Replace Thyristor

Does this solve the problem?

1] Yes

2] No

3] I don't know

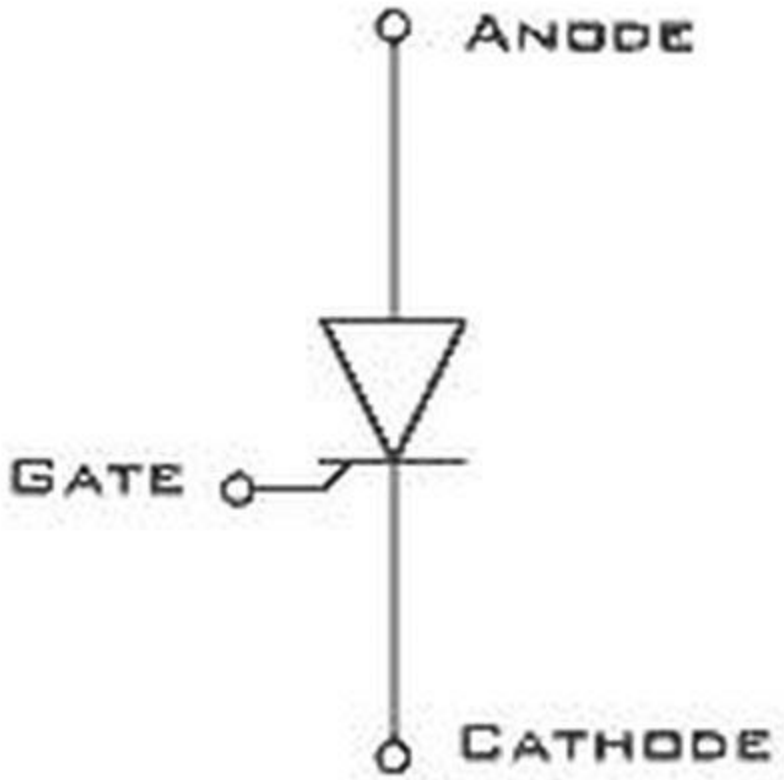
- **Explanation**

In this failure mode the alarm normally trips at 1000/1200rpm when the turbine connects to the grid. There are also current asymmetries in this failure mode which can be observed in the TAC display panel.

Thyristor – measurement test:

A thyristor is a simple diode, which can be switched on and off.

Example:



Please, note the names of the wires, they start with “A” and “K” ©.

We use double thyristor as one diode can only conduct in one direction.

Note the connections marked with A, AK and K.

AK is the center of the two thyristors.

Measuring on the thyristor.

Tools: Ordinary multimeter for measuring resistance in Ω.

With the red multimeter lead on ‘A’ and the black lead on ‘K’ it is possible to measure approximately 1-2 M ohm.

If the wires are exchanged the resistance will be even higher.

