SYL-2342Y PRESSURE CONTROLLER INSTRUCTION MANUAL

Version 1.5

Caution

- This controller is intended to control equipment under normal operating conditions. If failure or malfunction of the controller may lead to abnormal operating conditions that may result in personal injury or damage to the equipment or other property, devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of or protect against failure or malfunction of the controller must be incorporated into and maintained as part of the control system.
- Installing the rubber gasket supplied will protect the controller front panel from dust and water splash (IP54 rating). Additional protection is needed for higher IP rating.
- This controller carries a 90-day warranty. This warranty is limited to the controller only.

1. Specification

Alarm output	Relay contact. 250VAC/1A, 120VAC/3A, 24V/3A
Alarm function	Process high alarm, process low alarm, deviation high alarm, and deviation low alarm
Power supply	85~260VAC/50~60Hz
Power consumption	≤5 Watt
Ambient temperature	0~50°C, 32~122°F
Dimension	48 x 48 x100 mm (WxHxD)
Mounting cutout	45 x 45 mm

2. Terminal Wiring

Model SYL-2342Y

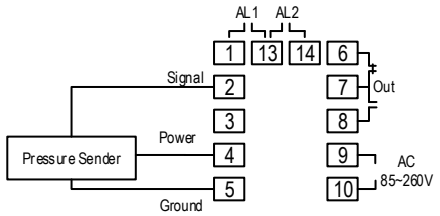


Figure 1. Wiring diagram

2.1 Power to the controller

The power cables should be connected to terminals 9 and 10. Polarity does not matter. It can be powered by 85-260V AC power source. Neither a transformer nor jumper is needed to wire it up. For the sake of consistency with the wiring example described later, we suggest you connect the hot wire to terminal 9 and neutral to 10.

2.2 Sensor connection

Signal wire should be connected to terminal 2. Voltage supply should be connected to terminal 4. Ground wire should be connected to terminal 5.

2.3 Control output connection

The relay output of the controller can be used to turn on a contactor. It can drive a small vacuum pump or compressor directly if it draws less than 3 Ampere when connected to 120V AC power source. For applications needing two control outputs, such as one for vacuum and another for compressor, relays AL1 or AL2 can be used for the second output with on/off control mode.

2.3.1 Connecting the load through a contactor

Assuming the controller is powered by 120V AC and the contactor has a 120V AC coil, jump a wire between terminals 8 and 9. Connect terminal 7 to one lead of the coil and terminal 10 to the other lead of the coil. Please see Figure 6 for example.

2.3.2. Connecting the load directly from the internal relay

Assuming the controller and the load are powered by the same voltage. Jump a wire from terminal 9 to 8. Connect terminal 7 to the one lead of the load and terminal 10 to the other lead of the load. Please see Figure 5 for details.

2.4 For first time users without prior experience with PID controllers, the following notes may prevent you from making common mistakes.

2.4.1 Power to the vaccum device or compressor does not flow through terminal 9 and 10 of the controller. The controller consumes less than 2 watts of power. It only provides a control signal to the relay. Therefore, wires in the 18 to 26 gauge range should be used for providing power to terminals 9 and 10. Thicker wires may be more difficult to install.

2.4.2 The control relay outputs, AL1 and AL2, are "dry" single pole switches. They do not provide power by themselves. Please see Figure 5 and 6 for how they are wired when providing a 120V output (or when output voltage is the same as the power source for the controller).

