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Service Note

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SELECTING PROPER RESISTORS FOR 4.5 DIGIT FRONT PANEL METERS ON M152/M252

Occasionally there is a need to re-range an API MX52 analyzer. In doing so, the front panel may not display the correct values for the new ranges. This document addresses how to set the front panel meter for the new ranges on the 4.5 digit front panel meter.

API MX52 analyzers will have one of three different types of front panel meter based on configuration and options.

The first type is standard with the analyzer. This is the "Percent read" front panel meter. It reads only percent of full scale and does not change scale when the analyzer range is changed. This meter has only a connector attached to it, not a PC card.

The second type is the 3.5 digit front panel meter. It is a direct read meter which changes scale with the range selection on the analyzer. It has a PC card attached to the meter with some pots and jumper blocks. The ranges of this type of meter are selected by jumper block configuration as well as resistor values and is the subject of another service note.

The third type is the subject of this service note. This card uses 3 or 4 pots and a couple of wire jumpers or resistors to select ranges. To set this card to a new set of ranges takes a little more work than with the second type.

The panel meter (DS11) uses 1.9999 VDC to represent 19999 on the meter. The decimal point is settable. The driving circuit supplies .001 ADC (1 mA) to the board at full scale and there is a string of resistors (pots-see attached) on the card. The meter current goes into the card at E1. The pots will develop a voltage drop across them based on the meter current and the pot setting. Three voltages are available. They are located at E5, E4 and E3 (for RNG 1, RNG 2, and RNG 3 respectively). The front panel switch selects one of these three points, based on the range setting, and shorts it to E2 which is the + pin of the front panel display.

Given 1 mA of current across the pots, 1 ohm of pot resistance = .001 V or 10 units on the meter. Thus we get a reading of 10 units for each ohm of pot resistance.

Selecting resistors when changing ranges can be done using this procedure, but API will be glad to assist you with this process if you need it.

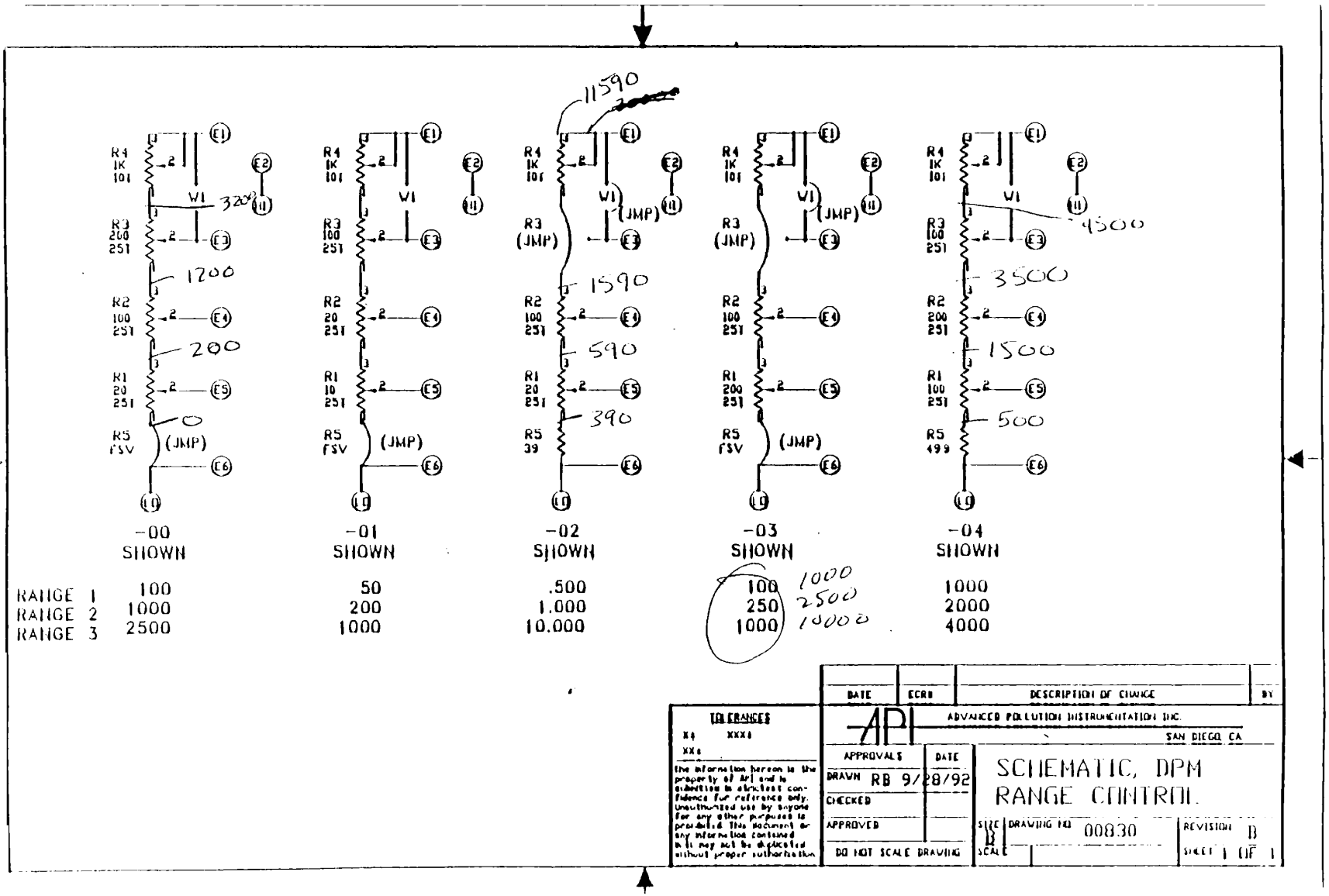
Using the attached schematic, you can select the pots you will need for the new ranges as well as decide whether to use jumpers or not.

