

Multiple Protection System for Motors

ALOX M 205

Application:

The ALOX M 205 is a multiple electronic protection system that has been specially designed for the complete overload and short-circuit protection of electric rotating machines and high-voltage transformers.

As compared with its predecessor, Type ALOX M 200, the equipment is supplemented by earth-fault and phase-fault unbalance protection, thus providing a wide range of applications due to the possibility of assembling the required system configuration from individual units.

The equipment has DC power supply. The power supply is provided by a station battery with 48, 60, 110 or 220 DC voltage. The input current unit is fitted with a current connector that ensures that all current circuits are automatically completed when this unit is with drawn. The equipment is housed in a new Size X 23 cabinet that can be fixed to a frame, or partially or fully flush-mounted on a panel.

Main features:

- Increased accuracy of measuring elements. Due to the current I_e of the input circuits being adjustable from 0,3 to 1,2 I_n , overcurrent protection can be adjusted within a range of 1,2 to 24 I_n . The resetting ratio is about 0,95.
- Increased accuracy of the timing elements used for overcurrent protection that can be adjusted in steps of 1 s from 1 to 64 s, or in steps of 10 s from 10 to 320 s.
- A two-component thermal model with time constants τ_1 and τ_2 that simulates more faithfully the thermal regime of the motor and permits its maximum utilization under overload condition.
- The ambient temperature can be added to the output of the thermal model with the corresponding temperature rise of the motor.
- A diagnostic test unit enabling the electronics of the whole ALOX M 205 system to be subjected to a rapid operational readiness test. By means of a rotary switch, the individual measuring units can be switched and tested consecutively. In this way, the function of the whole equipment can be checked, including the switching-off circuits of the cut-out switch.
- Due to this test, periodic tests of the equipment that require accurate measurement can be made at intervals of several years.
- Low self-consumption of the individual current circuits making the equipment operative even with large short-circuit currents far from the oversaturation region of the current transformers.
- Built-in fuse for auxiliary power supply circuits separate protection provides higher safety against overload or short-circuit.
- All units of the ALOX M 205 system are the plug-in type permitting easy and rapid repairs and checks to be made.
- Various combinations by protective devices can be configured to include only those protection facilities which are required by the customer.
ry voltage restoration.

Physical design:

The basic constructional unit of the ALOX M 205 protection system is a casket enclosing connectors for interchangeable units. The front dimension of the casket is 300 mm. The casket contains converters, measuring units, signalling units, testing units and a power pack. All elements are interchangeable so that with all units removed there remains the casket or cabinet with all connectors required for maximum utilization of the interwired equipment.

The units are fitted with front-wall controls and a finger board with type designation. They are secured against withdrawal by a central plate provided with the corresponding lettering. The electronic units use Type FRB connectors. Power converters are of rugged design. They are connected by means of short-circuiting current connectors. All units can be inserted from the front.

The set of protective devices are designed for mounting into a standard frame but are also available in a variant built in a box, Size X 23 that can be fully or partially flush-mounted on a panel.

In the former design variant, the equipment is intended for mounting into a vertical frame within a cabinet. Fitted with no cover, the terminal board is freely accessible from behind, featuring the IP 00 Type of protective enclosure. In this case, adequate protective enclosure is provided by the cabinet housing the equipment. As a result, the equipment has the IP 40 (30) type of protective enclosure both from the front and the sides.

In the latter design variant, the equipment is fitted with a removable glazed front frame permitting the viewing of all signalling devices and controls. In this case, the IP 40 type of protective enclosure is provided. The terminal board for conductors connecting has the IP 20 type of protective enclosure.

A great advantage of the ALOX M 205 system is that any combination of protective devices can be configured to suit the customer's needs. As already mentioned, the basic constructional unit of the system is a casket enclosing connectors for interchangeable units. The input unit is fitted with self-short-circuiting contacts. For all other units, Series FRB weak-current connectors are used. To attain a maximum packing density of the casket, all connectors use wire-wrap connections.

