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AFR 31

Smart Load to Reduce Ferroresonance

Description

The AFR 31 Smart Load is an instrument designed to protect metering voltage transformers against adverse effects of ferroresonance in medium voltage power distribution systems with ungrounded or indirectly grounded neutral wire. Ferroresonance comes up between transformer inductance and conductors' or switching elements' capacitance. Connecting, disconnecting, ground faults or other transitional effects may be the trigger events. Ferroresonance oscillations cause significant overvoltage and current surges as a result of transformer magnetic circuit saturation. This most often leads to metering transformer destruction.

AFR 31 Smart Load acts as metering voltage transformer protection against such effects. Unlike other methods, it is targetedly enabled only when ferroresonance occurs, being passive in common operation or with asymmetric loads.

Magnitude of trigger voltage can be adjusted to 20, 25 or 30 volts. For selectivity with ground connection protection devices an activation time delay circuit (4 seconds as default) is used. This is suitable at installations where a voltage transformer is used not only for measuring but as power supply for protection devices too (ground connection detection, automatic reconnection circuits etc.).

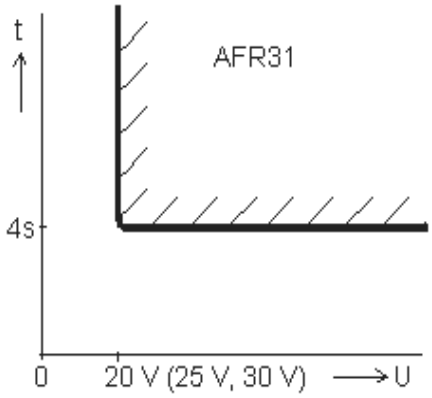
Installation

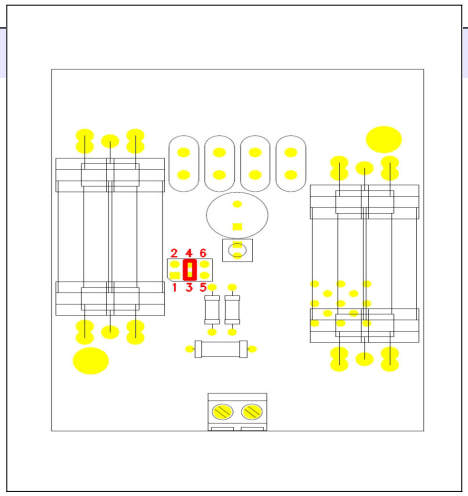
WARNING

Installation, adjusting and maintenance may by carried out by qualified personnel only with respect to installation instructions and safety regulations. When operated in contradiction with the technical specifications, proper functionality is not guaranteed. Before any manipulation with the instrument, disconnect voltage transformers out of the network. Don't touch instrument terminals and don't use the instrument without its cover.

Desired activation voltage must be set before installation. Release snap-in latches with an appropriate size screwdriver and remove the instrument cover. The activation voltage level can be set with the jumpers as shown on the picture below :

AFR 31 Smart Load Characteristics





You can set on of three levels according technical parameters table. Default activation voltage level is preset to 25 V. Higher level is suitable for medium voltage grids with higher unbalance of parasitic capacities. After setting, snap in the cover back (keep attention to the correct LED light pipe position).

The AFR 31 is designed to be installed on a 35-millimeter DIN rail (DIN EN 50 022) and for indoor use only.

Natural air circulation should be provided inside the distribution board cabinet, and in the instrument's neighbourhood, especially underneath the instrument, no other instrumentation that is source of heat should be installed. The instrument must be installed in indicated position with its terminals oriented down, usually in the measuring and protection control panels.

The AFR 31 should be connected in open delta of a metering voltage transformers auxiliary windings (terminals da, dn) as shown in the wiring diagram below. 2.5 square millimeter copper wire is recommended for the circuit. One pole of open delta connection must be grounded. Before putting into operation, check up the grounding. Avoid unwanted duplicity at both the transformer and the load side to; otherwise measuring voltage transformers can be short-circuited and destroyed.

The open delta configured auxiliary windings may be, together with the AFR 31 Smart Load, used for ground connection protection relay, which is to be connected in parallel to AFR 31 using the protection relay manufacturer's recommendations. AFR 31 parallel connection does not affect protection relay operation.

