
CM 2510

Digital Panel Meter

Universal Counter/Timer/Frequency Meter

Instruction Manual



ERMA

Electronic GmbH

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1. **Description**

The totalizing counter model **CM 2510** is an universal instrument for measuring **time-dependent signals**. There are following modes available:

- Chronometer with start and stop input
- Pulse counter with direction-input
- Period length measurement
- Pulse duration measurement
- Frequency measurement up to 10 kHz
- Revolutions per minute
- Operating hours meter
- Speed indicator with m/s or km/h

Standard hardware

- Four programmable digital input channels
- Buffered counter value

Standard software

- Scale factor 0,001 .. 10,000
- Offset value for counter mode
- Max. counter frequency 25 Hz, 7 kHz programmable
- Programmable decimal point
- Autoranging
- Rounding last digit with 1, 2, 5, or 10 digit steps
- Display test

2. Safety instructions

This instrument is produced in accordance with Class II of IEC 348 and VDE 0411. When delivered the instrument has been tested to meet all functions described. Before installing the instrument please read the mounting and servicing instructions.

We have no liability or responsibility to customer or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by equipment or software sold or furnished by us. Read the installation instruction carefully. No liability will be assumed for any damage caused by improper installation.

Inspect the instrument module carton for obvious damage. Be shure there are no shipping and handing damages on the module before processing. Do not apply power to the instrument if it has been damaged.

ERMA's warranty does not apply to defects resulting from action of the buyer, such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorized modifications.



2.1. Explanation of Symbols

Caution

Attention

Instruction

Hint

Caution: Dangerous!

Attention: Will cause **damage**

Instruction: If not noticed, **trouble** may occur

Hint: Useful hints for **better operation**

3. Mounting

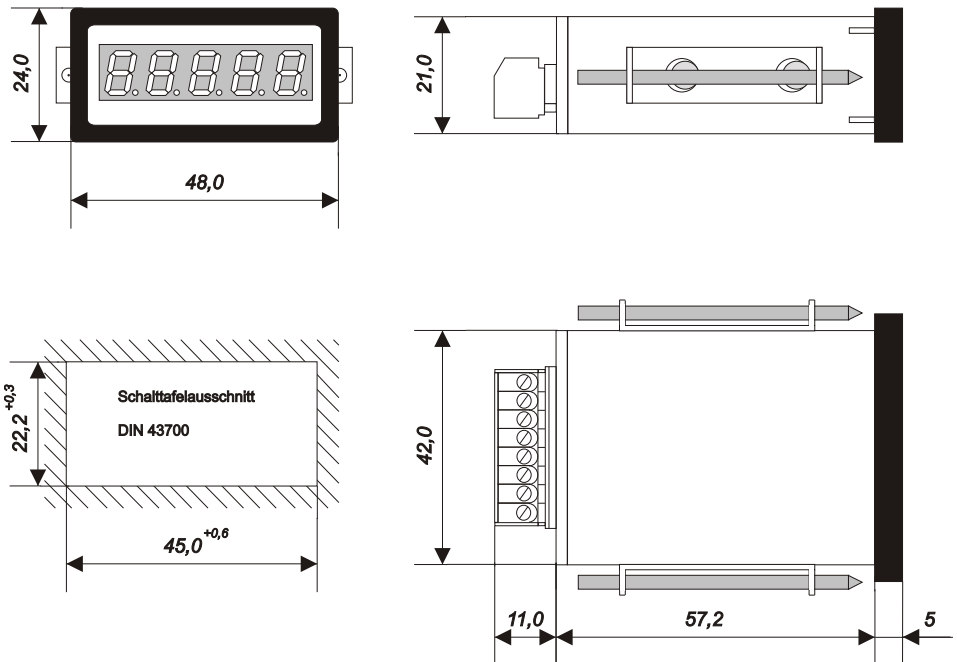
3.1. Place of Operation

Attention must be paid to the protection against humidity, dust and high temperatures at the place of operation.

