

**Instruction Manual**

# SYL-2813 Dual-Input Multifunction Autometer

Version 1.4 (August, 2015)

## A. Specifications

Table 1. Specifications of SYL-2813 Autometer

<b>Power Supply</b>	DC 12 -30 V (Isolated)
<b>Power Consumption</b>	< 2 Watt
<b>Relay Contact Rating</b>	3A at 220 VAC
<b>Input Type</b>	TC: K, E, S, R, J, T, B, WRe3/25. RTD: Pt100, Cu50 375R. 75mV, 30mV, 0-5V, 1-5V, 10V, 0-10mA, 0-20mA, 4-20mA.
<b>Input Channels</b>	Channel 1, Channel 2
<b>Display Range</b>	-1999 ~ 9999
<b>Accuracy</b>	± 0.2% of full input range or ± 1 unit
<b>LED Display</b>	0.48" red/green color
<b>Outside Dimension</b>	48x48x75 mm (1/16 DIN)
<b>Mounting Cutout</b>	45x45 mm
<b>Working Condition</b>	-20 ~ 50 °C, 85% RH

(TC: thermocouple; RTD: resistance temperature detector.)

## B. Front Panel



Figure 1. Front panel of SYL-2813.

- ① Alarm1 and relay J1 indicator (red LED)
- ② Alarm2 and relay J2 indicator (red LED)
- ③ Maximum value indicator of Channel1 (red LED)
- ④ Maximum value indicator of Channel2 (red LED)
- ⑤ SET key
- ⑥ Shift key
- ⑦ Down key
- ⑧ Up key
- ⑨ Display1 window (top display)
- ⑩ Display2 window (bottom display)

1. AL1 (or AL2) on indicates alarm is on and J1 (or J2) relay is pulled in (closed).
2. PK1 (or PK2) is on when display windows shows the maximum value MA1 of Channel 1 (or the MA2 of Channel 2) and the time MAT1 (or Mat2) when the peak value was caught.
3. SET key. In Normal Operating Mode, press SET once, enter the code for a setting mode. Press SET again to enter the setting mode. In Parameter Setting Mode, press it to select a parameter or to save the value.

4. Shift key ">". In the Parameter Setting Mode, press this key to select the digit to be changed. In the Normal Operating Mode, press this key to toggle the displayed variables between Process Values (PV1 and PV2), Maximum Value of Channel 1 (MA1 and MA2), and Maximum Value of Channel 2 (MA2 and MA2). See the diagram below. Please note that time is expressed in seconds when it is less than 9999 seconds. Time longer than 9999 seconds will be displayed as Hours.Minutes (hh.mm).
5. Down key "V". In the Parameter Setting Mode, press it to scroll the parameter list in a reversed order or decrease the parameter value. In the Peak Value Checking Mode, press it for 2 seconds to reset the peak values stored in the memory.
6. Up key "Λ". In the Parameter Setting Mode, press it to scroll the parameter list or to increase the parameter value. In the Normal Operating Mode, press this key to toggle the display brightness between bright and dim. Each time the key is pressed the display brightness will be changed.

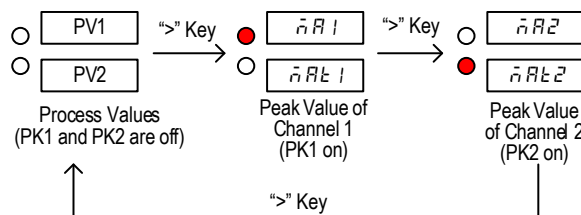


Figure 2. Diagram of how to check Peak Values.

