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WARNING: These products are not designed for use in, and should not be used for, human applications.

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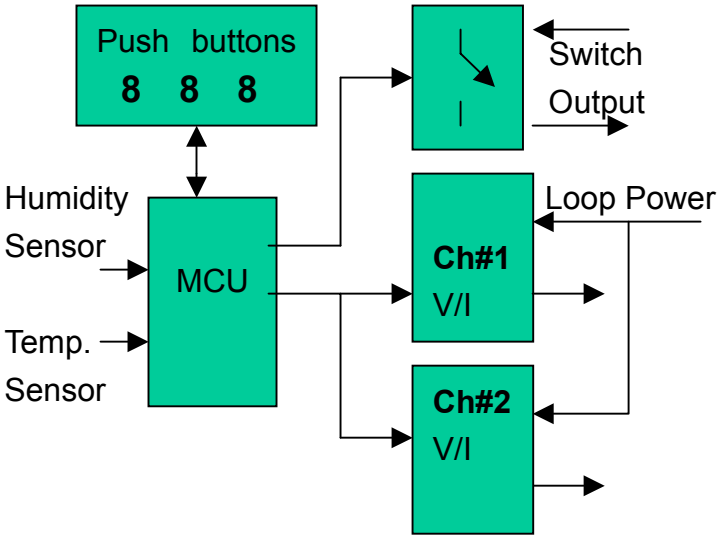
1. Introduction

This manual contains information for the installation and operation of the HX400 Series Humidity/Temperature Transmitter. The HX400 Series 2-wire loop-powered programmable multi-units transmitter, is a versatile instrument which Converts, Indicates, Transmits and Switches the input signal from an integrated digital polymer capacitive humidity sensor and a PN barrier silicon temperature sensor into a linearized, temperature compensated, dual single analog 4 - 20m ADC loop current output. See the unit block diagram <Fig. 1>

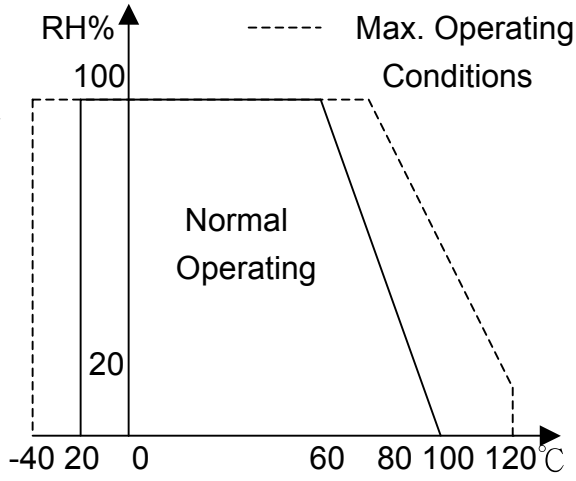
The HX400 Series is microprocessor based incorporating advanced electronic circuitry that enables it to provide a high degree of performance and flexibility yet at a reasonable cost and ease of use. The HX400 Series consists of a 3 push button front keyboard with dual color 3-digit 7-segments high bright LED modules. The display modules are used to indicate the values of the measured parameters and computed values during Measuring Mode, and provide prompting and programming instructions during Setup Mode and Calibration Mode. See sensor operating condition <Fig 1-a>

The Setup Mode may be used by the user who wishes to re-configure the transmitter for new applications. The Calibration Mode may be used by the user who wishes to maintain the high performance of the unit. All of the working parameters and calibration data are saved on EEPROM. If power to the transmitter is lost, the unit resumes normal operation with the parameters that have been configured upon reapplication power. The Transmitter's dual independent analog output range can be set anywhere within the operating range.

The HX400 Series provides dual galvanic isolated solid state single pole relay output which could be programmed as a high, low or window trips each with normally open or close contacts for a variety of control applications.



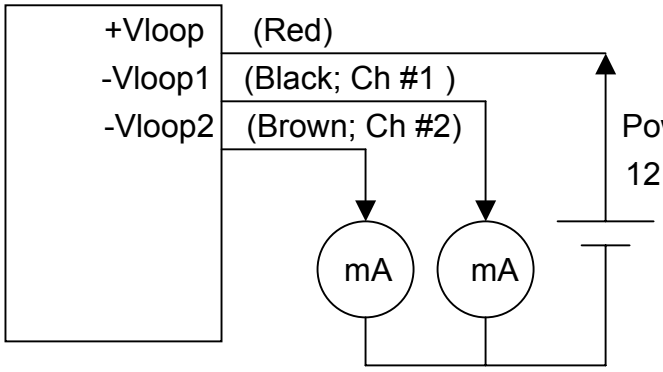
<Fig1> Block Diagram for HX402 Model
Ch #1 equipped only for HX401 Model



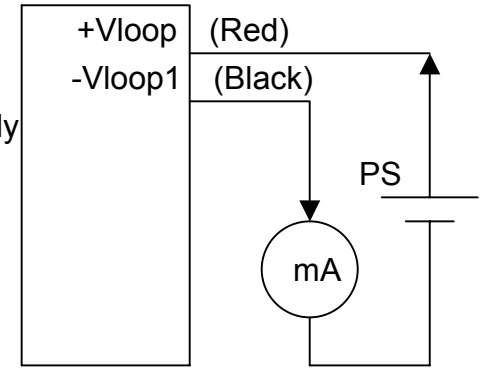
<Fig 1-a> Sensor Operating Conditions

2. Electrical Wired & Installation

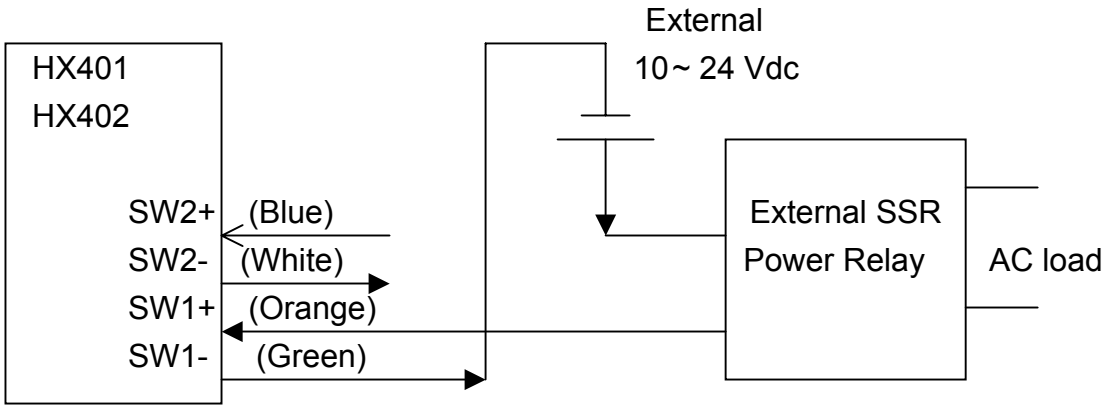
The power cord is one-meter length, 22 AWG, 7/6 different colors for recognition. Please pay attention to polarity (Wire Colored) when connecting loop power source and external Solid State Relay device. **Warning: Model HX402 will be damaged if only Ch #1 is powered**



