
# Transducers

CEWE INSTRUMENT

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# Transducer Survey

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| Type | Function | Output config. | Auxiliary | Case | Page |
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# GENERAL DESCRIPTION AND TECHNICAL DATA

In this catalogue, Cewe Instrument presents ”BLUE MODULE”, a wide range of Transducers for DIN-rail and panel mounting.

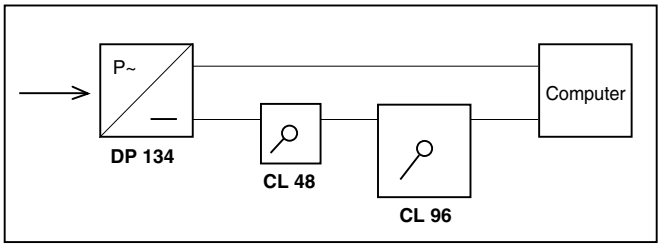
Thanks to high performance and high reliability e. g. a MTBF of 40 years for current transducers, Cewe Instrument transducers have obtained a wide clientele. The transducers are used by industries and power companies in around 40 countries in Europe as well as in all parts of the world. Cewe Instrument´s transducer are also produced on licence in China.

Below follows general information on electrical measuring transducers with examples of application, definition of terms and some common data for Cewe Instrument transducers. For each group of transducers then follows an explanation of working principle, block diagram, and general data.

The output from our transducers are within certain limits independent of load. The load limits are given in a data sheets. The load independence is obtained by a certain feedback of the output signal to the amplifier. These transducer charactaristics give great advan-tages among which the most important are mentioned below.

1. Measuring values can be transmitted over relatively long distances.

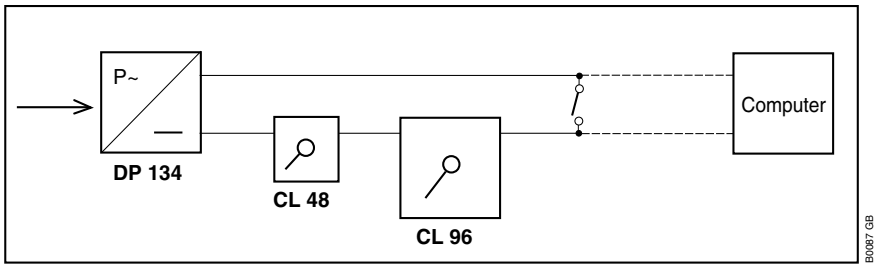
2. Within the framework of the permitted output signal loadings, several measuring or registration units can be connected simultane-ously to the same transducer. No special tuning is required.




3. No adjustment for wire resistance need to be made in connected instruments.

4. The actual wiring is simple and inexpensive in that thin wires can be used for output signals.

5. Individual instruments or other measuring or registration units can be disconnected from a circuit after short-circuiting their connection wires. The signal and the remaining units in the circuit remain unaffected which simplifies service.



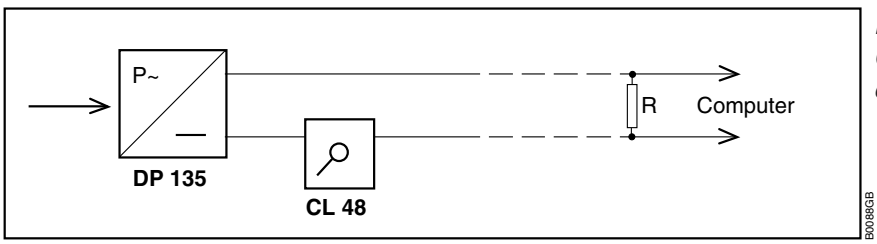

6. Maximum open circuit output voltage is low, 20 V, which means that the output circuit can be opened without any precautions.

7. They have a wide range of applications because of their high accuracy and the fact that they are approved in accordance wit interference tests IEC 255 -5 and -6, for input and output signals.

Certain A/D-converters and controllers require a positive input signal. For this purpose it is useful to have a zero displacement in power measurements with both positive and negative power. Cewe Instrument´s transducers can be produced with zero displacement up to 50 % of the measuring range.

**Example**: Measuring range 100-0-100 kW, output signal 4 – 12 – 20 mA where 4 mA = –100 kW, 12 mA = 0 kW and 20 mA = +100 kW.

See page 11 output signal L.

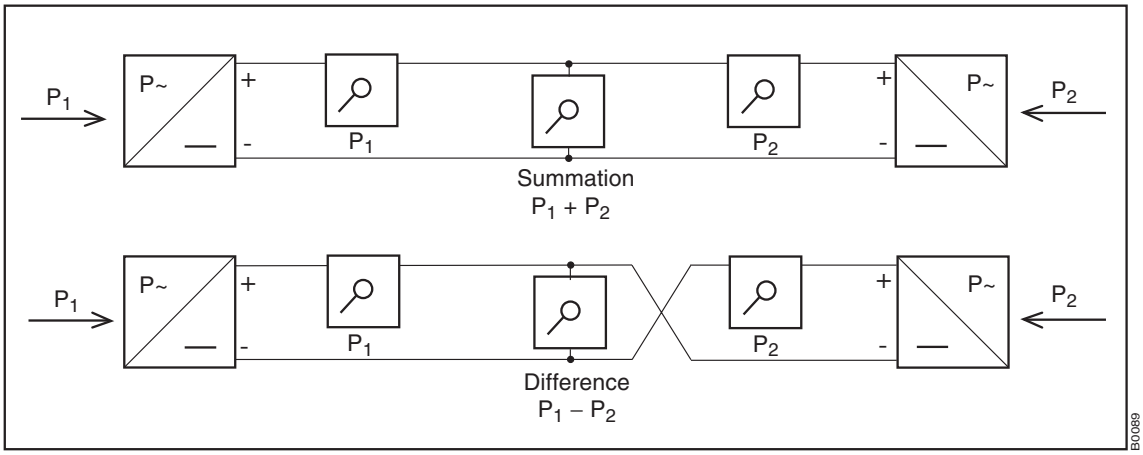



*Example: Connection to a computer.*

## Addition or subtraction of outputs

Summation or different measurements are made by connecting the outputs according to the figures below. This is possible because the outputs are potential free.

Cewe Instrument´s power transducers are adapted for both summation and different measurements. Other Cewe Instrumenttransducers can be used for summation measurements.



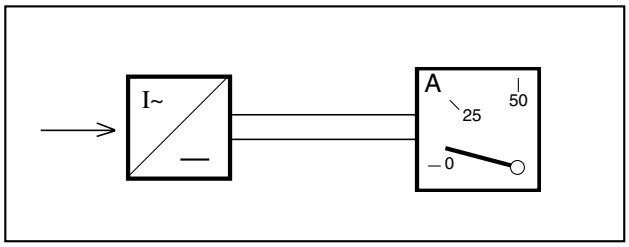

## Live-Zero output

Using a measuring transducer with a nominal output of 0 – 20 mA, there can be an uncertainty when the output is zero, whether the in-put quantity is zero or there is a faulty transformer, transducer or connector. To avoid this we produce transducers with a live zero out-put. This output is normally 4 – 20 mA for an input of 0 – 100 %. These live zero output transducers are frequently used in process technology, but could also be used in power distribution instrumentation.

## Transducer – Indicating instrument

As previosly mentioned the transducer output is a DC signal and from that follows that one or several moving-coil instruments often serve as the indicating part.

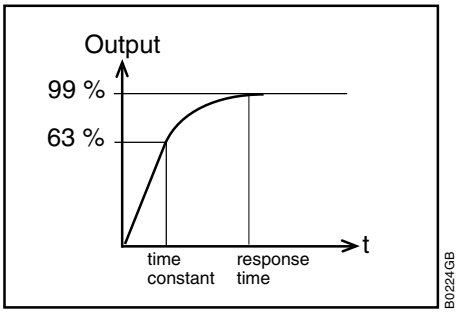
In power distribution technology moving-iron instruments are used for indication and measurements. The moving-iron is suppressed in the range 0 – 20 %, while it is practically linear from 20 to 100 %. If a good A.C. measurement in the range 0 – 20 % is needed, the combination transducer – moving-coil instrument is a suitable choice.




## Response time

The standard response time is 300 ms. A response time of 50 ms is available as an option. (Except for DF and DPF) Other response times on request.

In this catalogue the concept response time is used to characterize the time performance of the transducer. Time constant is often used in other cases. The diagram below makes clear the difference between response time and time constant.

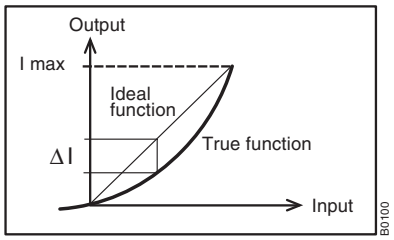



## Ripple

The maximum ripple on the output is < 1 % of the output signal (fs) for transducers in class 0.5. The max. ripple for transducers in class 0.2 is < 0,5 %.

## Linearity

A transducer is linear when the output is proportional to the input. A deviation from a linear function is called a non-linearity error and is expressed as a percentage of a range in our data sheets.




$$\text{Non linearity} = \frac{\Delta I_{out}}{I_{out}\ max} \times 100\ [\%]$$

## Auxiliary supply voltage

Cewe Instrument transducers – with some exceptions – are designed for 110 V A.C. or 230 V A.C. ±20 % auxiliary supply voltage. Further information on this can be found in the preamble of each transducer type description.

Cewe Instrument transducers are also manufactured with a switched power supply in two ranges; 18 – 80 V AC/DC and 80 – 276 V AC/DC, and as an option for 8 – 20 V DC. In case of auxiliary supply with a DC voltage the connection is unaffected by the polarity.

Types DU 120 and DI 120 do not require an auxiliary power supply.

## The accuracy class

Nominal accuracy class 0.5. Optional 0.2
Cewe Instrument transducers are calibrated to a nominal accuracy value with a maximum error of 0.1% for class 0.2 transducers, and 0.2% for class 0.5 transducers. The reference conditions are a power factor of 1.0.
Additional class number factors which influence the accuracy are:

### Auxiliary supply voltage variations

The auxiliary supply voltage can be varied within wide limits, without any appreciable affection of the measuring accuracy. Measurement error is less than 0,1 % of measuring range.

### Temperature variations

Cewe Instrument transducers are calibrated at an ambient temperature of +23°C. At other temperatures a temperature error has to be added. This error varies between different transducer types. The temperature dependence is separately given in each data sheet.

### Phase angle variations

The phase angle between the current and the voltage is of great importance when measuring the power. The additional error obtained when the phase angle varies is small and is expressed within the indicated class number as a % of the full output signal at ±90º. The values can be found in the product data sheet for the transducer concerned.

## Casing

The casing is made of self-extinguishing polycarbonate.

## Tropical design

In environments with a high temperature, high relative humidity and corrosive atmosphere the tropical design gives a good protection.

| Standard design | Tropical design |
|---|---|
| Relative humidity max 85% for max 60 days per year. Otherwise max 75% Year average max 65% | Relative humidity max 95% for max 30 days per year. Otherwise max 85% Year average max 75% |

## Mounting position

The measuring transducers can be mounted in any arbitrary position. The mounting position does not affect the measuring accuracy.

## Temperature range

Under general data for each transducer type, the three temperature ranges are given: working temperature -10 – +55°C, function temperature -20 – +65°C and storage temperature -65 – +80°C.

Working temperature range imply the temperature range within which the given data are valid.

Function temperature range imply the transducer functions within this range, but can show a somewhat higher temp. coefficient.

Storage temperature range imply that the transducer stands to be stored within this temperature interval witout being damaged.

## Mounting

The transducers are mounted easily and quickly on DIN rail type DIN EN 50022 35.

A plastic DIN rail, Art No. 4025, can be supplied for mounting single transducers. The rail can easily be cut to the correct length for the relevant case size. See page 59.

## Connections

The screw terminals are located on the front of the transducer and have a so-called self-opening washer, which facilitates assembly.

The terminals can accept a maximum conductor area of 2 x 2.5 $mm^2$. The transducers are always supplied with protection against accidental contact.

## Forms of enclosure (Protection degrees)

Case seal = IP 51

Terminal part = IP 20

## Standards

Cewe Instrument measurement transducers are tested according to the standards of the EMC Directive and according to IEC 255-5 and -6 (SS 436 1503 PL 4) “Interference environ-mental classes and test regulations for electronic apparatuses in control equipment for power stations”.

The transducers are manufactured to IEC 60688-2.2.

### EMC directives

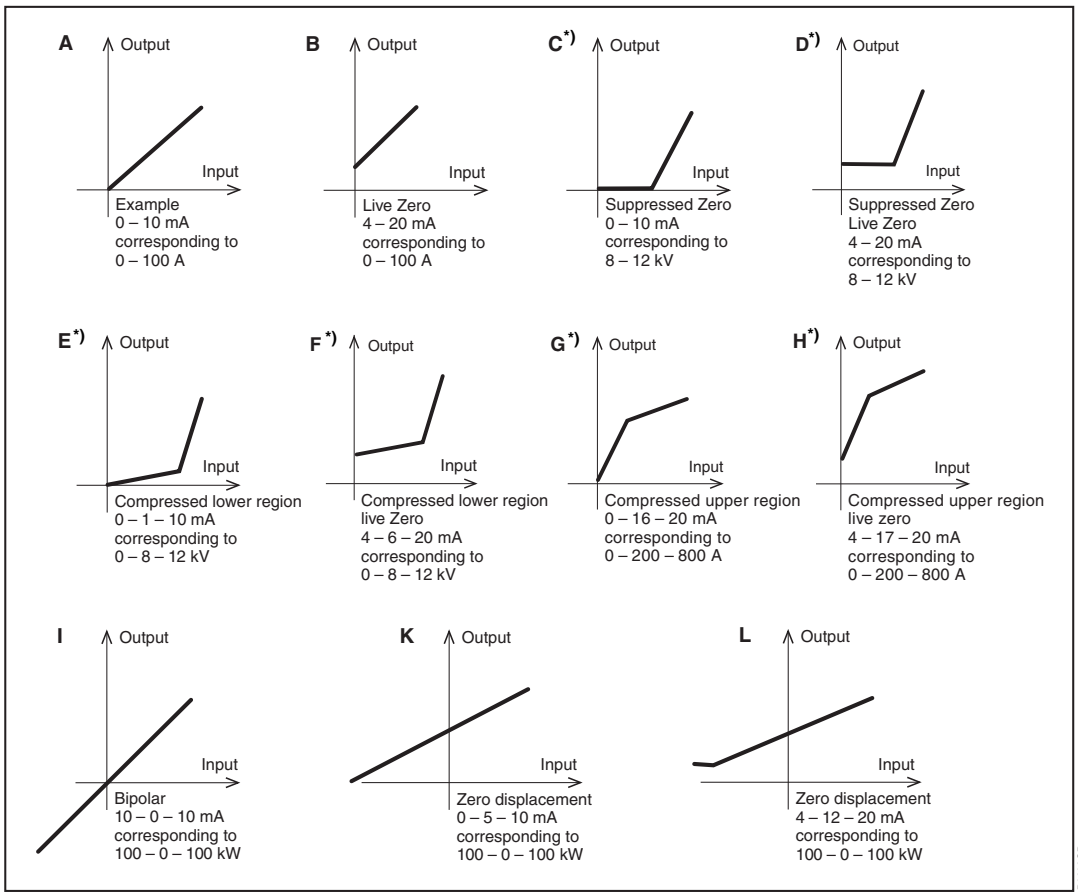
| | | |
|---|---|---|
| EN61000-6-3 | Emissions | light industry |
| EN61000-6-4 | Emissions | heavy industry |
| EN61000-6-1 | Immunity | light industry |
| EN61000-6-2 | Immunity | heavy industry |

### LVD directive

| | |
|---|---|
| EN61010-1 | Safety |
| IEC664-1 | Safety |

For all transducers that are connected to transformers, the secondary side of the transformer must be provided with a protective earth.

## Output signals




*) Normally the knee point should not be closer than 20 % to the end value.

The maximum load resistance (at current output) is calculated from the formula:

$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output; } [mA]}$$

# TRANSDUCERS DU FOR AC VOLTAGE

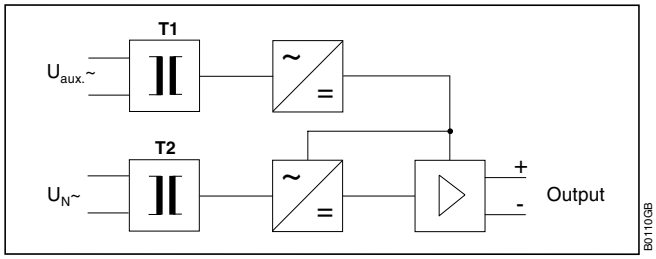
Transducers type DU transforms sinusoidal AC voltage to a proportional load independent DC signal. The input signal can be connected either directly to the transducer, or via a transformer (VT).

Transducer type DU 120 does not require auxiliary supply.

