MODBUS-RTU for VISION 2PLT PLUS200 2PLT PLUS100 2PLT

MODBUS-RTU protocol specifications for LAN control of VISION 2PLT / PLUS200 2PLT / PLUS100 2PLT series devices

(Software rel. 17 or higher)

Document: **MODBUS-RTU_2PLT_01-18_ENG**
Installed Software: **PLUS_2PLT.elf rel.17**

REED AND KEEP

INDEX

1: GENERAL DESCRIPTION

1.1 MODBUS PROTOCOL

The data communication system based on Modbus protocol allows to connect up to 247 devices in a common RS485 line with standard format and communication mode.
Communication takes place in half duplex by frame (transmitted continuously); only master (PC , PLC ...) can start polling with slaves as question/answer (only one slave addressed) and the polled slave answers. The slave answers after a minimum pause of 3,5 characters between received frame and the one to be transmitted.
Also broadcast communication mode exists where the master send a request to all the slaves simultaneously, and they give no answer back; this mode it's not available with this controller.
The data serial transmission mode implemented on the controller is RTU type (Remote Terminal Unit), where data are exchanged in binary format (8 bit characters).

1.2 SERIAL CONFIGURATION

Serial line:	***RS485***
Baud rate:	***300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400***
Data length:	***8 bit***
Parity:	***nessuna, pari o dispari***

Serial transmission of characters in RTU format:

Start	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	Parity (optional)	Stop

1.3 *MESSAGE FORMAT (FRAME)*

Each message (Frame) is made, based on MODBUS-RTU standard, by the following parts:

Start	*Device address*	*Function code*	*Data*	*CRC16*		*Stop*
pause (3.5 times the character transmission period)	Byte	Byte	n x Byte	LSByte	MSByte	pause (3.5 times the character transmission period)

- **Start / Stop :**
  Message starts with pause higher than 3.5 times the character transmission period.
  See chap. 1.4 for further clarifications.

- **Device address**:
  Device address with whom the master established the polling; it's a value between 1 and 247. Address 0 is reserved to the broadcast, message sent to all slave devices (not active on this controller). RS485 line allows to connect together up to 32 devices (1 Master + 31 slaves), but with appropriate "bridges" or relay devices it is possible to use the whole logical addressing field.

- **Function Code:**
  Code of the function to be execute or already executed; On device are acteve codes 0x03 (register reading), 0x06 (single register writing) and 0x2B/0x0E (identification data reading).

- **Data:**
  Data that must be exchanged.

- **CRC16:**
  Error checking field based on CRC16 algorithm. CRC16 is calculated on the whole message by the master device which is trasmitting and attached to the message itself. The slave, at the end of reception, calculates CRC16 on the message and compares it with the value learnt by the master; if the values do not match, the message will be considered not valid and will be discarded without sending any answer to the master.
  The following fragment of C code shows the CRC16 calculation mode:

```
unsigned int CRC16
void Modbus_CRC(unsigned char *Frame, unsigned char FrameLength)
{
unsigned char ByteCount;
unsigned char i;
unsigned char bit_lsb;
CRC16 = 0xFFFF;
for (ByteCount=0;ByteCount<FrameLength;ByteCount++)
  {
  CRC16^=Frame[ByteCount];
  for (i=0;i<8,i++)
    {
    bit_lsb = CRC16 & 0x0001;
    CRC16 = CRC16>>1;
    if (bit_lsb == 1)
      CRC16 ^= 0xA001;
    }
  }
}
```

1.4 MESSAGES SYNCHRONIZATION

Message synchronization between transmitter and receiver is made placing a pause on the messages at least 3.5 times the character transmission period. If the receiver does not receive any Byte for 3.5 times the character transmission period, consider the last message completed and set the next Byte received ad the first one of a new message.
The slave, once received the complete message, decodes it and, if there are no errors, sends the answer message to the master. To send the answer, slave keeps RS485 line busy, wait a pause of 3.5 times the character transmission period, send the complete message, wait 3.5 times the character transmission period and then release the RS485 line.
The master unit will have to consider these periods to avoid risks of transmission overlap; in particular must be set a proper answer reception time-out before starting a new transmission (typical time-out value: 500msec or higher, for a baud rate = 9600).

