



- Direct connection 12 to 48VDC systems, up to 1600VDC with RH adapter (up to 5000VDC on request)
- With test function
- All inputs and outputs fully isolated
- Triple-zone insulation monitoring and Supervision relay
- “Pathfinder” Indicates polarity of dominant earth fault
- Response time: 125-165mS
- Analogue output proportional to meter reading (F/L-version)
- With Modbus RTU (see Megacon modbus datasheet)

Specifications

Auxiliary Supply:	Nom: 24-48VDC as standard (Fuse 2A)
Optional AC Voltage:	100-120, 200-240, 380-415 or 440-460VAC, 40-70Hz (Fuse 0,5A)
Optional DC Voltage:	12 or 100-250VDC (Fuse 2A)
Supply tolerance:	± 20%
Power rating:	1,5VA
Contact rating:	AC: 100VA - 250V/2A max. DC: 50W - 100V/1A max.
Analogue Output:	Up to 20mA, max 500R (other on request) Up to 10V, min 100kohm
Temperature:	-20 to +70°C
Weight:	0.62kgs
Front protection:	IP52 (IP65 optional)
Communication:	Modbus RTU

INTELLIGENT SETTING ASSISTANCE

KPM169x has a built-in Assistance tool for setting/verification of the trip levels and the analogue output.

When either the **Warning** or **Alarm** potmeter on the rear is operated by user, the meter goes into **Assistance Mode** and meter reading and analogue output will reflect the potmeter setting.

How to set alarm levels:

Firstly adjust potmeter fully clockwise (see that meter goes to the top), then adjust potmeter down to required **Warning** or **Alarm** setpoint. In this mode, the Alarm or Warning LEDs (depending on which potmeter is adjusted) will flash quickly Red/Yellow.



Without any movement of potmeters, the meter will revert to normal Insulation Monitoring Mode after approximately 10 seconds.

How to test analogue output signal:

Adjust any trip level potmeter to activate Assistance Mode.
Example: On a 4-20mA output, adjust potmeter fully anti clockwise for 4mA and fully clockwise for 20mA.

The unit meets IEC60092-504 and the relevant environmental and EMC tests specified in IEC60068/60092 and IEC61000/60533 respectively, to comply with the requirements of the major Classification Societies.

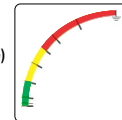
Description

The digitally controlled KPM169x monitors insulation level between a live non-grounded (IT) battery or live DC network and its protective earth. With built-in Modbus RTU com.

Only **ONE** KPM169x can be connected to the same DC-system. An AC or DC (standard) auxiliary voltage is required for the unit. A green LED indicates AUX POWER on. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay). In this way false tripping during power up, caused by initial charging of network spread capacitance, is avoided.

The DIN96 front-of-panel mounted instrument reads the insulation level directly in kΩ. The meter has reflection free glass. The ohmmeter and the triple-zone status LEDs at a glance give the clear safety message:

- **ALARM** (red zone)
- **WARNING** (yellow zone)
- **HEALTHY** (green zone)



General

SEV MEASURING PRINCIPLE

Insulation is measured between the complete galvanically interconnected DC network and its protective earth. The signal flows to ground via the path of the insulation fault, the level of flow expresses the insulation resistance, the direction of flow expresses the fault polarity. The measuring accuracy is not influenced by any normal kind of load attached to the network. The detection time for an insulation fault is 125-165mS.

PATHFINDER / POLARITY FUNCTION

During a Warning or Alarm condition the Polarity LED indicates the polarity causing the trip:

- POSITIVE EARTH FAULT:** LED not lit
- NEGATIVE EARTH FAULT:** blue LED lit

RELAY OUTPUTS

Relay operation depends on the selected model. A fail-safe relay changes status when powered. A trip LED flashes when the trip level is passed, the relay trips after elapsed delay. The timer resets if the fault is removed during countdown. Trip levels and delays are set-able on unit rear. Recommended trip level settings will depend on application and priority of safety hazards.

ANALOGUE OUTPUT

All F and L versions have an isolated analogue output proportional to meter reading.

