



- Direct connection up to 690V line voltage, up to 28kV with HV adapter for both single or three phase systems
- Monitoring during both live and standby conditions
- For use in land, marine, offshore, sub-sea and ocean floor Installations
- Complies with IMCA D 045 Code of Practice
- With test function and DC voltage exposure protection
- Immune to earth capacitance and voltage surges
- Analogue output proportional to meter reading (F-version)
- With Modbus RTU (see Megacon modbus datasheet)
- Optional slave indicator (0-1mA)

## 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 AC/DC:	3VA/3W
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
Communication:	Modbus RTU

### INTELLIGENT SETTING ASSISTANCE

KCM165x 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.

The KCM165x range is designed to comply with specification IMCAD 045 "Code of Practice for the Safe Use of Electricity Under Water" issued by IMCA.

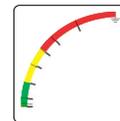
The unit meets IEC60092-504 and the relevant environmental and EMC tests specified in IEC60068/60092 and IEC61000/60533 respectively, to comply with the requirements of the major Classification Societies.

## Application

The digitally controlled KCM165x 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). The unit is for land, marine, offshore, sub-sea and ocean floor use. With built-in Modbus RTU.

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** KCM165x 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

### IDV MEASURING PRINCIPLE

Insulation is measured between the complete galvanically interconnected AC network and its protective earth. The unit injects a DC voltage signal into 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. Trip levels and delays are settable on unit rear. A trip LED flashes when the trip level is passed, the relay trips when the delay has elapsed. The timer resets if the fault is removed during countdown.

### MEGGER SAFE

When auxiliary power is **OFF** the unit input is automatically protected against "megger" test voltages up to 1.4kVDC, and incorrect measurements caused by the unit's input impedance are avoided.

### OUTPUTS

All F versions have an isolated **analogue output** (Term. 22,23) proportional to meter reading. And all models have a output for remote meter reading, we recommend 0-1mA for the slave indicator.

### SAFETY

When a voltage adapter (ARx or ANx) is used the signal to terminals 4 and 6 on KCM165x is limited to a safe level, avoiding any dangerous voltage exposure to personnel.

### Test Function

The unit have a self test function. A 20Mohm resistor is then connected on the input between line-in and PE as long as the TEST button is pressed.

### Communication

The KCM165x is fitted with modbus RTU communication. Details can be found in Megacon datasheet KxM16x-modbus protocol.

### DC protection

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 to normal operation when DC exposure ends.

Description

**KCM165H & KCM165HF - KCM165HG & KCM165HGF**

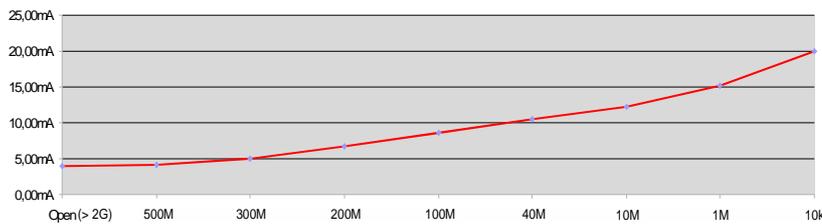
Start of monitoring has a 30 secs delay. This unit is for marine, offshore, sub-sea and ocean floor use. It has a wide measuring range in order to detect degradation of insulation at its origin. An important feature is the unit's unique inhibit function, controlled by the **Load Distortion and Earth-capacitance Detector (LDED)**.

The **LDED** function differentiates between a true (resistive) or a false (capacitive) drop in insulation reading, and will maintain reliable and accurate insulation monitoring even if load switching or a major change in load spread capacitance cause meter indication to drop **below** set relay trip levels. This situation may occur due to the latent high RC product at the high end part of the measuring range. The LDED will then momentarily inhibit all monitoring functions, freeze operation of meter, lamp display, alarm relays and analogue output for duration of a monitoring irregularity.

The unit will restore normal operation at the moment meter deflection rises **above** set alarm trip levels. The **LDED function has minimum 5 secs detection time for any insulation fault.**

Direct connection up to 690V line voltage.  
Up to 25kV via HV adaptor CH163Bx, AN6,6B, ARx or ANxB series.

