

# CVMk2

Three-phase power analyzer(balanced and unbalanced) for panel or DIN rail mounting

## Description

Three-phase power analyzer (balanced and unbalanced) for its assembly on panel or DIN rail mounting with a graphical display. measuring in 4 quadrants.

Other features include:

- Class 0.2 or 0.5 power and energy
- Measuring of Class B supply quality events (guaranteeing the power supply of the unit with an UPS, battery, etc.)
- Current measuring .../5 or .../1 A
- Measure of neutral current with transformer
- Optional energy consumption and generation billing (up to 9 rates)
- RS-485 Modbus/RTU Communications
- Expansion possibilities (up to 3 modules)
- Backlit graphical display
- Instantaneous display of maximum and minimum electrical parameters with date and hour
- Measure of energy consumed and generated, up to 100 GW·h
- Universal series power supply
- With ITF technology: galvanic insulation protection inputs

## Application

- Applied to the control of general switchboards and low, medium and high voltage connection points
- Alarm station with voltage-free digital inputs
- Submetering station: impulse meter with other types of consumption, such as gas, water, steam, etc. with their digital inputs
- Measuring converter: optional association of an instantaneous parameter to one of the analogue outputs available (0...20 mA / 4...20 mA)
- Instantaneous, maximum and minimum parameter recording unit, with date and hour and an expandable memory card
- Power quality analyzer: harmonic decomposition up to order 50°, asymmetries, flicker, unbalances, overvoltages, gaps, interruptions, etc.



## Features

|                                       |  |   |
|---------------------------------------|--|---|
| <b>Power supply circuit</b>           |  | 85...265 V ac / 90...300 V dc   |
| ac Power supply frequency             |  | 50..0.60 Hz   |
| ac Power supply consumption           |  | 30 V·A  |
| dc Power supply consumption           |  | < 25 W  |
| <b>Metering circuit</b>               |  |   |
| Nominal voltage                       |  | 300/500 V ph-n / V ph-ph or 500/866 V ph-n / V ph-ph  |
| Frequency                             |  | 45..0.65 Hz   |
| Metering margin                       |  | 5...120 % of the $U_n$ for $U_n = 300$ V ac (ph-n)<br>5...120 % of the $U_n$ for $U_n = 500$ V ac (ph-n)                            |
| Maximum metering voltage              |  | 360 V ac  |
| Admissible overvoltage                |  | 750 V ac  |
| Maximum consumption (limited current) |  | < 0.6 V·A   |
| <b>Current measuring circuit</b>      |  |   |
| Nominal current                       |  | .../5 A or .../1 A  |
| Metering margin                       |  | 1..0.120 % of $I_n$ for $I_n = 5$ A   |
| Primary current metered               |  | Programmable <30,000 A  |
| Admissible overload                   |  | 6 A permanent, 100 A $t < 1$ s  |
| Consumption                           |  | < 0.45 V·A  |
| <b>Maximum meter value</b>            |  | 100 GW·h  |
| <b>Class/Accuracy</b>                 |  | 0.2 or 0.5 power and energy   |
| <b>Ambient conditions</b>             |  |   |
| Operating temperature                 |  | -10 ... +50 °C  |
| Relative humidity                     |  | 5 ... 95%   |
| Altitud                               |  | 2000 m  |
| <b>Build features</b>                 |  |   |
| Metering module                       |  | Assembly on DIN Rail 46277 (EN 50022)   |
| Screen or screen + metering module    |  | Assembly on panel (96 x 96 mm, 144 x 144 mm) or opening with a 103 mm diameter  |
| External dimensions                   |  | 144 x 144 x 116 mm  |
| <b>Safety</b>                         |  |   |
|                                       |  | Designed for CAT III 300/520 Vac installations, in accordance with EN 61010<br>Double-insulated electric shock protection, class II |
| <b>Standards</b>                      |  |   |
|                                       |  | IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-11, IEC 61000-4-4, IEC 61000-4-5  |

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## References

Compact units (metering + display module)

| Quadrants | Class | Communications MODBUS / RTUProtocol | Neutral current | Universal power supply | Type          | Code   |
|-----------|-------|-------------------------------------|-----------------|------------------------|---------------|--------|
| 4         | 0,5   | RS-485                              | Yes             | Yes                    | CVMk2-ITF-405 | M54400 |
| 4         | 0,5   | RS-485                              | Yes             | Yes                    | CVMk2-ITF-402 | M54402 |

Measuring units (measuring module)

| Quadrants | Class | Communications MODBUS / RTUProtocol | Neutral current | Universal power supply | Type            | Code   |
|-----------|-------|-------------------------------------|-----------------|------------------------|-----------------|--------|
| 4         | 0,5   | RS-485                              | Yes             | Yes                    | M-CVMk2-ITF-405 | M54410 |
| 4         | 0,5   | RS-485                              | Yes             | Yes                    | M-CVMk2-ITF-402 | M54412 |