SYSTEM SUPERVISION

If voltage of the monitored DC system is not connected to the unit input or is too low, the NEG POLARITY LED will flash red, and relay 3 (System Error) will trip. If polarity of the input connection is reversed, the NEG POLARITY LED will flash red and blue, and relay 3 will trip. Trip of relay 3 will inhibit operation of the warning and alarm relay and their respective trip LEDs.

SAFETY

When an RHx Voltage Adapter is connected to the instrument, the adapter's maximum output is 60VDC.

Test Function

The external test input activates the self test function. A 20kohm resistor is then connected between the negative pole and PE as long as the button is pressed and will give meter and LED indication only.

Communication

The KPM169x is fitted with modbus RTU communication. Details can be found in Megacon datasheet KxM16x-modbus protocol.

Relay and LED Operation

	POWER OFF All LED's are off. Relays shown de-energised.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	POWER ON The GREEN LED (POWER) will light when unit is powered in normal condition (Positive Polarity). Fail Safe relays R2 and R3 are activated. (*) NB! The BLUE LED (NEG POLARITY) will also light if the unit detects a minor earth fault.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	WARNING POSITIVE The YELLOW LED (WARNING) flashes when the trip level is passed, the warning relay R1 trips after elapsed delay. Steady light after countdown.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	WARNING NEGATIVE The BLUE LED (NEG POLARITY) will light and the YELLOW LED (WARNING) flashes when the trip level is passed, the warning relay R1 trips after elapsed delay. Steady light after countdown.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	ALARM POSITIVE The RED LED (ALARM) flashes when the trip level is passed, the alarm relay R2 trips after elapsed delay. Steady light after countdown.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	ALARM NEGATIVE The BLUE LED (NEG POLARITY) will light and the RED LED (ALARM) flashes when the trip level is passed, the alarm relay R2 trips after elapsed delay. Steady light after countdown.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	FAULT STATUS / SYSTEM ERROR The NEG POLARITY LED (RED) flashes, this indicates missing measuring voltage (positive or negative) and status relay R3 will activate. In this mode the unit will not indicate any earth fault.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3
	FAULT STATUS / SYSTEM ERROR The NEG POLARITY LED flashes and changes colour between BLUE and RED. This will indicate reversed polarity and status relay R3 will activate. In this mode the unit may indicate an earth fault but alarm and warning relays will not be activated.	ALARM WARNING NEG POLARITY POWER DC INSULATION GUARD	R1 R2 R3

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Description

KPM169x models for 9- 60VDC

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

Direct connection for 12, 24 or 48VDC systems.

Relay Operation

Scale range: 0-100kΩ - ∞ (>100kΩ)

	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		*✓	**✓
R3			✓	*✓	

Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169E*	-	-	X			
KPM169F*	-	X	X			
KPM169G**	X	-	X	WARNING:	0-100kΩ	0-30secs
KPM169GF/**	X	X	X	ALARM:	0-100kΩ	0,1-3secs
KPM169EH	-	-	-			
KPM169FH	-	X	-			
KPM169GH**	X	-	-			
KPM169GFH**	X	X	-			

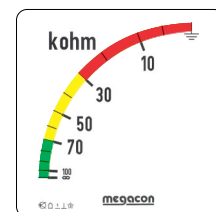
Output tables

Scale Ohm	0-10mA	0-20mA	4-20mA	0-10VDC	4-12-20mA	
					NEG.	POS.
0k	10,00 mA	20,00 mA	20,00 mA	10,00 Volt	4,00 mA	20,00 mA
10k	7,76 mA	15,51 mA	16,41 mA	7,76 Volt	5,80 mA	18,21 mA
20k	6,04 mA	12,08 mA	13,66 mA	6,04 Volt	7,17 mA	16,83 mA
30k	4,73 mA	9,45 mA	11,56 mA	4,73 Volt	8,22 mA	15,78 mA
40k	3,69 mA	7,39 mA	9,91 mA	3,69 Volt	9,05 mA	14,96 mA
50k	2,85 mA	5,70 mA	8,56 mA	2,85 Volt	9,72 mA	14,28 mA
70k	1,57 mA	3,14 mA	6,51 mA	1,57 Volt	10,75 mA	13,26 mA
100k	0,26 mA	0,53 mA	4,42 mA	0,26 Volt	11,79 mA	12,21 mA
110k	0,00 mA	0,00 mA	4,00 mA	0,00 Volt	12,00 mA	12,00 mA

Range

Coloured sectors show recommended areas of settings:

- Red - Indicates alarm trip zone
- Yellow - Indicates warning trip zone
- Green - Indicates healthy zone



Description

KPM169x models for 60-200VDC

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

This unit uses the voltage adapter RH2 for voltage from 60V to max.200VDC.

