

User manual for the
MODBUS TCP INTERFACE
DELPHYS MP & elite - DELPHYS MX & elite

UPS/NTA GB/MODBUS TCP.A

31/10/2006

FOREWORD

We thank you for the trust you have in Socomec Sicon's Uninterruptible Power Systems.

This equipment is fitted with up to date technology and power semiconductors (IGBT) including a digital micro-controller.

Our equipment complies with standard IEC EN 62040-2.

CAUTION: "This is a product for restricted sales distribution to informed partners. Installation restrictions or additional measures may be needed to prevent disturbances".

SOCOMECSICON UPS reserves the right to make any changes to data without prior notice.

SAFETY REQUIREMENTS

Using conditions:

Do read carefully this manual before using.

Whatever the repairs, they must be made only by authorised staffs which have been suitably trained.

UPS using conditions

Respect the safety requirements.

Do read carefully the operating instructions of the UPS prior to any intervention.

For an optimal operation, it is recommended to maintain the ambient temperature and humidity of the UPS environment below the values specified by the manufacturer.

This equipment meets the requirements of the European directives applied to this product. As a consequence, it is labelled as follows:



ENVIRONMENT CONCERNED REGULATION

Recycling of electrical products and equipment

Provision is made in European countries to break up and recycle materials making up the system. The various components must be disposed of in accordance with the legal provisions in force in the country where the system is installed.

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1. INTRODUCTION

General

DELPHYS MX and **DELPHYS MP** equipment can be provided with a *MODBUS TCP* type interface for direct UPS connection to the Ethernet.

This manual describes the features of the connection as well as the data available through the network.

Ethernet Interface

The interface proposes 2 types of connection:

- the « real port » mode, for which the host detects the communication as a standard serial port.
- the full TCP mode as per specifications « *modbus-ida* ».

This document does not describe the way the MODBUS TCP protocol is managed. For further details, please visit the official website www.modbus-ida.org. A summary of IDA specifications can be found at the end of the document.

The MODBUS TCP protocol for **DELPHYS MX** and **MP** equipment uses *Input Registers -3-* with a 16 bit coding for data reading and *Write single Registers -6-* for UPS management.

The data field is composed of words with a most significant byte (MSB) and a less significant byte (LSB) read as follows:

DATA (WORD)			
MSB		LSB	
b7	b0	b7	b0
b15			b0

Data decoding

Binary data

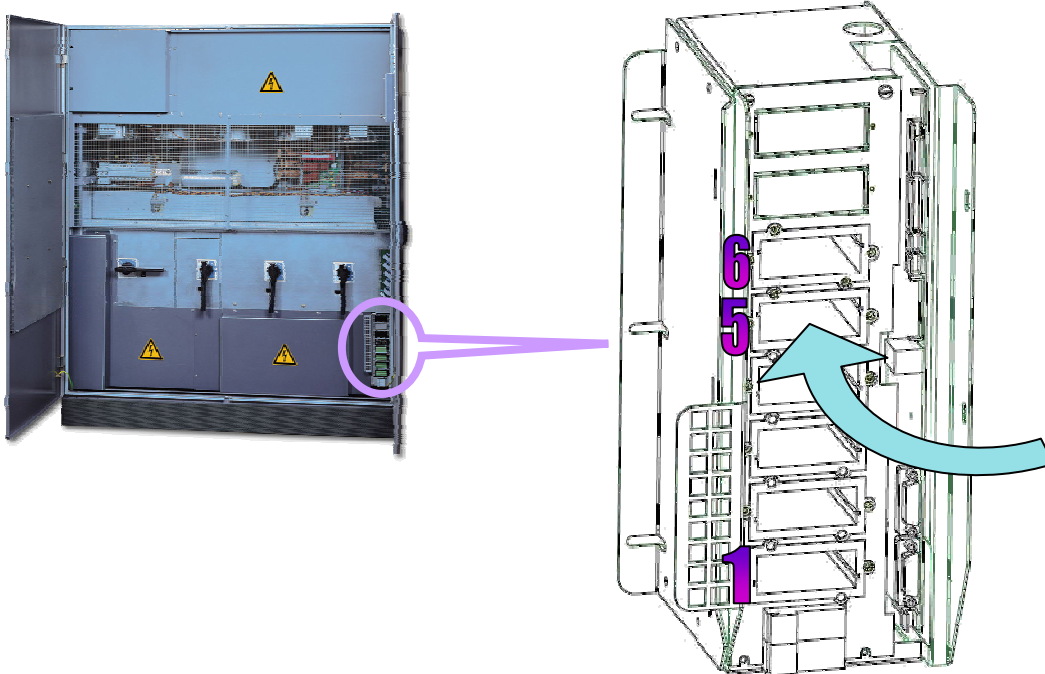
They consist of the status and alarms of the UPS. Each bit of each word corresponds to a data. When set at 1 in a word, the bit means the status or alarm is active.

Analogue data (measurement and counter data)

They consist of a 16-bit word. Some values are expressed in decimals bearing a sign or not (i.e. 0 to 65535 or -32767 to 32767) or in hexadecimal coding (0x0000 to 0xFFFF).

2. INSTALLATION OF THE MODBUS TCP PCB

Location of the com-slots



The « com-slots » includes all communication interfaces and is located in the lower right corner of the UPS. Slots 5 and 6 are dedicated to MODBUS TCP interfaces. Slots 1 to 4 are used for alarm transfer PCBs (ADC) including 3 input and 4 output data that are settable.

Installation of the MODBUS TCP interface

The interface must first be installed in the appropriate slot and fastened to the « com-slots » using 2 screws. **DELPHYS MX** and **DELPHYS MP** can include 2 independent MODBUS TCP interfaces.

JBUS interface in a parallel system



There is only one MODBUS TCP interface in a parallel system. It is not necessary to add an interface in the « com-slots » of the UPS units or modules. Data related to modules or UPS units can be accessed using a specific addressing ¹.

¹ Please refer to section 5

Setting by default of the serial connection (compulsory step)

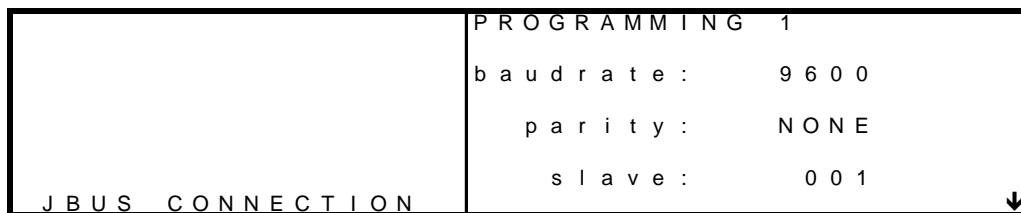
Baudrate: 9600 bauds
 Parity: none
 Data: 8 bits
 Stop: 1 bit
 Slave: 1

Serial connection parameters are programmed using the control panel or the graphic touch screen. **If this function can not be accessed, default parameters are then used.**



