



VEBKO ONLINE HELP

Undervoltage Protection Function Test in MICOM P141 Relay

Category	tester
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Voltage collapse occurs for various reasons such as increasing network load, decrease in phase voltage due to fault in the network, complete loss of bus voltage and similar cases. So, protection 27 is intended for different equipment. Suppose that in the MiCOM P141 relay, there is AND logic, through which the relay measures the phase-to-ground voltage and has a three-phase operation logic. The test preparation process will begin, provided that the setting at 51V phase to ground with a time of 4 seconds is provided for the relay.

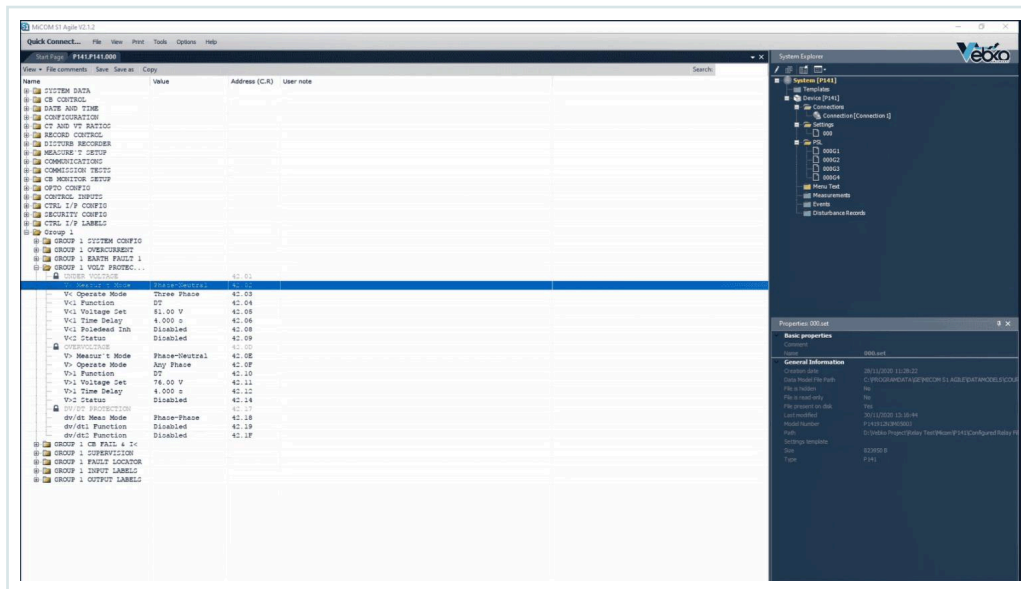


Figure 1

First of all, take a look at the relay configuration during AMPro settings to be aware of the conditions that may have blocked an operation of the undervoltage function. For example, as you can see here, opening the breaker or disconnector blocks the undervoltage.

