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Earth-fault Detection System (EDS)

Product Description

Earth-fault Detection System (EDS)

The EDS is designed to localise earth-faults detected from the IPM in isolated power systems up to 240VAC/300VDC. Designed to meet EN61557-9 requirements for earth-fault location monitors in industrial and medical environments. Up to 18 Ct's can be connected to the device to monitor up to 18 circuits.

The device can localise earth-faults in AC and DC power systems (Type AC/DC). This includes failure localisation in AC power systems with rectifiers and in DC power systems with inverters.

Only useable in combination with an IPM. Communication between the IPM and the EDS is via an RS485 interface. Maximum 5 devices can be connected to one insulation monitor. The device has 20 LEDs to show its system status.

Function

Communication between IPM and EDS runs via an RS485 interface. Both devices must be connected with a screened 2-wire cable. Both ends of RS485 must be terminated with a 120Ω resistor.

The devices must be linked in the software in the CB-menu from IPM, a new device must be added on an empty slot. If the IPM shows that device registration process is running all EDS devices not registered will start blinking with CB-Comm LED white.

The link between devices can also be deleted in this menu. In this case the settings will be deleted, the slot will be changed to empty, and the EDS will be set ready to link again.

Remember: All settings from linked devices will be stored in the IPM. Deleting a device in the IPM will delete all device settings and are irrecoverable.

Earth-Fault Localisation

When the IPM detects an earth-fault, the EDS device linked with that IPM will start an earth-fault location search if an earth fault is detected, an earth-fault search cycle will be started.

The IPM generates a search current with its search current generator which will flow from line over the earth-fault to earth. The EDS via the connected Ct's detect the current flow. During a search cycle the EDS shows this state with a yellow running light over LEDs.

When the search cycle is complete the LEDs will show earth-faults with appropriate yellow LED. The LEDs will stay yellow until a new search cycle begins or the earth fault disappears.

Note: *Response sensitivity is <300kΩ with earth leakage capacitance below 1µF. With higher earth leakage capacitance response sensitivity will be decreased.*

Ct Connection Monitoring

When no search cycle is running, the EDS will continuosly check the connection to configured Ct's. When a CT terminal is short or open a Ct connection failure will be displayed with the appropriate LED light red.In case of no connection failure CT-LED will light green if CT is configured as used or will be off if not configured as used.

If "Failure measure range" is displayed on IPM, faulty Ct's will be also displayed with a red LED and all other Ct LED's will be off. Replace the Ct's which are shown as faulty with new Ct's until "Failure measure range" disappears.

Control and Signalling

LED "On/System Fault"
During normal operation the "ON" LED is green. In case of a pending failure, with the exception of an insulation fault, the LED is red.

LED "CB"
This LED is for signalling the RS485 bus communication state. Bad or no communication (also when the device is not linked to an IPM) is red, effective communication is green. The LED will blink white during the device registration process if the device is not linked.

LED "CTx"
CT LEDs shows status of Ct's, if the Ct circuit is open or short the LED is red, no failure and no earth fault detected the LED is green. The LED is off if circuit is set as not used.

Button
The pushbutton is used for device registration process when a new EDS is linked to an IPM (registration process started) and the EDS is not already linked (CB-LED blinks white) the EDS can be registered on this slot by pressing the pushbutton on the front panel.

In normal operation when the EDS is already linked to an IPM pressing this button will display the CB address on CT-LEDs (CT1-LED for address 1, CT2-LED for address 2 and so on).

Warning: Connecting other Ct types than allowed can damage the EDS or can result in malfunction.

Warning: Failure to use the equipment as described in this data sheet may affect the protection provided by the equipment.

Note: Read the manual before starting installation, connection or commissioning. Keep the manual handy after startup.

Note: The installer is responsible for the safety of the system in which the EDS is used.

Insulation	
Overvoltage Category	III
Air & creepage distance	EN61010-1
Pollution degree	2
Voltage test to IEC61010-1	
Circuit I:	L1/L2
Circuit I:	CT1-CT18, CB a/ b
I – II	3,51kV/50Hz

Measure Circuits	
Max. count of measure circuits 18	18
Response sensitivity (one insulation fault)	< 300kΩ
Fault search time (after insulation fault detected)	~ 7s

Interfacing	
Type	Pluggable screw terminal
Wire capacity Supply/CB	0,2 - 2,5mm²
Wire capacity CTx	0,2 - 1,0mm²
Useable Ct types	CTS600, CTV200

Other	
Operating mode	Continuous
Installation / Operating position	Front panel oriented
Mounting on mounting rail	to EN60715
Protection to IEC60529	
Electronic	IP20
Terminals	IP00
Dimension	106 x 95 x 75 mm
Weight (without Ct's)	≤ 300g

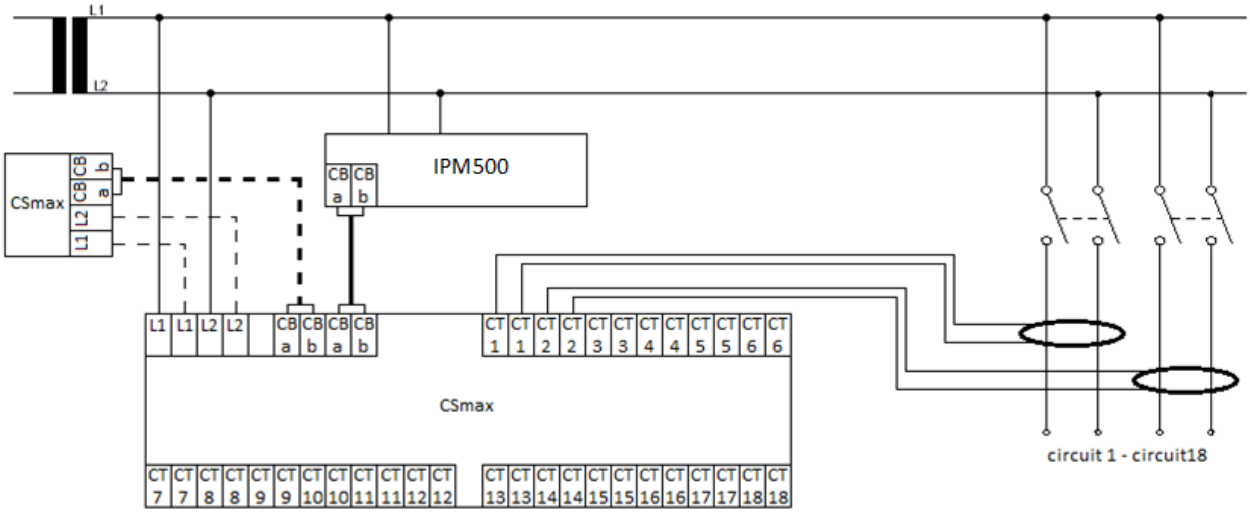
Supply Voltage	
Supply voltage Us	85 - 300VDC 85 – 240VAC, 47 - 440Hz
Self-consumption	< 2VA
Max. loop through current	1A

CB Communication	
Interface	RS485
Cable type	Screened (connected with earth), 2-wire

Environment/EMC	
EMC	EN61326-2-4
Temperature	
Operation	-5°C - +45°C
Transport	-25°C - +70°C
Storage	-25°C - +70°C
Relative humidity	10 - 90%
Climate class (IEC60721)	
Operation (IEC60721-3-3)	3k5
Transport (IEC60721-3-2)	2k3
Storage (IEC60721-3-1)	1k4
Mechanical load (EN61557-8)	

Note: Device cleaning in a de-energised state with a damp cloth soaked in methylated spirits.

Connection E620005



Note: Pay attention to the correct voltage connection! For voltage value see type label. Line protection according to the regulations is needed. The line protection should be installed near the device.

Note: Installation, commissioning and operation of the device must be performed by a skilled person (electrically) as defined in accordance with BS7671.

Danger: All lines (even extra-low voltage leads) that are connected to the device must be considered as a dangerous voltage lead (and must be safe to touch)

Danger: Before working on live parts, make sure that the system is de-energised.

Symbols

Danger: Dangerous situation that can result in death if not avoided.

Warning: Dangerous situation that can result to serious injury if not avoided.

Note: Possible danger and malfunction

Remember: Additional information.

Tip: Recommended action.

Appendix

Data Readable Via ModBus from the IPM. EDS data is send via CB communication to the IPM. Received data can be read out of the IPM via the ModBus interface. Data registers from the EDS contains the following data:

Register 0

Byte 1								Byte 2							
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
MSB		Software Revision		LSB	Memory failure	Communication failure	Failure measure range	Not used	Not used	Not used	Not used	CT18 connection failure	CT17 connection failure	CT16 connection failure	CT15 connection failure
0 – no alarm, 1 – alarm															

Register 1

Byte 1								Byte 2							
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CT14 connection failure	CT13 connection failure	CT12 connection failure	CT11 connection failure	CT10 connection failure	CT9 connection failure	CT8 connection failure	CT7 connection failure	CT6 connection failure	CT5 connection failure	CT4 connection failure	CT3 connection failure	CT2 connection failure	CT1 connection failure	CT18 Insulation failure found	CT17 Insulation failure found
0 – no alarm, 1 - alarm															

Register 2

Byte 1								Byte 2							
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CT16 Insulation failure found	CT15 Insulation failure found	CT14 Insulation failure found	CT13 Insulation failure found	CT12 Insulation failure found	CT11 Insulation failure found	CT10 Insulation failure found	CT9 Insulation failure found	CT8 Insulation failure found	CT7 Insulation failure found	CT6 Insulation failure found	CT5 Insulation failure found	CT4 Insulation failure found	CT3 Insulation failure found	CT2 Insulation failure found	CT1 Insulation failure found
0 – no alarm, 1 - alarm															

Product legislation and standards of conformity

EU Ref	EU Title	UK Ref	UK Title
2014/ 35/EU	Low Voltage Directive	2016/ 1101	Electrical Equipment (Safety) Regulations 2016
2014/ 30/EU	Electromagnetic Compatibility Directive	2016/ 1091	Electromagnetic Compatibility Regulations 2016
2011/ 65/EU	Restriction of Hazardous Substances (RoHS) Directive	2012/ 3032	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Reference	Title	Edition
EN IEC 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements.	2010+A1:2019
EN IEC 61557-1	Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring, or monitoring of protective measures Part 1: General requirements	2019
EN IEC 61557-9	Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring, or monitoring of protective measures - Part 9: Equipment for insulation fault location in IT systems	2015