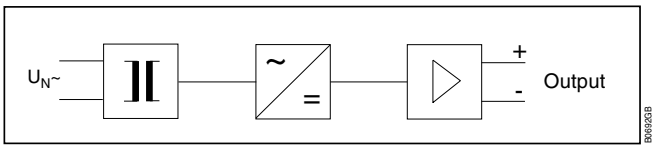
## Dimensions and weights

See page 58

**DU 121 to DU 125**




**DU 120**




## Output

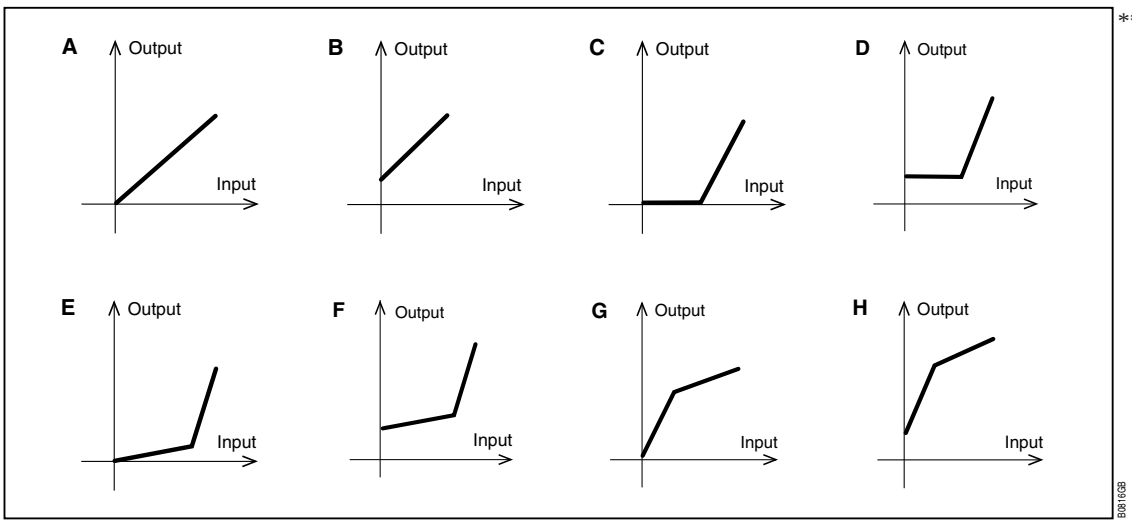
| Accuracy class | 0.5 | 0.2*) (Option) |
|---|---|---|
| Nominal accuracy | 0.2 | 0.1 |
| Non-linearity | < 0.2 % | < 0.1 % |
| Load dependence | < 0.05 % | < 0.05 % |
| Response time | < 300 ms | < 300 ms |
| Aux. supply dependence | < 0.1 % for $\Delta U_{aux.}$ ± 20 % | < 0.1 % for $\Delta U_{aux.}$ ± 20 % |
| Temperature coefficient | < 0.1 %/10°C | < 0.1 %/10°C |
| Max open circuit output voltage | 20 V | 20 V |
| Max output signal by overload*) | 125% | 125% |

*) Not DU 120

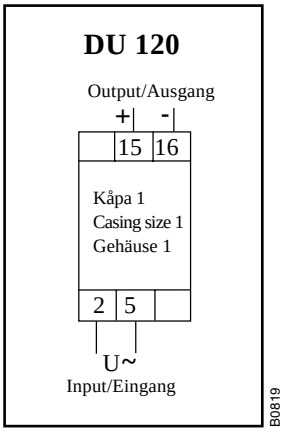
## General data

| | |
|---|---|
| Working temp. range | -10 – +55°C |
| Function temp. range | -20 – +65°C |
| Storage temp. range | -65 – +80°C |
| Test voltage | 3.7 kV at $U_N \leq 300$ V |
| | 5.55 kV at 300 V < $U_N \leq 600$ V |
| Overload | 1.2 x $U_N$ continuosly, varistor protection 1.5 x $U_N$ |

## Output signals**)




**) The availability of output signal per type, see page 13 and 14




*Connection*

## DU 120

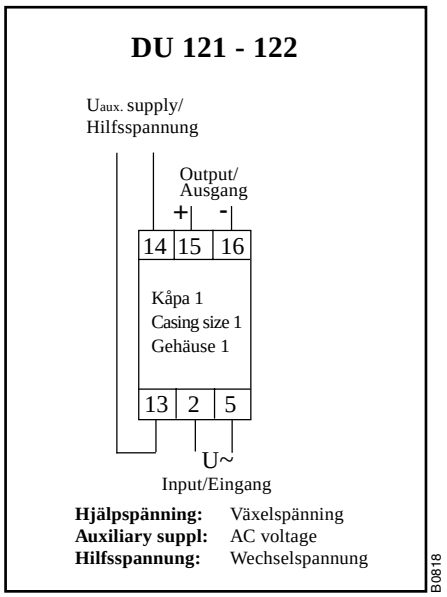
**Input**

| | |
|---|---|
| Input voltage ($U_N$) | 0 – 40…525 V [1] |
| Burden | < 1.2 VA |
| Frequency | 50, 60, 400 Hz |

**Does not require auxiliary supply.**

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A | 0 – 15 kΩ |
| 2.5 mA | A | 0 – 6.0 kΩ |
| 5 mA | A | 0 – 3.0 kΩ |
| 10 mA | A | 0 – 1.5 kΩ |
| 20 mA | A | 0 – 750 Ω |

[1] Other values on request.




*Connection*

## DU 121 to 122

**Input**

| | |
|---|---|
| Input voltage ($U_N$) | 0 – 40…600 V [1] |
| Burden | 1 mA x $U_N$ |
| Frequency | 16⅔, 50, 60, 400 Hz |

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, C, D | 0 – 15 kΩ |
| 2.5 mA | A, B, C, D | 0 – 6.0 kΩ |
| 5 mA | A, B, C, D | 0 – 3.0 kΩ |
| 10 mA | A, B, C, D | 0 – 1.5 kΩ |
| 20 mA | A, B, C, D | 0 – 750 Ω |
| 5 V | A, B, C, D | ≥ 2 kΩ |
| 10 V | A, B, C, D | ≥ 2 kΩ |

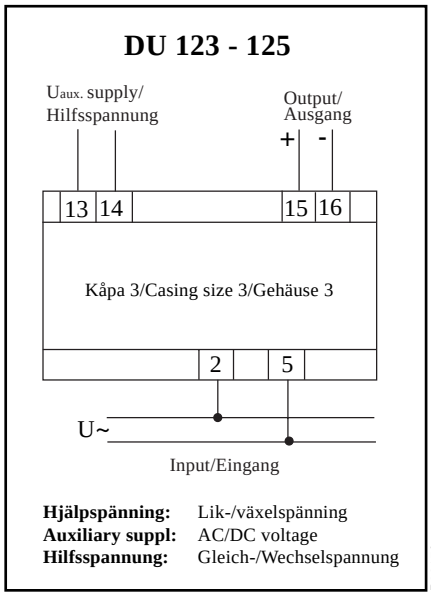
**Auxiliary voltage**

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 1 | 92 – 138 V AC | 45 – 65 Hz | 2 VA |
| 2 | 184 – 276 V AC | 45 – 65 Hz | 2 VA |

[1] Other values on request.

[2] Third digit in the type designition, shows type of auxiliary supply.

# TRANSDUCERS DU FOR AC VOLTAGE




*Connection*

## DU 123 to 125

**Input**

| | |
|---|---|
| Input voltage ($U_N$) | 0 – 40…600 V [1] |
| Burden | 1 mA x $U_N$ |
| Measuring range | 0.2 – 0.99 x $U_N$ |
| Frequency | 16²/₃, 50, 60, 400 Hz |

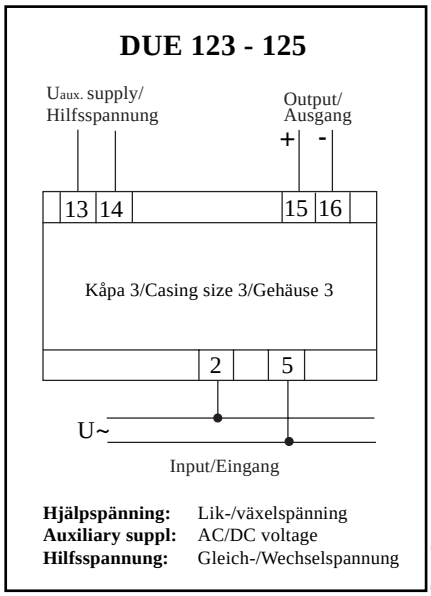
| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, C, D, E, F, G, H | 0 – 15 kΩ |
| 2.5 mA | A, B, C, D, E, F, G, H | 0 – 6.0 kΩ |
| 5 mA | A, B, C, D, E, F, G, H | 0 – 3.0 kΩ |
| 10 mA | A, B, C, D, E, F, G, H | 0 – 1.5 kΩ |
| 20 mA | A, B, C, D, E, F, G, H | 0 – 750 Ω |
| 5 V | A, B, C, D, E, F, G, H | ≥ 2 kΩ |
| 10 V | A, B, C, D, E, F, G, H | ≥ 2 kΩ |

**Auxiliary voltage**

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

[1] Other values on request.

[2] Third digit in the type designition, shows type of auxiliary supply.




*Connection*

## DUE 123 to 125, Earth leak

**Input**

| | |
|---|---|
| Input voltage ($U_N$) | 0 – 40…600 V [1] |
| Burden | 1 mA x $U_N$ |
| Measuring range | 0.2 – 0.99 x $U_N$ |
| Frequency | 16²/₃, 50, 60, 400 Hz |

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B | 0 – 15 kΩ |
| 2.5 mA | A, B | 0 – 6.0 kΩ |
| 5 mA | A, B | 0 – 3.0 kΩ |
| 10 mA | A, B | 0 – 1.5 kΩ |
| 20 mA | A, B | 0 – 750 Ω |
| 5 V | A, B | ≥ 2 kΩ |
| 10 V | A, B | ≥ 2 kΩ |

**Auxiliary voltage**

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

[1] Other values on request.

[2] Third digit in the type designition, shows type of auxiliary supply.

## Ordering form DU

| DU (Voltage AC) | | Default | Example 1 | Example 2 |
|---|---|---|---|---|
| Type: | | | DU 122 | DU 122 |
| Accuracy: | | cl. 0.5 | 0.5 | 0.5 |
| Transf. ratio voltage: | | | 11000/110 V | 11000/110 V |
| Frequency: | | 50 Hz | 50 Hz | 50 Hz |
| Measuring range: | | | 0-13,2 kV | 0-8-12 kV |
| Input signal: | | | 0-132 V | 0-88-132 V |
| Output: | | | 4-20 mA | 0-1-10 mA |
| Output curve: | | | B | E |
| Response time: | | 300 ms | 300 ms | 300 ms |
| Auxiliary supply: | | | 184-276 V AC | 184-276 V AC |

# TRANSDUCERS DI FOR AC CURRENT

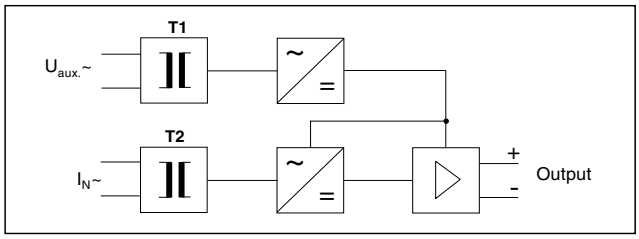
Transducers type DI transform sinusoidal AC current to a proportional load independent DC signal. The input signal can be connected either directly to the transducer, or via a transformer.

Transducer DI 11 does not require auxiliary supply.

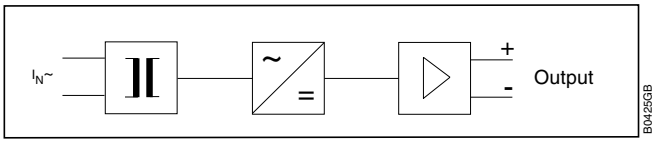
## Dimensions and weights

See page 58

**DI 121 to DI 125**




**DI 120**




## Output

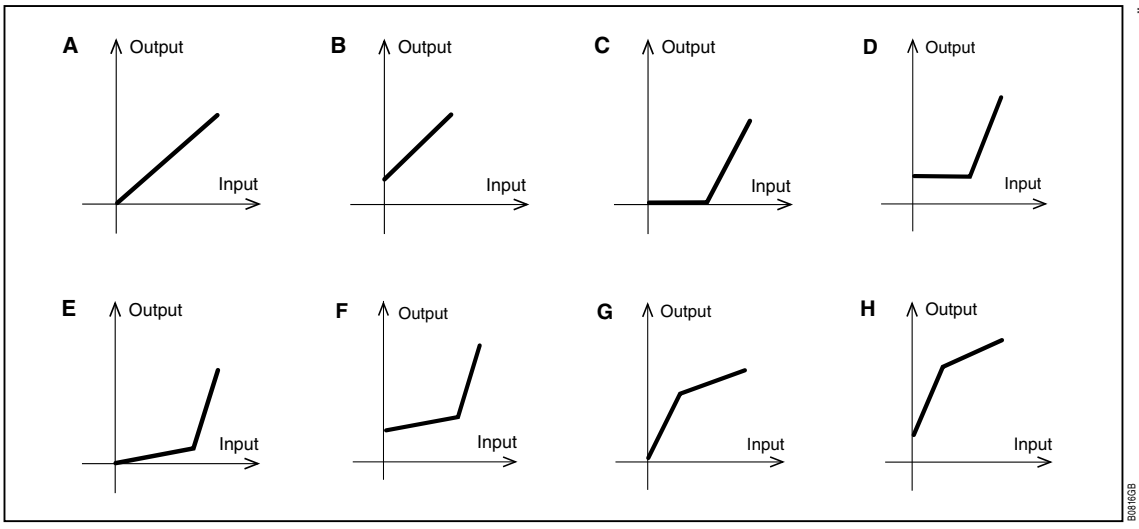
| **Accuracy class** | **0.5** | **0.2*) (Option)** |
|---|---|---|
| Nominal accuracy | 0.2 | 0.1 |
| Non-linearity | < 0.2 % | < 0.1 % |
| Load dependence | < 0.05 % | < 0.05 % |
| Response time | < 300 ms | < 300 ms |
| Aux. supply dependence | < 0.1 % for $\Delta U_{aux.}$ ± 20 % | < 0.1 % for $\Delta U_{aux.}$ ± 20 % |
| Temperature coefficient | < 0.1 %/10°C | < 0.1 %/10°C |
| Max open circuit output voltage | 20 V | 20 V |
| Max output signal by overload*) | 125% | 125% |

*) Not DI 120

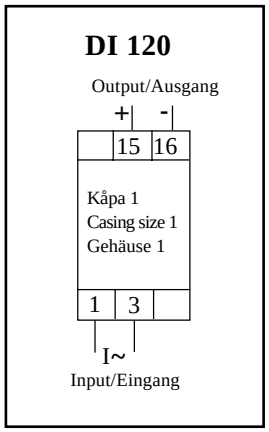
## General data

| | |
|---|---|
| Working temp. range | -10 – +55°C |
| Function temp. range | -20 – +65°C |
| Storage temp. range | -65 – +80°C |
| Test voltage | 3,7 kV Standard ($U_N \leq 300$ V), 5,55 kV, Option (300 V < $U_N \leq 600$ V) |
| Overload | 2 x $I_N$ continuosly, 10 x $I_N$ during 10 s, 40 x $I_N$ during 1 s |

## Output signals**)




**) The availability of output signal per type, see page 17 and 18




*Connection*

## DI 120

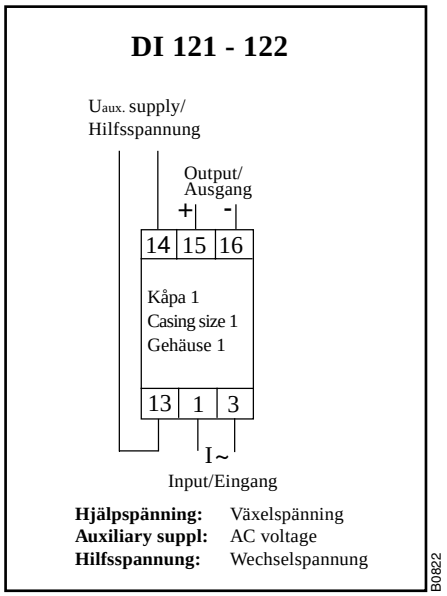
**Input**

| | |
|---|---|
| Input current ($I_N$) | 1.0, 1.2, 5.0, 6.0 A [1)] |
| Burden | < 0,25 to < 1.2 VA |
| Frequency | 50, 60, 400 Hz |

**Does not require auxiliary supply.**

| Output rated value [1)] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A | 0 – 15 kΩ |
| 2.5 mA | A | 0 – 6.0 kΩ |
| 5 mA | A | 0 – 3.0 kΩ |
| 10 mA | A | 0 – 1.5 kΩ |
| 20 mA | A | 0 – 750 Ω |

1) Other values on request.




*Connection*

## DI 121 to 122

**Input**

| | |
|---|---|
| Input current ($I_N$) | 1.0, 1.2, 2.0, 2.4, 5.0, 6.0 A [1)] |
| Burden | < 0.04 to < 0.2 VA |
| Frequency | 16⅔, 50, 60, 400 Hz |

| Output rated value [1)] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, C, D | 0 – 15 kΩ |
| 2.5 mA | A, B, C, D | 0 – 6.0 kΩ |
| 5 mA | A, B, C, D | 0 – 3.0 kΩ |
| 10 mA | A, B, C, D | 0 – 1.5 kΩ |
| 20 mA | A, B, C, D | 0 – 750 Ω |
| 5 V | A, B, C, D | ≥ 2 kΩ |
| 10 V | A, B, C, D | ≥ 2 kΩ |

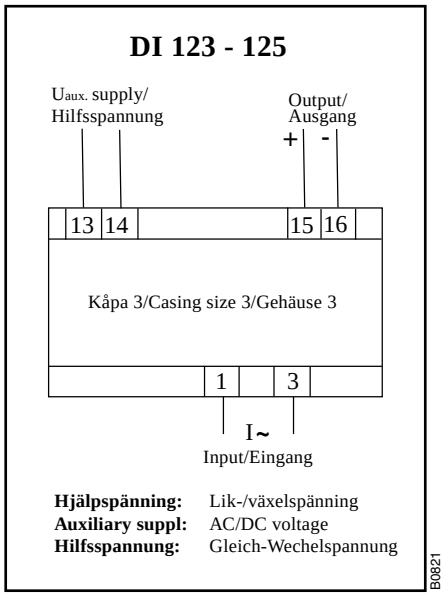
**Auxiliary voltage**

| Unit [2)] | Voltage | Frequency | Burden |
|---|---|---|---|
| 1 | 92 – 138 V AC | 45 – 65 Hz | 2 VA |
| 2 | 184 – 276 V AC | 45 – 65 Hz | 2 VA |

1) Other values on request.