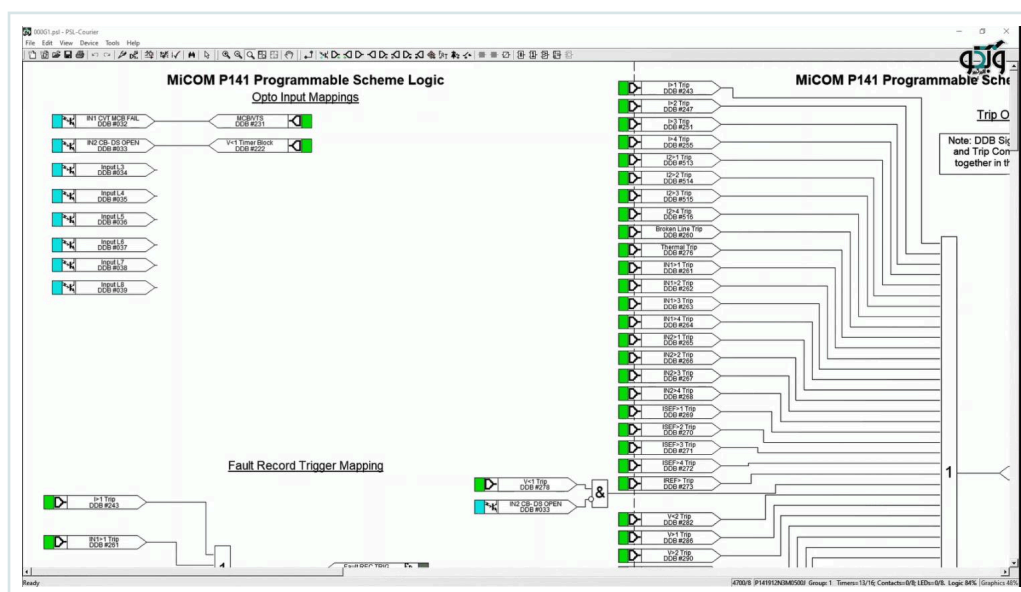


Figure 2

As another example, with online monitoring using “Monitor DDB Signals” feature, you also find that VTS blocks function 27 with AND logic when only one of the voltage phases is off.

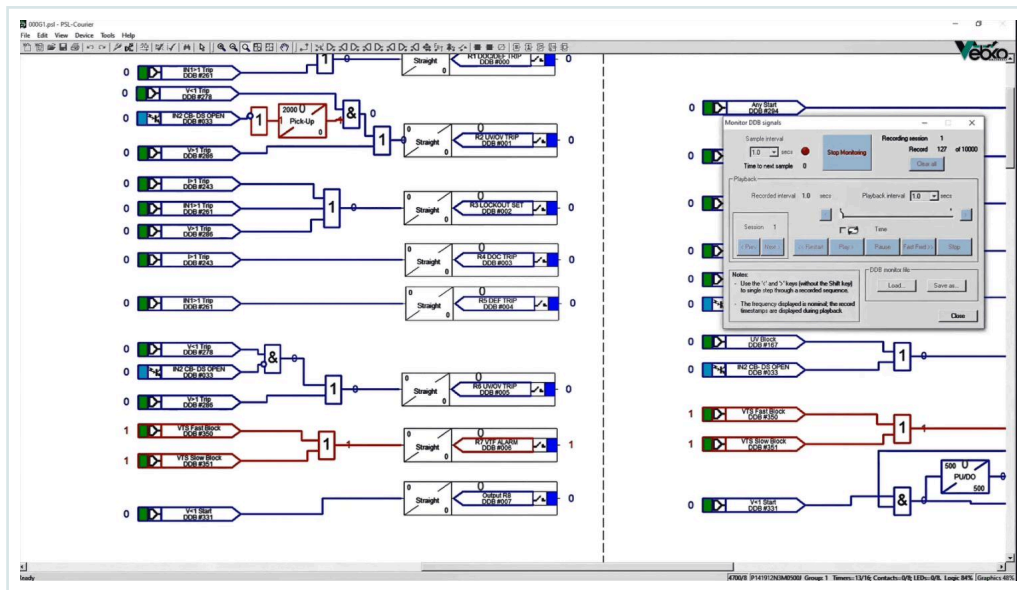


Figure 3

Note that if no conditions has prevented its operation, by default, a tripping command is issued by it and therefore the tripping contact is active. For this reason, it is necessary to create state 1 by default with nominal values to get the relay out of it and ready to test.

Table View			
	☐ S1		Normal General: Direct
Name	Prefault		
V L1-E: V L1-E	63.51 V	0.00 °	50.00 Hz
V L2-E: V L2-E	63.51 V	-120.00 °	50.00 Hz
V L3-E: V L3-E	63.51 V	120.00 °	50.00 Hz
Bin. Out			
Trigger			
Type	Normal		
Comment			
☐ Trigger Condition	C1	Trip	
Bin. Input			

Figure 4

Since the “Current Supervision” function is not active, there is no need to inject current in the relay, therefore deactivate the current outputs in “Hardware Configuration”.

You can specify the end condition of this state on a time or pressing space key in order to manage time duration.

Create the next state to make pickup conditions in three phases. Here you can select “Continuous Ramp” or “Step Ramp” in “State Type” to reduce three-phase voltage simultaneously. The difference between these two state types has already been explained in the following videos, but briefly it can be said that the values are steadily decreasing in “Continuous Ramp” and they decrease with the specific steps by the user in “Step Ramp”. The “Step Ramp” is selected here.