3.2. Panel mounting

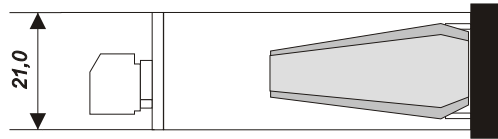
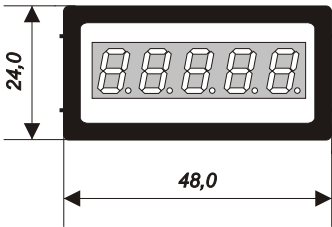
3.2.1. Panel for switch board

- For mounting in switch boards, insert the case into the panel cutout (according to DIN 43700: $45,0^{+0,6} \times 22,2^{+0,3}$ mm) from the front, using a fresh gasket for sealing as required. Click into and place at each side the two fastening clips (M2,5 x 50 mm).
- Tighten the screws alternately, using enough pressure to get good retention and sealing at the panel.



3.2.2. Panel for mosaic systems

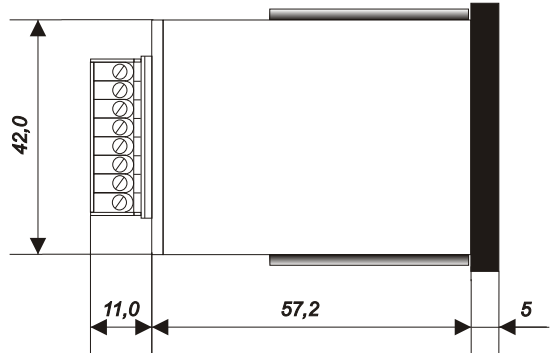
- Insert the case into one of the following mosaic-systems:
 - a) Mosaic-system 8RU (M50x25) from Siemens
 - b) Mosaic-system from Subkleb



Mosaiksystem:

Siemens 8RU (M50x25)

Subkleb



4. *Electrical connections*

4.1. *General Instructions*



- It is forbidden to plug or unplug connectors with voltage applied
- Attach input and output wires to the connectors only without voltages applied
- Cords must be provided with sleeves
- Attention must be paid that the power supply voltage applied will agree with voltage noticed at the name plate.
- The instrument has no power-on switch, so it will be in operation as soon as the power is connected.

4.2. *Hints Against Noisy Environment*

All inputs and outputs are protected against noisy environment and high voltage spikes. Nevertheless the location should be selected to ensure that no capacitive or inductive interference can have an effect on the instrument or the connection lines.

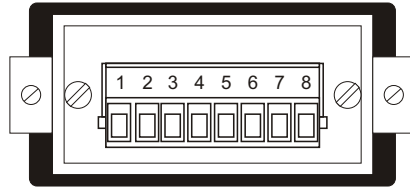
It is advisable:



- To use shielded cables.
- The wiring of shields and ground (0V) should be star-shaped.
- The distance to interference sources should be as long as possible. If necessary, protective screen or metal enclosures must be provided.
- Coils of relays must be supplied with filters.
- Parallel wiring of input signals and AC power lines should be avoided.

4.3. Connection and Pin Assignment

All inputs and outputs are connectors, designed as plug-in screw terminals.

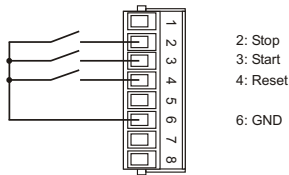


Pin assignment:

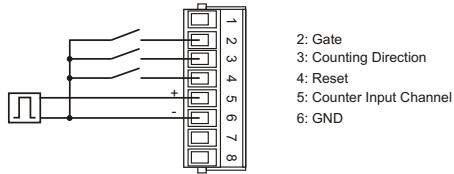
1	digital input 1 / display test	5	signal input
2	digital input 2	6	signal ground
3	digital input 3	7	supply voltage (-)
4	digital input 4	8	supply voltage (+)

