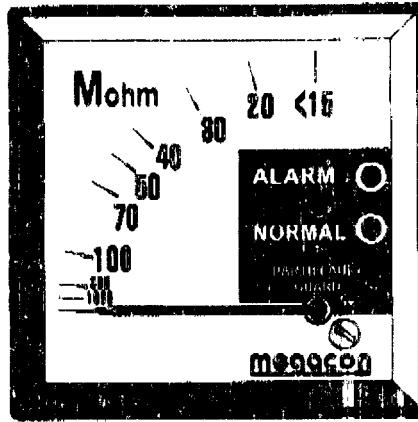




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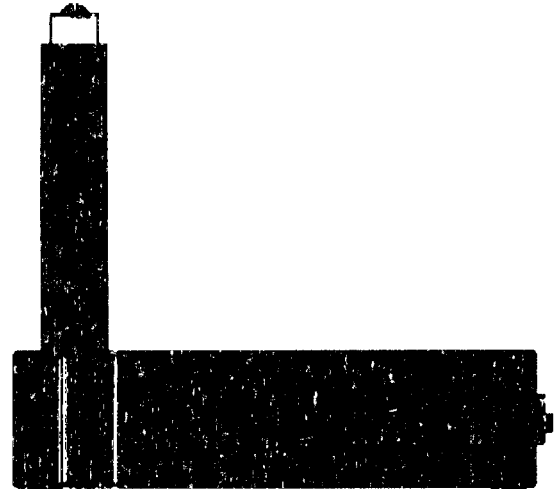
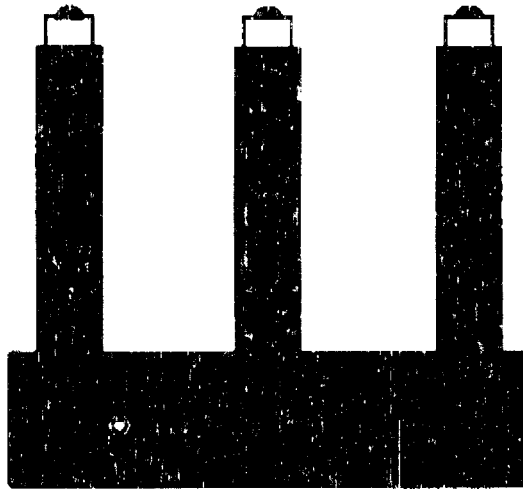
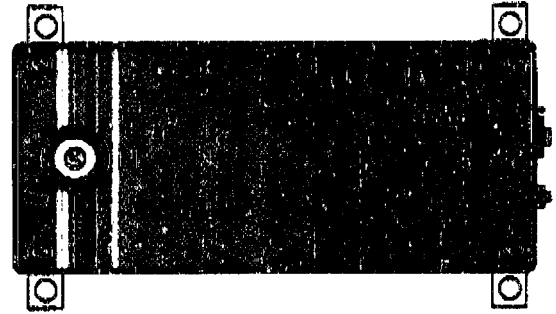
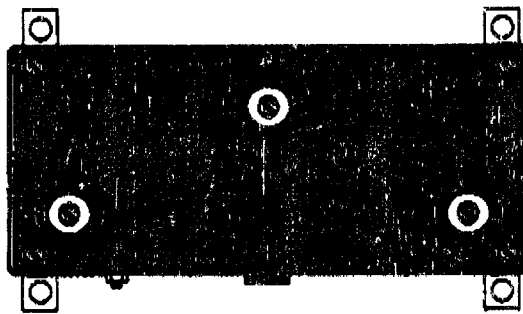
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TECHNICAL SPECIFICATION

AC HIGH VOLTAGE INSULATION GUARD KPM 165



HT ADAPTOR TYPE AR

HT ADAPTOR TYPE AN

The MEGACON policy is one of continuous improvement, consequently equipment supplied may vary in detail from this publication



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 Date: 21.01.90

ISOGUARD KPM165

HIGH VOLTAGE INSULATION AND EARTHFAULT MONITORING SYSTEM

GENERAL:

The Megacon Isoguard system is a complete range of products for selective monitoring of insulation level and location of earthfaults in earthed AC (single and 3-phase) and DC networks.

The Series KPM165 includes a range of High Voltage Insulation guards, which monitors insulation level to ground on running (active) or disconnected (standby) high voltage AC generators, motors, transformers, airfield lighting etc, in isolated 50, 60 or 400Hz supply systems. KPM165 is extensively used for monitoring of submersed and "down hole" pump motors in oil pipe systems, and for marine propulsion and thruster motors.

