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USER MANUAL

VT7S12E
VIBRATION TRANSMITTER

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1. INTRODUCTION

Foreword

Thank you for purchasing VT7S12E - Vibration Transmitter. This manual describes the basic functions and operation methods of VT7S12E.Please read through this user's manual carefully before using the product.

This is a 8 bit controller based instrument designed for vibration type. This instrument is operated by four user-friendly keys. These keys are used for operation and programming. The manual covers all aspects of operation of the instrument. Please read instructions carefully before altering any programming or configuration information.

VT7S12E module operate independently and also can be connected to a data Highway or remote systems communication functions through a personal computer or a distributed control system (DCS) using RS-485 Communication.

Notice

The contents of this manual are subject to change without notice as a result of continuing improvements to the instrument's performance and functions.

Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention, however, please inform Masibus Sales office or sales representative. Under no circumstances may the contents of this manual, in part or in whole, be transcribed or copied without our permission.

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Checking the Contents of the Package

Unpack the box and check the contents before using the product. If the product is different from that which you have ordered, if any parts or accessories are missing, or if the product appears to be damaged, contact your sales representative.

Product Ordering Code:

Ordering Code										
Model	**Channel-1**		**Channel-2**		**Power Supply**		**Output Type**		**Communication o/p**	
VT7S12E	X		X		X		X		X	
	1	Accelerometer i/p	N	None	A	85 to 265 VAC	C	4-20 mA	N	None
			1	Accelerometer i/p	B	18 to 36 VDC	D	0-20 mA	1	RS485
							E	1-5V DC		
							F	0-5V DC		
							G	0-10V DC		

Table 1 Product Ordering Code

2. INSTALLATION

Mounting method: DIN Rail mounting
To install the controller select a location where:

- no one may accidentally touch the terminals
- mechanical vibrations are minimal
- corrosive gas is minimal
- temperature can be maintained at about 25˚C to 35˚C and the fluctuation is minimal
- no direct radiant heat is present
- no magnetic disturbances are caused
- no wind blows against the terminal board
- no water splashed
- no flammable materials are around


Turn off the power to the controller before installing it on the Din Rail because there is a possibility of electric shock

How to connect wires:


Before carrying out wiring, turn off the power to the controller and check that the cables to be connected are not alive with a tester or the like because there is a possibility of electric shock.


NOTE:

- All wiring must confirm to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for Voltage, Current and temperature rating of the system.
- Provide power from a single-phase instrument power supply. If there is a lot of noise in the power line, insert an insulating transformer into the primary side of the line and use a line filter on the secondary side. Do not place the primary and secondary power cables close to each other.
- Use repeater after each set of 32 instruments connected in RS-485 Communication.
- Unused terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.


CAUTION:

High voltage transients may occur when switching inductive loads such as some contactors or solenoid valves. Through the internal contacts, these transients may introduce disturbances which could affect the performance of the instrument.
For this type of load it is highly recommended that a “snubber” is connected across the normally open contact of the relay switching though load. The snubber recommended consists of a series connected resistor/capacitor (typically **15nF/100 Ohms**). A snubber will also prolong the life of the relay contacts. A snubber should also be connected across the output of a trip output to prevent false triggering under line transient conditions.

3. HARDWARE SPECIFICATION DETAIL

3.1 Input specification

- No. of Input [(1)] : 1 , 2
- Accelerometer Input : Remote ICP piezoelectric Accelerometer
  Sensitivity: 100 mV/g ±10%
  Dynamic range: 80 g pk
- Sensor Excitation Current : 4 mA, Voltage: 21 VDC
- -3 dB Cut-off frequency
  High Pass Filter : 2.5Hz, 5 Hz, 10Hz
  Low Pass Filter : 1KHz, 2.5KHz, 10KHz
- Filter Accuracy : ± 10% of Cut-off Frequency
- Measuring parameter : Acceleration , Velocity , Displacement
- Measuring Range : 1) Acceleration 0-50 g, RMS/peak(derived)
  2) Velocity 0-100 mm/sec, RMS/peak (derived)
  3) Displacement 0-2000 micron, peak to peak (derived)
- Accuracy Input-display : ± 2% of full span (Input to Display)

[(1)] Factory Set

3.2 Power supply specification

- Rated Voltage : 85 - 265VAC 50/60 Hz / 100-300VDC Or 18-36VDC
- Power Consumption : Max 12VA (85-265VAC) and Max.7VA (18-36VDC)

3.3 Display specification

- Display : 1 digit- 0.3" Green seven segment For Channel Display
  4 digit- 0.3" Red seven segment For Measuring Parameter Display
- Status LEDs : Discrete/Individual RED LEDs
  2 for communication, 4 LEDs for Relay, 1 LED for
  Auto-manual and 2 for input type of channel
- Keys : 4 Keys (ENT, UP, DOWN & ESC)
- Scan Time : <=150 mSecond/Channel

3.4 Mechanical specification

- Mounting : 35mm DIN Rail
- Dimensions : 75 mm(H) x 70 mm(W) x 110 mm(D)
- Material : ABS Plastic
- Weight : 350 gm
- Terminal Cable Size : 2.5mm^2
- Protection : IP20

3.5 Environmental specification

- Ambient Temperature : 0 to 55 °C
- Humidity : 30 to 95% RH non-condensing
- Storage Temperature : 0 to 85°C
- Warm-Up Time of Instrument : 15 Min.

3.6 Output relay specification

- No of Relays : Four (2 nos per channel)
- Purpose : Alarm or trip
- Output Signal : C, NO, NC
- Delay for relay : 05 - 50 sec to avoid false tripping.
- Relay contact Rating : 2A @250VAC/30VDC & 5A @250VAC (optional)

3.7 Analog output specification

- No. of Analog Output : One per Channel
- Output Signal : 0-20 mA, 4-20 mA or 0-5 V, 1-5 V, 0-10 V DC (Voltage or current outputs are factory settable)
- Load Resistance : For current output, 500 ohms Max. For Voltage output, 3000 ohms Minimum.
- Output Accuracy : ±0.25 % of Full Scale (Display to output)

3.8 Rs-485 communication specification (optional)

- No. of Communication Port : 1- RS485
- Protocol : Modbus RTU.
- Parity : 2-Stop bit Parity none, 1-Stop bit Parity Even and 1-Stop Bit Parity Odd.
- Baud Rate : 9600,19200
- Maximum No. of Unit : 32
- Communication Error Detection : CRC Check

3.9 Buffer output specification

- No. of output : Two
- Output Impedance : <100 Ohms
- Frequency Range : 0.5 Hz to 10KHz
- Accuracy : 0.25% of Full Range

3.10 Signal isolations and insulation specification

- Isolation Rating : Withstanding Voltage:
  1) Between primary terminals[(2)] and secondary terminals[(3)] 1500VAC for 1 minute
  2) Between secondary terminals 500V AC for 1 minute
- Insulation Register : > 20 Mohms at 500V DC
- Signal Isolation : As Specified below Table:2

Sr No	Signals	Signal Isolation
1	Power Input	Isolated from other input/output terminals and internal circuit
2	Analog Inputs	Not isolated from other analog input terminals and from the internal circuit. But isolated from other input/output terminals.
3	RS-485 Communication	Isolated from other input/output terminals and internal circuit
4	Relay contacts	Isolated between contact output terminals and from other Input/output terminals and internal circuit
5	Analog Output	Isolated from other input/output terminals and internal circuit

Table 2 Signal Isolation Specification

[(2)] Primary terminals indicate power terminals and relay output terminals
[(3)] Secondary terminals indicate analog input signals, Digital Contact output terminals, communication Terminal.

4. FRONT PANEL DESCRIPTION

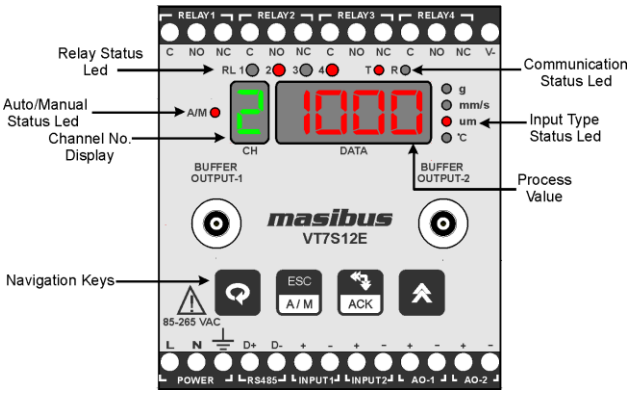


Figure 1 Front Panel Description

Name of Part	Function
Process Value Display**(DATA window)**	Displays Process Value. Display Parameter Name When user is Setting Parameter. Displays Error Message When An Error Occurs.
Channel No. Display **(CHANNEL window)**	Displays Channel Number in run mode. Also it will display relay number (01 – 04) in set mode (i.e.R.1,R.2,R.3,R.4) It will also display Group no(GP 1,GP 2/GP 1,GP 2,GP 3,GP 4) in set mode
Relay Status LED **(RL1, RL2, RL3, & RL4)** **OR** Open Sensor Indicator LED	When Relay is Energized the Respective LED turns ON (In Red). OR When Channel is OPEN (Channel no. is corresponding to Relay no.)
Auto/Manual status LED **(A/M)**	If LED is on, it indicates Manual mode and if LED is off Auto Mode.
Communication Status LEDs **(T,R)**	When Communication on, two LEDs (In Red) blink.
Input Type Status LEDs **(A, V, D, T)**	Depending upon the channel Input type LED is on.

Table 3 Front Panel Description

5. KEY FUNCTION DESCRIPTION

MENU/ENTER KEY:

It is used to enter in the sub menu (various levels) and save the parameters to nonvolatile memory, when user setting a proper data by Increment and shift key for parameter configuration.

ESCAPE KEY / AUTO-MANUAL KEY: ESC / A / M

It is used to come out from any sub menu (various levels) to the run mode. It is used for come out of the manual mode to auto mode too.

INCREMENT KEY:

It is used to increment the parameter for selection. Value of parameter can be incremented by pressing this key. When first time increment key is pressed, DP (decimal point) in PV display blink, so user can modify the value with increment key. It is used to increment the value in particular digit. Value can be incremented from 0- 9 and from '9' again it rollovers to '0'. The function Auto/Manual is integrated with this key. This key is used to enter into manual mode while the unit is in run mode.

SHIFT KEY/DECREMENT KEY: ACK

It is used to Shift the digit to set the parameter as describe in increment key when DP (decimal point) started to blink. Menu key is used to go forward to show next parameter and Shift key is used to go backward to show previous parameter. It is also used to acknowledge the trip relay.

6. CONNETION DIAGRAM

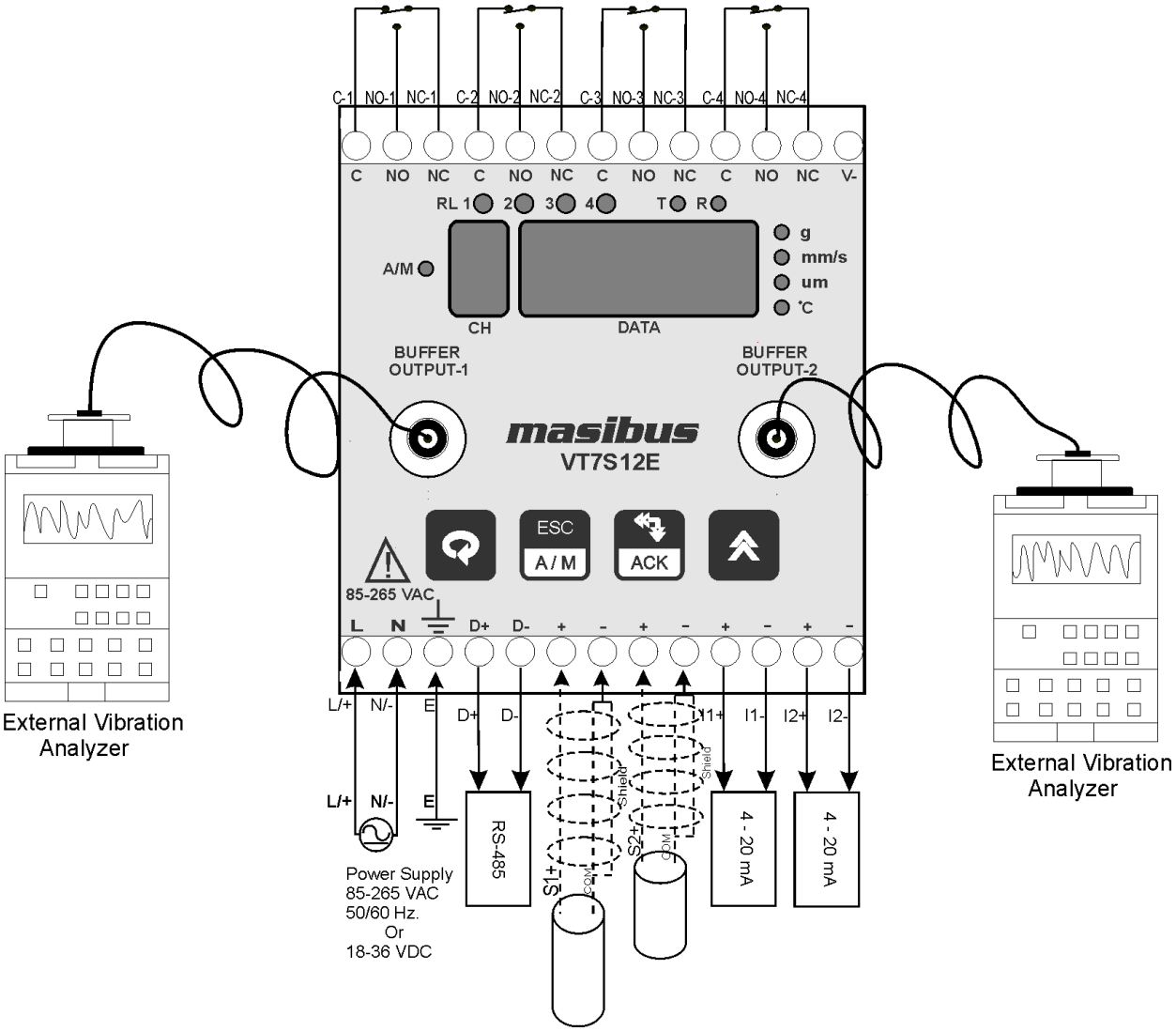


Figure 2 Connection Diagram of VT7S12E

7. MENU LAYOUT

7.1 Flow Diagram

Vibration Transmitter - VT7S12E has a number of software parameters which may or may not be required depending on your particular applications.