4.4. Connection of Digital Input Signals

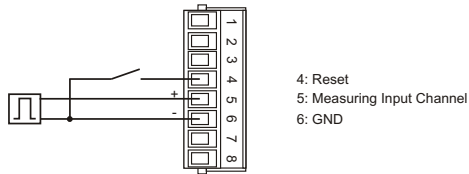
4.4.1. Mode Chronometer / Stop-Watch



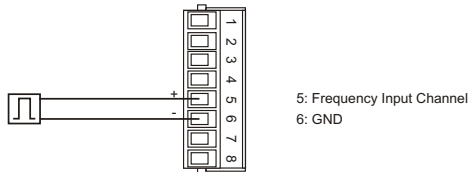
4.4.2. Mode Pulse Counter Forward / Backward



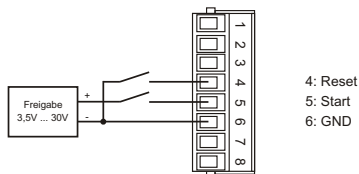
4.4.3. Period Length/Pulse Duration Measurement



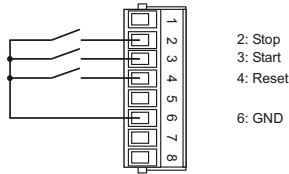
4.4.4. Mode Frequency / Revolutions Measurement



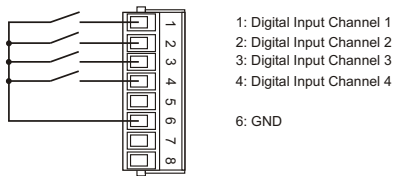
4.4.5. Mode Operating Hours Meter



4.4.6. Mode Speed Indicator



4.4.7. Digital Inputs Channels



Digital input 1

- active => connecting screw terminal 1 to 6
- connecting to ground, low-active

Digital input 2

- active => connecting screw terminal 2 to 6
- connecting to ground, low-active

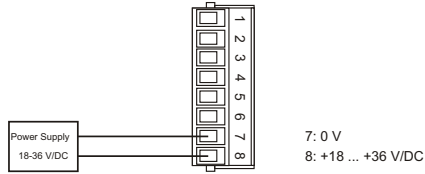
Digital input 3

- active => connecting screw terminal 3 to 6
- connecting to ground, low-active

Digital input 4

- active => connecting screw terminal 4 to 6
- connecting to ground, low-active

4.5. Connection of Power Supply Voltage



5. Start-Up



Attention must be paid that the power supply voltage applied will agree with the voltage noticed at the name plate.

Switch the power supply on (supply voltage applied to 7 (-) and 8 (+)).

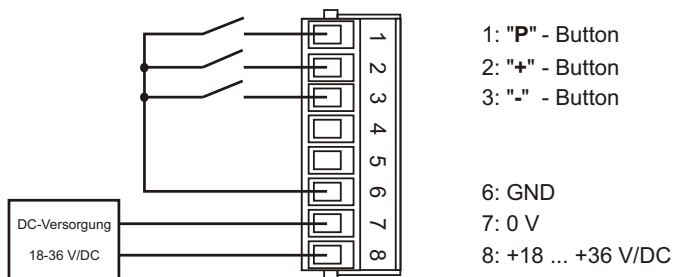
When delivered, the instrument is programmed with a standard configuration (default configuration). According to his measuring task, the customer can change the standard configuration by programming.



Attention: When the instrument is built-in a machine and the customer wants to change the configuration, attention must be paid, that no damage will occur to the machine!

6. Programming

The procedure of programming is organized in different steps and can be carried out via the screw terminals 1, 2 and 3 at the rear of the instrument. It is advisable to connect a push button to the screw terminals 1 - 3.



Push Button	Pressing
screw terminal 1 "P" - button	selection of - programming level - parameter
screw terminal 2 "+" - button	increase of - programming level - number of parameter - parameter
screw terminal 3 "- " - button	decrease of - programming level - number of parameter - parameter

Activating the programming routine

- Press "P"-button together with "+"-button
- The display shows "P-00"

Leaving the programming routine

- Press “+”-button or “-”-button until the display shows “PEnd”
- Confirm the display “PEnd” by pressing “P”-button
- Return to normal measuring

Selection of a programming level

- Selecting a programming level by pressing the “+”-button or “-”-button
- Confirm the selected programming level by pressing the “P”-button
- The display shows the parameter number of the selected programming level
e.g.: “0-00” => Parameter 0 of programming level 0

Leaving a programming level

- Press “+”-button or “-”-button until the display shows “xEnd”
e.g.: “0End” =>leaving programming level 0
- Confirm the display “xEnd” by pressing “P”-button
- The display shows the programming level
e.g. “P-00” => programming level 0

Selection of a parameter

- Selection the parameter by pressing “+”-button or “-”-button
- Confirm the parameter by pressing “P”-button
- The display shows the last programmed value of the selected parameter

Change and confirm a selected parameter

- Change the parameter by pressing the “+”-button or “-”-button
- Confirm the parameter by pressing “P”-button

The display shows the programming level and the number of the parameter
e.g.: “0-05” => Parameter 5 of programming level 0

6.1. Summary of the Programming Level

The parameters of the panel meter are organized in different programming levels.

P-00: Programming level for general configuration of the panel meter

This level is used to select a measurement mode. General functions like decimal point, display brightness etc. can be also changed in this level.

6.2. Programming Level Configuration P-00

Param	Description	Range	Default Value
0-00	Selection of modes 0 -> Chronometer / stop watch 1 -> Pulse counter forward 2 -> Pulse counter backward 3 -> Period length measurement 4 -> Pulse duration measurement 5 -> Frequency measurement 6 -> Revolutions per minute 7 -> Operating hours meter 8 -> Speed in m/s 9 -> Speed in km/h	0 .. 9	0
0-01	Measuring range selection: Function at chronometer / stop watch and period length / pulse duration measurement 0 -> Automatic measurement range 1 -> Resolution 0,01 Sec. 2 -> Resolution 0,1 Sec.	0 .. 2	0
	Function at pulse counter forward 0 -> Counter with 6 digits (XXXX.X -> XXXXX) 1 -> Counter with 5 digits (last digit "1") 2 -> Counter with 5 digits (last digit "10")		

Param	Description	Range	Default Value
0-01	Measuring range selection (cont.)		
	Function at pulse counter backward 0 -> Counter with 5 digits (XXXX.X) 1 -> Counter with 5 digits (last digit "1") 2 -> Counter with 5 digits (last digit "10")	0 .. 2	
	Function at frequency measurement 0 -> Automatic measurement range (f_{in} 0,6000Hz ... 9999 Hz) 1 -> Resolution 1 Hz (f_{in} 1 Hz ... 9999 Hz) 2 -> Resolution 0,1 Hz (f_{in} 0,1 Hz ... 999,9 Hz) 3 -> Resolution 0,01 Hz (f_{in} 0,01 Hz ... 99,99 Hz)	0 .. 3	
	Function at revolutions / min. 0 -> Automatic measurement range 1 -> Resolution 1 rpm 2 -> Resolution 0,1 rpm 3 -> Resolution 0,01 rpm		0
	Function at operating hours meter 0 -> Automatic measurement range 1 -> Resolution 0,01 h 2 -> Resolution 0,1 h	0 .. 2	
	Function at speed with m/s 0 -> Distance = 1 m Resolution = 0,01 m/s 1 -> Distance = var. (P 0-07) Resolution = 0,01 m/s	0 .. 1	
	Function at speed with km/h 0 -> Distance = 1 m Resolution = 0,1 km/h 1 -> Distance = var. (P 0-07) Resolution = 0,1 km/h	0 .. 1	

Param	Description	Range	Default Value
0-02	Offset at pulse counter f / b	-9999 .. +99999	0
0-03	Brightness of the display 0 -> Brightness 50 % 1 -> Brightness 100 %	0 .. 1	1
0-04	Decimal point (not at automatic measurement range) 0 -> XXXXX 1 -> XXXX.X 2 -> XXX.XX 3 -> XX.XXX 4 -> X.XXXX	0 .. 4	0
0-05	Operating hours meter: 0 -> Operating hours meter active after power supply connection. 1 -> Operating hours meter active after power supply connection and activation of enable input.	0 .. 1	0
0-06	Configuration of display under-/overflow (only at following modes: chronometer, stop watch, period length / pulse duration measurement, pulse counter f / b and operating hours meter.) 0 -> Signaling over- / underflow with " nnnnn " respectively " uuuuu ". 1 -> At overflow the display starts with " 0 ".	0 .. 1	0
0-07	Scale factor / distance:	0.001 - 10.000	1.000
	Function at pulse counter Adjustable scale factor		
	Function at frequency measurement Adjustable scale factor		
	Function at revolutions / min Adjustable scale factor		

Param	Description	Range	Default Value
0-07	Scale factor / distance (cont.)	0.001 - 10.000	1.000
	Function at speed with m/s a. km/h Adjustable distance in meter		
0-08	Configuration of digit 1 (only at following modes: frequency measurement and revolutions / min) 0 -> Display in steps of 1 1 -> Display in steps of 2 2 -> Display in steps of 5 3 -> Display in steps of 10	0 .. 3	0
0-09	Input filter for pulse counter 0 -> max. count frequency 7 kHz 1 -> max. count frequency 25 Hz	0 .. 1	0
0End	Leaving programming level P-00		

7. Review of Modes

7.1. Chronometer / Stop Watch

In the mode Chronometer / stop watch (parameter 0-00 = 0) will the time between a start- and a stop pulse be displayed.

Activating chronometer / stop watch

- By activating the digital input 3, connecting screw terminal 3 and 6

Stopping chronometer / stop watch

- By activating the digital input 2, connecting screw terminal 2 and 6

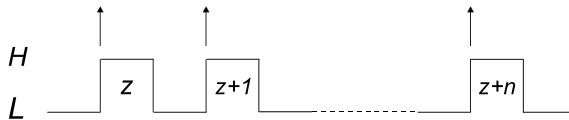
Resetting the display

- By activating the digital input 2, connecting screw terminal 4 and 6

The resolution can be set in the parameter 0-01.

7.2. Event Counter Forward

In the mode pulse counter forward (parameter 0-00 = 1) will the number of pulses with rising edges be counted:



There is the possibility to select an offset-value (parameter 0-02) and a scaling factor (Parameter 0-07). These values will be automatically calculated with the measurement signal and indicated at the display. The pulse counter is provided with a **data buffering**. If a power failure occurs, the registered data will be stored to the buffer memory. After a new start up, the data will be available again.

Connection of signal

- Connecting pulse signal to screw terminal 5 (+) und 6 (-).

Gate input

- By activating digital input 2

Switching of counter direction

- By activating digital input 3

Resetting the counter display

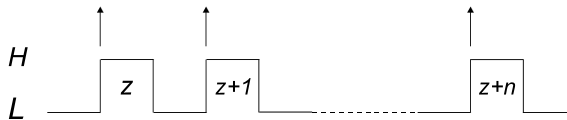
- By activating digital input 4

The number of digits can be set in parameter 0-01

- P 0-01 →0: automatically switch-over between 5 and 6 digits
- P 0-01 →1: counter with 5 digits, last digit = "1"
- P 0-01 →2: counter with 5 digits, last digit = "10"

7.3. Event Counter Backward

In the mode pulse counter backward (parameter 0-00 = 2) will the number of pulses with rising edges be counted:



There is the possibility to select an offset-value (parameter 0-02) and a scaling factor (Parameter 0-07). These values will be automatically calculated with the measurement signal and indicated at the display. The pulse counter is provided with a **data buffering**. If a power failure occurs, the registered data will be stored to the buffer memory. After a new start up, the data will be available again.

Connection of signal

- Connecting pulse signal to screw terminal 5 (+) and 6 (-).

Gate input

- By activating digital input 2

Switching of counter direction

- By activating digital input 3

Resetting the counter display

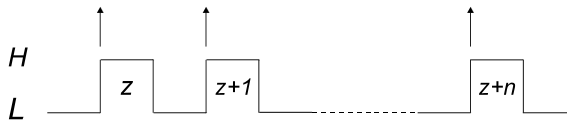
- By activating digital input 4

The number of digits can be set in parameter 0-01

- P 0-01 →0: counter with 5 digits, last digit = "1"
- P 0-01 →1: counter with 5 digits, last digit = "1"
- P 0-01 →2: counter with 5 digits, last digit = "10"

7.4. Period Length Measurement

In the mode period length measurement (parameter 0-00 = 3) will the time between two rising edges be measured:



Connection of signal

- Connecting pulse signal to screw terminal 5 (+) and 6 (-).