## C. Terminal Assignment

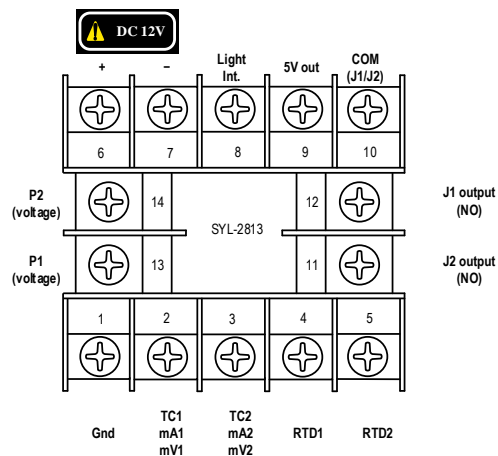


Figure 3. Terminal Assignments of SYL-2813.

### C.1 Description of Wiring Terminals (T1 ~ T14)

- T1: the circuit ground pole for input signals.
- T2: for TC, mA, and mV signals in Channel 1 (use with T1).
- T3: for TC, mA, and mV signals in Channel 2 (use with T1)
- T4: for RTD signal in Channel 1 (use with T1 and T2).
- T5: for RTD signal in Channel 2 (use with T1 and T3).
- T6: for the positive side of 12V DC power.
- T7: for the negative side of 12V DC power.

- T8: for +12V DC illumination signal from headlight (use with T7).
- T9: a 5V DC power for pressure sensor (use with T13/T14 and T1)
- T10: the common pole for J1 and J2 relay.
- T11: output for J2 (normally open) relay (use with T10).
- T12: output for J1 (normally open) relay (use with T10).
- T13: for pressure sensor in Channel 1 (use with T9 and T1)
- T14: for pressure sensor in Channel 2 (use with T9 and T1)

Please see Table 2 for a summary for terminal assignment.

Table 2. Summary of Terminal Assignments.

Terminal	Description	Channel	Use With
T1	Circuit Ground (all input sensors)	1 & 2	
T2	TC1, mA1, mV1	1	T1
T3	TC2, mA2, mV2	2	T1
T4	RTD1	1	T1 & T2
T5	RTD2	2	T1 & T3
T6	+12V DC power		T7
T7	-12V DC power		T6
T8	Headlight signal +12V DC		T7
T9	5V DC output for pressure sensor	1 & 2	
T10	Common pole for relays	1 & 2	
T11	Output for J2 relay		T10
T12	Output for J1 relay		T10
T13	Pressure sensor 1 (voltage signal)	1	T9 & T1
T14	Pressure sensor 2 (voltage signal)	2	T9 & T1

**C.2 General Wiring Rules**

1. T6 and T7 are 12V DC power input for the controller.
2. T1-T5, T13, and T14 are for different types of input signals. T1 is the circuit ground for all input signals.
3. Wiring of Thermocouples (TC). For Channel 1, connect the positive side of the TC to T2, the negative side to T1. For Channel 2, connect the positive side of the TC to T3, the negative side to T1. (See Figure 4(a).)
4. Wiring of Resistance Temperature Detectors (RTD). In Channel 1, for a three wire RTD, connect the two red wires to T1 and T2, connect white wire to T4; for a two wire RTD, connect the red wire to T2, and connect the white wire to T4, and short T1 and T2. In Channel 2, for a three wire RTD, connect the two red wires to T1 and T3, connect white wire to T5; for a two wire RTD, connect the red wire to T3, and connect the white wire to T5, and short T3 and T1. (See Figure 4(b).)
5. Wiring of Pressure Sensors. In Channel 1, connect the power source wire of the sensor to T9, the signal wire of the sensor to T13, and the ground wire of the sensor to T1. In Channel 2, connect the power source wire of the sensor to T9, the signal wire of the sensor to T14, and the ground wire of the sensor to T1. (See Figure 4(c).)
6. Wiring of mV and mA signals. Wiring for these signals are similar to thermocouple sensors.
7. T8 is for display brightness control. When connecting the illumination signal (+12V DC) to it, the brightness with synchronized with headlight. If not connected, the brightness can still be controlled by Up key "Λ". Use T8 and T7.
8. Wiring for relay output. J1 and J2 are two normally open relays. T10 is a common pole for both relays. Use T12 and T10 for J1 relay. Use T11 and T10 for J2 relay. (See Figure 4(d).)

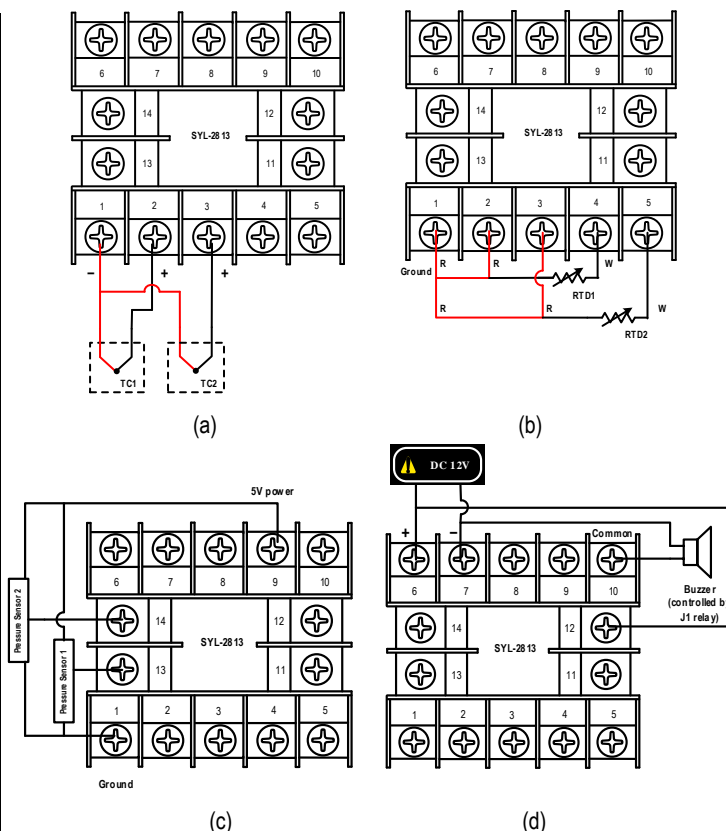


Figure 4. Wiring diagram for (a) thermocouples, (b) RTDs, (c) pressure sensors, and (d) relays.

**D. Parameter Setting**

**D.1 Basic Parameters** (Press SET key then enter 0089 to enter setting mode)

**D.1.a) Basic Parameters**

The SYL-2813 has two input channels that can read signals from two different sensors simultaneously. Each channel can have its own input sensor type, specified scale range, and input offset. See Table 3 for a list of basic parameters, description, range, and initial values. A list of valid types of input sensor is given in Table 4. Please note that all 19 input types are valid for Channel 1. But the last three input types in Table 3 (0-10mA, 0-20mA, and 4-20mA) are not valid for Channel 2.

Table 3. Basic Parameters.

Symbol	Name	Description	Channel	Range	Initial	Note
<i>Int 1</i>	Int1	Input type of Channel 1	1	See Table 3	P100	1
<i>dot 1</i>	dot1	Decimal Point Position 1		0000 ~ 0.000	0	2
<i>PuL 1</i>	PuL1	Scale Low 1		-1999 ~ 9999	1000	3
<i>PuH 1</i>	PuH1	Scale High 1		-1999 ~ 9999	2000	
<i>PSb 1</i>	PSb1	Input Offset 1		-1000 ~ 1000	0	4
<i>Int 2</i>	Int2	Input type of Channel 2	2	See Table 3	Cu50	1
<i>dot 2</i>	dot2	Decimal Point Position 2		0000 ~ 0.000	0	2
<i>PuL 2</i>	PuL2	Scale Low 2		-1999 ~ 9999	3000	3
<i>PuH 2</i>	PuH2	Scale High 2		-1999 ~ 9999	4000	
<i>PSb 2</i>	PSb2	Input Offset 2		-1000 ~ 1000	0	4
<i>E-F</i>	C-F	Temperature Unit	1 & 2	C, F	C	
<i>FiLk</i>	FiLk	Filter Coefficient		0 ~ 3	0	5
<i>End</i>	End	Exit				

Note 1. All 19 input types are available to Channel1. The 10mA, 20mA, and 4-20mA input types are not available to Channel2.