2) Third digit in the type designition, shows type of auxiliary supply.

# TRANSDUCERS DI FOR AC CURRENT




*Connection*

## DI 123 to 125

**Input**

| | |
|---|---|
| Input current ($I_N$) | 1.0, 1.2, 2.0, 2.4, 5.0, 6.0 A [1] |
| Burden | < 0.04 to < 0.2 VA |
| Frequency | 16⅔, 50, 60, 400 Hz |

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, C, D, E, F, G, H | 0 – 15 kΩ |
| 2.5 mA | A, B, C, D, E, F, G, H | 0 – 6.0 kΩ |
| 5 mA | A, B, C, D, E, F, G, H | 0 – 3.0 kΩ |
| 10 mA | A, B, C, D, E, F, G, H | 0 – 1.5 kΩ |
| 20 mA | A, B, C, D, E, F, G, H | 0 – 750 Ω |
| 5 V | A, B, C, D, E, F, G, H | ≥ 2 kΩ |
| 10 V | A, B, C, D, E, F, G, H | ≥ 2 kΩ |

**Auxiliary voltage**

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

[1] Other values on request.

[2] Third digit in the type designition, shows type of auxiliary supply.

## Ordering form DI

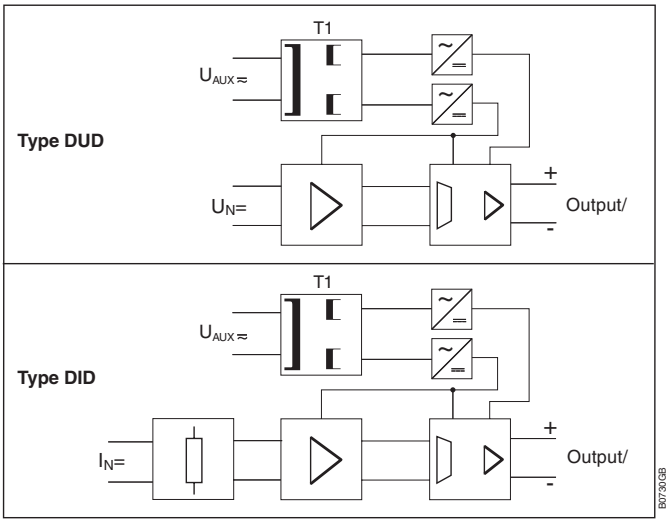
| DI (Current AC) | | Default | Example 1 | Example 2 |
|---|---|---|---|---|
| **Type:** | | | **DI 125** | **DI 120** |
| **Accuracy:** | | **cl. 0.5** | **0.5** | **0.5** |
| **Transf. ratio current:** | | | **100/5 A** | **100/5 A** |
| **Frequency:** | | **50 Hz** | **50 Hz** | **50 Hz** |
| **Measuring range:** | | | **0-120 A** | **0-120 A** |
| **Input signal:** | | | **0-6 A** | **0-6 A** |
| **Output:** | | | **4-20 mA** | **0-20 mA** |
| **Output curve:** | | | **B** | **A** |
| **Response time:** | | **300 ms** | **300 ms** | **300 ms** |
| **Auxiliary supply:** | | | **80-276 V AC/DC** | ——— |

# TRANSDUCERS DUD FOR DC VOLTAGE AND DID FOR DC CURRENT

Transducers type DUD and DID are used to measure DC voltage and DC current that are converted into a proportional load-independent galvanic isolated DC voltage or DC current signal.

## Dimensions and weights

See page 58



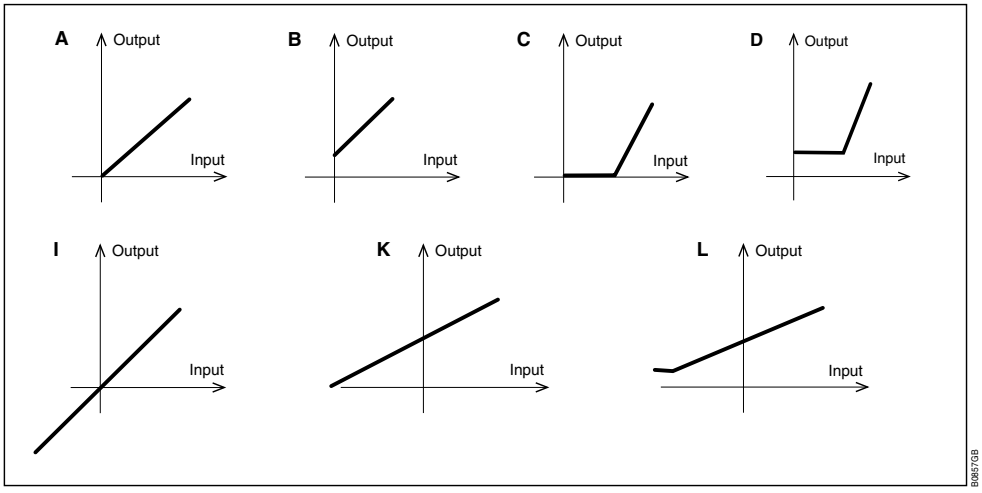

## Output data

| Accuracy class | 0.5 | 0.2 (Option) |
|---|---|---|
| Linearity error | < 0.2 % | <0.1 % |
| Load-dependence | <0.05 % | <0.05 % |
| Response time (0-99%) | 50 – 100 ms | 50 – 100 ms |
| Auxiliary voltage dependence | < 0.1 % | < 0.1 % |
| Temperature dependence | < 0.1 %/10 °C | < 0.06 %/10 °C |
| Max voltage with open output | 20 V | 20 V |
| Max output signal with over-driven input signal | ≤125 % | ≤125 % |
| Ripple (peak-to-peak) | <1.0 % | <0.5 % |

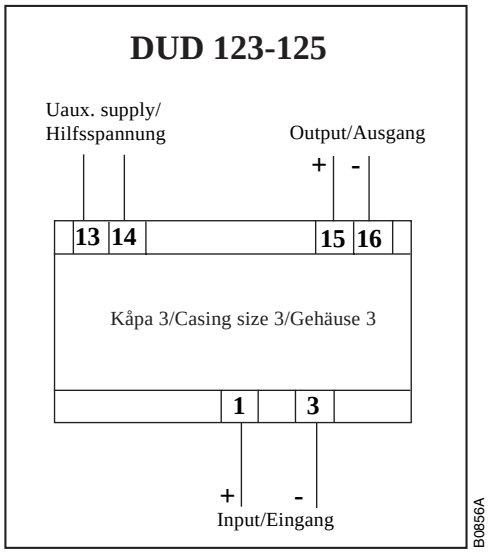
## General data

| | |
|---|---|
| Working temp. range | -10 – +55 °C |
| Function temp. range | -20 – +65 °C |
| Storage temp. range | -65 – +80 °C |
| Test voltage | 5.55 kV, 50 Hz |

## Output signals



# TRANSDUCERS DUD FOR DC VOLTAGE AND DID FOR DC CURRENT




*Connection*

## DUD 123 to 125, DC voltage

**Input data**

Measured voltage ($U_N$) 0 – 60 mV.....0 – 600 V
Input resistance 40 kΩ/V measuring range 0 – 0,5 V
10 kΩ/V measuring range 0 – 600 V

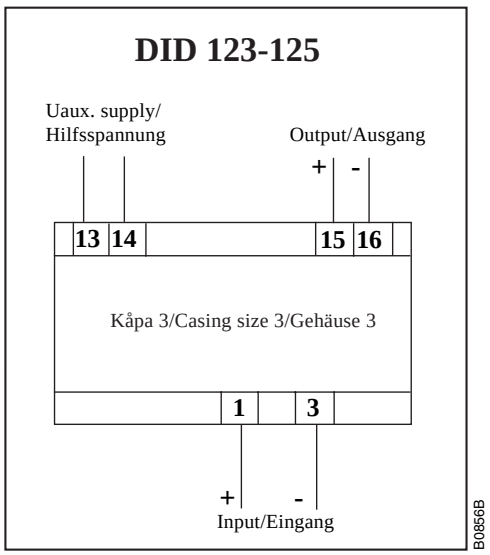
| Output signal [1] | Curve | Load resistance $R_L$ |
|---|---|---|
| 0 – 1 mA | A, B, C, D, I, K, L | 0 – 15 kΩ |
| 0 – 2 mA | A, B, C, D, I, K, L | 0 – 7.5 kΩ |
| 0 – 2,5 mA | A, B, C, D, I, K, L | 0 – 6.0 kΩ |
| 0 – 5 mA | A, B, C, D, I, K, L | 0 – 3.0 kΩ |
| 0 – 10 mA | A, B, C, D, I, K, L | 0 – 1,5 kΩ |
| 0 – 20 mA | A, B, C, D, I, K, L | 0 – 750 Ω |
| 4 – 20 mA | A, B, C, D, I, K, L | 0 – 750 Ω |
| 0 – 1 V | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 0 – 2 V | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 0 – 5 V | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 0 – 10 V | A, B, C, D, I, K, L | ≥ 2 kΩ |

**Auxiliary voltage**

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

1) Other values on request.

2) Third digit in the type designition, shows type of auxiliary supply.




*Connection*

## DID 123 to 125, DC current

**Input data**

Measuring current ($I_N$) 0 – 1 mA.....0 – 200 mA
Shunt voltage max 0,15 V

| Output signal [1] | Curve | Load resistance $R_L$ |
|---|---|---|
| 0 – 1 mA | A, B, C, D, I, K, L | 0 – 15 kΩ |
| 0 – 2 mA | A, B, C, D, I, K, L | 0 – 7.5 kΩ |
| 0 – 2,5 mA | A, B, C, D, I, K, L | 0 – 6.0 kΩ |
| 0 – 5 mA | A, B, C, D, I, K, L | 0 – 3.0 kΩ |
| 0 – 10 mA | A, B, C, D, I, K, L | 0 – 1,5 kΩ |
| 0 – 20 mA | A, B, C, D, I, K, L | 0 – 750 Ω |
| 4 – 20 mA | A, B, C, D, I, K, L | 0 – 750 Ω |
| 0 – 1 V | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 0 – 2 V | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 0 – 5 V | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 0 – 10 V | A, B, C, D, I, K, L | ≥ 2 kΩ |

**Auxiliary voltage**

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

1) Other values on request.

2) Third digit in the type designition, shows type of auxiliary supply.

## Ordering form DUD

| DUD (Voltage DC) | | Default | Example |
|---|---|---|---|
| Type: | | | DUD 125 |
| Accuracy: | | cl. 0.5 | 0.5 |
| Input signal: | | | 0-60 mV |
| Output: | | | 0-20 mA |
| Output curve: | | | A |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 80-276 V AC/DC |

## Ordering form DID

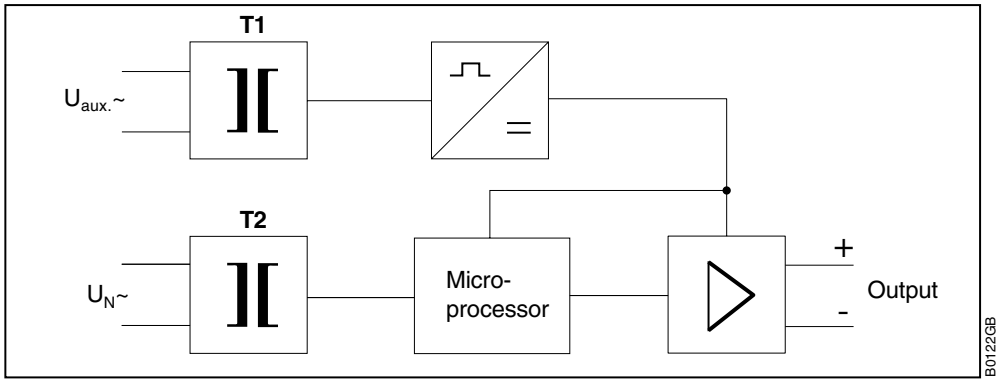
| DID (Current DC) | | Default | Example |
|---|---|---|---|
| Type: | | | DID 124 |
| Accuracy: | | cl. 0.5 | 0.5 |
| Input signal: | | | 4-20 mA |
| Output: | | | 4-20 mA |
| Output curve: | | | B |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 18-80 V AC/DC |

# TRANSDUCERS DF FOR FREQUENCY

Transducers type DF are used for the measurement of the frequency of an AC voltage and transforms it into a proportionally load independent DC signal. The input can be connected directly or via a transformer.

## Dimensions and weights

See page 58



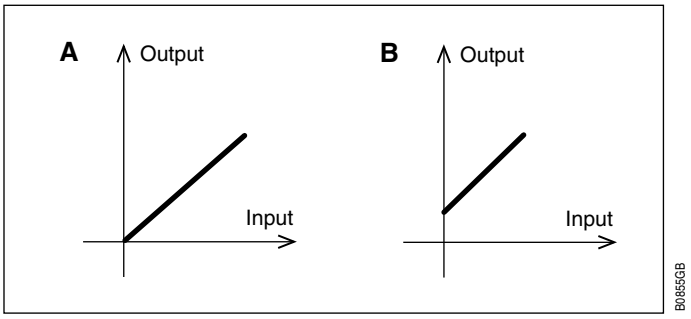

## Output

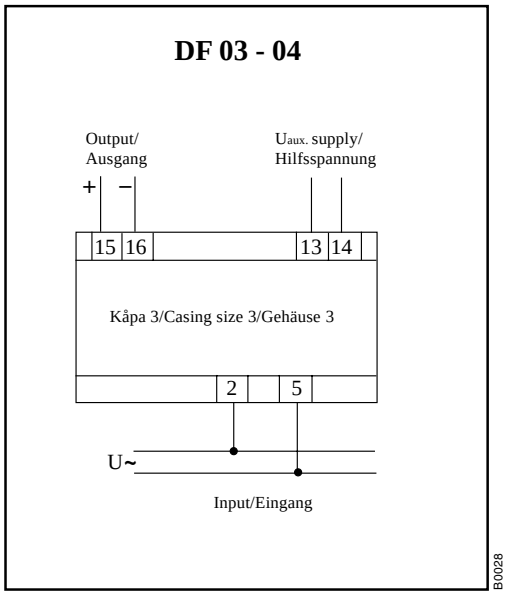
| | |
|---|---|
| Accuracy class | 0.1 |
| Non-linearity | < 0.05 % |
| Load dependence | < 0.05 % (within load limits) |
| Response time | < 300 ms |
| Aux. supply dependence | < 0.1 % for $U_{aux.}$ ± 20 % |
| Temperature coefficient | < 0.2 %/ 10°C |
| Max open circuit output voltage | 20 V |

## General data

| | |
|---|---|
| Working temp. range | -10 – +55°C |
| Function temp. range | -20 – +65°C |
| Storage temp. range | -65 – +80°C |
| Test voltage | 2 kV, 50 Hz |
| Overload | Max 540 V (varistor protection) |

## Output signals






*Connection*

## DF 03, 04

**Input**

| | |
|---|---|
| Input voltage ($U_N$) | 60…500 V |
| Working range | (40 – 120) x $U_N$ |
| Burden | ≤ 0,6 mA x $U_N$ |
| Measuring range | ± 10% – ± 50% $U_N$ |

**Auxiliary supply**

| | |
|---|---|
| Voltage | 88 – 264 V AC/DC |
| Burden | < 2.0 VA/<3.0 W |
| Voltage | 19 – 58 V AC/DC |
| Burden | < 2.0 VA/< 3.0 W |

**Measuring range**

45 – 55 Hz

48 – 52 Hz

55 – 65 Hz

58 – 62 Hz

| Output signal [1] | Curve | Load resistance $R_L$ | Type |
|---|---|---|---|
| 0 – 10 mA | A | 0 – 1.5 kΩ | DF 03 |
| 0 – 20 mA | A | 0 – 750 Ω | DF 03 |
| 4 – 20 mA | B | 0 – 750 Ω | DF 04 |
| 0 – 10 V | A | ≥ 2 kΩ | DF 03 |

[1] Other values on request.

## Ordering form DF

| DF (Frequency) | | Default | Example |
|---|---|---|---|
| **Type:** | | | **DF 03** |
| **Accuracy:** | | **cl. 0.1** | **0.1** |
| **Measuring range:** | | | **48-52 Hz** |
| **Voltage:** | | | **110 V** |
| **Output:** | | | **0-10 mA** |
| **Output curve:** | | | **A** |
| **Auxiliary supply:** | | | **110 V DC** |

# TRANSDUCERS DPF FOR POWER FACTOR

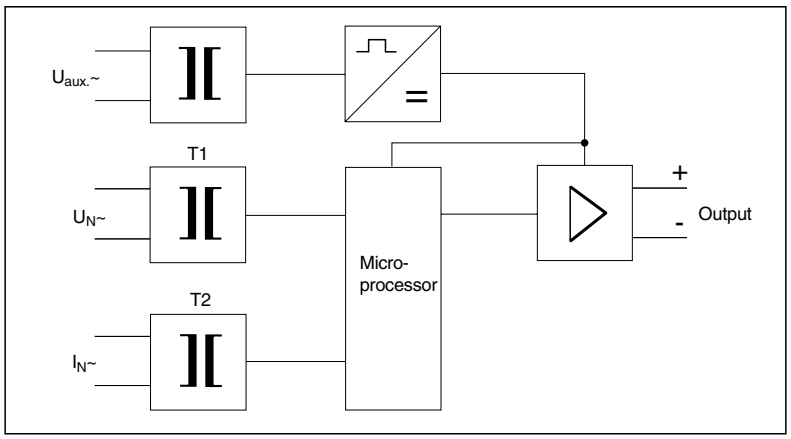
Transducers type DPF are connected to 3-phase, 3-wire symmetric load for the measurement of power factor, which value is transformed to a proportionally load independent output signal.

