Quality Management
ISO 9001:2008
▶ Voluntary participation in regular monitoring
DEKRA Certification
DEKRA certified

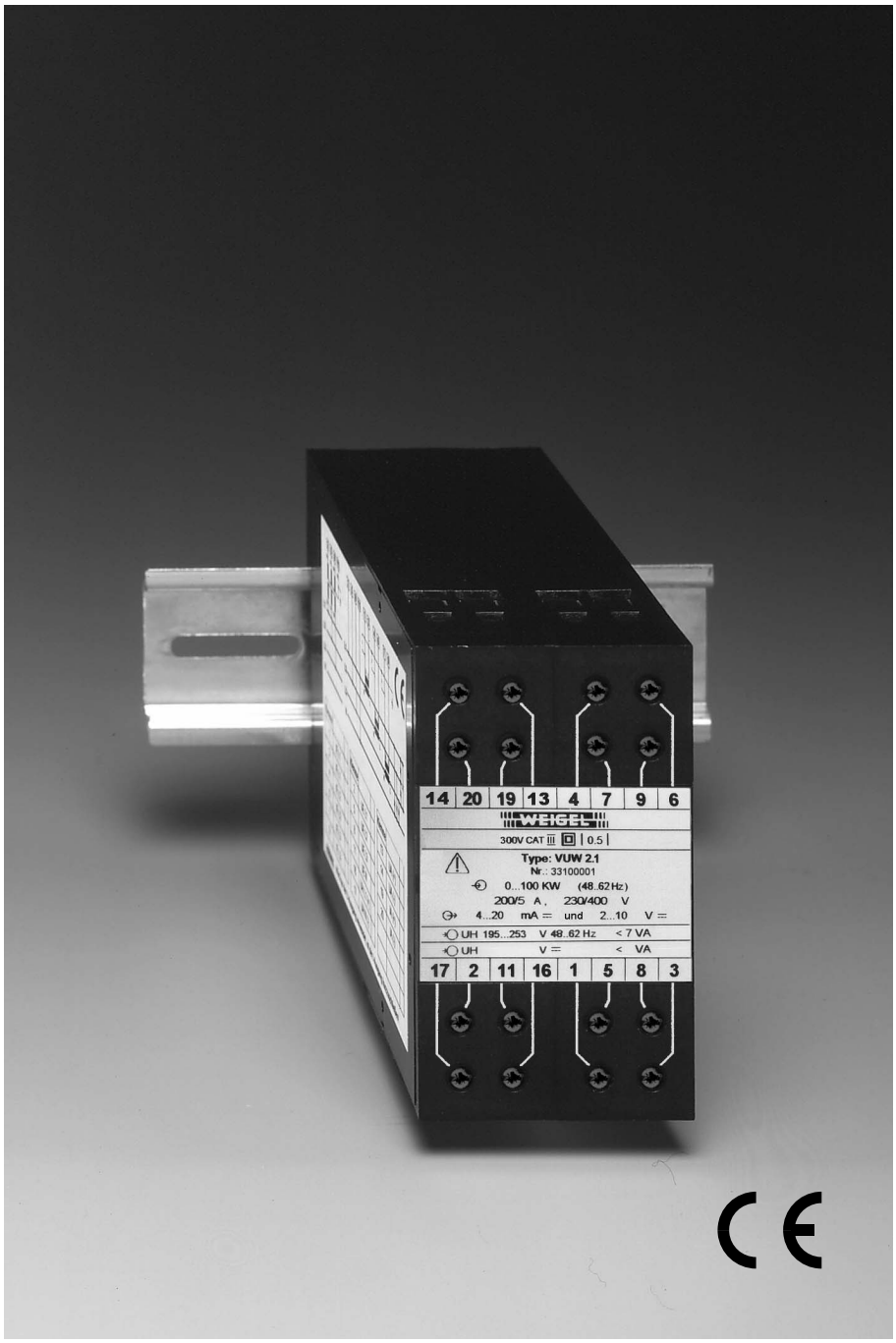
P/Q
=

Data Sheet

051.10e

Transducers for Active or Reactive Power in Systems with Unbalanced Load

DUW 2.1
DUB 2.1
VUW 2.1
VUB 2.1



WEIGEL

Application

The power transducer **2.1 series** in SMD technology and compact design convert all forms of **active or reactive power** polarity - true into a load independent DC current and voltage output which can be transmitted over a considerable distance and fed into indicators, recorders and/or control systems.

