# SINEAX DME 401 with RS 485 interface
# Programmable multi-transducer

## without analogue outputs, transfer of data via a MODBUS® interface

## Application

**SINEAX DME 401** (Fig. 1) is a programmable transducer with a **RS 485 bus interface (MODBUS®).** It supervises several variables of an electrical power system **simultaneously**.

The **RS 485** interface enables the user to determine the number of variables to be supervised (up to the maximum available). The levels of all internal counters that have been configured (max. 4) can also viewed. Provision is made for programming the SINEAX DME 401 via the bus. A standard EIA 485 interface can be used.

The transducers are also equipped with an **RS 232** serial interface to which a PC with the corresponding software can be connected for programming or accessing and executing useful ancillary functions. This interface is needed for bus operation to configure the device address, the Baud rate and possibly increasing the telegram waiting time (if the master is too slow) defined in the MODBUS® protocol.

The usual methods of connection, the types of measured variables, their ratings and the type of internal energy/metering are the main parameters that can be programmed.

The ancillary functions include a power system check and a facility for printing nameplates.

The transducer fulfils all the essential requirements and regulations concerning electromagnetic compatibility **(EMC)** and **safety** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001.

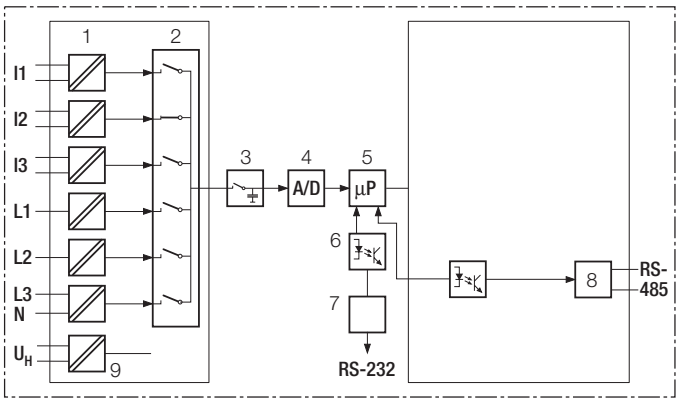
## Features / Benefits

- **Simultaneous measurement of several variables of a heavy-current power system / Full supervision of an asymmetrically loaded four-wire power system, rated current 1 to 6 A, rated voltage 57 to 400 V (phase-to-neutral) or 100 to 693 V (phase-to-phase)**

| Measured variables | Output | Types |
|---|---|---|
| Current, voltage (rms), active/reactive/apparent power cosφ, sinφ, power factor RMS value of the current with wire setting range (bimetal measuring function) Slave pointer function for the measurement of the RMS value IB Frequency Average value of the currents with sign of the active power (power system only) | **Without analogue outputs, with bus interface RS 485 (MODBUS)** | **DME 401** |
| | 4 analogue outputs and bus interface RS 485 (MODBUS) see Data Sheet DME 440-1 Le | DME 440 |
| | 2 analogue outputs and 4 digital outputs **or** 4 analogue outputs and 2 digital outputs see Data Sheet DME 424/442-1 Le | DME 424 / DME 442 |
| | Data bus LON see Data Sheet DME 400-1 Le | DME 400 |
| | PROFIBUS DP see Data Sheet DME 406-1 Le | DME 406 |


*Fig. 1. SINEAX DME 401 in housing **T24,** clipped onto a top-hat rail.*

- **For all heavy-current power system variables**
- **Input voltage up to 693 V (phase-to-phase)**
- **Transfer of data via a MODBUS® interface**
- **High accuracy: 0.2% (under reference conditions)**
- **4 integrated energy meters, storage every each 203 s, storage for: 20 years**
- **Windows software with password protection for programming, data analysis, power system status simulation, acquisition of meter data and making settings**
- **DC-, AC-power pack with wide power supply tolerance / Universal**
- **Provision for either snapping the transducer onto top-hat rails or securing it with screws to a wall or panel**




1 = Input transformer
2 = Multiplexer
3 = Latching stage
4 = A/D converter
5 = Microprocessor
6 = Electrical insulation
7 = Programming interface RS-232
8 = Bus RS 485 (MODBUS)
9 = Power supply

*Fig. 2. Block diagram.*

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## Symbols

| Symbols | Meaning |
|---|---|
| X | Measured variable |
| X0 | Lower limit of the measured variable |
| X1 | Break point of the measured variable |
| X2 | Upper limit of the measured variable |
| U | Input voltage |
| Ur | Rated value of the input voltage |
| U 12 | Phase-to-phase voltage L1 – L2 |
| U 23 | Phase-to-phase voltage L2 – L3 |
| U 31 | Phase-to-phase voltage L3 – L1 |
| U1N | Phase-to-neutral voltage L1 – N |
| U2N | Phase-to-neutral voltage L2 – N |
| U3N | Phase-to-neutral voltage L3 – N |
| UM | Average value of the voltages (U1N + U2N + U3N) / 3 |
| I | Input current |
| I1 | AC current L1 |
| I2 | AC current L2 |
| I3 | AC current L3 |
| Ir | Rated value of the input current |
| IM | Average value of the currents (I1 + I2 + I3) / 3 |
| IMS | Average value of the currents and sign of the active power (P) |
| IB | RMS value of the current with wire setting range (bimetal measuring function) |
| IBT | Response time for IB |
| BS | Slave pointer function for the measurement of the RMS value IB |
| BST | Response time for BS |
| φ | Phase-shift between current and voltage |
| F | Frequency of the input variable |
| Fn | Rated frequency |
| P | Active power of the system P = P1 + P2 + P3 |
| P1 | Active power phase 1 (phase-to-neutral L1 – N) |
| P2 | Active power phase 2 (phase-to-neutral L2 – N) |
| P3 | Active power phase 3 (phase-to-neutral L3 – N) |