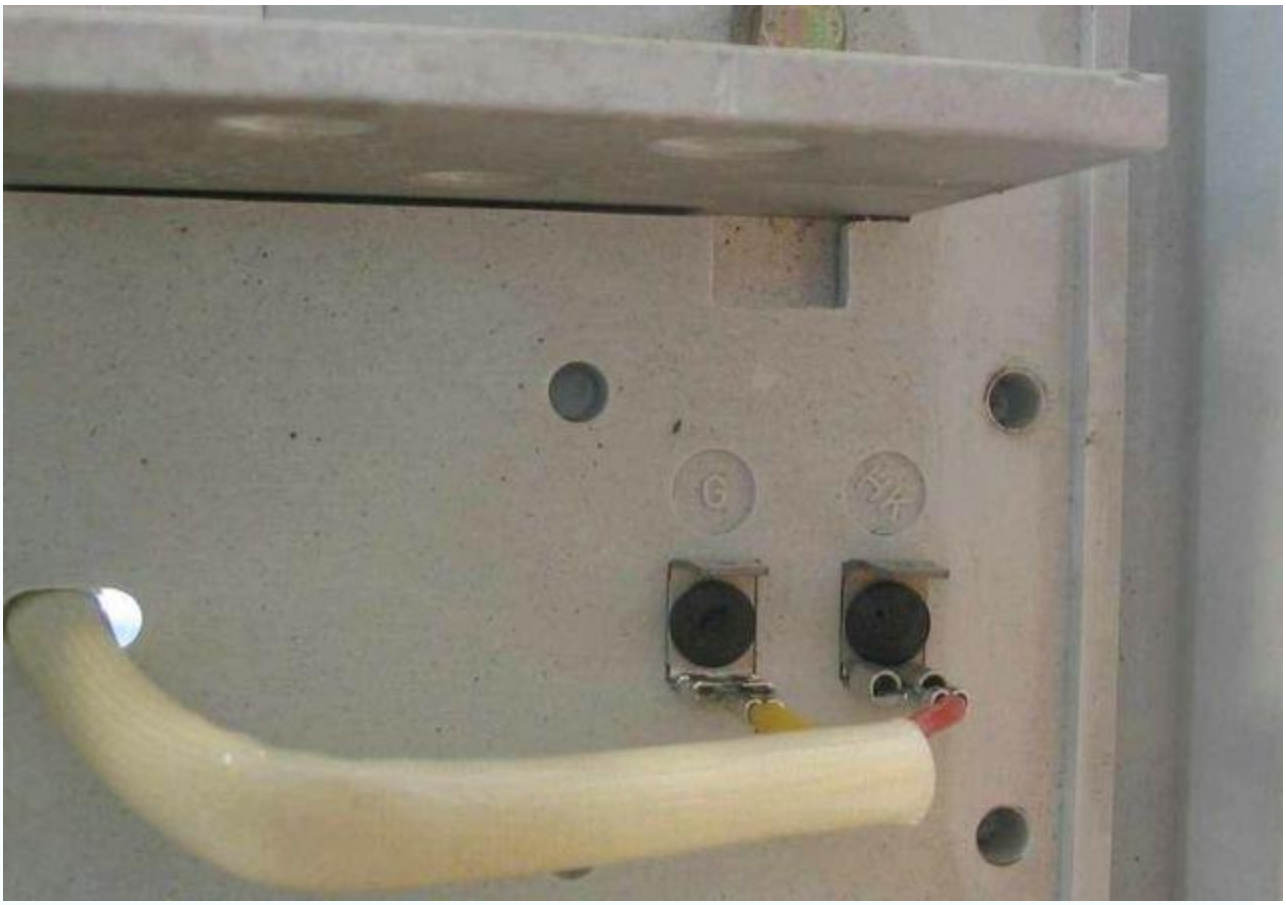
If the thyristor is defective the measurements will be radically different, maybe 100 ohm or below.

The measuring is made on both thyristor halves, in other words from ‘A’ and to ‘AK as well as from ‘AK’ to ‘K’.

On the two thyristor halves there is also a ’control leg’ marked with G, which is placed next to a ‘leg’ marked ‘HK’, which is connected to ‘K’.

By placing voltage on ‘G’ compared to ‘K’, the trigger card ensures that the diode opens.

Between ‘G‘ and ‘HK’ the measurement should be approximately 10 ohm.



Relevant spare parts	
Description	**Item No.**
Thyristor Module	60001041

Replace fuses

Does this solve the problem?

