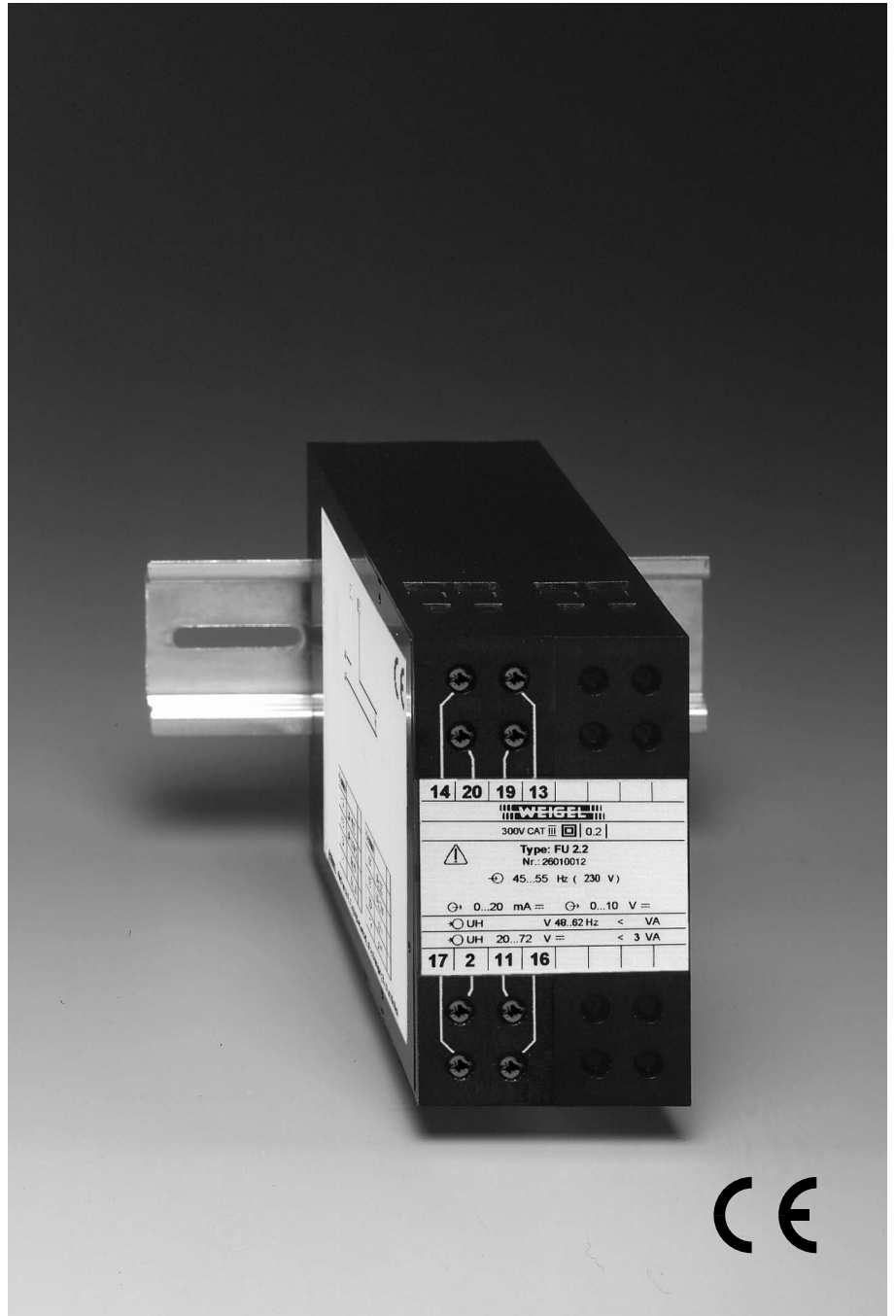


# Data Sheet

064.6e

## Transducers for Frequency

### FU 2.2



14	20	19	13		
<b>WEIGEL</b>					
300V CAT III 0.2					
Type: FU 2.2					
Nr.: 26010012					
45...55 Hz ( 230 V )					
0...20 mA = 0...10 V =					
UH V 48.62 Hz < VA					
UH 20...72 V = < 3 VA					
17	2	11	16		

## Application

The microprocessor controlled transducer **FU 2.2** convert **frequency** inputs to proportional load independent DC current and DC voltage output signals. The signals can be transmitted over a considerable distance and fed into indicators, recorders, data loggers 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 supply is provided by a separate auxiliary voltage input. Input, outputs and power supply are **galvanically isolated from each other**. The output circuits 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.

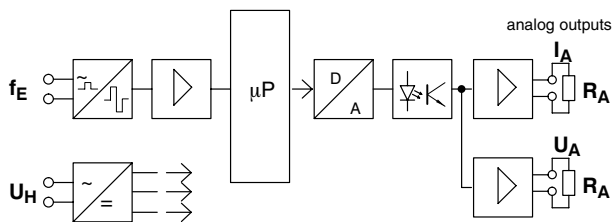
Optionally, the measured value can be inquired via a **serial interface (RS232/RS485)**, also switching signal can be produced. ▶

## Operating Principle

The input AC signal is converted into a constant rectangular waveform and then passed to a microprocessor analyzing it. Using a D/A converter, the signal is fed via an optocoupler for galvanic isolation to the output stages producing a load independent DC current and a synchronous DC voltage proportional to the frequency of the input signal.