| Symbols | **Meaning** (continuation) |
|---|---|
| Q | Reactive power of the system Q = Q1 + Q2 + Q3 |
| Q1 | Reactive power phase 1 (phase-to-neutral L1 – N) |
| Q2 | Reactive power phase 2 (phase-to-neutral L2 – N) |
| Q3 | Reactive power phase 3 (phase-to-neutral L3 – N) |
| S | Apparent power of the system $S = \sqrt{I_1^2 + I_2^2 + I_3^2} \cdot \sqrt{U_1^2 + U_2^2 + U_3^2}$ |
| S1 | Apparent power phase 1 (phase-to-neutral L1 – N) |
| S2 | Apparent power phase 2 (phase-to-neutral L2 – N) |
| S3 | Apparent power phase 3 (phase-to-neutral L3 – N) |
| Sr | Rated value of the apparent power of the system |
| PF | Active power factor $\cos\varphi = P/S$ |
| PF1 | Active power factor phase 1 P1/S1 |
| PF2 | Active power factor phase 2 P2/S2 |
| PF3 | Active power factor phase 3 P3/S3 |
| QF | Reactive power factor $\sin\varphi = Q/S$ |
| QF1 | Reactive power factor phase 1 Q1/S1 |
| QF2 | Reactive power factor phase 2 Q2/S2 |
| QF3 | Reactive power factor phase 3 Q3/S3 |
| LF | Power factor of the system LF = sgnQ · (1 – \|PF\|) |
| LF1 | Power factor phase 1 sgnQ1 · (1 – \|PF1\|) |
| LF2 | Power factor phase 2 sgnQ2 · (1 – \|PF2\|) |
| LF3 | Power factor phase 3 sgnQ3 · (1 – \|PF3\|) |
| H | Power supply |
| Hn | Rated value of the power supply |
| CT | c.t. ratio |
| VT | v.t. ratio |

## Applicable standards and regulations

| | |
|---|---|
| IEC 688 or EN 60 688 | Electrical measuring transducers for converting AC electrical variables into analogue and digital signals |
| IEC 1010 or EN 61 010 | Safety regulations for electrical measuring, control and laboratory equipment |
| IEC 529 or EN 60 529 | Protection types by case (code IP) |
| IEC 255-4 Part E5 | High-frequency disturbance test (static relays only) |
| IEC 1000-4-2/-3/-4/-6 | Electromagnetic compatibility for industrial-process measurement and control equipment |
| EN 55 011 | Electromagnetic compatibility of data processing and telecommunication equipment<br>Limits and measuring principles for radio interference and information equipment |
| IEC 68-2-1/-2/-3/-6/-27 or EN 60 068-2-1/-2/-3/-6/-27 | Ambient tests<br>-1 Cold, -2 Dry heat, -3 Damp heat, -6 Vibration, -27 Shock |
| DIN 40 110 | AC quantities |
| DIN 43 807 | Terminal markings |
| IEC 1036 | Alternating current static watt-hour meters for active energy (classes 1 and 2) |
| DIN 43 864 | Current interface for the transmission of impulses between impulse encoder counter and tarif meter |
| UL 94 | Tests for flammability of plastic materials for parts in devices and appliances |

## Technical data

### Inputs

| | |
|---|---|
| Input variables: | see Table 3 and 4 |
| Measuring ranges: | see Table 3 and 4 |
| Waveform: | Sinusoidal |
| Nominal frequency: | 50, 60 or 16 2/3 Hz |
| Consumption [VA]: | Voltage circuit: $U^2$ / 400 kΩ<br>Condition:<br>Characteristic XH01 … XH10<br>Current circuit: ≤ $I^2$ · 0.01 Ω |

**Continuous thermal ratings of inputs**

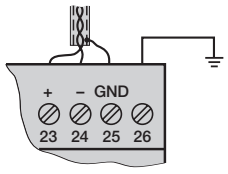
| | | |
|---|---|---|
| **Current circuit** | 10 A | 400 V<br>single-phase AC system<br>693 V<br>three-phase system |
| **Voltage circuit** | 480 V<br>831 V | single-phase AC system<br>three-phase system |

**Short-time thermal rating of inputs**

| **Input variable** | **Number of inputs** | **Duration of overload** | **Interval between two overloads** |
|---|---|---|---|
| **Current circuit** | 400 V single-phase AC system<br>693 V three-phase system | | |
| 100 A | 5 | 3 s | 5 min. |
| 250 A | 1 | 1 s | 1 hour |
| **Voltage circuit** | 1 A, 2 A, 5 A | | |
| Single-phase AC system 600 V<br>$H_{intern}$: 1.5 Ur | 10 | 10 s | 10 s |
| Three-phase system 1040 V<br>$H_{intern}$: 1.5 Ur | 10 | 10 s | 10 s |

### MODBUS® (Bus interface RS-485)

| | |
|---|---|
| Terminals: | Screw terminals, terminals 23, 24, 25 and 26 |
| Connecting cable: | Screened twisted pair |
| Max. distance: | Approx. 1200 m (approx. 4000 ft.) |
| Baudrate: | 1200 … 9600 Bd (programmable) |
| Number of bus stations: | 32 (including master) |
| Dummy load: | Not required |

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### Reference conditions

| | |
|---|---|
| Ambient temperature: | 15 … 30 °C |
| Pre-conditioning: | 30 min. acc. to EN 60 688 |
| Input variable: | Rated useful range |
| Power supply: | H = Hn ± 1% |
| Active/reactive factor: | cosφ = 1 resp. sinφ = 1 |
| Frequency: | 50 … 60 Hz, 16 2/3 Hz |
| Waveform: | Sinusoidal, form factor 1.1107 |
| Miscellaneous: | EN 60 688 |

