



LOVATO ELECTRIC S.P.A.

24020 GORLE (BERGAMO) ITALIA
VIA DON E. MAZZA, 12
TEL. 035 4282111
E-mail info@LovatoElectric.com
Web www.LovatoElectric.com



PROTEZIONI DI INTERFACCIA

Modbus manual



INTERFACE PROTECTIONS

Manuale modbus

PMVF



INTRODUCTION

The interface protections PMVF series supports the modbus protocol in the variants RTU, ASCII and TCP. The protocols differ mainly in the structure of the messages, although the information content is equivalent, and in some constraints which make them suitable for different communication buses.

RTU

Message structure:

Pause	Modbus node	Function	Data	CRC16	Pause
3,5 characters	1 byte	1 byte	2N bytes	2 bytes	3,5 characters

Bit timing is critical, therefore the RTU variant is suitable for serial buses (RS485).

ASCII

Message structure:

Character	Modbus node	Function	Data	CRC16	Characters
:	2 chars	2 chars	2N chars	2 chars	CR LF

The beginning and end of a message are marked by specific bytes and there are no time constraints, so the ASCII variant is suitable for buses with non-deterministic timings (for example, modems).

TCP

Message structure:

Transaction ID	Protocol ID	Length	Modbus node	Function	Data
2 bytes	00 00 (2 bytes)	2 bytes	1 byte	1 byte	2N bytes

The messages are marked by an identifier which lets the association between a specific query of the master and the relevant response of the slave, therefore the TCP variant is suitable for buses in which the sequence of messages is not guaranteed (ethernet).

PROTOCOL SPECIFICATIONS

- Byte and word order: big endian (high word first, high byte first), except for CRC which is a little endian (low byte first) register.
- A maximum of 120 registers can be contained in the data.
- Max connection number supported on Modbus TCP: 1 each physical communication port.
- Supported functions:

Function	Query data content	Reply data content
0x03 (Read holding register)	Address (2 bytes)	Replied registers byte number (1 byte)
0x04 (Read input register)	Register number R (2 bytes)	Registers (2R bytes)
0x06 (Preset single register)	Address (2 bytes)	Address (2 bytes)
	Register (2 bytes)	Register (2 bytes)
0x10 (Preset multiple registers)	Address (2 bytes)	Address (2 bytes)
	Register number R (2 bytes)	Written bytes number
	Registers (2R bytes)	
0x11 (Slave ID)	-	Replied registers byte number (1 byte)
		Model code (1 byte)
		Firmware revision (1 byte)
		Hardware revision (1 byte)
		Parameter revision (1 byte)
		0x11
		0x00
		0x00
		0x00

Model code:

PMVF52: 0xD0
PMVF81: 0xD1
PMVF90: 0xDF
PMVF3000: 0xDA

In the event of an error, the reply involves modifying the function code by raising the most significant bit (for example, if the error occurs with function 0x04, the function code in the response is 0x84) and the data consists only of 1 byte for the exception code:

Error code	Description
0x01	Function is not valid
0x02	Address is not valid
0x03	Value is out of range
0x04	Operation not valid
0x06	Slave busy

INTRODUZIONE

Le protezioni di interfaccia della serie PMVF supportano il protocollo modbus nelle varianti RTU, ASCII e TCP. I protocolli si differenziano principalmente per la struttura dei messaggi, benché il contenuto informativo sia equivalente, e per alcuni vincoli che li rendono adatti a diversi bus di comunicazione.

RTU

Struttura messaggio:

Pausa	Nodo modbus	Funzione	Dati	CRC16	Pausa
3,5 caratteri	1 byte	1 byte	2N byte	2 byte	3,5 caratteri

La temporizzazione dei bit è fondamentale, perciò la variante RTU è adatta a bus seriali (RS485).

ASCII

Struttura messaggio:

Carattere	Nodo modbus	Funzione	Dati	LRC	Caratteri
:	2 char	2 char	2N char	2 char	CR LF

L'inizio e la fine di un messaggio sono scanditi da byte specifici e non ci sono vincoli temporali, dunque la variante ASCII è adatta a bus con tempistiche non deterministiche (ad esempio modem).

TCP

Struttura messaggio:

ID transazione	ID protocollo	Lunghezza	Nodo modbus	Funzione	Dati
2 byte	00 00 (2 byte)	2 byte	1 byte	1 byte	2N byte

I messaggi sono marcati da un identificatore che permette l'associazione tra una specifica query del master e la risposta relativa dello slave, perciò la variante TCP è adatta a bus in cui non è garantita la sequenza dei messaggi (ethernet).

SPECIFICHE PROTOCOLLO

- Ordine byte e word: big endian (high word first, high byte first), tranne CRC che è un registro little endian (low byte first).
- Nei dati possono essere contenuti al massimo 120 registri.
- Massimo numero di connessioni supportate su Modbus TCP: 1 ogni porta di comunicazione fisica.
- Funzioni supportate:

Funzione	Contenuto Dati Query	Contenuto Dati Reply
0x03 (Read holding register)	Indirizzo (2 byte)	Numero byte registri restituiti (1 byte)
0x04 (Read input register)	Numero registri R (2 byte)	Registri (2R byte)
0x06 (Preset single register)	Indirizzo (2 byte)	Indirizzo (2 byte)
	Registro (2 byte)	Registro (2 byte)
0x10 (Preset multiple registers)	Indirizzo (2 byte)	Indirizzo (2 byte)
	Numero registri R (2 byte)	Numero byte scritti
	Registri (2R byte)	
0x11 (Slave ID)	-	Numero byte registri restituiti (1 byte)
		Codice modello (1 byte)
		Revisione firmware (1 byte)
		Revisione hardware (1 byte)
		Revisione parametri (1 byte)
		0x11
		0x00
		0x00
		0x00

Codice modello:

PMVF52: 0xD0
PMVF81: 0xD1
PMVF90: 0xDF
PMVF3000: 0xDA

In caso di errore, la replica prevede la modifica del codice funzione alzando il bit più significativo (ad esempio se l'errore avviene con la funzione 0x04, il codice funzione nella risposta è 0x84) e i dati sono costituiti solo da 1 byte per il codice eccezione:

Codice errore	Descrizione
0x01	Funzione non valida
0x02	Indirizzo non valido
0x03	Valore fuori range
0x04	Operazione non valida
0x06	Slave occupato