1.5 ERROR MESSAGES (EXCEPTIONS)

The device, if not possible to complete the required operation, answers with an error message, in the following format:

Device address	Function Code	Exception Code	CRC16	
Byte	Byte	Byte	LSByte	MSByte

- **Device address**:
  Address of slave device answering
- **Function Code**:
  Function code MSb =1 (to show exception); i.e. 0x83 (for 0x03 reading) or 0x86 (for 0x06 writing)
- **Exception Code**:
  Exception codes handled by the device are the following:

Exception code	Description	Exception cause
0x01	Function not implemented	A function code not available was requested, different from 0x03, 0x06 and 0x2B/0x0E.
0x02	Address not valid	It's generated in several situations: - a not implemented register has been requested (or a not-existing area) - a reading of a number of registers that goes further on the implemented area has been requested (starting from requested address) - tried to write on a read-only area
0x03	Value not valid for datum	It's generated in several situations: - message 0x2B/0x0E DeviceIdCode is not correct - has been tried to write a parameter with an out of range value

- **CRC16:**
  Error control field based on the CRC16 algorithm.

Note:
In case the device identifies in the received message an error on format or in CRC16, the message is discarded (considered not valid) and no answer is sent.

2: COMMANDS DESCRIPTION

All the registers, to equalize the interpretation, are handled in a Word format (16 bit), even if an 8-bit parameter is contained.

2.1 *REGISTER READING (0x03)*

Format of command sent by the Master:

Device address	*Function Code*	*Register address*		*Number of registers*		*CRC16*	
Byte	Byte	MSByte	LSByte	MSByte	LSByte	LSByte	MSByte

- **Device address**:
  Address of slave device to be polled
- **Function Code**:
  Function code to be executed, in this case register reading (0x03)
- **Register address**:
  Starting register address for reading expressed with two Bytes; (MSByte) and (LSByte).
- **Number of registers**:
  indicates the number of Word required from the starting address. If a number of registers more than 1 is requested, the answer message will provide all the registers required with consecutive addresses starting from the address shown on the "register address" field.
  The number of registers to read is expressed on two Bytes, particularly for this controller (MSByte) must always be 0x00.
- **CRC16:**
  Error control field based on the CRC16 algorithm.

Formato del messaggio di risposta dello slave:

Indirizzo dispositivo	*Codice funzione*	*N. di Bytes di dato*	*Dato 1*		*Dato 2*		*Dato n*		*CRC16*	
Byte	Byte	Byte	MSByte	LSByte	MSByte	LSByte	MSByte	LSByte	LSByte	MSByte

- **Device address**:
  Address of slave device answering
- **Function Code**:
  Function code to be answered to, in this case register reading (0x03)
- **Bytes' number of datum**:
  Contains the total Bytes number of data.
  Consider that the Bytes' number of datum is the double of the number of registers (because we talk about word). I.e. if in the polling message 2 registers are requested, in the answer message Bytes' number of datum must be set as 4.
- **Datum n** :
  Contains data sequences each expressed on two Bytes; (MSByte) and (LSByte).
- **CRC16:**
  Error control field based on the CRC16 algorithm.

2.2 *SINGLE REGISTER WRITING (0x06)*

Format of command sent by the Master:

Device address	*Function Code*	*Register address*		*Datum*		*CRC16*	
Byte	Byte	MSByte	LSByte	MSByte	LSByte	LSByte	MSByte

- **Device address**:
  Address of slave device to be polled
- **Function Code**:
  Function code to be executed, in this case single register writing (0x06)
- **Register address**:
  address of register to write expressed with two Bytes; (MSByte) and (LSByte).
- **Data**:
  Value to be assigned to the register expressed with two Bytes; (MSByte) and (LSByte).
- **CRC16:**
  Error control field based on the CRC16 algorithm.