Wire up Diagram in Metering Voltage Transformer Auxiliary Winding Open Delta Configuration

A, N: *Metering transformer medium voltage terminals*

a, n: *Secondary metering winding*

da, dn: *Auxiliary winding terminals*

AFR 31: *Smart Load*

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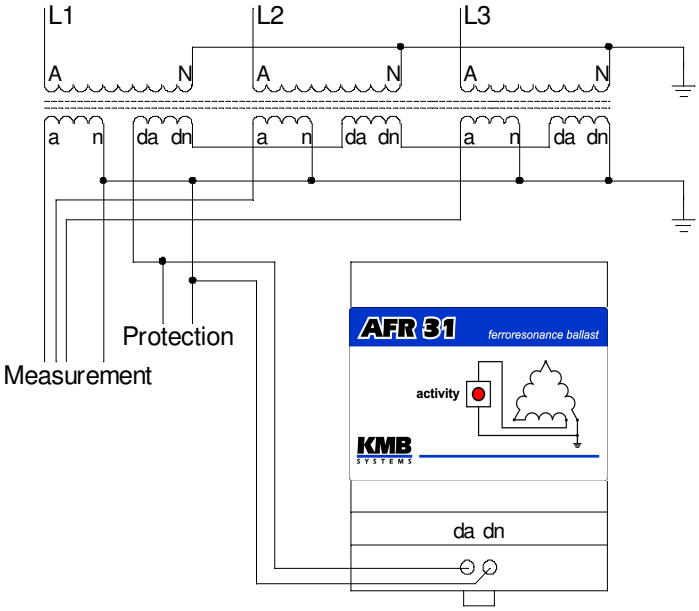
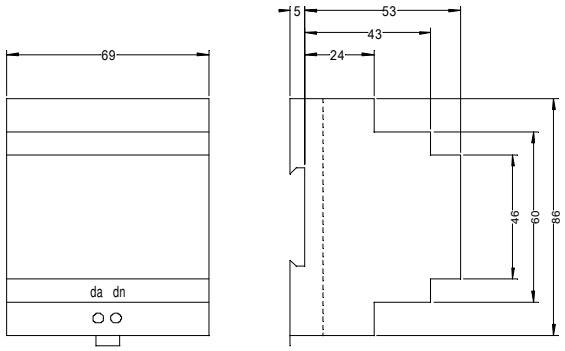


Mechanical Dimensions



Technical Parameters

Nominal voltage	open delta 3 x 100/3, 3 x 110/3 or 3 x 120/3 V_{AC}
Activation voltage	no jumper: 20 V_{AC} 3+4 jumper: 25 V_{AC} (default) 1+3 jumper: 30 V_{AC}
Activation delay	4.0 sec (other values in range 0.5÷10 sec on request)
Protection degree	IP20
Overvoltage class	II
Climate category	5/50/40
Operation / storage temperature	-40 °C÷40 °C / -40 °C÷70 °C
Operation / storage humidity	95 % non-condensing
Dimensions / mass	69 × 86 × 58 mm / 0.05 kg
Cover material	polycarbonate
Installation	35 mm DIN bar mount (DIN EN 50 022)
Connection	screw terminals, 0.5 ÷ 2.5 mm^2 wire cross section

Maintenance, Service

For reliable operation you only have to comply with the operating conditions specified and prevent mechanical damage to the instrument. For sufficient cooling, the ventilation slots must be kept free – an eventual impurities or dust must be removed with a dry wiper or a paintbrush.

In the event of the product's breakdown, you have to return it to the supplier at their address.

Supplier:

Manufacturer :

KMB systems, s.r.o.
559 Dr. M. Horákové
460 06, Liberec 7
Czech Republic
website: www.kmbsystems.eu

The product must be packed properly to prevent damage in transit. Description of the problem or its symptoms must be sent along with the product. If warranty repair is claimed, the warranty certificate must be sent in too. If after-warranty repair is requested, a written order must be included.

Warranty Certificate

Warranty period of 24 months from the date of purchase is provided for the instrument, however, no longer than 36 months from the day of dispatch from the manufacturer. Problems in the warranty period, provably because of faulty workmanship, design or inconvenient material, will be repaired free of charge by the manufacturer or an authorized servicing organization.

The warranty ceases even within the warranty period if the user makes unauthorized modifications or changes to the instrument, connects it to out-of-range quantities, if the instrument is damaged due to ineligible or improper handling by the user, or when it is operated in contradiction with the technical specifications presented.

Type of product: **AFR 31**..... Serial number.....

Date of dispatch: ..... Final quality inspection: .....

Manufacturer's seal:

Date of purchase: ..... Supplier's seal: