## STPM01

**USER MANUAL** 

# QUICK APPLICATION User Guide

Release 1.0



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## STPM01- QUICK APPLICATION USER GUIDE

### 1 - USING THE GUI

The GUI (Graphical User Interface) provides immediate and easy access to all options you need to set in order to use the STPM01 device.

The STPM01 Manager Functionalities are split in five main groups:

- Interactive information memo,
- Panel Page for Setting and manual Calibration features,
- Measured Information Panel to show mainly information about the measurement,
- Parameters to set and read relevant data,
- Control buttons.

The GUI is showed below:

#### Figure 1 : GUI



## **2 - INTERACTIVE INFORMATION MEMO**

The Interactive Information Memo allows the reading of all relevant messages coming from GUI. For instance, the picture below tells you to set the interface type as first step

#### Figure 2 : Interactive Information Memo





## **3 - STATUS BITS**

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The Status Bits allow you to know the information coming from the device status register.

### Figure 3 : STATUS BITS

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## Table 1 : Meaning of status bits in the 1.1. data records

G.R.	Name	Meaning of status bit value 0	Meaning of status bit value 1
0	BIL	no load condition not detected	no load condition detected
1	BCF	both $\Delta\Sigma$ signals alive	one or both $\Delta\Sigma$ signals stacked
2	BFR	$f_{CLKOUT}/2^{17} < f(u) < f_{CLKOUT}/2^{15}$	f(u) out of limits
3	BIT	tamper is not detected	tamper is detected
4	MUX	selected primary current channel	selected secondary current channel
5	LIN	positive half period of u	negative half period of u
6	PIN	output pins follow data	at least one pin differs from data
7	HLT	data are valid	retarded restart in progress

## 4 - MEASURED INFORMATION

The Measured Information allows you to read:

- 1 Frequency main, F(V)/Hz
- 2 Instantaneous Voltage value, V(t)/V
- 3 Instantaneous Current value, I(t)/A
- 4 Active Power considering until the 50th harmonic, P0/W
- 5 Active Power considering only the fundamental harmonic, P1/W
- 6 Apparent Power
- 7 Reactive Power
- 8 VRMS/V and IRMS/A information.

#### Figure 4 : Measured information

Main		Power			
0,0	f(t) /Hz	0,0	F OV W	Apparent VA	0,0
0,0	v(t)/V	0,0	P1/W	Reactive VAr	0.0
0,0	i(t)/A	ms	Vrms/V		0,0
		0.0		Irms/A	0,0

#### **5 - PARAMETERS**

The Parameters window allows the user to change some common constants used by the GUI application. Those constants are hardware dependent:

- 1 Resistor divider (R1 and R2) at voltage input of STPM01 must be set according to the hardware specifications;
- 2 Current gain (Ai) will change according to the PST bits setting while voltage channel gain (Au) is fixed and cannot be changed;
- 3 Current sensor sensitivity (Ks/mV/A) must be set according to the particular characteristics of the current sensor used;
- 4 Value of calibrators (Kup, Kip, Kis). This value changes according to the calibrators value for voltage and current channel;
- 5 Internal reference voltage, to be set according to the datasheet.

Change those constants accordingly, to reflect real state on the STPM01 evaluation board.

#### Figure 5 : Parameters

783000.00	8 4	0.560000	0.750000	0.750000
2/0hm : 475.0000		Vref/V : 1.5000	Kut :	kis : 0.750000

### 6 - PANEL PAGE

The Panel Page is divided in two main parts, Setting and Calibration:

1 Setting:

#### Figure 6 : Setting



#### Table 2 : Setting

Function	Panel
Calibration:Configuratiors Block shows configuration bits used for changing oper- ating modes. TSTD: Test mode and OTP write disable: TSTD=0:testing and continuous precharge of OTP when in read mode, TSTD=1:normal operation and no more writes to OTP MDIV: Measurement frequency range selection: MDIV=0:4.000MHz-4.194MHz, MDIV=1:8.000MHz-8.192MHz RC: Type of internal oscillator selection: RC=0:crystal oscillator, RC=1:RC oscillator FRS: Base frequency out of band influence to power calculation: FRS=0:if BFR then power=i*0, FRS=1:if BFR then power=i*u MSBF: Bit sequence output during record data reading selection: MSBF=0:msb first, MSBF=1:lsb first FUND: Type0 active energy selection: FUND=0:type0 is total, FUND=1:type0 is fundamental ABS: Power accumulation type selection: ABS=0:signed accumulation, ABS=1:absolute accumulation	Configurators Block

