Jupiter®

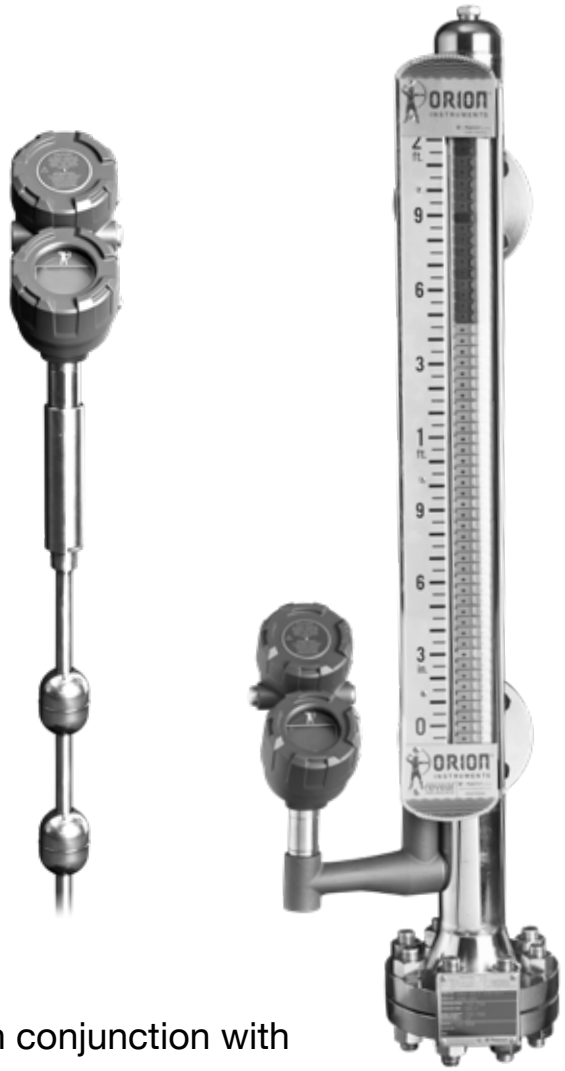
Model JM4

Installation and Operating Manual

Software v1.x

Magnetostrictive Level Transmitter

FOUNDATION fieldbus™



Use in conjunction with
I&O manual BE 46-650

MAGNETROL® ORION® INSTRUMENTS AMETEK®

Jupiter® Model JM4 Magnetostrictive Transmitter with FOUNDATION fieldbus™ Output

Table of Contents

1.0 FOUNDATION fieldbus™ Overview

1.1 Description

FOUNDATION fieldbus™ is a digital communications system that serially interconnects devices in the field. A Fieldbus system is similar to a Distributed Control System (DCS) with two exceptions:

- Although a FOUNDATION fieldbus™ system can use the same physical wiring as an existing 4–20 mA device, Fieldbus devices are not connected point to point, but rather are multidropped and wired in parallel on a single pair of wires (referred to as a segment).
- FOUNDATION fieldbus™ is a system that allows the user to distribute control across a network. Fieldbus devices are smart and actually maintain control over the system.

  Unlike 4–20 mA analog installations in which the two wires carry a single variable (the varying 4–20 mA current), a digital communications scheme such as FOUNDATION fieldbus™ considers the two wires as a network. The network can carry many process variables as well as other information. The Jupiter Model JM4 is a FOUNDATION fieldbus™ registered device that communicates with the H1 FOUNDATION fieldbus™ protocol operating at 31.25 kbits/sec. The H1 physical layer is an approved IEC 61158 standard.

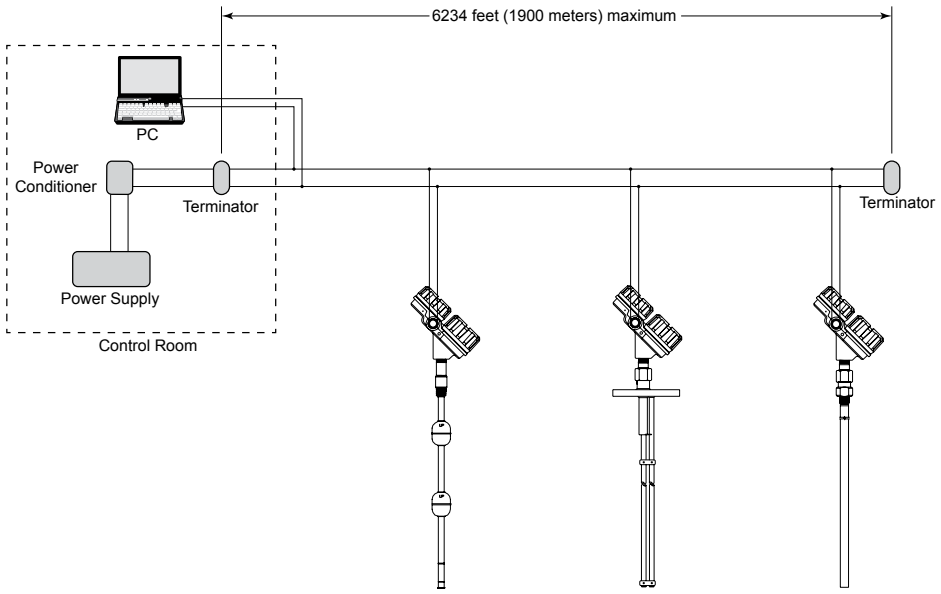


Fig. 1-1. Typical Fieldbus Installation

Details regarding cable specifications, grounding, termination, and other network information can be found in IEC 61158 or the wiring installation application guide AG-140 at **www.fieldbus.org**.

1.2 Device Description (DD)

An important requirement of Fieldbus devices is the concept of interoperability, defined as "the ability to operate multiple devices in the same system, regardless of manufacturer, without loss of functionality."

Device Description (DD) technology is used to achieve this interoperability. The DD provides extended descriptions for each object and provides pertinent information needed by the host system. DDs are similar to the drivers that your personal computer (PC) uses to operate peripheral devices connected to it. Any Fieldbus host system can operate with a device if it has the proper DD and Common File Format (CFF) for that device.

The most recent DD and CFF files can be found on the FOUNDATION fieldbus™ web site at www.fieldbus.org or at **www.magnetrol.com**.

NOTE: Consult your host system vendor for any host-specific files that may be needed.

1.2.1 FOUNDATION fieldbus™ DD Revision Table

Version	Release Date	Compatible with Model JM4 Software
Dev V01 DD V02	February 2015	Version 1.0a or later

1.3 Link Active Scheduler (LAS)

The default operating class of the Jupiter Model JM4FF with FOUNDATION fieldbus™ is a Basic device. However, it is capable of being configured as a Link Active Scheduler (LAS).

The LAS controls all communication on a FOUNDATION fieldbus™ segment. It maintains the "Live List" of all devices on a segment and coordinates both the cyclic and acyclic timing.

The primary LAS is usually maintained in the host system, but in the event of a failure, all associated control can be transferred to a backup LAS in a field device such as the Jupiter® Model JM4 FF.

NOTES:

1) The Jupiter Model JM4 is normally shipped from the factory with Device Class set to Basic.
2) The operating class can be changed from Basic to LAS using a FOUNDATION fieldbus™ configuration tool.

1.4 Intrinsic Safety

The H1 physical layer supports Intrinsic Safety (IS) applications with bus-powered devices. To accomplish this, an IS barrier or galvanic isolator is placed between the power supply in the safe area and the device in the hazardous area.

H1 also supports the Fieldbus Intrinsically Safe Concept (FISCO) model which allows more field devices in a network. The FISCO model considers the capacitance and inductance of the wiring to be distributed along its entire length. Therefore, the stored energy during a fault will be less and more devices are permitted on a pair of wires. Instead of the conservative entity model, which only allows about 90 mA of current, the FISCO model allows a maximum of 110 mA for Class II C installations and 240 mA for Class II B installations.

FISCO certifying agencies have limited the maximum segment length to 1000 meters because the FISCO model does not rely on standardized ignition curves.

The Jupiter Model JM4 magnetostrictive transmitter is available with entity IS or FISCO IS approvals.

2.0 Configuration

Although the Jupiter Model JM4 transmitter can be delivered pre-configured from the factory, it can also be easily reconfigured in the shop or at the installation using the local LCD/Keypad, HART communicator, or PACT*ware*/DTM. Bench configuration provides a convenient and efficient way to set up the transmitter before going to the tank site to complete the installation.

Before configuring any transmitter, collect all operating parameters information.

2.1 Password Protection

The Jupiter Model JM4 transmitter has three levels of password protection to restrict access to certain portions of the menu structure that affect the operation of the system. The user password can be changed to any numerical value up to 59999. When the transmitter is programmed for password protection, a password is required whenever configuration values are changed.

User Password

The User Password allows the customer to limit access to the basic configuration parameters.

The default User Password installed in the transmitter at the factory is 0. With a password of 0, the transmitter is no longer password protected, and any value in the basic user menus can be adjusted without entering a confirming password.

NOTE: If a User is not known or has been misplaced, the menu item New Password in the DEVICE SETUP/ADVANCED CONFIG menu displays an encrypted value representing the present password. Contact Technical Support with this encrypted password to retrieve the original User Password.

