



# Transducers



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# TRANSDUCER SURVEY

Type	Function	Output config.	Auxiliary	Case	Page
<b>AC Voltage</b>					
DU 120	AC voltage	A	Self powered	C1	13
DU 121	AC voltage	A, B, C, D	92 – 138 V AC	C1	13
DU 122	AC voltage	A, B, C, D	184 – 276 V AC	C1	13
DU 124	AC voltage	A, B, C, D, E, F, G, H	18 – 80 V AC/DC	C3	14
DU 125	AC voltage	A, B, C, D, E, F, G, H	80 – 276 V AC/DC	C3	14
<b>AC current</b>					
DI 120	AC current	A	Self powered	C1	17
DI 121	AC current	A, B, C, D	92 – 138 V AC	C1	17
DI 122	AC current	A, B, C, D	184 – 276 V AC	C1	17
DI 124	AC current	A, B, C, D, E, F, G, H	18 – 80 V AC/DC	C3	18
DI 125	AC current	A, B, C, D, E, F, G, H	80 – 276 V AC/DC	C3	18
<b>DC Voltage</b>					
DUD 124	DC voltage	A, B, C, D, I, K, L	18 – 80 V AC/DC	C3	20
DUD 125	DC voltage	A, B, C, D, I, K, L	80 – 276 V AC/DC	C3	20
<b>DC Current</b>					
DID 124	DC current	A, B, C, D, I, K, L	18 – 80 V AC/DC	C3	20
DID 125	DC current	A, B, C, D, I, K, L	80 – 276 V AC/DC	C3	20
<b>Frequency</b>					
DF 125, 127	2-wire, ph/n or ph/ph	A, B	24 – 48 V DC 80 – 275 V AC/DC	C3	22
<b>Power Factor</b>					
					24

# TRANSDUCER SURVEY

Type	Function	Output config.	Auxiliary	Case	Page
<b>Active Power</b>					
DP 124	1E, 1-phase/2-wire, (ph/n)	A, B, I, K, L	18 – 80 V AC/DC	C3	29
DP 125	1E, 1-phase/2-wire, (ph/n)	A, B, I, K, L	80 – 276 V AC/DC	C3	29
DP 134	1E, 3-wire, balanced load	A, B, I, K, L	18 – 80 V AC/DC	C3	30
DP 135	1E, 3-wire, balanced load	A, B, I, K, L	80 – 276 V AC/DC	C3	30
DP 144	1E, 4-wire, (ph/n), balanced load	A, B, I, K, L	18 – 80 V AC/DC	C3	31
DP 145	1E, 4-wire, (ph/n), balanced load	A, B, I, K, L	80 – 276 V AC/DC	C3	31
DP 234	2E, 3-wire, unbalanced load	A, B, I, K, L	18 – 80 V AC/DC	C3	32
DP 235	2E, 3-wire, unbalanced load	A, B, I, K, L	80 – 276 V AC/DC	C3	32
DP 334	3E, 3- or 4-wire, unbalanced load, without connected neutral	A, B, I, K, L	18 – 80 V AC/DC	C4	33
DP 335	3E, 3- or 4-wire, unbalanced load, without connected neutral	A, B, I, K, L	80 – 276 V AC/DC	C4	33
DP 344	3E, 4-wire, unbalanced load	A, B, I, K, L	18 – 80 V AC/DC	C4	34
DP 345	3E, 4-wire, unbalanced load	A, B, I, K, L	80 – 276 V AC/DC	C4	34
<b>Reactive Power</b>					
DQ 134	1E, 3-wire, balanced load	A, B, I, K, L	18 – 80 V AC/DC	C3	38
DQ 135	1E, 3-wire, balanced load	A, B, I, K, L	80 – 276 V AC/DC	C3	38
DQ 234	2E, 3-wire, unbalanced load	A, B, I, K, L	18 – 80 V AC/DC	C3	39
DQ 235	2E, 3-wire, unbalanced load	A, B, I, K, L	80 – 276 V AC/DC	C3	39
DQ 334	3E, 3- or 4-wire, unbalanced load without connected neutral	A, B, I, K, L	18 – 80 V AC/DC	C4	40
DQ 335	3E, 3- or 4-wire, unbalanced load without connected neutral	A, B, I, K, L	80 – 276 V AC/DC	C4	40
DQ 344	3E, 4-wire, unbalanced load	A, B, I, K, L	18 – 80 V AC/DC	C4	41
DQ 345	3E, 4-wire, unbalanced load	A, B, I, K, L	80 – 276 V AC/DC	C4	41

# TRANSDUCER SURVEY

Type	Function	Output config.	Auxiliary	Case	Page
<b>Active and Reactive Power Combined</b>					
DPQ 134	1E, 3-wire, balanced load	A, B, I, K, L	18 – 80 V AC/DC	C4	45
DPQ 135	1E, 3-wire, balanced load	A, B, I, K, L	80 – 276 V AC/DC	C4	45
DPQ 144	1E, 4-wire, (ph/n), balanced load	A, B, I, K, L	18 – 80 V AC/DC	C4	46
DPQ 145	1E, 4-wire, (ph/n), balanced load	A, B, I, K, L	80 – 276 V AC/DC	C4	46
DPQ 234	2E, 3-wire, unbalanced load	A, B, I, K, L	18 – 80 V AC/DC	C4	47
DPQ 235	2E, 3-wire, unbalanced load	A, B, I, K, L	80 – 276 V AC/DC	C4	47
DPQ 334	3E, 3- or 4-wire, unbalanced load , without connected neutral	A, B, I, K, L	18 – 80 V AC/DC	C4	48
DPQ 335	3E, 3- or 4-wire, unbalanced load, without connected neutral	A, B, I, K, L	80 – 276 V AC/DC	C4	48
DPQ 344	3E, 4-wire, unbalanced load	A, B, I, K, L	18 – 80 V AC/DC	C4	49
DPQ 345	3E, 4-wire, unbalanced load	A, B, I, K, L	80 – 276 V AC/DC	C4	49

## TRANSDUCER SURVEY

Type	Function	Output config.	Auxiliary	Case	Page
<b>Resistance/Temperature</b>					
DR 134	Pot	A, B, C, D	18 – 80 V AC/DC	C3	51
DR 135	Pot	A, B, C, D	80 – 276 V AC/DC	C3	51
DR 224	2-wire	A, B, C, D	18 – 80 V AC/DC	C3	51
DR 225	2-wire	A, B, C, D	80 – 276 V AC/DC	C3	51
DR 334	3-wire	A, B, C, D	18 – 80 V AC/DC	C3	51
DR 335	3-wire	A, B, C, D	80 – 276 V AC/DC	C3	51
DR 434	Temp.	A, B, C, D, I, K, L	18 – 80 V AC/DC	C3	51
DR 435	Temp.	A, B, C, D, I, K, L	80 – 276 V AC/DC	C3	51

# GENERAL DESCRIPTION AND TECHNICAL DATA

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

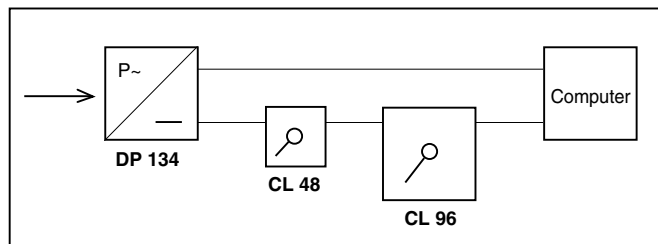
Thanks to high performance and high reliability e. g. a MTBF of 40 years for current transducers, Cewe Instrument transducers have obtained a wide clientele. The transducers are used by industries and power companies in around 40 countries in Europe as well as in all parts of the world.

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 characteristics give great advantages among which the most important are mentioned below.

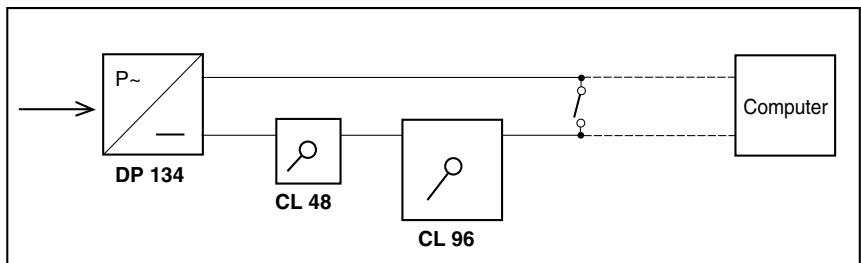
1. Measuring values can be transmitted over relatively long distances.
2. Within the framework of the permitted output signal loadings, several measuring or registration units can be connected simultaneously to the same transducer. No special tuning is required.
3. No adjustment for wire resistance need 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.

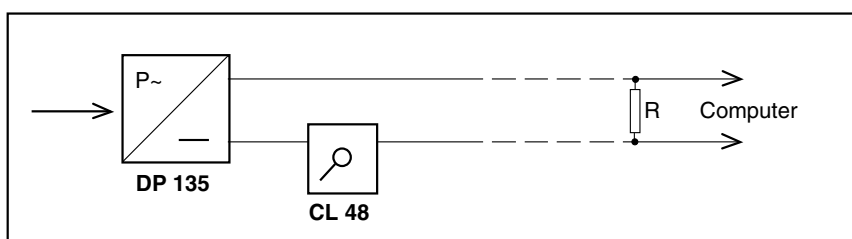


6. Maximum open circuit output voltage is low, 20 V, which means that the output circuit can be opened without any precautions.
7. They have a wide range of applications because of their high accuracy and the fact that they are approved in accordance with interference tests IEC 255 -5 and -6, for input 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.

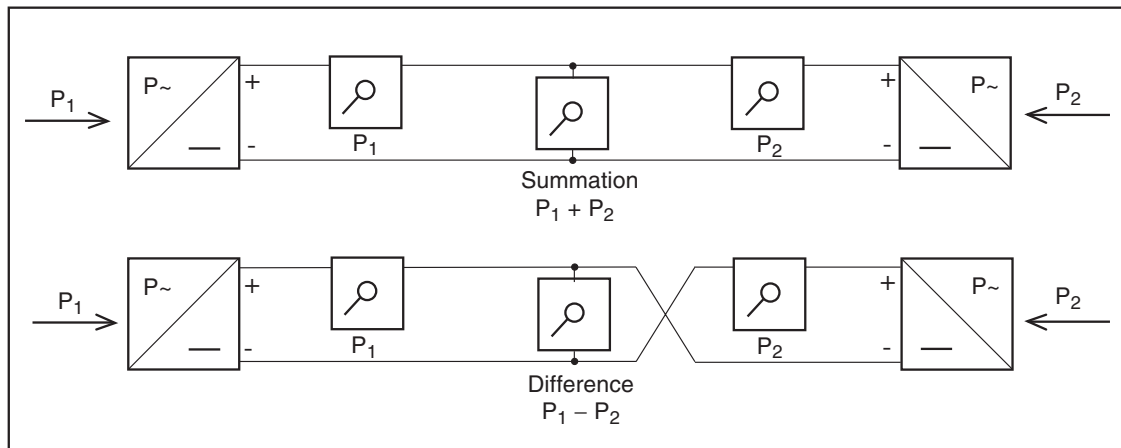


*Example:  
Connection to a  
computer.*

## 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.



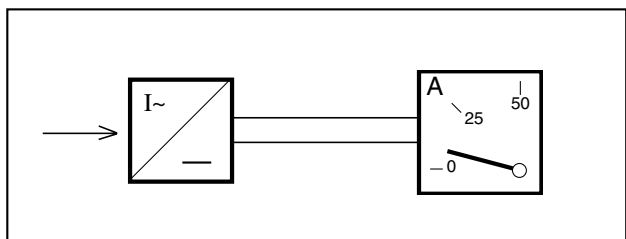
## Live-Zero output

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 previously 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.



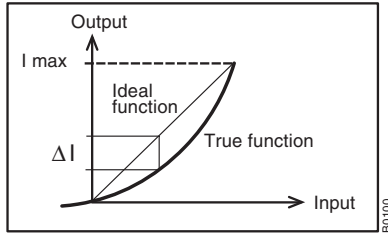
## Ripple

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 %.

# GENERAL DESCRIPTION AND TECHNICAL DATA

## 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.



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

## Auxiliary supply voltage

Cewe Instrument transducers – with some exceptions – are designed for 110 V A.C. or 230 V A.C.  $\pm 20\%$  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 (i.e. 23 - 64  $\pm 20\%$ ) and 80 – 276 V AC/DC (i.e. 100 – 230  $\pm 20\%$ ).

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  $\pm 90^\circ$ . The values can be found in the product data sheet for the transducer concerned.

## Casing

The casing is made of self-extinguishing polycarbonate. Corresponding to UL 94 V1

## 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.	Relative humidity max 95% for max 30 days per year.
Otherwise max 75%	Otherwise max 85%
Year average max 65%	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 without 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<sup>2</sup>. The transducers are always supplied with protection against accidental contact.

## Forms of enclosure (Protection degrees)

Case seal	= IP 51
Terminal part	= IP 20

# GENERAL DESCRIPTION AND TECHNICAL DATA

## Standards

Cewe Instrument measurement transducers are tested according to the standards of the EMC Directive and according to IEC 60255-5 and -6 "Interference environmental classes and test regulations for electronic apparatuses in control equipment for power stations".

The transducers are manufactured to IEC 60688-2.2.

