



# **MEMOBOX 300 smart**

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# Power Quality Analyser

## MEMOBOX 300 smart

The **MEMOBOX 300 smart** is the universal tool for power quality analysis, disturbance investigation and network optimisation on low and medium voltage power networks.

With application oriented measuring functions **MEMOBOX 300 smart** always measures the most relevant parameters for the actual application. Concerning the measuring functions there are three instrument versions available:

**Q: Voltage quality analysis and locating of disturbances**

**P: Power measurement and network optimisation**

**A: Advanced, combination of P and Q function**

Several hardware versions are available to meet all customer requirements:

- **Three phase voltage (3U)**
- **Three phase voltage, current, power (3U 3I)**
- **Three phase voltage, current, neutral current, power (3U 3I + N)**

All versions are available for 50 Hz or 60 Hz systems.

| Measuring parameters  |            |            |                    |
|---|------------|------------|--------------------|
| Channels voltage, current   | 3U+3I+N    | 3U+3I+N    | 3U+3I+N            |
| Measuring function  | P          | Q          | A                  |
| Voltage:  |            |            |                    |
| Mean-, Min-, Max-value  | L1, L2, L3 | L1, L2, L3 | L1, L2, L3         |
| Phase current:  |            |            |                    |
| Mean-, Max-value  | L1, L2, L3 | L1, L2, L3 | L1, L2, L3         |
| Current N:  |            |            |                    |
| Mean-, Max-value  | •          | •          | •                  |
| Voltage events  | •          | •          | •                  |
| Power:  |            |            |                    |
| P,  P  <sup>1)</sup> , Q, S, PF <sup>2)</sup> , TAN <sup>3)</sup> | •          |            | •, D <sup>4)</sup> |
| Power total, 3-phase:   |            |            |                    |
| P,  P  <sup>1)</sup> , Q, S, PF <sup>2)</sup> , TAN <sup>3)</sup> | •          |            | •, D <sup>4)</sup> |
| Energy  | •          |            | •                  |
| Flicker (Pst, Plt)  | •          | •          | •                  |
| Harmonics voltage   |            | •, 40      | •, 50              |
| Harmonics current   |            |            | •, 50              |
| Interharmonics (5)  |            | •          | •                  |
| THD U   | •          | •          | •                  |
| THD I   | •          |            | •                  |
| CF (crest factor) current   |            | •          | •                  |
| Unbalance   |            | •          | •                  |
| Frequency   |            | •          | •                  |

- 1) |P|: Absolute value of power  
 2) PF: Power factor  
 3) TAN: Tangent phi  
 4) D: Distortion power

### Max. number of intervals MEMOBOX 300 smart

| Version   | P, 3U   | Q      | P, U+I  | A, U+I |
|-----------|---------|--------|---------|--------|
| Intervals | >30.000 | >9.600 | >14.200 | >5.700 |

The maximum recording period can be calculated by multiplying the interval time defined in CODAM BASIC/PLUS with the maximum number of intervals from table.



### General Data

|                                |   |
|--------------------------------|---|
| <b>Intrinsic error:</b>        | Refers to the reference conditions and is guaranteed for two years  |
| <b>Quality system:</b>         | developed, designed, and manufactured according to DIN ISO 9001   |
| <b>Recalibration interval:</b> | 2 years recommended   |
| <b>Reference conditions:</b>   | 23°C ±2K, Um=230 V ±10%, 50 Hz ±0.1 Hz or 60 Hz ±0.1 Hz phase sequence L1, L2, L3, interval length: 10 minutes Star connection Power supply: 88 ...265 V AC |
| <b>Environment conditions</b>  |   |
| Working temp. range:           | -10°C ... +55 C   |
| Operating temp. range:         | 0°C ... +35°C   |
| Storage temp. range:           | -20°C ... +60°C   |
| Reference temp. Range:         | 23°C ± 2K   |
| Relative humidity:             | 10...80 %, no dewing  |
| Housing:                       | robust, compact housing made of CYCOLOY, colour: pantone 320  |
| <b>Protection:</b>             | IP65 as per EN 60529  |
| <b>Safety:</b>                 | IEC/EN 61010-1 600 V CAT III, 300 V CAT IV, pollution degree 2, double insulation   |
| <b>Type test voltage:</b>      | 5.2 kV RMS, 50 Hz / 60 Hz, 5 s  |
| <b>EMC:</b>                    |   |
| Emission:                      | IEC/EN 61326-1, EN55022   |
| Immunity:                      | IEC/EN 61326-1  |



