



- Direct connection up to 690V line voltage, up to 1,4kV with HV adapter for both single or three phase systems
- Monitoring during both live and standby conditions
- Protection against harmful DC voltage exposure
- "Megger" - safe to 1.4kVDC when aux power is OFF
- Immune to earth capacitance and voltage surges
- For use in land, marine, offshore, sub-sea and ocean floor Installations
- Complies with IMCA D 045 Code of Practice
- Analogue output proportional to meter reading (F-version)
- Optional slave indicator

## Specifications

Auxiliary Supply:	100-120, 200-240, 380-415 or 440-460VAC, 40-70Hz (Fuse 0.5A)
Optional Voltage:	12-24, 48 or 110VDC (Fuse 2A)
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
F-versions	Up to 10V, min 100kohm (other on request)
Temperature:	-20 to +70°C
Weight:	0.6kgs
Front protection:	IP21

### INTELLIGENT SETTING ASSISTANCE

KCM161Mx 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 front is operated by user, the slave 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.

#### NOTE:

The standard Insulation Guards KCM161x and KCM163x are protected against sporadic AC and DC voltage surges imposed on the monitored AC network. Exposure to enduring high energy DC voltage (reported to be up to several hundred volts with positive or negative polarity) will instantaneously cause the meter to read false insulation value and may destroy the unit.

## Application

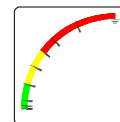
The digitally controlled KCM161Mx series monitors insulation level between a non-grounded (IT) AC mains and its protective earth, regardless of whether the mains is live or non-live (standby) in marine and offshore installations.

### IDV MEASURING PRINCIPLE

Insulation is measured between the complete galvanically interconnected AC network and its protective earth. The unit injects a sequentially coded measuring signal to the monitored system. The signal flows to ground via the path of the insulation fault, the level of flow indicates the insulation resistance. The measuring accuracy is not influenced by any normal kind of load attached to the AC network.

An AC or DC auxiliary voltage is required for the unit, if powered from a separate source the network can also be monitored during standby conditions. Only **ONE** KCM161Mx can be connected to each IT-system. The ohmmeter and the triple-zone status LEDs give at a glance the clear safety message:

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



## General

### HIGH ENERGY DC VOLTAGE IN YOUR AC MAINS, AN UNKNOWN AND NEGLECTED PROBLEM

Experience has confirmed that **full cycle** half-wave and **partial cycle** full-wave rectifier/regulator loads, inverter asymmetrical phases output or a semiconductor failure in heavy power rectifiers/inverters may impose high energy DC voltage on the AC supply line voltages. Intermittent or ENDURING imposed DC voltage is reported to be up to several hundred volts with positive or negative polarity relative to protective earth.

This DC voltage will distort insulation measurements, and may cause breakdown of protective guards. The uncontrolled DC energy can cause functional problems by saturating magnetic cores and influence performance of current and voltage transformers, reactors, motors, regenerative drives, generators and regulators. It is also a fact that this serious malfunction normally remains undetected and unknown to the crew. The M-variant therefore includes a unique DC voltage detection function with an alarm output.

When a "foreign" positive DC voltage exceeding 17V or a negative DC voltage exceeding 3V are detected on the monitored AC supply the DC detection function will within 20 seconds disable the insulation measuring function to avoid false readings, isolate the unit input, activate LED "DC EXPOSURE" and trip relay 3. In this mode unit will sustain continuous high-energy exposure up to +/- 800VDC. The "pathfinder" function identifies polarity of imposed DC. At 10 minutes intervals the unit senses if DC is still present and will reset automatically and restore normal operation when DC exposure ends.

To detect presence of harmful DC voltage connect a voltmeter between any AC supply line voltage and protective earth, and set the meter function switch to AC and DC alternately.

## Description

### KCM161M & KCM161MF - KCM161MG & KCM161MGF

This unit is used for hospital, industrial, marine and offshore installations.

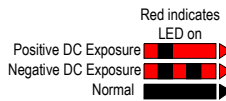
Start of monitoring function is delayed when auxiliary power is switched on (default 5 secs delay).

The unit has minimum 150 mS detection time for any insulation fault.

Direct connection up to 690V line voltage. Up to 1,4kV via HV adaptor CH163/1,4.

### PATHFINDER FUNCTION

The pathfinder indicates polarity of DC exposure by the flashing pattern of lamp DC EXPOSURE (Positive polarity gives steady light and flashing for negative polarity).



## Relay Operation

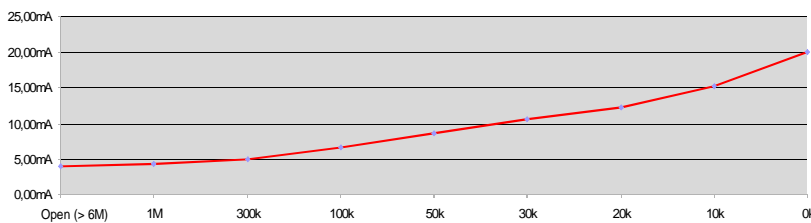
Scale range: 0-1000kΩ - ∞ (>6MΩ)

	Warning	Alarm	DC Exposure Alarm	Fail Safe	Latch
R1	✓				
R2		✓		✓	*✓
R3			✓		

Model	Latch	Output	Fail Safe	Adjustments	Trip level	Delay
KCM161M	-	-	X	WARNING:	0-1MΩ	0-30secs
KCM161MF	-	X	X	ALARM:	0-1MΩ	0,1-3secs
KCM161MG*	X	-	X			
KCM161MGF*	X	X	X			

Coloured sectors show recommended areas of settings:  
 - Red - Indicates alarm trip zone  
 - Yellow - Indicates warning trip zone  
 - Green - Indicates healthy zone

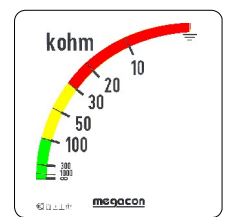
## Output diagram



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

Value (scale)	mA output
0kΩ	20.00mA
10kΩ	15.22mA
20kΩ	12.32mA
30kΩ	10.61mA
50kΩ	8.68mA
100kΩ	6.69mA
300kΩ	4.98mA
1MΩ	4.28mA
Open (>6MΩ)	4.00mA

## Range



### High Voltage Adaptors up to 1,4kVAC for KCM161Mx series

- HV Adaptor for AC Insulation Guards
- CH163x series, up to 1400V Line Voltage live or non-live (standby)
- Creates safety barrier from live HT network to LV switchboard
- Limits measuring output signal to safe levels
- No restrictions on distance between adapter and LV switchboard

Voltage Adaptors CH163x series are used for Insulation Guard KCM161Mx when the monitored line voltage is higher than 690VAC. These adaptors are a passive low-pass filter for use in 50, 60 or 400Hz networks, and are potted in polyurethane.

These units includes high inductance reactance modules, connected in a special configuration to avoid DC saturation. Connection to the star-point (Neutral) is Preferable. These adaptors maintain a high AC suppression of its signal output to very low, safe levels, under all conditions.

### Caution

Terminal 1 must be disconnected during "megger" test.

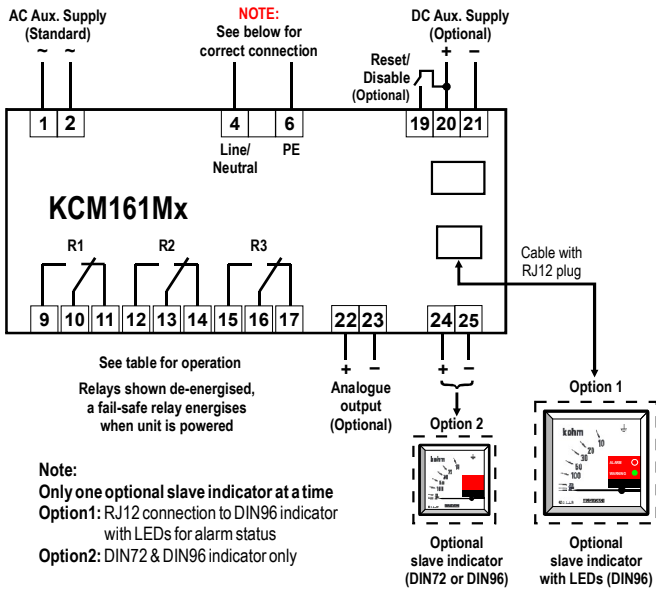


CH163/1,4 up to 1.4kVAC

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



## Connection



## Analogue Output

The unit has C/O relay outputs for insulation **Warning** and **Alarm** and **DC Exposure** alarm. The insulation alarm relay is fail to safety configured. The trip LED flashes when the set trip level is passed, the relay trips when the delay has elapsed. The timer resets if the fault is removed during countdown. Trip levels and delays are settable on unit rear.

**KCM161MF** and **KCM161MGF** 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

## Reset / Paralleling Disable Function

KCM161Mx has a built-in disable function. When connecting two or more IT-networks together **only one unit** can be active, the other(s) must be disabled. When unit is disabled the power led will flash every 2 seconds to indicate that unit is inactive.

Use a potential free contact on terminal 19 & 20 to activate the disable function (after 2 secs). When activated the measuring input terminal 4 will be internally disconnected.

A pulse (60mS - 2 secs) on terminal 19 & 20 will only reset any latching alarm.

## SAFETY

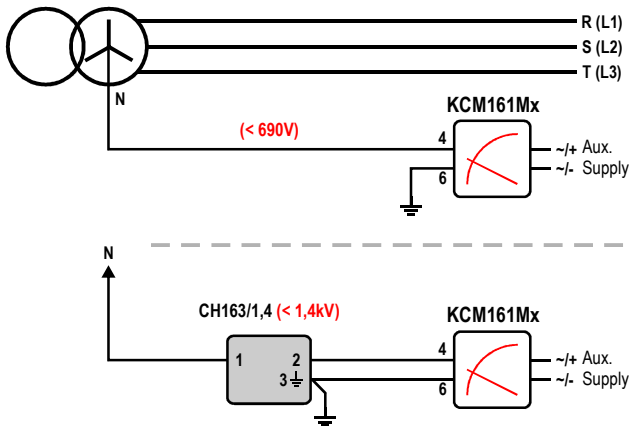
When a voltage adapter (CHx) is used the signal to terminals 4 and 6 on KCM161Mx is limited to a safe level, avoiding any dangerous voltage exposure to personnel.

The KCM161Mx range is designed to comply with specification IMCA D 045 "Code of Practice for the Safe Use of Electricity Under Water" issued by IMCA.

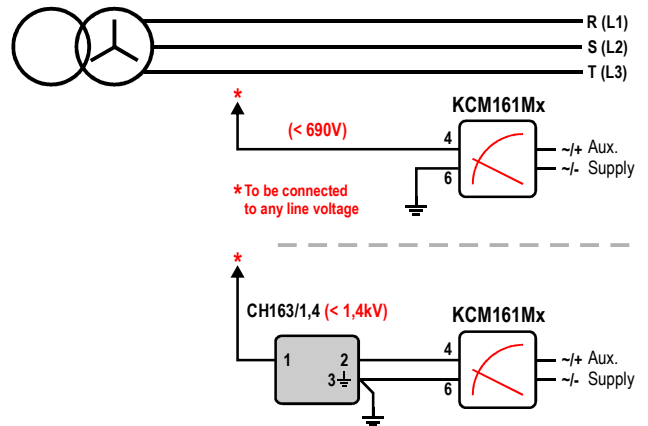
The unit meets IEC60092-504 and the relevant environmental and EMC tests specified in IEC60068/60092 and IEC61000/60533 respectively, to comply with the requirements of the major Classification Societies.

## Connection

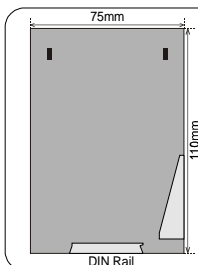
### NEUTRAL VOLTAGE INPUT



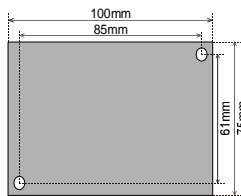
### LINE VOLTAGE INPUT



**!** The instrument will detect earth fault on all phases independent of which phase is connected to terminal 4.

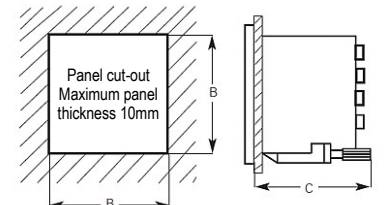
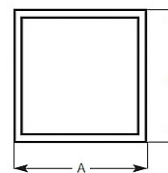


## Dimensions



## Dimensions for Slave instrument

	DIN 72	DIN96
A	72 x 72mm	96 x 96mm
B	68 x 68mm	92 x 92mm
C	64mm	64mm



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

## ORDERING EXAMPLE:

Type: KCM161MF  
 Aux. Supply: 200-240VAC  
 Network Voltage: 1,4kVAC  
 Analogue O/P: (O/P3) 4-20mA  
 Range: 0-1000kohm