Input voltage and input current can be connected either directly or via transformers.

The transducer type DPF requires separate auxiliary supply. If required, the measuring voltage can also be used as auxiliary supply under condition that this lies within the given tolerance.

## Dimensions and weights

See page 58



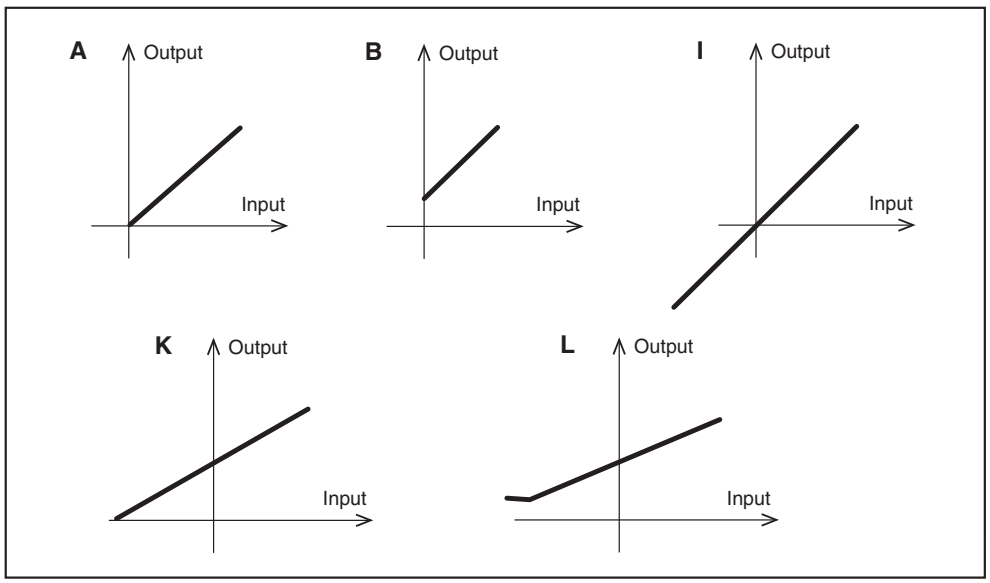

## Output

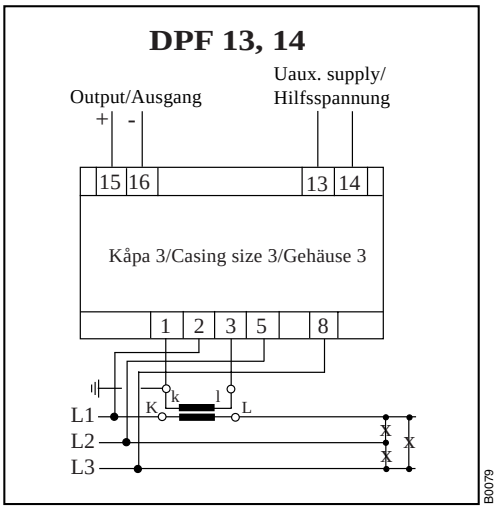
| | |
|---|---|
| Accuracy class | 0.5 |
| Non-linearity | < 0.1 % |
| Load dependence | < 0.05 % (within bad limits) |
| Response time | < 300 ms |
| Aux. supply dependence | < 0.1 % for $U_{aux.}$ ± 20 % |
| Temperature coefficient | < 0.2 %/10°C |
| Max open circuit output voltage | 20 V |

## General data

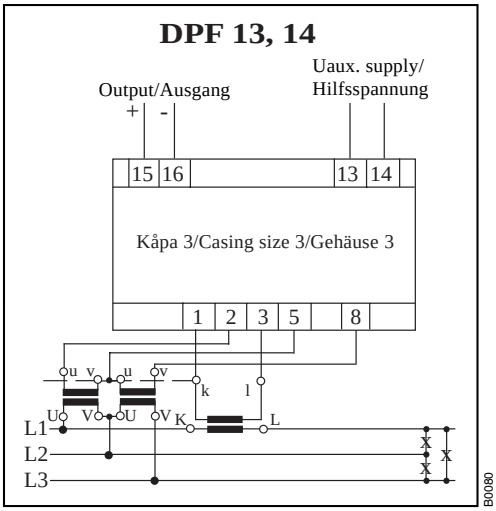
| | |
|---|---|
| Working temp. range | -10 – +55°C |
| Function temp. range | -20 – +65°C |
| Storage temp. range | -65 – +80°C |
| Test voltage | 2 kV, 50 Hz |
| Overboad | Max 540 V (varistor protection) |

## Output signals






*Connection*




*Connection*

## DPF 13, 14

### Input

| | |
|---|---|
| Input voltage ($U_N$) | 110.. .500 V (40-120%) |
| Working range | (40 – 120%) x $U_N$ |
| Burden | <0.6 mA per phase x $U_N$ |
| lnput current($I_N$) | 1, 2, 5 A |
| Working range | (10 – 130%) x $U_N$ |
| Burden | < 0.2 VA per phase |

### Auxiliary supply

| | |
|---|---|
| Voltage | 88 – 264 V AC/DC |
| Burden | < 2.0 VA/<3.0 W |
| Voltage | 19 – 58 V AC/DC |
| Burden | < 2.0 VA/< 3.0 W |

### Measuring range

**Cos φ**

Cap 0.5 – 1 – 0.5 Ind
Cap 0.8 – 1 – 0.8 Ind
Cap 0.5 – 1
Cap 0.8 – 1
1 – 0.5 Ind
1 – 0.8 Ind

| Output signal [1] | Curve | Load resistance $R_L$ | Type |
|---|---|---|---|
| 0 – ±10 mA | A, B, I, K | 0 – 1.5 kΩ | DPF 13 |
| 0 – ±20 mA | A, B, I, K | 0 – 750 Ω | DPF 13 |
| 4 – 20 mA | A, B, I, K, L | 0 – 750 Ω | DPF 14 |
| 0 – ±10 V | A, B, I, K | ≥ 2 kΩ | DPF 13 |

[1] Other values on request.

## Ordering form DPF

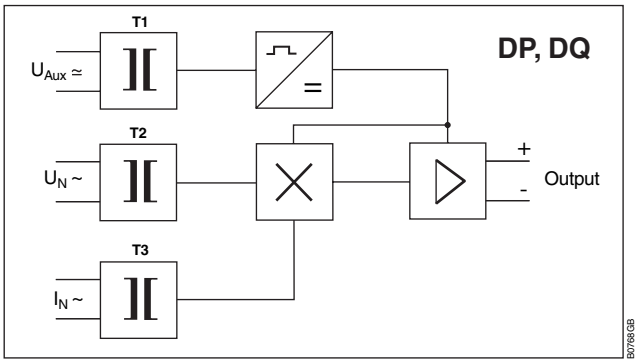
| DPF (Power factor) | | Default | Example |
|---|---|---|---|
| **Type:** | | | **DPF 13** |
| **Accuracy:** | | **cl. 0.5** | **0.5** |
| **Voltage:** | | | **110 V** |
| **Current:** | | | **5 A** |
| **Frequency:** | | **50 Hz** | **50 Hz** |
| **Measuring range:** | | | **0.5-1-0.5 cos phi** |
| **Output:** | | | **10-0-10 mA** |
| **Output curve:** | | | **I** |
| **Auxiliary supply:** | | | **230 V AC** |

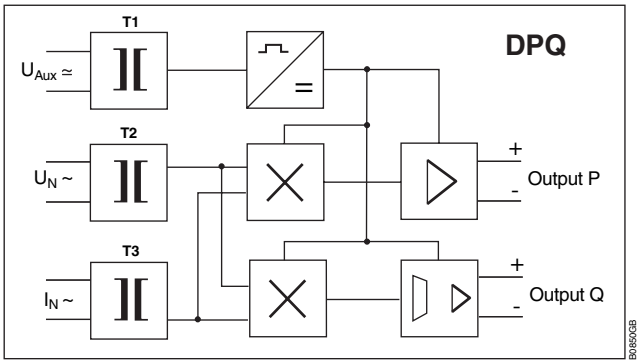
# TRANSDUCERS DP, DQ AND DPQ FOR ACTIVE AND REACTIVE POWER

Transducer type DP, DQ and DPQ measures the active (P) and reactive (Q) A.C.-power and converts these into proportional load-independent DC current signals. The measurement principle for multiplication of the current and the voltage is based on the TDM (Time-Division-Multiplication) method. The measurement principle also takes account of the curve form error and the phase angle difference ($\Delta\varphi = 0 – 360°$) between the current and the voltage and gives the true power value (true RMS) as its result. In transducer DPQ the signal outputs (P) and (Q) are galvanically separated from one another.

The measurement voltage and measurement current can be connected directly to the transducer or via measurement transformers. The permitted value for the scale factor shall lie within the range 0.3 – 1.8 and shall be defined by the scale factor formula. The current may not exceed 10 A.

$$\text{Scale factor} = \frac{\text{Measuring range [W or Var]}}{\text{Nominal apparent power [VA]}} \quad \text{(Normally 0.3 – 1.8)}$$




*Fundamental circuit*

## General data

| | |
|---|---|
| Working temp. range | -10 – +55°C |
| Function temp. range | -20 – +65°C |
| Storage temp. range | -65 – +80°C |
| Test voltage | 5.55 kV, 50 Hz (measurement input – signal/outputs) |
| | 3.7 kV, 50 Hz (auxiliary voltage input – signal/outputs) |
| | 1.5 kV, 50 Hz (signal output (P) – signal output (Q) |
| Overload | 1.2 x $U_N$ continuous, varistor protection 1.5 x $U_N$ |
| | 2 x $I_N$ continuous, 10 x $I_N$ during 10 s, 40 x $I_N$ during 1 s |

## Dimensions and weights

See page 58

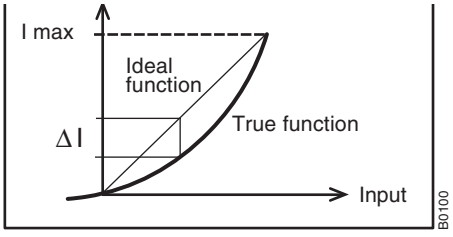
## Output data

| **Accuracy class** | **0.5** | **0.2 (option)** |
|---|---|---|
| Nominal accuracy | 0.2 | 0.1 |
| Linearity error | < 0.2 % | < 0.1 % |
| Load-dependence | < 0,05 % | < 0,05 % |
| Response time ($T_{99}$) | < 300 ms | < 300 ms |
| Auxiliary voltage dependence | < 0.1 % | < 0.1 % |
| Temperature dependence | < 0.2 %/10°C | < 0.2 %/10°C |
| Max voltage with open output | 20 V | 20 V |
| Max output signal with over-driven Input signal | ≤125% | ≤125% |

## Linearity

A transducer is linear when the output is proportional to the input. A deviation from a linear function is called a non-linearity error and is expressed as a percentage of a range in our data sheets.

$$\text{Non linearity} = \frac{\Delta I_{out}}{I_{out}\ max} \times 100\ [\%]$$



## Product range summary

The models of measuring transducers available for measuring the active power are shown in the table. Configuration of the measuring transducer with regard to the output rated value and the desired functional curve are shown in the tables and diagram on page 28 – 34.

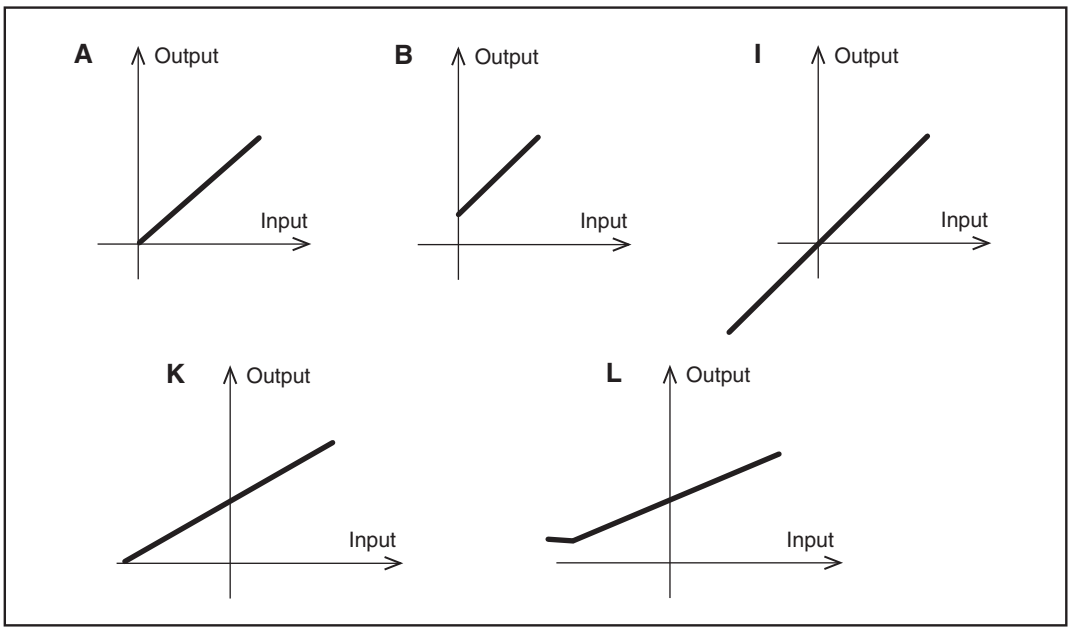
| Designition | Number of mesuring elements | System | Auxiliary supply | Casing size |
|---|---|---|---|---|
| DP 123 | 1 | 1E, 1.phase/2-wire, (ph/n) | 8 – 20 V (40 V) DC | 3 |
| DP 124 | 1 | 1E, 1.phase/2-wire, (ph/n) | 18 – 80 V AC/DC | 3 |
| DP 125 | 1 | 1E, 1.phase/2-wire, (ph/n) | 80 – 276 V AC/DC | 3 |
| DP 133 | 1 | 1E, 3-wire, balanced load | 8 – 20 V (40 V) DC | 3 |
| DP 134 | 1 | 1E, 3-wire, balanced load | 18 – 80 V AC/DC | 3 |
| DP 135 | 1 | 1E, 3-wire, balanced load | 80 – 276 V AC/DC | 3 |
| DP 143 | 1 | 1E, 4-wire, (ph/n), balanced load | 8 – 20 V (40 V) DC | 3 |
| DP 144 | 1 | 1E, 4-wire, (ph/n), balanced load | 18 – 80 V AC/DC | 3 |
| DP 145 | 1 | 1E, 4-wire, (ph/n), balanced load | 80 – 276 V AC/DC | 3 |
| DP 233 | 2 | 2E, 3-wire, unbalanced load | 8 – 20 V (40 V) DC | 3 |
| DP 234 | 2 | 2E, 3-wire, unbalanced load | 18 – 80 V AC/DC | 3 |
| DP 235 | 2 | 2E, 3-wire, unbalanced load | 80 – 276 V AC/DC | 3 |
| DP 333 | 3 | 3E, 3-wire or 4-wire | 8 – 20 V (40 V) DC | 4 |
| DP 334 | 3 | 3E, 3-wire or 4-wire | 18 – 80 V AC/DC | 4 |
| DP 335 | 3 | 3E, 3-wire or 4-wire | 80 – 276 V AC/DC | 4 |
| DP 343 | 3 | 3E, 4-wire, unbalanced load | 8 – 20 V (40 V) DC | 4 |
| DP 344 | 3 | 3E, 4-wire, unbalanced load | 18 – 80 V AC/DC | 4 |
| DP 345 | 3 | 3E, 4-wire, unbalanced load | 80 – 276 V AC/DC | 4 |

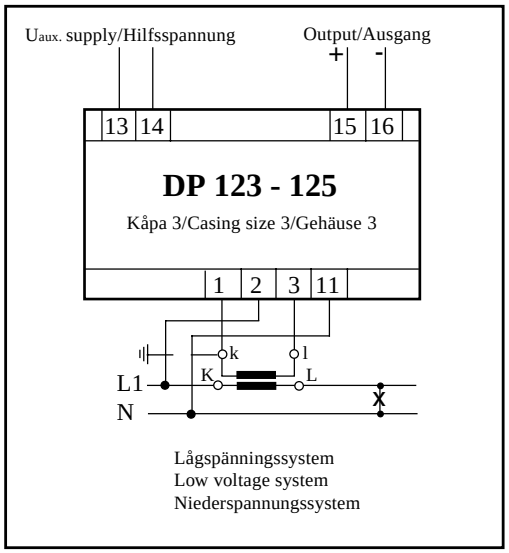
**Auxiliary voltage**

| Unit*) | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

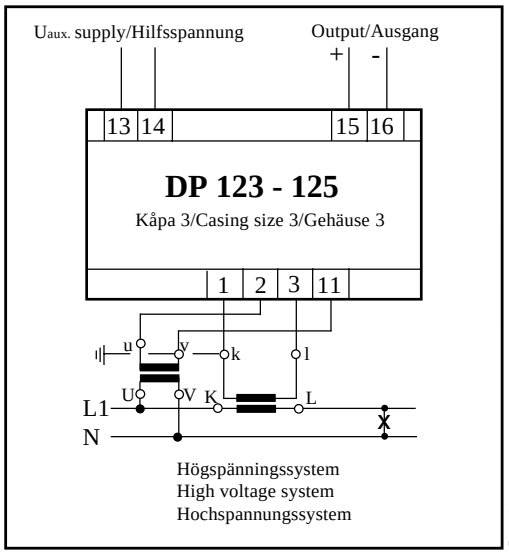
*) Third digit in the type designition, shows type of auxiliary supply.

