Precise digital meter CL 600 for strain gauge sensors

Application

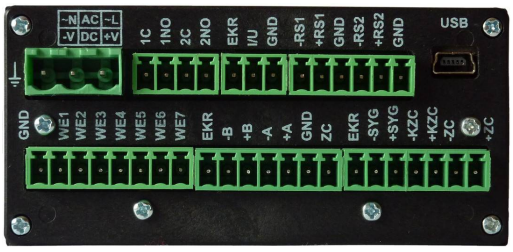
The digital meter CL600 is designed for precise measurement of any physical quantity converted into electrical signals, especially for systems requiring high accuracy measurements. Depending on the version, the analog part of the meter can be connected directly to:
- a full bridge strain gauge sensor (eg. force sensor, load cell, torque sensor, pressure sensor)
- a sensor with potentiometric output
- a half-bridge strain gauge
- a quarter-bridge strain gauge
- a constant voltage
- a direckt current.

To the digital part of meter can be attached:
- an open collector probe or line transmitter
- a rotational-impulse converter or optoelectronic ruler.

CL600 – front view of the housing version

CL600 – front view of the panel version

CL600 – back view of the housing version



CL600 – back view of the panel version

The CL600 meter is customized to the user's needs by specifying its configuration:

– analog or digital measuring channel
– connecting to the analog channel a strain gauge sensor (full bridge, half-bridge or quarter-bridge), potentiometric sensor, voltage or current signal
– connecting to the digital channel an open collector probe or a line transmitter
– supply voltage range: 11÷36Vdc or 100÷264VAC (47÷440Hz)

Convenience of operation and precision of measurements ensure:

– precise 24-bit analog-to-digital converter with built-in amplifier in the analog channel
– the mode of simultaneous display of indications from two measurement paths (from one digital path and from one analog circuit)
– three types of analog channel calibration (entering the scale and non-linearity, setting reference values, entering the levels of the measured signal)
– up to 30 nonlinear correction points for the sensor in the analog channel
– wide range of analog channel sampling rates (from 1,25 up to 2400 Hz)
– measurement in a digital channel of rotational speed, frequency, period, angular position or linear displacement
– bright OLED graphic display (resolution 256×64 points, yellow digits, digit height up to 12,2 mm)
– displaying any unit symbol and additional information about the gauge status
– built-in functions of searching and presenting extreme values (also for periodic signals)
– up to 63 independent memory banks of meter parameters
– seven binary inputs with programmable functions
– two isolated relay outputs (max. 50V/400mA) related to the comparison functions in the gauge
– analog output (option) configurable range of current or output voltage

Communication:

– USB 2.0 connector (Full Speed – Device) to PC
– free computer program CL600_PARAM (communicating with the meter via USB) for programming all meter parameters
– registration of waveforms from the meter to a text file with the use of the program CL600_PARAM
– communication with the controller or computer via one or two RS485 - MODBUS-RTU protocol - transmission speeds from 1200 to 115200 bps
– cooperation with an external large-size display controlled by the RS485 link
– possibility of printing the current measurement result on a printer
– memory of recorded waveforms (option) enabling the registration of waveforms without connecting the meter to a computer

SPECIFICATIONS

Number of analog channels	1
Type of analog channel	– strain gauge (full bridge, half-bridge or quarter-bridge), – potentiometric, – current, – voltage
Number of digital channels	1
Type of digital channel	– for probe with an open collector output or line transmitter, – quadrature input for rotary-pulse converter or ruler
Number of memory banks	up to 63
Power supply for the strain gauge sensor	5,0 Vdc (±0,2 V) max. 50 mA
Strain gauge resistance	minimum 110 Ω maximum 4000 Ω
Sensitivity of strain gauges	0,5÷92 mV/V
Resistance of strain gauges in a quarter or half bridge configuration	minimum 110 Ω, maximum 4000 Ω, standard: 120 Ω or 350 Ω
Unit for quarter-bridge measurements	µm/m
Quarter-bridge measurement resolution	1µm/m
Potentiometer sensor resistance	500 Ω÷10 kΩ
Potentiometric power supply	4,15 Vdc (±0,2 V)
Current measuring range	-24÷24 mA
Input resistance of a channel configured to measure current	50 Ω
Voltage measuring range	-12÷12 V or -1,2÷1,2 V
Input resistance of a channel configured for voltage measurement	1 MΩ (for range -12÷12 V) 100 kΩ (for range -1,2÷1,2 V)
Digital sensor power supply	5,0Vdc (±0,2V) max. 150mA or 15Vdc (±0,5V) max. 150mA
Input resistance for digital sensor	700Ω (for signal up to 5V) or 3,4kΩ (for signal up to 15V)
Cable length for sensors	< 30,0 meters
Analog-to-digital converter working modes	standard or with drift minimization
Sampling frequency	from 1,25 up to 2400 samples per second
Time to settle the result for a sudden change in the measured signal	4 samples for filter $sinc^4$ and normal operation mode, 3 samples for filter $sinc^3$ and normal operation mode, 2 samples for mode with drift minimization
Resolution of analog-to-digital converter	4 bits

Measurement resolution for the strain gauge	2000 divisions for a sensor with a sensitivity of 0.5 mV/V and maximum measurement speed, 50000 divisions for a sensor with a sensitivity of 0.5 mV / V and the minimum measuring speed, 4000 divisions for a sensor with a sensitivity of 1 mV/V and maximum measurement speed, 100000 divisions for a sensor with a sensitivity of 1 mV / V and the minimum measuring speed, 8000 divisions for a sensor with a sensitivity of 2 mV/V and maximum measuring speed, 200000 divisions for a sensor with a sensitivity of 2 mV/V and the minimum measuring speed
Measurement error for the strain gauge (for 300K)	< 0,0025% (compared to full scale)
Measurement temperature error for the strain gauge sensor	< 0,015%/10K (compared to full scale)
Long-term measurement error for the strain gauge sensor	< 0,010%/1000h (compared to full scale)
Measurement resolution for the potentiometer sensor	100000 divisions for maximum measurement speed 1000000 divisions for minimum measurement speed
Measurement error for potentiometer sensor (for 300K)	< 0,0025% (compared to full scale)
Temperature error of measurement for the potentiometer sensor	< 0,015%/10K (compared to full scale)
Long-term measurement error for the potentiometer sensor	< 0,010%/1000h (compared to full scale)
Measurement resolution for the sensor with current or voltage output	50000 divisions for maximum measurement speed 1000000 divisions for minimum measurement speed
Measurement error for a sensor with current or voltage output (for 300K)	< 0,02% (compared to full scale)
Temperature measurement error for a sensor with a current or voltage output	< 0,025%/10K (compared to full scale)
Measurement type for digital input	– rotational speed, frequency or period, – angular position or linear displacement
Input signal frequency range	– 0,04Hz ÷ 30kHz (for measuring rotational speed, frequency or period), – 0Hz ÷ 100kHz (for measuring angular position or linear displacement)
Digital sensor power supply	– 5Vdc or 15Vdc – current < 200mA
Digital sensor signal	RS422 (5V), HTL (15V) or open collector
Measurement error (for 300K)	– < 0,003% of indicated value ± 1 result division (for rotational speed, frequency or period measurement), – ±1 of result plot (for measuring angular position or linear displacement)

Measurement error in the full operating temperature range of the meter	– < 0,005% of indicated value ± 1 of result division (for rotational speed, frequency or period measurement), – ±1 of result plot (for measuring angular position or linear displacement)
Additional measurement averaging (optional)	2 to 32 samples in a sliding time window
Correction of the nonlinearity of the analog sensor	up to 30 points
Units displayed	any (max. 5 characters) - entered when entering meter parameters
Display update time	from 0,1s to 5,0s
Tarring	0÷100% of nominal value
Display	OLED, yellow, graphic, resolution 256×64
Active field of display	69,1×17,3mm
Character hight	– 12,2mm (when displaying result from one channel) – 5,4mm (when displaying result from both channels) – 3,5mm (when programming parameters) – 3,2mm (unit symbol and additional information)
Maximum indication	±999999
Acoustic signaling	buzzer
Binary inputs	7 units – pulled up to 5V by R>5kΩ
Voltage on open input	5V
Input current shorted to ground	< 0,85mA
Low voltage (short circuit)	< 1,4V
High voltage (open circuit)	> 3,6V
Wyjścia przekaźnikowe	2 szt.
Type of relay outputs	C-NO (elektronic)
Maximum voltage on relay	50Vdc, 50VAC (amplitude)
Maximum load current	400mA
Resistance of the attached relay	< 2,5Ω
Leakage of the disabled relay	< 1µA
Relay activation time	< 2,5ms
Relay off time	< 0,2ms
Comparison types	high alarm, low alarm, interval alarm, out of interval alarm
Insulation voltage for relays	> 100VAC
Computer connector	USB 2.0 – Full Speed
Computer socket	miniUSB type B
USB data transfer speed	ca. 250kB/s
Serial link – 2 units	RS485 – protocol MODBUS RTU – slave
Transmission speed	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200
Analog output ***(option)***	current or voltage
Maximum current range	±24mA
Maximum voltage range	±11V

Current ranges	0÷20mA, -20÷20mA
Voltage ranges	0÷5V, -5÷5V, 0÷10V, -10÷10V
Load resistance	from 10Ω to 500Ω for current ≥ 1kΩ for voltage
Maximum error (for 300K)	< 0,02% for voltage (compared to full scale) < 0,025% for current (compared to full scale)
Temperature error of measurement	< 0,025%/10K for voltage (compared to full scale) < 0,03%/10K for current (compared to full scale)
Output resistance	< 2Ω for voltage > 50MΩ for current
Analog output update	after each measurement
Memory of recorded waveforms ***(option)***	non-volatile (built-in FLASH memory)
Start recording (triggering)	immediate or after exceeding the recording start level in the analog or digital channel, or with the edge of the signal on the selected binary input
Completion of registration	manual or by edge of the signal on the selected binary input
Saving samples to memory during recording	continuous with declared sampling frequency or recording step or saving a sample to memory when a key or external button is pressed
Maximum number of saved runs (registrations)	1023
Maximum number of stored samples	3932100 for single channel 1966050 for both channels
Power supply	11÷36VDC or 100÷264VAC (47÷440Hz)
Maximum power consumed by the meter	< 13W
Dimensions	panel version: 96mm × 48mm × 158mm (width × hight × depth) housing version: 197mm x 85mm x 263mm (width × hight × depth)
Weight	panel version: 0,30 kg housing version: 3,00 kg
Operating temperture range	253K to 323K (-20°C to +50°C)
Relative humidity	20÷80%
Protection	IP40

The equipment includes:

1. Meter CL600 — 1 unit
2. USB cable — 1 unit
3. Program CL600_PARAM — 1 unit
4. User manual for CL600 meter and for CL600_PARAM program (pdf file) — 1 unit

Designation for the order depending on CL600 configuration type:

Ordering code	Configuration type
CL660-Cx-**V**yy-**D**z	Meter for a sensor with a full strain gauge bridge
CL65k-**R**rrr-**C**x-**V**yy-**D**z	Meter for a sensor with a half-bridge strain gauge
CL643-Rrrr-**C**x-**V**yy-**D**z	Meter for a sensor with a quarter-bridge strain gauge in 3-wire connection
CL644-Rrrr-**C**x-**V**yy-**D**z	Meter for a sensor with a quarter-bridge strain gauge in 4-wire connection
CL630-Pppp-**C**x-**V**yy-**D**z	Meter for a sensor with potentiometer output
CL620-I24-Cx-**V**yy-**D**z	Meter with current input (±24mA)
CL610-Un-**C**x-**V**yy-**D**z	Meter with voltage input
CL600-Cx-**V**yy-**D**z	Meter without analog channel (only digital channel)

where:

„x“ is digital signal configuration:

0 – no digital channel (**default**)

1 – 5V power supply for digital sensor, sensor signal up to 5V,

2 – 15V power supply for digital sensor, sensor signal up to 5V,

3 – 15V power supply for digital sensor, sensor signal up to 15V

„yy“ is power supply of the meter:

DC – 11÷36VDC (**default*)***

AC – 100÷264VAC

„z“ are additional systems:

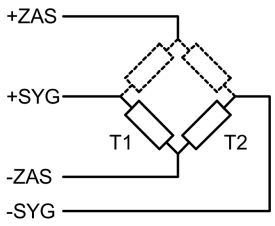
0 – no additional systems ***(default)***,

1 – analog current output or voltage output,

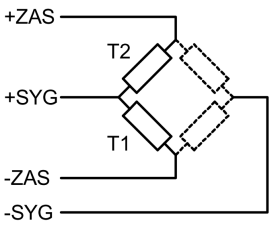
2 – additional FLASH memory for storing recorded waveforms

„k” is configuration of the half-bridge strain gauge (T1 and T2 are strain gauges):

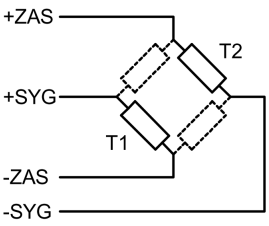
1 –



2 –



3 –



„rrr” is resistance of strain gauges in a half or quarter bridge (in Ω – eg. 350, 120)

„ppp” is resistance of the potentiometer sensor (in kΩ – eg. 0k5, 1k, 2k, 5k, 10k)

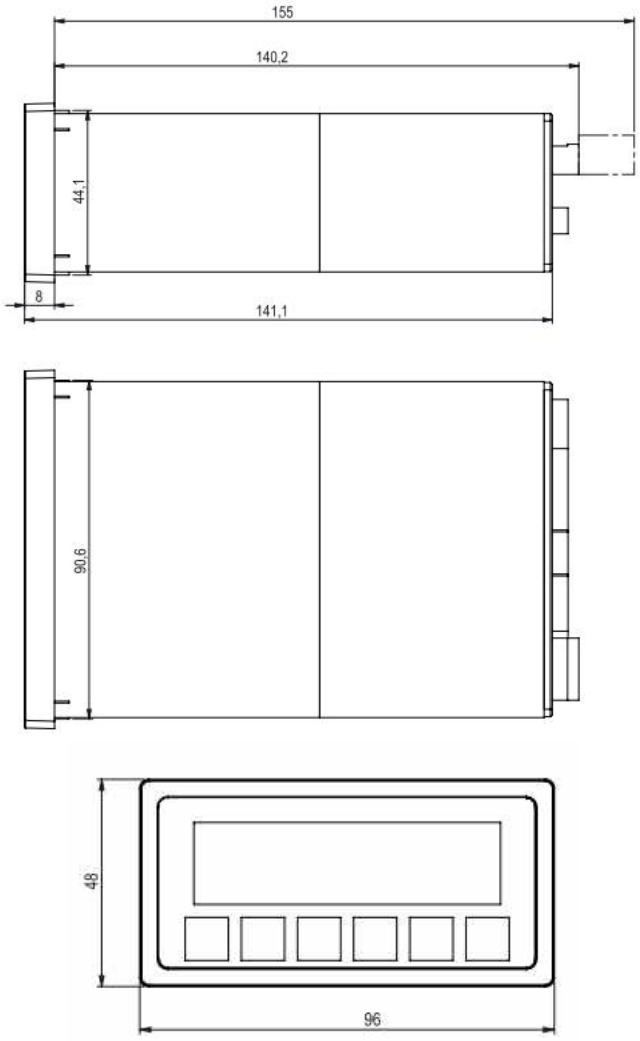
„n” is voltage input range:

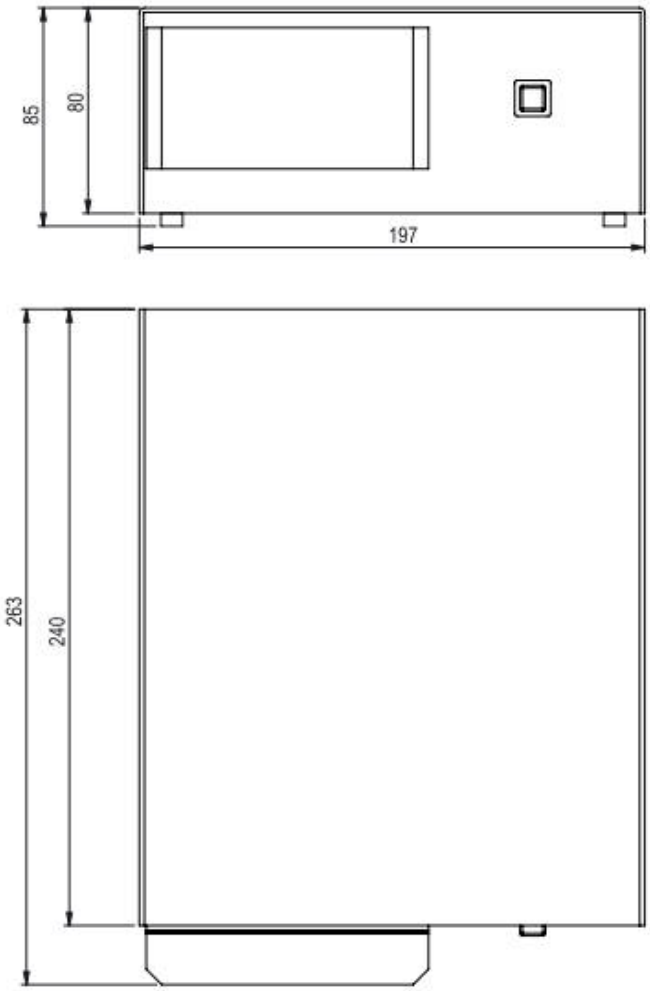
0 – -12÷12V ***(default)***,

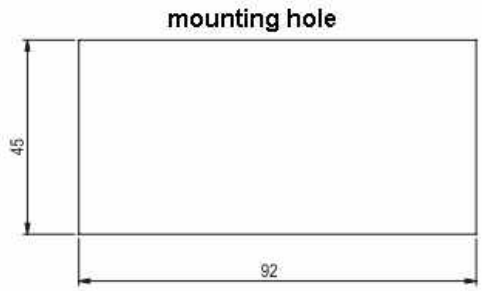
1 – -1,2÷1,2V

Caution: In the ordering code of a meter without an analog channel, the code **„CL600-C0”** is incorrect**. Correct are: „CL600-C1”, „CL600-C2” or „CL600-C3”.**

Dimensions







CL600 panel version

CL600 housing version

Manufacturer: _____

ZEPWN sp. z o.o. sp.k., Poland, 05-270 Marki, Kollataja 8

tel.: 004822 7812169, 7712411, e-mail: zepwn@zepwn.com.pl, http://www.zepwn.com.pl