

User's Manual

CLEAN ROOM DISPLAY UNIT **CDU**



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1. INTRODUCTION

Foreword

Thank you for purchasing CLEAN ROOM DISPLAY UNIT CDU.

This manual describes the basic functions and operation methods. Please read through this user's manual carefully before using the product.

Notice

The contents of this manual are subject to change without notice as a result of continuous 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 our 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.

Trademarks

Our product names or brand names mentioned in this manual are the trademarks or registered trademarks of Sonepar India Pvt. Ltd. (herein after referred to as MASIBUS).

Adobe, Acrobat, and Postscript are either registered trademarks or trademarks of Adobe Systems Incorporated. All other product names mentioned in this user's manual are trademarks or registered trademarks of their respective companies.

Checking the Contents of the Package

Unpack the box and check the contents before using the product. If the product is different from 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

Check the model and suffix codes to confirm that the product received is that which was ordered.

List of Accessories

The product is provided with the following accessories according to the model and suffix codes (see the table below). Check that none of them are missing or damaged.

Sr. No.	Description of Accessory	Part number	Quantity
**1	Pressure Coupler Part- 3 CDU Coupler 22mm Dia. with Accessories Drawing no.- mMP/mech/301-3	-	1
1	FLAT TYPE CSK HEAD SCREW M5x20 mm	-	4
2	SELF TAPING SCREW M5 X 20mm CSK	-	2

*3	Wired RH+T Sensor	CBL-CDU-TRH-10	1
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*only for remote sensor with cable

**only if Integral DP Sensor

Product Overview

Masibus model CDU Clean Room Display Unit is designed to measure and display Temperature, Humidity and Differential Pressure in one compact enclosure.

CDU Clean Room Display Unit accepts analog input from Temperature, Humidity and Differential pressure sensors, optionally the sensors for all 3 parameters are integrated inside for ease of use & installation. CDU is also available in Remote sensor with 10 meter cable option for RH + T measurement.

CDU is available in two display options either 4 digit 0.56" Red Seven segment displays to Indicate Temperature, %RH and DP individually. CDU with LED display option has individual LEDs for Status indication for all three channels. High and low alarm led Indications are settable using programming modes.

CDU has inbuilt buzzer for audible process value violation. Data Acquisition can be done on SCADA/ PLC application through RS485 using MODBUS protocol.

CDU optionally also accepts Humidity and Temperature input through wireless Zigbee network from Masibus make HT16Ew Humidity & Temperature Transmitter. Designed using proven micro-controller technology, this Clean Room Display Unit has been validated to perform accurate and Reliable Performance in harsh field environment.

Safety Precautions

The product and the instruction manual describe important information to prevent possible harm to users and damage to the property and to use the product safely.

Understand the following description (signs and symbols), read the text and Observe Descriptions.

DESCRIPTION OF SIGN

 WARNING	<i>This indicates a danger that may result in death or serious injury if not avoided.</i>
 CAUTION	<i>This indicates a danger that may result in minor or moderate injury or only a physical damage if not avoided.</i>

2. SPECIFICATION

Input	Differential Pressure(DP)	Humidity(RH)	Temperature(T)
input	✓	✓	✓
Integral	✓	✓	✓
Analog(4-20mA/0-10VDC)	X	✓	✓
Remote Sensor with Cable	X	✓	✓
Wireless	X	✓	✓
Measurement Range			
Intergral	± 500Pa, ±50.0 mmWC	0-100%RH	0-60°C
Analog	-999 to 999	-999 to 999	-999 to 999
Wireless	NA	0-100%RH	0-60°C
Accuracy			
Integral	± 2% of FS	±2.5% (0 to 90% RH) ±3.5% (90 to 100% RH)	±0.4°C
Analog	0.1% of full span + 1 count		
Repeatability	NA	0.25%	0.24°C
Hysteresis	NA	0.8%	NA
Resolution			
Integral	0.1/1 (user selectable)	1%	0.1 °C
Analog	1 count	1 count	1 count
Response time			
Integral	2 sec	12 sec typically(RH+T Wireless Remote Sensor) 2 sec typically (integral sensor)	
Analog	<1 sec		
Analog Input Type Features			
ADC resolution		16 Bit	
NMRR		>40dB	
CMRR		>120dB	
Temp Co		<100ppm/°C	
Input impedance		>1MΩ For Voltage i/P ; 250Ω For mA i/p	
Max Voltage		20VDC	
Display & Keys NFLP		Non-flameproof	
Process Value 1,2,3		0.56" Four-digit 7 segment Red LED(DP, RH, T)	
Status Indication		9 Red LED's for alarm, Batch Run, Communication	
Keys		Enter, Increment, Decrement, Acknowledgement	
RTC		0.56" 4-digit 7 segment Red LED (Optional)	
Display & Keys CDU-XP		Flameproof	
Process Value		0.56" Four-digit 7 segment Red LED(DP, RH, T)	
Status Indication		9 Red LED's for alarm, Batch Run, Communication and Pressure unit	
Keys		Touch sense keys: Enter, Increment, Decrement	

	Acknowledgement
Output	
Buzzer	Inbuilt Buzzer provided to beep in set values violated condition
RTC	Real time clock with battery backup
Loop Power Supply	24VDC ($\pm 10\%$) @75mA with Inbuilt Short Circuit Protection (For Analog i/p)
Communication O/P	
Interface	RS485 (2 Wire)
Protocol	DNP-3.0, Modbus-RTU
Baud Rate	9600,19200,38400 bps
Data Backfilling	Yes (with DNP 3.0 Protocol only)
Wireless	(For RH+T Wireless Remote Sensor)
Frequency Band	ISM 2.4 GHz
Protocol	ZigBee (IEEE 802.15.4 standard)
Transmit Power	63 mW (+18 dBm)
Receiver Sensitivity	-101 dBm
Line of sight Range (outdoors)	200 m typically
Indoor Range	90 m typically
Connectivity	With HT16Ew (masibus)
Data Logging	
Memory	64Mbits
Record Type	Date/Time/Year/Temperature/Humidity/Pressure
Total Records	Up to 400000
Record Transmit Interval	User Selectable from every 1 Min to 9999 Min
Power Supply	
Standard	18-36VDC
Power Consumption	<3VA

Isolation (Withstanding voltage)

- Between primary terminals* and secondary terminals**: At least 1500V AC for 1 minute
- Between secondary terminals**: At least 500V AC for 1 minute
- Insulation resistance: 20M Ω or more at 500V DC between power terminals and grounding terminal

* Primary terminals indicate power terminals.

** Secondary terminals indicate I/O signal & Communication O/P.

Environmental Condition	
Humidity	20% to 95% RH (Non-Condensing)
Ambient temperature	0 to 55°C
Storage Temperature	0 to 80°C
Non-flameproof Enclosure	
Enclosure Back Part W mm x H mm x D mm	116 x 114 x 45 mm
Enclosure Mounting	Brick wall mounting Wall mounting
Stainless Steel Front Plate: W mm x H mm	a) 165 x 165 mm a) 205 x 205 x 100 W mm x H mm x D mm

Enclosure Material	M.S. Powder Coated Body with Stainless Steel Front Flush	S.S-304
Weight Approx.	< 1 Kg	
Enclosure Protection	IP 20	
Terminal Cable Size	1.5mm ²	

Physical

	CDU	CDU-XP
Flameproof Enclosure Dimension (W x H x D) mm	150 x 150 x 50 (H x W x D) for LED 163 x 174 x 50 (H x W x D) for LCD Tolerance: ±2mm	212.20(H)x 212.20(W)x 55(D) Tolerance: ±2 mm
Stainless Steel Front Plate	165 x 165 (H x W) mm (LED) 195 x 195 (H x W) mm (LCD)	250(H) x 260(W)
Weight Approx.	< 1 kg	<4 Kg
Enclosure Mounting	wall mounting	wall mounting
Enclosure Material	Enclosure M.S. powder Coated Body with Stainless Steel Front Flush	Die cast aluminum alloy LM6
Finish:	Epoxy light grey shade- 631 of IS:5	Epoxy light grey shade- 631 of IS:5
Type of Protections:	Flameproof (Explosion Proof) EX-d	Flameproof (Explosion Proof) EX-d
Area Classification:	Hazardous Location of Zone 1 & 2	Hazardous Location of Zone 1 & 2
Gas Groups:	IIA & IIB	IIA & IIB
Enclosure Protection	IP20	IP 55
Cable entry size/no:	¾" ET – 5 Nos.	¾" ET – 5 Nos.
Plug Details:	5 Cable gland ¾"ET	5 Cable gland ¾"ET
Terminal Cable Size	1.5mm ²	1.5mm ²
Cut Out in mm	150(H) x 150(W) for LED 163(H) x 174(W) for LCD	225(H) x 225(W)

* Flameproof Enclosure itself is enclosed in enclosure.

Features

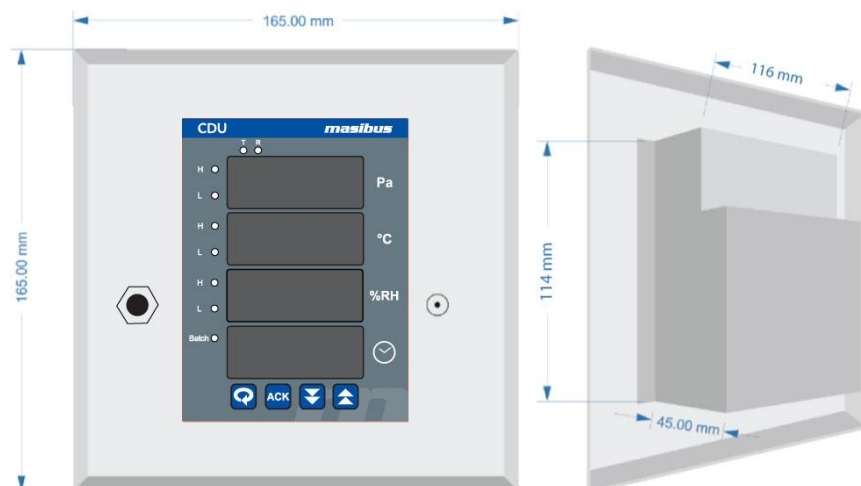
- RH, Temperature and DP measurement
- Advanced digital RH+T sensor technology
- Calibration on not required for digital RH+T sensor
- Internal sensor option (Ease of installation)
- Remote sensor option for RH + T measurement
- 3 programmable alarms with visual annunciation
- Software programmable channel ranges, units & input types
- Real time clock with battery back-up
- Synchronized with server clock over RS485
- Data backfilling via D
- NP 3.0 avoiding data loss (optional)
- RS485/MODBUS RTU multidrop communication on for PLC, SCADA etc.
- FDA 21CFR part11 compliant SCADA version also

- Data logging
- Optional Wireless connectivity (with HT16Ew model)

3. PHYSICAL SPECIFICATIONS & MOUNTING DETAILS

3.1 CDU

Non-flameproof Enclosure	For more Details Refer Fig 3.1	
Enclosure Back Part W mm x H mm x D mm	116 x 114x 45	
Enclosure Mounting	Brick wall mounting	Wall mounting
Stainless Steel Front Plate : W mm x H mm	b) 165 x 165 c) 185 x 185 d) 190 x 170	a) 205 x 205 x 100 W mm x H mm x D mm
Enclosure Material	M.S. Powder Coated Body with Stainless Steel Front Flush	S.S-304
Weight Approx.	<1kg.	
Enclosure Protection	IP 20	
Terminal Cable Size	1.5mm ²	