3. Front Panel and Operation

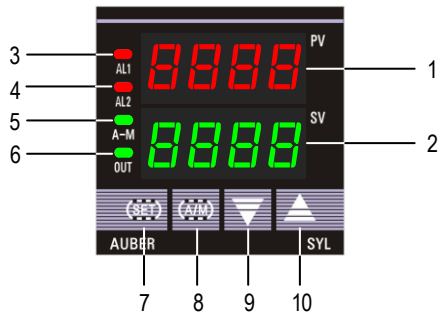


Figure 2. Front panel

① PV display: Indicates the sensor read out, or process value (PV).
② SV display: Indicates the set value (SV).
③ AL1 indicator: It lights up when AL1 relay is on.
④ AL2 indicator: It lights up when AL2 relay is on.
⑤ A-M indicator: This indicator is not used in On/off control mode
⑥ Output indicator: It is synchronized with control output (terminal 7 and 8), and the power to the load. When it is on, the load is powered.
⑦ SET key: When it is pressed momentarily, the controller will switch the lower (SV) display between set value and percentage of output (this is only useful in PID or manual control mode). When pressed and held for two seconds will put the controller into parameter setting mode.
⑧ Data shift key: Decimal point position can be shifted by pressing A/M key
⑨ Decrement key ▼: Decreases numeric value of the setting value.
⑩ Increment key ▲: Increases numeric value of the setting value.

3.1 Setup flow chart

Press SET and hold for roughly 2 seconds until the parameter setup menu is displayed. While in the parameter setup mode, use ▲ and ▼ to modify a digit and use A/M to select the digit that needs to be modified. Press the A/M and SET key at the same time to exit the parameter setup mode. The instrument will automatically exit if no key is pressed for 10 seconds. Figure 3 is the setup flow chart.

Please note the changed parameter will be automatically registered without pressing the SET key.

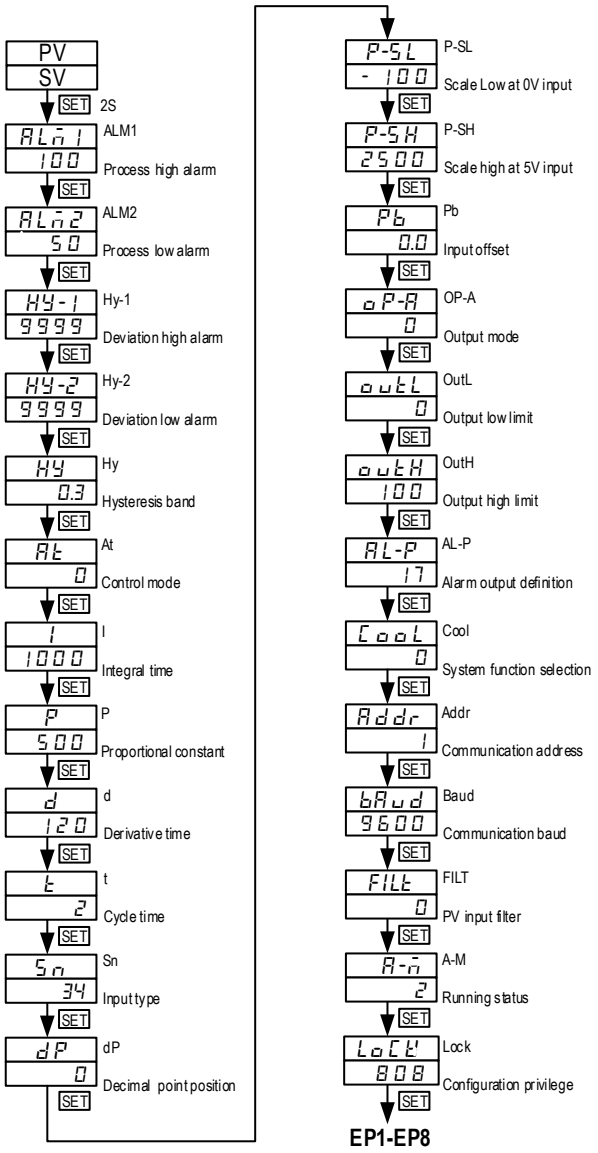


Figure 3. System setup flow chart

3.2 Basic Operation

Changing set value (SV): Press the ▼ or ▲ key once, and then release it. The decimal point on the lower right corner will start to flash. Press the ▼ or ▲ key to change SV until the desired value is displayed. If the change of SV is large, press the A/M key to move the flashing decimal point to the desired digit that needs to be changed. Then press the ▼ or ▲ key to start changing SV from that digit. The decimal point will stop flashing after no key is pressed for 3 seconds. The changed SV will be automatically registered without pressing the SET key.

