TECHNICAL DATA SHEET
Test device for windings & motors

MA3 MOTOR ANALYZER

Revision status 2.2, valid as of January 2026
All data and accuracy specifications apply at a room temperature of 22 °C (71.6 °F), after a 30-minute warm-up phase [1] and max. 40 %rh, measured directly at the output of the test device. Calibration is performed without measurement leads, as these can influence the measurement results depending on the test setup and position.

The MotorAnalyzer3 is THE multi-purpose tester for testing electric motors, stators, armatures, coils, transformers, ...
It offers 14 different test methods in a very compact design. This constitutes an unprecedented integration of different and useful test methods within one device. It makes the MotorAnalyzer3 the ideal tool for electric motor repair, electric motor maintenance, repair in production at separate working stations and testing in small series production.

Core features MA3

ELECTRICAL SPECIFICATIONS		
Included test methods	**AutoTest** • Surge Test Phase Comparison • Surge Test Peak-to-Peak • Ohmic resistance • Inductance • Impedance • Capacitance • Insulation Resistance • Polarization Index PI • Dielectric Absorption Ratio DAR • DC HiPot • DC HiPot with voltage increase per step • DC HiPot with voltage increase ramp **Toolkit** • Ohmmeter • Ohmmeter with continuity signal sound • Ohmmeter for diode testing • Megaohmmeter • DC HiPot tester • Surge voltage tester • RIC test – test of squirrel cage rotors • Protective conductor resistance • Direction of rotation measurement on the motor • Rotating field measurement on the stator • Induction measurement (windings short circuit localization) • *"Neutral zone"* adjustment of DC motors • DC Rotor test (resistance measurements between all adjacent bars)	
Power supply	Makita® Typ BL1860B / 6 Ah battery *Optional*: Mains voltage adapter for connection to a battery slot *Optional*: Bosch® ProCORE 8 Ah battery – must be ordered with the MA3, cannot be retrofitted *Optional*: Milwaukee® M18 REDLITHIUM 5 Ah battery – must be ordered with the MA3, cannot be retrofitted	
Battery operation	1 or 2 rechargeable tool batteries in single or dual operation	
Battery change during operation	Yes	
Battery life	Makita® Akku 6 Ah, continuously running AutoTest Bosch® Akku 8 Ah, continuously running AutoTest Milwaukee® Akku 5 Ah, continuously running AutoTest	: ca. 5 h : ca. 7 h : ca. 4.5 h

GENERAL SPECIFICATIONS

Operating temperature range	10 °C – 50 °C (50 °F – 122 °F)
Storage temperature range	-20 °C – 60 °C (-4 °F – 140 °F)
Display	10.1" touch display
Resolution	800 x 1280 pix
Test results storage	10 GB for tens of thousands of test results, including graphics
Communication interfaces	Bluetooth for communication with a PC and the PrintCom software
	WiFi for remote training
Test connections up to 3 kV	4 test points in four-wire technology (black, green, blue, yellow) – fully automatic switch-over of test points
	$1+1_{sense}$, $2+2_{sense}$, $3+3_{sense}$: for star or delta connected windings.
	Each test point also has a sense connection for connecting Kelvin test tongs.
	$GND+GND_{sense}$: for the housing connection, also in four-wire technology
	2 test points (yellow, red)
up to 6 kV	GND, HV+ : for two test tips for manual high-voltage and insulation test
Probe connection	Sub-D socket : Special accessory connection for test probes or room temperature sensors
Start-Stop connection	Jack socket : for foot switch or hand start buttons
Safety	Built-in discharge procedure with residual voltage measurement
Adjustment / Calibration	Adjustment via software or calibration menu, without having to open the MotorAnalyzer.
Software usability	All entries are subject to a plausibility check. This prevents incorrect entries.
	The operator can display detailed help (explanation) for each entry.
	Built-in operating manual for every question. The operator can display detailed instructions for each test method and function.
Front panel labeling language	DE, EN
Language of software	DE, EN, ES, FR, IT, PL, CS. More upon request
Language of the test protocol	DE, EN, IT, FR, ES, PL, CS. More upon request
Dimensions	488 x 386 x 185 mm (W x D x H)
Weight	11 kg	24.3 lbs.
Certificates and compliance with standards	CE conformity, 2014/35/EU, 2014/30EU, 2011/65/EU, EN61010-1:2011-07, EN61326-1:2013-07

Development and production	**Made in Germany – Premium Quality – Produced in Sauerland**