|                                    |  |
|------------------------------------|--|
| <b>Power Supply:</b>               | 88...400 V AC, 50 Hz / 60 Hz   |
| Functional range:                  | 100 V ... 400 V DC   |
|                                    | fuse: 630 mA T, replacement in service only.                                     |
| Safety:                            | IEC/EN 61010-1 300 V CAT IV  |
|                                    | pollution degree 2, double insulation  |
| Via test leads:                    | Supply can be in parallel to measuring input up to max. 400 V                    |
| Power consumption:                 | max. 7 VA  |
| <b>Memory capacity:</b>            | 4 MB Flash-EPROM   |
| <b>Intervals:</b>                  | >5.700 intervals, >39 days with 10 min intervals                                 |
| <b>Events:</b>                     | >13.000  |
| <b>Memory model:</b>               | linear, circular   |
| <b>Interface:</b>                  | RS 232, 9600...115 000 Baud, automatic Baud rate selection, 3-wire communication |
| <b>Dimensions:</b>                 | 170 mm x 125 mm x 55 mm  |
| <b>Weight:</b>                     | appr. 1.1 kg without accessories   |
| <b>Measurements:</b>               |  |
| A/D converter:                     | 16 bit   |
| Sampling frequency:                | 10.24 kHz  |
| Anti-aliasing filter:              | FIR-Filter, $f_c = 4.9$ kHz  |
| Frequency response:                | Error < 1 % of $U_N = 230$ V for 40 Hz...2500 Hz                                 |
| Interval length:                   | 5, 10, 30 s, 1, 5, 10, 15, 60 minutes  |
| Averaging time for Min/max values: | $\frac{1}{2}$ , 1 mains period, 200 ms, 1 s, 3 s, 5 s                            |
| Time base:                         | resolution: 10 ms (at 50 Hz), deviation: 2s/day at 23°C                          |

## Inputs

|                         |   |
|-------------------------|---|
| <b>Voltage</b>          |   |
| Input range $U_i$ P-N:  | 115 V / 230 V / 480 V AC                                |
| Input range $U_i$ P-P:  | 200 V / 400 V / 830 V AC                                |
| Max. overload voltage:  | 1.2 $U_i$   |
| Input range selection:  | by job programming                                      |
| Connections:            | P-P or P-N, 1- or 3-phase                               |
| Nominal voltage $U_N$ : | $\leq 999$ kV   |
| Input resistance:       | appr. 820 k $\Omega$ per channel $L_x - N$ single phase |
| (L1, L2, L3 connected): | appr. 300k $\Omega$                                     |
| Intrinsic error :       | 0.1 % of $U_i$  |
| Voltage transformer:    | ratio: <999 kV / $U_i$                                  |

## Current input with LEM-flex

|                          |   |
|--------------------------|---|
| Input ranges $I_i$       |   |
| L1, L2, L3, N:           | 15 / 150 / 1500 / 3000 A AC   |
| Measuring range:         | 0.75 A ... 3000 A AC  |
| Intrinsic error:         | <2 % of $I_i$   |
| Position influence:      | max. $\pm 2\%$ of m.v. – for distance conductor to meas. head >30 mm              |
| Stray field influence:   | $\leq \pm 2$ A AC for $I_{ext} = 500$ A AC and distance to measuring head >200 mm |
| Temperature coefficient: | < 0.05% / °C  |
| Transformer ratio:       | $\leq 999$ kA / $\leq I_i$  |
| Ratio selection:         | by job programming  |
| Connection:              | 3-phase, 3-phase+N<br>2-phase L1, L3 (2W-meter-method)                            |

## Current clamp input (instrument without sensors)

|                    |  |
|--------------------|--|
| Input ranges $I_i$ |  |
| L1, L2, L3, N:     | 0.5V nominal, 1.4 V peak   |
| Intrinsic error:   | <0.3 % of $I_i$  |
| Overload capacity: | 10 V AC max.   |
| Input resistance:  | appr. 8.2 k $\Omega$   |
| Transformer ratio: | $\leq 999$ kA / $\leq I_i$   |
| Connections:       | 7-pole plug<br>3-phase, 3-phase and Neutral<br>2-phase L1, L3, (2W-meter-method) |