3.3 Parameter Setting

Table 1. System parameters

Code	Description	Setting Range	Initial Setting	Remarks
ALM1	Process high alarm	-1999~+9999 ℃ or ℉	100.0	See 3.4
ALM2	Process low alarm	-1999~+9999 ℃ or ℉	50.0	
Hy-1	Deviation high alarm	0~9999 ℃ or ℉	999.9	
Hy-2	Deviation low alarm	0~9999 ℃ or ℉	999.9	
Hy	Hysteresis Band	0~200.0 ℃ or ℉ or 0~2000 for linear input	0.3	See 3.5
At	Auto tuning	0~3. Set to 1or 2 to start auto tuning	0	Don't Change
I	Integral time	0~9999	100.0	Don't Change
P	Proportional Constant	1~9999 %	500	
d	Derivative Time	0~2000	120	
t	Cycle time	2~125	2	Don't Change
Sn	Input type	0~37	34	Don't Change
dP	Decimal point position	0~3	1	See 3.6
P-SL	Display low limit	-1999~+9999 ℃ or ℉	-100	See 3.7
P-SH	Display high limit	-1999~+9999 ℃ or ℉	2500	
Pb	Input offset	-1999~+4000 -1999~+9999 ℃ or	0.0	See 3.8
OP-A	Output mode	0~2	0	Don't Change
OUTL	Output low limit	0~110 %	0	Don't Change
OUTH	Output high limit	0~110 %	100	
AL-P	Alarm output definition	0-31	17	See 3.9
COOL	System function selection	0~15	0	See 3.10
Addr	Communication address	0~20	1	Ignore this setting
bAud	Communication baud rate	0~19200	9600	Ignore this setting
FILt	PV input filter	0~20	0	See 3.11
A-M	Automatic/Manual status	0. Manual 1 Automatic 2. Manual suppressing	2	Don't Change
LocK	Configuration privilege	0~9999	808	See 3.12
EP1-EP8	Field parameter definition	nonE ~ A-M	nonE	

3.4 Alarm parameters

This controller offers four types of alarm, “ALM1”, “ALM2”, “Hy-1”, “Hy-2”.

- ALM1: High limit absolute alarm. If the process value is greater than the value specified as “ALM1+Hy” (Hy is the Hysteresis Band), then the alarm will turn on. It will turn off when the process value is less than “ALM1-Hy”.

- ALM2: Low limit absolute alarm. If the process value is less than the value specified as “ALM2-Hy”, then the alarm will turn on, and the alarm will turn off if the process value is greater than “ALM2+Hy”.
- Hy-1: Deviation high alarm. If the pressure is above “SV+Hy-1 +Hy”, the alarm will turn on, and the alarm will turn off if the process value is less than “SV+Hy-1 -Hy” (we will discuss the role of Hy in the next section)
- Hy-2: Deviation low alarm. If the pressure is below “SV-Hy-2 -Hy”, the alarm will turn on, and the alarm will turn off if the pressure is greater than “SV-Hy-2 +Hy”.

The things you should know about alarm

1) Absolute alarm and deviation alarm

High (or low) limit absolute alarm is set by the specific pressure that the alarm will be on. Deviation high (or low) alarm is set by how far above (or below) the control target pressure (SV) that the alarm will be on.

e.g. Assuming ALM1=80, Hy-1=2, SV=50. When the pressure (PV) is above 52, the deviation alarm will be on. When the pressure is above 80, the process high alarm will be on. Later, when SV changes to 40, the deviation alarm will be changed to 42 but process high alarm will remain the same. Here the Hysteresis Band (Hy) setting is ignored.

