INSULATION GUARD FOR NON-GROUNDED AC NETWORKS

KCM16x

- **Direct connection up to 750V line voltage, up to 25kV with HV adapter**
- **Monitoring during both live and standby conditions**
- **For use in land, marine, offshore, sub-sea and ocean floor Installations**
- **Comply with AODC 035 Code of Practice**
- **"Megger" - safe to 1.4kVDC when aux power is OFF**
- **Immune to earth capacitance and voltage surges**
- **Analogue output proportional to meter reading (F-version)**
- **Optional slave indicator**

Specifications

General	
Auxiliary Supply:	100-120, 200-240, 380-415 or 440-460VAC, 40-70Hz (Fuse 0.5A)
Optional Voltage:	12-24VDC (Fuse 2A)
Contact rating:	AC: 100VA - 250V/2A max. DC: 50W - 100V/1A max.
Analogue Output: F-versions	Up to 20mA, max 500R Up to 10V, min 100kohm (other on request)
Temperature:	-20 to +70ºC
Weight:	0.6kgs
Front protection:	IP21

INTELLIGENT SETTING ASSISTANCE
KCM16x 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 slave meter goes to the top), then adjust potmeter down to required **Warning** or **Alarm** setpoint. 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 KCM16x range is designed to comply with specification AODC035 "Code of Practice for the Safe Use of Electricity Under Water" issued by IMCA.

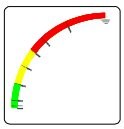
The unit meets IEC60092-504 and the relevant environmental and EMC tests specified in IEC60068/60092 and IEC61000/60533 respectively, to comply with the requirements of the major Classification Societies.

Application

The digitally controlled KCM16x 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.

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** KCM16x 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 sequentially coded measuring 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** proportional to meter reading. If output is used for remote meter reading, we recommend 0-1mA for the slave indicator.

SAFETY
When a voltage adapter (CHx, ANx or ARx) is used the signal to terminals 4 and 6 on KCM163x and KCM165x is limited to a safe level, avoiding any dangerous voltage exposure to personnel.

NOTE
Special versions of the KCM161, KCM163 and KCM165 are available as:

KCM161M & KCM163M - Insulation guard with DC detection function, protected against **high-energy** DC voltage imposed on the monitored AC supply.

KCM261x & KCM263x - Insulation guard with measuring loop continuity monitoring.

Description

KCM161E2 & KCM161F - KCM161G & KCM161GF

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 750V line voltage.

Relay Operation

Scale range: 0-1000kΩ - ∞ (>6MΩ)

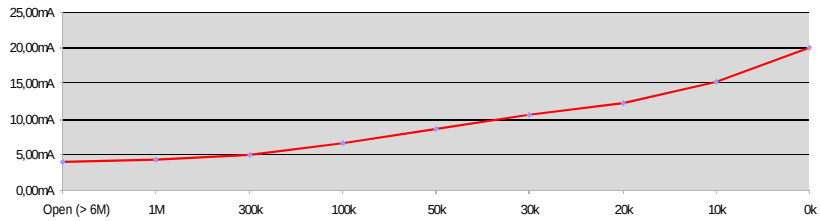
	Warning	Alarm	Fail Safe	Latch
R1	√			
R2		√	√	*√
R3		√	√	*√

Model	Latch	Output
KCM161E2	-	-
KCM161F	-	X
KCM161G*	X	-
KCM161GF*	X	X

Adjustments	Trip level	Delay
WARNING:	0-1MΩ	0-30secs
ALARM:	0-1MΩ	0,1-3secs

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

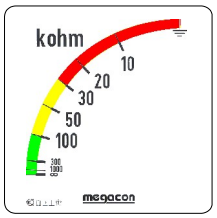
Output diagram



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 (slave indicator)



Description

KCM163E & KCM163F - KCM163G & KCM163GF

This unit is used for marine, ROV and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 10 secs delay). The unit has minimum 150 mS detection time for any insulation fault. **(Recommended for thruster standby monitoring)**

KCM163H & KCM163HF - KCM163HG & KCM163HGF

This unit is specifically designed for **sub-sea monitoring** and includes the advanced **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 1 secs detection time for any insulation fault.**

Direct connection up to 750V line voltage. Up to 6,6kV via HV adaptor CH163x or AN6,6 series.