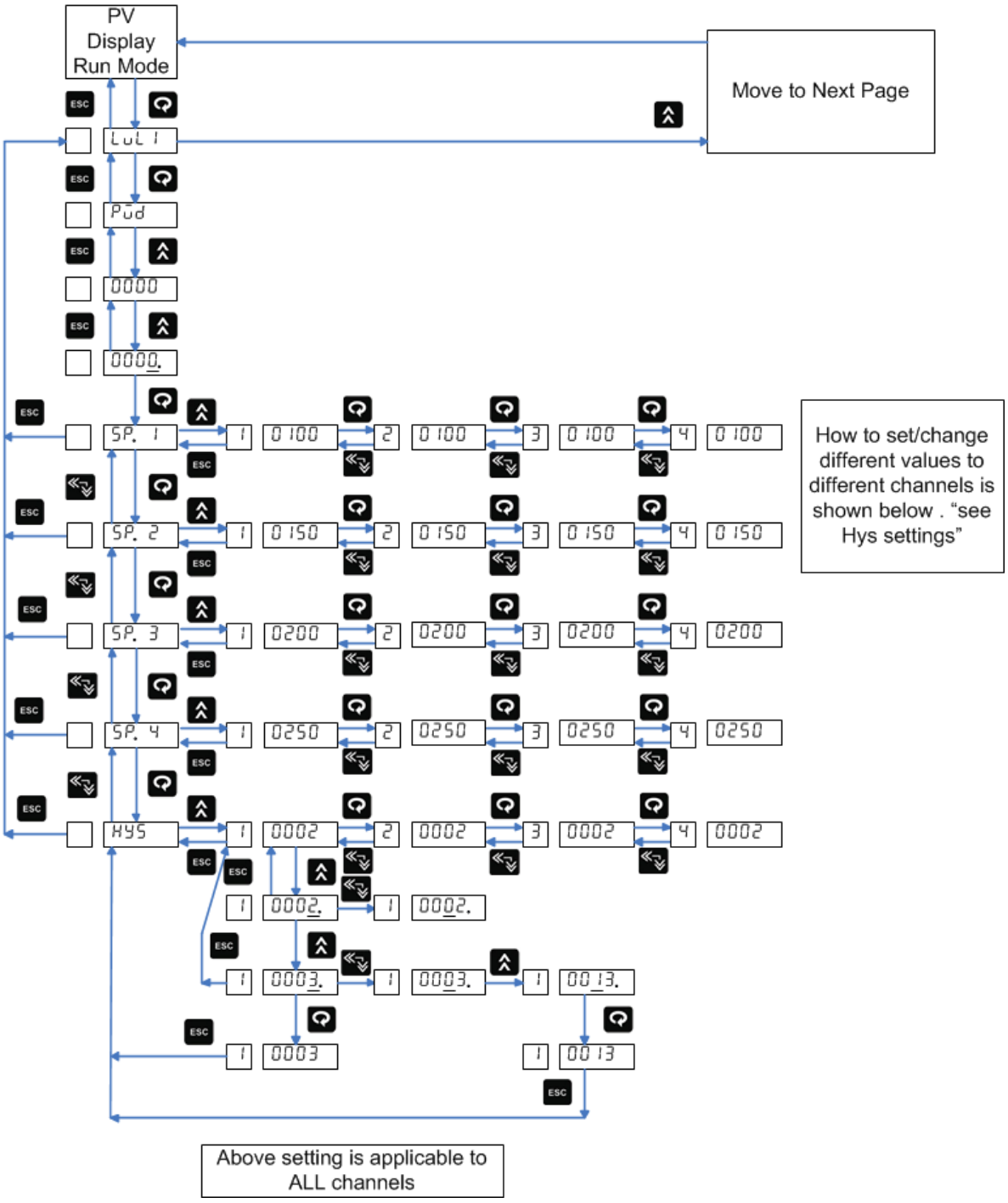
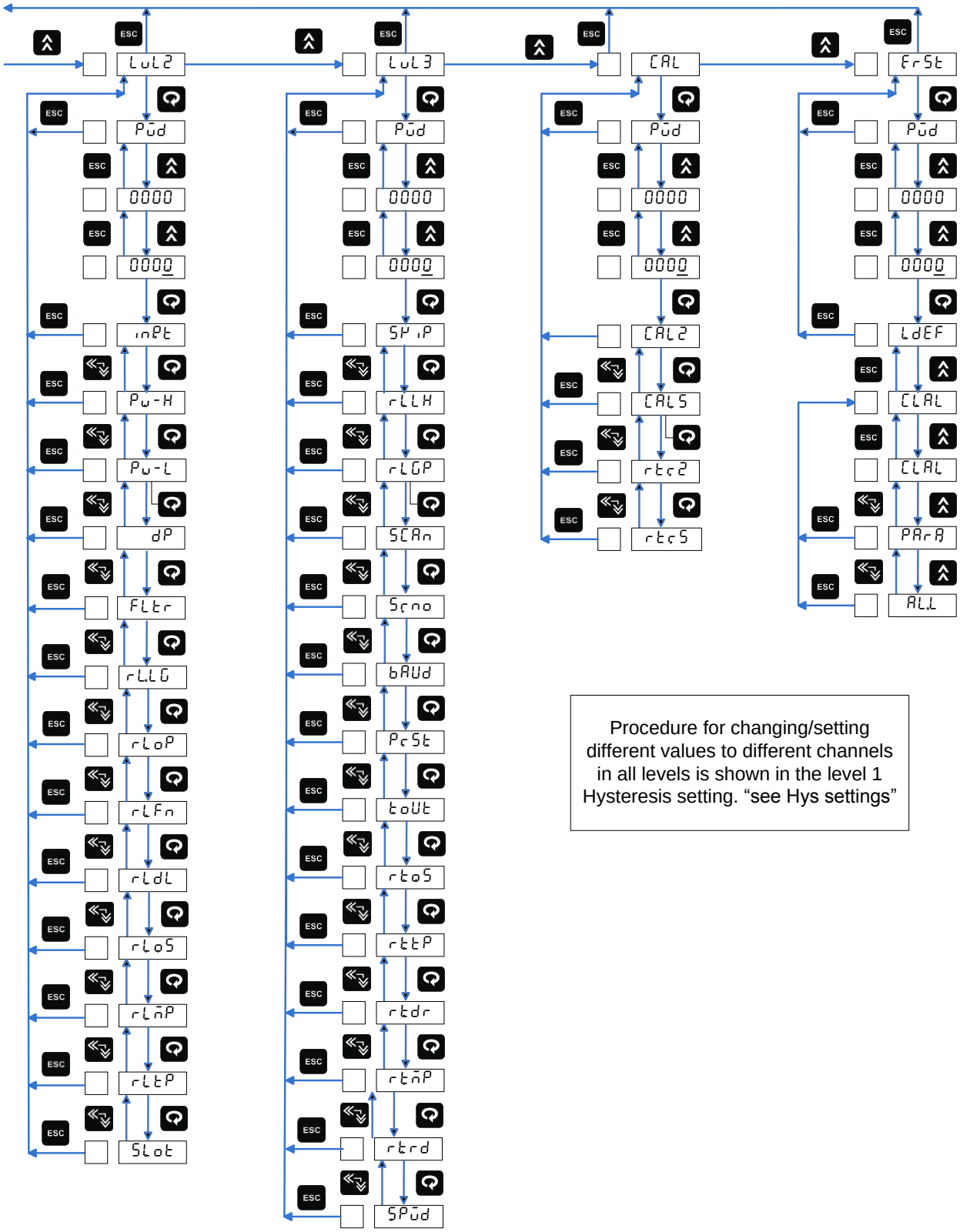


Figure 3 Level-1 Flow Diagram



Procedure for changing/setting different values to different channels in all levels is shown in the level 1 Hysteresis setting. “see Hys settings”

Figure 4 Level-1, Level-2, and Calibration & Factory Reset Mode Flow Diagram

7.2 Menu Parameters

- **Run Mode:**

Following parameters can view or change during run time.

- Immediately after powering, unit will run in Auto Mode. In auto mode channel will scan automatically according to scan time selection (1-250 second).
- By pressing **INCREMENT Key** in run mode, Channel number scanning on display is stopped. By pressing increment key again, we can change channel number manually.
- By pressing **SHIFT/DECREMENT Key** in run mode, relay acknowledgement can be done.
- By pressing **ESCAPE Key** after going into the Manual Mode unit comes back to run mode.

- **Other Modes:**

For entering in Menu press Enter key in RUN mode. There are total Five modes in menu. By pressing increment or decrement key mode can be changed. To enter into any mode press enter key again.

1. **Level – 1**
2. **Level – 2**
3. **Level – 3**
4. **Calibration Mode**
5. **Factory Reset Parameter**

The table below show the description and menu detail of the all the modes. In general to enter into any menu or to edit sub menu, press enter key, to change the submenu parameter press increment or decrement key. To come out from any menu press esc key.