### System response

| | |
|---|---|
| Accuracy class: | 0.2 resp. 0.4 at applications with phase-shift |
| Duration of the measurement cycle: | Approx. 0.5 to 1.2 s at 50 Hz, depending on measured variable and programming |
| Response time: | 1 … 2 times the measurement cycle |

### Influencing quantities and permissible variations

Acc. to EN 60 688

### Safety

| | | |
|---|---|---|
| Protection class: | II (protection isolated, EN 61 010-1) | |
| Enclosure protection: | IP 40, housing<br>IP 20, terminals | |
| Overvoltage category: | III | |
| Insulation test (versus earth): | Input voltage: | AC 400 V |
| | Input current: | AC 400 V |
| | RS 485: | DC 40 V |
| | Power supply: | AC 400 V<br>DC 230 V |
| Surge test: | 5 kV; 1.2/50 µs; 0.5 Ws | |
| Test voltages: | 50 Hz, 1 min. according to EN 61 010-1 | |
| | 5550 V, inputs versus all other circuits as well as outer surface | |
| | 3250 V, input circuits versus each other | |
| | 3700 V, power supply versus RS 485 and SCI as well as outer surface | |
| | 490 V, RS 485 versus SCI as well as outer surface | |

### Power supply →○

DC-, AC-power pack (DC and 50 … 60 Hz)

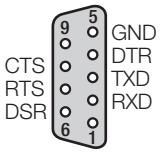
Table 1: Rated voltages and tolerances

| Rated voltage $U_N$ | Tolerance |
|---|---|
| 24 … 60 V DC, AC | DC – 15 … + 33%<br>AC ± 10% |
| 85 … 230 V DC, AC | |

Consumption: ≤ 9 W resp. ≤ 10 VA

### Programming connector on transducer

| | |
|---|---|
| Interface: | RS 232 C |
| DSUB socket: | 9-pin |




The interface is electrically insulated from all other circuits.

### Installation data

| | |
|---|---|
| Housing: | Housing **T24**<br>See Section "Dimensioned drawings" |
| Housing material: | Lexan 940 (polycarbonate), flammability class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen |
| Mounting: | For snapping onto top-hat rail (35 × 15 mm or 35 × 7,5 mm) acc. to EN 50 022<br>or<br>directly onto a wall or panel using the pull-out screw hole brackets |
| Orientation: | Any |
| Weight: | Approx. 0.7 kg |

### Terminals

| | |
|---|---|
| Type: | Screw terminals with wire guards |
| Max. wire gauge: | ≤ 4.0 mm² single wire or<br>2 × 2.5 mm² fine wire |

### Ambient tests

| | |
|---|---|
| EN 60 068-2-6: | Vibration |
| Acceleration: | ± 2 g |
| Frequency range: | 10 … 150 … 10 Hz, rate of frequency sweep: 1 octave/minute |
| Number of cycles: | 10, in each of the three axes |
| EN 60 068-2-27: | Shock |
| Acceleration: | 3 × 50 g<br>3 shocks each in 6 directions |
| EN 60 068-2-1/-2/-3: | Cold, dry heat, damp heat |

### Ambient conditions

| | |
|---|---|
| Variations due to ambient temperature: | ± 0.1% / 10 K |
| Nominal range of use for temperature: | 0…15…30…45 °C (usage group II) |
| Storage temperature: | – 40 to + 85 °C |
| Annual mean relative humidity: | ≤ 75% |

## Table 2: SINEAX DME 401 available as standard versions (without analogue outputs)

The versions of the transducer below programmed with the **basic** configuration are available ex stock. It is only necessary to quote the **Order No.**:

| Description / Basic programming | | Marking | **Order No.** |
|---|---|---|---|
| 1. Mechanical design: | Housing T24 for rail and wall mounting | 404 - 1 | |
| 2. Rated input frequency: | 50 Hz | 1 | |
| **3. Power supply:** | **24… 60 V DC, AC** | **7** | **146 523** |
| | **85…230 V DC, AC** | **8** | **146 515** |
| 4. Power supply connection: | External connection (standard) | 1 | |
| 5. Test certificate: | None supplied | 0 | |
| 6. Configuration: | Programmed basic configuration | 0 | |
| See Table 3 “Ordering information” | | | |
| **Basic configuration** | | | |
| 1. Application (system): | 4-wire, 3-phase asymmetric load | A 44 | |
| 2. Rated input voltage: | Rated value Ur = 100 V | U 21 | |
| 3. Rated input current: | Rated value Ir = 2 A | V 2 | |
| 4. Primary rating: | Without specification of primary rating | W 0 | |
| 5. Energy meter 1: | Not used | EA 00 | |
| 6. Energy meter 2: | Not used | FA 00 | |
| 7. Energy meter 3: | Not used | GA 00 | |
| 8. Energy meter 4: | Not used | HA 00 | |
| See Table 4 “Programming» | | | |

## Table 3: Ordering Information

| DESCRIPTION | MARKING |
|---|---|
| **1. Mechanical design** | |
| Housing T24 for rail and wall mounting | 401 - 1 |
| **2. Rated input frequency** | |
| 1) 50 Hz (60 Hz possible without additional error; 16 2/3 Hz, additional error 1.25) | 1 |
| 2) 60 Hz (50 Hz possible without additional error; 16 2/3 Hz, additional error 1.25) | 2 |
| 3) 16 2/3 Hz (not re-programming by user, 50/60 Hz possible, but with additional error 1.25) | 3 |
| **3. Power supply** | |
| 7) Nominal range 24 … 60 V DC, AC | 7 |
| 8) Nominal range 85 … 230 V DC, AC | 8 |
| **4. Power supply connection** | |
| 1) External (standard) 1 | |
| 2) Internal from measuring input | 2 |
| Line 2: Not available for rated frequency 16 2/3 Hz and applications A15 / A16 / A24 (see Table 4) | |
| Caution: The power supply voltage must agree with the input voltage (Table 4)! | |
| **5. Test certificate** | |
| 0) None supplied | 0 |
| D) With test certificate in German | D |
| E) With test certificate in English | E |
| **6. Configuration** | |
| 0) **Basic** configuration, programmed | 0 |
| 9) Programmed acc. to specification | 9 |
| Line 0: Not available if the power supply is taken from the measuring input | |
| Line 9: **All the programming data must be entered on Form W 2408e and the form must be included with the order.** | |