<Fig. 2a> HX402 power connection



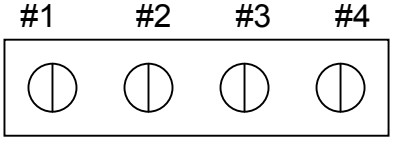
<Fig. 2b> HX401 power connection



<Fig.3> SW #1 & #2 Output Connection Diagram;

The built-in dual solid-state single pole switch output stress capacity is 40Vdc max. 15 mA max. between terminal SW+ and terminal SW-

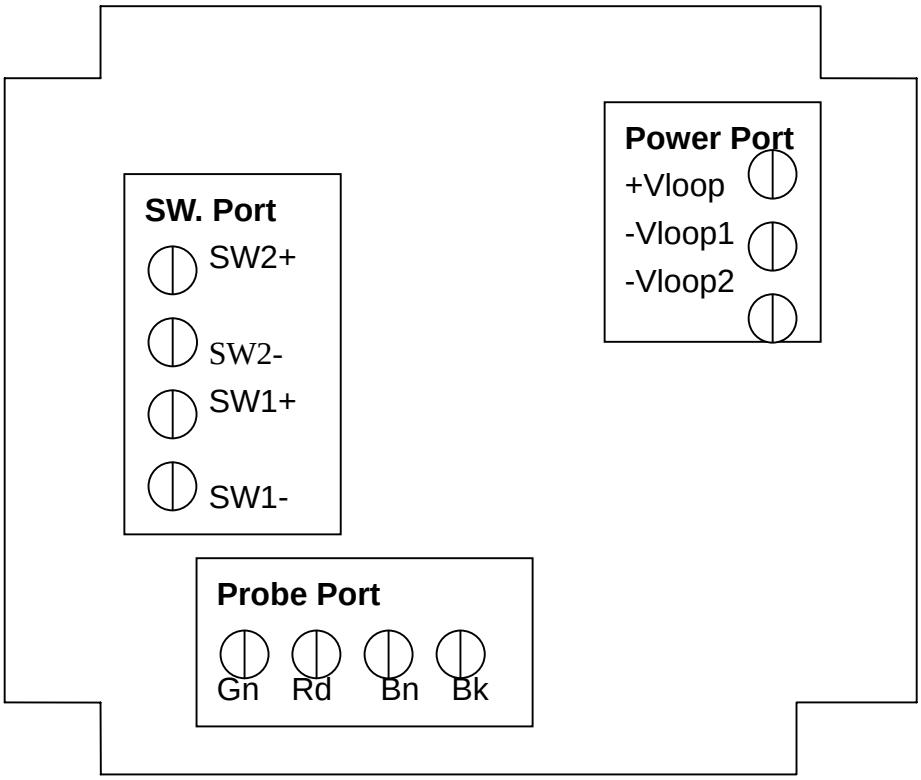
The Transmitter is designed for use in non-aggressive environments and indoor room use. It is not recommended to use under condensation and water aerosol conditions. This use could cause of water steam condensation on the sensor surface. If these conditions occur it can cause sensor damage or dramatically increase response time for humidity change. .



<Fig 4 > Probe Connection

Wire colored
#1: Green (Gn)
#2: Red (Rd)
#3: Brown (Bn)
#4: Black (Bk)

Connection Port on PCB location



<Fig 5> Internal Wire Connection

3. Configuring the HX400

The HX400 may be supplied factory configured for the working parameters as specified by the customer at time of order. Use this manual in order to alter and modify the existing parameters for new applications.

Keyboard Description:

ENT: **ENTER key**: Choose current display function or value as the correct and valid one. Also to be used to enter into one of the programming states.

↑ : **UP key**: Use to increase the numerical value of the display. Also to be used to scroll upwards through the program menu during Measuring, Setup and Calibration Mode.

↓ **: DOWN key**: Use to decrease the numerical value of the display. Also to be used to scroll downwards through the program menu during Measuring, Setup and Calibration Mode.

<Note>: Please do not press and release fast during operation the key, recommend at least holding up 0.5 Sec when pressed.

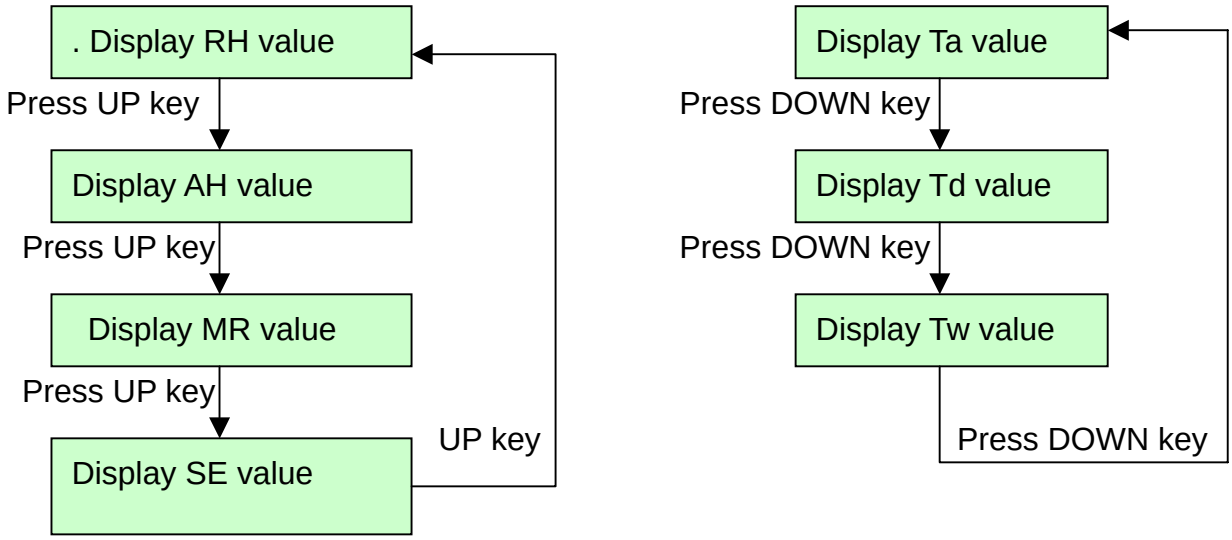
The HX400 Setup and Calibration functions are configured through a two level of access push button sequence. In order to use, the menu is divided into three main categories: Measuring, Setup and Calibrate Mode. The HX400 enters Measuring Mode automatically after power on.