Note 2. Dot parameter does not work for temperature input sensor (thermocouple, RTD). Thermocouple will be displayed in 0 decimal place (XXXX). RTD will be displayed in 1 decimal place (XXX.X).

Note 3. Only valid for input types that are neither TC nor RTD.

Note 4. Display Value = gauge reading + PSb. Only valid for TC and RTD signals. To enter negative value, please use shift key to shift to first left digit, then use up and down key to enter negative sign.

Note 5. Digital Filtering Coefficient: 0, no filter; 1, weak; 2, medium; 3, strong.

Table 4. Input type options.

Symbol	Input Type	Meter Range	Resolution	Accuracy	Impedance
t	TC, Type T	-200~400 ° C	1 ° C (F)	0.3 %	100 K
r	TC, Type R	-50~1600 ° C	1 ° C (F)	0.3 %	100 K
J	TC, Type J	-200~1200 ° C	1 ° C (F)	0.3 %	100 K
B r E	TC, WRe3/25	0~2300 ° C	1 ° C (F)	0.2 %	100 K
b	TC, Type B	260~1800 ° C	1 ° C (F)	0.2 %	100 K
S	TC, Type S	-50~1600 ° C	1 ° C (F)	0.3 %	100 K
P	TC, Type K	-200~1300 ° C	1 ° C (F)	0.2 %	100 K
E	TC, Type E	-200~850 ° C	1 ° C (F)	0.2 %	100 K
P 100	RTD, Pt100	-199.9~600.0 ° C	0.1 ° C (F)	0.2 %	(0.2 mA)
C u 50	RTD, Cu50	-50.0~150.0 ° C	0.1 ° C (F)	0.5 %	(0.2 mA)
375r	375Ω, Pressure	the display value can be set to any range within (-1999 ~ 9999)	16 Bit A/D	0.2 %	(0.2 mA)
75n u	75mV			0.1 %	100 K
30n u	30mV			0.1 %	100 K
0-5u	0-5V			0.1 %	100 K
1-5u	1-5V			0.1 %	100 K
10u	0-10V			0.1 %	100 K
0-10	0-10mA			0.3 %	150 K
0-20	0-20mA			0.2 %	150 K
4-20	4-20mA			0.2 %	150 K

(TC: thermocouple. RTD: resistance temperature detector.)

**D.1.b) The Procedure of Setting Basic Parameters** (see Figure 5).

To set or view Basic Parameters, press SET key once, the upper window will display "pass" and the lower window will display "0000". Change the number to "0089" in the lower window and press SET again to enter the Parameter Setting Mode. Two parameters from the parameter list will be displayed. The upper window will flash the first parameter, the lower window will steadily display the next parameter on the list (see table 3). Use Up or Down key to scroll to the desired parameter (flashing in the upper window) and press Set to view the value. For numerical values, use Shift key to go to any digit that needs to be changed and use Up or Down key to change the value. For letter values, use Up or Down key to select from available values. Then press SET to save and exit to the parameter list. To exit this mode, use Up or Down key to scroll to "End" (flashing in the upper display window) and press SET. See Figure 4 for a schematic diagram of how to change Basic Parameters.

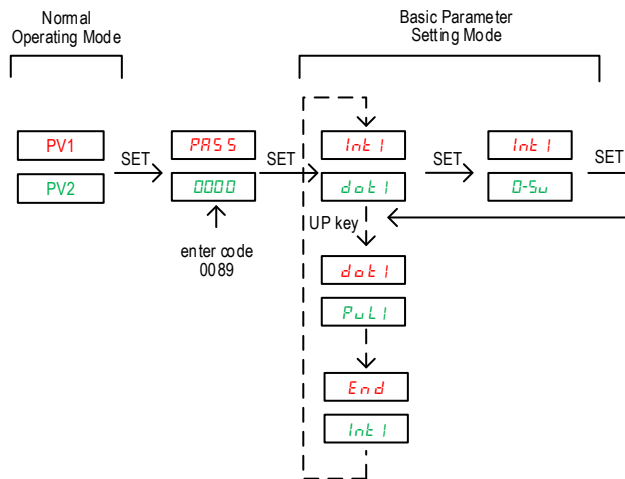


Figure 5. Schematic diagram of how to set Basic Parameters.