1] Yes

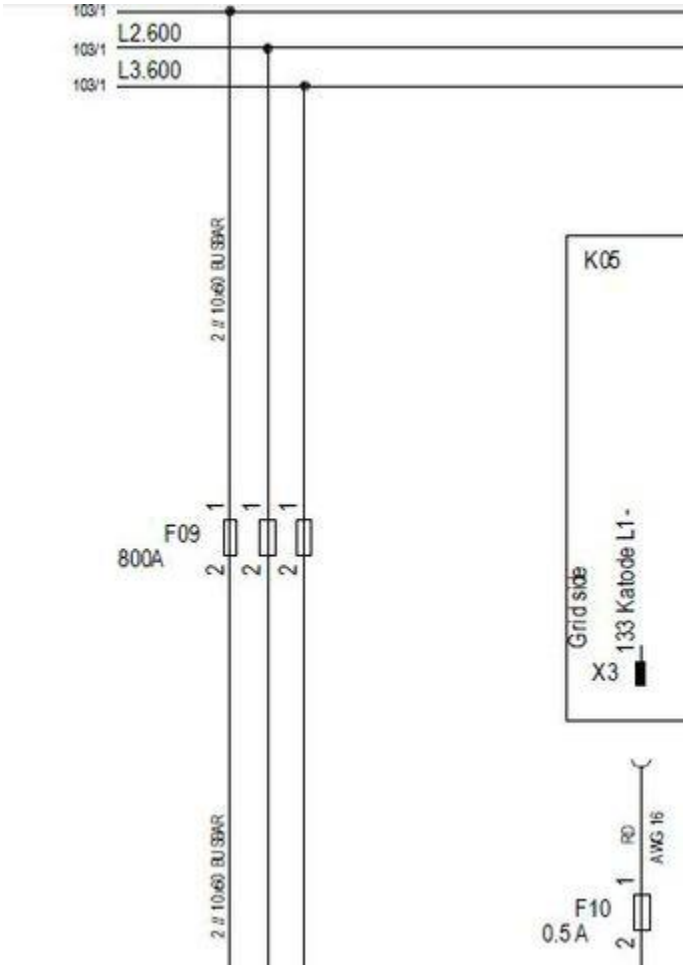
2] No

3] I don't know

- **Explanation**

Relevant spare parts	
Description	**Item No.**
Fuse SEMI 660V 800A PSC IEC/UL	60005355

Note: Sometimes there is no (aux) feedback from the thyristor fuse to trip ”alarm 563 Thyristor fuse blown” and it will show alarm 30 instead.



If the thyristor fuses fail often in low wind, check the BIOS version in the TAC II Controller and update as necessary in accordance with: 1001826

Relevant documentation	
Description	**DMS No.**
Upgrading of the BIOS in TAC II controller	1001826

Replace capacitor contactor and other defective components in PFC Panel

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

If occurring in low wind on a few turbines in the park, check for +kvar in the alarm snap-shots or data-logger, if so there is likely a capacitor contactor stuck closed while the turbine is not producing power.

Check the power factor correction contactors in the AT3 cabinet. None of them should be closed if the turbine is in pause or stop.

If you find a contactor stuck, go on to troubleshoot the rest of the components in that capacitor module. The WKI for replacing the capacitor has steps for testing the capacitors.

Perform a continuity test on all the fuses to find any that may be open.

Perform a capacitor test with your multimeter on all the capacitors one at a time, to determine if any have failed. A failed capacitor will normally show deformations, but it is possible for the capacitor to fail and look perfectly fine from the outside. A visual inspection is not enough to find a bad capacitor.

Relevant documentation	
Description	**DMS No.**
PFC panel wiring diagram Doc.	6013974
Replacing defective capacitors Doc.	0014-8310

Relevant spare parts	
Description	**Item No.**
CONT K350K10200 W/RCUNIT 240V	60099292
PFC capacitor unit	60013923
CAP 25kVAr 690V 50Hz VISHAY	60000931

Check/Replace current transformer and Shunt Resistor

Does this solve the problem?

