East Tester®

ET-AY30/31 Pressure Calibrator

User Manual

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Contents

Product introduction

The pressure calibrator is simple in shape and practical in function, with the functions of voltage, current, resistance measurement, 24V loop power supply, temperature measurement and verified data recording. It is mainly used to check the general pressure gauge, precision pressure gauge, sphygmomanometer, pressure transmitter, pressure switch or other pressure instruments. With HART manual function, it is convenient to set various parameters for transmitters with HART function, and the product can also be widely used for precise measurement of pressure.

1 Performance Index

- Pressure measuring range: -100kpa ~ 60MPa; accuracy: level 0.02, level 0.05, level 0.1, level 0.2.
- Voltage measuring range: (0 ~ 30)V; resolution: 1mV; accuracy: 0.02%RD+2 words.
- Current measuring range: (0 ~ 30)mA; resolution: 1μA; accuracy: 0.02%RD+2 words.
- Resistance measuring range: (0 ～ 150)Ω; resolution: 0.1Ω; accuracy: level 0.5
- 24 v output: (24±10%)V, the maximum load capacity is 24mA
- Pressure unit: there are 12 kinds of pressure units including kPa, psi, inHg, inH2O, mmHg, mmH2O, MPa, bar, mbar, atm, kg/cm2 and Pa.

  Too small or too large a pressure unit may result in abnormal

data display.

- Pressure overload: When the pressure measurement value exceeds 110%FS, overpressure is displayed and an alarm is given.
- Temperature measurement: (0~50) ℃; resolution 0.1℃; accuracy: ±0.5℃.
- Operating environment:

  a. Ambient temperature :(-5~50)℃;

  b. Relative humidity: ＜95% (no condensation);

  c.Atmospheric pressure :(86 ~ 106) kPa.
- Storage temperature :(-30 ~ 80) ℃.
- Display: 2.8-inch color screen, 5-digit display, Chinese and English can be switched.
- Power supply: built-in 3.7v lithium battery power supply, with 5V power adapter.
- Auto power-off function: turn off the auto power-off function and set the auto power-off time in the system information.
- Communication serial port configuration: baud rate: 9600; check bit: none; data bit: 8; stop bit: 1;
- Dimension: header Φ 115 mm x 45 mm; total length: 185 mm.
- Weight: about 0.5kg.
- Pressure connection: M20×1.5 (can be customized according to user needs).

2 Instructions for use

- The installation shall be carried out in accordance with the relevant provisions of GB3836.15-2000 "Electrical equipment used in explosive gas environment -- part 15: electrical installation in dangerous places (excluding coal mines)".
- Pay attention to the battery indicator icon on the upper right of the screen. When the battery indicator icon shows only one grid, please connect the power adapter to charge in time. Charging should be done under the condition of good ventilation and no gas leakage, and use the manufacturer's original power adapter.
- Connecting RS232 communication cable in explosive gas environment is prohibited.
- Do not replace the components or structures without permission, so as not to affect the explosion-proof performance.
- Avoid long-term overpressure, so as not to damage the pressure sensor.
- To avoid damaging the mechanical parts of the pressure calibrator, do not apply torque between the housing and the pressure connection.

3 About the keys

"LIGHT" Backlight key: short press the key to quickly adjust the backlight brightness; long press the key to turn on/off the pressure calibrator;

“MODE” Mode key: short press the key to switch the display modules; short press the key in the options section of the “menu” interface to switch the value of options.

“↑” Up key: short press the key in the “menu” interface to move the cursor up;

“↓”Down key: short press the key in the "pressure measurement" interface to quickly switch units; short press the key in the “menu” interface to move the cursor up;

“ESC” backspace key: long press the key in the "pressure measurement" interface to quickly enter the pressure zero calibration interface; short press the key in the “menu” interface to return to the previous interface;

“ENTER” enter key: Long press this key in the routine measurement interface to enter the "menu" interface; short press the key in the “menu” interface to confirm.

