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Guide to using external contact load voltages with the RT290

Selecting an external load voltage mode

When using RT290 software version 1.4.10 or later the following contact load options are available in a contact resistance test (for use with systems fitted with Contact Voltage Drop (CVD) Cards only)

C104 Contact switching load options:

CA0   as gen and clamp
DCN   dry circuit
L1   6V/100mA
L2   not available with CVD contact card option
L3   not available with CVD contact card option
L4   Vext/R2
L5   28V/100mA

The contact switching load is the load applied to the contact when it is being switched. To enable the external load voltage select switching load L4 Vext/R2.

C410 CR Measurement range options:

100mR-1MR
1R (VD) 6V/100mA
1R (VD) 28V/100mA
1R (VD) Vext/R2

The measurement range determines the load applied to the contact during the contact resistance measurement. To enable the external load voltage measurement range select 1R (VD) Vext/R2.

Connecting an external power supply to the RT290.

In external mode, a stable DC voltage must be applied to the rear panel mounted 4mm terminals. The +ve supply must be connected to the red terminal, the –ve (0V) rail to the black terminal. Any variation in the output voltage will cause measurement errors. Wiring from the power supply should be kept short and 10 Amp rated wire is recommended. If the power supply is 4 terminal, the force and sense connections should be made at the 4 mm terminals on the back of the RT290.

WARNING: The external PSU output voltage MUST be within the range +6.5 to +28.5V. Applying external load voltages greater than +30V DC may activate the RT290 internal crowbar protection circuit which could cause permenant damage to circuitry located on the system power supply card.

Calculating external load power supply voltage requirement

For load voltages > 10 Volts the load power supply voltage equation is:

Load power supply voltage = Voltage required at contact + 0.5 Volts.

Note that for load voltage < 10 Volts the following equation is more accurate:

Load power supply voltage = Voltage required at contact + 0.4 Volts.

Calculating external load power supply current requirement

The external power supply should be capable of providing enough current to supply the required load to each contact card fitted in the system plus a 20% margin.

Maximum load PSU output current
        = Number of contact cards x Maximum load current per contact x 120%

Note that if the contacts are of the 'make before break' type then the above current should be doubled.

Example:

System fitted with 8 changeover contage cards the maximum supply output current should be:

Max. PSU current   = No. of contact cards x Max load current per contact x 120%

                = 8 x 0.1 x 1.2

                = 0.96 Amps

Calculating contact voltage and current

The contact voltage is given as follows,

Load voltage > 10V: *Contact Voltage (V)* = *External PSU voltage – 0.5V* (approx.)

Load voltage < 10V: *Contact Voltage (V)* = *External PSU voltage – 0.4V* (approx.)

The contact current is given as follows:

Contact Current (A) = *(External PSU voltage – 1) / 277 (approx.)*

Example 1:

Contact voltage of 12 Volts is required, then the external power supply should be set to (12 + 0.5) Volts i.e. 12.5 Volts.

The load current will be   = (12.5 - 1) / 277
                              = 0.0415 Amps
                              = 41.5 mA approx.

Example 2:

Contact voltage of 15 Volts is required, then the external power supply should be set to (15 + 0.5) Volts i.e. 15.5 Volts.

The load current will be   = (15.5 - 1) / 277
                              = 0.0523 Amps
                              = 52.3 mA approx.

System Calibration and Selftest using the external load voltage

Before any contact resistance measurements can be performed using the external load power supply, the system must first be calibrated.#

Calibration

If the system is to be used with an external power supply voltage, a system calibration must first be performed. The AUTOCAL.R90 file which is run when the Run, Calibration option is selected has had the following test step added:

Calibrate CR range, Vext/R2

By default this line is skipped ([S] appears) and is therefore not normally run. In order to perform the calibration the following must be done:

1. Connect the external power supply see the section 'Connecting an external power supply to the RT290' above and switch on the RT290 and the external power supply.

2. Run the AUTOCAL.R90 file with the skip control removed from 'Calibrate CR range, Vext/R2'. This is most easily perfomed by using File, Open, Autocal.R90. Then with titles only displayed, use the cursor to hightlight the skipped line and press the keyboard spacebar, then press the letter 'N' on the keyboard, then press the 'Enter' key, then select 'Run', 'Test Sequence'.

3. Exit the software and agree to save the calibration data (save also the PSU A and PSU B data if required).

From this point onwards the external load power supply voltage MUST NOT BE ADJUSTED unless calibration is run again.

Selftest

1. Re-run the RT290 software.

2. Run SELFTEST.R90 file with the skip control removed from 'Self-test CR range, Vext/R2'. This is most easily perfomed by using File, Open, Selftest.R90. Then with titles only displayed, use the cursor to hightlight the skipped line and press the keyboard spacebar, then press the letter 'N' on the keyboard, then press the 'Enter' key, then select 'Run', 'Test Sequence'.

Selftest should pass providing the external load power supply voltage has not changed from when the calibration procedure was performed.