The KPM165 system continuously monitors the insulation level, displays insulation resistance directly in Mohms, and operates a potentialfree warning relay and an alarm-relay when the insulation level drops below the set values. The method of insulation leakage detection is DC voltage injection.

Isoguard detects even minute changes in insulation level. In exposed environments the insulation level can directly reflect the condition of a circuit. Breakdown may be anticipated by monitoring deterioration of insulation (trend analysis), an important tool for preventive maintenance.

PLEASE NOTE THAT THE GENERAL INFORMATION IN THIS TECHNICAL PUBLICATION APPLIES FOR THE USE OF KPM165 IN ANY APPLICATION. HOWEVER, SPECIFIC DETAILS IN THIS PUBLICATION MAY RELATE TO THE USE OF KPM165 IN AC MOTOR APPLICATIONS ONLY.

HIGH VOLTAGE INSULATION GUARD TYPE KPM165

- 1.0 Type KPM165-range is primarily designed for continuous insulation monitoring of running AC motors, generators or networks (up to nominal 21kV), or when disconnected from the mains supply during standby interval.

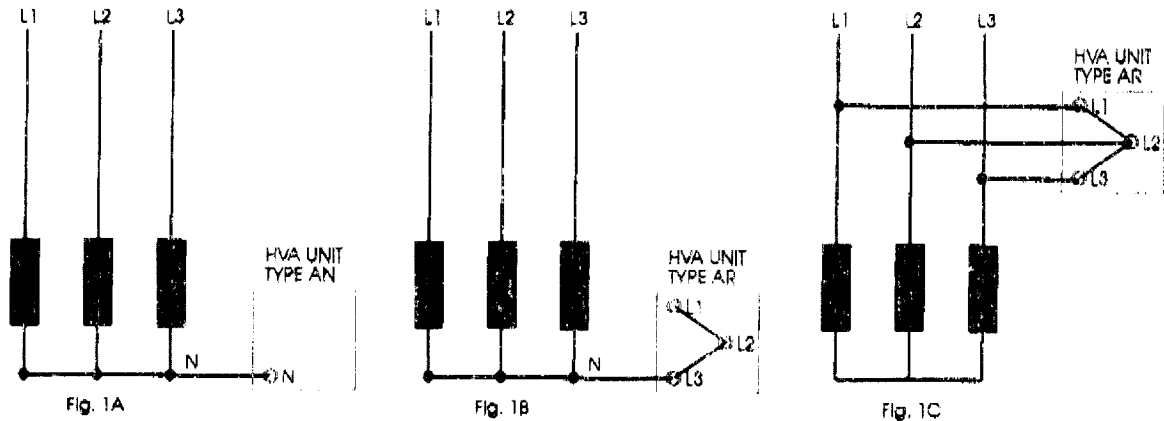
The KPM165 system consists of the following two units:

- A. High Voltage Adapter (HVA) AR3 (3,5kV), AR7 (7kV), AR14 or AN14 (14kV) or AN21 (21kV), and
- B. Insulation Guard KPM165

HIGH VOLTAGE ADAPTER (HVA):

- 2.0 For 21 kV systems the input to the HVA unit type AN21 must be connected to the systems neutral point for safety, as shown in fig. 1A.
- 2.1 For any other high tension system the input to the HVA unit type AR should be connected to the neutral point wherever possible, as shown in fig. 1B. Alternatively for 14kV systems HVA unit type AN14 may be used, connected as shown in fig. 1A.

- 2.2 In any installation up to 14kV the HVA unit type AR may be permanently connected to the three supply voltage inputs, as shown in fig. 1C.



An artificial neutral is created inside the HVA unit type AR by joining three special high resistance, high power resistors, connected to each HT voltage input, in a star configuration. See drawing KPM165/001B. The core of each HT insulator terminal (L1, L2, L3) is a high voltage resistor made of bonded glass and precious metals.

The HVA-unit's internal star point forms a safe, convenient, low voltage connection point for the KPM165 Insulation Guard. This method of connection complies with most applicable codes, including compliance with recommendations by UL and CSA etc.

- 2.3 To further optimize safety and avoid the use of external fuses, the output from the resistor starpoint is passed through a high voltage fuse and high inductance filter reactors (>100 Henry) connected in series. The filter effectively blocks the flow of AC current from the neutral point. In addition the output voltage from HVA to KPM165 is decoupled by a capacitor and limited by a high power varistor (G1).

If anyone of the phases should be lost, the star point AC output potential will remain below 100V. Should output terminal "L" (the HVA unit output signal) be grounded when in this state, the HVA units internal series impedance will limit the current flowing to ground to less than 1mA.

