

Mains Monitoring

Mains Monitoring Instruments



Mains Monitoring Instruments

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The power quality of the electrical supply networks plays an increasingly important role for the operational safety of electrical installations and equipment. Therefore it becomes more and more important to take appropriate measures to monitor the power quality.

In contrast to the past it is obvious that it is not sufficient to do a single measurement and then disregard the mains quality if the measurement showed unproblematic values.

Due to complex production processes, changing load conditions and a steady progress in the degree of automation it became important to permanently monitor the quality of electrical power supply.

Thus one can acquire energy know-how and define critical values for measurement variables such as voltage, current and harmonics.

Automatic alarms via different information channels such as e-mail, SMS, warning lights, etc. allow the control of compliance with the now specified critical values.

Of course, critical values predefined by standards and regulations can also be signalled via these channels.

FRAKO Mains Monitoring devices can handle all these operations.

Depending on type and version this can be achieved already by a single device or – even better - in combination with the FRAKO Energy Management System.

Monitoring of transformers, measurements at low voltage distribution boards as well as monitoring of individual machines and consumers FRAKO has the solution for every application.

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| | EM-PQ 3000 | EM-PQ 2500 | EMA 1101 | EMA 1496 |
|-----------------------------------|--|--|--|---|
| |  |  |  |  |
| Voltage | 95-240 V AC; 80-340 V DC \pm 10 % | 95-240 V AC; 80-340 V DC \pm 10 % | 230 V AC \pm 10 % | 110-400 V AC (max. 99-440 V AC) or 120-350 V DC (max. 96-420 V DC) |
| Frequency | 45/65 Hz | 45/65 Hz | 48...62 Hz | 45...66 Hz |
| Power consumption | Max. 9 VA | Max. 9 VA | Max. 7 VA | Max. 5 VA |
| Contact termination 3/4/5-wire | • / • / - | • / • / - | • / • / - | • / • / - ; 2-wire and single phase |
| Current measurement inputs | 4 x X/1A, X/5A | 4 x X/1A, X/5A | 3 x X/5A (Transformer current > 6 mA), electrically isolated | 3 x X/5A |
| Voltage measurements | 417/720 V AC (L-N/L-L) 3-phase 4-wire system 480 V AC (L-L) 3-phase 3-wire system | 417/720 V AC (L-N/L-L) 3-phase 4-wire system 480 V AC (L-L) 3-phase 3-wire system | 3 x 250-550 V AC (external/external conductor); 3 x 50-105 V AC (external/external conductor) | 3 x 100-289 V AC (external/neutral conductor); 3 x 173-500 V AC (external/neutral conductor) |
| Harmonics V/A | 1-63 | 1-40 | 1-19 | - |
| Short term interruptions | • | • | - | - |
| Active energy class | 0.2 (.../5A) | 0.2 (.../5A) | 2 | 2 |
| Analogue In-/Outputs | - / - | - / - | 2 temperature / - | - / - |
| Digital In-/Outputs | 8 / 5 | 8 / 5 | Tariff input for selection of 2 profiles / 1 alarm signalling contact 250 V DC, max. 3 A | - / optional Plug-In module for active or reactive power |
| Memory Min./Max. values | • | • | • | • |
| Memory size | 256 MB | 256 MB | - | - |
| Interfaces | | | | |
| Ethernet | • | • | - | - |
| FRAKO Energy Management System | • Connection via - Modbus RTU (RS-485) or - Modbus TCP (Ethernet) | • Connection via - Modbus RTU (RS-485) or - Modbus TCP (Ethernet) | • via FRAKO Starkstrombus® | • optional Plug-In module enables the connection via Modbus RTU |
| RS-232 / RS-485 | - / • | - / • | • (optional for EMA 1101, EMA 1101 105 V) / - | - / - |
| Profibus DP | • | • | • (only -DP - versions) | - |
| Webserver / E-Mail | - / - | • / • | - / - | - / - |
| Recommended applications | Transformer / NA | Transformer / NA | Transformer / NA | Load outgoing unit |
| Catalogue Page | Page 223 ff. | Page 227 ff. | Page 231 ff. | Page 235 ff. |



EM-PQ 3000 Power Quality Analyzer

Mains monitoring device class A for control panel installation to detect, monitor and analyze electrical measurement variables in mains up to 720 V (phase/phase) with 4 current transformer inputs and 4 voltage inputs. Direct connection to the FRAKO Energy Management System via integrated interfaces RS-485 (Modbus RTU) or Ethernet (Modbus TCP/IP).

Description

Measuring functions:

- Frequency of fundamental 15 Hz ... 440 Hz
- Measuring intervals from 10/12 (50/60 Hz) periods (200 ms)
- Continuous scanning with 20 kHz per channel and calculation of the following measurement readings:
 - Voltage L-N, neutral point displacement voltage
 - Voltage imbalance L1 ... L3
 - Voltage L-L
 - Frequency (equally for all channels)
 - Current, total current L1 ... L3, total current L1 ... L3+N
 - Power (active, reactive, apparent power, power factor, distortion reactive power)
 - Fundamental power (active, reactive, apparent power, cos phi, phase shift)
 - Summation L1 ... L3 of the above mentioned performance values
 - Summation L1 ... L4 (active, reactive, apparent power)
 - Active power (regenerated and consumed) of the main and ancillary system
 - Reactive power (capacitive and inductive) of the main and ancillary system

- Fourier analysis 1st ... 63rd harmonic for current, voltage, active and reactive power as well as interharmonics for every single harmonics per phase
- Distortion factors (THD) of current and voltage
- TDD (Total Demand Distortion) L1, L2, L3
- Current, short-term, long-term flicker
- Allocation of the measurement readings to generate protocols according to EN 50160, EN 61000-2-4, power quality and costs report

Detection and recording:

- Detection and recording of the minimum, maximum and average value of the measurement readings defined by the user as well as the acquisition periods for histograms of the parameterized time periods
- Detection of under- and overvoltages U_{rms}
- Detection of voltage failures U_{rms}
- Detection of inrush currents (10 ms)
- Detection of transients >50 microsec.
- Energy meter (active and reactive power, regenerated and consumed) with 8 tariffs
- Internal data storage: 256 MB Flash memory

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Device equipment:

- Active matrix display (TFT B x H: 115 x 88 mm), Resolution (Pixel): 320 x 240, Brightness (cd/m²): 300, Screen diagonal: 5.7 inch
- Embedded Webservice

Technical Data

- Inputs:
 - 4 voltage measurement inputs
 - 4 current measurement inputs .../1/5A
 - 8 digital inputs: e. g. to change the tariffs, for external synchronisation and to release the records, pulse meter for external consumption meters
 - 5 digital outputs, can also be programmed as a pulse or signal output
- Interfaces / Protocols:
 - RS-485, Protocol: Modbus RTU/Master and Slave for connecting with the FRAKO Energy Management System
 - Interface Profibus DP V0, with gateway function
 - Ethernet 10/100 TBase Modbus RTU Master/Slave for connecting with the FRAKO Energy Management System, Modbus-Gateway, BACnet / IP or MSTP (optional)
 - All interfaces run simultaneously
 - Protocols: Modbus TCP/IP (Port 502), Modbus over TCP/IP (Port 8000), HTTP, SMTP, SNMP, SNTIP, TFTP, FTP, DHCP
 - Built-in homepage for remote maintenance and diagnostics with open structure for application-specific adjustment
 - User programmable e-mail dispatch, e.g. in case of an alarm
 - Supports HTML pages, Java Applets, Flash MX and ActiveX
- Configuration and visualization software EM-PQ VIS:
 - Readout and visualization of measurement readings
 - Automatic ring buffer down load of the devices
 - Storage of data in a Derby database
 - Optional: MS SQL and MySQL database drivers
 - Graphical representation and analysis of online- and of-line-measurement readings
 - Freely configurable topology with freely selectable register levels
 - Configuration of the measurement devices
 - Parameterisation, visualization, data management, analysis
 - Cost centre management
 - Reporting function (EN 50160, voltage and cost centres) for freely definable time periods
 - Statistics function
 - Data export into a CSV file
 - Possibility of customer specified programming (SPS-functionality)
 - The following operating systems are supported:
 - Microsoft® Windows XP® (Service Pack 3 or higher)
 - Microsoft® Windows Vista® (Service Pack 1 or higher)
 - Microsoft® Windows 7,
 - MAC OS® (10.5 or higher),
 - Linux and Unix

Programming:

- Integrated Interpreter to create customized user programs, e.g. alarms, cost centre allocation, operating conditions, ...
- Freely accessible internal variables (measurement readings ...) via reloadable user programs
- 7 user programs can run at the same time

| | |
|--|---|
| Overvoltage category | 600 V CAT III |
| Rated voltage in 4-wire system | Max. 417/720 V AC, +10 % |
| Rated voltage in 3-wire system | Max. 480 V AC, +10 % |
| Frequency of auxiliary voltage | 45 - 65 Hz |
| Power consumption | 15 VA |
| Auxiliary voltage | L-N 95...240 V AC; 80...340 V DC |
| Power consumption | 15 VA |
| Current measurement | .../1A/5A |
| Minimum working current | 5 mA |
| Power consumption | 0.2 VA |
| Measurement method and measurement precision | Class A (according to IEC 61000-4-30) |
| Voltage | ± 0.1 % |
| Current | ± 0.2 |
| Power | ± 0.2 % |
| Active power | Class 0.2S at .../5A |
| Active power | Class 0.5S at .../1A |
| Reactive power | Class 2 at .../1/5A |
| Operational ambient temperature | -10 °C ...+55 °C |
| Relative humidity | 5 up to 95 % |
| Ingress protection | Front IP50, rear IP20 |
| Dimensions | 144 x 144 x 81 mm (W x H x D) |
| Including | Configuration and visualization software EM-PQ VIS Patch cable 3 m, (EM-PQ - Switch/Hub connection) Patch cable 2 m, cross-over (EM-PQ - PC connection) Fastening clamps |
| Article-No. | 29-20110 |

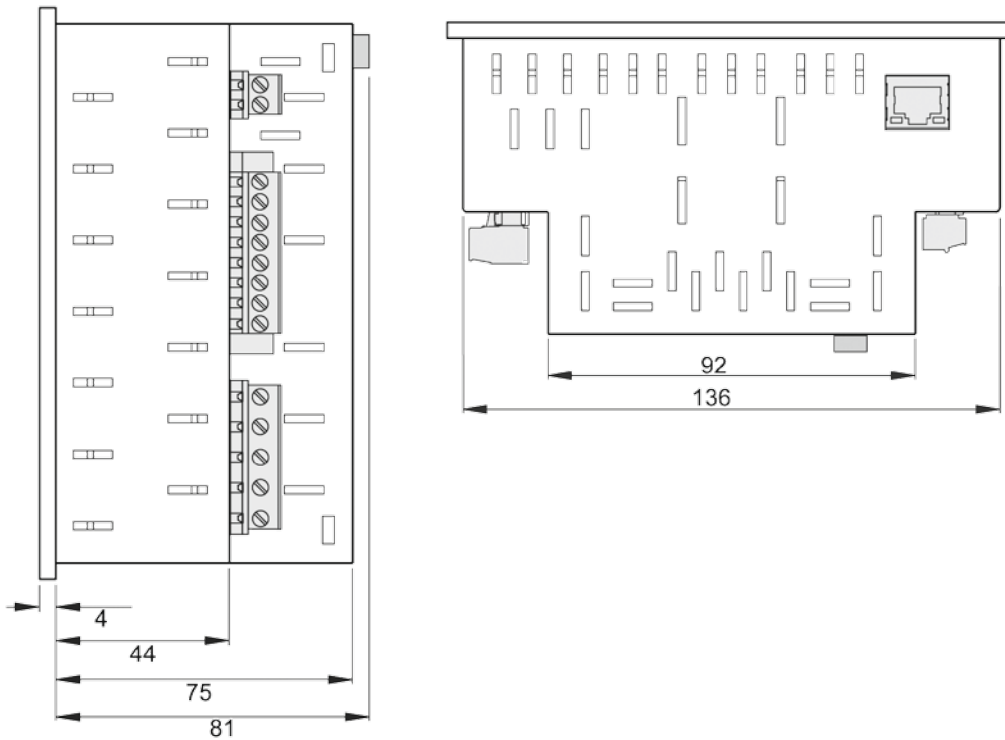
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Optional Accessories

| Article-No. | Type | Description |
|-------------|-------------------------------------|---|
| 29-20112 | Plug DB-9 WITH termination | Terminal plug DB-9 bush (with screw terminals) |
| 29-20113 | Plug DB-9 WITHOUT termination | Terminal plug DB-9 bush (with screw terminals) |
| 29-20114 | EM-PQ-VIS | Configuration and visualisation software for Power Quality Monitor for EM-PQ 2100, 2200, 2500 and 3000 |

Dimensions



Dimensional drawing EM-PQ 3000

All dimensions in mm

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EM-PQ 2500 Power Quality Analyzer

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Mains monitoring device for control panel installation to detect, monitor and analyze electrical measurement variables in mains up to 720 V (phase/phase) with 4 current transformer inputs and 4 voltage inputs. Direct connection to the FRAKO Energy Management System via integrated interfaces RS485 (Modbus RTU) or Ethernet (Modbus TCP/IP).