CRC COMPUTATION EXAMPLE

Frame = 0207h

CRC initialization	1111	1111	1111	1111
Load the first byte			0000	0010
Execute xor with the first Byte of the frame	1111	1111	1111	1101
Execute 1st right shift	0111	1111	1111	1110 1
Carry=1, load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1101	1111	1111	1111
Execute 2nd right shift	0110	1111	1111	1111 1
Carry=1, load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1100	1111	1111	1110
Execute 3rd right shift	0110	0111	1111	1111 0
Execute 4th right shift	0011	0011	1111	1111 1
Carry=1, load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1001	0011	1111	1110
Execute 5th right shift	0100	1001	1111	1111 0
Execute 6th right shift	0010	0100	1111	1111 1
Carry=1, load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1000	0100	1111	1110
Execute 7th right shift	0100	0010	0111	1111 0
Execute 8th right shift	0010	0001	0011	1111 1
Carry=1, load polynomial	1010	0000	0000	0001
Load the second byte of the frame			0000	0111
Execute xor with the Second byte of the frame	1000	0001	0011	1001
Execute 1st right shift	0100	0000	1001	1100 1
Carry=1,load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1110	0000	1001	1101
Execute 2nd right shift	0111	0000	0100	1110 1
Carry=1,load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1101	0000	0100	1111
Execute 3rd right shift	0110	1000	0010	0111 1
Carry=1,load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1100	1000	0010	0110
Execute 4th right shift	0110	0100	0001	0011 0
Execute 5th right shift	0010	0100	0000	1001 1
Carry=1,load polynomial	1010	0000	0000	0001
Execute xor with the polynomial	1001	0010	0000	1000
Execute 6th right shift	0100	1001	0000	0100 0
Execute 7th right shift	0010	0100	1000	0010 0
Execute 8th right shift	0001	0010	0100	0001 0
CRC Result	0001	0010	0100	0001
	0x12		0x41	

LRC COMPUTATION EXAMPLE

Address	01	00000001
Function	04	00000100
Start address hi.	00	00000000
Start address lo.	00	00000000
Register number	08	00001000
Sum		00001101
Complement to 1		11110010
+ 1		00000001
Complement to 2		11110101

LRC result F5

MODBUS REGISTERS
FUNCTION 0x03 - 0x04

ESEMPIO DI CALCOLO CRC

Frame = 0x0207

Inizializzazione CRC	1111	1111	1111	1111
Carica primo byte			0000	0010
Esegue xor con il primo Byte della frame	1111	1111	1111	1101
Esegue primo shift a dx	0111	1111	1111	1110 1
Carry=1,carica polinomio	1010	0000	0000	0001
Esegue xor con il polinomio	1101	1111	1111	1111
Esegue secondo shift dx	0110	1111	1111	1111 1
Carry=1,carica polinomio	1010	0000	0000	0001
Esegue xor con il polinomio	1100	1111	1111	1110
Esegue terzo shift	0110	0111	1111	1111 0
Esegue quarto shift	0011	0011	1111	1111 1
Carry=1, carica polinomio	1010	0000	0000	0001
Esegue xor con il Polinomio	1001	0011	1111	1110
Esegue quinto shift dx	0100	1001	1111	1111 0
Esegue sesto shift dx	0010	0100	1111	1111 1
Carry=1, carica polinomio	1010	0000	0000	0001
Esegue xor con polinomio	1000	0100	1111	1110
Esegue settimo shift dx	0100	0010	0111	1111 0
Esegue ottavo shift dx	0010	0001	0011	1111 1
Carry=1, carica polinomio	1010	0000	0000	0001
Carica secondo byte della frame			0000	0111
Esegue xor con il Secondo byte della frame	1000	0001	0011	1001
Esegue primo shift dx	0100	0000	1001	1100 1
Carry=1, carica polinomio	1010	0000	0000	0001
Esegue xor con il polinomio	1110	0000	1001	1101
Esegue secondo shift dx	0111	0000	0100	1110 1
Carry=1, carica polinomio	1010	0000	0000	0001
Esegue xor con il polinomio	1101	0000	0100	1111
Esegue terzo shift dx	0110	1000	0010	0111 1
Carry=1, carica polinomio	1010	0000	0000	0001
Esegue xor con il polinomio	1100	1000	0010	0110
Esegue quarto shift dx	0110	0100	0001	0011 0
Esegue quinto shift dx	0010	0100	0000	1001 1
Carry=1, carica polinomio	1010	0000	0000	0001
Esegue xor con il polinomio	1001	0010	0000	1000
Esegue sesto shift dx	0100	1001	0000	0100 0
Esegue settimo shift dx	0010	0100	1000	0010 0
Esegue ottavo shift dx	0001	0010	0100	0001 0
Risultato CRC	0001	0010	0100	0001
	0x12		0x41	

ESEMPIO DI CALCOLO LRC

Indirizzo	01	00000001
Funzione	04	00000100
Start address hi.	00	00000000
Start address lo.	00	00000000
Numero registri	08	00001000
Somma		00001101
Complemento a 1		11110010
+ 1		00000001
Complemento a 2		11110101

Risultato LRC F5

REGISTRI MODBUS
FUNZIONI 0x03 - 0x04

Address	Word	Description	Descrizione	Unit	Format	PMVF52	PMVF81	PMVF90	PMVF3000
Indirizzo				Unità	Formato				
0x0002	2	L1 Phase Voltage	Tensione Di Fase L1	V/100	Unsigned Long	*	*	*	
0x0004	2	L2 Phase Voltage	Tensione Di Fase L2	V/100	Unsigned Long	*	*	*	
0x0006	2	L3 Phase Voltage	Tensione Di Fase L3	V/100	Unsigned Long	*	*	*	
0x0008	2	L1 Current	Corrente Di Fase L1	A/10000	Unsigned Long				*
0x000A	2	L2 Current	Corrente Di Fase L2	A/10000	Unsigned Long				*
0x000C	2	L3 Current	Corrente Di Fase L3	A/10000	Unsigned Long				*
0x000E	2	L1-L2 Voltage	Tensione L1-L2	V/100	Unsigned Long	*	*	*	*
0x0010	2	L2-L3 Voltage	Tensione L2-L3	V/100	Unsigned Long	*	*	*	*
0x0012	2	L3-L1 Voltage	Tensione L3-L1	V/100	Unsigned Long	*	*	*	*
0x0014	2	L1 Active Power	Potenza Attiva L1	kW/100000	Signed Long				*
0x0016	2	L2 Active Power	Potenza Attiva L2	kW/100000	Signed Long				*
0x0018	2	L3 Active Power	Potenza Attiva L3	kW/100000	Signed Long				*
0x001A	2	L1 Reactive Power	Potenza Reattiva L1	kvar/100000	Signed Long				*
0x001C	2	L2 Reactive Power	Potenza Reattiva L2	kvar/100000	Signed Long				*
0x001E	2	L3 Reactive Power	Potenza Reattiva L3	kvar/100000	Signed Long				*
0x0020	2	L1 Apparent Power	Potenza Apparente L1	kVA/100000	Unsigned Long				*
0x0022	2	L2 Apparent Power	Potenza Apparente L2	kVA/100000	Unsigned Long				*