Relay Operation

Scale range: <10kΩ-5MΩ

	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		*✓	**✓
R3			✓	*✓	

Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169K2*	-	-	X			
KPM169L2*	-	X	X			
KPM169GK2**	X	-	X	WARNING:	10kΩ - 5MΩ	0-30secs
KPM169GL2**	X	X	X	ALARM:	10kΩ - 5MΩ	0,1-3secs
KPM169K2N	-	-	-			
KPM169L2N	-	X	-			
KPM169GK2N**	X	-	-			
KPM169GL2N**	X	X	-			

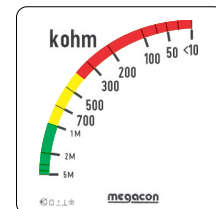
Output tables

Scale Ohm	0-10mA	0-20mA	4-20mA	0-10VDC	4-12-20mA	
					NEG.	POS.
10k	10,00 mA	20,00 mA	20,00 mA	10,00 Volt	4,00 mA	20,00 mA
100k	9,82 mA	19,64 mA	19,71 mA	9,82 Volt	4,15 mA	19,86 mA
200k	9,62 mA	19,24 mA	19,39 mA	9,62 Volt	4,31 mA	19,70 mA
300k	9,42 mA	18,84 mA	19,07 mA	9,42 Volt	4,47 mA	19,54 mA
500k	9,02 mA	18,04 mA	18,43 mA	9,02 Volt	4,79 mA	19,22 mA
700k	8,62 mA	17,24 mA	17,79 mA	8,62 Volt	5,11 mA	18,90 mA
1M	8,02 mA	16,04 mA	16,83 mA	8,02 Volt	5,59 mA	18,42 mA
2M	6,01 mA	12,03 mA	13,62 mA	6,01 Volt	7,19 mA	16,81 mA
3M	4,01 mA	8,01 mA	10,41 mA	4,01 Volt	8,80 mA	15,21 mA
4M	2,01 mA	4,01 mA	7,21 mA	2,01 Volt	10,40 mA	13,61 mA
5M	0,00 mA	0,00 mA	4,00 mA	0,00 Volt	12,00 mA	12,00 mA

Range

Coloured sectors show recommended areas of settings:

- Red - Indicates alarm trip zone
- Yellow - Indicates warning trip zone
- Green - Indicates healthy zone



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Description

KPM169x models for 200-400VDC

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

This unit uses the voltage adapter RH4 for voltage systems from 200V to max. 400VDC.

Output tables

Scale Ohm	0-10mA	0-20mA	4-20mA	0-10VDC	4-12-20mA	
					NEG.	POS.
10k	10,00 mA	20,00 mA	20,00 mA	10,00 Volt	4,00 mA	20,00 mA
100k	9,82 mA	19,64 mA	19,71 mA	9,82 Volt	4,15 mA	19,86 mA
200k	9,62 mA	19,24 mA	19,39 mA	9,62 Volt	4,31 mA	19,70 mA
300k	9,42 mA	18,84 mA	19,07 mA	9,42 Volt	4,47 mA	19,54 mA
500k	9,02 mA	18,04 mA	18,43 mA	9,02 Volt	4,79 mA	19,22 mA
700k	8,62 mA	17,24 mA	17,79 mA	8,62 Volt	5,11 mA	18,90 mA
1M	8,02 mA	16,04 mA	16,83 mA	8,02 Volt	5,59 mA	18,42 mA
2M	6,01 mA	12,03 mA	13,62 mA	6,01 Volt	7,19 mA	16,81 mA
3M	4,01 mA	8,01 mA	10,41 mA	4,01 Volt	8,80 mA	15,21 mA
4M	2,01 mA	4,01 mA	7,21 mA	2,01 Volt	10,40 mA	13,61 mA
5M	0,00 mA	0,00 mA	4,00 mA	0,00 Volt	12,00 mA	12,00 mA