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## Table 4: Programming

| DESCRIPTION | Application A11 … A16 | Application A34 | Application A24 / A44 |
|---|---|---|---|
| **1. Application** (system) | | | |
| Single-phase AC | A11 | — | — |
| 3-wire, 3-phase symmetric load, phase-shift U: L1-L2, I: L1 * | A12 | — | — |
| 3-wire, 3-phase symmetric load | A13 | — | — |
| 4-wire, 3-phase symmetric load | A14 | — | — |
| 3-wire, 3-phase symmetric load, phase-shift U: L3-L1, I: L1 * | A15 | — | — |
| 3-wire, 3-phase symmetric load, phase-shift U: L2-L3, I: L1 * | A16 | — | — |
| 3-wire, 3-phase asymmetric load | — | A34 | — |
| 4-wire, 3-phase asymmetric load | — | — | A44 |
| 4-wire, 3-phase asymmetric load, open-Y | — | — | A24 |
| **2. Rated input voltage** | | | |
| Rated value Ur = 57.7 V | U01 | — | — |
| Rated value Ur = 63.5 V | U02 | — | — |
| Rated value Ur = 100 V | U03 | — | — |
| Rated value Ur = 110 V | U04 | — | — |
| Rated value Ur = 120 V | U05 | — | — |
| Rated value Ur = 230 V | U06 | — | — |
| Rated value Ur [V] | U91 | — | — |
| Rated value Ur = 100 V | U21 | U21 | U21 |
| Rated value Ur = 110 V | U22 | U22 | U22 |
| Rated value Ur = 115 V | U23 | U23 | U23 |
| Rated value Ur = 120 V | U24 | U24 | U24 |
| Rated value Ur = 400 V | U25 | U25 | U25 |
| Rated value Ur = 500 V | U26 | U26 | U26 |
| Rated value Ur [V] | U93 | U93 | U93 |
| Lines U01 to U06: Only for single phase AC current or 4-wire, 3-phase symmetric load<br>Line U91: Ur [V] 57 to 400<br>Line U93: Ur [V] > 100 to 693 | | | |
| **3. Rated input current** | | | |
| Rated value Ir = 1 A V1 | V1 | V1 | |
| Rated value Ir = 2 A V2 | V2 | V2 | |
| Rated value Ir = 5 A V3 | V3 | V3 | |
| Rated value Ir > 1 to 6 [A] | V9 | V9 | V9 |
| **4. Primary rating (voltage and current transformer)** | | | |
| Without specification of primary rating | W0 | W0 | W0 |
| VT = kV CT = A | W9 | W9 | W9 |
| Line W9: Specify transformer ratio primary, e.g. 33 kV, 1000 A<br>The secondary ratings must correspond to the rated input voltage and current specified for feature 2, respectively 3. | | | |

** Basic accuracy 0.4 c*

Continuation “Table 4: Programming”

| DESCRIPTION | | | | Application A11 … A16 | Application A34 | Application A24 / A44 |
|---|---|---|---|---|---|---|
| **5. Energy meter 1** | | | | | | |
| Not used | | | | EA00 | EA00 | EA00 |
| I | System | | [Ah] | EA50 | — | — |
| I1 | L1 | | [Ah] | — | EA51 | EA51 |
| I2 | L2 | | [Ah] | — | EA52 | EA52 |
| I3 | L3 | | [Ah] | — | EA53 | EA53 |
| S | System | | [VAh] | EA54 | EA54 | EA54 |
| S1 | L1 | | [VAh] | — | — | EA55 |
| S2 | L2 | | [VAh] | — | — | EA56 |
| S3 | L3 | | [VAh] | — | — | EA57 |
| P | System | (incoming) | [Wh] | EA58 | EA58 | EA58 |
| P1 | L1 | (incoming) | [Wh] | — | — | EA59 |
| P2 | L2 | (incoming) | [Wh] | — | — | EA60 |
| P3 | L3 | (incoming) | [Wh] | — | — | EA61 |
| Q | System | (inductive) | [Varh] | EA62 | EA62 | EA62 |
| Q1 | L1 | (inductive) | [Varh] | — | — | EA63 |
| Q2 | L2 | (inductive) | [Varh] | — | — | EA64 |
| Q3 | L3 | (inductive) | [Varh] | — | — | EA65 |
| P | System | (outgoing) | [Wh] | EA66 | EA66 | EA66 |
| P1 | L1 | (outgoing) | [Wh] | — | — | EA67 |
| P2 | L2 | (outgoing) | [Wh] | — | — | EA68 |
| P3 | L3 | (outgoing) | [Wh] | — | — | EA69 |
| Q | System | (capacitive) | [Varh] | EA70 | EA70 | EA70 |
| Q1 | L1 | (capacitive) | [Varh] | — | — | EA71 |
| Q2 | L2 | (capacitive) | [Varh] | — | — | EA72 |
| Q3 | L3 | (capacitive) | [Varh] | — | — | EA73 |
| **6. Energy meter 2** | | | | | | |
| Same as energy meter 1, but markings start with a capital F | | | | FA .. | FA .. | FA .. |
| **7. Energy meter 3** | | | | | | |
| Same as energy meter 1, but markings start with a capital G | | | | GA .. | GA .. | GA .. |
| **8. Energy meter 4** | | | | | | |
| Same as energy meter 1, but markings start with a capital H | | | | HA .. | HA .. | HA .. |

