

IEC 61000-4-30 compliance and ION meters

This technical note outlines the compliance of PowerLogic™ meters with the International Electrotechnical Commission's IEC 61000-4-30 (4-30) standard, and is intended for personnel with knowledge of power quality and power quality standards.

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Additional information

Visit www.schneider-electric.com to download additional documentation.

For additional information regarding operation and installation of these meters, see the following documents available for download from the website:

- your meter's user guide and installation information
- *ION Reference*

You can use EcoStruxure™ Power Monitoring Expert to generate 4-30 reports from your meter's data. Refer to the Reports online help for more information.

For a complete description of the 4-30 standard, refer to the IEC website at www.iec.ch and the IEC publications catalog at www.iec.ch/searchpub/cur_fut.htm.

Third-party lab certifications are available for your device. Please contact your sales representative for details.

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IEC 61000-4-30 overview

The 4-30 standard defines methods for measurement and interpretation of power quality parameters in 50/60 Hz AC power supply systems.

The standard describes measurement methods for relevant parameters to obtain reliable, repeatable and comparable results using any compliant meter and regardless of the environmental conditions.

Relevant power quality parameters in 4-30 are: power frequency; magnitude of supply voltage and current; flicker; supply voltage dips and swells; voltage interruptions; transient voltages; supply voltage and current unbalance; voltage and current harmonics and interharmonics; mains signaling on the supply voltage; rapid voltage changes; and measurement of underdeviation and overdeviation parameters.

For each parameter measured, 4-30 defines three classes of measurement performance:

- **Class A (Advance) parameter performance:** This class of performance is used where precise measurements are necessary. Class A performance can be used to verify standards compliance or resolve settlement metering. Any 4-30 parameter based on the same signal, measured with separate class A compliant devices, will produce matching results within the specified margin of uncertainty for that parameter.
- **Class S (Surveys) parameter performance:** This class of performance is used for statistical applications such as surveys or power quality assessment, possibly with a limited subset of parameters. Although class S uses equivalent intervals of measurement as class A, the class S processing requirements are lower.
- **Class B parameter performance:** This class of performance is defined in order to avoid making many existing instrument designs obsolete.

NOTE: 4-30 flagging is not retained when the meter is powered down, so if the meter is power-cycled in the middle of a 4-30 reporting interval, the ION framework will lose any flagging information for the intervals in progress at the time, for power quality events occurring prior to the power cycle.

ION implementation of 4-30

The following tables outline 4-30 compliance in ION meters.

Meter ¹	Firmware version	IEC 61000-4-30 compliance
PM8000	all	Class S, Edition 2
ION9000	all	Class A, Edition 3
ION7400	all	Class S, Edition 2
ION7650	330 to 353	Class A, Edition 1
	355 to 401	Class A, Edition 2
	410 and later	Class A, Edition 3
ION8650A	400 to 4.21.2	Class A, Edition 2
	4.30.0 and later	Class A, Edition 3
ION8650B	400 to 4.21.2	Class S, Edition 2
	4.30.0 and later	Class S, Edition 3
ION8800A	330 to 334	Class A, Edition 1
	340 to 362	Class A, Edition 2

Meter ¹	Firmware version	IEC 61000-4-30 compliance
	370 and later	Class A, Edition 3
ION8800B	340 to 362	Class S, Edition 2
	370 and later	Class S, Edition 3

¹ION8650C and ION8800C meters do not support 4-30 functionality.

NOTE: All 4–30 compliant ION meters require installation of the corresponding power quality version of the meter template in order to support 4-30 power quality functionality. For example, ION7650 firmware version 410 requires the ION7650 v410 PQ template.

NOTE: Device performance may exceed standard requirements.

Class A measurement performance ($U_{din} = 230$ VAC) Edition 1 and 2

Parameter	Range	Accuracy
5.1 Power Frequency	50 Hz: 42.5 - 57.5 Hz 60 Hz: 51 - 69 Hz	+/-0.01 Hz
5.2 Magnitude of Supply Voltage	1 - 200% of U_{din} (Edition 1) 10 - 150% of U_{din} (Edition 2)	+/-0.1% of U_{din}
5.3 Flicker	0 - 20 P_{st} (Edition 1) 0.2 - 10 P_{st} (Edition 2)	5% of reading
5.4 Supply Voltage Dips & Swells	10 - 200% of U_{din}	Amplitude +/-0.2% of U_{din} Duration +/-1 cycle
5.5 Voltage Interruptions	< 10% of U_{din}	Amplitude +/-0.2% of U_{din} Duration +/-1 cycle
5.7 Supply Voltage Unbalance	0 - 5%	+/-0.15%
5.8 Voltage Harmonics	2 times the limit from IEC 61000-2-4 Class 3 up to the 50th harmonic	IEC 61000-4-7 Class I Method $U_{sg,h}$
5.9 Voltage Interharmonics	2 times the limit from IEC 61000-2-4 Class 3 up to the 50th harmonic	IEC 61000-4-7 Class I Method $U_{sg,h}$
5.10 Mains Signaling Voltage	Up to 3 kHz 0 - 15% of U_{din}	1 - 3% of U_{din} , +/-0.15% of U_{din} ; 3 - 15% of U_{din} , +/-5% of measured value
5.12 Measurement of Underdeviation and Overdeviation Parameters	1 - 200% of U_{din} (Edition 1) 10 - 150% of U_{din} (Edition 2)	+/-0.1% of U_{din}

NOTE: Device performance may exceed standard requirements.

Class S measurement performance ($U_{din} = 230$ VAC) Edition 2

Parameter	Measuring range	Uncertainty
5.1 Power Frequency	50 Hz: 42.5 - 57.5 Hz 60 Hz: 51 - 69 Hz	+/-0.05 Hz
5.2 Magnitude of Supply Voltage	10 - 150% of U_{din}	+/-0.5% of U_{din}
5.3 Flicker ¹	0.2 - 10 P_{st}	+/-5% of reading
5.4 Supply Voltage Dips & Swells	10 - 200% of U_{din}	Amplitude +/-0.2% of U_{din} Duration +/-1 cycle
5.5 Voltage Interruptions	N/A	Duration +/- 1 cycle
5.7 Supply Voltage Unbalance	U_2 (0.5 - 5)% U_0 (0.5 - 5)%	+/-0.15%
5.8 Voltage Harmonics	10 - 100% the limit from IEC 61000-2-4 Class 3, calculated up to the 40th harmonic	Twice IEC 61000-4-7 Class II
5.10 Mains Signaling Voltage ¹	0 - 15% of U_{din}	1 - 3% of U_{din} , +/-0.15% of U_{din} ; 3 - 15% of U_{din} , +/-5% of measured value

Parameter	Measuring range	Uncertainty
5.12 Measurement of Underdeviation and Overdeviation Parameters ¹	10 - 150% of U_{din}	+/-0.5% of U_{din}

¹ Not available on all Class S devices.

NOTE: Device performance may exceed standard requirements.

Class A measurement performance (Indoor(I), Fixed(F), $U_{din} = 230$ VAC) Edition 3

Parameter	Measuring range	Uncertainty
5.1 Power Frequency	50 Hz: 42.5 - 57.5 Hz 60 Hz: 51 - 69 Hz	+/-0.01 Hz
5.2 Magnitude of Supply Voltage	10 - 150% of U_{din}	+/-0.1% of U_{din}
5.3 Flicker	0.2 - 10 P_{st}	5% or 0.05 P_{st} , whichever is greater
5.4 Supply Voltage Dips & Swells	N/A	Amplitude +/-0.2% of U_{din} Duration +/-1 cycle
5.5 Voltage Interruptions	N/A	Duration +/-1 cycle
5.7 Supply Voltage Unbalance	U_2 (0.5 - 5)% U_0 (0.5 - 5)%	+/-0.15%
5.8 Voltage Harmonics	Up to 50th order 10% to 200% of cl. 3 IEC61000-2-4	IEC 61000-4-7 Class 1 $U_m \geq 1\% U_{nom}$: +/- 5% U_m $U_m < 1\% U_{nom}$: +/- 0.05% U_{nom}
5.9 Voltage Interharmonics	Up to 50th order 10% to 200% of cl. 3 IEC61000-2-4	IEC 61000-4-7 Class 2 $U_m \geq 1\% U_{nom}$: +/- 5% U_m $U_m < 1\% U_{nom}$: +/- 0.05% U_{nom}
5.10 Mains Signaling Voltage	Up to 3 kHz 0 - 15% of U_{din}	(1-3)% U_{din} : +/- 0.15% (3-15)% U_{din} : +/- 5%
4.6 Clock uncertainty ¹	N/A	50 Hz : +/- 20 ms 60 Hz : +/- 16.7 ms Non-sync : +/- 1 s / 24-h
5.11 Rapid Voltage Changes	N/A	Amplitude +/-0.2% U_{din} Duration +/-1 cycle
5.12 Underdeviation and Overdeviation	10 - 150% of U_{din}	+/-0.1% U_{din}
5.13.2 Current Magnitude	Specified Crest factor of 3	1% of reading for (10-100) % of I_n
5.13.4 Current Harmonics	Up to 50th order	IEC 61000-4-7 Class 1 $I_m \geq 1\% I_{nom}$: +/- 5% I_m $I_m < 1\% I_{nom}$: +/- 0.05% I_{nom}
5.13.5 Current Interharmonics	Up to 50th order	IEC 61000-4-7 Class 1 $I_m \geq 3\% I_{nom}$: +/- 5% I_m $I_m < 3\% I_{nom}$: +/- 0.15% I_{nom}
5.13.6 Current Unbalance	I_2 : (0.5 - 5)% I_0 : (0.5 - 5)%	+/-0.15%

¹ GPS synchronization is required on all devices for Clock Uncertainty compliance.

NOTE: Device performance may exceed standard requirements.

Class S measurement performance (Indoor(I), Fixed(F), $U_{din} = 230$ VAC) Edition 3

Parameter	Measuring range	Uncertainty
5.1 Power Frequency	50 Hz: 42.5 - 57.5 Hz 60 Hz: 51 - 69 Hz	+/-0.05 Hz
5.2 Magnitude of Supply Voltage	10 - 150% of U_{din}	+/-0.5% of U_{din}
5.3 Flicker ¹	0.2 - 10 P_{st}	5% or 0.05 P_{st} , whichever is greater
5.4 Supply Voltage Dips & Swells	N/A	Amplitude +/-0.2% of U_{din} Duration +/-1 cycle
5.5 Voltage Interruptions	N/A	Duration +/-1 cycle
5.7 Supply Voltage Unbalance	U_2 (0.5 - 5)% U_0 (0.5 - 5)%	+/-0.15%
5.8 Voltage Harmonics	Up to 40th order 10% to 100% of cl. 3 IEC61000-2-4	IEC 61000-4-7 Class II $U_m \geq 3\%$ U_{nom} : +/- 5% U_m $U_m < 3\%$ U_{nom} : +/- 0.15% U_{nom}
5.10 Mains Signaling Voltage ¹	Up to 3 kHz 0 - 15% of U_{din}	(1-3)% U_{din} : +/- 0.15% (3-15)% U_{din} : +/- 5%
4.6 Clock uncertainty	N/A	+/- 5 s / 24-h
5.12 Measurement of Underdeviation and Overdeviation Parameters ¹	10 - 150% of U_{din}	+/-0.5% of U_{din}
5.13.2 Current Magnitude	Specified Crest factor of 3	2% of reading for (10-100) % of I_n
5.13.4 Current Harmonics	Up to 40th order	IEC 61000-4-7 Class II $I_m \geq 10\%$ I_{nom} : +/- 5% I_m $I_m < 10\%$ I_{nom} : +/- 0.5% I_{nom}
5.13.6 Current Unbalance	I_2 : (0.5 - 5)% I_0 : (0.5 - 5)%	+/-0.15%

¹ Not available on all Class S devices.