3.1 Measuring Mode

The Measuring Mode is the normal operating mode after power on. In Measuring Mode, using all of the working parameters which were setup in Setup Mode, the outputs dual loop current displays the measured values on the dual high bright 7-Segments LED modules, the meter will do temperature drift compensation and real-time self-diagnostic checks. The sensor input circuit is monitored for failure and the output current responds in a defined value

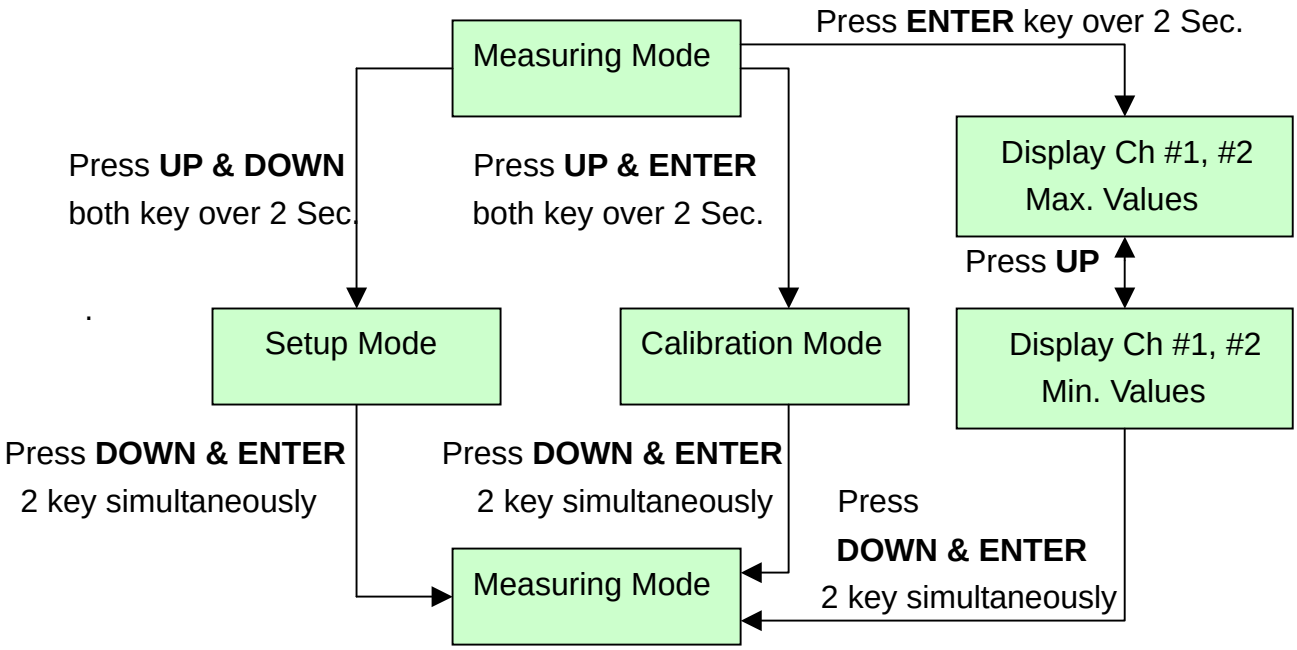
The HX400 is equipped with dual 4 ~ 20 mA current outputs and display modules, Channel #1 could be configured for Relative Humidity (RH), Absolutely Humidity (AH), Mixing Ratio (MR) or Specific Enthalpy (SE) computed parameters displayed on upper display module (Green Color) and Current Output, Channel #2 could be configured for Air Temperature (Ta), Dew Point Temperature (Td) or Wet Bulb Temperature (Tw) computed parameters displayed on lower display module (Red Color) and Current Output. Two temperature engineering units Celsius, Fahrenheit can be displayed with associated LED lamp in Ch # 2. Both Channels are independent of operation. Also the meter can check Max/Min readings since powered on or the last reset operation by press the ENTER key. When measured variable meets the alarm conditions the built-in solid-state single pole relay will be energized or un-energized depending on the Alarm Mode set and its associated LED lamp indication.

Note: Press UP/DOWN key browses computed parameters displayed only during the Measuring Mode

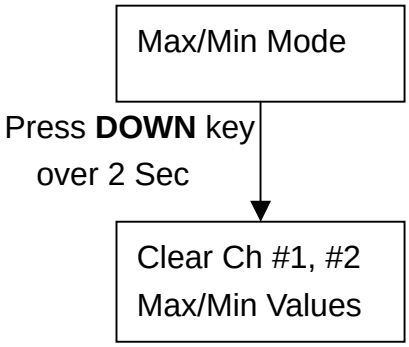


< Channel #1> < Channel #2 >

<Fig. 6> Change displayed computed parameter only during Measuring Mode



<Fig. 7> Flow chart of Operating Mode



< Fig. 8 > Reset Ch #1, #2 Max/Min values

RH: Relative Humidity
AH: Absolutely Humidity
MR: Mixing Ratio
SE: Specific Enthalpy
Ta: Air Temperature
Td: Dew Point Temperature
Tw: Wet Bulb Temperature

3.2 Entering the Setup Mode

To start the Setup Mode, first press and hold the UP key and DOWN key simultaneously until the setting prompt is displayed during Measuring Mode see< Fig 7>. The Setup Mode will allow the user to do the following:

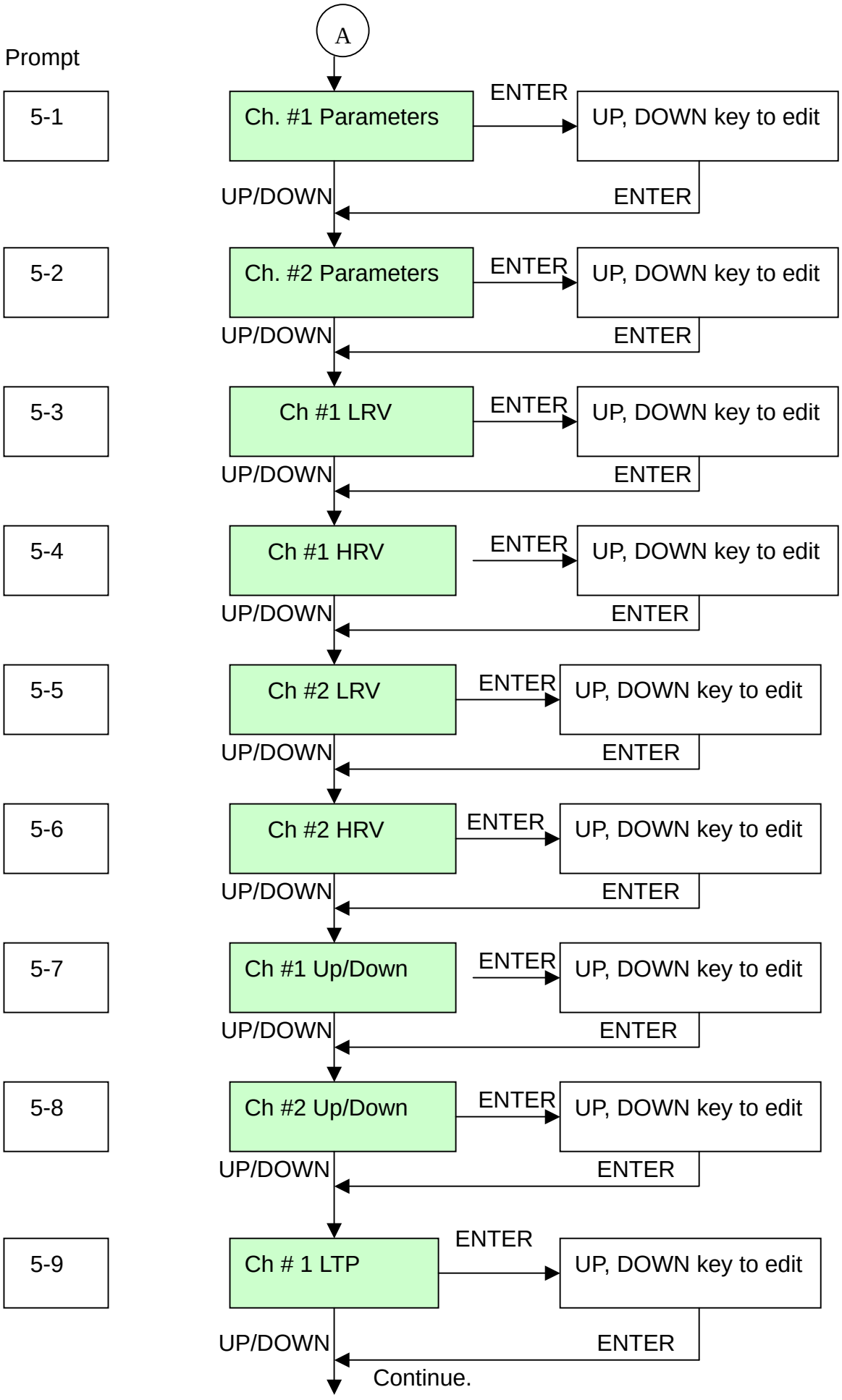
Change Ch #1 & Ch #2 computed parameter for Transmitting and Alarm operation.
Change Ch #1 & Ch #2 the 4mA Lower Range Value.
Change Ch #1 & Ch #2 the 20mA Full Scale Value.
Change Ch #1 & Ch #2 the Sensor Fail Safe detection. (Upscale/Downscale output)
Change Ch #1 & Ch #2 Lower / Higher Trip Point Value.
Change Ch #1 & Ch #2 Dead Band (Hysteresis) of Trip Point Value
Change SW #1 & SW #2 Alarm Operation Mode
Change Temperature Engineering Units and Local Barometric Pressure offset
Change Ch #1 or Ch #2 Active Output

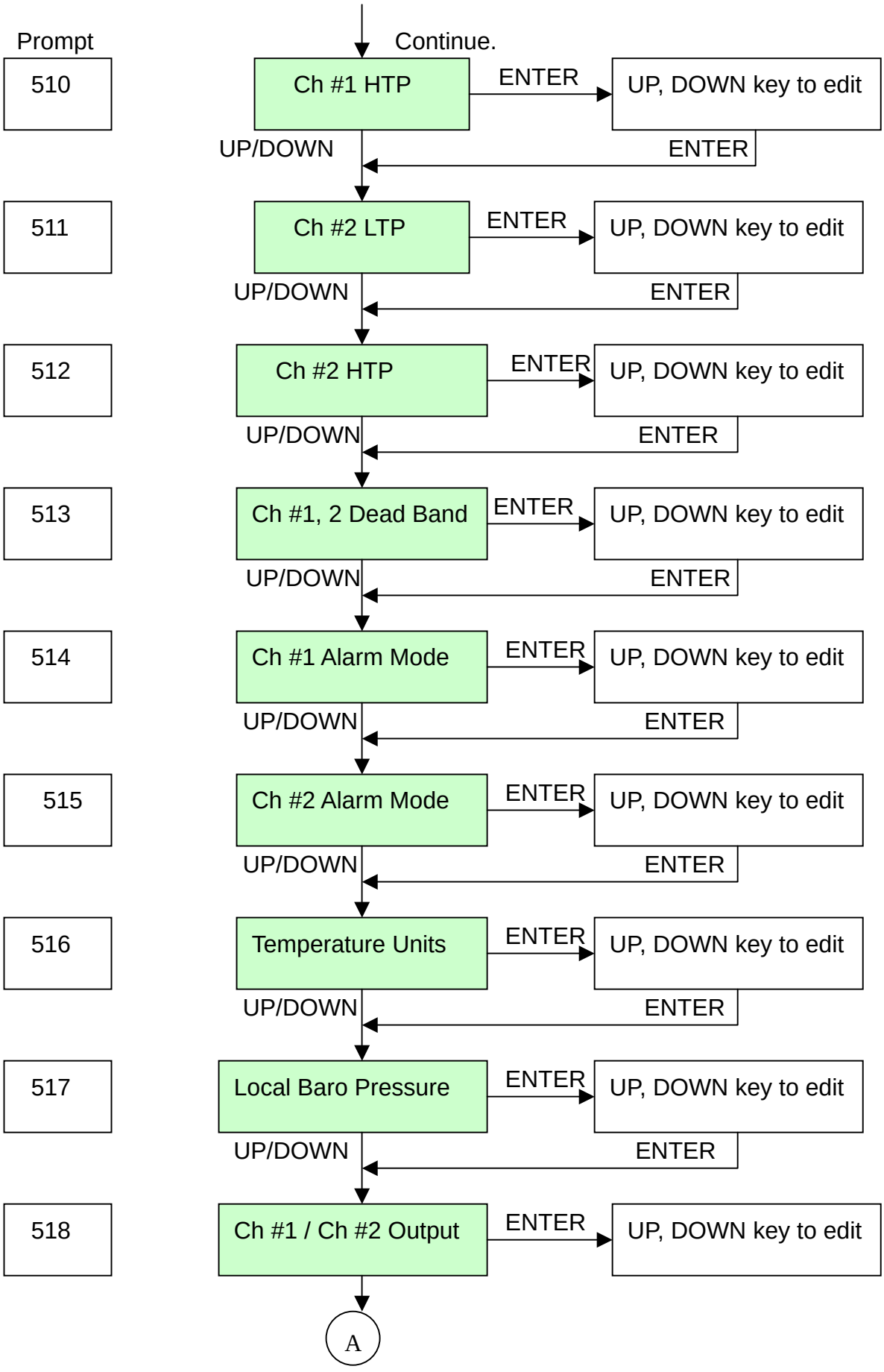
Each of these functions prompts are presented in sequence on the upper LED display module. Use the UP key or DOWN key to scroll the Setup Mode menu. To perform the displayed function press the ENTER key, the transmitter will response by displaying the existing status or working parameter on the lower LED display module. Press the UP key or DOWN key to increase or decrease the displayed value that you want to configure. Finally press ENTER key again to save the edited parameter into Non-Volatile Memory and display the next function prompt. These are described in detail below and summarized on the Keyboard Flow Chart see< Fig. 9 >.

