YAMATAKE

CM2-STJ200-2001

ST3000 Smart Transmitter Series900

Supplement Manual for HART® Communication Option

Yamatake Corporation

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About This Publication

This manual is intended as a detailed “how to” reference for operating Yamatake’s ST3000 Smart Transmitters Series 900 with HART® communication option. It is based on using the HART® Communicator as the operator interface for the transmitter.

Note that this manual does not include a detailed reference for installing, piping the transmitter or detail operations of the HART® Communicator. Refer the user’s manuals of ST3000 Smart Transmitter Series 900 (CM2-STJ100-2001) and the HART® Communicator.

Table of Contents

Section 1 – Starting Communications

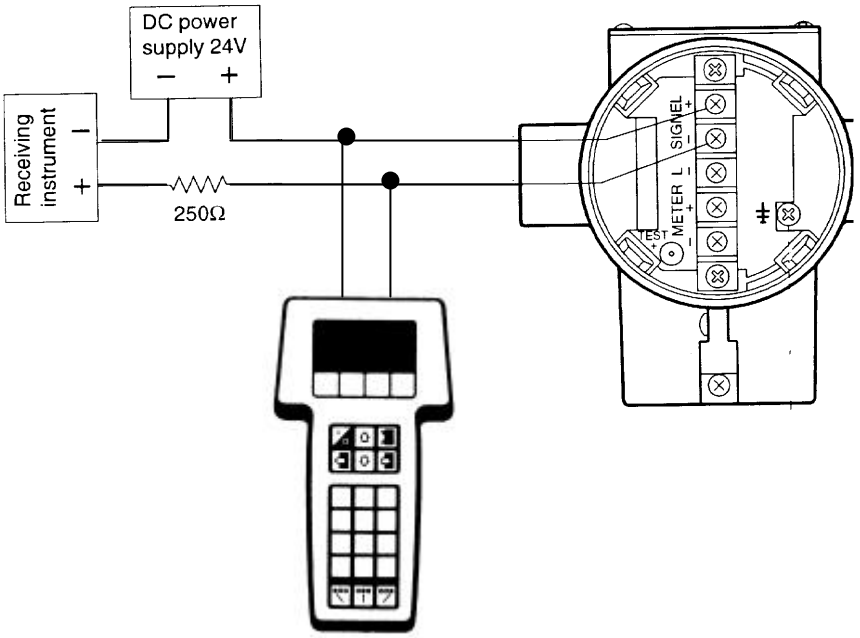
Overview of Section 1

Instructions for connecting HART® Communicator to this transmitter.
Basic instructions for Key-pad operation.