Output diagram



Relay Operation

Scale range: 10kΩ-500MΩ - ∞ (>2GΩ)

Relay	Warning	Alarm	Fail Safe	Latch
R1	X			
R2		X	X	*X
R3		X	X	*X

Model	Latch	Output	Adjustments	Trip level	Delay
KCM165H	-	-	WARNING:	10kΩ-400MΩ	0-30secs
KCM165HF	-	X	ALARM:	10kΩ-400MΩ	0-30secs
KCM165HG*	X	-			
KCM165HGF*	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
1MΩ	14.84mA
10MΩ	12.28mA
40MΩ	10.57mA
100MΩ	8.63mA
200MΩ	6.64mA
300MΩ	4.93mA
500MΩ	4.20mA
Open (>2GΩ)	4.00mA

Range (slave indicator)



Description

**KCM165G1 & KCM165GF1 - KCM165L1 & KCM165LF1**

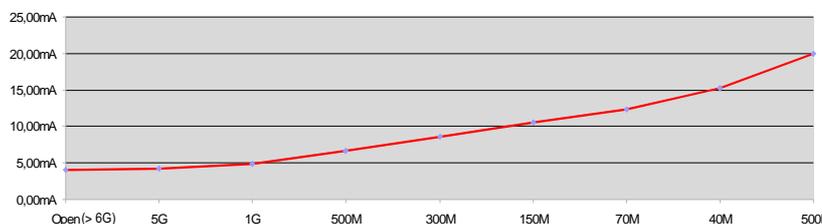
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The **LDED** function differentiates between a true (resistive) or a false (capacitive) drop in insulation reading, and will maintain reliable and accurate insulation monitoring even if load switching or a major change in load spread capacitance cause meter indication to drop **below** set relay trip levels. This situation may occur due to the latent high RC product at the high end part of the measuring range. The LDED will then momentarily inhibit all monitoring functions, freeze operation of meter, lamp display, alarm relays and analogue output for duration of a monitoring irregularity.

The unit will restore normal operation at the moment meter deflection rises **above** set alarm trip levels. The **LDED function has minimum 5 secs detection time for any insulation fault.**

Direct connection up to 690V line voltage.  
Up to 25kV via HV adaptor CH163Bx, AN6,6B, ARx or ANxB series.

Output diagram



Relay Operation

Scale range: 500kΩ-5GΩ - ∞ (>6GΩ)

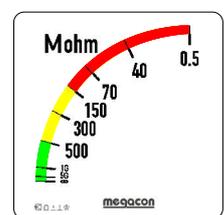
Relay	Warning	Alarm	Fail Safe	Latch
R1	X			
R2		X	X	*X
R3		X	X	*X

Model	Latch	Output	Adjustments	Trip level	Delay
KCM165G1*	X	-	WARNING:	500kΩ-3GΩ	0-30secs
KCM165GF1*	X	X	ALARM:	500kΩ-3GΩ	0-30secs
KCM165L1	-	-			
KCM165LF1	-	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
500kΩ	20.00mA
40MΩ	15.18mA
70MΩ	12.28mA
150MΩ	10.57mA
300MΩ	8.63mA
500MΩ	6.64mA
1GΩ	4.93mA
5GΩ	4.20mA
Open (>6GΩ)	4.00mA



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Description

KCM165E1 & KCM165F1 - KCM165N1 & KCM165NF1

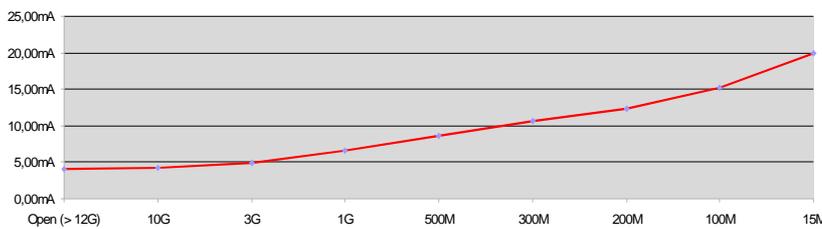
Start of monitoring has a 30 secs delay. This unit is for marine, offshore, sub-sea and ocean floor use. It has a wide measuring range in order to detect degradation of insulation at its origin. An important feature is the unit's unique inhibit function, controlled by the Load Distortion and Earth-capacitance Detector (LDED).

The LDED function differentiates between a true (resistive) or a false (capacitive) drop in insulation reading, and will maintain reliable and accurate insulation monitoring even if load switching or a major change in load spread capacitance cause meter indication to drop below set relay trip levels. This situation may occur due to the latent high RC product at the high end part of the measuring range. The LDED will then momentarily inhibit all monitoring functions, freeze operation of meter, lamp display, alarm relays and analogue output for duration of a monitoring irregularity.

The unit will restore normal operation at the moment meter deflection rises above set alarm trip levels. The LDED function has minimum 5 secs detection time for any insulation fault.

Direct connection up to 690V line voltage.  
Up to 25kV via HV adaptor CH163Bx, AN6,6B, ARx or ANxB series.

Output diagram



Relay Operation

Scale range: 15MΩ-10GΩ - ∞ (>12GΩ)

Relay	Warning	Alarm	Fail Safe	Latch
R1	X			
R2		X	X	*X
R3		X	X	*X

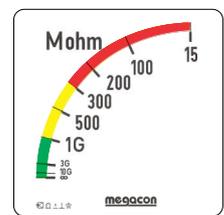
Model	Latch	Output	Adjustments	Trip level	Delay
KCM165E1*	X	-	WARNING:	15MΩ-5GΩ	0-30secs
KCM165F1*	X	X	ALARM:	15MΩ-5GΩ	0-30secs
KCM165N1	-	-			
KCM165NF1	-	X			

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

Output table (example for 4-20mA)

Value (scale)	mA output
15MΩ	20.00mA
100MΩ	15.18mA
200MΩ	12.28mA
300MΩ	10.57mA
500MΩ	8.63mA
1GΩ	6.64mA
3GΩ	4.93mA
10GΩ	4.20mA
Open (>12GΩ)	4.00mA

Range (slave indicator)



High Voltage Adaptors up to 28kVAC for KCM165x series

- HV Adaptor for AC Insulation Guards
- CH163Bx series, up to 5000V Line Voltage live or non-live (standby)
- AN6,6B up to 6600V System Voltage live or non-live (Starpoint/Neutral connection only)
- ARx series, up to 14kV Line Voltage live or non-live (standby)
- ANxB series, up to 28kV System Voltage live or non-live (Starpoint/Neutral connection only)
- 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 CH163Bx, AN6,6B, ARx and ANxB series are used for Insulation Guard KCM165x 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. 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



CH163B/3,6 up to 3.6kVAC  
CH163B/5 up to 5kVAC  
AN6,6B up to 6,6kVAC



AR7 up to 7kVAC  
AR14 up to 14kVAC

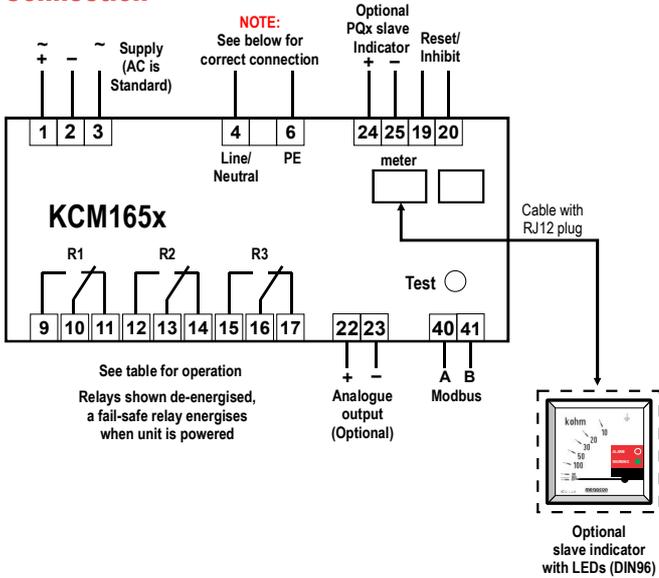


AN7B up to 7kVAC  
AN14B up to 14kVAC  
AN25B up to 25kVAC  
AN28 up to 28kVAC

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## Connection



## Analogue Output

KCM165HF, KCM165HGF, KCM165GF1, KCM165LF1, KCM165F1 and KCM165NF1 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