Advanced Password

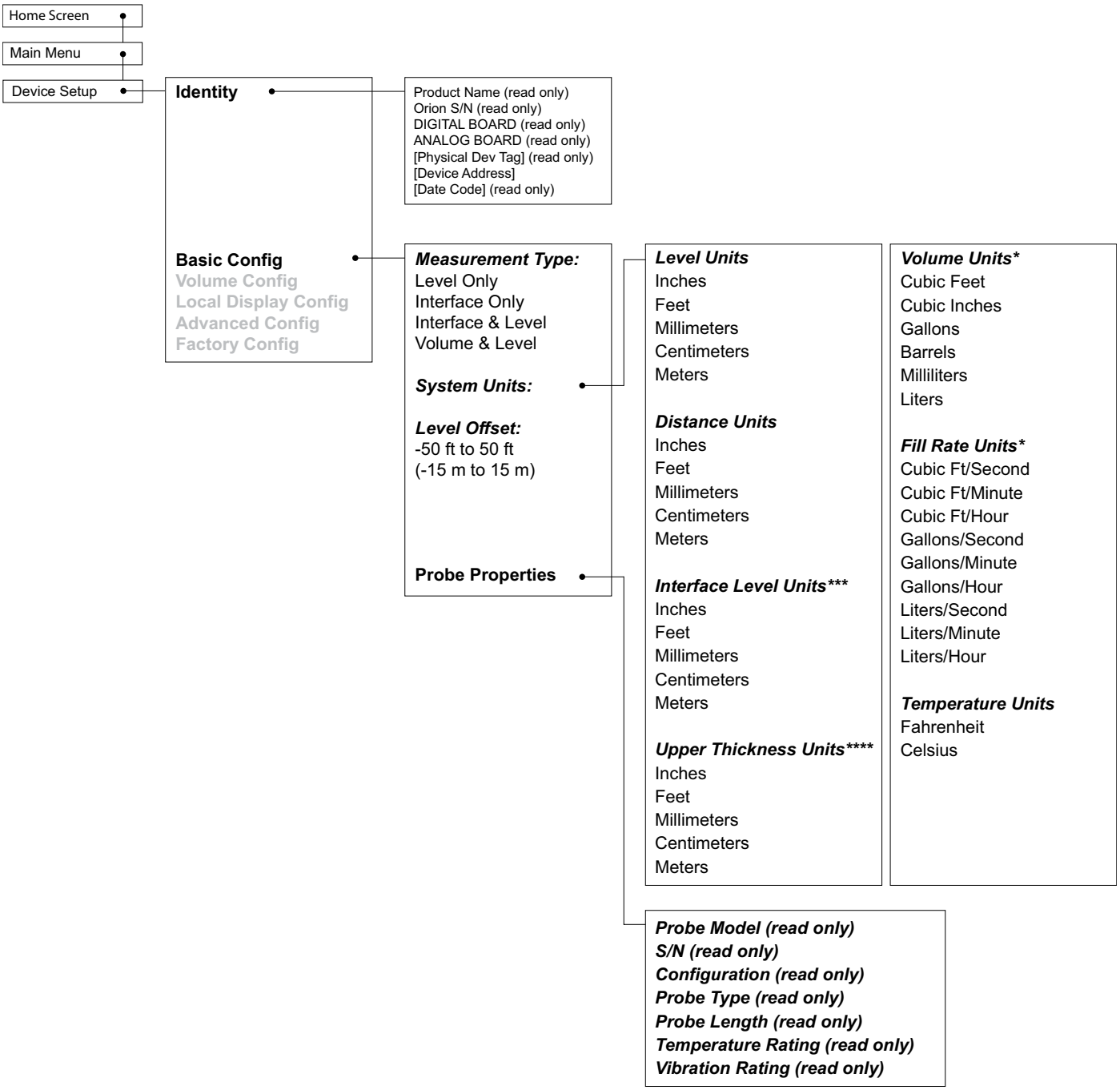
Certain portions of the menu structure that contain more advanced parameters are further protected by an Advanced Password.

This password will be provided when necessary, by Factory technical support.

Factory Password

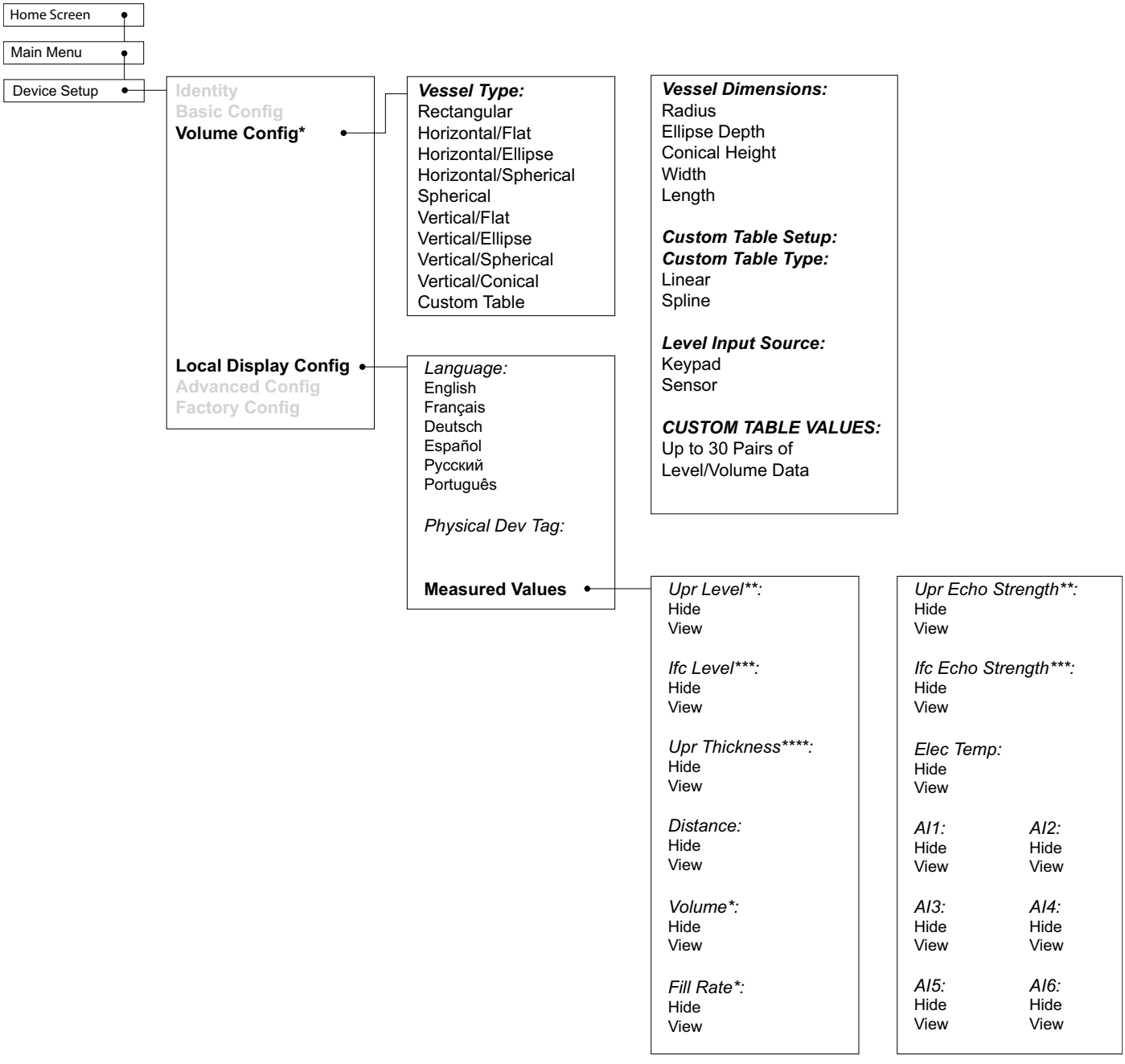
Calibration-related and other factory settings are further protected by a Factory Password.

2.2 Configuration Menu



* Only available when Measurement Type = Volume & Level
** Not available when Measurement Type = Interface Only
*** Only available when Measurement Type = Interface Only or Interface & Level
**** Only Available when Measurement Type = Interface & Level

2.2 Configuration Menu



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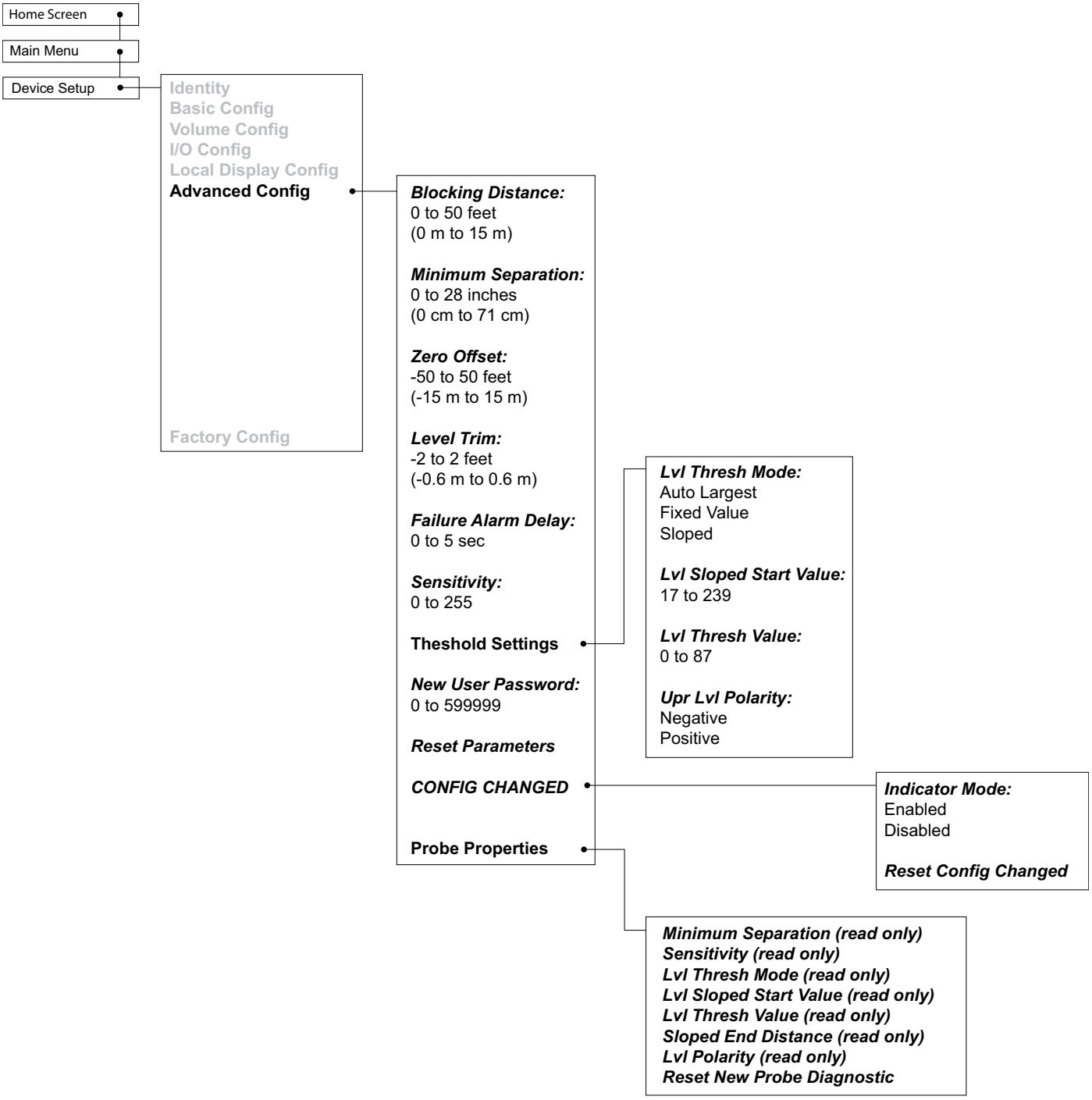