Displayed Prompt	**Functions**	**(Factory Set)**
5-1	Set the Ch #1 computed parameter	(**RH)**
5-2	Set the Ch #2 computed parameter	(**Ta**)
5-3	Set the Ch #1 4mA Value (ZERO)	(**10 %RH**)
5-4	Set the Ch #1 20mA Value (SPAN)	(**90 %RH**)
5-5	Set the Ch #2 4mA Value (ZERO)	(**0** ℃)
5-6	Set the Ch #2 20mA Value (SPAN)	(**60** ℃)
5-7	Set the Ch #1 Upscale / Downscale output	(**Downscale**)
5-8	Set the Ch #2 Upscale / Downscale output	(**Downscale**)
5-9	Set the Ch #1 Lower Trip Point Value	(**20 % RH**)
510	Set the Ch #1 Higher Trip Point Value	**(60 % RH**)
511	Set the Ch #2 Lower Trip Point Value	(**5** ℃)
512	Set the Ch #2 Higher Trip Point Value	**(50** ℃)
513	Set the Ch #1 & Ch #2 Dead Band of Trip Point	(**1% RH & 1**℃)
514	Set the Ch #1 Alarm Mode	(**Disable**)
515	Set the Ch #2 Alarm Mode	(**Disable**)
516	Set the Temperature Engineering Unit (℃ /℉)	(℃)
517	Set the local Barometric Pressure offset value	(**0 Kp**)

S18	Set Ch #1 or Ch #2 Active Output **(only HX402 Model)**

Table 1 Setup Mode


A
Prompt
5-1
Ch. #1 Parameters
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-2
Ch. #2 Parameters
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-3
Ch #1 LRV
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-4
Ch #1 HRV
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-5
Ch #2 LRV
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-6
Ch #2 HRV
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-7
Ch #1 Up/Down
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-8
Ch #2 Up/Down
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
5-9
Ch # 1 LTP
ENTER
UP, DOWN key to edit
UP/DOWN
ENTER
Continue.



<Fig 9 > Flow Chart of Setup Mode

3.2.1 Select Ch # 1 Computed Parameter function < 5-1 >

Select Ch#1 is the first function in the sequence. The Relative Humidity (RH), Absolute Humidity (AH), Mixing Ratio (MR) or Specific Enthalpy (SE) can be selected for Transmitting, Displaying and Alarm functions. The display prompt 5-1 is displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Computed Parameter Code displayed on the lower LED module. Use the UP key or DOWN key select the Code until the code is set correctly. Press the ENTER key again to save and quit the function. Default Code is 0. Note: when pressing keypads please hold until the displayed status has changed,

Computed Parameter	Code	Measuring Range	Min Span
Relative Humidity (RH)	0	1 ~ 99 %	10 %
Absolutely Humidity (AH)	1	0 ~ 600 g/M^3	60 g/M^3
Mixing Ratio (MR)	2	0 ~ 600 g/Kg	60 g/Kg
Specific Enthalpy (SE)	3	0 ~ 999 kj/Kg	100 kj/Kg

Table 2 Ch #1 Computed Parameter Code and Measuring Range

3.2.2 Select Ch # 2 Computed Parameter function < 5-2 >

The Air Temperature (Ta), Dew Point Temperature (Td) or Wet Bulb Temperature (Tw) can be selected for Transmitting, Displaying and Alarm. The display prompt 5-2 is displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Computed Parameter Code displayed on the lower LED module. Use the UP key or DOWN key select the Code until the code is set correctly. Press the ENTER key again to save and quit the function. Default Code is 4. Note: when pressing keypads please hold until the displayed status has changed,

Computed Parameter	Code	Measuring Range (℃)	Min Span (℃)
Air Temperature (Ta)	4	- 30 ~ 100	10
Dew Point Temperature (Td)	5	- 40 ~ 60	10
Wet Bulb Temperature (Tw)	6	- 40 ~ 60	10

Table 3 Ch #2 Computed Parameter Code and Measuring Range

3.2.3 Set Ch#1 Lower Range Value @ 4mA (ZERO) function < 5-3>

The function display prompt is S-3 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing ZERO value on the lower LED module. Use the UP key or DOWN key to increase /decrease the displayed value until the value is set correctly. Press the ENTER key again to save and quit the function. The adjustable ZERO range is from 0 to SPAN-10

3.2.4 Set Ch #1 Higher Range Value @ 20 mA (SPAN) function < 5-4 >

The function display prompt is S-4 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing SPAN value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly. Press the ENTER key again to save and quit the function. The adjustable SPAN range is from ZERO+10 to Maximum measuring range

3.2.5 Set Ch #2 Lower Range Value @ 4mA (ZERO) function < 5-5>

The function display prompt is S-5 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing ZERO value on the lower LED module. Use the UP key or DOWN key to increase /decrease the displayed value until the value is set correctly. Press the ENTER key again to save and quit the function. The adjustable ZERO range is from 0 to SPAN-10

3.2.6 Set Ch #2 Higher Range Value @20 mA (SPAN) function < 5-6 >

The function display prompt is S-6 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing SPAN value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly, Press the ENTER key again to save and quit the function. The adjustable SPAN range from ZERO+10 to Maximum measuring range

3.2.7 Set Ch#1 Fail Safe Reporting function < 5-7 >

Fail-safe reporting allows the transmitter to change the 4-20mA loop to indicate a failure condition. This failure may be a sensor failure or a transmitter failure. The function display prompt is S-7 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing Code on the lower LED module. Use the UP key or DOWN key to increase /decrease the Code until the value is set correctly. Press the ENTER key again to save and quit the function. Code=0 means loop current less than 3.8 mA (Downscale). Code=1 means loop current above 21 mA (Upscale). Default Code is 0

Fail-safe reporting	Code
Downscale	0
Upscale	1

Table 6 Ch #1 & Ch #2 Fail Safe Reporting

3.2.8 Set Ch#2 Fail Safe Reporting function < 5-8 >

Fail-safe reporting allows the transmitter to change the 4-20mA loop to indicate a failure condition. This failure may be a sensor failure or a transmitter failure. The function display prompt is S-8 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing Code on the lower LED module. Use the UP key or DOWN

key to increase /decrease the Code until the value is set correctly. Press the ENTER key again to save and quit the function. Code=0 means loop current less than 3.8 mA (Downscale). Code=1 means loop current above 21 mA (Upscale). Default Code is 0

3.2.9 Set Ch#1 Lower Trip Point Value (LTP) function < 5-9 >

The function display prompt is S-9 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Lower Trip Point value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly. Press the ENTER key again to save and quit the function. The Lower Trip Point Value must be greater than ZERO.