2) Assignment of the relays for the alarms

AL1 and AL2 are the name of the two relays used for alarm output. AL1 is the alarm relay 1 and AL2 is alarm relay 2. Please do not confuse the relays with alarm parameter ALM1 (process high alarm) and ALM2 (process low alarm). Either the AL1 or the AL2 can be used for any of the four alarms. AL-P (alarm output definition) is a parameter that allows you to select the relay(s) to be activated when the alarm set condition is met.

You can set all four alarms to activate the one relay (AL1 or AL2), but you can’t activate both relays for with just one alarm.

3) Display of the alarm

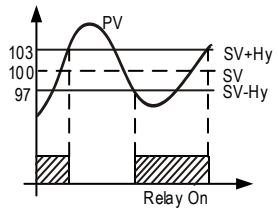
When AL1 or AL2 relay is activated, the LED on the upper left will light up. If you have multiple alarms assigned to a single relay, you might want to know which alarm activated the relay. This can be done by setting the E constant in the AL-P parameter (see 3.9). When E=0, the bottom display of the controller will alternately display the SV and the activated alarm parameter.

3.5 Hysteresis Band “Hy”

The Hysteresis Band parameter Hy is also referred as Dead Band, or Differential. It permits protection of the on/off control from high switching frequency caused by process input fluctuation. Hysteresis Band parameter is used for on/off control, 4-alarm control. For example: 1) When controller is set for on/off compressor control mode, the output will turn off when pressure goes above SV+Hy and on again when it drops to below SV-Hy. 2) If the high alarm is set at 60 and hysteresis is set for 2, the high alarm will be on at 62 (ALM1+Hy) and off at 58 (ALM1-Hy).

It is necessary for inductive loads such as compressors that do not like to take pulsed power. It works like a mechanical thermostat. When the measurement passes the SV+Hy, the load will be turned off. When the measurment drops back to below the hysteresis band (Hy) the heater will turn on again.

To use the On/off mode, the parameter At should be 0. Then, set the Hy to the desired range based on control precision requirements. Smaller Hy values result in tighter temperature control, but also cause the on/off action to occur more frequently.



For compressor, At=0
If PV≤(SV-Hy), relay on
If PV≥(SV+Hy), relay off
(SV=100, Hy=3)

Figure 4. On/off control mode

3.6 Decimal point setting “dP”

This parameter defines the resolution of the display value.

Table 2. dP parameter setting

dP Value	0	1	2	3
Display format	0000	000.0	00.00	0.000

3.7 The display scale “P-SH” and “P-SL”

These two parameters, together with dp, are very important parameters for scaling the display. Precision pressure value can only be displayed after they are properly set for the specific pressure sensor model used. They are also used for setting the pressure unit. P-SL refers to the pressure value to be displayed when signal is at 0V. And P-SH refers to the pressure value to be displayed at when signal is 5.0V. Typical pressure sensor comes with the pressure value at 0.5V and 4.5V because that is range where the pressure sensor works linearly. For all of the pressure sensors we offered, the sensor installation guide have calculated the equivalent pressure value at 0V and 5V that user can use. Although these guides might concentrated on how to set the scale for Auber SYL-1813 gauge, the scaling parameter used a different name, the definition for them are the same for this controller. The **PuL** for SYL-1813 is the same as **P-SL** for SYL-2342Y. The **PuH** for SYL-1813 is the same as **P-SH** for SYL-2342Y. The **dot** for SYL-1813 is the same as **dP** for SYL-2342Y. Therefore, you can set the **P-SL, P-SH** and **dp** with the same value as that used for **PuL, PuH** and **dot** for SYL-1813

If the sensor is not from Auber Instrument, and it does not have the equivalent pressure value at 0 and 5V, you can calculate them with the data you have assuming the sensor is linear from 0-5V. For the details of how to calculate them, please refer to the Part 4 of Quick Guide in this manual.

3.8 Input offset “Pb”

Pb is used to set an input offset to compensate the error produced by input signal.

For example, if the controller displays 0.5, setting Pb= - 0.5 will make the controller display 0.