It is possible to connect more than one measuring, recording or control device to the output circuit provided the total impedance does not exceed the rating.

Power transducers require an auxiliary power supply. Inputs, outputs and power supply are **galvanically isolated from each other**. The outputs are **short - circuit proof** and **safe against idling**.

The transducers comply with safety requirements and are tested for interference immunity.

The transducers are designed to be mounted in machines/systems. Regulations for installation of electrical systems and equipment have to be observed.

Operating Principle

Transformers in the current circuits and dividers in the voltage circuits adapt the signals which are transferred to an A/D converter via multiplexer.

A **true 3 - phase** conversion of the current and voltage inputs guarantees an absolutely **correct measuring results** within the specified accuracy class, independent of the operating conditions of the power supply network.

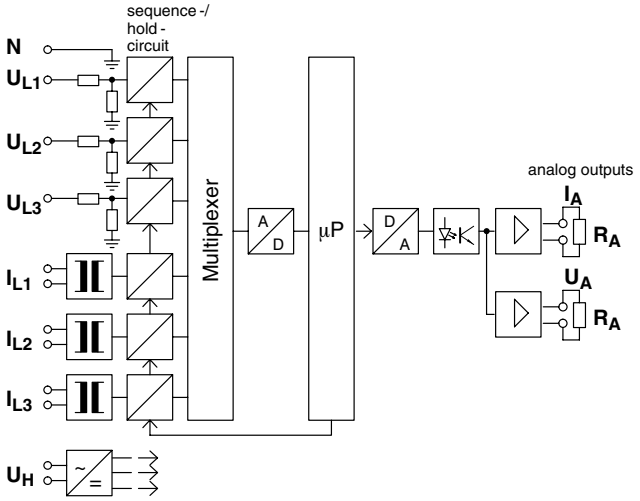
A microprocessor analyzes and multiplies the digitalized signal in real time. Depending on application and network structure, the output value desired will be computed from it producing a pulse - width modulated square signal proportional to the output value. An optocoupler provides galvanic isolation.

The output amplifier issues the output quantity as a load independent DC current and an impressed DC voltage.

The outputs *must not* be connected to each other.

Block Circuit Diagram

(3 - phase 4 - wire unbalanced load system)



For measurement in a 3 - phase 3 - wire unbalanced load system the current connection I_{L2} is not applicable.

➧ for other ratings refer to **Extras**

General Technical Data

case details	projecting case clamping to TH 35 DIN rail according to DIN EN 60 715
material of case	ABS/PC black self - extinguishing to UL rating 94 V–0
terminals	screw - terminals
wire cross - section	4 mm^2 max.
enclosure code	IP 40 case IP 20 terminals

dielectric test
2210 V all circuits to case
3536 V measuring circuit and auxiliary voltage to output
1330 V currents to each other and to voltages

operating voltage	300 V (rated voltage phase to zero)	
class of protection	II	
measurement category	CAT III	
pollution level	2	
dimensions WxHxL	45 mm x 80 mm x 115 mm	
weight approx.	**DUW/DUB 2.1** 0.29 kg	**VUW/VUB 2.1** 0.31 kg

Inputs

input rating	sinusoidal AC current and sinusoidal AC voltage

input quantity P_E	active power	reactive power
3 - phase 3 - wire system unbalanced load	**DUW 2.1**	**DUB 2.1**
3 - phase 4 - wire system unbalanced load	**VUW 2.1**	**VUB 2.1**

measuring range 0 ... P_N or $-P_N$ ... 0 ... P_N
P_N= (0.3 ... 1.5) · P_S

The apparent power P_S is calculated from primary ratings of current and voltage transformers:

3 - phase system $P_S = \sqrt{3} \cdot U \cdot I$

rated input voltage U_{EN} ➧
65 V, 100 V, 110 V, 240 V, 400 V, 415 V, 440 V, 500 V

rated input current I_{EN} ➧ N/1 A, N/5 A

operating voltage	519 V max.
modulation range	1.2 U_{EN} and 1.2 I_{EN}
overload limits	1.2 U_{EN}, 1.2 I_{EN} continuously 2 U_{EN}, 10 I_{EN} max. 1 s
frequency range	48 ... 52 Hz (50 Hz) ➧
power consumption	approx. 0.25 mA each voltage circuit $I^2 \cdot 0.01\ \Omega$ each current circuit