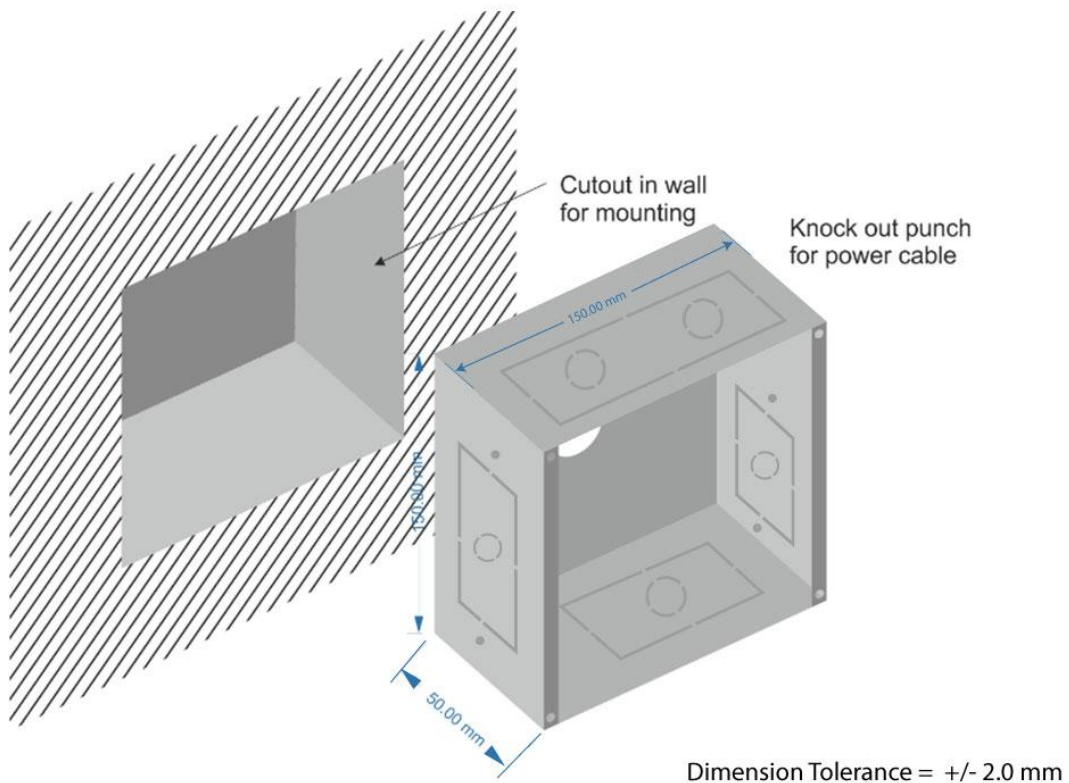


Dimension Tolerance = +/- 2.0 mm

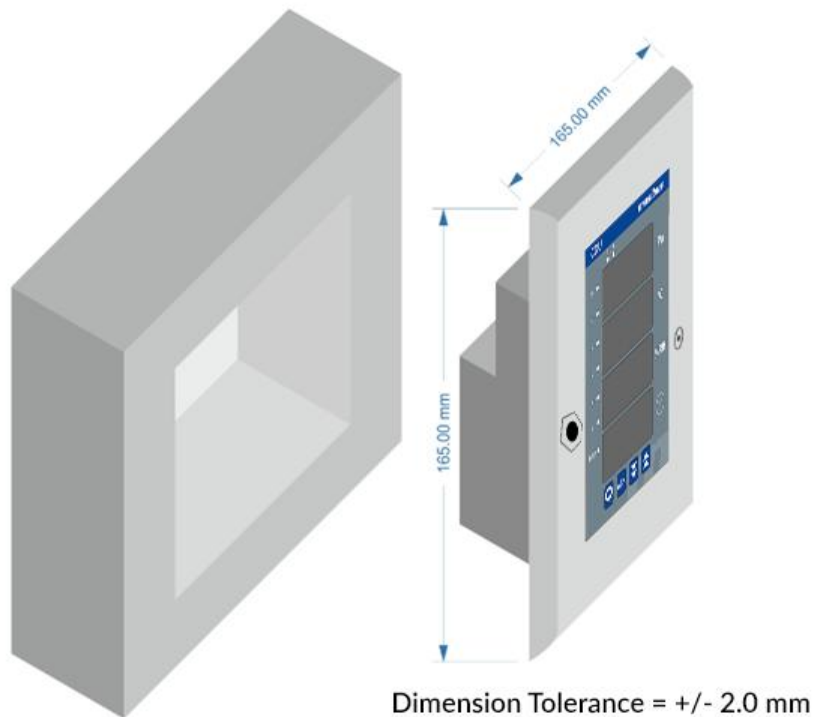
Fig 3.1: Whole Assembly Drawing

3.1.1 Brick Wall Flush Mount

- For Brick wall Flush mount, First fit the conceal box in the wall as shown in Fig 3.2.



Dimension: (W mm x H mm x D mm)
Conceal Box: 150 x 150 x 50 SS Front Plate: 165 x 165
Conceal Box: 170 x 170 x 50 SS Front Plate: 185 x 185
Fig 3.2: Conceal Box Fitting details

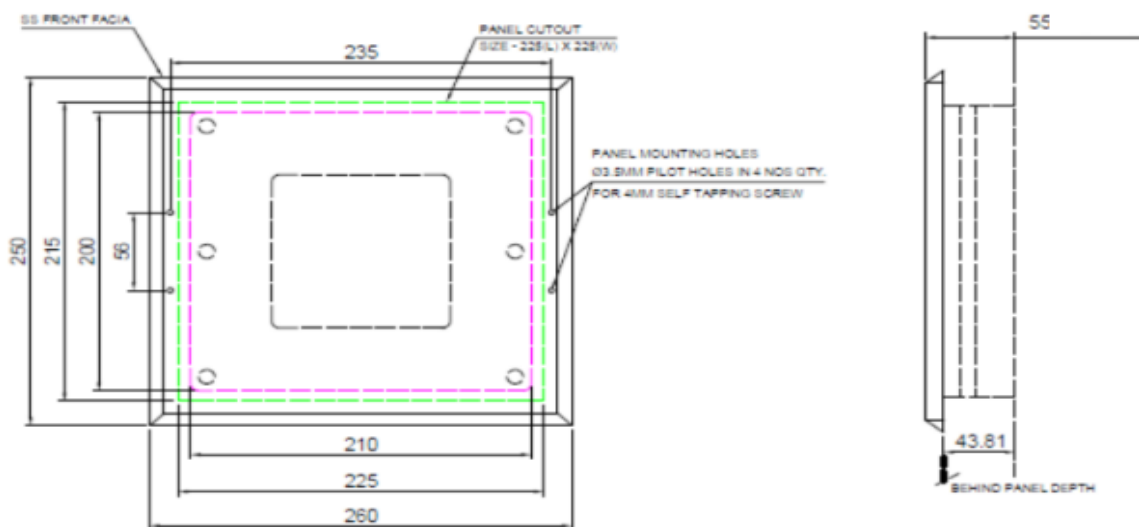


Enclosure Dimension (W mm x H mm x D mm): 165mm X 165mm X 45mm
Fig 3.3: Main Box Fitting in Conceal Box details

1. Conceal Box
2. Wall mounting screw for conceal Box
3. CDU Instrument
4. Instrument mounting screws
5. Check the Wiring before fixing the instrument.
6. Now fix the Instrument with M5X20mm MS Screws on the MS plate of the instrument.

3.2 CDU-XP

Flameproof Enclosure Dimension (W x H x D) mm	212.20(H)x 212.20(W)x 55(D) Tolerance: ± 2 mm
Stainless Steel Front Plate	250(H) x 260(W)
Weight Approx.	<4 Kg
Enclosure Mounting	wall mounting
Enclosure Material	Die cast aluminum alloy LM6
Finish:	Epoxy light grey shade- 631 of IS:5
Type of Protections:	Flameproof (Explosion Proof) EX-d
Area Classification:	Hazardous Location of Zone 1 & 2
Gas Groups:	IIA & IIB
Enclosure Protection	IP 55
Cable entry size/no:	3/4" ET – 5 Nos.
Plug Details:	5 Cable gland 3/4"ET
Terminal Cable Size	1.5mm ²
Cut Out in mm	225(H) x 225(W)



4. TERMINAL CONNECTIONS



For analog input

for integral Sensor input

Fig 4.1: Terminal Connection Detail of CDU

Sr.no	Terminal NO.	Description
V+	24VDC +	Power Supply Input
V-	24VDC -	
D+	RS 485 +	RS 485 Communication Output
D-	RS 485 -	
*1	V+	For Voltage or current input CH1
*2	V-	
*3	V+	For Voltage or current input CH2
*4	V-	
*5	V+	For Voltage or current input CH3
*6	V-	
*7,8	24V LPS+	Transmitted power supply
#1	+3.3V	Integral or Remote sensor with 10 meter cable for RH + T measurement
#2	GND	
#3	DATA	
#4	CLK	
5	+5V	External Buzzer Plate with LED
6	GND	
7	Buzzer	
8	LED	

*only if analog input

Only if Integral or remote sensor with cable RH+T input

4.1 How to connect wires?

Before carrying out wiring, turn off the power to the unit and check that the cables to be connected are not alive 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.
- ✓ Unused control terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.
- ✓ Use >250V-1Amp Cable for Power Supply.
- ✓ Supply voltage must be below maximum voltage rating specified on the label
- ✓ If cable has two parallel wires inside then isolation between them must be 2.5 KV.

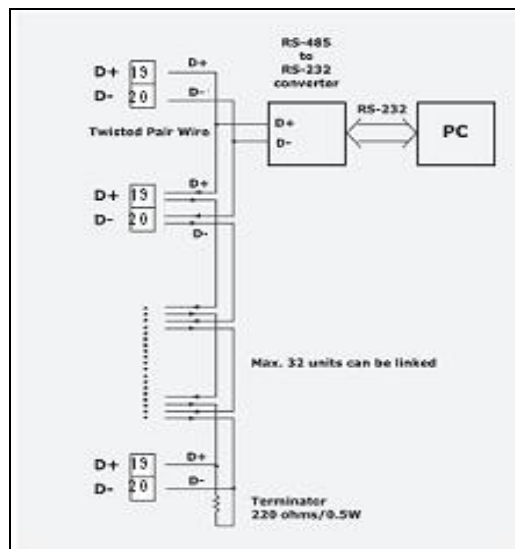
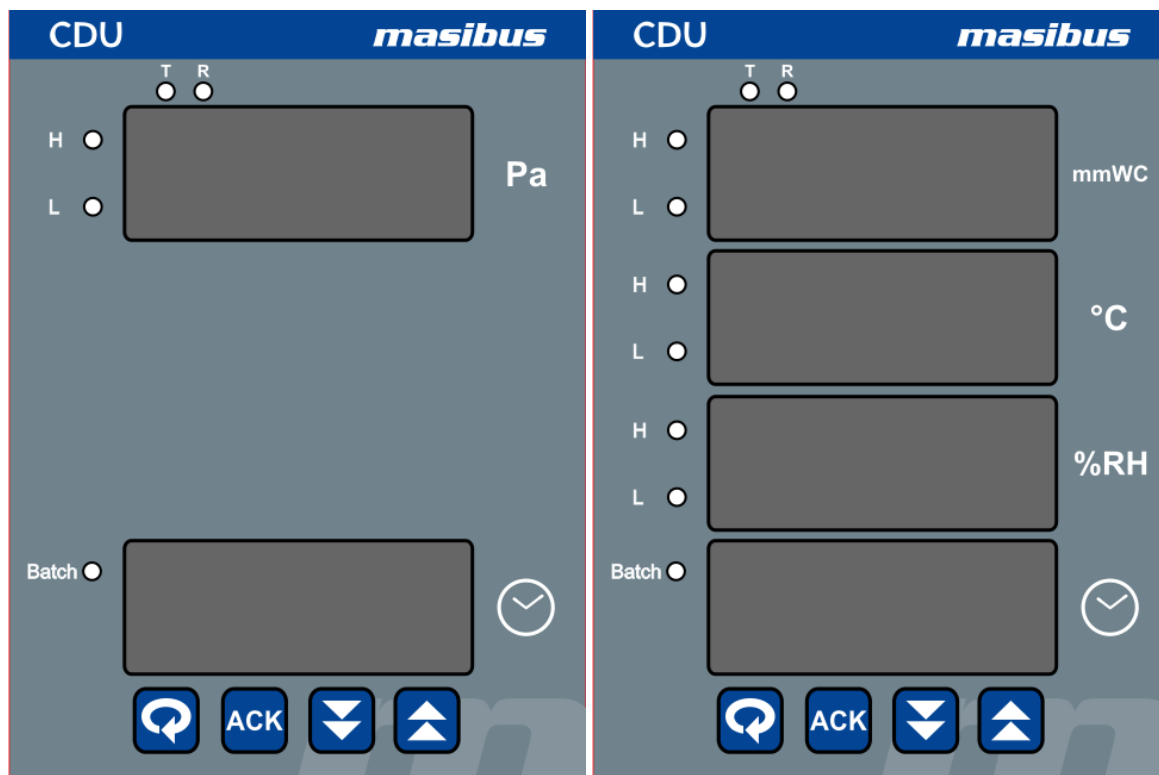
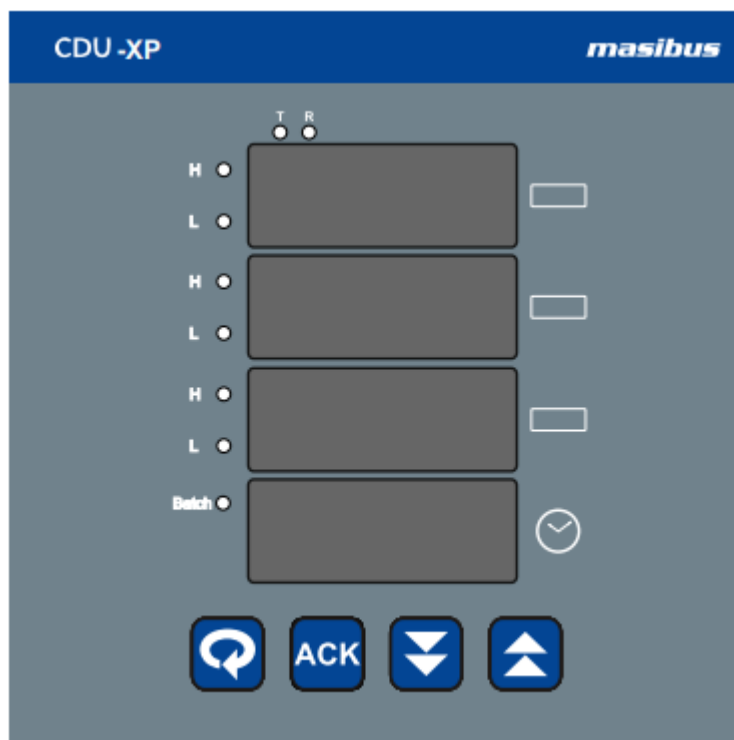
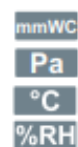


Fig 4.2: RS485 Connection Details

5. FRONT PANEL DETAILS



Note: individual 4 stickers in one page



Size: 11 mm x 5 mm

5.1 Front Panel Description

Symbol	Function
	Increment the Value of any Parameter in menu mode. Batch run start if pressed in RUN mode.
	Decrement the Value of any Parameter in menu mode. Batch run stop if pressed in RUN mode.
	In Sub Menu it can be used to get to the next Parameter. It is also used to save the parameters to nonvolatile memory, when user setting a proper data by Increment and decrement key for parameter configuration.
	Used to acknowledge the buzzer in Run mode. On Long press (Approx. 5 Sec), To check min. and max. Value of PV Pressure and PV Humidity and PV Temperature.
PV1	4 digit 0.56" inch RED Display Display process value1. Display Configuration mode name. Display parameter name when user set parameter. Display parameter value of parameter in process value field when user set parameter.
PV2	4 digit 0.56" inch RED Display Display process value2.
PV3	4 digit 0.56" inch RED Display Display process value3.
Time	4 digit 0.56" inch RED Display Display Real TIME.
T	LED ON when device is transmitting some Data (RS-485).
R	LED ON when device is receiving some Data (RS-485).
H	LED ON when setH process value violation
L	LED ON when setL process value violation
Batch	LED ON when Batch Run

6. APPLICATION DIAGRAM

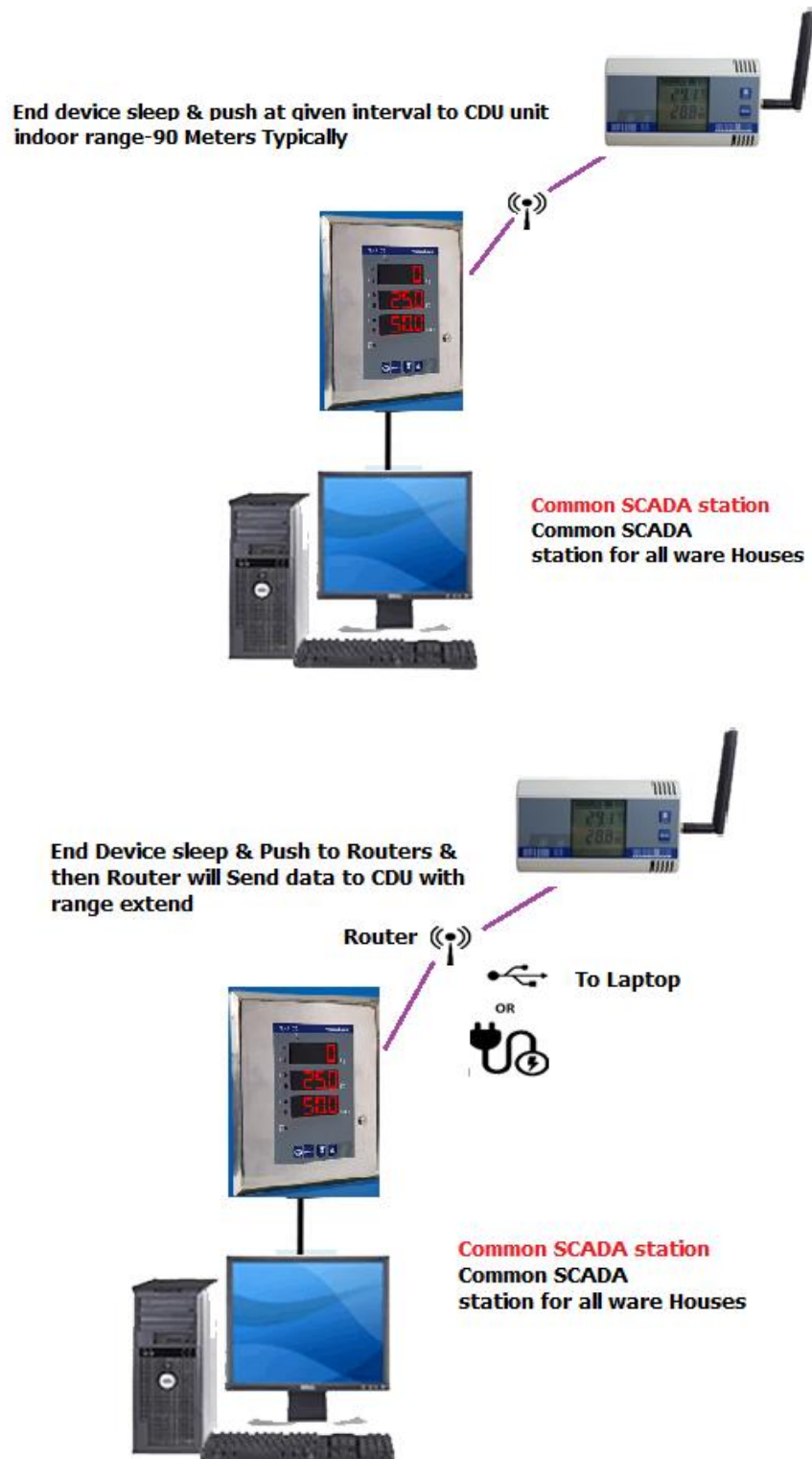
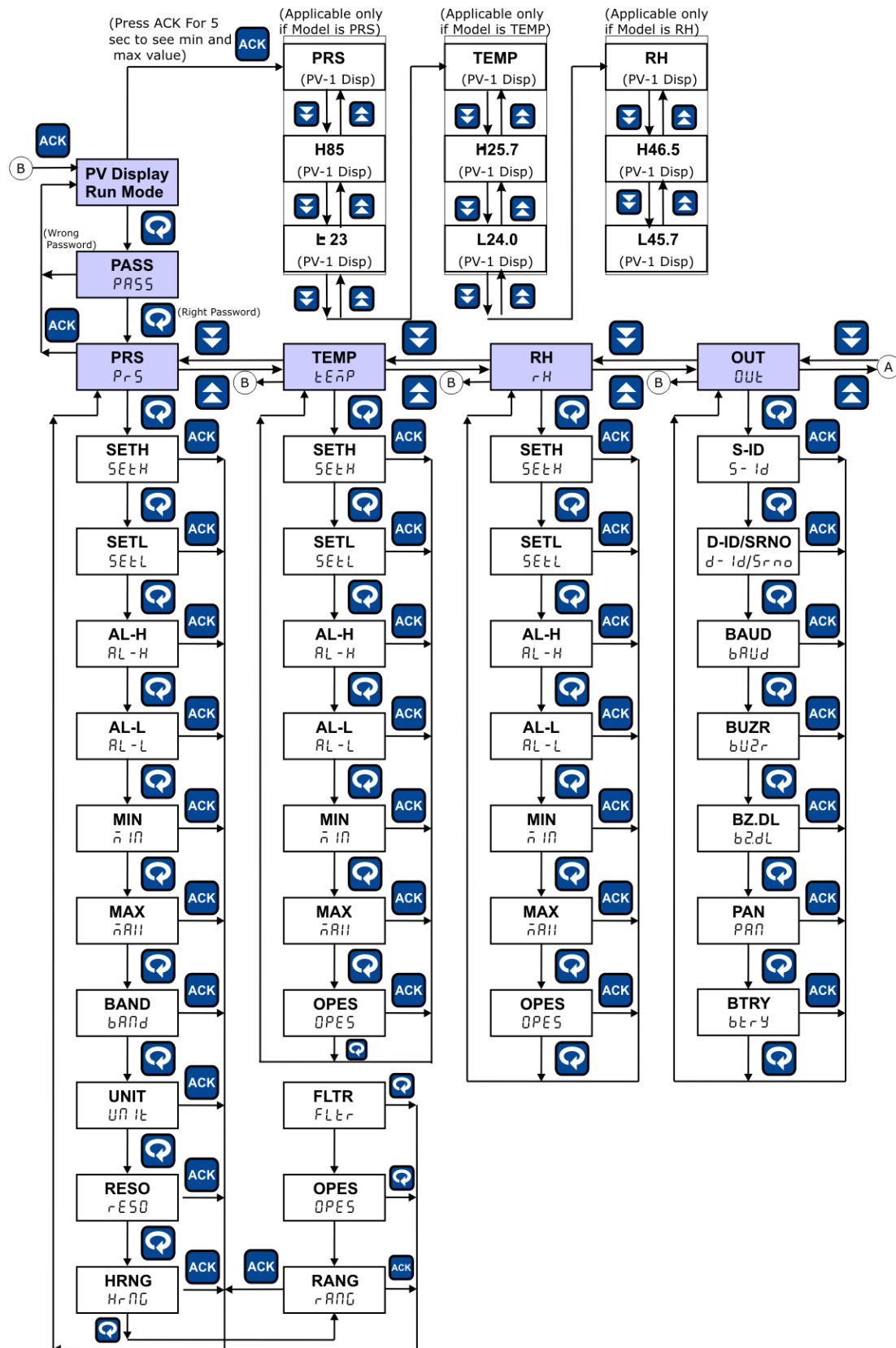


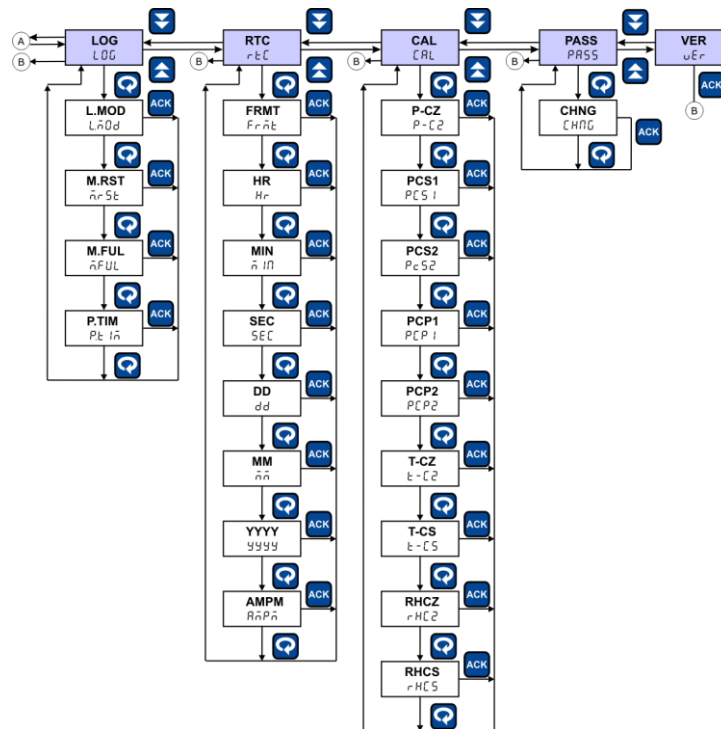
Fig 6.1: Application Diagram

NOTE: While power on-off of HT16Ew always send manual frame.

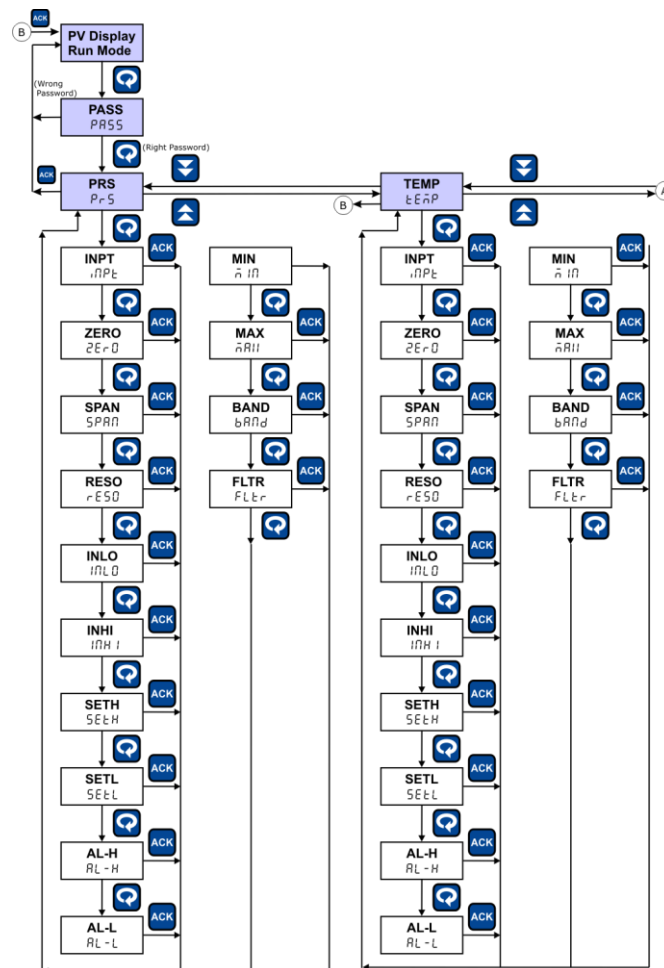
7. MENU LAYOUT

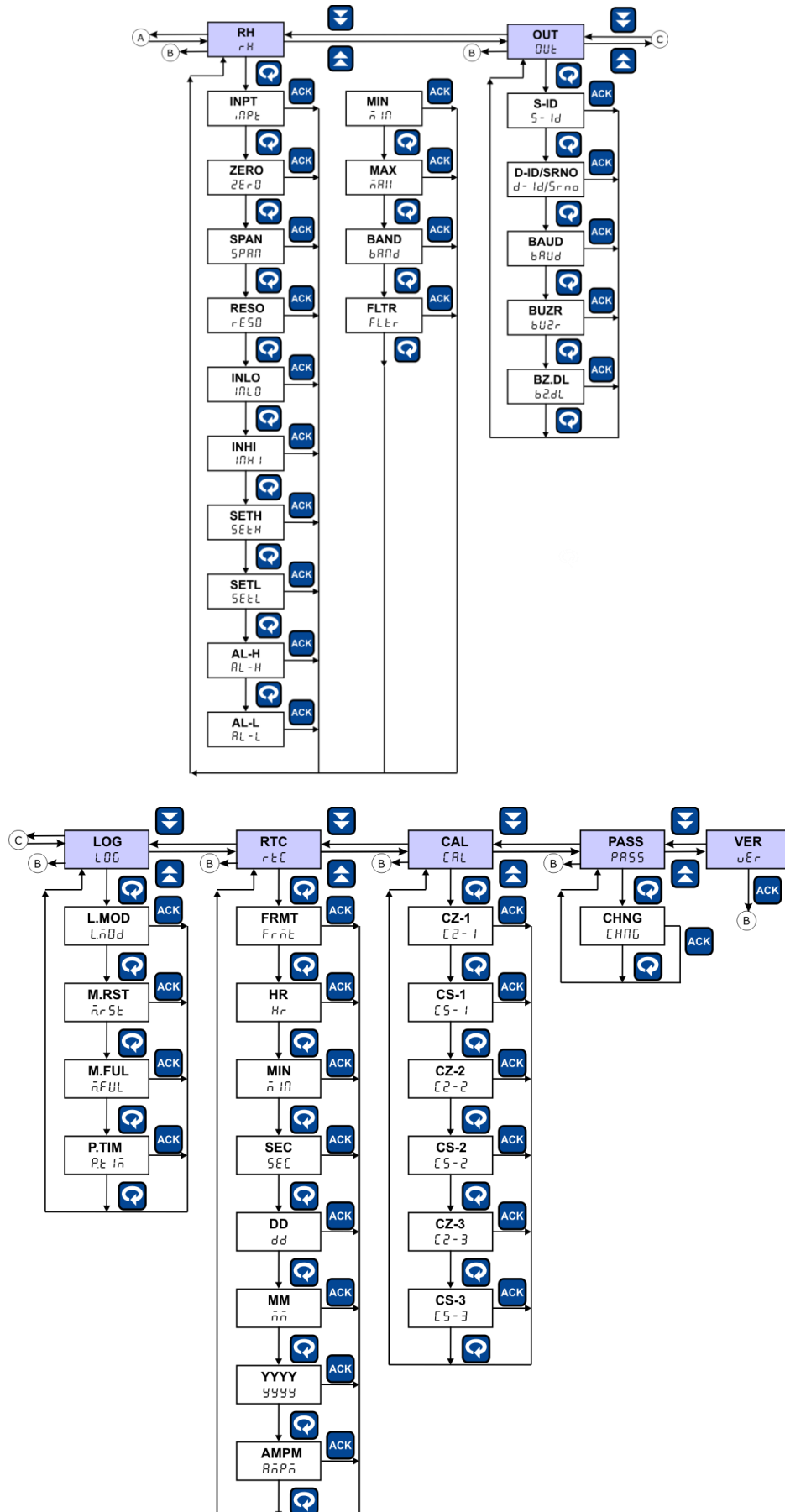
7.1 MENU LAYOUT for Integral/Remote/Cable sensor





7.2 MENU LAYOUT for ANALOG INPUT





7.3 Run Time Indication/Function

- To Run Batch, Press Increment key for 5 Sec. Calculation for Min and Max value of will start.
- To Stop Batch, Press Decrement Key for 5 Sec. Min and Max value of will get reset.
- To Stop Batch, Press Increment Key for 5 Sec. Increment key will work as a toggle key to start and stop Batch.
- To Acknowledge Buzzer, Press Acknowledgment Key.
- ¹ For Min and Max value of PV-1 Press acknowledgment Key for 5 Sec. Further Press Increment Key for Min and Max value of PV-2 Further Press Increment Key for Min and Max value of PV-3.
- ² If wireless communication with Masibus Make HT16Ew gets break, decimal point of digit 4 of PV -1 (DISP-1) will blink.
- ² If CDU receives logged data from Masibus Make HT16Ew, decimal point of digit 4 of PV -1 (DISP-1) will steady on.
- ² If memory of CDU gets full, decimal point of digit 4 of PV -1 (DISP-1) will blink.

¹ Applicable for Digital and Integral sensor

² Applicable for Digital sensor only.

Parameter (PV display)		Setting Name & Description	Default Value	Shows Only if
Symbol	Name			
7.4 PRS MODE				Integral Sensor
SETH (SEtH)	Set Point High	Adjust SET POINT High value -50.0 to 50.0 For mmwc, -500 to 500 For Pascal Note: Set Point High value cannot be set lower than Set Point Low value.	5	-
SETL (SEtL)	Set Point Low	Adjust SET POINT Low value -50.0 to 50.0 For mmwc, -500 to 500 For Pascal Note: Set Point Low value cannot be set higher than Set Point High value.	- 5	-
AL-H (AL-H)	Alarm High	Set Alarm Type for Alarm HIGH HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	HIGH	-
AL-L (AL-L)	Alarm Low	Set Alarm Type for Alarm LOW HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	LOW	-

MIN (<i>MIN</i>)	Minimum Value of Pressure	Display Minimum value of PV Pressure For Batch Run	0.0	-
MAX (<i>MAX</i>)	Maximum value of Pressure	Display Maximum value of PV Pressure For Batch Run	0.0	-
BAND (<i>BAND</i>)	Pressure BAND	Set band for data logging 0 to 50.0 For mmwc, 0 to 500 For Pascal	2.0	DNP protocol
UNIT (<i>UNIT</i>)	Pressure UNIT	Display Pressure UNIT <i>PA / mmWC</i> 0: Pa 1: mmWC	PA	-
RESO (<i>RESO</i>)	Resolution	Set Resolution For Pressure Input <i>1 / 0.1</i> 0: 1 1: 0.1	0.1	-
HRNG (<i>HRNG</i>)	Pressure High range	It is a pressure High range for display. 0.0 to 50.0 For mmwc 0 to 500 For Pascal,	100.0	-
RANG (<i>RANG</i>)	Pressure Display Range	Set Display Range For Pressure Input Unidirectional/Bidirectional <i>UN.DR / BI.DR</i> 0: UN.DR 1: BI.DR	UN.DR	-
OPES (<i>OPES</i>)	Open Sensor Status	PV value on Display while Link break/Sensor open with HT16Ew <i>LAST / DOWN / UP</i> 0 : LAST (Last PV value of RH, T) 1: DOWN (Min. PV value of RH = 0.0%, T = 0.0 °C) 2: UP (Last PV value of RH = 99.9% ,T = 60.0 °C)	LAST	-
FLTR (<i>FLTR</i>)	Filter for Process value	It is a filter rate of IIR filter, 0 value will disable the Filter. Set value from 0-120sec	0	-
7.5 TEMP				Integral /wireless/p or remote sensor
SETH (<i>SETH</i>)	Set Point High	Adjust Set Point High value. Set Point High value should be greater than Set Point Low value. 0 to 60.0	26.0	-

SETL (SEtL)	Set Point Low	Adjust Set Point Low value. Set Point Low value should be less than Set Point High value. 0 to 60.0	24.0	-
AL-H (AL-H)	Alarm High	Set Alarm Type for Alarm HIGH HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	High	-
AL-L (AL-L)	Alarm Low	Set Alarm Type for Alarm LOW HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	Low	-
MIN (Min)	Minimum Value of Temperature	Display Minimum value of PV Temperature For Batch Run	0.0	-
MAX (Max)	Maximum value of temperature	Display Maximum value of PV Temperature For Batch Run	0.0	-
BAND (band)	Temperature BAND	Set band for data logging 0.0 to 60.0	2.0	DNP protocol
OPES (OPES)	Open Sensor Status	PV value on Display while Link break with HT16Ew /Sensor open. LAST / DOWN / UP 0 : LAST (Last PV value of RH, T) 1: DOWN (Min. PV value of RH = 0.0%, T = 0.0 °C) 2: UP (Last PV value of RH = 99.9% ,T = 60.0 °C)	LAST	-
7.6 RH				Integral /wireless/p or remote sensor
SETH (SEtH)	Set Point High	Adjust Set Point High value. Set Point High value should be greater than Set Point Low value. 0 to 100.0	55.0	-
SETL (SEtL)	Set Point Low	Adjust Set Point Low value. Set Point Low value should be less than Set Point High value. 0 to 100.0	45.0	-
AL-H (AL-H)	Alarm High	Set Alarm Type for Alarm HIGH HI / LOW / DIS	High	-

		0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)																					
AL-L (AL-L)	Alarm Low	Set Alarm Type for Alarm LOW HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	LOW	-																			
MIN (MIN)	Minimum Value of Humidity	Display Minimum value of PV Humidity For Batch Run	0.0	-																			
MAX (MAX)	Maximum value of Humidity	Display Maximum value of PV Humidity For Batch Run	0.0	-																			
BAND (BAND)	Humidity BAND	Set band for data logging 0.0 to 99.9	2.0	DNP protocol																			
OPES (OPES)	Open Sensor Status	PV value on Display while Link break with HT16Ew /Sensor open. LAST / DOWN / UP 0 : LAST (Last PV value of RH, T) 1: DOWN (Min. PV value of RH = 0.0%, T = 0.0 °C) 2: UP (Last PV value of RH = 99.9% ,T = 60.0 °C)	LAST	-																			
7.7 CH1 / CH2 / CH3				Analog INPUT																			
INPT (INPT)	INPUT Type	Set PV Input Type 0- 10 / 0-5V / 1-5V / 0-20mA / 4-20mA <table><tr><td>INPT TYPE</td><td>INLO</td><td>INHI</td><td rowspan="6">-999 to 999</td></tr><tr><td>0-20mA</td><td>0V</td><td>5V</td></tr><tr><td>4-20mA</td><td>1V</td><td>5V</td></tr><tr><td>0-10V</td><td>0V</td><td>10V</td></tr><tr><td>0-5V</td><td>0V</td><td>5V</td></tr><tr><td>1-5V</td><td>1V</td><td>5V</td></tr></table> Table 7.8.1 *Use external 250ohms,0.1% for current input	INPT TYPE	INLO	INHI	-999 to 999	0-20mA	0V	5V	4-20mA	1V	5V	0-10V	0V	10V	0-5V	0V	5V	1-5V	1V	5V	0-10V	
INPT TYPE	INLO	INHI	-999 to 999																				
0-20mA	0V	5V																					
4-20mA	1V	5V																					
0-10V	0V	10V																					
0-5V	0V	5V																					
1-5V	1V	5V																					
ZERO (ZERO)	Zero Value For Display	Can be set to any value within the Input Range & less than the SPAN Value.(Refer Table 7.8.1)	-999																				
SPAN	Span Value for	Can be set to any value within the	999																				