2.4 IMPORTANT:

All HT inputs to the HVA unit must be disconnected during "megger" test, if applied test voltage exceeds 500VDC.

KPM165 - INSULATION GUARD

- 3.0 The "front of panel"-mounted DIN96 ComPAK Insulation Guard KPM165 measures and displays the system resultant insulation level, and operates the potentialfree warning and alarm relays. The operation of the alarm relay is "fail to safety". For 7kV, 14 kV and 21kV systems the meter is scaled 15-100Mohm, with the sector up to 100Mohm expanded.
- 3.1 KPM165 has relay outputs and lamp displays for the three control zones:

1 - NORMAL

2 - WARNING

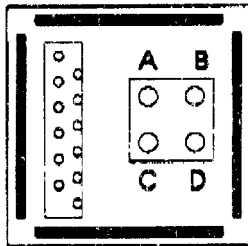
3 - ALARM

Early warning prevents breakdown and cuts maintenance cost. Improve total reliability by ISOGUARD triple zone condition monitoring of your system, regardless whether the circuit is energized or on standby.

The following zone trip levels are recommendations only typical for nominal 7kV networks.

Zone	Meter reading	Lamp status	Relay status
1 - NORMAL	Higher than 80Mohm	Green ON, Red OFF	4/5 ON, 6/7 ON
2 - WARNING	Lower than 80Mohm	Green OFF, Red OFF	3/4 ON, 6/7 ON
3 - ALARM	Lower than 30Mohm	Green OFF, Red ON	3/4 ON, 7/8 ON

- 3.2 The trip levels and trip relays time delay can be adjusted by potentiometers mounted on the KPM165 rear.



- A WARNING trip level: To 3,6kV, 0-100Mohm
7,6kV to 21kV, 15-1000Mohm
- B WARNING relay, release delay, 0-30sek.
- C ALARM trip level: To 3,6kV, 0-100Mohm
7,6kV to 21kV, 15-1000Mohm
- D ALARM relay, release delay 0-30sek.

- 3.3 The alarm relay and the alarm lamp have as standard manual reset, but can optionally be supplied for automatic reset.
- 3.4 Auxilliary voltage to KPM165 is continuously on. Pushing switch S1 RESET for 5 seconds will, however, break the auxilliary voltage supply to KPM165 to reset the alarm relay.
- 3.5 The unit can optionally supply an analogue 0-1mA DC output signal proportional to Insulation level. Note that the signals negative terminal is **not** galvanically isolated from protective earth.

INSTALLATION

- 4.0 The Insulation Guard KPM165 and the switch S1 RESET should be mounted on the front of the low voltage (instrumentation) compartment. The HIGH VOLTAGE ADAPTER must be mounted in the high voltage section of the switchboard enclosure.

1. Disconnect all power from the switchboard enclosure.
2. Fasten KPM165 on the panelfront with the brackets supplied. Fasten switch S1.
3. Install the HVA unit close to the motor cable, suitably protected from damage.

CAUTION: OBSERVE SAFETY PRECAUTIONS - DO NOT WORK ON LIVE CIRCUITS!

4. Link the HVA unit output to KPM165 as shown on drawing 165-AR/AN, 001A.
5. Connect terminals A and B across the circuit breaker coil, auxilliary coil or running light (if used).
6. Connect terminal 12 of HVA to system protective earth (PE).
7. Connect external monitoring equipment (if used) to the KPM165 warning and alarm relay outputs.
8. Connect the input lead(s) from the HVA unit to the system lines or neutral, according to high voltage safety practice.
9. Reconnect the supply and the control power to the system.
10. Relay K is only installed if KPM165 is to operate in standby mode only.

TESTING

- 5.0 1. With the motor supply power disconnected. Connect testresistors on one of the motor phases to ground. The ohm-meter should read approx. resistor value. The green lamp should go off and the contacts 3/4 close after elapsed time delay.
2. Short circuit the same phase to ground the meter should read approx. FSD. The red lamp should come on and the contacts 7/8 close. Reset KPM165 by setting switch S1 to position RESET.
3. Repeat with the two other phases.
4. Start the motor. The meter should read zero deflection, the green lamp should be on, and the external alarm outputs should not operate.
5. Stop the motor. The meter will now read the insulation level of the idling motor.