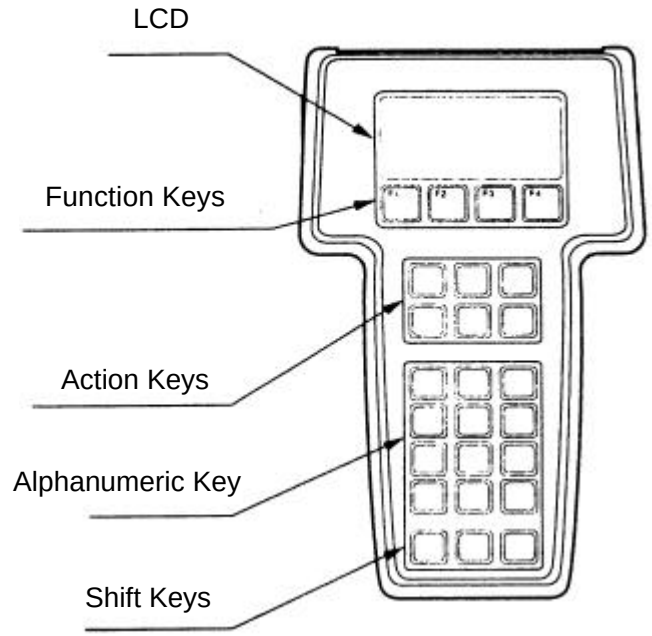
1.1 Connecting Communicator

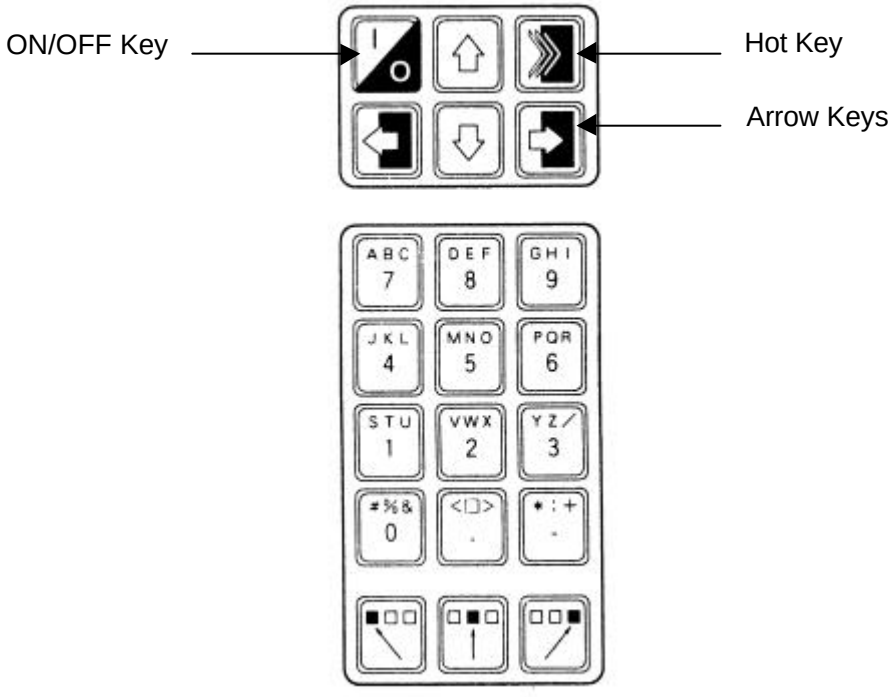
Connecting the communicator

You connect the communicator directly to signal terminals on the transmitter's terminal block or at any location in the 4 to 20 mA loop. (Polarity of the communicator connection does not matter)

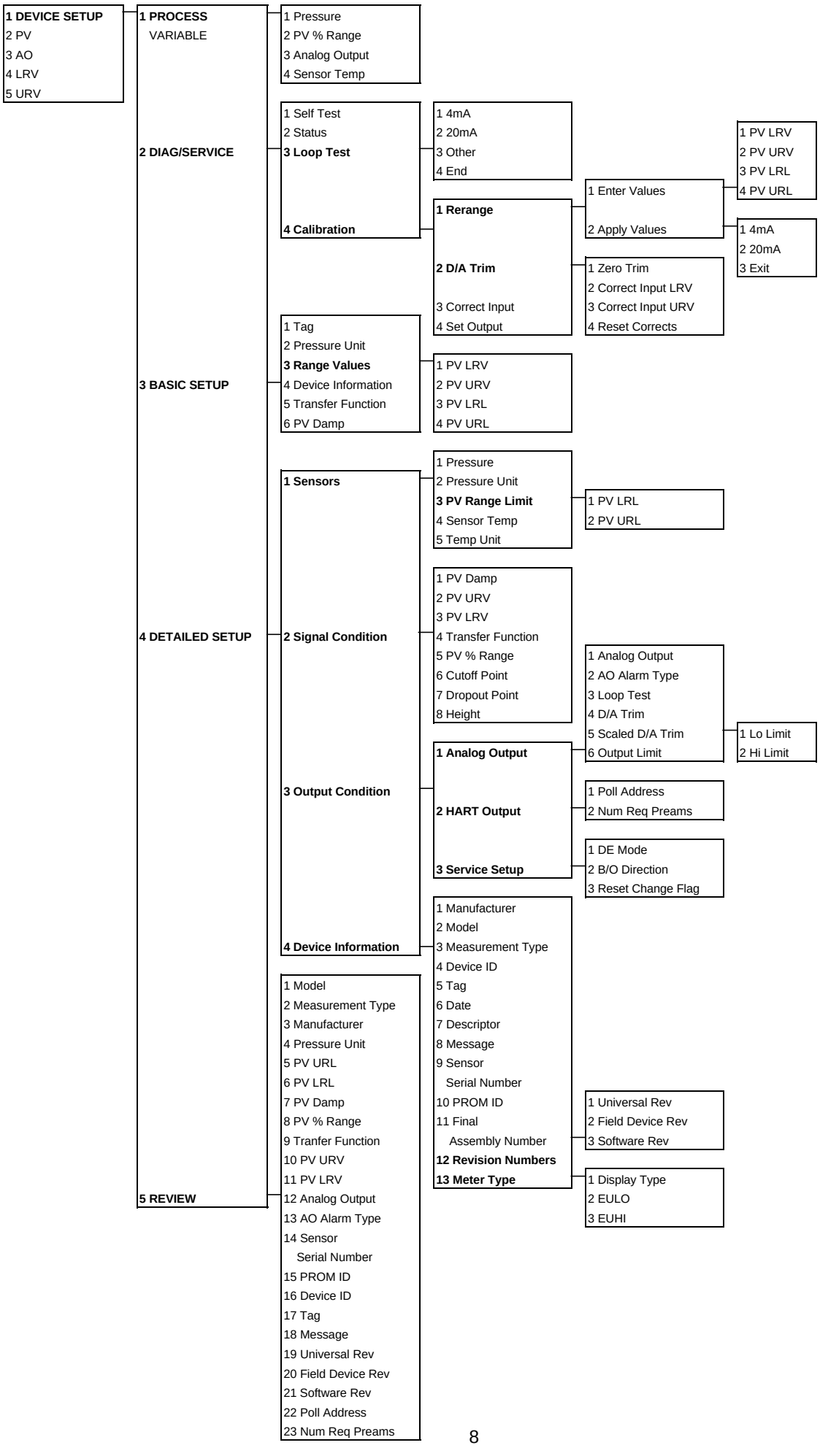


1.2 HART® Communicator Keyboard





2.1 HART® Communicator Menu Summary



1.3 Symbols on Communicator Screen

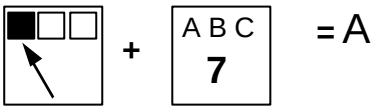
Symbols on screen

♡	Flashing heart icon in the upper right corner indicates that the transmitter and communicator are communicating.
⬅	This left arrow symbol indicates that the left arrow on the keypad brings you back to previous menu.
↑ or ↓	These arrows indicate there is more column to scroll though, using the indicated arrow on the keypad.
→	This right arrow indicates a menu item has menu option.

1.4 Keying in Alphanumeric Characters

Keying in alphanumeric characters

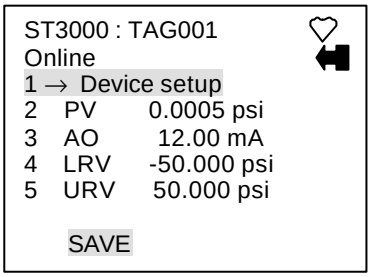
To key in an alphabet at the top of a key, press the arrow key indicating the position of the character on the key, then press the alphanumeric key.