## Output signals






*Connection*




*Connection*

## DP 123 to 125

**Input data**

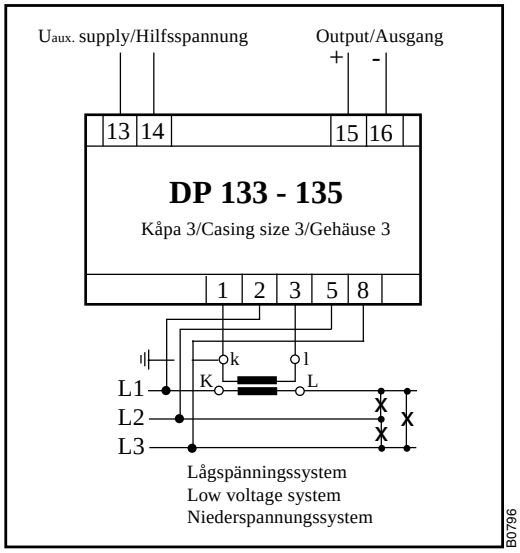
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

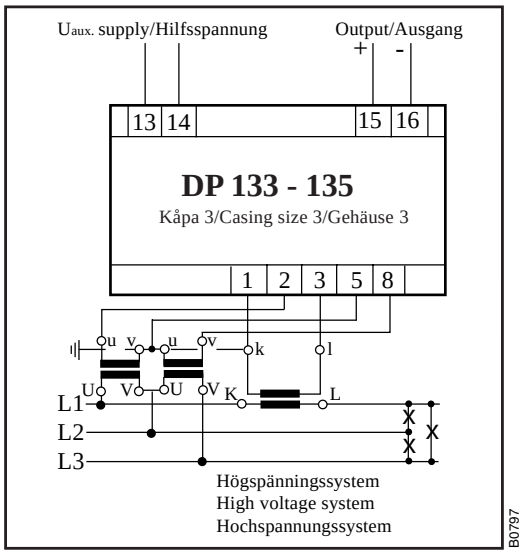
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DP 133 to 135

**Input data**

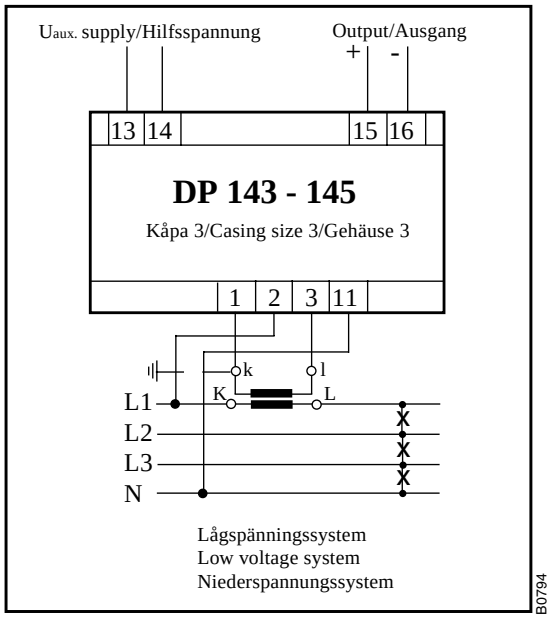
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | $16^2/_3$, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

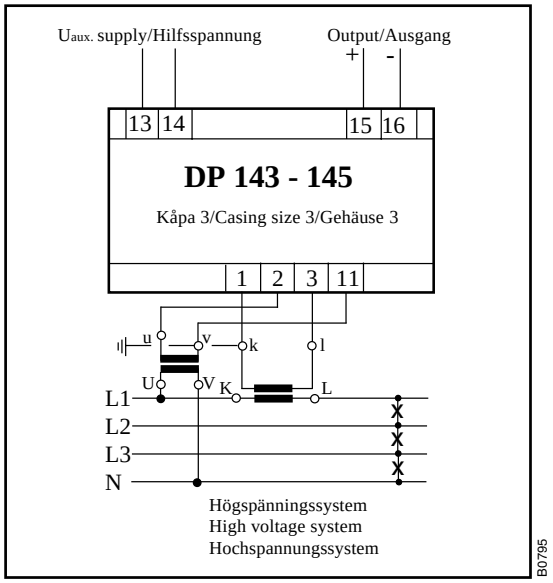
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DP 143 to 145

**Input data**

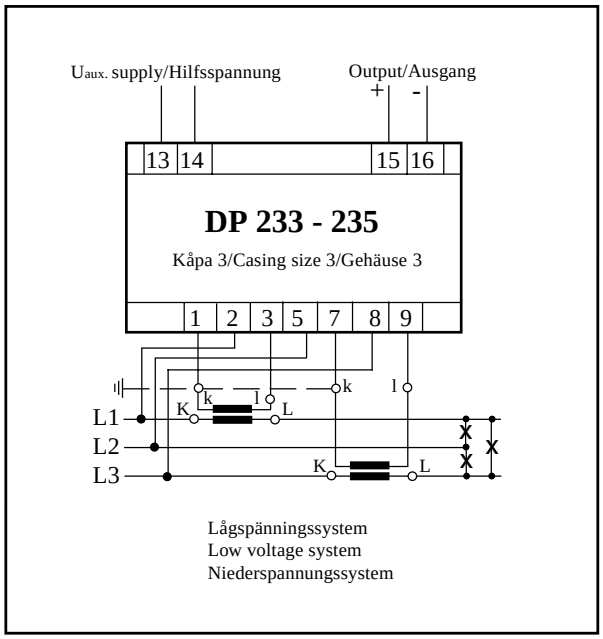
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

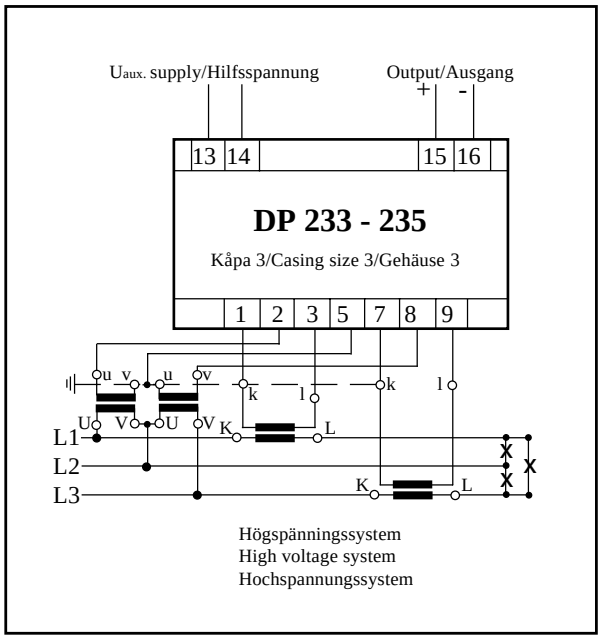
$$R_L \text{ max } [k\Omega] = \frac{15 \text{ [V]}}{\text{Output current [mA]}}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DP 233 to 235

**Input data**

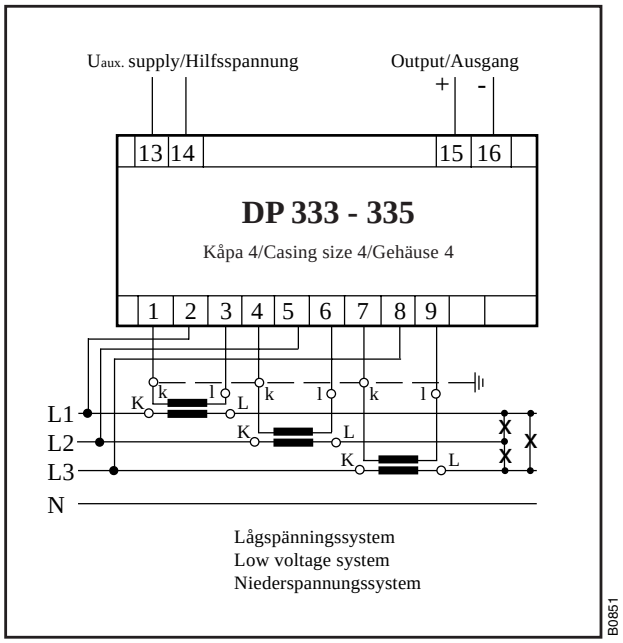
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | $16^2/_3$, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

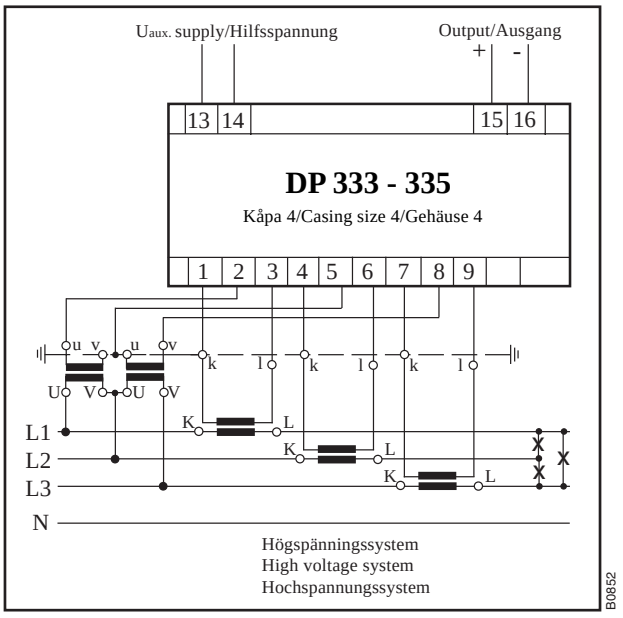
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DP 333 to 335

**Input data**

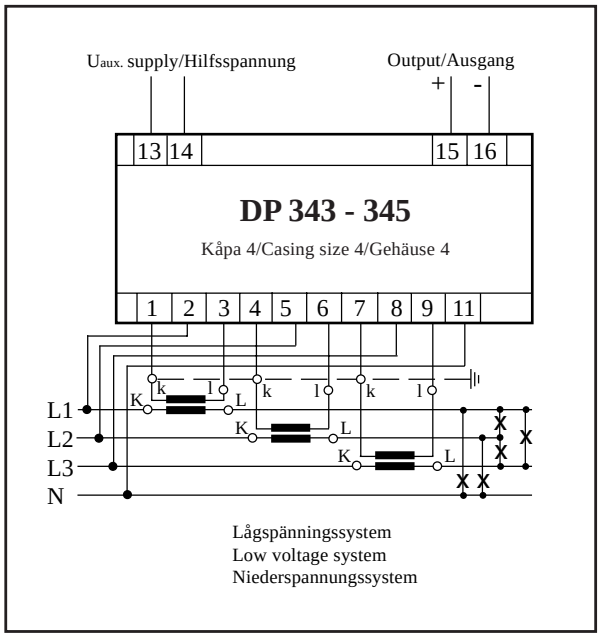
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

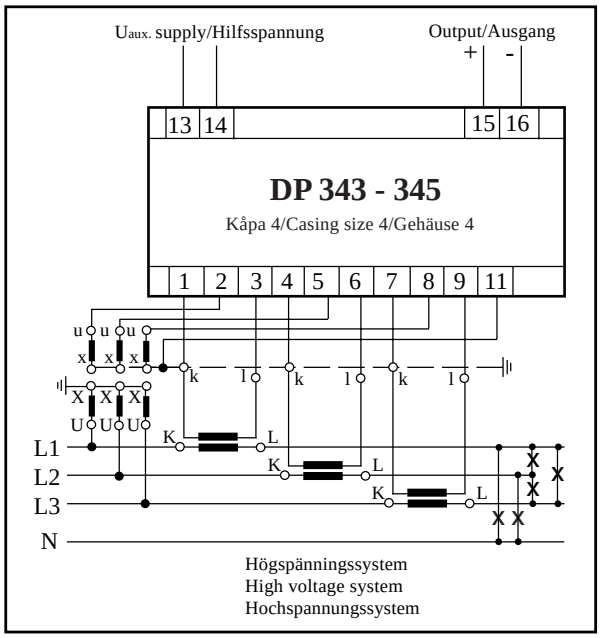
$$R_L \text{ max } [k\Omega] = \frac{15 \text{ [V]}}{\text{Output current [mA]}}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DP 343 to 345

**Input data**

| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.

## Ordering form DP

| DP (Active power) | | Default | Example |
|---|---|---|---|
| Type: | | | DP 235 |
| Accuracy: | | cl. 0.5 | 0.5 |
| Transf. ratio voltage: | | | 11000/110 V |
| Transf. ratio current: | | | 100/5 A |
| Frequency: | | 50 Hz | 50 Hz |
| Measuring range (P): | | | 0-2 MW |
| Output (P): | | | 4-20 mA |
| Output curve: | | | B |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 80 - 276 V AC/DC |

# TRANSDUCERS DQ FOR REACTIVE POWER

## Product range summary

The models of measuring transducers available for measuring the reactive power are shown in the table. Configuration of the measuring transducer with regard to the output rated value and the desired functional curve are shown in the tables and diagram on page 37 – 41.

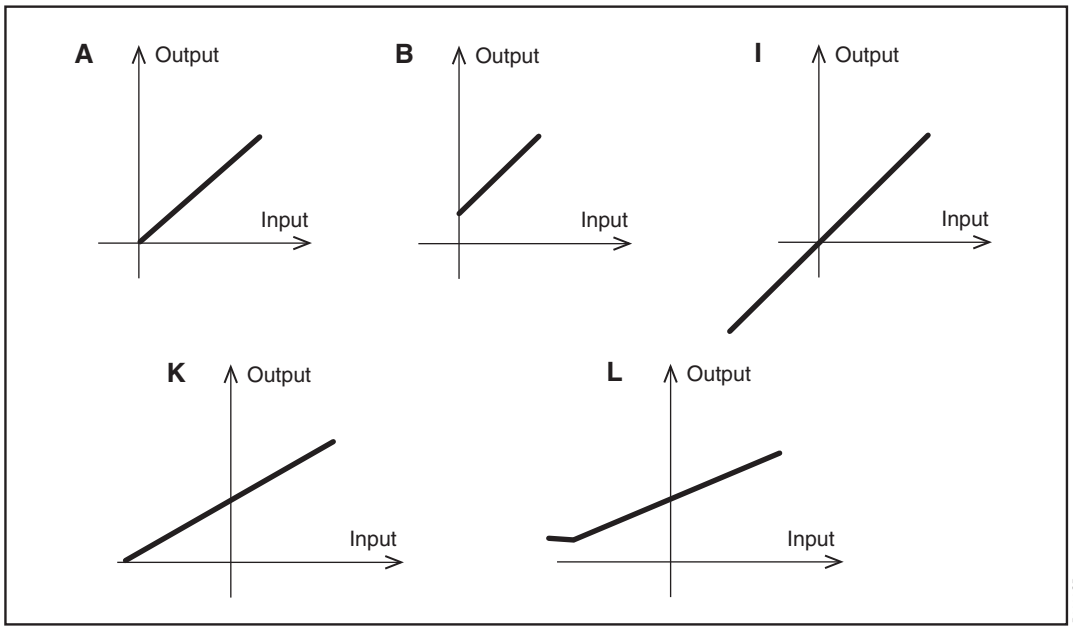
| Designition | Number of mesuring elements | System | Auxiliary supply | Casing size |
|---|---|---|---|---|
| DQ 133 | 1 | 1E, 3-wire, balanced load | 8 – 20 V (40 V) DC | 3 |
| DQ 134 | 1 | 1E, 3-wire, balanced load | 18 – 80 V AC/DC | 3 |
| DQ 135 | 1 | 1E, 3-wire, balanced load | 80 – 276 V AC/DC | 3 |
| DQ 233 | 2 | 2E, 3-wire, unbalanced load | 8 – 20 V (40 V) DC | 3 |
| DQ 234 | 2 | 2E, 3-wire, unbalanced load | 18 – 80 V AC/DC | 3 |
| DQ 235 | 2 | 2E, 3-wire, unbalanced load | 80 – 276 V AC/DC | 3 |
| DQ 333 | 3 | 3E, 3-wire or 4-wire | 8 – 20 V (40 V DC | 4 |
| DQ 334 | 3 | 3E, 3-wire or 4-wire | 18 – 80 V AC/DC | 4 |
| DQ 335 | 3 | 3E, 3-wire or 4-wire | 80 – 276 V AC/DC | 4 |
| DQ 343 | 3 | 3E, 4-wire, unbalanced load | 8 – 20 V (40 V) DC | 4 |
| DQ 344 | 3 | 3E, 4-wire, unbalanced load | 18 – 80 V AC/DC | 4 |
| DQ 345 | 3 | 3E, 4-wire, unbalanced load | 80 – 276 V AC/DC | 4 |

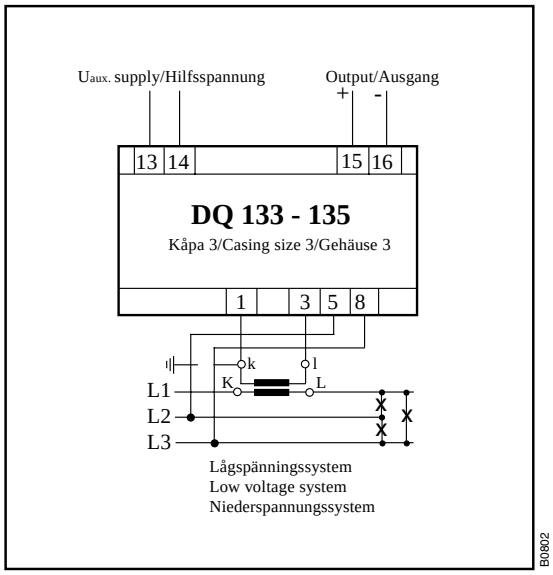
**Auxiliary voltage**

| Unit*) | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

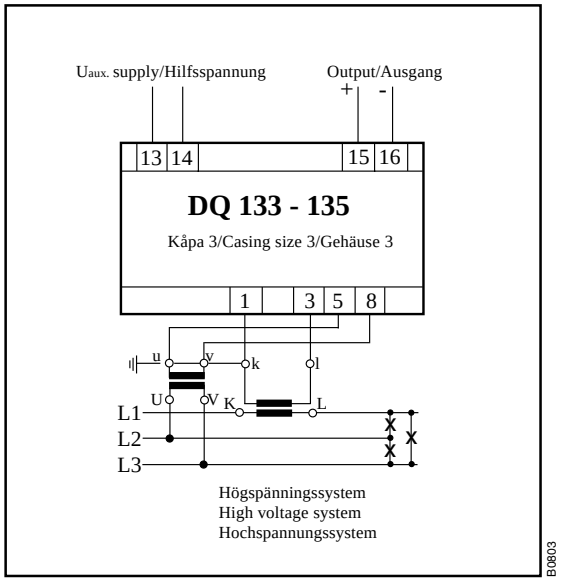
*) Third digit in the type designition, shows type of auxiliary supply.