## General specification

### RMS measurements

#### Slow voltage variations

|                   |  |
|-------------------|--|
| Measuring values: | Mean-value: RMS values averaged over interval length         |
| Min-, Max-values: | Averaging with selectable averaging time 0.5 periods to 45 s |
| Max-value:        | Max. 10ms r.m.s. value per interval                          |
| Min-value:        | Min. 10ms r.m.s. value per interval                          |

#### Current

|                   |  |
|-------------------|--|
| Measuring values: |  |
| Mean-value:       | RMS values integrated over interval length |
| Max-value:        | Highest RMS value per interval             |

### Events

|                             |  |
|-----------------------------|--|
| Dips, swells, interruptions |  |
| Limit value:                | variable, lower limit: 0...95 % $U_N$<br>upper limit: 105...120 % $U_N$<br>set in <b>CODAM BASIC/PLUS</b> software |
| Range:                      | 0... $U_i$ + 20 %  |
| Measuring value:            | $\frac{1}{2}$ period RMS value   |
| Intrinsic error:            | < 2 % of $U_i$   |
| Response time:              | $\frac{1}{2}$ mains period   |

### Flicker

|                            |   |
|----------------------------|---|
| Measuring value:           | Flicker level ( $P_{fl}/P_{st}$ ) according to IEC 61000-4-15 |
| Intrinsic error $P_{st}$ : | < 5 % of m.v.   |
| Measuring range $P_{st}$ : | 0.4 ... 4   |

### Power (A-, P-versions only)

#### P, Q, S, |P|

|                     |  |
|---------------------|--|
| Active power P:     | as per EN 61036, class 2                   |
| Reactive power Q:   | as per EN 61268, class 2                   |
| Distortion power D: | as per EN 61036, class 2 (A-function only) |
| Mean-value:         | averaged over interval length              |
| Max-value:          | highest value per interval                 |
| Min-value:          | smallest value per interval                |
| Phase error:        | < 0.3 degrees                              |
| Conditions:         | conductor centered within clamp/LEM-flex   |

### Harmonics

#### $U_m, I_m, THDU, THDI$ as per EN 61000-4-7, class B

#### Voltage harmonics (A-, Q-version)

|                  |                          |               |
|------------------|--------------------------|---------------|
| Intrinsic error: | for $U_m < 3\% U_N$ :    | < 0.15% $U_N$ |
|                  | for $U_m \geq 3\% U_N$ : | < 5% $U_m$    |

#### Current harmonics (A-version)

|                  |                           |              |
|------------------|---------------------------|--------------|
| Intrinsic error: | for $I_m < 10\% I_N$ :    | < 0.5% $I_N$ |
|                  | for $I_m \geq 10\% I_N$ : | < 5% $I_m$   |

#### THD U (A-, Q-version)

|                            |                      |         |
|----------------------------|----------------------|---------|
| Intrinsic error at $U_N$ : | for THD U < 3%:      | < 0.15% |
|                            | for THD U $\geq$ 3%: | < 5%    |

#### THD U (P-version)

|                            |                      |      |
|----------------------------|----------------------|------|
| Intrinsic error at $U_N$ : | for THD U < 3%:      | < 1% |
|                            | for THD U $\geq$ 3%: | < 5% |

#### THD I (A-, P-version)

|                            |                      |      |
|----------------------------|----------------------|------|
| Intrinsic error at $I_E$ : | for THD I < 3%:      | < 2% |
|                            | for THD I $\geq$ 3%: | < 5% |

#### Statistics:

|   |                                |
|---|--------------------------------|
| Frequency:                              | 42 classes for 10s mean values |
| Ripple control signals, Interharmonics: | 21 classes for 3s mean values  |

#### Analysis of measurement data

Programming and analysis with PC software **CODAM PLUS**.

