



S48 Technical manual

1. Introduction

This Technical manual is for technical or engineer only, who wants to re-calibrate or modify the controller.

2. Gap G1 closed to enable calibration procedure.

(for normal operation always keep G1 open to prevent unauthorized calibration.)

The technical menu can be accessed by pressing the SET , UP and Down keys simultaneously for 5 seconds.

To exit the technical menu, Pressing SET and Down key will return to PV/SV display.

2.1 Calibration Level

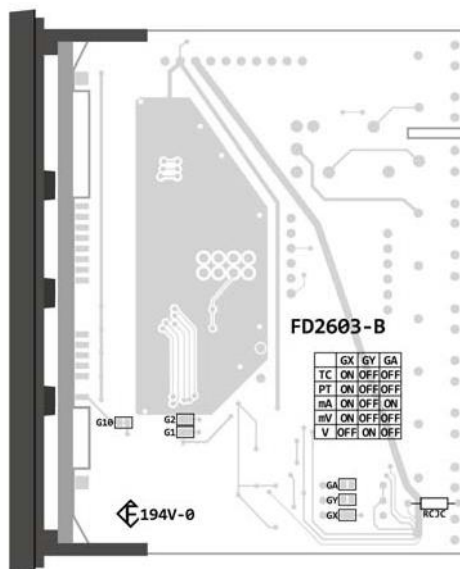
 **Do not perform the calibration procedure unless there is a definite requirement.**

To perform the calibration process, the following equipments are required.

- ☐ Thermometer with accuracy better than $\pm 0.1^{\circ}\text{C}$ or 0.01% of reading in the range of 0.0~50.0 $^{\circ}\text{C}$.
- ☐ 0.0~-850.0 $^{\circ}\text{C}$ PT100 calibrator with accuracy better than $\pm 0.05^{\circ}\text{C}$ or 0.01% of reading.
- ☐ 0~100mV millivolt source with accuracy better than $\pm 2\mu\text{V}$ or 0.01% of reading.
- ☐ 0~10V voltage source with accuracy better than $\pm 0.08\text{mV}$ or 0.01% of reading.
- ☐ 0~24mA current source with accuracy better than $\pm 0.4\mu\text{A}$ or 0.01% of reading.

Before calibration, Please note that the internal gaps on the bottom side of main board of the S48 controller should be configured in accordance with input signal.

	GX	GY	GA
Thermocouple	Linked	Open	Open
RTD	Linked	Open	Open
0~24 mA	Linked	Open	Linked
-60~60 mV	Linked	Open	Open
-10~10 V	Open	Linked	Open



Display	Description	Range
PV	Showing the process value. It is useful to check the accuracy after calibration procedure without exiting the technical menu.	Read only
PV.A	Showing the ambient temperature measured by the cold junction compensation component.	Read only. This parameter is only shown when the type is set to thermocouple.
TYPE	Input signal type for calibration, it is recommended to set K type for thermocouple and PT100(DIN) for RTD.	J : J type K : K type T : T type E : E type B : B type R : R type S : S type N : N type C : C type d-PT : PT100(DIN) J-PT : PT100(JIS) LinE: linear input signal such as mA, mV or V
Unit	Unit	°C : °C °F : °F Eng : Engineer (for linear input signal only)
dP	Decimal point.	0000 000.0

		00.00 (for linear input signal only) 0.000 (for linear input signal only)
CHO	The counts of ADC channel 0 for factory reference only	Read only
CHI	The counts of ADC channel 1 for factory reference only	Read only. This parameter will be hidden when the type is set to linear.

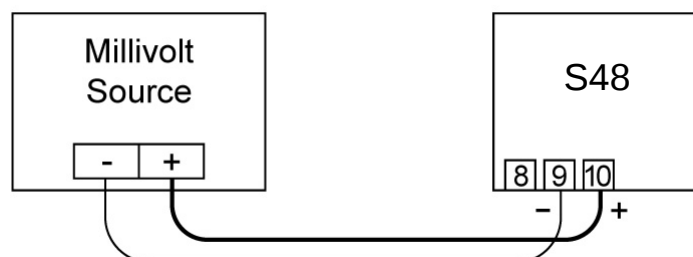
For different input signal type, the variant calibration parameters will be shown and the calibration procedure is explained as below.

