

ISOM K-20

Insulation monitoring devices



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1. DOCUMENTATION

All documentation relating to ISOM K-20 and its sensors is available on the SOCOMEC website at the following address: www.socomec.fr



2. HAZARDS AND WARNINGS

The term "device" used in this document covers all ISOM K-20 models.

The assembly, use, servicing and maintenance of this equipment must only be carried out by trained, qualified professionals. SOCOMEC is not responsible for any failure to follow the procedures given in these instructions.

2.1. Risks of electrocution, burns or explosion

	Caution: risk of electric shock	Ref. ISO 7000-0434B (2004-01)
	Caution: consult the device's documentation whenever you see this symbol.	Ref. ISO 7010-W001 (2011-05)

- This device must only be installed and serviced (cleaning with a dry cloth) by qualified personnel who have in-depth knowledge of installing, commissioning and operating the device and who have had appropriate training. He/she should have read and understood the various safety measures and warnings stated in the instructions.
- Be aware of protection devices (insulation monitoring system), annual preventive maintenance should be carried out to test the system's basic functions (manually activate the test function).
- Use connection cables compatible with the voltage and connection terminals of the devices.
- If, for usage reasons, the device is connected by terminals L1, L2 to a powered IT network, terminals TERRE and FE should not be separated from the protective conductor (PE).
- Prior to any work on or in the unit, disconnect all power sources (voltage inputs, the unit's auxiliary power supply and dry contact supplies).
- The isolation options must be:
 - within the electrical installation itself
 - located somewhere convenient and easily accessible
 - labelled as the unit's power switching device
- These devices are designed to be integrated; they must be installed in an additional enclosure providing protection against electric shocks and fire.
- Always use an appropriate voltage detection device to confirm the absence of voltage.
- Replace all devices, doors and covers before turning on power to this equipment.
- Always power the device with the correct rated voltage.
- Install the unit following the recommended installation instructions and in a suitable electrical cabinet.
- For safety reasons, only use accessories that conform to the manufacturer's specifications.
- During installation, the safety of any system integrating the device is the responsibility of the system installer.

Failure to follow these precautions could result in serious injury or death.

If there is a problem, please contact:

SOCOMEK, 1 rue de Westhouse, 67235 BENFELD, FRANCE

Tel. +33 3 88 57 41 41

info.scp.isd@socomec.com

2.2. Risks of damaging the unit

To ensure that the unit operates correctly, make sure that:

- The unit is correctly installed.
- The voltage of the auxiliary power supply.
- The frequency of the network shown on the device.
- There is a maximum voltage at the voltage input terminals of 480 VAC phase/phase or 277 VAC phase/neutral or 240 VDC.
- During specific checks, disconnect the devices from the network before attempting to insulate or carry out dielectric testing.
- The devices are designed for indoor use.
- If the ambient temperature exceeds +50°C, the minimum temperature of the copper conductors to connect to terminals should be +85°C.

Failure to respect these precautions could cause damage to the unit or cause an electrical shock.

2.3. Responsibility

- Assembly, connection and use must be carried out in accordance with the installation standards currently in force.
- The unit must be installed in accordance with the rules given in this manual.
- Failure to observe the rules for installing this unit may compromise the device's intrinsic safety.
- The unit must be positioned within an installation which complies with the standards currently in force.
- Any cable which needs to be replaced may only be replaced with a cable with the correct rating.

3. BEFORE YOU START

To ensure the safety of personnel and the device, please carefully read the contents of these instructions before installation.

Check the following points as soon as you receive the package containing the unit:

- The packaging is in good condition
- The unit has not been damaged during transportation
- The device reference number conforms to your order
- The packaging includes the device fitted with removable terminal blocks and a Quick Start Guide.

4. PRESENTATION

4.1. About ISOM K-20

ISOM K-20 monitors the insulation of the unearthed IT systems (IMD* function).

ISOM K-20 allows you to monitor the insulation of IT systems, by delivering alerts if the insulation level drops below the thresholds set by the operator.

ISOM K-20 offers a number of options including measuring the insulation and leakage capacity.

The ISOM K-20 is configured from the display or via the Easy Config software.