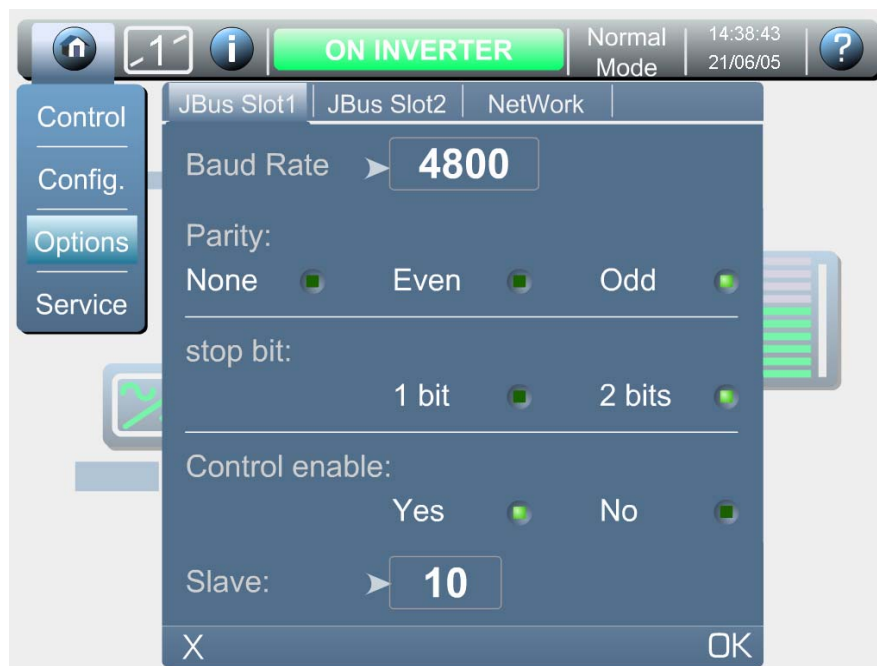
The connection must be set as conditions mentioned above. If need be, the configuration can be modified through the user interface.

Configuration screen of the control panel



Select the appropriate field using the ENTER key. It is also used for accessing the configuration of the second connection. Parameters are selected using the upward and downward scrolling keys.

Configuration screen of the graphic touch screen:



Parameters of MODBUS TCP 1 are affected to the interface installed in slot 5.
 Parameters of MODBUS TCP 2 are affected to the interface installed in slot 6.



The activation of serial connections is programmed by the Servicing department during UPS commissioning or PCB installation.

Description of LEDs

Yellow LED RJ45:	ON:	Line detected
	Blinking:	Searching line (If any WiFi option)
	OFF:	No ETHERNET line
Green LED RJ45:	ON:	No traffic
	OFF:	MODBUS TCP Traffic
	Blinking:	
Interface green LED TX	ON:	when transmitting data
Interface green LED RX	ON:	when receiving data
LED 5V iso	Interface live	

Features

IEEE 802.3
 10/100Base-T
 10/100Mbps (auto sensing)
 mode Half-duplex & Full-duplex (auto sensing)
 RJ-45

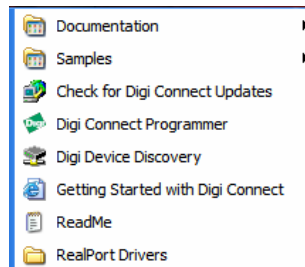
3. DEFAULT SETTING OF THE MODBUS TCP INTERFACE

Default setting

DHCP mode by default. No IP address set by default
 Mode MODBUS TCP
 Port TCP 502

Configuration software

Configuration tools are to be installed on a PC with WINDOWS. The setup programme is on the CD provided with the interface. A new programme group has been created.



Searching the UPSs connected to the Ethernet

The utility program « *Digi Device Discovery* » is for viewing the IP and MAC addresses of each UPS.

Accessing http pages

Data related to connection and module setting can be accessed using the web interface. The « home page » can be opened either by means of the « *Discovery* » utility or the Internet browser by selecting the IP address indicated by the « *Discovery* » utility.

Access to pages is protected by a « login » and a password.

Login by default: `root`

Password: `dbps`

Downloading firmware

By default the module is programmed with the firmware for the MODBUS TCP function.

In case of « real port » mode, the firmware on the CD must first be downloaded.

For any other configurations, please refer to the DIGI® manual available on the CD.

4. MODBUS TCP DATA MAP IN A SINGLE UNIT

General data map

§	DATA MAP	Start register		Length in words	JBUS Function
		Hexa	Decimal		
1	UPS Identification	0x1000	4096	12	function 3 (reading)
2	Date and time of UPS	0x1360	4960	4	function 3 (reading)
3	UPS configurations	0x10E0	4320	32	function 3 (reading)
4	Status (96 bits)	0x1020	4128	6	function 3 (reading)
5	Alarms (64 bits)	0x1040	4160	4	function 3 (reading)
6	Measurements	0x1060	4192	48	function 3 (reading)
7	Commands Permission	0x15C0	5568	2	function 3 (reading)
8	Commands	0x15B0	5552	1	6 write register

How to read data:

Identification, status and alarm data maps must be read completely (start register and length in words).

Measurement data map can be read word by word or by set of words, but without exceeding the length of the data map (from 0x1060 to 0x108F).

Incoming data structure:

Example with 6 words											
1	2	3	4	5	6	7	8	9	10	11	12
MSB 0	LSB 0	MSB 1	LSB 1	MSB 2	LSB 2	MSB 3	LSB 3	MSB 4	LSB 4	MSB 5	LSB 5
WORD 0		WORD 1		WORD 2		WORD 3		WORD 4		WORD 5	
b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀
S15	S00	S31	S16	S47	S32	S63	S48	S79	S64	S95	S80
A15	A00	A31	A16	A47	A32	A63	A48				
M00		M01		M02		M03		M04		M05	

(Snn index of status, Ann index of alarms, Mnn index of measurements)

'Concentrator Mode' in a parallel system

The MODBUS TCP data map above can also be used in a parallel system. Binary data of each module or UPS unit are indeed combined to get a "virtual" single system. Logic combination 'OR' is used except for data S00, S05, S15, A02, A07 and A31 that are defined in a different way depending on the redundancy conditions of the parallel system

Binary data	Logic combination in a redundant system	Logic combination in a non redundant system
S00	OR	AND
S05	AND	OR
S15	AND	OR
A02	AND	OR
A07	AND	OR
A31	AND	OR

UPS IDENTIFICATION: Start register 0x1000, 12 word reading

CODE	DESCRIPTION	Number of words	ADDRESS	Data type	Comments
I00	UPS CODE	1 word	0x1000	Digital value	515 = DELPHYS MX 516 = DELPHYS MX elite
I01	UPS power	1 word	0x1001	Digital value	In kVA * 10 5000 for a 500kVA UPS
I02	Number of module	1 word	0x1002	Digital value	1
I03	Serial number over 10 characters	5 words	0x1003	1 word = 2 ASCII codes	LSB = 1 st character MSB = 2 nd character Code of origin:CCCCCAaYYYYXXXXXXXXNn Code read:aXXXXXXXXNn
I04	Not used	1 word	0x1008	0 by default	
I05	Not used	1 word	0x1009	0 by default	
I06	Not used	1 word	0x100A	0 by default	
I07	Not used	1 word	0x100B	0 by default	

DATE & TIME OF THE UPS: Start register 0x1360, 4 word reading

CODE	DESCRIPTION	Number of words	ADDRESS	Type	Comments
D00	Minutes / seconds	1	0x1360	Byte value	MSB = minutes LSB = seconds
D01	Hours / day	1	0x1361	Byte value	MSB = day LSB = hours
D02	Month / day of the week	1	0x1362	Byte value	MSB = month LSB = day of the week 1=Monday 7=Sunday
D03	Year	1	0x1363	Direct value	00 = 2000