## MEMOBOX 300 smart version P – power

### Measurement values

#### Voltage L1, L2, L3: Phase to Phase or Phase to Neutral

- Voltage (Mean-, Min- and Max-values)
- THD U (Mean- and Max-values)
- Flicker Pst, Plt
- Voltage events (dips, swells, interruptions)

#### Current L1, L2, L3 and N

- Current (Mean-, Max-value), THD current

#### Power

- Active power P (Mean-, Min- and Max-values)
- Absolute values Active power |P| (Mean-, Min- and Max-values)
- Reactive power Q (Mean-, Min- and Max-values)
- Apparent Power S (Mean-, Min- and Max-values)
- Power Factor PF, tangent
- Energy per averaging interval

#### Total power

- Total power P, |P|, Q, S
- 3-wattmeter and 2-wattmeter method (Aron circuit)

### Applications

#### Power measurement

- Long-term analysis of active, reactive and apparent power
- Long-term analysis of power factor, symmetry

#### Disturbance analysis

- Examination of voltage dips, flicker measurement

#### Network optimisation

- Load measurements, acceptance of new loads
- Adjustment of compensation systems
- Examination of voltage dips and harmonic problems
- Flicker measurement
- Examination of ripple control signals (level)
- Specific search for disturbances through correlation of relevant measurement quantities (e.g. current, voltage, and flicker) considering the time of occurrence and their periodicity.

#### Network optimisation

- Load measurements, capture of current peaks
- Current measurement (with flexible sensors LEM~flex 5 - 3000A)

## MEMOBOX 300 smart version Q – EN50160

### Measurement values

#### All parameters of voltage quality according to EN 50160

#### Voltage L1, L2, L3: Phase to Phase or Phase to Neutral

- Voltage (Mean-, Max-, Min-value)
- Voltage Harmonics 1<sup>st</sup> - 40<sup>th</sup> order
- THD U
- Interharmonics 5-2500 Hz (in steps of 0.5Hz)
- Flicker Pst, Plt
- Unbalance
- Signaling voltages
- Frequency
- Voltage events (dips, swells, interruptions)

#### Current L1, L2, L3 and N

- Current (Mean-, Max-Value)

### Applications

#### Quality assurance

- Voltage quality analysis according to EN50160 over 1-week period
- Examination of measurement quantities as per standards

#### Disturbance analysis

- Long-term analysis of mains voltage
- Examination of voltage dips and harmonic problems
- Flicker measurement
- Examination of ripple control signals (level)
- Specific search for disturbances through correlation of relevant measurement quantities (e.g. current, voltage, and flicker) considering the time of occurrence and their periodicity.

#### Network optimisation

- Load measurements
- Current measurement (with flexible sensors LEM~flex 5 - 3000A)
- Capture of current peaks

## MEMOBOX 300 smart version A – “Advanced”

### Measurement values

#### All parameters of voltage quality according to EN 50160, power, energy, current harmonics

#### Voltage L1, L2, L3: Phase to Phase and Phase to Neutral

- Voltage (Mean-, Max-, Min-value)
- Voltage Harmonics 1<sup>st</sup> – 50<sup>th</sup> order
- THD U
- Interharmonics 5-2500 Hz (5, in steps of 0.5Hz)
- Flicker Pst, Plt
- Unbalance
- Signaling voltages
- Frequency
- Voltage events (dips, swells, interruptions)



#### Current L1, L2, L3 and N

- Current (Mean-, Max-Value)
- Current harmonics up to 50<sup>th</sup> order
- Crest factor and peak values of the currents

#### Power

- Active power P (Mean-, Min- and Max-values)
- Absolute values Active power |P| (Mean-, Min- and Max-values)
- Reactive power Q (Mean-, Min- and Max-values)
- Distortion power D (Mean-, Min- and Max-values)
- Apparent Power S (Mean-, Min- and Max-values)
- Power Factor PF, tangent
- Energy per averaging interval

#### Total power

- Total power P, |P|, Q, D, S
- 3-wattmeter circuit
- 2-wattmeter method (Aron circuit)
- 2 ½ element method

### Applications

#### Quality assurance

- Voltage quality analysis according to EN 50160 over a 1-week period
- Examination of measurement quantities as per standards

#### Disturbance analysis

- Long-term analysis of mains voltage
- Examination of voltage dips and harmonic problems
- Flicker measurement
- Examination of ripple control signals (level)
- Specific search for disturbances through correlation of relevant measurement quantities (e.g. current, voltage, and flicker) considering the time of occurrence and their periodicity.