Surge voltage test MA3
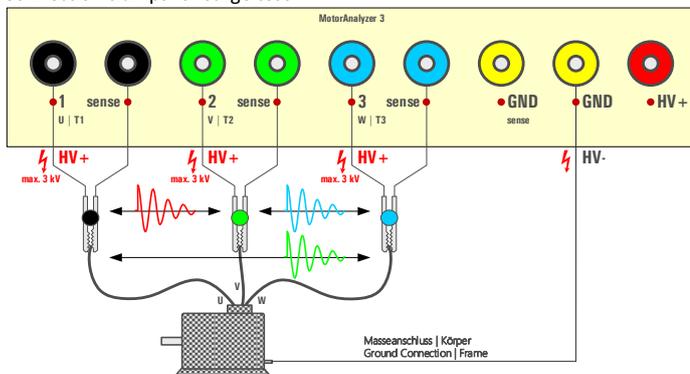
	Mode	
Test parameters menu	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
	Surge tester	Test parameters independent of AutoTest.
Visualization	AutoTest	Digital oscilloscope with automatic scaling plus digital readings.
	Surge tester	"
Measurement points	AutoTest	Built-in relay matrix one winding: 1 ↔ 2+GND two windings: 1 ↔ 2+GND, 3 ↔ 1+GND three windings: 1 ↔ 2+GND, 3 ↔ 1+GND, 2 ↔ 3+GND
	Surge tester	"
Measurement setup	AutoTest	Two-wire technology
	Surge tester	"
Evaluation based on	AutoTest	EAR (Error Area Ratio)
	Surge tester	"
EAR measurement range	AutoTest	0 – 98 %
	Surge tester	"
Test voltage	AutoTest	0 – 3000 V DC / in steps of 1 V
	Surge tester	"
Manual adjustment test voltage	AutoTest	No, not adjustable during automatic test.
	Surge tester	Yes, adjustable in steps of ±10 V, ±100 V, and ±1000 V during test.
Test voltage control	AutoTest	Automatic electronic voltage adjustment
	Surge tester	"
Resolution of the voltage reading	AutoTest	1 V
	Surge tester	"
Surge capacity	AutoTest	100 nF
	Surge tester	"
Surge power	AutoTest	0.45 Joule @ 3 kV
	Surge tester	"
Evaluation: Phase comparison	AutoTest	Typical for stators Phase comparison between the three phases of the stator using three EAR calculations.
	Surge tester	No evaluation
Evaluation: Peak-to-Peak	AutoTest	Typical for motors Peak-to-peak measurement in each individual phase of the motor using EAR calculations between the previous test voltage level and the current test voltage level.
	Surge tester	No evaluation
Evaluation: Reference comparison	AutoTest	Available Q4 2025. (will be retrofitted as a firmware update) Phase comparison between the three phases of the stator and the three phases of a previously measured reference stator using three EAR calculations.
	Surge tester	No evaluation by comparison with references stored in the test plan. But comparison with an oscillation that may have been temporarily stored using the "Memory" button.
Test results storage	AutoTest	Yes
	Surge tester	No
Calibration of the test method	AutoTest	No
	Surge tester	"

Surge tester = Tool: Surge voltage tester
Phase comparison = Includes digital oscilloscope for displaying the oscillations of all three phases.
Peak-to-Peak = Automatic voltage increase in steps during measurement of one phase and comparison to ensure that the deviation in percent from step to step is not too large. Includes a digital oscilloscope for displaying the oscillations of all phases plus the display of the EAR values in each voltage step.

