



- Direct connection 12 to 48VDC systems, up to 1600VDC with RH adapter (up to 5000VDC on request)
- Precision reading unaffected of system voltage
- 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)

**Specifications**

Auxiliary Supply:	Nom: 12-48VDC as standard (>9 - <60VDC, Fuse 2A)
Optional Voltage:	100-120, 200-240, 380-415 or 440-460VAC, 40-70Hz (Fuse 0,5A)
Supply tolerance:	± 10%
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)

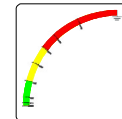
**Description**

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

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 gives the clear safety message:

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



**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.

**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**

The unit has non-latching C/O relay outputs for Warning (R1), Alarm (R2) and System Error (R3). The Alarm and error relays are fail to safety configured. 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 settable 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 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 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 the Voltage Adapter is connected to the instrument, max output from RHx adapters is 60VDC.

## Relay and LED Operation

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

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



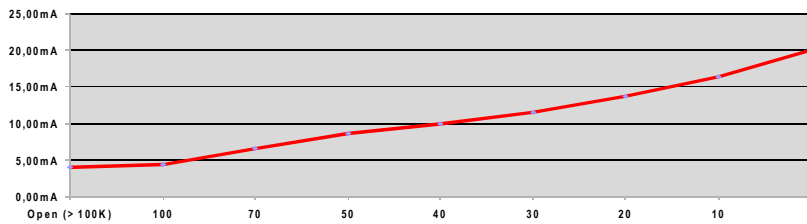
## Description

### 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.

## Output diagram



## Relay Operation

Scale range: 0-100kΩ - ∞ (>100kΩ)

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

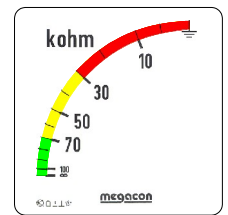
Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169E	-	-	X	WARNING:	0-100kΩ	0-30secs
KPM169F	-	X	X	ALARM:	0-100kΩ	0,1-3secs
KPM169G	X	-	X			
KPM169GF	X	X	X			
KPM169EH	-	-	-			
KPM169FH	-	X	-			
KPM169GH	X	-	-			
KPM169GFH	X	X	-			

Coloured sectors show recommended areas of settings:  
■ - Indicates alarm trip zone  
■ - Indicates warning trip zone  
■ - Indicates healthy zone

## Output table (example for 4-20mA)

Value (scale)	mA output
0kΩ	20.00mA
10kΩ	16.41mA
20kΩ	13.66mA
30kΩ	11.56mA
40kΩ	9.91mA
50kΩ	8.56mA
70kΩ	6.51mA
100kΩ	4.42mA
open (>100kΩ)	4.00mA

## Range



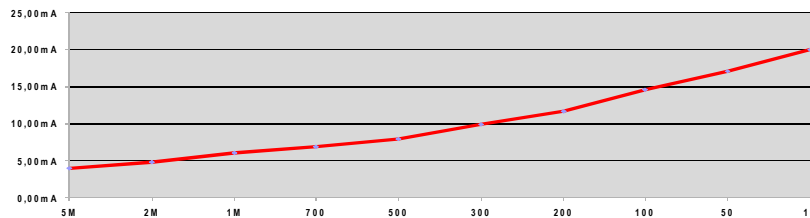
## Description

### 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 use the voltage adapter RH2 for voltage from 60V to max.200VDC.

## Output diagram



## Relay Operation

Scale range: <10kΩ-5MΩ

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

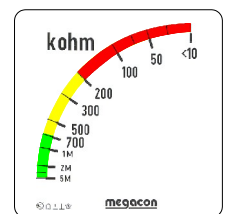
Model	Latch	Output	Fail-safe	Adjustments	Trip level	Delay
KPM169K2	-	-	X	WARNING:	10kΩ - 5MΩ	0-30secs
KPM169L2	-	X	X	ALARM:	10kΩ - 5MΩ	0,1-3secs
KPM169GK2	X	-	X			
KPM169GL2	X	X	X			
KPM169K2N	-	-	-			
KPM169L2N	-	X	-			
KPM169GK2N	X	-	-			
KPM169GL2N	X	X	-			