## Output signals






*Connection*




*Connection*

## DQ 133 to 135

**Input data**

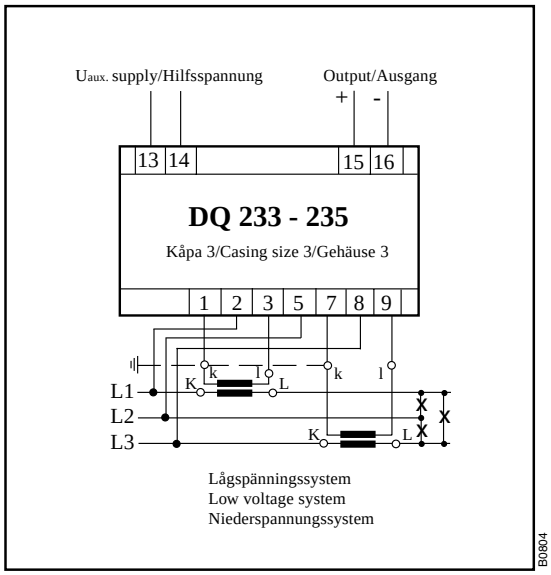
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

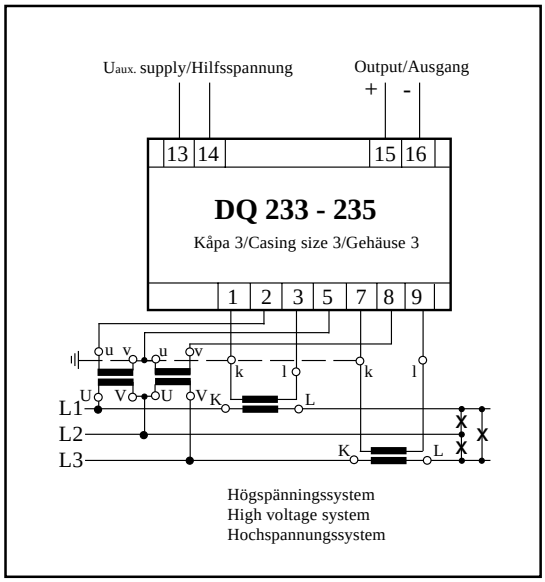
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DQ 233 to 235

**Input data**

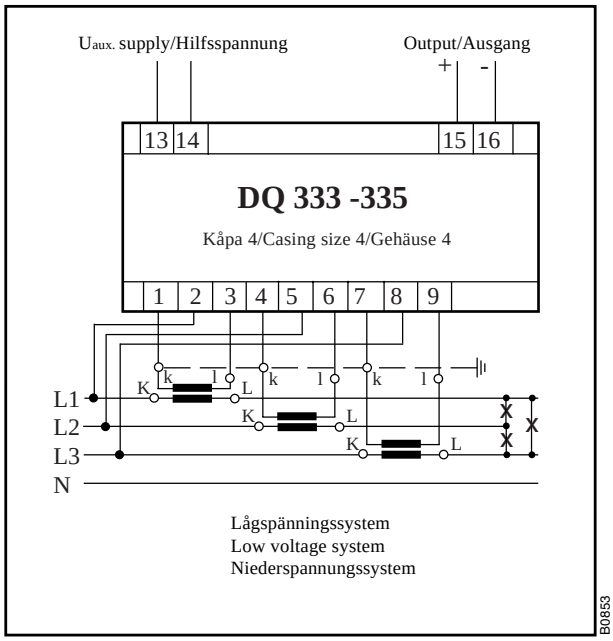
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

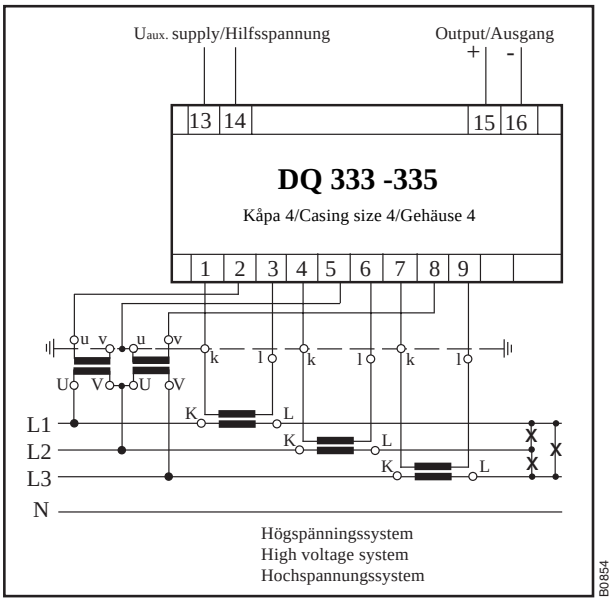
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DQ 333 to 335

**Input data**

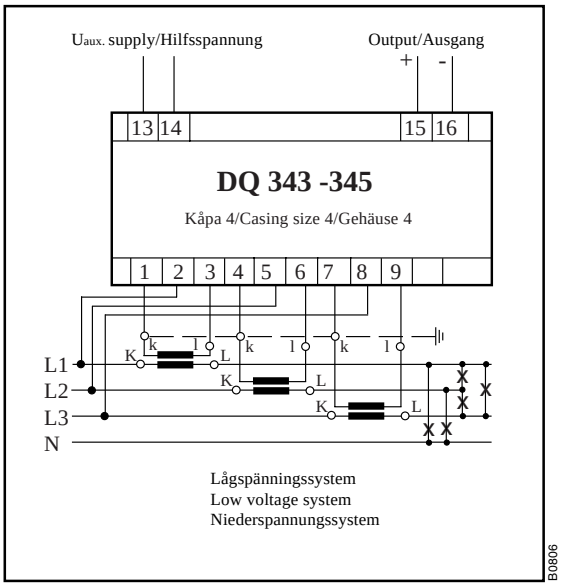
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

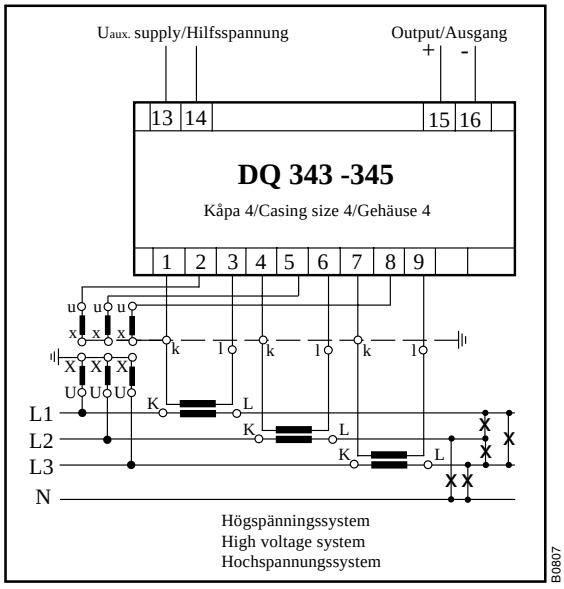
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current [mA]}}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DQ 343 to 345

**Input data**

| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

$$R_L \text{ max } [k\Omega] = \frac{15 \text{ [V]}}{\text{Output current [mA]}}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.

# TRANSDUCERS DQ FOR REACTIVE POWER

## Ordering form DQ

| DQ (Reactive power) | | Default | Example |
|---|---|---|---|
| Type: | | | DQ 235 |
| Accuracy: | | cl. 0.5 | 0.5 |
| Transf. ratio voltage: | | | 11000/110 V |
| Transf. ratio current: | | | 100/5 A |
| Frequency: | | 50 Hz | 50 Hz |
| Measuring range (Q): | | | 0-2 Mvar |
| Output (Q): | | | 4-20 mA |
| Output curve: | | | B |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 80 - 276 V AC |

## Product range summary

The models of measuring transducers available for measuring the active and reactive power are shown in the table. Configuration of the measuring transducer with regard to the output rated value and the desired functional curve are shown in the tables and diagram on page 44 – 49.

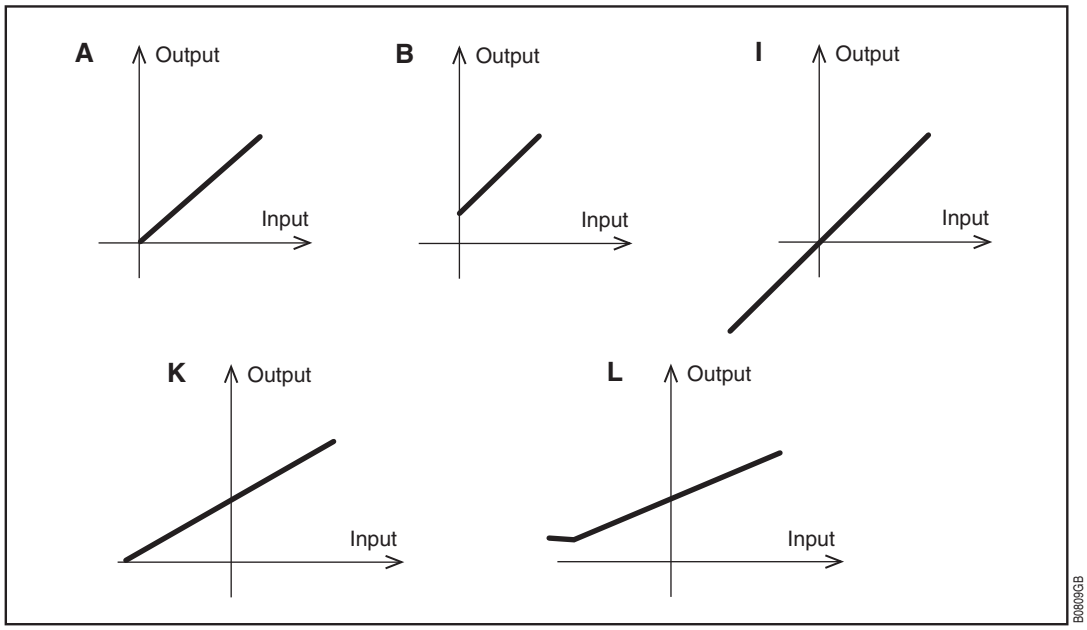
| Designition | Number of mesuring elements | System | Auxiliary supply | Casing size |
|---|---|---|---|---|
| DPQ 133 | 1 | 1E, 3-wire, balanced load | 8 – 20 V (40 V) DC | 4 |
| DPQ 134 | 1 | 1E, 3-wire, balanced load | 18 – 80 V AC/DC | 4 |
| DPQ 135 | 1 | 1E, 3-wire, balanced load | 80 – 276 V AC/DC | 4 |
| DPQ 143 | 1 | 1E, 4-wire, balanced load | 8 – 20 V (40 V) DC | 4 |
| DPQ 144 | 1 | 1E, 4-wire, balanced load | 18 – 80 V AC/DC | 4 |
| DPQ 145 | 1 | 1E, 4-wire, balanced load | 80 – 276 V AC/DC | 4 |
| DPQ 233 | 2 | 2E, 3-wire, unbalanced load | 8 – 20 V (40 V) DC | 4 |
| DPQ 234 | 2 | 2E, 3-wire, unbalanced load | 18 – 80 V AC/DC | 4 |
| DPQ 235 | 2 | 2E, 3-wire, unbalanced load | 80 – 276 V AC/DC | 4 |
| DPQ 333 | 3 | 3E, 3-wire or 4-wire | 8 – 20 V (40 V) DC | 4 |
| DPQ 334 | 3 | 3E, 3-wire or 4-wire | 18 – 80 V AC/DC | 4 |
| DPQ 335 | 3 | 3E, 3-wire or 4-wire | 80 – 276 V AC/DC | 4 |
| DPQ 343 | 3 | 3E, 4-wire, unbalanced load | 8 – 20 V (40 V) DC | 4 |
| DPQ 344 | 3 | 3E, 4-wire, unbalanced load | 18 – 80 V AC/DC | 4 |
| DPQ 345 | 3 | 3E, 4-wire, unbalanced load | 80 – 276 V AC/DC | 4 |

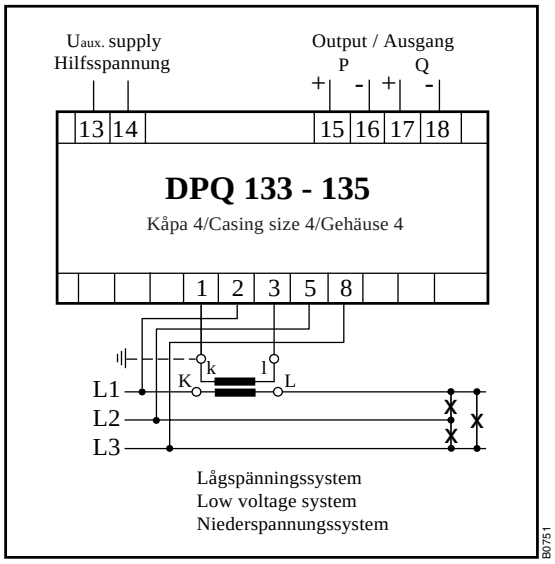
**Auxiliary voltage**

| Unit*) | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

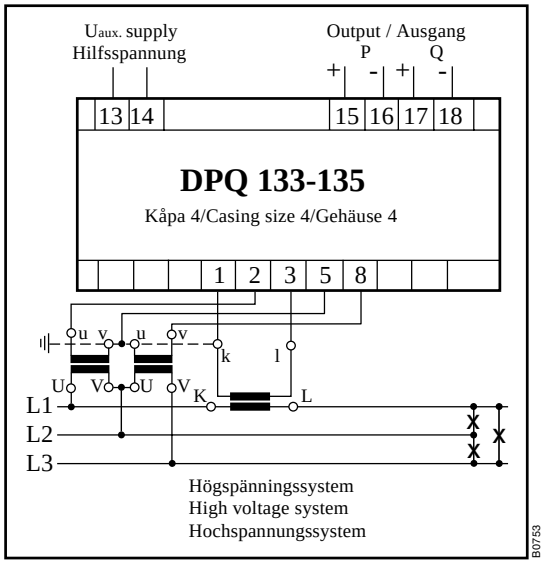
*) Third digit in the type designition, shows type of auxiliary supply.

## Output signals






*Connection*




*Connection*

## DPQ 133 to 135

**Input data**

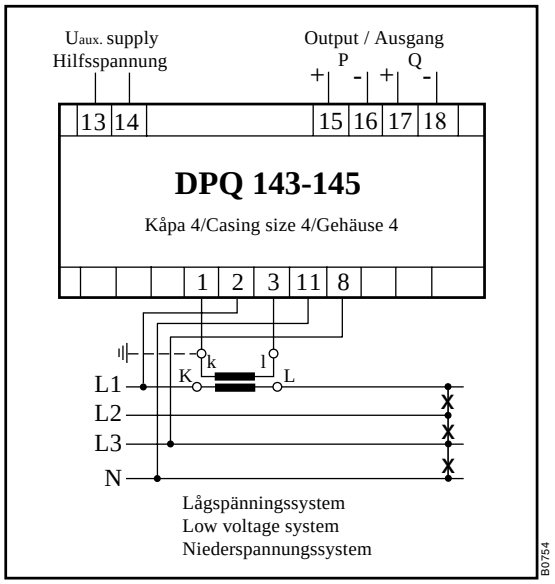
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

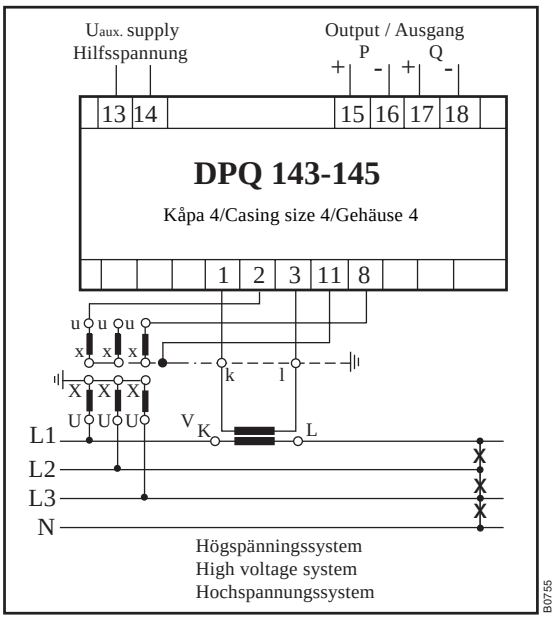
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DPQ 143 to 145

**Input data**

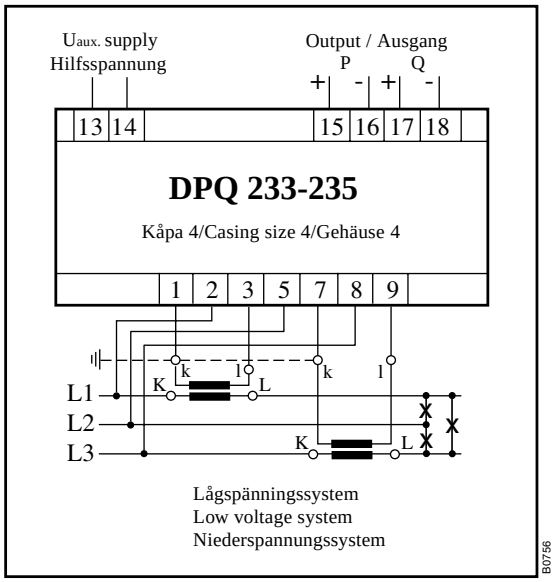
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | $16^2/_3$, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