Address Indirizzo	Word	Description	Descrizione	Unit Unità	Format Formato	PMVF52	PMVF81	PMVF90	PMVF3000
0x0024	2	L3 Apparent Power	Potenza Apparente L3	kVA/100000	Unsigned Long				*
0x0026	2	L1 Power Factor	Fattore Di Potenza L1	/10000	Signed Long				*
0x0028	2	L2 Power Factor	Fattore Di Potenza L2	/10000	Signed Long				*
0x002A	2	L3 Power Factor	Fattore Di Potenza L3	/10000	Signed Long				*
0x0032	2	Frequency	Frequenza	Hz/1000	Unsigned Long	*	*	*	*
0x0034	2	Eqv Phase Voltage	Tensione Di Fase Equivalente	V/100	Unsigned Long	*	*	*	
0x0036	2	Eqv Phase-To-Phase Voltage	Tensione Di Linea Equivalente	V/100	Unsigned Long	*	*	*	*
0x0038	2	Eqv Current	Corrente Equivalente	A/10000	Unsigned Long				*
0x003A	2	Eqv Active Power	Potenza Attiva Equivalente	kW/100000	Signed Long				*
0x003C	2	Eqv Reactive Power	Potenza Reattiva Equivalente	kvar/100000	Signed Long				*
0x003E	2	Eqv Apparent Power	Potenza Apparente Equivalente	kVA/100000	Unsigned Long				*
0x0040	2	Eqv Power Factor	Fattore Di Potenza Equivalente	/10000	Signed Long				*
0x0042	2	VLL Unbalance	Asimmetria VLL	%/100	Unsigned Long	*	*	*	*
0x0044	2	VLN Unbalance	Asimmetria VLN	%/100	Unsigned Long	*	*	*	
0x0046	2	Current Unbalance	Asimmetria Di Corrente	%/100	Unsigned Long				*