Coloured sectors show recommended areas of settings:  
■ - Indicates alarm trip zone  
■ - Indicates warning trip zone  
■ - Indicates healthy zone

## Output table (example for 4-20mA)

Value (scale)	mA output
<10kΩ	20.00mA
50kΩ	17.05mA
100kΩ	14.60mA
200kΩ	11.62mA
300kΩ	9.89mA
500kΩ	7.95mA
700kΩ	6.91mA
1MΩ	5.91mA
2MΩ	4.78mA
5MΩ	4.00mA

## Range



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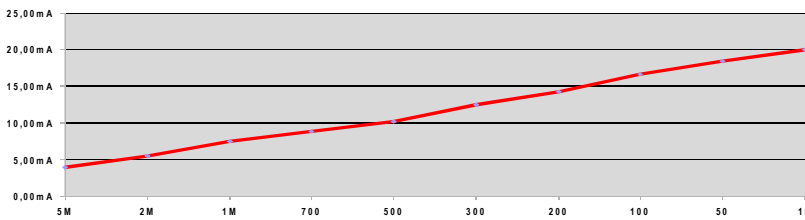
## Description

### 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 use the voltage adapter RH4 for voltage systems from 200V to max. 400VDC.

## Output diagram



## Relay Operation

Scale range: <10kΩ-5MΩ

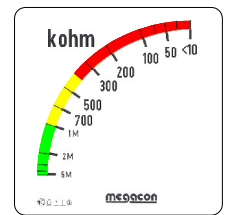
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		✓	✓
R3			✓	✓	

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

Coloured sectors show recommended areas of settings:  
■ - Indicates alarm trip zone  
■ - Indicates warning trip zone  
■ - Indicates healthy zone

## Output table (example for 4-20mA)

Value (scale)	mA output
<10kΩ	20.00mA
50kΩ	18.40mA
100kΩ	16.69mA
200kΩ	14.24mA
300kΩ	12.51mA
500kΩ	10.24mA
700kΩ	8.83mA
1MΩ	7.50mA
2MΩ	5.50mA
5MΩ	4.00mA



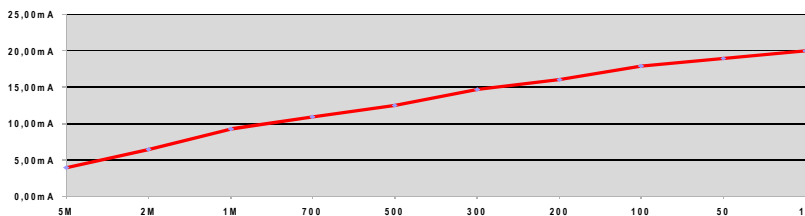
## Description

### 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 use the voltage adapter RH8 for voltage systems from 400V to max. 800VDC.

## Output diagram



## Relay Operation

Scale range: <10kΩ-5MΩ

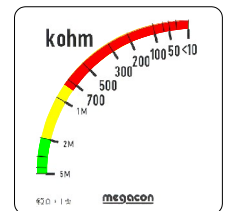
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		✓	✓
R3			✓	✓	

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

Coloured sectors show recommended areas of settings:  
■ - Indicates alarm trip zone  
■ - Indicates warning trip zone  
■ - Indicates healthy zone

## Output table (example for 4-20mA)

Value (scale)	mA output
<10kΩ	20.00mA
50kΩ	18.98mA
100kΩ	17.89mA
200kΩ	16.07mA
300kΩ	14.64mA
500kΩ	12.49mA
700kΩ	10.95mA
1MΩ	9.31mA
2MΩ	6.47mA
5MΩ	4.00mA



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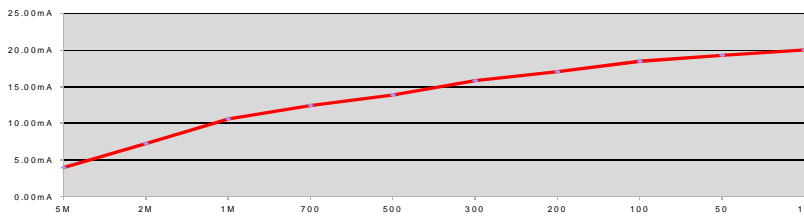
## Description

### 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 use the voltage adapter RH12 for Voltage systems from 800V to max. 1200VDC.