1.5 Establishing Communications

Starting Communications

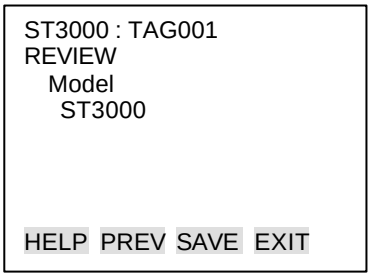
This procedure starts communications between the transmitter and the communicator:

STEP	Action and/or Description
1	Turn on communicator. The communicator runs a self-test check then determines if it is connected to a transmitter.
2	If you receive a communication error message (No Device Found), check the following: - Loop resistance: Is there a minimum of 250 ohms resistance between the communicator and the power supply? - Power supply: Is power applied? Is there greater than 11 volts at the transmitter? Correct any problems, the try communicating again. If the message, or any other error message, appears again, refer to Section 7 – Trouble shooting for probable cause.
3	When the “Online” display – shown below – appears, you have established communication with the transmitter.  The flashing heart icon in the upper right corner indicates the communicator and the transmitter are communicating.

1.6 Checking Basic Data

Checking configuration data

This procedure checks the transmitter's factory-set configuration parameters:

STEP	Action and/or Description
1	From the "Online" menu, enter "Device setup" by pressing the right arrow (→) key on the communicator keypad.
2	Press the down arrow (↓) key to scroll down to menu-item "5 Review". When highlighted press the right arrow (→) key to enter review function. 
3	Press PREV and/or NEXT to scroll through the configuration data including: - Model - Measurement type - Manufacturer - Pressure unit - URL (Upper Range Limit) - LRL (Lower Range Limit) - Damping - PV % Range - Transfer function (linear or square root) - PV URV (Upper Range Value) - PV LRV (Lower Range Value) - Analog output (in mA) - AO Alarm type - Sensor serial number - PROM ID - Device ID - Tag name - Message - Universal revision number - Field device revision number - Software revision number - Polling address - Number of required preambles
4	Press EXIT to go back to the "Device setup" menu.

Section 2 – Configuration

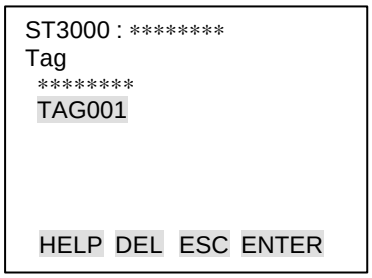
Overview of Section 2

This section introduces you configuration of ST3000 Series 900 transmitter with HART® option using the HART® Communicator.

This section also provides an overview of the HART® Communicator, including menus and keyboards.

2.2 Changing Tag No.

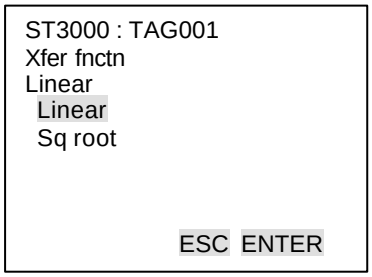
This shows how to change or enter tag number.
(Device setup) – (Detailed setup) – (Device information) – (Tag)



After entering a tag number with pressing ENTER, press SEND to download the change to the transmitter.

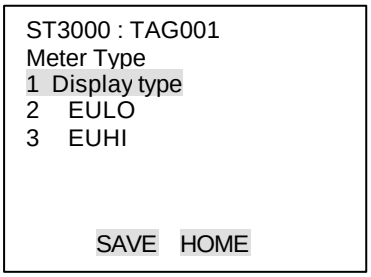
2.3 Changing Output Format

This shows how to change output format, which linear calculation or square root calculation used for measuring differential pressure between a primary element with DP type transmitter.
(Device setup) – (Detailed setup) – (Signal condition) – (Xfer fnctn)



2.4 Indicator Display Format

This shows how to configure display format and/or its ranges.
(Device setup) – (Detailed setup) – (Device information) –(Meter type)



