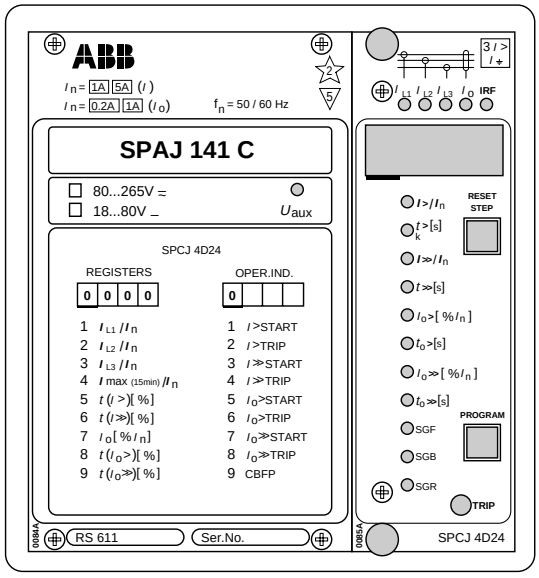
Operation indicators



A) The indicator TRIP is lit when one of the protective stages operate. When the protective stage resets, the red indicator remains lit.

B) If the display is dark when one of the protective stages I>, I>>, I_0> or I_0>> call for a tripping, the faulty phase or the neutral path is indicated with a yellow LED. If, for instance, the TRIP indicator glows red, and the indicators I_{L1} and I_{L2} at the same time are illuminated, overcurrent has occurred on phase L1 and L2.

C) Besides being a code number at data presentation, the leftmost red digit or the display serves as a visual opetarion indicator. An operation indicator is recognized by the fact that the red digit alone is switched on. The following table named OPERATION IND. on the relay front panel is a key to the function code numbers used.

Indication	Explanation
1	I> START = The low-set stage I> of the overcurrent unit has started
2	I> TRIP = The low-set stage I> of the overcurrent unit has tripped
3	I>> START = The high-set stage I>> of the overcurrent unit has started
4	I>> TRIP = The high-set stage I>> of the overcurrent unit has tripped
5	I_0> START = The low-set stage I_0> of the earth-fault unit has started
6	I_0> TRIP = The low-set stage I_0> of the earth-fault unit has tripped
7	I_0>> START = The high-set stage I_0>> of the earth-fault unit has started
8	I_0>> TRIP = The high-set stage I_0>> of the earth-fault unit has tripped
9	CBFP = Circuit Breaker Failure Protection has operated

D) The TRIP indications persist when the protective stage returns to normal. The indicator is reset by pushing the RESET/STEP push-button.

Further, the indicators may be reset via the external control input 10-11 by applying a control voltage to the input, provided that the switch SGB/8 is in position 1.

The basic protective relay functions are not depending on the state of the operation indicators, reset or non-reset. The relay is permanently operative.

If a protective stage starts, but no tripping occurs because the energizing quantity goes below the starting level before the delay circuit times out, the starting indicators are normally automatically switched off. However, by means of the switches SGF2/1…4 the starting indications may be made persistant which means that they are to be reset by pushing the RESET/STEP push-button.

The persistent indications are obtained through the following programming.

Switch SGF2/1 = 1
Starting indication on I> persistent
Switch SGF2/2 = 1
Starting indication on I>> persistent
Switch SGF2/3 = 1
Starting indication on I_0> persistent
Switch SGF2/4 = 1
Starting indication on I_0>> persistent

On delivery from the factory the switches SGF2/1…4 have the preset configuration 0.

E) Shortly after the internal self-supervision system has detected a permanent relay fault the red IRF indicator is switched on and the output relay of the self-supervision system operates. Further, in most fault situations a autodiagnostic fault code is shown in the display. The fault code is composed of a red figure 1 and a green code number which indicates what may be the fault type. The fault code persists until the STEP/RESET button is pressed. When a fault code appears on the display, the code number should be recorded and stated when service is ordered.