## Output diagram



## Relay Operation

Scale range: <10kΩ-5MΩ

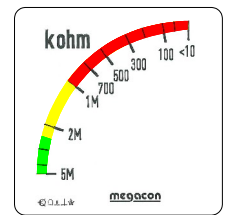
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		✓	✓
R3			✓	✓	

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	-			

Coloured sectors show recommended areas of settings:  
■ - Indicates alarm trip zone  
■ - Indicates warning trip zone  
■ - Indicates healthy zone

## Output table (example for 4-20mA)

Value (scale)	mA output
<10kΩ	20.00mA
50kΩ	19.30mA
100kΩ	18.50mA
200kΩ	17.07mA
300kΩ	15.85mA
500kΩ	13.90mA
700kΩ	12.40mA
1MΩ	10.65mA
2MΩ	7.23mA
5MΩ	4.00mA



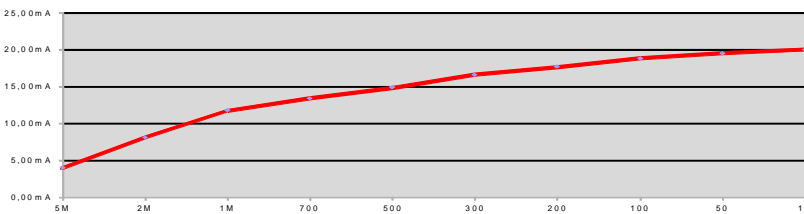
## Description

### 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 use the voltage adapter RH16 for voltage from 1200V to max. 1600VDC.

## Output diagram



## Relay Operation

Scale range: <10kΩ-5MΩ

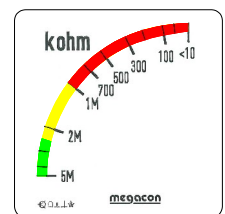
	Warning	Alarm	System Error	Fail Safe	Latch
R1	✓				
R2		✓		✓	✓
R3			✓	✓	

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	-			

Coloured sectors show recommended areas of settings:  
■ - Indicates alarm trip zone  
■ - Indicates warning trip zone  
■ - Indicates healthy zone

## Output table (example for 4-20mA)

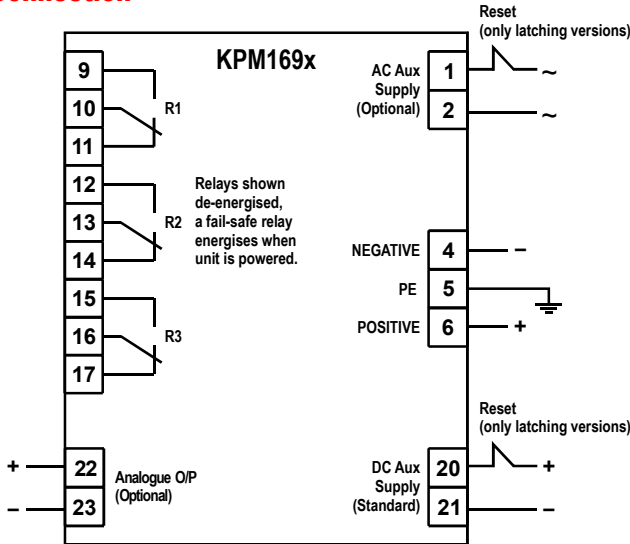
Value (scale)	mA output
<10kΩ	20.00mA
50kΩ	19.52mA
100kΩ	18.84mA
200kΩ	17.69mA
300kΩ	16.62mA
500kΩ	14.88mA
700kΩ	13.46mA
1MΩ	11.77mA
2MΩ	8.14mA
5MΩ	4.00mA



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## Connection



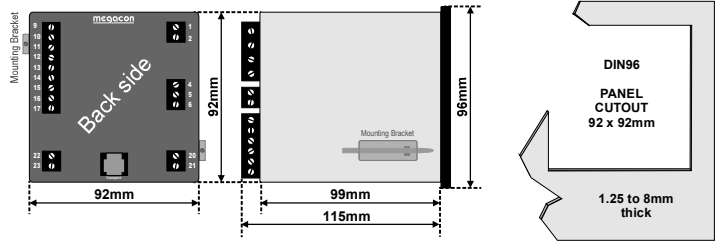
## Analogue Output

KPM169F, KPM169GF, KPM169L2, KPM169GL2, KPM169L4, KPM169GL4, KPM169L8, KPM169GL8, KPM169L12, KPM169GL12, KPM169L16 and KPM169GL16 have an analogue output proportional to meter reading. (Special outputs are available on request)