Resetting the display

- By activating digital input 4

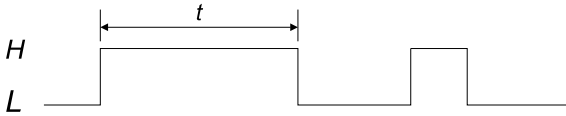
The resolution can be set in the parameter 0-01.

There will be only one period length measured per cycle. Each measurement cycle must be restart by activating digital input 4.



7.5. Pulse Duration Measurement

In the mode pulse duration measurement (parameter 0-00 = 4) will the time between a rising edge and a negative edge be measured:



Connection of signal

- Connecting pulse signal to screw terminal 5 (+) and 6 (-).

Resetting the counter display

- By activating digital input 4

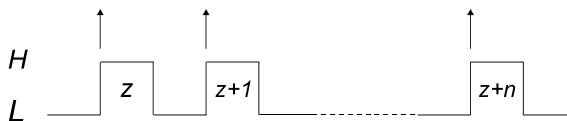
The resolution can be set in the parameter 0-01.



There will be only one pulse duration measured per cycle. Each measurement cycle must be restart by activating digital input 4.

7.6. Frequency Measurement

In the mode frequency measurement (parameter 0-00 = 5) will a applied frequency be measured:



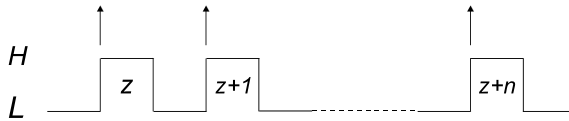
Connection of signal

- Connecting pulse signal to screw terminal 5 (+) and 6 (-).

The measurement range can be set in the parameter 0-01. There is the possibility to select a scaling factor (Parameter 0-07). **Attention:** The scaling factor is at the automatically measurement range deactivated.

7.7. Revolutions Per Minute

In the mode revolutions per minute (parameter 0-00 = 6) will the number of clock pulses per minute be measured:



Connection of signal

Connecting pulse signal to screw terminal 5 (+) und 6 (-).

The measurement range can be set in the parameter 0-01. There is the possibility to select a scaling factor (Parameter 0-07). **Attention:** The scaling factor is at the automatically measurement range deactivated.

7.8. Operation Hours Meter

The operation hours meter is activated by programming the parameter 0-00 to 7. An enable input can be activated by using parameter 0-05.

Starting the operation hours meter without enable input (param. 0-05 to 0)

- Connecting the instrument to supply voltage
- Leaving the programming mode

Starting the operation hours meter with enable input (param. 0-05 to 1)

- Applying an active level between 3,5V and 30V to the enable input

Resetting of operation hours meter

- By Activating digital input 4
- By Leaving the programming mode

The display range can be selected by parameter 0-01.

The operation hours meter is provided with a **data buffering**. If a power failure occurs, the registered data will be stored to the buffer memory. After a new start up, the data will be available again.

7.9. Speed Indicator m/s

The mode speed indicator with m/s can be activated by programming parameter 0-00 to 8. The speed in m/s depends on the duration between a start and a stop pulse and a programmed distance (fix. or var.) will be displayed.

Starting the speed indicator

- By activating digital input 3

Stopping speed indicator

- By activating digital input 2

Resetting the display

- By activating digital input 4

The distance in meters can be set by programming the parameter 0-01 and 0-07.

Parameter 0-01	Parameter 0-07	Wegstrecke in m
0	XXXXX	1.000
1	0.001 - 10.000	0.001 - 10.000

7.10. Speed Indicator km/h

The mode speed indicator with km/s can be activated by programming parameter 0-00 to 9. The speed in km/s dependence on the duration between a start and a stop pulse and a programmed distance (fix. or var.) will be displayed.

Starting the speed indicator

- By activating digital input 3

Stopping speed indicator

- By activating digital input 2

Resetting the display

- By activating digital input 4

The distance in meters can be set by programming the parameter 0-01 and 0-07.

