FLUKE®

1773/1775/1777

3 Phase Power Quality Analyzer

Product Specifications

BC
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General Specifications

Dimensions	28.0 cm x 19.0 cm x 6.2 cm (11.0 in x 7.5 in x 2.4 in)
Weight	2.1 kg (4.6 lb)
Display	7-in TFT, 1024 x 600 pixels with capacitive touch that supports operation with PPE gloves for up to 1000 V ARC 4 rating
Anti-Theft Protection	Slot to support Kensington lock
Warranty	
Logger	2 years (battery not included)
Accessories	1 year (battery included)
Calibration Cycle	2 years

Environmental Specifications

Logger	
Temperature	
Operating	-10 °C to 50 °C
Storage	-20 °C to 60 °C 15 °C to 30 °C (recommended)
Operating Humidity	IEC60721-3-3: 3K5, modified: -10 °C to 30 °C: ≤95%, no condensation or ice 35 °C: 70 % 40 °C: 55 % 50 °C: 35 %
Altitude	
Operating	2000 m
Storage	12 000 m
BP1770 Battery	Li-ion 3.65 V, 14.6 Wh
Ingress Protection	
with protection caps attached	IEC 60529: IP50 (Category 2 Enclosure)
with protection caps removed	IEC 60529: IP20 *A Category 2 enclosure is where no pressure difference relative to the surrounding air is present.*
Vibration	IEC 60721-3-3 / 3M2
Safety	
General	IEC 61010-1: Pollution Degree 2
Power Supply	Overvoltage Category IV 600 V
Mains Adapter MA-C8	Overvoltage Category II 300 V
Measurement	IEC 61010-2-030: CAT IV 600 V, CAT III 1000 V
Altitudes between 2000 m and 4000 m, derate to:	
Power Supply	Overvoltage Category IV 300 V
Mains Adapter MA-C8	Overvoltage Category II 150 V
Measurement	IEC 61010-2-030: Overvoltage CAT IV 300 V, CAT III 600 V

Electromagnetic Compatibility (EMC)

International	IEC 61326-1: Industrial CISPR 11: Group 1, Class A *Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.* *Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.* *Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.* *Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object.*
Korea (KCC)	Class A Equipment (Industrial Broadcasting & Communication Equipment) *Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.*
USA (FCC)	47 CFR 15 subpart C.

Wireless Radio with WiFi/BLE Module (depends on region)

2.4 GHz band	
Frequency Range	2400 MHz to 2483.5 MHz
Output Power	<100 mW
5 GHz band 1	
Frequency Range	5150 MHz to 5725 MHz
Output Power	<200 mW
5 GHz band 2	
Frequency Range	5725 MHz to 5875 MHZ
Output Power	<25 mW

Electrical Specifications

Power Supply

Voltage Range	
using safety plug input with power from the measurement circuit	100 V to 600 V -10 % / +10 % (90 V to 660 V)
using MA-C8 with standard power cord (IEC 60320 C7)	100 V to 240 V
Power consumption	Maximum 40 VA
Maximum no-load consumption	<0.6 W

- Efficiency ..... ≥78 % (depends on input voltage)
- Mains Frequency ..... 50/60 Hz (42.5 Hz to 69 Hz)
- UPS ..... Li-ion battery BP1770 with extended temperature range, customer-replaceable
- On-Battery Runtime ..... up to 1.25 hr
- Charging Time ..... 8 hr, 3 hr when power is turned off

Voltage Inputs

- Number of Inputs ..... 4, 3 phases and neutral referenced to PE (5 connectors)
- Measurement Category ..... 1000 V CAT III / 600 V CAT IV
- Maximum Input Voltage ..... 1000 V_{rms} / 1000 V dc (1700 Vpk)
- Nominal Voltage Range
  - Wye and single phase ..... Variable (50 V – 1000 V)
  - Delta ..... Variable (100 V – 1000 V)
    IEC 61000-4-30 Class A compliance for the nominal voltages (U_{din})
    100 V – 690 V
- Input Impedance ..... 10 MΩ between P-P and P-N, 5 MΩ between P-PE and N-PE
- Bandwidth ..... DC to 30 kHz for PQ measurements, excluding transients
- Sampling Frequency ..... 80 kS/s at 50/60 Hz
- Scaling ..... 1:1, variable for use of potential transformers

Voltage Transients

- Measurement Range ..... ±8 kV
- Sampling Rate
  - 1775 ..... 1 MS/s
  - 1777 ..... 1 MS/s, 20 MS/s
- Bandwidth ..... DC to 1 MHz
- Trigger ..... Adjustable trigger level. Triggers on high-frequency components >1.5 kHz
- Resolution ..... 14-bit synchronous sampling

Current Inputs

- Number of Inputs ..... 4 inputs 3 phases and Neutral, range selected automatically to attached sensor
- Input Voltage
  - Clamp ..... 50 mV / 500 mV_{rms}; CF 3
  - Rogowski Coil ..... 15 mV / 150 mV_{rms} at 50 Hz
    18 mV / 180 mV_{rms} at 60 Hz; CF 3; all at nominal probe range
- Input Impedance ..... 11 kΩ

- Range
  - AC
    - i17XX-flex1500 12 ..... 1 A to 1500 A
    - i17XX-flex1500 24 ..... 1 A to 1500 A
    - i17XX-flex3000 24 ..... 3 A to 3000 A
    - i17XX-flex6000 36 ..... 6 A to 6000 A
    - i40s-EL clamp ..... 40 mA to 40 A
    - i400s-EL clamp ..... 4 A to 400 A
  - DC
    - 80i-2010-EL ..... 20 A to 2000 A
  - Bandwidth ..... DC to 30 kHz
  - Resolution ..... 24-bit synchronous sampling
  - Sampling frequency ..... 80 kS/s at 50/60 Hz
  - Scaling ..... 1:1, variable
- Auxiliary Inputs
  - Wired connection with 17xx-AUX adapter
  - Number of Inputs 2
  - Input Range ..... Direct: 0 V dc to ±10 V dc or 0 V dc to ±1000 V dc
  - Input Impedance ..... Direct: 2.92 MΩ
  - Scale Factor ..... Format: mx + b (gain and offset) user configurable
  - Displayed Units ..... User configurable (up to 8 characters, for example °C, psi, or m/s)
- Wireless Bluetooth connection (check for availability)
  - Number of Inputs 2
  - Supported Modules ..... Fluke Connect™ 3000 series
  - Acquisition ..... 1 reading/s
- Data Acquisition Voltage and Current
  - Input Mains Frequency ..... DC, 50/60 Hz ±15 % (42.5 Hz to 57.5 Hz, 51 Hz to 69 Hz)
  - Topologies ..... 1-Φ, 1-Φ IT, Split phase, 3-Φ delta, 3-Φ wye IT, 3-Φ Aron/Blondel (2-element delta), 3-Φ delta open leg, 3-Φ high leg delta
  - Data Storage
    - 1773/1775 ..... 8 GB Internal (expandable with microSD card)
    - 1777 ..... 32 GB microSD card (installed)
  - Memory Size ..... Typical 10 logging sessions of 8 weeks with 1-minute intervals and 100 events. The number of possible logging sessions and logging period depends on user requirements.
  - Real-Time Accuracy
    - Internal ..... 3 ppm (0.26 s/day, 8 s/month)
    - NTP (Internet time) ..... Depending on Internet latency, typical <0.1 s absolute to UTC
    - GPS ..... <1 ms absolute to UTC

Trend Interval
- Measured Parameter ..... see *Users Manual*
- Interval ..... User selectable: 1 sec, 3 sec, 5 sec, 10 sec, 30 sec, 1 min, 5 min, 10 min, 15 min, 30 min
- Averaging Interval Min/Max Values
  - Voltage, Current ..... Half-cycle RMS (one-cycle RMS refreshed each half-cycle)
  - AUX, Power ..... 200 ms

Power Quality Measurements
- Measured Parameter ..... see *Users Manual*
- Harmonics ..... h0 to h50
% fund and RMS for voltage, current and power
Phase angles for voltage and current up to h11
- Interharmonics ..... ih0 to ih50
% fund and RMS for voltage and current
- Supraharmonics ..... 2–9 kHz with 200 Hz bins
9–30 kHz with 2 kHz bins
RMS for voltage and current
- Harmonics Measurement Method ..... Grouped, sub-grouped and single harmonic bins according to IEC 61000-4-7. Method selected automatically based on configured PQ standard or user configurable.
- Total Harmonic Distortion ..... Calculated on up to 50 harmonics (depends on selected PQ standard)
- Mains Signaling ..... 2 frequencies in the range from 110 Hz to 3000 Hz
- Events
  - Voltage ..... Dip, swell, interruption, rapid voltage change, mains signaling, waveshape deviation, transients
  - Current ..... Inrush current
- Triggered Recordings ..... Half cycle RMS of voltage and current for 10 s
Waveform of voltage and current for 10/12 cycles
  - Mains Signaling ..... 200 ms RMS of mains signaling voltage up to 120 s
  - Transients ..... Waveform of voltage
    - 1777 ..... 1 MS/s or 20 MS/s, 500,000 pts
    - 1775 ..... 1 MS/s, 25,000 pts

Interfaces
- Ethernet ..... 1 Gbit/s 1000BASE-T
- USB Type A ..... USB 2.0 high speed for USB flash drives to transfer measurement data, firmware updates, and license installation.
Max. supply current: 500 mA.
- USB-C ..... USB 2.0 high speed for data download to PC and calibration (requires USB type A to USB-C or USB-C to USB-C cable)
Auxiliary power supply for the Analyzer (requires USB C power adapter PD 2.0 or higher with 9 V 1.8 A support)
USB 3.0 super-speed for USB-C flash drives to transfer measurement data, firmware updates and license installation.
Max. supply current: 900 mA.

WiFi/BLE Module[1] ..... 802.11 ac 2.4 GHz / 5 GHz, support for concurrent access point and client mode

TX/RX Frequencies in MHz

2.4 GHz band ..... 2400 to 2483.5

5 GHz band ..... 5150 to 5875

Transmit Operating Power ..... <100 mW

Bandwidth

2.4 GHz band ..... 20, 40 MHz

5 GHz band ..... 40, 80 MHz

Modulation Type

2.4 GHz band ..... CCK, DQPSK, DBPSK

5 GHz band ..... BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM

Encryption Algorithm WPA2-AES

Wireless Output Power ..... <100 mW

Bluetooth 5.0/BLE

Antenna ..... Internal and external[2]

LTE/4G Module[3] ..... LTE-A Cat 12
Worldwide LTE-A and UMTS/HSPA+ coverage
Antenna: External[2]

[1] Not in 177X/BASIC versions.

[2] Requires Antenna Cable, 5 m, 50 Ω, 6 GHz. The gain of the antenna shall not exceed 12 dBi (max 2.89 dBi with cable losses.

[3] Availability and supported providers vary by country. Check with your local Fluke representative.

Power/Energy

Parameter	Direct Input [1]	i17xx-Flex1500-24	iFlex3000-24	iFlex6000-36	i40S-EL
Power Range W, VA, var	Clamp: 50 mV/500 mV Rogowski: 15 mV/150 mV	150 A / 1500 A	300 A / 3000 A	600 A / 6000 A	4 A / 40 A
	Clamp: 50 W/500 W Rogowski: 15 W/150 W	150 kW / 1.5 MW	300 kW / 3 MW	600 kW / 6 MW	4 kW / 40 kW
Max. Resolution W, VA, var	0.1 W	0.01 kW / 0.10 kW	1 kW / 10 kW	1 kW / 10 kW	0.1 W / 1 W
Max. Resolution PF, DPF	0.01				
Phase (Voltage to Current) [1]	±0.2 °	±0.28 °			±1 °

[1] In the range of 100 V ... 500 V; also known as U_{din}

Accuracy at Reference Conditions

Parameter			Range	Maximum Resolution	Intrinsic Accuracy at Reference Conditions (% of Reading + % of Range)
Voltage			1000 V	0.1 V	±0.1 % of nominal voltage [1] [2] ±(0.04 % + 0.004 %)
Voltage Dips and Swells			1000 V	0.1 V	±0.2 % of nominal voltage [1] [2]
Voltage Transients			±8 kVpk	---	±(5 % + 0.25 %)
Voltage Harmonics/Interharmonics			100 %/1000 V	0.1 %/0.1 mV	≥1 % Vnom[1]: ±2.5 % of rdg. <1 % Vnom[1]: ±0.025 Vnom[1]
Voltage THD			100 %	0.1 %/0.1 mV	±(2.5 % + 0.05 %)
Voltage Distortions 2 kHz to 9 kHz			100 V	0.1 mV	±(2.5 % + 0.1 V)
Voltage Distortions 9kHz to 31 kHz			100 V	0.1 mV	±(2.5 % + 0.1 V)
Voltage Unbalance			100 %	0.01 %	±0.15 %
Flicker P_{inst}, P_{st}, P_{lt}			0 to 20	0.01	±5 %
Mains Signaling Voltage ≤3 kHz			0 %-15 % of Vnom	0.1 V/0.1 %	1-3 % Vnom: ±0.15 % of Vnom 3-15 % Vnom: ±5 % of rdg.
Voltage Min/Max			1000 V	0.1 V	±2 % of nominal input voltage [1]
Current	Direct Input[3]	Rogowski Mode	15 mV	0.01 mV	±(0.3 % + 0.2 %)
			150 mV	0.1 mV	±(0.3 % + 0.02 %)
		Clamp Mode	50 mV	0.01 mV	±(0.2 % + 0.02 %)
			500 mV	0.1 mV	±(0.2 % + 0.02 %)
	with iFlex 1500 A i17XX-FLEX1500-24		150 A	0.01 mA	±(1 % + 0.2 %)
			1500 A	0.1 mA	±(1 % + 0.02 %)
	with iFlex 3000 A i17XX-FLEX3000-24		300 A	1 mA	±(1 % + 0.3 %)
			3000 A	10 mA	±(1 % + 0.03 %)
	with iFlex 6000 A i17XX-FLEX6000-36		600 A	1 mA	±(1.5 % + 0.3 %)
			6000 A	10 mA	±(1.5 % + 0.03 %)
	with AC Clamp 40 A i40s-EL		4 A	1 mA	(0.7 % + 0.02 %)
			40 A	10 mA	(0.7 % + 0.02 %)
	with AC Clamp 400 A i400s-EL		40 A	0.01 A	±(2 % + 0.2 %)
			400 A	0.1 A	±(0.7 % + 0.2 %)
	with AC/DC Clamp 2000 A 80i-2010s-EL		200 A	0.01 A	±(0.8 % + 0.2 %)
			2000 A	0.1 A	
Current Min/Max			defined by accessory	defined by accessory	Intrinsic accuracy x 2
Current Harmonics/Interharmonics			100 %	defined by accessory	≥3 % Inom: ±2.5 % of rdg.[4] <3 % Inom: ±0.15 % of Inom
Current THD			100 %	0.1 %	±(2.5 % + 0.5 %)

Accuracy at Reference Conditions (cont.)