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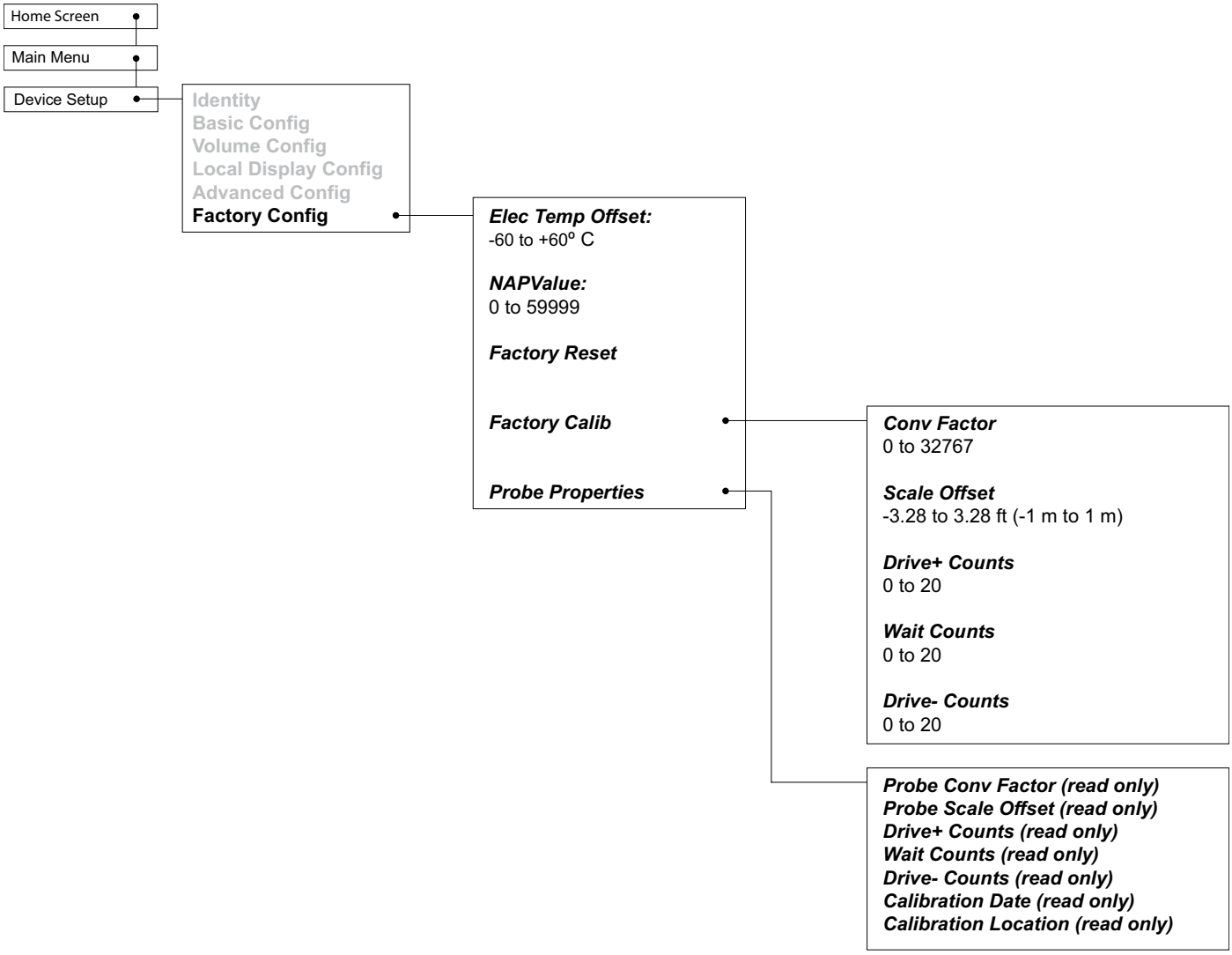

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3.0 Function Blocks

3.1 Overview

The function of a FOUNDATION fieldbus™ device is determined by the arrangement of a system of blocks defined by the Fieldbus Foundation. The types of blocks used in a typical User Application are described as either Standard or Advanced.

Function Blocks are built into the FOUNDATION fieldbus™ devices as needed to provide the desired control system behavior. The input and output parameters of function blocks can be linked over the Fieldbus and there can be numerous function blocks in a single User Application.

The Jupiter Model JM4FF is a Magnetostrictive level transmitter with the following standard FOUNDATION fieldbus™ Function Blocks:

- One (1) Resource Block (RB)
- Two (2) Custom Transducer Blocks (TB)
- Six (6) Analog Input Function Blocks (AI)
- Two (2) PID Blocks (PID)

With Advanced Function Blocks:

- One (1) Integrator Block (IT)
- One (1) Arithmetic Block (AR)
- One (1) Input Selector Block (IS)
- One (1) Signal Characterizer Block (SC)

The idea of Function Blocks, which a user can customize for a particular application, is a key concept of Fieldbus topology. Function Blocks consist of an algorithm, inputs and outputs, and a user-defined name.

The Transducer Block (TB) output is available to the network through the Analog Input (AI) blocks. Refer to Section 3.3 for additional information on the Transducer Blocks.

The AI blocks take the TB values and make them available as an analog value to other function blocks. The AI blocks have scaling conversion, filtering, and alarm functions.

Refer to Section 3.4 for additional information on the Analog Input Blocks.

The End User needs the Process Variable value as an Analog Input to their fieldbus network.

3.1.1 Universal Fieldbus Block Parameters

The following are general descriptions of the parameters common to all blocks. Additional information for a given parameter is described later in that specific block section.

ST_REV (static data revision): a read only parameter that gives the revision level of the static data associated with the block. This parameter will be incremented each time a static parameter attribute value is written and is a vehicle for tracking changes in static parameter attributes.

TAG_DESC (tag descriptor): a user assigned parameter that describes the intended application of any given block.

STRATEGY: a user assigned parameter that identifies groupings of blocks associated with a given network connection or control scheme.

ALERT_KEY: a user assigned parameter which may be used in sorting alarms or events generated by a block.

MODE_BLK: a structured parameter composed of the actual mode, the target mode, the permitted mode(s), and the normal mode of operation of a block.

- Target: The mode to "go to"
- Actual: The mode the "block is currently in"
- Permitted: Allowed modes that target may take on
- Normal: Most common mode for target

NOTES:

1) It may be required to change the the MODE_BLK target parameter to OOS (out of service) to change configuration parameters in that specific function block. (When in OOS, the normal algorithm is no longer executed and any outstanding alarms are cleared.)

2) All blocks must be in an operating mode for the device to operate. This requires the Resource Block and the Transducer Block to be in "AUTO" before the specific function block can be placed in a mode other than OOS (out of service).

BLOCK_ERR: a parameter that reflects the error status of hardware or software components associated with, and directly affecting, the correct operation of a block.

NOTE: A BLOCK_ERR of "Simulation Active" in the Resource Block does not mean simulation is active—it merely indicates that the simulation (hardware) enabling jumper is present and soft simulation disable is set to NO. (Refer to Section 3.4.5 for additional information).

3.2 Resource Block

The RESOURCE BLOCK describes the characteristics of the FOUNDATION fieldbus™ device such as the device name, manufacturer, and serial number. As it only contains data specific to the Jupiter Model JM4 FF transmitter, it has no control function.

3.2.1 Resource Block Parameters

NOTE: The Resource Block has no control function.

MODE_BLK: Must be in AUTO in order for the remaining blocks in the transmitter to operate.

NOTE: A Resource Block in "out of service" will stop all function block execution in the transmitter.

RS_STATE: Identifies the state of the RESOURCE block state machine. Under normal operating conditions, it should be "On-Line."

DD_RESOURCE: A string identifying the tag of the resource that contains the Device Description for this device.

MANUFAC_ID: Contains Magnetrol International's FOUNDATION fieldbus™ manufacturer's ID number, which is 0x000156.

DEV_TYPE: The model number of the Jupiter Model JM4 FF transmitter (0x0005). It is used by the Host System and other fieldbus interface devices to locate the Device Descriptor (DD) file.

DEV_REV: Contains the firmware revision of the Jupiter Model JM4 FF transmitter and is used by the Host System and other fieldbus interface devices to correctly select the associated DD.

DD_REV: Contains the revision of the DD associated with the version of firmware in the Jupiter Model JM4 FF transmitter. It is used by the Host System and other Fieldbus interface devices to correctly select the associated DD.

RESTART: Default and Processor are the available selections. Default will reset the Model JM4 to the default factory block configuration.

NOTE: As RESTART DEFAULT will set most function block configuration parameters to their default values. Devices need to be reconfigured following activation of this function.

FEATURES: A list of the features available in the transmitter, such as Reports and Soft Write Lock.

FEATURES_SEL: Allows the user to turn Features on or off.

CYCLE_TYPE: Identifies the block execution methods that are available.

CYCLE_SEL: Allows the user to select the block execution method.

MIN_CYCLE_T: The time duration of the shortest cycle interval. It puts a lower limit on the scheduling of the resource.

NV_CYCLE_T: The minimum time interval between copies of non-volatile (NV) parameters to NV memory. NV memory is only updated if there has been a significant change in the dynamic value and the last value saved will be available for the restart procedure.

NOTE: After completing a download, allow several seconds before removing power from the Jupiter Model JM4 FF transmitter to ensure that all data has been saved.

FREE_SPACE: Shows the amount of available memory for further configuration. The value is zero percent in a pre-configured device.

FREE_TIME: The amount of the block processing time that is free to process additional blocks.

SHED_RCAS: The time duration at which to give up computer writes to function block RCas locations.

SHED_ROUT: The time duration at which to give up computer writes to function block ROut locations.

FAULT_STATE, SET_FSTATE, CLR_FSTATE: These only apply to output function blocks. (The Model JM4FF has no output function blocks).

MAX_NOTIFY: The maximum number of alert reports that the transmitter can send without getting a confirmation.

LIM_NOTIFY: the maximum numbers of unconfirmed alert notify messages allowed. No alerts are reported if set to zero.

CONFIRM_TIME: the time that the transmitter will wait for confirmation of receipt of a report before trying again. Retry will not occur if CONFIRM_TIME = 0.

WRITE_LOCK: When set to LOCKED, will prevent any external change to the static or non-volatile data base in the Function Block Application of the transmitter. Block connections and calculation results will proceed normally, but the configuration will be locked.

UPDATE_EVT (Update Event): Is an alert generated by a write to the static data in the block.