Parameter 0-01	Parameter 0-07	Wegstrecke in m
0	XXXXX	1.000
1	0.001 - 10.000	0.001 - 10.000

8. Software Functions

8.1. Filter for Event Counter Mode

It is possible to activate a digital filtering by programming parameter 0-09 to 1. When the digital filter is activated, the max input frequency is reduced from 7kHz to 17 Hz.

Filtering activated

- Parameter 0-09 = 1.

8.2. Exceeding of the Measuring Range

When underflow is active the display shows “uuuuu”.

For counter overflow two modes of overflow can be programmed by parameter 0-06.

Parameter: 0-06 = 0

Exceeding of the measuring range will be displayed.

- When overflow is active the display shows “nnnnn”.

Parameter: 0-06 = 1

- When overflow occurs the counter value will be resetted.

8.3. Display Test

When activating the display test all segments and the alarm LED's of the display are light on. The display shows “:8.8.8.8.8.”

Activating the display test:

- By activating the digital input 1..

9. Technical Specifications

Measuring Modes

Timer

Measuring range	:10 ms - 9999,9 s
Accuracy	:< 0,1% v. MW. \pm 1 Digit

Event Counter

Max. frequency	:7 kHz/17Hz
----------------	-------------

Pulse Duration

Measuring range	:0,01 s - 9999,9 s
Accuracy:	:< 0,1% v. MW. \pm 1 Digit

Period Measurement

Measuring range	:0,01 s - 9999,9 s
Accuracy:	:< 0,1% v. MW. \pm 1 Digit

Frequency

Measuring range	:0.6Hz -9. 9999 kHz
Conversion rate	:2 measurements/s
Accuracy	:< 0,02% of display \pm 1 Digit

Revolutions/min

Measuring range	:42,00 rpm - 9999 rpm
Conversion rate	:2 measurements/s
Accuracy	:< 0,02% of display \pm 1 Digit

Operating hours meter

Measuring range	:0,02 h - 9999,9 h
Accuracy	:< 0,1% of display

Speed indicator with m/s

Measuring range	:d = 1 m - 10 m t = 0,1 s - 10 s
Accuracy	:< 0,1% of display \pm 1 Digit

Speed indicator with km/h

Measuring range	: d = 1m - 10 m t = 0,1 s - 10 s
Accuracy	:< 0,1% of display \pm 1 Digit

Screw terminals 1 - 4

Impedance	: Pull-Up, 10 k
L-level	: < 0,4 V
H-level	: > 3,5 V, max. 30 V

Screw terminal 5

Impedance	: Pull-Down, 10 k
Switching level	: 2,5V
max. level	: 30 V

Display

5 decades, 8 mm

Option : green color

Power supply

Power consumption : 18 bis 36 V DC (isolated)

Power consumption : max. 30 mA (red display)

Power consumption : max. 43 mA (green display)

Optional : 12 V DC, $\pm 10\%$ (isolated)

: 5 V DC, $\pm 10\%$ (isolated)

Case

: 48 x 24 x 62 mm

Depth

: < 95 mm (incl. plug-in screw

term.)

Protection case, at the front : IP 40

Protection case, connections : IP20

EMC

: in conform with 89/336/EWG

Operating Temperature

: 0 to 50 °C

10. Ordering Information

CM 2510 -						
						Case
						0 Panel Mounting 1 Panel-Clip
						Front Bezel Color
						0 black 1 Grey RAL 7037
						Front Design
						0 Without Front Foil 2 Front Foil ERMA-METER 3 Front Foil NEUTRAL
						Display Color
						0 Red 1 Green
						Power Supply
						0 5 V DC, $\pm 10\%$ (isolated) 1 12 V DC, $\pm 10\%$ (isolated) 2 18 bis 36 V DC (isolated)

11. Notes

ERMA - Electronic GmbH
Max-Eyth-Str. 8
D-78194 Immendingen

Telefon (+49 7462) 2000-0
Fax (+49 7462) 2000-29
email info@erma-electronic.com
Web www.erma-electronic.com