Description

Measuring functions:

- Frequency of fundamental 40 Hz ... 70 Hz
- Measuring intervals from 10/12 (50/60 Hz) periods (200 ms)
- Continuous scanning with 20kHz per channel and calculation of the following measurement readings:
 - Voltage L-N, neutral point displacement voltage
 - Voltage imbalance L1 ... L3
 - Voltage L-L
 - Frequency (equally for all channels)
 - Current, total current L1 ... L3, total current L1 ... L3+N
 - Power (active, reactive, apparent power, power factor, distortion reactive power)
 - Fundamental power (active, reactive, apparent power, cos phi, phase shift)
 - Summation L1 ... L3 of the above mentioned performance values
 - Summation L1 ... L4 (active, reactive, apparent power)
 - Active power (regenerated and consumed)
 - Reactive power (capacitive and inductive)
 - Fourier analyses 1st ... 40th harmonic component (harmonics) for current, voltage, active and reactive power

– Distortion factors (THD) von current and voltage

- Allocation of the measurement readings to generate protocols for voltage and costs

Detection and recording:

- Detection and recording of the minimum, maximum and average value of the measurement readings defined by the user as well as the acquisition periods for histograms of the parameterized time periods
- Detection of under- and overvoltages U_{rms}
- Detection of voltage failures U_{rms}
- Detection of inrush currents (10 ms)
- Detection of transients >50 microsec.
- Energy meter (active and reactive power, regenerated and consumed) with 8 tariffs
- Internal data storage: 256 MB Flash memory

Device equipment:

- Active matrix display (TFT B x H: 115 x 88 mm), resolution (Pixel): 320 x 240, brightness (cd/m²): 300, screen diagonal 5.7 inch
- Embedded Webserver

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Technical Data

- Inputs:
 - 4 Voltage measurement inputs
 - 4 Current measurement inputs .../1/5A
 - 8 digital inputs: e. g. to change the tariffs, for external synchronisation and to release the records, pulse meter for external consumption meters
- Outputs:
 - 5 digital outputs, can also be programmed as a pulse or signal output
- Interfaces / Protocols:
 - RS-485, Protocol: Modbus RTU/Master and Slave for connecting with the FRAKO Energy Management System
 - Profibus DP V0 Interface, with gateway function
 - Ethernet 10/100 TBase Modbus RTU Master/Slave for connection to FRAKO Energy Management System, Modbus-Gateway, BACnet / IP or MSTP (optional)
 - All interfaces run simultaneously
 - Protocols: Modbus TCP/IP (Port 502), Modbus over TCP/IP (Port 8000), HTTP, SMTP, SNMP, SNTP, TFTP, FTP, DHCP
 - Built-in homepage for remote maintenance and diagnostics with open structure for application-specific adjustment
 - User programmable e-mail dispatch, e.g. in case of an alarm
 - Supports HTML pages, Java Applets, Flash MX and ActiveX
- Configuration and visualization software EM-PQ VIS:
 - Readout and visualization of measurement readings
 - Automatic ring buffer download of the devices
 - Storage of data in a Derby database
 - Optional: MS SQL and MySQL database drivers
 - Graphical representation and analysis of online- and of-line-measurement readings
 - Freely configurable topology with freely selectable register levels
 - Configuration of the measurement devices
 - Parameterisation, visualization, data management, analysis
 - Cost centre management
 - Reporting funktion (Voltage and cost centres) for freely definable time periods
 - Statistics function
 - Data export into a CSV file
 - Possibility of customer specified programming (SPS-functionality)
 - The following operating systems are supported:
 - Microsoft® Windows XP® (Service Pack 3 or higher)
 - Microsoft® Windows Vista® (Service Pack 1 or higher)
 - Microsoft® Windows 7,
 - MAC OS® (10.5 or higher),
 - Linux and Unix

- Programming:
 - Integrated interpreter to create customized user programs, e.g. alarms, cost centre allocation, operating conditions, ...
 - Freely accessible internal variables (measurement readings...) via reloadable user programs
 - 7 user programs can run at the same time

