EN

ELETTRONICA PROFESSIONALE
PROFESSIONAL ELECTRONICS

XPS ELETTROTEST PROTOCOL

EN USER MANUAL

READ AND SAVE THESE INSTRUCTIONS

LEGGI E CONSERVA QUESTE ISTRUZIONI

EN

XPS Models covered in this manual:

Model	Code
XPS/M/3KVA	**99114053**
XPS/M/6KVA	**99114113**
XPS/T/18KVA	**99114513**
XPS/T/30KVA	**99114613**
XPS/T/67KVA	**99114813**

This manual is written from XPS/T firmware version 10162.
Please check the latest manual version at www.elettrotestspa.it
To consult older manual versions, please contact our support at service@elettrotestspa.it

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INDEX

1. INTRODUCTION

The structure of the protocol is a typical master slave system

START	ADD	COD	DATA	CHK DATA	CHK TOT
"S"	2 Bytes	1 Byte	X Bytes	1 Byte	1 Byte

→ XPS

PC ←

START	ADD	COD	DATA	CHK DATA	CHK TOT
"R"	2 Bytes	1 Byte	X Bytes	1 Byte	1 Byte

1.1. VERSION

This manual is written for **XPS firmware version 10162** and higher.

To consult older manual versions, please contact our support at service@elettrotestspa.it

2. COMMUNICATION PACKET

Down you can find the structure of the communication packet

START	ADD	COD	DATA	CHK DATA	CK TOT
1 Byte	2 Byte	1 Byte	X Byte	1 Byte	1 Byte

START: Start byte of the packet and it can be:

- **"S"** when the packet is sent to the XPS .
- **"R"** when the packet is received from the XPS.

ADD: Two address bytes, now those bytse are not used.

COD: It is the code of the packet

DATA Data part of the packet.

CHK DATA: It is the CHKSUM of the data part and It is the least significant byte of the sum of data bytes.

CHK TOT: It is the CHKSUM of all packet and It is the least significant byte of the sum of all bytes of the packet.

3. LIST OF PACKETS OF THE PC

3.1. INIT (1) (7 bytes)

START (1)	ADD (2)	COD (1)	DATA (1)	CHK DATA (1)	CHK TOT (1)
"S"	00	1	0	0	1 Byte

Init command permits to read the state of the XPS, the XPS sends the ECHO packet.

3.2. ACQ (2) (9 bytes)

START (1)	ADD (2)	COD (1)	DATA (3)	CHK DATA (1)	CHK TOT (1)
"S"	00	2	A B C	X	1 Byte

With this packet you can acquire some data from the XPS
Byte A

0: Nothing.
1: Request of setting voltage.
2: Request of output voltage.

- 3: Request of output current (when the XPS can measure it).
- 4: Request of phase.
- 5: Request of frequency.
- 6: Request of alarms.
- 7: Request of mode.
- 8: Request of revision and code of the machine.
- 9: Request of options installed in the machine.
- 10: Request of the range.
- 11: Request of the waveform.
- 12: Request of instantaneous alarms
- 13: Request busy state of the machine
- 14: Output current in [A/1000]
- 15: Limit enable
- 16: Start frequency
- 17: Gain for Iout measure
- 18: Not used
- 19: Link
- 20: Serial Number
- 21: Tempo di funzionamento
- 22: Limit RMS
- 23: Limit PEAK
- 24: Limit Time
- 99: EEPROM Request

    - Byte B =0,
    - Byte C= EEprom Address

3.3. SET_MD (3) (8 bytes)

START (1)	ADD (2)	COD (1)	DATA (2)	CHK DATA (1)	CHK TOT (1)
"S"	00	3	A B	X	1 Byte

With this command you can set the functions mode of the machine. (It is used only the first byte A)

A BYTE							
7	6	5	4	3	2	1	0
Range	Sense	Mono	Sink	DC	Remote	OUT	INRSH

Range[1]: 0 Low 1 High
Sense: 0 2 wire 1 4 Wire
Mono[2]: 0 Single 1 Three
Sinc: 0 Line 1 Internal
DC[3]: 0 AC 1 DC
Remote: 0 Local 1 Remote
OUT[4]: 0 Relay off 1 Relay on
INRSH[5]: 0 Continuous 1 Inrush

[1] Only with the double range macchine
[2] Only with singlephase/threephase macchine
[3] Only with Dc option
[4] Only if the output realy switching is enabled
[5] Only in the machine with countinous/Inrush macchine

3.4. RAMP_VF (4) (24 bytes)

START (1)	ADD (2)	COD (1)	DATA (18)	CHK DATA (1)	CHK TOT (1)
"S"	00	4	X	X	1 Byte

With this command you can do a ramp of voltage and frequency from the actual value to the setting value on the packet.
The machine check the coherency of the data, if the value is not correct the machine sends to the PC the ACK packet with 4 on the data bytes. Below there is the structure of data
When It is set line frequency the command of ramp voltage and frequency is not accepted.

