

773/783/793

Pressure Controller



773/783/793 Pressure Controller

-----User Manual

[Version number: 2403V01]

Additel Corporation

Statement

This user manual provides operating and safety instructions for Additel 773/783/793 Pressure Controllers. To ensure correct operation and safety, please follow the instructions in this manual. Additel Corporation reserves the right to change the contents and other information contained in this manual without notice.

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Safety Instructions

1. Safety and Marks

- ◆  Indicates the user must refer to the instructions prior to use the controller.
- ◆  Indicates the terminals or sockets may have high voltage and user should avoid contact.

2. User Responsibilities

To ensure safety, users must do the following:

- ◆ Before using this product, please make sure you have read and understand this user's manual;
- ◆ Use the controller properly and use a medium that meets the requirements;
- ◆ Establish and follow safety procedures, operators must have relevant professional knowledge;
- ◆ Use the controller only when it is in good working condition;
- ◆ The controller should only be purchased and repaired at Additel or authorized distributors;
- ◆ The controller must be grounded to the AC power supply's safety ground.

3. General Safety

- ◆ The controller can only operate safely and without failure if it is stored, transported, installed and used correctly;
- ◆ Avoid using the device in vibration, high temperature, high humidity and strong magnetic field environments;
- ◆ Do not insert any object into the controller;
- ◆ The voltage of the controller's power supply may cause injuries to personnel. Even after switched off, dangerous voltage may exist;
- ◆ In the event of condensation, the controller must be dried out before being switched on;
- ◆ Make sure the pressure is vented before switching off the controller.

4 . Warning

- ◆ High pressure is potentially dangerous! It should only be installed and operated by professionals;

- ◆ Tubing, valves and other equipment connected to the controller must be able to withstand the maximum pressure that will be exerted and allow for adequate safety redundancy;
- ◆ Do not use in dusty, steam, or corrosive gas environments.
- ◆ Do not use in explosive hazardous environments;
- ◆ Do not overpressure the controller;

5. Air source and medium requirements

- ◆ For controllers that need to access an air source, the stability and safety of the air source must be ensured. It is strongly recommended to install a pressure stabilizer, pressure safety valve (or equivalent functional device), isolation valve and release valve in the input tubing of the pressure source, so that the controller can be used safely in the best condition;
- ◆ When the air source pressure is connected to the controller is greater than 5% of the maximum working pressure and meets the upper pressure limit (please refer to the label on the back of the controller for the maximum access pressure limit), a warning will be displayed on the controller interface. At this moment, the air source pressure should be adjusted to meet the controller's requirements;
- ◆ The vacuum source connected to the controller must be 1kPa or lower than the minimum vacuum working pressure. It is also recommended to set up a liquid collector in the vacuum source tubing to prevent the liquid in the DUT from directly entering the vacuum source and affecting the life of vacuum source. In serious cases it may directly cause damage to the vacuum source;
- ◆ For controllers that need to be connected to an air source, it is necessary to ensure that the air source is clean, dry and non-corrosive. Specifically, nitrogen with a purity of more than 99% is the preferred medium. If the nitrogen has undergone multi-stage compression, it is necessary to install an oil mist and particle filter in the tubing after the final stage of compression. We recommend that the filtration accuracy of the particle filter is less than 5μm;

Usually, the compressed nitrogen in the industrial nitrogen bottle has been filtered and dried, it can be directly connected to the pressure supply tubing of the controller; if compressed air is selected as the gas source, an oil mist filter, dryer and particle filter need to be installed in the tubing after final compression;

- ◆ When inert gases other than compressed nitrogen or compressed air are used as the gas source for the controller, the damage and impact on personnel and the environment must be fully evaluated.
- ◆ It is absolutely prohibited to use flammable, explosive and toxic gases as the gas source for the controller.
- ◆ For controllers which use liquid as medium, the liquid medium in the liquid reservoir should be replaced regularly and based on actual conditions. When replacing the liquid medium, it should meet the requirements of the equivalent medium. For water medium controller, it is strongly recommended to replace the water in the liquid reservoir once a week.

1. Introduction

1.1 Overview

Additel's 773/783/793 pressure controllers highly integrate the latest control/measurement technology, modular design concepts, and easy-to-use/maintenance design ideas, providing a wide range from -14.35 psi to 15,000 psi. Among them, Additel 773 is a low pressure model (-380 inH₂O ~ 400 inH₂O), Additel 783-D (-14.35 psi ~ 35 psi), Additel 783-1K (-14.35 psi ~ 1,000 psi), and Additel 783-3.5K (-14.35 psi ~ 3,600 psi) are pneumatic models, Additel 793 is hydraulic models (0~ 15,000 psi), achieving high control stability, high control rate, and high measurement accuracy, making them an ideal solution for automated production, pressure test and calibration.

Achieving wide range coverage and simplifying test calibration tasks, the 773/783/793 can quickly receive pressure control modules and a reference barometric pressure modules. Each pressure control module provides dual ranges and reading accuracies. This modular design allows users to choose the pressure modules flexibly according to range and accuracy requirements. At the same time, the quick plug-in feature of the module makes calibration work simple.

Manufacturing companies for pressure sensors and pressure transmitters have strict controls over the risk of production line shutdowns. Additel773/783/793 adopts a variety of easy-maintenance designs. Users can quickly replace pressure control modules, pressure control components, clean the solenoid valve, finely filter contamination particles, optional external CPS anti-pollution device, and for the hydraulic controller, an optional external reservoir can be used for single cycle. These simple maintenance features make Additel773/783/793 the powerful and reliable solutions for production line users.

General pressure controllers require an external air source, and users must consider the configuration of the air source. Due to the different pressure ranges of the controllers, it is sometimes very troublesome to provide an air source that might be too large or too small. The Additel773 and Additel 793 have built-in pump sources, which create pressure quickly and reliably. Users do not need an external air source. For the Additel783 to achieve the fastest pressure control speed, a large flow of external air source is required, the user can configure the air source according to the conventional air source. Additel also provides a fully automatic air source solution. Call Additel for assistance.

The automatic test functions will improve the user's work efficiency. Additel's 773/783/793 controllers integrate numerous test functions, such as pressure switch test, pressure leak test, pressure safety valve test, script task test, pressure automatic step test, External I/O alarm output, external drive valve control.

1.2 Models Specification

Table 1 Models Specification

Additel773/783/793 intelligent automatic pressure controller					
Models	ADT773	ADT783-D	ADT783-1K	ADT783-3.6K	ADT793
Maximum pressure	(-380~400) inH ₂ O	(-14.35 ~ 35) psi	(-14.35 ~ 1,000) psi	(-14.35 ~ 3,600) psi	(0 ~ 15,000) psi
control range	(-0.95~1) bar	(-0.99~2.5) bar	(-0.99~70) bar	(-0.99~250) bar	(0~1,000) bar

Pressure type	Low differential pressure	Differential pressure	Gauge	Gauge	Gauge
Pressure media	Gas	Gas	Gas	Gas	Liquid (water or oil)
Built-in pump	√	-	-	-	√
External air source	-	√	√	√	-
Internal pressure control module	2	2	2	2	1
Barometric pressure module(Optional)	1	1	1	1	1
External pressure control module	-	-	-	-	√
Absolute pressure switching ^[1]	√	√	√	√	√

Note: [1]Absolute pressure is achieved through the synthesis of the basic gauge pressure module and the optional atmospheric pressure module.

1.3 Technical Specifications

1. General Specifications

Table 2 General Specifications

Features	Specifications
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Power Requirements	Power supply: AC100 ~ 240V, 50/60Hz Fuse: T3.15A 250Vac Maximum power consumption: 150W
Size / Weight	Chassis size: 17.32 × 5.23 × 14.96 in (440(W) × 133(H) × 380(D) mm) Rack mount dimensions: 3U-19" rack, Horizontal Direction Weight: Additel773: 17.6 kg / Additel783: 16.9 kg / Additel793: 20.7 kg Pressure module weight: 0.5 kg
Environment	Operating ambient temperature: 10°C ~ 50°C Storage temperature: -20°C ~ 70°C (oil medium), 5 ~ 70 °C (water medium) Working humidity range: 5%RH ~ 95%RH, no condensation Working altitude: <2000 m Protection level: IP20, indoor use only Vibration level: 2g Impact intensity: 4g Warm-up time: 15 minutes Bare machines drop height: 250mm
Conformity	CE
Communication	RS232, USB-A*2, LAN WIFI, Bluetooth, GPIB, mouse, keyboard and other peripherals can be expanded through USB The SCPI command set is compatible with Additel780, PACE5000/6000, DRUCK DPI520, MENSOR, WIKA, FLUKE, and user customizable.

External drive valve port	<p>3-channel external drive valves, green terminal connector with lock</p> <p>Maximum drive capacity 24V/12W, port withstand voltage 30Vmax.</p> <p>One channel fixed to the CPS pollution prevention device, the remaining 2 channels can be used to control the external vacuum pump and external isolation valve.</p>
I/O alarm port	<p>3-channel, green terminal connector with a lock</p> <p>Volt-Free No/Nc relay, the maximum current-carrying capacity: 24 V / 0.5 A, 30 V max</p>
Pressure switch test interface	<p>1-way, lockable green terminal connector</p> <p>Maximum load 24V/0.1A, interface withstand voltage 30Vmax.</p> <p>Supports mechanical switch and electronic switch testing</p>
Display	<p>7-inch capacitive touch screen, resolution 1280*800, reflective panels, black and white background switchable</p> <p>Communication update speed: 10 times/second.</p> <p>Display refresh rate: 5 times/second</p> <p>Pressure value maximum displays: ± 9999999, display digits is adjustable</p>
External pressure control module port	<p>5-pin standard Lemo plug, connect external pressure control module (ADT161).</p>
Internal pressure control module port	<p>Opening the cabin door will automatically release the pressure for safe removal of modules.</p> <p>Inside of cabin:</p> <p>For ADT773/783, 3 bays, from left to right including a high-pressure module bay, a low-pressure module bay, and a barometric pressure module bay.</p> <p>For ADT793, 2 bays, from left to right, including a pressure module bay, and a barometric module bay.</p>
Warranty	<p>1 year</p>