| | |
|---------------------------------|---|
| Overvoltage category | 600V CAT III |
| Rated voltage in 4-wire system | max. 417/720 V AC, +10 % |
| Rated voltage in 3-wire system | max. 480 V AC, +10 % |
| Frequency of auxiliary voltage | 45 - 65 Hz |
| Power consumption | 0.1VA |
| Auxiliary voltage | L-N 95...240 V AC; 80...340 V DC |
| Power consumption | 15 VA |
| Current measurement | .../1A/5A |
| Minimum working current | 5 mA |
| Power consumption | 0.2 VA |
| Voltage | ± 0.1 % |
| Current | ± 0.2 |
| Power | ± 0.2 % |
| Active power | Class 0.2 at .../5A |
| Active power | Class 0.5 at .../1A |
| Reactive power | Class 2 at .../1/5A |
| Operational ambient temperature | -10 °C...+55 °C |
| Relative humidity | 5 up to 95 % |
| Ingress protection | Front IP50, Rear IP20 |
| Dimensions | 144 x 144 x 81 mm (W x H x D) |
| Including | Configuration and visualization software EM-PQ VIS Patch cable 3 m, (EM-PQ - Switch/Hub connection) Patch cable 2 m, cross-over (EM-PQ - PC connection) Fastening clamps |
| Article-No. | 29-20109 |

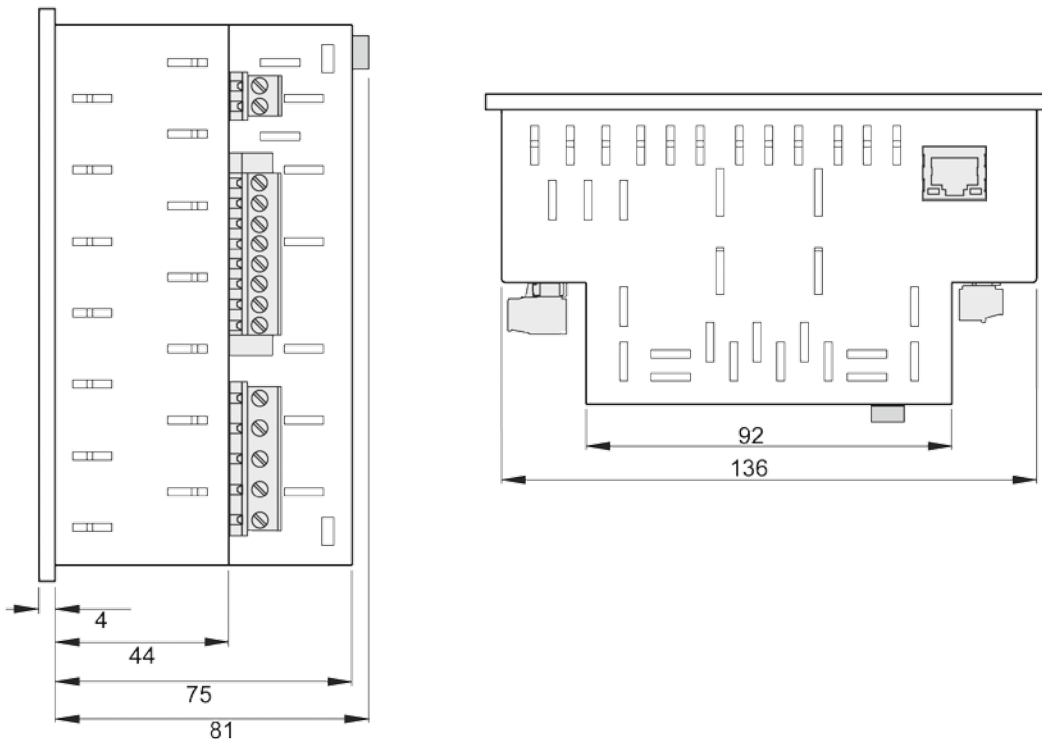
Mains Monitoring

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Optional Accessories

| Article-No. | Type | Description |
|-------------|-------------------------------------|---|
| 29-20112 | Plug DB-9 WITH termination | Terminal plug DB-9 bush (with screw terminals) |
| 29-20113 | Plug DB-9 WITHOUT termination | Terminal plug DB-9 bush (with screw terminals) |
| 29-20114 | EM-PQ-VIS | Configuration and visualisation software for Power Quality Monitor for EM-PQ 2100, 2200, 2500 and 3000 |

Dimensions



Dimensional drawing EM-PQ 2500

All dimensions in mm

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EMA 1101 Mains Monitoring Instrument

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Microprocessor 3-phase measurement and monitoring unit with optional connection to the FRAKO Starkstrombus® to detect, analyze and monitor electrical measurement variables in 400 V and 525 V low voltage mains or medium voltage mains (100 V secondary).

