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 to 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 \( V_{\text{avg},L123} / V_{\text{min}} / V_{\text{max}} \)
  - Average current \( I_{\text{avg},L123} / I_{\text{min}} / I_{\text{max}} \)
  - Real power \( P_{\text{total}} / P_{L1} / P_{L2} / P_{L3} \)
  - Reactive power \( Q_{\text{total}} \)
  - Apparent power \( S_{\text{total}} \)
  - Power factor (\( \cos\phi_{L1} \))
  - 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 (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

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SPECIFICATIONS

Accuracy ................................................. Class 0.5
Power supply .............................................. 12/24 Vdc (8 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 ............................................... [1] 69/120 Vac or [7] 400/690 Vac
Rated voltage V_{ph-ground}: [1] 150 Vac or [7] 600 Vac
Max. cont. voltage V_{ph-ph}: [1] 150 Vac or [7] 862 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
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
......................................................... 2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
Pilot duty (PD) ............................................. 1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc
Housing ................................................... Type Extrusion profile UM122
for DIN rail mounting
Dimensions .................................................. 146 × 128 × 50 mm
Connection ................................................. screw/plug terminals depending on connector 2.5 mm² (14 AWG)
Protection system ....................................... IP20
Disturbance test (CE) ................................. tested according to applicable EN guidelines
Listings ................................................... UL/cUL listed (File No.: E231544), GOST-R

DIMENSIONS

PART NUMBERS

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated PT secondary</th>
<th>Rated CT secondary</th>
<th>Mounting</th>
<th>Part Number (P/N)</th>
</tr>
</thead>
</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 $V$, $f$, $I$, $P_{act}$, $P_{react}$