(SPAN)	Display	Input Range & greater than the ZERO Value.(Refer Table 7.8.1)		
RESO (rESD)	Resolution	Set Resolution For analog channel 1 1 / 0 . 1 / 0 . 0 1 0: 1 1: 0.1 2: 0.01	0 . 1	-
INLO (INLD)	Input Low Voltage	Can be set to any value within the Range & less the Input high value.(Refer Table 7.8.1)	0 . 0	
INHI (INH I)	Input High Voltage	Can be set to any value within the Range & greater the Input Low value.(Refer Table 7.8.1)	10 . 0	
SETH (SEtH)	Set Point High	Adjust SET POINT High value -999 to 999 Note: Set Point High value cannot be set lower than Set Point Low value.	100	-
SETL (SEtL)	Set Point Low	Adjust SET POINT Low value -999 to 999 Note: Set Point Low value cannot be set higher than Set Point High value.	- 100	-
AL-H (AL -H)	Alarm High	Set Alarm Type for Alarm HIGH HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	HI GH	-
AL-L (AL -L)	Alarm Low	Set Alarm Type for Alarm LOW HI / LOW / DIS 0 : HI(High) 1 : LOW(Low) 2: DIS(Disable)	LOW	-
MIN (MIN)	Minimum Value of Channel	Display Minimum value of PV channel 1 For Batch Run	0 . 0	-
MAX (MAX)	Maximum value of Channel	Display Maximum value of PV channel 2 For Batch Run	0 . 0	-
BAND (BAND)	BAND	Set band for data logging 0 / 0 . 1 / 0 . 00 1 0: 0 to 999 For resolution-0, 1: 0.0 to 99.9 For resolution-0.1, 2: 0.00 to 9.99 For resolution-0.01	2 . 0	DNP protocol

FLTR (FLTR)	Filter for Filter for Process value	It is a filter rate of IIR filter, 0 value will disable the Filter. Set value from 0-120sec	0	
-----------------------	-------------------------------------	--	---	--

7.8 OUT

S-ID (5-ID)	Source ID	Source ID for Communication 1 to 9999	1	DNP protocol
D-ID (d-ID)	Destination ID	Destination(Unit) ID for Communication 1 to 9999	2	DNP protocol
SRNO (Srno)	Serial No.	Sr.no for Communication 1 to 247	2	MODBUS Protocol
BAUD (baud)	Baud Rate	Set Serial Communication Baud Rate 9.6K / 19.2K / 38.4K 0 : 9.6K (9600 bps) 1 : 19.2K (19200 bps) 2 : 38.4K (38400 bps)	96K	-
BUZR (buzr)	Buzzer Status	Set Enable or Disable For Audible Process value violation d IS / EN 0: DIS 1: EN	EN	-
BZDL (bzdl)	Buzzer on Delay	It is a delay time to Buzzer ON. 0 to 3600 Sec	30	-
**PAN (PAN)	PAN ID	Set ZigBee PAN ID 0 to 9999	ZigBee PAN ID	Wireless RH.T
BTRY (btry)	Battery percentage	Battery percentage limit for alarm Set 0-100%	60	Wireless RH.T

** 0 pan id is not settable

7.9 LOG

L.MOD (L.mod)	LOG Mode	Set Log mode for memory full condition HOLD / OVL P 0 : HOLD 1 : OVLP	0 O L P	DNP protocol
M.RST (m.rst)	Memory RESET	Set memory reset condition YES / NO 0: YES 1: NO	no	
M.FUL	Memory FULL	Set Buzzer status for memory full	b2on	

($\bar{n}$.FUL)		condition b2 .00 / b2 .0F 0: BZ.ON 1: BZ.OF		
P.TIM (P .t l $\bar{n}$)	Periodic Time	Set Periodic time 0 to 59	5	

7.10 RTC

FRMT (Fr $\bar{n}$ t)	Time Format	Set Time Format. 24hr / 12hr 0 : 12HR 1 : 24HR	24hr	
HR (Hr)	Hour	Set hour of RTC 0 to 23	Real Time	
MIN ($\bar{n}$ l $\bar{n}$)	Minute	Set Minute of RTC 0 to 59	Real Time	
SEC (SE $\bar{C}$)	Second	Set Second of RTC 0 to 59	Real Time	
DD (dd)	Date	Set Date according to Month of RTC 1 to 31	Real Time	
MM ($\bar{n}$ $\bar{n}$)	Month	Set Month of RTC 1 to 12	Real Time	
YYYY (yyyy)	Year	Set Year of RTC 2019 to 2037	Real Time	
*AMPM (A $\bar{n}$ P $\bar{n}$)	AM/PM	Display only if 12hr Format A $\bar{n}$ / P $\bar{n}$ 0 : AM 1 : PM	Real Time	

*Only shows when time format is 12 hour.

7.11 CAL

P-CZ (P- $\bar{C}$ 2)	Calibration Zero	Calibration Zero for PV input Pressure	-	Integral or Digital pressure Sensor
PCS1 (P $\bar{C}$ S1)	Calibration Span 1	Calibration Span1 for PV input Pressure	-	
PCS2 (P $\bar{C}$ S2)	Calibration Span 2	Calibration Span2 for PV input Pressure	-	
PCP1 (P $\bar{C}$ P1)	Calibration Point 1	Calibration Point-1 for PV input Pressure calibration	125	
CP-2 (P $\bar{C}$ P2)	Calibration Point 2	Calibration Point-2 for PV input Pressure calibration	140	

T-CZ (t - C2)	Calibration Zero	Calibration Zero for PV input Temperature	0 .000	Integral RH+T or Remote Sensor with Cable
T-CS (t - C5)	Calibration Span	Calibration Span1 for PV input Temperature	1 .000	
RHCZ (r-HC2)	Calibration Zero	Calibration Zero for PV input Humidity	0 .000	
RHCS (r-HC5)	Calibration Span	Calibration Span1 for PV input Humidity	1 .000	
CZ-1 (C2 - 1)	Calibration Zero channel 1	Calibration zero for PV input channel 1 (PV3 Display : Current PV1)	-	analog input
CS-1 (C5 - 1)	Calibration Span Channel 1	Calibration Span For PV input channel 1 (PV3 Display : Current PV1)	-	
CZ-2 (C2 - 2)	Calibration Zero channel 2	Calibration zero for PV input channel 1 (PV3 Display : Current PV2)	-	
CS-2 (C5 - 2)	Calibration Span Channel 2	Calibration Span For PV input channel 1 (PV3 Display : Current PV2)	-	
CZ-3 (C2 - 3)	Calibration Zero channel 3	Calibration zero for PV input channel 1 (PV3 Display : Current PV3)	-	
CS-3 (C5 - 3)	Calibration Span Channel 3	Calibration Span For PV input channel 1 (PV3 Display : Current PV3)	-	

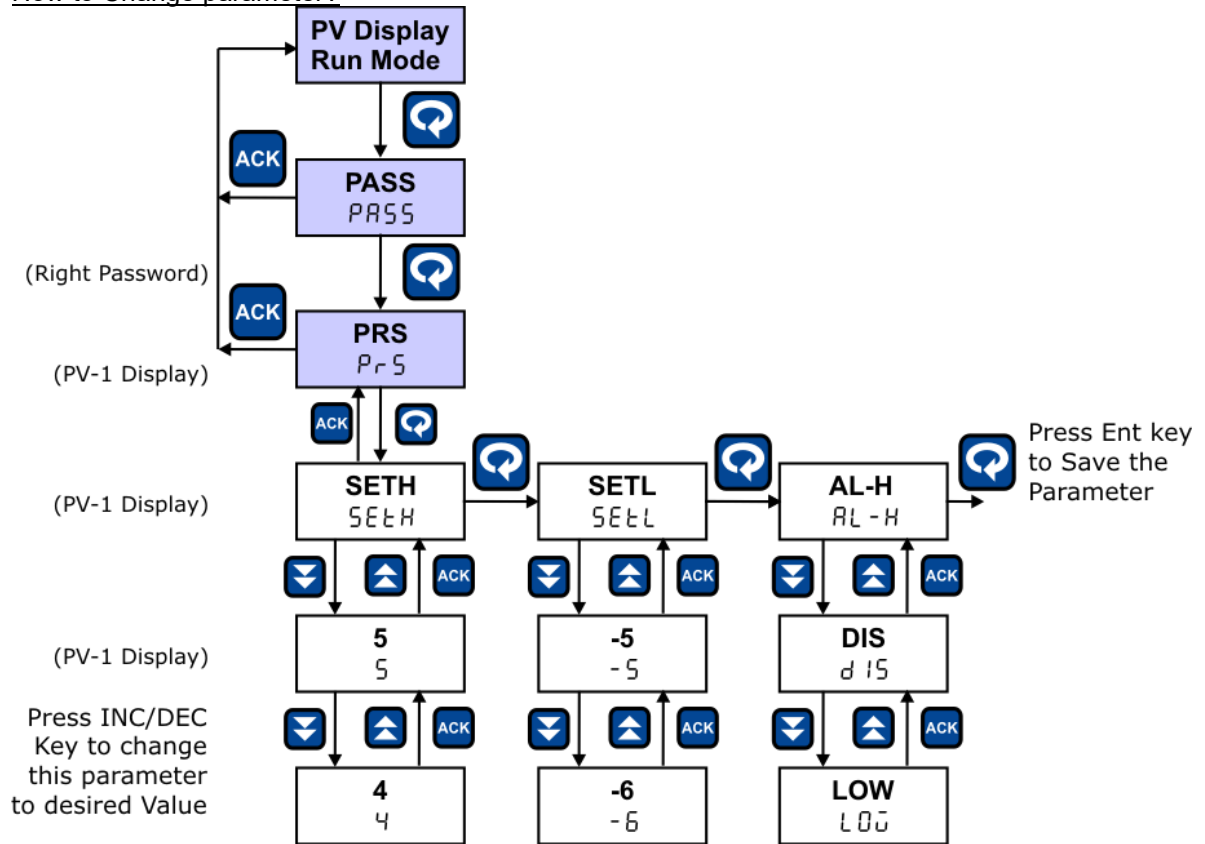
7.12 PASS

CHNG (CHNG)	Change Password	Set Device Password 1 to 9999	1	
NO. (NO .)	Version No.	Shows the Version of the Current Firmware	# .00	

is 1 for CDU

Examples For CDU:

1. How to Change parameter?



8. CALIBRATION PROCEDURE

The instrument is factory calibrated for the specified range of Differential pressure input (PV1)*, but due to long term drift of components, re-calibration may be necessary in some cases. For calibrating the instrument a reliable source is required. This source should be at least ten times accurate compared to the range of the instrument.

The unit can be calibrated without opening it and without trim pots.

While calibration from Modbus please set flag to 1 on address 40201 and set it to 0 after done calibration.

For DIGITAL PRESSURE SENSOR:

8.1 Procedure for calibration zero and span of pressure sensor

To calibrate CDU for Digital Sensor, zero calibration, span point 1 calibration and span point 2 calibration are required.

Zero calibration: The value should be calibrated to zero only.

Example: if process value is 0.4, then calibrate that value to 0.0

Span Point 1 Calibration: It can be done either at positive side or negative side.

Example:

- 0 to 125 Pa. 0 means zero calibration and 125 means span point 1 calibration.
- 0 to -125 Pa. 0 means zero calibration and -125 means span point 1 calibration.

Span Point 2 Calibration: It can be done at positive side only.

Example:

0 to 140 Pa. 0 means zero calibration and 140 means span point 2 calibration.

To enter into the Calibration Mode, Please refer Menu Layout.

Apply appropriate Input from the source, and press 'DECREMENT KEY' until decimal point of digit 4 of PV-1 starts to blink. It indicates calibration is done.

MODBUS CALIBRATION:

Calibration of pressure sensor input with Modbus RTU.

Example:

To calibrate pressure input:

Set value of zero point on Modbus holding register 40092.

Set value of span point 1 on Modbus holding register 40093.

Set value of span point 2 on Modbus holding register 40094.

Now to calibrate zero point write "1", to calibrate span point 1 write "2", to calibrate span point 2 write "3" on Modbus holding register 40091.

* No need of calibration for PV2 and PV3 for digital sensor only, Zigbee Based communication with HT16Ew is required for PV2 and PV3 for digital sensor only.

For ANALOG SENSOR:

8.2 Procedure for calibration zero and span of analog input channel

To calibrate CDU for Analog input, zero calibration, span calibration is required.

After applying appropriate Input from the calibrator source, press 'INCREMENT' OR 'DECREMENT' KEY to bring the actual process value on display according to applied input voltage.

Example:

At zero calibration reading expected on the display is 100 and it shows 107, one need to adjust the process value to 100 by using 'DECREMENT KEY'. Now press 'ENT' to store the calibration parameter in non-volatile memory. Similarly one can calibrate SPAN.

MODBUS CALIBRATION:

Calibration of All three channels with Modbus RTU.

Example:

To calibrate channel 1:

Set value of zero point on Modbus holding register 40102.

Set value of span point on Modbus holding register 40103.