#### Power measurement

- Long-term analysis of active, reactive, distortion and apparent power
- Long-term analysis of power factor, unbalance

#### Network optimisation

- Load measurements, acceptance of new loads
- Adjustment of compensation systems
- Examination of voltage dips and harmonic problems
- Flicker measurement
- Examination of ripple control signals (level)
- Specific search for disturbances through correlation of relevant measurement quantities (e.g. current, voltage, and flicker) considering the time of occurrence and their periodicity.
- Current measurement (with flexible sensors LEM~flex 5 - 3000A)
- Capture of current peaks

## Software CODAM PLUS

**CODAM PLUS** is the universal application software for **MEMOBOX 300**, **MEMOBOX 300 smart**, **MEMOBOX 800** and **MEMOBOX 808**. Job processing, verification of actual measurement values with ONLINE-function and data transfer from the **MEMOBOX** to the PC are the main functions. The user interface is intentionally kept easy, evaluations are optimised for practical applications: Graphical presentations provide an overview of power quality, statistics and measurement value tables show the details. The measured values can be exported to ASCII-files for post-processing in spread sheet calculation software.

**CODAM PLUS** is operative on PCs with all usual operating systems: Windows® 98/ME/NT4.0/2000/XP.

**CODAM PLUS** is part of the delivery of the **MEMOBOX 300 smart**.

### Job processing allows for setting:

- Interval length
- Memory model
- Voltage input range, nominal voltage, nominal current
- Response time for Min-, Max-values
- Connection type (P-N, P-P)
- Thresholds for event detection, interruptions

The configuration of the **MEMOBOX 300 smart** can be done offline without a connected MEMOBOX. If a **MEMOBOX 300 smart** is connected to the PC during job processing session the connected accessory is detected automatically. Faulty scaling is impossible. Time activated jobs, switch activated jobs and immediate jobs can be programmed.

### Setup

- Internal clock (date/time)
- Define MEMOBOX 808 designation
- Parameters for data export
- Software-Updates

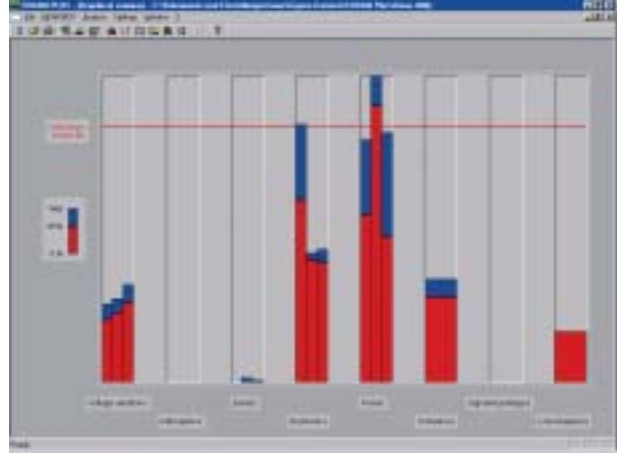
### Analysis

For detailed analysis the following presentations are available:

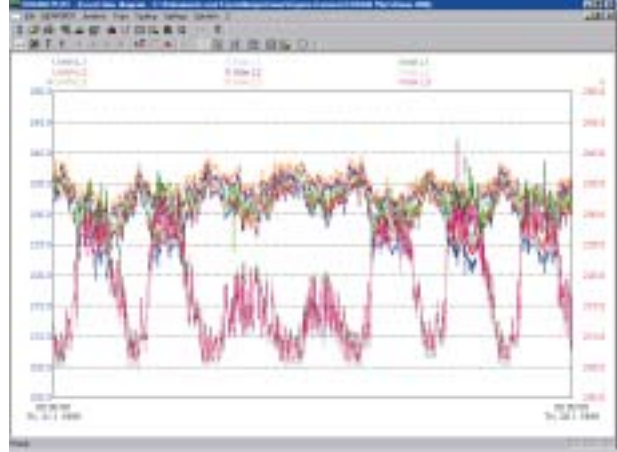
- ONLINE TEST function
- Graphical summary of all EN50160 parameters
- Level time diagrams
- table summaries
- event tables (UNPEDE DISDIP table)
- application oriented analysis (AOA)
- list of measurement values
- cumulative frequency diagram of harmonics (A- and Q-versions)
- Statistical presentations (A- and Q-versions)
- table of all limit exceedings (A- and Q-versions)
- table of critical values (A- and Q-function)
- export to ASCII data files

The remote data transfer of measurement data via analogue modems, ISDN-modems or GSM-modems is provided. The optional communication software PERMLINK establishes a transparent connection from the PC via the modems to the **MEMOBOX 300 smart** installed onsite.

