



02-016B
2 May, 2007

INSTALLATION OF A ISOLATED CURRENT OUTPUT

I. PURPOSE:

This Service Note provides instructions on proper installation of an Isolated Current output into a M100A/M200A/M300/M400A analyzer.

II. TOOLS:

Solder Vacuum. Solder Wick or Solder Sucker
Solder Iron
Diagonal Cutters

III. PARTS:

032270000 (0-20MA OPTION)

IV. PROCEDURE:

- First determine whether you want a 0-20ma output or a 4-20ma output.
- For either option **refer to the 032270000** drawing for jumper locations and jumper settings.
- For 0-20ma the JP3 jumper must be set to pins 1-2 and the JP2 jumper must be installed.
- For the 4-20ma output the JP3 jumper must be set to pins 2-3 and the JP2 jumper removed.

Next you must determine on which channel the current output will be installed. In the SO2 analyzer there are three (3) channels available for the current output, in the NOx analyzer there are four (4) channels available, the CO and Ozone analyzers only have one channel available.

CHANNEL	SO2	NOx	CO	OZONE
DAC 0	CONC 1	NOx	CONC 1	CONC 1
DAC 1	CONC 2	NO	N/A	N/A
DAC 2	TEST	NO2	N/A	N/A
DAC 3	N/A	TEST	N/A	N/A

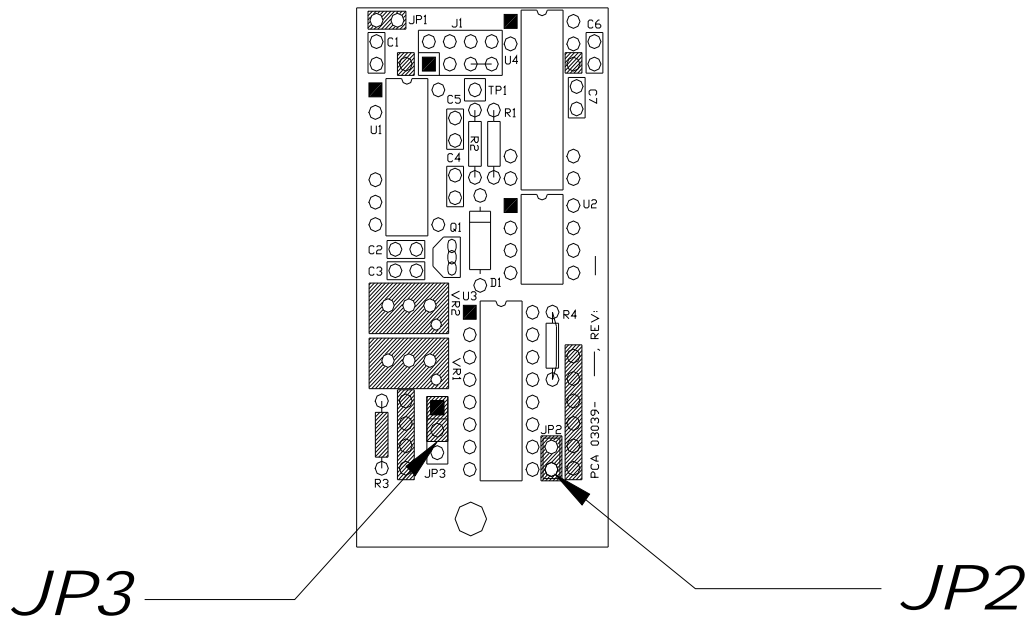
- The locations for installing the current output channels for the SO2/NOx analyzers are shown in **FIGURE 1 Status temperature board.**
- The location for installing the current output for the CO analyzer is on the motherboard shown in **FIGURE 2 Motherboard.**
- The location for installing the current output for the Ozone analyzer is on the rear panel shown in **FIGURE 3 Rear panel.**

Once you have determined which channel you are going to install the current output to, and the location of that channel, then you may proceed by following the installation procedures for the instrument that you have.