Outputs

current output

output current	I_A	load independent DC current
rated current	I_{AN}	0 (4) ... 20 mA or 0 ... 10 mA or 0 ... 5 mA ➧
load range	R_A	0 ... 500 Ω (based on 20 mA) 0 ... 1000 Ω (based on 10 mA) 0 ... 2000 Ω (based on 5 mA)
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 1%$_{rms}$ of I_{AN} with load R_A
idling voltage		≤ 15 V
current limitation		to approx. 120% of end value to 100 ... 140% of end value on request ➧
response time		approx. 500 ms

Quality Management ISO 9001:2008 ▸ Voluntary participation in regular monitoring DEKRA Certification DEKRA certified

P/Q =

Data Sheet

051.10e

Transducers for Active or Reactive Power in Systems with Unbalanced Load

voltage output

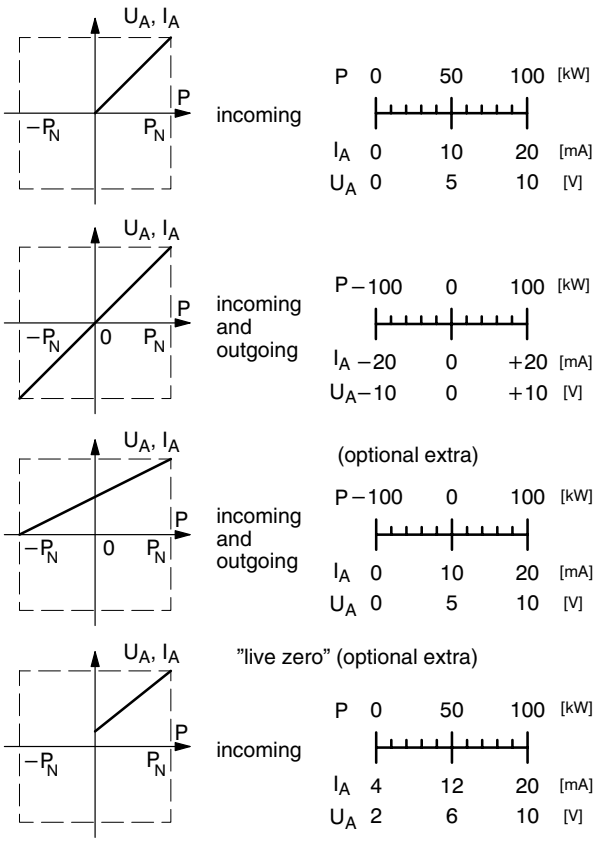
output voltage	U_A	load independent DC voltage
rated voltage	U_{AN}	0 (2) ... 10 V ⧫
load	R_A	≥ 4 kΩ
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 1%$_{rms}$ of U_{AN} with load $R_A = U_{AN} / 5$ mA
idling voltage		≤ 15 V
response time		approx. 500 ms

Also, bipolar output quantities are possible using power supply units **H4** and **H5** (e.g. –20 ... 0 ... 20 mA). ⧫

If the voltage output only will be used, short-circuit the current output !

Input and outputs are galvanically isolated.

Conversion Characteristics



Power Supply

power supply unit	auxiliary voltage	power consumption
H1 *)	230 V~ (195 ... 253 V), 48 ... 62 Hz	<7 VA
H2	115 V~ (98 ... 126 V), 48 ... 62 Hz	< 4 VA
H3	24 V= (20 ... 72 V)	< 3 VA
H4	20 ... 100 V= or 20 ... 70 V~	< 3VA
H5	90 ... 357 V= or 65 ... 253 V~	< 4 ... 7 VA

*) standard

Galvanic isolation between input, output and auxiliary voltage

⧫ for other ratings refer to **Extras**

Accuracy at Reference Conditions

accuracy **class 0.5** (±0.5% of end value)

temperature coefficient ≤ 0.02%/K

valid for standard products and a life-period of 1 year maximum

reference conditions

input voltage	U_{EN} ±0.5%
power factor	cos φ =1
frequency	50 Hz
wave form	sine wave, distortion factor ≤ 0.1%
auxiliary voltage	U_{HN} ±1%, 48 ... 62 Hz
ambient temperature	23°C ±1K
warm-up	≥ 5 min