1. Level – 1 :

Pressing MENU key DATA window shows LvL 1 (LvL1) message. Press MENU key again DATA window shows PWd (PWD) message, press increment key twice to select password and then press MENU key to enter into Level-1. DATA window shows SP .1 (SP.1) message and by pressing increment key, DATA window shows Set Point-1 Value. Use INC and SHIFT key to modify value. OR press MENU key again to change Set-point 1 for Channel 2. ESCAPE KEY is used to come out SP.1

LEVEL 1				
Parameter (DATA window)		Setting name and description	Default value	Shows only if
Symbol	Name			
PWd (PWD)	Level-1 Password	0 to 9999	0000	-
SP.1 (SP.1)	Target Set point-1	SetPoint-1 for All Channel	50.0	-
SP.2 (SP.2)	Target Set point-2	SetPoint-2 for All Channel	50.0	Relay group 2 is selected
SP.3 (SP.3)	Target Set point-3	SetPoint-3 for All Channel	50.0	Relay group 1 is selected
SP.4 (SP.4)	Target Set point-4	SetPoint-4 for All Channel	50.0	Relay group 1 is selected
HYS (HYS)	Hysteresis	Hysteresis for All Channel	1.0	-

Table 4 Level – 1 Parameter description

2. LEVEL – 2 :

Pressing MENU key DATA window shows LvL2 (LvL2) message. Press MENU key again DATA window shows PWd (PWD) message, press increment key twice to select password and then press MENU key to enter into Level-2. Following parameters can be configured in LEVEL – 2.

LEVEL 2:				
Parameter (DATA Window)		Setting name and description	Default value	Shows only if
Symbol	Name			
PWd (PWD)	Level-2 Password	0 to 9999	0000	-

InPt (inP.t)	PV Input Type	Follow **Table 21** (Input type for All Channel)	Acceleration(for all channel)	-
Pu-h (PV-H)	Process value range high setting (PV high > PV low)	Follow **Table 21** (Range High for All Channel)	40.0	-
Pu-L (PV-L)	Process value range lower setting	Follow **Table 21** (Range Low for All Channel)	0.0	-
FLtr (FLtr)	Digital Filter	0 to 9	1	
rLLG (rLLG)	Relay Logic (Applicable for All Relay)	nL / FS (Normal / Fail Safe) 0:Noraml 1:Fail Safe	Normal(for All Relay)	-
rLoP (rLOP)	Relay Operation	AL / Co (Alarm / Control Output) 0:Alarm 1: Control Output	Alarm	-
rLFn (rLFn)	Relay Function (Applicable for All Relay)	AL / tr (Alarm / Trip) 0:ALARM 1:TRIP	Alarm(for All Relay)	rLoP is set to AL
rLdL (rLdL)	Relay Delay (Applicable for All Relay)	1 to 99 seconds	1 second(for All Relay)	-
rLoS (rLoS)	Relay Open sensor (Applicable for All Relay)	UP / dn (UP / Down) 0:DOWN 1:UP	Up Scale(for All Relay)	-
rLmP (rlmp)	Relay mapping (Applicable for All Channel)	See Relay Configuration	Refer Note:3	rLoP is set to AL
rLtP (rltp)	Relay Group Type	See Relay Configuration	Refer Note:2	-

Table 5 Level – 2 Parameter Description

7.2.1 Relay Configuration

Relay configuration depends on selection of Relay group i.e. Relay group 1 or Relay group 2 or Relay group 4 in Level-3.

- **Relay Group - 1:**

If **Relay group – 1** is selected, there will be only one group of relay. That group has four relays. **(G-1). G-1** means RELAY 1, RELAY 2, RELAY 3 and RELAY 4

CHANNEL NO	NONE	G-1
1		✓
2		✓
3	✓	
4		✓

Relay Group	Relay Type
G - 1	Low ON (**L**) or High ON (**H**)

Relay Type can be selected as shown below:

Table 6 Relay Group – 1 Configuration Detail

Example:-
Note:- None means no group is selected for particular channel.

- **Relay Group - 2:**
  If relay group – 2 is selected, there will be two group of relay. Each group has two relays. **(G-1 and G-2). G-1** means relay 1, relay 3 & **G-2** means relay 2, relay 4
  Example:

CHANNEL NO	NONE	G-1	G-2
1		✓	
2			✓
3	✓		
4		✓	

Relay Group	Relay Type
G – 1	High/ Very High (**H-VH**) or Very Low /Low (**VL-L**) or Low/High (**L-H**)
G – 2	High/ Very High (**H-VH**) or Very Low /Low (**VL-L**) or Low/High (**L-H**)

Table 7 Relay Group – 2 Configuration Detail

Note : - **1)** All Groups cannot be selected for single Channel .
2) None means no group is selected for particular channel.

- **Relay Group - 4:**
  If relay group – 4 is selected, there will be four group of all 4 relays. Each group has one relay. **(G -1, G -2, G -3 and G -4). G - 1** means relay 1**, G -2** means relay 2**, G -3** means relay 3**, G -4** means relay 4

Example:

CHANNEL NO	NONE	G -1	G -2	G -3	G -4
1		✓			
2	✓				
3			✓		
4					✓

Relay Group	Relay Type
G - 1	Low ON (**L**) or High ON (**H**)
G - 2	Low ON (**L**) or High ON (**H**)
G - 3	Low ON (**L**) or High ON (**H**)
G - 4	Low ON (**L**) or High ON (**H**)

Table 8 Relay Group – 4 Configuration Detail

Note: - **1)** More than one Group cannot be selected for single Channel.
2) None means no group is selected for particular Channel.
3) If rL .oP is set to Co then All relay will be assigned channel wise.

- **Relay as Control Output:**
  Whenever rL .oP is set to Co then All relay will be assigned channel wise and all assignments are remain fixed. And Relay type

Example:

CHANNEL NO	NONE	G -1	G -2	G -3	G -4
1		✓			
2			✓		
3				✓	
4					✓

Relay Group	Relay Type
G - 1	Low ON (**L**) or High ON (**H**)
G - 2	Low ON (**L**) or High ON (**H**)
G – 3	Low ON (**L**) or High ON (**H**)
G – 4	Low ON (**L**) or High ON (**H**)

Table 9 Relay as Control Output Configuration Detail

- **For Relay functionality Refer Relay outputs (Chapter – 8).**

3. LEVEL - 3 :

Pressing MENU key DATA window shows **LvL3** (LvL3) message. Press MENU key again DATA window shows PWd (PWD) message, press increment key twice to select password and then press MENU key to enter into Level-3.Following parameters can be configured in LEVEL – 3.