Thermocouple calibration

Display	Description	Range
mVL	0.00mV calibration	0.00 mV fixed
mVH	50.00mV calibration	50.00mV fixed
tCJC	Set the cold junction compensation temperature.	0.0~50.0 °C
HCJC	Set the cold junction compensation temperature offset value.	-50.0~50.0 °C

Even though any thermocouple input in °C or °F unit is available during calibration, but K type is the most recommended. Here the thermocouple calibration procedure is applied with K type in °C with no decimal point.

1. Locate the thermometer as closed to the controller as possible. And keep away from any heating source.
2. Set the input signal type to K , the unit to °C and decimal point to 0000.
3. Press SET key several times until “mVL “ is shown on upper display. Connect a standard 0.00 mV to the input terminals 10(+) and 9(-), then press SET key for about 3 seconds. The upper display will change to “mVH” automatically. (S48: terminals 7(+) and 8(-))
4. Connect a standard 50.00 mV source to terminals 10(+) and 9(-) in correct polarity. Then press SET key for about 3 seconds. The upper display will change to “tCJC” automatically. (S48: terminals 7(+) and 8(-))
- 5.

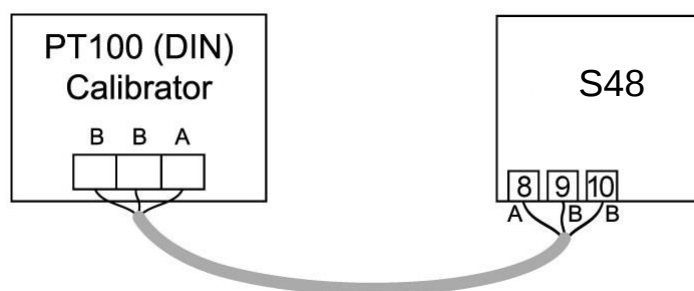


6. Set the “tCJC” to a value same as the reading of thermometer. Then press SET key for about 3 seconds. The upper display will change to “HCJC” automatically.
7. Set the “HCJC” to “0” and pressing SET key for about 3 seconds. The thermocouple calibration is done. Please note that the default setting of “HCJC” is “0000”, do not change the setting.

PT100 calibration

Display	Description	Range
rtd.L	Low calibration for PT100 (Shown only PT100 input is selected)	-200 ~ 850°C
rtd.h	High calibration for PT100 (Shown only PT100 input is selected)	-200 ~ 850°C

1. Set the input signal type to PT100(DIN), the unit to °C and decimal point to 000.0.
2. Connect a PT100 (DIN) calibrator to terminals 8 ,9 and 10 as shown below. Set the calibrator to 0.0°C. Set the “rtd.L” value to 0.0 if its value is other than 0.0. Then press SET key for about 3 seconds. The upper display will change to “rtd.h” automatically. (S48: terminals 7 ,8 and 9)

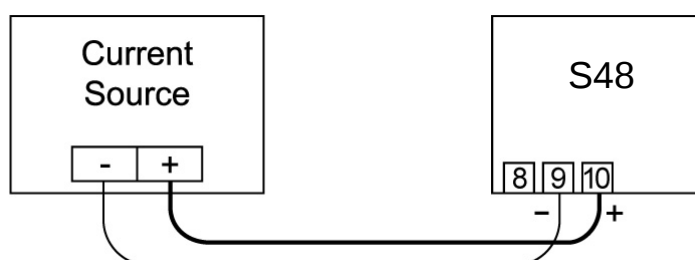


3. Set the calibrator to 800.0°C and set the “rtd.h” value to 800.0. Then press SET key for about 3 seconds. The upper display will show **PU** and lower display will show the process value automatically. The PT100 calibration is done.

mA calibration

Display	Description	Range
LnLo	Low scale of linear input (Shown only Linear input is selected)	-1999~9999
LnHi	High scale of linear input (Shown only linear input is selected)	-1999~9999

1. Set the input signal type to linear.
2. Connect a current source to terminals 10(+) and 9(-) as shown below. Set the current source to 4.00mA. Set the “LnLo” to a low scale value corresponding to 4.00mA. Then press SET key for about 3 seconds. The upper display will change to “LnHi” automatically. (S48: terminals 7(+) and 8(-))