Hose & Filter End of Life	The estimated End of Life (EOL) expectancy for all hoses and filters (pneumatic and hydraulic) is approximately 10 years and should be replaced at the first sign of wear or damage.
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2. Pressure control specifications

Table 3 Pressure control specifications

Pressure control specifications					
Model	ADT773	ADT783-D	ADT783-1K	ADT783-3.6K	ADT793
Maximum pressure control range ^[10]	(-380~400) inH2O (-0.95~1) bar	(-14.35 ~ 35) psi (-0.99~2.5) bar	(-14.35 ~ 1,000) psi (-0.99~70) bar	(-14.35 ~ 3,600) psi (-0.99~250) bar	(0 ~ 15,000) psi (0~1,000) bar
Pressure type	Low differential pressure	Differential pressure	Gauge	Gauge	Gauge
Absolute pressure switching ^[1]	√	√	√	√	√
Number of internal pressure control modules	2	2	2	2	1
Number of external control pressure modules	-	-	-	-	1
Maximum range of internal module	(-400~400) inH2O (-1~1) bar	(-15~36) psi (-1~ 2.5) bar	(-15~1,000) psi (-1~70) bar	(-15~3,600) psi (-1~250) bar	(0~15,000) psi (0~1,000) Bar

Minimum range of internal module	(-1~1) inH2O (-2.5~2.5) mbar	-(10~10) inH2O (-25~25) mbar	(-10~10) psi (-0.7~0.7) bar	(-15~150) psi (-1~10) bar	(-15~3,000) psi (-1~200) Bar
Minimum range of external module	-	-	-	-	(-15~1,000) psi (-1~70) Bar
Maximum high and low range ratio	-	-	20:1	-	-
Range switching Mode ^[2]	fixed, automatic	fixed, automatic	fixed, automatic	fixed, automatic	fixed, automatic
Pressure supply source ^[3]	Built-in air pump	External air source	External air source	External air source	Built-in liquid pump
Maximum supply pressure ^[4]	-	4bar	80bar	280bar	-
Control mode	Fast, standard, custom	Fast, standard, custom	Fast, standard, custom	Fast, standard, custom	Fast, standard, custom
Maximum overshoot	<1%FS	<1%FS	<1%FS	<1%FS	<1%FS
Maximum load Volume	500 ml	1,000 ml	1,000 ml	1,000 ml	<10,000 psi: 80 ml, 10,000~15,000 psi: 60 ml
Control response time ^[5]	<10S	<10S	<10S	<10S	< 30S

Control stability ^[6]	<0.003%FS ^[7]	<0.003%FS Typical 0.001%FS	<0.003%FS Typical 0.001%FS	<0.003%FS Typical 0.001%FS	<0.005%FS Typical 0.003%FS
Lasting stable time	>5min	>5min	>5min	>5min	>5min
Connect to CPS anti-pollution device	√	√	√	√	√
Pressure port	6 mm Festo	6 mm Festo	1/4BSP M	1/4BSP M	1/4BSP M
Air source interface ^[9] safe pressure limit	-	Air source port: 1MPa Vacuum port: 500kPa	Air source port: 14MPa Vacuum port: 500kPa	Air source port: 30MPa Vacuum port: 500kPa	
Interface filter ^[8]	√	√	√	√	√
Built-in Reservoir Volume	-	-	-	-	800ml
External Reservoir Extension	-	-	-	-	Optional

Note: [1] After the reference atmospheric pressure module is installed, users can select gauge or absolute pressure.

[2] Automatic range switching between internal pressure control module and external pressure control module is not supported;

[3] Gas refers to clean and dry nitrogen or air; liquid refers to Diethylhexyl sebacate or deionized water;

[4] In order to achieve the best control effect, the source pressure should be adjusted to about 110% of the maximum range of the internal pressure control module or 1bar, whichever is greater;

[5] The air pressure is tested under an external load volume 50 ml, 20% step, and the time to reach 0.005%FS stability.

The hydraulic pressure is tested under an external load volume 10ml and 20% step, and the time to reach 0.005%FS stability;

[6] In order to achieve the specified control stability, some additional stabilization time at the desired pressure may be needed depending on the configuration and pressure level.

[7] The control stability is 0.003%FS or 0.05Pa, whichever is the greater;

[8] All pressure ports are installed with 40 ~ 100 μ m filters;

[9] In order to prevent the inlet pressure of the air source from exceeding the safety limit, it is recommended to install a suitable pressure safety valve at the outlet of the air source;

[10] The minimum negative pressure limit is given based on the atmospheric pressure value of 1bar.

2. First time use

2.1 Controller illustration

2.1.1 Front panel

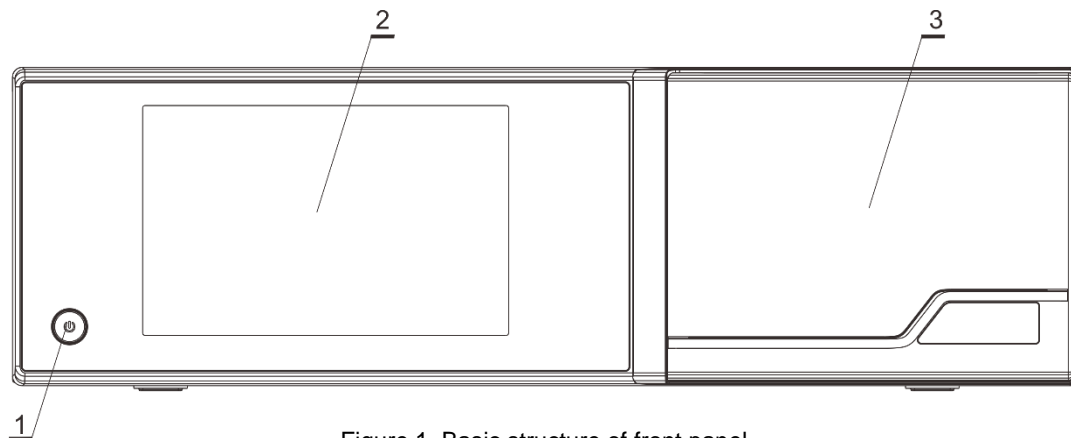


Figure 1 Basic structure of front panel

Table 4 Front panel structure description

No.	Description
1	Power button
2	Touchscreen
3	Front cabin door (open to see the pressure control modules, atmospheric

2.1.2 Cabins Inside Introductions

The pressure controlling modules (ADT151) are installed in the cabin, the upper edge of the cabin is simple to open. As the door opens, the controller will automatically release pressure, providing the safe removal and installation of the ADT151 modules.