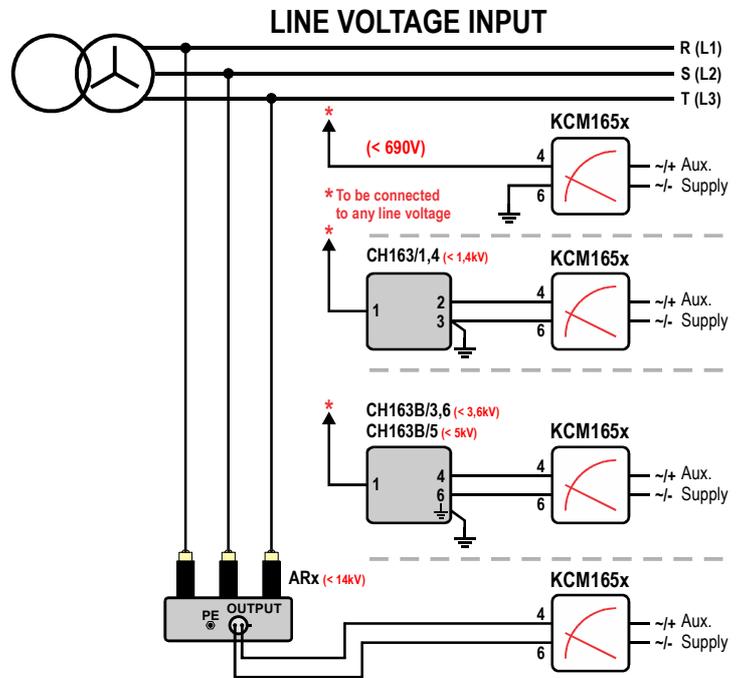
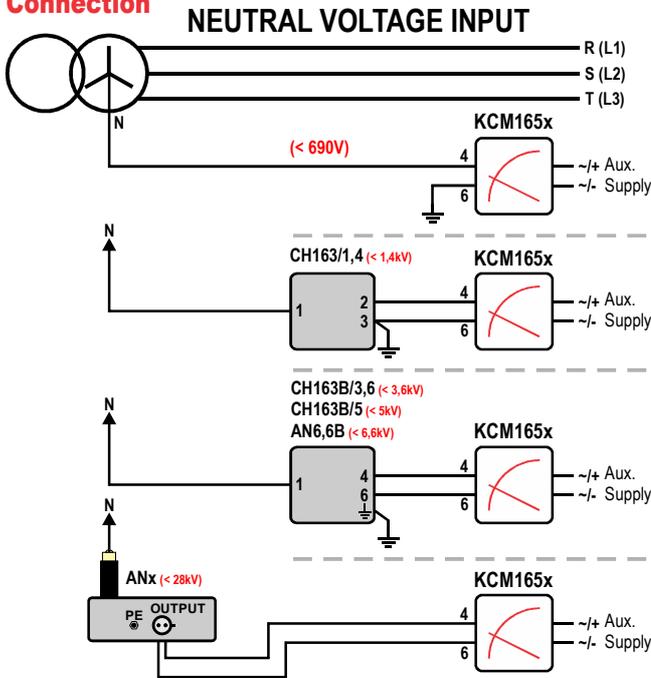
## Reset / Paralleling Disable Function

KCM165x 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.

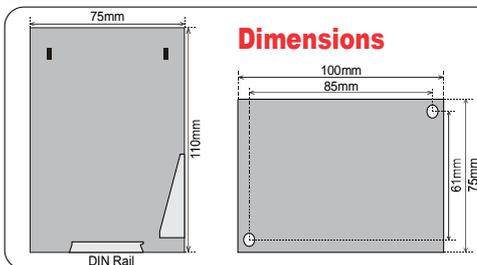
Use a potential free contact on terminal 19 & 20 to activate the disable function (after 2 secs). When activated the measuring input terminal 4 will be internally disconnected.

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

## Connection

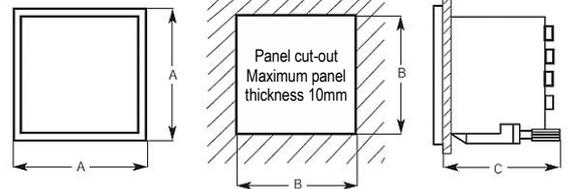


**The instrument will detect earth fault on all phases independent of which phase is connected to terminal 4.**



### Dimensions for Slave instrument

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



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### ORDERING EXAMPLE:

Type: KCM165F1  
 Aux. Supply: 200-240VAC  
 Network Voltage: 14kVAC  
 Analogue O/P: (O/P3) 4-20mA  
 Range: 15Mohm - 10Gohm

