



COM5003

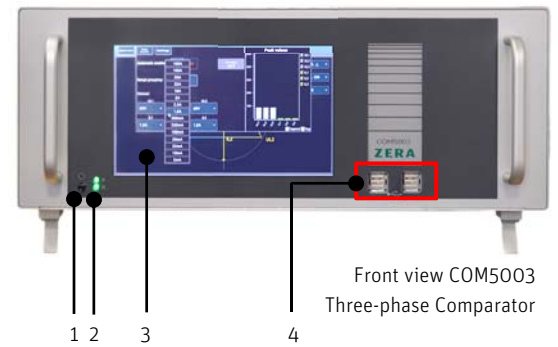
A class of its own.

Primary Standard of accuracy 0.005

Concept

Comparator COM5003 is part of the ZERA high precision measuring instrument series. With highest accuracy of 0.005 % (50 ppm), COM5003 presents its new innovative digital technology and extended features for measurement. As primary standard the comparator serves for testing current and voltage meters as well as single- or poly-phase power and energy meter testing systems. This innovation is especially useful in metrological institutes, official testing places and other testing fields of energy suppliers or manufacturers of electricity meters.

Operation, measurements and visualizations can be realized by 9" touchscreen.



- 1 ON/OFF-Button POWER
- 2 Control-LEDs P = POWER, R = Ready
- 3 Touchscreen
- 4 4x USB2.0 interface (for PC mouse, keypad etc.)

Multifunctional precision technology

- Simultaneous energy measurement in three measurement modes
- Power measurement at alternating energy direction
- Active impedance compensation at currents ≤ 100 mA
- Operation and entries via capacitive touchscreen and keypad/PC mouse

Features

- Highest accuracy in its class (0.005 %)
- Excellent long-term stability
- Manual and automatic measuring range selection
- More dynamic due to individual selection of current and voltage ranges per phase
- Wide-range current input for measurements from 1 mA ... 160 A

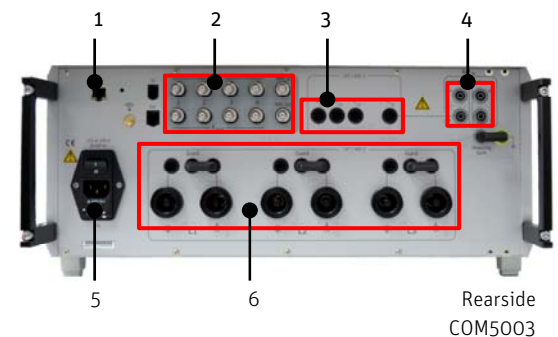
Functions

- Actual value measurement
- Vectorial display
- Curve display
- Harmonic measurement
- Error measurement
- Reference measurement
- Power measurement at alternating energy direction

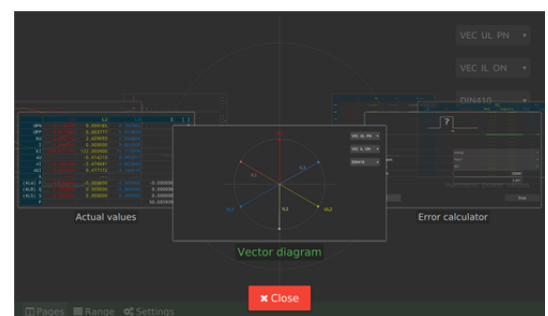
Actual value display

COM5003 displays the current measured data in the actual value menu. Measured values are updated permanently.

The parameters of the three-phase power system are displayed as averages values with adjustable integration time.



- 1 Ethernet and LAN interface
- 2 f_{in}/f_{out} pulse inputs and outputs
- 3 Voltage connections $U_{L1, L2, L3}$ and U_N , max. 500 V
- 4 Reference inputs for current and voltage
- 5 Mains connection 115/230 V, 50-60 Hz, ON/OFF switch
- 6 Current connections $I_{L1}, I_{L1}', I_{L2}, I_{L2}'$ and I_{L3}, I_{L3}' , max. 160 A