UPS CONFIGURATION: Start register 0x10E0, 32 word reading

Code	DESCRIPTION	Unit	ADDRESS	COMMENTS
T00	Nominal start input voltage	V	0x10E0	
T01	Nominal start output voltage	V	0x10E1	
T02	Nominal input frequency	Hz	0x10E2	
T03	Nominal output frequency	Hz	0x10E3	
T04	Version	whole* 100	0x10E4	100 = V1.00
T05			0x10E5	
T06			0x10E6	
T07			0x10E7	
T08	Nominal battery capacity	Ah * 10	0x10E8	3000 = 300Ah
T09	Number of battery elements		0x10E9	
T10	Reserved		0x10EA	Value set at 0xFFFF (-1)
T11	Reserved		0x10EB	Value set at 0xFFFF (-1)
T12	Reserved		0x10EC	
T13	Working mode	Bit field	0x10ED	b0 = not used b1 = with battery b2 = Gen Set present b3 = 'energy saver' enabled
T14	Redundancy level	value	0x10EE	0 = without 1 = N+1
T15	Reserved		0x10EF	100
T16	Reserved		0x10F0	Value set at 0xFFFF (-1)
..				
T31			0x10FF	

STATUS DATA MAP: Start register 0x1020, 6 word reading

CODE	DESCRIPTION	BIT	ADDRESS	COMMENTS
S00	Rectifier input supply ON	0	0x1020	
S01	Inverter ON	1	0x1020	
S02	Rectifier ON	2	0x1020	
S03	Load protected by inverter	3	0x1020	
S04	Load on automatic bypass	4	0x1020	
S05	Load on battery	5	0x1020	
S06	Remote controls disabled	6	0x1020	0 = controls enabled
S07	Eco-mode ON	7	0x1020	if function available
S08		8	0x1020	
S09		9	0x1020	
S10		10	0x1020	
S11		11	0x1020	
S12		12	0x1020	
S13	Battery test programming enabled	13	0x1020	
S14	Battery test failed	14	0x1020	
S15	Battery discharged	15	0x1020	IMMINENT stop and end of back up time
S16	Battery near end of back up time	0	0x1021	
S17	Battery OK	1	0x1021	No alarm and battery circuit closed
S18		2	0x1021	
S19		3	0x1021	
S20		4	0x1021	
S21		5	0x1021	
S22		6	0x1021	
S23		7	0x1021	
S24		8	0x1021	
S25		9	0x1021	
S26	Bypass input supply ON	10	0x1021	
S27	Battery charge activated	11	0x1021	
S28	Rectifier input frequency out of tolerance	12	0x1021	
S29		13	0x1021	Set at 1
S30	UPS in parallel configuration	14	0x1021	Set at 0 in single systems
S31		15	0x1021	
S32	Unit operating (available or connected)	0	0x1022	
S33		1	0x1022	
S34		2	0x1022	
S35		3	0x1022	
S36		4	0x1022	
S37		5	0x1022	
S38	Auxiliary input 1 activated	6	0x1022	IN1 ADC PCB slot 1 or 2
S39	Auxiliary input 2 activated	7	0x1022	IN2 ADC PCB slot 1 or 2
S40	Auxiliary input 3 activated	8	0x1022	IN3 ADC PCB slot 1 or 2
S41	Auxiliary input 4 activated	9	0x1022	IN1 ADC PCB slot 3
S42	Commands control table	10	0x1022	At 1
S43		11	0x1022	
S44		12	0x1022	
S45		13	0x1022	
S46	Operating on Emergency Get	14	0x1022	
S47		15	0x1022	
S48	Maintenance mode activated	0	0x1023	
S49	End of first maintenance period	1	0x1023	
S50		2	0x1023	
S51		3	0x1023	
S52		4	0x1023	
S53		5	0x1023	
S54		6	0x1023	
S55		7	0x1023	
S56		8	0x1023	
S57		9	0x1023	
S58		10	0x1023	
S59		11	0x1023	
S60		12	0x1023	
S61		13	0x1023	
S62		14	0x1023	
S63		15	0x1023	

.../...

.../...

CODE	DESCRIPTION	BIT	ADDRESS	COMMENTS
S64	Boost charge ON	0	0x1024	
S65		1	0x1024	
S66	Inverter switch closed	2	0x1024	
S67	Bypass breaker closed	3	0x1024	
S68	Maintenance bypass breaker closed	4	0x1024	
S69	General maintenance bypass breaker closed	5	0x1024	
S70	Output breaker closed	6	0x1024	
S71	Q21 closed	7	0x1024	
S72	Q22 closed	8	0x1024	
S73	Unit operating	9	0x1024	Either on inv or bypass
S74		10	0x1024	
S75		11	0x1024	
S76	Normal Mode ON	12	0x1024	No Eco-mode or 'energy-saver'
S77		13	0x1024	
S78		14	0x1024	
S79		15	0x1024	
S80		0	0x1025	
S81		1	0x1025	
S82		2	0x1025	
S83		3	0x1025	
S84		4	0x1025	
S85		5	0x1025	
S86		6	0x1025	
S87		7	0x1025	
S88		8	0x1025	
S89		9	0x1025	
S90		10	0x1025	
S91		11	0x1025	
S92		12	0x1025	
S93		13	0x1025	
S94		14	0x1025	
S95		15	0x1025	

Status with no description are not managed by **DELPHYS MX**.

ALARM DATA MAP: Start register 0x1040, 4 word reading

CODE	DESCRIPTION	BIT	ADDRESS	COMMENTS
A00	General alarm	0	0x1040	Activated if at least one alarm is present
A01	Battery failure	1	0x1040	battery failure, technical plant, circuit open
A02	UPS overload	2	0x1040	
A03				
A04	Control failure (electronic, com, supply...)	4	0x1040	Critical alarm ctrl PCB
A05	Rectifier input supply out of tolerance	5	0x1040	
A06	Bypass input supply out of tolerance	6	0x1040	
A07	Temperature out of tolerance	7	0x1040	Ambient temperature
A08	Maintenance bypass closed	8	0x1040	Q5 closed
A09		9	0x1040	
A10	Battery charger failure	10	0x1040	
A11		11	0x1040	
A12		12	0x1040	
A13		13	0x1040	
A14		14	0x1040	
A15		15	0x1040	
A16		0	0x1041	
A17	Improper condition of use (maintenance BYP alarm)	1	0x1041	Q3 and Q5 closed
A18	Overload timeout blocking inverter	2	0x1041	Imminent stop and overload
A19	Microprocessor control system failure	3	0x1041	Prev alarm ctrl PCB
A20		4	0x1041	
A21	PLL fault	5	0x1041	ACS source fault
A22	Rectifier input supply fault	6	0x1041	
A23	Rectifier general alarm	7	0x1041	Rotation, ventil, temp.
A24		8	0x1041	
A25	Inverter general alarm	9	0x1041	Ventil., temp., sensor
A26	Battery charger general alarm	10	0x1041	
A27		11	0x1041	
A28		12	0x1041	
A29	Bypass general alarm	13	0x1041	Ventil, temp
A30		14	0x1041	
A31	Imminent stop	15	0x1041	
A32	General alarm Unit 1	0	0x1042	
A33		1	0x1042	
A34		2	0x1042	
A35		3	0x1042	
A36		4	0x1042	
A37		5	0x1042	
A38	External alarm	6	0x1042	Alarm to be set
A39		7	0x1042	
A40		8	0x1042	
A41		9	0x1042	
A42	e-Service	10	0x1042	NOT AVAILABLE
A43		11	0x1042	
A44	Servicing alarm	12	0x1042	
A45	Automatic and manual transfer disabled	13	0x1042	
A46	Automatic transfer disabled	14	0x1042	
A47	Battery room alarm	15	0x1042	
A48	Maintenance bypass alarm	0	0x1043	
A49	Battery discharged	1	0x1043	
A50		2	0x1043	
A51	Synoptic and options general alarm	3	0x1043	
A52	Rectifier fault - critical alarm	4	0x1043	
A53		5	0x1043	
A54	Inverter fault - critical alarm	6	0x1043	
A55		7	0x1043	
A56		8	0x1043	
A57		9	0x1043	
A58	ESD activated	10	0x1043	
A59	Battery circuit open	11	0x1043	
A60		12	0x1043	
A61		13	0x1043	
A62	By-pass fault	14	0x1043	
A63		15	0x1043	

Alarms with no description are not managed by **DELPHYS MX**.