032270000 CURRENT OUTPUT ASSEMBLY

VER	OUTPUT	JP2	JP3	R4*	VR1,VR2,R3
-00	0-20MA	CLOSED	1-2	JMP	REMOVED
-01	4-20MA	OPEN	2-3	JMP	REMOVED

*PCB REV C & ABOVE



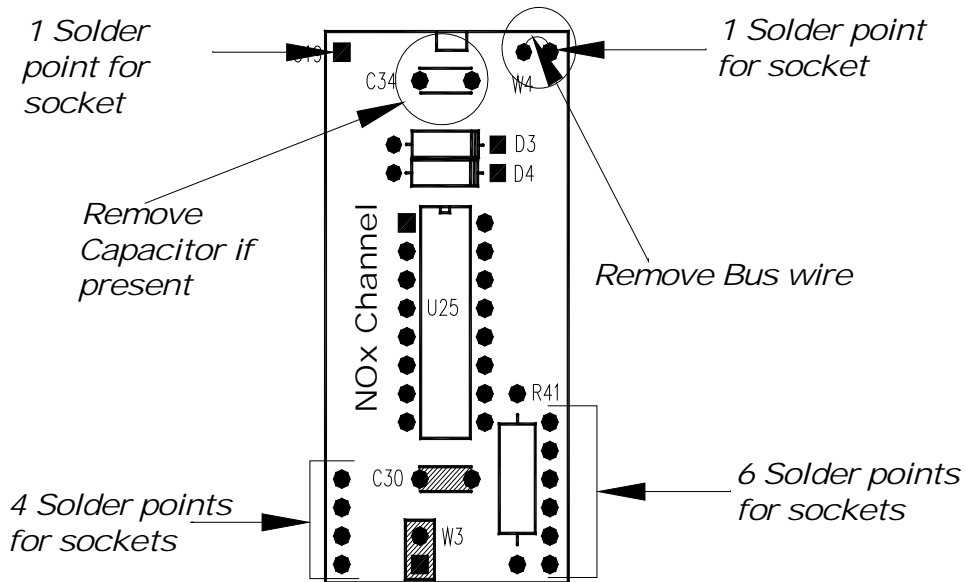
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INSTALLATION PROCEDURE

INSTALLATION FOR SO₂/NO_x ANALYZERS

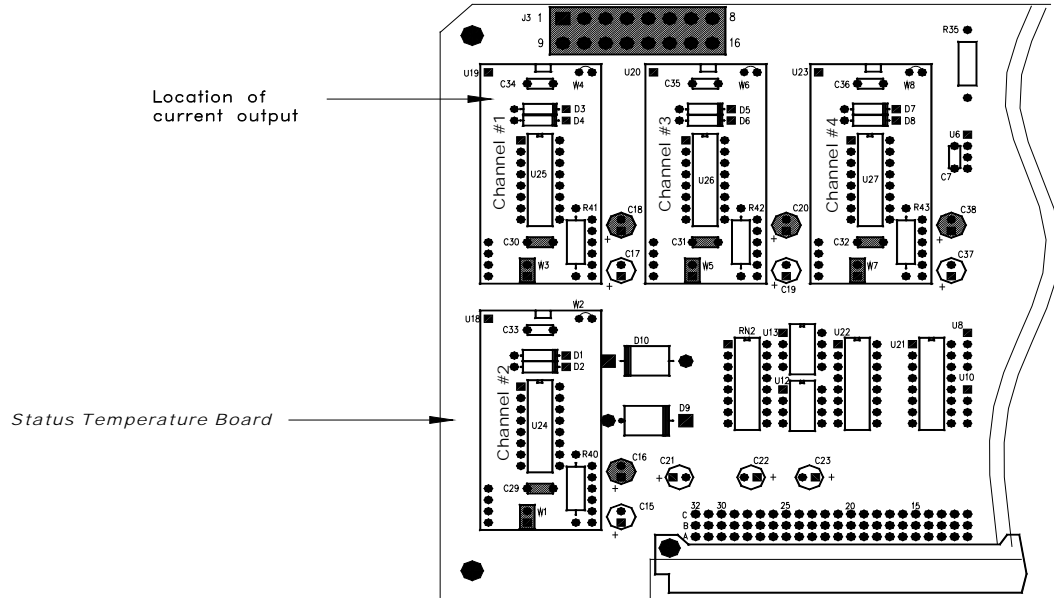
1. Refer to **Figure 1** for the components to be removed or added to the channel.
 2. Refer to **Figure 1a** for locations of Output channels for a SO₂/NO_x analyzer.
 3. De-solder and remove the buss wire.
 4. De-solder and remove the Capacitor at the top if it is present.
 5. De-solder the solder points if they are not already de-soldered. Refer to **Figure 1** for location of the solder points.
 6. Take the sockets that came with the assembly and attach them to the 032270000 board if they are not already attached. This will ensure that the pins from the assembly are lined up and seated properly on to the sockets.
 7. Solder the sockets onto the Status Temperature board at the solder points shown in **Figure 1**.
 8. The next task is to change the jumper settings on the motherboard from voltage to current. Refer to **Table 1b** for jumper positions.
 9. Once the jumpers are set correctly on the motherboard then you must set the V/F board DIPswitches for each channel that has the isolated current output to 5 Volts. Refer to **Table 1c** for Dip Switch settings.
 10. Now that you have installed the hardware and set all the jumpers you must perform the D/A Calibration on page 7 of this service note or refer to your Operators manual Section 9.3.3.1 (M100A), Section 9.3.3.1 (M200A).
- *Note: If you are installing more then one Isolated Current option follow steps 1-10 above for each additional channel before performing the D/A Calibration Procedure.