Relay Operation

Scale range: <10kΩ-5MΩ

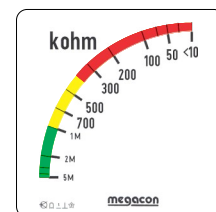
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		*✓	**✓
R3			✓	*✓	

Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169K4*	-	-	X			
KPM169L4*	-	X	X			
KPM169GK4**	X	-	X	WARNING:	10kΩ - 5MΩ	0-30secs
KPM169GL4**	X	X	X	ALARM:	10kΩ - 5MΩ	0,1-3secs
KPM169K4N	-	-	-			
KPM169L4N	-	X	-			
KPM169GK4N**	X	-	-			
KPM169GL4N**	X	X	-			

Range

Coloured sectors show recommended areas of settings:

- Indicates alarm trip zone
- Indicates warning trip zone
- Indicates healthy zone



Description

KPM169x models for 400-800VDC

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

This unit uses the voltage adapter RH8 for voltage systems from 400V to max. 800VDC.

Output tables

Scale Ohm	0-10mA	0-20mA	4-20mA	0-10VDC	4-12-20mA	
					NEG.	POS.
10k	10,00 mA	20,00 mA	20,00 mA	10,00 Volt	4,00 mA	20,00 mA
100k	9,82 mA	19,64 mA	19,71 mA	9,82 Volt	4,15 mA	19,86 mA
200k	9,62 mA	19,24 mA	19,39 mA	9,62 Volt	4,31 mA	19,70 mA
300k	9,42 mA	18,84 mA	19,07 mA	9,42 Volt	4,47 mA	19,54 mA
500k	9,02 mA	18,04 mA	18,43 mA	9,02 Volt	4,79 mA	19,22 mA
700k	8,62 mA	17,24 mA	17,79 mA	8,62 Volt	5,11 mA	18,90 mA
1M	8,02 mA	16,04 mA	16,83 mA	8,02 Volt	5,59 mA	18,42 mA
2M	6,01 mA	12,03 mA	13,62 mA	6,01 Volt	7,19 mA	16,81 mA
3M	4,01 mA	8,01 mA	10,41 mA	4,01 Volt	8,80 mA	15,21 mA
4M	2,01 mA	4,01 mA	7,21 mA	2,01 Volt	10,40 mA	13,61 mA
5M	0,00 mA	0,00 mA	4,00 mA	0,00 Volt	12,00 mA	12,00 mA

Relay Operation

Scale range: <10kΩ-5MΩ

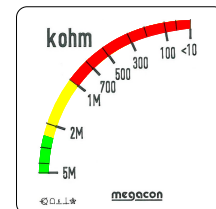
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		*✓	**✓
R3			✓	*✓	

Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169K8*	-	-	X			
KPM169L8*	-	X	X			
KPM169GK8**	X	-	X	WARNING:	10kΩ - 5MΩ	0-30secs
KPM169GL8**	X	X	X	ALARM:	10kΩ - 5MΩ	0,1-3secs
KPM169K8N	-	-	-			
KPM169L8N	-	X	-			
KPM169GK8N**	X	-	-			
KPM169GL8N**	X	X	-			

Range

Coloured sectors show recommended areas of settings:

- Indicates alarm trip zone
- Indicates warning trip zone
- Indicates healthy zone



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Description

KPM169x models for 800-1200VDC

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

This unit uses the voltage adapter RH12 for Voltage systems from 800V to max. 1200VDC.