LEVEL 3:				
Parameter (DATA Window)		Setting name and description	Default value	Shows only if
Symbol	Name			
PWd	Level-3 Password	0 to 9999	0000	-

(PWD)				
SK iP (skip)	Channel skip/ Unskip selection.	YES / no 0:NO 1:YES	0(for all channel)	-
rLLH (rLLH)	Relay Latch	on / oFF 0:OFF 1:ON	0	rLoP is set to AL
rLGP (rLGP)	Relay Group	rGP4 / rGP2 0:Relay Group-4 1:Relay Group-2 2:Relay Group-1	1	rLoP is set to AL
SCAn (SCAn)	Scan Time	1 to 250 seconds	1	-
Srno (Srno)	Unit ID	1 to 247	1	-
bAUd (baud)	Communication Baud rate	9600 / 19.2K 0:(9600) – 9600 bps 1:(19.2K) –19.2 Kbps	9600 bps	
PrSt (PrSt)	Parity/Stop bit selection	PnS1 / PnS2 / PoS1 / PES1 0:(PnS1)-parity none-stop bit-1 1:(PnS2)-parity none-stop bit-2 2:(PoS1)-parity odd-stop bit-1 3:(PES1)-parity even-stop bit-1	parity none-stop bit2	
toUt (tout)	Timeout for display back to Run Mode	10 to 100 Seconds	60	-
rtoS (rtos)	Retransmission Open sensor	UP / doun 0:DOWN 1:UP	1(For Both Output Card)	-
rttP (rttp)	Retransmission Output Type	0-20/4-20/ 0-5u/ 1-5u/ 0- 10u 0:(0-20) – 0-20mA 1:(4-20) – 4-20mA 2:(0-5) – 0-5volt 3:(1-5) – 1-5volt 4:(0- 10) – 0-10volt	1(For Both Output Card)	-
rtdr (rtdr)	Retransmission direction	dir / rEu 1:(dir) 0:(rev)	1(For Both Output Card)	-
rtmP (rt mp)	Retransmission mapping	See Table 12		
rtrd (rtrd)	Retransmission Channel Value	nAll / min 1:(Max) 0: (Min)	1(For Both Output Card)	-
SPud (SPWD)	Password Set password to lock selected level	0 to 9999	0	-

Table 10 Level – 3 Parameter Description

Note:-

1) None means no AO (Analog Output) (Retransmission Output) is assigned to particular channel.

2) AO O/p number = 0 represents "**None**". AO O/p Number = 1 and 2 represents "**Retransmission No. 1 and Retransmission No. 2.**

3) In "Retransmission mapping" parameter, maximum 2 numbers of Analog Outputs can be assigned to each channel. I.e. each channel can have maximum two numbers of analog outputs simultaneously. See the example below.

- **Example 1:** If Retransmission mapping for channel 1 = 0102 H, it means Retransmission output number 1 and output number 2 are assigned to channel 1. And output of channel 1 can be taken on analog output (retransmission output) number 1 and number 2.
- **Example 2:** If Retransmission mapping for channel 2 = 0001 H, it means Retransmission output number 1 is assigned to channel 2. And output of channel 2 can be taken on analog output (retransmission output) number 1.

Retransmission Output number (Decimal)	Retransmission Output number (Hex)	Setting Name and Description
0	0 x 00	nonE (None)
1	0 x 01	rt .01 (Retransmission Output-1)
2	0 x 02	rt .02 (Retransmission Output-2)

Table 11 AO (Analog Output) (Retransmission Output) description

Note: - By default For Channel-1 Retransmission output-1 and For Channel-2 Retransmission output- 2 is set.

4. Calibration mode :

Pressing MENU key, DATA window shows CAL (CAL) message. Press MENU key again, DATA window shows PWd (PWD) message, press increment key twice to select password and then press MENU key to enter into Calibration.

Calibration:				
Parameter (DATA Window)		Setting name and description	Default value	Shows only if
Symbol	Name			
PWd (PWD)	Password	0 to 9999	0000	-
CAL2 (CAL.Z)	All Input Type Zero Calibration	Depending on PV sensor type selected	-	-
CAL5 (CAL.S)	All input type Span Calibration	Depending on PV sensor type selected	-	-
rtr.2 (rtr.Z)	Retransmission voltage and current Zero calibration	Depending on Retransmission type selected	-	-
rtr.5 (rtr.S)	Retransmission voltage and current Span calibration	Depending on Retransmission type selected	-	-

Table 12 Calibration Mode Parameter Description

5. Factory Reset Parameters :

Pressing MENU key, DATA window shows FrSt (FrST) message. Press MENU key again, DATA window shows PWd (PWD) message, press Increment key twice to select password and then press MENU key to enter into Factory Reset.

Factory Reset Mode:				
Parameter (DATA window)		Setting name and description	Default value	Shows only if
Symbol	Name			
PWd (Pwd)	Password	0 to 9999	-	-
LdEF (LdEF)	LOAD Default	CAL\PArA\ ALL (CAL)\(PARA)\(ALL) CAL- Only calibration set to default value PArA- All parameters excluding calibration will set to default value ALL-Calibration and parameters will set to default value	-	-

Table 13 Factory Reset Mode Parameter Description

Note: - Factory reset will load default parameters, as mention in MENU LAYOT (Default value). Once this function applies, user has to switch off the instrument and again switch on the instrument to work according to Default value.

8. RELAY OUTPUTS

Following function can be set for Relay outputs.

- **Relay Logic (Direction):**
  Relay Logic means Relay contact can be changed from Open to Close OR Close to Open. If relay logic is selected Normal, when Fault occur Relay contact will change from Close to Open. If relay logic is selected Fail Safe, when Fault occur Relay contact will change from Open to Close.

- **Relay Function:** Relay function can be selected as ALARM or TRIP.
  If relay is selected as ALARM, the moment abnormal condition occurs the Relay will be ON, once condition is returned to the normal after the abnormal condition the Relay will be OFF.
  If relay is selected as TRIP, the moment abnormal condition occurs the Relay will be ON, once condition is returned to the normal after the abnormal condition the Relay will ON. Relay will be off through Acknowledge.

- **Relay Delay:** A time delay can be provided for the actual output.

- **Relay Open Sensor**: Open sensor upscale or down scale can be selected for each relay output.

- **Relay Mapping:** Refer Menu layout LEVEL - 2

- **Relay Types:** Various relay operations are shown in the reference figure. (High, Low, Very High- High, Low-Very Low, High-Low). For relay types selection Refer Menu layout LEVEL – 2.

  - Relay type High (H-ON):
    For High type of set value, once process value reaches up to set point + Hysteresis value,
    relay will be ON after few seconds (as per relay delay) and it will be ON until process value goes down to Set point.

  - Relay type Low (L-ON):
    For Low type of set value, once process value reaches down to set point - Hysteresis value relay will be ON after nearly few seconds (as per relay delay) and it will be ON until process value goes up toward Set point.

NOTE:-

VT7S12E has both Control Logic (ON-OFF) & Alarm Logic. If Control Logic (ON-OFF) is required, rLoP in LuL2 must be selected as Co.
Whenever Control Output (ON-OFF) logic is selected, all relays are mapped as shown in chapter no.6. As well as, relay latch is off and relay group is assigned as relay per group 1. In this logic, user cannot change relay mapping, relay latch and relay group and user cannot acknowledge relays.

Alarm 1
Momemtary alarm
(when in abnormal condition ack not pressed)

CONDITION				NORMAL	ABNORMAL	UP (O/S)	DOWN (O/S)	ACK **	NORMAL *	ACK ***
High	Alarm	Latch Yes	Lamp	Off	Steady	Steady	Off		Steady	Off
			Relay	Off	On	On	Off		Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Steady	Off		Off	Off
			Relay	Off	On	On	Off		Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****		Steady	Off
			Relay	Off	On	Off****	Off****		On	Off
Low	Alarm	Latch Yes	Lamp	Off	Steady	Off	Steady		Steady	Off
			Relay	Off	On	Off	On		Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Off	Steady		Off	Off
			Relay	Off	On	Off	On		Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****		Steady	Off
			Relay	Off	On	Off****	Off****		On	Off
Vlow	Alarm	Latch Yes	Lamp	Off	Steady	Off	Steady		Steady	Off
			Relay	Off	On	Off	On		Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Off	Steady		Off	Off
			Relay	Off	On	Off	On		Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****		Steady	Off
			Relay	Off	On	Off****	Off****		On	Off

Alarm al2
Momemtary alarm
(when in abnormal condition ack not pressed)