## EMC directives

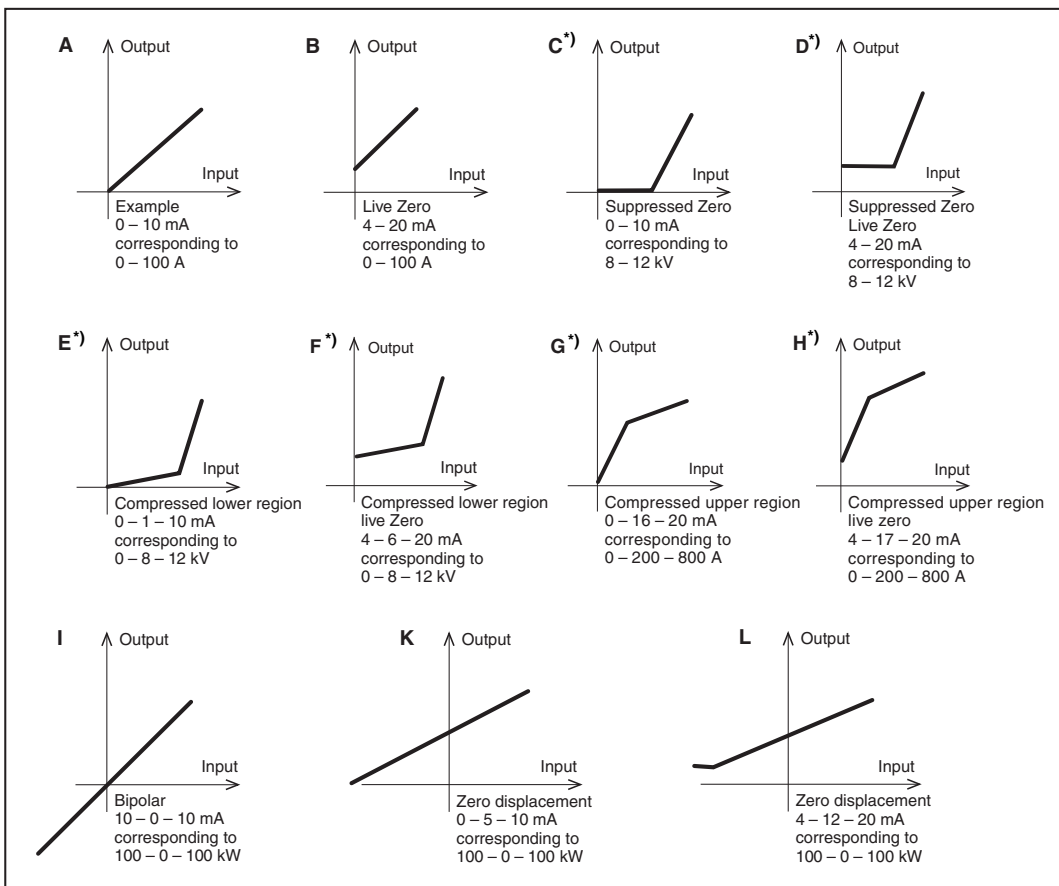
IEC 61000-6-3	Emissions	light industry
IEC 61000-6-4	Emissions	heavy industry
IEC 61000-6-1	Immunity	light industry
IEC 61000-6-2	Immunity	heavy industry

## LVD directive

IEC 61010-1	Safety
IEC 60664-1	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:

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

# TRANSDUCERS DU FOR AC VOLTAGE

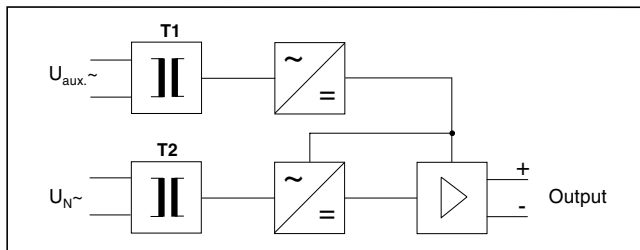
Transducers type DU transforms sinusoidal AC voltage to a proportional load independent DC signal. The input signal can be connected either directly to the transducer, or via a transformer (VT).

Transducer type DU 120 does not require auxiliary supply.

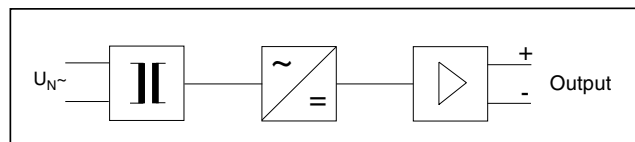
## Dimensions and weights

See page 58

### DU 121 to DU 125



### DU 120



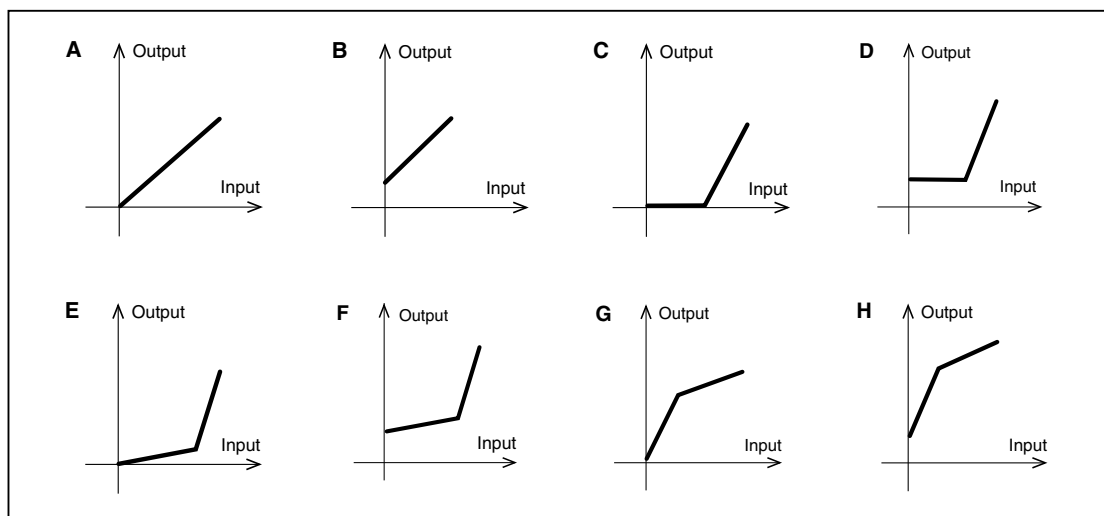
## Output

Accuracy class	0.5	0.2 <sup>*)</sup> (Option)	<sup>*)</sup> Not DU 120
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 $\Delta U_{aux.} \pm 20 \%$	< 0.1 % for $\Delta U_{aux.} \pm 20 \%$	
Temperature coefficient	< 0.1 %/10°C	< 0.1 %/10°C	
Max open circuit output voltage	20 V	20 V	
Max output signal by overload <sup>*)</sup>	125%	125%	

## General data

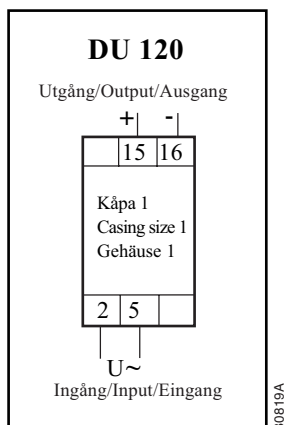
Working temp. range	-10 – +55°C
Function temp. range	-20 – +65°C
Storage temp. range	-65 – +80°C
Test voltage	3.7 kV at $U_N \leq 300 \text{ V}$ 5.55 kV at $300 \text{ V} < U_N \leq 600 \text{ V}$
Overload	1.2 x $U_N$ continuously, varistor protection 1.5 x $U_N$

## Output signals<sup>\*\*)</sup>



<sup>\*\*)</sup> The availability of output signal per type, see page 13 and 14

# TRANSDUCERS DU FOR AC VOLTAGE



Connection

## DU 120

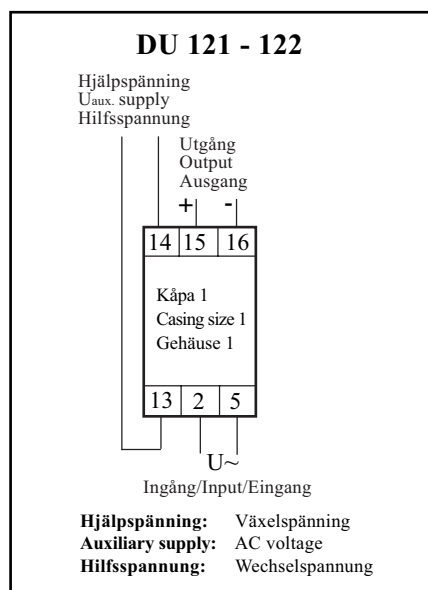
### Input

Input voltage ( $U_N$ ) 0 – 40...525 V <sup>1)</sup>  
 Burden < 1.2 VA  
 Frequency 50 or 60 Hz

Does not require auxiliary supply.

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A	0 – 15 k $\Omega$
2.5 mA	A	0 – 6.0 k $\Omega$
5 mA	A	0 – 3.0 k $\Omega$
10 mA	A	0 – 1.5 k $\Omega$
20 mA	A	0 – 750 $\Omega$

<sup>1)</sup> Other values on request.



Connection

## DU 121 to 122

### Input

Input voltage ( $U_N$ ) 0 – 40...600 V <sup>1)</sup>  
 Burden 1 mA x  $U_N$   
 Frequency  $16^{2/3}$ , 50/60, 400 Hz

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, C, D	0 – 15 k $\Omega$
2.5 mA	A, B, C, D	0 – 6.0 k $\Omega$
5 mA	A, B, C, D	0 – 3.0 k $\Omega$
10 mA	A, B, C, D	0 – 1.5 k $\Omega$
20 mA	A, B, C, D	0 – 750 $\Omega$
5 V	A, C	$\geq 2$ k $\Omega$
10 V	A, C	$\geq 2$ k $\Omega$

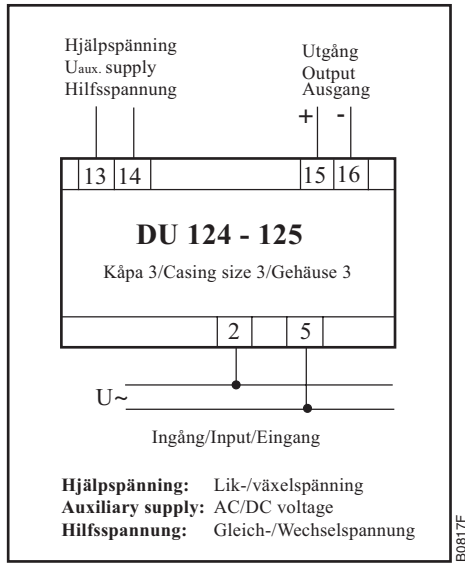
### Auxiliary voltage

Unit <sup>2)</sup>	Voltage	Frequency	Burden
1	92 – 138 V AC	45 – 65 Hz	2 VA
2	184 – 276 V AC	45 – 65 Hz	2 VA

<sup>1)</sup> Other values on request.

<sup>2)</sup> Third digit in the type designation, shows type of auxiliary supply.

# TRANSDUCERS DU FOR AC VOLTAGE



Connection

## DU 124 to 125

### Input

Input voltage ( $U_N$ )	0 – 40...600 V <sup>1)</sup>
Burden	1 mA x $U_N$
Frequency	16 <sup>2/3</sup> , 50/60, 400 Hz

Output rated value <sup>1)</sup>	Output signal <sup>2)</sup>	Load resistance $R_L$
1 mA	A, B, C, D, E, F, G, H	0 – 15 k $\Omega$
2.5 mA	A, B, C, D, E, F, G, H	0 – 6.0 k $\Omega$
5 mA	A, B, C, D, E, F, G, H	0 – 3.0 k $\Omega$
10 mA	A, B, C, D, E, F, G, H	0 – 1.5 k $\Omega$
20 mA	A, B, C, D, E, F, G, H	0 – 750 $\Omega$
5 V	A, C, E, G	$\geq 2$ k $\Omega$
10 V	A, C, E, G	$\geq 2$ k $\Omega$

### Auxiliary voltage

Unit <sup>3)</sup>	Voltage	Frequency	Burden
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

- <sup>1)</sup> Other values on request.
- <sup>2)</sup> Curve E, F: Min. suppressed lower region is 0-20% of max input value.  
Curve G, H: Max. suppressed upper region is 80-100% of max input.
- <sup>3)</sup> Third digit in the type designation, shows type of auxiliary supply value.

## TRANSDUCERS DU FOR AC VOLTAGE

### Ordering form DU

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

# TRANSDUCCERS DI FOR AC CURRENT

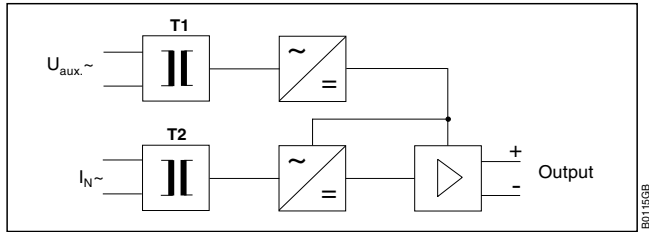
Transducers type DI transform sinusoidal AC current to a proportional load independent DC signal. The input signal can be connected either directly to the transducer, or via a transformer.

Transducer DI 11 does not require auxiliary supply.

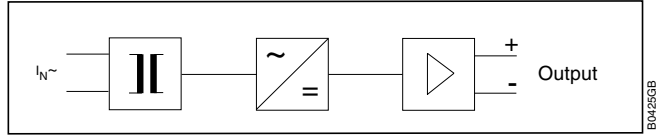
## Dimensions and weights

See page 58

### DI 121 to DI 125



### DI 120



## Output

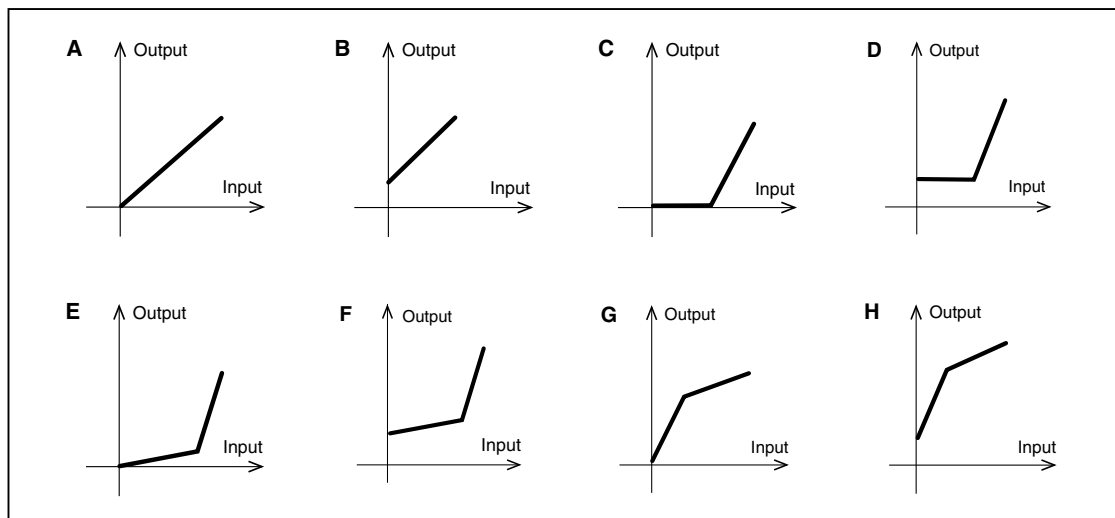
Accuracy class	0.5	0.2*) (Option)
Nominal accuracy	0.2	0.1
Non-linearity	< 0.2 %	< 0.1 %
Load dependence	< 0.05 %	< 0.05 %
Response time	< 300 ms	< 300 ms
Aux. supply dependence	< 0.1 % for $\Delta U_{aux.} \pm 20 \%$	< 0.1 % for $\Delta U_{aux.} \pm 20 \%$
Temperature coefficient	< 0.1 %/10°C	< 0.1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

\*) Not DI 120

## General data

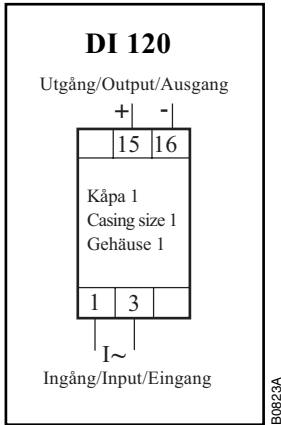
Working temp. range	-10 – +55°C
Function temp. range	-20 – +65°C
Storage temp. range	-65 – +80°C
Test voltage	3,7 kV Standard ( $U_N \leq 300 \text{ V}$ ), 5,55 kV, Option ( $300 \text{ V} < U_N \leq 600 \text{ V}$ )
Overload	2 x $I_N$ continuously, 10 x $I_N$ during 10 s, 40 x $I_N$ during 1 s

## Output signals\*\*)



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

# TRANSDUCERS DI FOR AC CURRENT



Connection

## DI 120

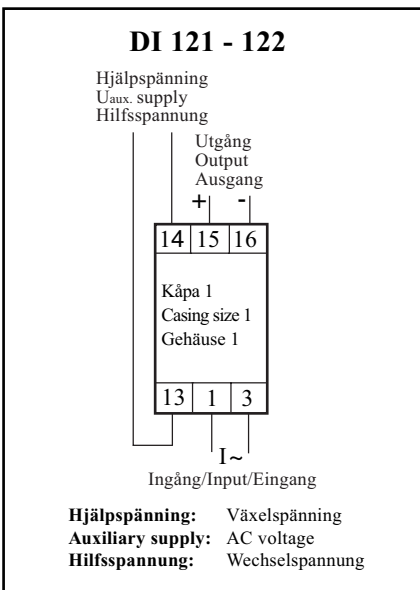
### Input

Input current ( $I_N$ )	1.0, 1.2, 5.0, 6.0 A <sup>1)</sup>
Burden	< 0,25 to < 1.2 VA
Frequency	50/60 Hz at Class 0.5

Does not require auxiliary supply.

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A	0 – 15 k $\Omega$
2.5 mA	A	0 – 6.0 k $\Omega$
5 mA	A	0 – 3.0 k $\Omega$
10 mA	A	0 – 1.5 k $\Omega$
20 mA	A	0 – 750 $\Omega$

<sup>1)</sup> 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 <sup>1)</sup>
Burden	< 0.04 to < 0.2 VA
Frequency	16 <sup>2/3</sup> , 50/60, 400 Hz

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, C, D	0 – 15 k $\Omega$
2.5 mA	A, B, C, D	0 – 6.0 k $\Omega$
5 mA	A, B, C, D	0 – 3.0 k $\Omega$
10 mA	A, B, C, D	0 – 1.5 k $\Omega$
20 mA	A, B, C, D	0 – 750 $\Omega$
5 V	A, C	$\geq$ 2 k $\Omega$
10 V	A, C	$\geq$ 2 k $\Omega$

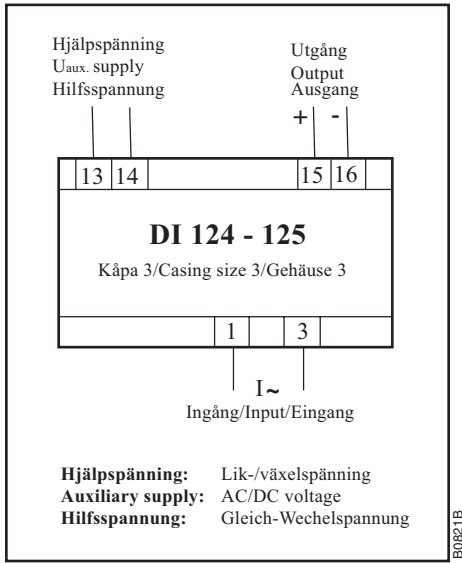
### Auxiliary voltage

Unit <sup>2)</sup>	Voltage	Frequency	Burden
1	92 – 138 V AC	45 – 65 Hz	2 VA
2	184 – 276 V AC	45 – 65 Hz	2 VA

<sup>1)</sup> Other values on request.

<sup>2)</sup> Third digit in the type designation, shows type of auxiliary supply.

# TRANSDUCCERS DI FOR AC CURRENT



## DI 124 to 125

### Input

Input current ( $I_N$ )	1.0, 1.2, 2.0, 2.4, 5.0, 6.0 A <sup>1)</sup>
Burden	< 0.04 to < 0.2 VA
Frequency	16 <sup>2/3</sup> , 50/60, 400 Hz

Output rated value <sup>1)</sup>	Output signal <sup>2)</sup>	Load resistance $R_L$
1 mA	A, B, C, D, E, F, G, H	0 – 15 k $\Omega$
2.5 mA	A, B, C, D, E, F, G, H	0 – 6.0 k $\Omega$
5 mA	A, B, C, D, E, F, G, H	0 – 3.0 k $\Omega$
10 mA	A, B, C, D, E, F, G, H	0 – 1.5 k $\Omega$
20 mA	A, B, C, D, E, F, G, H	0 – 750 $\Omega$
5 V	A, C, E, G	$\geq 2$ k $\Omega$
10 V	A, C, E, G	$\geq 2$ k $\Omega$

### Connection

- <sup>1)</sup> Other values on request.
- <sup>2)</sup> Curve E, F: Min. suppressed lower region is 0-20% of max input value.  
Curve G, H: Max. suppressed upper region is 80-100% of max input.
- <sup>3)</sup> Third digit in the type designation, shows type of auxiliary supply value.

### Auxiliary voltage

Unit <sup>3)</sup>	Voltage	Frequency	Burden
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

## Ordering form DI

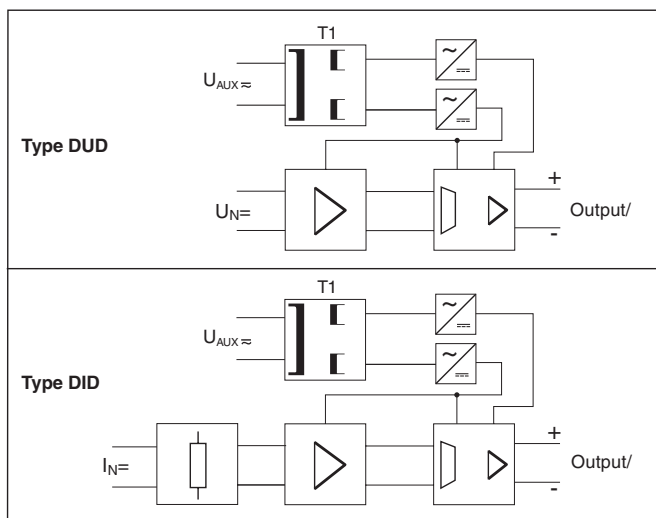
DI (Current AC)	Default	Example 1	Example 2
Type:		DI 125	DI 120
Accuracy:	cl. 0.5	0.5	0.5
Transf. ratio current:		100/5 A	100/5 A
Frequency:	50 Hz	50 Hz	50 Hz
Measuring range:		0-120 A	0-120 A
Input signal:		0-6 A	0-6 A
Output:		4-20 mA	0-20 mA
Output curve:		B	A
Response time:	300 ms	300 ms	300 ms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



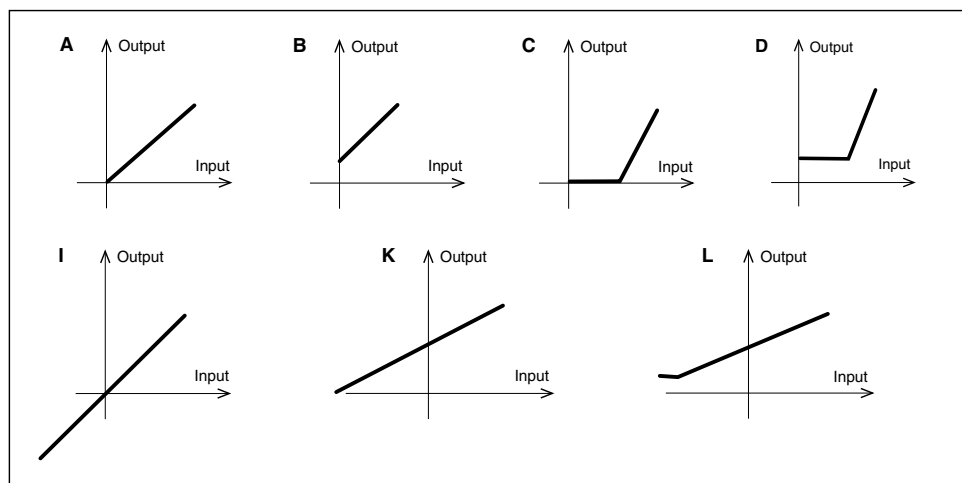
## Output data

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 %

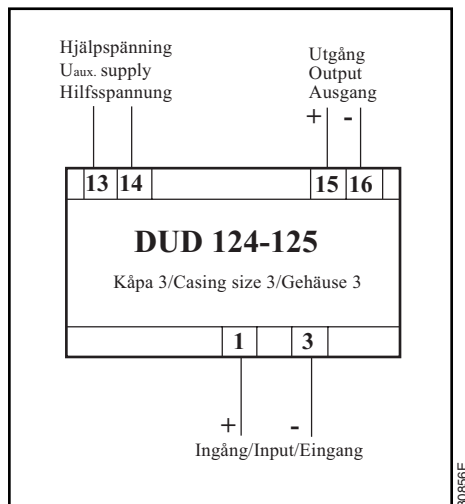
## General data

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 124 to 125, DC voltage

### Input data

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

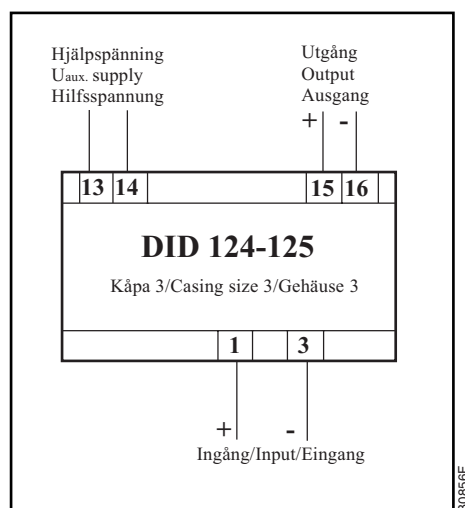
Output signal <sup>1)</sup>	Curve	Load resistance $R_L$
0 – 1 mA	A, B, C, D, I, K, L	0 – 15 k $\Omega$
0 – 2 mA	A, B, C, D, I, K, L	0 – 7.5 k $\Omega$
0 – 2,5 mA	A, B, C, D, I, K, L	0 – 6.0 k $\Omega$
0 – 5 mA	A, B, C, D, I, K, L	0 – 3.0 k $\Omega$
0 – 10 mA	A, B, C, D, I, K, L	0 – 1,5 k $\Omega$
0 – 20 mA	A, B, C, D, I, K, L	0 – 750 $\Omega$
4 – 20 mA	A, B, C, D, I, K, L	0 – 750 $\Omega$
0 – 1 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
0 – 2 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
0 – 5 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
0 – 10 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$

### Auxiliary voltage

Unit <sup>2)</sup>	Voltage	Frequency	Burden
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

<sup>1)</sup> Other values on request.

<sup>2)</sup> Third digit in the type designation, shows type of auxiliary supply.



Connection

## DID 124 to 125, DC current

### Input data

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

Output signal <sup>1)</sup>	Curve	Load resistance $R_L$
0 – 1 mA	A, B, C, D, I, K, L	0 – 15 k $\Omega$
0 – 2 mA	A, B, C, D, I, K, L	0 – 7.5 k $\Omega$
0 – 2,5 mA	A, B, C, D, I, K, L	0 – 6.0 k $\Omega$
0 – 5 mA	A, B, C, D, I, K, L	0 – 3.0 k $\Omega$
0 – 10 mA	A, B, C, D, I, K, L	0 – 1,5 k $\Omega$
0 – 20 mA	A, B, C, D, I, K, L	0 – 750 $\Omega$
4 – 20 mA	A, B, C, D, I, K, L	0 – 750 $\Omega$
0 – 1 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
0 – 2 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
0 – 5 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
0 – 10 V	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$

### Auxiliary voltage

Unit <sup>2)</sup>	Voltage	Frequency	Burden
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

<sup>1)</sup> Other values on request.

<sup>2)</sup> Third digit in the type designation, shows type of auxiliary supply.

## TRANSDUCERS DUD FOR DC VOLTAGE AND DID FOR DC CURRENT

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### Ordering form DUD

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

### Ordering form DID

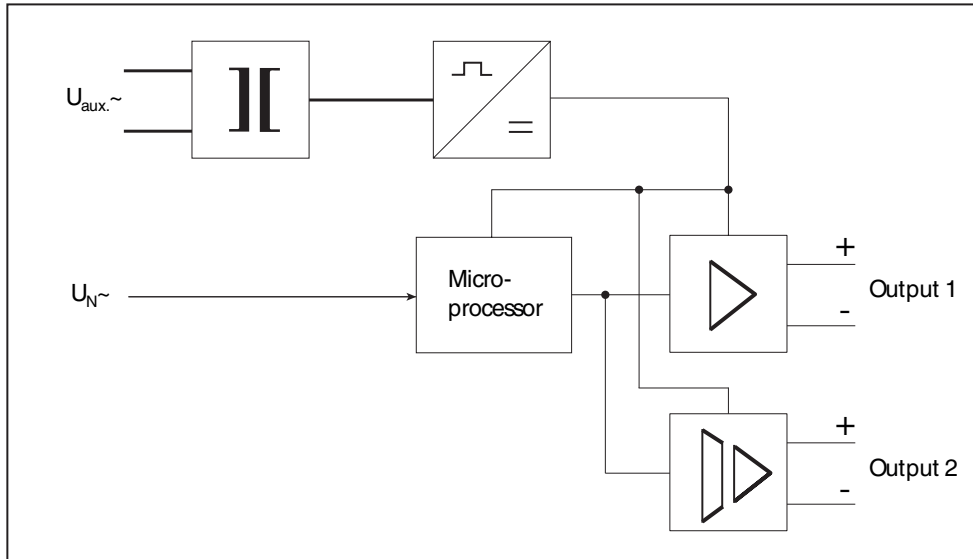
DID (Current DC)		Default	Example
Type:	<input type="text"/>		DID 124
Accuracy:	<input type="text"/>	cl. 0.5	0.5
Input signal:	<input type="text"/>		4-20 mA
Output:	<input type="text"/>		4-20 mA
Output curve:	<input type="text"/>		B
Response time:	<input type="text"/>	300 ms	300 ms
Auxiliary supply:	<input type="text"/>		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



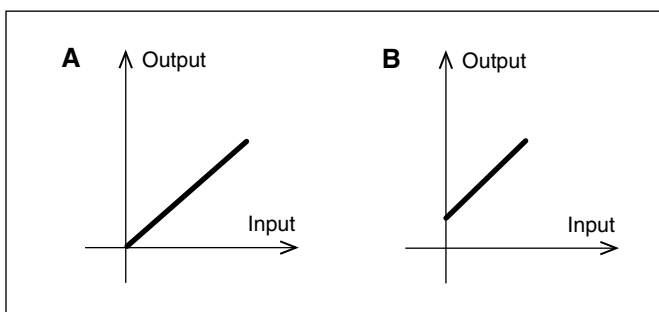
## Output

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

## General data

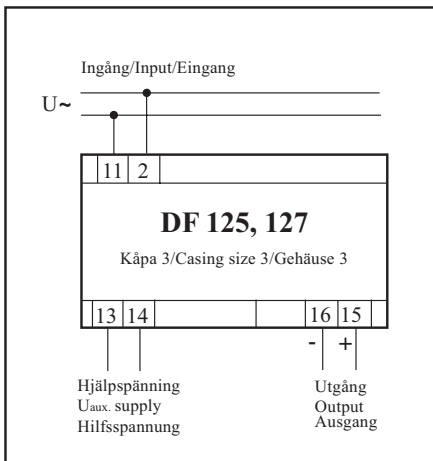
Working temp. range	-10 – +50°C
Function temp. range	-10 – +50°C
Storage temp. range	-20 – +60°C
Test voltage	3.75 kV, 50 Hz
Overload capacity	$U_N \times 2$ , rated for 1 sec

## Output signals



# TRANSDUCERS DF FOR FREQUENCY

## Connection single output



## DF 125, 127

### Input

Input voltage ( $U_N$ )	63.5...500 V
Working range	$(0.8 - 1.2) \times U_N$
Power consumption	< 0.5 VA

### Auxiliary supply

Voltage DF 125	80 – 276 V AC(45-65 Hz) / DC
Power consumption	< 8.0 VA/<4.0 W
Voltage DF 127	24 – 48 V DC( $\pm 20\%$ )
Power consumption	< 4.0 VA

### Measuring range

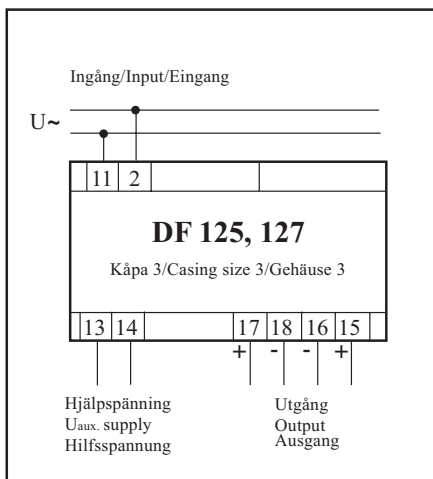
45 – 55 Hz

48 – 52 Hz

55 – 65 Hz

58 – 62 Hz

## Connection dual output



Output signal <sup>1)</sup>	Curve	Load resistance $R_L$
0 – 10 mA	A	0 – 600 $\Omega$
0 – 20 mA	A	0 – 600 $\Omega$
4 – 20 mA	B	0 – 600 $\Omega$
0 – 10 V	A	$\geq 2$ k $\Omega$
0 – 5 V	A	$\geq 2$ k $\Omega$
1 – 5 V	B	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

## Ordering form DF

DF (Frequency)	Default	Example
Type:		DF 125
Accuracy:	cl. 0.1	0.1
Measuring range:		48-52 Hz
Voltage:		110 V
Output 1:		0-10 mA
Output curve 1:		A
Output 2:		
Output curve 2:		
Auxiliary supply:		110 V DC



### Brief description

The Programmable Transducer type DPT has in a fully equipped version; four analogue channels for any instantaneous measured value, with a output signal of mA or V, galvanic insulated from each other and from the input signals , two digital pulse outputs for energy and a Modbus RTU with all measured values available.

Easy programmed with the belonging software CofigView connected with a standard USB cable. Available as ConfigView or as a ConfigView kit, software and USB cable.

The Transducer is meant for DIN rail mounting and has the dimensions 71 x 101,4 x 113,8 mm (h x w x d)

The Transducer is designed according to the standard IEC 60688 and reaches the accuracy class 0.2 or 0.5 as per your order.

All essential measuring values can be programmed to the outputs and are available through Modbus communication, the connection of the input signals can be freely programmed for single phase, 3 phase 3 wire as well as 3 phase 4 wire and for both balanced and unbalanced load.

Both input voltage and input current as well as auxiliary supply are of wide range type. See separate product presentation.

# 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 ( $\Delta\varphi = 0 - 360^\circ$ ) 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.

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

## 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

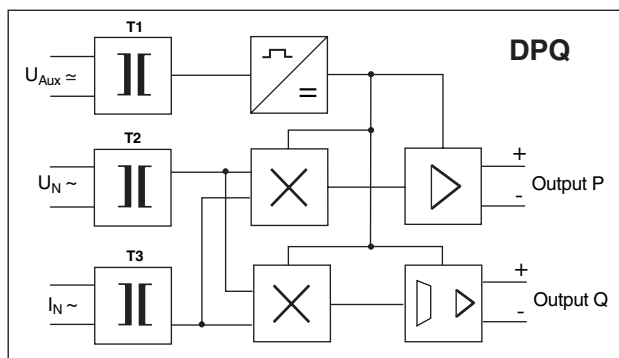
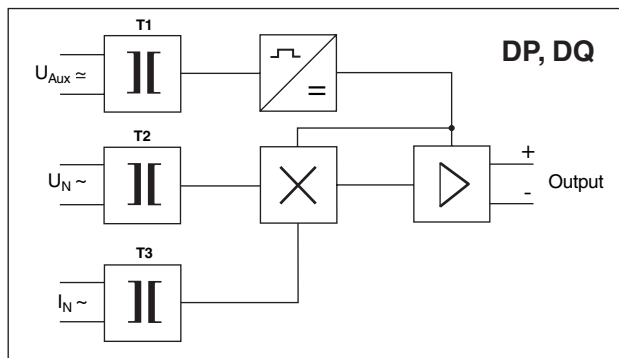
## Output data

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	$\leq 125\%$	$\leq 125\%$

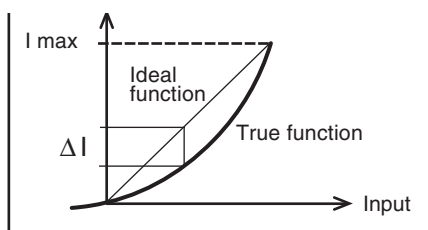
## Linearity

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.

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



Fundamental circuit



## TRANSDUCERS DP FOR ACTIVE POWER

### 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.

Designation	Number of measuring elements	System	Auxiliary supply	Casing size
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 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 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 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 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 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

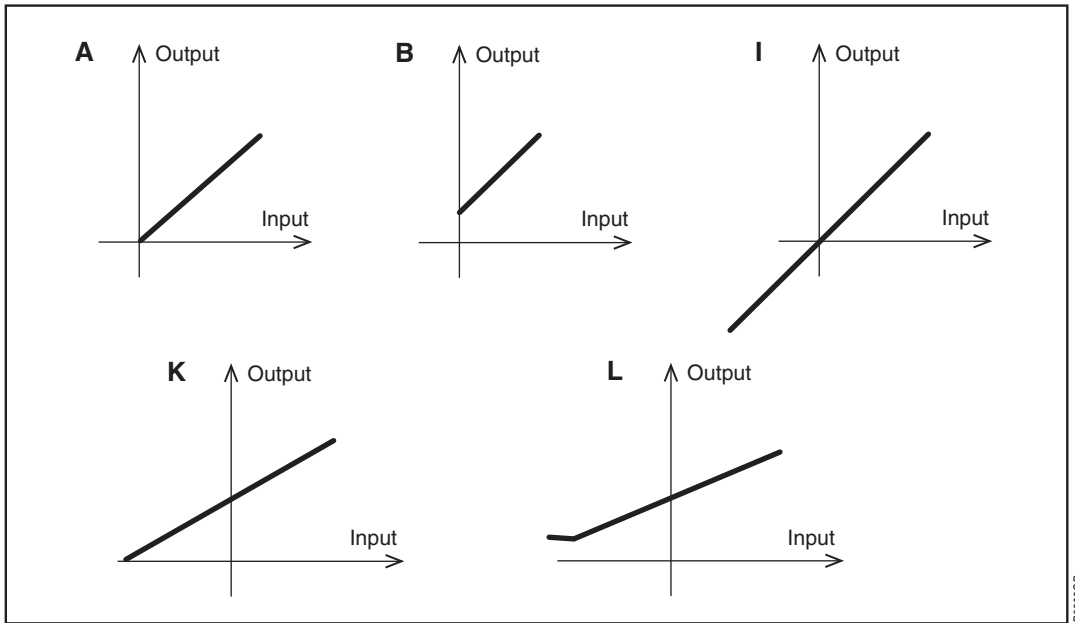
### Auxiliary voltage

Unit*)	Voltage	Frequency	Burden
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

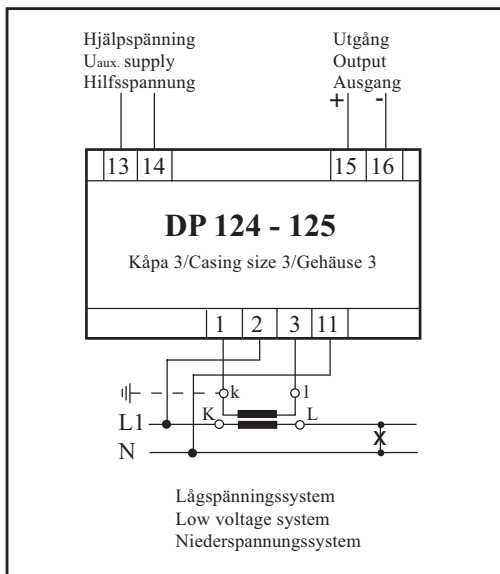
\*) Third digit in the type designation, shows type of auxiliary supply.

