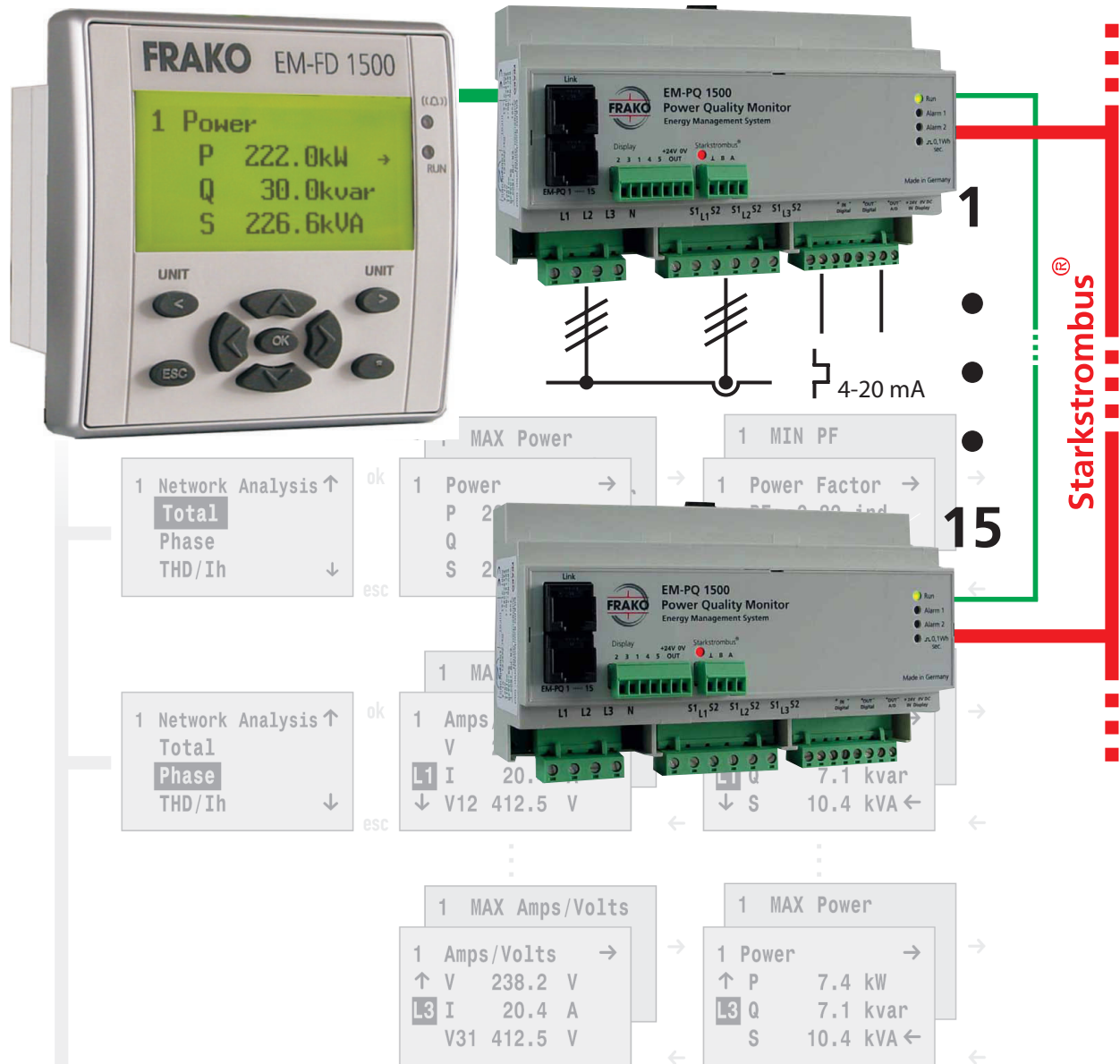


# Power Quality Monitoring System EM-PQ 1500 / EM-FD 1500

Two-part design simplifies panel mounting



## Benefits that count

### EM-FD 1500 Display Unit

- No cut-out needed in panel
- Simply mount display unit with 2 x Ø 22.5 mm holes in panel
- Only one cable from the display unit to the power quality monitor
- Backlit display and keys
- Plain language menu

### EM-PQ 1500 Power Quality Monitor

- DIN rail mounting
- System easily extendable to include up to 15 EM-PQ 1500
- Energy meters for active and reactive work
- Interface to Starkstrombus®
- Bimetallic function
- Digital/analog output

# Power Quality Monitoring System

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### Technical data

#### EM-FD 1500 Display Unit

- Instrument power supply
  - Voltage tapped from measured voltage
  - Frequency 42 to 62 Hz
  - Power draw max. 7 VA
- Supply types 3- and 4-wire
- Measuring inputs
  - Voltage circuit 3 x 57.7 / 100 V up to 240 / 415 V +/- 10 %
  - Power draw < 1.0 VA per phase
  - Fusing 2 A external protection required
  - Current circuit 3 x X/5A (converter current > 6mA) electrically isolated
  - Power draw max 0.5 VA per CT
- Inputs
  - IN display 24 VDC voltage input for displays with 24V control module
- Outputs
  - OUT digital max. 48 VDC, 100 mA
  - OUT digital/analog max. 30 VDC, 100 mA (DC 4-20 mA passive)
- Interfaces
  - FRAKO Starkstrombus®** for connecting to FRAKO Energy Management System (to EN 50170)
    - Transmission rate 76.8 kbit/s
    - Type / protocol RS485 / P-NET
    - Link connection (2x)** connecting to more EM-PQ 1500 (max. of 15 pieces) for common use of 1 display only
    - Type / protocol CAN/FRAKO (proprietary)
    - Display** Connecting to display EM-FD 1500
- Ingress protection enclosure / terminals IP40/20
- Protection to DIN EN 61010-1, DIN EN 61000-6-2 and DIN EN 61000-6-3
- Mounting on DIN 35 mm rail to DIN EN 50022

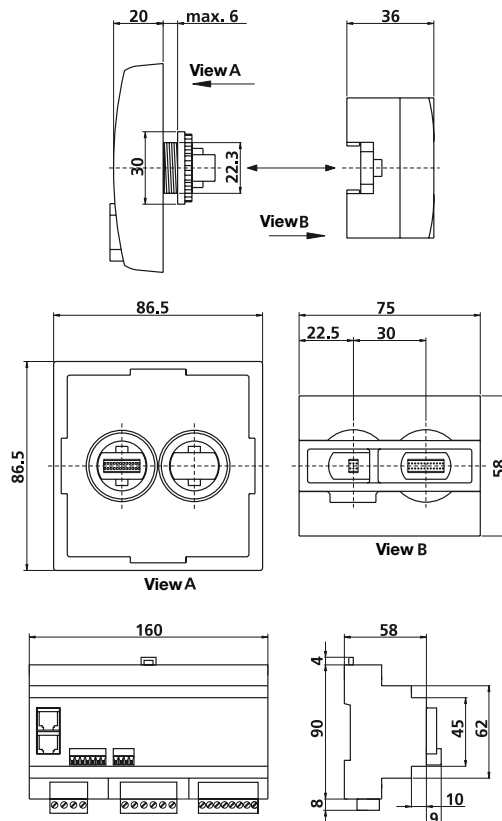
#### EM-PQ 1500 Power Quality Monitor

- Power supply depending on control module
  - Voltage 24 VDC + 15%\* or 85...264 VAC, 50/60 Hz
  - Power draw approx. 3 W
- Control
  - Distance 5- / 7-wire cable max. 10 m between EM-FD 1500 and EM-PQ 1500
- Ingress protection Enclosure IP65 (after mounting)

\*24V version available with or without power supply unit

### Dimensions

(All dimensions in mm)