Format of answer message from slave::

Device address	*Function Code*	*Register address*		*Datum*		*CRC16*	
Byte	Byte	MSByte	LSByte	MSByte	LSByte	LSByte	MSByte

The answer message is a simple echo of the polling message to confirm that the variable has been modified.

2.3 DATA READING OF DEVICE IDENTIFICATION (0x2B / 0x0E)

Format of command sent by the Master::

Device address	Function Code	MEI type	Read Device Id Code	Object Id	CRC16	
Byte	Byte	Byte	Byte	Byte	LSByte	MSByte

- **Device address**:
  Address of slave device to be polled
- **Function Code**:
  Function code to be executed, in this case identification data reading (0x2B)
- **MEI type**:
  Modbus Encapsulated Interface type: it must be 0x0E.
- **Read Device Id Code**:
  Indicates the access type to data: it must be 0x01.
- **Object Id**:
  Indicates the starting object for data reading (range: 0x00 – 0x02).
- **CRC16:**
  Error control field based on the CRC16 algorithm.

Format of answer message from slave:

Device address	Function code	MEI Type	Read Device Id Code	Conformity level	More Follows	Next Object Id	Number Of Object	Object Id (n)	Object Length (n)	Object Value (n)	CRC16	
Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	ASCII String	LSByte	Byte

- **Device address**:
  Address of slave device answering
- **Function Code**:
  Function code to be executed, in this case identification data reading (0x2B)
- **MEI type**:
  Modbus Encapsulated Interface type: it must be 0x0E.
- **Read Device Id Code**:
  Indicates the access type to data: it must be 0x01.
- **Conformity level**:
  indicates the slave conformity level: it is always 0x01.
- **More Follows**:
  indicates the number of additional transactions requested: it is always 0x00.
- **Next Object Id**:
  indicates the object that has to be requested in the eventual following transaction: it is always 0x00

- **Number Of Object**:
  number of objects that follow (1, 2 o 3).
- **List of**:
  - **Object Id**:
    current object number .
  - **Object Length**:
    length of following string.
  - **Object Value**:
    ASCII string that contains the identification information.
- **CRC16:**

Error control field based on the CRC16 algorithm.

Reading example of all controllers identification information with software VISION 2PLT (address 1)

Demand message: (01 2B 0E 01 00 70 77)

- **Indirizzo dispositivo**: 0x01
- **Codice funzione**: 0x2B
- **Tipo MEI**: 0x0E
- **Read DeviceIdCode**: 0x01
- **ObjectId**: 0x00
- **CRC16:** to be calculated on previous values

Answer message: (01 2B 0E 01 01 00 00 03 00 04 50 45 47 4F 01 08 4E 41 4E 4F 5F 32 5A 4E 02 03 30 30 32 3F B9)

- **Device address**: 0x01
- **Function code**: 0x2B
- **MEI type**: 0x0E
- **Read DeviceIdCode**: 0x01
- **Conformity level**: 0x01
- **More Follows**: 0x00
- **Next ObjectId**: 0x00
- **Number Of Object**: 0x03
- **ObjectId**: 0x00
- **Object Length**: 0x04
- **Object Value**: 'PEGO' (Vendor Name field in ASCII)
- **ObjectId**: 0x01
- **Object Length**: 0x08
- **Object** Value: 'PLUS2PLT' (Product Code field in ASCII)
- **ObjectId**: 0x02
- **Object Length**: 0x03
- **Object Value**: '008' (Revision field in ASCII)
- **CRC16:** to be calculated on previous values

3: REGISTERS AND ADDRESSES DESCRIPTION

Each register has a 16 bit dimension. It has been formed some blocks of variables (each with a different MSByte address) basing on the the type of these variables. In the followings paragraphs are described in the detail all the available blocks and, for each block, the implemented variables.
At the beginning of each table it has been indicated in the first row if its data could be only read (READ-ONLY) or written and read (READ/WRITE).

