

TESTING THE WH ALLEN ROCOF RELAY

1. Introduction

The WH Allen ROCOF is a single phase df/dt relay used in G59 schemes. The relay is self-powered, and has an exceptionally high inrush current when power is applied. To test this relay using the DVS3, it is necessary to parallel the DVS3 outputs and increase the voltage from zero when powering up. The DVS3 software has been modified from version 1.21 to allow the outputs to be easily paralleled and controlled together.

Note: DVS3 Software version 1.21 or later is required for this test.

2. DVS3 Setup

The ROCOF mode screen on the DVS3 is shown below.

Set Min Freq	ROCOF Fmin: 49.75 Hz Fmax: 50.25 Hz Rate: 0.012 Hz/s	Ua 64.0V
Set Max Freq		Ub 64.0V
Set Rate		Uc 64.0V
Parallel Outputs	SweepType : Cont. sweep	Pa 0.0°
Voltage ABC	↑ ↑ ↑	Pb -120.0°
Sweep Type	C1 <input checked="" type="checkbox"/> C2 <input checked="" type="checkbox"/>	Pc 120.0°
		F 49.88 Hz
		T 11344 ms

Figure 2.1 DVS3 ROCOF mode

To test the WH Allen ROCOF, first set all the outputs to 0° phase. This is achieved by pressing the “Parallel Outputs” button. The output voltage should then be set to zero by selecting “Voltage ABC” and then typing in “0” followed by the enter key.

The display will then show:

Set Min Freq	ROCOF Fmin: 49.75 Hz Fmax: 50.25 Hz Rate: 0.012 Hz/s	Ua 0.0V
Set Max Freq		Ub 0.0V
Set Rate		Uc 0.0V
Parallel Outputs	SweepType : Cont. sweep	Pa 0.0°
Voltage ABC	↑ ↑ ↑	Pb 0.0°
Sweep Type	C1 <input checked="" type="checkbox"/> C2 <input checked="" type="checkbox"/>	Pc 0.0°
		F 49.88 Hz
		T 11344 ms

Figure 2.2 DVS3 ROCOF mode set for parallel outputs

Before starting the test, set the desired minimum and maximum frequency and a rate of change of frequency that will not trip the relay.



3. Connections

Identify the relay operating voltage – this will be either 120V or 240V.

A 120V relay connects directly the DVS3 outputs with outputs A,B, and C connected together using a DVS3 paralleling lead shown in figure 3.1. This has a 1Ω resistor in series with each output from the DVS3.

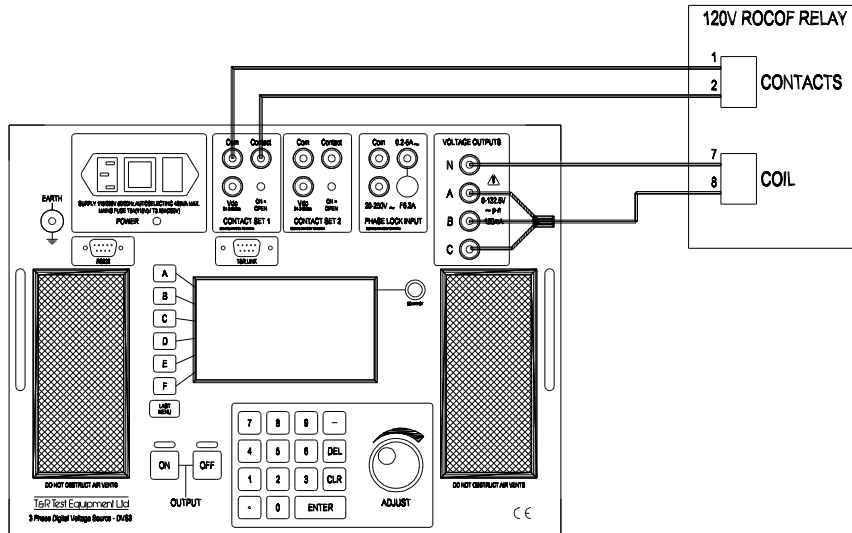


Figure 3.1 Connection for 120V relay

The 240V version of the relay is connected to the DVS3 via the VT box as illustrated in figure 3.2. The outputs of the VT box are connected in parallel using the paralleling lead as shown.

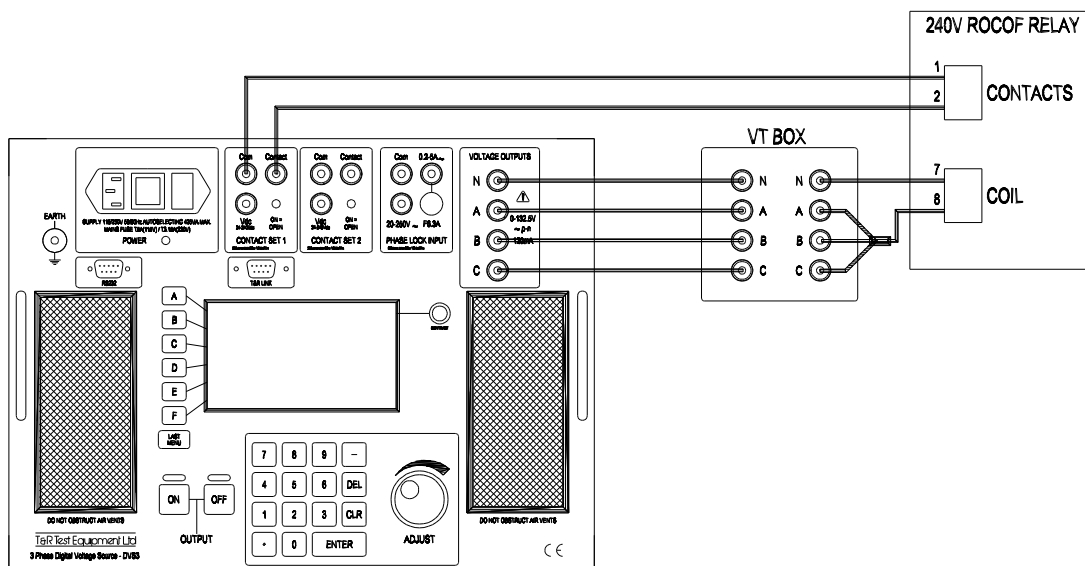


Figure 3.2 Connection for 240V relay

4. Testing

Press the output ON key, and increase the output voltage to the desired level using the adjust knob. If the output trips, switch the output on with the DVS3 set to 5V rather than 0V, and then increase the voltage to the desired test voltage.

4.1 Operating point

To find the operating point of the relay, start with low rate of change, and gradually increase the value using the adjust knob until the relay trips. The state of the relay contacts is shown on the display of the DVS3.

4.2 Timing

To time the operation of the relay, it is necessary to apply a step change of df/dt to the relay, starting the timer at the moment the step is applied.

Set the rate of change to a value that will not trip the relay, and wait for the relay to reset if it was previously tripped.

Type in the new rate of change to trip the relay using the keypad. This should be at least 10% greater than the setting value measured in section 4.1. When the Enter key is pressed, the timer will reset and start, and the new rate of change of frequency will be applied to the relay. The timer will stop when the relay trips.

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