## Standard accessories

1 Operating Instructions for SINEAX DME 401 in three languages:
German, French, English

1 blank type label, for recording programmed settings

1 Interface definition DME 401: German, French or English

# SINEAX DME 401 with RS 485 interface
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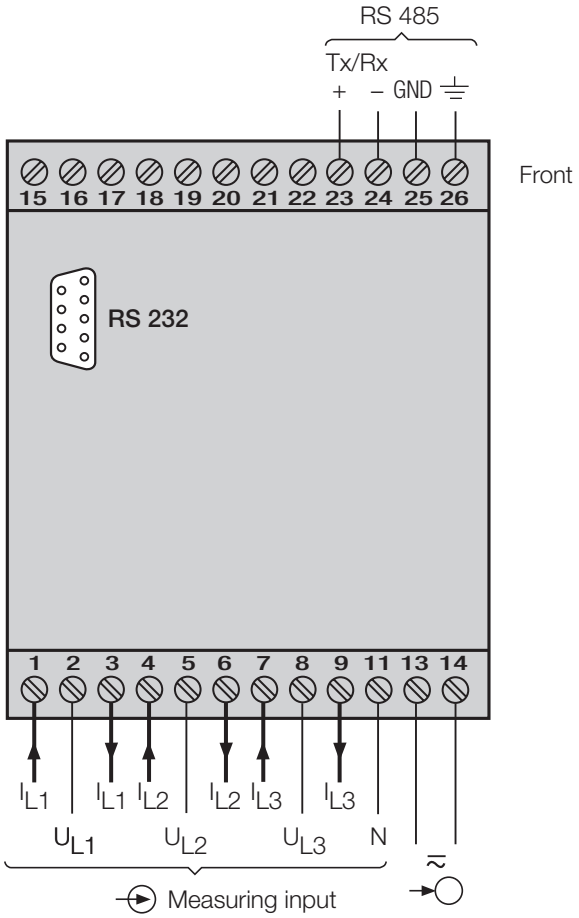
## Electrical connections

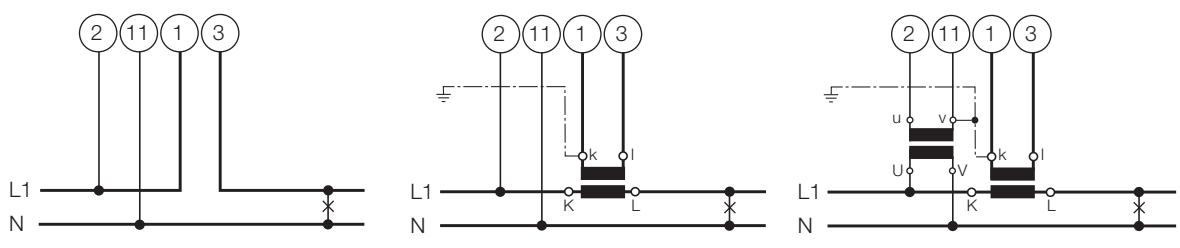
| Function | | | Connect. |
|---|---|---|---|
| Measuring input | AC current | IL1 | 1 / 3 |
| | | IL2 | 4 / 6 |
| | | IL3 | 7 / 9 |
| | AC voltage | UL1 | 2 |
| | | UL2 | 5 |
| | | UL3 | 8 |
| | | N | 11 |
| RS 485 (MODBUS) | | Tx + / Rx + | 23 |
| | | Tx – / Rx – | 24 |
| | | GND | 25 |
| | | ⏚ | 26 |
| Power supply | AC | ~ | 13 |
| | | ~ | 14 |
| | DC | + | 13 |
| | | – | 14 |




If power supply is taken from the measured voltage internal connections are as follows:

| Application (system) | Internal connection Terminal / System |
|---|---|
| Single-phase AC current | 2 / 11 (L1 – N) |
| 4-wire 3-phase symmetric load | 2 / 11 (L1 – N) |
| All other (apart from A15 / A16 / A24) | 2 / 5 (L1 – L2) |

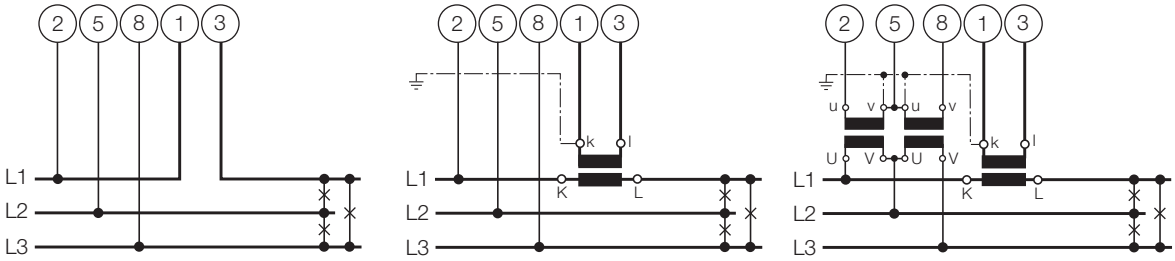
**Measuring inputs**

| System / application | Terminals |
|---|---|
| **Single-phase** AC system |  |

**Measuring inputs**

| System / application | Terminals |
|---|---|

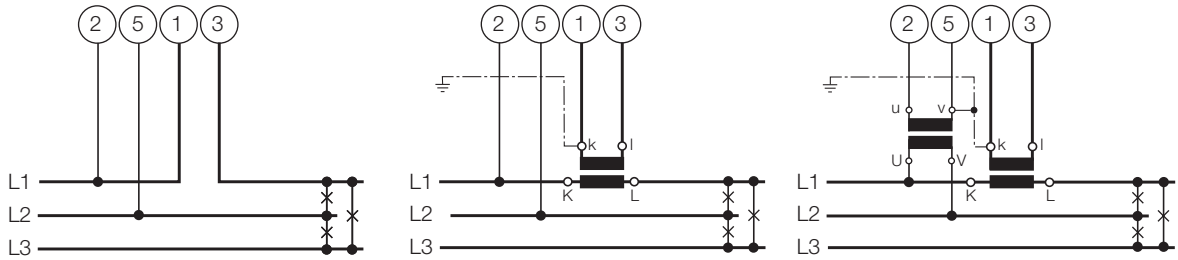
**3-wire**
3-phase
**symmetric load**
**I: L1**