TABLE COLUMNS DESCRIPTION:

- **Register** :
  It indicates the register address that has to be used in the structure of Modbus command for reading or writing the data into device. It is expressed on two Bytes: (MSByte) and (LSByte).
- **Description** :
  Description of the register and possible corresponding programming variable of the device.
- **Meaning and Bytes range:**
  Dimension (MSByte and LSByte), allowed range and notes about register.
- **U.M. :**
  Unit of measure of datum contained in the register.
- **Conv. :**
  Values contained in the registers that represent signed variables require a conversion and they are marked from **X** sign in the following column.
  Conversion procedure:
  - If the value contained in the register is included between 0 and 32767, it represents a positive or null number (the results is the value itself)
  - If the value contained in the register is included between 32768 and 65535, it represents a negative number (the results is the register value - 65536)
- **Molt :**
  It indicates the multiplication factor that has to be mapped to register's datum and that coupled to columns U.m and Conv permits the right interpretation of the value to convert.
  Examples:
  A datum **(0x0012)** = 18 with Molt =**0,1** / U.m= **°C** / Conv=**C** corresponds to a temperature of (18x0,1)= **1,8 °C**
  A datum **(0xFFF0)** = 65520 with Molt =**0,1** / U.m= **°C** / Conv=**C** corresponds to a temperature [(65520 – 65536) x0,1] = **-1,6 °C**
  A datum **(0x0078)** = 120 with Molt =**1** / U.m= **min** / Conv=**C** corresponds to a time of (120x1)= **120 minutes**
  A datum **(0x0014)** = 20 with Molt =**0,1** / U.m= **°C** / Conv=**C** corresponds to a temperature of (20x0,1)= **2,0 °C**

3.1 ANALOG INPUTS

READ-ONLY						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
256	Reference probe	MSByte LSByte	Resolution 0,1°C range: -45°C .. +99°C Values > +99°C indicate broken probe	°C	X	0,1
257	Ambient probe 1	MSByte LSByte	Resolution 0,1°C range: -45°C .. +99°C Values > +99°C indicate broken probe	°C	X	0,1
258	Ambient probe 2	MSByte LSByte	Resolution 0,1°C range: -45°C .. +99°C Values > +99°C indicate broken probe	°C	X	0,1
259	Evaporator Probe 1	MSByte LSByte	Resolution 0,1°C range: -45°C .. +99°C Values > +99°C indicate broken probe	°C	X	0,1
260	Evaporator Probe 2	MSByte LSByte	Resolution 0,1°C range: -45°C .. +99°C Values > +99°C indicate broken probe	°C	X	0,1

3.2 PARAMETERS

READ / WRITE						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
768	Temperature Setpoint 1	MSByte LSByte	0.1 °C steps, with sign range: LSE..HSE	°C	X	0,1
769	Temperature Setpoint 2	MSByte LSByte	0.1 °C steps, with sign range: LSE..HSE	°C	X	0,1
770	r0 temperature differential	MSByte LSByte	0.1 °C steps, without sign range: 0.2..10.0 °C	°C		0,1
771	d0 defrosting period (hours)	MSByte LSByte	1 hour steps range: 0..24 hours (0 = disactivated)	hours		1
772	d21 Setpoint end-of-defrosting temperature 1	MSByte LSByte	0,1 °C steps, with sign range: -35,0..+45,0 °C	°C	x	0,1
773	d22 Setpoint end-of-defrosting temperature 2	MSByte LSByte	0,1 °C steps, with sign range: -35,0..+45,0 °C	°C	x	0,1
774	d31 Max defrosting duration evap. 1	MSByte LSByte	1 minute steps range: 1..120 minutes	min		1
775	d32 Max defrosting duration evap. 1	MSByte LSByte	1 minute steps range: 1..120 minutes	min		1
776	d7 dripping duration	MSByte	1 minute steps range: 0..120 min (0 = disactivated)	min		1