CONDITION				NORMAL	ABNORMAL	UP (O/S)	DOWN (O/S)	ACK **	NORMAL *	ACK ***
Vhigh	Alarm	Latch Yes	Lamp	Off	Steady	Steady	Off		Steady	Off
			Relay	Off	On	On	Off		Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Steady	Off		Off	Off
			Relay	Off	On	On	Off		Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****		Steady	Off
			Relay	Off	On	Off****	Off****		On	Off
High	Alarm	Latch Yes	Lamp	Off	Steady	Steady	Off		Steady	Off
			Relay	Off	On	On	Off		Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Steady	Off		Off	Off
			Relay	Off	On	On	Off		Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****		Steady	Off
			Relay	Off	On	Off****	Off****		On	Off
Low	Alarm	Latch Yes	Lamp	Off	Steady	Off	Steady		Steady	Off
			Relay	Off	On	Off	On		Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Off	Steady		Off	Off
			Relay	Off	On	Off	On		Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****		Steady	Off
			Relay	Off	On	Off****	Off****		On	Off

Alarm al1
Maintained alarm
(when in abnormal condition ack is pressed)

CONDITION				NORMAL	ABNORMAL	UP (O/S)	DOWN (O/S)	ACK **	NORMAL *	ACK ***
High	Alarm	Latch Yes	Lamp	Off	Steady	Steady	Off	Steady	Steady	Off
			Relay	Off	On	On	Off	Off	Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Steady	Off	Steady	Off	Off
			Relay	Off	On	On	Off	Off	Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****	Steady	Steady	Off
			Relay	Off	On	Off****	Off****	On	On	Off
Low	Alarm	Latch Yes	Lamp	Off	Steady	Off	Steady	Steady	Steady	Off
			Relay	Off	On	Off	On	Off	Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Off	Steady	Steady	Off	Off
			Relay	Off	On	Off	On	Off	Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****	Steady	Steady	Off
			Relay	Off	On	Off****	Off****	On	On	Off
Vlow	Alarm	Latch Yes	Lamp	Off	Steady	Off	Steady	Steady	Steady	Off
			Relay	Off	On	Off	On	Off	Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Off	Steady	Steady	Off	Off
			Relay	Off	On	Off	On	Off	Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****	Steady	Steady	Off
			Relay	Off	On	Off****	Off****	On	On	Off

Alarm al2
Maintained alarm
(when in abnormal condition ack is pressed)

CONDITION				NORMAL	ABNORMAL	UP (O/S)	DOWN (O/S)	ACK **	NORMAL *	ACK ***
Vhigh	Alarm	Latch Yes	Lamp	Off	Steady	Steady	Off	Steady	Steady	Off
			Relay	Off	On	On	Off	Off	Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Steady	Off	Steady	Off	Off
			Relay	Off	On	On	Off	Off	Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****	Steady	Steady	Off
			Relay	Off	On	Off****	Off****	On	On	Off
High	Alarm	Latch Yes	Lamp	Off	Steady	Steady	Off	Steady	Steady	Off
			Relay	Off	On	On	Off	Off	Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Steady	Off	Steady	Off	Off
			Relay	Off	On	On	Off	Off	Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****	Steady	Steady	Off
			Relay	Off	On	Off****	Off****	On	On	Off
Low	Alarm	Latch Yes	Lamp	Off	Steady	Off	Steady	Steady	Steady	Off
			Relay	Off	On	Off	On	Off	Off	Off
	Alarm	Latch No	Lamp	Off	Steady	Off	Steady	Steady	Off	Off
			Relay	Off	On	Off	On	Off	Off	Off
	Trip		Lamp	Off	Steady	Off****	Off****	Steady	Steady	Off
			Relay	Off	On	Off****	Off****	On	On	Off

NOTE:
* means normal condition after abnormal has occurred
** means ack pressed in abnormal condition
*** means ack pressed in normal condition after abnormal has already occurred.
******** means it remains in the previous state. If previous state is ON then it will remain ON and the same case for OFF condition.

Pressing Shift/Decrement key for 3 seconds, acknowledgement will be given for alarm and trip relay in abnormal condition.
Alarm Latch function applicable only for ALARM, there is no affect when TRIP Selected as a relay function LEVEL – 2.

9. CALIBRATION PROCEDURE

Calibration is provided for sensor input, Retransmission output.
First select the calibration function as described below and then follow the procedure depending on the parameter to be calibrated. The sequences of parameters that will be available for calibration are listed below:

- PV Sensor input
- Retransmission output (calibration for voltage or current)

PV input sensor calibration:-

When user enters in calibration menu, DATA window shows CAL .2 (Calibration ZERO) for sensor input zero calibration for Vibration Input Type. Press Increment Key, DATA window shows as per the Input feed. Feed sensor input using a calibrator, such that process value is close to lower range value.

Note: The Transmitter allows the user to calibrate sensor's input anywhere in the range, but it is recommended that it should be calibrated for the input at points close to lower and upper range values.

DP of last digit will blink to indicate that the value can be changed. Use Inc/Shift key to correct the displayed reading to the desired process value and press MENU key. The transmitter will display message WAIT (wait) in the DATA window to indicate that it is doing the necessary calculations.
When the calculations are over, the new calibration values are stored automatically.
This will complete Zero calibration.
Press MENU key to calibrate other parameters or press Escape key to come out to normal operation.

DATA window shows the CAL .5 (calibration SPAN) for sensor input span calibration for Vibration Input Type. Press Increment Key, DATA window shows as per the Input feed. Feed sensor input using a calibrator, such that process value is close to sensor's upper range value. Use Inc/Shift key to arrive at the desired process value. Press MENU key to register the changes.
The transmitter will display message WAIT (wait) in the DATA window to indicate that it is doing the necessary calculations. Depending on the situation, this process may take few seconds to calibrate. This will complete Zero and Span calibration.

In case, the transmitter cannot complete the calibration due to any reason, it will hold previous calibration parameters. Calibration for input sensor is over.

Retransmission output calibration (Voltage/current output) (Optional):-

In VT7S12E, maximum 2 numbers of Analog Output (Retransmission Output) are available. Analog output should be measured using a highly accurate digital multi meter. If user wants Current output then Output current value needs to be calibrated. For Current output calibration, set output type as 4-20 mA. If user wants Voltage output, then Output Voltage value needs to be calibrated. For Voltage output calibration, set output type as 0-10 V.

Press MENU key repeatedly, till DATA window shows message rtr .2 (retransmission output zero calibration).

DATA window shows the value being outputted on Retransmission output terminals. Measure the value using a highly accurate digital multi meter. Use Inc/Shift key to change measured value observed in multi meter on DATA window. Press MENU key. The controller will store zero calibration value. Press MENU key to calibrate retransmission output span calibration menu.

DATA window shows the message rtr .5 (retransmission output span calibration). DATA window shows the value being outputted on retransmission output terminals. Measure the value using a highly accurate digital multi meter. Use Inc/Shift key to change measured value observed in multi meter on DATA window. Press MENU key. When the calculations are over, the new calibration values are stored automatically. Calibration for Retransmission output is over.
Press Escape key to come out to normal operation.

Note: - For Calibration of PV Sensor input it is strongly recommended digital filter (FLtr) parameter value should be 1 (default value).

10. MODBUS COMMUNICATION DETAIL

The MODBUS Communications protocol as RS-485 interface module is installed. Only RTU mode is supported. Data is transmitted as 8-bit binary bytes with 1 start bit, 1/2 stop bit and optional parity checking (None, Even, Odd). Baud rate may be set to 9600 and 19200.

- **Function code use for Modbus:**

CODE	NAME	Function
01	Write Coil Status	Use to write output and input status
03	Read Holding registers	Use to read PV for 4-channels
04	Read input registers	Use to read programmable registers
05	Force Single Coil	Use to set or reset the coil
06	Preset Single register	Use to write programmable register

Table 14 Modbus Function code description

- **Exception responses for Modbus:**

CODE	NAME	Function
01	Illegal function	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
02	Illegal data address	The data address received in the query is not an allowable address for the slave
03	Illegal data value	A value contained in the query data field is not an allowable value for the slave
06	Slave device Busy	When Master device write some parameters to Slave device If slave device busy it will send 06 code to indicate slave device is busy.