Now to calibrate zero point write "1" and to calibrate span point write "2" on Modbus holding register 40101.

Note: same procedure is applicable for channel 2 and channel 3 please refer chapter 10 for Modbus address.

9. COMMUNICATION PROTOCOL–DNP 3

9.1 Introduction

The unit can be connected in RS-485 communication data link either in multi drop or repeat mode. Each unit must have unique Destination ID. Entire range of addresses (1 to 9999) may be used. Before starting any communication, choose a baud rate compatible to the host computer. The serial protocol used is DNP 3.

9.2 Analog Input

Sr. No	Parameter Description	DNP 3 Point no.	Parameter Type	Access
1	Differential Pressure PV with time stamp	1	Integer	R
2	Temperature PV with time stamp	2	Integer	R
3	Humidity PV with time stamp	3	Integer	R
4	HT16Ew Battery LED Status with wireless communication status	4 [#]	Integer	R
5	Batch Run Status* (Run/Stop) with time stamp	5	Integer	R
6	^{\$} Error Code for Sensor Open	6	integer	R

Healthy condition of battery of HT16Ew is = 0, Unhealthy condition of battery of HT16Ew (< 20%) = 128, Wireless Communication break with HT16Ew = 256, Wireless Sensor open with HT16Ew = 1024

*Batch Run = 1, Batch Stop = 0, ^{\$}Refer table 9.1 for Error code

Error Code	DNP point no.6 result
No error	0
SM9541	1
RHT sensor error	2
memory Full	3
Data flash IC	4
InputChannel1	5
InputChannel2	6
InputChannel3	7
multiple error	9

Table 9.1

Parameter	Analog Input																
DNP 3 Point no.	4																
Bit No.	15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0
Description	Future Use					HT16Ew Sensor Break	Future Use	HT16Ew break		HT16Ew Battery LED Status*	0	0	0	0	0	0	0

*Wireless Break condition with HT16Ew, HT16Ew Battery LED Status will be 0

9.3 Analog Output

Sr. No	Parameter Description	DNP Point no. 3	Parameter Type	Access
1.	Set point 2 of Differential Pressure H	0	Integer	R/W
2.	Set point 2 of Temperature H	1	Integer	R/W
3.	Set point 2 of Humidity H	2	Integer	R/W
4.	Set point 1 of Differential Pressure L	3	Integer	R/W
5.	Set point 1 of Temperature L	4	Integer	R/W
6.	Set point 1 of Humidity L	5	Integer	R/W
7.	Acknowledge Write	6	Integer	R/W

10.COMMUNICATION PROTOCOL– MODBUS RTU

10.1 Introduction

The unit can be connected in RS-485 communication data link either in multi drop or repeat mode. Each unit must have unique Serial Number. Entire range of addresses (1 to 247) may be used. Before starting any communication, choose a baud rate compatible to the host computer. The serial protocol used is MODBUS RTU.

10.2 Function Code for Modbus

CODE	NAME	Function
01	Read Coil Status	Use to Read Coil status, Battery status, Wireless Communication break status, Sensor open status etc.
03	Read Holding registers	Use to read PV, Alarm status, Battery status etc.
04	Read input registers	Use to read programmable registers
06	Preset Single register	Use to write programmable register
16	Preset Multiple Registers	Use to write programmable register

The error checking field contains a 16-bit value implemented as two eight-bit bytes. The error check value is the result of a Cyclical Redundancy Check (CRC) calculation performed on the message contents.

10.3 Parameter Address Details

Sr. No.	Parameters	Absolute Address	Type	Access Type
1.	Temperature AL1 H	1	Bit	Read Only
2.	Temperature AL2 L	2	Bit	Read Only
3.	Humidity AL1 H	3	Bit	Read Only
4.	Humidity AL2 L	4	Bit	Read Only
5.	Pressure AL1 H	5	Bit	Read Only
6.	Pressure AL2 L	6	Bit	Read Only
7.	Buzzer status	7	Bit	Read Only
8.	HT16Ew Battery Status	8	Bit	Read Only
9.	HT16Ew break	9	Bit	Read Only
10.	Batch Run	10	Bit	Read Only
11.	HT16Ew RH+T Sensor Break	11	Bit	Read Only
Sr. No.	Parameters	Absolute Address	Type	Access Type
1	Process Value of Pressure	30001	int16_t	Read Only
2	Process Value of Temperature	30002	uint16_t	Read Only
3	Process Value of Humidity	30003	uint16_t	Read Only
4	Alarm Status*	30004	uint16_t	Read Only
5	Battery Status	30005	uint16_t	Read Only

6	Error Code	30006	uint16_t	Read Only
7	Minimum Value of Pressure	30007	uint16_t	Read Only
8	Maximum value of Pressure	30008	uint16_t	Read Only
9	Minimum Value of Temperature	30009	uint16_t	Read Only
10	Maximum value of temperature	30010	uint16_t	Read Only
11	Minimum Value of Humidity	30011	uint16_t	Read Only
12	Maximum value of Humidity	30012	uint16_t	Read Only

Parameter	Absolute Address																				
Alarm Status*	30004																				
Bit No.	15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0				
Description	Future Use					HT16Ew Sensor Break	Batch Run	HT16Ew break		HT16Ew Battery Status	Buzzer status	Pressure AL2 L	Pressure AL1 H	Humidity AL2 L	Humidity AL1 H	Temperature AL2 L	Temperature AL1 H				

Healthy condition of battery of HT16Ew is = 0, Unhealthy condition of battery of HT16Ew (< 20%) = 1, Wireless Communication break with HT16Ew = 1, Batch Run = 1, Batch Stop = 0, HT16Ew RH + T Sensor Break = 1, 0 = Healthy condition, 1 = Unhealthy condition.

NOTE:

- Process Value (PV) Error Condition value For Sensor damaged
 PV : OPEN : 32767
 PV: OVER : 32766
 PV: UNDER : 32765
- Process Value (PV) Error Condition Value while CDU power on-off or faulty Sensor.

LBRK(Link break)	Sensor break	HEALTHY Condition	POWER On/OFF
LAST	LAST Value	Process Value	0.0
DOWN	Min.Value of Display Range	Process Value	Min.Value of Display Range
UP	Max.Value of Display Range	Process Value	Max.Value of Display Range

Sr. No.	Parameters	Absolute Address	Type	Access Type	Shows Only if
Pressure parameters					
1.	Set Point High (SETH) of Pressure	40001	int16_t	R + W	
2.	Set Point Low (SETL) of	40002	int16_t	R + W	

	Pressure				
3.	Alarm High (AL-H) of Pressure	40003	int16_t	R + W	
4.	Alarm Low (AL-L) of Pressure	40004	int16_t	R + W	
5.	Reserved for future use	40005	int16_t	R + W	
6.	Reserved for future use	40006	int16_t	R + W	
7.	Band For logging	40007	int16_t	R + W	
8.	Reserved for future use	40008	int16_t	R + W	
9.	Unit of Pressure	40009	int16_t	R + W	Integral or Digital pressure Sensor
10.	Resolution	40010	int16_t	R + W	
11.	Pressure High range	40011	int16_t	R + W	Integral or Digital pressure Sensor
12.	Pressure Display Range	40012	int16_t	R + W	
13.	OPES	40013	int16_t	R + W	
14.	Filter	40014	int16_t	R + W	
15.	INPT	40015	int16_t	R + W	Analog input
16.	ZERO	40016	int16_t	R + W	
17.	SPAN	40017	int16_t	R + W	
18.	INLO	40018	int16_t	R + W	
19.	INH1	40019	int16_t	R + W	
Temperature parameters					
20.	Set Point High (SETH) of Temperature	40021	int16_t	R + W	
21.	Set Point Low (SETL) of Temperature	40022	int16_t	R + W	
22.	Alarm High (AL-H) of Temperature	40023	int16_t	R + W	
23.	Alarm Low (AL-L) of Temperature	40024	int16_t	R + W	
24.	Reserved for future use	40025	int16_t	R	
25.	Reserved for future use	40026	int16_t	R	
26.	Band For logging	40027	int16_t	R + W	
27.	Reserved for future use	40028	int16_t	R + W	Analog input
28.	Reserved for future use	40029	int16_t	R + W	
29.	Resolution	40030	int16_t	R + W	Analog input
30.	OPES	40031	int16_t	R + W	
31.	Filter	40032	int16_t	R + W	Analog input
32.	INPT	40033	int16_t	R + W	
33.	ZERO	40034	int16_t	R + W	
34.	SPAN	40035	int16_t	R + W	
35.	INLO	40036	int16_t	R + W	
36.	INH1	40037	int16_t	R + W	

Humidity parameters					
37.	Set Point High (SETH) of Humidity	40041	int16_t	R + W	
38.	Set Point Low (SETL) of Humidity	40042	int16_t	R + W	
39.	Alarm High (AL-H) of Humidity	40043	int16_t	R + W	
40.	Alarm Low (AL-L) of Humidity	40044	int16_t	R + W	
41.	Minimum Value of Humidity	40045	int16_t	R + W	
42.	Maximum value of Humidity	40046	int16_t	R + W	
43.	Band For logging	40047	int16_t	R + W	
44.	Reserved for future use	40048	int16_t	R + W	Analog input
45.	Reserved for future use	40049	int16_t	R + W	
46.	Resolution	40050	int16_t	R + W	
47.	OPES	40051	int16_t	R + W	
48.	Filter	40052	int16_t	R + W	Analog input
49.	INPT	40053	int16_t	R + W	
50.	ZERO	40054	int16_t	R + W	
51.	SPAN	40055	int16_t	R + W	
52.	INLO	40056	int16_t	R + W	
53.	INLH	40057	int16_t	R + W	
*RTC Parameters					
54.	Time Format	40061	int16_t	R + W	
55.	Hour	40062	int16_t	R + W	
56.	Minute	40063	int16_t	R + W	
57.	Second	40064	int16_t	R + W	
58.	Date	40065	int16_t	R + W	
59.	Month	40066	int16_t	R + W	
60.	Year	40067	int16_t	R + W	
61.	AM/PM	40068	int16_t	R + W	
*Only write when Protocol is MBUS.					
OUT Parameters					
62.	Destination ID/Slave ID	40071	int16_t	R + W	
63.	Baud Rate	40072	int16_t	R + W	
64.	Buzzer	40073	int16_t	R + W	
65.	Buzzer Delay	40074	int16_t	R + W	
66.	Periodic Time	40075	int16_t	R + W	
67.	Memory Reset	40076	int16_t	R + W	
68.	Password	40081	int16_t	R + W	
69.	Version	40082	int16_t	R	
CAL Parameters					
70.	Calibration Zero and Span for pressure	40091	int16_t	R + W	Integral/remote sensor RH+T

	1 : Zero calibration 2 : Span1 Calibration 3 : Span2 Calibration				and Digital pressure Sensor
71.	Pressure span-1	40092	int16_t	R + W	
72.	Pressure span-2	40093	int16_t	R + W	
73.	Temp zero factor	40094	int16_t	R + W	
74.	Temp span factor	40095	int16_t	R + W	
75.	RH zero factor	40096	int16_t	R + W	
76.	RH span factor	40097	int16_t	R + W	
77.	Reserved for future use	40098	int16_t	R + W	
78.	Reserved for future use	40099	int16_t	R + W	
79.	CH-1 PV	40101	int16_t	R + W	Analog input
80.	CH-1 Zero	40102	int16_t	R + W	
81.	CH-1 Span	40103	int16_t	R + W	
82.	CH-2 PV	40104	int16_t	R + W	
83.	CH-2 Zero	40105	int16_t	R + W	
84.	CH-2 Span	40106	int16_t	R + W	
85.	CH-3 PV	40107	int16_t	R + W	
86.	CH-3 Zero	40108	int16_t	R + W	
87.	CH-3 Span	40109	int16_t	R + W	
Retrieve index Parameters					
88.	RH+T Retrieved index	40501	Swapped Long	R+W	
89.	DP Retrieved index	40503	Swapped Long	R+W	
90.	RH+T Log index	40505	Swapped Long	R+W	
91.	DP Log index	40507	Swapped Long	R+W	
92.	Device Serial No.	40509	Swapped Long	R+W	

10.4 Exceptional Response

TABLE- 8

CODE	MEANING
01	Function code Invalid. It must be 03, 04, 06 or 16. The function code received in the query is not allowable action for the slave.
02	Illegal address value. 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.