2.4.1 Display Type

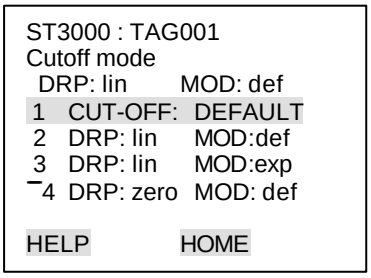
Mode	Description
E.UNIT (Linear)	Displaying PV with engineering unit when output format is linear.
% (Linear)	Displaying PV with % when output format is linear.
E.UNIT (Dsp Flow)	Displaying square rooted PV with engineering unit and output is linear
% (Dsp Flow)	Displaying square rooted PV with % and output is linear.
E.UNIT (Flow)	Displaying square rooted PV with engineering unit and output is also square rooted.
% (Flow)	Displaying square rooted PV with % and output is also square rooted.

2.4.2 EULO / EUHI
EULO and EUHI must be configured between –19999 and +19999 to indicate PV with an engineering unit.
EULO: The value to be indicated when the output is 0%
EUHI: The value to be indicated when the output is 100%

2.5 Low Flow Cutoff Value / Dropout Point

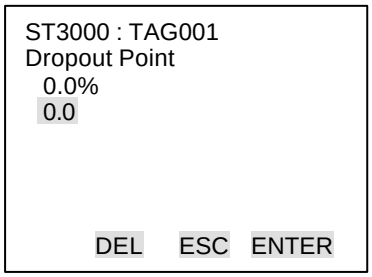
This shows how to configure low flow cut value.
This function is effective only when Square Root is selected for the output format.
(Device setup) – (detailed setup) – (Signal condition) – (Cutoff mode)

When Square Root is selected for the output format, the following display will be appeared.



DRP: Dropout Format (Linear / Zero)
MOD: Flow Rate Mode (Default / Expand)

When you select Dropout Format, you will be prompted to write cutoff mode and press OK to return to “Cutoff mode” menu.
Configure dropout point selecting “Dropout Point”.



2.6 Selecting unit of Measurement

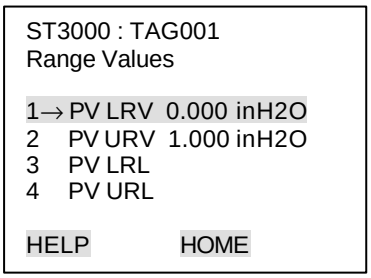
This function is to select a pressure unit of the transmitter.
(Device setup) – (Basic setup) – (Pressure Unit)

A pressure unit is able to be selected from the following;

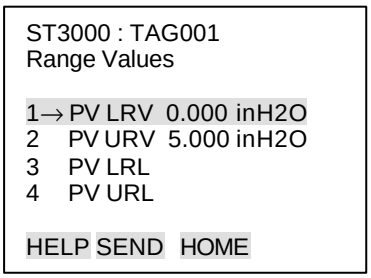
inH2O	inHg	mmH2O	mmHg	psi	bar
mbar	g/Sqcm	kg/Sqcm	Pa	kPa	
MPa					

2.7 Setting Range Values

This is to configure the measuring range of the transmitter.
(Device setup) – (Basic setup) – (Range values)



- Select PV LRV or PV URV to key in the desired setting.
- Press ENTER. This takes you back to “Range values” menu.
- Press SEND to download change to transmitter.



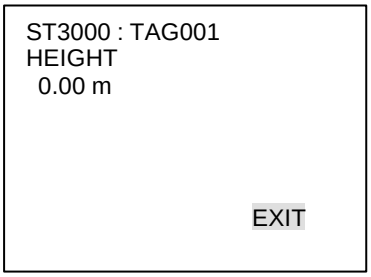
If the number of digit you key in is more than four, the set range is not appeared on “Range Values” menu.
LRL and URL are to refer only.

2.8 Fill Fluid Temperature Compensation

Yamatake's unique fill fluid temperature compensation function for remote diaphragm seals transmitter minimizes the effect of the fill fluid density changes by ambient temperature on the transmitter performance.