* IMD: Insulation monitoring device (product standard IEC 61557-8)

4.1.1. Range

Insulation monitoring device (IMD)



Insulation monitoring device for unearthed IT networks

ISOM K-20 AC

Auxiliary power supply $U_s=110-230 \text{ VAC} / 120-240 \text{ VDC}$

Ref. 4725 0110

Insulation monitoring device for unearthed IT networks

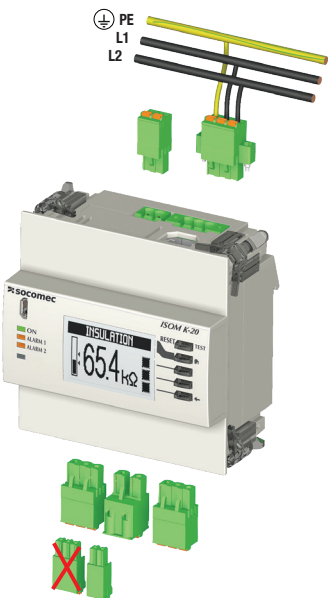
ISOM K-20 DC

Auxiliary power supply $U_s=24 \text{ VDC}^*$

Ref. 4725 0111

(*) **IMPORTANT:** The 24 VDC auxiliary power supply must be galvanically separated from the monitored network.

4.1.2. Principle



4.1.3. Functions

ISOM K-20 offers a number of options, including:

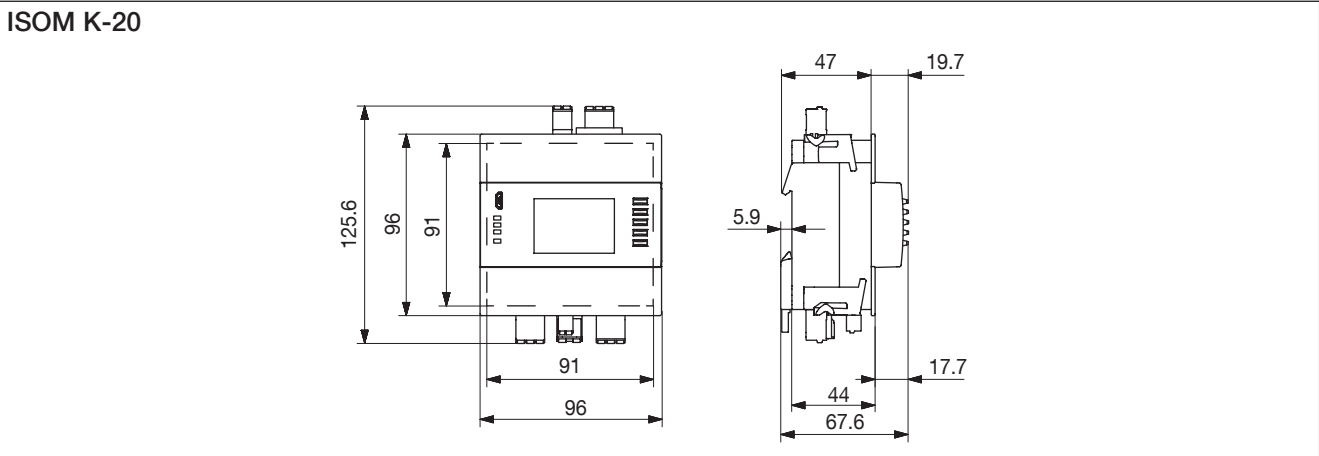
Insulation monitoring

- R_f, C_e measurements
- Min. R_f measurement

4.1.4. Electrical readings

	ISOM K-20 AC	ISOM K-20 DC
Multi-measurement		
R _F , C _e	•	•
Alarms		
On set thresholds (R _t)	•	•
Format		
Width / number of modules	96 mm / 5.5	96 mm / 5.5
Reference	4725 0110	4725 0111

4.1.5. Dimensions



5. MOUNTING

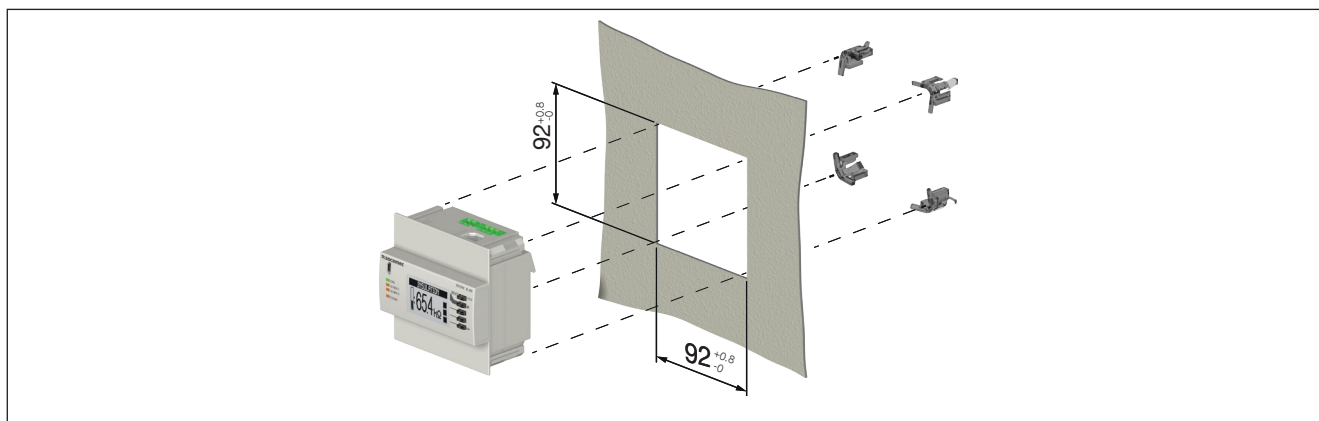
The following paragraphs describe the installation of ISOM K-20.

5.1. Recommendations and safety

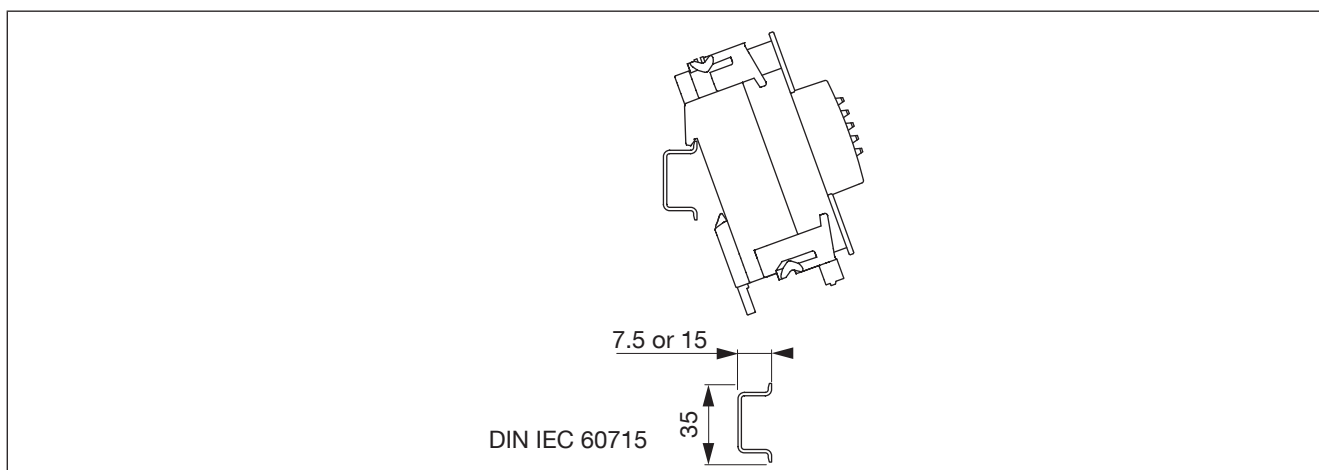
Refer to the safety instructions (section “2. HAZARDS AND WARNINGS”, page 4).