If your lowest range is less than 500 units (PPB or PPM doesn't matter here), than you will need to install a jumper at R5 as shown in the -00 and -01 versions. This will allow the value of R1 to select range 1 full scale. Since R1 can vary from 0 ohms to the value of R1, the range will be 0 units at the low end and 10 times the value of R1 at the max adjustment of R1. For instance, a value of 20 ohms for R1 will allow you to have a full scale value for range 1 of 0 to 200 units.

Installing a resistor at R5 will limit the lowest full scale value for range 1 to 10 times the value of R5. The -02 shows this. Adjusting R1 to minimum means a full scale of 390 units (10 times 39 ohms). Adjusting R1 to maximum means a full scale of 10 times (R1+R5).

Installing a jumper at W1 should be done when a value of 10000 units is desired (disregard the decimal point). This is shown in the -02 and -03 versions.

When selecting values for the pots, remember that the pot will adjust from 0 ohms to the value of the pot. You will want to select values that will put the pots around the midrange of their adjustment. Looking at the -04 circuit, R5 sets a minimum range of 49.9 units for range 1. R1 sets a maximum range of 1500. By adding the R2 min and max values to this, R2 will let range 2 vary from 500 (If pots R1 and R2 are 0 ohms) to 3500 (if R1 and R2 are maximum). R3 will let range 3 vary from 500 (R1, R2 and R3 set to 0 ohms) to 4500 (R1, R2 and R3 at maximum). So ranges of 1000, 2000 and 4000 puts the pots right in the middle of their adjustments.



	-00 SHOWN	-01 SHOWN	-02 SHOWN	-03 SHOWN	-04 SHOWN
RANGE 1	100	50	.500	100 1000	1000
RANGE 2	1000	200	1.000	250 2500	2000
RANGE 3	2500	1000	10.000	1000 10000	4000

DATE	ECR#	DESCRIPTION OF CHANGE	BY

TOLERANCES
X± XXX±
XX±

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SAN DIEGO, CA

APPROVALS	DATE
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SCHEMATIC, DPM RANGE CONTROL

SIZE B | DRAWING NO 00830 | REVISION B
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