This function implemented by inputting the height between the flanges on which the transmitter is mounted.

(Device setup) – (Detailed setup) – (Signal condition) – (Height)

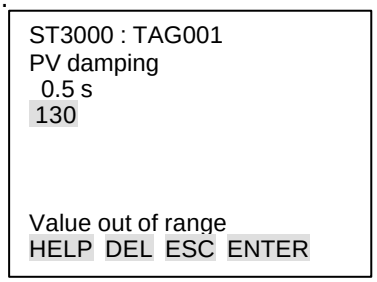


Key in the height between the flanges in meter.
When communicating with the transmitter without this function, the screen shows "0.00 m". Keying in "0" disables the function.

2.9 Adjusting Damping Time

You can adjust the damping time to reduce the output noise.

(Device setup) – (Detailed setup) – (Signal condition) – (PV damping)
When PV damping menu, key in appropriate damping time from 0.0 to 128.0, and the press ENTER. A display will prompt when you enter the value out of range that the value is out of range.



Section 3 - Start-up and Operation

Overview of Section 3

This section identifies how to access typical data associated with the start-up and the operation of ST3000 S900 with HART® communication option. It includes the procedure for running an analog output check

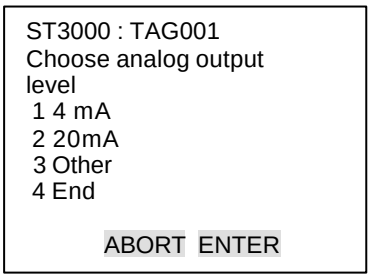
3.1 Running Analog Output Check

You can put the transmitter into a constant-current source mode, which maintains the output that is set between 4 mA (0%) and 20 mA (100%).

This shows how to configure the transmitter in a constant-current source mode and to return to its original output.

(Device setup) – (Detailed setup) – (Output condition) – (Analog output) – (Loop test)

You will be prompted to put the loop into manual mode. After doing so, press ENTER.
Then, the following screen is appeared.

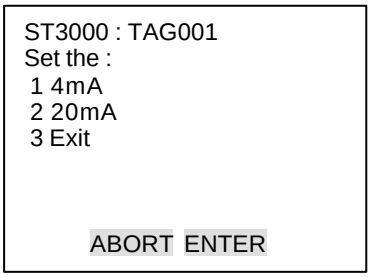


- Select 4mA to set the output signal level to 4mA (0%).
- Select 20mA to set the output signal level to 20mA (100%).
- Select Other and press ENTER, then use communicator's keyboard to enter other values.
- Select End and press ENTER. The communicator will notify you that it is returning transmitter to its original output.

3.2 Configuring Ranges with Applying Pressure

This shows how to configure ranges with applying 4mA/20mA input pressure.

(Device setup) – (Diag/Service) – (Calibration) – (Rerange) – (Apply Values)
You will be warned to remove the loop from automatic control. After doing so, press ENTER.
Then the following screen will be appeared.



- Choose 4mA then press ENTER.

A display will prompt you to apply new 4 mA input.
When "Current applied process value" display appears, choose "Set as 4mA value" then press ENTER.
Return the loop to automatic.

Section 4 - Calibration

Overview of Section 4

This section provides information about calibrating the transmitter’s analog output and measuring range. It also covers the procedure for resetting calibration to default values.

4.1 Calibrating Analog Output Signal

You can calibrate the transmitter's analog output circuit at its and 100% levels by using the transmitter in its constant current source mode.