Description

Measuring functions:

- Frequency of fundamental from 40 Hz ... 70 Hz
- Measuring intervals from 10/12 (50/60 Hz) periods (200 ms)
- Continuous scanning with 20kHz per channel and calculation of the following measurement readings:
 - Voltage L-N, neutral point displacement voltage
 - Voltage imbalance L1 ... L3
 - Voltage L-L
 - Frequency
 - Current, total current L1 ... L3, total current L1 ... L3+N
 - Power (active, reactive, apparent power, power factor)
 - Fundamental power (active, reactive, apparent power, cos phi, phase shift)
 - Summation L1 ... L3 of the above mentioned values
 - Summation L1 ... L4 (active, reactive, apparent power)
 - Active power (regenerated and consumed)
 - Reactive power (capacitive and inductive)
 - Fourier analyses 1st ... 40th harmonic component of current, voltage, active and reactive power
 - Distortion factor (THD) of current and voltage
- Allocation of the measurement readings to generate protocols of voltage and costs
- Measurement via three external current converters
- Measurement of active demand for incoming and regenerated power
- Menu-driven in plain text and 6 parameters displayed for direct comparison
- Alarm on exceeding set limits with potential-free NO contact as well as plain text shown on a flashing backlit display
- Visualisation of the currents as a bar graph to determine the utilization capacity
- Menu-driven programming in plain text with operator guidance
- Backlit display
- Storage of all meter readings and limit values in the event of a mains failure
- Illuminated LC display of measured values

Mains Monitoring

Mains Monitoring Instruments

Technical Data

| Power supply | |
|-----------------------------------|--|
| Mains voltage | 230 VAC +/- 10 % |
| Power consumption | Max. 7 VA |
| Fuse protection | 2 A external protection required |
| Measurement input | |
| Voltage path | 3x 250 to 550 V AC (external / external conductor) Power consumption: max. 1.0 VA/external conductor Fuse protection: 2 A external protection required |
| Current path | 3x X/ 5 A (transformer current > 6 mA) Power consumption: max. 1.8 VA/ transformer connection |
| Outputs | |
| 1 Alarm signalling contact | 250 V AC / max. 3 A (potential-free NO contact) |
| Inputs | |
| Tariff inputs | 2 profiles selectable (e. g. HT/NT) |
| Interfaces (mode can be selected) | |
| 1 FRAKO Starkstrombus® | For connection to FRAKO Energy Management System, according to EN 50170 (P-Net), standardised fieldbus, RS-485 Transfer rate: 76.8 kbit/s |
| RS-232 Interface | Can be directly connected with a PC via RS-232 interface Transfer rate: 19 200 Baud |
| Operating elements | Membrane keyboard with 5 keys |
| Display elements | Lid LCD (4 lines each of 20 characters) |
| Connections | Plug-in connecting strips (supplied) |
| Mechanical construction | |
| Dimensions | Front plate dimensions: 144 x 144 mm (DIN 43700) Switch panel aperture: 138 x 138 mm (DIN 43700) Installation depth: 105 mm |
| Ingress protection | Housing/Terminals IP54/20 according to VDE 0470 / EN60529 |
| Version | According to VDE 0411 / EN 61010 Contamination level 3, EN 50081, EN 50082 |
| Housing | Flame retardant UL94-V0 |
| Installation | From front panel with screwdriver |
| Mounting position | Optional |
| Weight | Approx. 1.3 kg |
| Operating conditions | |
| Ambient temperature | 0 °C up to +50 °C |

Versions

| Article-No. | Type | Mains Monitoring Instrument for use in |
|-------------|------------------|--|
| 20-30011 | EMA 1101 S | 3-phase 400 V and 525 V low-voltage systems |
| 20-30005 | EMA 1101 | 3-phase 400 V and 525 V low-voltage systems; Connection to FRAKO Starkstrombus® |
| 20-30008 | EMA 1101 105V | Medium-voltage systems (100 V secondary); Connection to FRAKO Starkstrombus® |
| 20-30007 | EMA 1101 DP | 3-phase 400 V and 525 V low-voltage systems, with Profibus-DP interface |
| 20-30009 | EMA 1101 DP 105V | Medium-voltage systems (100 V secondary), with Profibus-DP interface |

Mains Monitoring

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| | EMA 1101 S | EMA 1101 | EMA 1101 105V | EMA 1101-DP | EMA 1101-DP 105V |
|---|------------|----------|---------------|-------------|------------------|
| For use in 3-phase 400 V and 525 V low-voltage systems | • | • | | • | |
| For use in medium-voltage systems (100 V secondary) | | | • | | • |
| Connection to FRAKO Starkstrombus® | | • | • | | |
| Profibus-DP interface | | | | • | • |
| Determination of current in PEN (neutral conductor + PE) | | • | • | • | • |
| Bar chart display of the currents and distortion factors | | • | • | • | • |
| Connection to a PC or modem via RS-232 interface (optional) | • | • | • | | |

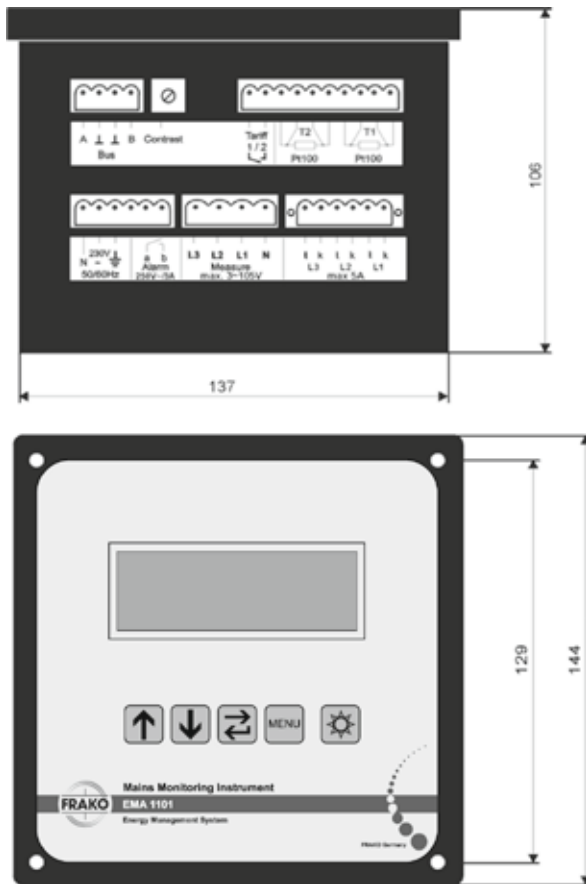
Optional Accessories

| Article-No. | Type | Description |
|-------------|-------------------------------|---|
| 20-10310 | EM-RS 232 | RS-232 adapter for direct access via PC to the data of EMA 1101 (SW-Version 1.11 or higher), EMR 1100 (SW-Version 1.95 or higher) or EMF 1102 (SW-Version 1.0 or higher) |
| 20-10309 | EM-RS 232 for modem operation | RS-232 adapter for access to the data of EMA 1101 (SW-Version 1.11 or higher), EMR 1100 (SW-Version 1.95 or higher) or EMF 1102 (SW-Version 1.0 or higher) via modem |
| 20-10311 | EMA-SW | Software for the configuration and online-display of the Mains Monitoring Unit EMA 1101. Access via: EMIS 1500, EMP 1100, EMT 1101 and RS-232 adapter. Note: included with FRAKO-NET (when supplied on CD). |

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Dimensions



Dimensional drawing EMA 1101

All dimensions in mm

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EMA 1496 Mains Monitoring Instrument

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The unit measures and displays all major electrical and power quality parameters, including imported real and reactive energy, in terms of Wh, kWh, MWh, VARh, KVARh and MVARh for single phase, three-phase-3-wire or three-phase-4-wire supplies. In order to measure these parameters, the unit requires voltage and current inputs in addition to the supply required to power the unit. The current input (s) are obtained via current transformers (CTs).

The unit can be configured to work with a wide range of CTs, giving the unit a wide range of operation. Option modules can be fitted to provide pulse and RS-485 Modbus/JC N2 outputs.

The unit can be powered from a separate auxiliary a.c. (or d.c.). Alternatively it can be powered from the monitored supply, where appropriate.

Description

- Precise display of all major electrical and power quality parameters
- Measures 17 electrical parameters, including total harmonic distortion (THD) up to the 31st harmonic
- Energy meter for active and reactive power
- Plug-in output modules (option):
 - 1 output per module
 - Max. 2 modules possible (type, valency, duration) for active or reactive work (kWh or kvarh) for transmission to FRAKO Cost Centre and Alarm System EMF or PLC
- Plug-in output module (option) for connection to a FRAKO Energy Management System, Modbus RTU
- Front panel installation, DIN 96 enclosure

Optional Accessories

- Programmable pulse output (EMA 1496 EXT IMP):
 - Type, valency and duration - active or reactive work (kWh or kvarh) can be provided for PLC or FRAKO EMF 1102 Cost Centre and Alarm System
- Module RS-485 (EMA 1496 EXT MODBUS):
 - Connection of EMA 1496 to the FRAKO Energy Management System can be realized via this interface RS-485 using the Modbus RTU or the Johnson Controls® Metasys® N2 protocol, enabling all measurement readings to be recorded and monitored.

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Technical Data

| Power supply | |
|--------------------------------|--|
| AC voltage | 110 up to 400 V AC (max. 99 up to 440 V AC) |
| DC voltage | 120 up to 350 V DC (max. 96 up to 420 V DC) |
| Frequency | 45-66 Hz |
| Power consumption | Max. 5 VA |
| Measuring input | |
| Connection type 3/4/5-wire | ●/●/- , 2-wire and single-phase |
| Current measurement input | 3 x X/5A |
| Voltage measurement input | 3 x 100-289 V AC (phase/neutral conductor) 3 x 173-500 V AC (phase/phase conductor) |
| In-/Outputs | |
| Analogue In-/Outputs | - / - |
| Digital In-/Outputs | - / optional plug-in for active and reactive energy |
| Interfaces | |
| FRAKO Energy Management System | Optional plug-in module offers connectivity via Modbus RTU |
| Measurement accuracy | |
| Current | 0.5 % |
| Voltage | 0.5 % (4 %: I ₂ in 3-phase 3-wire operation) |
| Calculated neutral current | 4 % |
| Power factor | 1 % of equality |
| Frequency | 0.1 Hz |
| Active power | ± 1 % of range maximum |
| Reactive power | ± 1 % of range maximum |
| Apparent power | ± 1 % of range maximum |
| Active energy | Class 1 (IEC 62053-21) |
| Reactive energy | ± 1 % of range maximum |
| THD | 1 % up to 31 st harmonic |
| Response time to step input | 1 s, typical to 99 % of the final value |
| Repetition rate recording | Max. 300 ms (maximum for %THD registration) |
| Operating elements | 4 keys |
| Display elements | Backlit LCD |
| Connections | Covered box terminals: 0.05-2.5 mm ² |

| Mechanical construction | |
|-------------------------|---|
| Dimensions | 96 x 96 x 64.1 (W x H x D), installation depth: 58 mm (with modules: 82.5 mm) |
| Ingress protection | Front: IP52 (IP54 using an additional seal) Housing: IP30 |
| Version | IEC 61326/61010-1/62053-21 |
| Housing | Flammability to UL 94-V0 |
| Installation | Front panel installation |
| Weight | 300 g |
| Operating conditions | |
| Operating temperature | -10 °C up to +55 °C |
| Article-No. | 29-20144 |

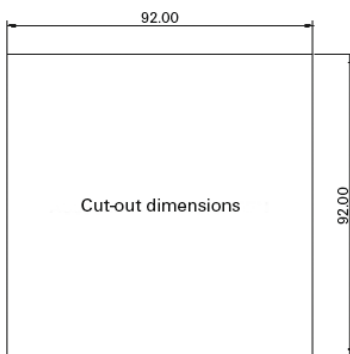
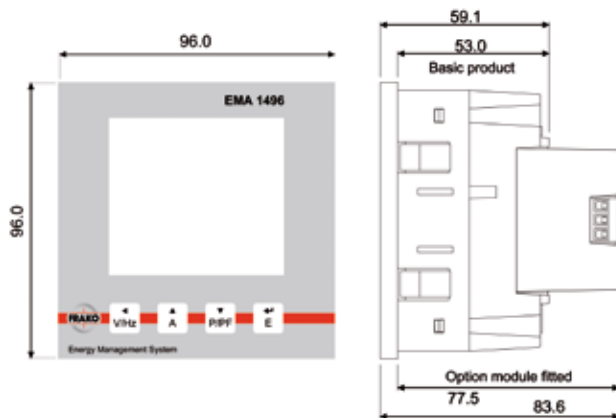
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Optional Accessories

| Article-No. | Type | Description |
|-------------|------------------------|---|
| 29-20145 | EMA 1496 EXT IMP | Configurable pulse module for Mains Monitoring Instrument EMA 1496 for passing the pulses of active and reactive power (kWh or kVAh) to a PLC or the Cost Centre and Alarm Unit EMF 1102. Type, valency and duration of the pulse output can be configured. |
| 29-20146 | EMA 1496 EXT MODBUS | Communication module for Mains Monitoring Instrument EMA 1496 for connection to the FRAKO Energy Management System via RS-485 with JBUS-/Modbus-Protocol, enabling all measurement recordings to be recorded, monitored and analyzed by PC using the visualization software EMVIS 3000. For connection to EMIS® 1500 Central Unit a Modbus coupler (Art.-Nr. 20-10220) is required. |

Dimensions



Dimensional drawing EMA 1496

All dimensions in mm

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