

**Adaptation circuit for Sepam series 60 & 80
using 240VAC supplied coils
and Trip Circuit Supervision**

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Application note

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UPDATES

Version /date Written by	Modified pages	Origin and description of the modification
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1) OBJECTIVES

Sepam series 60 & 80 are designed to be supplied with a DC voltage only, for the Sepam supply itself as well as for the digital inputs. Driving an AC supplied coil is not an issue as the digital outputs are dry contacts of relays. However when TCS, Trip Circuit Supervision need to be used then the AC supply of the coil cannot be used to feed the digital inputs.

When digital inputs are supplied by an AC source no destruction is expected but the response time of the inputs is totally unknown, and can go up to several seconds. This leads to unpredictable behavior of the control command logic.

This document describes a circuit that can be used to feed I101 & I102 from a 240VAC source, which makes it possible to drive the AC-supplied coil and use TCS at the same time.

2) CIRCUIT DESCRIPTION

The Sepam trip circuit supervision function is designed for trip circuits with shunt trip or undervoltage coils.

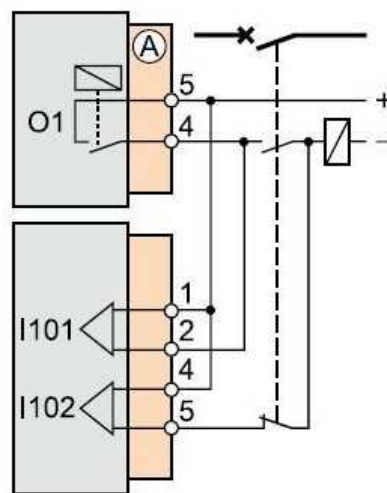
With undervoltage trip units, only the circuit breaker position contacts can be supervised (if trip coil is defective, the CB will open so the detection is made).

With shunt trip coils the function detects the circuit continuity, the loss of supply and mismatching of position indication contacts.

When a fault is detected, the function inhibits closing of the breaking device.

The TCS usage implies a specific wiring of I101 and I102: the wiring arrangement uses a current passing through the coil to supply the inputs. So, if the coil circuit becomes an open circuit (for example, due to a wiring issue or coil failure) the corresponding input is not activated anymore and the TCS function detects the fault.

Here is the wiring described in the user manual for trip coils supplied by a DC power supply:

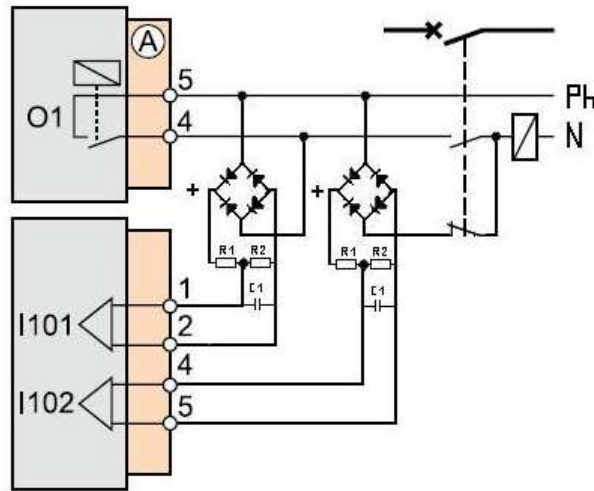


When the CB is open, I102 is activated by the current flowing from positive rail of the supply to the negative pole through a normally closed contact and the coil. When the CB is closed, the current of I101 goes through a normally open contact of the CB and the trip coil.

In both cases the input's current needs to pass through the coil, ensuring the supervision of the coil.

When the coil is supplied by an AC voltage, the above wiring cannot be used because the input will receive AC voltage.

The wiring below can then be used:



