MFR 300
Multifunction Relay / Measuring Transducer with CANopen / Modbus Communication

APPLICATIONS
The MFR 300 is a measuring transducer for monitoring single- and three-phase power systems. The MFR 300 has both voltage and current inputs for measuring an electrical power source. A digital processor makes it possible to accurately measure true RMS values, regardless of harmonics, transients or disturbing pulses. The primary measured and calculated values are transmitted via CANopen / Modbus protocol to a supervisory control system.

The MFR 300 performs monitoring functions for mains decoupling, including four freely configurable time-dependent undervoltage monitoring functions for FRT (fault ride-through).

The primary measured values of voltage and current are used to calculate the real, reactive, and apparent power and the power factor (cosφ) values.

The list of measured values includes:
- Measured
  - Voltage
    - Wye: \( V_{L1N} / V_{L2N} / V_{L3N} \)
    - Delta: \( V_{L12} / V_{L23} / V_{L31} \)
  - Frequency \( f_{L123} \)
  - Current \( I_{L1} / I_{L2} / I_{L3} \)
- Calculated
  - Average voltage \( V_{\text{avg},123} / V_{\text{min}} / V_{\text{max}} \)
  - Average current \( I_{\text{avg},123} / I_{\text{min}} / I_{\text{max}} \)
  - Real power \( P_{\text{total}} / P_{L1} / P_{L2} / P_{L3} \)
  - Reactive power \( Q_{\text{total}} \)
  - Apparent power \( S_{\text{total}} \)
  - Power factor (cosφ) \( L1 \)
  - Active energy kWh \( \text{positive/negative} \)
  - Reactive energy kvarh \( \text{leading/lagging} \)

DESCRIPTION
Features
- 3 true RMS voltage inputs
- 3 true RMS current inputs
- Class 0.5 accuracy for voltage, frequency and current
- Class 1 accuracy for real and reactive power or energy
- Configurable trip/control setpoints
- Configurable delay timers for individual alarms (0.02 to 300.00 s)
- 4 configurable relays (change-over)
- 1 “Ready for operation” relay
- Switchable relay logic
- 2 kWh counters (max. \( 10^{12} \) kWh)
- 2 kvarh counters (max. \( 10^{12} \) kvarh)
- CANopen / Modbus communication
- Configurable via CAN bus / RS-485 / Service Port
- 2 kWh counters (max. \( 10^{12} \) kWh)
- 2 kvarh counters (max. \( 10^{12} \) kvarh)
- CANopen / Modbus communication
- Configurable via CAN bus / RS-485 / Service Port (USB/RS-232)
- 24 Vdc power supply

Protection (all) ANSI #
- Over-/undervoltage (59/27)
- Over-/underfrequency (81O/U)
- Voltage asymmetry (47)
- Overload (32)
- Positive/negative load (32R/F)
- Unbalanced load (46)
- Phase shift (78)
- Overcurrent (50/51)
- df/dt (ROCOF)
- Ground fault
- QV monitoring
- Voltage increase
- Freely configurable time-dependent undervoltage monitoring for:
  - FRT (fault ride-through)

True RMS sensing
- Class 0.5 accuracy for voltage, frequency and current
- Class 1 accuracy for real and reactive power or energy
- Programmable relay outputs
- Configurable via CAN bus / RS-485 / Service Port
- Programmable threshold setpoints with individual time delays
- Optional wiring configurations for either single phase, three phase, or a combination of both
- CANopen / Modbus communication
- UL/cUL Listed
- CE marked
**SPECIFICATIONS**

Accuracy ................................................................. Class 0.5
Power supply .......................................................... 12/24 Vdc (6 to 32 Vdc)
Intrinsic consumption ................................................. max. 5 W
Ambient temperature (operation) .................. -20 °C (-4 °F) / 70 °C (158 °F)
Ambient temperature (storage) .................... -40 °C (-40 °F) / 85 °C (185 °F)
Ambient humidity ...................................................... 95 %, non-condensing

Voltage .................................................................
- Rated value \(\Delta\): [1] 69/120 Vac or [7] 400/690 Vac
- Rated voltage \(V_{ph-ground}\): [1] 150 Vac or [7] 600 Vac
- Rated surge voltage: [1] 2.5 kV or [7] 6.0 kV
- Measuring frequency .............................................. 45 to 65 Hz
- Linear measuring range ........................................ 1.25 × \(V_{rated}\)
- Input resistance .................................................... [1] >0.5 MΩ
- [7] >2.0 MΩ
- Max. power consumption per path ................... 0.15 W
- Current \(I_{rated}\) ..................................................... [1] ../1 A, [5] ../5 A
- Linear measuring range ........................................ 3 × \(I_{rated}\)
- Max. power consumption per path ................... <0.15 VA

**Relay outputs** .................................................... isolated
Contact type ....................................................... Form C (change-over)
Contact material .................................................. AgCdO
Load (GP) ............................................................. 2.00 Aac@250 Vac
- Pilot duty (PD) .................................................... 1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc

**Housing** ............................................................. Type Extrusion profile UM122
Dimensions .......................................................... 146 × 128 × 50 mm
Connection .......................................................... screw/plug terminals depending on connector 2.5 mm² (14 AWG)
Protection system .................................................. IP20
Weight ................................................................. approx. 300 g

**Disturbance test (CE)** tested according to applicable EN guidelines

**Listings** .......................................................... UL/cUL listed (File No.: E231544), GOST-R

**DIMENSIONS**

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<th>Measurements</th>
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**PART NUMBERS**

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<th>Model</th>
<th>Rated PT secondary</th>
<th>Rated CT secondary</th>
<th>Mounting</th>
<th>Part Number (P/N)</th>
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</table>
### TYPICAL APPLICATIONS

#### General Application

In this general application the device is used as a transducer with monitoring functions. The control does not operate any breaker.

- PLC measuring data $V$, $f$, $I$, $P_{act}$, $P_{react}$
- Monitoring $V$, $f$, $I$, $P_{act}$, $P_{react}$

#### Generator Application

In this generator related application the device is used as a transducer with monitoring functions. The control can be used to open a breaker.

- Generator measuring data $V$, $f$, $I$, $P_{act}$, $P_{react}$
- Monitoring $V$, $f$, $I$, $P_{act}$, $P_{react}$

#### Mains Application

In this mains related application the device is used as a transducer with monitoring functions. The control can be used to open a breaker.

- Mains measuring data $V$, $f$, $I$, $P_{act}$, $P_{react}$
- Monitoring $V$, $f$, $I$, $P_{act}$, $P_{react}$