MEASUREMENT DATA MAP: Start register 0x1060, 48 word reading

Code	Description	Unit	ADDRESS	COMMENTS
M00	Output load rate phase 1	%	0x1060	
M01	Output load rate phase 2	%	0x1061	Value set at 0xFFFF if single-phase
M02	Output load rate phase 3	%	0x1062	Value set at 0xFFFF if single-phase
M03	UPS load rate	%	0x1063	
M04	Battery capacity	%	0x1064	
M05	Battery capacity	Ah*10	0x1065	
M06	Bypass input voltage phase 1	V	0x1066	
M07	Bypass input voltage phase 2	V	0x1067	Value set at 0xFFFF if single-phase
M08	Bypass input voltage phase 3	V	0x1068	Value set at 0xFFFF if single-phase
M09	Output voltage phase 1	V	0x1069	
M10	Output voltage phase 2	V	0x106A	Value set at 0xFFFF if single-phase
M11	Output voltage phase 3	V	0x106B	Value set at 0xFFFF if single-phase
M12			0x106C	Value set at 0xFFFF (-1)
M13			0x106D	Value set at 0xFFFF (-1)
M14			0x106E	Value set at 0xFFFF (-1)
M15	Output current phase 1	A*10	0x106F	
M16	Output current phase 2	A*10	0x1070	Value set at 0xFFFF if single-phase
M17	Output current phase 3	A*10	0x1071	Value set at 0xFFFF if single-phase
M18	Bypass input frequency	Hz*10	0x1072	
M19	Output frequency	Hz*10	0x1073	
M20	Positive battery voltage (+)	V*10	0x1074	
M21	Negative battery voltage (-)	V*10	0x1075	Value set at 0
M22	Internal temperature	°C	0x1076	Ambient temperature
M23	Remaining back up time	Minutes	0x1077	Calculated when operating from the battery
M24	Battery current	+/- A*10	0x1078	
M25			0x1079	Value set at 0xFFFF (-1)
M26			0x107A	Value set at 0xFFFF (-1)
M27			0x107B	Value set at 0xFFFF (-1)
M28	Positive rectifier voltage (+)	V	0x107C	
M29	Negative rectifier voltage (-)	V	0x107D	Value set at 0
M30			0x107E	Value set at 0xFFFF (-1)
M31			0x107F	Value set at 0xFFFF (-1)
M32			0x1080	Value set at 0xFFFF (-1)
M33	Rectifier input voltage phase 1	V	0x1081	
M34	Rectifier input voltage phase 2	V	0x1082	
M35	Rectifier input voltage phase 3	V	0x1083	
M36	UPS output power	kW*10	0x1084	
M37	Output apparent power ph1	kVA*10	0x1085	
M38	Output apparent power ph2	kVA*10	0x1086	Value set at 0xFFFF if single-phase
M39	Output apparent power ph3	kVA*10	0x1087	Value set at 0xFFFF if single-phase
M40			0x1088	Value set at 0xFFFF (-1)
M41			0x1089	Value set at 0xFFFF (-1)
M42			0x108A	Value set at 0xFFFF (-1)
M43			0x108B	
M44			0x108C	
M45			0x108D	
M46			0x108E	
M47			0x108F	

CONTROL PERMISSION DATA MAP: Start register 0x15C0, 2 word reading

CODE	DESCRIPTION	BIT	ADDRESS	COMMENTS
C00		0		
C01		1		
C02		2		
C03	Eco-mode enabled	3	0x15C0	
C04	normal Mode enabled	4	0x15C0	
C05		5		
C06		6		
C07		7		
C08		8		
C09		9		
C10	Automatic Bypass transfer enabled	10	0x15C0	
C11	Inverter transfer enabled	11	0x15C0	
C12		12		
C13		13		
C14		14		
C15		15		
C16	Battery test enabled	0	0x15C1	
C17		1		
C18		2		
C19		3		
C20		4		
C21		5		
C22		6		
C23		7		
C24		8		
C25		9		
C26		10		
C27		11		
C28		12		
C29		13		
C30		14		
C31		15		

SENDING CONTROLS TO THE UPS: Write register at the address 0x15B0

Function 6 is used to send controls to the UPS.

Before sending any remote control to the UPS, the serial interface must be set in 'remote' mode using the device/user interface; Local controls on the control panel or on the graphic touch screen are no more accessible.

The list of controls below is for checking if the control selected is possible or not. If the control is sent to the UPS while not enabled, the system will ignore it.

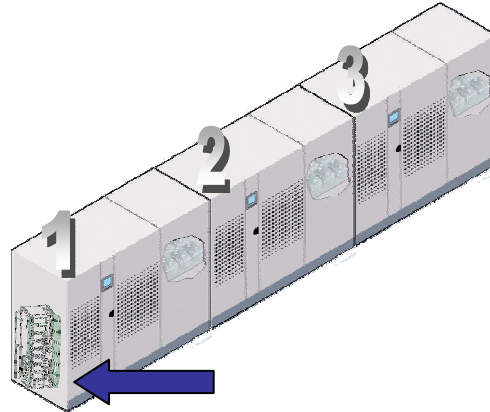
List of controls available

Code	Control	Value	ADDRESS	COMMENTS
C03	Eco-mode	0x0003	0x15B0	
C04	Normal mode	0x0004	0x15B0	
C10	Automatic bypass transfer	0x000A	0x15B0	
C11	Inverter transfer	0x000B	0x15B0	
C16	Battery test	0x0010	0x15B0	

5. MODBUS TCP DATA MAP IN PARALLEL SYSTEMS

Reminder

In a parallel system, there is only one MODBUS TCP interface. Access to data specific to each module or UPS unit is determined by the addresses indicated in the 2 following tables. The interface is located in the 'com-slots' of the central cabinet (CC) for a central bypass system or in the 'com-slots' of unit 1 for a modular system (see figure below).



How to read data:

The identification, status and alarm data map must be read completely (start register and length in word).

The measurement data map can be read word by word or by set of words without exceeding the length of the data map. (from 0x60 to 0x8F).