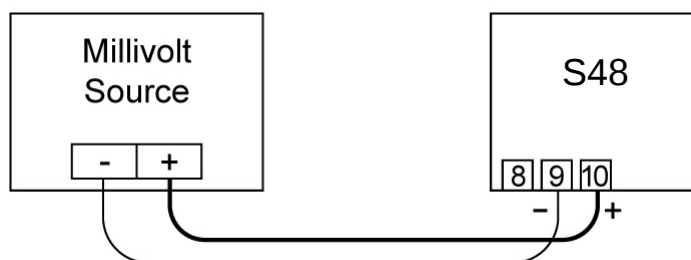


- Set the current source to 20.00mA and set the “LnHi” to a high scale value corresponding to 20.00mA. Then press SET key for about 3 seconds. The upper display will show **PU** and lower display will show the process value automatically. The mA calibration is done.

mV calibration

Display	Description	Range
LnLo	Low scale of linear input (Shown only Linear input is selected)	-1999~9999
LnHi	High scale of linear input (Shown only linear input is selected)	-1999~9999

- Set the input signal type to linear.
- Connect the millivolt source to terminals 10(+) and 9(-) as shown below. Set the millivolt source to 0.00mV. Set the “LnLo” to a low scale value corresponding to 0.00mV. Then press SET key for about 3 seconds. The upper display will change to “LnHi” automatically. (S48: terminals 7(+) and 8(-))
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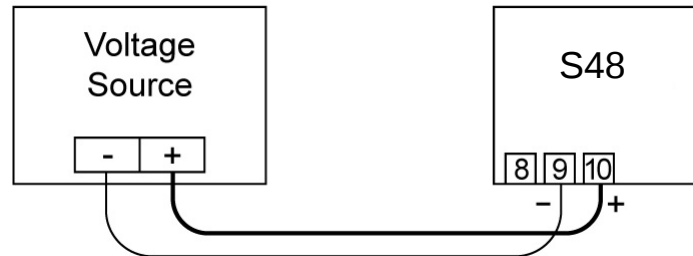


- Set the millivolt source to 50.00mV and set the “LnHi” to a high scale value corresponding to 50.00mV. Then press SET key for about 3 seconds. The upper display will show **PU** and lower display will show the process value automatically. The mV calibration is done.

V calibration

Display	Description	Range
LnLo	Low scale of linear input (Shown only Linear input is selected)	-1999~9999
LnHi	High scale of linear input (Shown only linear input is selected)	-1999~9999

1. Set the input signal type to linear.
2. Connect a voltage source to terminals 10(+) and 9(-) as shown below. Set the voltage source to 0.00V. Set the “LnLo” to a low scale value corresponding to 0.00V. Then press SET key for about 3 seconds. The upper display will change to “LnHi” automatically. (S48: terminals 7(+) and 8(-))
- 3.



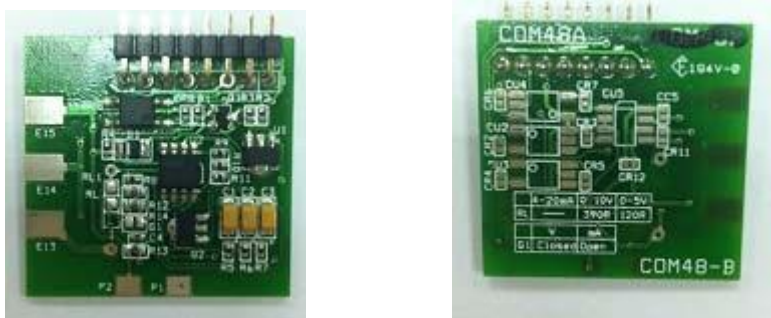
4. Set the voltage source to 10.00V and set the “LnHi” to a high scale value corresponding to 10.00V. Then press SET key for about 3 seconds. The upper display will show **PU** and lower display will show the process value automatically. The V calibration is done.