Technical data:

Power supply

Auxiliary input voltage E_n	48, 60, 110 or 220 V DC
Allowed fluctuation	from 0,8 to 1,1 E_n
Allowed ripple	< 5 %
Power consumption:	
- permanently at rest	< 20 W / 220 V DC
- with all outputs available	< 50 W / 220 V DC

Input circuits of protective devices I_1 , I_2 , I_3 , I_4 and I_0 in the zero branch

Rated current I_n	1 A or 5 A
Nominal frequency f_n	50 or 60 Hz
Current I_e adjustable	in steps of 0,1 I_n (from 0,3 I_n to 1,2 I_n)
Overload capacity:	
- permanently	4 I_e , max. 4 I_n
- current for 10 s	20 I_n
- current for 1 s	70 I_n
- dynamic I_{dyn} with $I_n = 1$ A	150 A (amplitude)
$I_n = 5$ A	750 A (amplitude)
Power consumption with $I_e = I_n$	≤ 0.5 VA

Input circuit of earth-fault protection I_0 connected to a summation transformer

Overload capacity:	
- permanently	4 A max.
- current I_n for 1 s	70 A
- dynamic I_{dyn}	150 A (amplitude)
Load of summation transformer	< 1 Ω

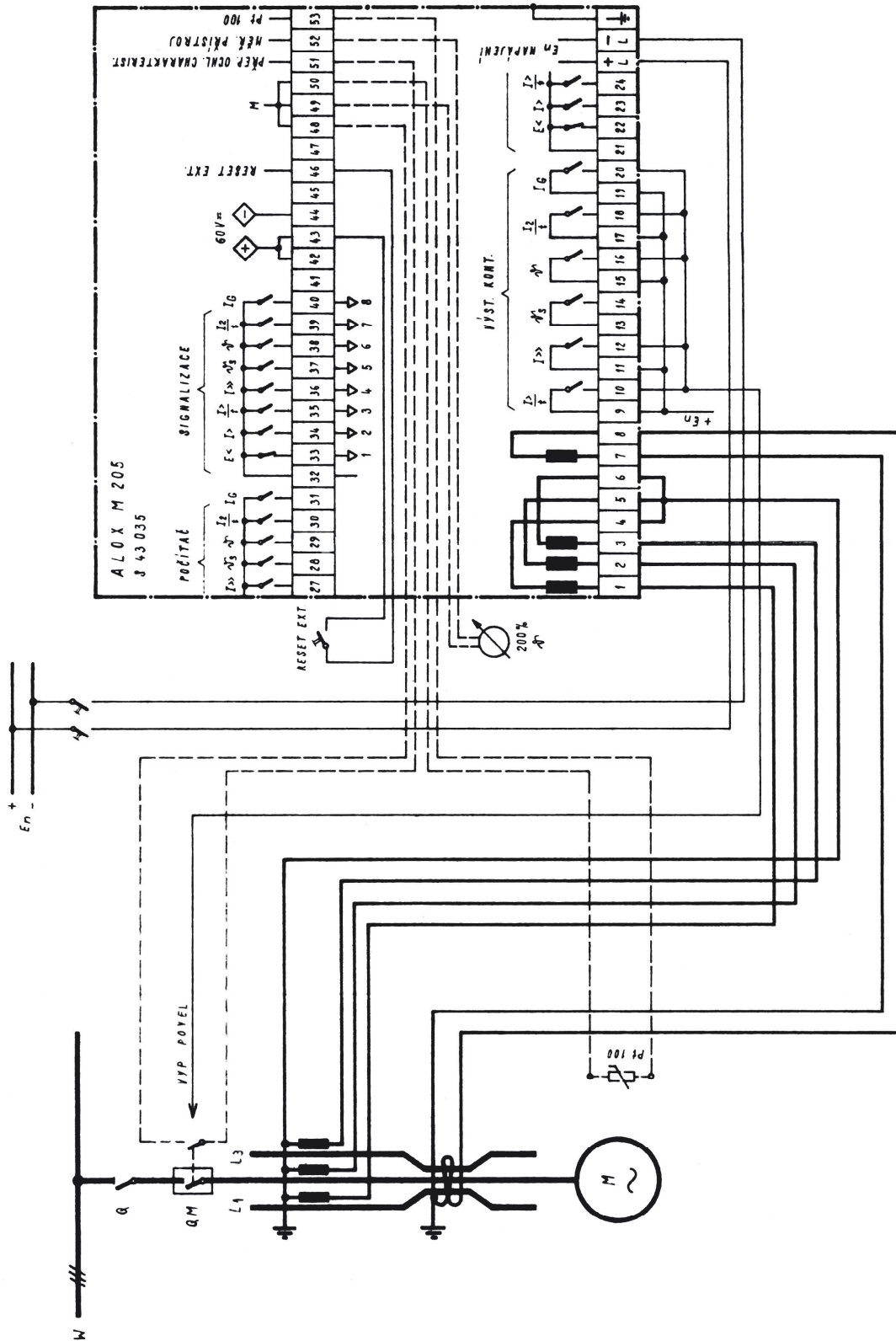


Fig. 1 Basic connection of ALOX M 205