Address Indirizzo	Word	Description	Descrizione	Unit Unità	Format Formato	PMVF52	PMVF81	PMVF90	PMVF3000
0x0400	2	High Voltage L1	Tensione L1 Massima	V/100	Unsigned Long	*	*	*	
0x0402	2	High Voltage L2	Tensione L2 Massima	V/100	Unsigned Long	*	*	*	
0x0404	2	High Voltage L3	Tensione L3 Massima	V/100	Unsigned Long	*	*	*	
0x0406	2	High Current L1	Corrente L1 Massima	A/10000	Unsigned Long				*
0x0408	2	High Current L2	Corrente L2 Massima	A/10000	Unsigned Long				*
0x040A	2	High Current L3	Corrente L3 Massima	A/10000	Unsigned Long				*
0x040C	2	High Voltage L1L2	Tensione L1L2 Massima	V/100	Unsigned Long	*	*	*	*
0x040E	2	High Voltage L2L3	Tensione L2L3 Massima	V/100	Unsigned Long	*	*	*	*
0x0410	2	High Voltage L3L1	Tensione L3L1 Massima	V/100	Unsigned Long	*	*	*	*
0x0412	2	High Active Power L1	Potenza Attiva L1 Massima	kW/100000	Signed Long				*
0x0414	2	High Active Power L2	Potenza Attiva L2 Massima	kW/100000	Signed Long				*
0x0416	2	High Active Power L3	Potenza Attiva L3 Massima	kW/100000	Signed Long				*
0x0418	2	High Reactive Power L1	Potenza Reattiva L1 Massima	kvar/100000	Signed Long				*
0x041A	2	High Reactive Power L2	Potenza Reattiva L2 Massima	kvar/100000	Signed Long				*
0x041C	2	High Reactive Power L3	Potenza Reattiva L3 Massima	kvar/100000	Signed Long				*
0x041E	2	High Apparent Power L1	Potenza Apparente L1 Massima	kVA/100000	Unsigned Long				*
0x0420	2	High Apparent Power L2	Potenza Apparente L2 Massima	kVA/100000	Unsigned Long				*
0x0422	2	High Apparent Power L3	Potenza Apparente L3 Massima	kVA/100000	Unsigned Long				*
0x0424	2	High Power Factor L1	Power Factor L1 Massimo	/10000	Signed Long				*
0x0426	2	High Power Factor L2	Power Factor L2 Massimo	/10000	Signed Long				*
0x0428	2	High Power Factor L3	Power Factor L3 Massimo	/10000	Signed Long				*
0x0430	2	High Frequency	Frequenza Massima	Hz/1000	Unsigned Long	*	*	*	*
0x0432	2	High Voltage Ln Eqv	Tensione Ln Eqv Massima	V/100	Unsigned Long	*	*	*	
0x0434	2	High Voltage LL Eqv	Tensione LL Eqv Massima	V/100	Unsigned Long	*	*	*	*
0x0436	2	High Current Eqv	Corrente Eqv Massima	A/10000	Unsigned Long				*
0x0438	2	High Active Power Tot	Potenza Attiva Tot Massima	kW/100000	Signed Long				*
0x043A	2	High Reactive Power Tot	Potenza Reattiva Tot Massima	kvar/100000	Signed Long				*
0x043C	2	High Apparent Power Tot	Potenza Apparente Tot Massima	kVA/100000	Unsigned Long				*
0x043E	2	High Power Factor Tot	Power Factor Tot Massimo	/10000	Signed Long				*
0x0440	2	High Vll Unbalance	Asimmetria Vll Massima	V/100	Unsigned Long	*	*	*	*
0x0442	2	High Vln Unbalance	Asimmetria Vln Massima	V/100	Unsigned Long	*	*	*	
0x0444	2	High Current Unbalance	Asimmetria Corrente Massima	A/10000	Unsigned Long				*
0x0600	2	Low Voltage L1	Tensione L1 Minima	V/100	Unsigned Long	*	*	*	
0x0602	2	Low Voltage L2	Tensione L2 Minima	V/100	Unsigned Long	*	*	*	
0x0604	2	Low Voltage L3	Tensione L3 Minima	V/100	Unsigned Long	*	*	*	
0x0606	2	Low Current L1	Corrente L1 Minima	A/10000	Unsigned Long				*
0x0608	2	Low Current L2	Corrente L2 Minima	A/10000	Unsigned Long				*
0x060A	2	Low Current L3	Corrente L3 Minima	A/10000	Unsigned Long				*
0x060C	2	Low Voltage L1L2	Tensione L1L2 Minima	V/100	Unsigned Long	*	*	*	*
0x060E	2	Low Voltage L2L3	Tensione L2L3 Minima	V/100	Unsigned Long	*	*	*	*
0x0610	2	Low Voltage L3L1	Tensione L3L1 Minima	V/100	Unsigned Long	*	*	*	*
0x0612	2	Low Active Power L1	Potenza Attiva L1 Minima	kW/100000	Signed Long				*
0x0614	2	Low Active Power L2	Potenza Attiva L2 Minima	kW/100000	Signed Long				*
0x0616	2	Low Active Power L3	Potenza Attiva L3 Minima	kW/100000	Signed Long				*
0x0618	2	Low Reactive Power L1	Potenza Reattiva L1 Minima	kvar/100000	Signed Long				*
0x061A	2	Low Reactive Power L2	Potenza Reattiva L2 Minima	kvar/100000	Signed Long				*
0x061C	2	Low Reactive Power L3	Potenza Reattiva L3 Minima	kvar/100000	Signed Long				*
0x061E	2	Low Apparent Power L1	Potenza Apparente L1 Minima	kVA/100000	Unsigned Long				*
0x0620	2	Low Apparent Power L2	Potenza Apparente L2 Minima	kVA/100000	Unsigned Long				*
0x0622	2	Low Apparent Power L3	Potenza Apparente L3 Minima	kVA/100000	Unsigned Long				*
0x0624	2	Low Power Factor L1	Power Factor L1 Minimo	/10000	Signed Long				*
0x0626	2	Low Power Factor L2	Power Factor L2 Minimo	/10000	Signed Long				*
0x0628	2	Low Power Factor L3	Power Factor L3 Minimo	/10000	Signed Long				*
0x0630	2	Low Frequency	Frequenza Minima	Hz/1000	Unsigned Long	*	*	*	*
0x0632	2	Low Voltage Ln Eqv	Tensione Ln Eqv Minima	V/100	Unsigned Long	*	*	*	
0x0634	2	Low Voltage Ll Eqv	Tensione Ll Eqv Minima	V/100	Unsigned Long	*	*	*	*
0x0636	2	Low Current Eqv	Corrente Eqv Minima	A/10000	Unsigned Long				*
0x0638	2	Low Active Power Tot	Potenza Attiva Tot Minima	kW/100000	Signed Long				*
0x063A	2	Low Reactive Power Tot	Potenza Reattiva Tot Minima	kvar/100000	Signed Long				*
0x063C	2	Low Apparent Power Tot	Potenza Apparente Tot Minima	kVA/100000	Unsigned Long				*
0x063E	2	Low Power Factor Tot	Power Factor Tot Minimo	/10000	Signed Long				*
0x0640	2	Low Vll Unbalance	Asimmetria Vll Minima	V/100	Unsigned Long	*	*	*	*
0x0642	2	Low Vln Unbalance	Asimmetria Vln Minima	V/100	Unsigned Long	*	*	*	
0x0644	2	Low Current Unbalance	Asimmetria Corrente Minima	A/10000	Unsigned Long				*
0x0800	2	Average Voltage L1	Tensione L1 Media	V/100	Unsigned Long	*	*	*	
0x0802	2	Average Voltage L2	Tensione L2 Media	V/100	Unsigned Long	*	*	*	
0x0804	2	Average Voltage L3	Tensione L3 Media	V/100	Unsigned Long	*	*	*	
0x0806	2	Average Current L1	Corrente L1 Media	A/10000	Unsigned Long				*
0x0808	2	Average Current L2	Corrente L2 Media	A/10000	Unsigned Long				*
0x080A	2	Average Current L3	Corrente L3 Media	A/10000	Unsigned Long				*