DATA																	
Phase L1						Phase L2						Phase L3					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
V_{MSB}	V_{LSB}	F_{MSB}	F_{LSB}	T_{MSB}	T_{LSB}	V_{MSB}	V_{LSB}	X	X	X	X	V_{MSB}	V_{LSB}	X	X	X	X

The parameters with "X" indication are not used.

V_{MSB} : V_{LSB}[6]
To obtain the value to insert on the racket you must use this formula:

$$V = \frac{Vset * 4095}{Range}$$

Example If you are in the 300V range and you want to set 200V

$$V = \frac{200 * 4095}{300} = 2730$$

F_{MSB} : F_{LSB}
It is the frequency multiply for 10 (example 50Hz = 500)

T_{MSB} : T_{LSB}
The time is expressed in hundredths of a second. (Example 1s = 100)

The precision depends on the quantization of the time and the voltage inside the machine.

[6] For the HPS series only fase R data are used.

3.5. RAMP_PAR (5) (19 bytes)

START (1)	ADD (2)	COD (1)	DATA (13)		CHK DATA (1)	CHK TOT (1)
			Type (1)	DATA (12)		
"S"	00	5	T	X	X	1 Byte

Type
0 Voltage ramp
1 Frequency ramp
2 Phase ramp

0. Voltage Ramp

DATA											
Phase R				Phase S				Phase T			
1	2	3	4	5	6	7	8	9	10	11	12
V_{MSB}	V_{LSB}	T_{MSB}	T_{LSB}	V_{MSB}	V_{LSB}	T_{MSB}	T_{LSB}	V_{MSB}	V_{LSB}	T_{MSB}	T_{LSB}

V_{MSB} : V_{LSB}
To obtain the value to insert on the racket you must use this formula:

$$V = \frac{Vset * 4095}{Range}$$

1: Frequency ramp

DATA											
PHASE R				PHASE S				PHASE T			
1	2	3	4	5	6	7	8	9	10	11	12
F_{MSB}	F_{LSB}	T_{MSB}	T_{LSB}	X	X	X	X	X	X	X	X

F_{MSB} : F_{LSB}
It is the frequency multiply for 100 (example 50Hz = 5000)

2: Phase ramp

DATA											
PHASE R				PHASE S				PHASE T			
1	2	3	4	5	6	7	8	9	10	11	12
PH_{MSB}	PH_{LSB}	x	x	PH_{MSB}	PH_{LSB}	x	x	PH_{MSB}	PH_{LSB}	x	x

PH_{MSB} : PH_{LSB}
To obtain the value to insert on the packet you must use this formula:

$$DATO = \frac{PH * 4095}{360}$$

The phase is instantly set without any ramp

3.6. COM (6) (8 bytes)

START (1)	ADD (2)	COD (1)	DATA(2)		CHK DATA (1)	CHK TOT (1)
			Type (1)	Data (1)		
"S"	00	6	T	X	X	1 Byte

Single command for change mode

Type	Description	Data	
0	Remote	0= Local	1= Remote
1	Out relay	0= off	1= on
2	Range	0= Low	1= High
3	Sense	0= 2wire	1= 4 wire
4	Mono	0= 1-Phase	1= 3-Phase
5	Sink	0= Line	1= Internal
6	DC	0= AC	1= DC
7	Inrush	0= Countinous	1= Inrush
8	Waveform	Not used	
9	Limit RMS ALL	0 disable	1 enable
10	Limit Peak ALL	0 disable	1 enable
11	SOF ALL	0 disable	1 enable
12	Limit RMS R	0 disable	1 enable
13	Limit Peak R	0 disable	1 enable
14	SOF R	0 disable	1 enable
15	Limit RMS S	0 disable	1 enable
16	Limit Peak S	0 disable	1 enable
17	SOF S	0 disable	1 enable
18	Limit RMS T	0 disable	1 enable
19	Limit Peak T	0 disable	1 enable
20	SOF T	0 disable	1 enable

3.7. RESET (7) (7 bytes)

Reset of machine

START (1)	ADD (2)	COD (1)	DATA (1)	CHK DATA (1)	CHK TOT (1)
"S"	00	7	X	X	1 Byte

This command resets only the control board, not the display board.

3.8. 3.8 LIM (8) (9 bytes)

START (1)	ADD (2)	COD (1)	DATA(3)		CHK DATA (1)	CHK TOT (1)
			Type (1)	Data (2)		
"S"	00	8	T	A B	X	1 Byte

Command for setting current limit

Type

Type	
4 bit	4 bit
Phase	Limit

Limit

0 PEAK current limit setting
1 RMS current limit setting
2 Delay setting

Phase

0 limit for All the line
1 limit for L1
2 limit for L2
3 limit for L3

Data

It is the direct value with one decimal point (A MSB /B LSB)

3.9. SERIAL_N (10) (11 bytes)

Command for reading/writing serial number in eeprom

START (1)	ADD (2)	COD (1)	DATA(5)		CHK DATA (1)	CHK TOT (1)
			Key (1)	Data (4)		
"S"	00	10	200		X	1 Byte

SERIAL_N: ➔ write serial number
ACQ(20): ➔ read serial number

3.10. PC_READ_EE_BYTE (99) (9 bytes)

Command for writing byte in eeprom

START (1)	ADD (2)	COD (1)	DATA(3)			CHK DATA (1)	CHK TOT (1)
			Key (1)	Pos(1)	Data (1)		
"S"	00	99	99 (write)	EE defined position	Data (write)	X	1 Byte

4. LIST OF PACKET OF THE XPS

4.1. ECHO (101) (42 byte)

START (1)	ADD (2)	COD (1)	DATA (36)	CHK DATA (1)	CK TOT (1)
"R"	00	101	X	X	1 Byte

The command ECHO carries the state of XPS

Phase L1

1	2	3	4	5	6	7	8	9	10	11	12
$Vset_{MSB}$	$Vset_{LSB}$	$Vout_{MSB}$	$Vout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$	PH_{MSB}	PH_{LSB}	F_{MSB}	F_{LSB}	**Mode**	**Alarms**

Phase L2

13	14	15	16	17	18	19	20	21	22	23	24
$Vset_{MSB}$	$Vset_{LSB}$	$Vout_{MSB}$	$Vout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$	PH_{MSB}	PH_{LSB}	F_{MSB}	F_{LSB}	**Mode**	**Alarms**

Phase L3

25	26	27	28	29	30	31	32	33	34	35	36
$Vset_{MSB}$	$Vset_{LSB}$	$Vout_{MSB}$	$Vout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$	PH_{MSB}	PH_{LSB}	F_{MSB}	F_{LSB}	**Mode**	**Alarms**

Vset
It is the setting voltage with 12bit expression, to guarantee the maximum precision. Down you can find the formula

$$Vset = \frac{Vset_{12bit} * Range}{4095}$$

If range 300

$$Vset = \frac{Vset_{12bit} * 300}{4095}$$

Vout
It is the output reading voltage. As the setting voltage it is rappresentated with 12 bit expression,

$$Vout = \frac{Vout_{12bit} * Vout_{\max}}{4095}$$

If range 300

$$Vout = \frac{Vout_{12bit} * 315}{4095}$$

Vout max is the maximum setting voltage plus the 5%. (due to slow compensation)

Iout
It is the reading output current, this value has a number after the dot. (XXX.X)

PH
It is the setting phase always with 12bit expression.

$$PH = \frac{PH_{12bit} * 360}{4095}$$

Fset
It is the setting frequency (XXXX.X)

Mode
It is the byte for the configurations of each phase

Bit	Description	Data	
1	Remote	0: Local	1: Remote
2	3 phase	0: 1 phase	1: 3 phase
3	DC	0:AC	1: DC
4	Range	0: Low	1: High
5	Output Relay	0: Off	1 : On
6	Inrush	0: Disab.	1: Enable
7	Sink	0: Line	1: Internal
8	Sense	0: 2 wire	1: 4 wire

Alarms
It is the byte for the alarms of the machine:

Bit	Alarms
1	Over voltage on the bus
2	Under voltage on the bus
3	Overtemperature
4	Inverter alarm
5	Comunication error
6	Sequence error
7	Limitation of output current
8	PE Overvoltage

4.2. RISP (102) (13byte)

START (1)	ADD (2)	COD (1)	DATA(4)		CHK DATA (1)	CK TOT (1)
			Type(1)	Data(6)		
"R"	00	102	T	X	1 Byte	1 Byte

Type:
0: Nothing.
1: Request of setting voltage.
2: Request of output voltage.
3: Request of output current (when the XPS can measure it).
4: Request of phase
5: Request of frequency. (x10 anzichè x 100)
6: Request of alarms.
7: Request of mode.
8: Request of revision and code of the machine. (Not used)
9: Request of options installed in the machine.
10: Request of the range.
11: Request of the waveform.
12: Request of instantaneous alarms.
13: Request of busy state of the machine
14: Output current in [mA] (3 decimal digits)
15: Limit Enable
16: Start frequency
17: Gain for Iout measure
18: Not used
19: Link
20: Serial Number
21: Working time
22: Limit RMS
23: Limit PEAK
24: Limit Time

Values description:

1 Setting voltage.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
$Vset_{MSB}$	$Vset_{LSB}$	$Vset_{MSB}$	$Vset_{LSB}$	$Vset_{MSB}$	$Vset_{MSB}$

2 Reading output voltage.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
$Vout_{MSB}$	$Vout_{LSB}$	$Vout_{MSB}$	$Vout_{LSB}$	$Vout_{MSB}$	$Vout_{LSB}$

3 Output current.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
$Iout_{MSB}$	$Iout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$

4 Setting phase.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
PH_{MSB}	PH_{LSB}	PH_{MSB}	PH_{LSB}	PH_{MSB}	PH_{LSB}

5 Frequency.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
FR_{MSB}	FR_{LSB}	FS_{MSB}	FS_{LSB}	FT_{MSB}	FT_{LSB}

6: Alarms.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
Not used	Alrm L1	Not used	Alrm L2	Not used	Alrm L3

7: Mode.