Relay Operation

Scale range: 0-10MΩ - ∞ (>60MΩ)

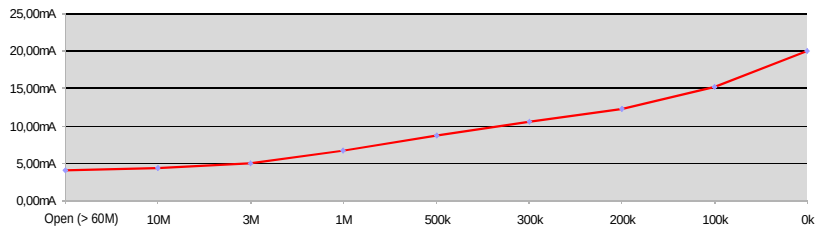
	Warning	Alarm	Fail Safe	Latch
R1	√			
R2		√	√	*√
R3		√	√	*√

Model	Latch	Output
KCM163E	-	-
KCM163F	-	X
KCM163G*	X	-
KCM163GF*	X	X
KCM163H	-	-
KCM163HF	-	X
KCM163HG*	X	-
KCM163HGF*	X	X

Adjustments	Trip level	Delay
WARNING:	0-10MΩ	0-30secs
ALARM:	0-10MΩ	0,1-3secs

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

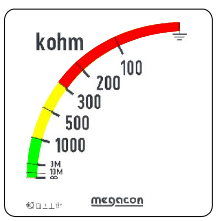
Output diagram



Output table (example for 4-20mA)

Value (scale)	mA output
0kΩ	20.00mA
100kΩ	15.18mA
200kΩ	12.30mA
300kΩ	10.59mA
500kΩ	8.67mA
1MΩ	6.69mA
3MΩ	4.98mA
10MΩ	4.28mA
Open (60MΩ)	4.00mA

Range (slave indicator)



IS range

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.**

Connection up to 25kV via HV adaptor ARx or ANx series.

Relay Operation

Scale range: 10kΩ-500MΩ - ∞ (>2GΩ)

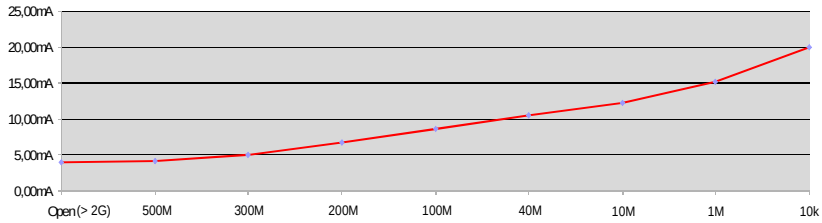
	Warning	Alarm	Fail Safe	Latch
R1	√			
R2		√	√	*√
R3		√	√	*√

Model	Latch	Output
KCM165H	-	-
KCM165HF	-	X
KCM165HG*	X	-
KCM165HGF*	X	X

Adjustments	Trip level	Delay
WARNING:	10kΩ-400kΩ	0-30secs
ALARM:	10kΩ-400kΩ	0-30secs

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

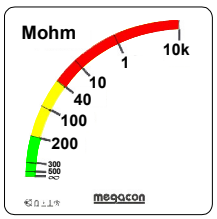
Output diagram



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

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.**

Connection up to 25kV via HV adaptor ARx or ANx series.

Relay Operation

Scale range: 500kΩ-5GΩ - ∞ (>6GΩ)

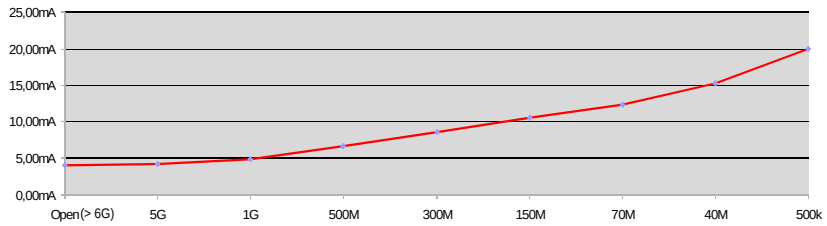
	Warning	Alarm	Fail Safe	Latch
R1	√			
R2		√	√	*√
R3		√	√	*√

Model	Latch	Output
KCM165G1*	X	-
KCM165GF1*	X	X
KCM165L1	-	-
KCM165LF1	-	X

Adjustments	Trip level	Delay
WARNING:	500kΩ-3GΩ	0-30secs
ALARM:	500kΩ-3GΩ	0-30secs

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

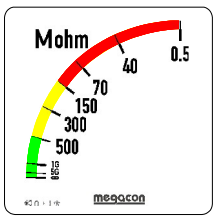
Output diagram



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

Range (slave indicator)



IS range

KCM16x

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.**

Connection up to 25kV via HV adaptor ARx or ANx series

Relay Operation

Scale range: 15MΩ-10GΩ - ∞ (>12GΩ)