Incoming data structure:

Example of 6 words - 12 bytes											
1	2	3	4	5	6	7	8	9	10	11	12
MSB 0	LSB 0	MSB 1	LSB 1	MSB 2	LSB 2	MSB 3	LSB 3	MSB 4	LSB 4	MSB 5	LSB 5
WORD 0		WORD 1		WORD 2		WORD 3		WORD 4		WORD 5	
b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀	b ₁₅	b ₀
S15	S00	S31	S16	S47	S32	S63	S48	S79	S64	S95	S80
A15	A00	A31	A16	A47	A32	A63	A48				
M00		M01		M02		M03		M04		M05	

(Snn index of status, Ann index of alarms, Mnn index of measurements)

JBUS data map in a central bypass system (CC)

DATA MAP	Start register	Word length	JBUS function
UPS identification	0x8000	12	function 3 (reading)
UPS configurations	0x80E0	32	function 3 (reading)
Date and time of UPS	0x8360	4	function 3 (reading)
Status CC (96 bits)	0x8020	6	function 3 (reading)
Alarms CC (64 bits)	0x8040	4	function 3 (reading)
Measurements CC	0x8060	48	function 3 (reading)
Status module 1 (96 bits)	0x2020	6	function 3 (reading)
Alarms module 1 (64 bits)	0x2040	4	function 3 (reading)
Measurements module 1	0x2060	48	function 3 (reading)
Status module 2 (96 bits)	0x3020	6	function 3 (reading)
Alarms module 2 (64 bits)	0x3040	4	function 3 (reading)
Measurements module 2	0x3060	48	function 3 (reading)
Status module 3 (96 bits)	0x4020	6	function 3 (reading)
Alarms module 3 (64 bits)	0x4040	4	function 3 (reading)
Measurements module 3	0x4060	48	function 3 (reading)
Status module 4 (96 bits)	0x5020	6	function 3 (reading)
Alarms module 4 (64 bits)	0x5040	4	function 3 (reading)
Measurements module 4	0x5060	48	function 3 (reading)
Status module 5 (96 bits)	0x6020	6	function 3 (reading)
Alarms module 5 (64 bits)	0x6040	4	function 3 (reading)
Measurements module 5	0x6060	48	function 3 (reading)
Status module 6 (96 bits)	0x7020	6	function 3 (reading)
Alarms module 6 (64 bits)	0x7040	4	function 3 (reading)
Measurements module 6	0x7060	48	function 3 (reading)
Control permission	0x15C0	2	function 3 (reading)
Controls	0x15B0	1	6 write register

JBUS data map in a modular system

DATA MAP	Start register	Word length	JBUS function
UPS identification	0x1000	12	function 3 (reading)
UPS configurations	0x10E0	32	function 3 (reading)
Date and time of UPS	0x1360	4	function 3 (reading)
System output measurements	0x8060	48	function 3 (reading)
Status module 1 (96 bits)	0x2020	6	function 3 (reading)
Alarms module 1 (64 bits)	0x2040	4	function 3 (reading)
Measurements module 1	0x2060	48	function 3 (reading)
Status module 2 (96 bits)	0x3020	6	function 3 (reading)
Alarms module 2 (64 bits)	0x3040	4	function 3 (reading)
Measurements module 2	0x3060	48	function 3 (reading)
Status module 3 (96 bits)	0x4020	6	function 3 (reading)
Alarms module 3 (64 bits)	0x4040	4	function 3 (reading)
Measurements module 3	0x4060	48	function 3 (reading)
Status module 4 (96 bits)	0x5020	6	function 3 (reading)
Alarms module 4 (64 bits)	0x5040	4	function 3 (reading)
Measurements module 4	0x5060	48	function 3 (reading)
Status module 5 (96 bits)	0x6020	6	function 3 (reading)
Alarms module 5 (64 bits)	0x6040	4	function 3 (reading)
Measurements module 5	0x6060	48	function 3 (reading)
Status module 6 (96 bits)	0x7020	6	function 3 (reading)
Alarms module 6 (64 bits)	0x7040	4	function 3 (reading)
Measurements module 6	0x7060	48	function 3 (reading)

UPS IDENTIFICATION: Start register 0x1000 or 0x8000, 12 word reading

CODE	DESCRIPTION	Number of WORDS	ADDRESS	Type	Comments
I00	UPS CODE	1 word	0x1000	Digital value	1018 = DELPHYS MX MODULAR 1019 = DELPHYS MX // common by-pass 1020 = DELPHYS MX elite modular 1021 = DELPHYS MX elite // by-pass
I01	UPS Power	1 word	Digital value	Digital value	In kVA * 10 8000 for a 800kVA system
I02	Module number	1 word	0x1002	Digital value	Depends on the address
I03	Serial number (10 characters)	5 words	0x1003	1 word = 2 ASCII codes	LSB = 1 st character MSB = 2 nd character The code includes part of the last 10 characters of the serial number displayed
I04	Not used	1 word	0x1008	At 0 by default	
I05	Not used	1 word	0x1009	At 0 by default	
I06	Not used	1 word	0x100A	At 0 by default	
I07	Not used	1 word	0x100B	At 0 by default	

DATE & TIME OF THE UPS: Start register 0x1360 or 0x8360, 4 word reading

CODE	DESCRIPTION	Number of words	Addresses	Type	Comments
D00	Minutes / seconds	1	0x1360	Byte value	MSB = minutes LSB = seconds
D01	Hours / day	1	0x1361	Byte value	MSB = day LSB = hours
D02	Month / day of week	1	0x1362	Byte value	MSB = month LSB = day of the week 1=Monday 7=Sunday
D03	year	1	0x1363	Direct value	00 = 2000

UPS CONFIGURATION: Start register 0x10E0 or 0x80E0, 32 word reading

Code	DESCRIPTION	Unit	ADDRESS	COMMENTS
T00	Nominal start input voltage	V	0x10E0	
T01	Nominal start output voltage	V	0x10E1	
T02	Nominal input frequency	Hz	0x10E2	
T03	Nominal output frequency	Hz	0x10E3	
T04	Version	whole* 100	0x10E4	100 = V1.00
T05			0x10E5	
T06			0x10E6	
T07			0x10E7	
T08	Nominal battery capacity	Ah * 10	0x10E8	3000 = 300Ah
T09	Number of battery elements		0x10E9	
T10	Not used		0x10EA	Value set at 0xFFFF (-1)
T11	Not used		0x10EB	Value set at 0xFFFF (-1)
T12	Not used		0x10EC	
T13	Working mode	Bit field	0x10ED	b0 = auto start enabled b1 = with battery b2 = Gen Set present b3 = 'energy saver' enabled
T14	Redundancy level	value	0x10EE	0 = without 1 = N+1
T15	Not used		0x10EF	100
T16	Not used		0x10F0	Value set at 0xFFFF (-1)
..				
T31			0x10FF	

Comments



In the following MODBUS TCP data map, only the less significant byte is mentioned, knowing that the most significant byte of the address depends on the number of the module or UPS unit.

Symbol 'x' in the corresponding columns, i.e central bypass 'CC', 'Module' or 'Unit' indicates if the information is available on the equipment (Unit means UPS unit in a parallel modular system).

Please refer to §4.4 for further details on each status.

STATUS DATA MAP: Start register 0x20, 6 word reading

CODE	DESCRIPTION	BIT	LSB	CC	Module	Unit
S00	Rectifier input supply ON	0	0x20		X	X
S01	Inverter ON	1	0x20		X	X
S02	Rectifier ON	2	0x20		X	X
S03	Load protected by inverter	3	0x20	X	X	X
S04	Load on automatic bypass	4	0x20	X		X
S05	Load on battery	5	0x20		X	X
S06	Remote controls disabled	6	0x20			X
S07	Eco-mode ON ²	7	0x20	X	X	X
S08		8	0x20			
S09		9	0x20			
S10		10	0x20		X	X
S11		11	0x20			
S12		12	0x20			
S13		13	0x20			
S14	Battery test failed	14	0x20		X	X
S15	Battery discharged	15	0x20		X	X
S16	Battery near end of back up time	0	0x21		X	X
S17	Battery OK	1	0x21		X	X
S18		2	0x21			
S19		3	0x21			
S20		4	0x21			
S21		5	0x21			
S22		6	0x21			
S23	Inverter synchronised with bypass input	7	0x21	X		X
S24	Charger ON	8	0x21		X	X
S25	Not used	9	0x21			
S26	Bypass input supply ON	10	0x21	X		X
S27	Battery charge activated	11	0x21		X	X
S28	Rectifier input frequency out of tolerance	12	0x21		X	X
S29		13	0x21			
S30	UPS in parallel configuration	14	0x21	X	X	X
S31		15	0x21			
S32	Unit 1 operating	0	0x22	X		X
S33	Unit 2 operating	1	0x22	X		X
S34	Unit 3 operating	2	0x22	X		X
S35	Unit 4 operating	3	0x22	X		X
S36	Unit 5 operating	4	0x22	X		X
S37	Unit 6 operating	5	0x22	X		X
S38	Auxiliary input 1 activated	6	0x22	X	X	X
S39	Auxiliary input 2 activated	7	0x22	X	X	X
S40	Auxiliary input 3 activated	8	0x22	X	X	X
S41	Auxiliary input 4 activated	9	0x22			
S42	Commands control table	10	0x22	X	X	X
S43		11	0x22			
S44	Contract e-Service activated	12	0x22			
S45	Automatic report e-Service activated	13	0x22			
S46	Operating on Emergency Get	14	0x22	X	X	X
S47		15	0x22			

.../...

² If available

.../...

CODE	DESCRIPTION	BIT	low ADDRESS	CC	Module	Unit
S48	Maintenance mode activated	0	0x23	X	X	X
S49	End of first maintenance period	1	0x23			
S50	Not used	2	0x23			
S51	Not used	3	0x23			
S52	Not used	4	0x23			
S53	Not used	5	0x23			
S54	Not used	6	0x23			
S55	Not used	7	0x23			
S56	Not used	8	0x23			
S57	Not used	9	0x23			
S58	Not used	10	0x23			
S59	Not used	11	0x23			
S60	Not used	12	0x23			
S61	Not used	13	0x23			
S62	Not used	14	0x23			
S63	Not used	15	0x23			
S64	Boost charge ON	0	0x24		X	X
S65	ACS* synchronisation reference	1	0x24	X		X
S66	Inverter switch closed	2	0x24		X	X
S67		3	0x24			
S68	Maintenance bypass breaker closed	4	0x24	X		X
S69	General maintenance bypass breaker closed	5	0x24	X		X
S70	Output breaker closed	6	0x24	X	X	X
S71	Q21 closed	7	0x24		X	X
S72	Q22 closed	8	0x24		X	X
S73	Unit operating	9	0x24		X	X
S74	Mode 'energy saver' activated*	10	0x24	X	X	X
S75		11	0x24			
S76	Mode normal activated	12	0x24	X	X	X
S77	Not used	13	0x24			
S78	Not used	14	0x24			
S79	Not used	15	0x24			
S80	Not used	0	0x25			
S81	Not used	1	0x25			
S82	Not used	2	0x25			
S83	Not used	3	0x25			
S84	Not used	4	0x25			
S85	Not used	5	0x25			
S86	Not used	6	0x25			
S87	Not used	7	0x25			
S88	Not used	8	0x25			
S89	Not used	9	0x25			
S90	Not used	10	0x25			
S91	Not used	11	0x25			
S92	Not used	12	0x25			
S93	Not used	13	0x25			
S94	Not used	14	0x25			
S95	Not used	15	0x25			

* if function is available

ALARMS: Start register 0x40, 4 word reading

CODE	DESCRIPTION	BIT	LSB	CC	Module	Unit
A00	General alarm	0	0x40	X	X	X
A01	Battery failure	1	0x40		X	X
A02	UPS overload	2	0x40	X	X	X
A03						
A04	Control failure (electronic, com, supply...)	4	0x40	X	X	X
A05	Rectifier input supply out of tolerance	5	0x40	X	X	X
A06	Bypass input supply out of tolerance	6	0x40	X		X
A07	Temperature out of tolerance	7	0x40	X	X	X
A08	Maintenance bypass closed	8	0x40	X		X
A09						
A10						
A11						
A12						
A13						
A14						
A15						
A16						
A17	Improper condition of use (maintenance BYP alarm)	1	0x41	X		X
A18	Overload timeout blocking inverter	2	0x41		X	X
A19	Microprocessor control system failure - preventive alarm	3	0x41	X	X	X
A20						
A21	PLL fault	5	0x41	X		X
A22	Rectifier input supply fault	6	0x41	X		X
A23	Rectifier general alarm - preventive alarm	7	0x41		X	X
A24						
A25	Inverter general alarm - preventive alarm	9	0x41		X	X
A26	Battery charger general alarm	10	0x41		X	X
A27					X	X
A28						
A29	Bypass general alarm - preventive alarm	13	0x41	X	X	X
A30						
A31	Imminent stop	15	0x41	X	X	X
A32	General alarm Unit 1	0	0x42	X		X
A33	General alarm Unit 2	1	0x42	X		X
A34	General alarm Unit 3	2	0x42	X		X
A35	General alarm Unit 4	3	0x42	X		X
A36	General alarm Unit 5	4	0x42	X		X
A37	General alarm Unit 6	5	0x42	X		X
A38	External alarm	6	0x42	X	X	X
A39						
A40						
A41						
A42	General alarm E-Service*	10	0x42			
A43	Loss of redundancy *	11	0x42	X		X
A44	Servicing alarm	12	0x42			
A45	Automatic and manual transfer disabled	13	0x42	X		X
A45	Automatic transfer disabled	14	0x42	X		X
A47	Battery room alarm	15	0x42		X	X
A48	Maintenance bypass alarm	0	0x43	X		X
A49	Battery discharged	1	0x43		X	X
A50	Insufficient resources	2	0x43	X		X
A51	Synoptic and options general alarm	3	0x43			
A52	Rectifier fault - critical alarm	4	0x43		X	X
A53						
A54	Inverter fault - critical alarm	6	0x43		X	X
A55						
A56						
A57						
A58	ESD activated	10	0x43	X	X	X
A59	Battery circuit open	11	0x43		X	X
A62	By-pass fault - critical alarm	14	0x43	X	X	X

For further details, please refer to the data map of a single unit (§1.5)

* If the function is available

MEASUREMENT DATA MAP: Start register 0x60, 48 word reading

Code	Description	Unit	low ADDRESS	COMMENTS
M00	Output load rate phase 1	%	0x60	
M01	Output load rate phase 2	%	0x61	Value set at 0xFFFF if single-phase
M02	Output load rate phase 3	%	0x62	Value set at 0xFFFF if single-phase
M03	UPS load rate	%	0x63	
M04	Battery capacity	%	0x64	
M05	Battery capacity	Ah*10	0x65	
M06	Bypass input voltage phase 1	V	0x66	
M07	Bypass input voltage phase 2	V	0x67	Value set at 0xFFFF if single-phase
M08	Bypass input voltage phase 3	V	0x68	Value set at 0xFFFF if single-phase
M09	Output voltage phase 1	V	0x69	
M10	Output voltage phase 2	V	0x6A	Value set at 0xFFFF if single-phase
M11	Output voltage phase 3	V	0x6B	Value set at 0xFFFF if single-phase
M12			0x6C	Value set at 0xFFFF (-1)
M13			0x6D	Value set at 0xFFFF (-1)
M14			0x6E	Value set at 0xFFFF (-1)
M15	Output current phase 1	A*10	0x6F	
M16	Output current phase 2	A*10	0x70	Value set at 0xFFFF if single-phase
M17	Output current phase 3	A*10	0x71	Value set at 0xFFFF if single-phase
M18	Bypass input frequency	Hz*10	0x72	
M19	Output frequency	Hz*10	0x73	
M20	Positive battery voltage (+)	V*10	0x74	
M21	Negative battery voltage (-)	V*10	0x75	Value set at 0
M22	Internal temperature	°C	0x76	
M23	Remaining back up time	Minutes	0x77	
M24	Battery current	+/- A*10	0x78	
M25			0x79	
M26			0x7A	
M27			0x7B	
M28	Positive rectifier voltage (+)	V	0x7C	
M29	Negative rectifier voltage (-)	V	0x7D	Value set at 0
M30		V	0x7E	
M31		V	0x7F	
M32			0x80	Value set at 0xFFFF (-1)
M33	Rectifier input voltage phase 1	V	0x81	
M34	Rectifier input voltage phase 2	V	0x82	Value set at 0xFFFF if single-phase
M35	Rectifier input voltage phase 3	V	0x83	Value set at 0xFFFF if single-phase
M36	UPS output power	kW*10	0x84	
M37	Output apparent power ph1	kVA*10	0x85	
M38	Output apparent power ph2	kVA*10	0x86	Value set at 0xFFFF if single-phase
M39	Output apparent power ph3	kVA*10	0x87	Value set at 0xFFFF if single-phase
M40			0x88	Value set at 0xFFFF (-1)
M41			0x89	Value set at 0xFFFF (-1)
M42			0x8A	Value set at 0xFFFF (-1)
M43			0x8B	
M44			0x8C	
M45			0x8D	
M46			0x8E	
M47			0x8F	

Rectifier and battery measurements are not available in the data map of the central bypass cabinet.

CONTROL PERMISSION DATA MAP: Start register 0x15C0, 2 word reading

CODE	DESCRIPTION	BIT	ADDRESS	COMMENTS
C00		0		
C01		1		
C02		2		
C03	Eco-mode enabled	3	0x15C0	
C04	Mode normal enabled	4	0x15C0	
C05		5		
C06		6		
C07		7		
C08		8		
C09		9		
C10	Transfer to automatic by-pass enabled	10	0x15C0	
C11	Transfer to inverter enabled	11	0x15C0	
C12		12		
C13		13		
C14		14		
C15		15		
C16	Battery test module 1 enabled	0	0x25C1	
C16	Battery test module 2 enabled	0	0x35C1	
C16	Battery test module 3 enabled	0	0x45C1	
C16	Battery test module 4 enabled	0	0x55C1	
C16	Battery test module 5 enabled	0	0x65C1	
C16	Battery test module 6 enabled	0	0x75C1	

SENDING OF COMMANDS TO THE UPS: write register at the address 0x15B0

Function 6 is used to send controls to the UPS.

Before controlling the UPS, the serial interface must be set in remote mode using the user/device interface. Local controls on the control panel or on the graphic touch screen are no more accessible.

The control data map of controls makes it possible to check if the control selected is enabled or not. If not enabled and sent to the UPS, the control is ignored and not executed by the system.

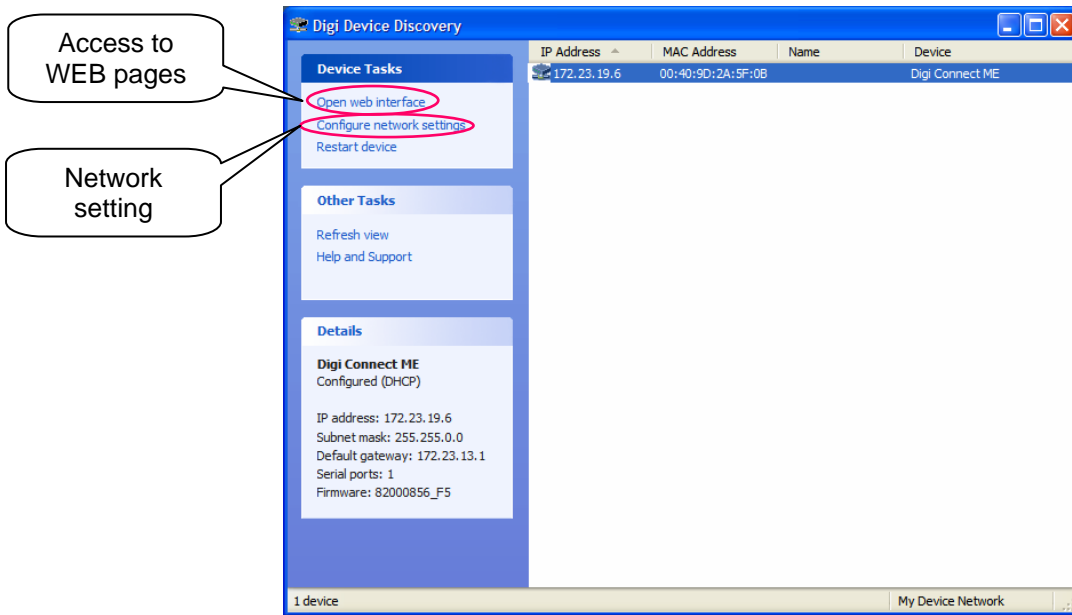
Controls are intended for the whole system - which explains why address 0x15B0 is used, with the exception of the battery test control which is specific to each module or UPS unit.

List of controls available

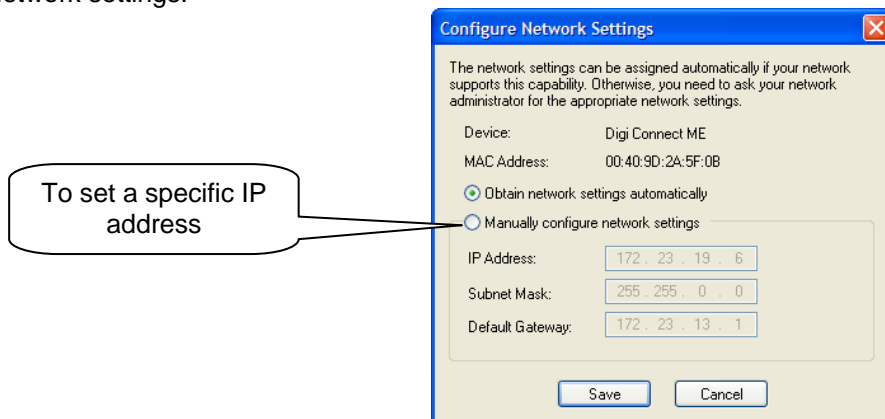
Code	Control	Write register	ADDRESS	COMMENTS
C03	Eco-mode	0x0003	0x15B0	
C04	Normal mode	0x0004	0x15B0	
C10	Automatic bypass transfer	0x000A	0x15B0	
C11	Inverter transfer	0x000B	0x15B0	
C16	Battery test module 1	0x0010	0x25B0	
C16	Battery test module 2	0x0010	0x35B0	
C16	Battery test module 3	0x0010	0x45B0	
C16	Battery test module 4	0x0010	0x55B0	
C16	Battery test module 5	0x0010	0x65B0	
C16	Battery test module 6	0x0010	0x75B0	