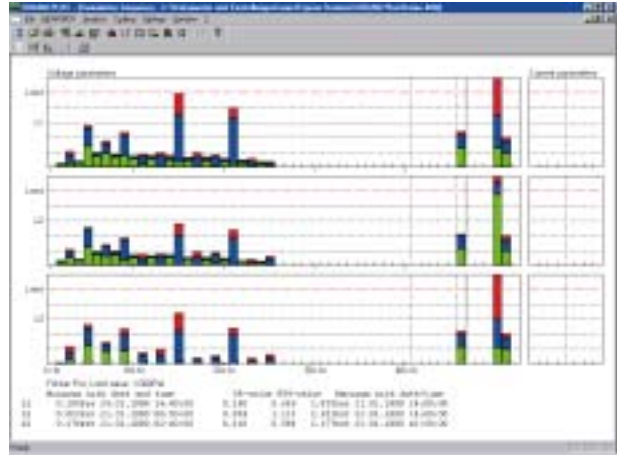
### Graphical EN50160 overview:



### Level-time diagram:



### Harmonics:



### UNPEDE DISDIP Tabelle for voltage events:

| Category                            | Value | Limit | Exceeding |
|-------------------------------------|-------|-------|-----------|
| Number of targets                   | 0     |       |           |
| Number of days                      | 0     |       |           |
| Number of limit exceedings (10 min) | 0     |       |           |
| Number of limit exceedings (1 min)  | 0     |       |           |
| Number of harmonics                 | 0     |       |           |
| Total alarm and interruption        | 0     |       |           |
| Total number of critical points     | 0     |       |           |
| Total number of critical segments   | 0     |       |           |

## Optional accessories

### Current clamp sets

Current clamp sets with measurement ranges between 1A and 1000A AC for 1-phase, 3-phase and 3-phase+N-measurements are available:

- EP0450A:** 1 A / 10 A, 3-phase
- EP0451A:** 1 A / 10 A, 3-phase + N
- EP0452A:** 5 A / 50 A 3-phase
- EP0453A:** 5 A / 50 A 3-phase + N
- EP0455A:** 20 A / 200 A 3-phase
- EP0456A:** 20 A / 200 A 3-phase + N



#### Technical specification

Conductor cross section: max. 15mm diameter,  
15mm x 17 mm bus bars  
Intrinsic error: <math>< \pm 0.5\% \text{ of m. v.}</math>  
Phase angle error: <math>< 1^\circ</math>  
Safety: 600 V CAT III

The clamp sets use a memory device for calibration data, and sensor identity. Thus high accuracy and small phase angle errors can be achieved – each set is calibrated individually. One of the two measurement ranges can be selected during job processing within the **CODAM BASIC/PLUS** software. The sensor type is detected automatically by the MEMOBOX, only ranges which are supported by the hardware can be selected.

- EP0457Z:** 100 A / 1000 A 3-phase
- EP0458Z:** 100 A / 1000 A 3-phase + N

For the ranges 100A/1000A AC special clamps with large jaw opening are provided due to the large conductor cross sections:



#### Technical specification

Conductor cross section: max. 54mm diameter  
Intrinsic error: <math>< \pm 0.5\% \text{ of m. v.}</math>  
Phase angle error: <math>< 0.5^\circ</math>  
Safety: 600 V CAT III

## LEM~flex-Sets

- EP0403A:** 15/150/1500/3000 A, 3-phase
- EP0404A:** 15/150/1500/3000 A, 3-phase + N



#### Technical specification

Measuring head length: 61cm, 2m cable  
Intrinsic error: <math>< \pm 0.5\% \text{ of m. v.}</math>  
Phase angle error: <math>< 0.5^\circ</math>  
Safety: 600 V CAT III

Sets of flexible current sensors (LEM~flex) with measurement ranges from 15A up to 3000A AC are available in versions for 1-phase, 3-phase and 3-phase+N measurements.

The ranges for each set are: 15A/150A/1500A/3000A AC. The LEM~flex set contains a memory device with calibration data and sensor identity. Thus best precision and small phase angle errors can be achieved.

The range selection is done in **CODAM PLUS** software during job processing. The sensor type is detected by the **MEMOBOX 300 smart**, ranges that are supported by the hardware can be selected only.

For details see the leaflet concluded to each set.

## Remote data upload, remote control - PERMLINK communication-software



**PERMLINK** establishes a modem connection to the remote **MEMOBOX 300 smart** installed onsite. **CODAM PLUS** can operate the **MEMOBOX 300 smart** via the serial COM-port of the PC and the modem connection.