FIGURE 1.



Location of the channel outputs for SO₂/NO_x Analyzers

FIGURE 1a.

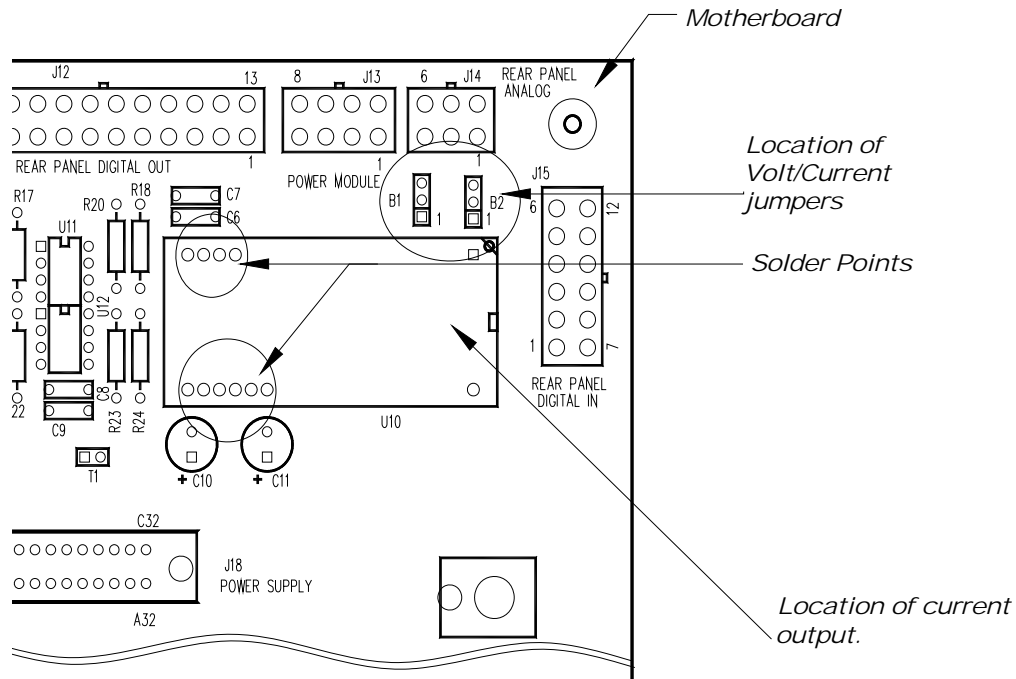


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INSTALLATION PROCEDURE FOR CO ANALYZERS

1. Unlike the SO₂ and NO_x analyzers there is only one channel (REC) that can accommodate the current output in the CO analyzer.
2. Change the output jumpers from Voltage to Current by moving the jumpers B1 and B2 from pins 2-3 to pins 1-2. Refer to **FIGURE 2** for location of B1 and B2 jumpers.
3. Once the jumpers have been switched from Voltage to Current you may install the 032270000 assembly.
4. Install the sockets, if not already installed, on to the assembly 032270000 board.
5. De-solder the solder points on the motherboard, if not already de-soldered.
6. Install the board assembly with the sockets onto the motherboard at U10 and solder the sockets in place.
7. Once the jumpers are set correctly on the motherboard and you have installed the current option, then you must set the V/F board DIPswitches for each channel that has the isolated current output to 5 Volts. Refer to **Table 1c** for Dip Switch settings.
8. Now that you have installed the hardware and set the jumpers you must now perform the D/A calibration procedure on page 7 of this service note or refer to your Operator's manual Section 9.2

Channel Location on the CO analyzer
FIGURE 2.