Option module card installation

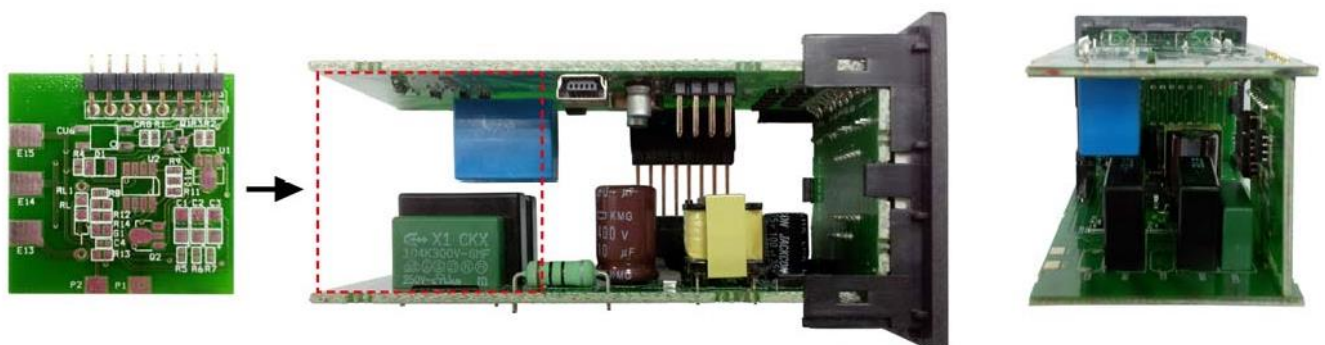
RS485 communication module card

S48

The RS485 communication is available by equipped with RS485 communication module card, Part No. H-COM48BB, as shown below.

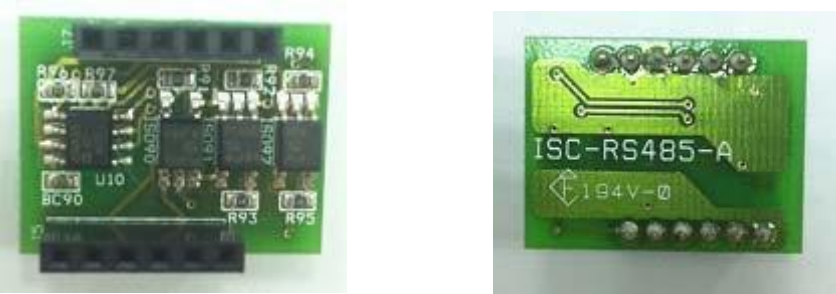


The H-COM48BB module card should be installed on the J3 of S48 main board and be soldered to the pads P40 and P41 of S48 power board as shown below.



WH660

The RS485 communication is available by equipped with RS485 communication module card, Part No. H-RS485-2, as shown below.



The H-RS485-2 module card should be installed on the J3/J4 of WH660 main board

Retransmission output

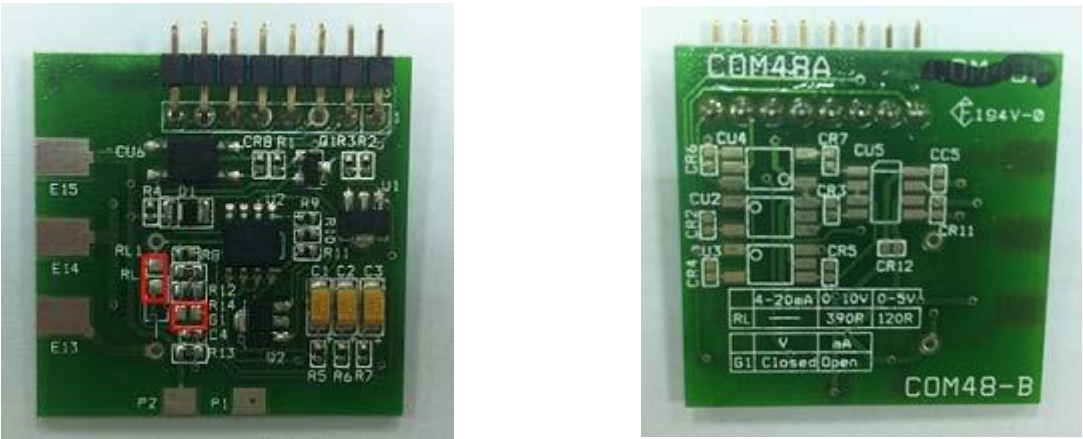
S48

The part No. for retransmission output module card is H-COM48AB.

Retransmission output device	Part No.
4~20mA	H-COM48AB (Note 1)
0~10Vdc	H-COM48AB (Note 2)
0~5Vdc	H-COM48AB (Note 3)

Note 1: For different output signal of H-COM48AB. The gap G1 and resistor RL must be configured as follow.