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

## Block Circuit Diagram



## 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 <sup>2</sup> 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. 0.23 kg

## Inputs

input rating	sinusoidal AC voltage				
measuring unit	frequency $f_E$ $f_{Emin} \geq 14$ Hz $f_{Emax} \leq 500$ Hz				
<b>measuring ranges</b>	<b><math>f_{Emin}</math> ...</b>	<b><math>f_N</math> ...</b>	<b><math>f_{Emax}</math></b>	<b><math>\Delta f</math></b>	<b>class</b>
	45 ...	50 ...	55 Hz	10 Hz	0.2
	48 ...	50 ...	52 Hz	4 Hz	0.3
	55 ...	60 ...	65 Hz	10 Hz	0.2
	58 ...	60 ...	62 Hz	4 Hz	0.5
	360 ...	400 ...	440 Hz	80 Hz	0.2
	380 ...	400 ...	420 Hz	40 Hz	0.2
	▶ ( $\Delta f = f_{Emax} - f_{Emin}$ )				
<b>rated voltage</b>	$U_{EN}$				
	100 V				
	110 V				
	115 V				
	120 V				
	230 V				
	240 V				
	380 V				
	400 V				
	415 V				
	440 V ▶				
operating voltage	519 V max.				
overload limit	1.2 $U_{EN}$ continuously 2 $U_{EN}$ 1 s max.				
current consumption	approx. 0.25 mA				

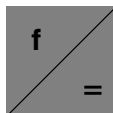
## Outputs

<b>current output</b>	
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 $\Omega$ (based on 20 mA) 0 ... 1000 $\Omega$ (based on 10 mA) 0 ... 2000 $\Omega$ (based on 5 mA)
load error	$\leq 0.1\%$ based on 50% load change
residual ripple	$\leq 1\%$ rms of $I_{AN}$ with load $R_A$
idling voltage	$\leq 20$ V
response time	$\leq 500$ ms based on $R_{Amax}$
<b>voltage output</b>	
output voltage	$U_A$ load independent DC voltage
rated voltage	$U_{AN}$ 0 (2) ... 10 V ▶
load	$R_A \geq 1$ k $\Omega$ (based on $U_{AN}$ )
load error	$\leq 0.1\%$ based on 50% load change
residual ripple	$\leq 1\%$ rms of $U_{AN}$ with load $R_A = U_{AN} / 5$ mA
idling voltage	$\leq 16$ V
response time	$\leq 500$ ms based on $R_{Amin}$

**When using both outputs simultaneously, the load across the voltage output must be  $\geq 1,5$  k $\Omega$  !**

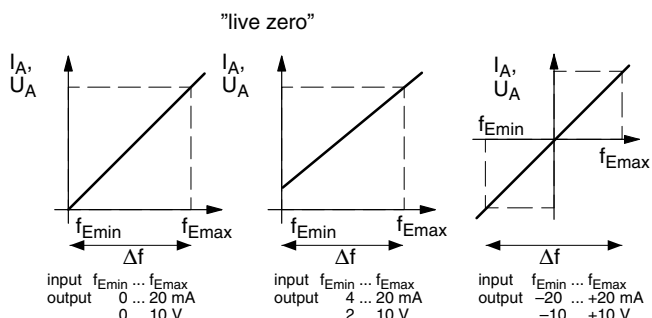
**If the voltage output only will be used, short-circuit the current output !**  
Input and outputs are galvanically isolated.

▶ for other ratings refer to **Extras**



## Transducers for Frequency

### Conversion Characteristics



### 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~	< 3 VA
H5	90 ... 357 V= or 65 ... 253 V~	< 4 ... 7 VA

\*) standard

Galvanic isolation between input, output and auxiliary voltage

### Accuracy at Reference Conditions

accuracy class 0.2 ( $\Delta f = f_{Emax} - f_{Emin}$ ) ( $\pm 0.2\%$  of  $\Delta f$ ) when  $f_{Emin}/\Delta f \leq 10$

accuracy class 0.3 ( $\pm 0.3\%$  of  $\Delta f$ ) when  $10 < f_{Emin}/\Delta f \leq 12$

accuracy class 0.5 ( $\pm 0.5\%$  of  $\Delta f$ ) when  $12 < f_{Emin}/\Delta f$

temperature coefficient  $\leq 0.01\%/K$

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

#### reference conditions

frequency  $f_N$

wave form sine wave, distortion factor  $\leq 0.1\%$

voltage  $U_{EN} \pm 1\%$

auxiliary voltage  $U_{HN} \pm 1\%$ , 48 ... 62 Hz

ambient temperature  $23^\circ C \pm 1K$

warm-up  $\geq 5$  min

### Environmental

climatic suitability climatic class 3 to VDE/VDI 3540 sheet 2

operating temperature range 0 ...  $+55^\circ C$

storage temperature range  $-25 \dots +65^\circ C$

relative humidity  $\leq 75\%$  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

input frequency  $f_E$  other than standard inputs (on request)

rated voltage  $U_{EN}$  other than standard inputs (on request)