3.9 Alarm output definition “AL-P”

Parameter “AL-P” may be configured in the range of 0 to 31. It is used to define which alarms (“ALM1”, “ALM2”, “Hy-1” and “Hy-2”) is output to AL1 or AL2. Its function is determined by the following formula:

AL-P=AX1+BX2+CX4+DX8+EX16

If A=0, then AL2 is activated when Process high alarm occurs;
If A=1, then AL1 is activated when Process high alarm occurs;
If B=0, then AL2 is activated when Process low alarm occurs;
If B=1, then AL1 is activated when Process low alarm occurs;
If C=0, then AL2 is activated when Deviation high alarm occurs;
If C=1, then AL1 is activated when Deviation high alarm occurs;
If D=0, then AL2 is activated when Deviation low alarm occurs;
If D=1, then AL1 is activated when Deviation low alarm occurs;
If E=0, then alarm types, such as “ALM1” and “ALM2” will be displayed alternatively in the lower display window when the alarms are on. This makes it easier to determine which alarms are on.
If E=1, the alarm will not be displayed in the lower display window (except for “orAL”). Generally this setting is used when the alarm output is used for control purposes.

For example, in order to activate AL1 when a Process high alarm occurs, trigger AL2 by a Process low alarm, Deviation high alarm, or Deviation low alarm, and not show the alarm type in the lower display window, set A=1, B=0, C=0, D=0, and E=1. Parameter "AL-P" should be configured to:
AL-P=1X1+0X2+0X4+0X8+1X16=17 **(this is the factory default setting)**

Note: Unlike controllers that can be set to only one alarm type (either absolute or deviation but not both at same time), this controller allows both alarm types to function simultaneously. If you only want one alarm type to function, set the other alarm type parameters to maximum or minimum (ALM1, Hy-1 and Hy-2 to 100, ALM2 to 100) to stop its function.

3.10 Control Selection "COOL"
Parameter "COOL" is used to set compressor or vacuum function.
When COOL=1, vacuum control. The output relay turns on when pressure is higher than set point (SV+Hy)
When COOL=0, compressor control. The output relay turns on when pressure is below the set point (SV-Hy).

3.11 Input digital filter "FILt"
If measurement input fluctuates due to noise, then a digital filter can be used to smooth the input. "FILt" may be configured in the range of 0 to 20. Stronger filtering increases the stability of the readout display, but causes more delay in the response to change in temperature. FILt=0 disables the filter.

3.12 Lock up the settings, field parameter "EP" and parameter "LocK"
To prevent the operator from changing the settings by accident, you can lock the parameter settings after initial setup. You can select which parameter can be viewed or changed by assigning one of the field parameters to it. Up to 8 parameters can be assigned into field parameter EP1-EP8. The field parameter can be set to any parameter listed in Table 2, except parameter EP itself. When LocK is set to 0, 1, 2, and so on, only parameters or setting values of program defined in an EP can be displayed. This function can speed up parameter modification and prevent critical parameters (like input, output parameters) from being modified.
If the number of field parameters is less than 8, then define the first unused parameter as none. For example, if only ALM1 and ALM2 need to be modified by field operators, the parameter EP can be set as following:
LocK=0, EP1=ALM1, EP2=ALM2, EP3=nonE.
In this case, the controller will ignore the field parameters from EP4 to EP8. If field parameters are not needed after the instrument is initially adjusted, simply set EP1 to nonE.
Lock code 0, 1 and 2 will give the operator limited privileges to change some of the parameters that can be viewed. Table 3 shows the privileges associated with each lock code.

Table 3. LocK parameter

LocK value	SV Adjustment	EP1-8 Adjustment	Other parameters
0	Yes	Yes	Locked
1	Yes	No	Locked
2	No	Yes	Locked
3 and up	No	No	Locked
808			unlocked

4. Wiring examples

4.1 Controlling the load directly with internal relay

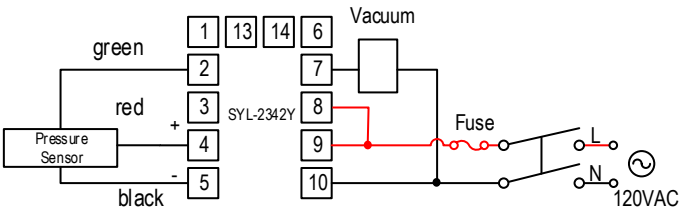


Figure 5. SYL-2342Y controls the vacuum directly by the internal relay of the controller. The vacuum must consume less current than the internal relay's maximum rating.