# TRANSDUCERS DP FOR ACTIVE POWER

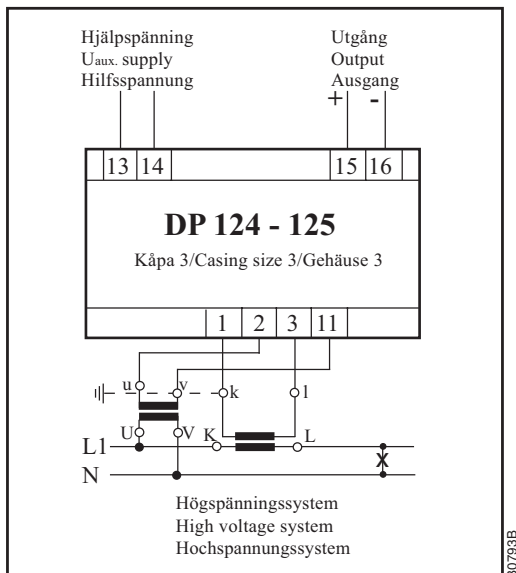
## Output signals



# TRANSDUCERS DP FOR ACTIVE POWER



Connection



Connection

## DP 124 to 125

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

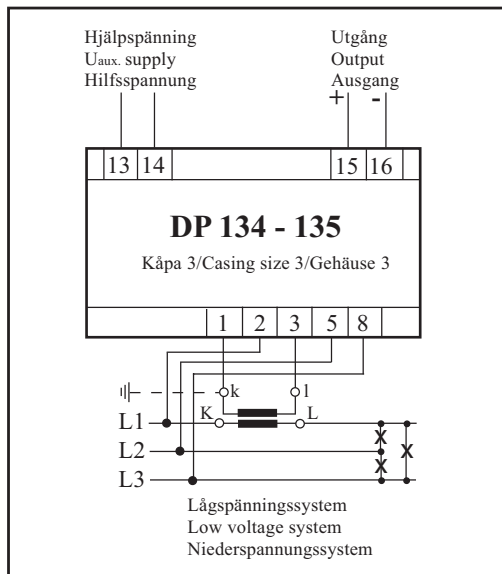
The maximum load resistance (at current output) is calculated from the formula:

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

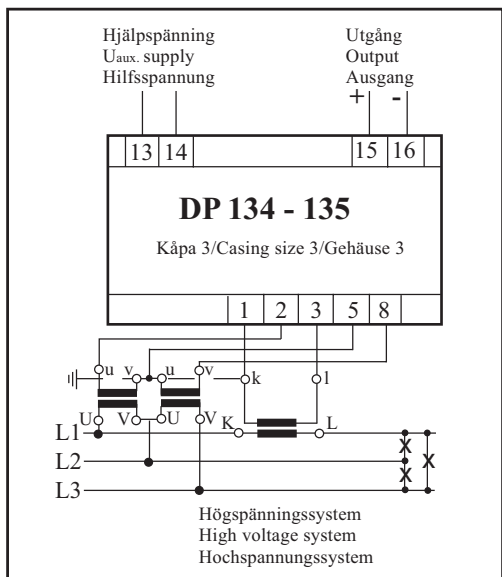
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DP FOR ACTIVE POWER



Connection



Connection

## DP 134 to 135

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

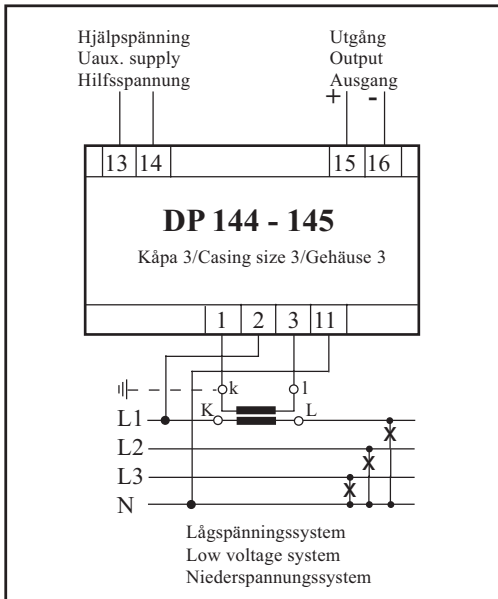
The maximum load resistance (at current output) is calculated from the formula:

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DP FOR ACTIVE POWER



Connection

B0794B

## DP 144 to 145

### Input data

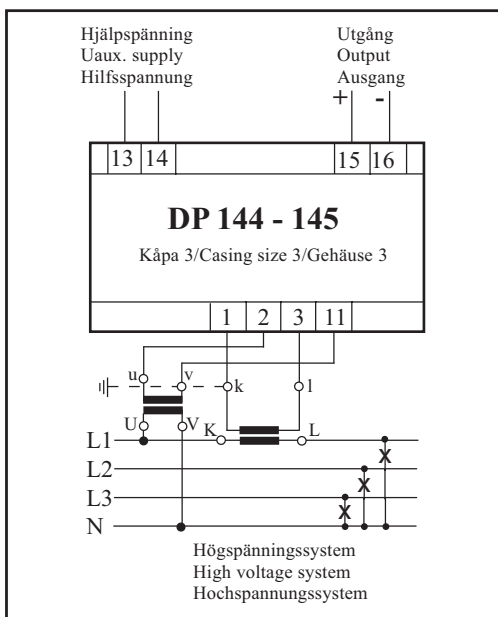
Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

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

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

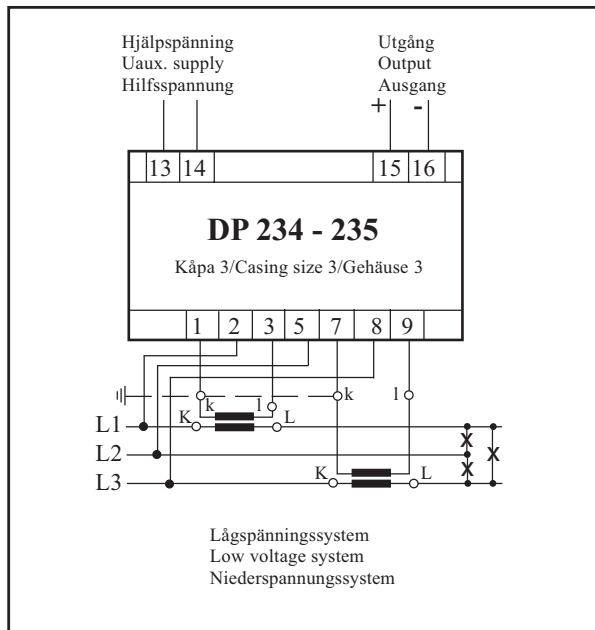
<sup>1)</sup> Other values on request.



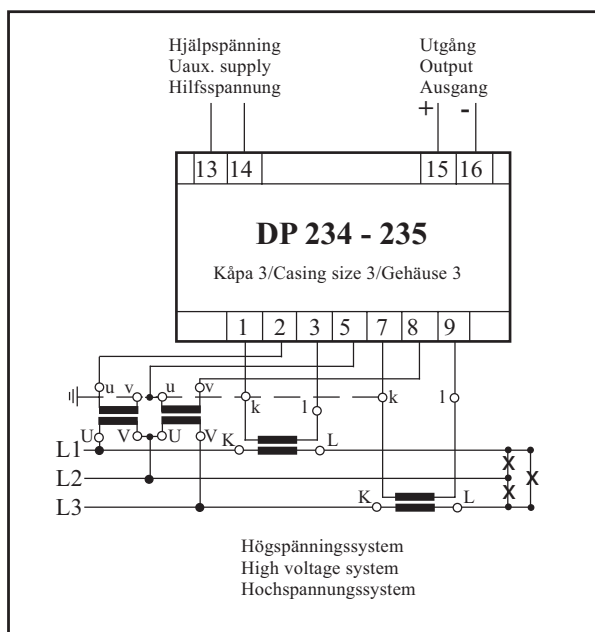
Connection

B0795B

# TRANSDUCERS DP FOR ACTIVE POWER



Connection



Connection

## DP 234 to 235

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

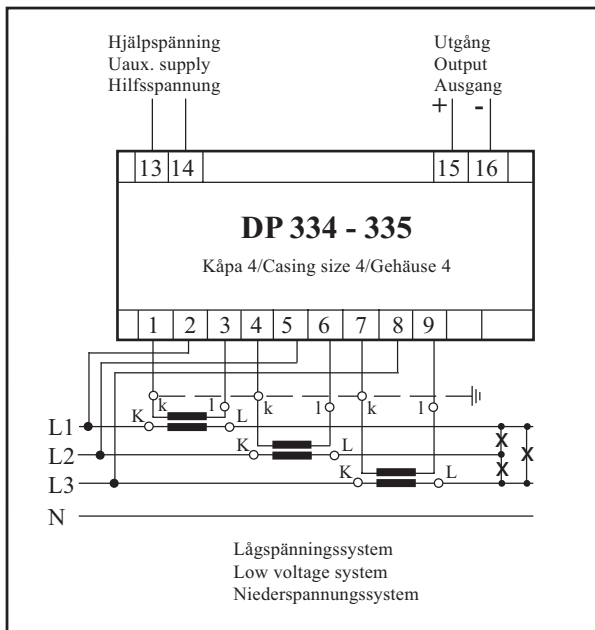
The maximum load resistance (at current output) is calculated from the formula:

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

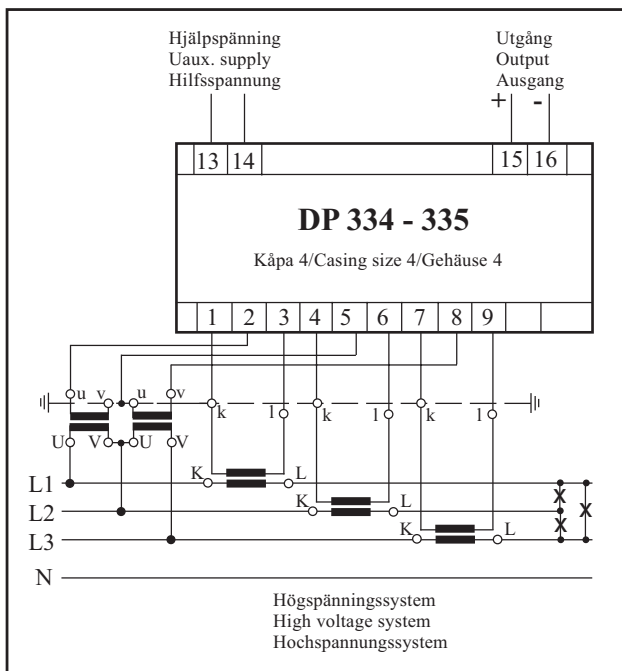
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DP FOR ACTIVE POWER



Connection



Connection

## DP 334 to 335

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

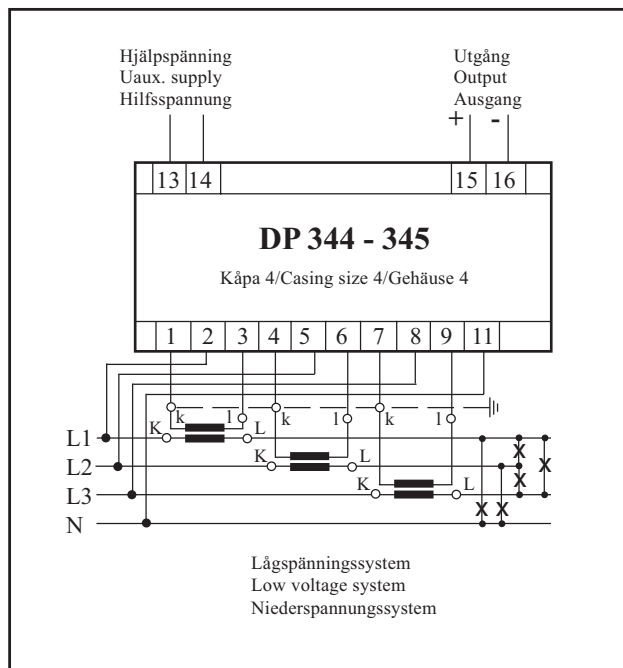
The maximum load resistance (at current output) is calculated from the formula:

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

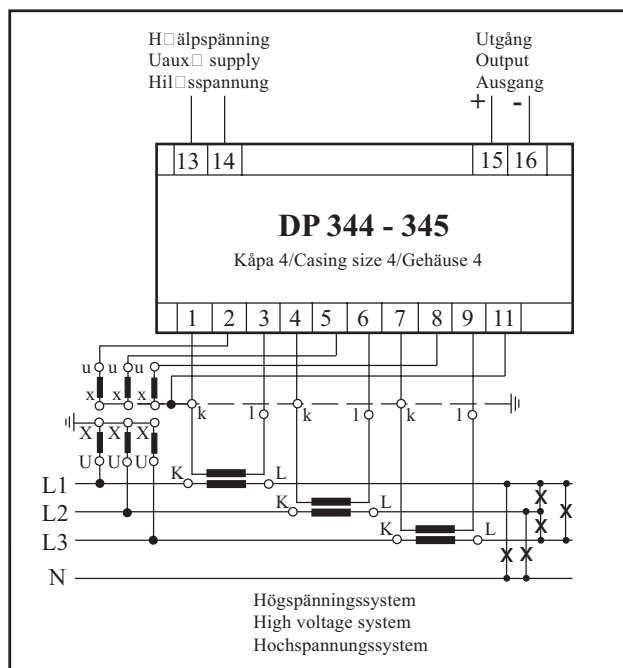
<sup>1)</sup> Other values on request.