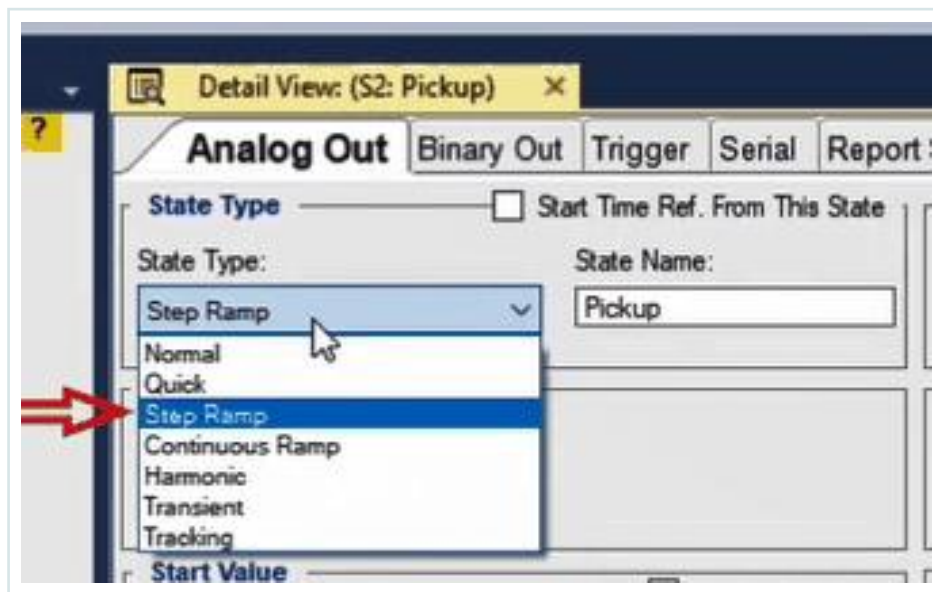


Figure 5

In “Start Value”, start voltage values of the state remain by default, but in order to speed up the test, you can select a value close to the operation settings. Since the constant time characteristic requires 4 seconds to display its performance, it is needed to make it and even a little more after each voltage change. Therefore, “Step Time” is set to more than 4 seconds, for example 4.5 seconds. Another solution is to change the amount of time in the relay from 4 seconds to 0 and perform the test faster. So, you can set the “Step Time” to a little value, such as 200 milliseconds.