ANNEXE 1: SETTING OF THE INTERFACE USING DIGI DEVICE DICOVERY³

Search window for UPSs connected to the network

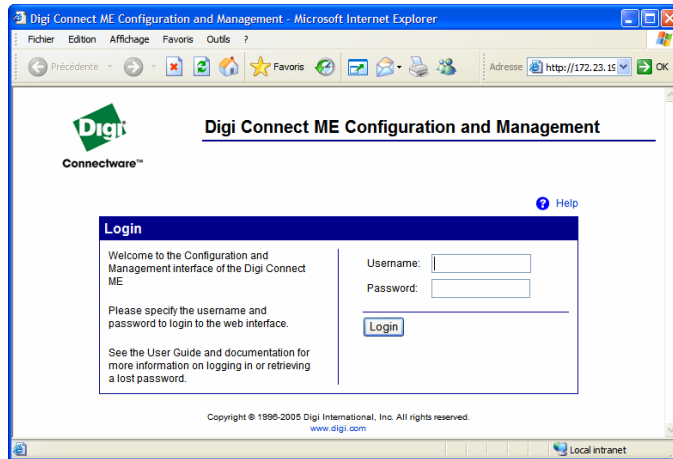


Network settings:



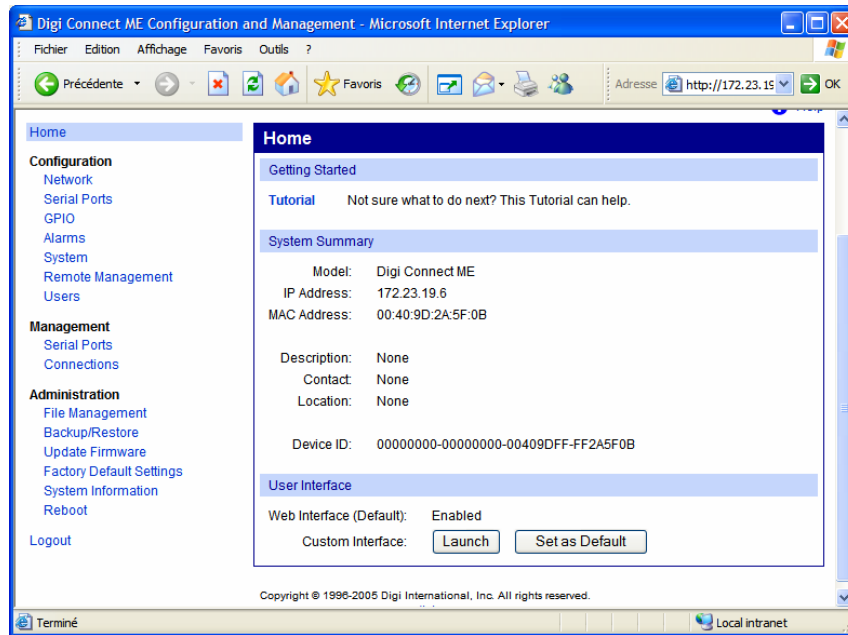
³ Digi is a registered brand.

Access to HTTP pages

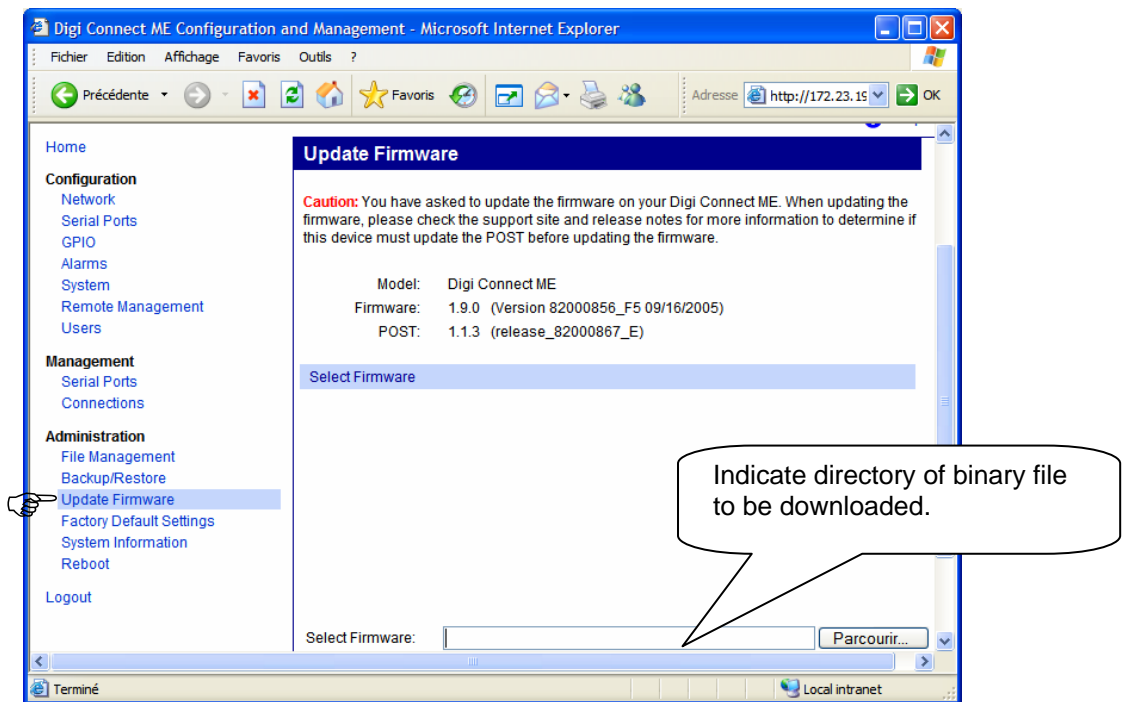


Login: root
 Password: dbps

Home Page:



Updating of the firmware:



Version of firmware:

MODBUS TCP: 82001164.bin

REAL PORT: 82000856_F5.bin

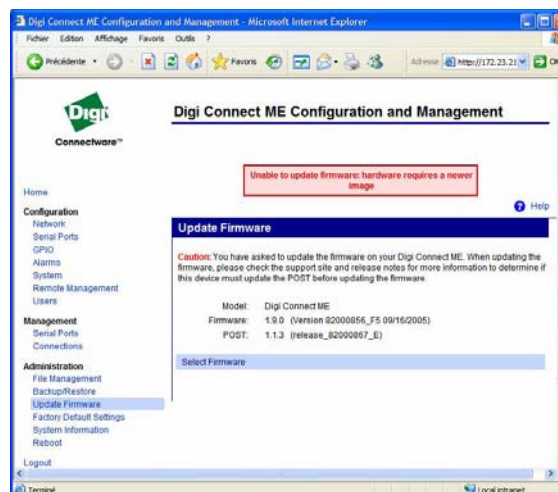
Click on

[Help](#) opens an on-line help window and a link to DIGI site if necessary.

After completing the downloading process, click on Reboot.
Wait for at least 1 minute before trying to access the interface.

Problem during downloading process:

If the following screen appears during downloading, it is necessary to download the POST version of the firmware (available on the CD) as well as the firmware.



ANNEXE 2: MODBUS TCP IDA specification

The JBUS frames below are only examples:

REQUEST BY MASTER IN MODE JBUS/MODBUS RTU

Original frame: 01 03 1034 0003 40C5
 Encapsulated frame: **0046 0000 0006** 01 03 1034 0003

where:

0046 corresponds to the transaction number
 0000 corresponds to the protocol identifier
 0006 corresponds to the number of bytes (length of the message)

Note:

The CRC is suppressed in the encapsulated JBus frame.

REPLY OF THE UPS IN MODE JBUS/MODBUS RTU:

Original frame: 01 03 06 0002 0184 0000 1960
 Encapsulated frame: **0046 0000 0009** 01 03 06 0002 0184 0000

where:

0046 corresponds to the transaction number
 0000 corresponds to the protocol identifier
 0006 corresponds to the number of bytes (length of the message)

Note:

The CRC is suppressed in the encapsulated JBus frame.