1. Pneumatic controllers cabin inside:



Figure 2 ADT773/783 cabin inside

2. Hydraulic controller cabin inside:

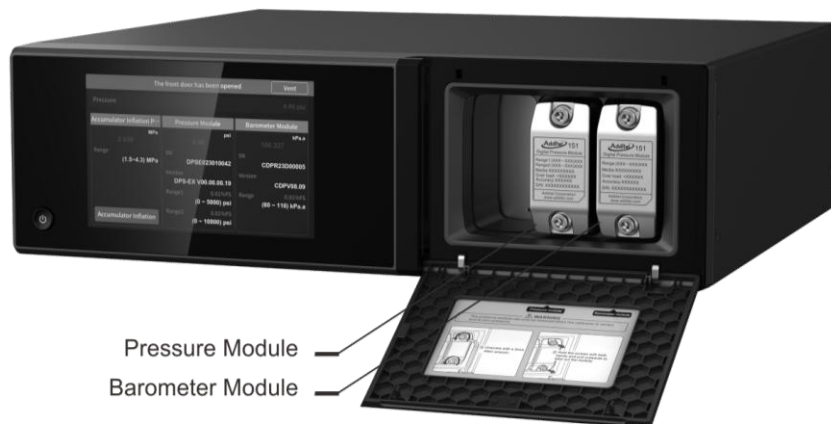


Figure 3 Adt793 cabin inside

2.1.3 Back Panel Ports Description

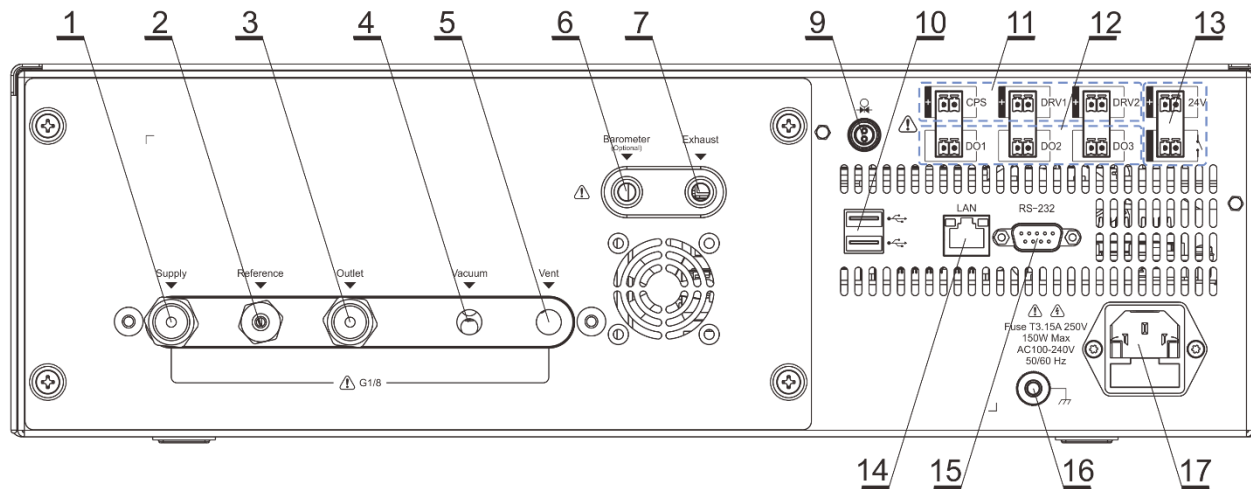


Figure 4 Additel773/783back panel

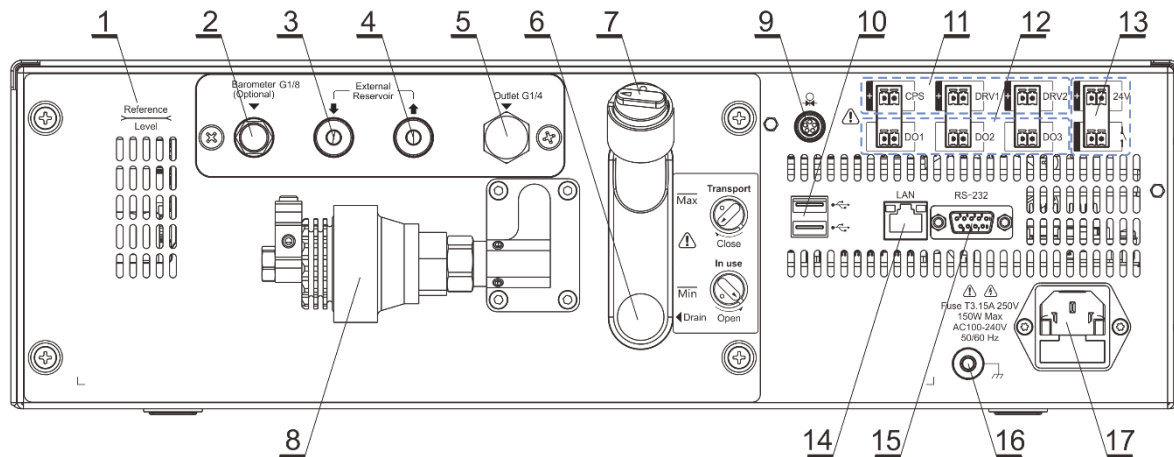


Figure 5 Additel793back panel


Table 5 Additel773/783/793ports description

No.	Additel773/783	No.	Additel793
1	Positive pressure source port, inside is 1/8BSP F	1	Pressure reference level mark
2	Differential pressure reference port, inside is 1/8BSP F	2	Barometric measuring port, inside is 1/8BSP F
3	Pressure output /measureport, inside is 1/8BSP F	3	External reservoir inlet port, $\varnothing 6$ hose connected to the clean


			liquid tank
4	Vacuum source supplyport, inside is 1/8BSP F, ADT773 is blocked	4	External reservoir outlet port , $\phi 6$ hose connected to the dirty liquid tank
5	Vent port, inside is 1/8BSP F	5	Pressure output /measurement port, G1/4 M
6	Barometric measuring port, inside is 1/8BSP F	6	Internal media drain port
7	Air exhaust port, inside is 1/8BSP F	7	Liquid filling and vent to atmosphere valve
8	--	8	Accumulator
9	Lemoport for External module (ADT793 external module can be used as a pressure control module)		
10	USB port		
1 1	External drive valve connection ports, one of which is fixed to the CPS pollution prevention device, and the other two can be used to control external vacuum pumps and external isolation valves		
1 2	I/O alarm output port		
1 3	Pressure switch test port		
14	Ethernet port		
15	RS232 port		
1 6	Controller shell grounding post		
1 7	AC power supply (AC100~240V, 50/60Hz, maximum power 150W)		

2.2 First time use

2.2.1 Power on

1. Press the power button  to power on the unit;
2. The controller displays the startup interface;
3. After a short wait, the controller will enter the main display;

2.2.2 Set date and time

Click the system setting button  under the main display, and enter into the personalization, there is a date and time setting, which can set the system date and time and display format of the controller; if it is connected to the Internet, you can directly click to synchronize the time.

2.2.3 Output pressure

1. ADT773/783

Set a pressure within the range as the target value in the main display, and the controller will control and output this pressure according to the target value.

2. ADT793

- ◆ Fill medium: rotate the vent valve of the liquid reservoir first, remove the vent valve and then fill in the required working medium, as shown in Figure 4 for the liquid filling operation. The height of the medium needs to be between the Min and Max mark lines;
- ◆ Reinstall the vent valve and rotate the vent valve knob to open it;
- ◆ Connect an UUT on the output port or block it;
- ◆ In the main display, set a pressure within the range as the target value, and the controller will control and output

this pressure according to the target value.



Figure 6 Liquid reservoir operation diagram

3. Display and operations

3.1 Main interface brief introduction

The main interface consists of the top status bar and the pressure display area, as shown in Figure 7.

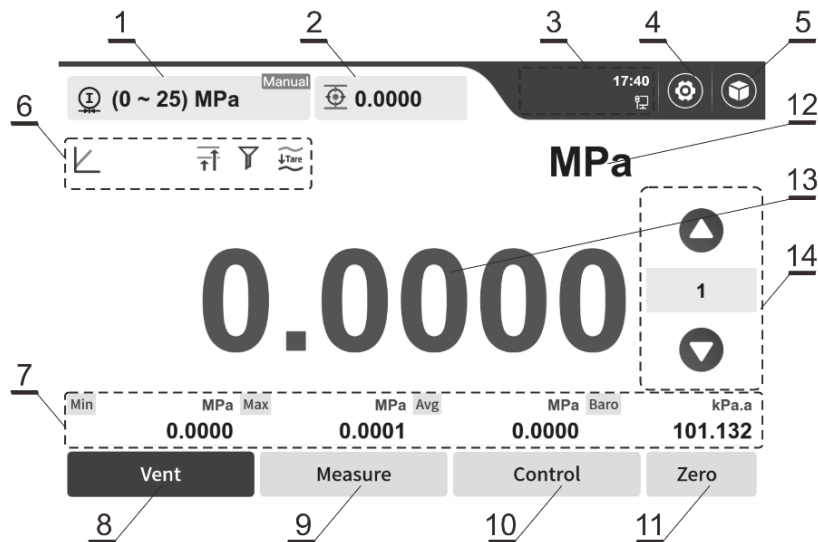


Figure 7 Main interface

Table 6 Introduction to the display area of the main interface

No.	Display area	Instructions
1	Pressure control range	Click to switch the pressure control range
2	Setpoint	Click to set the setpoint
3	Status Bar	WIFI, Bluetooth, U-flash, external modules, etc. Click here to view detailed status information
4	System settings	Various settings of the device, including Control Settings, Measure Settings, Service, Personalization, communication settings, etc.
5	Application	Various applications provided by the device
6	Parameters preview	Parameter status is displayed. Click to set the parameter enable/disable status.
7	Running information	Choose any four types of information for real-time display
8	Vent	Quickly vent the pressure value in the controller to atmosphere
9	Measure	In measure mode, the ADT151 pressure module will measure the pressure value of the UUT connect on output port.
10	Control	In control mode, the controller will output a high-precision pressure at the output port according to the set point.
11	Zero	Make the controller quickly meet the zeroing conditions and perform the zeroing.
12	Pressure units	Click to change the pressure units.
13	Real-time pressure reading	Display the current pressure value, click it to set the pressure setpoint.



14	Manual step setting	Click the middle number to set the step values and control the target pressure value by stepping up and down.
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3.2 Main interface detailed introduction

In order to quickly understand the operations of controller, please refer to the Figure 7 and follow below introductions.

1. Pressure control range

(1) The current pressure control range can be switched by clicking it, gas and liquid controllers have different controlling module versions, that makes different displays.

ADT773/783:  indicates the High pressure internal module,  indicates the Low pressure internal module.

ADT793:  indicates the Internal pressure module,  indicates the external pressure module.

(2) The Manual mark in the upper right corner indicates that the current range mode is manually, and the Auto mark indicates automatic select pressure range;

2. Setpoint


The current pressure set point is displayed, and you can click it to change the set point; click on the real-time pressure value in area 13, and you can also set the target value.








3. Status Bar

The status bar can be clicked. After clicking, it will enter the "Control Center" interface, which provides more system setting operations.

◆ Time and date: The time is the system time;

◆ WIFI:  icon identifies WIFI connection status and signal strength;

◆ LAN connection:  icon indicates Ethernet cable is plugged in;

- ◆USB:  icon indicates that a USB device is plugged in;
- ◆Bluetooth:  icon indicates that the Bluetooth is turned on;
- ◆Message notification:  icon will be highlighted in red when there is an abnormal message notification, users can click details information further to view the specific warning information;
- ◆Contamination Prevention System:  icon indicating that the CPS system is enabled, see 4.6.1 for details ;
- ◆External pressure module:  icon indicates that the external pressure module is online;
- ◆Vacuum pump:  icon for ADT783 only, indicates that the vacuum pump driver is selected on DRV1 or DRV2 ports.
- ◆Load Volume Expander:  icon for ADT793 only, indicates the load volume expander is selected on DRV1 port (It's the same icon display as vacuum pump).

In addition, in the detailed information, you can also quickly set the screen brightness, volume, RS232 serial port communication, select DRV1 or DRV2 ports, lock/unlock screen and reboot.

4. System settings

The main settings of the controller are all here, including control settings, measure settings, personalization, service, communication, expansion interface, maintenance, and information. See Chapter 4 for a detailed introduction to each function.

5. Applications









Click to enter the device applications menu. The applications facilitate users to complete some common process operations. See Chapter 5 for details.

6. Parameters preview

To view the settings of commonly used parameters, click it to enter the parameter preview setting interface to

quickly set the status of the features, but cannot set the specific parameters.

(1) Icon display

- ◆ Control Mode: Icons  (Fast) /  (Standard) /  (Custom), indicating using the corresponding control mode;
- ◆ Slew Rate:  icon indicates the pressure control speed limitation is active;
- ◆ Vent Rate Limit:  icon indicates the vent rate limitation is active (for ADT773/783 only);
- ◆ Height difference correction:  icon indicates that the height difference correction is enabled;
- ◆ Filter:  icon indicates reading filtering is enabled;
- ◆ Tare:  icon indicates that the tare is enabled.

(2) Parameter preview settings

Click it to enter into the parameter preview settings display, to set the display parameters

- ◆ Control mode: Three modes can be set: fast, standard, and customized;
- ◆ Control stability: The control stability can be set only for custom control mode, and other modes cannot be set. For details, see "Control Stability" in Chapter 4.1;
- ◆ Slew rate: The slew rate and pressure control speed limitations can be set only for custom mode, and other modes cannot be set. For details, see Chapter 4.1;
- ◆ Height difference correction: To set the height difference correction status and parameters, refer to "Height Difference Correction" in Chapter 4.1;
- ◆ Tare: To set tare status and parameters, refer to the "Tare" in Chapter 4.1;
- ◆ Filtering: To set the readings filtering status and parameters, refer to the "Filtering" in Chapter 4.2.