**D.2 Alarm Parameters** (Press SET Key and enter 0001 to enter setting mode)

**D.2.a) Alarm Parameters and Alarm Relays**

Table 5. Alarm parameters.

Symbol	Name	Description	Range	Initial	Note
AH1	AH1	J1 ON	-1999 ~ +9999	800	6
AL1	AL1	J1 OFF	-1999 ~ +9999	900	
AH2	AH2	J2 ON	-1999 ~ +9999	800	
AL2	AL2	J2 OFF	-1999 ~ +9999	900	

Note 6. Relay Action Setting.

For either J1 or J2 relay:

- 1). When AH = AL, relay is disabled.
- 2). When AH > AL, relay is set as high limit alarm (see Figure 6).
- 3). When AH < AL, relay is set as low limit alarm (see Figure 7).

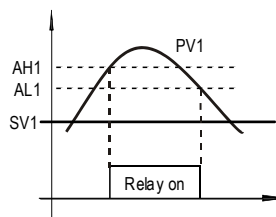


Figure 6. Absolute high alarm on J1.

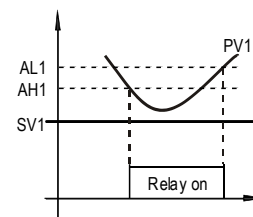


Figure 7. Absolute low alarm on J1.

**D.2.b) The procedure for setting Alarm Parameters is similar to Basic Parameters showed in Figure 4 except the access code is 0001.**

**D.3 Peak Value Parameters** (Press SET then enter 0036 to enter)

**D.3.a) Peak Value Parameters**

Table 6. Peak Value Parameters.

Symbol	Name	Description	Range	Initial	Note
MA1	MA1	Maximum Value 1	on/off	on	
Mat1	Mat1	Time of MA1	on/off	off	7
MA2	MA2	Maximum Value 2	on/off	on	
Mat2	Mat2	Time of MA2	on/off	off	7
brlt	brlt	Brightness	1-5	1	8
Clr	Clr	Peak Value Clear	on/off	off	9
End	End	Exit			

Note 7. When MA1 (or MA2) is set to "off", setting for MA1 (or MA2) will be ignored.

Note 8. The higher the brlt value, the brighter the display.

Note 9. When Clr is set to off (default), the controller will keep all the peak values even the power is lost. When Clr is set to on, current peak value will be reset when you reboot the controller.

**D.3.b) The procedure of setting Peak Value Parameters is similar to the Basic Parameters showed in Figure 4 except the access code is 0036.**

**D.3.c) Check the Peak Value**

To check the Peak Value during operation mode, use the Shift key ">". Press ">" once, the PK1 indicator will be on, MA1 and MA1 will be displayed in the upper and lower window respectively. Press ">" key again, the PK2 indicator will be on, MA2 and MA2 will be displayed in the upper and lower window respectively; press ">" again to exit this mode and return to the Normal Operating Mode.

**D.3.d) Reset the Peak Value**

Current Peak Values will be automatically reset when this meter is powered off. To reset them manually, change display to show MA1, MA1, MA2, and MA2. Then, press and hold Down key "V" for 3 seconds. The display will show " - - - ", indicating the memory (for all four peak parameters) is cleared. The meter will start to catch the new peak after 2 seconds.

**D.3.e) Time of Peak Values**

Time is displayed in seconds if the peak time (MA1 and MA2) is less than 9999 seconds. When the peak time is longer than 9999 seconds, it will be displayed as Hours.Minutes (HH.MM).