1] Yes

2] No

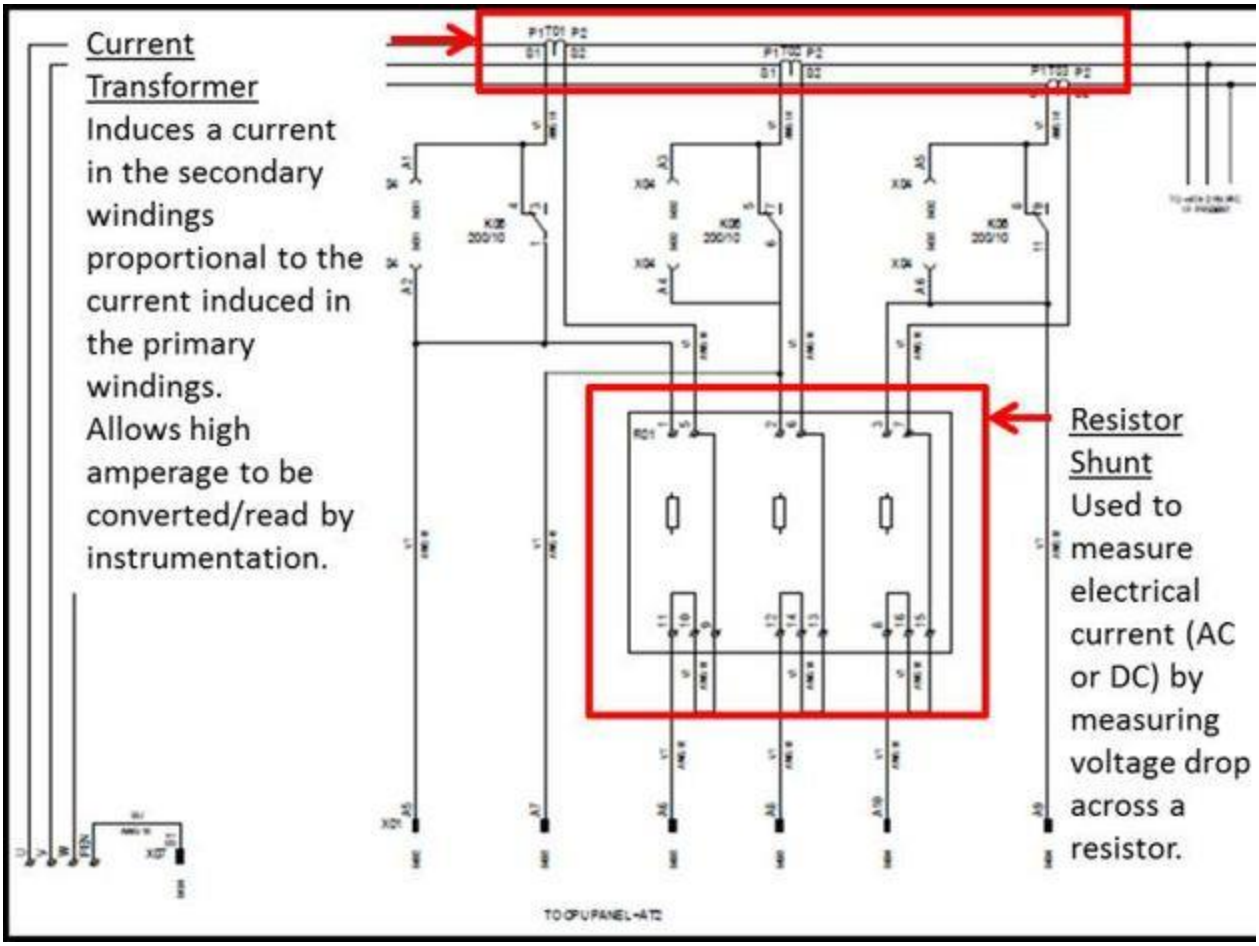
3] I don't know

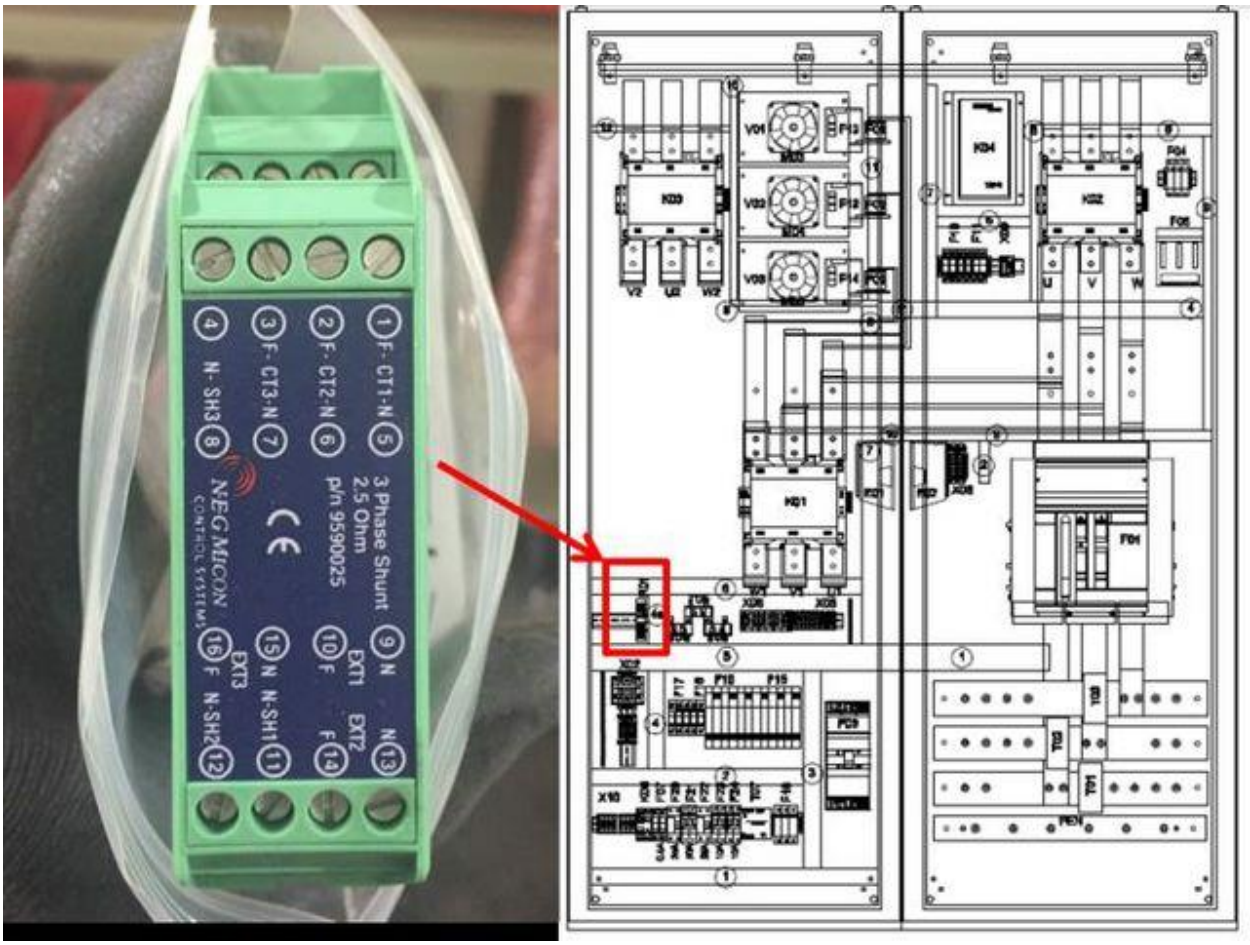
- **Explanation**

NOTE: The entire turbine must be isolated from the grid to access the CT's!

Remove wires from CT's and measure resistance. A good CT should measure about 7 ohms.

Put wires back on current transformers and test resistance with wires on. If higher resistance is found on faulting line problem is likely the Resistor Shunt in the AT1.


Current Transformer
Induces a current in the secondary windings proportional to the current induced in the primary windings.
Allows high amperage to be converted/read by instrumentation.
Resistor Shunt
Used to measure electrical current (AC or DC) by measuring voltage drop across a resistor.



Relevant spare parts	
Description	**Item No.**
TRAFO CURRENT 2000/1A 25VA	60007164
RESISTOR SHUNT 3X2.5 OHM	51700501

Relevant documentation	
Description	**DMS No.**

“Current Transformer Replacement V82 1.65MW”	0034-5892

Inspect/replace K06 Relay

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

Check the K06 relay in the AT1 cabinet. Replace it if fond to be defective.

Test the contacts by manually closing them with the orange tab (lift) on top of the K06.

Relevant documentation	
Description	**DMS No.**
Main Panel AT1 wiring diagram	934113

Relevant spare parts	
Description	**Item No.**
RELAY MT326230 10A 230V 3P	60004535

Inspect/replace fuses

Does this solve the problem?