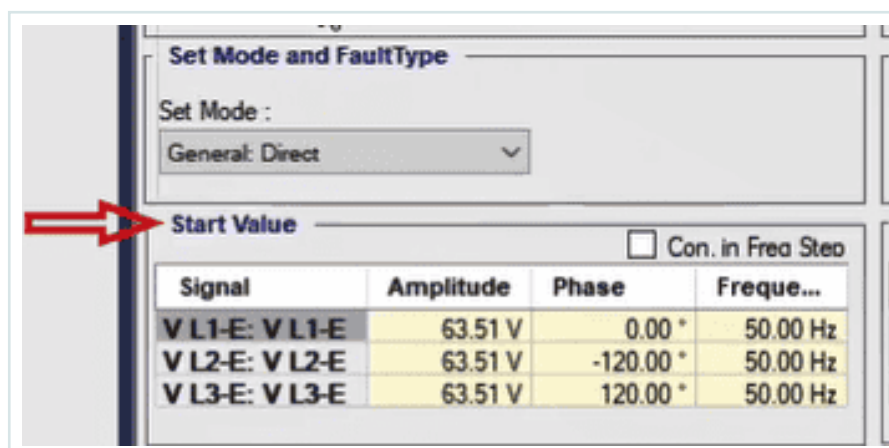
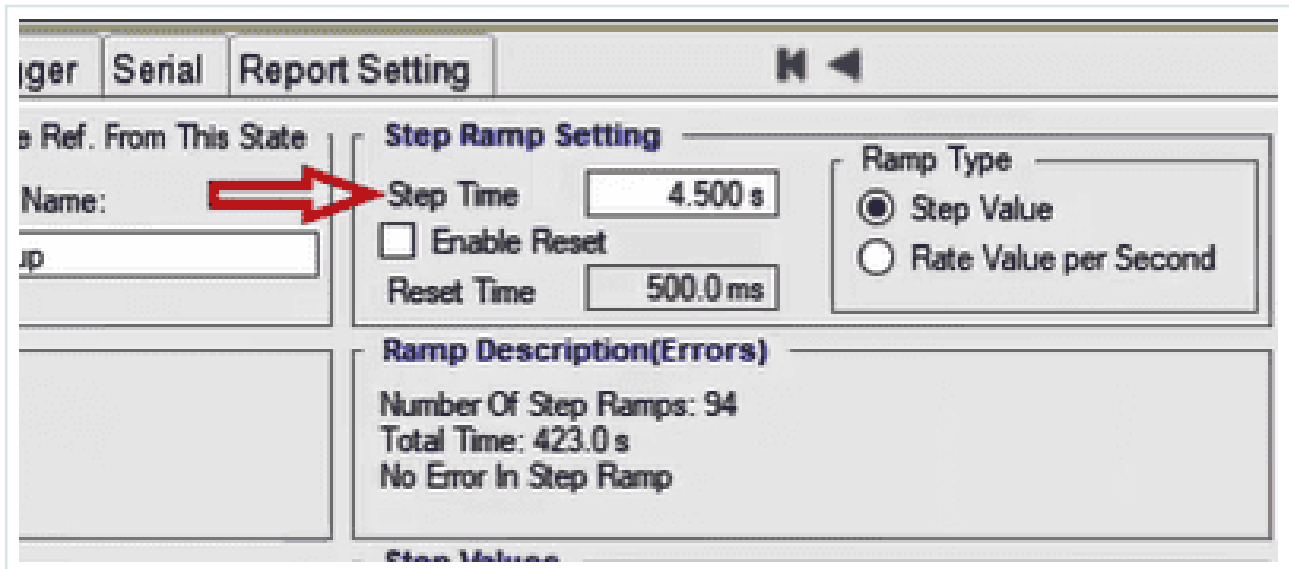


Figure 6



Report Setting

Name:

Step Ramp Setting

Step Time: 4.500 s

☐ Enable Reset

Reset Time: 500.0 ms

Ramp Type

☒ Step Value

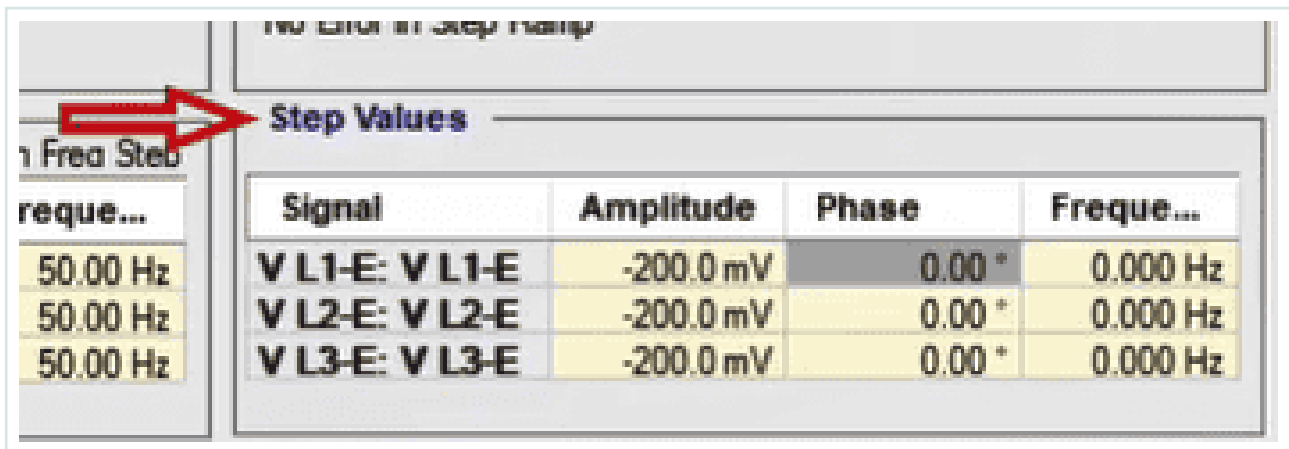
☐ Rate Value per Second

Ramp Description (Errors)

Number Of Step Ramps: 94
 Total Time: 423.0 s
 No Error In Step Ramp

Figure 7

In "Step Values", specify the value of the voltage reduction step. The smaller the steps, the more accurate the pickup value obtained, but it takes a long time.