7. Running information

Click to enter the running information display. The running information includes: statistics and live data. You can

choose up to 4 of them for real-time display on the main display; click the “Reset” button to recalculate the running information; and click the “Clear” button to remove all the selected running information.

(1) Statistics: Min (minimum value), Max (maximum value), Avg (average value), PP (peak-to-peak value), Rate (actual rate);

(2) Live Data:

- ◆ ADT773/783: Supply (positive pressure source module), Vacuum (negative pressure source module), H (internal high-pressure module), L (internal low-pressure module), Switch (mechanical switch), Baro (Barometric pressure), Ext (external module);

- ◆ ADT793: Ac (accumulator pressure), I (internal pressure), Pin (pressure source module), Pctl (front-end pressure module), Piston (piston position), Switch (mechanical switch), Baro (Barometric pressure), Ext (external module).

8. Vent

Rapidly release the pressure in the controller to the atmosphere. The pressure release time is related to the current pressure value, control rate, vent pressure and venting rate.

9. Measure

In measure mode, the ADT151 pressure module will measure the pressure value of the UUT connect on output port.

10. Control

In control mode, the controller will output a high-precision pressure at the output port according to the set point.

11. Zero

Perform the zeroing when the zeroing conditions are met. After enable the automatic zeroing in the control settings, there will be a zero mark on this button:

- ◆ The controller's reading cannot exceed the vent pressure when try to zero (ADT793 vent pressure: 1bar, ADT793W vent pressure: 5bar; ADT783 vent pressure: can be set and viewed in the control settings)
- ◆ When the controller's reading is higher than the vent pressure value, and try to zero it, it will prompt to reduce the pressure before performing the zeroing operation;
- ◆ When performing zeroing, the controller will perform a venting operation at first and wait until the internal zeroing conditions are met before performing zeroing.

12. Pressure unit





Displays the currently set pressure unit, click it to set the displayed pressure unit. After the new pressure unit is set, the displayed real-time pressure value and operating information will follow the newly set pressure unit.

13. Real-time pressure value

Displays real-time pressure reading, click it to set the target point. According to the set resolutions, the corresponding number of digits is displayed.

14. Manual step

The manual step mode can be set as Step Value mode or Point List mode in the Advanced Setting of Control Settings.

- ◆ Step Value: When use the step value mode, click the number in the middle of  and  buttons to set the step value, click up or down buttons will changes the set points at the setted step value interval.
- ◆ Point List: When use the point list mode, click the number in the middle of the  and  buttons will pop up the step point list display, users can add or delete the step points, click up or down buttons at main display will switch

to the next points as the new setpoint.

3.3 Pressure control

3.3.1 Pressure control module ranges switching

1. ADT773/783 pressure ranges switching

Select internal high pressure module **(H)** or low pressure module **(L)** as pressure control module.

For ranges selection, users can select auto range or manually select ranges

Select pressure range
here for ADT773/783

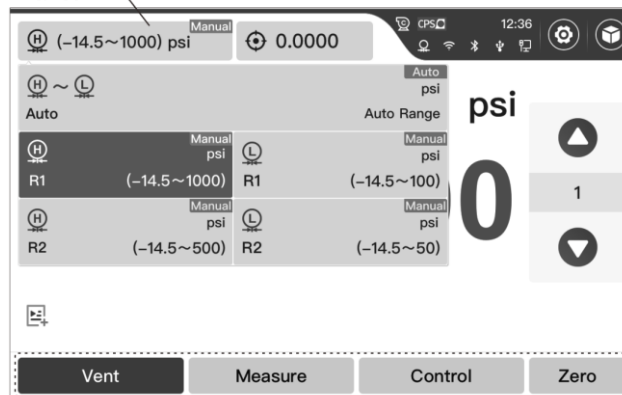




Figure 8 ADT773/783 Pressure Ranges Switching

- (1) ADT793 can use the internal pressure module  or external pressure module  as the pressure controlling module.
- (2) For ranges selection, users can select auto range or manually select ranges.

Select pressure range
here for ADT793

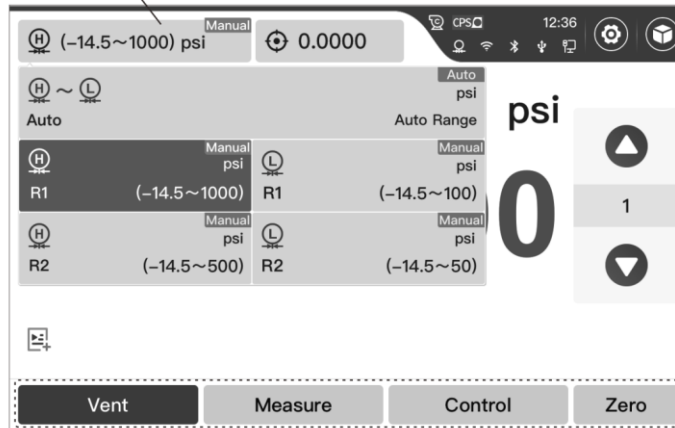





Figure 9 ADT793 Pressure Ranges Switching

3.3.2 Pressure output

1. Make connections

(1) When use internal pressure module as controlling module. (ADT793: , ADT773/783: /), the tubing connections are shown in below figure.

1) ADT773/783 Tubing connections

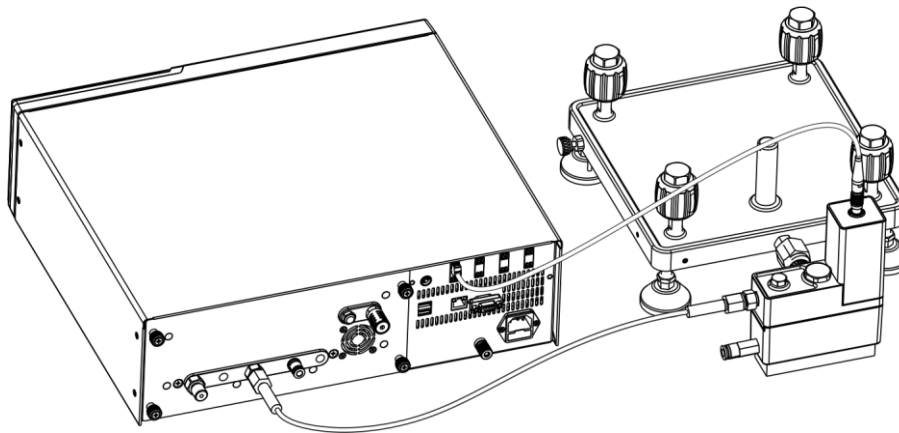


Figure 10 ADT773/783 Typical Tube Connections with manifold and CPS

2) ADT793 Tubing Connections

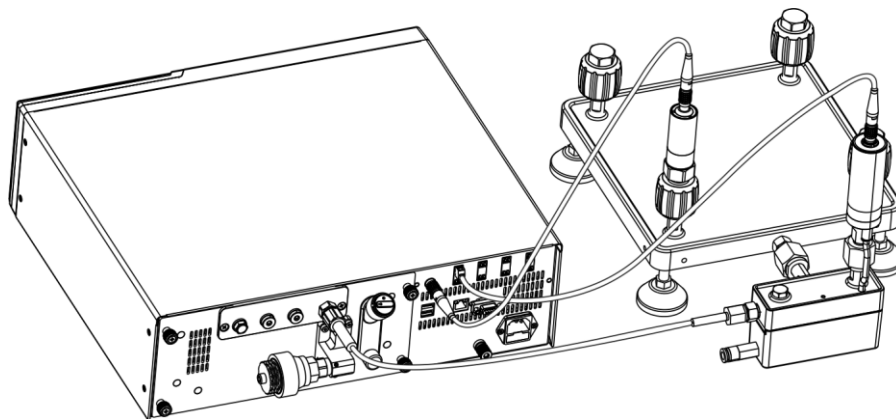




Figure 11 ADT793 Typical Tubing Connections with manifold and CPS

2. Input Setpoint

- ◆ Click the screen set point or pressure value display area and enter the setpoint;
- ◆ Or click to step upward  or downward  buttons to adjust the setpoint;
- ◆ The setpoints must be within the pressure control range of the controller;
- ◆ In addition to the range limits of the pressure control module, the setpoint is also limited by the setpoint limits in "Control Settings" (see Chapter 4.1 Setpoint Limit);
- ◆ When the setpoint exceeds the current pressure range, the setting cannot be completed and needs to be

re-entered.

3. Start/stop pressure control

- ◆ After setting the setpoint, the controller immediately starts generating pressure and control pressure;
- ◆ In the vent or measure mode, click the "Control" button on the screen to start pressure control;
- ◆ Click the "vent" and "Measure" buttons on the screen to switch to the vent or measure mode to stop pressure control.

4. Pressure Stability

- ◆ When the current output pressure meets the control stability conditions in "Control Settings" (see Chapter 4.1), the pressure value turns to green, indicating that it is stable.

5. Manual step

See manual step in Chapter 3.2.14 for details.


3.3.3 Pressure measurement

1. Switch to measure mode and select the required module and range;
2. Connect the external pressure controller to the output port of Additel controller;
3. External pressurization
 - ◆ The external pressure controller must use the same media with Additel controller;
 - ◆ It is prohibited to apply pressure beyond the range of the controller;
 - ◆ If the external pressure exceeds the current using range, the reading value turns red and triggers the alarm;
 - ◆ If the external pressure exceeds the controller's tolerance range, the system will be vented immediately and prompt over-pressure protection.

3.3.4 Pressure unit

1. Units switching: Click the pressure unit area in the main display to enter the pressure unit selection interface. Click the required unit to complete the pressure unit switching.
2. Unswitchable unit: In the unit selection interface, if any units are grayed out that means they cannot be selected, because the units cannot fully display all digits in the full range.
3. System unit configuration: The displayed switchable units are the system configured units. For details on the configuration of the system units, please see Chapter 4.3.5.