4 Measuring Interface

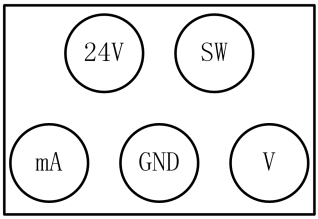
The arrangement of the measurement interface of the pressure calibrator is shown in the figure below:

The connection method of the measuring pen is as follows:

Check 4-wire current transmitter: mA and GND

Check 4-wire voltage transmitter: V and GND

Check 2-wire current transmitter: 24V



and mA
HART communication: 24V and mA
Check the pressure switch: SW and GND

5 Basic Function Instructions

5.1 Turning on/off

Turn on the main power switch on the back of the pressure calibrator, and long press the "LIGHT" key for 3 seconds to start the instrument. In the start-up state, long press the "LIGHT" key for 3 seconds to turn it off. Buzzing occurs when you turn it on or off.

5.2 Routine Measurement

After starting up, it enters the routine measurement interface, as shown in the figure, the contents displayed on the screen are:

① Interface identification: the interface is divided into six modes: "Pressure", "P+Current", " P+Voltage", "PRS+Ctl" , "TEMP "and "P+LOOP".In the " P+Current " interface, press the "↑" button for a long time to enter the "P+LOOP" interface, while the other interfaces press the "↑" button for a long time to open the HART function.

② 24V power output identification

③ Verified data recording identification (See the following paragraphs for details)

④ Battery icon

⑤ Pressure measurement value

⑥ Electrical measuring value

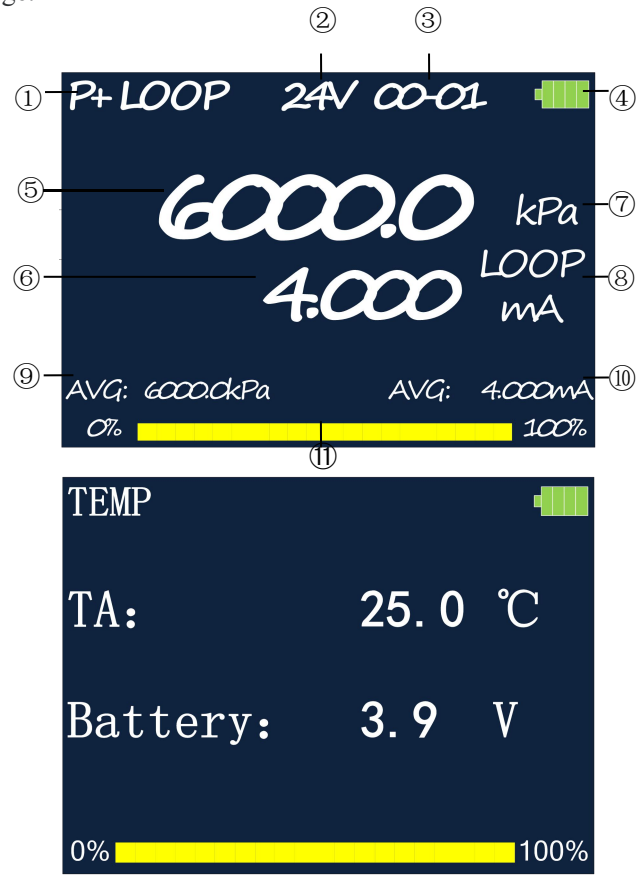
⑦ Numerical unit of pressure

⑧ Numerical unit of electrical logging

⑨ AVG/MIN/MAX value of pressure measurement

⑩ AVG/MIN/MAX value of electrical measurement

⑪ The percentage bar of the current measured pressure relative to the full range.



Interface of temperature measurement

5.3 Pressure Zero Calibration

If the current pressure measurement value is within the range of (-10% ~ 10%), long press "ESC" to reset the measured value.