1] Yes

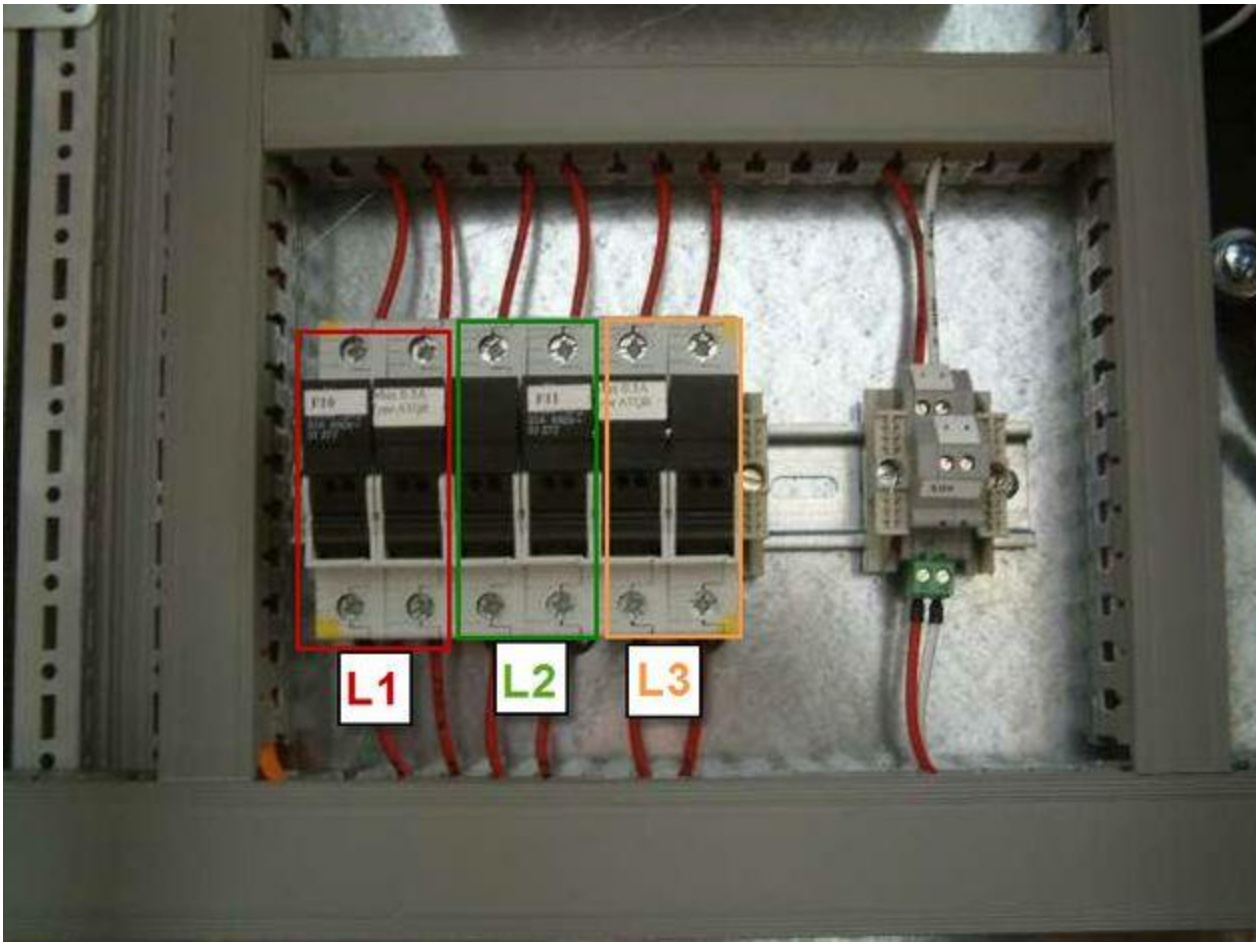
2] No

3] I don't know

- **Explanation**

An asymmetry in the current could be due to the F10 or F11 0.5A fuses located between the TAC40 and the thyristors. This problem would exhibit itself before the K02 bypass contactor closes.

This will not cause alarm 563, thyristor fuse blown. That alarm is caused by the F09 opening.



Relevant spare parts	
Description	**Item No.**
Fuse ATQR CC Time Delay .5A	60005379
Fuse holder for F10 or F11	60005362
PFC capacitor unit	60013923

Relevant documentation	
Description	**DMS No.**
Main Panel AT1 wiring diagram	934113

http://dkrdsdezide01/internal/start.jsp?guide=V82%2FTroubleshooting%2F30+-+Asymmetric+current+fast++-+NM72%2CNM82%2CV82+Mk1-5.net&section=17

Feedback

Check and replace the operation of Trigger Board

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  Check and replace the trigger board, if it's not operational as intended.

Relevant spare parts	
Description	**Item No.**
TRIGGER BOARD TAC 40 690V	51700901

Test/Replace the K01 Grid Contactor

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  Check the K01 Grid Contactor. If it is not closing evenly, it could cause unevenly high resistance on two of the lines making one line look like it has high amperage. With the circuit LOTO, manually operate the K01 and confirm that it

works with a digital multimeter. Use the white pushbutton to manually close the K01 and then use a multimeter to test the resistance on each line across the contactor.

Relevant spare parts	
Description	**Item No.**
CONT EH1200-30-11 220V/220-240V 50/60Hz	60004316

Check/Replace TAC II

Does this solve the problem?