Address Indirizzo	Word	Description	Descrizione	Unit Unità	Format Formato	PMVF52	PMVF81	PMVF90	PMVF3000
0x080C	2	Average Voltage L1L2	Tensione L1L2 Media	V/100	Unsigned Long	*	*	*	*
0x080E	2	Average Voltage L2L3	Tensione L2L3 Media	V/100	Unsigned Long	*	*	*	*
0x0810	2	Average Voltage L3L1	Tensione L3L1 Media	V/100	Unsigned Long	*	*	*	*
0x0812	2	Average Active Power L1	Potenza Attiva L1 Media	kW/100000	Signed Long				*
0x0814	2	Average Active Power L2	Potenza Attiva L2 Media	kW/100000	Signed Long				*
0x0816	2	Average Active Power L3	Potenza Attiva L3 Media	kW/100000	Signed Long				*
0x0818	2	Average Reactive Power L1	Potenza Reattiva L1 Media	kvar/100000	Signed Long				*
0x081A	2	Average Reactive Power L2	Potenza Reattiva L2 Media	kvar/100000	Signed Long				*
0x081C	2	Average Reactive Power L3	Potenza Reattiva L3 Media	kvar/100000	Signed Long				*
0x081E	2	Average Apparent Power L1	Potenza Apparente L1 Media	kVA/100000	Unsigned Long				*
0x0820	2	Average Apparent Power L2	Potenza Apparente L2 Media	kVA/100000	Unsigned Long				*
0x0822	2	Average Apparent Power L3	Potenza Apparente L3 Media	kVA/100000	Unsigned Long				*
0x0824	2	Average Power Factor L1	Power Factor L1 Medio	/10000	Signed Long				*
0x0826	2	Average Power Factor L2	Power Factor L2 Medio	/10000	Signed Long				*
0x0828	2	Average Power Factor L3	Power Factor L3 Medio	/10000	Signed Long				*
0x0830	2	Average Frequency	Frequenza Media	Hz/1000	Unsigned Long	*	*	*	*
0x0832	2	Average Voltage Ln Eqv	Tensione Ln Eqv Media	V/100	Unsigned Long	*	*	*	*
0x0834	2	Average Voltage LI Eqv	Tensione LI Eqv Media	V/100	Unsigned Long	*	*	*	*
0x0836	2	Average Current Eqv	Corrente Eqv Media	A/10000	Unsigned Long				*
0x0838	2	Average Active Power Tot	Potenza Attiva Tot Media	kW/100000	Signed Long				*
0x083A	2	Average Reactive Power Tot	Potenza Reattiva Tot Media	kvar/100000	Signed Long				*
0x083C	2	Average Apparent Power Tot	Potenza Apparente Tot Media	kVA/100000	Unsigned Long				*
0x083E	2	Average Power Factor Tot	Power Factor Tot Medio	/10000	Signed Long				*
0x0840	2	Average VII Unbalance	Asimmetria VII Media	V/100	Unsigned Long	*	*	*	*
0x0842	2	Average VIn Unbalance	Asimmetria VIn Media	V/100	Unsigned Long	*	*	*	*
0x0844	2	Average Current Unbalance	Asimmetria Corrente Media	A/10000	Unsigned Long				*
0x0A06	2	Max Demand Current L1	Max Demand Corrente L1	A/10000	Unsigned Long				*
0x0A08	2	Max Demand Current L2	Max Demand Corrente L2	A/10000	Unsigned Long				*
0x0A0A	2	Max Demand Current L3	Max Demand Corrente L3	A/10000	Unsigned Long				*
0x0A0C	2	Max Demand Voltage L1L2	Max Demand Tensione L1L2	V/100	Unsigned Long				*
0x0A0E	2	Max Demand Voltage L2L3	Max Demand Tensione L2L3	V/100	Unsigned Long				*
0x0A10	2	Max Demand Voltage L3L1	Max Demand Tensione L3L1	V/100	Unsigned Long				*
0x0A12	2	Max Demand Active Power L1	Max Demand Potenza Attiva L1	kW/100000	Signed Long				*
0x0A14	2	Max Demand Active Power L2	Max Demand Potenza Attiva L2	kW/100000	Signed Long				*
0x0A16	2	Max Demand Active Power L3	Max Demand Potenza Attiva L3	kW/100000	Signed Long				*
0x0A18	2	Max Demand Reactive Power L1	Max Demand Potenza Reattiva L1	kvar/100000	Signed Long				*
0x0A1A	2	Max Demand Reactive Power L2	Max Demand Potenza Reattiva L2	kvar/100000	Signed Long				*
0x0A1C	2	Max Demand Reactive Power L3	Max Demand Potenza Reattiva L3	kvar/100000	Signed Long				*
0x0A1E	2	Max Demand Apparent Power L1	Max Demand Potenza Apparente L1	kVA/100000	Unsigned Long				*
0x0A20	2	Max Demand Apparent Power L2	Max Demand Potenza Apparente L2	kVA/100000	Unsigned Long				*
0x0A22	2	Max Demand Apparent Power L3	Max Demand Potenza Apparente L3	kVA/100000	Unsigned Long				*
0x0A24	2	Max Demand Power Factor L1	Max Demand Power Factor L1	/10000	Signed Long				*
0x0A26	2	Max Demand Power Factor L2	Max Demand Power Factor L2	/10000	Signed Long				*
0x0A28	2	Max Demand Power Factor L3	Max Demand Power Factor L3	/10000	Signed Long				*
0x0A30	2	Max Demand Frequency	Max Demand Frequenza	Hz/1000	Unsigned Long				*
0x0A34	2	Max Demand Voltage LI Eqv	Max Demand Tensione LI Eqv	V/100	Unsigned Long				*
0x0A36	2	Max Demand Current Eqv	Max Demand Corrente Eqv	A/10000	Unsigned Long				*
0x0A38	2	Max Demand Active Power Tot	Max Demand Potenza Attiva Tot	kW/100000	Signed Long				*
0x0A3A	2	Max Demand Reactive Power Tot	Max Demand Potenza Reattiva Tot	kvar/100000	Signed Long				*
0x0A3C	2	Max Demand Apparent Power Tot	Max Demand Potenza Apparente Tot	kVA/100000	Unsigned Long				*
0x1B20	4	Active Energy - Import	Energia Attiva Importata	kWh/100	Unsigned Long				*
0x1B24	4	Active Energy - Export	Energia Attiva Esportata	kWh/100	Signed Long				*
0x1B28	4	Reactive Energy - Import	Energia Reattiva Importata	kvarh/100	Unsigned Long				*
0x1B2C	4	Reactive Energy - Export	Energia Reattiva Esportata	kvarh/100	Signed Long				*
0x1B30	4	Apparent Energy	Energia Apparente	kVAh/100	Unsigned Long				*
0x1B34	4	Partial Active Energy - Import	Energia Attiva Importata Parziale	kWh/100	Unsigned Long				*
0x1B38	4	Partial Active Energy - Export	Energia Attiva Esportata Parziale	kWh/100	Signed Long				*
0x1B3C	4	Partial Reactive Energy - Import	Energia Reattiva Importata Parziale	kvarh/100	Unsigned Long				*
0x1B40	4	Partial Reactive Energy - Export	Energia Reattiva Esportata Parziale	kvarh/100	Signed Long				*
0x1B44	4	Partial Apparent Energy	Energia Apparente Parziale	kVAh/100	Unsigned Long				*