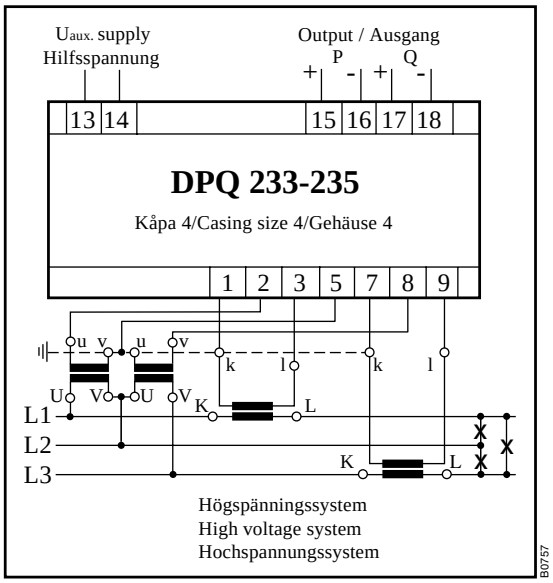
$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DPQ 233 to 235

**Input data**

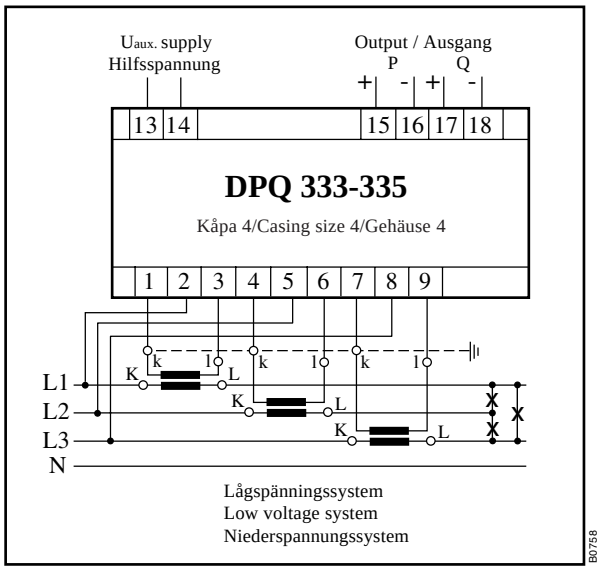
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

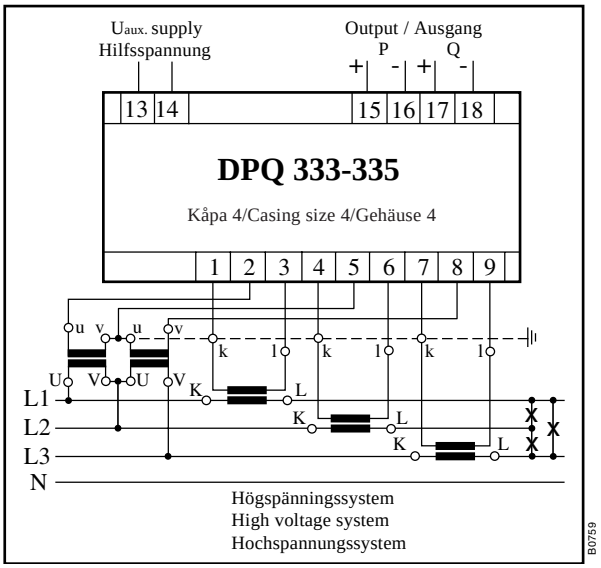
$$R_L \text{ max } [k\Omega] = \frac{15 \text{ [V]}}{\text{Output current [mA]}}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DPQ 333 to 335

**Input data**

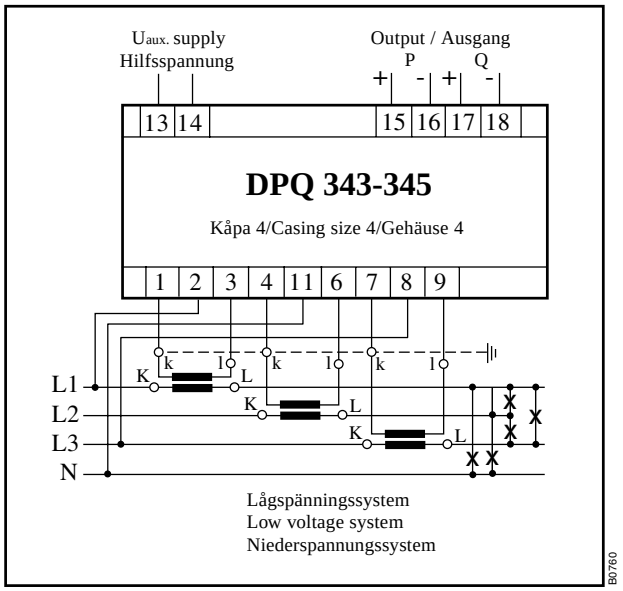
| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | $16^2/_3$, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

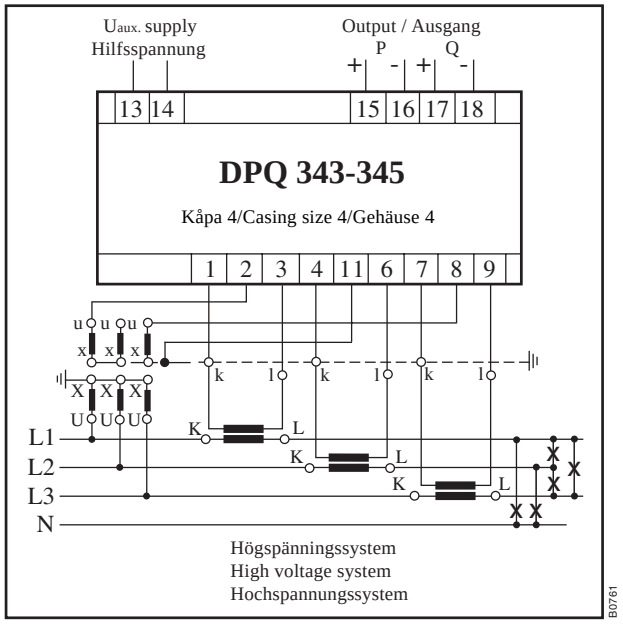
$$R_L \text{ max } [k\Omega] = \frac{15 \text{ [V]}}{\text{Output current [mA]}}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.




*Connection*




*Connection*

## DPQ 343 to 345

**Input data**

| | |
|---|---|
| Measurement voltage ($U_N$) | 40 to 600 V [1] |
| Internal consumption | 1 mA per phase x $U_N$ |
| Measurement current ($I_N$) | 1, 2, 5 A [1] |
| Internal consumption | <0.1 VA per phase |
| Frequency | 16²/₃, 50, 60, 400 Hz |

The maximum load resistance (at current output) is calculated from the formula:

$$R_L \text{ max } [k\Omega] = \frac{15\ [V]}{\text{Output current } [mA]}$$

| Output rated value [1] | Output signal | Load resistance $R_L$ |
|---|---|---|
| 1 mA | A, B, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, I, K, L | 0 – 7,5 kΩ |
| 2,5 mA | A, B, I, K, L | 0 – 6 kΩ |
| 5 mA | A, B, I, K, L | 0 – 3 kΩ |
| 10 mA | A, B, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, I, K, L | 0 – 750 Ω |
| 1 V | A, B, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, I, K, L | ≥ 2 kΩ |

[1] Other values on request.

# TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER

## Ordering form DPQ

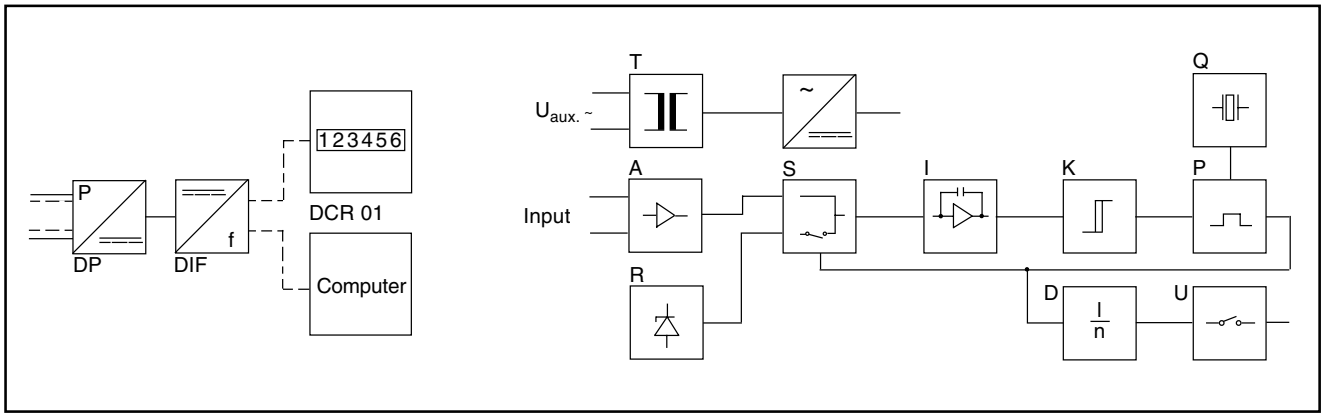
| DPQ (Active and reactive power combined) | | Default | Example |
|---|---|---|---|
| Type: | | | DPQ 145 |
| Accuracy: | | cl. 0.5 | 0.5 |
| Transf. ratio voltage: | | | $11\sqrt{3}$ kV/$110\sqrt{3}$ V |
| Transf. ratio current: | | | 100/5 A |
| Frequency: | | 50 Hz | 50 Hz |
| Measuring range (P): | | | 0-2 MW |
| Measuring range (Q): | | | 0-1 Mvar |
| Output (P): | | | 4-20 mA |
| Output (Q): | | | 4-20 mA |
| Output curve (P): | | | B |
| Output curve (Q): | | | B |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 80-276 V AC&DC |

## Function principle type DIF/DCR

Transducers type DIF converts an analogue DC input signal to a proportional pulse frequency output. The output signal is send via a relay to the output terminals. The input signal can be either uni-polar or bi-polar. If required, one or two 6-digit mechanical counters in separate casings type DCR can be supplied. The figures on the counters represent the time integral of the input signal. If the input, for example, represents active power, the value on the counters will represent energy (kWh). The energy pulses can of course also be transmitted to an integrator in a computer.

## Dimensions and weights

See page 58




## Output

| | |
|---|---|
| Accuracy class | 0.2 |
| Non-linearity | < 0.1 % |
| Pulse frequency | 0 – 0.0001 Hz (min), 0 – 10 Hz, (max) by pulse time = 40 ms |
| Pulse time | 40, 80, 160 ms, (80 ms standard) |
| Aux. supply dependence | < 0.1 % for $\Delta U_{aux.}$ ±20 % |
| Temperature coefficient | < 0.1 %/10°C |

### Relay

| | |
|---|---|
| Contacts | 0.75 A, 350 V, 50 VA |
| Life expectancy | $10^8$ operations |

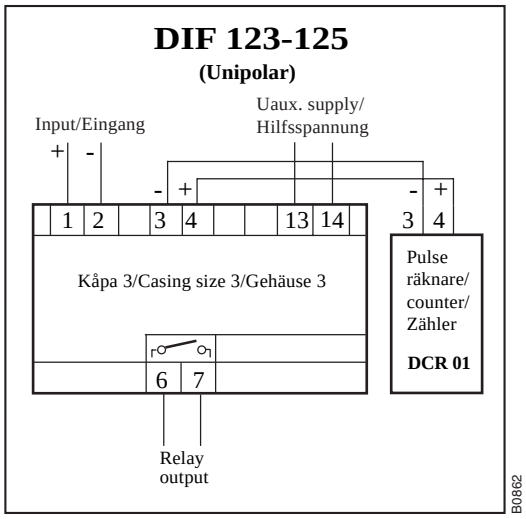
### Counter DCR

| | |
|---|---|
| Number of figures | 6 |
| Max. counting frequency | 6 Hz |
| Min. pulsetime | 80 ms |
| Puls level | 5 V / l4 mA ±10% |

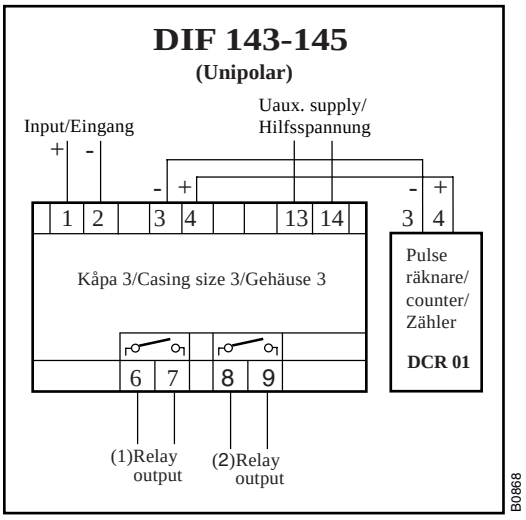
## General data

| | |
|---|---|
| Working temp. range | –10 — +55°C |
| Function temp. range | –20 — +65°C |
| Storage temp. range | –65 — +80°C (DIF 123 – 245), -40 – +80°C (DCR 01, 02) |
| Test voltage | 2 kV, 50 Hz |

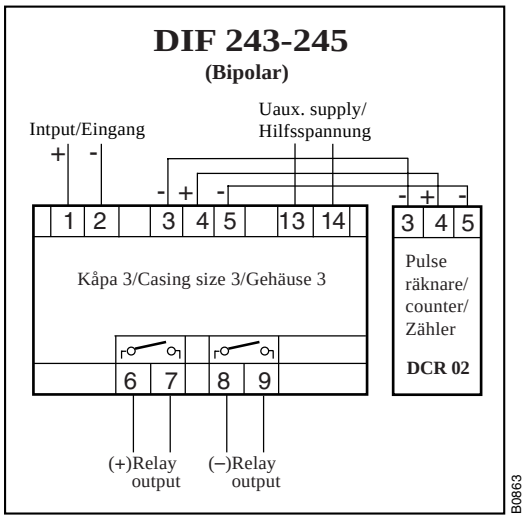
# TRANSDUCER DIF AND DCR, DC TO PULSE RATE CONVERTER




*Connection*




*Connection*




*Connection*

## DIF 123 to 245

| **Input** | | |
|---|---|---|
| (uni-polar) | 0 – 5 mA | DIF 123–145 |
| (uni-polar) | 0 – 10 mA | DIF 123–145 |
| (uni-polar) | 0 – 20 mA | DIF 123–145 |
| (uni-polar) | 4 – 20 mA | DIF 123–145 |
| (uni-polar) | 0 – 10 V | DIF 123–145 |
| (uni-polar) (double output) | 0 – 5 mA | DIF 143–145 |
| (uni-polar) (double output) | 0 – 10 mA | DIF 143–145 |
| (uni-polar) (double output) | 0 – 20 mA | DIF 143–145 |
| (uni-polar) (double output) | 4 – 20 mA | DIF 143–145 |
| (uni-polar) (double output) | 0 – 10 V | DIF 143–145 |
| (bi-polar) | 0 – ± 5 mA | DIF 243 – 245 |
| (bi-polar) | 0 – ±10 mA | DIF 243 – 245 |
| (bi-polar) | 0 – ±20 mA | DIF 243 – 245 |
| (bi-polar) | 4 – 12 – 20 mA | DIF 243 – 245 |
| (bi-polar) | 0 – ±10 V | DIF 243 – 245 |

**Auxiliary voltage**

| Unit[2)] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

2) Third digit in the type designition, shows type of auxiliary supply.

## Ordering form DIF

| DIF DC Frequency transducer | | Default | Example |
|---|---|---|---|
| **Type:** | | | **DIF 01** |
| **Accuracy:** | | **cl. 0.2** | **0.2** |
| **Pulsetime:** | | **80 ms** | **80 ms** |
| **Input:** | | | **0-20 mA** |
| **Input corresponding value:** | | | **200 kW** |
| **Pulse output:** | | | **10 kWh/pulse** |
| **Pulse frequency:** | | | **0.2 Hz** |
| **Auxiliary supply:** | | | **110 V AC** |

**Example:**
20 mA = 7200 kW
Pulse output = 10 kWh/pulse

$$\frac{7200\ (\text{kW})}{3600 \times 10\ (\text{kWh/pulse})} = 0.2\ \text{Hz}$$

# TRANSDUCERS DR FOR RESISTANCE

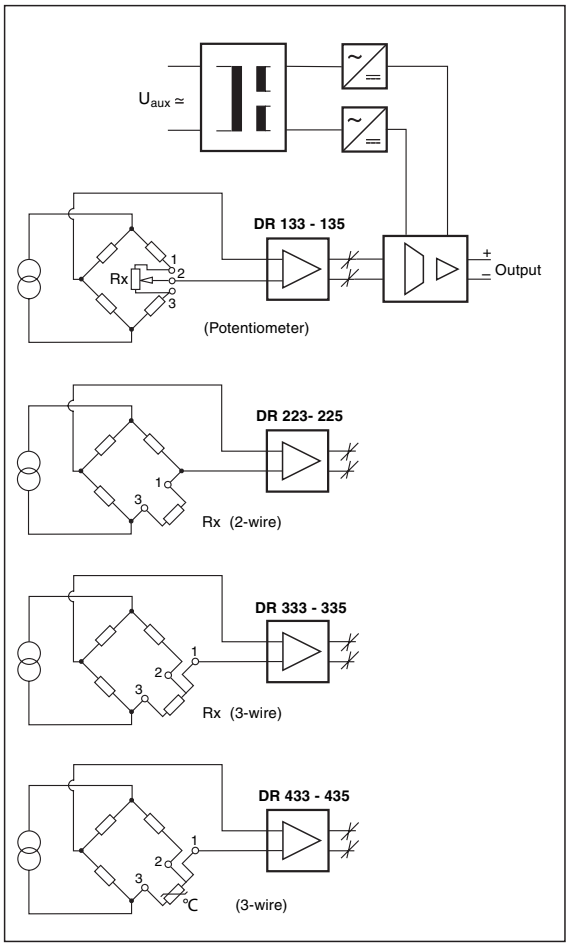
## Type DR 133 to 435

Transducers type DR are used to measure resistance that is converted into a proportional, load-independent galvanic isolated DC voltage or DC current signal. Transducer DR can be connected, for example, to resistance sensors in a two-wire, three-wire or potentiometer circuit.