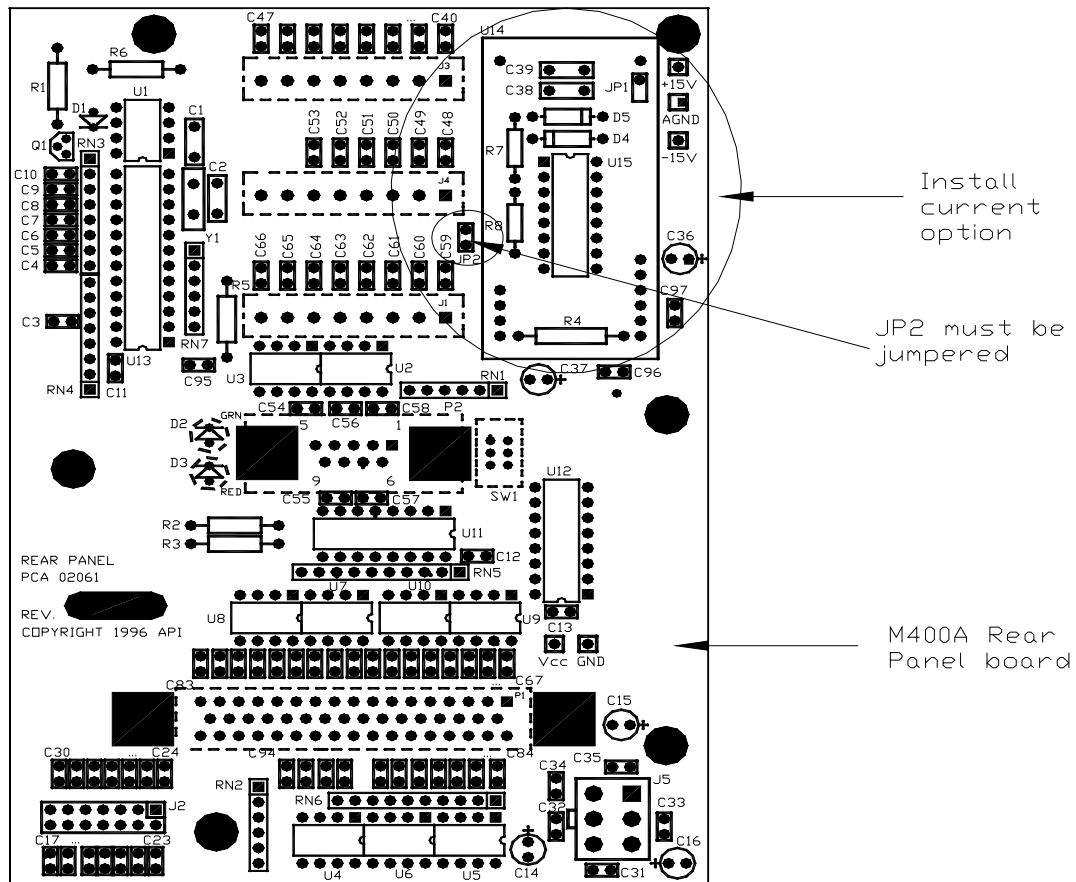


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FOR O3 ANALYZERS

1. Unlike the SO₂ and NO_x analyzers there is only one channel (REC) can accommodate the current output in the OZONE analyzer.
2. Ensure that JP2 is jumpered on the rear panel board.
3. Install the sockets, if not already installed, on to the assembly 032270000 board.
4. De-solder the solder points on the rear panel board, if not already de-soldered.
5. Install the board assembly with the sockets onto the rear panel board at U14 and solder the sockets in place.
6. Once the jumpers are set correctly on the rear panel board and you have installed the current option, then you must set the V/F board DIPswitches for each channel that has the isolated current output to 5 Volts. Refer to **Table 1c** for Dip Switch settings.
7. Now that you have installed the hardware and configured the jumpers you must now perform the D/A calibration procedure on page 7 of this service note or refer to your Operator's manual. Section 9.3.7.3 and 9.3.4