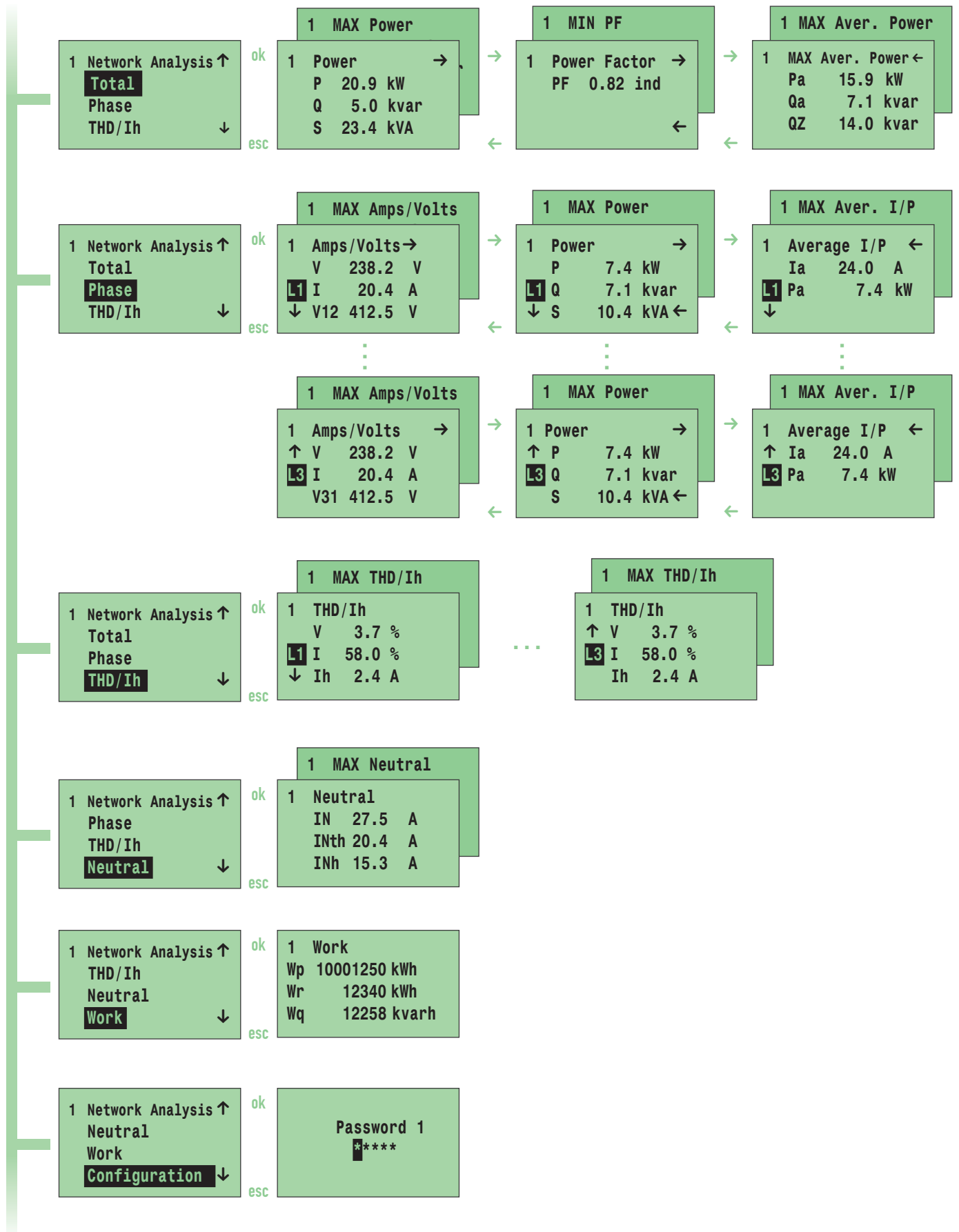
**Reliable energy solutions.**

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# Power Quality Monitoring System