Connect the voltage according to the following table for current measurement in L2 or L3:

| Current transf. | Terminals | | 2 | 5 | 8 |
|---|---|---|---|---|---|
| L2 | 1 | 3 | L2 | L3 | L1 |
| L3 | 1 | 3 | L3 | L1 | L2 |

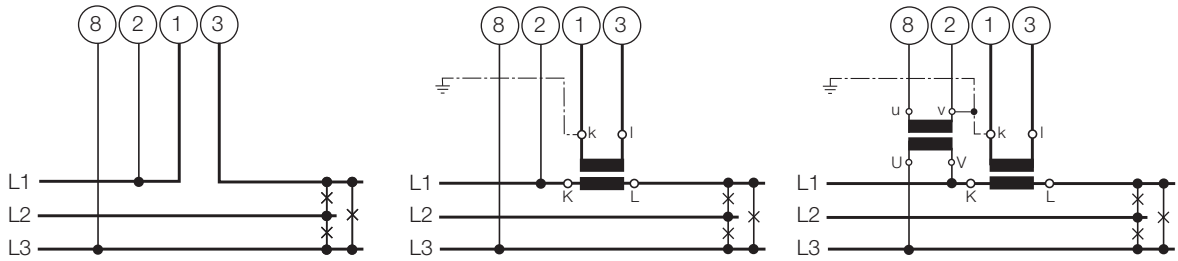
**3-wire**
3-phase
**symmetric load**
Phase shift
U: L1 – L2
I: L1




Connect the voltage according to the following table for current measurement in L2 or L3:

| Current transf. | Terminals | | 2 | 5 |
|---|---|---|---|---|
| L2 | 1 | 3 | L2 | L3 |
| L3 | 1 | 3 | L3 | L1 |

**3-wire**
3-phase
**symmetric load**
Phase shift
U: L3 – L1
I: L1

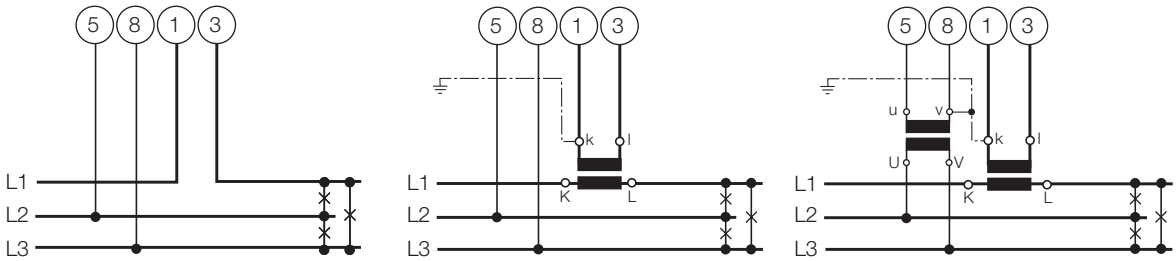
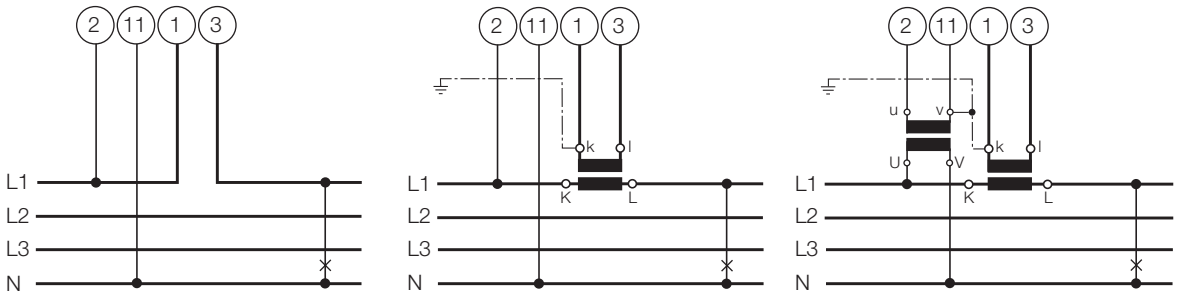
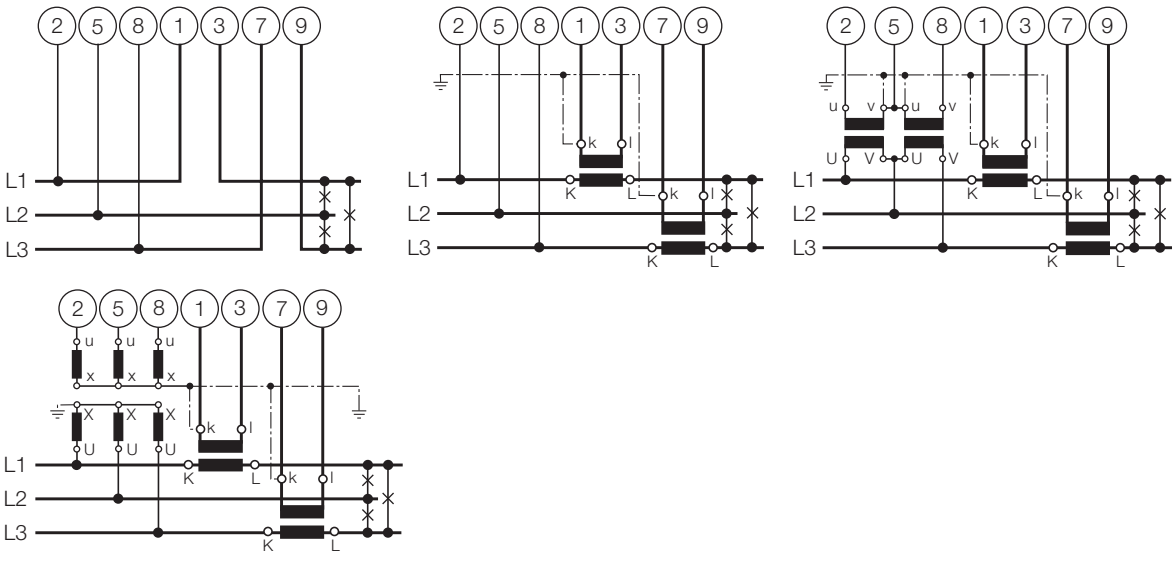