5.4 Switching pressure unit

Press "↓" to switch the pressure unit in the following order: kPa、psi、inHg、inH2O、mmHg、mmH2O、MPa、bar、mbar、atm、kg/cm2、Pa. You can also long press "ENTER" to enter "menu \ routine measurement \ pressure unit selection" and select the corresponding unit directly. The pressure unit will be automatically saved when you turn off the instrument, and the unit displayed next time will be the unit set in the last shutdown.

Note: if the length of the full range of currently selected unit exceeds the number of display bits on the screen, data such as 99999 may appear.

Conversion between units is shown in the following table:

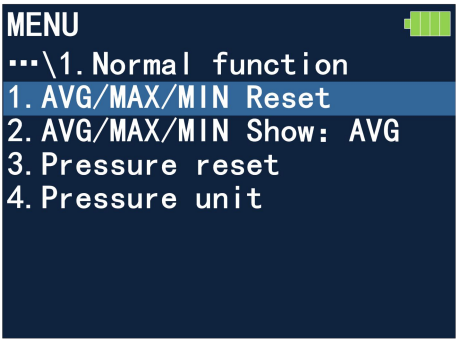
1	kPa	1	7	MPa	0.001
2	psi	0.1450377	8	bar	0.01
3	inHg	0.2953	9	mbar	10
4	inH_2O	4.01463	10	atm	0.0098692
5	mmHg	7.50061	11	kg/cm^2	0.010197
6	mmH_2O	102.047	12	Pa	1000

5.5 The instrument is in backlight

Press "LIGHT" to adjust the backlight brightness, there are 3 levels of backlight brightness to choose from.

6 Menu instructions

6.1 Routine measurement menu



The routine measurement menu is shown in the figure above.

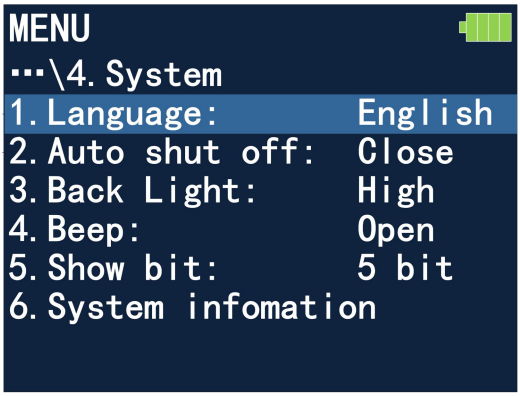
AVG/MAX/MIN record reset: used to reset the AVG/MAX/MIN recorded value on the main measurement interface.

AVG/MAX/MIN display: used to select which statistic data to display on the main measurement interface. After that, press the "MODE" key to switch.

Pressure zero calibration: used to zero check the pressure gauge when the sensor is empty

Pressure unit selection: used to directly select the pressure unit you want to display.

6.2 System setup menu



System setup menu is shown in the figure above.

Language: used to select the display language of the interface as Chinese or English.

Auto power-off: used to select the auto power-off time with no keystroke operation. You can select "off, 5 minutes, 15 minutes, 30 minutes, 60 minutes".

Brightness control: used to control the backlight brightness of the screen, and there are three levels to choose from.

Buzzer: used to select whether the buzzer will beep when the key is pressed.

Display bits: used to select the maximum data bits that can be displayed on the main measurement interface, and 5-bit data can be displayed.

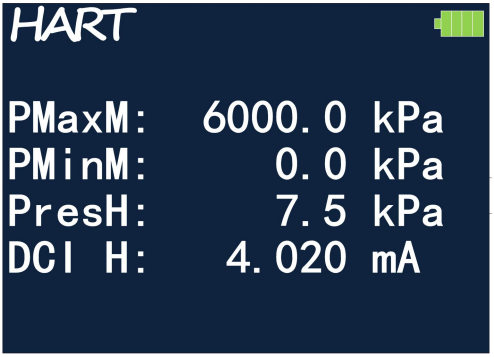
System information: used to check the model, range, grade of precision, serial number, version number and other information of the machine.