TECHNICAL SPECIFICATION

Control Module KPM165:

Auxiliary voltage ($\pm 10\%$)	: 115, 230 or 400V, 50-60Hz
Max. Power	: 5VA
Meter range	: AR3 : 0-10Mohm (expanded up to 1Mohm) AR7, AR/AN14 and AN21 : 15-500Mohm (expanded up to 100Mohm)
Injected voltage	: AR3 : Nom. 30VDC AR7, AR/AN14 and AN21 : Nom. 70VDC
Output relays rating	: 250VAC/52A, 100VDC, 0,5A Max 50W
Analogue output	: 0-1mA DC (optional)
Dimensions	: DIN96, 115mm deep.
Temperature	: -10 to +54°C

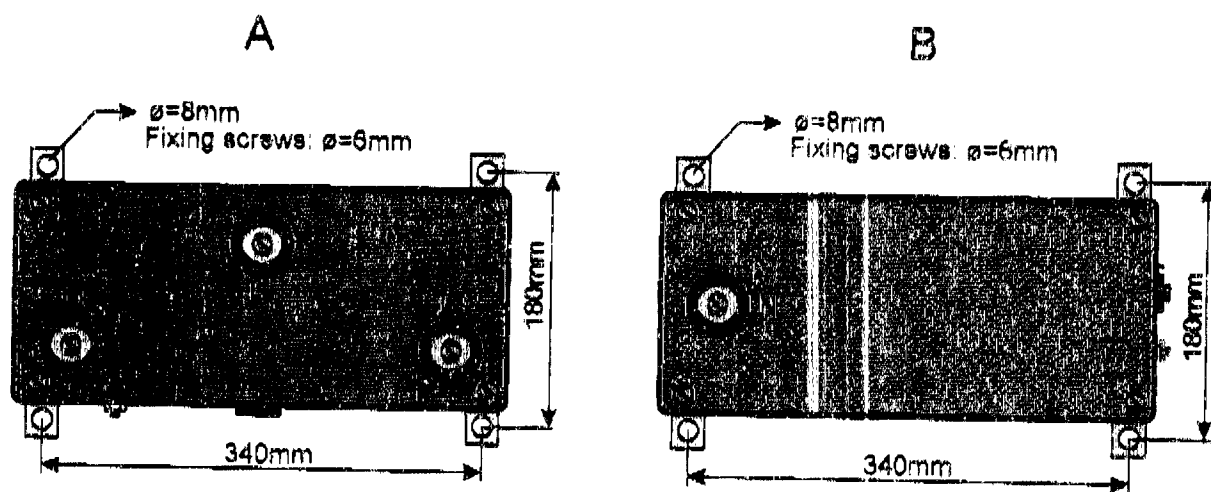
HV Adapter AR:

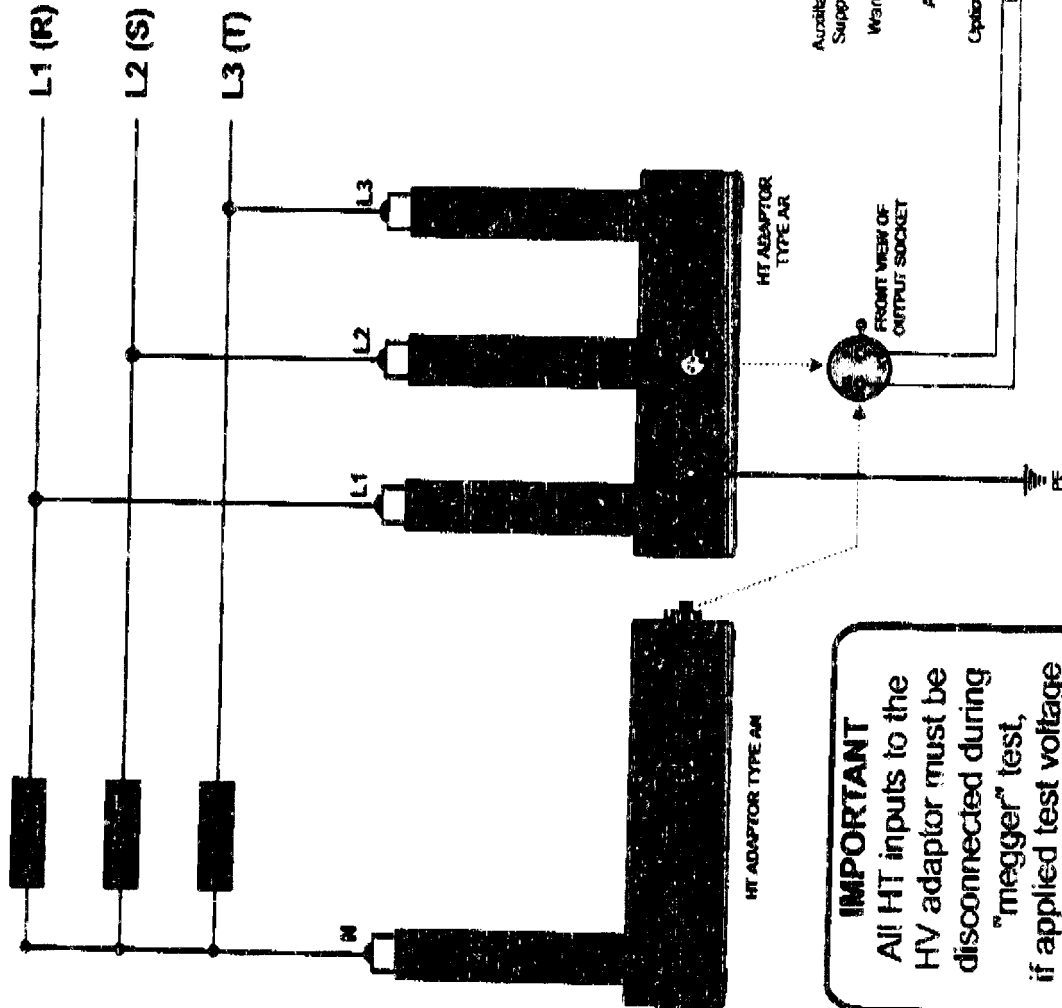
	AR3	AR7	AR14	AN14	AN21
Value R1, R2, R3 ($\pm 5\%$)	2,5M Ω	5M Ω	10M Ω	10M Ω	20M Ω
Rated dissipation (20°C)	5W	25W	50W	50W	100W
Stability (10 years)	2%	2%	2%	2%	2%
Voltage coefficient	Negligible	Negligible	Negligible	Negligible	Negligible
Nominal operating voltage	3,8kV	7,6kV	14kV	14kV	21kV
Max. operating voltage (max 10sec.)	10kV	30kV	50kV	50kV	100kV
1,5 μ S negative impulse wave breakdown	20kV	40kV	80kV	80kV	160kV