Address Indirizzo	Word	Description	Descrizione	Unit Unità	Format Formato	PMVF52	PMVF81	PMVF90	PMVF3000
0x1F30 – bit 0	2	OUT1 status	Stato OUT1	/1	Unsigned long	*	*	*	*
0x1F30 – bit 1	2	OUT2 status	Stato OUT2	/1	Unsigned long	*	*	*	*
0x1F30 – bit 2	2	OUT3 status	Stato OUT3	/1	Unsigned long	*	*	*	*
0x1F30 – bit 3	2	OUT4 status	Stato OUT4	/1	Unsigned long	*	*	*	*
0x1F30 – bit 4	2	Digital input status INP6	Stato ingresso digitale INP6	/1	Unsigned long	*	*	*	*
0x1F30 – bit 5	2	Digital input status INP7	Stato ingresso digitale INP7	/1	Unsigned long	*	*	*	*
0x1F30 – bit 6	2	OUT5 status	Stato OUT5	/1	Unsigned long	*	*	*	*
0x1F30 – bit 7	2	IS state	Stato DDI	/1	Unsigned long		*	*	*
0x1F30 – bit 8	2	Global Alarm	Allarme Globale	/1	Unsigned long	*	*	*	*
0x1F30 – bit 9	2	flag trip U>AV (shared with U>)/59.S1	Flag trip U>AV (condiviso con U>)/59.S1	/1	Unsigned long	*	*	*	*
0x1F30 – bit 10	2	Flag trip 59.S2/U>>	Flag trip 59.S2/U>>	/1	Unsigned long	*	*	*	*
0x1F30 – bit 11	2	Flag trip 27.S1/U<	Flag trip 27.S1/U<	/1	Unsigned long	*	*	*	*
0x1F30 – bit 12	2	Flag trip 27.S2/U<<	Flag trip 27.S2/U<<	/1	Unsigned long	*	*	*	*
0x1F30 – bit 13	2	Flag trip FMAX 81.S1/F>	Flag trip FMAX 81.S1/F>	/1	Unsigned long	*	*	*	*
0x1F30 – bit 14	2	Flag trip FMIN 81.S1/F<	Flag trip FMIN 81.S1/F<	/1	Unsigned long	*	*	*	*
0x1F30 – bit 15	2	Flag trip FMAX 81.S2/F>>	Flag trip FMAX 81.S2/F>>	/1	Unsigned long	*	*	*	*
0x1F30 – bit 16	2	Flag trip FMIN 81.S2/F<<	Flag trip FMIN 81.S2/F<<	/1	Unsigned long	*	*	*	*

Address Indirizzo	Word	Description	Descrizione	Unit Unità	Format Formato	PMVF52	PMVF81	PMVF90	PMVF3000
0x1F30 – bit 17	2	Alarm A01	Allarme A01	/1	Unsigned long	*			*
0x1F30 – bit 18	2	Alarm A02	Allarme A02	/1	Unsigned long	*	*	*	*
0x1F30 – bit 19	2	Alarm A03	Allarme A03	/1	Unsigned long	*	*	*	*
0x1F30 – bit 20	2	Alarm A04	Allarme A04	/1	Unsigned long	*	*	*	*
0x1F30 – bit 21	2	Alarm A05	Allarme A05	/1	Unsigned long	*	*	*	*
0x1F30 – bit 22	2	Alarm A06	Allarme A06	/1	Unsigned long	*	*	*	*
0x1F30 – bit 23	2	Alarm A07	Allarme A07	/1	Unsigned long		*	*	*
0x1F30 – bit 24	2	Alarm A08	Allarme A08	/1	Unsigned long				*
0x1F30 – bit 24	2	flag trip ROCOF	flag trip ROCOF	/1	Unsigned long		*	*	
0x1F30 – bit 25	2	flag trip Vector Shift	flag trip Vector Shift	/1	Unsigned long		*	*	
0x1F30 – bit 26	2	flag trip remote trip	flag trip telescatto	/1	Unsigned long		*	*	
0x1F30 – bit 27	2	Digital input status INP1	Stato ingresso digitale INP1	/1	Unsigned long		*	*	
0x1F30 – bit 28	2	Digital input status INP2	Stato ingresso digitale INP2	/1	Unsigned long		*	*	
0x1F30 – bit 29	2	Digital input status INP3	Stato ingresso digitale INP3	/1	Unsigned long	*	*	*	
0x1F30 – bit 30	2	Digital input status INP4	Stato ingresso digitale INP4	/1	Unsigned long	*	*	*	
0x1F30 – bit 31	2	Digital input status INP5	Stato ingresso digitale INP5	/1	Unsigned long	*	*	*	
0x1F30 – bit 4	2	Digital input status INP1	Stato ingresso digitale INP1	/1	Unsigned long				*
0x1F30 – bit 5	2	Digital input status INP2	Stato ingresso digitale INP2	/1	Unsigned long				*
0x1F30 – bit 6	2	Digital input status INP3	Stato ingresso digitale INP3	/1	Unsigned long				*
0x1F30 – bit 7	2	Digital input status INP4	Stato ingresso digitale INP4	/1	Unsigned long				*
0x1F30 – bit 25	2	flag trip ROCOF	flag trip ROCOF	/1	Unsigned long				*
0x1F30 – bit 26	2	flag trip Vector Shift	flag trip Vector Shift	/1	Unsigned long				*
0x1F30 – bit 27	2	OUT5 status	Stato OUT5	/1	Unsigned long				*
0x1F30 – bit 28	2	OUT6 status	Stato OUT6	/1	Unsigned long				*
0x1F30 – bit 29	2	OUT7 status	Stato OUT7	/1	Unsigned long				*
0x1F30 – bit 30	2	OUT8 status	Stato OUT8	/1	Unsigned long				*
0x1F30 – bit 31	2	OUT9 status	Stato OUT9	/1	Unsigned long				*
0x1F32 – bit 0	2	flag trip relay 1 (latched)	flag trip OUT 1 (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 1	2	flag trip relay 2 (latched)	flag trip OUT 2 (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 2	2	flag trip relay 3 (latched)	flag trip OUT 3 (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 3	2	flag trip relay 4 (latched)	flag trip OUT 4 (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 9	2	flag trip U> (latched)	flag trip U> (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 10	2	flag trip U>> (latched)	flag trip U>> (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 11	2	flag trip U< (latched)	flag trip U< (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 12	2	flag trip U<< (latched)	flag trip U<< (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 13	2	flag trip F> (latched)	flag trip F> (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 14	2	flag trip F< (latched)	flag trip F< (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 15	2	flag trip F>> (latched)	flag trip F>> (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 16	2	flag trip F<< (latched)	flag trip F<< (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 24	2	flag trip ROCOF (latched)	flag trip ROCOF (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 25	2	flag trip Vector Shift (latched)	flag trip Vector Shift (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 26	2	flag trip relay 5 (latched)	flag trip OUT 5 (memorizzato)	/1	Unsigned long		*		
0x1F32 – bit 0	2	OUT10 status	Stato OUT10	/1	Unsigned long				*
0x1F32 – bit 1	2	Digital input status INP5	Stato ingresso digitale INP5	/1	Unsigned long				*
0x1F32 – bit 2	2	Digital input status INP6	Stato ingresso digitale INP6	/1	Unsigned long				*
0x1F32 – bit 3	2	Digital input status INP7	Stato ingresso digitale INP7	/1	Unsigned long				*
0x1F32 – bit 4	2	Digital input status INP8	Stato ingresso digitale INP8	/1	Unsigned long				*
0x1F40	2	Trip counter IS	Contatore soglia DDI	/1	Unsigned long		*		*
0x1F42	2	Trip counter U<<	Contatore soglia U<<	/1	Unsigned long		*		*
0x1F44	2	Trip counter U<	Contatore soglia U<	/1	Unsigned long		*		*
0x1F46	2	Trip counter U>>	Contatore soglia U>>	/1	Unsigned long		*		*
0x1F48	2	Trip counter U>	Contatore soglia U>	/1	Unsigned long		*		*
0x1F4A	2	Trip counter F<<	Contatore soglia F<<	/1	Unsigned long		*		*
0x1F4C	2	Trip counter F>>	Contatore soglia F>>	/1	Unsigned long		*		*
0x1F4E	2	Trip counter F<	Contatore soglia F<	/1	Unsigned long		*		*
0x1F50	2	Trip counter F>	Contatore soglia F>	/1	Unsigned long		*		*
0x1F52	2	Trip counter Backup	Contatore Rincalzo	/1	Unsigned long		*		*
0x1F54	2	Trip counter remote trip	Contatore Telescatto	/1	Unsigned long		*		*
0x1F56	2	IS open time counter (seconds)	Contatore DDI aperto (secondi)	/1	Unsigned long		*		*
0x1F58	2	Trip counter ROCOF	Contatore soglia ROCOF	/1	Unsigned long		*		*
0x1F5A	2	Trip counter Vector Shift	Contatore soglia Vector Shift	/1	Unsigned long		*		*
0x1F5C	2	IP switch on counter	Contatore accensioni SPI	/1	Unsigned long		*		*