4. System settings

In the main display, click the button icon  to enter the system setting interface. System settings include eight major menus: Control settings, Measure Settings, Personalization, Service, Communication, Expansion Interface, Maintenance and Information.

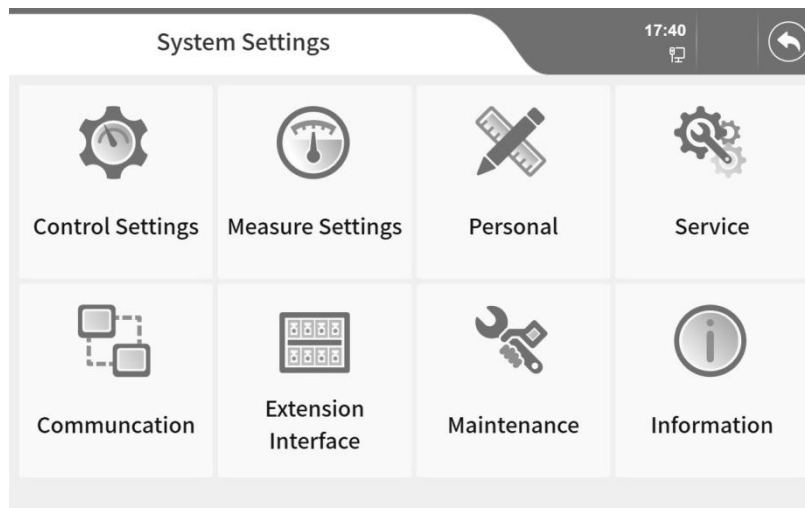


Figure 12 System settings

4.1 Control settings

1. Range mode

Set the switching mode of the pressure control ranges.

(1) Manual: Need to manually switch pressure control range, the default is manual mode;

Auto: The range will be automatically switched according to the current pressure value.

2. Pressure type

Pressure type can be switched between Gauge pressure and absolute pressure

3. Control mode

- (1) Fast: In fast mode, the slew rate is fixed at the maximum value, the control stability is also fixed at a fixed value.
- (2) Standard: In standard mode, the slew rate is also fixed at the maximum value, the control stability is also fixed at a fixed value;
- (3) Custom: In custom mode, the slew rate limit can be enabled or disabled, the slew rate can be set if enabled. If it is disabled, the slew rate will be set to maximum value, and the control stability can be set, (0.001~1)%FS for ADT773/783, (0.005 ~ 1)%FS for ADT793, and the stability time can be set from 1s to 60s.

4. Stable control

Can only be set when the control mode is custom mode, the stable judgement conditions can be set.

- (1) StableTime: If the difference between the output pressure and the setpoint meets the requirements and remains stable for the settable time, the pressure control is considered stable, (1 ~ 60) seconds are settable;
- (2) Stability Setting: Set the stability judgement type, %FS or Fluctuation value types can be selected;
- (3) Stability: Set the specific value of the %FS or Fluctuation value, to judge if the pressure is stable or not according to compare the setted value here and the difference between the output pressure and the setpoint;
- (4) During the control process, the pressure can be determined to be stable if the following two conditions are met at the same time:
 - 1) To achieve stable conditions:
When the stability is set to "%FS": $|\text{output pressure} - \text{setpoint}| \leq \text{The pressure module range used by the pressure control} \times \text{stability}$;
When the stability is set to "Fluctuation value": $|\text{output pressure} - \text{Setpoint}| \leq \text{stability}$
 - 2) Continue to meet 1) conditions to reach pressure stabilization time.

5. Slew rate limit

This feature is visible and settable only when the control mode is custom mode, you can choose to enable or disable it:

- (1) When set to disable, the slew rate defaults to the maximum value ;
- (2) When set to enable, the slew rate can be set.

6. Slew rate

It can be set only when the control mode is custom mode, and the slew rate limit is enabled. In other cases, it defaults to the maximum value.

- (1) Set the maximum rate during pressure control. The maximum slew rate during pressure control will not exceed the set upper limit;
- (2) The slew rate displays "maximum", which means that the controller will approach the set point at the maximum slew rate.

7. Vent pressure

The maximum pressure of controller when performing the venting operation, the value range is (100 ~ 1000)kPa.

- (1) When the current pressure value is higher than the venting pressure set value, the controller will firstly reduce the pressure to the venting pressure value at the vent rate, and then execute the venting;
- (2) When the current pressure is lower than this venting pressure set value, the controller will immediately execute venting operation.
- (3) Note: This function can only be set for ADT773/783.

8. Setpoint limit

According to the control module range, input a smaller range as the upper and lower limits of the pressure control to ensure that the pressure output to the UUT will not exceed its range.

- (1) This feature is invalid when disabled. The setting will be stored and will remain after reboot;

(2) The upper and lower limits of the set point limits can be set when enable it, and the pressure control target value will be limited by the limits;

(3) It will not allow to set this set point if the target value exceeds the Setpoint limit.

9. Head Height Correction

(1) Enable: You can choose to enable or disable the height difference correction function;

(2) Corrected value: Read-only display of the correction value of the current height difference;

Unit system: Choose metric (SI) or imperial (BS) system;

Height difference: The input range is (-1000 ~ 1000) cm;

Standard density of medium:

ADT783: Click to select air, nitrogen or custom value;

ADT793: Click to select purified water, sebacate oil or customized value;

Gravity acceleration: the gravity acceleration value of the position, the input range is (9 ~ 10) m/s²;

Temperature: ambient temperature, the input range is (0~50) °C.

10. Tare

It can be set to enable or disable. After it is enabled, you can enter the corresponding tare value and it will take effect immediately after saving.

(3) Enable: You can choose to enable or disable the tare function;

Tare value: The value that needs to be tared. The input range is (-99999 ~ 999999), and the unit is the using pressure unit.

11. Auto Zeroing

(1) This function is invalid when disabled;

(2) The pressure reading will be automatically zeroed when the meet the zeroing conditions (refer to Clearing in

3.2).

12. Exacuation pressure

The maximum pressure value when performing the emptying operation inside the equipment, the value range is (100 ~ 1000)kPa.

- (3) When the current pressure value is higher than the emptying pressure set value, the equipment first reduces the pressure to the emptying pressure value at the emptying rate, and then performs the emptying operation;
- (4) When the current pressure is lower than this venting pressure set value, the device will immediately perform venting operation.

(5) Note: This function can only be set for the Pneumatic version.

13. Advanced settings

(1) For ADT773/783

1) Vent rate limit

Enable or disable the vent rate limit of the ADT783 units.

- ◆ Enable: when the current pressure value is higher than the venting pressure setting value, the controller first reduces the pressure to the venting pressure at the vent rate, and then executes the venting operation.
- ◆ Disable, when the current pressure value is higher than the venting pressure setting value, the controller first reduces the pressure to the venting pressure at the maximum rate, and then executes the venting operation.

2) Vent rate

Only for the ADT773/783, the maximum pressure reducing rate from the current pressure value to the venting pressure when the current pressure is higher than venting pressure.

3) Gauge zero mode

When the set point is 0 (gauge pressure), the processing methods can be selected:

- ◆ Control: Use pressure control method to control the pressure to 0 (gauge pressure)
- ◆ Vent/Draining: When controlling the 0 (gauge pressure) point, directly execute the vent or draining process

4) Volume fixed

It can be set to enable and disable. If there is a large volume between the controller and the UUT, this function needs to be enabled and set the volume to make the controlling more accurate and faster.

5) Volume

When enable the Volume fixed feature, the volume value needs to be entered.

6) Manual step Mode

Step value or point list can be selected. For details parameter, please refer to section 3.2.

7) Default Barometric Value

Only effective when the barometric pressure module is not online, the settable range is (60~120)kPa.a

(2) For ADT793

1) Vent Stable Convert Measure

Can enable or disable this feature, if enable, after venting and stabilizing for a while, the control mode will switch to measurement mode, and the time can be set by the stable dwell time.

2) Stable dwell time

It's valid when the Vent Stable Convert Measure feature is enabled, set the time to switch to measurement mode after venting stable, the time range can be set (1 ~ 180)s.

3) Manual step Mode, same with ADT773/783

4) Default Barometric Value, same with ADT773/783

4.2 Measure settings

The pressure module that needs to be set can be selected on the left side of the display and set the module parameters on the right side. The measurement parameters of the module include:

1. Unit

Switch pressure units for the selected module.

2. Resolution

Set the number of digits to display the pressure value;

(1) High-precision modules can be selected from 5, 6, and 7;

(2) Low precision modules can be selected from 4, 5, and 6.

3. Filter

The filter feature can be enabled or disabled, and the filter type and related coefficient can be set.

(1) Filter type: first-order filtering or average filtering can be selected;

(2) Filter coefficient: Visible when the filter type is first-order filtering, the filter coefficient range is (0.01 ~ 1);

(3) Filter sampling time: Visible when the filter type is average filtering, the time value range is (1 ~ 20) seconds.

4.3 Personal

Personal includes settings for Datetime, Display, Sound, Language and System unit.

4.3.1 Date time

Table 7 Date time

Items	Valid values	Description
Time	00:00 : 00 ~ 23:59:59	Time setting
Date		Date setting

Date Format	Year - Month - Day / Month - Day - Year / Day - Month - Year	Date format settings
24-hour clock	On/Off	Whether to use 24- hour clock display or not
Delimiter	. - /	Date separator settings
Time zone	Select suitable time zones	Depending on the location of the device, select the appropriate time zone
Synchronization time		Synchronize update time when connected to the Internet

4.3.2 Display

Table 8 Display setting

Items	Valid values	Description
Brightness	Set brightness in a bar form	Set screen brightness
Mode	Light mode / Dark mode	Set the background and base color

4.3.3 Sound

Table 9 Sound settings

Items	Valid values	Description
Volume	Set the volume in a bar form	Device volume settings
Touch tone	ON / OFF	Touch tone settings
Prompt tone	ON / OFF	Prompt tone settings
Over range alarm	ON / OFF	Over range alarm sound setting

Switch On/Off prompt tone	ON / OFF	Switch on/off tone setting
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4.3.4 Language

The controller provides multiple languages. Users can select the desired language through this menu, and the selection will take effect immediately.