11.APPENDIX

11.1 Relative Humidity

It is the percentage of Actual Vapor density to the saturated Vapor density of the air.
 $\%RH = (\text{Actual Vapor density} / \text{Saturated Vapor density}) * 100.$

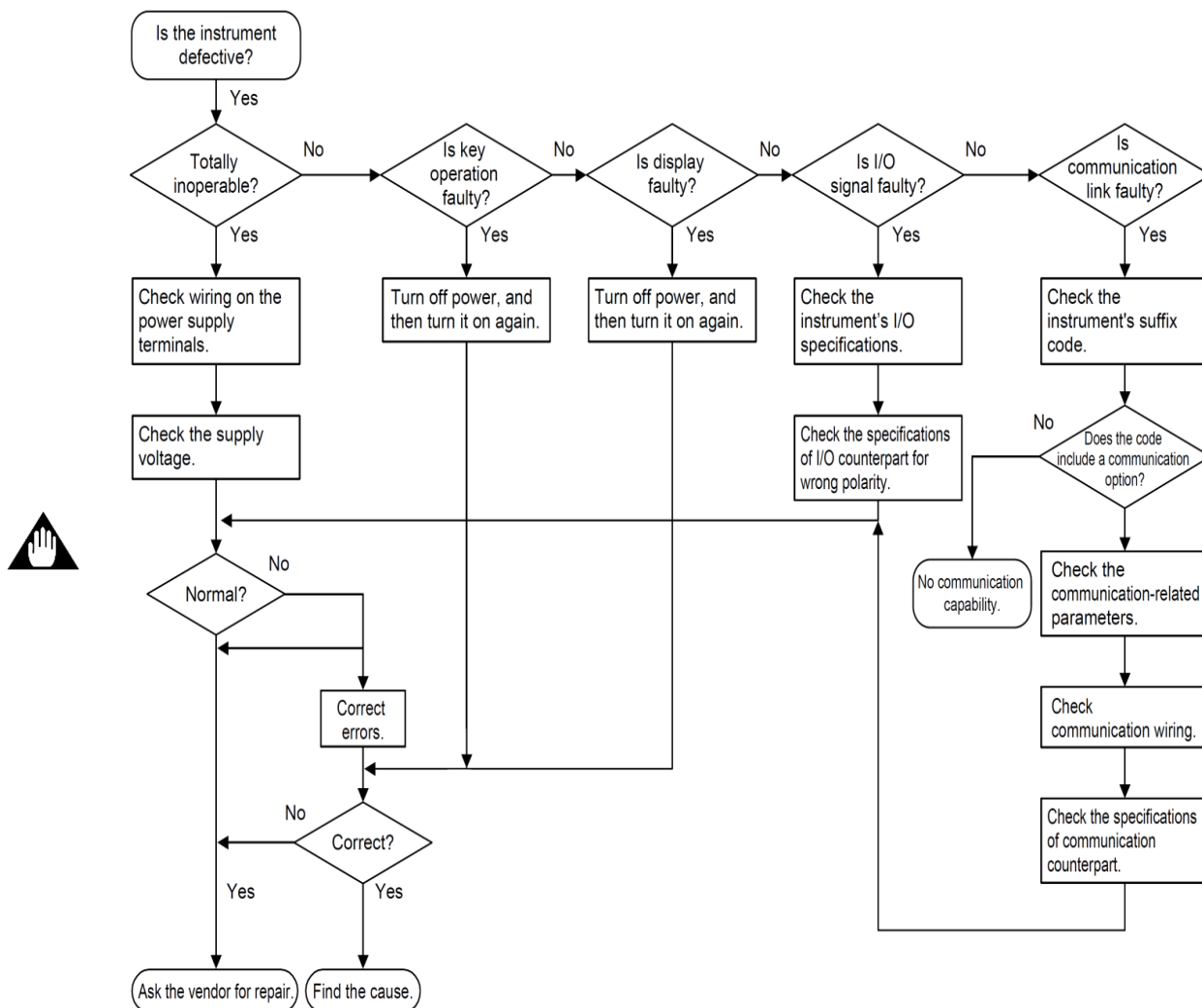
11.2 Troubleshooting

If the operating display does not appear after turning on the unit's power, follow the measures in the procedure below.

If a problem appears complicated, contact our sales representative.

IMPORTANT

Take note of the parameter settings when asking the vendor for repair.



11.3 RH & T Sensors: Handling Instructions and Reconditioning Procedure

Handling Instructions RH&T sensors

- Prevent sensors from external harsh environments like strong cleaning agents, accumulation of condensation water, volatile organic compound, acid & corrosive substances. ex- HCl, H₂SO₄, HNO₃, NH₃ etc. Also Ozone in high concentration or H₂O₂ have the same effect and therefore shall be avoided. ex- volatile chemicals such as solvents or other organic compounds. Especially high concentration and long exposure must be avoided. Ketenes, Acetone, Ethanol, Isopropyl Alcohol, Toluene, etc. are known to cause drift of the humidity reading – irreversibly in most of the cases.
- Handle the sensor carefully as the sensor is delicate to mechanical shocks & pressure.

Reconditioning procedure

As stated above extreme conditions or exposure to solvent vapors may offset the sensor. The following reconditioning procedure may bring the sensor back to calibration state:

- Baking: 100 – 105°C at < 5%RH for 24Hr

12.FAQ

1. What is batch start?

The starting point at which any particular task is started. Minimum and maximum value gets reset on every batch start, and it again starts to calculate the same. On every alarm generation buzzer will get ON if batch is started.

2. What is batch stop?

The starting point at which any particular task is ended. Minimum and maximum value gets reset on every batch stop, and it again starts to calculate the same. On every alarm generation buzzer will not get ON if batch is stopped.

3. What is Minimum and Maximum Values in Clean Room Display Unit (CDU)?

It is the minimum and maximum value of pressure and temperature and humidity calculated between every batch run / stop and the present time.

4. When does maximum and minimum values get reset?

It gets reset on every batch start and batch stop.

5. How Min. and Max. values are calculated?

It will be calculated in between Batch start and batch stop and vice versa.

6. How many types of frames received in CDU from HT16Ew?

There will be following types of data frames:

- Live data frame: it will be the data frame received from HT16Ew at specific time interval set up from its menu parameter settings.
- Logged data frame: it will be the data frame received from Ht16Ew after establishment of connection from connection break, if logged data prevails during that break.
- Manual data frame: force fully pushed the live data frame to CDU.
- Power on-off data frame: it will be the data frame received from Ht16Ew while Ht16Ew is power on reset.
- Link Check data frame: it will be the data frame received from Ht16Ew at predefined time interval specified in HT16Ew.

7. Which value is taken for min and max calculation in CDU?

Min. and max. Values are calculated for all data frame values except Logged data frame received from HT16Ew.

8. When will min. and max. values of SCADA and CDU differ?

It will be different when log data will be received from HT16Ew after connection established from connection break, while batch is start / stop.

9. When will CDU Display the data of temperature and humidity?

- Manual data frame.
- Live data frame.

10. When CDU will Display “OPEN” Message?

During power on-off if Connection is break between CDU and HT16Ew temperature and humidity will display value according to open sensor status save in menu mode i.e. last value, up value or down value.

If Sensor is damaged in HT16Ew, live data frame received from HT16Ew displays “OPEN” on temperature and humidity.

If Pressure sensor is damaged in CDU, it will display “OPEN” on pressure.

11. Why does PV-2 and PV-3 display look blank In Run time of CDU?

It looks blank in PV-2 and PV-3 if only pressure input is enabled.

NOTE: According to the requirement user can configure model like single-line display (any one out of three i.e. pressure or temperature or humidity), two-line display (any two out of three i.e. pressure and temperature or temperature and humidity or humidity and pressure), and three-line display (pressure, temperature and humidity), with time display option.

12. Why time synchronization is required?

To avoid data mismatch between SCADA and CDU, It may differ the minimum and maximum value.

13. How to know the time stamp of Batch start / Stop on SCADA?

SCADA will display the actual time stamp when the event was generated in case of healthy communication or connection established after connection break.

14. How to know that log data is retrieved from HT16Ew?

Decimal point of last segment of PV -1 will be steady ON while log data is retrieving, and it will be steady ON until live data will not be received.

15. How to know the battery status of HT16Ew?

DNP3 point number 4 analog input value will be 128 for Low battery status16Ew.

16. How to know that connection is break between CDU and HT16Ew?

- If the link check data frame will not receive at link check time from HT16Ew then, after 20 Sec it will blink the last segment of PV -1 Display.
- DNP3 point number 4 analog value will be 256 if connection is break between CDU and HT16Ew.

17. What will happen after connection is established from connection lost between SCADA and CDU?

Logged data will be retrieved first and then it will update the batch start/stop, low battery status, as well as live data frame.

18. What will happen with the data when the connection break between SCADA and CDU?

Data will be saved in memory of CDU that is called as logging of data.

19. What is band?

Band is defined as the exception for data logging to save the memory during connection break with SCADA.

For ex. If the value of band is set as 1.0 from menu parameter setting.

If $PV = 2$ than CDU will log the data, if PV is greater than $3(PV + BAND)$ or PV is less than $1(PV - BAND)$.

20. How to know that the memory is full in CDU?

Last segment of PV -3 humidity will start blinking and buzzer is ON. it will be occurred during hold condition of log mode set up from its menu parameter settings.

Buzzer can be acknowledged by pressing the acknowledgement key.

21. What will happen when power on-off during memory full condition?

While Power on-off last segment of PV -3 humidity will blink and the buzzer is ON, only if memory is not reset from menu parameter settings.

Buzzer can be acknowledged by pressing the acknowledgement key.

22. How to analyse data on wire shark?

As shown in figure 1 it shows queries and response of different devices, it is filter with dnp3.

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help						
Filter: dnp3						
No.	Time	Source	Destination	Protocol	Length	Info
500175	2018-01-29 10:44:50.375000000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 4 to 1, Response
500178	2018-01-29 10:44:57.365792000	192.168.0.1	192.168.0.22	DNP 3.0	78	78 from 1 to 2, Read, Class 123
500180	2018-01-29 10:44:57.379855000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 2 to 1, Response
500183	2018-01-29 10:44:57.566023000	192.168.0.1	192.168.0.22	DNP 3.0	78	78 from 1 to 3, Read, Class 123
500185	2018-01-29 10:44:57.580013000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
500187	2018-01-29 10:44:57.766192000	192.168.0.1	192.168.0.22	DNP 3.0	81	81 from 1 to 4, Read, Class 0123
500190	2018-01-29 10:44:57.796913000	192.168.0.22	192.168.0.1	DNP 3.0	131	131 from 4 to 1, Response
500194	2018-01-29 10:44:58.366093000	192.168.0.1	192.168.0.22	DNP 3.0	81	81 from 1 to 2, Read, Class 0123
500196	2018-01-29 10:44:58.388618000	192.168.0.22	192.168.0.1	DNP 3.0	99	99 from 2 to 1, Response
500199	2018-01-29 10:44:58.566105000	192.168.0.1	192.168.0.22	DNP 3.0	81	81 from 1 to 3, Read, Class 0123
500201	2018-01-29 10:44:58.596890000	192.168.0.22	192.168.0.1	DNP 3.0	131	131 from 3 to 1, Response
500204	2018-01-29 10:44:59.366031000	192.168.0.1	192.168.0.22	DNP 3.0	78	78 from 1 to 4, Read, Class 123
500206	2018-01-29 10:44:59.380072000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 4 to 1, Response
500208	2018-01-29 10:45:00.366203000	192.168.0.1	192.168.0.22	DNP 3.0	78	78 from 1 to 2, Read, Class 123
500210	2018-01-29 10:45:00.379891000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 2 to 1, Response
500211	2018-01-29 10:45:00.566184000	192.168.0.1	192.168.0.22	DNP 3.0	78	78 from 1 to 3, Read, Class 123
500213	2018-01-29 10:45:00.579990000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
Frame 500309: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface 0						
Ethernet II, Src: Micro-St_d0:cc:b6 (6c:62:6d:d0:cc:b6), Dst: MoxaTech_65:ee:ca (00:90:e8:65:ee:ca)						
Internet Protocol Version 4, Src: 192.168.0.1 (192.168.0.1), Dst: 192.168.0.22 (192.168.0.22)						
Transmission Control Protocol, Src Port: 57570 (57570), Dst Port: dnp (20000), Seq: 2501782, Ack: 2491674, Len: 24						
Distributed Network Protocol 3.0						
Data Link Layer, Len: 17, From: 1, To: 4, DIR, PRM, Unconfirmed User Data						
Transport Layer: 0xcd (FIR, FIN, Sequence 13)						
Application Layer: (FIR, FIN, Sequence 14, Read)						