# TRANSDUCCERS DP FOR ACTIVE POWER



Connection

B0800B



Connection

B0801B

## DP 344 to 345

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

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

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1,5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, KL	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

## TRANSDUCERS DP FOR ACTIVE POWER

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### 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

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### 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.

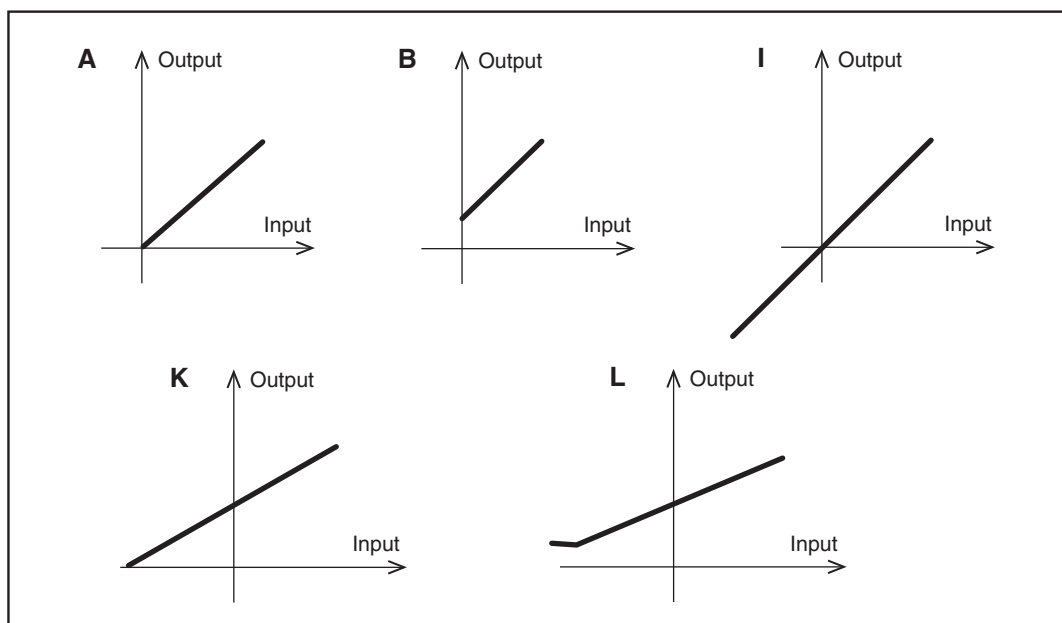
Designation	Number of measuring elements	System	Auxiliary supply	Casing size
DQ 134	1	1E, 3-wire, balanced load	18 – 80 V AC/DC	3
DQ 135	1	1E, 3-wire, balanced load	80 – 276 V AC/DC	3
DQ 234	2	2E, 3-wire, unbalanced load	18 – 80 V AC/DC	3
DQ 235	2	2E, 3-wire, unbalanced load	80 – 276 V AC/DC	3
DQ 334	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 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 <sup>*)</sup>	Voltage	Frequency	Burden
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

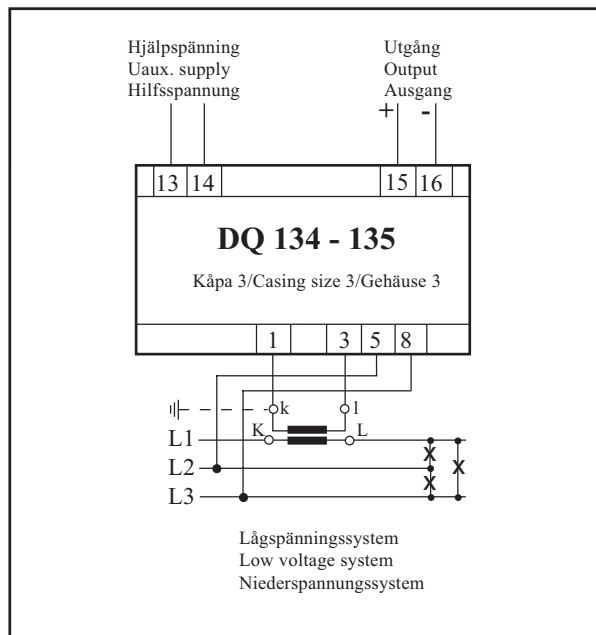
<sup>\*)</sup> Third digit in the type designation, shows type of auxiliary supply.

## Output signals



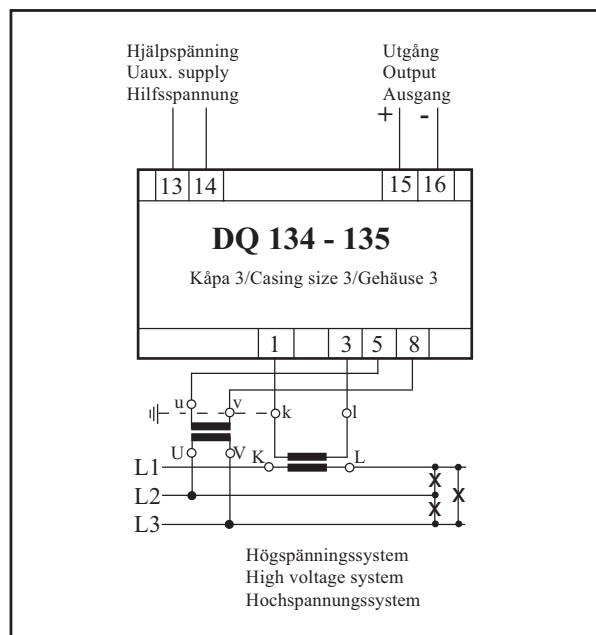
B0809GB

# TRANSDUCERS DQ FOR REACTIVE POWER



Connection

B0802B



Connection

B0803B

## DQ 134 to 135

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

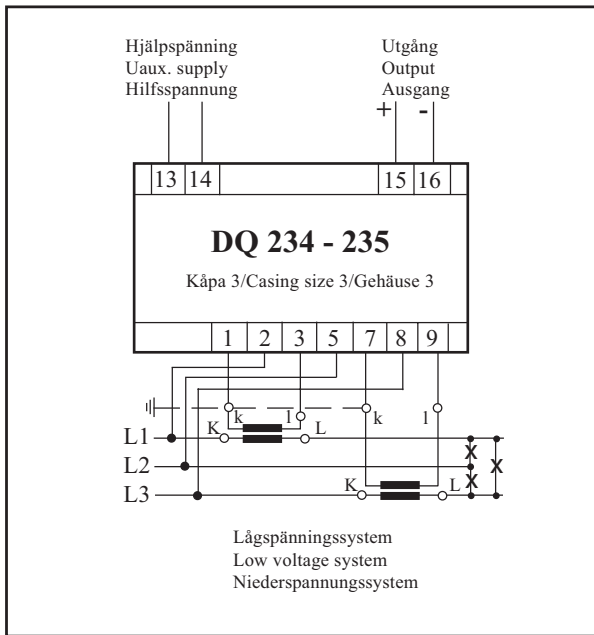
The maximum load resistance (at current output) is calculated from the formula:

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

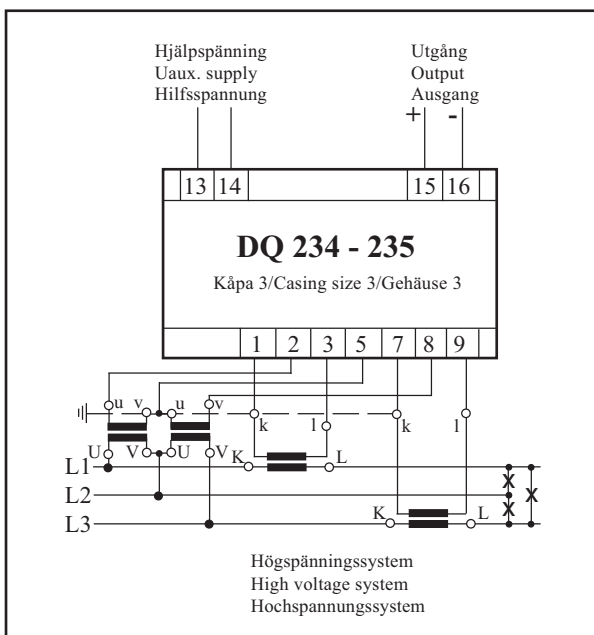
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DQ FOR REACTIVE POWER



Connection



Connection

## DQ 234 to 235

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

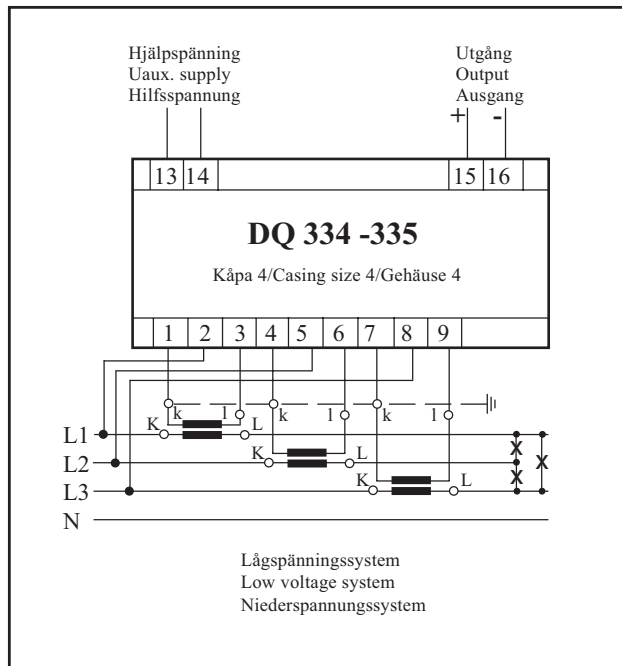
The maximum load resistance (at current output) is calculated from the formula:

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1,5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

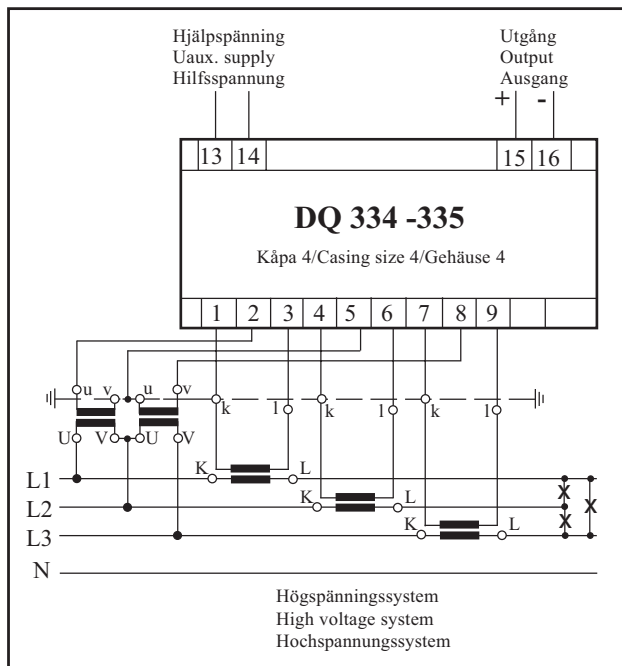
<sup>1)</sup> Other values on request.

# TRANSDUCERS DQ FOR REACTIVE POWER



Connection

B0853B



Connection

B0854B

## DQ 334 to 335

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

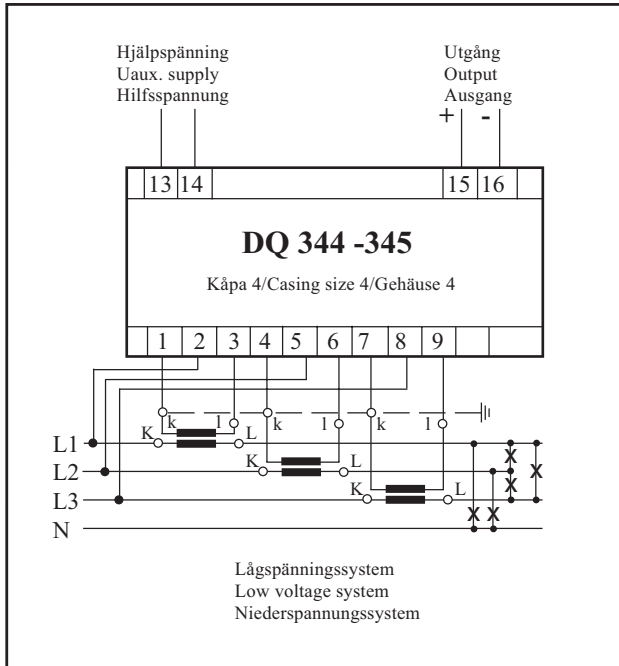
The maximum load resistance (at current output) is calculated from the formula:

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

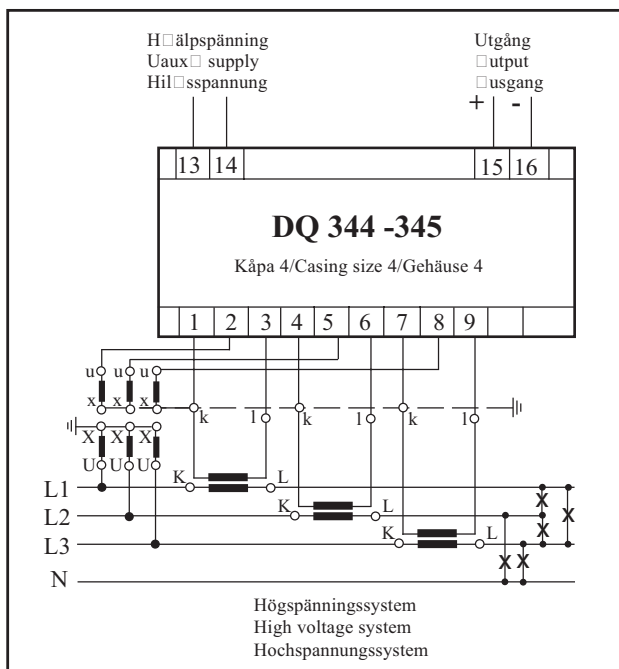
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1,5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DQ FOR REACTIVE POWER