READ / WRITE						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
777	F5 fans stop duration post defrosting	MSByte LSByte	1 minute steps range: 1..10 min	minuti		1
778	dEL Second system start delay (valid if nrC=2 e Set=1)	MSByte LSByte	1 minute steps range: 0..60 min	minuti		1
779	A1 Minimum temperature alarm	MSByte LSByte	1 °C steps, with sign range: -45..(A2-1) °C	°C	x	1
780	A2 Maximum temperature alarm	MSByte LSByte LSByte	1 °C steps, with sign range: (A1+1)..99 °C	°C	x	1
781	dF1 Real-time defrost enable, evaporator 1	MSByte LSByte	0 = disable 1 = enable	num		1
782	dF2 Real-time defrost enable, evaporator 2	MSByte LSByte	0 = disable 1 = enable	num		1
783..788	d41…d46 Programming defrost times, evaporator 1	MSByte LSByte	value = hours*60 + minutes range = 0...1430 minutes (23:50)	minuti		1
789..794	d51…d56 Programming defrost times, evaporator 2	MSByte LSByte	value = hours*60 + minutes range = 0...1430 minutes (23:50)	minuti		1
795	nrC Number of compressors (or solenoids or systems)	MSByte LSByte	1 = 1 system 2 = 2 systems	num		1
796	nrE Number of evaporators	MSByte LSByte	1 = 1 evaporator 2 = 2 evaporators	num		1
797	Set Single or double set-point setting (ignored if nrC = 1)	MSByte LSByte	1 = one setting only 2 = double setting	num		1
798	rot Compressor rotation (ignored if nrC = 1)	MSByte LSByte	0 = compressor rotation 1 = fixed call	num		1
799	F3 Fan status with compressor off	MSByte LSByte	0 = Fans running continuously 1 = Fans running only if compressor is working 2 = fans disabled	num		1
800	F4 Fan pause during defrost	MSByte LSByte	0 = Fans running during defrost 1 = Fans not working during defrost	num		1
801	dE1 Evaporator 1 sensor presence	MSByte LSByte	0 = evaporator 1 sensor present 1 = evaporator 1 sensor absent	num		1

READ / WRITE						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
802	dE2 Evaporator 2 sensor presence	MSByte LSByte	0 = evaporator 2 sensor present 1 = evaporator 2 sensor absent	num		1
803	d1 Defrost type	MSByte LSByte	0 = element 1 = hot gas 2 = hot gas with basin	num		1
804	d8 Post-defrost compressor start mode.	MSByte LSByte	0 = if an evaporator is still defrosting the second system can continue working 1 = compressors do not start until all defrosts have been completed	num		1
805	Ald Minimum and maximum temperature signalling and alarm display delay	MSByte LSByte	1 minute steps, without sign 0…240 min	min		1
806	C1 Minimum time between shutdown and subsequent switching on of the compressor.	MSByte LSByte	1 minute steps, without sign 0…15 min	min		1
807	CE1 Duration of compressor ON time in the case of faulty ambient probe (emergency mode).	MSByte LSByte	0…240 minutes 0 = disabled	min		1
808	CE2 Duration of compressor OFF time in the case of faulty ambient probe (emergency mode).	MSByte LSByte	5…240 minutes	min		1
809	CL1 Room sensor 1 value correction	MSByte LSByte	0,1 °C steps, with sign -10,0 .. +10,0 °C	°C	x	0,1
810	CL2 Room sensor 2 value correction	MSByte LSByte	0,1 °C steps, with sign -10,0 .. +10,0 °C	°C	x	0,1
811	HSE Maximum value attributable to set point	MSByte LSByte	1 °C steps, with sign (LSE+1) .. +99 °C	°C	x	1
812	LSE Minimum value attributable to set point	MSByte LSByte	1 °C steps, with sign -45 ..(HSE-1) °C	°C	x	1
813	BEE Buzzer state	MSByte LSByte	0 = buzzer disable 1 = buzzer enable	num		1
814	doC Compressor safety time for door switch	MSByte LSByte	0 … 5 min	min		1
815	Tdo Time to re-insert compressor after opening door	MSByte LSByte	0 … 240 min 0 = disabled	min		1