Figure 1

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help						
Filter: dnp3.src==3						
No.	Time	Source	Destination	Protocol	Length	Info
500571	2018-01-29 10:45:42.596769000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
500581	2018-01-29 10:45:43.605754000	192.168.0.22	192.168.0.1	DNP 3.0	99	99 from 3 to 1, Response
500592	2018-01-29 10:45:45.596013000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
500602	2018-01-29 10:45:46.603931000	192.168.0.22	192.168.0.1	DNP 3.0	97	97 from 3 to 1, Response
500613	2018-01-29 10:45:48.600787000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
500623	2018-01-29 10:45:49.617388000	192.168.0.22	192.168.0.1	DNP 3.0	131	131 from 3 to 1, Response
500636	2018-01-29 10:45:51.600873000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
500646	2018-01-29 10:45:52.609051000	192.168.0.22	192.168.0.1	DNP 3.0	99	99 from 3 to 1, Response
500662	2018-01-29 10:45:54.600535000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
500674	2018-01-29 10:45:55.618158000	192.168.0.22	192.168.0.1	DNP 3.0	131	131 from 3 to 1, Response
500685	2018-01-29 10:45:57.600618000	192.168.0.22	192.168.0.1	DNP 3.0	71	71 from 3 to 1, Response
Frame 500623: 131 bytes on wire (1048 bits), 131 bytes captured (1048 bits) on interface 0						
Ethernet II, Src: MoxaTech_65:ee:ca (00:90:e8:65:ee:ca), Dst: Micro-St_d0:cc:b6 (6c:62:6d:d0:cc:b6)						
Internet Protocol Version 4, Src: 192.168.0.22 (192.168.0.22), Dst: 192.168.0.1 (192.168.0.1)						
Transmission Control Protocol, Src Port: dnp (20000), Dst Port: 57570 (57570), Seq: 2494315, Ack: 2503771, Len: 77						
Distributed Network Protocol 3.0						
Data Link Layer, Len: 64, From: 3, To: 1, PRM, Unconfirmed User Data						
Transport Layer: 0xf8 (FIR, FIN, Sequence 56)						
Application Layer: (FIR, FIN, Sequence 9, Response)						
Control: 0xc9 (FIR, FIN, Sequence 9)						
Function Code: Response (0x81)						
Internal Indications: (0x0000)						
RESPONSE Data Objects						
Object(s): 16-Bit Analog Change Event with Time (Obj:32, Var:04) (0x2004), 5 points						
Qualifier Field, Prefix: 1-Octet Indexing, Code: 8-bit Single Field Quantity						
Number of Items: 5						
Point Number 2 (Quality: online), value: 240, Timestamp: Jan 29, 2018 10:46:00.000000000						
Point Number 3 (Quality: online), value: 481, Timestamp: Jan 29, 2018 10:46:00.000000000						
Point Number 1 (Quality: online), value: 2, Timestamp: Jan 29, 2018 10:46:13.000000000						
Point Number 4 (Quality: online), value: 0, Timestamp: Jan 27, 2018 16:16:55.000000000						
Point Number 5 (Quality: online), value: 1, Timestamp: Jan 27, 2018 18:10:35.000000000						

Figure 2

As shown from figure 2 we can filter device response with syntax `dnp3.src=device destination ID`.

Blue highlight shows data byte received from device having destination ID=3.

To analyze the data follow the steps mentioned below:

Click on Distributed network protocol3.0 it expands the details.

Click on application layer it expands the details.

Click on response data objects.

Point number 1 gives Pressure value

Point number 2 gives Temperature value

Point number 3 gives Humidity value

Point number 4 gives Battery status of HT16Ew as well as wireless connection break status.

Point number 5 gives Batch Run, Batch Stop status.

- Value of point number 4 having 0 shows healthy communication between CDU and HT16Ew as shown in figure 2.
- Value of point number 4 having 256 means wireless connection break with HT16Ew as shown in figure 3
- Value of point number 4 having 128 means battery low indication of HT16Ew as shown in figure 4.
- Value of point number 5 having 0 means batch stop indication as shown in Figure 4.
- Value of Point number 5 having 1 indicates batch start status as shown in figure 3.

No.	Time	Source	Destination	Protocol	Length	Info
345480	2018-01-29 00:31:19.036955000	192.168.0.22	192.168.0.1	DNP 3.0	99	from 4 to 1, Response
345487	2018-01-29 00:31:19.429263000	192.168.0.22	192.168.0.1	DNP 3.0	71	from 4 to 1, Response
345502	2018-01-29 00:31:30.045890000	192.168.0.22	192.168.0.1	DNP 3.0	131	from 4 to 1, Response
345509	2018-01-29 00:31:30.428692000	192.168.0.22	192.168.0.1	DNP 3.0	71	from 4 to 1, Response
345529	2018-01-29 00:31:41.036956000	192.168.0.22	192.168.0.1	DNP 3.0	99	from 4 to 1, Response
345538	2018-01-29 00:31:41.428968000	192.168.0.22	192.168.0.1	DNP 3.0	71	from 4 to 1, Response
345579	2018-01-29 00:31:52.044965000	192.168.0.22	192.168.0.1	DNP 3.0	131	from 4 to 1, Response
345586	2018-01-29 00:31:52.428292000	192.168.0.22	192.168.0.1	DNP 3.0	71	from 4 to 1, Response
345599	2018-01-29 00:32:03.039894000	192.168.0.22	192.168.0.1	DNP 3.0	99	from 4 to 1, Response
345605	2018-01-29 00:32:03.432141000	192.168.0.22	192.168.0.1	DNP 3.0	71	from 4 to 1, Response
345628	2018-01-29 00:32:14.048286000	192.168.0.22	192.168.0.1	DNP 3.0	131	from 4 to 1, Response

Filter: dnp3.src==4

Expression... Clear Apply Save Filter Filter

Frame 345579: 131 bytes on wire (1048 bits), 131 bytes captured (1048 bits) on interface 0

Ethernet II, Src: MoxaTech_65:ee:ca (00:90:e8:65:ee:ca), Dst: Micro-St_d0:cc:b6 (6c:62:6d:d0:cc:b6)

Internet Protocol Version 4, Src: 192.168.0.22 (192.168.0.22), Dst: 192.168.0.1 (192.168.0.1)

Transmission Control Protocol, Src Port: dnp (20000), Dst Port: 57570 (57570), Seq: 1532034, Ack: 1667911, Len: 77

Distributed Network Protocol 3.0

Data Link Layer, Len: 64, From: 4, To: 1, PRM, Unconfirmed User Data

Transport Layer: 0xd3 (FIR, FIN, Sequence 19)

Application Layer: (FIR, FIN, Sequence 4, Response)

Control: 0xc4 (FIR, FIN, Sequence 4)

Function Code: Response (0x81)

Internal Indications: (0x0000)

RESPONSE Data Objects

Object(s): 16-Bit Analog Change Event with Time (Obj:32, Var:04) (0x2004), 5 points

Qualifier Field, Prefix: 1-Octet Indexing, Code: 8-bit Single Field Quantity

Number of Items: 5

Point Number 2 (Quality: online), value: 253, Timestamp: Jan 27, 2018 18:09:00.000000000

Point Number 3 (Quality: online), value: 432, Timestamp: Jan 27, 2018 18:09:00.000000000

Point Number 1 (Quality: online), value: 31, Timestamp: Jan 29, 2018 00:32:12.000000000

Point Number 4 (Quality: online), value: 256, Timestamp: Jan 27, 2018 19:04:00.000000000

Point Number 5 (Quality: online), value: 1, Timestamp: Jan 27, 2018 17:46:21.000000000

Figure 3

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Figure 4

23. What will happen when the communication is lost and it gets healthy after few hours or Days.?

Case 1: Communication is failed between CDU & HT16Ew.

As soon as the communication established between HT16Ew & CDU, HT16Ew will transfer all the logs to CDU device. During the data transfer between HT16Ew & CDU the PV2 LED will be constantly ON. As soon as the data received by CDU it will be transferred to SCADA. The real time value such as batch run/ stop status will be displayed only after all the data logs transferred to SCADA system from CDU.

Case 2: Communication failed between CDU & SCADA.

In this case all the run time data will be stored in CDU device itself and it will be transferred to SCADA system as soon as the communication re-established between SCADA server and CDU. The real time value such as batch run/ stop status will be displayed only after all the data logs transferred to SCADA system from CDU.

24. What will happen if point no.4 and point no.5 have wrong time stamp update on SCADA?

Time sync of CDU from SCADA may not update the time stamp of point no.4 and point no. 5 as shown in figure 1.

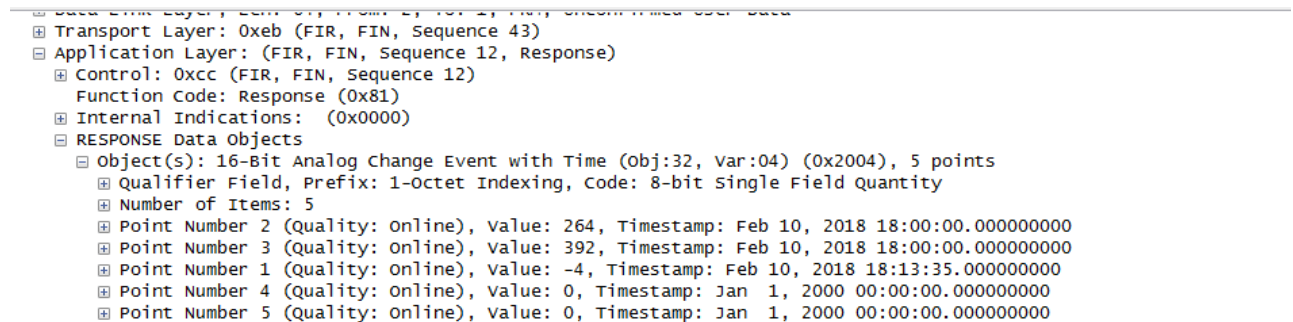


Figure 1

Because status of point no.4 and point no.5 will not be updated on SCADA until the event of point no.4 and point no.5 will not generated from CDU.

In order to update the time stamp one should power on reset or wait for the event of point no.4 and point no.5 to update the same in the SCADA.

It will update the correct time stamp of point no.4 and point no. 5 on SCADA as shown in figure 2.

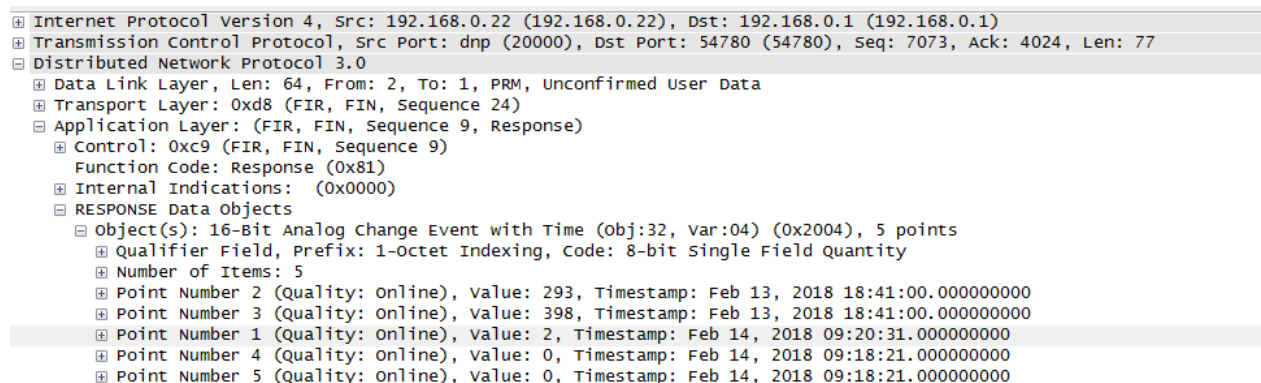


Figure 2

25. Why unit display 0.0 value for wireless RH+T sensor while power on?

Unit will display value according to Open Sensor status saved in CDU while Last value of open sensor it display 0.0 value on Display until communication will not healthy between HT16Ew and CDU.

26. How to get reading on CDU display for RH+T remote sensor with cable?

With accessories you have sensor with 10 meter cable, connect it on terminals and check the same.

27. Why display is flashing in integral Sensor? What should we do?

Display will start flashing while Sensor will be open or damaged. Please check connections or revert to respective authority for the same.

28. Why random value display on display and it starts flashing?

While inbuilt sensor will be open or damaged display will display value according to status (i.e. LAST, UP or DOWN value of Sensor Range) of open sensor saved in main menu mode of individual display.

29. How to remove error message displays on time display?

It gives time error. Please set time to remove the error message.

30. How to get Power off time of CDU?

When CDU will power on it will log one sample with

DATA: high display range of sensor + 1.

TIME: last logged data time + periodic time saved in memory.

Ex. Step-1: HT last log with timestamp 17:24:31

Step-2: CDU power off at 17:24:45

Step-3: CDU power on at 17:26:38

CDU power on it will punch high value of log (for HT and DP) with time 17:26:31.

31. Why does the maximum sensor value not punch at power on?

If the Time stamp (last log time + periodic time) is greater than the power on time of CDU, it will not punch the future time stamp.

Ex. Step-1: Set CDU periodic Time = 2 minute.

Step-2: CDU power off at 17:30:16.

Step-3: CDU power on at 17:30:19.

Last periodic log punch with time 17:29:00, CDU power on it will not punch high value