Environmental

climatic suitability	climatic class 3 to VDE/VDI 3540 sheet 2
operating temperature range	–10 ... +55°C
storage temperature range	–25 ... +65°C
relative humidity	≤ 75% annual average, non-condensing

Rules and Standards

DIN EN 60 529	Enclosure codes by housings (IP-code)
DIN EN 60 688	Electrical measuring transducers converting AC quantities into analog or digital signals
DIN EN 60 715	Dimensions of low voltage switching devices: standardized DIN rails for mechanical fixation of electrical devices in switchgears
DIN EN 61 010-1	Safety requirements for electrical measuring, control and laboratory equipment Part 1: General requirements
DIN EN 61 326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: General requirements
VDE/VDI 3540 sheet 2	Reliability of measuring and control equipment (classification of climates for equipment and accessories)

Extras (on Request)

input ratings

rated current I_{EN}	deviating from standard inputs ranging from 0 ... (0.5 A ... I_{EN} ... 5 A)
rated voltage U_{EN}	deviating from standard inputs ranging from 0 ... (60 V ... U_{EN} ... 519 V)
frequency range	$16^2/_3$ Hz, 60 Hz,100 Hz, others on request

output ratings

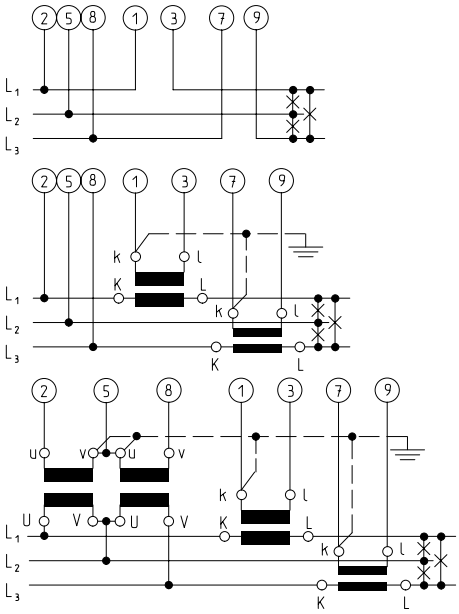
output I_A, U_A	4 ... 20 mA, 2 ... 10 V (”live zero”) 0 ... 10 ... 20 mA, 0 ... 5 ... 10 V

output current limitation to 100 ... 140% of end value

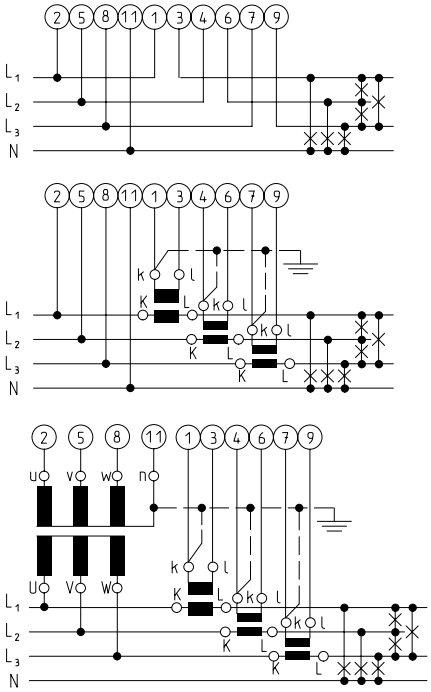
Connections

inputs

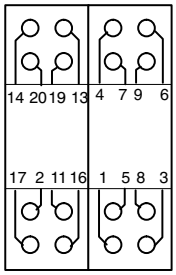
DUW/DUB 2.1



VUW/VUB 2.1



Terminals



No.	Function	Transducer	DUW/DUB	VUW/VUB
1	I_E L1	input current ON	X	X
3	I_E L1	input current OFF	X	X
4	I_E L2	input current ON	–	X
6	I_E L2	input current OFF	–	X
7	I_E L3	input current ON	X	X
9	I_E L3	input current OFF	X	X
2	U_E L1	input voltage	X	X
5	U_E L2	input voltage	X	X
8	U_E L3	input voltage	X	X
11	U_E N	input voltage	–	X
13	U_A (+)	output positive	X	X
14	U_A (–)	output negative	X	X
19	I_A (+)	output positive	X	X
20	I_A (–)	output negative	X	X
16	U_H L1(+)	auxiliary voltage	X	X
17	U_H N (–)	auxiliary voltage	X	X

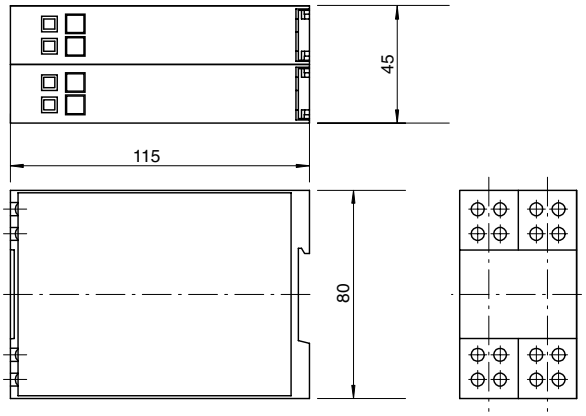
I_E current input
U_E voltage input
The terminal numbering correspond to details in the connection diagrams (to DIN 43 807).

I_A current output
U_A voltage output

U_H auxiliary voltage input

Dimensions

side view front view



(dimensions in mm)

Quality Management ISO 9001:2008
▶ Voluntary participation in regular monitoring
DEKRA Certification
DEKRA certified

P/Q =

Data Sheet

051.10e

Transducers for Active or Reactive Power in Systems with Unbalanced Load

Ordering Guide

type	Transducers for Watts or VARs
	Active Power
DUW 2.1	3-phase 3-wire system unbalanced load
VUW 2.1	3-phase 4-wire system unbalanced load
	Reactive Power
DUB 2.1	3-phase 3-wire system unbalanced load
VUB 2.1	3-phase 4-wire system unbalanced load
	current input
N/1	1 A
N/5	5 A
xx	special current input **)
	voltage input
65	65 V
100	100 V
110	110 V
240	240 V
400	400 V
415	415 V
440	440 V
500	500 V
xxx	special voltage input **)
	measuring range
xxx	to be specified
	input frequency range
F50	48 ... 52 Hz (50 Hz) *)
F60	58 ... 62 Hz (60 Hz) *)
F16	15 ... 18 Hz ($16^2/_3$ Hz)
F100	98 ... 102 Hz (100 Hz)
Fxxx	special frequency **)
	output
11	0 ...20 mA and 0 ... 10 V
12	0 ...10 mA and 0 ... 10 V
13	0 ... 5 mA and 0 ... 10 V
14	4 ...20 mA and 2 ... 10 V
15	–20 ... 0 ... 20 mA and –10 ... 0 ... 10 V ***)
10	special output **)
	auxiliary supply
H1	AC 230 V (195 ... 253 V), 48 ... 62 Hz *)
H2	AC 115 V (98 ... 126 V), 48 ... 62 Hz
H3	DC 24 V (20 ... 36 V)
H4	DC 20 ... 100 V / AC 20 ... 70 V
H5	DC 90 ... 357 V / AC 65 ... 253 V

*) standard
**) on request, please clearly add the desired specifications.
***) only available with **H4** or **H5**

ordering example

VUW 2.1	250/5	400	125kW	F50	11	H1

Watt transducer (active power), input current 250/5 A,
input voltage 400 V, measuring range 0 ... 125 kW, frequency 50 Hz,
output 0 ... 20 mA and 0 ... 10 V, auxiliary supply 230 V AC

Weigel Meßgeräte GmbH

Postfach 720154 • 90241 Nürnberg • Phone: 0911/42347-0
Erlenstraße 14 • 90441 Nürnberg • Fax: 0911/42347-39
Sales: Phone: 0911/42347-94
Internet: http://www.weigel–messgeraete.de
e–mail: vertrieb@weigel–messgeraete.de

– specifications subject to change without notice; date of issue 12/10 –
– valid for series no. 33100000 and higher –

WEIGEL