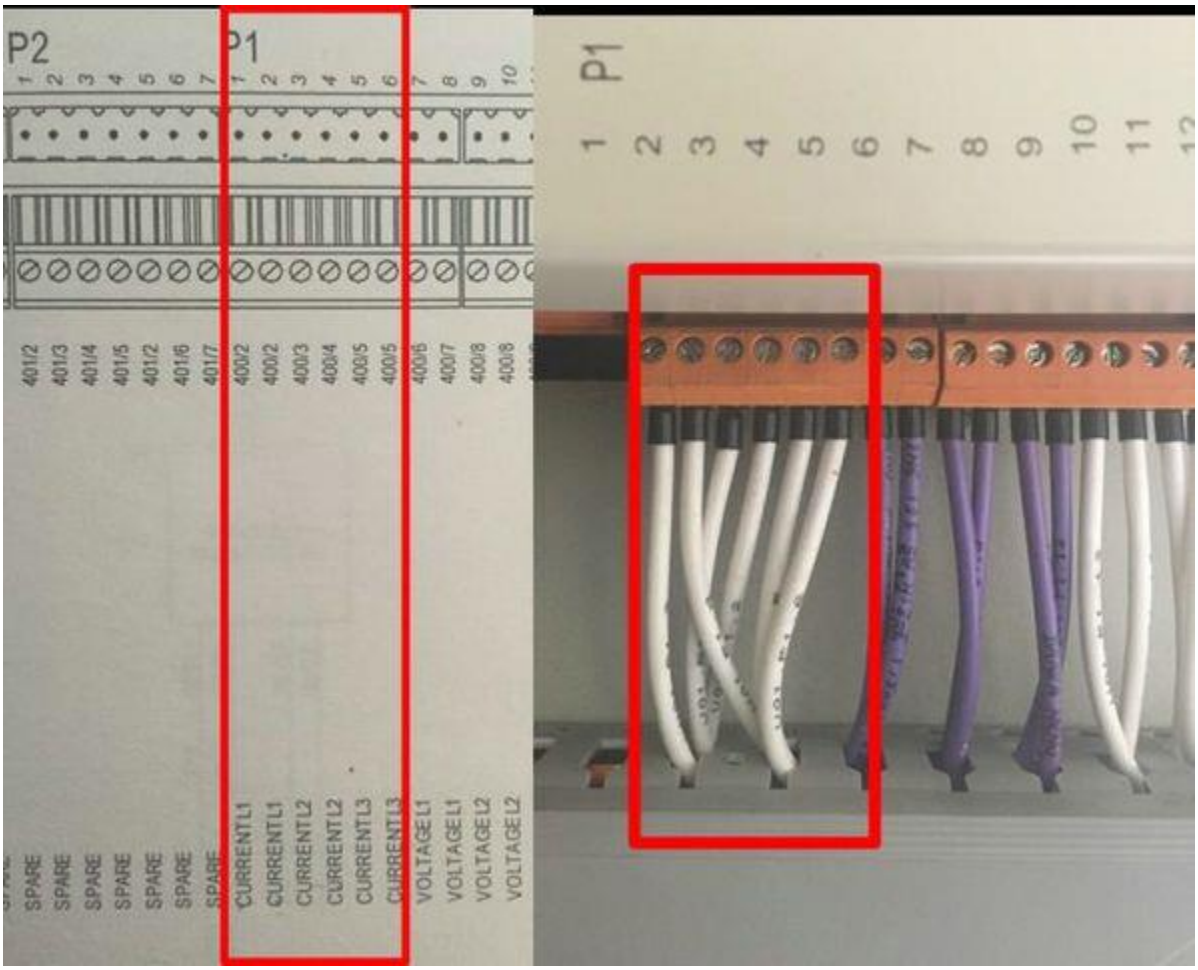
1] Yes

2] No

3] I don't know

- **Explanation**

  Verify the TAC II isn't defective. Look in alarm snapshot to see which phase is incorrect and switch to another phase at the P1 connector on the back of the TAC II. If the fault current stays the same, the TAC II is defective if it moves the issue is in another part of the circuit.



Relevant spare parts	
Description	**Item No.**
TAC-II/F NEGM NM1500C/72/82	51707301

Check Generator cable and generator

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

Measure the Insulation Resistance between generator cable cores and replace, if found defective.

Check the generator. When taking measurements on the generator remember to dismount all cables, as it will make the measurement unreliable if they remain connected.

Relevant documentation	
Description	**DMS No.**
Electrical Measurements on Generator	959335

Relevant spare parts	
Description	**Item No.**
CABLE LUGS & BOLT SET V82 GEN	60106872
GEN ELIN 1650kW 690V 50Hz	093858 / 093858REN