Table 15 Exception codes

- **Modbus Parameter Details for Process Value:**

Sr No.	Parameter	Absolute Address	Parameter Type	Min Value	Max Value	Access Type
1	PV Channel - 1	30001	INT	-	-	R
2	PV Channel - 2	30002	INT	-	-	R

Table 16 Modbus Parameter Details for Process Value

- **Modbus values for OPEN, OVER, UNDER and SKIP Conditions:**

SR. NO.	Parameter	Value
1	Open sensor	32767
2	Over reading	32766
3	Under reading	32765
4	Skip Channel	32764

Table 17 Details of abnormal Conditions of Process Value

- **Modbus Parameter Details for Input Register:**

SR.NO.	Parameter	Absolute Address	Parameter Type	Min Value	Max Value	Access Type	Refer Table
1	SP.1 CH – 1	40001	INT	-	-	R/W	Table 21
2	SP.1 CH – 2	40002	INT	-	-	R/W	
3	SP.2 CH- 1	40005	INT	-	-	R/W	
4	SP.2 CH- 2	40006	INT	-	-	R/W	
5	SP.3 CH- 1	40009	INT	-	-	R/W	
6	SP.3 CH- 2	40010	INT	-	-	R/W	
7	SP.4 CH- 1	40013	INT	-	-	R/W	
8	SP.4 CH- 2	40014	INT	-	-	R/W	
9	HYS CH – 1	40017	INT	1	250	R/W	-
10	HYS CH – 2	40018	INT	1	250	R/W	-
11	INPUT TYPE CH - 1	40021	INT	-	-	R/W	Table 21
12	INPUT TYPE CH - 2	40022	INT	-	-	R/W	
13	Range High CH - 1	40025	INT	-	-	R/W	
14	Range High CH - 2	40026	INT	-	-	R/W	
15	Range Low CH - 1	40029	INT	-	-	R/W	
16	Range Low CH - 2	40030	INT	-	-	R/W	
17	Decimal Point CH - 1	40033	INT	0	3	R/W	-
18	Decimal Point CH - 2	40034	INT	0	3	R/W	-
19	RLY-Logic.1	40037	INT	0	1	R/W	
20	RLY-Logic.2	40038	INT	0	1	R/W	
21	RLY-Logic.3	40039	INT	0	1	R/W	Tab
22	RLY-Logic.4	40040	INT	0	1	R/W	**Relay Log**
23	RLY-Operation	40041	INT	0	1	R/W	Table 23
24	RLY-Function.1	40042	INT	0	1	R/W	Table 24
25	RLY-Function.2	40043	INT	0	1	R/W	
26	RLY-Function.3	40044	INT	0	1	R/W	
27	RLY-Function.4	40045	INT	0	1	R/W	
28	RLY-Delay.1	40046	INT	1	99	R/W	-
29	RLY-Delay.2	40047	INT	1	99	R/W	-
30	RLY-Delay.3	40048	INT	1	99	R/W	-
31	RLY-Delay.4	40049	INT	1	99	R/W	-
32	RLY-OpenSensor.1	40050	INT	0	1	R/W	Table 25
33	RLY-OpenSensor.2	40051	INT	0	1	R/W	
34	RLY-OpenSensor.3	40052	INT	0	1	R/W	
35	RLY-OpenSensor.4	40053	INT	0	1	R/W	
36	RLY-Map CH - 1	40054	INT	0	2/4	R/W	Table 27 Table 28 Table 29
37	RLY-Map CH - 2	40055	INT	0	2/4	R/W	
38	RLY-Map CH - 3	40056	INT	0	2/4	R/W	
39	RLY-Map CH - 4	40057	INT	0	2/4	R/W	
40	RLY-Type.1	40058	INT	0	2/4	R/W	Table 30 Table 31
41	RLY-Type.2	40059	INT	0	2/4	R/W	
42	RLY-Type.3	40060	INT	0	2/4	R/W	
43	RLY-Type.4	40061	INT	0	2/4	R/W	
44	SKIP-Channel CH - 1	40062	INT	0	1	R/W	-
45	SKIP-Channel CH - 2	40063	INT	0	1	R/W	-
46	RLY Latch	40066	INT	0	1	R/W	Table 32
47	RLY Group	40067	INT	0	2	R/W	Table 26
48	Scan Rate	40068	INT	1	250	R/W	-
49	Auto CJC	40069	INT	0	1	R/W	-
50	Fix CJC	40070	INT	0	60.0	R/W	-
51	Machine ID	40071	INT	1	247	R/W	-
52	Baud Rate	40072	INT	0	1	R/W	Table 33
53	Parity/Stop Bit	40073	INT	0	3	R/W	Table 34
54	Timeout	40074	INT	10	60	R/W	-
55	Retransmission Open Sensor AO Card-1	40085	INT	0	1	R/W	Table 35
56	Retransmission Open Sensor AO Card-2	40086	INT	0	1	R/W	
57	Retransmission Type AO Card-1	40087	INT	0	4	R/W	Table 36
58	Retransmission Type AO Card-2	40088	INT	0	4	R/W	
59	Retransmission Direction AO Card-1	40089	INT	0	1	R/W	Table 37
60	Retransmission Direction AO Card-2	40090	INT	0	1	R/W	

61	Retransmission Mapping CH-1	40091	INT	-	-	R/W	-
62	Retransmission Mapping CH-2	40092	INT	-	-	R/W	-
63	Retransmission Value AO Card-1	40095	INT	0	1	R/W	Table 38
64	Retransmission Value AO Card-2	40096	INT	0	1	R/W	
65	Password	40098	INT	0	9999	R/W	-
66	Over Limit	40099	INT	0	10	R/W	-
67	Under Limit	40100	INT	0	10	R/W	-
68	Digital Filter	40101	INT	0	9	R/W	-

Table 18 Modbus Parameter Details for Input Register

Sr. No.	Parameter	Absolute Address	Parameter Type	Min Value	Max Value	Access Type	NOTE
1	Calibration Password	49001	INT	0	65000	W	
2	Zero Calibration Channel-1	49003	INT	-	-	W	
3	Zero Calibration Channel-2	49004	INT	-	-	W	
4	Span Calibration Channel-1	49011	INT	-	-	W	
5	Span Calibration Channel-2	49012	INT	-	-	W	
6	Zero Calibration AO Card-1	49019	INT	-	-	W	
7	Zero Calibration AO Card-2	49020	INT	-	-	W	
8	Span Calibration AO Card-1	49021	INT	-	-	W	
9	Span Calibration AO Card-1	49022	INT	-	-	W	

Table 19 Modbus Parameter Details for Calibration Register

- **Modbus Parameter Details for Read Output Status Register:**

Sr. No	Parameter	Absolute Address	Parameter Type	Access Type
1	Alarm.1 Channel-1	1	BIT	R
2	Alarm.1 Channel-2	2	BIT	R
3	Alarm.2 Channel-1	5	BIT	R
4	Alarm.2 Channel-2	6	BIT	R
5	Alarm.3 Channel-1	9	BIT	R
6	Alarm.3 Channel-2	10	BIT	R
7	Alarm.4 Channel-1	13	BIT	R
8	Alarm.4 Channel-2	14	BIT	R
9	RELAY STATUS-1	17	BIT	R
10	RELAY STATUS-2	18	BIT	R
11	RELAY STATUS-3	19	BIT	R
12	RELAY STATUS-4	20	BIT	R
13	Auto/Manual Mode	21	BIT	R/W
14	Acknowledge Status	22	BIT	W
15	Unused	-	-	-
16	Unused	-	-	-

Table 20 Modbus Parameter Details for Read Output Status Register

NOTE: - For Auto/Manual Mode, to set Manual mode bit value = 1 and to set Auto mode bit value = 0.

