mounting Hardware 2.0” Chamber
S25213-2.5	Kit – Mounting Hardware 2.5” Chamber
S25213-3.0	Kit – Mounting Hardware 3.0” Chamber
S25213-2.0-VIB	Kit – Mounting Hardware 2.0” Chamber, Vibration Kit
S25213-2.5-VIB	Kit – Mounting Hardware 2.5” Chamber, Vibration Kit
S25213-3.0-VIB	Kit – Mounting Hardware 3.0” Chamber, Vibration Kit
E-CON-JUMP2	Replacement Write Protect Jumper

5.4 Measurement Troubleshooting

Measurement Troubleshooting issues can be addressed in the Filters menu, See Section 4.2.11 for more information on operation, and follow the flowchart below.



6. Glossary/Other

6.1 Appendices

6.2 General Specification

Electronics

Supply Voltage:	12.5 - 36 Vdc (12.5 V @ 20mA)
Repeatability:	.005% of Full scale or .010", whichever is greater
Non-Linearity:	.01% of full scale or .030", whichever is greater
Damping:	1 to 32 Seconds
Operating Temp:	-50°C to 85°C (-58°F to 185°F)
RFI Guide:	SAMA PMC 31.1 - 5.1 20 to 1000 MHz to 30 V/m
Humidity Guide:	SAMA PMC 31.1 - 5.2

Housing

Epoxy coated aluminum (Standard)
316 Stainless Steel (Optional)

Dual Compartment Explosion Proof Housing

3/4" NPT conduit entry

NEMA 4X; IP66

Vibration Guide:	SAMA PMC 31.1 - 5.3
Sensor Probe Specification	316L/316SS Standard

See Sales Drawing A-35152-SALES for BOM and Dimensional Information

6.3 Hazardous Locations Ratings and Markings

Ambient Temp. Range: -40°F [-40°C] ≤ T_a ≤ 140°F [60°C]

Explosion Proof:

IP66

US/Canada:

Class I Div. 1 Groups B,C,D T6
Class I Zone 1 AEx db IIB+H2 T6
Ex db IIB+H2 T6 Gb

ATEX: ITS19ATEX14921X
II 2G Ex db IIB+H2 T6 Gb

IECEx:

IECEx ETL 19.0030X
Ex db IIB+H2 T6 Gb

Intrinsic Safety:

IP66 (With enclosure cover(s) securely in place)
IP20 (With enclosure cover(s) removed)

US/Canada:

Class I Div. 1 Groups C,D T4
Class I Zone 1 AEx db ia IIB T4 Gb
Ex db ia IIB T4 Gb

ATEX:

ITS-I21ATEX28848X
II 2G Ex db ia IIB T4 Gb

IECEx:

IECEx ETL 21.0003X
Ex db ia IIB T4 Gb

6.4 Full Menu/Command List

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+1.440.572.1500 www.clarkreliance.com