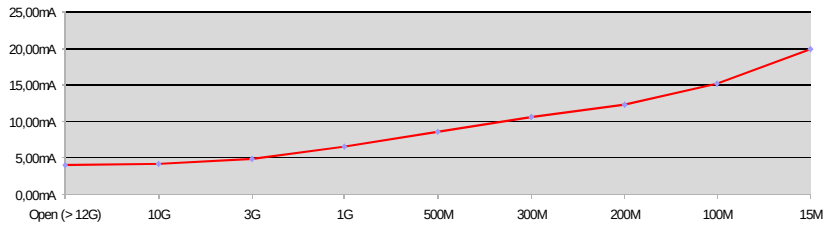
	Warning	Alarm	Fail Safe	Latch
R1	√			
R2		√	√	*√
R3		√	√	*√

Model	Latch	Output
KCM165E1*	X	-
KCM165F1*	X	X
KCM165N1	-	-
KCM165NF1	-	X

Adjustments	Trip level	Delay
WARNING:	15MΩ-5GΩ	0-30secs
ALARM:	15MΩ-5GΩ	0-30secs

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

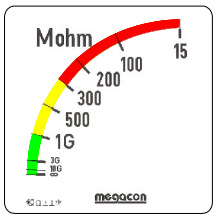
Output diagram



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 25kVAC for KCM163x & KCM165x series

CH163/1,4 up to 1.4kVAC
(for KCM163x series)

CH163/3,6 up to 3.6kVAC
(for KCM163x series)

CH163/5 up to 5kVAC
(for KCM163x series)

AN6,6 up to 6,6kVAC
(for KCM163x series)

AN7 up to 7kVAC
(for KCM165x series)

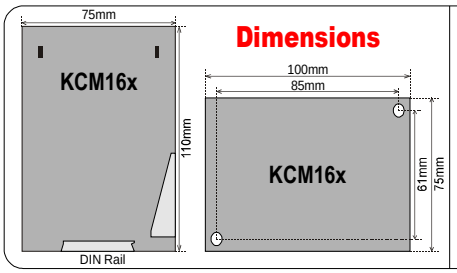
AN14 up to 14kVAC
(for KCM165x series)

AN25 up to 25kVAC
(for KCM165x series)

AR7 up to 7kVAC
(for KCM165x series)

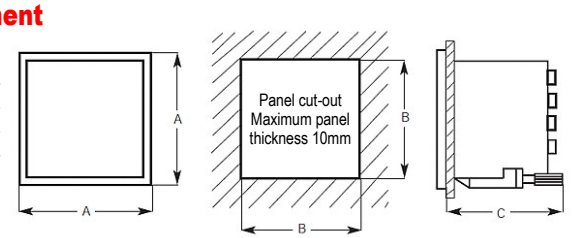
AR14 up to 14kVAC
(for KCM165x series)

Dimensions



Dimensions for Slave instrument

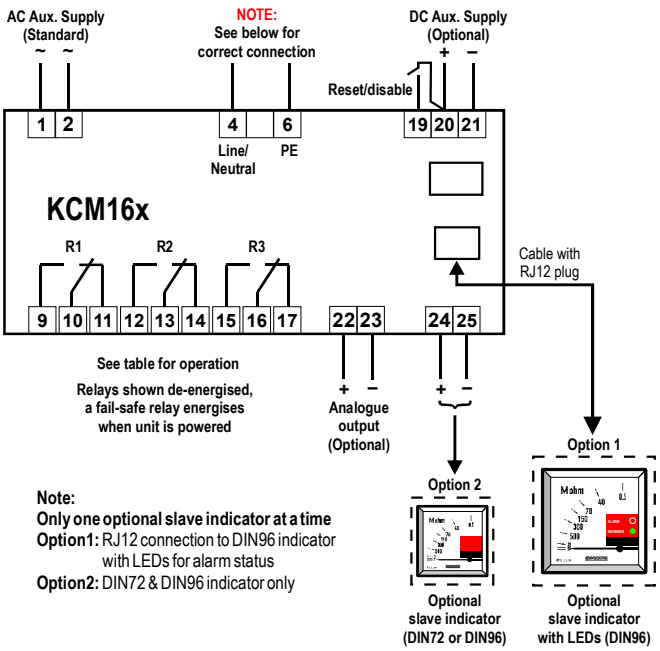
	A	B	C
DIN72	72 x 72mm	68 x 68mm	64mm
DIN96	96 x 96mm	92 x 92mm	64mm



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

IS range

KCM16x



Note:
Only one optional slave indicator at a time
Option1: RJ12 connection to DIN96 indicator with LEDs for alarm status
Option2: DIN72 & DIN96 indicator only