5.2. Installing ISOM K-20

5.2.1. Door mounted

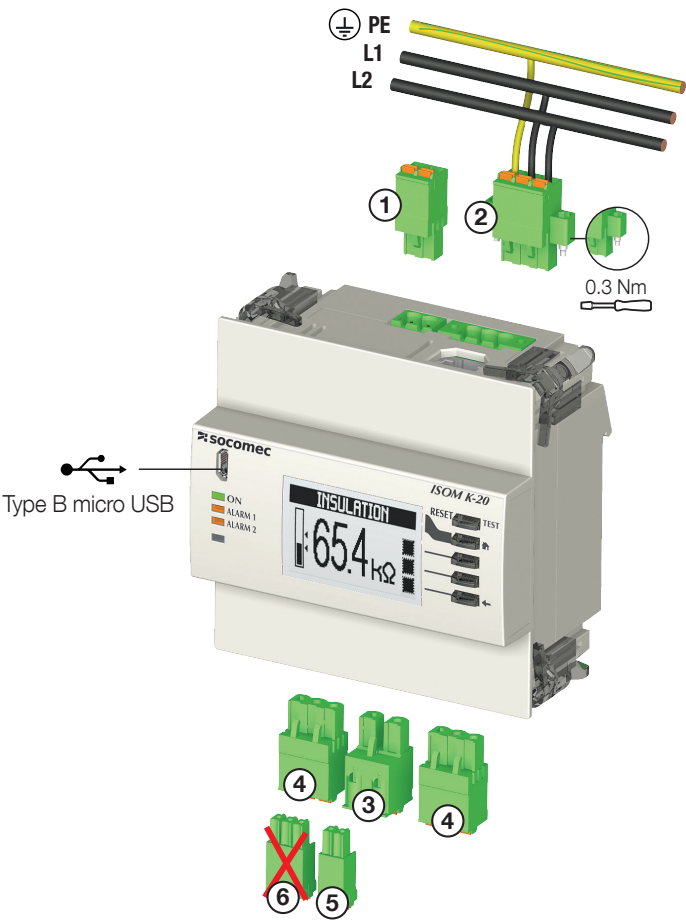


5.2.2. DIN rail mounted



6. CONNECTIONS

6.1. Connecting ISOM K-20



		
①	AUXILIARY POWER SUPPLY For AC version: 110-230 VAC 50/60Hz, 120-240 VDC For DC version: 24VDC ±10%* (*) IMPORTANT: The 24 VDC auxiliary power supply must be galvanically separated from the monitored network.	x= 10 mm 0.2 to 1.5 mm² rigid 0.2 to 2.5 mm² flexible
②	CONNECTION U / PE (L1 - L2 - KE) 24-277VAC L/N 24-480VAC L/L' 24-240VDC +/-	
③	FE (÷)	
④	2x OUTPUT RELAYS 230 VAC 3 A max 30 VDC 1 A max	
⑤	1x INPUT (TEST/RESET) TEST > 3s RESET < 1s Max. length < 3m	x= 7 mm 0.14 mm² - 1.5 mm²
⑥	Not in use	

The inputs/outputs above are defined as SELV (safety extra-low voltage): 1 (for DC model), 3, 5,.



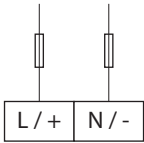
IMPORTANT:

- When connecting, make sure you separate the low voltage (LV) section and the safety extra-low voltage (SELV) section to prevent any risk of electric shock.
- Conductors should be clamped as close as possible to the terminals to avoid them detaching themselves and reducing the insulation distances.
- The 24 VDC auxiliary power supply must be galvanically separated from the monitored network.

Description of the terminals

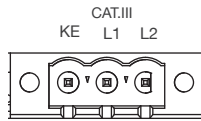
AUXILIARY POWER SUPPLY ①

ISOM K-20 AC (4725 0110)
110-230 VAC 50/60Hz,
120-240 VDC
ISOM K-20 DC (4725 0111)
24 Vdc $\pm 10\%$ galvanically separated
from the monitored network

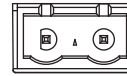


U / PE CONNECTION ②

L1 - L2 - KE
24-277 VAC L/N
24-480 VAC L/L'
24-240 VDC +/-

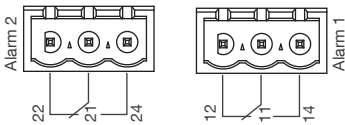


FE (⏏) ③



1A gG / BS 88 1 A gG / T1AH300VDC

2x OUTPUT RELAYS ④



The relay's dry contacts should be protected with a 2A gG fuse
=> use up to 2A with resistive load.

Or T3AH250V => use up to 3A with resistive load.

It is not permitted for use on a 230VAC/30 VDC relay or a SELV signal.

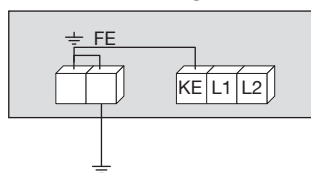
You can use different phases on the 2 output relays, but they must be from the same three-phase network

TEST / RESET ⑤

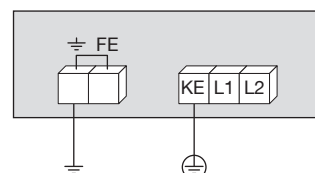
Dry contacts
Max. length < 3 m



Connecting K-20



Not allowed

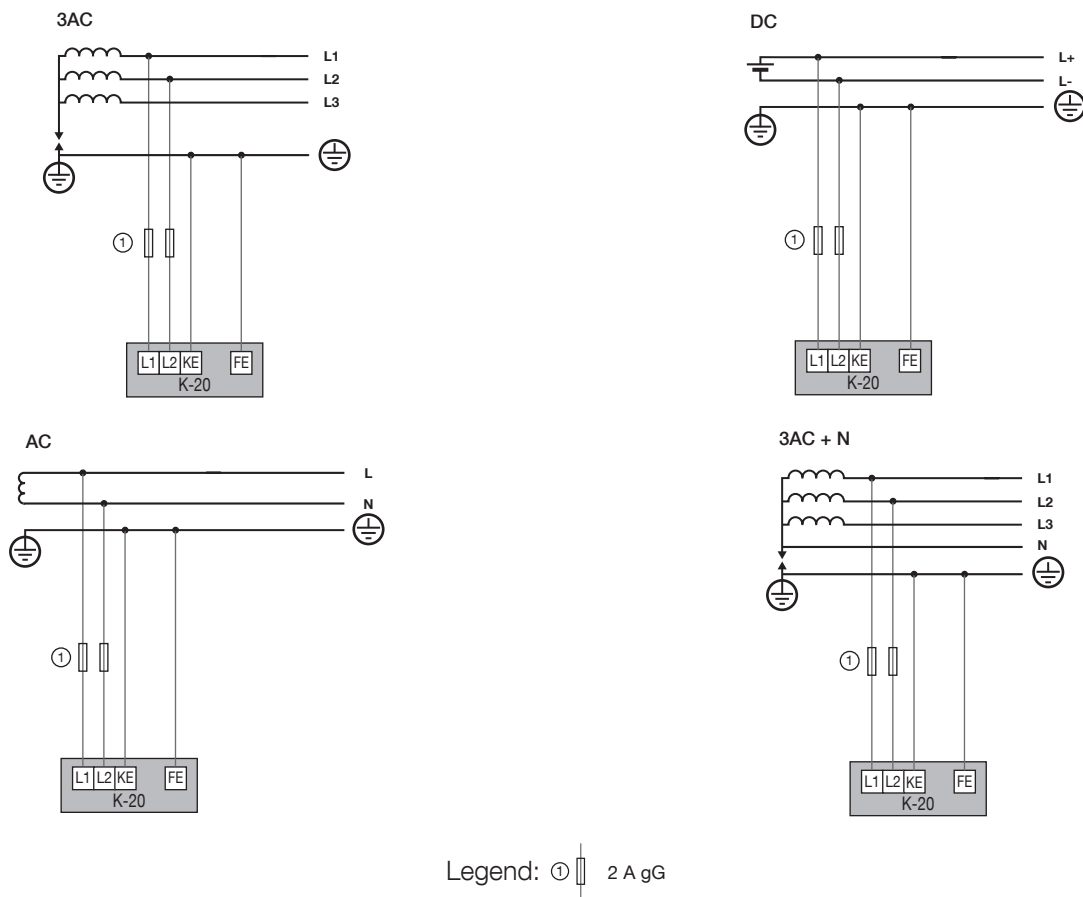


Authorised

6.2. Connecting to the electrical network and circuits

The insulation monitoring system ISOM K-20 is suitable for single-phase, two-phase, three-phase and DC networks. It ensures the insulation of a complete powered IT system is monitored.

6.2.1. Description of the main network and circuit combinations

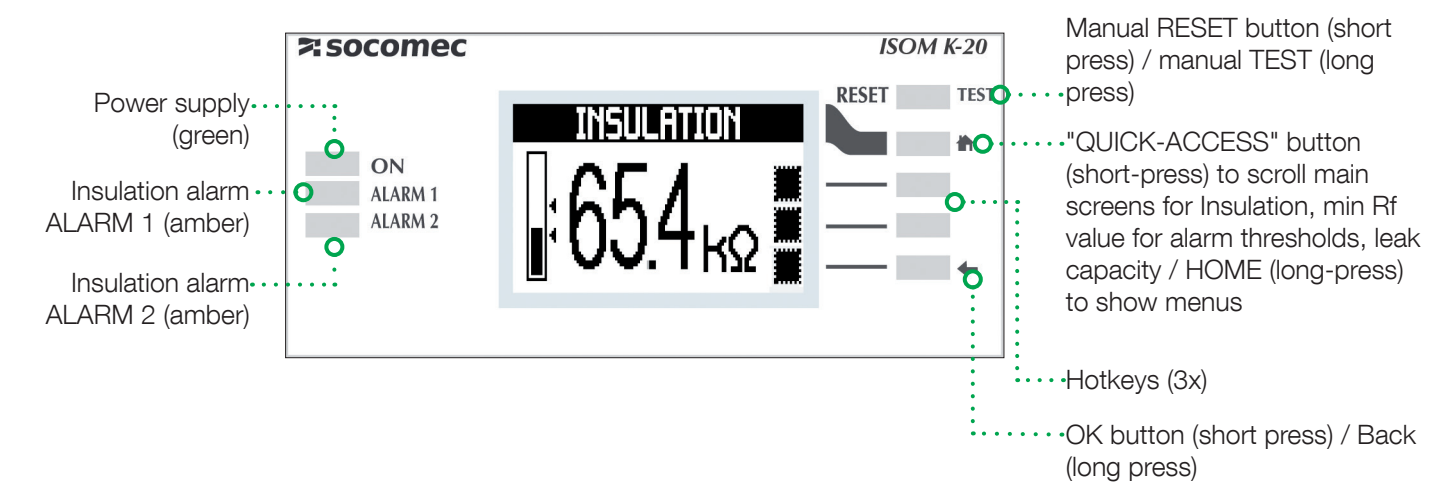


7. STATUS LEDS, BUTTONS AND AUTO-ADDRESSING

7.1. Status LEDs and buttons

These LEDs can be used to find out the status of the device at any time. Use specific buttons to go straight to the devices' main functions.

7.1.1. K-20



LED status	Constant	Flashing	Pulsing
ON	Working		1 second at startup
ALARM 1	Presence of an alarm due to exceeding the low threshold ALARM1	System alarm (e.g. network connection error)	
ALARM 2	Presence of an alarm due to exceeding the low threshold ALARM2	System alarm (e.g. network connection error)	

7.1.2. Autotest

In order to ensure a high degree of safety when measuring the insulation and in operation, ISOM K-20 offers advanced autotesting functions.

After powering on the devices, all their internal measurement functions as well as the data memories and connections to the network and the PE protection conductor are tested.

You can follow the progress of the autotest option onscreen (TEST message).

You can also start the autotest at any time during use by pressing the TEST button.

The ALARM 1 and ALARM 2 signalling relays can be configured to switch if the auto-test fails.

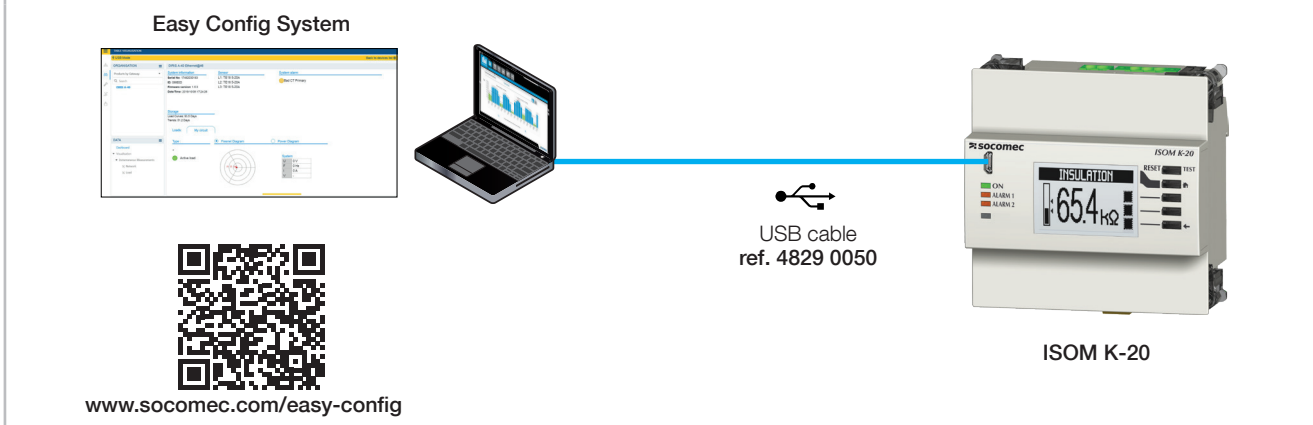
8. CONFIGURATION

Configuration can be carried out using the Easy Config software. Use the Easy Config software to configure ISOM K-20 via USB. To use the USB link, you must have Easy Config installed.

8.1. Configuration using Easy Config System

8.1.1. Connection modes

Configuration using Easy Config System (USB)



8.1.2. Using Easy Config System

Easy Config System is a configuration software used to set device parameters easily and quickly.

8.1.2.1. Configuring the electrical network

In the electrical network configuration menu, the user selects the type of network (three-phase, single-phase, etc.), the nominal voltage, the network frequency.

Configuration can also be done locally from the ISOM K-20

Example: three-phase network 400VAC:

The screenshot shows the 'EASY CONFIG SYSTEM 2.1' software interface. The top bar includes the 'socomec' logo and the text 'EASY CONFIG SYSTEM 2.1'. Below this is a 'DEVICE CONFIGURATION' header. The left sidebar has a 'CONFIGURATION' tab selected, with a 'Settings' dropdown menu. The 'Settings' menu is expanded, showing 'Display', 'Measurement', 'Electrical Network' (selected), 'Insulation Circuit', 'Insulation', 'Digital I/O', and 'Alarms'. The main area is titled 'Electrical Network' and contains a table with the following data:

Description	Value	K-20	Unit
Electrical Network			
Network			
Type	2P	-	-
Nominal Voltage	400	-	V
Nominal Frequency	50 Hz	-	-
Voltage Transformer			
Voltage Transformer	No	-	-

On the right side of the table, there are two yellow buttons: 'Read' and 'Program'.

On this screen you can configure the type of IMD connection:

Three-phase or two-phase → "2P"

Single-phase → "1P+N"

Continuous → "DC"

The voltage value, as well as the rated frequency of the network (50Hz, DC...)

8.1.2.2. Insulation

Easy Config System

socomec EASY CONFIG SYSTEM 2.1 English

DEVICE CONFIGURATION

ORGANISATION

CONFIGURATION

- Settings
 - Display
 - Measurement
 - Insulation
 - Insulation Profiles**
 - Injection
 - Manual Test
 - High Resistance Grounding System
 - Digital I/O
 - Alarms

Description	Value	K-20	Unit
Insulation Profiles			
Installation Profile	Distribution	-	-
IMD Max Injection Voltage	75 V	-	-
Max Cf	30	-	µF
Filtering	High	-	-

Read

Program

The "Insulation Profiles" screen defines the general settings of the device:

Choosing the profile is an easy way to support the measurement algorithm on the intended application, with improved filtering/measurement times.

You can choose between 3 profiles:

- Custom
- Distribution
- Control/command

8.1.2.3. Configuring alarms

Insulation alert:

Easy Config System

socomec EASY CONFIG SYSTEM 2.1 English

DEVICE CONFIGURATION

ORGANISATION

CONFIGURATION

- Settings
 - Display
 - Measurement
 - Insulation
 - Digital I/O
 - Alarms
 - Insulation Alarm
 - System Alarm
 - ISOM System Alarm Causes

Insulation Alarm

Description	Value	K-20	Unit
Insulation Alarm 1			
Common			
Alarm Activation	Enabled	-	-
Type			
Type	Rf Alarm 1	-	-
Information			
Criticality	Not Critical	-	-
Acknowledgement			
Acknowledgement Mett	Auto	-	-
Threshold			
Rf Low Threshold	50000	-	ohm
Hysteresis	0	-	%
Delay			
Startup Delay	0	-	x500 ms
Dropout Delay	0	-	x500 ms
Relay			
Startup Delay of Relay	0	-	x500 ms

Read

Program

In this screen, you can set key information linked to the thresholds Alarm1 and Alarm2.

The Rf threshold value can be set between 1K and 1000K. You can OK a fault automatically (= "Auto") or manually with BP RESET ("COM")

System alarm:

Easy Config System

socomec EASY CONFIG SYSTEM 2.1 English

DEVICE CONFIGURATION

ORGANISATION

CONFIGURATION

- Settings
 - Display
 - Measurement
 - Insulation
 - Digital I/O
 - Alarms
 - Insulation Alarm
 - System Alarm**
 - ISOM System Alarm Causes

System Alarm

Description	Value	K-20	Unit
System Alarm 1			
Common			
Alarm Activation	Enabled		-
Alarm Type	None	-	-
Information			
Criticality	Information	-	-
Acknowledgement			
Acknowledgement Met	Auto	-	-
Delay			
Startup Delay	0	-	x0.5 s
Dropout Delay	0	-	x0.5 s
System Alarm 2			
Common			
Alarm Activation	Disabled	-	-
Alarm Type	None	-	-
System Alarm 3			
Common			

Read

Program

In this screen, you can set when to activate a startup alarm in the following cases:

- Measuring failure
- voltage network outside specified range
- Device overheating
- The IMD measurement is outside the tolerance range and is not shown
- Internal device failure

8.2. On-screen configuration

8.2.1. Navigation concept



8.2.2. Screen menu structure

ISOM IMD	
Rf	
Rf min	
Ran	
Ce	
SETTINGS	
Language	
Isom IMD	Measuring insulation: profile, network (Un, Fn)
	Alarm: Alarm 1, Alarm 2
	Relay
Password	
Factory reset	
Restart device	
DIAG	
Information	
Configuration view	
State I/O	

 Note: when you change a setting, first confirm it by pressing "OK", then exit the menu by pressing "OK" again to make sure your changes are saved.

8.2.3. Quick setup

- 1.  "QUICK-ACCESS / HOME" button: press for 3 seconds to go to settings ("HOME" screen)
- 2. "HOME" menu: go to "Settings" with the hotkey "▼".
Press the hotkey "OK" to confirm.
- 3. "RESTRICTED ACCESS" menu: enter the code "1 0 0" by using the hotkeys "◀" and "▲",
then confirm with "OK".
- 4. "Language" submenu: change the language to desired one, then confirm with "OK".
- 5. "Isom IMD" submenu to go to the basic settings of the IMD
 - a. "Insulation measurement" submenu → make your network settings (profile, network voltage,...),
press "OK" after each setting then "OK" again to exit the submenu.
 - b. "Alarms" submenu:
 - i. "Alarm 1" → "Min." to change the threshold for ALARM 1 with hotkeys "▼" and "◀" , then confirm
with "OK".
 - ii. "Alarm 2" → "Min." to change the threshold for ALARM 2 with hotkeys "▼" and "◀" , then confirm
with "OK".
- 6. To exit and return to the home screen, briefly press  "QUICK-ACCESS/HOME".

9. SPECIFICATIONS

9.1. ISOM K-20 specifications

9.1.1. Mechanical characteristics

Casing type	Modular for DIN rail and board mount Enclosure size DIN 96x96
Casing protection index	IP20
Front panel protection index / shockproof	IP40 on the nose in modular assembly / IK08
Material and flammability class of housing	Polycarbonate UL94-V0
Weight	400 g

9.1.2. Electrical specifications

ISOM K-20	
Power supply K-20 AC	AC 110-230 V 50-60 Hz / DC 120-240 V (AC preset protection: Fuses 1A gG) (DC preset protection: Fuses T1AH300VAC)
Power supply K-20 DC	24 VDC (Preset protection: Fuses T1AH300VDC) (The 24 VDC auxiliary power supply must be galvanically separated from the monitored network)
MONITORED IT NETWORK	
AC or combined AC/DC	K-20: ≤ 480 VAC connection L1/L2 on phases +/- 10% Rated shock voltage 6 kV (IEC 60364-4-44) CAT III
AC frequency	DC, 50 to 460 Hz
Power consumption	10 VA (K-20 AC) 1.9 VA (K-20 DC)
Operating range of the voltage network	+/- 10%
Rated shock voltage	6 kV (IEC60364-4-44)

9.1.3. Measurement characteristics

MEASUREMENT ACCURACY	
Accuracy	K-20: in accordance with IEC 61557-8
ISOM PERFORMANCE	
Specific response value R_{an}	K-20: ALARM 1: 1 K Ω - 1 M Ω ALARM 2: 1 K Ω - 1 M Ω
Max. leakage capacity C_e	K-20: 30 μ F
Specific response value uncertainty	+/- 10% according to profile
Response time t_{an}	For $R_F = 0.5 \times R_{an}$ and $C_e = 1 \mu$ F: typically 4s
Measurement voltage U_m	75 V depending on profile
Measurement current I_m	Max 1 mA
Max. external DC voltage U_{fg}	510 V
Measurement range C_e	K-20: 0 - 30 μ F

9.1.4. Input/output specifications HMI

Type / Power supply	Insulated input, internal polarisation, dry contact (default impedance max 100 Ω) - SELV
Input function	TEST (<1s) / RESET (>3s)
Connection	Plug-in spring terminal block, 2 points, stranded or solid 0.2 - 1.5 mm ² cable
Dry contact outputs	3A

9.1.5. Environmental specifications

STANDARD MODEL	
Ambient operating temperature	-10 to +55°C (IEC 60068-2-1 / IEC 60068-2-2)
Storage temperature	-40 to +70°C (IEC 60068-2-1 / IEC 60068-2-2)
Operating humidity	25°C / 97% RH & 55°C / 93% RH (IEC 60068-2-30)
Operating altitude	< 2000 m
Vibration	2 Hz to 13.2 Hz- amplitude $\pm$ 1 mm (IEC 60068-2-6) 13.2 Hz to 100 Hz – acceleration $\pm$ 0.7g (IEC 60068-2-6)

9.1.6. Standards and safety

Product	Conformity with IEC 61557-8
Safety	Conformity with Low Voltage Directive 2014/35/EU of 26 February 2014 (EN 61010-1:2010)
Insulation coordination	Installation category III, Degree of pollution 2
EMC	compliance with EMC Directive 2014/30/EU of 26 February 2014 (EN 61326-2-4:2013)

9.1.7. Service life

MTTF (Mean Time to Failure)	> 100 years
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 **socomec**
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