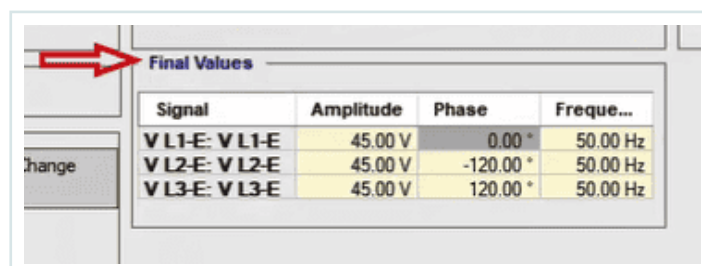


Step Values

Signal	Amplitude	Phase	Freque...
V L1-E: V L1-E	-200.0 mV	0.00 °	0.000 Hz
V L2-E: V L2-E	-200.0 mV	0.00 °	0.000 Hz
V L3-E: V L3-E	-200.0 mV	0.00 °	0.000 Hz

Figure 8

Finally, the final value is specified in "Final Values". Because the voltage is set to 50 volts in the relay setting, this value is set to a less value, for example, 45 volts.



Final Values

Signal	Amplitude	Phase	Freque...
V L1-E: V L1-E	45.00 V	0.00 °	50.00 Hz
V L2-E: V L2-E	45.00 V	-120.00 °	50.00 Hz
V L3-E: V L3-E	45.00 V	120.00 °	50.00 Hz

Figure 9

Afterwards in “Trigger”, you should specify under what conditions this state ends. If a specific LED is determined to record the relay pickup, you can select “Space Key Press” option and press the space key while the LED is on.

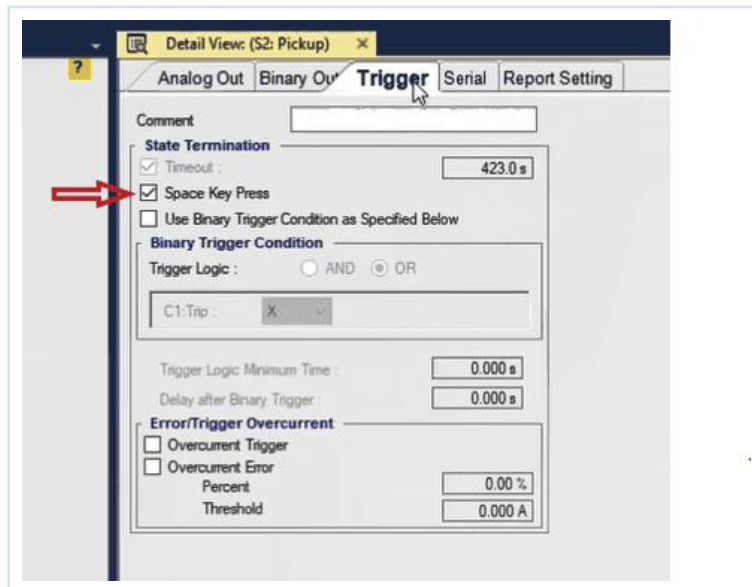


Figure 10

By referring to the MiCOM relay PSL, it's defined LED 1 with any start input to turn on if any element is picked up. At this stage, this option can be used to detect pickups.

