GRID AND SYSTEM PROTECTION

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Protection relay HRNF-200

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Grid and System Protection

WHY?

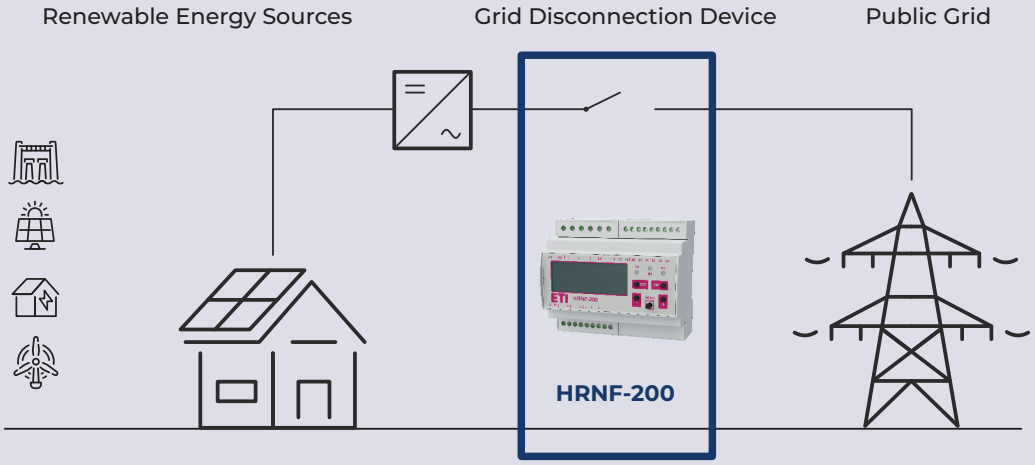
If a network shutdown or disturbance occurs, all small-scale power generation units must be promptly disconnected from the electrical grid to ensure the safety of personnel and to prevent damage to equipment.

FUNCTION

Protection relay HRNF-200 serves as grid and system protection for supplying cogeneration units, wind power stations, hydroelectric power plants, photovoltaic systems, and battery storage systems. HRNF-200 offers optimal solution for each country and any environment, because the device is multifunction, fully configurable without any limitations and controls the plants in low and medium voltage grid.

The function of the control relay is to monitor and control the feed-in of energy into the 230/400 V public grid. The monitored values are voltage (loss of mains, loss of phase, phase shift, phase voltage) and frequency of the grid.
In the event of power failure or fault in the grid (monitored values deviate beyond the prescribed limits), small power plants must be immediately disconnected (within few milliseconds) from the public grid to avoid any risk to maintenance personnel and to prevent electronic components from being exposed to impermissible voltages and frequencies.

APPLICATION CONCEPT



REQUIREMENTS

Small-scale power generation facilities are required to include an automatic disconnection system that has been tested and approved by a recognized accredited body. Detailed requirements for the design, implementation, and certification of this interface are specified by national standards.

The protection relay uses pre-installed standards for operation in multiple countries, allowing it to be used universally. For countries without a predefined standard in the device, an open setup option can be used. Upon selection of a country-specific standard, the corresponding parameters are automatically loaded. In case the grid operator requires threshold values that deviate from the standards, it is possible in part to set some of the threshold values outside of the standard defined range. Outside of this range the device is no longer in compliance with standards and the corresponding certificates lose their validity (a warning indicator is displayed). Settings outside of this range are therefore within the operator's scope of responsibility and/or the acceptance authority of the system.

Protection relay HRNF-200

Functional & design description

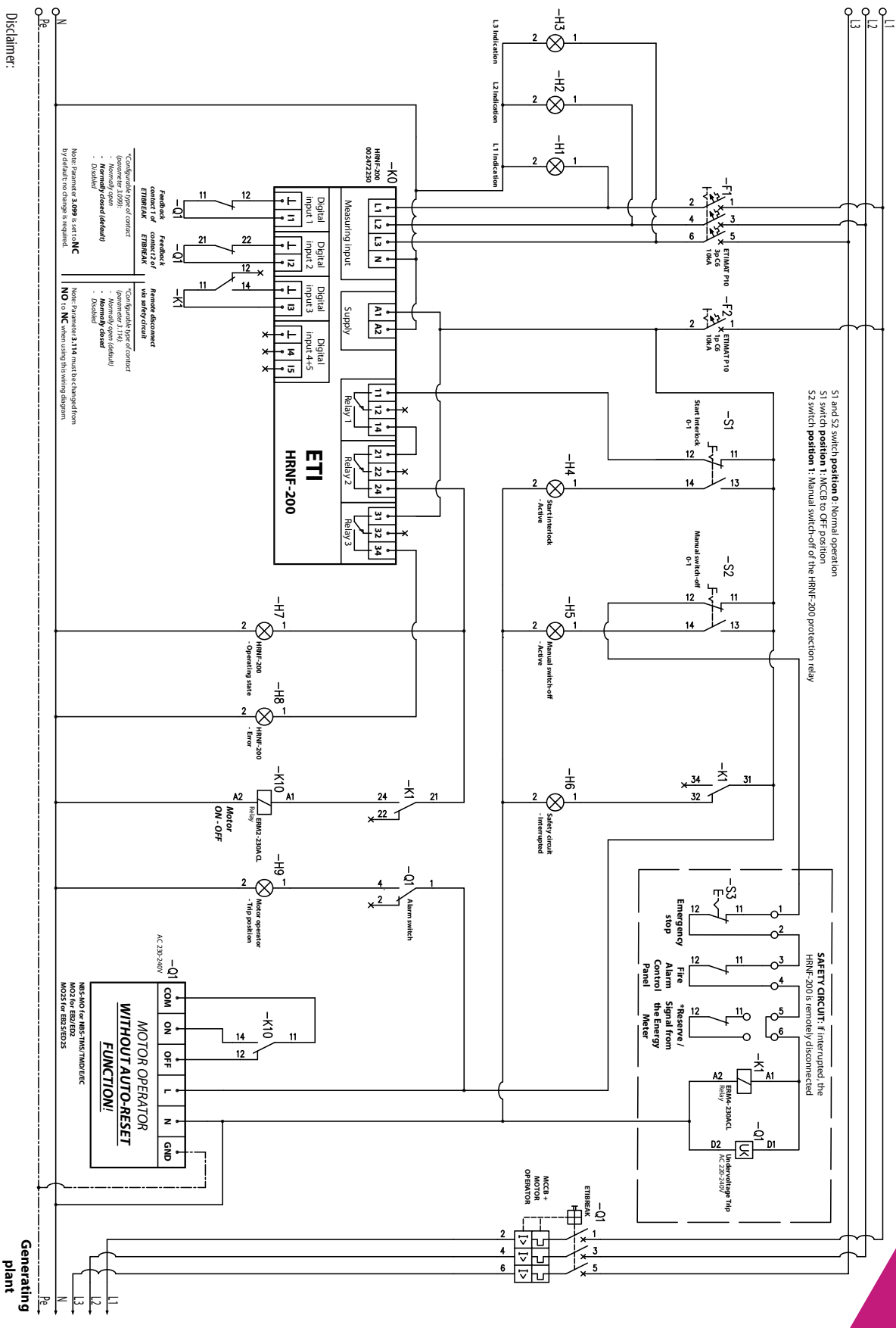
Implemented standards	Predefined parameter settings for several countries
Measured quantities	Phase to phase voltage, phase to neutral voltage, 10-minute average voltage, frequency, frequency change, phase shift, zero sequence voltage
Measuring range	Phase to phase voltage: 0 … 560 V AC, phase to neutral voltage: 0 … 325 V AC, frequency: 40 … 65 Hz (measured between L1/N), frequency change: 100 … 2000 mHz/s, phase shift: 1 … 15°
Monitoring functions	▰ Phase to phase overvoltage, phase to phase undervoltage ▰ Phase to neutral overvoltage, phase to neutral undervoltage ▰ 10-minute average voltage ▰ Overfrequency, underfrequency, random overfrequency ▰ Frequency change, phase shift ▰ Zero sequence overvoltage
Features	▰ Each turn-off threshold is associated with its own turn-off time ▰ Fixed turn-on time, random turn-on time ▰ Configurable feedback contact evaluation ▰ Enable / disable functions via digital inputs ▰ Enable / disable functions via selectable mode ▰ 4 different connection and measuring modes: 2 wire (single phase L1, N), 3 wire (3 phase without N), 4 wire (3 phase LL only), 4 wire (3 phase LL + LN) ▰ Configurable nominal voltage ▰ Functional safety ▰ Password protection and sealing capability ▰ Error memory with time stamp (entries)
Supply voltage	24 … 48V DC 110 … 240V AC
Rated frequency	50 … 60 Hz or DC; Tolerance: 48 … 63 Hz
Output circuit	3 × changeover contacts, rated 5 A (utilization category AC1) at 250 V AC (1250 VA)
Digital inputs	5 inputs for potential-free auxiliary contacts, rated 24 V / 5 mA
Dimensions (W x H x D)	106,3 x 90,5 x 62 mm
Relay compliance standards	EN IEC 60255-1:2023 EN 60255-26:2013 + AC2013 + AC2:2015 IEC 60255-26:2023 EN 60255-27:2014 IEC 60255-27:2023 EN 60255-127:2014 EN 60255-181:2019 EN IEC 61000-3-2:2018/A1:2020 EN IEC 61000-3-3:2013/A2:2021/COR1:2022 EN IEC 63000:2018
Applicable regulations and standards	EN 50549-1:2019 EN 50549-2:2019 numerous national regulations and standards

Measured values and parameters are accessible and readable on the LCD display of the HRNF-200 protection relay.

Protection relay HRNF-200

Type	I_n [A]	Code No.	g	
HRNF-200	3 x 5 A (AC1)	002472250	255	1

Wiring Example Using MCCB and Motor Operator



Disclaimer:
This schematic is provided as a reference example for the HRNF-200 product. It shall be adapted to the requirements of the applicable standard in the country of use and the specific requirements of the project.

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