4.3.5 System unit

1. Pressure units

This feature can be selectively added to the system pressure units among all pressure units, and the display order of the pressure units can be adjusted, and the pressure units can also be customized.

- (1) Add all: Add all units supported in all pressure units to the system pressure units;
- (1) Clear all: Clear the system pressure units. When the system pressure units is empty, you cannot exit this function directly;
- (2) Restore default: To restore system pressure units to factory default;
- (3) Custom: Set custom units. Supports maximum 5 custom units;
- (4) Sorting: Set the system pressure units displayed order.

2. Rate units

Set the rate unit of the system, 1/s or 1/min.

3. Temperature units

Set the temperature units of the system, K, °C or °F.

4.4 Services

System services include: system calibration, advanced configuration, restore factory and firmware update.

4.4.1 System calibration

Input password to enter system calibration. The factory default password is: 123456 .

1. Pressure module calibration


(1) Tubing connection

- ◆ The internal pressure module can be calibrated in either internal pressurization or external pressurization mode;
- ◆ When selecting internal pressurization mode, please connect the controller pressure output port to a reference pressure device;
- ◆ When selecting external pressure mode, please connect the controller to the pressure output port of the external reference pressure controller;
- ◆ When calibrating an external pressure device, if the range of the controller covers the UUT, either internal or external pressure mode can be used. If not covered, only external pressurization is an option.

(2) Select Calibration Module

Select the pressure module to be calibrated and select multi-point calibration

(3) Multi-point calibration


- 1) Click multi-point calibration to enter the calibration interface;
- 2) Last time calibration data: the data and date of the last calibration will be displayed at first after entering. If it has not been calibrated, will display "- - -".
- 3) Configuration before calibration: click button  to enter calibration configuration display
 - ◆ Select pressure source: internal pressure or external pressure
 - ◆ Height difference(only for ADT793): Since the height difference has a great impact on hydraulic calibration, it needs to be set.

- ◆ Calibration point: It can be changed. Please ensure the entered calibration point is within the range of the internal pressure module, and ensure that the current set point is smaller than the subsequent set point.


4) Start calibration

A. Click the Next button  to execute calibration;

B. Internal pressurization:

- ◆ According to the prompts of the controller, the controller outputs the pressure to the reference. After the pressure is stable, click the standard value which corresponding to the calibration point and input the readings of the reference. After confirmation, click  button to proceed to the next point;
- ◆ Use same method to calibrate all points, click Save to complete the calibration.

C. External pressurization:

- ◆ According to the prompts of the controller, use the external reference device to output pressure to the controller internal pressure modules. After the pressure is stable, click the standard value which corresponding to the calibration point and input the readings of the reference. After confirmation, click  button to proceed to the next point;
- ◆ Use same method to calibrate all points, click Save to complete the calibration.

D. If there is too much difference between the entered standard value and the indicating value, it will be prompt to re-enter.

E. After the calibration is successful, the new calibration data takes effect immediately, and the calibration date will take the current system date.

(4) Cancel Zero

- ◆ Click Cancel zero to cancel the zeroing operation of the pressure module.

(5) Restore factory calibration data

◆ Click Restore Factory Calibration Data to restore the calibration to the factory calibration data.

2. ADT793 Supply Pressure Module Calibration

Use the ADT151 pressure module as the reference to calibrate the internal supply pressure module and pressure sensor before booster to correct the pressure drift caused by long-term operation of the internal sensors. The output port must be blocked before the calibration.

3. ADT773/783 Supply Pressure Module Calibration

The pressure supply source sensor S1 and the vacuum source sensor S2 can be zeroed here.

Before calibration, please perform the following operations first:

- ◆ Please vent the supply source pressure at the "Supply" port
- ◆ Please vent the vacuum source pressure at the "Vacuum" port

4. Auto Tune


(1) Function introduction

Through the Auto Tune, the degradation of controller performance parameters caused by long-term use can be optimized, thereby improving pressure control stability and pressure control efficiency.

(2) Preparation before execution

- ◆ For ADT773/783: Before execution, the supply pressure of the "Supply" port needs to be adjusted to the appropriate pressure range.
- ◆ For ADT793: Make sure the output port is blocked when executing.

(3) Execution process

Click the start button , the program will run automatically. You can check the current execution progress through the progress bar until the program is completed.

(4) Restore Factory

After entering the application, click Restore Factory to restore the auto tune related data to the factory default.

Note: It is only necessary to perform auto tune when the pressure control capability decreases. Invalid auto tune will affect the control effect. Please use this function with caution.

5. Automatic Module Calibration

(1) Function Introduction

The automatic module calibration function can quickly and automatically calibrate the internal pressure control module for user convenience.

(2) Conditions of Use

- ◆ External standard modules need to be connected and connected correctly;
- ◆ The range of the external standard module needs to cover the range of the internal module.

(3) Steps

Need an external reference module is connected to enter the application. The steps are as follows:

- ◆ Display the reference and UUT information. For the ADT793, need to enter the height difference and click Calibrate to start the automatic calibration process.
- ◆ The equipment automatically detects whether the reference module range meets the calibration requirements of the internal pressure control module. If it meets the requirements, it will be calibrated. If it does not, it will prompt.
- ◆ During the calibration process, the internal pressure control module will be automatically calibrated in sequence until the calibration is completed.
- ◆ During the calibration process, you can click the return button to exit the calibration process, or click stop to interrupt the calibration process;
- ◆ After the calibration is completed, you can click Save to save the calibration results.

6. Calibration Record

- (1) The relevant information of each calibration operation is recorded, including calibration items, calibration time, and detailed calibration data;
- (2) The pressure module, liquid source module, autotune, etc. will be recorded separately, allowing users to search and browse based on calibration items and calibration time.

7. Calibration Expiration Reminder

- (1) You can set whether the calibration expiration reminder function of each module is enabled and set the expiration reminder date;
- (2) After enable the function, the expiration reminder can be set as a timed reminder or a cycle reminder.
 - ◆ Timed reminder: remind once when the set expiration reminder date is reached.
 - ◆ Cycle reminder: calculated from the set date and will be reminded once every time the set cycle is reached. The default reminder cycle is 180 days.
- (3) A module of the controller exceeds the calibration period, a prompt will be given when powering on or when the module comes online .

4.4.2 Advanced Configuration

The factory default password is: 123456 to enter the Advanced Configuration.

1. Configuration Management

Manage configuration information, divided into currentconfiguration, last configuration and backuprestore, to facilitate configuration import, export and restoration operations.

2. Remote Desktop Sharing

The remote desktop sharing function can be started or stopped after entering. Need to access the network for this application.

3. Remote Assistance

The remote assistance function can be enabled or disabled after entering. Need to access the network for this application.

4.4.3 Restore Factory

1. You need to enter a password to use factory reset. The factory default password is: 123456 . Data cannot be recovered after factory restore, so please use it with caution.
2. After entering the password, enter the factory reset interface, select restore settings only, and confirm.

4.4.4 Firmware update

The control provides firmware update function. Currently, it only provides update using USB flash drive.

1. Copy the update file to the root directory of the USB flash drive;
2. After powering on, insert the USB flash drive into the USB port on the back of the controller;
3. Click Firmware Update, and the available update files in the USB flash drive will be automatically checked and displayed;
4. Click to select the update file you want to use, and the file will be unzipped, and then the updating information will be displayed. You can click Start Update to update the firmware, or click Give Up to return.
5. After updates starts, you need to wait for a few minutes until the update process is completed. The system will automatically display the update result information. After confirmation, the controller will automatically reboot.

4.5 Communication

The communication methods include: Protocol, Ethernet, RS232, External WLAN

4.5.1 Protocol

Currently supports SCPI, PACE 5000/6000, DPI520, Fluke6270A, WIKA-SCPI, CPC8000/6000/4000/3000.

4.5.2 Ethernet


The controller communicates with the computer through a network cable. The communication parameters can be set and click the button  to save and apply the settings.

Table 10 Ethernet address acquisition method selection

Items	Valid values	Description
Address acquisition	DHCP/ Manual	Select the device address acquisition methods; DHCP: Parameters are automatically matched by the system. Manual: Parameters can be set manually
IP Address	0.0.0.0 ~ 255.255.255.255	Set the controller host IP address
Subnet Mask	0.0.0.0 ~ 255.255.255.255	Set the controller host subnet mask
Gateway	0.0.0.0 ~ 255.255.255.255	Set the controller host source gateway
Port	8000	Factory settings and cannot be changed
Physical Address		Factory settings and cannot be changed


4.5.3 RS232

Table 11 Serial port settings

Items	Valid values	Description
Baud rate	9600, 19200, 38400, 57600, 115200, custom	Data transmission rate during communication

Data bits	7, 8	Data bits parameter settings in communication
Stop bit	1, 2	Stop bits Parameter settings in communication
Check Digit	No parity, odd parity, even parity	Verification method selection in communication

4.5.4 WLAN

An external WIFI module is required to use this function. The controller communicates with the computer through the wireless network. The WLAN status and parameters can be set, the settings take effect directly after set, and click  button to return.

1. Wireless communication settings

Table 12 Wireless communication settings

Items	Valid values	Description
WLAN	On/Off	Turn wireless network On/Off
Wireless network	Depends on network environment	Select the wireless network access point. After connecting, the WIFI name and IP will be displayed.
Advanced options	DHCP/ Manual	Select the device address acquisition method, the manual mode need further settings, refer to Table13.
Physical Address		Factory settings and cannot be changed
Port	8000	Factory settings and cannot be changed

2. When selecting manual mode in the advanced options, the following table needs to be filled in manually:

Table 13 Manual mode in wireless communication advanced options

Items	Valid values	Description
IP address	0.0.0.0 ~ 255.255.255.255	Set the controller host IP address
subnet mask	0.0.0.0 ~ 255.255.255.255	Set the controller host subnet mask
gateway	0.0.0.0 ~ 255.255.255.255	Set the controller host source gateway

4.6 Extension Interface

The extension interfaces are divided into three areas, corresponding to the parts 11, 12 and 13 in Figure 4 or Figure 5 respectively. Click to configure each interface separately.

4.6.1 Externally driven valves interface

The interface can provide voltage to the external devices. One of the channels is fixedly configured for the CPS contamination prevention system, and the remaining two channels can be used by users to control external vacuum pump and external isolation valves.