3.2.10 Set Ch#1 Higher Trip Point Value (HTP) function < 510 >

The function display prompt is S10 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing Higher Trip Point value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly. Press the ENTER key again to save and quit the function. The Higher Trip Point Value must be less than SPAN.

3.2.11 Set Ch#2 Lower Trip Point Value (LTP) function < 511 >

The function display prompt is S11 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Lower Trip Point value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly. Press the ENTER key again to save and quit the function. The Lower Trip Point Value must be greater than ZERO.

3.2.12 Set Ch#2 Higher Trip Point Value (HTP) function < 512 >

The function display prompt is S12 displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying the existing Higher Trip Point value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly. Press the ENTER key again to save and quit the function. The Higher Trip Point Value must be less than SPAN.

Note: The relationship of ZERO ≦ LTP < HTP ≦ SPAN must be followed

3.2.13 Set Ch #1 & Ch #2 Dead Band (Hysteresis) of Trip Point function < 513 >

The function display prompt is S13 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Dead Band value on the lower LED module. Use the UP key or DOWN key to increase /decrease the value until the value is set correctly. Press the ENTER key again to save and quit the function. Default value is 1

WARNING: The alarm should not be used for critical safety applications such as an emergency shut down system.

3.2.14 Set Ch #1 Alarm Mode function < 514 >

The function display prompt is S14 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Alarm Mode Code on the lower LED module. Use the UP key or DOWN key to increase /decrease the code until the code is set correctly. Press the ENTER key again to save and quit the function. Default Code is 0.

Alarm Mode	Code
Disable	0
Mode 1	1
Mode 2	2
Mode 3	3
Mode 4	4

Table 7 Ch #1 Alarm code

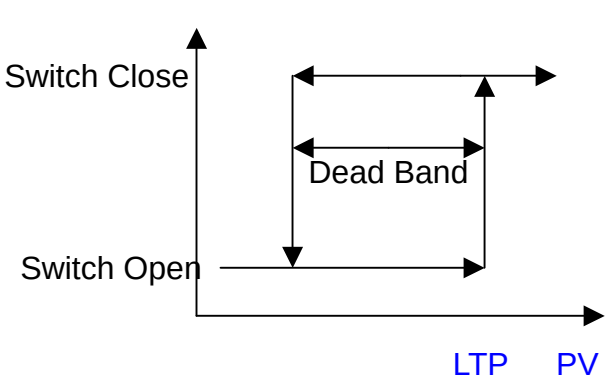
3.2.15 Set Ch #2 Alarm Mode function < 515 >

The function display prompt is S15 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing Alarm Mode Code on the lower LED module LED. Use the UP key or DOWN key to increase /decrease the code until the code is set correctly. Press the ENTER key again to save and quit the function. Default Code is 0.

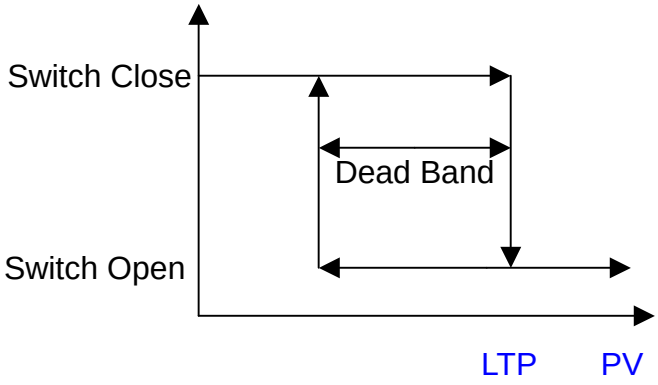
Alarm Mode	Code
Disable	0
Mode 1	1
Mode 2	2
Mode 3	3
Mode 4	4

Table 7 Ch #2 Alarm code

1. Mode 1: PV > Low Trip Point; Alarm tripped, SSR change position from Open to Close
2. Mode 2: PV < Low Trip Point; Alarm tripped, SSR change position from Close to Open

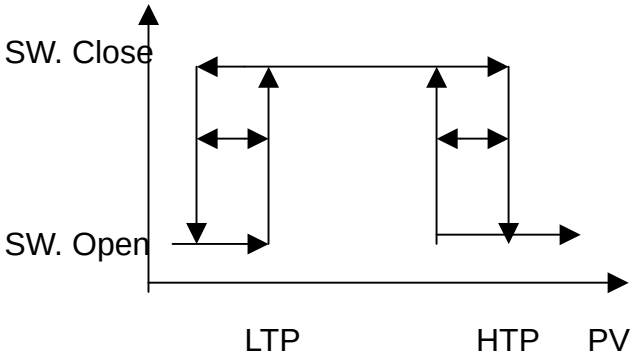


<Fig. 10-a > MODE 1

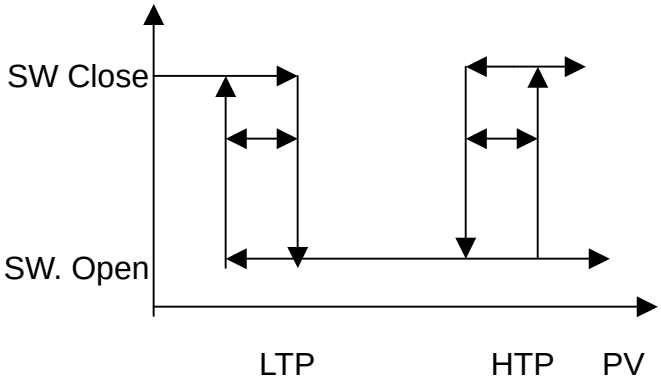


< Fig. 10-b > MODE 2

3. Mode 3: LTP < PV <HTP; Alarm tripped, SSR change Position from Open to Close
4. Mode 4: LTP < PV <HTP; Alarm tripped, SSR change Position from Close to Open



<Fig. 10-c> MODE= 3



< Fig. 10-d> MODE= 4

< Fig 10> Alarm Modes

Note: PV= Process Value. LTP= Lower Trip Point, HTP= Higher Trip Point

3.2.16 Set Temperature Engineering units function < 516 >

The function display prompt is S16 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing temperature engineering units code on the lower LED module. Use the UP key or DOWN key to increase /decrease the code until the code is set correctly. Press the ENTER key again to save and quit the function. Default code is 0

Temperature Engineering units	Code
Celsius,	0
Fahrenheit	1

3.2.17 Set Local Barometric Pressure Function <517>

Barometric Pressure is required for computation of Tw, MR and SE input parameters. The function display prompt is S17 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing offset value from default on the lower LED module. Use the UP key or DOWN key to increase /decrease the offset value until the value is set correctly. Press the ENTER key again to save and quit the function. The default Barometric Pressure is 101.3 kP. Adjustable range: +/- 99 kP

3.2.18 Set Ch #1 or Ch #2 as a active output Function <518>

This function is used only for single loop current HX401 model. The function display prompt is S18 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the existing code value on the lower LED module. Use the UP key or DOWN key to increase /decrease the code until the code is set correctly. Press the ENTER key again to save and quit the function. The default code is 1

Active output	Code
Ch #1	1
Ch #2	2

4. Calibrate the Transmitter

Do not start any calibration procedure without first reading and fully understanding this manual. Improper operation may cause the loss of calibration data. The Transmitter and Calibration Equipments need warm-up (5 minutes) before getting high performance.