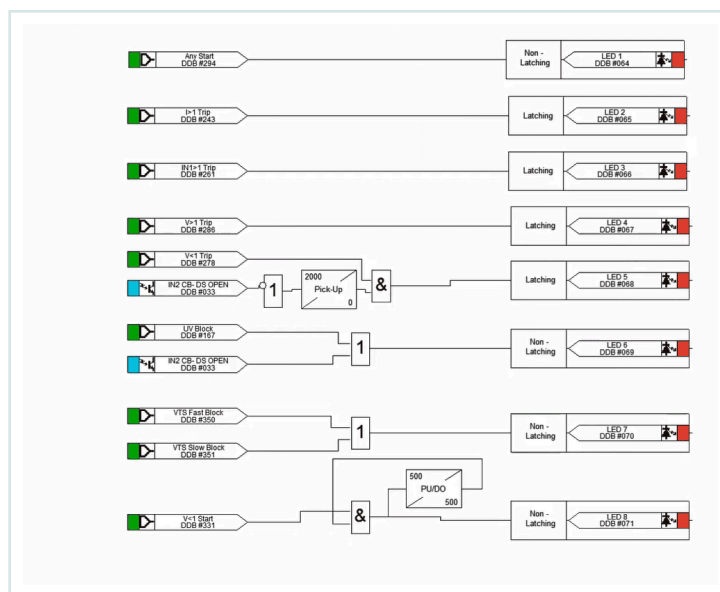


Figure 11

Dealing with it, you can assign a contact to the relay pickup. In this case, you can select the “Use

binary trigger condition as specified below” option in “Trigger”, for example, record the pickup time by connecting the output of the relay contact to the default binary input C1.

In the next step, form the drop off process in the same way but with the process of increasing the voltage. The “Step Ramp” is also selected here. The start value is lower than the setting value, for example, 45 volts. Keep in mind that depending on the moment of the drop off process, you can set “Step Time” to a low value such as 500 milliseconds. In “Step Value”, enter the value of 200 millivolt and in the “Final Step” section, the nominal value remains in force.

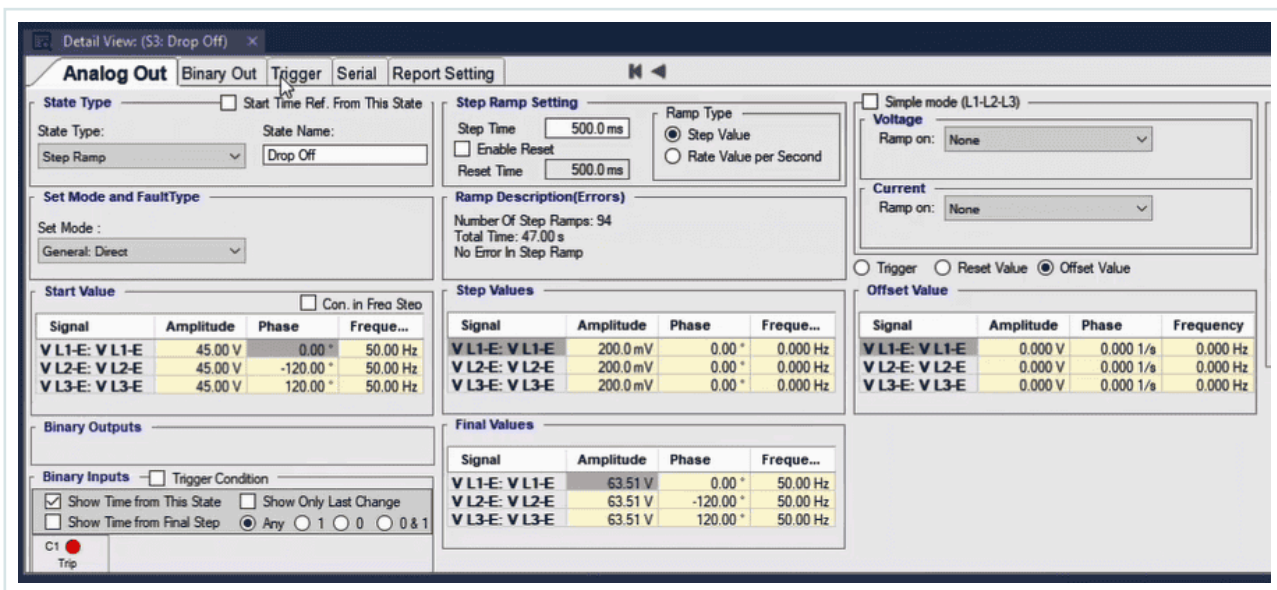


Figure 12

In “Trigger”, you can select the space key or changing a binary from 1 to 0 as a state termination of drop off state.