READ / WRITE						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
816÷819	In1…In4 digital input configuration	MSByte LSByte	-9…9	num		1
820	Fst FAN shutdown temperature	MSByte LSByte	1 °C steps, with sign -45 … +45 °C	°C	x	1
821	Fd Fst differential	MSByte LSByte	1 °C steps, without sign 1 … 10 °C	°C		1
822	rA DO digital output setting	MSByte LSByte	2 = door resistance deicing (NO) 1 = General alarm(NO) 0 = disabled -1 = General alarm (NC) -2 = Door resistance deicing (NC)	num		1
823	StA Setpoint deicing resistance relay	MSByte LSByte	1 °C steps, with sign -45 … +45 °C	°C	x	1
824	F6 Evaporator fans activation for air recirculation	MSByte LSByte	0 … 240 min 0 = disabilitato	min		1
825	F7 Evaporator fans duration for air recirculation	MSByte LSByte	0 … 30 min	min		1

3.2a REAL-TIME CLOCK PARAMETERS

READ						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
1024	Minute clock	MSByte LSByte	Range: 0 … 59	Min.		1
1025	Hour clock	MSByte LSByte	Range: 0 … 23	Hour		1
1026	Year	MSByte LSByte	Range: 0..99	num		1
1027	Month	MSByte LSByte	Range: 1..12	num		1
1028	Day	MSByte LSByte	Range: 1..28, 1..29, 1..30, 1..31 (by month and year)	num		1

3.2b READ-ONLY PARAMETERS

READ						
Register	**Description**	**Bytes meaning and range**		**U.M.**	**Conv**	**Molt**
512	mOd Mode of operation	MSByte LSByte	1 = only ambient 1 regulation probe 2 = only ambient 2 regulation probe 3 = probe 1 regulation, probe 2 safety 4 = adjust with the average value of the probes	num		1
513	Hr1 Compress. 1 hour counter	MSByte LSByte	0 … 9990 hours	hours		1
514	Hr2 Compress. 2 hour counter	MSByte LSByte	0 … 9990 hours	hours		1

3.3 *INPUTS / OUTPUTS / ALARMS STATUS*

READ-ONLY							
Register	***Description***	***Bytes meaning***			***U.M.***	***Conv***	***Molt***
1280	output status	MSByte	bit 7 (MSb)	Not used	num		1
			bit 6	Not used			
			bit 5	Not used			
			bit 4	Not used			
			bit 3	Not used			
			bit 2	Not used			
			bit 1	Not used			
			bit 0 (LSb)	Alarm relay			
		LSByte	bit 7 (MSb)	Door resistance relay			
			bit 6	cold room light relay			
			bit 5	defrost 2 relay			
			bit 4	defrost 1 relay			
			bit 3	fans 2 relay			
			bit 2	fans 1 relay			
			bit 1	Compressor 2 relay			
			bit 0 (LSb)	Compressor 1 relay			
1281	input status		bit 7 (MSb)	Not used	num		1
			bit 6	Not used			
			bit 5	Not used			
			bit 4	Not used			
			bit 3	Not used			
			bit 2	Not used			
			bit 1	Not used			
			bit 0 (LSb)	fan 2 protection			
			bit 7 (MSb)	fan 1 protection			
			bit 6	Stop defrosting remotely (edge)			
			bit 5	Start defrosting remotely (edge)			
			bit 4	Remote Stand-by			
			bit 3	Door switch			
			bit 2	Man in room alarm			
			bit 1	Compressor 2 protection			
			bit 0 (LSb)	Compressor 1 protection			
1282	alarms status 1	MSByte	bit 7 (MSb)	Fans 1 protection alarm	num		1
			bit 6	EdP Alarm			
			bit 5	Ec2 Compr. 2 safety device tripped			
			bit 4	Ec1 Compr. 1 safety device tripped			
			bit 3	Ed Door open alarm			
			bit 2	E8 Man in room alarm			
			bit 1	100 N Master EEPROM alarm			
			bit 0 (LSb)	E6 Flat battery alarm			
		LSByte	bit 7 (MSb)	Communication error (100N Master)			
			bit 6	E0 eeprom alarm			
			bit 5	Ed2 Defrost sensor 2 faulty			
			bit 4	Ed1 Defrost sensor 1 faulty			
			bit 3	E2 Room temperature sensor 2			
			bit 2	E1 Room temperature sensor 1			
			bit 1	EL Minimum temperature alarm			
			bit 0 (LSb)	EH Maximum temperature alarm			

