



FFT Harmonics

Harmonics Analyses Option

For instruments type X3M D6, X3M 96, Flash D6, Flash 96

The instruments type **X3M D6**, **X3M 96**, **Flash D6** and **Flash 96** feature the option of expanding their measurement capability by adding on new parameters to the existing ones. The FFT harmonics option adds all the parameters necessary for a comprehensive Harmonics analyses. It supports a 32 bit calculation which gives superior metering accuracy and enable to classify these instruments as genuine Energy & Harmonics analysers with a performance comparable with many sophisticated and expensive analysers.

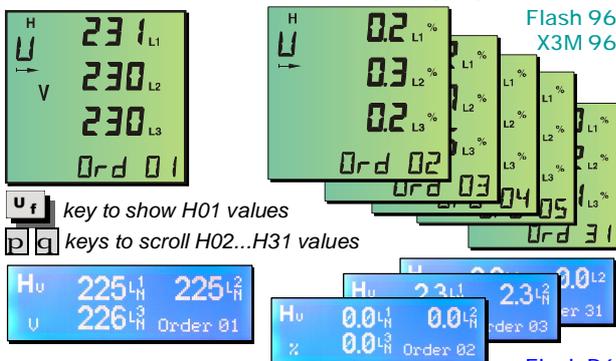
The FFT harmonics option supports all the readings that are needed for a superior analyses of the problems related to harmonics. Readings give both the harmonics power and the direction providing an invaluable tool for immediate examination of the harmonics flow inside one's own plant and for identifying potentially undesirable imported problems.

Harmonics readings

• Voltages Harmonics

§ H01: value in V per phase

§ H02...31: value in % of the fundamental per phase



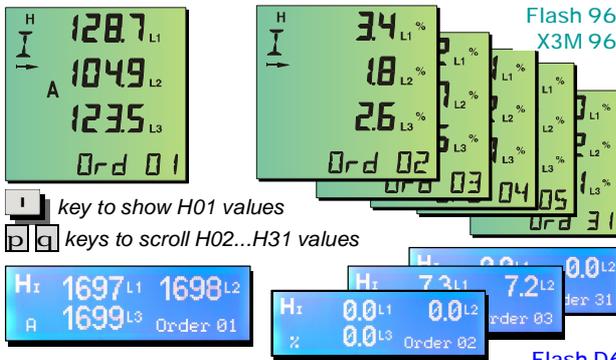
key to show H01 values

keys to scroll H02...H31 values

• Currents Harmonics

§ H01: value in A per phase

§ H02...31: value in % of the fundamental per phase



key to show H01 values

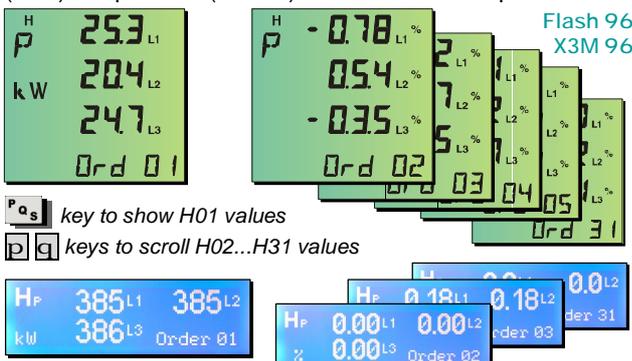
keys to scroll H02...H31 values

• Harmonics Powers/Direction

§ H01: value in W per phase

§ H02...31: value in % of the fundamental per phase

§ + or - sign indicating the harmonics origin downstream (load) or upstream (source) the measurement point.



key to show H01 values

keys to scroll H02...H31 values

Harmonics surveys (X3M D6 and X3M 96 only)

With the X3M and X3M-D instruments, Harmonic Surveys can be made when the FFT upgrade is installed.

A date/time stamped sample of 42 default readings is automatically saved to the instruments' built-in memory on a circular buffer (FIFO) covering a 10-day survey period with samples taken every 2 minutes. Each sample covers:

- Voltage: **U**, **THD-U**, **H1-U**, **H3-U**, **H5-U**, **H7-U** and **H9-U** per phase
- Current: **I**, **THD-I**, **H1-I**, **H3-I**, **H5-I**, **H7-I** and **H9-I** per phase

The survey data is retrieved via serial line as daily files in the HTML, XLS or TXT formats (line commands required).

Modbus communication

A total of 384 readings related to harmonics are enabled as Modbus registers on serial port by the FFT harmonics option.

- Current and voltage harmonics per order and per phase
- Phase angle in degrees (range -180,0÷180,0°) per harmonic order, per phase, referred to U_{L1} fundamental. These parameters may be used for external reconstruction of vectorial graphs such as those supported by the Energy Brain software.

Technical specification

Harmonics range Odd and Even harmonics up to 31st order

Parameters ..H_U, H_I, H_P & sign (direction) per order, per phase

Parameters up date interval..... approx. 1 s

Readings indication:

H01 floating point values with automatic unit/K/M exponent

H02-31 ... values in % of fund. (3½ digit, range 0,0÷100,0%)

H direction (+) or (-) sign on power

Modbus readings:

Voltage, current, phase angle per harmonic order, per phase

Accuracy:

H_U & H_I.....±(0,1% rdg.+1LSD) for H01 to max. ± 2,0% for H31

H_P±(0,2% rdg.+2LSD) for H01 to max. ± 2,0% for H31

Phase angles ± 0,1 deg. for H01 to max ± 3,0 deg. for H31

Sampling frequency..... 64 x f (mains frequency)

FFT size 64 points

FFT calculation accuracy..... 32 bits

Window..... rectangular

Minimum reading..... 1%

How to order

The FFT harmonics option can be implemented at any time, after meter installation and requires no tools nor accessories. It is simply performed by the entry, via front keyboard, of a unique PUK code that may be ordered for the serial number of the instrument to be upgraded.

Description	P.N.
FFT Harmonics option	PFSW 399-00
The S.No. of the instrument to be upgraded must be indicated on the order	

The FFT harmonics option may also be supplied in the meters by ordering the instruments type "H" (Flash 96 H, Flash D6 H, X3M 96 H, X3M D6 H) with the option included.