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

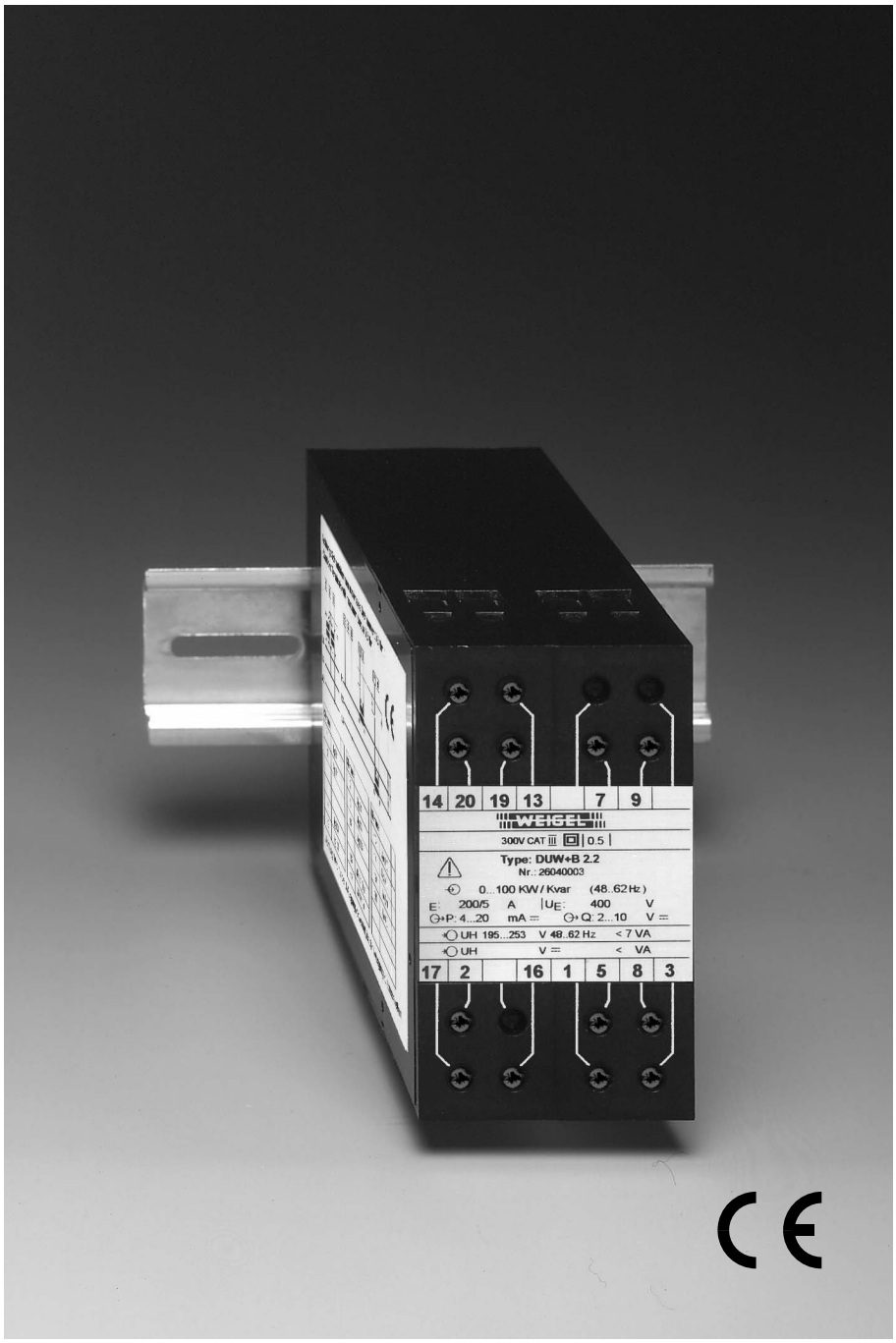
P+Q
=

Data Sheet

066.8e

Transducers for Active *and* Reactive Power

EW+B 2.2
DGW+B 2.2
VGW+B 2.2
DUW+B 2.2
VUW+B 2.2



WEIGEL

Application

The **E/DG/VG/DU/VU W+B 2.2** power transducers convert all forms of **active *and* reactive power** polarity-true into a load independent DC current or an impressed DC voltage. The output signal can be indicated, recorded and/or used for controlling directly at the test point or in measuring facilities located far away.

The range of active and reactive power transducers includes all types both for **single-phase** AC (**EW+B 2.2**) and **3-phase 3-wire** or **3-phase 4-wire** power supply systems of **balanced** or **unbalanced** loads **(DGW+B 2.2, VGW+B 2.2** or **DUW+B 2.2, VUW+B 2.2)**.

It is possible to connect more than one indicator, recorder, controller, computer etc. to the output circuit provided the total impedance does not exceed the rating.

Power supply is effected by a separate auxiliary voltage input. Inputs, output and auxiliary voltage input are **galvanically isolated from each other**. The output is **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 required output value is computed and transferred to a D/A converter which passes the signal via an optocoupler for galvanic isolation to the output stages.

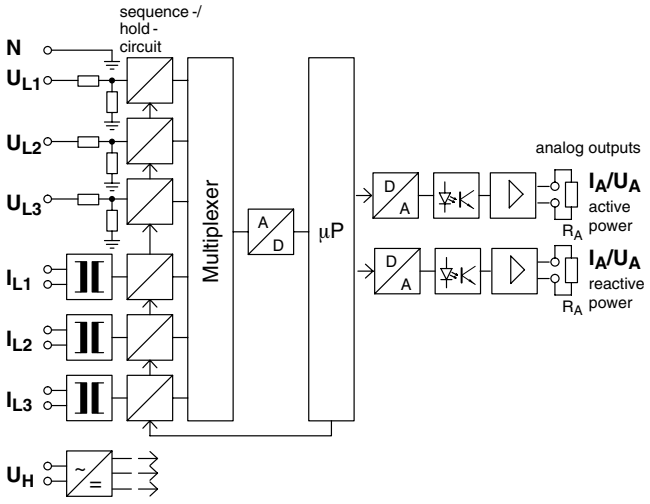
The output amplifier issues the output quantity as a load independent DC current and an impressed DC voltage.

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

Optionally, the measured value can be inquired via a **serial interface (RS232/RS485)**, also switching signal can be produced. ⧫

Block Circuit Diagram

(3-phase 4-wire unbalanced load system)



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	EW+B 2.2 DGW+B 2.2 VGW+B 2.2	DUW+B 2.2	VUW+B 2.2
approx.	0.27 kg	0.29 kg	0.31 kg

Inputs

input quantity	sinusoidal AC current and sinusoidal AC voltage
measurable quantity P_E	active and reactive power

type

single-phase AC system	**EW+B 2.2**
3-phase 3-wire system balanced load	**DGW+B 2.2**
3-phase 4-wire system balanced load	**VGW+B 2.2**
3-phase 3-wire system unbalanced load	**DUW+B 2.2**
3-phase 4-wire system unbalanced load	**VUW+B 2.2**

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:

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

rated input voltage U_{EN} ⧫	0 ... 50-519 V
rated input current I_{EN} ⧫	0 ... 0,5-5 A
operating voltage	519 V max.
modulation range	1.2 U_{EN} *or* 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 ... 62 Hz ⧫
power consumption	approx. 0.25 mA each voltage circuit $I^2 \cdot 0.01\ \Omega$ each current circuit

⧫ extras on request

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

P+Q =

Data Sheet

066.8e

Transducers for Active *and* Reactive Power

Outputs

current output

output current	I_A	load independent DC current (0 ... 20 mA) ⧫
rated current	I_{AN}	0 ... 20 mA or 4 ... 20 mA
load range	R_A	0 ... 10 V / I_{AN}
current limitation		to approx. 120% of end value to 100 ... 140% of end value on request ⧫

voltage output

output voltage	U_A	impressed DC voltage (0 ... 10 V) ⧫
rated voltage	U_{AN}	0 ... 10 V or 2 ... 10 V
load	R_A	≥ 4 kΩ

load error	≤ 0.1% based on 50% load change
residual ripple	≤ $1\%_{rms}$
response time	approx. 500 ms
idling voltage	≤ 15 V

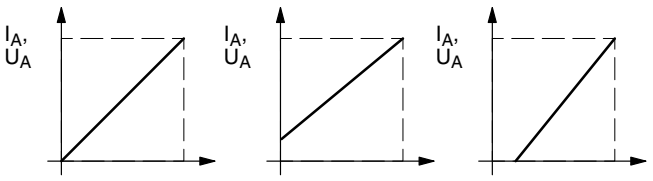
Also, bipolar output quantities are possible using power supply units **H4** and **H5** (e.g. –20 ... 0 ... 20 mA). ⧫

Input and outputs are galvanically isolated.

Conversion Characteristics

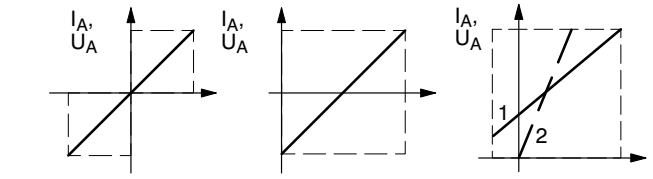
examples

standard ”live zero”



measurement quantities (equal active and reactive power ranges)

incoming and outgoing bipolar output option



measured quantities (equal active and reactive power ranges)

measured quantities (**not** equal active and reactive power ranges); example:
1 active power –10 ... 0 ... 100 kW / 4 ... 20 mA
2 reactive power
0 ... 50 kvar / 0 ... 10 V

Auxiliary 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

⧫ extras on request

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 ... 60 Hz
wave form	sine curve, 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)

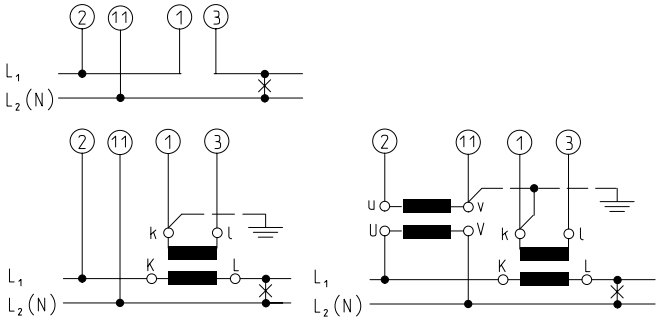
Extras (on Request)

- with kinked characteristic curve
- with switching output
- with output limitation
- with RS232 and RS485 interface (to be used alternatively) to digitally inquire different measuring values
- frequency range 15 ... 18 Hz, 98 ... 102 Hz
- active and reactive power ranges are **not** equal

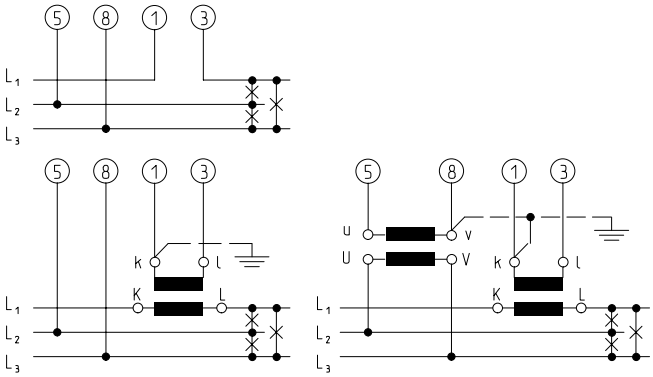
Connection Diagrams

input

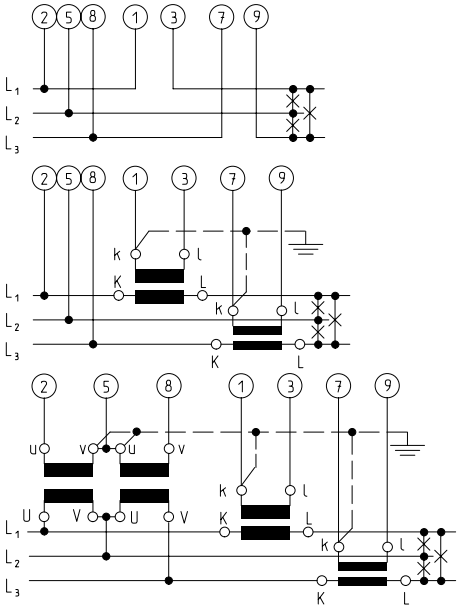
EW+B 2.2



DGW+B 2.2

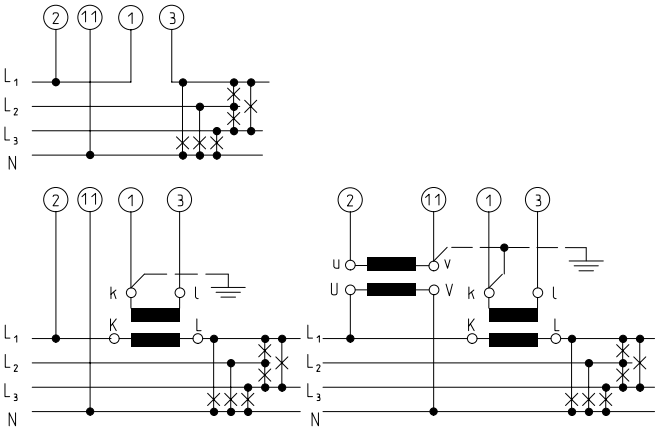


DUW+B 2.2

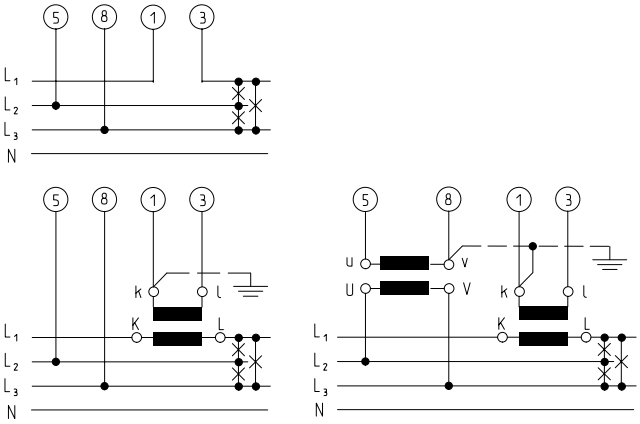


VGW+B 2.2

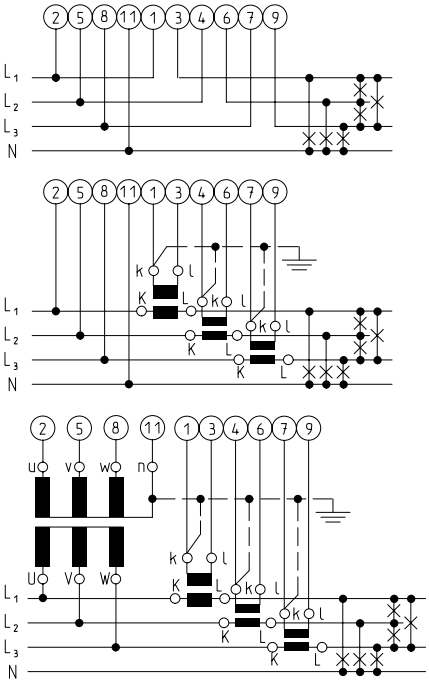
for voltage connection L1–N



for voltage connection L2–L3



VUW+B 2.2



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

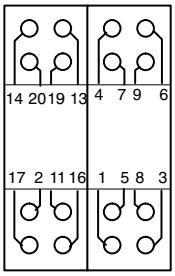
P+Q
=

Data Sheet

066.8e

Transducers for Active *and* Reactive Power

Terminal Assignment



No.	Function	Transducer	EW+B	DGW +B VGW +B L2–L3	DUW +B	VUW +B
			VGW +B L1–N			
1	I_E L1	input current IN	X	X	X	X
3	I_E L1	input current OUT	X	X	X	X
4	I_E L2	input current IN	–	–	–	X
6	I_E L2	input current OUT	–	–	–	X
7	I_E L3	input current IN	–	–	X	X
9	I_E L3	input current OUT	–	–	X	X
2	U_E L1	input voltage	X	–	X	X
5	U_E L2	input voltage	–	X	X	X
8	U_E L3	input voltage	–	X	X	X
11	U_E N	input voltage	X	–	–	X
13	I_A/U_A (+)	reactive power output	X	X	X	X
14	I_A/U_A (–)	reactive power output	X	X	X	X
19	I_A/U_A (+)	active power output	X	X	X	X
20	I_A/U_A (–)	active power output	X	X	X	X
16	U_H L1(+)	auxiliary voltage	X	X	X	X
17	U_H N (–)	auxiliary voltage	X	X	X	X

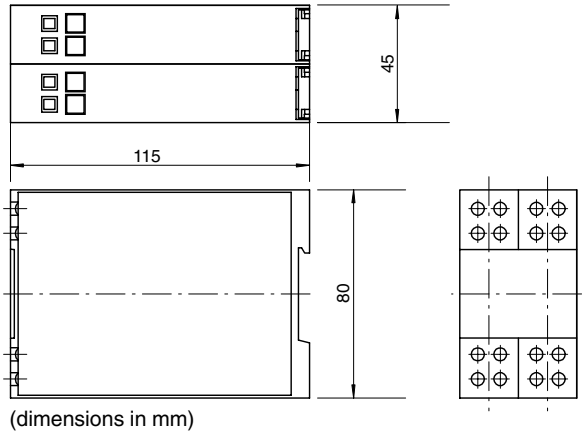
I_E current input
U_E voltage input
The terminal numbering correspond to details in the connection diagrams (to DIN 43 807).

I_A current output
U_A voltage output

U_H auxiliary voltage input

Dimensions

side view front view



(dimensions in mm)

Preference Types

The table below shows a listing of standard measuring ranges for voltages of 230/400 V with current ratings of N/1A or N/5A:

I_{EN}[A]		P_{EN}[kW], Q_{EN}[kvar]	
		type **EW+B 2.2**	types **DGW+B 2.2** **VGW+B 2.2** **DUW+B 2.2** **VUW+B 2.2**
		calibration factor 0.87	calibration factor 0.72
directly connected 1	1/5	0.2	0.5
5/1	directly connected 5	1	2.5
10/1	10/5	2	5
15/1	15/5	3	7.5
20/1	20/5	4	10
25/1	25/5	5	12.5
30/1	30/5	6	15
40/1	40/5	8	20
50/1	50/5	10	25
60/1	60/5	12	30
75/1	75/5	15	37.5
80/1	80/5	16	40
100/1	100/5	20	50
120/1	120/5	24	60
150/1	150/5	30	75
200/1	200/5	40	100
250/1	250/5	50	125
300/1	300/5	60	150
400/1	400/5	80	200
500/1	500/5	100	250
600/1	600/5	120	300
750/1	750/5	150	375
800/1	800/5	160	400
1000/1	1000/5	200	500
and values of next decades	and values of next decades	and values of next decades	and values of next decades

The transducers of this preference list offer advantages on site due to the fact that they are calibrated to exactly the same secondary current ratings (calibration factor 0.87 resp. 0.72).

This means, the transducers are interchangeable within the current transformer ratings listed and Watts resulting thereof. They will not have to be recalibrated. Only the type label should be corrected accordingly.

Example:

For a supply system of 230/400 V and a primary transformer current of 250 A, the calculated active power rating will be 125 kW for a transducer VUW+B 2.2.

The apparent power (cos φ =1) on the basis of these system data would be:

$$P_S = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi$$
$$P_S = 400\ V \cdot 250\ A \cdot \sqrt{3} \cdot 1$$
$$P_S = 173\ kW$$

multiplied by a calibration factor 0.72 results in P_{EN} = 125 kW (refer to table).

Changing the transformer connection to 400 A for instance, active power rating results in: $P_{EN} = U \cdot I \cdot \sqrt{3} \cdot 0.72$

$$P_{EN} = 400\ V \cdot 400\ A \cdot \sqrt{3} \cdot 0.72$$
$$P_{EN} = 200\ kW \text{ (refer to table above)}$$

Ordering Guide

type	Transducers for
	active and reactive power
EW+B 2.2	single-phase AC
DGW+B 2.2	3-phase 3-wire system balanced load
VGW+B 2.2	3-phase 4-wire system balanced load
DUW+B 2.2	3-phase 3-wire system unbalanced load
VUW+B 2.2	3-phase 4-wire system unbalanced load
	current input
N/1	1 A
N/5	5 A
	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
	connection for VGW+B 2.2
–1	L1–N
–2	L2–L3
	measuring range
xxx	active and reactive power ranges are equal (refer to preference types)
xxx/yyy	active and reactive power ranges are **not** equal (refer to preference types)
	input frequency range
F50	48 ... 62 Hz (50/60 Hz) *)
F16	15 ... 18 Hz ($16^2/_3$ Hz)
F100	98 ... 102 Hz (100 Hz)
	active power output
11	0 ... 20 mA
12	0 ... 10 mA
13	0 ... 5 mA
14	4 ... 20 mA
15	–20 ... 0 ... 20 mA ***)
16	–10 ... 0 ... 10 V ***)
17	0 ... 10 V
18	2 ... 10 V
10	special output **)
	reactive power output
21	0 ... 20 mA
22	0 ... 10 mA
23	0 ... 5 mA
24	4 ... 20 mA
25	–20 ... 0 ... 20 mA ***)
26	–10 ... 0 ... 10 V ***)
27	0 ... 10 V
28	2 ... 10 V
20	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 ... 72 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

VGW+B 2.2	250/5	400–2	125	F50	11	28	H1

Transducer for active and reactive power, input current 250/5 A,
input voltage 400 V, L2–L3 connection,
measuring range 0 ... 125 kW/kvar, frequency 50/60 Hz,
active power output 0 ... 20 mA, reactive power output 2 ... 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