7 HART Function

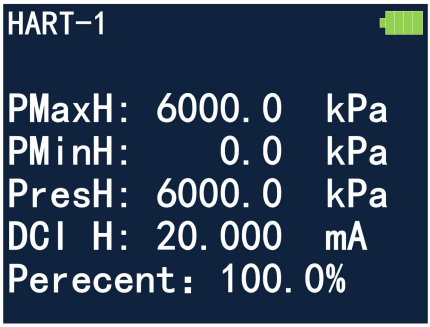
7.1 HART Interface

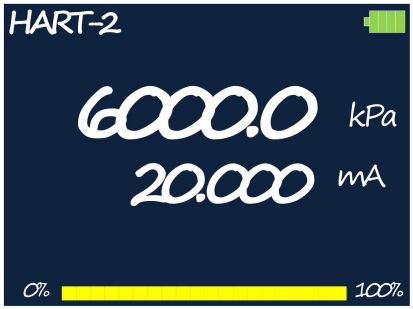
Long press the "ENTER" key to enter the menu, select the second item "HART", and then the calibrator will automatically turn on the 24V power output and send a handshake command to the transmitter connected to the calibrator and read the parameters at the same time. When the calibrator and the transmitter communicate successfully, it will display as follows:

"Upper limit M" and "lower limit M" represent the maximum and minimum pressures supported by the pressure sensor inside the transmitter. "Pressure H" and "current H" represent the pressure value and current values currently measured by the pressure transmitter.



Short press the "MODE" key under the HART function to switch between the following two interfaces, which are the routine measurement interfaces under HART function.



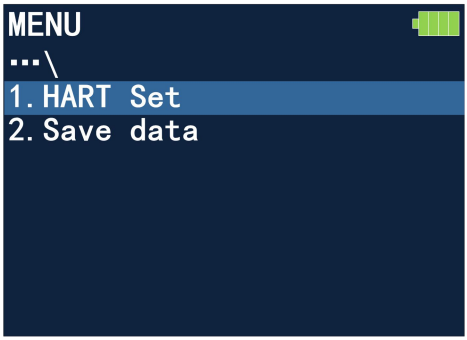


"Upper limit H" and "lower limit H" in the HART-1 interface represent the maximum and minimum measuring ranges set by the pressure transmitter. "Pressure H" and "current H" represent the pressure value and output current value currently measured by the pressure transmitter. The "percentage" represents the ratio of the measured pressure value to the full range.

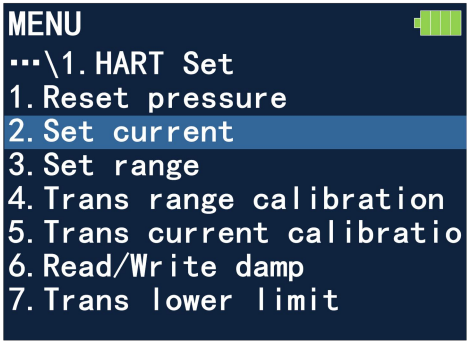
The pressure value and current value under HART-2 interface represent the pressure value currently measured by the pressure calibrator and the current value output by the transmitter.

7.2 HART Operation Menu

Long press the "ENTER" key under the HART function to enter the HART operation menu, as shown in the figure below:



HART setup menu is as follows:



Introduction to HART setup menu:

Zero calibration of current value: equals to zero reset, set the value currently measured by the pressure transmitter to 0.

Forced output of loop current: the pressure transmitter is removed from the automatic control of loop current, and its output current is manually set by the calibrator with a range of 4~20mA.

Range modification: used to modify the maximum and minimum user ranges set by the pressure transmitter.

Transmitter range calibration: it is divided into two parts: zero

point and full range point. The zero calibration requires the pressure transmitter to accept an accurate minimum range pressure that the user wishes to set, and then perform the calibration; full range point calibration requires the pressure transmitter to accept an accurate maximum range pressure that the user wishes to set, and then perform the calibration.