**Measurement principle, three-wire circuit:** This eliminates the resistive effect of wiring between the transducer and the sensor. It is essential to use a three-wire circuit with use of Pt100 sensors, and with combination with linearisation, an output signal proportional to the temperature is obtained.

**Measurement principle, two-wire circuit:** This is used in applications where the resistance of the wiring is negligible relative to Rx.

**Potentiometer circuit:** Used in conjunction with mechanical moving sensors such as position transmitters.




## Output data

| Accuracy class | 0.5 | 0.2 (Option) |
|---|---|---|
| Linearity error | < 0.2 % | <0.1 % |
| Load-dependence | <0.05 % | <0.05 % |
| Response time (0-99%) | 50 – 100 ms | 50 – 100 ms |
| Auxiliary voltage dependence | < 0.1 % | < 0.1 % |
| Temperature dependence | < 0.1 %/10°C | < 0.06 %/10°C |
| Max voltage with open output | 20 V | 20 V |
| Max output signal with over-driven input signal | ≤125 % | ≤125 % |
| Ripple (peak-to-peak) | <1.0 % | <0.5 % |

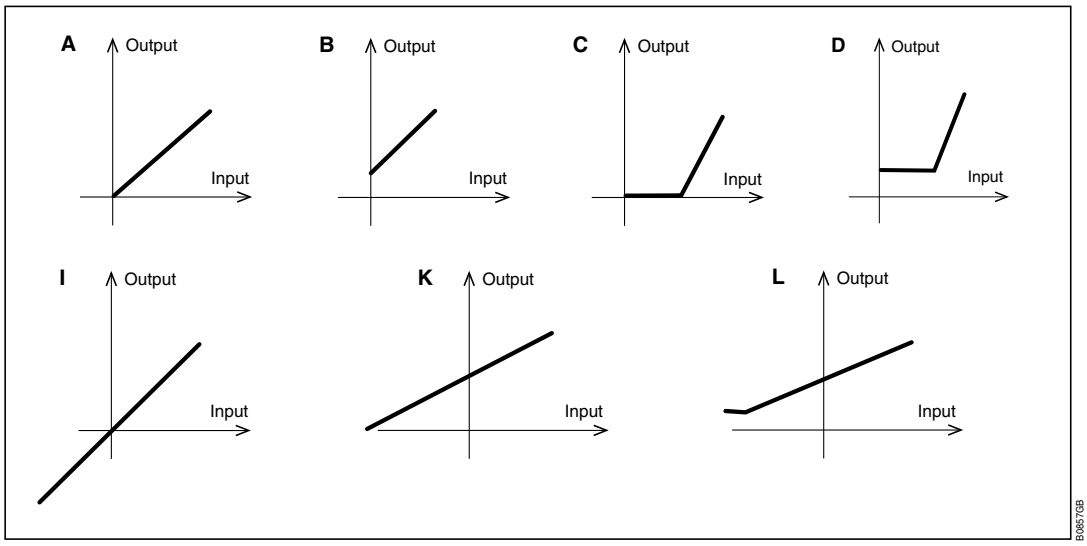
## General data

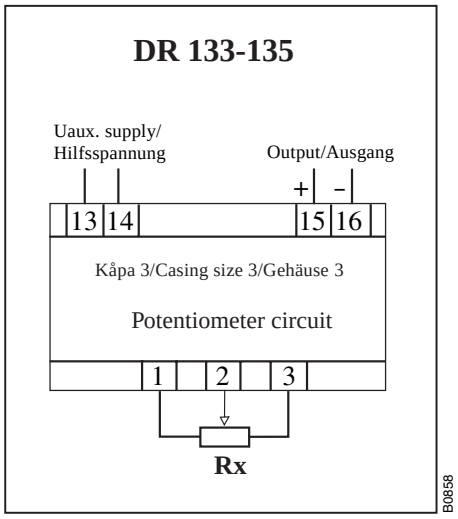
| | |
|---|---|
| Working temp. range | -10 – +55 °C |
| Function temp. range | -20 – +65 °C |
| Storage temp. range | -65 – +80 °C |
| Test voltage | 5.55 kV, 50 Hz |

## Dimensions and weights

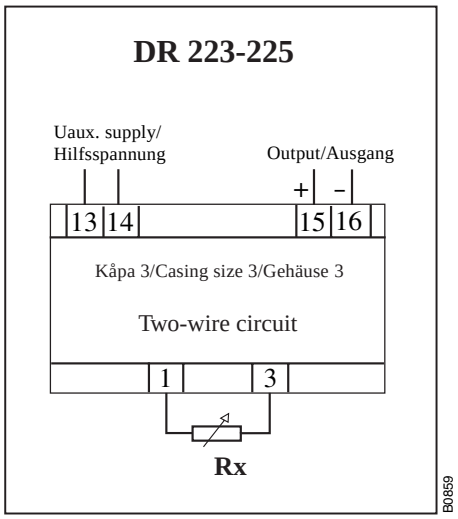
See page 58

## Output signals

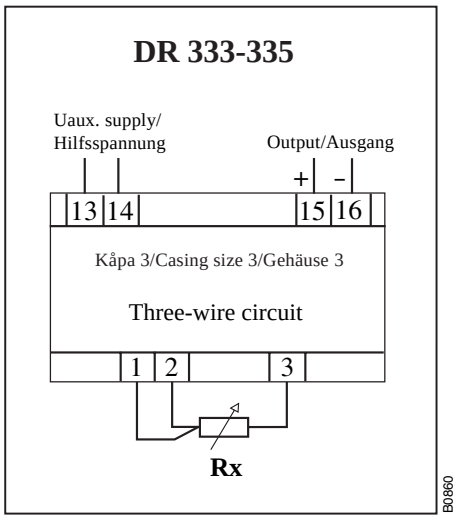




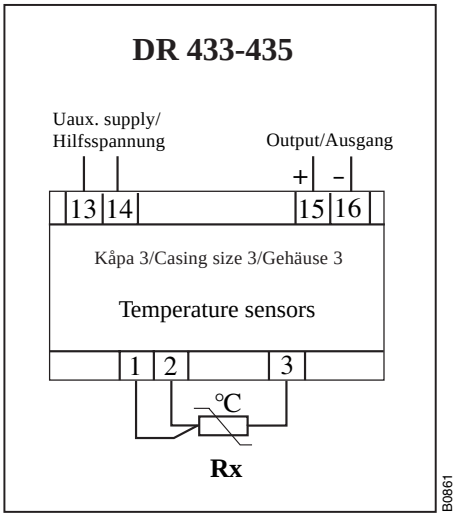

*Connection*




*Connection*




*Connection*




*Connection*

## DR 133 to 435

### Input data

Measuring range ($R_X$) 0 – 10 Ω, ..... 0 – 10 kΩ
Measuring current ($I_{RX}$) 0,2 – 10 mA (measuring range 0 – 10 kΩ)
10 mA (measuring range 0 – 10 Ω)
3.5 – 5 mA (PT 100 sensor)

| Output rated value [1] | Output signal DR 133-335 | Output signal DR 433-435 | Load resistance $R_L$ |
|---|---|---|---|
| 1 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 15 kΩ |
| 2 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 7.5 kΩ |
| 2,5 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 6.0 kΩ |
| 5 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 3.0 kΩ |
| 10 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 1.5 kΩ |
| 20 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 750 Ω |
| 20 mA | A, B, C, D | A, B, C, D, I, K, L | 0 – 750 Ω |
| 1 V | A, B, C, D | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 2 V | A, B, C, D | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 5 V | A, B, C, D | A, B, C, D, I, K, L | ≥ 2 kΩ |
| 10 V | A, B, C, D | A, B, C, D, I, K, L | ≥ 2 kΩ |

[1] Other values on request.

### Auxiliary voltage

| Unit [2] | Voltage | Frequency | Burden |
|---|---|---|---|
| 3 | 8 – 20 V (40 V) DC | DC | 2.5 W |
| 4 | 18 – 80 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |
| 5 | 80 – 276 V AC/DC | 45 – 65 Hz or DC | 4 VA/2.5 W |

[2] Third digit in the type designition, shows type of auxiliary supply.

# TRANSDUCERS DR FOR RESISTANCE

## Ordering form DR

| DR (Resistance DC) | | Default | Example |
|---|---|---|---|
| Type: | | | DR 134 |
| Measurment principle | | | Potentiometer |
| Accuracy: | | cl. 0.5 | 0.5 |
| Input | | | 15x20 ohm |
| Measuring range: | | | |
| Output: | | | 0-20 mA |
| Output curve: | | | A |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 18-80 V AC/DC |

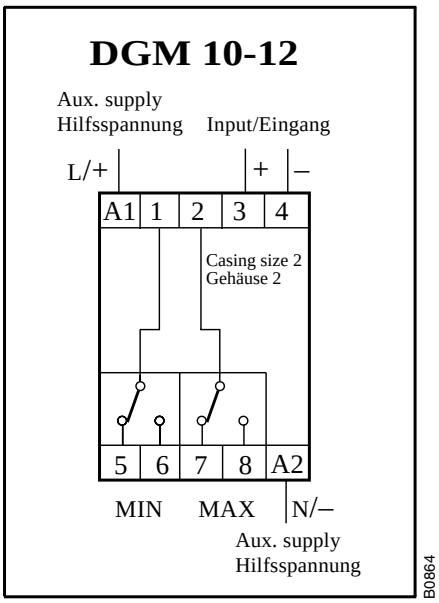
| DR (Resistance DC) | | Default | Example |
|---|---|---|---|
| Type: | | | DR 435 |
| Measurment principle | | | Temperature |
| Accuracy: | | cl. 0.5 | 0.5 |
| Sensor: | | | PT 100 ohm/0°C |
| Measuring range: | | | 0-100°C |
| Output: | | | 0-10 mA |
| Output curve: | | | C |
| Response time: | | 300 ms | 300 ms |
| Auxiliary supply: | | | 80-276 V AC/DC |


DGM level detector is used to monitor and indicate obtained limit values. Indication is done by means of LEDS simultaneously with potential free tw-pole opening or closing relay.

The DGM level detector is equipped with Max- and Min-function. The Max-relay is activated when the max-limit is exceeded and deactivated when the max-limit is underpassed. The function in the Min-relay corresponds- i.e. it is activated when the min-limit is underpassed and deactivated when the min-limit is exceeded.

The DGM level detector is set according to the value to be monitored. This is done by thumb wheels in the level detector front.

The level detector is equipped with a delay for approx. 1 second in order to avoid undesired “switching”.




*Connection*

## General

| | |
|---|---|
| Operating temperature range | -10 - +50°C |
| Degree of protection | IP 40 |

## Dimensions and weights

See page 58

### Input data

| Maximum input | Input resistance |
|---|---|
| 5mA | 220 Ω |
| 20mA | 60 Ω |

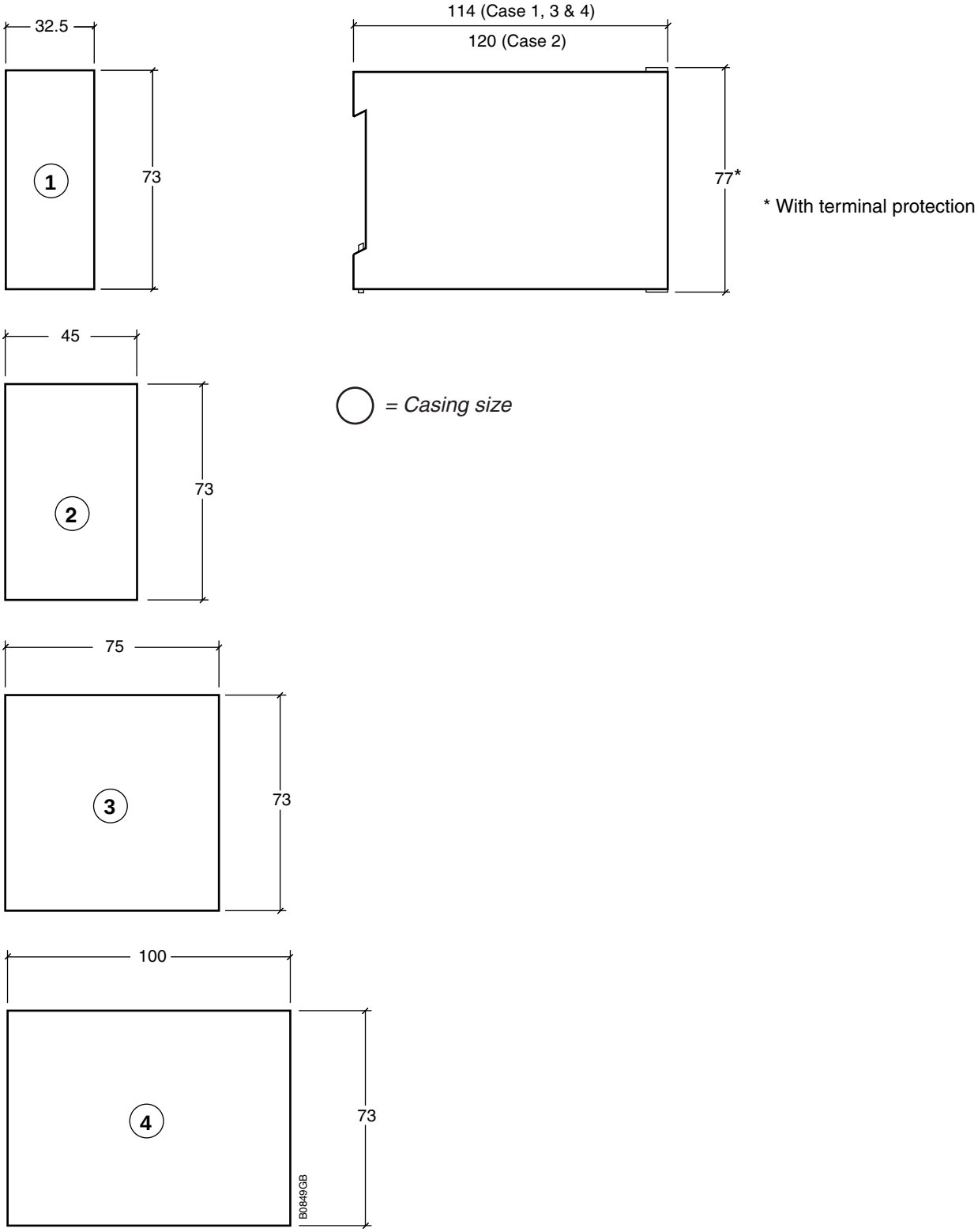
### Relays

| | |
|---|---|
| Number: | 2 |
| Contacts: | changeover |
| Load: | 230 V AC / 4A or 30 V DC / 60 W |
| Life: | 50 000 switching operations at maximum load |
| Indication: | Relay position is indicated by LED |

### Auxiliary voltage

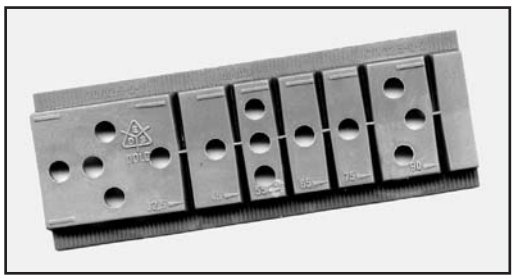
| Type | Voltage | Frequency | Internal consumption |
|---|---|---|---|
| DGM 10 | 94 - 121V AC | 45 – 65 Hz | 2 VA |
| DGM 11 | 196 – 253 V AC | 45 – 65 Hz | 2 VA |
| DGM 12 | 20 – 30 V DC | DC | 2.5 W |

# DIMENSIONS AND WEIGHTS



For mounting the transducers on walls with screws, a plastic DIN rail (Art No. 4025) can be ordered.

The rail can easily be cut to the correct length for the relevant case.



*DIN rail Art. No. 4025*

| Type | Weight g |
|---|---|
| DU 120 | 280 |
| DU 121, DU 122 | 260 |
| DU 123 – DU 125 | 340 |
| DUE 123 – DUE 125 | 340 |
| DI 120 | 210 |
| DI 121, DI 122 | 250 |
| DI 123 – DI 125 | 450 |
| DUD 123 – DUD 125 | 320 |
| DID 123 – DID 125 | 350 |
| DF 03 – DF 04 | 350 |
| DPF 13 – DPF 14 | 370 |
| DP 123 – DP 145 | 480 |
| DP 233 – DP 235 | 510 |
| DP 333 – DP 345 | 610 |
| DQ 133 – DQ 135 | 480 |
| DQ 233 – DQ 235 | 510 |
| DQ 333 – DQ 345 | 610 |
| DPQ 133 – DPQ 235 | 420 |
| DPQ 333 – DPQ 345 | 510 |
| DIF 123 - 245 | 520 |
| DCR 01, DCR 02 | 250 |
| DR 133 – DR 435 | 330 |
| DGM 10 – 11 | 330 |
| DGM 12 | 250 |

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