## EM-PQ 1500 / EM-FD 1500

Two-part design simplifies panel mounting



# Power Quality Monitoring System

## EM-PQ 1500 / EM-FD 1500

Two-part design simplifies panel mounting



| Measured variable                                  | Symbol   | Range                              | L1 L2 L3 N | Total | Current value | Average value <sup>1</sup> | Max. value <sup>2</sup> | Min. value | Alarm <sup>3</sup> |
|--|--|------------------------------------|------------|-------|---------------|----------------------------|-------------------------|------------|--------------------|
| r.m.s. voltages                                    |  |                                    |            |       |               |                            |                         |            |                    |
| Phase / phase                                      | $V_{1-2'}, V_{2-3'}, V_{3-1}$                        | 0 - 99.9 kV                        | ● ● ●      |       | ●             |                            | ●                       |            |                    |
| Phase / neutral                                    | $V_{1-N'}, V_{2-N'}, V_{3-N}$                        | 0 - 99.9 kV                        | ● ● ● ●    |       | ●             |                            | ●                       |            | < >                |
| r.m.s. currents                                    |  |                                    |            |       |               |                            |                         |            |                    |
| Phases   | $I_{1'}, I_{2'}, I_{3}$                              | 0 - 99.9 kA                        | ● ● ●      |       | ●             |                            | ●                       |            | < >                |
| Neutral  | $I_N$  | 0 - 99.9 kA                        |            | ●     | ●             |                            | ●                       |            | >                  |
| <b>Active power</b> $P = \int V \times I$          | $P_{1-N'}, P_{2-N'}, P_{3-N'}, P_{total}$            | ± 0 - 99.9 MW                      | ● ● ● ●    | ●     | ●             |                            | ●                       |            | >                  |
| <b>Apparent power</b> $V_{rms} \times I_{rms}$     | $S_{1-N'}, S_{2-N'}, S_{3-N'}, S_{total}$            | 0 - 99.9 MVA                       | ● ● ● ●    | ●     | ●             |                            | ●                       |            |                    |
| <b>Reactive power</b> Fundamental reactive power   | $Q_{1-N'}, Q_{2-N'}, Q_{3-N'}, Q_{total}$            | ± 0 - 99.9 MVar<br>± 0 - 99.9 MVar | ● ● ● ●    |       | ●             | ●                          | ●                       |            | ><br>>             |
| <b>Total power factor</b>                          | PF   | 0.00ind - 1.00 - 0.00cap           |            | ●     |               |                            |                         | ●          |                    |
| <b>Required compensating power</b>                 | $Q_Z$  | ± 0 - 99.9 MVar                    |            |       | ●             |                            |                         |            |                    |
| <b>Harmonic currents</b>                           |  |                                    |            |       |               |                            |                         |            |                    |
| Phases   | $I_{h1'}, I_{h2'}, I_{h3}$                           | 0 - 99.9 kA                        | ● ● ●      |       | ●             |                            | ●                       |            |                    |
| Neutral  | $I_{Nh}$   | 0 - 99.9 kA                        |            | ●     | ●             |                            | ●                       |            |                    |
| <b>Total harmonic distortion</b>                   |  |                                    |            |       |               |                            |                         |            |                    |
| Phase currents                                     | THD( $I_1$ ), THD( $I_2$ ), THD( $I_3$ )             | 0 - 99.9 %                         | ● ● ●      |       | ●             |                            | ●                       |            | >                  |
| Neutral current                                    | THD( $I_N$ )   | 0 - 99.9 %                         |            | ●     | ●             |                            | ●                       |            | >                  |
| Phase / neutral voltages                           | THD( $V_{1-N}$ ), THD( $V_{2-N}$ ), THD( $V_{3-N}$ ) | 0 - 99.9 %                         | ● ● ● ●    |       | ●             |                            | ●                       |            | >                  |
| <b>Variables measured with bimetallic function</b> |  |                                    |            |       |               |                            |                         |            |                    |
| Phase currents                                     | $I_{1'}, I_{2'}, I_{3}$                              | 0 - 99.9 kA                        | ● ● ●      |       |               | ●                          | ●                       |            | >                  |
| Neutral current                                    | $I_N$  | 0 - 99.9 kA                        |            | ●     |               | ●                          | ●                       |            | >                  |
| Active power                                       | $P_{1-N'}, P_{2-N'}, P_{3-N'}, P_{total}$            | ± 0 - 99.9 MW                      | ● ● ● ●    | ●     | ●             | ●                          | ●                       |            | < >                |
| Fundamental reactive power                         | $Q_{total}$  | ± 0 - 99.9 MVar                    |            | ●     | ●             | ●                          | ●                       |            |                    |
| Required compensating power                        | $Q_Z$  | ± 0 - 99.9 MVar                    |            | ●     | ●             | ●                          |                         |            | >                  |
| <b>Active work drawn</b>                           | $W_p$  | 1-99 999 999 kWh                   |            |       | ●             |                            |                         |            |                    |
| <b>Active work fed back to supply</b>              | $W_f$  | 1-99 999 999 kWh                   |            |       | ●             |                            |                         |            |                    |
| <b>Reactive work, lagging</b>                      | $W_q$  | 1-99 999 999 kVarh                 |            |       | ●             |                            |                         |            |                    |

<sup>1</sup> Bimetallic function with measuring period settable at 5, 10, 30, 60, 300, 480 and 900 sec

<sup>2</sup> The greatest value measured since the last reset is saved.

<sup>3</sup> Alarm signal if the measured variable falls below (<) a set minimum or exceeds (>) a set maximum.

## Convenient remote display

All current values of the measured variables, such as voltages, currents, active and reactive power and power factor, are displayed on the PC screen at your workplace.

The metering function in the EM-PQ 1500 also enables you to display the momentary meter readings for active and reactive work whenever you desire.

The alarm outputs can be set individually in order to assess and monitor the power quality in a network.

These values can be entered easily in a clear dialogue in the Configuration menu. Any faults occurring in the system can therefore be identified, enabling you to initiate appropriate remedial action.