	4~20mA	0~10V	0~5V
G1	Open	Closed	Closed
RL	Not install	390ohms	120ohms



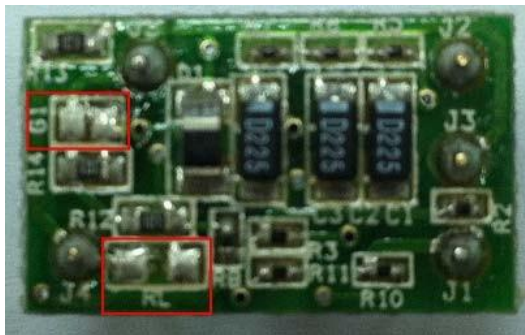
S48

The part No. for retransmission output module card is H-OM420-G

Retransmission output device	Part No.
4~20mA	H-OM420-G (Note 1)
0~10Vdc	H-OM420-G (Note 2)
0~5Vdc	H-OM420-G (Note 3)

Note 1: For different output signal of H-OM420-G. The gap G1 and resistor RL must be configured as follow.

	4~20mA	0~10V	0~5V
G1	Open	Closed	Closed
RL	Not install	390ohms	120ohms



3. 4th Level

There is an additional level “4th level” which is reserved for technician or engineer to adjust the linear output signal (4~20mA) of control output1 (part No. H-OM420G).

To access 4th level, the following procedures are necessary.

1. The G1 must be linked.
2. Select the **LoCE** in second level and change its setting to “0111” or “1111”.
3. Press “SEL” key for at least 5 seconds to change from 3rd level to 4th level. Now the 4th level can be selected by using “UP” or “DOWN” key.

NOTE: To prohibit from unauthorized tampering. Please always keep G1 unlinked and set the **LoCE** to “00xx” or “10xx” for normal operation.

The parameters in 4th level are as follow:

Display	Description	Range
CHO 1	High scale of linear output for control output 1.	0~1000 counts
CLO 1	Low scale of linear output for control output 1.	0~1000 counts
rESH	High scale of aux. output module for retransmission output.	0~9999 counts
rESL	Low scale of aux. output module for retransmission output.	0~9999 counts
rr	Manual reset. Default = 0.0. Do not adjust.	0.0 ~100.0 %
rES	PV or SV retransmission Selection.	PV : Process value retransmission. SP : Setpoint retransmission.

3.1 4~20mA control output signal adjustment

1. Connect the multimeter to control output terminals to measure the current value. (S48:terminal 11 and 12, WH660:terminal 17 and 18)
2. Select the 4th level.
3. Presses “SET” key to get **CHO 1** for control output 1.
4. Using up and down key to adjust the value until the reading of multimeter is 20.00 mA.
5. Press “SET” key to get **CLO 1** for control output 1.
6. Using up and down key to adjust the value until the reading of multimeter being 4.00 mA.
7. The 4-20 mA control output module adjustment is done.

3.2 4~20mA retransmission output signal adjustment

1. Connect the multimeter to retransmission output terminals to measure the current value. (S48: terminal 13 and 14, WH660+:terminal 1 and 2)
2. Select the 4th level.
3. Presses “SET” key to get **rESH**.
4. Using up and down key to adjust the value until the reading of multimeter is 20.00 mA.
5. Press “SET” key to get **rESL**.
6. Using up and down key to adjust the value until the reading of multimeter being 4.00 mA.
7. The 4-20 mA retransmission output signal adjustment is done.

Reset all parameters to factory default setting

To reset all parameters to factory default setting, Press “up” and “down” key together then turn the power on. After reset, All parameter setting will be back to default setting. One should be careful to set all those parameter again to meet the application requirement, such as the input type, cycle time, high / low limit.

Option		Model No		Model No	
		S48		WH660	
		Part No.	Position	Part No.	Position
OUT1	SSR (P)	R0.25WB47^x2	SR1+.SR1-	R0.25WB47^x2	SR1+.SR1-
	Relay (R)	O-RELAY-02	OM1	O-RELAY-02	OM2
	4-20mA(M)	H-OM420-G		H-OM420-G	
OUT2	SSR (P)	N/A		N/A	
	Relay (R)				
	4-20mA (M)				
A1		O-RELAY-05	RY1	O-RELAY-05	RY1
A2		O-RELAY-05	RY2	O-RELAY-05	RY2
A3		H-ECOUT2CC	J4	O-RELAY-05	RY3
RS485 COM.		H-COM48BB	J3	H-RS485-2	J3/J4
Retransmission		H-COM48AB	J3	H-OM420-G	OM1

O-RELAY-02 is 24VDC (Small Relay)

O-RELAY-05 is 5VDC (Small Relay)