## Connections

Connection of 4 Current transformers (5 wires)

Connection of 4 Current transformers and 2 voltage transformers

Connection of 3 Current transformers (3 wires)

## Dimensions

Fig. 1

Fig. 2

Fig. 3

Figures 1, 2 and 3: Display of the frontal panel part embedding (display) in a 92 x 92 mm opening, with a diameter of 110 mm and 138 x 138 mm, respectively

Exchangeable modules

CVM k2

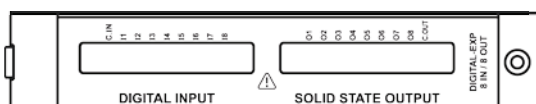
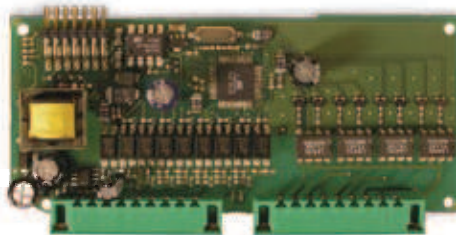


1. k2-EXP-8I / 8O-Digital-TR Card

Card with 8 digital inputs and 8 digital outputs of transistor

Features

| Features                       |                          |
|--------------------------------|--------------------------|
| Logical inputs                 |                          |
| Type of input                  | Voltage-free             |
| Type of coupling               | Optoinsulated            |
| V max                          | 24 Vdc                   |
| minimum t ON / t OFF           | t ON 40 ms               |
|                                | t OFF 40 ms              |
| Static outputs                 |                          |
| AC Voltage                     | <100 Vac                 |
| Non-repetitive Peak voltage    | 350 V pk.                |
| Nominal current                | 100 mA                   |
| Repetitive current during t=1s | 120 mA                   |
| Maximum current t=10 ms        | 350 mA                   |
| Connection                     |                          |
| Rigid conductor section        | 0.05...1 mm <sup>2</sup> |
| Code                           | M54501                   |



Connection

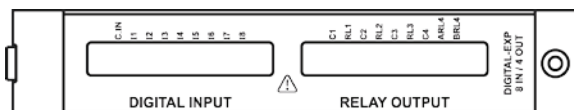
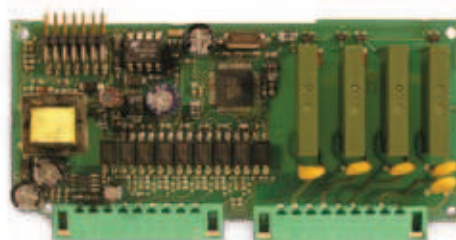


2. k2-EXP-8I / 4O-Digital-RL Card

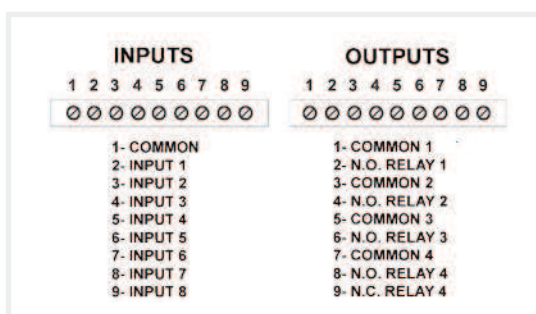
Card with 8 digital inputs and 4 digital outputs. Outputs with relay.

Features

| Features                |  |
|-------------------------|--|
| Logical inputs          |  |
| Type of input           | Voltage-free   |
| Type of coupling        | Optoinsulated  |
| V max                   | 24 Vdc   |
| minimum t ON / t OFF    | t ON 40 ms   |
|                         | t OFF 40 ms  |
| Relay outputs           |  |
| AC Voltage              | 250 Vac  |
| AC Current              | 6 Aac  |
| Minimum relay load      | 1 Vac  |
|                         | 0.001 Aac  |
| Mechanical working life | 5 x 10 <sup>6</sup> operations                       |
| Electrical working life | NO: 5x10 <sup>4</sup> , NC: 3x10 <sup>4</sup> cycles |
| Connection              |  |
| Rigid conductor section | 0.05...1 mm <sup>2</sup>                             |
| Code                    | M54503   |



Connection



## Exchangeable modules

### CVM k2

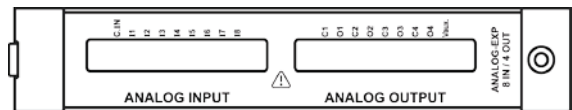
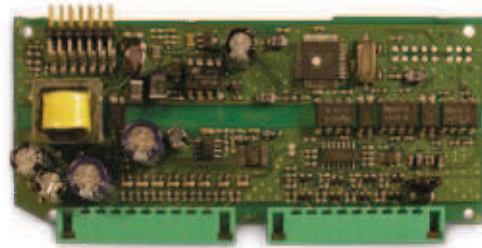