Connection clamps for surge test

Insulation resistance test, DAR and PI MA3

GENERAL SPECIFICATIONS

	Mode	
Test methods	AutoTest	R_{Iso}, DAR, PI
	Megaohmmeter	R_{Iso}
Test parameters menus	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
	Megaohmmeter	Test parameters independent of AutoTest.
Visualization	AutoTest	Digital oscilloscope with automatic scaling plus digital readings.
	Megaohmmeter	"
Measurement points	AutoTest 3 kV	Built-in relay matrix [1]: 1+2+3 ↔ GND
	Megaohmmeter 3 kV	"
	AutoTest 6 kV	For 2 x test tips [2]: HV+ ↔ GND
	Megaohmmeter 6 kV	"
Measurement setup	AutoTest	Two-wire technology
	Megaohmmeter	"
Evaluation based on	AutoTest	R_{Iso}, DAR, PI
	Megaohmmeter	None
Measurement range	AutoTest	1 MΩ – 500 GΩ (1 TΩ)
	Megaohmmeter	"
Resolution	AutoTest	1 MΩ – 9.999 MΩ → 3 decimal places 10 MΩ – 99.99 MΩ → 2 decimal places 100 MΩ – 999.9 MΩ → 1 decimal place 1 GΩ – 9.999 GΩ → 3 decimal places 10 GΩ – 99.99 GΩ → 2 decimal places 100 GΩ – 250 GΩ → 1 decimal place >250 GΩ → 0 decimal places
	Ohmmeter	"
Measurement accuracy R_{Iso} Determined at ideal humidity! Determined with ideal cable routing!	AutoTest @ 1 kV	1 MΩ – 10 GΩ → ±2.5 % of measurement value 10 GΩ – 100 GΩ → ±5 % of measurement value 100 GΩ – 250 GΩ → ±10 % of measurement value 250 GΩ – 500 GΩ → ±15 % of measurement value 500 GΩ – 1 TΩ → ±20 % of measurement value
	Megaohmmeter@1kV	1 MΩ – 10 GΩ → ±2.5 % of measurement value 10 GΩ – 100 GΩ → ±5 % of measurement value 100 GΩ – 250 GΩ → ±10 % of measurement value 250 GΩ – 500 GΩ → ±15 % of measurement value 500 GΩ – 1 TΩ → ±20 % of measurement value
Test voltage	AutoTest 3 kV	Built-in matrix [1]: 250 – 3000 V DC / in steps of 1 V
	Megaohmmeter 3 kV	"
	AutoTest 6 kV	Test tips [2]: 250 – 6000 V DC / in steps of 1 V
	Megaohmmeter 6 kV	"
Measurement accuracy test voltage	AutoTest 3 kV	±0.5 % of measurement value
	Megaohmmeter 3 kV	"
	AutoTest 6 kV	±0.5 % of measurement value
	Megaohmmeter 6 kV	"
Manual adjustment test voltage	AutoTest	No, not adjustable during automatic test
	Megaohmmeter	Yes, adjustable in steps of ±10 V, ±100 V, and ±1000 V during test
Set value of the test voltage	AutoTest	Approximately 10–25 V higher than the specified value, from no load to full load
	Megaohmmeter	"
Test voltage control	AutoTest	Automatic electronic control with undervoltage monitoring
	Megaohmmeter	"
Resolution of the voltage reading	AutoTest	1 V
	Megaohmmeter	"
Voltage rise ramp	AutoTest	None - 1V/s - 2.5V/s - 5V/s - 10V/s - 25V/s - 50V/s - 100V/s - 250V/s - 500V/s - 1000V/s 100V/min - 250V/min - 500V/min - 1000V/min - 2000V/min
	Megaohmmeter	No
Test timer	AutoTest	15 s – 600 s / in steps of 1 s
	Megaohmmeter	Start/stop operation: Test device is started and stopped again at the end
Temperature compensation	AutoTest	Can be activated at 40 °C or 104 °F
	Megaohmmeter	"
Evaluation: R_{Iso}	AutoTest	The last measured value is used to be evaluated for the insulation resistance
	Megaohmmeter	No
Evaluation: DAR	AutoTest	Yes, can be activated in combination with insulation resistance testing
	Megaohmmeter	No
Evaluation: PI	AutoTest	Yes, can be activated in combination with insulation resistance and DAR test
	Megaohmmeter	No
Test voltage	AutoTest 3 kV	max. 5 mA
	Megaohmmeter 3 kV	"
	AutoTest 6 kV	max. 5 mA
	Megaohmmeter 6 kV	"
Built-in discharge resistor	AutoTest 3 kV	1 MΩ at terminals 1, 2, and 3 respectively / means: between terminals 2 MΩ
	Megaohmmeter 3 kV	"
	AutoTest 6 kV	No discharge
	Megaohmmeter 6 kV	"

... continued on the next page

Residual voltage monitoring	AutoTest	Yes, the test is terminated as soon as the output voltage has dropped below 50 V.
	Megaohmmeter	"
Test results storage	AutoTest	Yes
	Megaohmmeter	No
Calibration of the test method	AutoTest	Yes
	Megaohmmeter	"

Megaohmmeter = Tool for insulation measurement

1+2+3 ↔ GND = Measuring points 1, 2, and 3 are connected in parallel internally and are connected to +HVDC. The opposite pole is GND, connected to -HVDC.

R_{Iso} = Insulation resistance

DAR = Dielectric Absorption Ratio DAR (typically: R_{Iso} after 30 s / R_{Iso} after 60 s)

PI = Polarization index (typically: R_{Iso} after 60 s / R_{Iso} after 600 s)

1) Built-in relay matrix for switch-over of the various test methods on up to four measuring points.
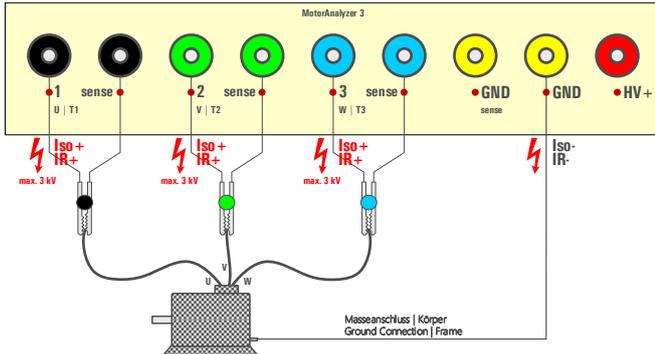AutoTest 3 kV
Megaohmmeter 3 kV

2) The two test tips for insulation resistance measurement are designed for two test methods (high voltage DC and insulation resistance).
AutoTest 6 kV
Megaohmmeter 6 kV

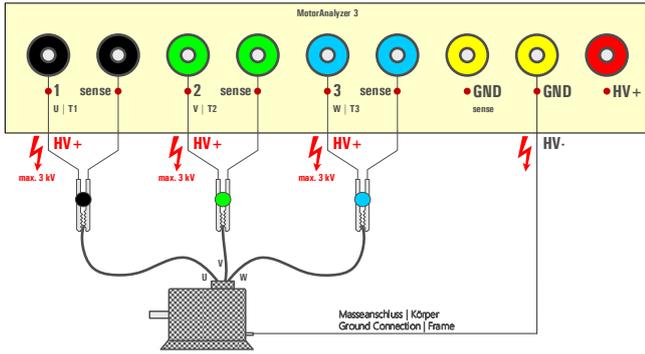# DC HiPot MA3

	Mode	
Test parameters menu	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
	HV tester	Test parameters independent of AutoTest.
Visualization	AutoTest	Digital oscilloscope with automatic scaling plus digital readings.
	HV tester	"
Measurement points	AutoTest 3 kV	Built-in relay matrix [1]: 1+2+3 ↔ GND
	HV tester 3 kV	"
	AutoTest 6 kV	For 2 x test tips [2]: HV+ ↔ GND
	HV tester 6 kV	"
Measurement setup	AutoTest	Two-wire technology
	HV tester	"
Evaluation based on	AutoTest	Flowing current (also called leakage current or discharge current)
	HV tester	None
Measurement range of the current	AutoTest	0 – 3 mA
	HV tester	"
Test voltage	AutoTest 3 kV	Built-in matrix [1]: 250 – 3000 V DC / in steps of 1 V
	HV tester 3 kV	"
	AutoTest 6 kV	Test tips [2]: 250 – 6000 V DC / in steps of 1 V
	HV tester 6 kV	"
Resolution of the voltage reading	AutoTest	1 V
	HV tester	"
Measurement accuracy Test voltage	AutoTest 3 kV	±0.5 % of measurement value
	HV tester 3 kV	"
	AutoTest 6 kV	±0.5 % of measurement value
	HV tester 6 kV	"
Manual adjustment test voltage	AutoTest	No, not adjustable during automatic test
	HV tester	Yes, adjustable in steps of ±10 V, ±100 V, and ±1000 V during test
Set value of the test voltage	AutoTest	Approximately 10–25 V higher than the specified value, from no load to full load
	HV tester	"
Test voltage control	AutoTest	Automatic electronic control with undervoltage monitoring
	HV tester	"
Voltage rise ramp	AutoTest	Available Q4 2025 (will be retrofitted as a firmware update) None - 1 V/s - 2.5 V/s - 5 V/s - 10 V/s - 25 V/s - 50 V/s - 100 V/s - 250 V/s - 500 V/s - 1000 V/s 100 V/min - 250 V/min - 500 V/min - 1000 V/min - 2000 V/min
	HV tester	No
Voltage steps	AutoTest	Yes, number of steps adjustable from 2 to 60 or voltage level adjustable from 50 to 1000 V
	HV tester	No
Test timer	AutoTest	1 s – 600 s / in steps of 1 s
	HV tester	Start/stop operation: Test device is started and stopped again at the end
Evaluation: Test voltage	AutoTest	The highest value measured during the test is used for evaluation.
	HV tester	No evaluation of the test current.
Test voltage	AutoTest	max. 5 mA
	HV tester	"
Resolution of the power reading	AutoTest	1 µA
	HV tester	"
Measurement accuracy test voltage	AutoTest	±2.5 % of measurement value
	HV tester	"
Measurement range test voltage	AutoTest	1 µA – max. test voltage
	HV tester	"
Built-in discharge resistor	AutoTest 3 kV	1 MΩ at terminals 1, 2, and 3 respectively / means: between terminals 2 MΩ
	HV tester 3 kV	"
	AutoTest 6 kV	No discharge
	HV tester 6 kV	"
Residual voltage monitoring	AutoTest	Yes, the test will end as soon as the output voltage has dropped below 50 V.
	HV tester	"
Test results storage	AutoTest	Yes
	HV tester	No
Calibration of the test method	AutoTest	Yes
	HV tester	"

HV tester = Tool: High-voltage measurement with DC

1+2+3 ↔ GND = Measuring points 1, 2, and 3 are connected in parallel internally and are connected to +HVDC. The opposite pole is GND, connected to -HVDC.
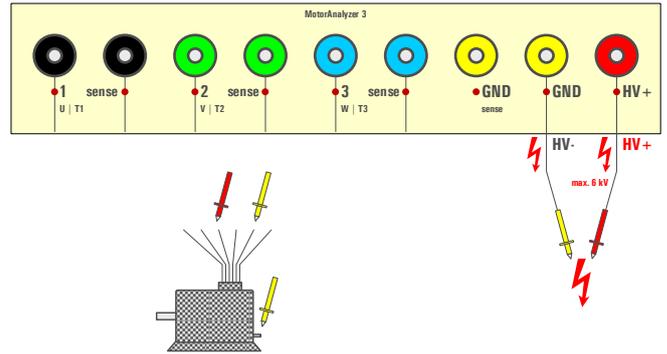
1) Built-in relay matrix for switch-over of the various test methods on up to four measuring points.
AutoTest 3 kV
DC HiPot tester 3 kV

2) The two test tips are designed for two test methods (high voltage DC and insulation resistance).
AutoTest 6 kV
DC HiPot tester 6 kV

Resistance test _{MA3}

GENERAL SPECIFICATIONS

	Mode	
Test parameters menu	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
	Ohmmeter	Test parameters independent of AutoTest.
Visualization	AutoTest	Digital display of measured values between measuring points plus graphical star-delta representation including conversion to phase resistances.
	Ohmmeter	Digital display of measured values between measuring points.
Measurement points	AutoTest	Built-in relay matrix one winding: 1 ↔ 2 two windings: 1 ↔ 2, 1 ↔ 3 three windings: 1 ↔ 2, 1 ↔ 3, 2 ↔ 3
	Ohmmeter	"
Measurement setup	AutoTest	Four-wire technology
	Ohmmeter	"
Test voltage	AutoTest	Max. 10 V DC / The test voltage level depends on the resistance to be measured.
	Ohmmeter	"
Test current	AutoTest	0.8 A / The level of the test current depends on the resistance to be measured. Q4 2025: KTY thermocouple testing: 1 mA constant current source
	Ohmmeter	"
Measurement method	AutoTest	Four-wire measurement
	Ohmmeter	"
Measurement range	AutoTest	1 mΩ – 200 kΩ
	Ohmmeter	"
Resolution	AutoTest	1 mΩ – 9.999 mΩ → 3 decimal places 10 mΩ – 99.99 mΩ → 2 decimal places 100 mΩ – 999.9 mΩ → 1 decimal place 1 Ω – 9.999 Ω → 3 decimal places 10 Ω – 99.99 Ω → 2 decimal places 100 Ω – 999.9 Ω → 1 decimal place 1 kΩ – 9.99 kΩ → 2 decimal places 10 kΩ – 99.9 kΩ → 1 decimal place 100 kΩ – 200 kΩ → 1 decimal place 200 kΩ – 499 kΩ → 0 decimal places
	Ohmmeter	"
Measurement accuracy	AutoTest	1 mΩ – 1000 mΩ → ±1 % of measurement value 1 Ω – 10 Ω → ±1.5 % of measurement value 10 Ω – 100 Ω → ±2 % of measurement value >100 Ω → No indication, without specification
	Ohmmeter	Accuracy similar to AutoTest Q4 2025 – Q1 2026 (will be retrofitted as a firmware update)
Q4 2025: Thermo sensor test Test current limiting	AutoTest	max. 3 mA
	Ohmmeter	"
Q4 2025: Thermo sensor test Conversion to temperature	AutoTest	Yes
	Ohmmeter	No
Stabilization time	AutoTest	Automatic time optimization or 1 – 60 s
	Ohmmeter	"
Evaluation: set value	AutoTest	Comparison of individual phase resistances with set values and associated tolerances. Set values adjustable from 10 mΩ – 499 kΩ Deviations adjustable from 0 – ±99 %
	Ohmmeter	No
Evaluation: Scattering range	AutoTest	Comparison of phase resistances with each other for symmetry. Evaluation variant 1: max. ΔR/R$_{mean}$ adjustable Evaluation variant 2: max. ΔR/R$_{center}$ adjustable Deviations adjustable from 0 – ±99 %
	Ohmmeter	"
Test results storage	AutoTest	Yes
	Ohmmeter	No
Calibration of the test method	AutoTest	Yes
	Ohmmeter	No, but available from Q4 2025 – Q1 2026 (software update)

Ohmmeter = Tool: Resistance measurement

Calculation of the scattering range:

Variant 1:
Calculation of the scattering range as the ratio of the range ΔR to the mean value R$_{mean}$ in %
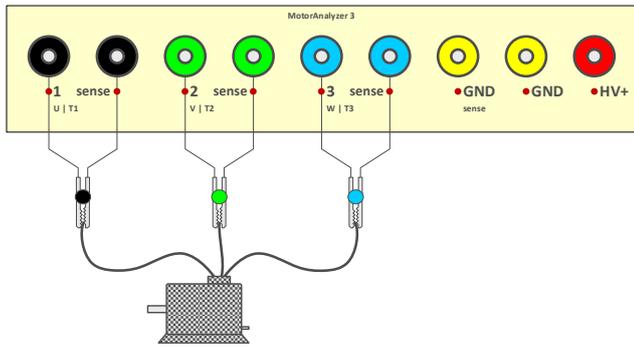
$$\frac{(R_{max} - R_{min})}{\bar{R}} \cdot 100\% \qquad \bar{R} = \frac{1}{n}\sum_{i=1}^{n} R_i$$

Variant 2:
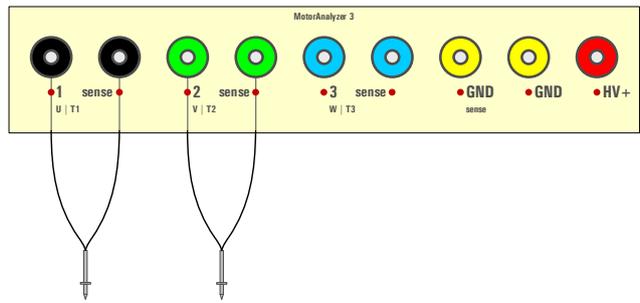Scattering range as the ratio of the difference between the maximum deviation from the mean value and the mean value in %

$$\frac{(R_{max\Delta\bar{R}} - \bar{R})}{\bar{R}} \cdot 100\% \qquad \bar{R} = \frac{1}{n}\sum_{i=1}^{n} R_i$$

Connection example for 3-phase resistance test

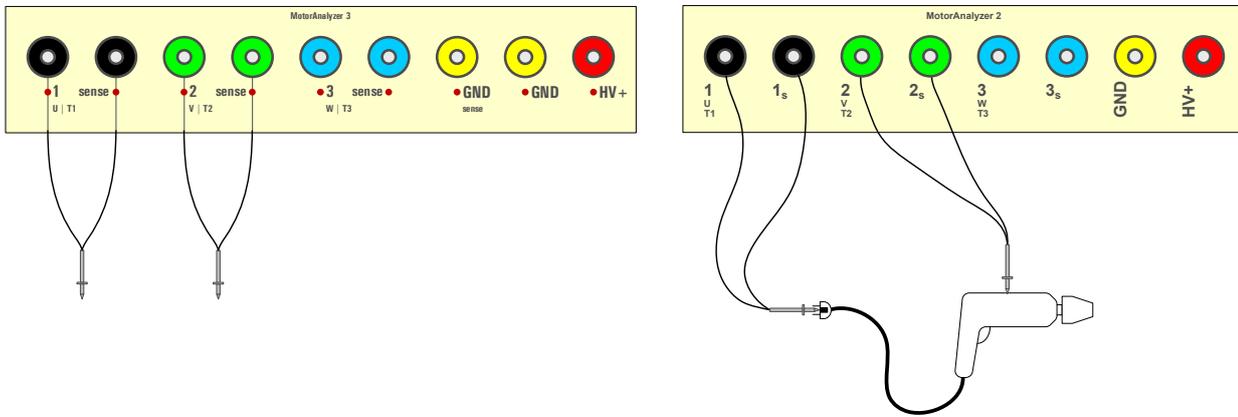Connection example for 1-phase resistance test

Protective earth resistance test MA3

	Mode	
Test parameters menu	PE	Test parameters independent of AutoTest.
Visualization	PE	Digital display of measured values between measuring points.
Measurement points	PE	Built-in relay matrix zwischen: 1 ↔ 2
Measurement setup	PE	Four-wire technology
Test voltage	PE	min. 0.2 A - max. 0.8 A / The test voltage level depends on the resistance to be measured.
Measurement setup	PE	Four-wire measurement
Measurement range	PE	1 mΩ – 10 Ω
Resolution	PE	1 mΩ – 9.999 mΩ → 3 decimal places 10 mΩ – 99.99 mΩ → 2 decimal places 100 mΩ – 999.9 mΩ → 1 decimal place 1 Ω – 9.999 Ω → 3 decimal places "
Measurement accuracy	PE	±1 % of measurement value
Stabilization time	PE	Automatic time optimization or 1 – 60 s
Evaluation: limit value	PE	GO if the measured value is ≤ set value.
Test results storage	PE	No
Calibration of the test method	PE	No

Connection example for protective earth resistance test using four-wire technology with test tips – or better yet, with the Kelvin test tong supplied.

Inductance test MA3

	Mode	
Test parameters menu	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
Visualization	AutoTest	Digital display of measured values between measuring points plus graphical star-delta representation.
Measurement points	AutoTest	Built-in relay matrix one winding: 1 ↔ 2 two windings: 1 ↔ 2, 1 ↔ 3 three windings: 1 ↔ 2, 1 ↔ 3, 2 ↔ 3
Measurement setup	AutoTest	Four-wire technology
Test voltage	AutoTest	0.5 − 8 V$_{eff}$ / The test voltage level depends on the inductance to be measured.
Measurement frequency	AutoTest	50, 60 Hz / The selection of the measurement frequency can affect measurement accuracy.
Test voltage	AutoTest	max. 0.5 A / The level of the test current depends on the inductance to be measured.
Measurement method	AutoTest	Four-wire measurement
Measurement range	AutoTest	(10 µH) 100 µH − 100 mH (500 mH)
Resolution	AutoTest	< 100 µH → 1 decimal place 100 µH − 999.9 µH → 1 decimal place 1 mH − 9.999 mH → 3 decimal places 10 mH − 99.99 mH → 2 decimal places > 100 mH → 1 decimal place
Measurement accuracy @ 50 Hz	AutoTest	< 100 µH → No indication, without specification 100 µH bis 100 mH → ±10 % of measurement value > 100 mH → No indication, without specification
Evaluation: Set value	AutoTest	Comparison of individual phase inductances with set values and associated tolerances.
Evaluation: Scattering range	AutoTest	Comparison of inductances with each other for symmetry.
Test results storage	AutoTest	Yes
Calibration of the test method	AutoTest	No

Calculation of the scattering range:

Variant 1:
Calculation of the scattering range as the ratio of the range to the mean value in %.
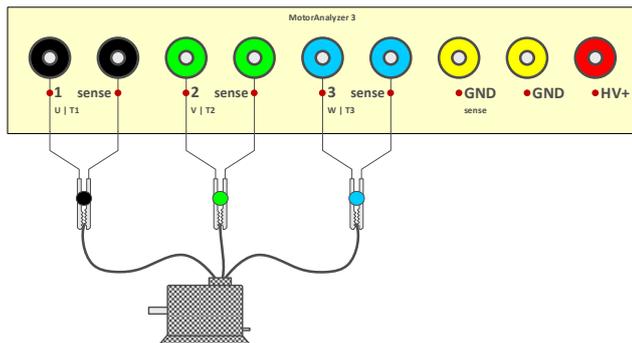
$$\frac{(L_{max} - L_{min})}{\bar{L}} \cdot 100\% \qquad \bar{L} = \frac{1}{n}\sum_{i=1}^{n} L_i$$

Variant 2:
Scattering range as the ratio of the difference between the maximum deviation from the mean value and the mean value in %

$$\frac{(R_{max\Delta\bar{R}} - \bar{R})}{\bar{R}} \cdot 100\% \qquad \bar{L} = \frac{1}{n}\sum_{i=1}^{n} L_i$$

Connection example for 3-phase inductance testing

Impedance test MA3

	Mode	
Test parameters menu	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
Visualization	AutoTest	Digital display of measured values between measuring points plus graphical star-delta representation including conversion to phase impedances.
Measurement points	AutoTest	Built-in relay matrix one winding: 1 ↔ 2 two windings: 1 ↔ 2, 1 ↔ 3 three windings: 1 ↔ 2, 1 ↔ 3, 2 ↔ 3
Measurement setup	AutoTest	Four-wire technology
Test voltage	AutoTest	0.5 – 8 V_{eff} / The test voltage level depends on the impedance to be measured.
Measurement frequency	AutoTest	50, 60 Hz / The selection of the measurement frequency can affect measurement accuracy.
Test current	AutoTest	max. 0.5 A / The level of the test current depends on the impedance to be measured.
Measurement method	AutoTest	Four-wire measurement
Measurement range	AutoTest	1 mΩ – 500 kΩ @ 50 Hz or 60 Hz
Evaluation: set value	AutoTest	Comparison of individual phase impedances with set values and associated tolerances.
Evaluation: Scattering range	AutoTest	Comparison of impedances with each other for symmetry.
Test results storage	AutoTest	Yes
Calibration of the test method	AutoTest	No

1) The measurement range is only calibrated up to 25 mH

Calculation of the scattering range:

Variant 1:
Calculation of the scattering range as the ratio of the range to the mean value in %
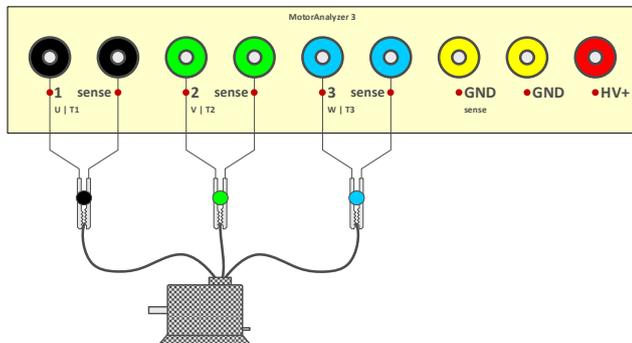
$$\frac{(L_{max} - L_{min})}{\bar{L}} \cdot 100\% \qquad \bar{L} = \frac{1}{n}\sum_{i=1}^{n} L_i$$

Variant 2:
Scattering range as the ratio of the difference between the maximum deviation from the mean value and the mean value in %.

$$\frac{(R_{max\Delta\bar{R}} - \bar{R})}{\bar{R}} \cdot 100\% \qquad \bar{L} = \frac{1}{n}\sum_{i=1}^{n} L_i$$

Connection example for 3-phase impedance testing

Capacitance test MA3

GENERAL SPECIFICATIONS

	Mode	
Test parameters menu	AutoTest	The test parameters are automatically generated using the *AutoTest Configurator*. These test parameters can be changed later.
Visualization	AutoTest	Digital display of the measured value.
Measurement points	AutoTest	Built-in relay matrix: 1+2+3 ↔ GND+GND$_{sense}$
Measurement setup	AutoTest	Four-wire technology
Test voltage	AutoTest	0.5 − 8 V$_{eff}$ / The test voltage level depends on the capacitance to be measured.
Measurement frequency	AutoTest	4000 Hz
Measurement method	AutoTest	Four-wire measurement
Measurement range	AutoTest	up to 1 µF and 4000 Hz from 1 µF and 50 Hz (automatic switch-over to 50 Hz)
Resolution	AutoTest	1 nF − 9.999 nF → 3 decimal places 10 nF − 99.99 nF → 2 decimal places 100 nF − 999.9 nF → 1 decimal place 1 µ − 9.999 µF → 3 decimal places 10 µF − 99.99 µF → 2 decimal places >100 µF → 1 decimal place
Measurement accuracy	AutoTest	< 1 nF → No indication, without specification 1 nF − 9.999 µF → ±15 % of measurement value 10 µF − 100 µF → ±30 % of measurement value > 100 µF → No indication, without specification
Evaluation: set value	AutoTest	Comparison of individual capacitance with a set value and associated tolerance.
Test results storage	AutoTest	Yes
Calibration of the test method	AutoTest	No

Connection example for 3-phase capacitance test
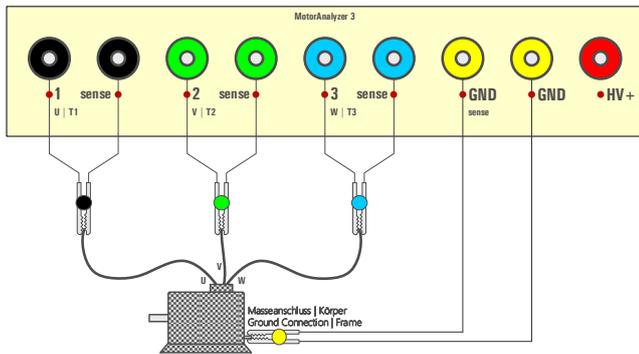
More information

For further information please visit our homepage www.schleich.com

RoHS conformity

We declare the conformity of our products with the **RoHS2 directive 2011/65/EU** of the European Parliament and of the Council of June 8, 2011, on the restriction of the use of hazardous substances in electrical and electronic equipment, as well as conformity with the **extended delegated directive 2015/863/EU** from March 31, 2015, effective July 22, 2019.

REACH conformity

As a manufacturer of electronic products, SCHLEICH GmbH is a so-called "downstream user" within the meaning of 'REACH'. SCHLEICH GmbH is not subject to any obligations arising from the manufacture and placing on the market of substances/chemicals for pre-registration or registration (ECHA). Our products supplied to customers are "articles" and therefore not to be defined as "substance" or "preparation" (in accordance with Article 3 Definitions). Furthermore, under normal and reasonably foreseeable conditions of use, no substances should be released from the products purchased by customers. Therefore, SCHLEICH GmbH is neither subject to the registration obligation nor to the obligation to prepare safety data sheets. In order to keep the supply chain secure and in the interest of maximum product safety, we make sure that our suppliers fulfill all requirements for the materials and substances we use.

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