BLOCK_ALM (Block Alarm): Is used for configuration, hardware, connection, or system problems in the block. The cause of any specific alert is entered in the subcode field.

ALARM_SUM (Alarm Summary): Contains the current alert status, the unacknowledged states, the unreported states, and the disabled states of the alarms associated with the block.

ACK_OPTION (Acknowledge Option): Selects whether alarms associated with the block will be automatically acknowledged.

WRITE_PRI (Write Priority): The priority of the alarm generated by clearing the write lock.

WRITE ALM (Write Alarm): The alert generated if the write lock parameter is cleared.

ITK_VER (ITK Version): Contains the version of the Interoperability Test Kit (ITK) used by the Fieldbus Foundation during their interoperability testing.

3.2.2 Additional Resource Block Parameters

Additional parameters are available within the resource block for use with NE-107 to aid in communicating device conditions to the user.

FD_VER: Major version of the Field Diagnostic specification to which this device conforms.

FD_FAIL_ACTIVE: For error conditions that have been selected for the FAIL alarm category, this parameter reflects those that have been detected as active.

FD_OFFSPEC_ACTIVE: For error conditions that have been selected for the OFFSPEC alarm category, this parameter reflects those that have been detected as active.

FD_MAINT_ACTIVE: For error conditions that have been selected for the MAINT alarm category, this parameter reflects those that have been detected as active.

FD_CHECK_ACTIVE: For error conditions that have been selected for the CHECK alarm category, this parameter reflects those that have been detected as active.

FD_FAIL_MAP: Maps conditions to be detected as active for the FAIL alarm category.

FD_OFFSPEC_MAP: Maps conditions to be detected as active for the OFFSPEC alarm category.

FD_MAINT_MAP: Maps conditions to be detected as active for the MAINT alarm category.

FD_CHECK_MAP: Maps conditions to be detected as active for the CHECK alarm category.

FD_FAIL_MASK: Used to suppress an alarm from being broadcast for single or multiple conditions that are active in the FAIL alarm category.

FD_OFFSPEC_MASK: Used to suppress an alarm from being broadcast for single or multiple conditions that are active in the OFFSPEC alarm category.

FD_MAINT_MASK: Used to suppress an alarm from being broadcast for single or multiple conditions that are active in the MAINT alarm category.

FD_CHECK_MASK: Used to suppress an alarm from being broadcast for single or multiple conditions that are active in the CHECK alarm category.

FD_FAIL_ALM: Used to broadcast a change in the associated active conditions, which are not masked, for the FAIL alarm category.

FD_OFFSPEC_ALM: Used to broadcast a change in the associated active conditions, which are not masked, for the OFFSPEC alarm category.

FD_MAINT_ALM: Used to broadcast a change in the associated active conditions, which are not masked, for the MAINT alarm category.

FD_CHECK_ALM: Used to broadcast a change in the associated active conditions, which are not masked, for the CHECK alarm category.

FD_FAIL_PRI: Specifies the priority of the FAIL alarm category.

FD_OFFSPEC_PRI: Specifies the priority of the OFFSPEC alarm category.

FD_MAINT_PRI: Specifies the priority of the MAINT alarm category.

FD_CHECK_ALM: Used to broadcast a change in the associated active conditions, which are not masked, for the CHECK alarm category.

FD_FAIL_PRI: Specifies the priority of the FAIL alarm category.

FD_OFFSPEC_PRI: Specifies the priority of the OFFSPEC alarm category.

FD_MAINT_PRI: Specifies the priority of the MAINT alarm category.

FD_CHECK_PRI: Specifies the priority of the CHECK alarm category.

FD_SIMULATE: Diagnostic conditions can be manually supplied when simulation is enabled.

FD_RECOMMEN_ACT: Describes what actions can be taken to address an active diagnostic condition.

FD_EXTENDED_ACTIVE_1: For error conditions that have been selected in the Extended_Map_1 parameter, this parameter reflects those that have been detected as active.

FD_EXTENDED_MAP_1: Allows the user finer control in selecting multiple conditions contributing to a single condition that may be mapped for the various alarm categories.

Manufacturer-Specific Parameters

SOFT_SIMULATION_DISABLE: If set to yes, enabling of simulation is disallowed regardless of the presence of the simulation jumper, and the "simulation" indicator will be cleared in the Block Error parameter. If set to no, simulation can only be enabled if the simulation jumper is present which also sets the "simulation" indicator in the Block Error parameter.

SERIAL_NUMBER: Read-only parameter that corresponds to "Magnetrol Serial Number" in the Transducer Block.

FIRMWARE_VERSION: Read-only parameter that corresponds to "Firmware Version" in the Transducer Block.

HARDWARE_VERSION: Read-only parameter that corresponds to "Hardware Version" in the Transducer Block.

3.3 Transducer Block

The TRANSDUCER block contained within the Jupiter Model JM4 FF transmitter is a custom block containing parameters that are pertinent to the transmitter itself.

TRANSDUCER Block 1 (used for level and interface operation) contains information such as the Configuration, Diagnostics, Calibration data, output level and Status information.

TRANSDUCER Block 2 contains volume parameters.

The read-only parameters and read-write parameters within the TB are grouped in a useful configuration.

- The read-only parameters report the block status and operation modes.
- The read-write parameters affect the operation of the function block and the transmitter itself.

NOTE: The TB will automatically be changed to "Out of Service" when the local interface (keypad) is used to change a parameter online. The TB must be manually placed back in service from the Host System to resume operation.

3.3.1 Transducer Block Parameters

The first six parameters in the TRANSDUCER Block are the universal parameters discussed in Section 3.1.1. After the universal parameters, six additional parameters are required for Transducer Blocks. The most notable of these parameters are **UPDATE_EVT** and **BLOCK_ALM**. It should be noted that these six additional parameters must exist but do not have to be implemented.

An important device-specific parameter found later in the TRANSDUCER Block list is **DEVICE_STATUS**, which displays the status of the device. If more than one message exists, then the messages are displayed in priority order.

If **DEVICE_STATUS** indicates a problem, refer to Section 5.0 Troubleshooting.

For a complete list of Transducer Block Parameters, refer to table in the Appendix.

NOTE: The user should compare the DD file and revision number of the device with the HOST system to ensure they are at the same revision level.

Please refer to the DD Revision Table Section 1.2.1.

Please refer to Appendix A for a complete list of the three Transducer Block parameter sets.

3.3.2 Password Parameters

To change a parameter at the local user interface, a value matching the user password must be entered (Default=1). If a static parameter is changed from the local user interface, the Associated Transducer Block goes Out of Service (OOS).

Please refer to the Section 2.1 for additional information regarding passwords.

After 5 minutes with no keypad activity, the entered password expires. However, the device must be placed back in service from the Host System.

From the Host system network, the instrument always behaves as if it is in the user password mode by default. In other words, it is not necessary to enter the user password in order to write most parameters from the Host system.

3.3.3 Jupiter Model JM4 FF Configuration Parameters

One of the main advantages of the Jupiter Model JM4 FF magnetostrictive transmitter is that the device can be delivered pre-configured to the user.

On the other hand, part of the advantage of FOUNDATION fieldbus™is to provide the ability to monitor changes and make adjustments to a transmitter. The Fieldbus™concept allows a user to make adjustments if deemed necessary.

3.3.4 Jupiter Model JM4 FF Device-Specific Configuration Parameters

Please refer to JUPITER Model JM4 I/O Manual ORI-650 for detailed information on he Model JM4 device-specific configuration parameters.

3.4 Analog Input Block

The ANALOG INPUT (AI) block takes the Jupiter Model JM4 FF input data, selected by channel number, and makes it available to other function blocks at its output.

The channel selections are:

Transducer Blocks	Process Variable	Channel Parameter Value (AI Blocks)
TB1 - Level	Level	1
	Interface Level	2
	Upper Thickness	3
	Distance	4
	Echo Strength	5
	Ifc Echo Strength	6
	Electronics Temperature	7
TB2 - Volume	Volume	8
	Fill Rate	9

3.4.1 AI Block Parameters

The following are general descriptions of the parameters common to all function blocks. Additional information for a given parameter may be described later in a section that describes the specific block.

ST_REV: a read only parameter that gives the revision level of the static data associated with the block. This parameter will be incremented each time a static parameter attribute value is written and is a vehicle for tracking changes in static parameter attributes.

TAG_DESC: a user assigned parameter that describes the intended application of any given block.

STRATEGY: a user assigned parameter that identifies groupings of blocks associated with a given network connection or control scheme.

ALERT_KEY: a user assigned parameter which may be used in sorting alarms or events generated by a block.

MODE_BLK: a structured parameter composed of the actual mode, the target mode, the permitted mode(s), and the normal mode of operation of a block.

- Target: The mode to “go to”
- Actual: The mode the “block is currently in”
- Permitted: Allowed modes that target may take on
- Normal: Most common mode for target

PV: Either the primary analog value for use in executing the function, or a process value associated with it.

OUT: The primary analog value calculated as a result of executing the function block.

SIMULATE: Allows the transducer analog input or output to the block to be manually supplied when simulate is enabled. When simulate is disabled, the simulate value and status track the actual value and status. Please refer to Section 3.4.5 for additional information.

XD_SCALE: The high and low scale values, Engineering Units, and number of digits to the right of the decimal point used with the value obtained from the transducer for a specified channel.

OUT_SCALE: The high and low scale values, Engineering Units, and number of digits to the right of the decimal point to be used in displaying the OUT parameter.

GRANT_DENY: Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block.

IO_OPTS: Option which the user may select to alter input and output block processing.

STATUS_OPTS: Options which the user may select in the block processing of status.

CHANNEL: The number of the logical hardware channel that is connected to this I/O block. (This information defines the transducer to be used going to or from the physical world).

L_TYPE: Determines if the values passed by the transducer block to the AI block may be used directly (Direct), or if the value is in different units and must be converted linearly (Indirect), using the input range defined for the transducer and the associated output range.

LOW_CUT: Limit used in square root processing.

PV_FTIME: Time constant of a single exponential filter for the PV, in seconds.

FIELD_VAL: Raw value of the field device in % of PV range, with a status reflecting the Transducer condition before signal characterization (L_TYPE) or filtering (PV_FTIME).

UPDATE_EVT: This alert is generated by any change to the static data.

BLOCK_ALM: The block alarm is used for all configuration, hardware, or system problems in the block.

ALARM_SUM: The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.

ACK_OPTION: Selection of whether alarms associated with the function block will be automatically acknowledged.

ALARM_HYS: Amount the PV must return within the alarm limits before the alarm condition clears. Alarm hysteresis expressed as a percent of the span of the PV.

HI_HI_PRI: Priority of the high high alarm.

HI_HI_LIM: The setting for high high alarm in engineering units.

HI_PRI: Priority of the high alarm.

HI_LIM: The setting for high alarm in engineering units

LO_PRI: Priority of the low alarm.

LO_LIM: The setting for low alarm in engineering units.

LO_LO_PRI: Priority of the low low alarm.

LO_LO_LIM: The setting for low low alarm in engineering units.

HI_HI_ALM: The status for high high alarm and its associated time stamp.

HI_ALM: Status for high alarm and associated time stamp.

LO_ALM: Status for low alarm and associated time stamp.

LO_LO_ALM: The status for low low alarm and its associated time stamp.

BLOCK_ERR_DESC: Reports more specific details regarding some errors reported through BLOCK_ERR.

The MODE_BLK parameter (within both the TB and AI Blocks) must be set to AUTO to pass the PV Value through the AI to the network.

Transducer scaling, called XD_SCALE is applied to the PV from the CHANNEL to produce the FIELD_VAL in percent.

- Valid XD_SCALE engineering units depend on the Channel Type.

3.4.2 AI Block Diagnostics

The AI blocks can display a BLOCK_ERR diagnostic when:

1. The Channel is not set correctly. (Refer to Default Channel Table in Section 3.4).
2. XD_SCALE does not have suitable engineering units.
3. The SIMULATE parameter is active.
4. AI block MODE is O/S (out of service).

NOTE: This can be caused by the Resource Block being OOS or the AI Block not scheduled for execution.

5. L-TYPE not set or set to Direct with improper OUT_SCALE.

The AI block uses the STATUS_OPTS setting and the TRANSDUCER PV LIMIT value to modify the AI PV and OUT QUALITY.

A Damping Filter is a feature of the AI block. The PV_FTIME parameter is a time constant of a single exponential filter for the PV, in seconds. This parameter can be used to dampen out fluctuation in level due to excessive turbulence.

The AI block also has multiple ALARM functions that monitor the OUT parameter for out of bound conditions.

3.4.3 Local Display of Analog Input Transducer Block Output

The Jupiter Model JM4FF transmitter incorporates a useful feature that allows the Analog Input (AI) block Out values to be displayed on the local LCD.

NOTE: There are many reasons that AI block Out values can deviate from the measurement value originating in the Transducer block, and because the keypad and local display will only provide access to Transducer block parameters, there is no way to change (or view) the other fieldbus configuration items affecting the AI block output using the keypad and LCD.

In other words, these screens should only be considered as measured value indicators for configured transmitters. For example:

- The screens are not used for commissioning or diagnostic/troubleshooting purposes.
- Prior to full fieldbus configuration (transmitter assigned a permanent address, AI block(s) configured and scheduled for execution, etc.), the value displayed will not reflect the transducer measurement.

3.4.3.1 AI Out Display Screens

The Analog Input Block Out values can be conditionally displayed as part of the "rotating" home menu screens. A representative example is shown at left.

The screens will be formatted as shown with:

- Physical Device Tag (Selectable)
- Measured Value Status (Bad, Good, Uncertain)
- Bar Graph

For example, "AI1_Level" would be the most commonly used AI Out screen.

"AI2---" would be displayed when the channel value is 0 [uninitialized] for AI block 2.

Because the Model JM4 transmitter has eight (8) Analog Input blocks, any or all of which may be used in particular applications, a Transducer block parameter controls which AI block Out values will be displayed on the LCD.

Any or all (or none) of the AI block Out values can be selected for display on the LCD.

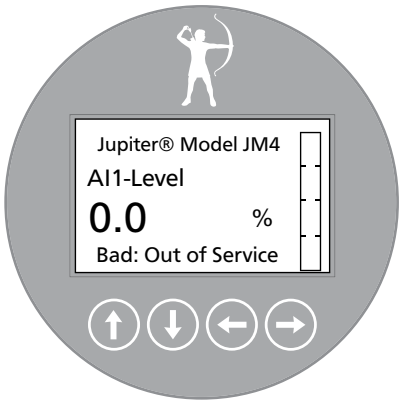


Fig. 3-1. Out of Service

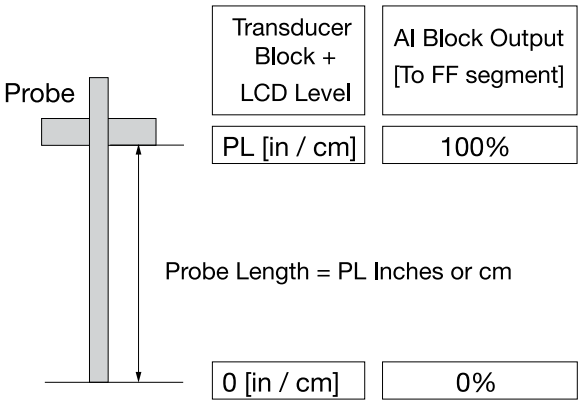
NOTE: In Fig. 3-1, status is shown as "Bad: Out of Service". This message would be shown prior to commissioning.

3.4.4 AI Block Configuration

Below are shown some examples of various typical AI Block configurations.

Example 1: standard configuration for transmitter with probe of length PL inches or cm.

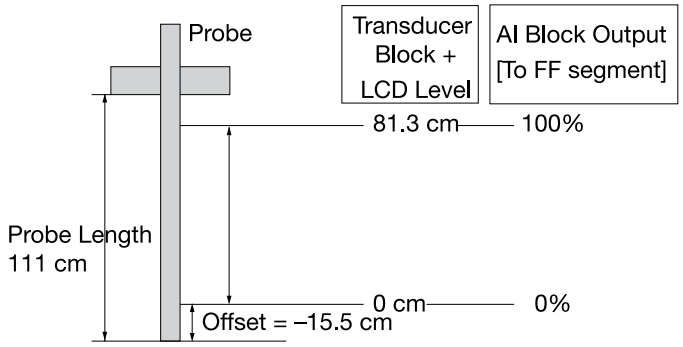
[setup by factory as part of final assembly procedure]



Configuration	
Probe Length	PL
Level Offset	0
XD Scale EU at 0%	0
XD Scale EU at 100%	PL
XD Scale Units	in/cm
Out Scale EU at 0%	0
Out Scale EU at 100%	100
Out Scale Units	%
L Type	Indirect

Example 2: end user desires 0 to 100% output for a subset of the measureable region [probe]

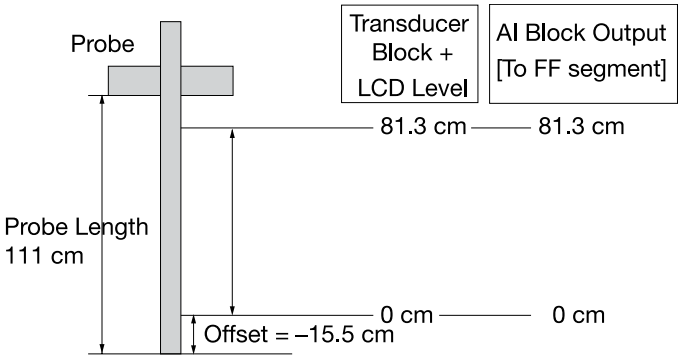
[e.g., for a chamber application]



Configuration	
Probe Length	111
Level Offset	-15.5
XD Scale EU at 0%	0
XD Scale EU at 100%	81.3
XD Scale Units	cm
Out Scale EU at 0%	0
Out Scale EU at 100%	100
Out Scale Units	%
L Type	Indirect

Example 3: same configuration as previous except Direct [no] scaling setup in AI block

Output to FF segment is in cm



Configuration	
Probe Length	111
Level Offset	-15.5
XD Scale EU at 0%	0
XD Scale EU at 100%	81.3
XD Scale Units	cm
Out Scale EU at 0%	0
Out Scale EU at 100%	81.3
Out Scale Units	cm
L Type	Direct

3.4.5 Simulation Feature

Fig. 3-2. Placement of Jumper

The Jupiter Model JM4 with FOUNDATION fieldbus™ supports the Simulate feature in the Analog Input block. The Simulate feature is typically used to exercise the operation of an AI block by simulating a TRANSDUCER block input.

This feature cannot be activated without the placement of a hardware jumper. This jumper is installed as standard on the Jupiter Model JM4, and is placed under the display module to avoid inadvertent disabling of this feature. Refer to Figure 3-2 for jumper location.

NOTE: A BLOCK_ERR of "Simulation Active" in the Resource Block does not mean simulation is active—it merely indicates that the simulation (hardware) enabling jumper is present.

- The jumper may be removed to eliminate the BLOCK_ERR, but please note that this will permanently disable the Simulate feature.
- Refer to Section 3.2.2 for additional information on the SOFT_SIMULATION_DISABLE parameter in the resource block.

3.5 PID Block

The PID Function Block contains the logic necessary to perform Proportional/Integral/Derivative (PID) control. The block provides filtering, set point and rate limits, feed-forward support, output limits, error alarms, and mode shedding.

Although most other function blocks perform functions specific to the associated device, the PID block may reside in any device on the network. This includes a valve, a transmitter, or the host itself.

The Jupiter Model JM4 FF PID Block implementation follows the specifications documented by the Fieldbus Foundation.

3.5.1 PID Block Parameters

ACK_OPTION: Used to set auto acknowledgment of alarms.

ALARM_HYS: The amount the alarm value must return to before the associated active alarm condition clears.

ALARM_SUM: The summary alarm is used for all process alarms in the block.

ALERT_KEY: The identification number of the plant unit.

BAL_TIME: The specified time for the internal working value of bias to return to the operator set bias.

BKCAL_IN: The analog input value and status for another blocks BKCAL_OUT output.

BKCAL_HYS: The amount the output must change away from its output limit before the limit status is turned off, expressed as a percent of the span of the output.

BKCAL_OUT: The value and status required by the BKCAL_IN input for another block.

BLOCK_ALM: Used for all configuration, hardware, or system problems in the block.

BLOCK_ERR: Reflects the error status associated with the hardware or software components associated with a block.

BYPASS: Used to override the calculation of the block.

CAS_IN: The remote setpoint value from another block.

CONTROL_OPTS: Allows one to specify control strategy options.

DV_HI_ALM: The DV HI alarm data.

DV_HI_LIM: The setting for the alarm limit used to detect the deviation high alarm condition.

DV_HI_PRI: The priority of the deviation high alarm.

DV_LO_ALM: The DV LO alarm data.