1. CPS interface, you can configure to enable it or not.
 - ◆ If enabled, it can only be used together with CPS.
 - ◆ If disabled, it can be used as a general drive valve and controlled by manual output.
2. DRV interface, click to configure manual output or remote control
 - ◆ If you select remote control, you can only control it through commands.
 - ◆ If manual output is selected, it will be used as a general drive valve and controlled by manual output.

4.6.2 DO alarm output interface

As an alarm output interface, DO has two output modes: manual output and status output.

1. Manual output: manual control of opening and closing status
2. Status output: when configured as status output, activation status and system status need to be configured
 - ◆ The activation state is the state performed by DO when the required system state is reached.
 - ◆ The system status is the status needed to detect, including: measure, control, vent, stable, unstable, and over-range; when the selected status is reached, DO is active.

4.6.3 Pressure switch testing interface

1. 24 V power supply interface to provide 24V voltage for switch testing
2. Switch connection port, click to select the type of switch

4.6.4 Manual output

Click the Manual Output button to enter the manual control display. The ports configured as manual output in the external drive valve interface and DO alarm output interface can be controlled here.

4.7 Maintenance

The applications for equipment maintenance

4.7.1 Maintenance and fluid change (for ADT793)

1. Function introduction

The maintenance and fluid replacement function is used to guide the draining and filling of fluid, and it needs to be operated according to the controller prompt instructions and requirements.

2. Operation guide

◆ When filling liquid, the equipment must be in a horizontal state and do not exceed the MAX line. If it exceeds the

MAX line, extra liquid will be drained out from the vent hole during the pressure control process;




- ◆ It is recommended to change the oil medium every six months.

4.7.2 Piston maintenance (for ADT793)

1. Function introduction

The piston maintenance function can be used as the first step troubleshooting method when there is a problem with the piston. Regularly performing the piston maintenance function can ensure that the piston is in good operating condition and extend the service life of the piston.

2. Steps




- ◆ Block the output port, entering the piston maintenance display, and click the start button  to start.
- ◆ There will be several sub-stages during the entire process. All the execution processed can be viewed through the progress bar.
- ◆ During the execution process, you can click the stop button  to stop the process, and you can click the return button  to exit the application and go back to previous display.

4.7.3 System pressure relief

1. Function introduction

It is used to release the pressure at the output port and inside the instrument. This function is generally performed before maintenance and turn off.

2. Operating procedures

- ◆ After entering the system pressure relief interface, click the Start button  to execute the application.
- ◆ The whole execution processes can be viewed through the progress bar.
- ◆ During the execution process, you can click the stop button  to stop the process, and you can click the return button  to exit the application and go back to previous display.

4.7.4 Accumulator maintenance (for ADT793)

1. Function introduction

When the accumulator pressure is too low, the accumulator needs to be replaced in time to ensure normal operation and extend the service life of the controller; when low pressure is detected for accumulator, an alarm will be prompted.

2. Operating procedures


- ◆ After entering the application, the time of the last accumulator testing and the accumulator pressure value will be displayed.
- ◆ Click Accumulator Test, to test the current pressure value of the accumulator at any time and determine whether it meets the requirements.
- ◆ Click Accumulator Replacement to enter the accumulator replacement process. Replace the accumulator according to the step prompts. After the replacement is completed, the accumulator pressure value will be tested again to ensure that the replaced accumulator can meet the requirements.



4.7.5 Assisted aspiration(for ADT793)

1. Function introduction

When used for the first time or after liquid change, the equipment tubing is not filled with liquid, which may cause abnormal pressure control. The Assisted aspiration function can be performed to ensure that the equipment is in good operating condition.

2. Operating procedures

- ◆ When using an internal reservoir, open the vent valve; when using an external reservoir, close the internal reservoir vent valve and ensure that the external reservoir is vented to the atmosphere;
- ◆ After entering the Assisted aspiration display, click the start button  to start executing the application;

- ◆ During the entire execution process, the whole execution process can be viewed through the progress bar;
- ◆ You can click the stop button  to stop the execution process, you can click the return button  to exit the application and go back to previous display.

4.7.6 Front cabin door settings

1. Function introduction




To set enable or disable whether to vent immediately once detect the cabin door is open. If it is enabled, the venting operation will be performed immediately when the front cabin door is opened.

4.7.7 System purge (for ADT793)

1. Function introduction

If contamination exists in the system, it will be concentrated at the output valve, affecting the performance of the controlling. The system purge function can be used to flush away the contaminations, thereby improving control performance and achieving self-maintenance.

2. Operating procedures

- ◆ After entering the system purge function, click the start button , follow the prompts to block the output port, and then start executing the application;
- ◆ During the entire execution process, the whole execution progress can be viewed through the progress bar;
- ◆ You can click the stop button  during execution to stop the execution processor click the return button  to exit the application or return to previous display.

4.7.8 Advanced diagnose

1. Function introduction

Provide some diagnostic tools to facilitate locating the root cause of failures.

2. Operating procedures

Enter the password "1 23456 " to enter the advanced diagnosedisplay. The diagnostic tools of the ADT773/783 and ADT793 are different.

(1) For ADT793

- ◆ Hydraulic circuit operation diagram: displays the current hydraulic information status, including valve status, pressure value of each sensor, pump operating status, etc., and can perform pressure control operations.

(2) For ADT773/783

- ◆ Gas circuit debugging: Display the current air pressure information status, including valve status, pressure value of each sensor, pump operating status, etc., and can perform pressure control operations.

4.8 ProductInformation

4.8.1 Host

Host information includes Model, Serial number, Mainversion, Working medium, Output pressure range, etc. Please provide this information to Additel/s service team if assistance is required.

4.8.2 Control module

Control module information includes serial number, firmware version, and hardware version.

4.8.3 Internal pressure module

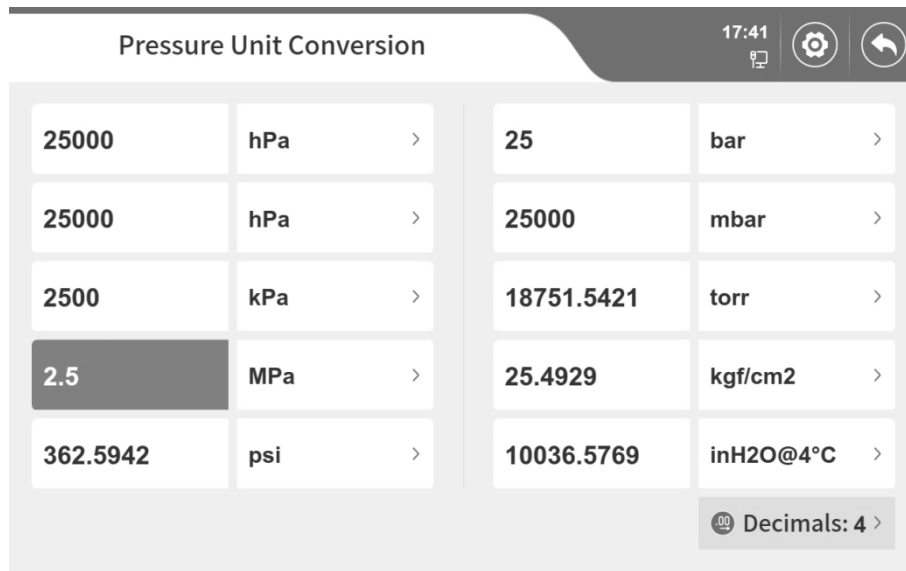
Internal module information includes serial number, version and ranges information.

4.8.4 External module (when connected)

External module information includes serial number, version and range information.

5. Application

5.1 Pressure unit conversion



Value	Unit	Value	Unit
25000	hPa	25	bar
25000	hPa	25000	mbar
2500	kPa	18751.5421	torr
2.5	MPa	25.4929	kgf/cm2
362.5942	psi	10036.5769	inH2O@4°C

Decimals: 4

Figure 13 Pressure unit conversion

1. It has 10 groups of units for unit conversion.
2. Click the pressure value on the left side of a group (this group will be used as the basis for pressure unit



conversion), and set its pressure value, the other 9 pressure units will make the unit conversation to display the corresponding values.

3. Click on the right side of each group to set the pressure unit of the group; if the set unit is the selected group, the values of other groups will be re-converted based on the selected group; if the set unit is not the selected group, the value of the set group will be re-converted based on the selected group values and units;
4. Click "Decimal " to set the maximum number of decimal places for the pressure value to be displayed, with the value ranging from 0 to 6 ;

5.2 Pressure leak test

Used to test the sealing performance of the overall equipment under the required pressure for a period of time

1. View test records

- ◆ Click the application to enter the application homepage, which displays historical test information. Click any of the historical test results to view them in more detail.
- ◆ In the test result interface, you can view test result storage parameters, test parameters, test result statistics, and test curves. Click  button to view specific test data.
- ◆ Click the test button , you can enter the test process.

2. Parameter settings before testing

After entering the application, click the test button  to set the basic parameters.






Table 14 Pressure leak test parameter settings

Items		Description
Basic parameters	Test pressure	Set the required test pressure value according to the requirements
	Pressure type	Gauge pressure or absolute pressure can be selected


	Units	Select the required pressure unit. The default is the pressure unit of the last test.
	Waiting time	After the pressure stabilizes, the waiting time before starting the leak test timing, the range is 0 0 : 00:00 ~ 23 : 59 : 59
	Testing time	The time used for the leak test, the range is 0 0 :00:00 ~ 23 : 59 : 59
Range	Range mode	You can choose automatic or manual
	Module and range selection	Select the module and range required for testing

3. Implement


After completing parameters setting, click Confirm button  to enter the execution display.

- ◆ Perform a zeroing before starting.
- ◆ Click the start button  to start the test;
- ◆ After the pressure reaches the set point and is stable, switch to measurement mode. After the countdown waiting time is over, the test countdown starts until the end of the test ;
- ◆ Can click  button during execution to view the statistical information of the test results, click  button to switch back to test curve display;
- ◆ Can click to stop  during execution process to terminate the test and jump directly to the save interface;
- ◆ Can click  button during execution process to stop and exit the testing.

