Insulation fault location
Planning and set-up

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requires the rapid location and elimination of insulation faults.

Bender offers a modular solution to this requirement with an insulation fault location system (IFLS), comprising an insulation monitoring device ISOMETER® with integrated locating current injector, insulation fault locator and locating current sensors. IFLSs are used in, among other places, power stations, hospitals, in shipbuilding, in the paper industry, oil and gas installations, in the machine tool manufacture and in heavy engineering.
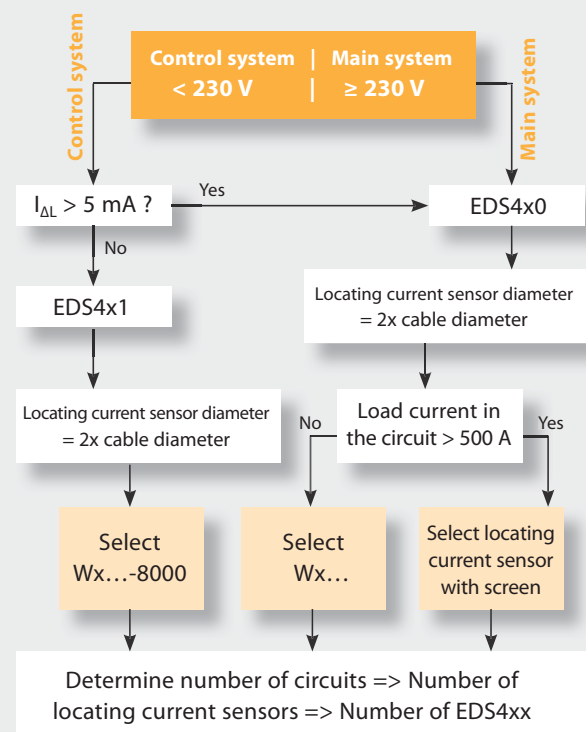
Insulation faults can be found quickly without shutting down the installation and the operation of the installation is therefore safeguarded. The defective circuit can be located simply and quickly and the location of the fault is indicated centrally. As a consequence, maintenance and service costs are reduced.

Planning

Some knowledge of the installation to be monitored is required to plan an IFLS. For example, is the installation a small control system with small, simple loads and a voltage < 230 V, or a main circuit with voltages ≥ 230 V, converters and system interference due to non-linear loads? The answer to this question will allow the locating current to be determined for the insulation fault location.

In systems with sensitive loads, such as relays and PLCs, the insulation fault location is often only allowed to be undertaken using very low locating currents, while in systems with large loads, such as motors and converters, a higher locating current should be selected to be able to differentiate interference from the locating current. If a locating current > 5 mA is allowed to be used for insulation fault location in a control system, an EDS4x0 can be used in exactly the same way as in the main circuit. The diameter of the locating current

sensors must be selected such that the inside diameter of the sensor is twice the outside diameter of the cable. However, it is required, a very sensitive insulation fault locator EDS4x1, locating current sensors of type Wx...-8000 are used. In this way it is also possible to detect smaller locating currents. If an EDS4x0 with lower sensitivity is used, it is possible to select screened or unscreened locating current sensors depending on the load current. The number of circuits monitored defines the number of locating current sensors required, and therefore also the number of EDS4xx required. ▶▶▶

Control system | **Main system**
< 230 V | **≥ 230 V**

Control system → $I_{\Delta L} > 5$ mA ?
— Yes → EDS4x0
— No → EDS4x1

EDS4x1 → Locating current sensor diameter = 2x cable diameter → Select Wx...-8000

EDS4x0 → Locating current sensor diameter = 2x cable diameter → Load current in the circuit > 500 A
— No → Select Wx...
— Yes → Select locating current sensor with screen