#### 3. k2-EXP-8I / 4O-Analogue Card

Card with 8 digital inputs and 4 digital outputs

##### Features

| Features                 |                          |
|--------------------------|--------------------------|
| <b>Analogue outputs</b>  |                          |
| Maximum internal voltage | 20 / 24 Vdc              |
| Output range             | 0 / 4...20 mA            |
| Linearity                | 1 %                      |
| Load resistance          | < 500 ohm                |
| Output range             | 4000 points              |
| <b>Analogue inputs</b>   |                          |
| Type of metering         | -                        |
| Input range              | 0 / 4...20 mA            |
| Metering accuracy        | 1 %                      |
| Input impedance          | 200 ohm                  |
| <b>Connection</b>        |                          |
| Rigid conductor section  | 0.05...1 mm <sup>2</sup> |
| <b>Code</b>              | <b>M54502</b>            |



##### Connection

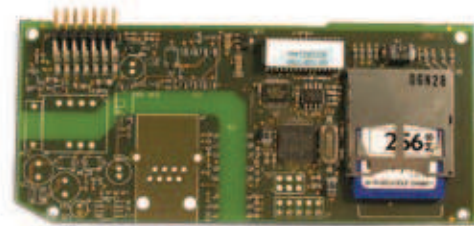
| ENTRADAS |                        |                        |                        |                        |                        |                        |                        |                        | SALIDAS  |                       |          |                       |          |                       |          |                       |                  |
|----------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|----------|-----------------------|----------|-----------------------|----------|-----------------------|----------|-----------------------|------------------|
| 1        | 2                      | 3                      | 4                      | 5                      | 6                      | 7                      | 8                      | 9                      | 1        | 2                     | 3        | 4                     | 5        | 6                     | 7        | 8                     | 9                |
| ⊘        | ⊘                      | ⊘                      | ⊘                      | ⊘                      | ⊘                      | ⊘                      | ⊘                      | ⊘                      | ⊘        | ⊘                     | ⊘        | ⊘                     | ⊘        | ⊘                     | ⊘        | ⊘                     | ⊘                |
| 1- COMUN | 2- Entrada Analógica 1 | 3- Entrada Analógica 2 | 4- Entrada Analógica 3 | 5- Entrada Analógica 4 | 6- Entrada Analógica 5 | 7- Entrada Analógica 6 | 8- Entrada Analógica 7 | 9- Entrada Analógica 8 | 1- COMUN | 2- Salida Analógica 1 | 3- COMUN | 4- Salida Analógica 2 | 5- COMUN | 6- Salida Analógica 3 | 7- COMUN | 8- Salida Analógica 4 | 9- Vaux. EXTERNA |

#### 4. k2-EXP-SD Card

Ethernet communications card and SD memory

##### Features




| SD Card          |               |
|------------------|---------------|
| Type of card     | SD            |
| Maximum capacity | 2 Gb          |
| Format           | FAT 16        |
| <b>Code</b>      | <b>M54506</b> |



##### Recommendations

Card used to record up to 400 electrical variables coming from a CVMk2 power quality analyzer. It also includes a log of the quality events: overvoltages, voltage interruptions or gaps.

##### Icons

-  · Correct SD memory state
-  · Incorrect SD memory state
-  · SD Card removal enabled





## Exchangeable modules

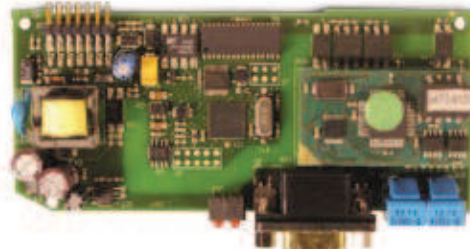
### CVM k2

#### 5. PROFIBUS Card

##### GSD Modules

The GSD modules are configured in accordance with the following table. The table shows the module number, content (variables) and the total size of the module.

| Mod. | Parameters                     | Byte | Size |
|------|--------------------------------|------|------|
| 1    | Simple voltages                | 12   | 52   |
|      | Phase currents                 | 12   |      |
|      | Compound voltages              | 12   |      |
|      | Power factor                   | 12   |      |
|      | Frequency                      | 4    |      |
| 2    | Power ratings                  | 48   | 48   |
| 3    | Mean values                    | 12   | 44   |
|      | Neutral values                 | 8    |      |
|      | Three-phase values             | 24   |      |
| 4    | Current energy with no billing | 48   | 48   |
| 5    | THD U / I                      | 32   | 32   |
| 6    | THD odd / even                 | 64   | 64   |
| 7    | Unbal / Asymmetry / Flicker    | 44   | 44   |
| 8    | Odd harmonics, Voltage (15°)   | 72   | 72   |
| 9    | Even harmonics, Current (15°)  | 72   | 72   |
| 10   | Digital I. 1 / Analogue I. 2   | 64   | 64   |
| 11   | Digital I. 2 / Analogue I. 3   | 64   | 64   |
| 12   | Digital I. 3 / Analogue I. 1   | 64   | 64   |
| 13   | Cos φ                          | 12   | 12   |



Code **M5450A**

#### 6. k2-EXP-SD-MODBUS/TCP Card

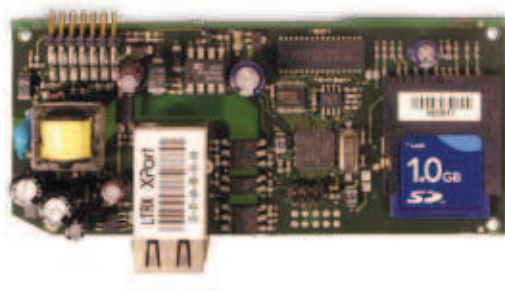
Ethernet communications card and SD memory

##### Features

| Ethernet output        |   |
|------------------------|---|
| Network Protocol       | Ethernet RJ-45                          |
| Communication protocol | Modbus / TCP                            |
| Speed                  | compatible with 10 base T / 100 base Tx |
| SD Card                |   |
| Type of card           | SD                                      |
| Maximum capacity       | 2 Gb                                    |
| Format                 | FAT 16                                  |
| <b>Code</b>            | <b>M54504</b>                           |

##### Recommendations

- The unit is formatted automatically when installing an SD card. Do not install cards with contents stored that you wish to keep.
- To remove the SD card safely, interrupt the communications between the unit and the memory. There are two ways to do so; either turning the unit off or accessing the card setup menu.



##### Icons

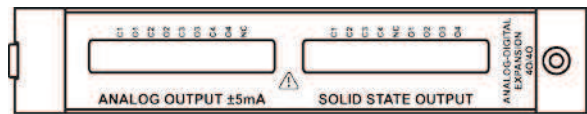
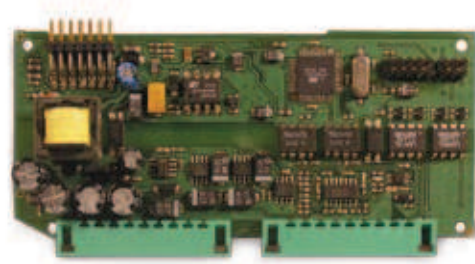
- Correct SD memory state
- Incorrect SD memory state
- SD Card removal enabled

## Exchangeable modules CVM k2

### 7. Exp. Card 4 S analogue + 4 S static. $\pm 5$ mA

#### Features

|                                   |                          |
|-----------------------------------|--------------------------|
| <b>Features</b>                   |                          |
| <b>Logical outputs</b>            |                          |
| Output range                      | $\pm 5$ mA               |
| Linearity                         | 1 %                      |
| Load resistance                   | < 1000                   |
| Output range                      | 4000 points              |
| <b>Static outputs</b>             |                          |
| Voltage                           | <100 Vac/Vdc             |
| Non-repetitive Peak voltage       | 350 V pk.                |
| Nominal current                   | 100 mA                   |
| Repetitive current during $t=1$ s | 120 mA                   |
| Maximum current $t=10$ ms         | 350 mA                   |
| <b>Connection</b>                 |                          |
| Rigid conductor section           | 0.05...1 mm <sup>2</sup> |
| <b>Code</b>                       | <b>M54507</b>            |



#### Connection

| A. OUTPUTS |                      |           |                      |           |                      |           |                      |             | T. INPUTS |           |           |           |           |                        |                        |                        |                        |
|------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|----------------------|-------------|-----------|-----------|-----------|-----------|-----------|------------------------|------------------------|------------------------|------------------------|
| 1          | 2                    | 3         | 4                    | 5         | 6                    | 7         | 8                    | 9           | 1         | 2         | 3         | 4         | 5         | 6                      | 7                      | 8                      | 9                      |
| ○          | ○                    | ○         | ○                    | ○         | ○                    | ○         | ○                    | ○           | ○         | ○         | ○         | ○         | ○         | ○                      | ○                      | ○                      | ○                      |
| 1- COMMON  | 2- Analogic output 1 | 3- COMMON | 4- Analogic output 2 | 5- COMMON | 6- Analogic output 3 | 7- COMMON | 8- Analogic output 4 | 9- Not used | 1- COMMON | 2- COMMON | 3- COMMON | 4- COMMON | 5- COMMON | 6- Transistor output 1 | 7- Transistor output 2 | 8- Transistor output 3 | 9- Transistor output 4 |