Analogue Output

KCM161F, KCM161GF, KCM163F, KCM163GF, KCM163H, KCM163HGF, 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

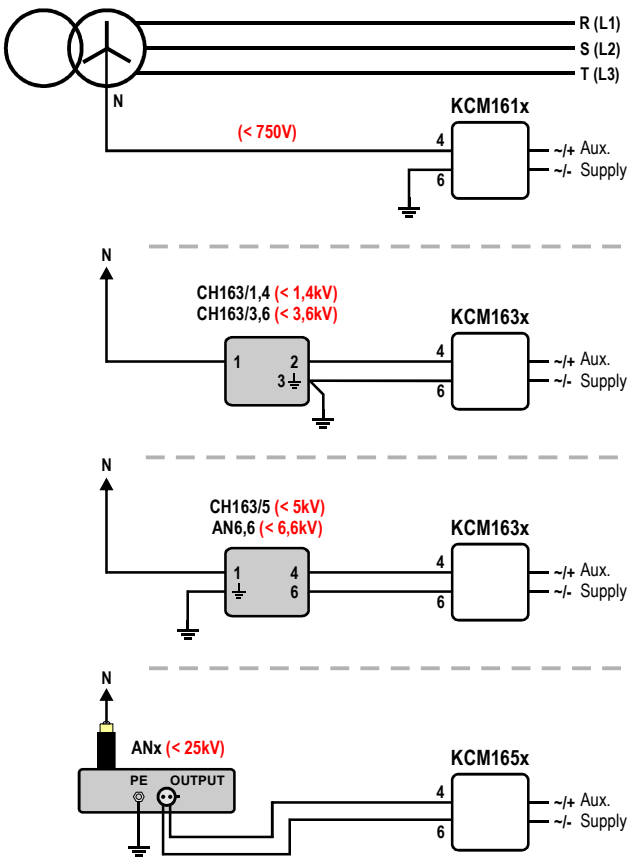
Reset / Parallelling Disable Function

KCM16x 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.

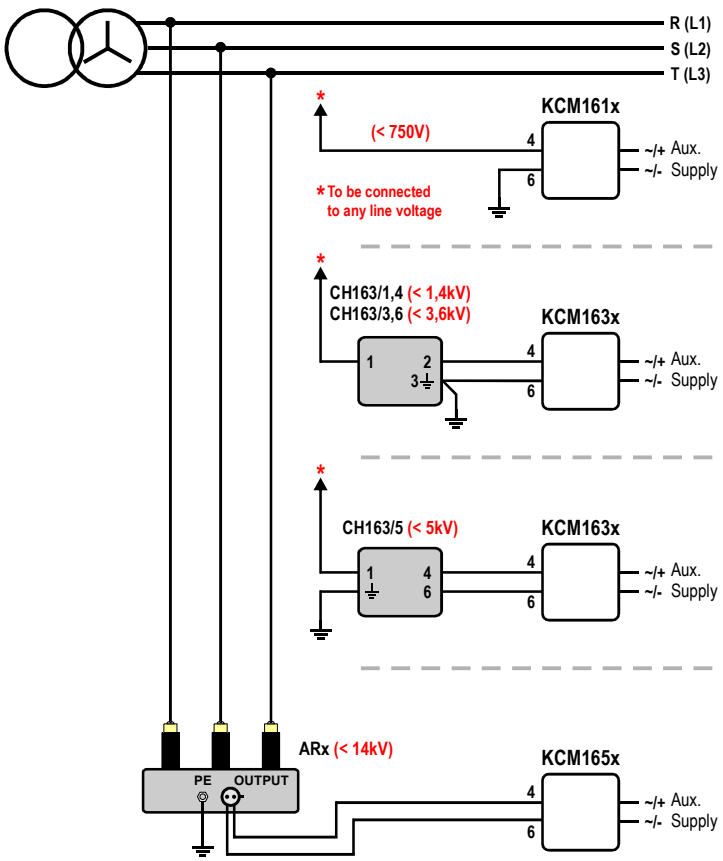
Use a potentional free contact on terminal 19 and 20 to activate the disable function (after 2 secs). When activated the measuring input terminal 4 will be internally disconnected.

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

NEUTRAL VOLTAGE INPUT



LINE VOLTAGE INPUT



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ORDERING EXAMPLE:

Type:	KCM165GF1
Aux. Supply:	200-240VAC
Network Voltage:	14kVAC
Analogue O/P:	(O/P3) 4-20mA
Range:	500K - 5Gohm

IS range