FIGURE 3



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D/A CALIBRATION PROCEDURE

1. After the switches and jumpers are set, turn on instrument power and complete the following:
 - a. Press SETUP-MORE-DIAG, and then press ENTER. Scroll to D/A CALIBRATION, press ENTER. Press A/D to select the first task, which is to calibrate the A/D converter.
 - b. Connect a DVM ground lead to TP3-AGND on the V/F board. Connect the positive lead to TP9-DAC0.
 - c. Adjust R27 until the displayed voltage matches the DVM voltage, then press ENTER.
 - d. Adjust R31 until the displayed voltage matches the DVM voltage, then press ENTER.
2. Then next task is to calibrate each of the DAC output channels. The NEXT – PREV buttons allows the selection of any of the D/A channels. DAC0 – is displayed first.
 - a. The SET button has 2 functions, first to select the output mode – voltage or current. Press VOLT and CURR depending on the type of output desired. – **Remember, the VOLT or CURR setting must match the switch and jumper settings made previously.** Second, the voltage output can be biased up to +/- 10 % of the selected range with the OFFSET parameter. Just key in the desired offset, or press EXIT to leave the OFFSET at zero. NOTE * When switching from current back to voltage there will be approximately 1Vdc offset. You must set the OFFSET parameter to zero.
 - b. For DAC channels in VOLTAGE mode press CAL. This will cause the instrument to automatically calibrate the channel.
 - c. For DAC channels in current mode first connect a 250-ohm resistor in series with a current meter to the correct pair of terminals on the rear panel. Press CAL. The instrument will output close 0ma to the rear panel terminals and the display will show the zero adjust. Use the UP, DOWN buttons to change the output displayed on the meter, and then press ENTER once the desired value is reached. Next the display will show Gain Adjust and then close to 20ma is then output to the rear panel. As before, press the UP, DOWN buttons to get the correct reading, then press ENTER.

To go to the next channel press the NEXT button and follow the previous steps starting with step A. Proceed through all 4 DAC channels, and then exit. To back up to previously calibrated channels, press the PREV button.

NOTE* For greater accuracy we recommend that the data logger or PLC is used in place of the current meter when doing the adjustments above. If you cannot set the data logger or PLC into current mode then a meter will suffice.

The installed isolated current output is now ready for use.

If you have any questions on this installation procedure or any other questions please contact the Teledyne-API Customer Service Department.

**Table 1b.
Motherboard Jumper Settings for SO2**

Analog Output	Terminal Pair Rear Panel	Jumper Pair	Jumper Setting For Voltage Mode	Jumper Setting For Current Mode
DAC 0 – SO2 (REC)	1-2	JP1 – JP2	B – C	A – B
DAC 1 – SO2 (DAS)	3-4	JP3 – JP4	B – C	A – B
DAC 2 – SPARE	5-6	JP5 – JP6	B – C	A – B
DAC 3 – TEST	7-8	JP7 – JP8	B – C	A – B

Motherboard Jumper Settings for NOx

Analog Output	Terminal Pair Rear Panel	Jumper Pair	Jumper Setting For Voltage Mode	Jumper Setting For Current Mode
DAC 0 – NOx	3-4	JP3 – JP4	B – C	A – B
DAC 1 – NO	5-6	JP1 – JP2	B – C	A – B
DAC 2 – NO2	1-2	JP5 – JP6	B – C	A – B
DAC 3 – TEST	7-8	JP7 – JP8	B – C	A – B

Motherboard Jumper Settings for CO

Analog Output	Terminal Pair Rear Panel	Jumper Pair	Jumper Setting For Voltage Mode	Jumper Setting For Current Mode
DAC 0 – REC	1-2	JP1 – JP2	B – C	A – B
DAC 1 – DAS	3-4	N/A	N/A	N/A
DAC 2 – TEST	N/A	N/A	N/A	N/A
DAC 3 – SPARE	N/A	N/A	N/A	N/A

Rear Panel Jumper Settings for OZONE

Analog Output	Terminal Pair Rear Panel	Jumper Pair	Jumper Setting For Voltage Mode	Jumper Setting For Current Mode
DAC 0 – REC	1-2	JP2	OPEN	A – B
DAC 1 – DAS	3-4	N/A	N/A	N/A
DAC 2 – TEST	5-6	N/A	N/A	N/A
DAC 3 – O3 GEN	7-8	N/A	N/A	N/A

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**V/F DIP Switch settings for 5Volts
Table 1c.**

DAC #	Sw 1	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7
0	ON	OFF	OFF	ON	OFF	OFF	OFF
1	ON	OFF	OFF	ON	OFF	OFF	OFF
2	ON	OFF	OFF	ON	OFF	OFF	OFF
3	ON	OFF	OFF	ON	OFF	OFF	OFF

**V/F DIP Switch settings for 10Volts
Table 1c.**

DAC #	Sw 1	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7
0	ON	OFF	ON	OFF	OFF	OFF	OFF
1	ON	OFF	ON	OFF	OFF	OFF	OFF
2	ON	OFF	ON	OFF	OFF	OFF	OFF
3	ON	OFF	ON	OFF	OFF	OFF	OFF