4.2 Controlling the load via external contactor

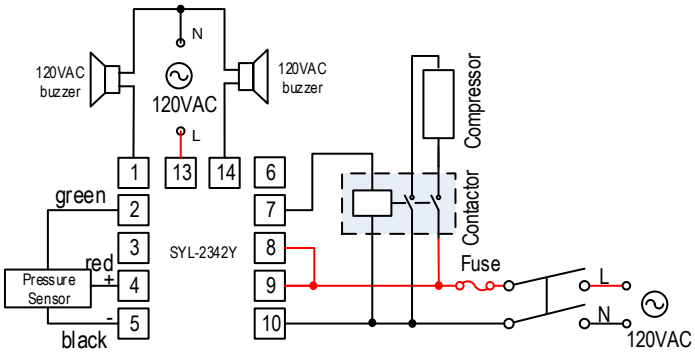


Figure 6. SYL-2342Y with external relay output.

Using the external contactor allows users to control higher power loads than the internal relay can handle. It is also easy to service. If the contacts of the relay wear out, it is more economical to replace them than to repair the controller. In this example, we assume the coil voltage of the contactor is the same as the voltage of the controller power supply. The voltage of power supply for alarm is 120V AC. **Note: You don't have to wire or set the alarm to control the load. It is just to show how the alarm can be wired.**

Quick Guide for SYL-2342Y

1. Wiring
1) Power to the controller. Connect the 85-260V AC power to terminal 9 and 10.
2) Control output connection. Connect terminals 7 and 8 for output.
3) Sensor connection. connect the positive wire to terminal 4, the Ground to terminal 5. Sensor signal input to terminal 2.

2. Setting the controller for control.
For vaccum control, set COOL=0; For compressor control, set COOL=1

3. Setting target pressure (SV)
Press the ▼ or ▲ key once, and then release it. The decimal point on the lower right corner will start to flash. Press the ▼ or ▲ key to change SV until the desired value is displayed. The decimal point will stop flashing after no key is pressed for 3 seconds. You can press the A/M key to move the flashing decimal point to the desired digit that needs to change. Then press the ▼ or ▲ key to change SV starting from that digit.

4 Setting P-SL and P-SH

For many pressure transducers on the market, the measured pressure value is linearly corresponding a voltage signal within certain range (usually between 0.5 V – 4.5 V). This relationship can be expressed as **V** = **a** x **P** + **b**, where **P** is the pressure, **V** is the voltage, **a** is the slope and **b** is the intersection at zero pressure.

If using a 2.5 Bar (36.3 PSI) pressure transducer as an example,
a = (4.5-0.5)/(2.5-(-1)) = 1.14
b = V- a x P= 1.64
So, V = 1.14P +1.64, or P = (V -1.64)/1.14
Therefore, at 0 V, P = -1.44 Bar; at 5 V, P = 2.94 Bar.
So, the P-SL = -1.44 Bar, and P-SH = 2.94 Bar.
To display the pressure in PSI unit, set dP to 000.0, P-SL = -20.8, P-SH = 42.6.

Please read each Auber pressure transducer installation guide's appendix for specific linear slope calculation.

5 Error Message and trouble shooting

5.1 No output

When the controller output is set for relay output, the "OUT" indicator is synchronized with output relay. If the load has no output when it is supposed to, check the OUT indicator first. If it is not lit, the controller parameter settings are wrong. If it is on, check the external switching device (if the relay is pulled-in). If the external switching device is on, then the problem is either the external switching device output, its wiring, or the Load.

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