Parameter			Range	Maximum Resolution	Intrinsic Accuracy at Reference Conditions (% of Reading + % of Range)
Current Supra-Harmonics 2 kHz to 9 kHz	Direct Input[3]	Rogowski Mode	15 mV/150 mV	0.1 mV	±(2.5 % + 0.001 %)
		Current Mode	50 mV/500 mV	0.1 mV	±(2.5 % + 0.001 %)
	with iFlex 1500 A i17XX-FLEX1500-24		150 A	0.1 mA	±(2.5 % + 0.002 %) [6]
			1500 A	0.1 mA	
	with iFlex 3000 A i17XX-FLEX3000-24		300 A	0.1 mA	
			3000 A	0.1 mA	
	with iFlex 6000 A i17XX-FLEX6000-36		600 A	0.1 mA	
			6000 A	0.1 mA	
	with AC Clamp 40 A i40s-EL		4 A	0.1 mA	±(2.5 % + 0.005 %) [6]
			40 A	0.1 mA	
	with AC Clamp 400 A i400s-EL		40 A	0.01 A	±(4 % + 0.025 %) [6]
			400 A	0.1 A	
Current Supra-Harmonics 9 kHz to 30 kHz	Direct Input[3]	Rogowski Mode	15 mV/150 mV	0.1 mV	±(2.5 % + 0.01 %)
		Current Mode	50 mV/500 mV	0.1 mV	±(2.5 % + 0.01 %)
	with iFlex 1500 A i17XX-FLEX1500-24		150 A	0.1 mA	±(5 % + 0.01 %) [6]
			1500 A	0.1 mA	
	with iFlex 3000 A i17XX-FLEX3000-24		300 A	0.1 mA	
			3000 A	0.1 mA	
	with iFlex 6000 A i17XX-FLEX6000-36		600 A	0.1 mA	
			6000 A	0.1 mA	
	with AC Clamp 40 A i40s-EL		4 A	0.1 mA	intrinsic accuracy ±(5 % + 0.01 %) [6]
			40 A	0.1 mA	
	with AC Clamp 400 A i400s-EL		40 A	0.01 A	not available (3 dB bandwidth: 10 kHz)
			400 A	0.1 A	
Current Unbalance			100 %	0.01 %	±0.15 %
Frequency			42.5 Hz to 69 Hz	0.001 Hz	±0.01 Hz
Aux			±10 V	0.1 mV	±(0.2 % + 0.05 %)

[1] Nominal voltage in the range of 100 V to 690 V. Also know as Udin.
[2] 0 °C … 45 °C: Intrinsic accuracy x 2, outside of 0 °C … 45 °C: Intrinsic accuracy x 3
[3] Only for calibration laboratories
[4] with iFlex 1500 A i17xx-FLEX1500-24
[5] f …. Frequency in kHz
[6] with firmware version 1.1 or higher

Intrinsic Uncertainty ±(% of measurement value + % of power range)

Parameter	Influence Quantity	Direct Input [1]	i17xx-Flex1500-24	iFlex3000-24	iFlex6000-36	i40S-EL
		Clamp: 50 mV/500 mV Rogowski: 15 mV/150 mV	**150 A 1500 A**	**300 A 3000 A**	**600 A 6000 A**	**4 A 40 A**
Active Power P Active Energy E_a	PF ≥0.99	0.5 % + 0.005 %	1.2 % + 0.005 %	1.2 % + 0.0075 %	1.7 % + 0.0075 %	1.2 % + 0.005 %
	0.1 ≤ PF <0.99	see Formula 1	see Formula 2	see Formula 3	see Formula 4	see Formula 5
Apparent Power S Apparent Energy E_{ap}	0 ≤ PF ≤1	0.5 % + 0.005 %	1.2 % + 0.005 %	1.2 % + 0.0075 %	1.2 % + 0.0075 %	1.2 % + 0.005 %
Reactive Power Q Reactive Energy E_r	0 ≤ PF ≤1	2.5 % of measured apparent power/energy				
Power Factor PF Displacement Power Factor DPF/cosφ	-	Reading ±0.025				
Additional uncertainty (% of power high-range)	V_{P-N} >250 V	0.015 %	0.015 %	0.0225 %	0.0225 %	0.015 %

[1] Only for calibration laboratories
Reference Conditions:
Environmental: 23 °C ±5 °C, instrument operating for at least 30 minutes, no external electrical/magnetic field, RH <65 %
Input conditions: CosΦ/PF=1, Sinusoidal signal f=50/60 Hz, power supply 120 V/230 V ±10 %.
Current and power specifications: Input voltage 1ph: 120 V/230 V or 3ph wye/delta: 230 V/400 V
Input current >10 % of current range
Primary conductor of clamps or Rogowski coil in center position
Temperature Coefficient: Add 0.1 x specified accuracy for each degree C above 28 °C or below 18 °C

Formula 1: $\left(0.5 + \frac{\sqrt{1 - PF^2}}{3 \times PF}\right)$ % +0.005 %

Formula 2: $\left(1.2 + \frac{\sqrt{1 - PF^2}}{2 \times PF}\right)$ % +0.005 %

Formula 3: $\left(1.2 + \frac{\sqrt{1 - PF^2}}{2 \times PF}\right)$ % +0.0075 %

Formula 4: $\left(1.7 + \frac{\sqrt{1 - PF^2}}{2 \times PF}\right)$ % +0.0075 %

Formula 5: $\left(1.2 + 1.7 \times \frac{\sqrt{1 - PF^2}}{PF}\right)$ % +0.005 %

Example:
Measurement at 120 V/16 A using an iFlex1500-12 in low range. Power Factor is 0.8