4.1 Calibration Equipment:

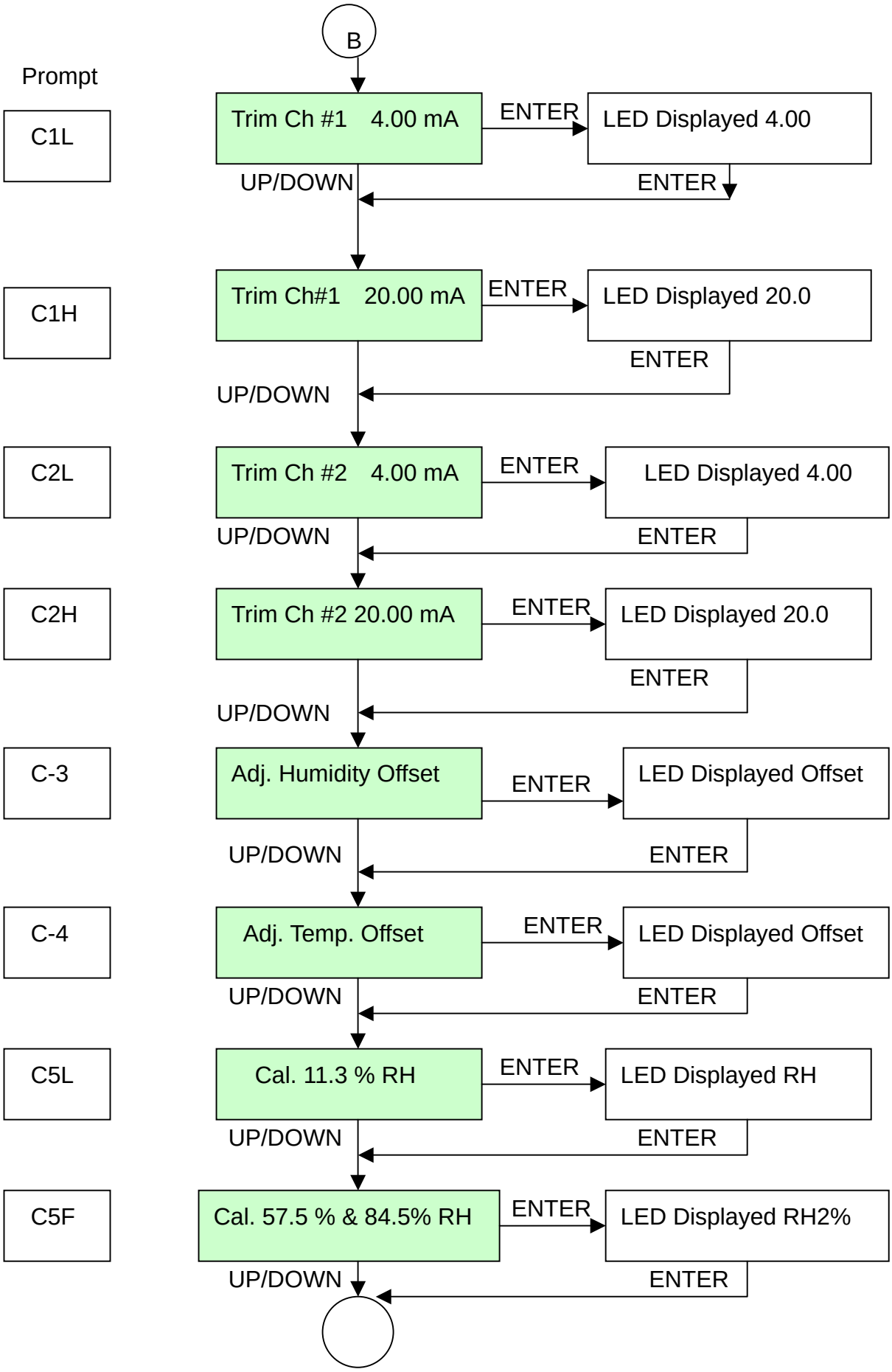
Standard Humidity Buffer/ Chamber or Humidity Generator (Salt Solutions)
51/2 Multi-meter; Monitor output current from transmitter
Power Supply: 24 Vdc nominal

4.2 Entering the Calibration Mode

To start the Calibration Mode, first press and hold the UP key and ENTER key simultaneously until the Calibration Mode prompt is displayed during Measuring Mode see
< Fig.7 >. The Calibration Mode will allow the user to do the following operation. See <Fig 11>
Setting Ch # 1 & Ch # 2 ZERO point 4 mA
Setting Ch # 1 & Ch # 2 SPAN point 20 mA
Field Alignment one-point Humidity Offset
Field Alignment one-point Temperature Offset
Calibration 3 points Humidity

Displayed Prompt	Functions
C1L	Trim Ch #1 4.00 mA
C1H	Trim Ch #1 20.00 mA
C2L	Trim Ch #2 4.00 mA
C2H	Trim Ch #2 20.00 mA
C-3	Alignment one-point Humidity Offset
C-4	Alignment one-point Temperature Offset
C5L	Calibration 11.3% RH Humidity
C5F	Calibration 57.5% RH Humidity
C5H	Calibration 84.5% RH Humidity

Table 8 Calibration Mode



<Fig. 11 > Flow Chart of Calibration Mode

4.2.1 Trim Ch #1 4.00 mA

The function display prompt is C1L displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying 4.00 on the lower LED module and will output a milliamp current equal to its internal set 4mA. This 4 mA value should be read on an external Multi-meter. Use the UP key or DOWN key to increase /decrease the output current until the 4.00mA current is read correctly. Press the ENTER key again to save and quit the function. It is advisable to use a higher accuracy Multi-meter to read the output current. It is very possible that the transmitter will be more accurate than a great many Multi-meters. In this case, trimming will make the transmitter less accurate rather than more accurate

4.2.2 Trim Ch #1 20.00 mA

The function display prompt is C1H displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying 20.0 on the lower LED module and will output a milliamp current equal to its internal set 20mA. This 20 mA value should be read on an external Multi-meter. Use the UP key or DOWN key to increase /decrease the current until 20.00mA current is read correctly. Press the ENTER key again to save and quit the function.