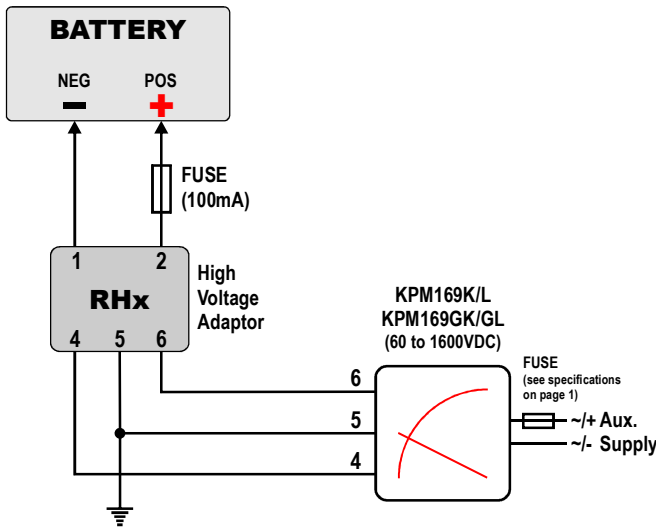
Add suffix from table below to type designation to specify output required:

O/P1	0 - 10mA	O/P6	N/A
O/P2	0 - 20mA	O/P7	N/A
O/P3	4 - 20mA	O/P8	0 - 10VDC
O/P4	N/A	O/P9	N/A
O/P5	N/A	O/P10	N/A

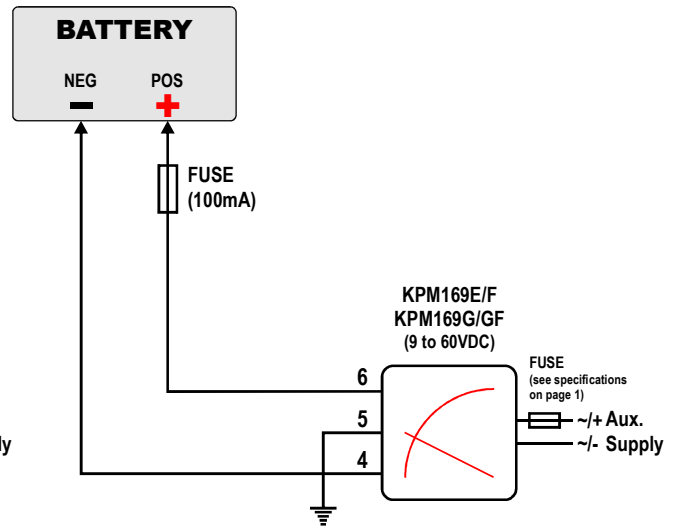
## Dimensions



## INPUT VIA RH ADAPTOR



## DIRECT INPUT <60VDC

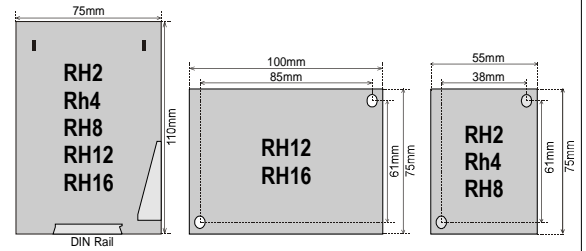


## High Voltage Adaptors (RHx) for KPM169Kx/Lx series

DC Voltage Adapter for use in conjunction with KPM169x series when the monitored DC voltage is higher than 60VDC. The adapter is a passive resistive/capacity unit and is potted in polyurethane for electrical safety. When the adapters is connected to the instrument the maximum voltage output is app. 60VDC.



## Dimensions for RHx series



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### ORDERING INFORMATION

Type	: KPM169F
Aux. Supply	: 230VAC
Network Voltage	: 24VDC
Analogue O/P	: 4-20mA
Range	: -