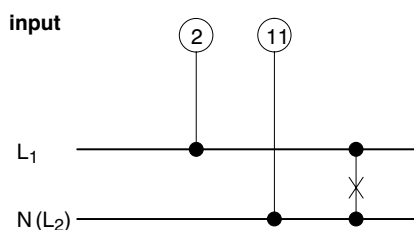
#### output ratings

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

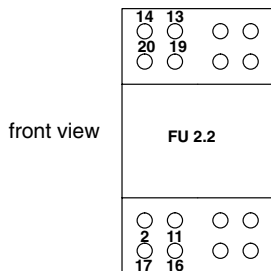
switching output

RS232 and RS485 interface (to be used alternatively) to digitally inquire different measuring values

### Connections



## Terminals

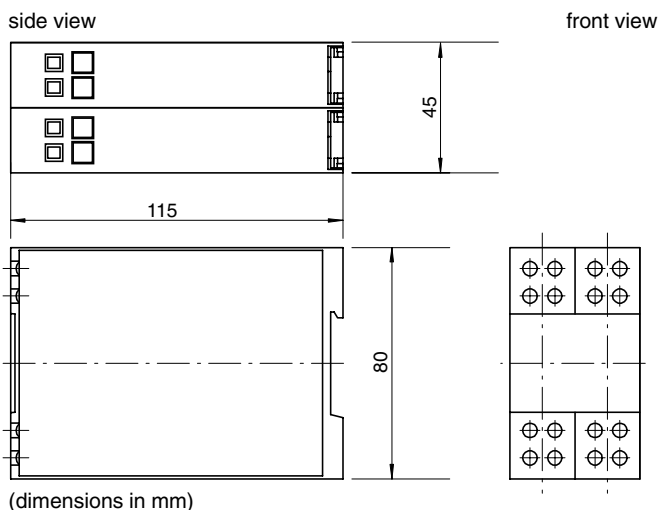


terminal	FU 2.2
2	$U_E L_1$
11	$U_E N (L_2)$
13	$U_A (+)$
14	$U_A (-)$
16	$U_H L_1 (+)$
17	$U_H N (-)$
19	$I_A (+)$
20	$I_A (-)$

$U_E$  voltage input  
The numbers on the terminals conform to details in connection diagrams (refer to DIN 43 807).

$I_A$  current output  
 $U_A$  voltage output  
 $U_H$  auxiliary voltage input

## Dimensions



## Ordering Guide

type	transducer
	<b>physical unit</b>
<b>FU 2.2</b>	frequency
	<b>input frequency range</b>
<b>51</b>	45 ... 50 ... 55 Hz
<b>52</b>	48 ... 50 ... 52 Hz
<b>61</b>	55 ... 60 ... 65 Hz
<b>62</b>	58 ... 60 ... 62 Hz
<b>41</b>	360 ... 400 ... 440 Hz
<b>42</b>	380 ... 400 ... 420 Hz
<b>00</b>	special measuring range **)
	<b>rated input voltage</b>
<b>100</b>	100 V
<b>110</b>	110 V
<b>115</b>	115 V
<b>120</b>	120 V
<b>230</b>	230 V
<b>240</b>	240 V
<b>380</b>	380 V
<b>400</b>	400 V
<b>415</b>	415 V
<b>440</b>	440 V
<b>xxx</b>	special rated voltage **)
	<b>output</b>
<b>11</b>	0 ... 20 mA and 0 ... 10 V
<b>12</b>	0 ... 10 mA and 0 ... 10 V
<b>13</b>	0 ... 5 mA and 0 ... 10 V
<b>14</b>	4 ... 20 mA and 2 ... 10 V
<b>15</b>	-20 ... 0 ... 20 mA and -10 ... 0 ... 10 V ***)
<b>10</b>	special output **)
	<b>auxiliary supply</b>
<b>H1</b>	AC 230 V (195 ... 253 V), 48 ... 62 Hz *)
<b>H2</b>	AC 115 V (85 ... 126 V), 48 ... 62 Hz
<b>H3</b>	DC 24 V (20 ... 72 V)
<b>H4</b>	DC 20 ... 100 V / AC 20 ... 70 V
<b>H5</b>	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

FU 2.2 52 230 14 H1

transducer measuring frequency,  
input frequency range 48 ... 50 ... 52 Hz,  
rated input voltage 230 V,  
output 4 ... 20 mA and 2 ... 10 V,  
auxiliary supply 230 V AC

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– specifications subject to change without notice; date of issue 12/10 –