DV_LO_LIM: The setting for the alarm limit used to detect the deviation low alarm condition.

DV_LO_PRI: The priority of the deviation low alarm.

FF_GAIN: The feedforward gain value.

FF_SCALE: The high and low scale values associated with FF_VAL.

FF_VAL: The feedforward control input value and status.

GAIN: The proportional gain value. This value cannot equal zero.

GRANT_DENY: Options for controlling access of host computers to alarm parameters of the block.

HI_ALM: The HI alarm data.

HI_HI_ALM: The HI HI alarm data.

HI_HI_LIM: The setting for the alarm limit used to detect the HI HI alarm condition.

HI_HI_PRI: The priority of the HI HI Alarm.

HI_LIM: The setting for the alarm limit used to detect the HI alarm condition.

HI_PRI: The priority of the HI alarm.

IN: The connection for the PV input from another block.

LO_ALM: The LO alarm data.

LO_LIM: The setting for the alarm limit used to detect the LO alarm condition.

LO_LO_ALM: The LO _LO alarm data.

LO_LO_LIM: The setting for the alarm limit used to detect the LO_LO alarm condition.

LO_LO_PRI: The priority of the LO_LO alarm.

LO_PRI: The priority of the LO alarm.

MODE_BLK: The actual, target, permitted, and normal modes of the block.

OUT: The block input value and status.

OUT_HI_LIM: The maximum output value allowed.

OUT_LO_LIM: The minimum output value allowed.

OUT_SCALE: The high and low scale values associated with OUT.

PV: The process variable use in block execution.

PV_FTIME: The time constant of the first order PV filter.

PV_SCALE: The high and low scale values associated with PV.

RATE: The derivative action time constant.

RCAS_IN: Target setpoint and status that is provided by a supervisory host.

RCAS_OUT: Block setpoint and status that is provided to a supervisory host.

RESET: The integral action time constant.

ROUT_IN: Block output that is provided by a supervisory host.

ROUT_OUT: Block output that is provided to a supervisory host.

SHED_OPT: Defines action to be taken on remote control device timeout.

SP: The target block setpoint value.

SP_HI_LIM: The highest SP value allowed.

SP_LO_LIM: The lowest SP value allowed.

SP_RATE_DN: Ramp rate for downward SP changes.

SP_RATE_UP: Ramp rate for upward SP changes.

STATUS_OPTS: Allows one to select options for status handling and processing.

STRATEGY: Can be used to identify grouping of blocks.

ST_REV: The revision level of the static data associated with the function block.

TAG_DESC: The user description of the intended application of the block.

TRK_IN_D: Discrete input that initiates external tracking.

TRK_SCALE: The high and low scale values associated with TRK_VAL.

TRK_VAL: The value applied to OUT in LO mode.

UPDATE_EVT: This alert is generated by any changes to the static data.

BLOCK-ERR-DESC: Reports more specific details regarding some errors reported through BLOCK_ERR.

4.0 Advanced Function Blocks

4.1 Integrator Block (IT)

The Integrator (IT) function block integrates one or two variables over time. The block compares the integrated or accumulated value to pre-trip and trip limits and generates discrete output signals when the limits are reached.

ST_REV: The revision level of the static data associated with the function block.

TAG_DESC: The user description of the intended application of the block.

STRATEGY: The strategy field can be used to identify grouping of blocks.

ALERT_KEY: The identification number of the plant unit. This information may be used in the host for sorting alarms.

MODE_BLK: The actual, target, permitted, and normal modes of the block.

- Target: The mode to "go to"
- Actual: The mode the "block is currently in"
- Permitted: Allowed modes that target may take on
- Normal: Most common mode for target

BLOCK_ERR: The summary of active error conditions associated with the block. The block error for the Integrator function block is Out of service.

TOTAL_SP: The set point for a batch totalization.

OUT: The block output value and status.

OUT_RANGE: The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT.

GRAND_DENY: Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block (not used by the device).

STATUS_OPTS: Allows you to select option for status handling and processing. The supported status option for the Integrator block is: "Uncertain if Manual mode."

IN_1: The block input value and status.

IN_2: The block input value and status.

OUT_TRIP: The first discrete output.

OUT_PTRIP: The second discrete output.

TIME_UNIT1: Converts the rate time, units in seconds.

TIME_UNIT2: Converts the rate time, units in seconds.

UNIT_CONV: Factor to convert the engineering units of IN_2 into the engineering units of IN_1.

PULSE_VAL1: Determines the mass, volume or energy per pulse.

PULSE_VAL2: Determines the mass, volume or energy per pulse.

REV_FLOW1: Indicates reverse flow when "true"; 0- Forward, 1- Reverse

REV_FLOW2: Indicates reverse flow when "true"; 0- Forward, 1- Reverse

RESET_IN: Resets the totalizers

STOTAL: Indicates the snapshot of OUT just before a reset.

RTOTAL: Indicates the totalization of "bad" or "bad" and "uncertain" inputs, according to INTEG_OPTIONS.

SRTOTAL: The snapshot of RTOTAL just before a reset

SSP: The snapshot of TOTAL_SP

INTEG_TYPE: Defines the type of counting (up or down) and the type of resetting (demand or periodic)

INTEG_OPTIONS: A bit string to configure the type of input (rate or accumulative) used in each input, the flow direction to be considered in the totalization, the status to be considered in TOTAL and if the totalization residue should be used in the next batch (only when INTEG_TYPE=UP_AUTO or DN_AUTO).

CLOCK_PER: Establishes the period for periodic reset, in hours.

PRE_TRIP: Adjusts the amount of mass, volume or energy that should set OUT_PTRIP when the integration reaches (TOTAL_SP-PRE_TRIP) when counting up of PRE_TRIP when counting down.

N_RESET: Counts the number of resets. It cannot be written or reset.

PCT_INC: Indicates the percentage of inputs with "good" status compared to the ones with "bad or "uncertain" and "bad" status.

GOOD_LIMIT: Sets the limit for PCT_INC. OUT. Receives the status "Good" is PCT_INCL ≥ GOOD_LIM.

UNCERTAIN_LIMIT: Sets the limit for PCT_INC. OUT receives the status "uncertain" if PECT_INC ≥ UNCERT.LIM.

OP_CMD_INT: Operator command RESET resets the totalizer

OUTAGE_LIMIT: The maximum tolerated duration for power failure

RESET_CONFIRM: Momentary discrete value with can be written by a host to enable further resets, if the option "Confirm reset" in INTEG_OPTIONS is chosen.

UPDATE_EVT: This alert is generated by any changes to the static data.

BLOCK_ALM: Used for all configuration, hardware, connection failure, or system problems in the block.

BLOCK_ERR_DESC: Reports more specific details regarding some errors reported through BLOCK_ERR.

4.2 Arithmetic Block (AR)

The Arithmetic function block provides the ability to configure a range extension function for a primary input and applies the nine (9) different arithmetic types as compensation to or augmentation of the range extended input.

The nine (9) arithmetic functions are:

- Flow Compensation Linear
- Flow Compensation Square Root
- Flow Compensation Approximate
- Btu Flow
- Traditional Multiply and Divide
- Average
- Summer
- Fourth Order Polynomial
- Simple HTG Compensate Level

ST_REV: The revision level of the static data associated with the function block. The revision value will increment each time a static parameter value in the block is changed.

TAG_DESC: The user description of the intended application of the block.

STRATEGY: The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.

ALERT_KEY: The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.

MODE_BLK: The actual, target, permitted, ad normal modes of the block.

- Target: The mode to "go to"
- Actual: The mode the "block is currently in"
- Permitted: Allowed modes that target may take on
- Normal: Most common mode for target

BLOCK_ERR: This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string so that multiple errors may be shown.

PV: The primary analog value for use in executing the function, or a process value associate with it.

OUT: The analog output value and status.

PRE_OUT: Displays what would be the OUT value if the mode was "Auto" or lower.

PV_SCALE: Associated with the PV.

OUT_RANGE: The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT.

GRANT_DENY: Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block.

INPUT_OPTIONS: Option bit string for handling the status of the auxiliary inputs.

IN: The block input value and status.

IN_LO: Input of the low range transmitter, in a range extension application.

IN–1, IN–2, IN–3: Inputs combined with the PV in a section of four term math functions.

RANGE_HI: Constant value above which the range extension has switch to the high range transmitter.

RANGE_LO: Constant value below which the range extension has switch to the high range transmitter.

BIAS_IN_1: The bias value for IN_1.

GAIN_IN_1: The proportional gain (multiplier) value for IN_1.

BIAS_IN_2: The bias value for IN_2.

GAIN_IN_2: The proportional gain (multiplier) value for IN_2.

BIAS_IN_3: The bias value for IN_3.

GAIN_IN_3: The proportional gain (multiplier) value for IN_3.

COMP_HI_LIM: Determines the high limit of the compensation input.

COMP_LO_LIM: Determines the low limit of the compensation input.

ARITH_TYPE: The set of 9 arithmetic functions applied as compensation to or augmentation of the range extended input.

BAL_TIME: Specifies the time for a block value to match an input, output, or calculated value or the time for dissipation of the internal balancing bias.

BIAS: The bias value is used to calculate the output.

GAIN: The gain value is used to calculate the output.

OUT_HI_LIM: The maximum output value allowed.

OUT_LO_LIM: The minimum output value allowed.

UPDATE_EVT: This alert is generated by any changes to the static data.

BLOCK_ALM: Used for all configuration, hardware, connection failure, or system problem in the block.

BLOCK_ERR_DESC: Reports more specific details regarding some errors reported through BLOCK_ERR.

4.3 Input Selector Block (IS)

The Input Selector (IS) function block can be used to select the first good, maximum, minimum, or average of as many as four input values and place it at the output. The block supports signal status propagation. (There is no process alarm detection in the Input Selector function block.)

ST_REV: The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.

TAG_DESC: The user description of the intended application of the block.

STRATEGY: The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.

ALERT_KEY: The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.

MODE_BLK : The actual, target, permitted, and normal modes of the block.

- Target: The mode to “go to”
- Actual: The mode the “block is currently in”
- Permitted: Allowed modes that target may take on
- Normal: Most common mode for target

BLOCK_ERR: This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.

OUT: The block output value and status.

OUT_RANGE: High and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT

GRANT_DENY: Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block.

STATUS_OPTIONS: Allows you to select options for status handling and processing. The supported status options for the input selector block are: "Use Uncertain as Good", "Uncertain if Man mode."

IN_1: The block input value and status.

IN_2: The block input value and status.

IN_3: The block input value and status.

IN_4: The block input value and status.

DISABLE_1: Parameter to switch off the input from being used 0- Use, 1 - Disable.

DISABLE_2: Parameter to switch off the input from being used 0- Use, 1 - Disable.

DISABLE_3: Parameter to switch off the input from being used 0- Use, 1 - Disable.

DISABLE_4: Parameter to switch off the input from being used 0- Use, 1 - Disable.

SELECT_TYPE: Determines the selector action; First good, Minimum, Maximum, Middle, Average.

MIN_GOOD: The minimum number of inputs which are "good" is less than the value of MIN_GOOD then set the OUT status to "bad".

SELECTED: The integer indicating the selected input number.

OP_SELECT: An operator settable parameter to force a given input to be used.

UPDATE_EVT: This alert is generated by any change to the static data.

BLOCK_ALM: The block alarm is used for all configuration, hardware, connection failure, or system problems in the block.

BLOCK_ERR_DESC: Reports more specific details regarding some errors reported through BLOCK_ERR.

4.4 Signal Characterizer Block (SC)

The Signal Characterizer (SC) function block characterizes or approximates any function that defines an input/output relationship. The function is defined by configuring as many as 21 X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates. Two separate analog input signals can be processed simultaneously to give two corresponding separate output values using the same defined curve.

ST_REV: The revision level of the static data associated with the function block. The revision value will be incremented in each time a static parameter value in the block is changed.

TAG_DESC: The user description of the intended application of the block.

STRATEGY: The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.

ALERT_KEY: The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.

MODE_BLK: The actual, target, permitted, and normal modes of the block.

- Target: The mode to "go to"
- Actual: The mode the "block is currently in"
- Permitted: Allowed modes that target may take on
- Normal: Most common mode for target

BLOCK_ERR: This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string so that multiple errors may be shown.

OUT1: The block output value and status.

OUT2: The block output value and status.

X_RANGE: The display scaling of the variable corresponding to the x-axis for display. It has no effect on the block.

Y_RANGE: The display scaling of the variable corresponding to the y-axis for display. It has no effect on the block.

GRANT_DENY: Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block.

IN1: The block input value and status.

IN2: The block input value and status.

SWAP_2: Changes the algorithm in such a way that IN_2 corresponds to "y" and OUT _2 to "x".

CURVE_X: Curve input points. The "x" points of the curve are defined by an array of 21 points.

CURVE_Y: Curve input points. The "y" points of the curve are defined by an array of 21 points.

UPDATE_EVT: This alert is generated by any changes to the static data.

BLOCK_ALM: The block alarm is used for all configuration, hardware, connection failure, or system problems in the block.

BLOCK_ERR_DESC: Reports more specific details regarding some errors reported through BLOCK_ERR.

5.0 Troubleshooting

The Jupiter transmitter is designed and manufactured for years of trouble free operation over a wide range of conditions. Common transmitter problems are discussed in terms of their symptoms and recommended corrective actions.

Troubleshooting

Problem	Solution
Blank display	Ensure local Keypad / LCD is properly installed. Remove power and reapply power to the unit. Check to see if LED on module is illuminated. Check voltage at terminal board. If jumper is in place under display, remove jumper.
Transmitter does not track level (External Mount)	Remove transmitter and probe from piping column and test with re-alignment magnet. Run magnet from bottom to top of probe. Check zero and span calibration. If no change in output, consult the factory.
(Direct Insertion)	Float stuck, Probe bent (Chamber)
Float inside the level gauge is moving slowly or not at all.	Ensure that the magnetic level indicator is plumb. The process fluid being measured may be too viscous and heat tracing may be required to make the material more fluid. The specific gravity of the process fluid and float weight may need to be reverified. The liquid being measured may contain magnetic particles collecting on the magnetic section of the float causing drag. If this happens magnetic trap assemblies can be purchased from the factory. Visual inspection of the float may be required to see if the float has collapsed.
LEVEL and % OUTPUT values are all inaccurate.	Wipe probe with external magnet. Confirm configuration settings.
LEVEL and % OUTPUT values fluctuate.	Turbulence, increase damping factor until readings stabilize.
Level reading on display is correct, but loop value is stuck at 4 mA.	Set poll address to zero.

Status Messages

Display Message	Brief Description	Solution
No Probe	No probe connected to transmitter	Check probe connection to transmitter, Consult Factory
New Probe	Probe memory contents disagree with EEPROM image	On Display, go to 'Reset New Probe' and enter password.
Analog Board Error	No response from co-processor, or clock error	Consult Factory.
Probe Memory Error	Memory device in probe is unresponsive	Consult Factory.
No Float Detected	Echo curve does not rise above threshold	Run echo curve. If a visible peak exists, increase gain/sensitivity. If there is no peak, visually inspect probe to confirm presence of float. If float still not detected, consult factory.
Config Conflict	Measurement Type and Primary Variable selection parameters are inconsistent	Confirm measurement type matches PV. Good Examples: 1. MT = Level Only, PV = Total Level 2. MT = Level & IFC, PV = IFC
High Volume Alarm	Level exceeds highest level in strapping table or top of vessel by more than 5%	Confirm span set points are at desired values.
Extra Float Detected	Echo curve rises above threshold additional instance from expected number	Check Measurement type; Decrease Gain/Sensitivity Settings; Swipe probe with pocket magnet to eliminate possibility of residual magnetism; Consult Factory.
2nd Float Missing	Echo curve rises above threshold only once	Check Measurement type; Increase Gain/Sensitivity Settings; Verify two floats are present. Consult Factory.
High Elec Temp	Present electronics temperature above maximum	Take measures to cool transmitter head. Consider installing sunshade.
Low Elec Temp	Present electronics temperature below minimum	Take measure to warm transmitter head. Consider installing heat tracing.
Low Supply Voltage	Power supply voltage inadequate to prevent brownout or reset	Check supply voltage.
Weak Upr Echo	Strength of echo from float at gas-liquid interface less than allowable minimum	Increase Gain/Sensitivity Settings; Consult Factory.
Weak Ifc Echo	Strength of echo from float at liquid-liquid interface less than allowable minimum	Increase Gain/Sensitivity Settings; Consult Factory.
High Noise/Lvl Threshold	Strength of baseline noise too near upper level threshold	Echo Rejection may be required, Consult Factory, Swipe probe with pocket magnet to eliminate possibility of residual magnetism
High Noise/Ifc Threshold	Strength of baseline noise too near interface level threshold	Echo Rejection may be required, Consult Factory, Swipe probe with pocket magnet to eliminate possibility of residual magnetism

Appendix A

Level (and Interface) Transducer Block Table

Item	Parameter Name	Parameter Label
0	BLOCK_STRUCTURE	BLOCK STRUCT
1	ST_REV	Static Revision
2	TAG_DESC	Tag Description
3	STRATEGY	Strategy
4	ALERT_KEY	Alert Key
5	MODE_BLK	Block Mode
6	BLOCK_ERR	Block Error
7	UPDATE_EVT	Update Event
8	BLOCK_ALM	Block Alarm
9	TRANSDUCER_DIRECTORY	Transducer Directory
10	TRANSDUCER_TYPE	Transducer Type
11	XD_ERROR	Transducer Error
12	COLLECTION_DIRECTORY	Collection Directory
13	MEAS_TYPE	Measurement Type
14	LEVEL	Level
15	LEVEL_UNIT	Level Unit
16	DISTANCE	Distance
17	DISTANCE_UNIT	Distance Unit
18	PROBE_MODEL_NUM	Probe M/N
19	PROBE_SER_NUM	Probe S/N
20	PROBE_CONFIG	Probe Configuration
21	PROBE_TYPE	Probe Type
22	PROBE_LENGTH	Probe Length
23	PROBE_TEMP_RATING	Probe Temp Rating
24	PROBE_VIBRATION_RATING	Probe Vibration Rating
25	PROBE_FLOATMINSEP	Probe Minimum Separation
26	PROBE_ SENSITIVITY	Probe Sensitivty
27	PROBE_ LEVEL_THRESHOLD_MODE	Probe Level Threshold Mode
28	PROBE_ LEVEL_SLOPED_START_AMPL	Probe Level Sloped Start Value
29	PROBE_ LEVEL_THRESHOLD_VALUE	Probe Level Threshold Value
30	PROBE_ IFC_LEVEL_THRESH_MODE	Ifc Level Thresh Mode
31	PROBE_ IFC_SLOPED_START_AMPL	Ifc Sloped Start Value
32	PROBE_ IFC_LEVEL_THRESH_VALUE	Ifc Level Thresh Value
33	PROBE_SLOPED_END_DISTANCE	Sloped End Distance
34	PROBE_ UPR_LVL_POLARITY	Probe Upr Lvl Polarity
35	PROBE_IFC_LVL_POLARITY	Probe Ifc Level Polarity
36	RESET_NEW_PROBE_DIAGNOSTIC	Reset New Probe Diagnostic
37	PROBE_CONV_FACT	Probe Conversion Factor
38	PROBE_SCLE_OFFS	Probe Scale Offset

39	PROBE_DRIVE_PLUS_COUNTS	Probe Drive+ Counts
40	PROBE_WAIT_COUNTS	Probe Wait Counts
41	PROBE_DRIVE_MINUS_COUNTS	Probe Drive- Counts
42	PROBE_CAL_DATE	Probe Cal Date
43	PROBE_CAL_LOC	Probe Cal Location
44	PARAMETER_5	Parameter 5
45	PARAMETER_6	Parameter 6
46	LEVEL_OFFSET	Level Offset
47	ZERO_OFFSET	Zero Offset
48	SENSITIVITY	Sensitivity
49	BLOCKING_DISTANCE	Blocking Distance
50	ALARM_DELAY	Failure Alarm Delay
51	LEVEL_TRIM	Level Trim
52	LEVEL_THRESHOLD_MODE	Level Threshold Mode
53	LEVEL_THRESHOLD_VALUE	Level Threshold Value
54	UPR_LVL_POLARITY	Level Polarity
55	FLOATMINSEP	Minimum Separation
56	LEVEL_SLOPED_START_AMPL	Level Sloped Start Value
57	SLOPED_END_DISTANCE	Sloped End Distance
58	INTERFACE_LEVEL	Interface Level
59	INTERFACE_LEVEL_UNIT	Interface Level Unit
60	UPPER_THICKNESS	Upper Thickness
61	UPPER_THICKNESS_UNIT	Upper Thickness Unit
62	IFC_LEVEL_TRIM	Ifc Level Trim
63	IFC_LEVEL_THRESH_MODE	Ifc Level Thresh Mode
64	IFC_LEVEL_THRESH_VALUE	Ifc Level Thresh Value
65	IFC_LVL_POLARITY	Ifc Level Polarity
66	IFC_SLOPED_START_AMPL	Ifc Sloped Start Value
67	RESET_PARAMETERS	Reset Parameters
68	LEVEL_TICKS	Level Ticks
69	ECHO_STRENGTH	Echo Strength
70	INTERFACE_TICKS	Interface Ticks
71	IFC_ECHO_STRENGTH	Ifc Echo Strength
72	LEVEL_NOISE_RATIO	Level Noise Ratio
73	LEVEL_NOISE_LOCATION	Level Noise Location
74	IFC_NOISE_RATIO	Ifc Noise Ratio
75	IFC_NOISE_LOCATION	Ifc Noise Location
76	ELECTRONICS_TEMPERATURE	Electronics Temp
77	TEMPERATURE_UNIT	Temperature Unit
78	MAX_ELECTRONICS_TEMP	Max Elec Temp
79	MIN_ELECTRONICS_TEMP	Min Elec Temp