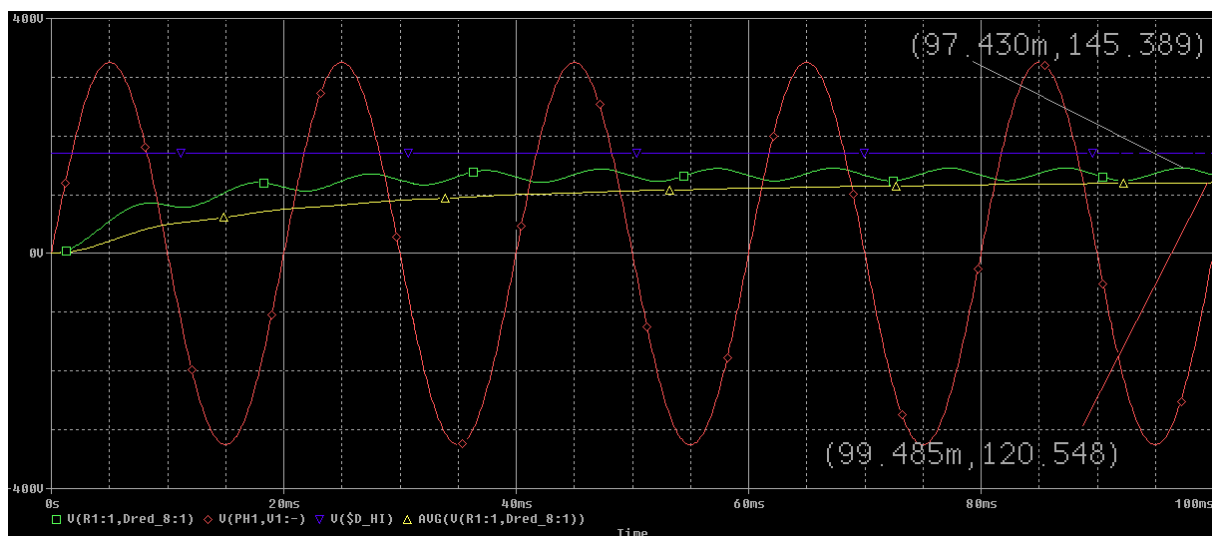
The adaptation circuit uses a diode bridge to rectify the AC voltage. The DC voltage produced is then reduced by the voltage divider made by R1 and R2. The signal is then filtered by C1.

The circuit uses the following component values (designed for 240VAC only, cannot work for other voltages):

- Diode bridge: 600V or more / 1A or more, no need for particular diodes like high speed, soft recovery, but they will suit also.
- R1 : 33kOhm 3 watts (power needed to withstand a short circuit on R2)
- R2 : 50kOhm 1 watt
- C1 : 0,47μF 250VAC or more, class X (class X is mandatory here)
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For the resistors, one possibility is to source only 100kOhm 1 or 2 watts and use 3 in parallel for R1 and 2 in parallel for R2.

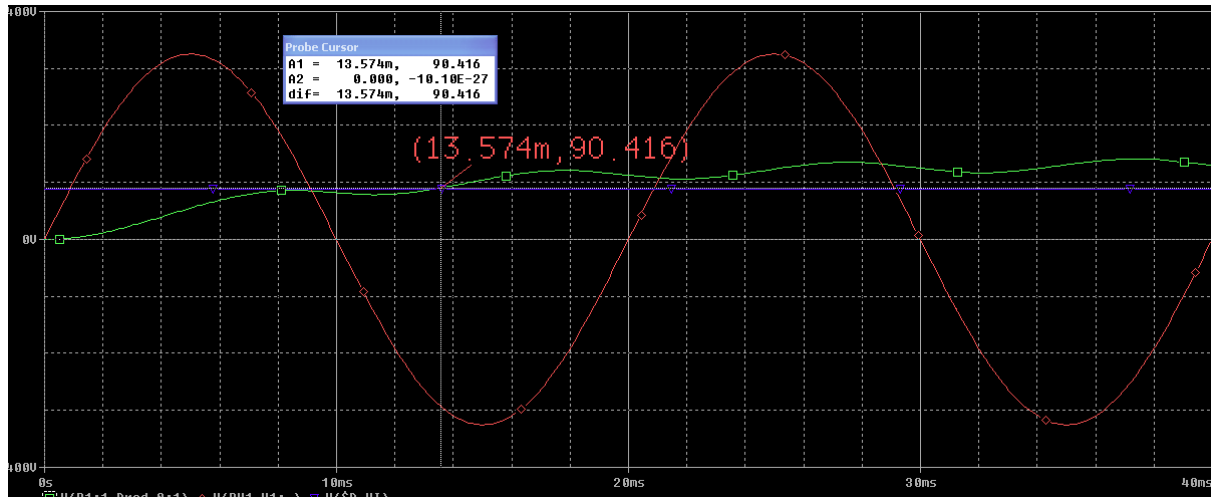
With these values the signals are the following:



Red: input voltage
Green: voltage applied on the Sepam input
Blue: MES 120G threshold

This simulation shows that the circuit cannot be used with 240VAC and the MES120G module because the input activation threshold is 170V and the output signal doesn't reach that level

Utilization of MES120H module:



With the MES120H the threshold is 88V. The output signal crosses that value after less than 14ms in the worst case (AC voltage starting exactly at 0V).

A standard MES120 module is also suitable as the threshold is 19V. However this version of MES120 provides a lower immunity to electrical noise because of the lower threshold.

3) CONCLUSION

This adaptation circuit built in duplicate can be interposed between the AC voltage supply and the I101 & I102 inputs.

This circuit only works for 240VAC and the MES120H must be used. The threshold compatibility of MES120H (155V) must be checked for the other inputs present on this module (I103 to I114).

It is however possible to mix MES120, 120H and 120G on the same Sepam Series 80 base unit (no setting needed according to the MES module).

AED does not provide any industrial solution for this circuit. It has to be built locally under the responsibility of the builder.

The component choice has to be strictly respected for safety and reliability reasons.