READ / WRITE							
Register	**Description**	**Bytes meaning**			**U.M.**	**Conv**	**Molt**
1283	alarms status 2	MSByte	bit 7 (MSb)	Not used	num		1
			bit 6				
			bit 5				
			bit 4				
			bit 3				
			bit 2				
			bit 1				
			bit 0 (LSb)				
		LSByte	bit 7 (MSb)	Not used			
			bit 6	Not used			
			bit 5	Not used			
			bit 4	Not used			
			bit 3	Not used			
			bit 2	Not used			
			bit 1	Not used			
			bit 0 (LSb)	Fans 2 protection alarm			

3.4 STATO DISPOSITIVO

READ / WRITE							
Register	**Description**	**Bytes meaning**			**U.M.**	**Conv**	**Molt**
1536	device status	MSByte	bit 7 (MSb)	Not used	num		1
			bit 6	Not used			
			bit 5	Not used			
			bit 4	Not used			
			bit 3	defrost 2 forcing enabling			
			bit 2	defrost 1 forcing enabling			
			bit 1	modify enabling of light status			
			bit 0 (LSb)	modify enabling of stand-by status			
		LSByte	bit 7 (MSb)	Not used			
			bit 6	Not used			
			bit 5	Not used			
			bit 4	Not used			
			bit 3	defrost 2 forcing 1 = start defrost 2 0 = stop defrost 2			
			bit 2	defrost 1 forcing 1 = start defrost 1 0 = stop defrost 1			
			bit 1	cold room light key status 1 = active cold room light 0 = non-active cold room light			
			bit 0 (LSb)	stand-by status 1 = stand-by 0 = ON			

For asking the modification of one of device status bits, the master has to send into LSByte the requested value for the bit and into MSByte the corresponding bit set to 1. i.e.: for stand-by staus forcing, the master has to send MSByte = 00000001 and LSByte = 00000001.

4: GLOSSARY

- **Binary Number:**
  It is used in computer science for the internal representation of numbers, thanks to the simplicity to physically realize an element with two state (0,1) instead an higher number, but also with the matching with the logic values TRUE and FALSE.

- **Decimal Numer:**
  On decimal system all whole numbers can be represented using the ten digits that indicates the first ten natural numbers, included zero. The value of each of these digits depends on the position occupied inside the number, and it increases in powers of 10, from right to left.

- **Hexadecimal Number:**
  It is part of a positional numeric system with base 16, that means it uses 16 symbols instead usual 10 of the traditional numerical deciaml system. Hexadecimal generally uses symbols from 0 to 9 and then letters from A to F, for a total 16 symbols. Conventionally an hexadecimal number is preceded by 0x (i.e. 0x03) or by H (i.e. H03).

- **bit:**
  A bit is a binary digit that is one of the two symbols of numerical binary system, usually called zero (0) and one (1). It represents the definition unit of a logic state.
  It's defined also as elementary unit of the information used by a computer.

- **Byte:**
  It's the quantity of bit needed to define an alphanumeric character; particularly a Byte is made by a sequence of 8 bit (i.e. 10010110).

- **Word:**
  Unit of measure that fixes information lenght at 16 bits that is equivalent to 2 Bytes
  (i.e. 10010110 01101011).

- **LSb:**
  Less significant bit of a binary digit (first bit on the right of the indicated number)

- **MSb:**
  Most significant bit of a binary digit (first bit on the left of the indicated number)

- **LSByte:**
  Less significant Byte of a Word (Byte on the right of the indicated Word)

- **MSByte:**
  Most significant Byte of a Word (Byte on the left of the indicated Word)

Note:

Note:

PEGO s.r.l.
Via Piacentina, 6/b 45030 Occhiobello ROVIGO - ITALIA
Tel. +39 0425 762906 Fax +39 0425 762905
e.mail: info@pego.it – www.pego.it

AFTER-SALES ASSISTANCE CENTRE
Tel. +39 0425 762906 e.mail: tecnico@pego.it

Distributor: