

Micrologic E - Real-Time Measurements

Current Metering

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Phase I1, I2, I3, and neutral IN current measurements ⁽¹⁾ - Maximum current values of phases I1 MAX, I2 MAX, I3 MAX, and the neutral IN MAX ⁽¹⁾ - Maximum value (MAX) of all phase currents - Minimum current values of phases I1 MIN, I2 MIN, I3 MIN and neutral IN MIN ⁽¹⁾ - Minimum value (MINMIN) of all phase currents - Average current Iavg measurements - Maximum average current value Iavg MAX - Minimum average current value Iavg MIN	A	0–20 In	+/-1%	0.2–1.2 In
Micrologic 6 - Ground-fault current measurement - Maximum/minimum value of the ground-fault current	% Ig	0–600%	–	–
Micrologic 7 - Earth-leakage current measurement - Maximum/minimum value of the earth-leakage current	A	0–100	–	–
(1) IN with 4-pole or 3-pole trip unit with ENCT option				

Current Unbalance Metering

The accuracy range is for the current range: 0.2–1.2 In.

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Current phase unbalance measurements I1 unbal, I2 unbal, I3 unbal - Maximum values of current phase unbalances I1 unbal MAX, I2 unbal MAX, I3 unbal MAX - Maximum value (MAXMAX) of all phase unbalances	% Iavg	-100–100%	+/-2%	-100–100%

NOTE:

- The unbalance values are signed (relative values).
- The unbalance maximum values (MAX) are not signed (absolute values).

Voltage Metering

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Phase-to-phase V12, V23, V31 and phase-to-neutral V1N, V2N, V3N voltage measurements ⁽¹⁾ - Maximum values of phase-to-phase voltages V12 MAX L-L, V23 MAX L-L, V31 MAX L-L and phase-to-neutral voltages V1N MAX L-N, V2N MAX L-N, V3N MAX L-N ⁽¹⁾ - Maximum value of the MAX phase-to-phase voltages (V12, V23, V31) - Minimum values of phase-to-phase voltages V12 MIN L-L, V23 MIN L-L, V31 MIN L-L and phase-to-neutral voltages V1N MIN L-N, V2N MIN L-N, V3N MIN L-N ⁽¹⁾ - Minimum value of the minimum phase-to-phase voltages (V12, V23, V31) - Average voltage measurements Vavg L-L and Vavg L-N - Maximum value of average voltages Vavg MAX L-L and Vavg MAX L-N - Minimum value of average voltages Vavg MIN L-L and Vavg MIN L-N	V	0–850	+/-0.5%	70–850
(1) V1N, V2N, V3N with 4-pole or 3-pole trip unit with ENVV option				

Voltage Unbalance Metering

The accuracy range is for the voltage range: 70–850 V.

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Phase-to-phase voltage V12unbal L-L, V23unbal L-L, V31unbal L-L and phase-to-neutral voltage V1Nunbal L-N, V2Nunbal L-N, V3Nunbal L-N unbalance measurements ⁽¹⁾ - Maximum values of phase-to-phase voltage unbalances V12unbal MAX L-L, V23unbal MAX L-L, V31unbal MAX L-L and phase-to-neutral voltage unbalances V1Nunbal MAX L-L, V2Nunbal MAX L-L, V3Nunbal MAX L-L ⁽¹⁾ - Maximum values (MAXMAX) of the MAX of the phase-to-phase and phase-to-neutral voltage unbalances ⁽¹⁾	% Vavg L-L % Vavg L-N	-100–100%	+/-1%	-100–100%
(1) V1N, V2N, V3N with 4-pole or 3-pole trip unit with ENVT option				

NOTE:

- The unbalance values are signed (relative values).
- The unbalance maximum values (MAX) are not signed (absolute values).

Power Metering

The accuracy range is for:

- current range: 0.1–1.2 I_n
- voltage range: 70–850 V
- cos ϕ range: from -1 to -0.5 and from 0.5 to 1

Measurement	Unit	Measurement range	Accuracy	Accuracy range
Only with 4-pole or 3-pole trip unit with ENVT option - Active power measurements for each phase P1, P2, P3 - Maximum values of active powers for each phase P1 MAX, P2 MAX, P3 MAX - Minimum values of active powers for each phase P1 MIN, P2 MIN, P3 MIN	kW	-1000 to 1000	+/-2%	-1000 to -1 1 to 1000
- Total active power measurement P_{tot} - Maximum value of total active power P_{tot} MAX - Minimum value of total active power P_{tot} MIN	kW	-300 to 3000	+/-2%	-3000 to -3 3 to 3000
Only with 4-pole or 3-pole trip unit with ENVT option - Reactive power measurements for each phase Q1, Q2, Q3 - Maximum values of reactive powers for each phase Q1 MAX, Q2 MAX, Q3 MAX - Minimum values of reactive powers for each phase Q1 MIN, Q2 MIN, Q3 MIN	kVAR	-1000 to 1000	+/-2%	-1000 to -1 1 to 1000
- Total reactive power measurement Q_{tot} - Maximum value of total reactive power Q_{tot} MAX - Minimum value of total reactive power Q_{tot} MIN	kVAR	-3000 to 3000	+/-2%	-3000 to -3 3 to 3000
Only with 4-pole or 3-pole trip unit with ENVT option - Apparent power measurements for each phase S1, S2, S3 - Maximum values of apparent powers for each phase S1 MAX, S2 MAX, S3 MAX - Minimum values of apparent powers for each phase S1 MIN, S2 MIN, S3 MIN	kVA	-1000 to 1000	+/-2%	-1000 to -1 1 to 1000
- Total apparent power measurement S_{tot} - Maximum value of total apparent power S_{tot} MAX - Minimum value of total apparent power S_{tot} MIN	kVA	-3000 to 3000	+/-2%	-3000 to -3 3 to 3000
Only with 4-pole or 3-pole trip unit with ENVT option - Fundamental reactive power measurements for each phase Q_{fund} 1, Q_{fund} 2, Q_{fund} 3 - Maximum values of fundamental reactive powers for each phase Q_{fund} 1 MAX, Q_{fund} 2 MAX, Q_{fund} 3 MAX - Minimum values of fundamental reactive powers for each phase Q_{fund} 1 MIN, Q_{fund} 2 MIN, Q_{fund} 3 MIN	kVAR	-1000 to 1000	+/-2%	-1000 to -1 1 to 1000

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Total fundamental reactive power measurement Qfundtot - Maximum value of total fundamental reactive power Qfundtot MAX - Minimum value of total fundamental reactive power Qfundtot MIN	kVAR	-3000 to 3000	+/-2%	-3000 to -3 3 to 3000
Only with 4-pole or 3-pole trip unit with ENVT option - Distorting power measurements for each phase D1, D2, D3 - Maximum values of distorting powers for each phase D1 MAX, D2 MAX, D3 MAX - Minimum values of distorting powers for each phase D1 MIN, D2 MIN, D3 MIN	kVAR	-1000 to 1000	+/-2%	-1000 to -1 1 to 1000
- Total distorting power measurement Dtot - Maximum value of total distorting power Dtot MAX - Minimum value of total distorting power Dtot MIN	kVAR	-3000 to 3000	+/-2%	-3000 to -3 3 to 3000

Operating Indicators

Measurement	Unit	Measurement range	Accuracy	Accuracy range
Operating quadrant measurement	–	1, 2, 3, 4	–	–
Direction of phase rotation measurement	–	0, 1	–	–
Type of load measurement (leading/lagging)	–	0, 1	–	–

Energy Quality Indicators

The accuracy range is for:

- current range: 0.1–1.2 In
- voltage range: 70–850 V

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Measurement of: - power factors PF1, PF2, PF3 and $\cos \phi$ 1, $\cos \phi$ 2, $\cos \phi$ 3 for each phase - Only with 4-pole or 3-pole trip unit with ENVT option - total power factor PF and $\cos \phi$ - Maximum values: - per phase of power factors PF1 MAX, PF2 MAX, PF3 MAX and $\cos \phi$ 1 MAX, $\cos \phi$ 2 MAX, $\cos \phi$ 3 MAX - of the power factor PF MAX and $\cos \phi$ MAX - Minimum values: - of the power factors PF1 MIN, PF2 MIN, PF3 MIN and $\cos \phi$ 1 MIN, $\cos \phi$ 2 MIN, $\cos \phi$ 3 MIN - Only with 4-pole or 3-pole trip unit with ENVT option - of the total power factor PF MIN and $\cos \phi$ MIN	–	-1.00 to 1.00	+/-2%	-1.00 to -0.50 0.50 to 1.00
- Measurement of the total harmonic current distortion THD for each phase THD(I1), THD(I2), THD(I3) - Maximum values of the total harmonic current distortion THD for each phase THD(I1) MAX, THD(I2) MAX, THD(I3) MAX - Minimum values of the total harmonic current distortion THD for each phase THD(I1) MIN, THD(I2) MIN, THD(I3) MIN	% Ifund	0– >1000%	+/-10%	10–500% I >20% In
- Measurement of the total harmonic phase-to-phase voltage THD(V12) L-L, THD(V23) L-L, THD(V31) L-L and phase-to-neutral voltage THD(V1N) L-N, THD(V2N) L-N, THD(V3N) L-N distortion⁽¹⁾ - Maximum values of the total harmonic phase-to-phase voltage THD(V12) MAX L-L, THD(V23) MAX L-L, THD(V31) MAX L-L and phase-to-neutral voltage THD(V1N) MAX L-N, THD(V2N) MAX L-N, THD(V3N) MAX L-N distortion⁽¹⁾ - Minimum values of the total harmonic phase-to-phase voltage THD(V12) MIN L-L, THD(V23) MIN L-L, THD(V31) MIN L-L and phase-to-neutral voltage THD(V1N) MIN L-N, THD(V2N) MIN L-N, THD(V3N) MIN L-N distortion⁽¹⁾	% Vfund L-L % Vfund L-N	0– >1000%	+/-5%	2–500% V >100 V
(1) THD(V1N), THD(V2N), THD(V3N) with 4-pole or 3-pole trip unit with ENVT option				

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Frequency measurement - Maximum frequency - Minimum frequency	Hz	15–440	+/-0.2%	45–65
(1) THD(V1N), THD(V2N), THD(V3N) with 4-pole or 3-pole trip unit with ENVT option				

Motor Thermal Image (Micrologic 6 E-M)

The accuracy range is for the current range: 0.2–1.2 In.

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Motor thermal image measurements - Maximum value of the motor thermal image - Minimum value of the motor thermal image	% Ir	0–100%	+/-1%	0–100%

Micrologic E - Demand Value Measurements

Current Demand and Peak Values

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Phase (I1, I2, I3) and neutral (IN) current demand values ⁽¹⁾ - Phase (I1, I2, I3) and neutral (IN) peak current values ⁽¹⁾	A	0–20 I _n	+/-1.5%	0.2–1.2 I _n
(1) IN with 4-pole or 3-pole trip unit with ENCT option				

Power Demand and Peak Values

The accuracy range is for:

- current range: 0.1–1.2 I_n
- voltage range: 70–850 V
- cos ϕ range: -1–0.5 and 0.5–1

Measurement	Unit	Measurement range	Accuracy	Accuracy range
- Demand value of the total active power (P_{tot}) - Total active power peak value (P_{tot})	kW	0–3000 kW	+/-2%	3–3000 kW
- Demand value of the total reactive power (Q_{tot}) - Total reactive power peak value (Q_{tot})	kVAR	0–3000 kVAR	+/-2%	3–3000 kVAR
- Demand value of the total apparent power (S_{tot}) - Total apparent power peak value (S_{tot})	kVA	0–3000 kVA	+/-2%	3–3000 kVA

Micrologic E - Energy Metering

Energy Meters

The accuracy range is for:

- current range: 0.1–1.2 I_n
- voltage range: 70–850 V
- cos ϕ range: -1—0.5 and 0.5–1

Measurement	Unit	Measurement range	Accuracy	Accuracy range
Active energy measurements: Ep, Epln supplied, and EpOut consumed	kWh then MWh	1 kWh to > 1000 TWh	+/-2%	1 kWh to 1000 TWh
Reactive energy measurements: Eq, EqIn supplied, and EqOut consumed	kVARh then MVARh	1 kVARh to > 1000 TVARh	+/-2%	1 kVARh to 1000 TVARh
Apparent energy measurement Es	kVAh then MVAh	1 kVAh to > 1000 TVAh	+/-2%	1 kVAh to 1000 TVAh