**D.3.f) Change the Brightness**

The brlt value decides the brightness level of the dim display. The higher the brlt value, the brighter the display. Press Up key during normal operating mode will switch the display brightness between dim and bright (brlt=5).

**E. Application Examples**

**E.1 Measuring Exhaust Gas Temperature (EGT) and Boost Pressure.**

The SYL-2813 meter has two input channels and it can read two different types of signal simultaneously. The wiring diagram of connecting an EGT sensor and a MAP sensor to SYL-2813 is shown in Figure 8. The steps for setting up the meter for this application is also given in this section.

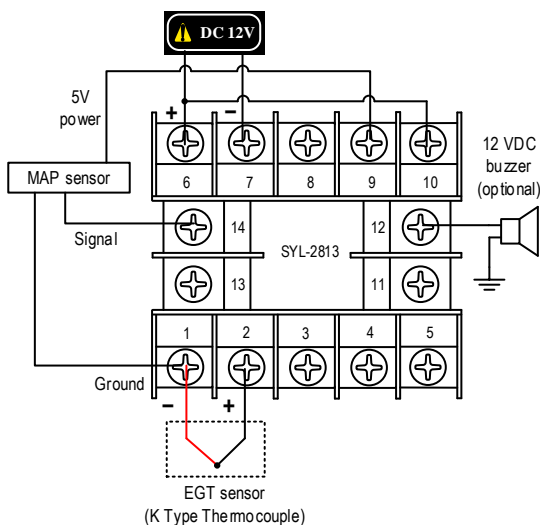


Figure 8. SYL-2813 wiring example of EGT sensor in Channel 1 and MAP sensor in Channel 2.

E.1.a) Wire the EGT sensor (K type thermocouple in this example) and the MAP sensor (AUBER-303) as shown the Figure 7, where the EGT sensor is connected to channel 1 and MAP sensor is connected to channel 2.

E.1.b) Press SET, change the code to 0089 to enter the Basic Parameter Setting mode. Set Int1 to "k" and Int2 to "0-5v".

E.1.c) To display the pressure in Bar with 0.01 bar resolution, set the decimal point dot2 = 2 (this step needs to be done before set PuL2 and PuH2). Set the PuL2 = -0.38 and PuH2 = 03.38. (Please see the installation guide for AUBER-303 from the product page on our website).

E.1.d) To display the pressure in PSI with 0.1 PSI resolution, set the decimal point dot2 = 1. Set the PuL2 = -05.4 and PuH2 = 048.9.

**E.2 Measuring Exhaust Gas Temperature (EGT) and Oil Temperature.**

To measure temperatures with one thermocouple sensor and one RTD sensor, you can wire the sensors to SYL-2813 meter as the diagram in Figure 9. In this diagram, the thermocouple is connected to the Channel 1, and the RTD sensor is connected to the Channel 2. You will need to change the input types and other parameters for Channel 1 and 2 accordingly.

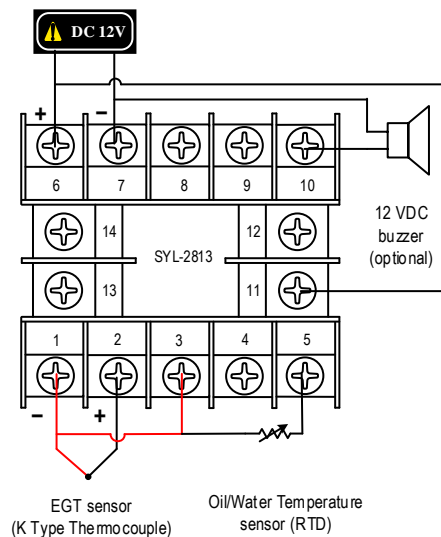


Figure 9. SYL-2813 wiring example of an EGT sensor in Channel 1 and an Oil/Water Temperature Sensor in Channel 2.

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