Connection



Connection

## DQ 344 to 345

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
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:

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1,5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

## TRANSDUCERS DQ FOR REACTIVE POWER

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### Ordering form DQ

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

## TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER

### 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.

Designation	Number of measuring elements	System	Auxiliary supply	Casing size
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 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 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 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 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

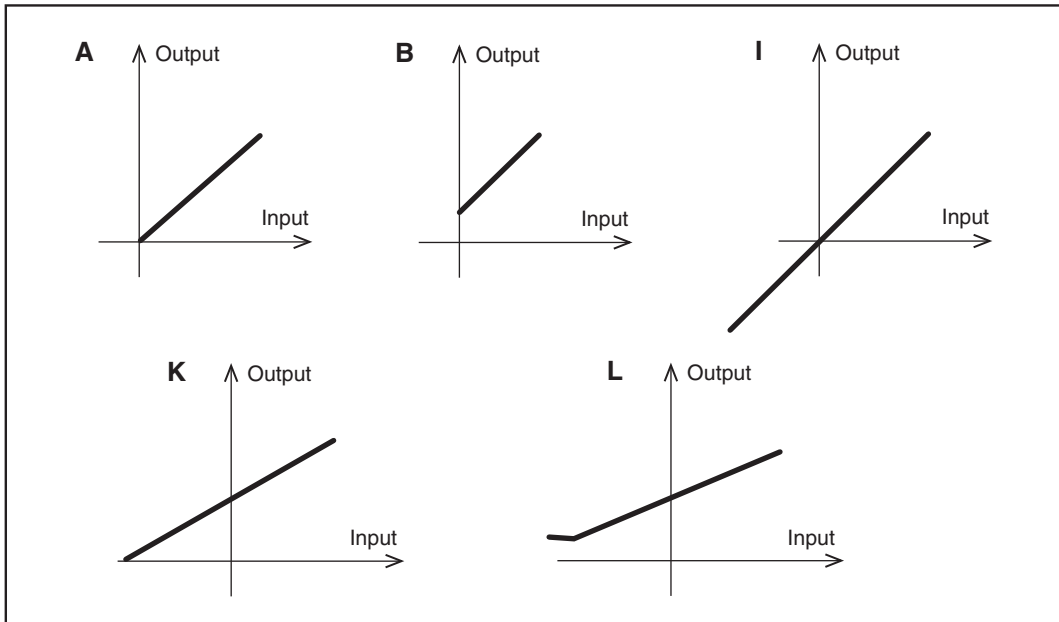
### Auxiliary voltage

Unit*)	Voltage	Frequency	Burden
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 designation, shows type of auxiliary supply.

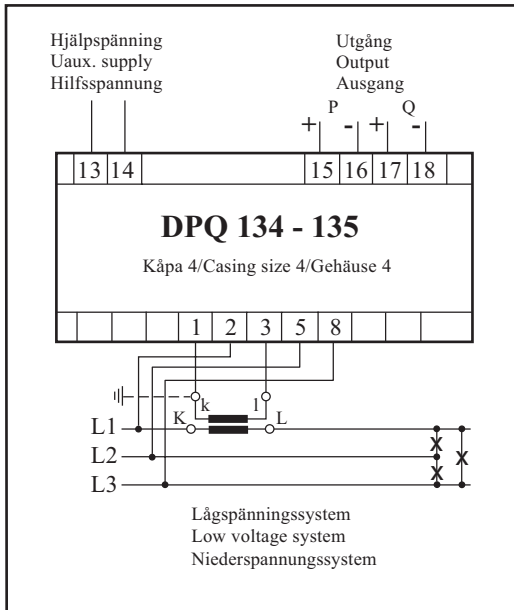
# TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER

## Output signals

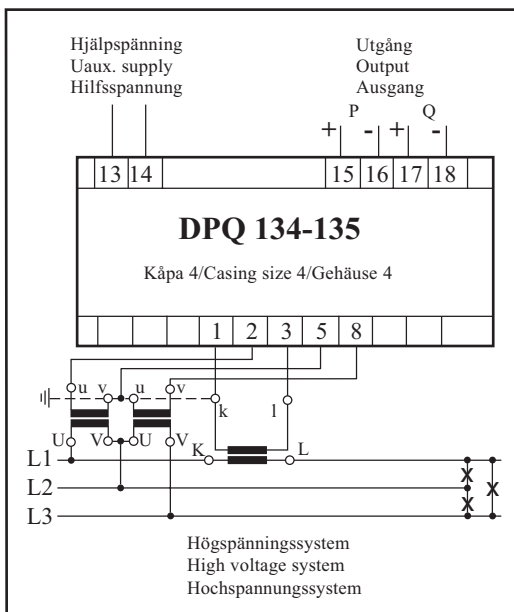


ENR09GB

# TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER



Connection



Connection

## DPQ 134 to 135

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	$16^{2/3}$ , 50, 60, 400 Hz

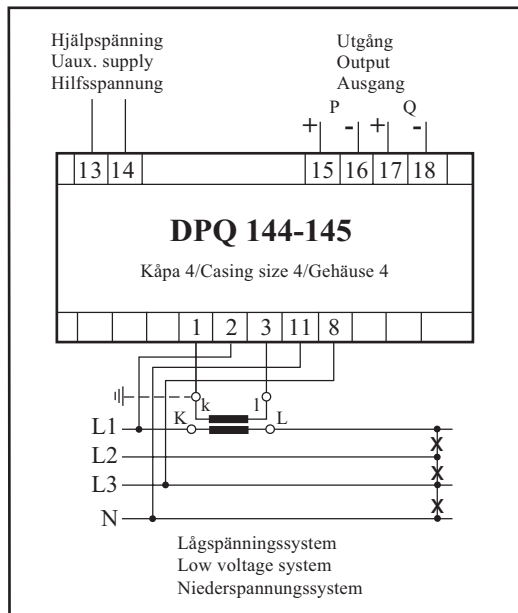
The maximum load resistance (at current output) is calculated from the formula:

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

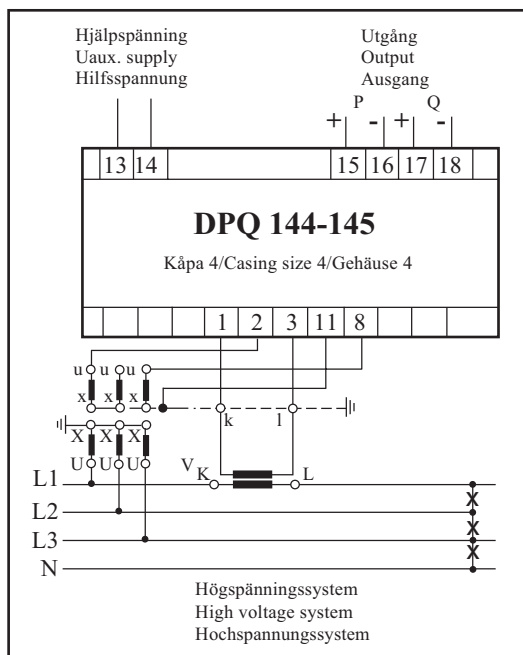
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCCERS DPQ FOR ACTIVE AND REACTIVE POWER



Connection



Connection

## DPQ 144 to 145

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

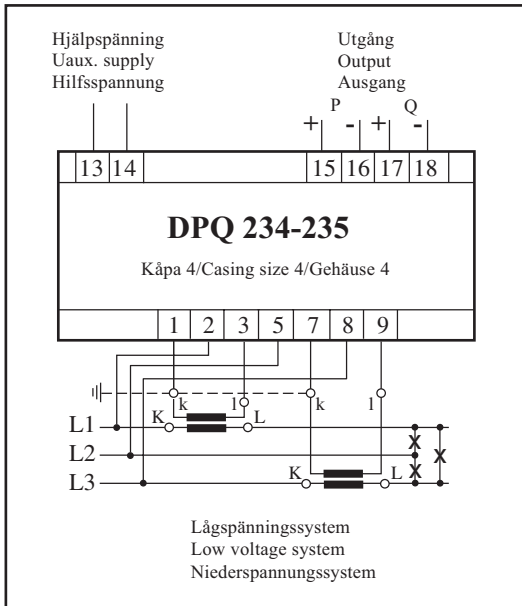
The maximum load resistance (at current output) is calculated from the formula:

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

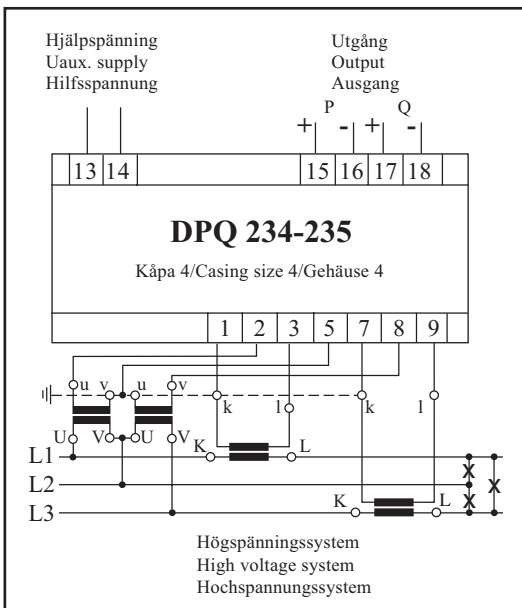
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER



Connection



Connection

## DPQ 234 to 235

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

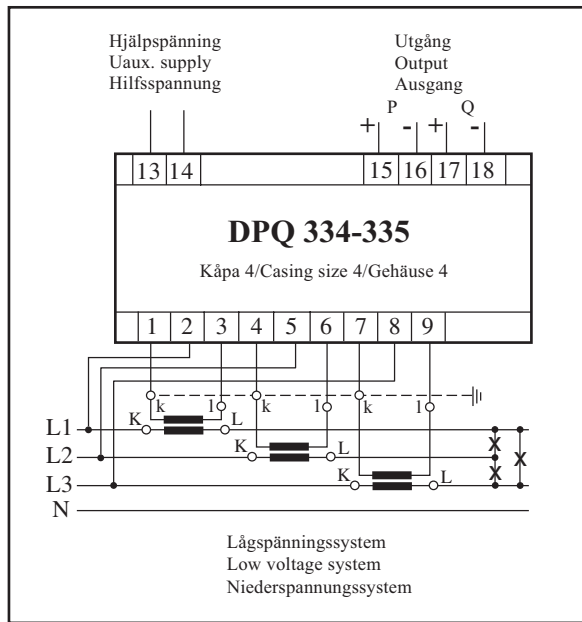
The maximum load resistance (at current output) is calculated from the formula:

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

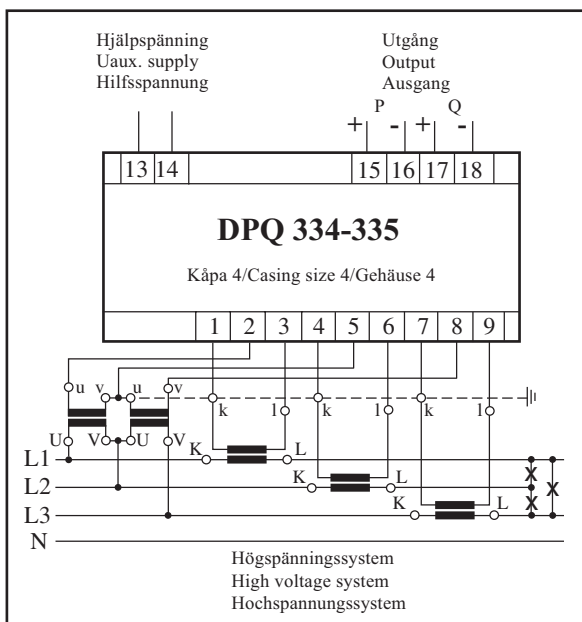
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCCERS DPQ FOR ACTIVE AND REACTIVE POWER



Connection



Connection

## DPQ 334 to 335

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

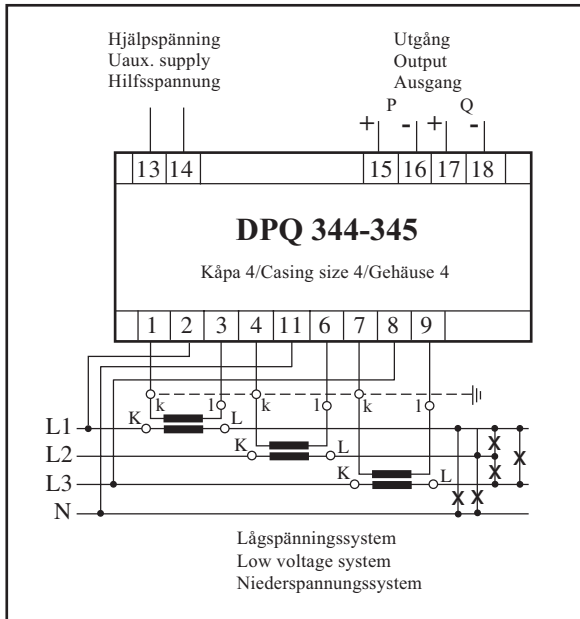
The maximum load resistance (at current output) is calculated from the formula:

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

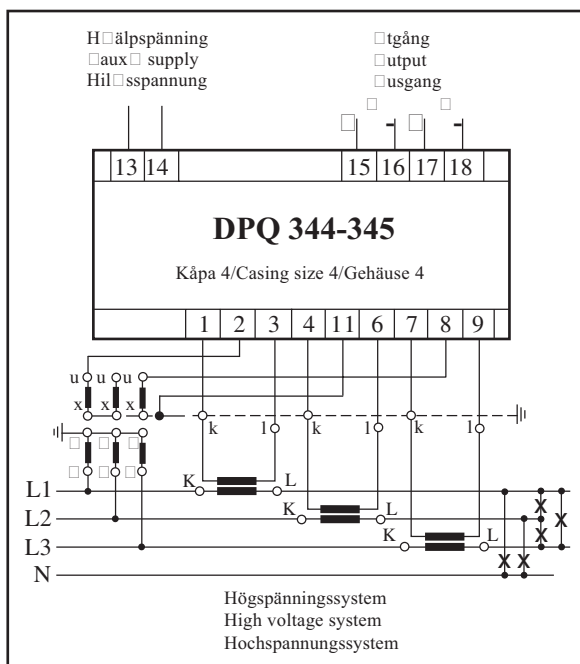
Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1,5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

# TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER



Connection



Connection

## DPQ 344 to 345

### Input data

Measurement voltage ( $U_N$ )	40 to 600 V <sup>1)</sup>
Internal consumption	1 mA per phase x $U_N$
Measurement current ( $I_N$ )	1, 2, 5 A <sup>1)</sup>
Internal consumption	<0.1 VA per phase
Frequency	16 <sup>2/3</sup> , 50, 60, 400 Hz

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

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

Output rated value <sup>1)</sup>	Output signal	Load resistance $R_L$
1 mA	A, B, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, I, K, L	0 – 7,5 k $\Omega$
2,5 mA	A, B, I, K, L	0 – 6 k $\Omega$
5 mA	A, B, I, K, L	0 – 3 k $\Omega$
10 mA	A, B, I, K, L	0 – 1,5 k $\Omega$
20 mA	A, B, I, K, L	0 – 750 $\Omega$
1 V	A, I, K	$\geq 2$ k $\Omega$
2 V	A, I, K	$\geq 2$ k $\Omega$
5 V	A, I, K	$\geq 2$ k $\Omega$
10 V	A, I, K	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

## TRANSDUCERS DPQ FOR ACTIVE AND REACTIVE POWER

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### 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

# TRANSDUCERS DR FOR RESISTANCE

## Type DR 134 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  $R_x$ .

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

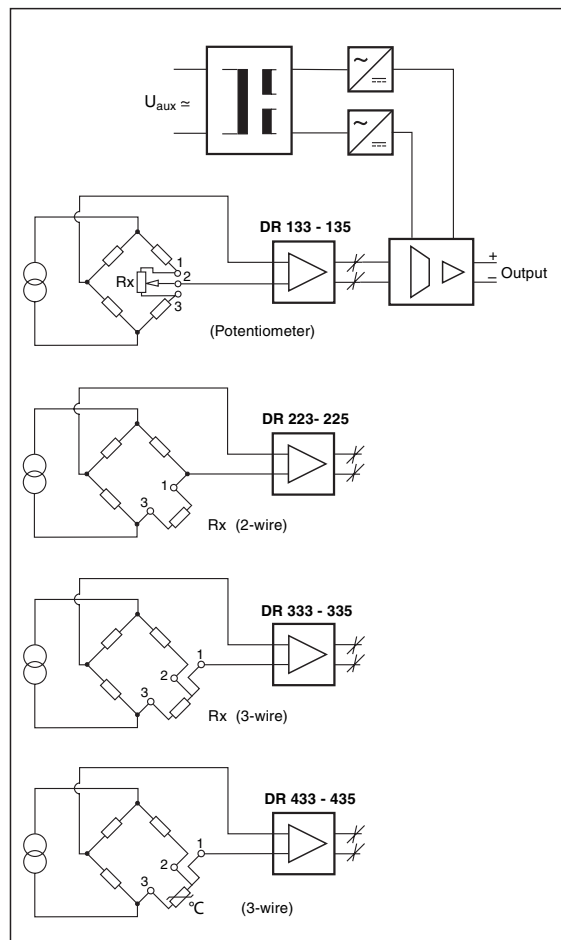
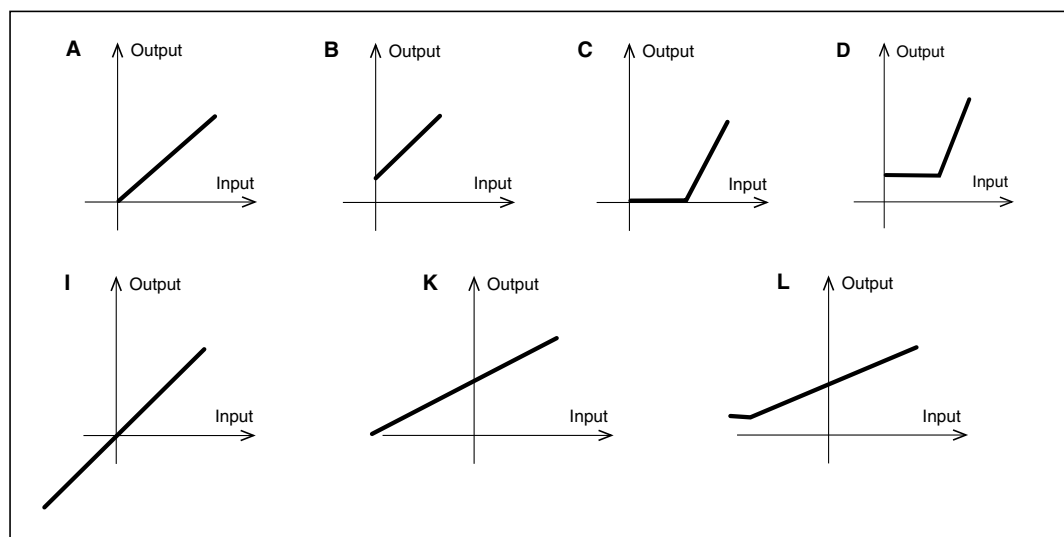
## Output data

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

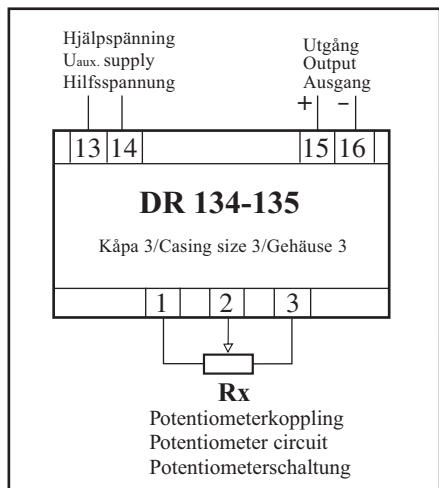
## Output signals



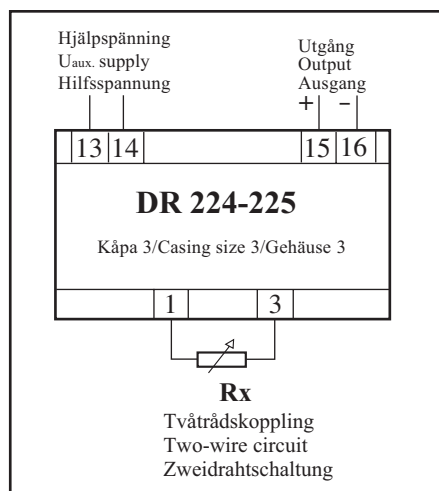
## Dimensions and weights

See page 58

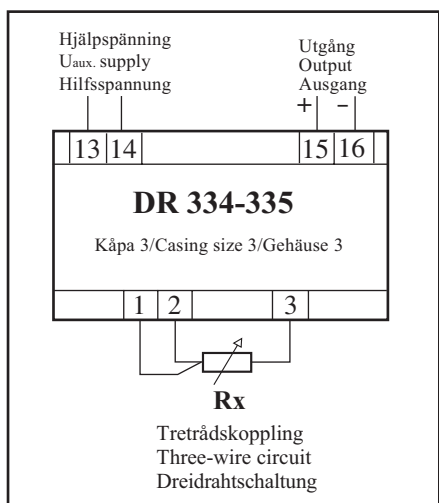
# TRANSDUCCERS DR FOR RESISTANCE



Connection



Connection



Connection

## DR 134 to 435

### Input data

Measuring range ( $R_x$ ) 0 – 100  $\Omega$ , ..... 0 – 10 k $\Omega$   
 Measuring current ( $I_{RX}$ ) 0,2 – 10 mA (measuring range 0 – 10 k $\Omega$ )  
 10 mA (measuring range 0 – 100  $\Omega$ )  
 3.5 – 5 mA (PT 100 sensor)

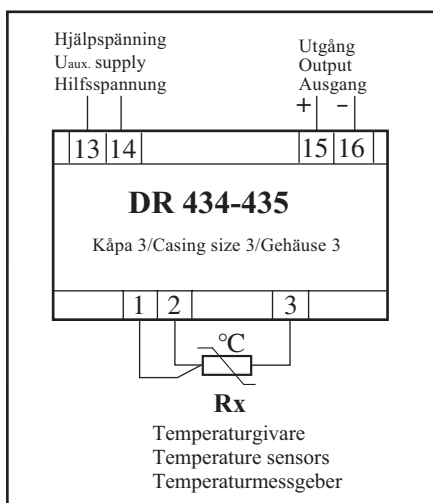
Output rated value <sup>1)</sup>	Output signal DR 134-335	Output signal DR 434-435	Load resistance $R_L$
1 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 15 k $\Omega$
2 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 7.5 k $\Omega$
2,5 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 6.0 k $\Omega$
5 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 3.0 k $\Omega$
10 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 1.5 k $\Omega$
20 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 750 $\Omega$
20 mA	A, B, C, D	A, B, C, D, I, K, L	0 – 750 $\Omega$
1 V	A, B, C, D	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
2 V	A, B, C, D	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
5 V	A, B, C, D	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$
10 V	A, B, C, D	A, B, C, D, I, K, L	$\geq 2$ k $\Omega$

<sup>1)</sup> Other values on request.

### Auxiliary voltage

Unit <sup>2)</sup>	Voltage	Frequency	Burden
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

<sup>2)</sup> Third digit in the type designation, shows type of auxiliary supply.



Connection

## TRANSDUCERS DR FOR RESISTANCE

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### Ordering form DR

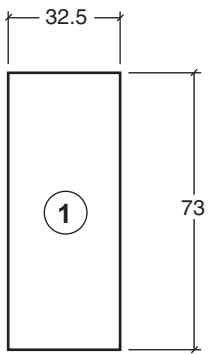
DR (Resistance DC)		Default	Example
Type:	<input type="text"/>		DR 134
Measurment principle	<input type="text"/>		Potentiometer
Accuracy:	<input type="text"/>	cl. 0.5	0.5
Input	<input type="text"/>		15x20 ohm
Measuring range:	<input type="text"/>		
Output:	<input type="text"/>		0-20 mA
Output curve: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

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

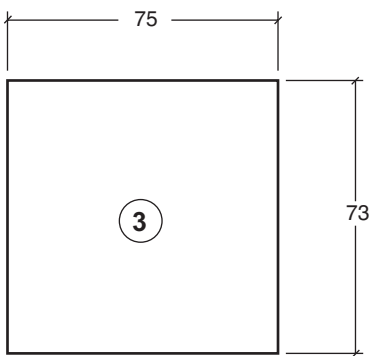
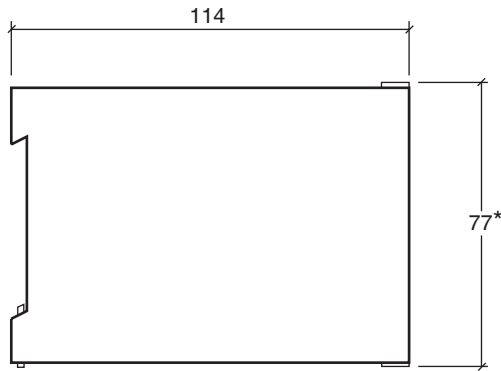
# DIMENSIONS AND WEIGHTS

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**Front view**

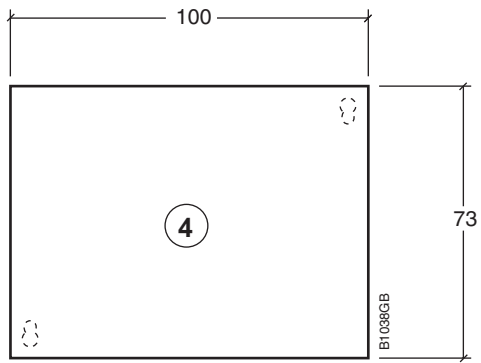


**Side view**



○ = *Casing size*

\* With terminal protection



## DIMENSIONS AND WEIGHTS

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Type	Weight g
DU 120	280
DU 121, DU 122	260
DU 124 – DU 125	340
DI 120	210
DI 121, DI 122	250
DI 124 – DI 125	450
DUD 124 – DUD 125	320
DID 124 – DID 125	350
DF 125, DF 127	<600
DP 124 – DP 145	480
DP 234 – DP 235	510
DP 334 – DP 345	610
DQ 134 – DQ 135	480
DQ 234 – DQ 235	510
DQ 334 – DQ 345	610
DPQ 134 – DPQ 235	420
DPQ 334 – DPQ 345	510
DR 134 – DR 435	330



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