Notes

- Flags stay active for the same time they are at display.
- Address 0x1F30: bit counting starts from bit 0 as the least significant bit (LSB).
- Address 0x1F32: bit counting starts from bit 0 as the least significant bit (LSB). Bits are reset by sending the following command: address 0x1F32, function 0x06, length 1, value 1 or by switching off and on the device.

Note

- I flag rimangono attivi per lo stesso tempo in cui sono mostrati a display.
- Indirizzo 0x1F30: il conteggio dei bit inizia dal bit 0 come bit meno significativo (LSB).
- Indirizzo 0x1F32: il conteggio dei bit inizia dal bit 0 come bit meno significativo (LSB). I bit sono resettati mandando il comando seguente: indirizzo 0x1F32, funzione 0x06, lunghezza 1, valore 1 o spegnendo e riaccendendo il dispositivo.

Address Indirizzo	Word	Description	Descrizione	Unit Unità	Format Formato	PMVF52	PMVF81	PMVF90	PMVF3000
0x1FF0	2	Serial number	Numero di serie	/1	Unsigned long	*	*	*	*
0x2100	1	Input 1 (bit 0) - 8 (bit 7)	Ingresso 1 (bit 0) - 8 (bit 7)	/1	Unsigned Int	*	*	*	*
0x2110	1	Output 1 (bit 0) - 10 (bit 9)	Uscita 1 (bit 0) - 10 (bit 9)	/1	Unsigned Int	*	*	*	*

PARAMETERS SETUP
FUNCTION 0x06 – 0x10

The parameters are read and modified according to the following rules.

IMPOSTAZIONE PARAMETRI
FUNZIONI 0x06 – 0x10

I parametri vengono letti e modificati applicando la seguente regola.

Address Indirizzo	Word	Meaning Significato	Function Funzione	Example Esempio
0x5000	1	Menu number selection Selezione numero menu	0x04 read 0x06 write	Write value 1 to select the menu number 1 Per selezionare il menu 1 scrivere il valore 1

Address Indirizzo	Word	Meaning Significato	Function Funzione	Example Esempio
0x5001	1	Submenu number selection Selezione numero sottomenu	0x04 read 0x06 write	Write value 4 to select the submenu number 4. If the submenu number is not required, write 0. Per selezionare il sottomenu 4 scrivere il valore 4. Se il sottomenu non è presente, scrivere 0.
0x5002	1	Parameter number selection Selezione numero parametro	0x04 read 0x06 write	Write value 2 to select the parameter number 2 Per selezionare il parametro 2 scrivere il valore 2
0x5004	1...28	Parameter value Valore parametro	0x04 read 0x06 write 0x10 multi-write	
0x2F03	1	Save to flash memory Salvataggio in memoria	0x06 write	Value=5 Valore=5

Example: language setting from menu M02 – Utility, P02.01

Menu 02: 01 06 4F FF 00 02 2E EF
Submenu: not necessary
Parameter P02.01 (Language): 01 06 50 01 00 01 08 CA
Parameter value (Language=English): 01 06 50 03 00 00 68 CA
Save
01 06 2F 02 00 05 E0 DD
The device saves and reboots (no response modbus protocol message will be received).

COMMANDS
FUNCTION 0x06

Esempio: impostazione lingua dal menu M02 – Utilità, P02.01

Menu 02: 01 06 4F FF 00 02 2E EF
Sottomenu: non necessario
Parametro P02.01 (Lingua): 01 06 50 01 00 01 08 CA
Valore parametro (Lingua=Inglese): 01 06 50 03 00 00 68 CA
Salvataggio
01 06 2F 02 00 05 E0 DD
Il dispositivo effettua il salvataggio dei parametri ed esegue il reboot (non si riceve nessuna risposta da modbus).