Note: **These functions are only for the purpose of adjusting the loop current to be exactly 4.00/20.00 mA according to the plant's local standard. This is not to re-range the transmitter**

4.2.3 Trim Ch #2 4.00 mA

The function display prompt is C2L displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying 4.00 on the lower LED module and will output a milliamp current equal to its internal set 4mA. This 4 mA value should be read on an external Multi-meter. Use the UP key or DOWN key to increase /decrease the output current until 4.00mA current is read correctly. Press the ENTER key again to save and quit the function. It is advisable to use a higher accuracy Multi-meter to read the output current. It is very possible that the transmitter will be more accurate than a great many Multi-meters. In this case, trimming will make the transmitter less accurate rather than more accurate

4.2.4 Trim Ch #2 20.00 mA

The function display prompt is C2H displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying 20.0 on the lower LED module also output a milliamp current equal to its internal set 20mA. This 20 mA value should be read on an external Multi-meter. Use the UP key or DOWN key to increase /decrease the current until 20.00mA current is read correctly, press ENTER key again to save and quit the function.

Note: **These functions are only for the purpose of adjusting the loop current to be exactly 4.00/20.00 mA according to the plant's local standard. This is not to re-range the transmitter**

4.2.5 Alignment one point Humidity (Humidity Offset)

The function display prompt is C-3 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the measured value on the upper LED module and will display the offset value on the lower LED module. Press the UP/DOWN key to change the measured value and offset value of the measured value until the measured value match as the standard value. Press the ENTER key again to execute and quit the function **Note: Replace or re-calibrate the Humidity sensor if the humidity offset value is larger than +/- 3 % RH or more.**

4.2.6 Alignment one point Temperature (Temperature Offset)

The function display prompt is C-4 displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying the measured value on the upper LED module and will display the offset value on the lower LED module. Press the UP/DOWN key to change the measured value and offset value of the measured value until the measured value match as the standard value. Press the ENTER key again to execute and quit the function **Note: The temperature sensor has to be replaced if the temperature offset value is larger than +/- 1 ℃ or more.**

4.2.7 Calibration 11.3 % RH

Place the probe into a humidity chamber or salt solutions of 11.3 % RH and wait until it settles into equilibrium. The function display prompt is C5L displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying a default of 11.3 or the existing value (last calibrated) on the lower LED module. Press the UP/DOWN key to change to the matching chamber presented. Press the ENTER key again to execute and quit the function. The calibration data will be displayed a short time and saved to EEPROM. Note: An error will be displayed on the upper LED module if the calibration point is out of 10 ~12 %RH range. It is recommended to repeat this function several times to insure the probe is in equilibration.

4.2.8 Calibration 57.5 % RH

Place the probe into a humidity chamber or salt solutions of 57.5 % RH and wait until it settles into equilibrium. The function display prompt is C5F displayed on the upper LED module. Press the ENTER key, the transmitter will response by displaying a default of 57.5 or existing value (last calibrated) on lower LED module, press UP/DOWN key to change to the matching chamber presented. Press the ENTER key again to execute and quit the function. The calibration data will be displayed a short time and saved to EEPROM. Note: An error will be displayed on the upper LED module if calibration point out of 56~ 60 %RH range. It is recommended to repeat this function several times to insure the probe is in equilibration

4.2.9 Calibration 84.3 % RH

Place the probe into a humidity chamber or salt solutions of 84.3 % RH and wait until it settles

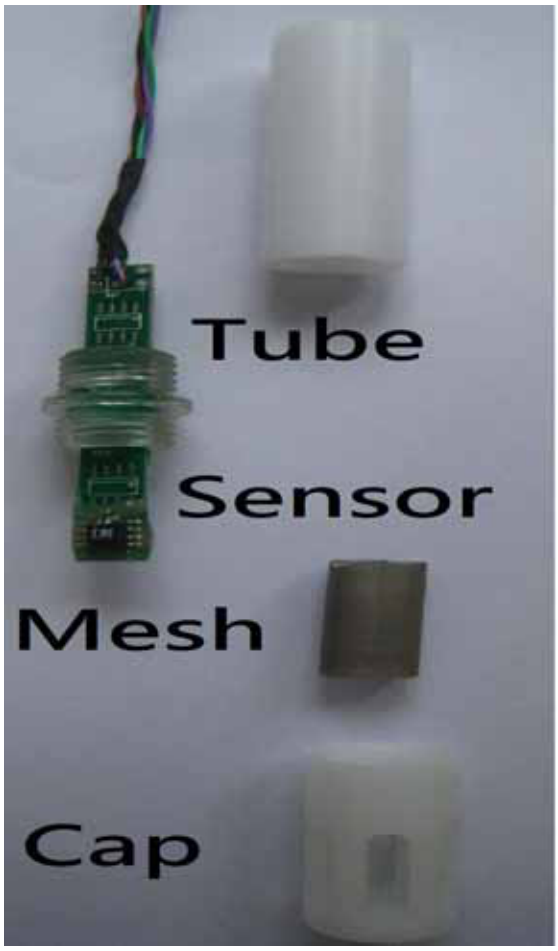
into equilibrium. The function display prompt is C5H displayed on the upper LED module. Press the ENTER key, the transmitter will respond by displaying a default of 84.3 or existed value (last calibrated) on the lower LED module. Press the UP/DOWN key to change to the matching chamber presented. Press the ENTER key again to execute and quit the function. The calibration data will be displayed a short time and saved to EEPROM. Note: An error displayed on the upper LED module if calibration point out of 82~ 86 %RH range.
It is recommended to repeat this function several times to insure the probe is in equilibration

5. Application and Maintenance

Please avoid any high concentration of volatile & aggressive chemical solvent vapors or other organic compounds or Acids and bases such as Ketenes, Acetone, Ethanol, Isopropyl Alcohol, Toluene, HCL, H_2SO_4, HNO_3, NH_3 , H_2O_2, Ozone etc or exposure to extreme high humidity and temperature conditions for extended time periods (may offset the sensor output). If these happens, the following conditioning procedure may bring the sensor back to calibration state.
Baking: 100 ~ 105 ℃ at less 5% RH for 10 hours.
Re-Hydration: 20 ~ 30 ℃ at > 75% RH for 12 hours

5.1 Sensor replacement

Power-off the unit. Open the HX400, loosen the sensor input wires as picture represent. Remove the Cap from probe by counterclockwise turns (recommend pliers to hold the limpid area of the probe). Loosen & remove the sensor PCB from Tube.



6. Error Code

When the sensor input wires are broken, or beyond acceptable range or the internal components fail the instrument will display error symptoms for revealing the cause of the fault.

Err3: Humidity/Temperature sensor input wires are broken or the input signal is beyond the acceptable range. Check input wires

Err4 ~8: Internal Calibration data failure. Need to re-calibrate again or Return to Omega Engineering for repair

7. Model

HX401W	**Single Loop; Wall mounted Probe length 80 mm**
HX401R	**Single Loop; Remote type Wire length 100 cm**
HX401D	**Single Loop; Duct mounted Probe length 230 mm**
HX402W	**Dual Loop; Wall mounted Probe length 80 mm**
HX402R	**Dual Loop; Remote type Wire length 100 cm**
HX402D	**Dual Loop; Duct mounted Probe length 230 mm**

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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