Dimensions

Case	type	A	A	B	A	B
Base:	H (mm)	95	95	120	95	120
	W (mm)	360	360	400	360	400
	D (mm)	160	160	250	160	250
Isolator(s):	Dia. (mm)	15	45	45	45	45
	H (mm)	25	150	270	270	270

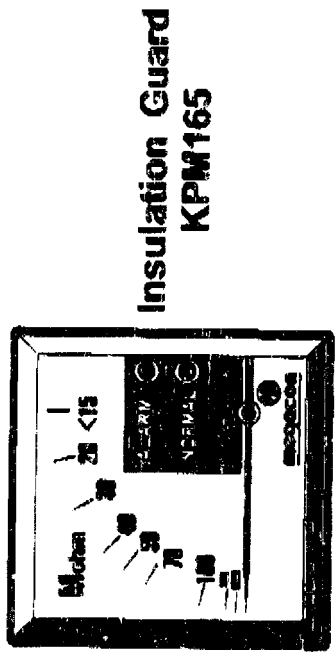
Fixing details:





IMPORTANT
All HT inputs to the HV adaptor must be disconnected during "megger" test, if applied test voltage exceeds 500VDC

- NOTE:
1. Relays shown de-energised
 2. Warning relay (high) energised when insulation resistance is lower than set level
 3. Alarm relay (low) energised when insulation resistance is higher than set level
 4. Case connected internally to terminal 12

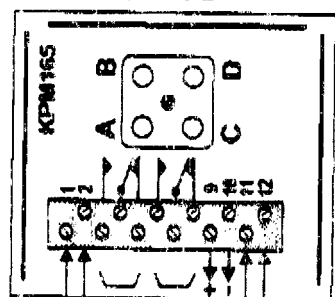


Insulation Guard KPM165

The range of the instrument is divided into three sections (control zones): NORMAL, WARNING and ALARM. Green and red lamps indicate the level of safety as shown:

Zone	Status	Condition	Lamp
■	Hazardous conditions	3-4 and 7-8	ON Alarm
		3-4 and 6-7	OFF
■	Deviation from control	4-5 and 6-7	OFF Warning
		4-5 and 5-7	OFF
■	Normal insulation level	4-5 and 7-8	ON Normal
		4-5 and 7-8	OFF

Delay in direction of arrows



For system voltage 7.6, 14 and 21kV:
A-Warning trip 15 to 1000 Mohm
B-Warning delay 0 to 30 seconds
C-Alarm trip 15 to 1000 Mohm
D-Alarm delay 0 to 30 seconds

CONNECTION DIAGRAM
KPM165 Insulation Guard
ARIAN High voltage Adaptor