Analogue or ISDN-modems, GSM-terminals can be used to configure a **MEMOBOX 300 smart** and to upload measurement data to the PC in the control centre and to upload measurement data to the PC in the control centre, and to monitor the measurement parameters ONLINE on the PC.

**PERMLINK** supports modems of the following manufacturers: US-Robotics (3Com), Zyxel, GSM-modems of SIEMENS, WAVECOM and others.

## Scope of Delivery, Accessories, Service

### Power Quality Analyser

|  |         |
|--|---------|
| <b>MEMOBOX 300 smart (3 U)</b><br>3-phase voltage, function P, RS 232 cable, 4 dolphin clips, mains outlet adapter, operating instructions, carrying bag, software CODAM PLUS  | EP0461Z |
| <b>MEMOBOX 300 smart (3U + 3I, P)</b><br>3-phase voltage, current, power, measuring function P, RS232 cable, 4 dolphin clips, mains outlet adapter, operating instructions, carrying bag, software CODAM PLUS                        | EP0462Z |
| <b>MEMOBOX 300 smart (3U + 4I, P)</b><br>3-phase voltage, current, N-current, power, measuring function P, RS232 cable, 4 dolphin clips, mains outlet adapter, operating instructions, carrying bag, software CODAM PLUS             | EP0464Z |
| <b>MEMOBOX 300 smart (3U Q, EN50160)</b><br>3-phase voltage, measuring function Q, RS232 cable, 4 dolphin clips, mains outlet adapter, operating instructions, carrying bag, software CODAM PLUS                                     | EP0491Z |
| <b>MEMOBOX 300 smart (3U + 3I, P + Q)</b><br>3-phase voltage, current, power, measuring function A, RS232 cable, 4 dolphin clips, mains outlet adapter, operating instructions, carrying bag, sw. CODAM PLUS                         | EP0492A |
| <b>MEMOBOX 300 smart (3U + 3I, Q, EN50160)</b><br>same as EP0492A but with measuring function Q  | EP0492Z |
| <b>MEMOBOX 300 smart (3U + 4I, P + Q)</b><br>3-phase voltage, current, N-current, power, energy, measuring function A, RS232 cable, 4 dolphin clips, mains outlet adapter, operating instructions, carrying bag, software CODAM PLUS | EP0494A |
| <b>MEMOBOX 300 smart (3U + 4I, Q, EN50160)</b><br>same as EP0494A but with measuring function Q  | EP0494Z |

### Optional Accessories

|   |                           |            |
|---|---------------------------|------------|
| LEM~flex<br>15/150/1500/3000A           | 3-phase, 2m cable         | EP0403A    |
|   | 3-phase+N, 2m cable       | EP0404A    |
| Current clamp set                       | 1 A / 10 A, 3-phase       | EP0450A    |
|   | 1 A / 10 A, 3-phase+N     | EP0451A    |
|   | 5 A / 50 A, 3-phase       | EP0452A    |
|   | 5 A / 50 A, 3-phase+N     | EP0453A    |
|   | 20 A / 200 A, 3-phase     | EP0455A    |
|   | 20 A / 200 A, 3-phase+N   | EP0456A    |
|   | 100 A / 1000 A, 3-phase   | EP0457A    |
|   | 100 A / 1000 A, 3-phase+N | EP0458A    |
| Dolphin clip black                      |                           | EP0327Z    |
| Adapter for connection to mains outlets |                           | EP0345A    |
| Mounting kit for pylons                 |                           | EP0340A.Z  |
| Carrying bag                            |                           | EP0350A    |
| PERMLINK communication software         |                           | E631820090 |

## Scope of delivery, standard accessories

**MEMOBOX 300 smart** is delivered with a carrying bag which has room for the **MEMOBOX 300 smart**, standard- and special accessories:



The standard delivery applies to the positions **EP0461Z, EP0462Z, EP0464Z, EP0491Z, EP0492A, EP0492Z, EP0494A, und EP0494Z**

- **MEMOBOX 300 smart**
- Carrying bag
- Carrying, fastening belt
- Test certificate with measurement values
- Operating instructions for **MEMOBOX 300 smart**
- Operating instructions for **CODAM PLUS**
- **CODAM PLUS** software
- RS 232 serial cable, 3m
- Adapter for European outlets
- 4 dolphin clips: 3 red for L1, L2, L3, 1 blue for N-conductor