Output tables

Scale Ohm	0-10mA	0-20mA	4-20mA	0-10VDC	4-12-20mA	
					NEG.	POS.
10k	10,00 mA	20,00 mA	20,00 mA	10,00 Volt	4,00 mA	20,00 mA
100k	9,82 mA	19,64 mA	19,71 mA	9,82 Volt	4,15 mA	19,86 mA
200k	9,62 mA	19,24 mA	19,39 mA	9,62 Volt	4,31 mA	19,70 mA
300k	9,42 mA	18,84 mA	19,07 mA	9,42 Volt	4,47 mA	19,54 mA
500k	9,02 mA	18,04 mA	18,43 mA	9,02 Volt	4,79 mA	19,22 mA
700k	8,62 mA	17,24 mA	17,79 mA	8,62 Volt	5,11 mA	18,90 mA
1M	8,02 mA	16,04 mA	16,83 mA	8,02 Volt	5,59 mA	18,42 mA
2M	6,01 mA	12,03 mA	13,62 mA	6,01 Volt	7,19 mA	16,81 mA
3M	4,01 mA	8,01 mA	10,41 mA	4,01 Volt	8,80 mA	15,21 mA
4M	2,01 mA	4,01 mA	7,21 mA	2,01 Volt	10,40 mA	13,61 mA
5M	0,00 mA	0,00 mA	4,00 mA	0,00 Volt	12,00 mA	12,00 mA

Relay Operation

Scale range: <10kΩ-5MΩ

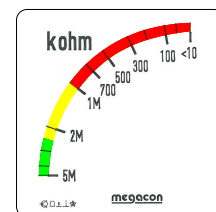
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		*✓	**✓
R3			✓	*✓	

Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169K12*	-	-	X	WARNING:	10kΩ - 5MΩ	0-30secs
KPM169L12*	-	X	X	ALARM:	10kΩ - 5MΩ	0,1-3secs
KPM169GK12*/**	X	-	X			
KPM169GL12*/**	X	X	X			
KPM169K12N	-	-	-			
KPM169L12N	-	X	-			
KPM169GK12N**	X	-	-			
KPM169GL12N**	X	X	-			

Range

Coloured sectors show recommended areas of settings:

- Red - Indicates alarm trip zone
- Yellow - Indicates warning trip zone
- Green - Indicates healthy zone



Description

KPM169x models for 1200-1600VDC

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

This unit uses the voltage adapter RH16 for voltage from 1200V to max. 1600VDC.

Output tables

Scale Ohm	0-10mA	0-20mA	4-20mA	0-10VDC	4-12-20mA	
					NEG.	POS.
10k	10,00 mA	20,00 mA	20,00 mA	10,00 Volt	4,00 mA	20,00 mA
100k	9,82 mA	19,64 mA	19,71 mA	9,82 Volt	4,15 mA	19,86 mA
200k	9,62 mA	19,24 mA	19,39 mA	9,62 Volt	4,31 mA	19,70 mA
300k	9,42 mA	18,84 mA	19,07 mA	9,42 Volt	4,47 mA	19,54 mA
500k	9,02 mA	18,04 mA	18,43 mA	9,02 Volt	4,79 mA	19,22 mA
700k	8,62 mA	17,24 mA	17,79 mA	8,62 Volt	5,11 mA	18,90 mA
1M	8,02 mA	16,04 mA	16,83 mA	8,02 Volt	5,59 mA	18,42 mA
2M	6,01 mA	12,03 mA	13,62 mA	6,01 Volt	7,19 mA	16,81 mA
3M	4,01 mA	8,01 mA	10,41 mA	4,01 Volt	8,80 mA	15,21 mA
4M	2,01 mA	4,01 mA	7,21 mA	2,01 Volt	10,40 mA	13,61 mA
5M	0,00 mA	0,00 mA	4,00 mA	0,00 Volt	12,00 mA	12,00 mA

Relay Operation

Scale range: <10kΩ-5MΩ

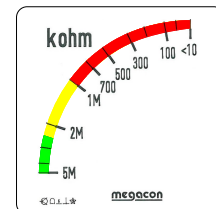
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		*✓	**✓
R3			✓	*✓	

Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169K16*	-	-	X	WARNING:	10kΩ - 5MΩ	0-30secs
KPM169L16*	-	X	X	ALARM:	10kΩ - 5MΩ	0,1-3secs
KPM169GK16*/**	X	-	X			
KPM169GL16*/**	X	X	X			
KPM169K16N	-	-	-			
KPM169L16N	-	X	-			
KPM169GK16N**	X	-	-			
KPM169GL16N**	X	X	-			

Range

Coloured sectors show recommended areas of settings:

- Red - Indicates alarm trip zone
- Yellow - Indicates warning trip zone
- Green - Indicates healthy zone



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Analogue Output