80	RESET_ELECTRONICS_TEMPS	Reset Electronic Temps
81	ENTER_PASSWORD	Enter Password
82	ELEC_TEMP_OFFSET	Elec Temp Offset
83	NAP_VALUE	NAP Value
84	FACTORY_RESET	Factory Reset
85	CONV_FACT	Conversion Factor
86	SCLE_OFFS	Scale Offset
87	DRIVE_PLUS_COUNTS	Drive+ Counts
88	WAIT_COUNTS	Wait Counts
89	DRIVE_MINUS_COUNTS	Drive- Counts
90	FACTORY_PARAMETER_1	Factory Parameter 1
91	FACTORY_PARAMETER_2	Factory Parameter 2
92	FACTORY_PARAMETER_3	Factory Parameter 3
93	FACTORY_PARAMETER_4	Factory Parameter 4
94	MAGNETROL_SERIAL_NUMBER	Magnetrol S/N
95	DATE_CODE	Date Code
96	CONFIG_CHANGED_MODE	TB Config Chgd Mode
97	RESET_CONFIG_CHANGED	Reset Config Changed
98	USER_PASSWORD	New User Password
99	LOCAL_DISP_MEAS_VALUES	Local Disp Meas Values
100	LOCAL_DISP_LANGUAGE	Local Disp Language
101	LOCAL_DISP_PHYS_DEV_TAG	Local Disp Phys Dev Tag
102	MAIN_FIRMWARE_VERSION	Main Firmware Version
103	MAIN_HARDWARE_VERSION	Main Hardware Version
104	COP_FIRMWARE_VERSION	CoP Firmware Version
105	COP_HARDWARE_VERSION	CoP Hardware Version
106	PRESENT_STATUS	Present Status
107	STATUS_INDICATORS_1	Indicators Group 1
108	STATUS_INDICATORS_2	Indicators Group 2
109	STATUS_INDICATORS_3	Indicators Group 3
110	STATUS_INDICATORS_4	Indicators Group 4
111	STATUS_INDICATORS_5	Indicators Group 5
112	STATUS_INDICATORS_6	Indicators Group 6
113	TREND_LEVEL_VALUE	Level
114	TREND_DISTANCE_VALUE	Distance
115	TREND_IFC_LEVEL_VALUE	Interface Level
116	TREND_UPPER_THICK_VALUE	Upper Thickness
117	TREND_ECHO_STR_VALUE	Echo Strength
118	TREND_IFC_ECHO_STR_VALUE	Ifc Echo Strength
119	DEVICE_CLOCK	Device Clock

120	HISTORY_CONTROL	History Control
121	HIST_ENTRY1	Event History 1
122	HIST_ENTRY2	Event History 2
123	HIST_ENTRY3	Event History 3
124	HIST_ENTRY4	Event History 4
125	HIST_ENTRY5	Event History 5
126	HIST_ENTRY6	Event History 6
127	HIST_ENTRY7	Event History 7
128	HIST_ENTRY8	Event History 8
129	HIST_ENTRY9	Event History 9
130	HIST_ENTRY10	Event History 10
131	RESET_HISTORY	Reset History
132	ECHO_HIST_TRIGGER_MODE	Echo Hist Trigger Mode
133	ECHO_HIST_TIME_TRIGGERS	Echo Hist Time Triggers
134	ECHO_HIST_EVENT_TRIGGERS	Echo Hist Event Triggers
135	ECHO_REFERENCE_LOG	Echo Reference
136	ECHO_HISTORY_LOG1	Echo History 1
137	ECHO_HISTORY_LOG2	Echo History 2
138	ECHO_HISTORY_LOG3	Echo History 3
139	ECHO_HISTORY_LOG4	Echo History 4
140	ECHO_HISTORY_LOG5	Echo History 5
141	ECHO_HISTORY_LOG6	Echo History 6
142	ECHO_HISTORY_LOG7	Echo History 7
143	ECHO_HISTORY_LOG8	Echo History 8
144	ECHO_HISTORY_LOG9	Echo History 9
145	DELETE_ECHO_HISTORY	Delete Echo History
146	SAVE_ECHO_CURVE	Save Echo Curve
147	VIEW_ECHO_CURVE	View Echo Curve
148	WAVEFORM_SUMMARY	Waveform Summary
149	ECHO_CURVE_DATA	Echo Curve Data
150	ECHO_DATA_INDEX	Echo Data Index
151	DATA_LOG_SETUP	Data Log Setup
152	DATA_LOG_SUMM_READ_REQ	Log Summary Read Req
153	DATA_LOG_SUMMARY	Data Log Summary
154	DATA_LOG_INDEX	Data Log Index
155	DATA_LOG_RECORDS	Log Data
156	PD_TAG_APPL_IMAGE	PD Tag

Level (and Interface) Transducer Block Table

Item	Parameter Name	Parameter Label
0	BLOCK_STRUCTURE	BLOCK STRUCT
1	ST_REV	Static Revision
2	TAG_DESC	Tag Description
3	STRATEGY	Strategy
4	ALERT_KEY	Alert Key
5	MODE_BLK	Block Mode
6	BLOCK_ERR	Block Error
7	UPDATE_EVT	Update Event
8	BLOCK_ALM	Block Alarm
9	TRANSDUCER_DIRECTORY	Transducer Directory
10	TRANSDUCER_TYPE	Transducer Type
11	XD_ERROR	Transducer Error
12	COLLECTION_DIRECTORY	Collection Directory
13	MEAS_TYPE	Measurement Type
14	VOLUME	Volume
15	VOLUME_UNIT	Volume Unit
16	FILL_RATE	Fill Rate
17	FILL_RATE_UNIT	Fill Rate Unit
18	LEVEL_VALUE	Level
19	LEVEL_UNIT	Level Unit
20	VESSEL TYPE	Vessel Type
21	VESSEL_RADIUS	Vessel Radius
22	VESSEL_ELLIPSE_DEPTH	Vessel Ellipse Depth
23	VESSEL_CONICAL_HEIGHT	Vessel Conical Height
24	VESSEL_WIDTH	Vessel Width
25	VESSEL_LENGTH	Vessel Length
26	VOLUME_TABLE_TYPE	Volume Table Type
27	LEVEL_INPUT_SOURCE	Level Input Source
28	VOLUME_TABLE_LENGTH	Volume Table Length
29	VOLUME_TABLE_PT_01	Volume Table Pt 01
30	VOLUME_TABLE_PT_02	Volume Table Pt 02
31	VOLUME_TABLE_PT_03	Volume Table Pt 03
32	VOLUME_TABLE_PT_04	Volume Table Pt 04
33	VOLUME_TABLE_PT_05	Volume Table Pt 05
34	VOLUME_TABLE_PT_06	Volume Table Pt 06
35	VOLUME_TABLE_PT_07	Volume Table Pt 07
36	VOLUME_TABLE_PT_08	Volume Table Pt 08
37	VOLUME_TABLE_PT_09	Volume Table Pt 09
38	VOLUME_TABLE_PT_10	Volume Table Pt 10

39	VOLUME_TABLE_PT_11	Volume Table Pt 11
40	VOLUME_TABLE_PT_12	Volume Table Pt 12
41	VOLUME_TABLE_PT_13	Volume Table Pt 13
42	VOLUME_TABLE_PT_14	Volume Table Pt 14
43	VOLUME_TABLE_PT_15	Volume Table Pt 15
44	VOLUME_TABLE_PT_16	Volume Table Pt 16
45	VOLUME_TABLE_PT_17	Volume Table Pt 17
46	VOLUME_TABLE_PT_18	Volume Table Pt 18
47	VOLUME_TABLE_PT_19	Volume Table Pt 19
48	VOLUME_TABLE_PT_20	Volume Table Pt 20
49	VOLUME_TABLE_PT_21	Volume Table Pt 21
50	VOLUME_TABLE_PT_22	Volume Table Pt 22
51	VOLUME_TABLE_PT_23	Volume Table Pt 23
52	VOLUME_TABLE_PT_24	Volume Table Pt 24
53	VOLUME_TABLE_PT_25	Volume Table Pt 25
54	VOLUME_TABLE_PT_26	Volume Table Pt 26
55	VOLUME_TABLE_PT_27	Volume Table Pt 27
56	VOLUME_TABLE_PT_28	Volume Table Pt 28
57	VOLUME_TABLE_PT_29	Volume Table Pt 29
58	VOLUME_TABLE_PT_30	Volume Table Pt 30
59	VOLUME_HIGH_LIMIT	Volume High Limit
60	LEVEL_LOW_LIMIT	Level Low Limit
61	LEVEL_HIGH_LIMIT	Level High Limit
62	ENTER_PASSWORD	Enter Password
63	PRESENT_STATUS	Present Status
64	STATUS_INDICATORS_1	Indicators Group 1
65	STATUS_INDICATORS _2	Indicators Group 2
66	STATUS_INDICATORS _3	Indicators Group 3
67	STATUS_INDICATORS _4	Indicators Group 4
68	STATUS_INDICATORS _5	Indicators Group 5
69	STATUS_INDICATORS _6	Indicators Group 6
70	TREND_VOLUME_VALUE	Volume

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

Any unit that was used in a process must be properly cleaned in accordance with the proper health and safety standards applicable by the owner, before it is returned to the factory.
A material Safety Data Sheet (MSDS) must be attached at the outside of the transport crate or box.
All shipments returned to the factory must be by prepaid transportation. Magnetrol ***will not accept*** collect shipments.
All replacements will be shipped Ex Works.

BULLETIN N°: BE 46-651.0
EFFECTIVE: JUNE 2019
SUPERSEDES: NEW

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