4. Save result


After test completed, click save button  to enter the save parameter settings interface.


◆ Save parameter settings: You can set the name, operator, model, serial number, ambient temperature, ambient humidity, remark information, etc.


◆ In the save parameter interface, click the save button  to save the test result.

5. Export


◆ To Export Data a USB drive must be inserted into the USB port;


◆ On the home page of the application, click the export button  to enter export display;


◆ Click to select the test results that need to be exported, or click the Select All button  to select all test results;

◆ Click Confirm  to export the selected test results to the USB flash drive.

6. Delete

◆ On the home page of the application, click the delete button  to enter delete display;


◆ Click to select the test results that need to be deleted, or click the Select All button  to select all test results;

◆ Click OK  to delete the selected test results.

5.3 Pressure switch test

1. View historical test information

◆ Click the application to enter the application homepage, which displays historical test information. Click to view it.

◆ Click the test button  to enter the switch test parameter setting interface.


2. Pressure switch test parameter settings

◆ Set the parameter information of the pressure switch. The relevant parameters are introduced in the following table:

Table 15 Pressure switch test parameter settings


Items	Valid values	Description
-------	--------------	-------------

Range	Pressure switch range	Set the upper limit, lower limit and unit
Pressure type	Gauge pressure, absolute pressure, differential pressure	Set the pressure type of the switch
Switch type	Mechanical switch, PNP, NPN	Set the type of switch
Action type	High, Low	Set switch action type
Set point	Within the switching range	Set the default action point of the switch
Deadband range	Within the switching range	Set the deadband range. After the test, the data must meet the requirements of the switching difference range.
Accuracy(FS)	0.5%, 1%, 1.5%, 2%, 2.5%, 4%, custom	Set the switch accuracy, one of the requirements that the data after testing must meet
Cycles	1, 2, 3	Set the number of testing cycles

◆ Click next button  to enter the range selection interface;



3. Select range and range mode



◆ Select pressure module and range mode;



◆ Click the confirm button  to enter the execution interface.

4. Implement

◆ Click the start button  to run the test;




◆ You can click the data button  during execution to display data details, click the curve button  to change back to curve display;

◆ You can click the stop button  during execution to stop the test, click the return button  to stop and exit the test;

- ◆ When the execution is completed, click the save button  to enter the save information display, fill in the name, operator, model, serial number, ambient temperature, ambient humidity, remarks and other information ;
- ◆ Click the save button  to complete the test, and the test results are displayed in the historical information on the home page.

5. Export and delete

Need a USB flash driver insert in the controller to export the dates

- ◆ On the home page of the application, click the delete button  to enter the delete display, select the test results that need to be deleted, click OK button  to delete all selected results;
- ◆ On the home page of the application, click the export button  to enter the export display, select the test results to be exported, click OK button  to export the test results to the USB flash drive.






5.4 Auto step

1. Click Auto step icon to enter the application home page, click the parameters position on the above of the display to enter the auto step settings display. The autostep parameters are shown in the table below;

Table 16 Auto step settings

Items	Valid values	Description
Stroke mode	Round trip, One way	Set the stroke mode
Cycle Count	0 ~ 1000	Set the number of cycles
Step Mode	Points, percent, value, custom	Set the auto step mode
Cycle interval	0 ~ 3600 seconds	Set the interval time between the end of each cycle and the start of the next cycle
Dwell time	0 ~ 3600 seconds	The pressure stable remaining time for one point

Control Range	Module range currently available for pressure control	Module range used for auto step
Step range	Cannot exceed the controllable pressure range of the selected control range.	Set auto step output range
Number of step points	2 ~ 21	Set the step points.
Step value	5% ~ 100%	Can be set when step mode is percent
Step value	The step range is related to the step points range	Can be set when step mode is value
Step point list	It can be edited when the step mode is custom, and it's read only in other modes.	Displays a list of set points for autostep

2. After the parameters setting is completed, users can Vent or Zero the controller.
3. Click the start button  to run the auto step process;
4. After starting, each step point is executed sequentially. Users can also click  or  to switch step points;
5. Click  button to pause the step process, or click  button to stop the step process.

5.5 Absolute Pressure Error Calculator

Through the range and accuracy of barometric pressure and gauge pressure, the range and accuracy of absolute pressure can be synthesized, which is convenient for users to use.

1. Barometer pressure settings

-
- (1) Select the barometer pressure source, users can select the internal Barometer module or Custom Barometer.
 - (2) If select the internal barometer module, the range and accuracy spec is from the barometer module.
 - (3) If select custom barometer, need to set the error type, range etc.
 - ◆ Error type selection: relative error and absolute error
 - ◆ Range setting: Need to set the range lower, upper limits and units.
 - ◆ Accuracy: It needs to be filled in when selecting reference error as the error type. The settable range is (0.001 ~ 10) %FS;
 - ◆ Precision: It needs to be filled in when selecting absolute error as the error type. The settable range is dependent on the pressure range.
2. Internal barometer module mode error calculation
- (1) At the gauge pressure range, select the module range that participates in the synthetic error. Other parameters cannot be set.
 - (2) At the absolute pressure range, the resultant absolute pressure range and error are automatically calculated.
The resultant error type is the same as that at the gauge pressure range.
3. Custom barometer mode error calculation
- (1) Click Add Custom Range Control under Gauge Pressure Range to set relevant parameters. For the setting process, refer to the settings for custom atmospheric pressure in "1".
 - (2) After the setting is completed, the synthesized absolute pressure range and error are automatically calculated at the absolute pressure range. The synthesized error type is the same as the custom range type at the gauge pressure range.

6. System diagnostics

6.1 ADT773/783

Table 17 ADT773/783 system diagnostics

Fault name	Error code	Solution
Target pressure overpressure protection	300	1. Perform auto tune operation
The target pressure cannot be controlled stably	301	1. Please check whether there are leaks in the equipment and connecting tubing 2. Perform auto tune operation
	302	1. Please check the positive pressure air source pressure S1 2. Please check whether there are leaks in the equipment and connecting tubing 3. Perform auto tune operation
	303	1. Please check the negative pressure air source pressure S2 2. Please check whether there are leaks in the equipment and connecting tubing 3. Perform auto tune operation
The target pressure cannot be reached during boosting	304	1. Please check whether there are leaks in the equipment and connecting tubing
	305	1. Please check the positive pressure air source pressure S1 2. Please check whether there are leaks in the equipment and connecting tubing
	306	1. Unable to deflate under negative pressure
The target pressure cannot be reached during decompression	307	1. Please check whether the CPS circuit connection and gas line connection are normal.
	308	1. Unable to deflate under positive pressure

	309	1. Please check the negative pressure air source pressure S2 2. Please check whether there are leaks in the equipment and connecting tubing
	310	1. Please check whether there are leaks in the equipment and connecting tubing
System protection when target pressure cannot be reached	311	1. Due to the fault {here is the fault code: such as 305}, the target pressure cannot be reached for a long time, and the system has automatically stopped controlling. Please follow the corresponding fault prompts or consult the user manual to handle it accordingly.
Unable to drain	315	1. Please check whether the CPS circuit connection and gas line connection are normal.
	316	1. Please check whether the drain valve can be opened normally
High pressure module cannot be connected	320	1. Please confirm whether the high-pressure module has been installed. If it has been installed, reinstall the high-pressure module. 2. Restart the device
Internal low high-pressure module cannot be connected	321	1. Restart the device 2. Reinstall the low-pressure module
High and low range module installation error	322	1. Please reinstall the high and low-pressure modules. The measuring range of the high-pressure module must be greater than or equal to the measuring range of the low-pressure module.
Low range module overpressure alarm	323	1. Please check whether the gas line connection is normal 2. Please check whether the calibration data of the low-pressure module is normal.
Low range module	324	1. Please check whether the gas line connection is normal

overpressure protection		2. Please check whether the calibration data of the low-pressure module is normal.
High range module overpressure alarm	325	1. Please check whether the gas line connection is normal 2. Please check whether the high-pressure module calibration data is normal.
Internal module overpressure protection	326	1. Please check whether the gas line connection is normal 2. Please check whether the high-pressure module calibration data is normal.
External module overpressure alarm	327	1. Please check whether the external module tubing connection is normal.
External module overpressure protection	328	1. Please check whether the external module tubing connection is normal.
The external module is not connected to the tubing	329	1. Please check whether the external module tubing is connected normally 2. Please check whether there is leakage in the external module tubing
Atmospheric pressure module over-pressure alarm	330	1. Please check whether the gas line connection of the atmospheric pressure module is normal. 2. Please check whether the calibration data of the atmospheric pressure module is normal.

6.2 ADT793

Table 18 ADT793 system diagnosis

Fault name	Error code	Solution
Target pressure overpressure protection	200	1. Perform auto tune operation

The target pressure cannot be controlled stably	201	<ol style="list-style-type: none"> 1. The control cannot be stabilized due to too small a control pressure (this item is displayed when the set point value is determined to be less than 100kPa) 2. Check the equipment for leaks 3. Perform auto tune operation
The target pressure cannot be reached during boosting	202	<ol style="list-style-type: none"> 1. Check whether the liquid level in the liquid storage tank is too low 2. Check the equipment for leaks
	203	<ol style="list-style-type: none"> 1. Check the equipment for leaks 2. Perform auto tune operation
The target pressure cannot be reached during decompression	204	<ol style="list-style-type: none"> 1. Perform self-tuning operation
Accumulator pressure is low	209	<ol style="list-style-type: none"> 1. Please execute "Accumulator Charging", the entrance is located in "System Settings" -> "Maintenance"
Internal low pressure module overpressure protection	214	<ol style="list-style-type: none"> 1. Restart the device and re-control the pressure
Internal high pressure module overpressure protection	215	<ol style="list-style-type: none"> 1. Restart the device
External module overpressure protection	216	<ol style="list-style-type: none"> 1. Check the pressure connection of the external module
The external module is not	217	<ol style="list-style-type: none"> 1. Please check whether the external module tubing is connected normally

connected to the tubing		2. Please check whether there is leakage in the external module tubing
Internal low-pressure module cannot be connected	270	1. Restart the device
Internal module cannot be connected	271	1. Restart the device