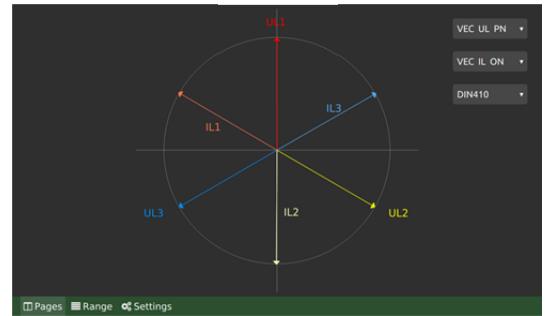
Menus with preview

	L1	L2	L3	Σ	[]
UPN	59.922	59.925	59.911		V
UPP	103.790	103.785	103.772		V
kU	0.299	0.296	0.272		%
I	1.006	1.004	1.027		A
kI	0.670	0.983	19.977		%
ΔU		2.094	4.189		°
ΔI	5.239	3.147	1.053		°
ΔUI	-0.524	4.713	3.665		°
λ	0.503	0.495	-0.981		
(4LW) P	30.304	29.801	-60.323	-0.218	W
(4LB) Q	-52.120	52.258	-0.330	-0.192	VAR
(4LS) S	60.291	60.161	61.517	181.970	VA
F				50.006	Hz

All measured values are marked with colours according to the phases displayed in a total view.

Vectorial display

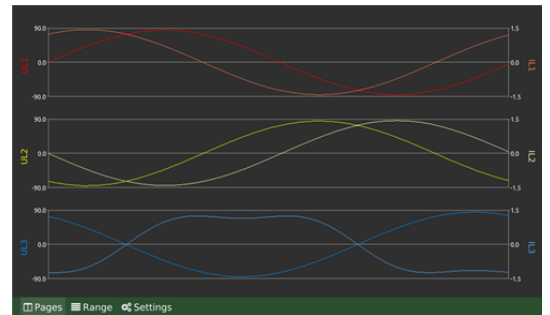
The measured values for current, voltage and phase angle can be shown as diagram according to IEC 387 or DIN 410.



Vectorial display according to DIN 410

Curve display

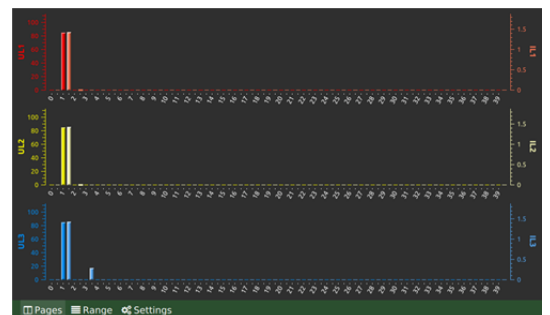
The measured values of voltage and currents can be displayed in different ways. The user can choose between display as curves with indication of individual values and harmonic displaying with individual distortion values.



Curve display for current and voltage per phase

Harmonic measurement

Harmonic measurement allows to measure harmonics in voltage and current circuit up to the 40th harmonic. The measured harmonics can be shown as table or bar chart.



Harmonics display in a bar chart

Power measurement

The power measurement allows to measure active, reactive and apparent power per phase and in total in measurement mode 2-wire, 3-wire or 4-wire.

	L1	L2	L3	Σ []	
P1	30.305	29.805	-60.334	-0.223	W 4LW
Q1	-52.127	52.266	-0.330	-0.191	Var 4LB
S1	60.298	60.171	61.527	181.996	VA 4LS

At the bottom, there are navigation buttons for 'Pages', 'Range', and 'Settings'.

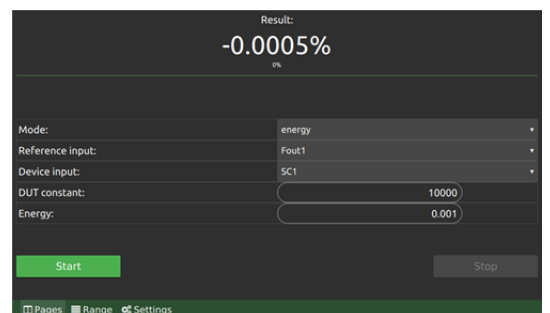
Power measurement

Error measurement

Static and electromechanical power meters as well as all kind of measuring instruments with power proportional frequency output can be tested in the menu "Error measurement".

The user can select between scanning head input or frequency input.

The result will be shown in % with max. five decimal digits.