Power supply and output relay module

To be able to operate the relay needs a secured auxiliary voltage supply. The power supply module forms the voltages required by the measuring relay module and the auxiliary relays. The withdrawable power supply and output relay module is located behind the system front panel, which is fixed by means of form cross-slotted screws. The power supply and output relay module contains the power supply unit, all output relays, the control circuits of the output relays and the electronic circuitry of the external control inputs.

The power supply and output relay module can be withdrawn after removing the system front panel. The primary side of the power supply module is protected with a fuse, F1, located on the PCB of the module. The fuse size is 1 A (slow).

The power supply unit is a transformer connected, i.e. galvanically isolated primary and secondary side, flyback-type dc/dc converter. It forms the dc secondary voltages required by the measuring relay module; that is +24 V, ±12 V and +8 V. The output voltages ±12 V and +24 V are stabilized in the power supply module, while the +5 V logic voltage required by the measuring relay module is formed by the stabilizer of the relay module.

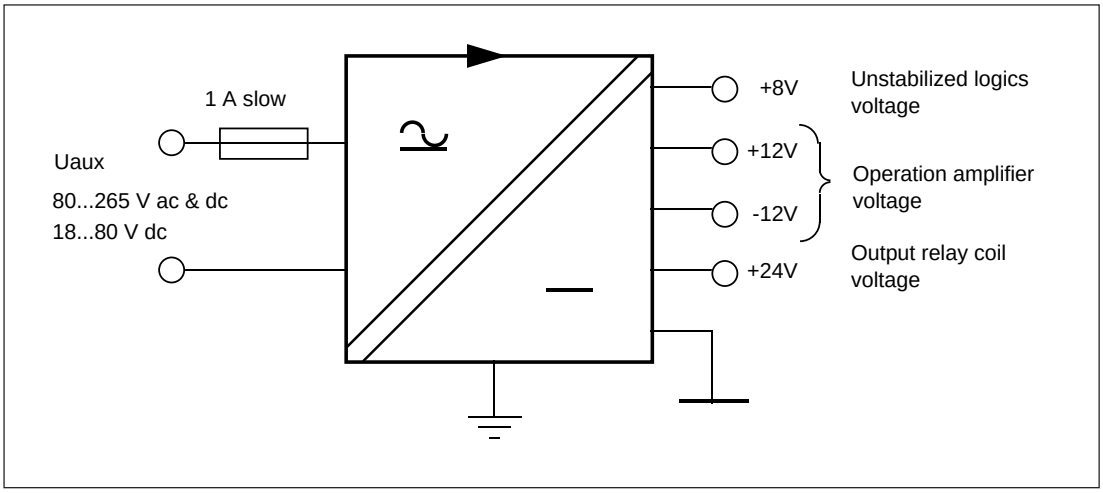


Fig. 5. Voltage levels of the power supply module.

A green LED indicator U_{aux} on the system front panel is illuminated when the power supply module is in operation. The supervision of the voltages supplying the electronics is placed in the measuring module. If a secondary voltage deviates from its rated value by more than 25 %, a selfsupervision alarm will be established. An alarm is also received when the power supply module is withdrawn from the relay case, or when the auxiliary power supply to the relay is interrupted.

There are two versions of power supply and output relay modules available. For both types, the secondary sides and the relay configurations are identical, but the input voltage ranges differ.

Insulation test voltage between the primary and secondary side and the protective earth
2 kV, 50 Hz, 1 min

Rated power P_n 5 W

Voltage ranges of the power supply modules:
- SPTU 240 R1 U_{aux} = 80...265 V dc/ac
- SPTU 48 R1 U_{aux} = 18...80 V dc (on request)

The SPTU 240 R1 module can be used with both ac and dc voltages. SPTU 48 R1 is designed for dc supply only. The system front panel of the relay indicates the auxiliary voltage range of the power supply module of the relay assembly.