Finally, the operating time is recorded. It is highly recommended to first create a state for pre-fault to return the condition to normal again. The state trigger is a “Time” or “Space Key Press” as you wish. Now in the final state, to measure the operating time, set the “State Type” to “Normal” mode with a voltage below the operating limit for three-phase.

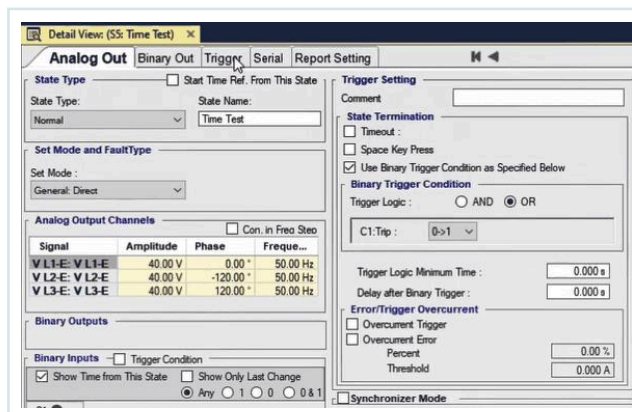


Figure 13

This state trigger can also be the relay tripping contact, which is assigned to one of the binary inputs by default, or it can be recorded by pressing space when it sees the relay LED. However, due to the high accuracy, it is recommended to use binary status change.

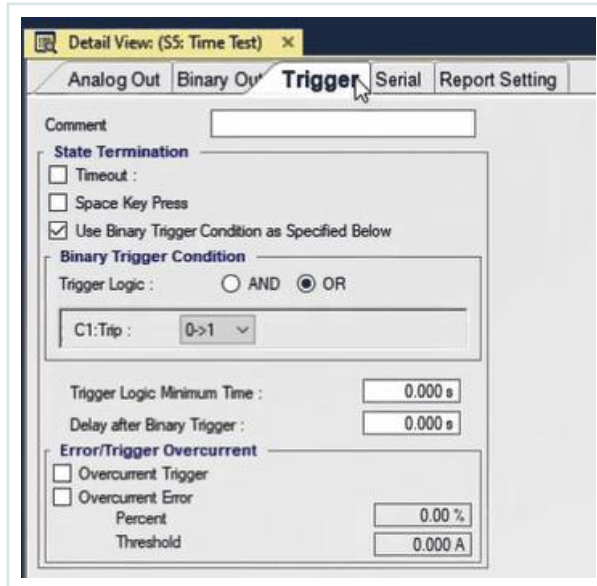
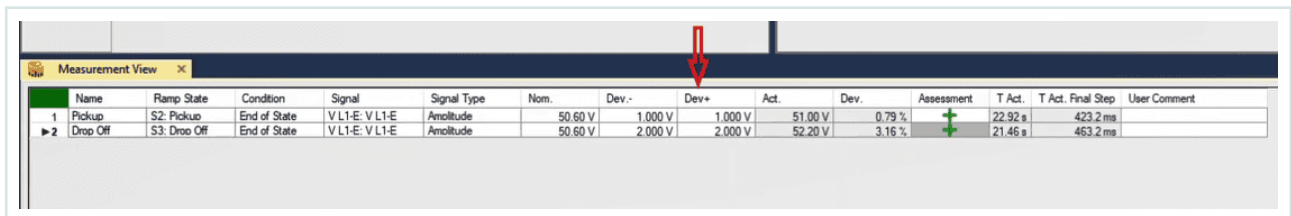


Figure 14

At the end of the test, it's time to apply the settings to record the values in the "Measurement View".

First enter the name, ramp status, state completion condition, signal to be checked, signal type, nominal value and tolerance for the state in which the pickup is registered, i.e., state 2. If the values are entered correctly, you will see the amount of voltage recorded for the three-phase pickup in the "Act" column. Also, in "Dev" the recorded error and in the "Assessment" section the green confirms the test result. Follow this for the state in which the drop off is recorded.