Active power uncertainty σ_P :

$$\sigma_P = \pm\left(\left(1.2\ \% + \frac{\sqrt{1 - 0.8^2}}{2 \times 0.8}\right) + 0.005\ \% \times P_{Range}\right) = \pm(1.575\ \% + 0.005\ \% \times 1000\ V \times 150\ A) = \pm(1.575\ \% + 7.5\ W)$$

The uncertainty in W is $\pm(1.575\ \% \times 120\ V \times 16\ A \times 0.8 + 7.5\ W) = \pm 31.7\ W$

Apparent power uncertainty σ_S :

$$\sigma_S = \pm(1.2\ \% + 0.005\ \% \times S_{Range}) = \pm(1.2\ \% + 0.005\ \% \times 1000\ V \times 150\ A) = \pm(1.2\ \% + 7.5\ VA)$$

The uncertainty in VA is $\pm(1.2\ \% \times 120\ V \times 16\ A + 7.5 VA) = \pm 30.54\ VA$

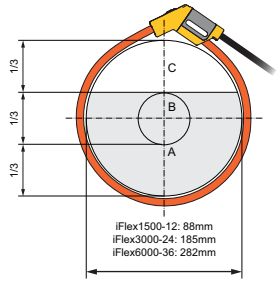
Reactive/non-active power uncertainty σ_Q :

$$\sigma_Q = \pm(2.5\ \% \times S) = \pm(2.5\ \% \times 120\ V \times 16\ A) = \pm 48\ var$$

In case of a measured voltage that is >250 V, the additional error is calculated with:
$Adder = 0.015\ \% \times S_{High\ Range} = 0.015\ \% \times 1000\ V \times 1500\ A = 225$ W/VA/var

iFlex Probe Specifications

Flexible Current Probe Specifications	i17XX-FLEX1500-24	i17XX-FLEX3000-24	i17XX-FLEX6000-36
Measuring range	1 A ac to 150 A ac 10 A ac to 1500 A ac	3 A ac to 300 A ac 30 A ac to 3000 A ac	6 A ac to 600 A ac 60 A ac to 6000 A ac
Weight	170 g (0.38 lb)	170 g (0.38 lb)	190 g (0.42 lb)
Probe Cable Length	610 mm (24 in)	610 mm (24 in)	915 mm (36 in)
Probe Cable Diameter	7.5 mm (0.3 in)		
Minimum Bending Radius	38 mm (1.5 in)		
Nondestructive current	100 kA (50/60 Hz)		
Intrinsic Error at reference condition	±0.7 % of reading [Reference Condition: Environmental: 23 °C ±5 °C, no external electrical/magnetic field, RH 65 %. Primary conductor in center position]		
Temperature Coefficient over operating temperature range	0.05 % of reading / °C (0.028 % of reading / °F)		0.1 % of reading / °C (0.056 % of reading / °F)
Working Voltage	1000 V CAT III, 600 V CAT IV		
Output Cable length	2 m (6.6 ft)		
Probe Cable Material	TPR		
Coupling Material	POM + ABS/PC		
Output Cable Material	TPR/PVC		
Temperature, operating	-25 °C to +70 °C (-13 °F to +158 °F) temperature of conductor under test shall not exceed 80 °C (176 °F)		
Temperature, non-operating	-40 °C to +80 °C (-40 °F to +176°F)		
Altitude, operating	2000 m (6500 ft) up to 4000 m (13 000 ft) derate to 1000 V CAT II/600 V CAT III/ 300 V CAT IV		
Altitude, storage	12 km (40 000 ft)		
IP Rating	IEC 60529:IP40		
Warranty	1 year		
External magnetic field rejection in reference to external current (with cable >100 mm from the head-coupling and r-coil)	40 dB		

Flexible Current Probe Specifications	i17XX-FLEX1500-24	i17XX-FLEX3000-24	i17XX-FLEX6000-36
Phase shift	< ±0.5°		
Bandwidth	10 Hz to 23.5 kHz (for accuracy specifications of higher frequencies, see *Accuracy at Reference Conditions*)		
Frequency derating	I x f ≤385 kA Hz		
Positioning error with position of conductor in the probe window. 	A: ±(1 % of reading + 0.02 % of range)		±(1.5 % of reading + 0.03 % of range)
	B: ±(1.5 % of reading + 0.02 % of range)		±(2.0 % of reading + 0.03 % of range)
	C: ±(2.5 % of reading + 0.02 % of range)		±(4 % of reading + 0.03 % of range)