Error measurement

Reference measurement

The reference measurement enables comparing an external DC voltage standard with the internal reference. For this purpose, the external standard will be connected with COM5003 via two separate inputs.

Power measurement at alternating energy direction

CED power measurement determines the active power at alternating energy direction.

CED means Change Energy Direction.

The total power measurement value will be displayed as well as the part of positive and negative active power by using a predefined period interval (5 - 5000) and a time interval (1 - 100 s).

	L1	L2	L3	Σ	I
+P	0.000	0.000	0.000	0.000	W
-P	-0.000	-0.000	-0.000	-0.000	W
P	0.000	-0.000	-0.000	-0.000	W

CED power measurement

Technical data

COM5003 Three-phase Comparator

General

Power supply	115 V / 230 V +/-15 %, 50 ... 60 Hz
Power consumption	max. 200 VA
Temperature range, operation	+5° ... +45° C
Temperature range, storage	-15° ... +65° C
Relative humidity (not condensing)	max. 95 %
Dimensions (DxWxH)	47 cm x 48 cm x 20 cm
Weight	~ 25 kg

Safety

IP class according to DIN EN 60529	IP40
Declaration of conformity	CE conform
Protection class according to DIN EN 61140	I

Reference meter

Measuring modes	2WA, 2WR, 2WAP, 3WA, 3WR, 3WAP, 4WA, 4WR, 4WAP
Fundamental frequency	15 ... 70 Hz
Sampling	24 bit 504 samples/period
Accuracy class for measuring of power / energy 3) 4) 6) 11) 25)	0.005 %
Angle measurement accuracy 3) 4)	< 0.001°
Frequency measurement deviation	± 0.001 Hz

Voltage Measurement

Voltage measurement	100 mV ... 580 V ≈
Voltage range(s)	480 V, 240 V, 120 V, 60 V, 12 V, 5 V
Voltage channels input impedance (@ range)	478 kΩ @ 480 V ... 5 V
Voltage measurement accuracy 5) 11) 25)	< 0.002 % + < 0.0005 % @ 30 V ... 480 V < 0.004 % + < 0.001 % @ 10 V ... < 30 V < 0.004 % + < 0.001 % @ 1 V ... < 10 V, I ≤ 10 A
Voltage measurement temperature drift 3)	< 0.5 x 10E-6 / K
Voltage measurement long term stability 2) 3)	< 0.0015 % / Year

Current measurement

Current measurement	0.5 mA ... 160 A ~
Current range(s)	160 A, 100 A, 50 A, 25 A, 10 A, 5 A, 2.5 A, 1 A, 500 mA, 250 mA, 100 mA, 50 mA, 25 mA, 10 mA, 5 mA
Current channels input impedance (@ range)	< 4 mR @ 160 A ... 25 A < 40 mR @ 10 A ... 2.5 A < 2 R @ 1 A ... 250 mA < 5 R @ 100 mA ... 5 mA 22)
Current measurement accuracy 5) 11) 25)	< 0.002 % + < 0.0005 % @ 50 mA ... 100 A < 0.004 % + < 0.001 % @ 10 mA ... < 50 mA / > 100 A ... 160 A < 0.007 % + < 0.003 % @ 1 mA ... < 10 mA
Current measurement temperature drift 4)	< 0.5 x 10E-6 / K
Current measurement long term stability 2)	< 0.0015 % / Year

Power Measurement

Power/energy measurement accuracy 3) 5) 6) 11) 25)	< 0.004 % + < 0.001 % @ 50 mA ... 100 A < 0.006 % + < 0.0015 % @ 10 mA ... < 50 mA / > 100 A ... 160 A < 0.01 % + < 0.0035 % @ 1 mA ... < 10 mA
Power/energy measurement temperature drift 3) 4)	< 1 x 10E-6 / K
Power/energy measurement long term stability 2) 3) 4)	< 0.003 % / Year

2: Stability over 1 year (every month one measurement over one hour)
3: From 30 V ... 480 V
4: From 50 mA ... 100 A
5: % related to the read value + % related of end of range
6: Related to the active power with power factors from 1 to 0.5 i and from 1 to 0.8 c
10: Option
11: From 45 Hz ... 65 Hz
22: Only at 50 Hz, compensated
25: Measurement uncertainties of the laboratory has to be considered
Subjects to alteration.

23.07.2018