Connect the voltage according to the following table for current measurement in L2 or L3:

| Current transf. | Terminals | | 8 | 2 |
|---|---|---|---|---|
| L2 | 1 | 3 | L1 | L2 |
| L3 | 1 | 3 | L2 | L3 |

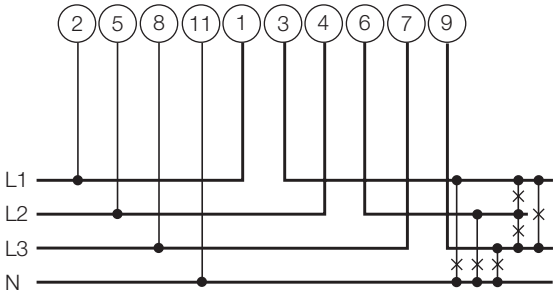
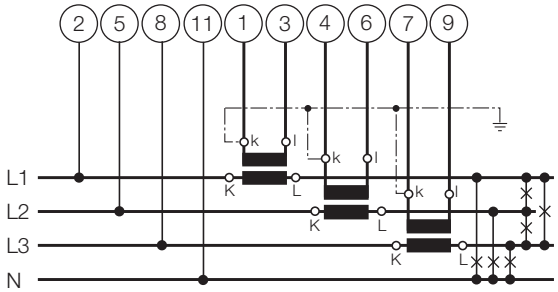
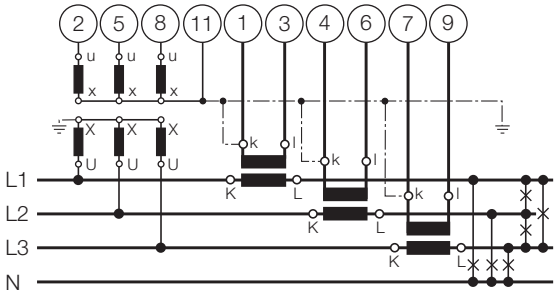
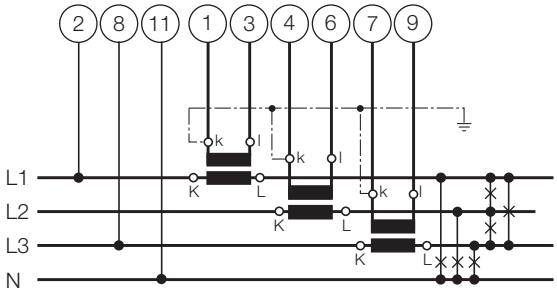
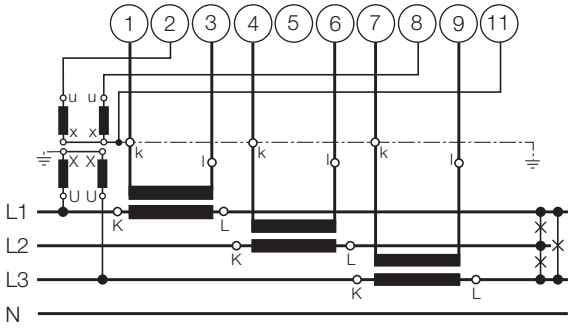
# SINEAX DME 401 with RS 485 interface
# Programmable multi-transducer

**Measuring inputs**

| System / application | Terminals |
|---|---|
| **3-wire** 3-phase **symmetric load** Phase-shift U: L2 – L3 I: L1 |   Connect the voltage according to the following table for current measurement in L2 or L3: |
| **4-wire** 3-phase **symmetric load** **I: L1** |   Connect the voltage according to the following table for current measurement in L2 or L3: |
| **3-wire** 3-phase **asymmetric load** |   |

| Current transf. | Terminals | | 5 | 8 |
|---|---|---|---|---|
| L2 | 1 | 3 | L3 | L1 |
| L3 | 1 | 3 | L1 | L2 |

| Current transf. | Terminals | | 2 | 11 |
|---|---|---|---|---|
| L2 | 1 | 3 | L2 | N |
| L3 | 1 | 3 | L3 | N |

| Measuring inputs | |
|---|---|
| System / application | Terminals |
| **4-wire** 3-phase **asymmetric load** |    3 single-pole insulated voltage transformers in high-voltage system |
| **4-wire** 3-phase **asymmetric load,** Open Y connection |  Low-voltage system  2 single-pole insulated voltage transformers in high-voltage system |