Transmitter current calibration: it is divided into two parts: 4mA calibration and 20mA calibration. There will be a set value and a measured value in the calibration interface. The set value is the current value that is intended to control the output of the pressure transmitter, and the measured value is the actual current value measured by the calibrator. If the actual current value is not equal to the current value of the calibration point, it is necessary to change the set value until the actual current value is equal to the current value of the calibration point. At this moment, the calibration is finished.

Read/modify damping: used to modify the measured damping time of the pressure transmitter. The unit is second.

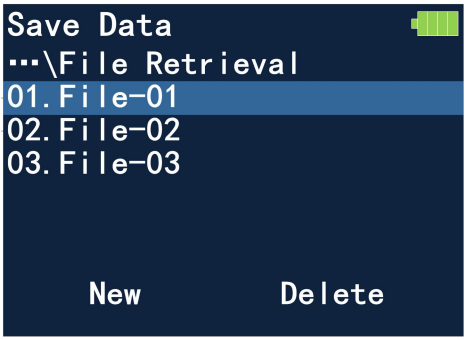
Conversion function: used to set the conversion relationship between pressure measured by pressure transmitter and time output current. It is divided into linear or square root functions.

8 Saving the Verified Data

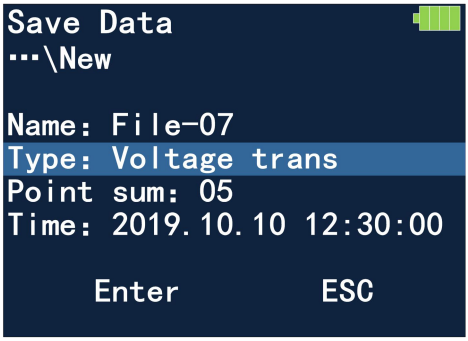
This pressure calibrator has convenient verified data saving function, which saves users from the trouble of manually recording verified data when verifying various types of pressure transmitters, and stores up to 30 files *110 data. The operation process can be divided into three steps: (1) creating verified data document; (2) verifying and saving by point; (3) the verification is completed. After that, the document can be read through the upper computer software.

8.1 Creating verified data documents

After entering the verified data saving menu, a document retrieval menu will appear, as shown in the figure below:



You can check the previously created verified data documents in the menu, and use the keys of "↑""↓" to select different documents. Press "MODE" to move the cursor to the bottom, and select "delete" the currently selected document or "create" a new document.

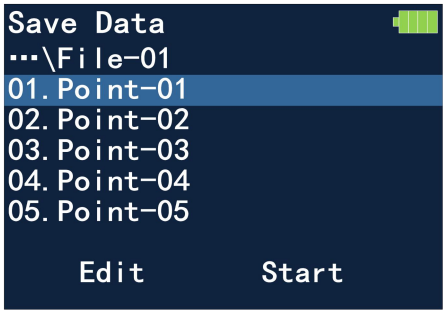


The new document interface is shown in the figure above. Use the keys of "↑""↓" to select different items. Press "ENTER" to enter the modification state, and then use the keys of "↑""↓" to modify the selected parameters, and press "ENTER" to save when finished. Press

“MODE” to move the cursor to the bottom, and select "ok" to complete the creation of a new document or select "cancel" to exit.

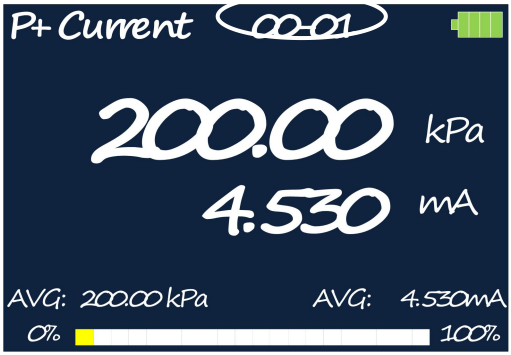
8.2 Verifying and saving by point

After selecting a verified data document, the interface displayed is as follows:



You can see in the interface how many pressure points have been selected when creating the document. Use the keys of “↑”“↓” to select different pressure points for checking. Press “MODE” to move the cursor to the bottom, and select "edit" to modify the parameters of the current document, and select "start" to start verification and recording.

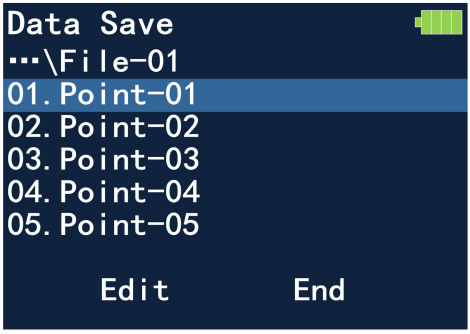
When the verification and recording is started, the interface switches to the routine measurement interface (current, voltage or switch) corresponding to the type of sensor to be recorded in the document. "Verified data recording identification" will appear on the upper part of the interface, as shown in the circle below:



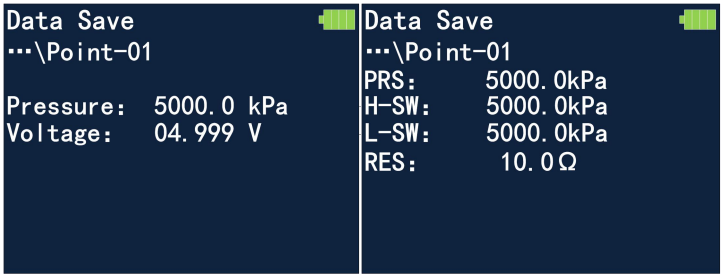
- The front number represents the number of verification record document, and the rear number represents the pressure point number to be recorded. When the measurement of a certain pressure point is completed, just long press the "↓" key and the calibrator will automatically save the current measured data, and the pressure point number on the "verified data record identification" will increase by one digit, waiting for the measurement of the next pressure point. When all the pressure points to be measured are measured and recorded, the verified data recording will be completed, and the "verified data recording identification" on the upper part of the interface will automatically disappear.

8.3 Verification completed

As mentioned above, when all the pressure points to be measured are measured and recorded, the verified data recording will be completed, and the "verified data recording identification" at the upper part of the interface will automatically disappear. However, if the pressure point data is not fully recorded, then the verification recording process can be ended as follows:



There is an "end" option at the bottom of the screen. Press "MODE" to move the cursor to the bottom, and select "end" and confirm, and then the verification recording process would be ended. The "verified data recording identification" at the upper part of the routine measurement interface will also disappear.



When selecting one of the pressure points in the document to view the data, the display interface is shown in the figure above, which can only view the data, but cannot modify the data. If data has not been recorded at a pressure point, the data value for that pressure point will display as "nan".

9 How to charge and replace the batteries

When the battery indicator icon of the instrument shows only 1 grid,

please charge in time. Not charging in time will lead to auto power-off of the instrument, which will greatly affect the service life of the battery.

The instrument is powered by a built-in 3.7v lithium battery and charged by a 5V/1A charger. Please contact the manufacturer or distributor for battery replacement.

10 Fault analysis and troubleshooting

1 ） If the applied pressure exceeds 10% of the range, an overpressure alarm will be given. At this moment, the pressure should be immediately reduced to avoid damage to the pressure sensor.

2）If the battery life has been reduced after long use, please contact the manufacturer.

3）If the attempt to long press "LIGHT" to start the instrument fails, please check whether the main power switch on the back of the pressure gauge is on or connect the power adapter to eliminate battery problems.

11 Configuration List

No.	Item	Quantity
1	Pressure Calibrator Host	1
2	Certificate and warranty card	1
3	Product manual	1
4	Measuring pen	1
5	5V/1A power adapter	1