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## Table 2 : Setting

Function	Panel
Read mode can be normal and in continous and fast STPM01 reading (S is checked) in FULL version. Application can be used for computing FFT of current and voltage data from STPM01 only if samples are read in constant sampling rate(FULL version).	Read nucle Sequence   128 x   3 amples 8   128 x   8 x   100 x   100 x   1100 x   1100 x   1100 x
Special shows some bits used for changing: ADDG: Selection of adding current gain 8:ADDG=0: Gain+=0, ADDG=1: Gain+=8 CRIT: Selection of tamper threshold: CRIT =0: 12,5%, CRIT =1: 6,25% LVS: Type of stepper selection: LVS=0: 10 poles, 30ms, 5V, LVS=1: 2 poles, 150ms, 3V	Special Current Gain ADDG C Stepper Tamper Threshold N/A
Press the button to open the parallel link between GUI program and programmer board. Perform this step before of others all.	PC Link UX 378
First bit is used for selecting MSB or LSB order during reading. Refer to STPM01 user manual for meaning of MSBF bit located in Configurators Blockwindow.	First bit MSB LSB
Stepper Pulse/KWh shows some bits used for changing: Constant of stepper pulses/kWh selection when APL>1: If LVS==0 KMOT=0:1000, KMOT=1:500, KMOT=2:2000, KMOT=3:250 If LVS==1 KMOT=0:100, KMOT=1:50, KMOT=2:200, KMOT=3: 25 Selection of pulses(X) for LED when APL=0: KMOT=0: X=P, KMOT=1: X=P, KMOT=1: X=P, KMOT=2: X=Q, KMOT=3: X=S	Stepper Pulses/KWh
No load cond.threshold shows some bits used for changing the no load condition threshold as % of nominal current selection in this way: LTCH=0: 0.05%, LTCH=1: 0.1%, LTCH=2: 0.2%, LTCH=3: 0.4%	No load cond. threshold

## Table 2 : Setting

Function	Panel
Application type shows some bits to select between Peripheral or Standalone mode, in these terms:     APL=0: peripheral, MOP:MON=ZeroCross:Reset, LED=pulses(X),     APL=1: peripheral, MOP:MON=ΔΣouts(u:i),   LED=mux(current),     APL=2: standalone, MOP:MON=stepper(P),   LED=pulses(P)     SCLNLC=no load condition, SDATD=tamper detected   SYN=negative power direction     APL=3: standalone, MOP:MON=stepper(P),   LED=pulses(P/64),     SCLNLC=no load condition, SDATD=tamper detected   SYN=negative power direction	Application Type
Current ch.sensor type is used to set the sensor type gain and tamper: PST=0:primary is coil x8/x16 <sup>1</sup> , secondary is not used, no tamper PST=1:primary is coil x24/x32 <sup>1</sup> , secondary is not used, no tamper PST=2:primary is CT x8, secondary is not used, no tamper PST=3:primary is shunt x32, secondary is not used, no tamper PST=4:primary is coil x8/x16 <sup>1</sup> , secondary is coil x8/x16 <sup>1</sup> , tamper PST=5:primary is coil x24/x32 <sup>1</sup> , secondary is coil x24/x32 <sup>1</sup> , tamper PST=6:primary is CT x8, secondary is CT x8, tamper PST=7:primary is CT x8, secondary is shunt x32, tamper	Sensor Type PST2 PST1 PST0 Pinage Channel 8 29 29 29 4 9 19 24 20 4 19 25 20 20 20 1 10 25 20 20 20 20 20 20 20 20 20 20 20 20 20
Precharge will swap data sequence order during STPM01 readout. Refer to STPM01 user manual for precharge command	ON - OFF -
RC Oscillator has the same meaning as MDIV bit.	RC Oscillator Selector 8 MHz 4.19 MHz 8.38 MHz 4 MHz
Sensor Type has the same meaning as PST bits	Sensor Type Shunt CT Rogowski •

## Table 2 : Setting

Function	Panel
VOTP selector is used to set if Votp is internal or external.	VOTP Selector
Refer to STPM01 user manual for more details.	External

## 2 Calibration:

## Figure 7 : Calibration

Voltage channel (%)		Current C	hannel ONE	[%]	Current Channel T	W0 (%)
	%		13	.∎%		₹.∎%
· · · ·				-		_
Bir	ary			Binary		Binary
8888888	8	88	888	888	8888	8888
Edit Value 75	Hex	Edit Valu	e 75	Hex	Edit Value 75	Hex
Phase Corpensation	Mode	e		Write Cor	ngurators	
CPH3 CPH2	ГВ	ANK I	TSTO	T BAI	NK F PUMP	IT RD
CPH1 CPH0				Internal T	est Mode	
	Bin Edi Value 75 Phase Corpensation CPH3 CPH2	Edit Value 75 Hex Phase Conpensation Mode CPH3 CPH2 F B CPH1 CPH0 F P	Binary Binary Binary Binary Binary Binary Edit Value 75 Hex Edit Value 75 Hex Edit Value 75 Binary Hex Edit Value 75 Binary Hex Edit Value 75 Binary Hex Edit Value 75 CPH3 © CPH2 CPH1 © CPH0	Binary Binary Binary Binary Hex Edit Value 75 Phase Corpensation CPH3 CPH2 CPH1 CPH0 Binary	Binary Binary	Binary Binary Binary Binary Binary Binary Hex Edit Value 75 Phase Corpensation CPH3 CPH2 CPH1 CPH0 BANK TST0 PUMP TST1 Internal Test Mode