**Relationship between PF, QF and LF**

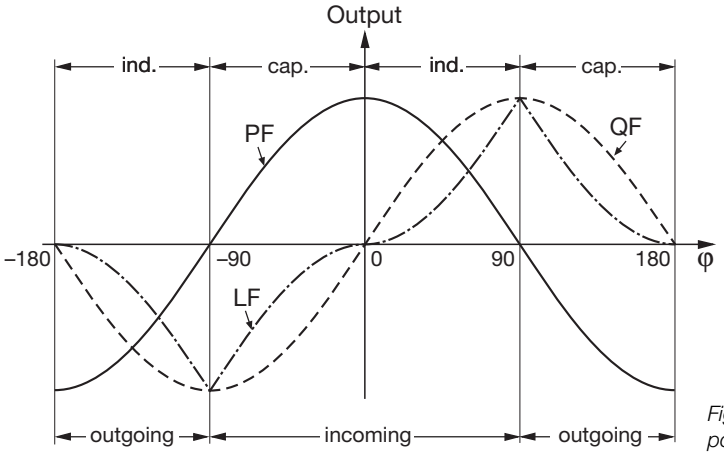



*Fig. 3. Active power PF ——, reactive power QF ------, power factor LF – – – – –.*

# SINEAX DME 401 with RS 485 interface
# Programmable multi-transducer

### Connecting devices to the bus

The RS 485 interface of the DME 401 is galvanically isolated from all other circuits. For an optimal data transmission the devices are connected via a 3-wire cable, consisting of a twisted pair cable (for data lines) and a shield. There is no termination required. A shield both prevents the coupling of external noise to the bus and limits emissions from the bus. The shield must be connected to solid ground.

You can connect up to 32 members to the bus (including master). Basically devices of different manufacturers can be connected to the bus, if they use the standard MODBUS® protocol. Devices without galvanically isolated bus interface are not allowed to be connected to the shield.

The optimal topology for the bus is the daisy chain connection from node 1 to node 2 to node n. The bus must form a single continuous path, and the nodes in the middle of the bus must have short stubs. Longer stubs would have a negative impact on signal quality (reflection at the end). A star or even ring topology is not allowed.

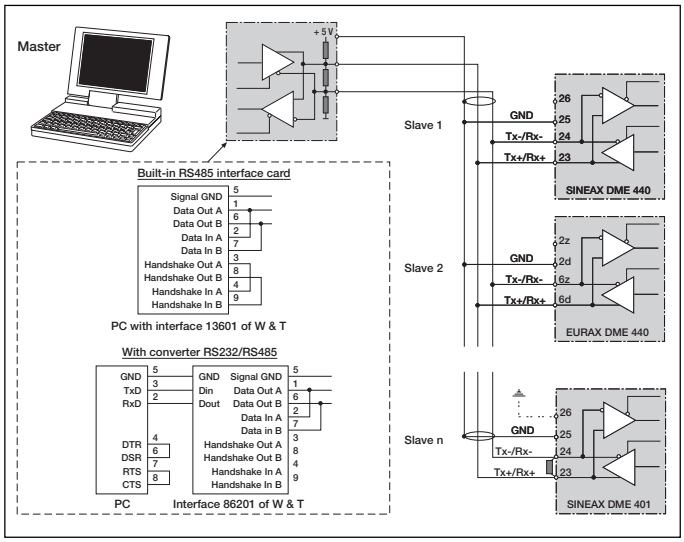



*Fig. 4*

There is no bus termination required due to low data rate. If you got problems when using long cables you can terminate the bus at both ends with the characteristic impedance of the cable (normally about 120 Ω). Interface converters RS232⇔RS485 or RS485 interface cards often have a built-in termination network which can be connected to the bus. The second impedance then can be connected directly between the bus terminals of the device far most.

Fig. 4 shows the connection of transducers DME 401 to the MODBUS. The RS 485 interface can be realized by means of PC built-in interface cards or interface converters. Both is shown using i.e. the interfaces 13601 and 86201 of W & T (Wiesemann & Theis GmbH). They are configured for a 2-wire application with automatic control of data direction. These interfaces provide a galvanical isolation and a built-in termination network.

*Important:*

- ***Each device connected to the bus must have a unique address***
- ***All devices must be adjusted to the same baudrate.***

## Dimensioned drawings

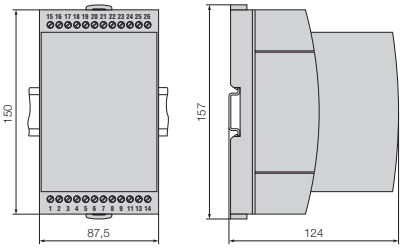



*Fig. 5. SINEAX DME 401 in housing **T24** clipped onto a top-hat rail (35 × 15 mm or 35 × 7.5 mm, acc. to EN 50 022).*

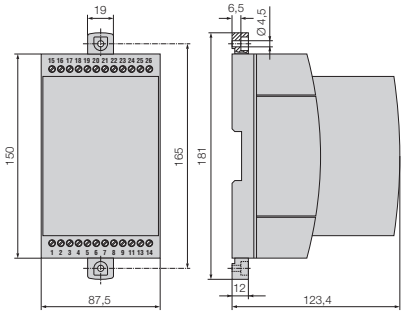



*Fig. 6. SINEAX DME 401 in housing **T24**, screw hole mounting brackets pulled out.*

## Table 5: Accessories and spare parts

| Description | Order No. |
|---|---|
| **Programming cable** | 980 179 |
| **Configuration software DME 4** for SINEAX/EURAX DME 424, 440, 442, SINEAX DME 400, 401 and 406 Windows 3.1x, 95, 98, NT and 2000 on CD in German, English, French, Italian and Dutch **(Download free of charge under http://www.gmc-instruments.com)** In addition, the CD contains all configuration programmes presently available for Camille Bauer products. | 146 557 |
| **Software METRAwin 10 / DME 440/401** | 128 373 |
| **Operating Instructions DME 401-1** B d-f-e, in three languages, German, English and French | 146 804 |

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