Table 21 Input Type Selection					
Input Type	**I/P no**	**Type Display**	**Zero**	**Span**	**Resolution**
Acceleration RMS	1	A-rn	0	50.0	0.1
Acceleration PEAK	2	A-Pn	0	50.0	0.1
Acceleration PEAK-PEAK	3	A-PP	0	50.0	0.1
Velocity RMS	4	u-rn	0	100.0	0.1
Velocity PEAK	5	u-Pn	0	100.0	0.1
Velocity PEAK-PEAK	6	u-PP	0	100.0	0.1
Displacement PEAK-PEAK	7	d-PP	0	2000	1

Table 22 Relay Logic Selection	
Modbus Index	**Parameter Value**
0	Normal
1	Fail Safe

Table 23 Relay Operation Selection	
Modbus Index	**Parameter Value**
0	Alarm
1	Control Output

Table 24 Relay Function Selection	
Modbus Index	**Parameter Value**
0	Alarm
1	Trip

Table 25 Relay Open sensor Selection	
Modbus Index	**Parameter Value**
0	Down
1	Up

Table 26 Relay Group Selection	
Modbus Index	**Parameter Value**
0	Relay Per Group – 4
1	Relay Per Group – 2
2	Relay Per Group – 1

Table 27 Relay Group 1 Selection	
Modbus Index	**Parameter Value**
0	None
1	G – 1 (RELAY 1,2,3& 4)

Table 28 Relay Group 2 Selection	
Modbus Index	**Parameter Value**
0	None
1	G – 1 (RELAY 1 & 3)
2	G – 2 (RELAY 2 & 4)

Table 29 Relay Group 4 Selection	
Modbus Index	**Parameter Value**
0	None
1	G-1 (RELAY – 1)
2	G-2 (RELAY – 2)
3	G-3 (RELAY – 3)
4	G-4 (RELAY – 4)

Table 30 Relay Type for Group – 2 Selection	
Modbus Index	**Parameter Value**
0	Low ON
1	High ON

Table 31 Relay Type for Group – 4 & 1 Selection	
Modbus Index	**Parameter Value**
0	High/Very High
1	Low/Very Low
2	High/LOW

Table 32 Relay Latch selection	
Modbus Index	**Parameter Value**
0	OFF
1	ON

Table 33
Baud Rate for Communication Selection

Modbus Index	Parameter Value
0	9600bps
1	19.2kpbs

Table 34
Parity/Stop Bit Selection

Modbus Index	Parameter Value
0	Parity-None/Stop Bit - 1
1	Parity-None/Stop Bit - 2
2	Parity Odd/Stop Bit – 1
3	Parity Even/Stop Bit – 1

Table 35
Retransmission OPEN sensor Selection

Modbus Index	Parameter Value
0	Down
1	Up

Table 36
Retransmission Type Selection

Modbus Index	Parameter Value
0	0 – 20 mAmp
1	4 – 20 mAmp
2	0 – 5V
3	1 – 5V
4	0 – 10V

Table 37
Retransmission Direction Selection

Modbus Index	Parameter Value
0	Reverse
1	Direct

Table 38
Retransmission Value Selection

Modbus Index	Parameter Value
0	Minimum
1	Maximum

11. MISCELLANEOUS

- **PV INPUT STATUS DISPLAY DURING BURNOUT CONDITION:**

Input type	Display Message
Acceleration RMS	OPEN
Acceleration PEAK	OPEN
Acceleration PEAK-PEAK	OPEN
Velocity RMS	OPEN
Velocity PEAK	OPEN
Velocity PEAK-PEAK	OPEN
Displacement PEAK-PEAK	OPEN

Table 39 PV Status during burn out Condition

Note:-

- If set PV_low /PV_high for input type is less then maximum value of zero and span for then process value will display readings above 5% of display range, then after it will show OuEr/UNdr message until value crosses maximum value of Sensor range. **OVER/UNDER condition is applicable for RTD input types only**. Process value greater then maximum value of zero/span then display will show OPEN (OPEN) message. Retransmission o/p(Retransmission is optional) will follow 5% of display range and then it will give fixed o/p depending up on OPEN sensor selection. In case of linear inputs scaling is applied then during OPEN sensor condition it may not show OPEN (OPEN) message instead it will show either OuEr/UNdr (OVER/UNDER).
- **For Vibration input type UNDER** condition is not applicable, Process value will display reading above 5% of span after that it will show OuEr (OVER) message, until Process value crosses full range of input type after that it will show OPEN (OPEN) message.

- **RETRAMISSION OUTPUT TABLE FOR OPEN /OVER CONDITION :**

RETRASMISSION	VARIABLE	SCALE	ACTION	OPEN	OVER	ERROR
4-20 mA	PV	UP	DIR	21.6	20.8	-
	PV	DOWN	REV	20.8	3.2	-
	PV	UP	REV	2.4	3.2	-
	PV	DOWN	DIR	2.4	20.8	-

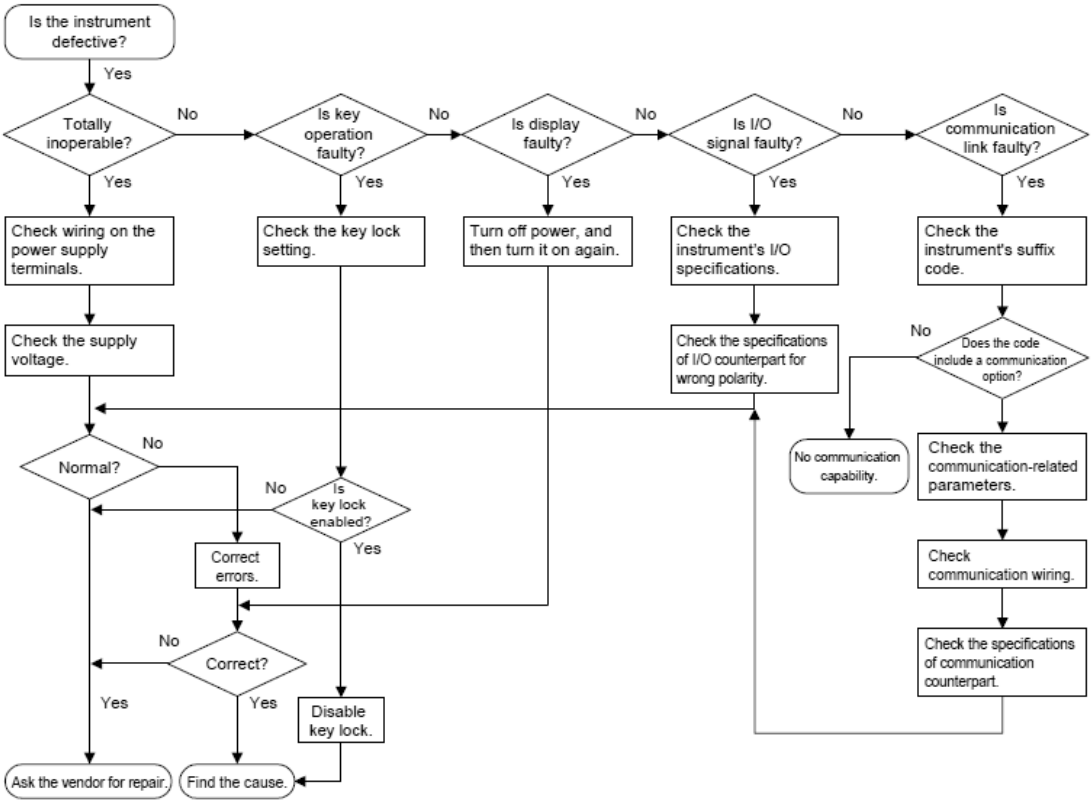
Table 40 Retransmission Output during Open/Over Condition

NOTE: -

- For Retransmission output type 0-20mamp, 0-10v, 1-5v and 0-5v also applicable according to above table.
- Also, 0-20mamp, 0-10v and 0-5v minimum output value will be 0mamp and 0v respectively.

12. TROUBLESHOOTING

If the operating display does not appear after turning on the Vibration Transmitter power, follow the measures in the procedure below. If a problem appears complicated, contact our sales representative.



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