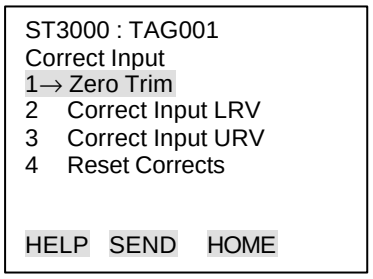
(device setup) – (Detailed setup) – (Output Condition) – (Analog output) – (D/A trim)

STEP	Action/Description
1	You will be warned to remove the loop from automatic control. After doing so, press OK. When prompt appears, connect a precision milliammeter or volt meter (0.03% accuracy or better) in loop to check readings. Press OK.
2	The following display prompts will appear: - Setting field device output to 4 mA. Press OK. - Enter meter value . Key in meter value, then press OK. - Field device output 4.000 mA equal to reference meter? 1 Yes 2 No If not equal, select No, press ENTER, then key in new meter value. (returns to "Enter meter value" prompt until field device output equals reference meter.) If equal, select Yes, press ENTER.
3	The following display prompts will appear: - Setting field device output to 20 mA. Press OK. - Enter meter value. Key in meter value, then press ENTER. - Filed device output 20.000 mA equal to reference meter? 1 Yes 2 No If not equal, select No, press ENTER, then key in new meter value. (Returns to "Enter meter value" prompt until field device output equals reference meter.) If equal, select Yes, press ENTER. Prompt notifies you that the field device will be returned to its original output.

4.2 Calibrating Range

The ST3000 Smart Transmitter has two-point calibration. This means when you calibrate two points in the range, all the points in that range adjust to that calibration.

(Device setup) – (Diag/Service) – (Calibration) – (Correct Input)



- Select “Correct Input LRV” or “Correct Input URV”.
- You will be warned to remove the loop from automatic control. After doing so, press OK.
- When prompted, adjust pressure source to apply pressure equal to LRV (0%) or URV (100%), then press OK.
- When pressure is stable, press OK.
- When prompted, remove pressure.

4.3 Resetting Calibration

A Corrects Rest returns the zero and span calibration factors to their default values. The transmitter calculates its output based on the characterization equation alone, without any compensation for the residual errors.

(Device setup) – (Diag/Service) – (Calibration) – (Reset Corrects)

- When prompted, remove the loop from automatic control. Press OK.
- Prompt notifies you that a Reset Corrects is about to occur. Press OK.
- When message “Reset Corrects OK” appears, press OK.

- Calibration is reset to default values.
- When prompted, return the loop to automatic control and press OK.

Section 5 – Service Setup Menu

Overview of Section 5

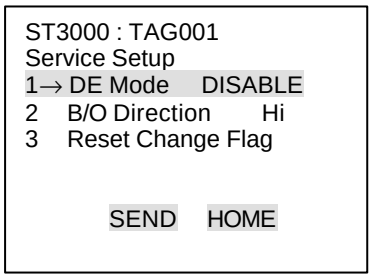
Service Setup menu includes;
- DE Mode
- B/O Direction
- Reset Change Flag

To enter Service Setup menu, password number is required.

5.1 Entering Service Setup Menu

(Device setup) – (Detailed Setup) – (Output Condition) – (Service Setup)

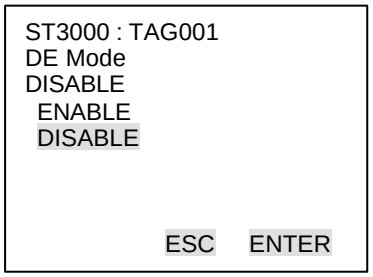
When the prompt notifies you that password number is required, press OK.
Key in “3000” as the password number.
The following display will appear.



5.2 DE Mode

The ST3000 Series 900 with HART® communication option has capability to communicate with both HART® Communicator and SFC (Smart Field Communicator).
The function to communicate with SFC is disabled when the transmitter is shipped.
To enable the function, follow the procedure.

(Service Setup) – (DE Mode)



Select ENABLE and press ENTER.

5.3 Changing Failsafe Direction

The transmitter is shipped with the failsafe direction which is defined by model number.
When you need to change the direction, follow the procedure.

(Service Setup) – (B/O Direction)

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