#### Table 3 : Calibration

Panel
Temperature TC3 TC2 TC1 TC1

#### Table 3 : Calibration

Function	Panel
Nominal V is used to modify the nominal voltage value for singlewiremeter in these terms: NOM=0: 220V, NOM=1: 240V, NOM=2: 260V, NOM=3: 280V,	Nominal Voltage
RC Compensation is used to set the internal RC compesation in this way. Refer to STPM01 user manual for more details.	RC Compensation CRC1 CRC0
Phase Compensation is used to set the compensation of the phase. Refer to STPM01 user manual for more details.	CPH3 CONDENSAtion
Mode shows the operating mode of STPM01	Node F BANK F TST0 F PUMP F TST1 WE F TST2 F RD
The Write Configurators window shows special mode commands used for selecting various modes of operation. Please refer to STPM01 user manual for the meaning of special commands.	Wite Configuration F BANK F PUMP F RD Internal Test Mode F TST2 F TST1 F TST0
Voltage allows voltage channel calibration. Refer to STPM01 user manual for more details.	Voltage channel (2) Binary Binary COOOCOO Hex Edit Value (75)

### Table 3 : Calibration

Function	Panel
Current ONE allows the primary current channel calibration. Refer to STPM01 user manual for more details.	Current Oneward DME (R)
Current TWO allows the secondary current channel calibration. Refer to STPM01 user manual for more details.	Durient Channel Tw/D (3)

## 7 - CONTROL BUTTONS

Three buttons allow you to open and save your work session and to quit the application.

## Figure 8 : Control Button





## 8 - APPENDIX A

#### 8.1 - Writing data

The user can also write data bits in STPM01. Refer to the STPM01 user manual for more detailed information about the meaning of written data bits.

The data bits that can be written in STPM01 are:

- 1 CHVs, CHPs and CHSs,
- 2 TCs
- 3 CPHs
- 4 CRCs
- 5 NOMs
- 6 APLs
- 7 PSTs
- 8 LTCHs
- 9 KMOTs
- 10 ADDG
- 11 CRIT
- 12 LVS
- 13 MDIV
- 14 RC
- 15 FRS
- 16 MSBF
- 17 FUND
- 18 ABS

19 Write Configurators section.

Refer to the STPM01 user manual for the meaning.

Note: Writing a signle bit is possible only for data bits (in this case mode command) located in the Write Configurators group.

#### Figure 9 : Write Button

🔒 Lock 📝 R	eset 📷 Read	🖉 Write 🖌	Write OTP
------------	-------------	-----------	-----------

#### 8.2 - Sending mode command to STPM01

The bits used to change the special modes of STPM01 are located in the group named Write Configurators. Note that those bits are written seperately. Refer to the STPM01 user manual for the meaning of the various operating modes.

To write a mode bit check or uncheck the box next to the bit name and press the mouse right button. A new menu will show up with just one option: Write. Click this option to write the selected bit in STPM01. Press the read button to see if writing was successful.

#### Figure 10 : Write to OPT Button

Wite Configurators

#### 8.3 - Writing to shadow latches

To write selected bits to shadow latches make sure that STPM01 is operating in the right mode (please refer to STPM01 user manual). The user can check the operating mode by reading data from STPM01. Select all data bits you want to write in STPM01 and then click the Write button.

#### 8.4 - Writing to OTP

Writing selected bits to OTP is similar to writing to shadow latches. STPM01 must operate in the right mode. Note that a high voltage must be available to the STPM01. The high voltage source is selected from:

Figure 11 : Write to OPT Button



#### 8.5 - Locking STPM01

The lock button is used for final write of a special bit named TSTD in STPM01. Use with care as no more writing can be done to the STPM01.

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## 9 - APPENDIX B

#### 9.1 - PROGRAMMER

In order to use the STPM01 Manager GUI you must use the programmer, whose schematic is shown below:

#### Figure 12 : Programmer



Using the programmer is very easy. After you developed the board (see the PCB below) and connected it to the PC parallel port you have to connect it to the Measurement Board of the Power Meter Kit. Make sure that pin 1 of the cable is connected to the right pin on the board. You can recognize it by the mark printed on the PCB.

Switching on the PC and running the STPM01 Manager GUI you will be able to use all functions of the Power Meter Kit.

Take care that you must power on the Measure Board if you want to program the OTP inside the STPM01. On the contrary power on the Measure Board is not necessary if you want only to read and write(not OTP write) the RAM inside the STPM01.

Figure 13 : PCB, top and bottom layout



## **10 - REVISON AND LEGAL INFORMATION**

## Table 4 : Revision History

Date	Revision	Description of Changes
22-Feb-2005	1	First Release.



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