Name	Ramp State	Condition	Signal	Signal Type	Nom.	Dev.	Dev+	Act.	Dev.	Assessment	T Act.	T Act. Final Step	User Comment
1 Pickup	S2: Pickup	End of State	V L1-E: V L1-E	Amplitude	50.60 V	1.000 V	1.000 V	51.00 V	0.79 %	+	22.92 s	423.2 ms	
2 Drop Off	S3: Drop Off	End of State	V L1-E: V L1-E	Amplitude	50.60 V	2.000 V	2.000 V	52.20 V	3.16 %	+	21.46 s	463.2 ms	

Figure 15

You can now record the operating time assessments in "Time Assessment". Here you also enter the state name, states or conditions that should be ignored in this review, start and end conditions, nominal value and tolerance limit. In this section, if all the items are entered correctly, you can see the operating time in "T Act" column. Also, the error is specified in "T Dev" and you can make sure of the correct operation in the "Assessment".

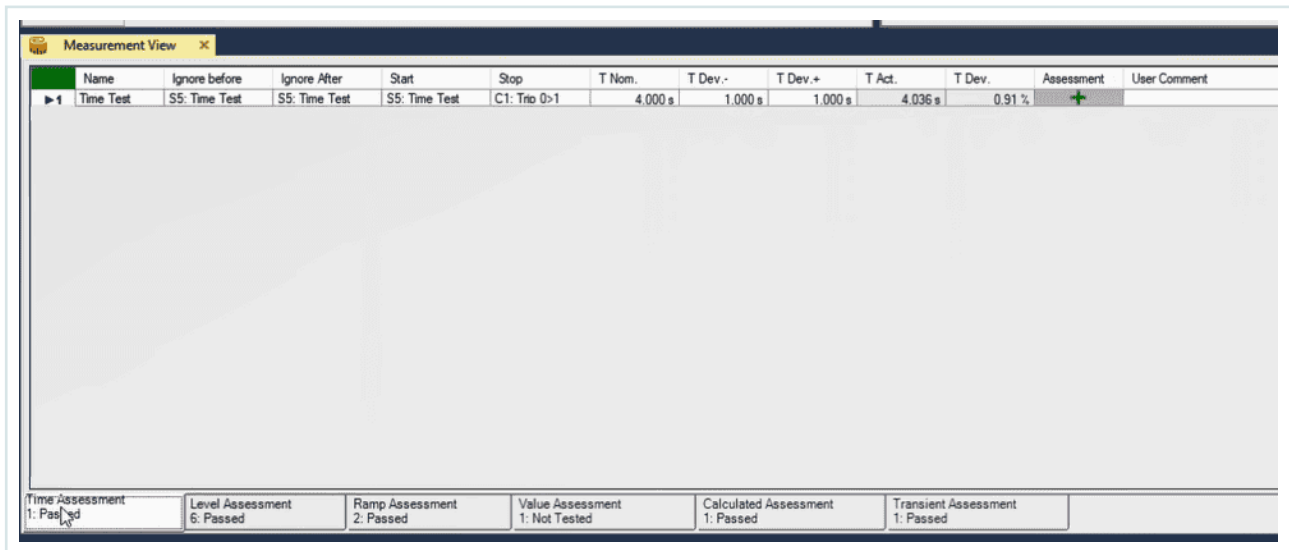


Figure 16

After this step, by selecting “Parameters” and then clicking on “Reports”, you can select the elements that you want to display in “Report Settings” and have the output as a file.

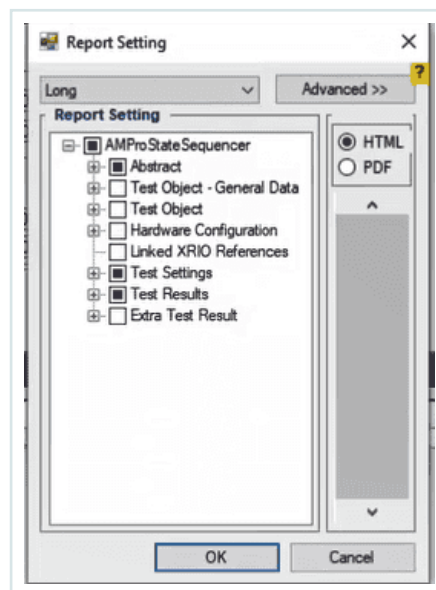


Figure 17

[jg1]MICOMP141_UNDERVOLTAGE