COMANDI
FUNZIONE 0x06

Address Indirizzo	Word	Value Valore	Format Formato	Description	Descrizione	PMVF52	PMVF81	PMVF90	PMVF3000
0x2FF0	1	0x00	Unsigned int	Reset MAX-MIN	Azzeramento MAX-MIN	•	•	•	•
0x2FF0	1	0x01	Unsigned int	Reset trip counters	Azzeramento contatori trip	•	•	•	
0x2FF0	1	0x0C	Unsigned int	Setup to default	Ripristino parametri a default	•		•	
0x2FF0	1	0x0D	Unsigned int	Backup parameters	Backup parametri	•		•	
0x2FF0	1	0x0E	Unsigned int	Restore backup parameters	Ripristino parametri	•		•	
0x2FF0	1	0x0F	Unsigned int	27<.S2 threshold test	Collaudo soglia 27<.S2	•			
0x2FF0	1	0x10	Unsigned int	Autotest	Autotest	•			
0x2FF0	1	0x11	Unsigned int	Reset event list	Azzeramento lista eventi	•			
0x2FF0	1	0x12	Unsigned int	Alarms inhibition	Inibizione allarmi	•			
0x2FF0	1	0x0C	Unsigned int	Setup to default P≤ 50 kW	Ripristino parametri a default P≤ 50 kW		•		
0x2FF0	1	0x0D	Unsigned int	Setup to default P> 50 kW	Ripristino parametri a default P> 50 kW		•		
0x2FF0	1	0x0E	Unsigned int	Setup to default Table 11 VDE-AR-N 4110	Ripristino parametri a default tabella 11 VDE-AR-N 4110		•		
0x2FF0	1	0x0F	Unsigned int	Setup to default Table 13 VDE-AR-N 4110	Ripristino parametri a default tabella 13 VDE-AR-N 4110		•		
0x2FF0	1	0x10	Unsigned int	Setup to default Table 7 of VDE-AR-N 4120	Ripristino parametri a default tabella 7 VDE-AR-N 4120		•		
0x2FF0	1	0x11	Unsigned int	Setup to default Table 8 of VDE-AR-N 4120	Ripristino parametri a default tabella 8 VDE-AR-N 4120		•		
0x2FF0	1	0x12	Unsigned int	Setup to default EEA-NE7	Ripristino parametri a default EEA-NE7		•		
0x2FF0	1	0x13	Unsigned int	Setup to default VFR2019	Ripristino parametri a default VFR2019		•		
0x2FF0	1	0x23	Unsigned int	Backup parameters	Backup parametri		•		
0x2FF0	1	0x24	Unsigned int	Restore backup parameters	Ripristino parametri		•		
0x2FF0	1	0x25	Unsigned int	Inhibition U>UMAX	Inibizione U>UMAX		•		
0x2FF0	1	0x26	Unsigned int	Inhibition U<UMAX	Inibizione U<UMAX		•		
0x2FF0	1	0x27	Unsigned int	Autotest	Autotest		•		
0x2FF0	1	0x28	Unsigned int	Reset event list	Azzeramento lista eventi		•		
0x2FF0	1	0x29	Unsigned int	Alarms inhibition	Inibizione allarmi		•		
0x2FF0	1	0x0F	Unsigned int	Inhibition U>>UMAX	Inibizione U>>UMAX			•	
0x2FF0	1	0x10	Unsigned int	Inhibition U>UMAX	Inibizione U>UMAX			•	
0x2FF0	1	0x11	Unsigned int	Inhibition U<UMAX	Inibizione U<UMAX			•	
0x2FF0	1	0x12	Unsigned int	Autotest	Autotest			•	
0x2FF0	1	0x13	Unsigned int	Reset event list	Azzeramento lista eventi			•	
0x2FF0	1	0x14	Unsigned int	Alarms inhibition	Inibizione allarmi			•	
0x2FF0	1	0x01	Unsigned int	Reset MAX demand	Azzeramento MAX demand				•
0x2FF0	1	0x02	Unsigned int	Reset counters	Azzeramento contatori				•
0x2FF0	1	0x03	Unsigned int	Reset partial energy counters	Azzeramento contatori di energia parziali				•
0x2FF0	1	0x04	Unsigned int	Reset energy counters	Azzeramento contatori di energia				•
0x2FF0	1	0x05	Unsigned int	Setup to default	Ripristino parametri a default				•
0x2FF0	1	0x06	Unsigned int	Backup parameters	Backup parametri				•
0x2FF0	1	0x07	Unsigned int	Restore backup parameters	Ripristino parametri				•
0x2FF0	1	0x08	Unsigned int	Reset event list	Azzeramento lista eventi				•
0x2FF0	1	0x09	Unsigned int	Autotest	Autotest				•
0x2FF0	1	0x0A	Unsigned in	TEST E.5.2.3 - 59.S1 Moving average	TEST E.5.2.3 - 59.S1 Media mobile				•
0x2FF0	1	0x0B	Unsigned in	TEST E.5.2.4 - 59.S2	TEST E.5.2.4 - 59.S2				•
0x2FF0	1	0x0C	Unsigned in	TEST E.5.2.5 - 27.S1	TEST E.5.2.5 - 27.S1				•
0x2FF0	1	0x0D	Unsigned in	TEST E.5.2.5 - 27.S2	TEST E.5.2.5 - 27.S2				•
0x2FF0	1	0x0E	Unsigned in	TEST E.5.2.6 - 81>S1	TEST E.5.2.6 - 81>S1				•
0x2FF0	1	0x0F	Unsigned in	TEST E.5.2.6 - 81>S2	TEST E.5.2.6 - 81>S2				•
0x2FF0	1	0x10	Unsigned in	TEST E.5.2.7 - 81<S1	TEST E.5.2.7 - 81<S1				•
0x2FF0	1	0x11	Unsigned in	TEST E.5.2.7 - 81<S2	TEST E.5.2.7 - 81<S2				•
0x2FF0	1	0x12	Unsigned in	TEST E.5.2.8 - 59V0A	TEST E.5.2.8 - 59V0A				•
0x2FF0	1	0x13	Unsigned in	TEST E.5.2.8 - 59V0B	TEST E.5.2.8 - 59V0B				•
0x2FF0	1	0x14	Unsigned in	TEST E.5.2.9 - 59.VI	TEST E.5.2.9 - 59.VI				•
0x2FF0	1	0x15	Unsigned in	TEST E.5.2.10 - 27.VD	TEST E.5.2.10 - 27.VD				•
0x2FF0	1	0x16	Unsigned in	TEST E.5.2.11 - 81.V	TEST E.5.2.11 - 81.V				•
0x2FF0	1	0x17	Unsigned in	TEST E.5.2.12 - Remote tripping	TEST E.5.2.12 - teleseccato				•
0x2FF0	1	0x18	Unsigned in	TEST E.5.2.13 - Exclusion	TEST E.5.2.13 - Esclusione				•
0x2FF0	1	0x19	Unsigned in	TEST E.5.2.14 - 0.2s	TEST E.5.2.14 - 0.2s				•