Determine number of circuits => Number of locating current sensors => Number of EDS4xx
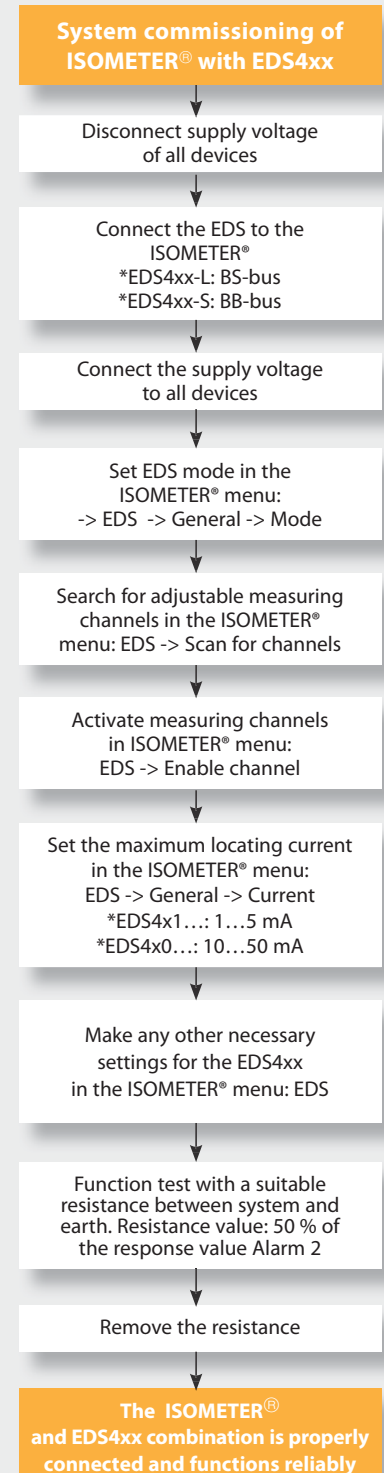
Practical

Expertise

▶▶▶ Set-up

To set up an IFLS, all the devices in the project must be switched off. The insulation fault locators are interconnected via the BS[1] or BB[2] bus and connected to the related insulation monitoring device with integrated locating current injector. Each insulation fault locator requires an individual address on the BS bus in the range 2...90. The BS bus can be used for communication with insulation fault locators at distances of up to 1200 m. The BB bus is a local device expansion on an insulation monitoring device for one to two insulation fault locators. After the locating current sensors have been connected to the related insulation fault locator the system can be switched on again.

The EDS mode is set either using the commissioning wizard or via the menu. In this way, you can define whether the insulation fault location should start automatically on the occurrence of an insulation fault (mode: Auto) or only when an electrician starts the search manually on the insulation monitoring device (mode: Manual). Afterwards, a channel scan is carried out. During this process all EDS channels detected on the permissible interfaces are indicated and their parameters can be configured. The channels to which locating current sensors are not connected can be deactivated such that all the channels no longer appear during subsequent group parameter configuration.

The upper limit for the locating current is defined by the maximum locating current used for the insulation fault location. For control systems combined with an EDS4x1, a locating current of 1...5 mA can be set, and for main systems combined with an EDS4x0, a locating current of 10...50 mA. The locating current defined in the insulation monitoring device (which has integrated locating current injector) must be greater than the corresponding response value in the insulation fault locators. The response values are specified in the factory settings such that they are below the minimum locating current values in the insulation monitoring device.

For insulation fault locators of type EDS46x, the locating current sensor type must also be set. Other possible settings are connection monitoring in the insulation fault locator, as well as the fault memory or the trigger mode, which is factory set to "com". This means that the insulation fault locator receives a trigger via interface and measures the locating current in the locating current sensors based on this trigger. If the trigger mode is set to "auto", the locating current in all circuits is measured continuously. In systems with heavy interference and high residual currents, the trigger mode should be set to "com" to obtain better measurement results. ■

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System commissioning of ISOMETER® with EDS4xx

Disconnect supply voltage of all devices
↓
Connect the EDS to the ISOMETER®
*EDS4xx-L: BS-bus
*EDS4xx-S: BB-bus
↓
Connect the supply voltage to all devices
↓
Set EDS mode in the ISOMETER® menu:
-> EDS -> General -> Mode
↓
Search for adjustable measuring channels in the ISOMETER® menu: EDS -> Scan for channels
↓
Activate measuring channels in ISOMETER® menu:
EDS -> Enable channel
↓
Set the maximum locating current in the ISOMETER® menu:
EDS -> General -> Current
*EDS4x1…: 1…5 mA
*EDS4x0…: 10…50 mA
↓
Make any other necessary settings for the EDS4xx in the ISOMETER® menu: EDS
↓
Function test with a suitable resistance between system and earth. Resistance value: 50 % of the response value Alarm 2
↓
Remove the resistance
↓
The ISOMETER® and EDS4xx combination is properly connected and functions reliably

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[1] BS: Bender sensor bus for communication with insulation fault locators. Partially compatible with BMS.
[2] BB: BackBone bus for communication with insulation fault locators