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
0	MDr	0	MDs	0	MDt

8: Revision and machine code.

DATA					
1	**2**	**3**	**4**	**5**	**6**
REV	COD	0	0	0	0

Machine Code	
10	XPS 3-PHASE
16	XPS 1-PHASE

9: Installed options

DATA					
1	2	3	4	5	6
L1 OPT_LSB	L1 OPT_MSB	L2 OPT_LSB	L2 OPT_MSB	L3 OPT_LSB	L3 OPT_MSB

Options LSB	
BIT	*Description*
0	Inrush - countinous
1	Out switching
2	AC-DC
3	Threephase -Singlephase
4	Double Range
5-7	NU (not can be used)

10: Full Range value (value x 10)

DATA					
1	2	3	4	5	6
H_{MSB}	H_{LSB}	L_{MSB}	L_{LSB}	0	0

13: Request of busy state of the machine

DATA					
1	2	3	4	5	6
BUSY	0	0	0	0	0

BUSY=1 means machine busy

14: Output current in [mA] (3 decimal digits) (non gestito)

DATA					
Phase L1		**Phase L2**		**Phase L3**	
1	2	3	4	5	6
$Iout_{MSB}$	$Iout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$	$Iout_{MSB}$	$Iout_{LSB}$

17: Gain for Iout measure

DATA					
1	2	3	4	5	6
Gain L1 MSB	Gain L1 LSB	Gain L2 MSB	Gain L2 LSB	Gain L3 MSB	Gain L3 LSB

19: Link

DATA					
1	2	3	4	5	6
Link	0	0	0	0	0

Link:

b7	b6	b5	b4	b3	b2	b1	b0

b7 – b 6
0: Elettrotest protocol
1: SCPI protocol
2: Modbus

B5 ÷ b4
0: RS32 communication
1: RS485 communication
2: tcp-Ip

b3 ÷ b0
0: Baud rate 1200
1: Baud rate 9600
2: Baud rate 19200

20: Serial Number

DATA					
1	2	3	4	5	6
SN A	SN B	SN C	SN D	0	0

SN A: serial number MSB
SN B: serial number LSB
SN C: month
SN D: year

4.3. ACK (103) (7 bytes)

START (1)	ADD (2)	COD (1)	DATA (1)	CHK DATA (1)	CHK TOT (1)
"R"	00	103	X	X	1 Byte

This packet contains the informations of the require command. Below you can see the correspondence between the sent packet to the received packet:

0 Command accepted.
1 Error on the racket.
2 Command is not enabled.
3 XPS busy.
4 Values are not correct.

4.4. ALARMS (104) (22 bytes)

START (1)	ADD (2)	COD (1)	DATA (16)	CHK DATA (1)	CHK TOT (1)
"R"	00	104	X	X	1 Byte

DATA (16 byte)[7]
Register of the requested alarm:

Byte	Meaning
0	Alarm index
1	Line (R=0,S=1,T=2)
2	hours
3	minutes
4	seconds
5	Vset (MSB)
6	Vset (LSB)
7	Vout (MSB)
8	Vout (LSB)
9	Iout (MSB)
10	Iout (LSB)
11	Fset (MSB)
12	Fset (LSB)
13	Mode
14	Alarms
15	Checksum

[7] For the meaning of each byte, see previous sections

4.5. CORRESPONDENCE TABLE OF PACKET

PC	XPS
INIT (1)	ECHO (101) o ACK(103)
ACQ (2)	RISP (102) o ACK(103)
SET_MD (3)	ACK (103)
RAMP_VF (4)	ACK (103)
RAMP_PAR (5)	ACK (103)
COM (6)	ACK (103)
RESET (7)	-
LIM (8)	ACK (103)
MEM (9)	ALARMS (104) o ACK (103)

4.6. SERIAL SETTING

Parameter	*Data*
BAUD	1200
BIT	8
Parity	NO
STOP BIT	1
Timeout	3 Secs

5. REVISION INDEX

00_	First Emission (UT001.19)	29/09/22	A.Ferro	M.Rigobello	
Rev.	***Descrizione***	***Data***	***Autore***	***Verificato***	***Approvato***