Supported Parameters

	min/max	Measurement Unit	Interval	PQ Meter / PQ Logger	Single Phase Single Phase IT	Split Phase (2P-3W)	3-Φ Wye (3P-4W)	3-Φ Delta (3P-3W) 3-Φ Wye IT	2 Element Delta (Aron/Blondel)	3-Φ Delta Open Leg (3P-3W)	3-Φ High Leg Delta
1773, 1775, 1777											
			Basic Parameters								
V_{AN}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●	●	●	●	●[2]	●[2]	●[2]	●[2]
V_{BN}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●		●	●	●[2]	●[2]	●[2]	●[2]
V_{CN}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●			●	●[2]	●[2]	●[2]	●[2]
V_{NG}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●	●	●	●				
V_{AB}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●		●[2]	●[2]	●	●	●	●
V_{BC}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●			●[2]	●	●	●	●
V_{CA}	$U_{rms(½)}$ [1] U_{DC} 10/12 cycles (typ. 200ms)	V_{RMS}, V_{PK}, CF, V_{DC}	Trend: 1s-30min PQ: 10min	● / ●			●[2]	●	●	●	●
I_A	$I_{rms(½)}$ [1] I_{DC} 10/12 cycles (typ. 200ms)	A_{RMS}, A_{PK}, CF, A_{DC}	Trend: 1s-30min	● / ●	●	●	●	●	●	●	●
I_B	$I_{rms(½)}$ [1] I_{DC} 10/12 cycles (typ. 200ms)	A_{RMS}, A_{PK}, CF, A_{DC}	Trend: 1s-30min	● / ●		●	●	●	Δ	●	●
I_C	$I_{rms(½)}$ [1] I_{DC} 10/12 cycles (typ. 200ms)	A_{RMS}, A_{PK}, CF, A_{DC}	Trend: 1s-30min	● / ●			●	●	●	●	●
I_N	$I_{rms(½)}$ [1] I_{DC} 10/12 cycles (typ. 200ms)	A_{RMS}, A_{PK}, CF, A_{DC}	Trend: 1s-30min	● / ●		●	●				
f	10/12 cycles (typ. 200ms)	Hz	Trend: 1s-30min PQ: 10s	● / ●	●	●	●	●	●	●	●
Aux 1, 2	10/12 cycles (typ. 200ms)	mV, user defined	Trend: 1s-30min	– / ●	●	●	●	●	●	●	●
			Unbalance								
Voltage unbalance	10/12 cycles (typ. 200ms) (Trend only)	%	Trend: 1s-30min PQ: 10min	● / ●			●	●	●	●	●
Voltage positive sequence component	n/a	V	Trend: 1s-30min PQ: 10min	● / ●			●	●	●	●	●
Voltage negative sequence component	n/a	V	Trend: 1s-30min PQ: 10min	● / ●			●	●	●	●	●
Voltage zero sequence component	n/a	V	Trend: 1s-30min PQ: 10min	● / ●			●				
Current unbalance	10/12 cycles (typ. 200ms) (Trend only)	%	Trend: 1s-30min PQ: 10min	● / ●			●	●	●	●	●
Current positive sequence component	n/a	A	Trend: 1s-30min PQ: 10min	● / ●			●	●	●	●	●
Current negative sequence component	n/a	A	Trend: 1s-30min PQ: 10min	● / ●			●	●	●	●	●
Current zero sequence component	n/a	A	Trend: 1s-30min PQ: 10min	● / ●			●				
			Flicker								
Flicker $P_{st,}$ P_{lt} phase A	n/a	1	PQ: 10min, 2hrs	● / ●	●	●	●				
Flicker P_{st}, P_{lt} phase B	n/a	1	PQ: 10min, 2hrs	● / ●		●	●				
Flicker $P_{st,}$,P_{lt} phase C	n/a	1	PQ: 10min, 2hrs	● / ●			●				
Flicker $P_{st,}$ P_{lt} phase-phase AB	n/a	1	PQ: 10min, 2hrs	● / ●				●	●	●	●
Flicker P_{st}, P_{lt} phase-phase BC	n/a	1	PQ: 10min, 2hrs	● / ●				●	●	●	●
Flicker $P_{st,}$,P_{lt} phase-phase CA	n/a	1	PQ: 10min, 2hrs	● / ●				●	●	●	●
Factor-k, k-Factor phase A	10/12 cycles (typ. 200ms)	%	Trend: 1s-30min	● / ●							
Factor-k, k-Factor phase B	10/12 cycles (typ. 200ms)	%	Trend: 1s-30min	● / ●							
Factor-k, k-Factor phase C	10/12 cycles (typ. 200ms)	%	Trend: 1s-30min	● / ●							
			Over- and Underdeviation								
Over-, underdeviation V_A	n/a	V	PQ: 10min	● / ●	●	●	●				
Over-, underdeviation V_B	n/a	V	PQ: 10min	● / ●		●	●				
Over-, underdeviation V_C	n/a	V	PQ: 10min	● / ●			●				
Over-, underdeviation V_{AB}	n/a	V	PQ: 10min	● / ●				●	●	●	●
Over-, underdeviation V_{BC}	n/a	V	PQ: 10min	● / ●				●	●	●	●
Over-, underdeviation V_{CA}	n/a	V	PQ: 10min	● / ●				●	●	●	●
			Harmonics								
THD V_{AN} TID V_{AN} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●	●	●	●				
THD V_{BN} TID V_{BN} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●		●	●				

THD V_{CN} TID V_{CN} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●			●				
THD V_{NG} TID V_{NG} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●			●				
THD V_{AB} TID V_{AB} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
THD V_{BC} TID V_{BC} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
THD V_{CA} TID V_{CA} (PQ only)	10/12 cycles (typ. 200ms)	V, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Harmonics h00-50 V_{AN} Interharmonics ih00-50 V_{AN}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●	●	●	●				
Harmonics h00-50 V_{BN} Interharmonics ih00-50 V_{BN}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●		●	●				
Harmonics h00-50 V_{CN} Interharmonics ih00-50 V_{CN}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Harmonics h00-50 V_{NG} Interharmonics ih00-50 V_{NG}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Harmonics h00-50 V_{AB} Interharmonics ih00-50 V_{AB}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Harmonics h00-50 V_{BC} Interharmonics ih00-50 V_{BC}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Harmonics h00-50 V_{CA} Interharmonics ih00-50 V_{CA}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Voltage Phase Angle $\varphi_{A,fund}$	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Voltage Phase Angle $\varphi_{B,fund}$ (relative to $\varphi_{A,fund}$)	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Voltage Phase Angle $\varphi_{C,fund}$ (relative to $\varphi_{A,fund}$)	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●			●	●	●	●	●
Voltage Phase Angle φ_A h02-11	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Voltage Phase Angle φ_B h02-11	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Voltage Phase Angle φ_C h02-11	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●			●	●	●	●	●
THD I_A TID I_A (PQ only)	10/12 cycles (typ. 200ms)	A, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●	●	●	●	●	●	●	●
THD I_B TID I_B (PQ only)	10/12 cycles (typ. 200ms)	A, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●		●	●	●	●	●	●
THD I_C TID I_C (PQ only)	10/12 cycles (typ. 200ms)	A, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●			●	●	●	●	●
THD I_N TID I_N (PQ only)	10/12 cycles (typ. 200ms)	A, %	Trend: 1s-30min PQ: 10min, 150/180 cycles	● / ●		●	●				
TDD IA[4]	10/12 cycles (typ. 200ms)	%	PQ: 10min, 150/180 cycles	● / ●	●	●	●	●	●	●	●
TDD IB[4]	10/12 cycles (typ. 200ms)	%	PQ: 10min, 150/180 cycles	● / ●		●	●	●	●	●	●
TDD IC[4]	10/12 cycles (typ. 200ms)	%	PQ: 10min, 150/180 cycles	● / ●			●	●	●	●	●
Harmonics h00-50 I_A Interharmonics ih00-50 I_A	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●	●	●	●				
Harmonics h00-50 I_B Interharmonics ih00-50 I_B	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●		●	●				
Harmonics h00-50 I_C Interharmonics ih00-50 I_C	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Harmonics h00-50 I_N Interharmonics ih00-50 I_N	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Current Phase Angle $\varphi_{A,fund}$	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Current Phase Angle $\varphi_{B,fund}$ (relative to $\varphi_{A,fund}$)	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Current Phase Angle $\varphi_{C,fund}$ (relative to $\varphi_{A,fund}$)	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●			●	●	●	●	●
Current Phase Angle φ_A h02-11	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Current Phase Angle φ_B h02-11	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Current Phase Angle φ_C h02-h11	10/12 cycles (typ. 200ms)	°	Trend: 1s-30min	● / ●			●	●	●	●	●
Power harmonics h00-50 A, Power THC_A	10/12 cycles (typ. 200ms)	W, %	PQ: 10min, 150/180 cycles	● / ●	●	●	●	●	●	●	●
Power harmonics h00-50 B Power THC_B	10/12 cycles (typ. 200ms)	W, %	PQ: 10min, 150/180 cycles	● / ●		●	●	●	●	●	●
Power harmonics h00-50 C Power THC_C	10/12 cycles (typ. 200ms)	W, %	PQ: 10min, 150/180 cycles	● / ●			●	●	●	●	●
Mains Signaling											
Mains signaling f1,f2 V_A	n/a	V, % Vnom	150/180 cycles	– / ●	●	●	●				
Mains signaling f1,f2 V_B	n/a	V, % Vnom	150/180 cycles	– / ●		●	●				
Mains signaling f1,f2 V_C	n/a	V, % Vnom	150/180 cycles	– / ●			●				
Mains signaling f1,f2 V_{AB}	n/a	V, % Vnom	150/180 cycles	– / ●				●	●	●	●
Mains signaling f1,f2 V_{BC}	n/a	V, % Vnom	150/180 cycles	– / ●				●	●	●	●
Mains signaling f1,f2 V_{CA}	n/a	V, % Vnom	150/180 cycles	– / ●				●	●	●	●

Events											
Dip / Swell / Interruption		% Unom % sliding reference	½ cycle RMS	● / ●	●	●	●	●	●	●	●
Rapid voltage change		% Unom	½ cycle RMS	● / ●	●	●	●	●	●	●	●
Mains Signalling		% Unom	200ms RMS	● / ●	●	●	●	●	●	●	●
Waveform deviation		% Unom	10.24kHz	● / ●	●	●	●	●	●	●	●
Inrush current		A	½ cycle RMS	● / ●	●	●	●	●	●	●	●
Power											
Active Power P_A Fund. Active Power $P_{A\ fund}$	10/12 cycles (typ. 200ms)	W	Trend: 1s-30min	● / ●	●	●	●				
Active Power P_B Fund. Active Power $P_{B\ fund}$	10/12 cycles (typ. 200ms)	W	Trend: 1s-30min	● / ●		●	●				
Active Power P_C Fund. Active Power $P_{C\ fund}$	10/12 cycles (typ. 200ms)	W	Trend: 1s-30min	● / ●			●				
Active Power P_{Total} Fund. Active Power $P_{Total\ fund}$	10/12 cycles (typ. 200ms)	W	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Non-active Power N_A Fund. Reactive Power Q_A	10/12 cycles (typ. 200ms)	var	Trend: 1s-30min	● / ●	●	●	●				
Non-active Power N_B Fund. Reactive Power Q_B	10/12 cycles (typ. 200ms)	var	Trend: 1s-30min	● / ●		●	●				
Non-active Power N_C Fund. Reactive Power Q_C	10/12 cycles (typ. 200ms)	var	Trend: 1s-30min	● / ●			●				
Non-active Power N_{Total} Fund. Reactive Power Q_{Total}	10/12 cycles (typ. 200ms)	var	Trend: 1s-30min	● / ●			●	●	●	●	●
Apparent Power S_A Fund. Apparent Power $S_{A\ fund}$	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●	●	●	●				
Apparent Power S_B Fund. Apparent Power S_B	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●		●	●				
Apparent Power S_C Fund. Apparent Power S_C	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●			●				
Apparent Power S_{Total} Fund. Apparent Power S_{Total}	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Distortion Harmonic Power SH_A	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●	●	●	●				
Distortion Harmonic Power SH_B	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●		●	●				
Distortion Harmonic Power SH_C	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●			●				
Distortion Harmonic Power SH_{Total}	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Distortion Unbalance Power SU_{Total}	10/12 cycles (typ. 200ms)	VA	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Power Factor PF_A Displacement Power Factor DPF_A/Cos Phi_A Tangens Phi - Phase A	10/12 cycles (typ. 200ms)	1	Trend: 1s-30min	● / ●	●	●	●				
Power Factor PF_B Displacement Power Factor DPF_B/Cos Phi_B Tangens Phi - Phase B	10/12 cycles (typ. 200ms)	1	Trend: 1s-30min	● / ●		●	●				
Power Factor PF_C Displacement Power Factor DPF_C/Cos Phi_C Tangens Phi - Phase C	10/12 cycles (typ. 200ms)	1	Trend: 1s-30min	● / ●			●				
Power Factor PF_{Total} Displacement Power Factor DPF_{Total}/Cos Phi_{Total} Tangens Phi - Total	10/12 cycles (typ. 200ms)	1	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Energy											
Active Energy E_A	n/a	Wh	Trend: 1s-30min	● / ●	●	●	●				
Active Energy E_B	n/a	Wh	Trend: 1s-30min	● / ●		●	●				
Active Energy E_C	n/a	Wh	Trend: 1s-30min	● / ●			●				
Active Energy E_{Total} Active Energy E_{Total} forward Active Energy E_{Total} reverse	n/a	Wh	Trend: 1s-30min	● / ●		●	●	●	●	●	●
Non-active Energy E_{rA}	n/a	varh	Trend: 1s-30min	● / ●	●	●	●				
Non-active Energy E_{rB}	n/a	varh	Trend: 1s-30min	● / ●		●	●				
Non-active Energy E_{rC}	n/a	varh	Trend: 1s-30min	● / ●			●				
Non-active Energy E_{rTotal}	n/a	varh	Trend: 1s-30min	● / ●			●	●	●	●	●
Apparent Energy E_{aA}	n/a	VAh	Trend: 1s-30min	● / ●	●	●	●				
Apparent Energy E_{aB}	n/a	VAh	Trend: 1s-30min	● / ●		●	●				
Apparent Energy E_{aC}	n/a	VAh	Trend: 1s-30min	● / ●			●				
Apparent Energy E_{aTotal}	n/a	VAh	Trend: 1s-30min	● / ●		●	●	●	●	●	●
1775, 1777											
Events											
Transients		V	trigger on voltage > 1.5kHz	● / ●	●	●	●	●	●	●	●

Event Recordings											
RMS profile		V, A	½ cycle RMS up to 10s	● / ●	●	●	●	●	●	●	●
Waveform		V, A	80kS/s up to 10 cycles	● / ●	●	●	●	●	●	●	●
Transients		V	1MS/s, 25,000 samples	● / ●	●	●	●	●	●	●	●
Mains Signaling RMS profile		V,A	10/12 cycles up to 120s	– / ●	●	●	●	●	●	●	●
Supra-Harmonics											
Supra-harmonics 2-31 kHz V_{AN}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●	●	●	●				
Supra-harmonics 2-31 kHz V_{BN}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●		●	●				
Supra-harmonics 2-31 kHz V_{CN}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Supra-harmonics 2-31 kHz V_{NG}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Supra-harmonics 2-31 kHz V_{AB}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Supra-harmonics 2-31 kHz V_{BC}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Supra-harmonics 2-31 kHz V_{CA}	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●				●	●	●	●
Supra-harmonics 2-31 kHz I_A	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●	●	●	●				
Supra-harmonics 2-31 kHz I_B	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●		●	●				
Supra-harmonics 2-31 kHz I_C	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
Supra-harmonics 2-31 kHz I_N	10/12 cycles (typ. 200ms)	V, %	PQ: 10min, 150/180 cycles	● / ●			●				
1777											
Event Recordings											
Transients		V	1MS/s, 20MS/s 500,000 samples	● / ●	●	●	●	●	●	●	●

● = Measured values
[1]: $U_{rms(½)}$, $I_{rms(½)}$: 1-cycle rms values, refreshed each half cycle
[2] Available in Fluke Energy Analyze - Advanced graphs