JBUS/MODBUS

Manuel d'installation et d'utilisation FR

Installation and operating manual GB

socomec

Innovative Power Solutions

INTRODUCTION

Thank you for choosing a SOCOMEC product.

This equipment is fitted with up to date technology. The rectifier and inverter subsets are provided with 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.

SOCOMEC reserves the right to modify their specifications at any time as far as this contributes to technical progress.

SUMMARY

1. JBUS

1.1. REQUIREMENTS

SAFETY

- Conditions of use

  Please read these operation instructions carefully before using the JBUS/MODBUS interface.

  Any repairs must be made only by suitably qualified and authorized staff. Maintaining the ambient temperature and humidity of the UPS environment below the values specified by the manufacturer is recommended.

- UPS operating reference.

  Follow the safety requirements.

  Please read the UPS installation and operating manual carefully.

  Maintaining the ambient temperature and humidity of the UPS environment below the values specified by the manufacturer is recommended for optimum operation.

  This equipment meets the requirements of the European directives applied to this product, and is labeled to this effect.

ENVIRONMENT

- 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 should be disposed of in accordance with the legal provisions in force in the country where the system is installed.

1.2. PRESENTATION

This document is for reference purposes of the customer who intends to design products that must communicate and comply with the UPS range.

INTRODUCTION

This document describes the SOCOMEC protocol that has been adopted to communicate with all communication products, such as Supervisor, etc.

The protocol is embedded in SOCOMEC's equipment so that the same driver can be used in all products. This document describes the MODBUS addresses and tables of contents for SOCOMEC.

COMMUNICATION LAYERS

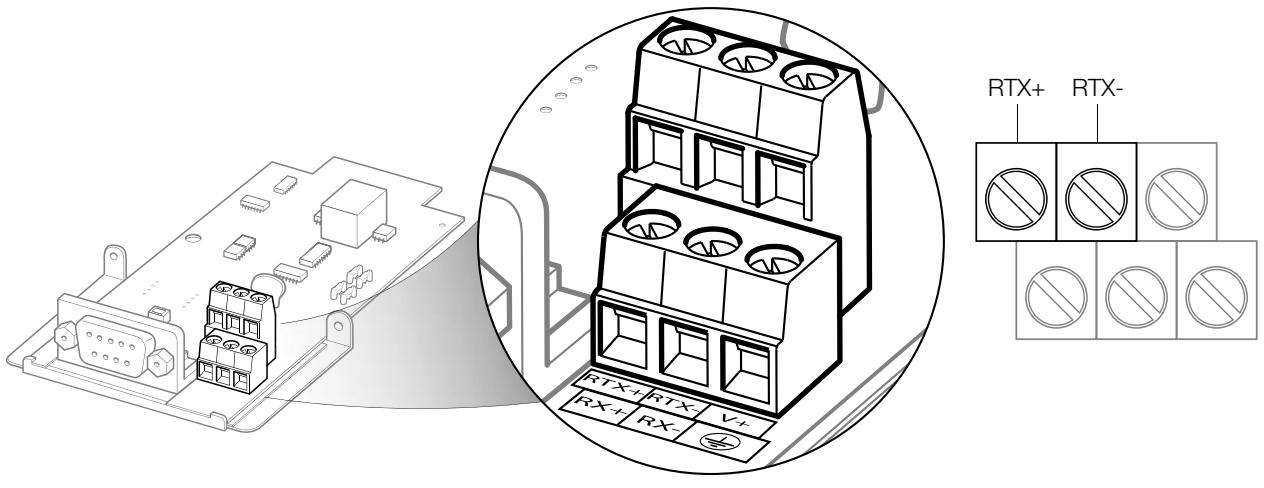
- Applications:
  - NET VISION
  - Building Management System
  - And all SCADA systems
- Data table:
  - FIXED
- Address specification:
  - PUBLIC DATA
  - JBUS-P
- Jbus Transport Protocol
- Hardware interface:

  NETYS UPS range
  - RS232 DB9 connector

  ITYS UPS range
  - RS232 DB9 connector

  MASTERYS UPS range
  - RS232 DB9 connector (JBUSP)
  - RS485 optional board (see figure below)
  - MODBUS TCP-IDA optional board (see chapter 'MODBUS TCP FOR MASTERYS')

1.2-1



RTX+ / RTX- wires: 0.20 mm² min./120 ohms resistor

1.3. JBUS GENERAL PURPOSE

INTRODUCTION

JBUS/MODBUS is a Master/Slaves protocol, in which the UPS is one of the slave. The Master sends a request to a slave, the slave sends the data or an ACK to the Master. For more information or documentation on the MODBUS protocol, please visit the official MODBUS website: www.modbus.org

GENERAL MESSAGE FORMAT

SLAVE NUMBER (1 byte)	Specifies the destination node
FUNCTION CODE (1 byte)	Specifies a READ or WRITE data command
DATA FIELD	Information to read or write data (Address, value, number of data...)
CONTROL WORD (CRC16) (2 bytes, 1 word)	Algorithm calculation of each data

JBUS FUNCTIONS.

READ WORD: code function 0x03
WRITE 1 WORD: code function 0x06 (used for command)
WRITE SEVERAL WORDS: code function 0x010 (used for configuration)

Remark:
1 Address = 16 bits or 1 Word (LSB and MSB)

JBUS FUNCTION DESCRIPTION

OUTPUT VOLTAGE CONFIGURATION MENU

Master request: 8 bytes

Slave number	Function READ	Address High	Address Low	0	N° of words to read	CRC low	CRC high
x01	x03	x02	x50	0	x0A		

Example: request to slave number 1, the data (10 words) beginning at 0x0250 (Address).

Slave Message:

Slave number	Function READ N°	N° of bytes	First Data High	First Data Low	Next data	CRC low	CRC high
x01	0x03	x14	x0A	x04	.....		

Example: the first Data at 0x0250 is xA04, in decimal format: (10*256) + 4 = 2564

FUNCTION 0X06

This function is used to send a command to the slave.

Slave number	Function WRITE	Address High	Address Low	Data to write High	Data to write Low	CRC low	CRC high
x01	0x06	x00	x20	x00	x01		

Example: Write the data 01 to Address 0x0020.

The slave sends the same message if no, error has occurred.

Note: If the slave number is 0, all slaves execute the command, without sending message.

FUNCTION 0X10

This function is used to write configurations (several words) to a slave..

Slave number	Funct. write word	first Addr. High	fist Addr. Low	Blank	N° of words	N° of bytes to write	1. Data to write High	1. Data to write Low	Next data	CRC low	CRC high
x01	0x10	x00	x40	x00	x05	x0A	x00	x32	.....		

Example: Write 5 words beginning Address 0x0040 to slave 1. The first data is x32.

Slave Message:

Slave number	Function write word	Address High	Address Low	Blank	N° of words	CRC low	CRC high
x01	0x10	x00	x40	x00	x05		

ACKNOWLEDGEMENT OF END OF DATA PACKAGE

A time-out equal to a value of 10* character transmission time indicates that the data package is finished (the CRC has been sent).

ERROR MESSAGES

A slave sends an error message in the following cases:

- Bad JBUS function
- Bad Address to read or write
- Bad length data to read or write (number of words too large)

Error message:

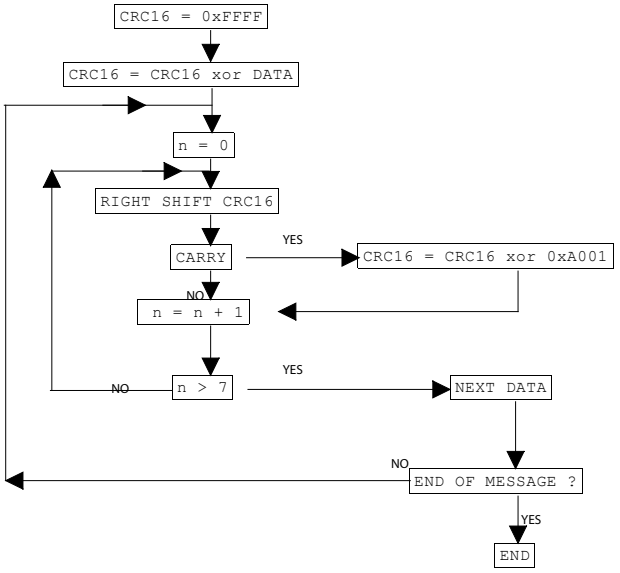
Slave number	Function Code + x80	Error Code (1 byte)	CRC low	CRC high
x01	F0x03: 0x83 F0x06: 0x86 F0x10: 0x90	1 : Bad function code 2 : Bad address 3: Bad CRC FF: unknow		

CRC 16 CALCULATION

EXAMPLE OF CRC CALCULATION

```
unsigned int CALCUL_CRC(unsigned int *Msg){
   unsigned int Crc;
   int lenght,i,n;
   Crc = 0xFFFF;
   length = Msg[0];
   for ( i = 1 ; i <= length  ; i++ ){
            Crc ^=  Msg[i];
            for ( n = 1 ; n <= 8 ; n++)     {
                     /* if CRC is even */
                     if ((Crc % 2) == 0)
                     /* to right decrement */
                        Crc >>=  1;
                     else{
                        Crc >>=  1;
                        Crc ^= 0xA001;
                     }
            }
   }
   return( Crc );
}
```

1.3-1



1.4. JBUS GENERAL POINTS

DATA BASES

Each device has its DATA BASE, set out in the following tables:

- STATES
- ALARMS
- MEASUREMENTS
- CONFIGURATIONS
- DATE and TIME
- COMMANDS

INFORMATION CODING

Each item of information is identified with a code, i.e.

- Sxxx for states
- Axxx for alarms
- Mxxx for measurements
- Txxx for configurations
- Cxxx for commands

The log coding is the same for all devices, as well as the date and time format.

SETTINGS

JBUS default settings

BAUD RATE:	9600 bauds
PARITY:	NONE
DATA:	8 bits
STOP:	1 bits
SLAVE:	1

The serial link settings can be set from the control panel:

AVAILABLE BAUD RATE:	1200-2400-4800-9600-19200 bauds
PARITY:	EVEN-ODD-NONE
SLAVE:	1 to 32

1.5. JBUS P DEFINITION

GENERAL TABLE DATA AREA DEFINITION

DATA	Length (Word)	TYPE	Information	JBUS Functions
STATES	4	BIT	64 States	3 (read)
ALARMS	4	BIT	64 Alarms	3 (read)
MEASUREMENTS	48	WORD	48 Measurements	3 (read)
CONFIGURATIONS	32	WORD	32 Configurations	3 (read)
DATE/TIME	4	1 Word = 2 Data items	See related chapter: DATE AND TIME FORMAT	3 (read) 16 (write more words)
COMMANDS	1	1 Word for all commands	Commands are coded by a decimal value.	6 (write 1 word) 16 (write more words)
IDENTIFIERS	12	WORD	See related chapter	3 (read)
POWER SHARE	5	WORD	See related chapter	3 (read) 16 (write more words)
STAND-BY SCHEDULING (1)	5	WORD	See related chapter	16 (write more words)
BATTERY TEST SCHEDULING	2	WORD	See related chapter	16 (write more words)
COMMANDS CONTROL TABLE	2	WORD	Define if a command is enabled or disabled.	3 (read)

(1) This function is not supported if the UPS is on Bypass or Stand-by.

NOTES:
- If a command is sent to the UPS and is not performed, the UPS sends the acknowledgement frame with the error code “function not supported”.
- For supervisor systems the data must be read and written in blocks according to the specified '**Length**' field.

GENERAL VECTOR INDEX

ADDRESS HIGH		ADDRESS LOW	END ADDRESS	DATA AREA	LENGTH (in words)
Nibble high (Mod. Num.)	Nibble low	Byte low			
0 Broadcast	0	00	0xm01F	IDENTIFIERS	12
1 Concentrator	0	20	0xm023	STATES	4
2 module 1	0	40	0xm043	ALARMS	4
3 module 2	0	60	0xm08F	MEASUREMENTS	48
4 module 3	0	E0	0xm15F	CONFIGURATION	32
5 module 4	3	60	0xm36F	DATE/TIME	4
6 module 5	4	00	0xn40F	POWER SHARE	5
7 module 6	5	80	0xm59F	STAND-BY Schedule	5
	5	A0	0xm5AF	BATTERY Schedule	2
	5	B0	0xm5B0	COMMANDS	1
	5	C0	0xm5CF	COMMANDS CTLR TAB.	2

Nibble high identifies the number of the module.

Nibble low (of Address High) + Address low identify the logical address of the memory map. The logical address of one data item is: Nibble low (of Address High) + Address low + Data Position (the position of the data must be extracted from the specific Data Map Description).

IN CASE OF PARALLEL SYSTEMS

In both the cases listed below, each device has to manage these states and alarms:

A32 to A37 Module [31 + n] General Alarm (n from 1 to 6)

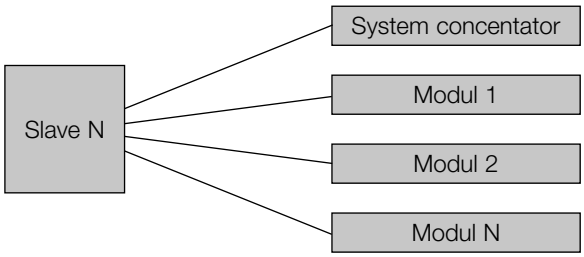
S30 UPS in Parallel Mode

S32 to S37 Module [31 + n] in parallel present (n from 1 to 6).

MODULAR SYSTEM (WITHOUT CONCENTRATOR)

In this case, each module of the system has its own slave number. The Master asks for the data unit after unit.

PARALLEL SYSTEM WITH DATA CONCENTRATOR



In this case, one slave is associated with several "internal" modules. The MSB of the vector address determines the module number.

The default value of the module is 1, in case of single module.

• Hardware environment

In this case, the system is equipped with one serial interface, and the slave number is unique. The other module data is obtained using the module address. The maximum of module is six.

• Module number association

Device	Address Module Number	Identifier module number
System Concentrator	01	00
Module 1	02	01
Module 2	03	02
Module 3	04	03
Module 4	05	04
Module 5	06	05
Module 6	07	06

1.6. JBUS REQUESTS: INSIGHTS AND EXAMPLES

Master request: 8 bytes

Slave number	Function READ	Address High	Address Low	0	N° of word to read	CRC low	CRC high
1	3	x02	x50	0	10		

Example: request to slave number 1, the data (10 words) beginning at 0x0250 (Address)

• Modules addressing:

The Address High byte (Most Significan Byte of Address word) is split into 2 nibbles:

MSN (Most Significan Nibble), LSN (Less Significant Nibble)

Address High	
Nibble High (MSN)	Nibble Low (LSN)
Module Number	Part of Address

MSN contains the module number as described in the following table:

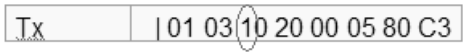
0 = Broadcast
1 = Concentrator
2 = module 1
3 = module 2
4 = module 3
5 = module 4
6 = module 5
7 = module 6

Therefore, the value for a specific module is:

Value = ModuleNumber + 1

The maximum number of modules is 6.

In the following frame example, a red circle highlights the module number nibble (in this case, it represents a request for the Concentrator):

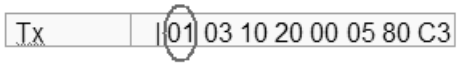


For further information, refer to the JBUS protocol document (i.e. page 8 of Masterys J-BUS protocol document).

• Modules addressing:

Different devices connected on the same RS-485 line are identified by SlaveNumber byte (the first byte of the frame).

In the following frame example, a red circle highlights the slave number byte:



Other examples:

• Date/Time read example

Master Request
TX: 01 03 13 60 00 04 40 93

SlaveID = 01
Function 03 (read) = 03
Req. To Concentrator = 1
Address 3 60 = Date/time
Blank = 00
Number of words = 04
CRC Low = 40
CRC High = 93

Slave Answer
RX: 01 03 08 26 26 18 11 07 00 00 0A 2E 8F

SlaveID = 01
Function 03 (read) = 03
Bytes number = 08 (4 words)
Word 1 = 26 26
Word 2 = 18 11
Word 3 = 07 00
Word 4 = 00 0A
CRC Low = 2E
CRC High = 8F

• Alarms table read example

Master Request
TX: 01 03 10 40 00 04 41 1D

SlaveID = 01
Function 03 (read) = 03
Req. To Concentrator = 1
Address 0 40 = Alarms table
Blank = 00
Number of words = 04
CRC Low = 41
CRC High = 1D

Slave Answer
RX: 01 03 08 00 00 00 00 00 00 00 00 95 D7

SlaveID = 01
Function 03 (read) = 03
Bytes number = 08 (4 words)
Word 1 = 00 00
Word 2 = 00 00
Word 3 = 00 00
Word 4 = 00 00
CRC Low = 95
CRC High = D7

• States table read example (Module 2)

Master Request
TX: 01 03 20 20 00 06 CF C2

SlaveID = 01
Function 03 (read) = 03
Req. To Module1 = 2
Address 0 20 = States table
Blank = 00
Number of words = 06
CRC Low = CF
CRC High = C2

Slave Answer
RX: 01 03 0C 20 0F 0C 82 34 00 00 00 00 00 00 00 98 A5

SlaveID = 01
Function 03 (read) = 03
Bytes number = 0C (6 words)
Word 1 = 20 0F
Word 2 = 0C 82
Word 3 = 34 00
Word 4 = 00 00
Word 5 = 00 00
Word 6 = 00 00
CRC Low = 98
CRC High = A5

• Command Write example

Master Request
TX: 01 10 15 B0 00 01 02 00 08 F9 67

SlaveID = 01
Function 10 (writing several words) = 10
Write To Concentrator = 1
Address 5 B0 = write to commands table
Blank 00 = 00
Number of words = 01
Number of bytes = 02
Word 1 to write = 00 08 (buzzer off)
CRC Low = F9
CRC High = 67

Slave Answer
RX: 01 10 15 B0 00 01 04 22

SlaveID = 01
Function 10 (writing several words) = 10
Write to Concentrator = 1;
Address 5 B0 = write to commands table
Blank = 00
Number of words = 01
CRC Low = 04
CRC High = 22

2. JBUS FOR NETYS PR - NETYS RT - ITYS

2.1. STATES DATA AREA

Base address index = 0xm020

CODE	Description	NETYS PR NETYS RT ITYS
S00	Input Mains present (Mains OK)	•
S01	Inverter ON	•
S02	Rectifier ON	•
S03	Load on Inverter (normal mode)	•
S04	Load on Mains/Load on Bypass	•
S05	Load on Battery/Battery Discharging (UPS in back-up mode)	•
S07	Eco Mode ON	•
S08	UPS in Stand-by mode	•
S09	Buzzer ON	•
S10	Battery Test in progress	•
S13	Battery Test supported (1=test possible)	•
S14	Battery Test failed (not concluded, ...)	•
S15	Battery near end of Back-up (Low battery)	•
S16	Battery discharged	•
S17	Battery OK = 1; Battery not OK = 0	•
S23	Inverter synchronised with Mains	•
S24	Boost ON	•
S26	Auxiliary mains OK	•
S27	Battery charger ON-OFF 1 = ON 0 = OFF	•
S28	Auxiliary input frequency out of tolerance	•
S31	Battery extension present	•
S42	The commands control table is managed (if = 1)	•

Default status bit initialisation map should be set to 0

• States bit coding description

bit7							bit0	
S07							S00	byte 0
S15							S08	byte 1
S23							S16	byte 2
S31							S24	byte 3
S39							S32	byte 4
S47							S40	byte 5
S55							S48	byte 6
S63							S56	byte 7

• Example of data sequence:

Word 0		Word 1	
High	Low	High	Low
S15 .....S08	S07 .....S00	S31 .....S24	S23 .....S16

2.2. ALARMS DATA AREA

Base address index = 0xm040

CODE	Description	NETYS PR NETYS RT ITYS
A00	Alarm present (OR of all UPS fault alarms)	•
A01	Battery Failure/Battery fuse open	•
A02	UPS overload	•
A03	Output voltage out of tolerance	•
A04	Digital power supply fault (Vcc)	•
A05	Input voltage out of tolerance	•
A06	Auxiliary mains out of tolerance	•
A07	Internal over-temperature alarm (OR of all temperature sensors)	•
A18	Overload timeout blocking Inverter	•
A22	Input mains general alarm	•
A30	UPS stopped for overload	•
A31	Imminent Stop	•

Default alarms bit initialisation map should be set to 0

• Alarm bit coding description

bit7							bit0	
A07							A00	byte 0
A15							A08	byte 1
A23							A16	byte 2
A31							A24	byte 3
A39							A32	byte 4
A47							A40	byte 5
A55							A48	byte 6
A63							A56	byte 7

• Example of data sequence:

Word 0		Word 1	
High	Low	High	Low
A15 .....A08	A07 .....A00	A31 .....A24	A23 .....A16

2.3. MEASUREMENTS DATA AREA

Base address index = 0xm060

Address index	Code	Description	Unit	Data representation	NETYS PR NETYS RT ITYS
0X060	M00	Load phase 1	%	#####	•
0X063	M03	Total load: $\frac{\text{(phase 1+2+3)}}{\text{(n° of phases)}}$	%	#####	•
0X064	M04	$\frac{\text{Battery capacity}^{(1)}}{\text{Remaining Battery Capacity \%}^{(2)}}$	%	#####	•
0X066	M06	Auxiliary mains star voltage V1	%	#####	•
0X069	M09	Output star voltage V1	V	#####	•
0X06F	M15	Output current phase L1	A*10	####.#	•
0X072	M18	Auxiliary frequency	Hz*10	####.#	•
0X073	M19	Output frequency	Hz*10	####.#	•
0X074	M20	Positive battery voltage	V*10	####.#	•
0X076	M22	Internal UPS temperature	°C	#####	•
0X077	M23	Remaining back-up time	Minutes	#####	•
0X081	M33	Input mains star voltage V1	V	#####	•

(1) displayed during charging only.

(2) displayed during discharging only.

All measurements should be represented as positive numbers between 0 and 65535.

All measurements, present in the measure table, should be initialised to 0xFFFF default value.

2.4. CONFIGURATION DATA AREA

Base address index = 0xm0E0

Address index	Code	Description	Unit	Data representation.	NETYS PR NETYS RT ITYS
0xE0	T00	Nominal star input voltage	V	#####	•
0xE1	T01	Nominal star output voltage	V	#####	•
0xE2	T02	Nominal input frequency	Hz	#####	•
0xE3	T03	Nominal output frequency	Hz	#####	•
0xE4	T04	Firmware version of communication board (ex 1.00)	Integer *100	####.#	•
0xE8	T08	Total nominal battery capacity (battery expansion cabinets included)	Ah*10	####.#	•
0xEA	T10	Number of Power Share Plugs Available	Integer	#####	•
0xFA	T26	Input mode : 1 = NORMAL,2=WIDE	Integer	#####	Solo Netys PR
0xFB	T27	Vout setting : 220/230/240	Integer	#####	Solo Netys PR
0xFC	T28	Battery extentions : 0/1/2	Integer	#####	Solo Netys PR

2.5. COMMANDS DATA CODE

The following code should be written into 0x5B0 vector index address.

Value	Code	Description	NETYS PR NETYS RT ITYS
0x0005	C05	Stand_by Mode enable	•
0x0006	C06	Stand_by Mode (UPS ON) disable	•
0x0007	C07	Buzzer enable (1)	•
0x0008	C08	Buzzer off	•
0x000D	C13	Mimic panel LED test	•
0x000E	C14	Buzzer disable (1)	•
0x0010	C16	Immediate Battery Test	•

> All commands should be sent from the supervisor to the UPS as positive numbers between 0x0000 and 0xFFFF

(1) Used to enable or disable UPS acoustic sound alarm (buzzer).

2.6. COMMANDS CONTROL TABLE

This table defines if a command is enabled or disabled. The first bit defines the C000 command, the second bit defines the C001 command, and so on…

If the bit is set, the command concerned is enabled.

This table is managed only if the S42 status is set to 1.

2.7. STAND BY SCHEDULE DATA AREA

Base address index = 0xm0580

0 15	16 31	0 15	16 31	0 15
Word 0	**Word 1**	**Word 2**	**Word 3**	**Word 4**
Delay_off		Min_off		Scheduling_type

Delay_off:

Seconds that must pass before the UPS goes into Stand-by
NETYS PR : from 20 secs up to 600 secs

Min_off:

Minutes of UPS Stand-by operation.
NETYS PR : from 1 min up to 9999 mins

Scheduling_type:

0 = no scheduling / reset pending schedule
1 = one_shot
2 = not used
3 = not used
4 = UPS shutdown management with restore time delay(1)

(1) This function is used to manage the UPS shutdown system with remote UPS management software such as NET VISION. In this case, the meaning of Delay_off and Min_off are:

> Delay_off defines how many seconds after beginning the shutdown procedure the UPS will go into Stand-by (no load supply). Used to enable P.C. Server Shutdown.

> Min_off defines how many minutes after the power has been restored that the UPS will be turned on again.

Please refer to the paragraph “Examples of Application”

EXAMPLE 1

After sending a remote shutdown command, the UPS output will be forced off (Stand-by UPS status) in 2 mins and will restore UPS output after 3 mins.

1. External supervisor sets the SCHEDULE DATA with the following values
   - Delay_off: 120 (2x60 seconds) – time necessary to shut down P.C. server
   - Min_off: 3 (minutes of Stand-by UPS output OFF status)
   - Schedule_type: 1 (one shot)
2. The UPS waits 120 seconds before setting the output to OFF for 3 minutes. After this time the UPS forces the output to ON.

EXAMPLE 2

The external supervisor detects a MAINS FAILURE status and the UPS must be switched off at the end of battery autonomy.

1. External supervisor sets the SCHEDULE DATA with the following values:
   - Delay_off : 120 (2x60 seconds) – time necessary to shut down P.C. server
   - Min_off : 1 (minutes of Stand-by UPS output OFF status)
   - Schedule_type : 4 (UPS shutdown management with restore time delay)
2. The UPS waits 120 seconds before setting the output to OFF for 1 minute. Before this time the UPS forces the output to ON.

NOTE:
The supervisor can cancel the SCHEDULE UPS action when a Schedule_type = 0 command is sent. After receiving this command, the UPS restarts immediately.

If MAINS FAILURE event returns at normal status after SCHEDULE is written, the UPS will set the output to OFF and next to ON to allow the PC operating system to restart.

2.8. BATTERY SCHEDULE DATA AREA

Base address index = 0xm5A0

0 15	0 15
Word 0	**Word 1**
Batt_test_on	Mode_test

Batt_test_on
test battery interval in days.

Mode_test:
1 = start the test as soon as possible; (see the Immediate Battery Test Command)

EXAMPLE:
1. Batt_test_on = XX and Mode_test=0 sets the days between one test and another, but doesn't activate the test;
2. Batt_test_on = 00 and Mode_test=0 disables the battery test;
3. Batt_test_on = XX and Mode_test=1 sets the days between one test and another and starts it immediately;
4. Batt_test_on = 00 and Mode_test=1 starts the battery test immediately but only once.

2.9. POWER SHARE DATA AREA

Base address index = 0xm400

NETYS PR: POWER SHARE PLUGS NOT PRESENT

The power share feature manages up to four output power plugs. Each plug can be switched on or off and the plugs priority can be changed, according to the battery capacity

Address	Nibble 3	Nibble 2	Nibble 1	Nibble 0
Word 0 : 0xm400	Not Used	Not Used	Not Used	Plugs Status
Word 1 : 0xm401	Plugs 0 management info			
Word 2 : 0xm402	Plugs 1 management info			
Word 3 : 0xm403	Plugs 2 management info			
Word 4 : 0xm404	Plugs 3 management info			

Word 0 [0xm400] = Status of the power share plugs – Read only (0x03 JBUS function)
Each bit of the word0 vector shows the status of the related power share plug. From 4 to 15 bits are reserved and will be set to 1. If a Plug is closed (powered), the related bit should set to 0.

Example:

PLUG STATUS			
Bit 3		Bit 0	
1	0	1	0

Plugs 1 and 3 are closed, and the output power is available on these plugs.
Only plugs 1,2,3 are available on this UPS, so the unused forth bit is set to 1.

Word 1 – 4 = Plugs priority vector
Each word is related to one plug (ie. The WORD 1 [0xm401] sees the priority value of the first plug).
Using these vectors' values, you can change the management of each plug. You can also link the 'plug switch off' operation to the value of the **Remaining Battery Capacity (%)** or to the **Remaining Backup Time (min)** measurement.

Bits 14-15 = Type of management:
0x00 : Management OFF
0x01 : Battery capacity management ON
0x02 : Remaining Back-up Time management ON
0x03 : Emergency Lighting ON (no parameters are needed)

Bits 13-14 = Reserved for future use

Bits 0-12 = References value. The UPS compares this value with the related measurement, and when this value is lower than the management value, the plugs is switched to 'off'. For the Emergency Lighting functionality, the UPS sets the related PLUG to OFF (opened) and closes it when the input power fails.

NOTE: When the UPS switches from 'On battery' status to 'On inverter' status, it has to set the available plugs to the default value:

Battery capacity management	Default status = CLOSE
Remaining Backup Time management	Default status = CLOSE
Emergency Lighting	Default status = OPEN

2.10. DATE AND TIME DATA AREA

This feature is available on Netys RT and Itys.

Word 1		Word 2		Word 3		Word 4	
High	Low	High	Low	High	Low	High	Low
Minuts	Seconds	Day	Hour	Month	Day (1)		Year
0-59	0-59	1-31	0-23	1-12	1(m) – 7(s)		00-99

If the date time value is not available, all the frame bytes should be set to 0xFF value.

This area is read/write.

2.11. IDENTIFIER DATA AREA

This table identifies the device with the following information:

Word 0	Word 1	Word 2	Word 3-7	Word 8-11	Word 12
UPS type	Power (*10)	Module	Serial num.	Event	Jbus code

UPS TYPE

Code	UPS type
29	NETYS UPS

POWER

UPS Nominal Power (kVA). The number should be in kVA*10 format.
Example: WORD1 = 15: 1.5kVA

MODULE

Return the address of the module-addressed UPS.
0 > system (concentrator)
1—6 > modules

SERIAL NUM.

NETYS PR : fixed to "_UNKNOWN__"
UPS serial number. ASCII chars are read from [0x003] to [0x007] data area.

LSB Char 1	MSB Char 2	LSB Char 3	MSB Char 4	LSB Char 5	MSB Char 6	LSB Char 7	MSB Char 8	LSB Char 9	MSB Char 10
Word 0		Word 1		Word 2		Word 3		Word 4	

A character with a ASCII code less than ASCII 32 (space) or greater than ASCII 123 ("z"), is not valid.

JBUS CODE

NETYS PR: NOT PRESENT
This word reports the SOCOMEC SICON JBUS protocol version and revision:

bit 0 bit 3	bit 4 bit 7	bit 8 bit 11	bit 12 bit 15
JBUS- Version	Version code	Version code	Reserved

> JBUS- Version: 0x02 = JBUS-P
other codes are reserved.

> Version code: numeric code: Example 1 for 1.00
> Revision code: numeric code: Example 10 for 1.10

3. JBUS FOR MASTERYS

3.1. STATES DATA AREA

Base address index = 0xm020

CODE	Description	BC	MC	EB	IP	GP
S00	Input Mains present (Mains OK)	•	•	•	•	•
S01	Inverter ON	•	•	•	•	•
S02	Rectifier ON	•	•	•	•	•
S03	Load on Inverter (normal mode)	•	•	•	•	•
S04	Load on Mains/Load on Bypass	•	•	•	•	•
S05	Load on Battery/Battery Discharging (UPS in back-up mode)	•	•	•	•	•
S06	Remote command disabled : 0 = remote command permission; 1 = no remote command permission.	•	•	•	•	•
S07	ECO/MODE ON	•	•	•	•	•
S08	UPS in Stand-by mode	•	•	•	•	•
S09	Buzzer ON	•	•	•	•	•
S10	Battery Test in progress	•	•	•	•	•
S11	Battery Test programmed	•	•	•	•	•
S12	Battery Test on stand-by	•	•	•	•	•
S13	Battery Test supported (1=test possible)	•	•	•	•	•
S14	Battery Test failed (not concluded,...)	•	•	•	•	•
S15	Battery near end of Back-up (Low battery)	•	•	•	•	•
S16	Battery discharged	•	•	•	•	•
S17	Battery OK = 1; Battery not OK = 0	•	•	•	•	•
S23	Inverter synchronised with Mains	•	•	•	•	•
S24	Boost ON					
S26	Auxiliary mains OK	•	•	•	•	•
S27	Battery charger ON-OFF 1 = ON 0 = OFF	•	•	•	•	•
S28	Auxiliary input frequency out of tolerance	•	•	•	•	•
S29	Scheduling ON/OFF disabled : 1 = scheduling permission; 0 = no scheduling permission.	•	•	•	•	•
S30	UPS on parallel system	•	•	•	•	•
S31	Battery extension present		•	•	•	•
S32	Module 1 in parallel present		•	•	•	•
S33	Module 2 in parallel present		•	•	•	•
S34	Module 3 in parallel present		•	•	•	•
S35	Module 4 in parallel present		•	•	•	•
S36	Module 5 in parallel present		•	•	•	•
S37	Module 6 in parallel present		•	•	•	•
S38	External state 1	•	•	•	•	•
S39	External state 2	•	•	•	•	•
S40	External state 3	•	•	•	•	•
S41	External state 4	•	•	•	•	•
S42	The commands control table is managed (if = 1)	•	•	•	•	•
S43	Power Share capability available	•	•	•	•	•

CODE	Description	BC	MC	EB	IP	GP
S45	Automatic E-Service report	•	•	•	•	•
S46	Operating on generator set	•	•	•	•	•
S48	Maintenance mode active	•	•	•	•	•
S49	First maintenance period	•	•	•	•	•
S50÷S63	Reserved					

Default status bit initialisation map should be set to 0

• States bit coding description

bit7							bit0	
S07							S00	byte 0
S15							S08	byte 1
S23							S16	byte 2
S31							S24	byte 3
S39							S32	byte 4
S47							S40	byte 5
S55							S48	byte 6
S63							S56	byte 7

• Example of data sequence:

Word 0		Word 1	
High	Low	High	Low
S15 .....S08	S07 .....S00	S31 .....S24	S23 .....S16

3.2. ALARMS DATA AREA

Base address index = 0xm040

CODE	Description	BC	MC	EB	IP	GP
A00	Alarm present (OR of all UPS fault alarms)	•	•	•	•	•
A01	Battery Failure/Battery fuse open	•	•	•	•	•
A02	UPS overload	•	•	•	•	•
A04	Digital power supply fault (Vcc)	•	•	•	•	•
A06	Auxiliary mains out of tolerance	•	•	•	•	•
A07	Internal over-temperature alarm (OR of all temperature sensors)	•	•	•	•	•
A08	Manual Bypass closed	•	•	•	•	•
A10	Battery charger failure (use A26)	•	•	•	•	•
A13	Precharge voltage out of tolerance	•	•	•	•	•
A14	BOOST output voltage too low	•	•	•	•	•
A15	BOOST output voltage too high	•	•	•	•	•
A16	Battery voltage too high	•	•	•	•	•
A18	Overload timeout blocking Inverter	•	•	•	•	•
A20	Configuration data map corrupted	•	•	•	•	•
A21	PLL Fault	•	•	•	•	•

CODE	Description	BC	MC	EB	IP	GP
A22	Input mains general alarm	•	•	•	•	•
A23	Rectifier general alarm	•	•	•	•	•
A25	Inverter general alarm	•	•	•	•	•
A26	Battery charger general alarm	•	•	•	•	•
A27	Output voltage over limits	•	•	•	•	•
A30	UPS stopped for overload	•	•	•	•	•
A31	Imminent Stop	•	•	•	•	•
A32	Module 1 in parallel general alarm		•	•	•	•
A33	Module 2 in parallel general alarm		•	•	•	•
A34	Module 3 in parallel general alarm		•	•	•	•
A35	Module 4 in parallel general alarm		•	•	•	•
A36	Module 5 in parallel general alarm		•	•	•	•
A37	Module 6 in parallel general alarm		•	•	•	•
A38	External Alarm 1	•	•	•	•	•
A39	External Alarm 2	•	•	•	•	•
A40	External Alarm 3	•	•	•	•	•
A41	External Alarm 4	•	•	•	•	•
A42	REMOTE SERVICE ALARM	•	•	•	•	•
A43	Redundancy Lost		•	•	•	•
A44	Maintenance alarm	•	•	•	•	•
A49	Battery discharged	•	•	•	•	•
A50	Insufficient resources	•	•	•	•	•
A51	Option board general alarm	•	•	•	•	•
A52	Rectifier fault	•	•	•	•	•
A54	Inverter fault	•	•	•	•	•
A55	Parallel fault	•	•	•	•	•
A56	Generator set general alarm		•	•	•	•
A57	Generator set fault		•	•	•	•
A58	Emergency STOP	•	•	•	•	•
A59	Battery circuit open	•	•	•	•	•
A60	Fan failure	•	•	•	•	•
A61	Phase detection fault	•	•	•	•	•
A62 ÷ A63	Reserved					

Default alarms bit initialisation map should be set to 0

• Alarm bit coding description

bit7							bit0	
A07							A00	byte 0
A15							A08	byte 1
A23							A16	byte 2
A31							A24	byte 3
A39							A32	byte 4
A47							A40	byte 5
A55							A48	byte 6
A63							A56	byte 7

• **Example of data sequence:**

Word 0		Word 1	
High	**Low**	**High**	**Low**
A15 .....A08	A07 .....A00	A31 .....A24	A23 .....A16

3.3. MEASUREMENTS DATA AREA

Base address index = 0xm060

ADRESS INDEX	CODE	Description	Unit	Data representation	BC	MC	EB	IP	GP
0X060	M00	Load phase 1	%	#####	•	•	•	•	•
0X061	M01	Load phase 2	%	#####	•(5)	•(5)	•(5)	•(5)	•(5)
0X062	M02	Load phase 3	%	#####	•(5)	•(5)	•(5)	•(5)	•(5)
0X063	M03	Total load: - (phase 1+2+3) - (n° of phases)	%	#####	•	•	•	•	•
0X064	M04	Battery capacity(1) Remaining Battery Capacity % (2)	%	#####	•	•	•	•	•
0X065	M05	Battery capacity(1) Remaining Battery Capacity (2)	Ah*10	####.#	•	•	•	•	•
0X066	M06	Auxiliary mains star voltage V1	V	#####	•(6)	•(6)	•(6)	•(6)	•(6)
0X067	M07	Auxiliary mains star voltage V2	V	#####	•(6)	•(6)	•(6)	•(6)	•(6)
0X068	M08	Auxiliary mains star voltage V3	V	#####	•	•	•	•	•
0X069	M09	Output star voltage V1	V	#####	•(5)	•(5)	•(5)	•(5)	•(5)
0X06A	M10	Output star voltage V2	V	#####	•(5)	•(5)	•(5)	•(5)	•(5)
0X06B	M11	Output star voltage V3	V	#####		•	•	•	•
0X06C	M12	Input current phase L1	A	#####		•(6)	•(6)	•(6)	•(6)
0X06D	M13	Input current phase L2	A	#####		•(6)	•(6)	•(6)	•(6)
0X06E	M14	Input current phase L3	A	#####		•	•	•	•
0X06F	M15	Output current phase L1	A*10	####.#		•(5)	•(5)	•(5)	•(5)
0X070	M16	Output current phase L2	A*10	####.#		•(5)	•(5)	•(5)	•(5)
0X071	M17	Output current phase L3	A*10	####.#		•(5)	•(5)	•(5)	•(5)
0X072	M18	Auxiliary frequency	Hz*10	####.#	•	•	•	•	•
0X073	M19	Output frequency	Hz*10	####.#	•	•	•	•	•
0X074	M20	Positive battery voltage (3)	V*10	####.#	•	•	•	•	•
0X075	M21	Negative battery voltage (3)	V*10	####.#	•	•	•	•	•
0X076	M22	Internal UPS temperature	°C	#####	•	•	•	•	•
0X077	M23	Remaining back-up time	Minutes	#####	•	•	•	•	•
0X078	M24	Battery current	A*10	####.#	•	•	•	•	•
0X079	M25	Inverter current phase L1	A*10	####.#	•	•	•	•	•
0X07A	M26	Inverter current phase L2	A*10	####.#	•(5)	•(5)	•(5)	•(5)	•(5)
0X07B	M27	Inverter current phase L3	A*10	####.#	•(5)	•(5)	•(5)	•(5)	•(5)
0X07C	M28	Positive rectifier voltage (+)	V	#####	•	•	•	•	•
0X07D	M29	Negative rectifier voltage (-)	V	#####	•	•	•	•	•
0X081	M33	Input mains star voltage V1	V	#####	•	•	•	•	•

ADRESS INDEX	CODE	Description	Unit	Data representation	BC	MC	EB	IP	GP
0X082	M34	Input mains star voltage V2	V	#####	•(6)	•(6)	•(6)	•(6)	•(6)
0X083	M35	Input mains star voltage V3	V	#####	•(6)	•(6)	•(6)	•(6)	•(6)
0X084	M36	Output active power (4)	kW*10	####.#	•	•	•	•	•
0X085	M37	Output power phase 1	KVA * 10	####.#	•	•	•	•	•
0X086	M38	Output power phase 2	KVA * 10	####.#	•(5)	•(5)	•(5)	•(5)	•(5)
0X087	M39	Output power phase 3	KVA * 10	####.#	•(5)	•(5)	•(5)	•(5)	•(5)
0X088	M40	Input power phase 1	KVA * 10	####.#	•	•	•	•	•
0X089	M41	Input power phase 2	KVA * 10	####.#	•(6)	•(6)	•(6)	•(6)	•(6)
0X08A	M42	Input power phase 3	KVA * 10	####.#	•(6)	•(6)	•(6)	•(6)	•(6)
0X08B	M43	Input mains Frequency	Hz*10	####.#	•	•	•	•	•
	M44 ÷ M47	Reserved							

(1) displayed during charging only.

(2) displayed during discharging only.

(3) both measurements should always be managed; if only the positive battery voltage is present, the negative battery voltage should be fixed to 0 (zero). The total battery voltage is the sum of battery voltage positive (value-absolute) and battery voltage negative (value-absolute).

(4) If this measurement is available on the UPS, the kVA should be set to 0xFFFF, and vice versa.

(5) displayed only for UPS 3/3 type.

(6) displayed only for UPS 3/3 or 3/1type.

All measurements must be represented as positive numbers between 0 and 65535.
All measurements, present in the measure table, should be initialised to 0xFFFF default value.

3.4. CONFIGURATION DATA AREA

Base address index = 0xm060

ADDRESS INDEX	CODE	Description	Unit	Data representation	BC	MC	EB	IP	GP
0xE0	T00	Nominal star input voltage	V	#####	•	•	•	•	•
0xE1	T01	Nominal star output voltage	V	#####	•	•	•	•	•
0xE2	T02	Nominal input frequency	Hz	#####	•	•	•	•	•
0xE3	T03	Nominal output frequency	Hz	#####	•	•	•	•	•
0xE4	T04	Firmware version of communication board (ex 1.00)	Integer *100	###.##	•	•	•	•	•
0xE5	T05	Firmware version of internal board 1	Integer *100	###.##	•	•	•	•	•
0xE8	T08	Total nominal battery capacity (battery expansion cabinets	Ah*1 0	####.#	•	•	•	•	•
0xE9	T09	Total battery number of serial elements	Integer	#####	•	•	•	•	•
0xEA	T1 0	Number of Power Share Plugs Available	Integer	#####	•	•	•	•	•
0xEB	T1 1	Communication board FW checksum (HEX representation: example A3F7)	Integer	#####	•	•	•	•	•
0xED	T13	Working mode (bit mapped): Bit 0 == 1 - autorestart enabled Bit 1 == 1 - Converter mode enabled Bit 2 == 1 - Gen.set	Bit map		•	•	•	•	•

ADDRESS INDEX	CODE	Description	Unit	Data representation	BC	MC	EB	IP	GP
0xEE	T14	Redundancy level: 0 = Power 1 = N+1 2 = N+2 ...etc...	Integer	#####		•	•	•	•
0xEF	T15	Firmware checksum of internal board 1	Hex	#####	•	•	•	•	•
0xFA	T26	Counter 6	Integer	#####	•	•	•	•	•
0xFB	T27	Counter 5	Integer	#####	•	•	•	•	•
0xFC	T28	Counter 4	Integer	#####	•	•	•	•	•
0xFD	T29	Counter 3	Integer	#####	•	•	•	•	•
0xFE	T30	Counter 2	Integer	#####	•	•	•	•	•
0xFF	T31	Counter 1	Integer	#####	•	•	•	•	•

3.5. COMMANDS DATA CODE

The following code should be written into 0x5B0 vector index address.

VALUE	CODE	Description	BC	MC	EB	IP	GP
0x0000	C00	Reset all commands	•	•	•	•	•
0x0001	C01	Alarms Reset	•	•	•	•	•
0x0002	C02	UPS OFF	•	•	•	•	•
0x[n]003	C03	ECO MODE enable	•	•	•	•	•
0x0004	C04	ECO MODE disable	•	•	•	•	•
0x0007	C07	Buzzer enable (1)	•	•	•	•	•
0x0008	C08	Buzzer off	•	•	•	•	•
0x000C	C12	UPS event history (log file) reset	•	•	•	•	•
0x000D	C13	Mimic panel LED test	•	•	•	•	•
0x000E	C14	Buzzer disable (1)	•	•	•	•	•
(2)0xn00F	C15	Power share plugs immediate ON		•	•	•	•
0x0010	C16	Immediate Battery Test	•	•	•	•	•
0x001 1	C1 7	Advanced eco mode enabled (low THD) (2)		•		•	•
0x0011	C18	Energy saver enabed (2)		•	•	•	•

> All commands should be sent from the supervisor to the UPS as positive numbers between 0x0000 and 0xFFFF

> If the UPS is operating in ECO/MODE, the commands C10 and C11 should be disabled. C10 and C11 are only available if the UPS is operating in “NORMAL MODE”. If a C10 or C11 command is sent to the UPS working in ECO/MODE, it answers “Command not available”.

(1) Used to enable or disable the UPS acoustic sound alarm (buzzer).

Example: The command 0x500 F immediately switches ON plugs 0 and 2, and immediately turns OFF plugs 1 and 3.
The command 0xF00F immediately switches ON all the plugs.
Bit = 0 4 Plug set to OFF (opened)
Bit = 1 4 Plug set to ON (closed)

(2) Not yet implemented as a JBUS command

3.6. COMMANDS CONTROL TABLE

This table defines if a command is enabled or disabled. The first bit defines the C000 command, the second bit defines the C001 command, and so on...

If the bit is set, the command concerned is enabled. This table is manage only if the S42 status is set to 1.

3.7. STAND-BY SCHEDULE DATA AREA

AREA Base address index = 0xm0580

BC	MC	EB	IP	GP
•	•(1)	•	•	•

(1) only with advanced synoptic.

0 15	16 31	0 15	16 31	0 15
Word 0	**Word 1**	**Word 2**	**Word 3**	**Word 4**
Delay_off		Min_off		Scheduling_type

Delay_off:
Seconds that should pass before the UPS goes into Stand-by
NETYS PR : from 20 secs up to 600 secs

Min_off:
Minutes of UPS Stand-by operation.
NETYS PR : from 1min up to 9999 mins

Scheduling_type:
0 = no scheduling / reset pending schedule
1 = one_shot
2 = Not used
3 = not used
4 = UPS shutdown management with restore time delay(1)

(1) This function is used to manage the UPS shutdown system with remote UPS management software such as UPS Vision. In this case, the meaning of **Delay_off** and **Min_off** are:
> **Delay_off** defines how many seconds after beginning the shutdown procedure the UPS will go into Stand-by (no load supply). Used to enable P.C. Server Shutdown.
> **Min_off** defines how many minutes after the power has been restored the UPS is turned on again.

Please refer to paragraph “Examples of Application”

STAND-BY SCHEDULE DATA AREA - EXAMPLE 1

After send a remote shutdown command, the UPS output will be forced off (Stand-by UPS status) in 2 mins and UPS output will be restored after 3 mins.

1. The external supervisor sets SCHEDULE DATA with the following values value:
   - **Delay_off:** 120 (2x60 seconds) – time necessary to shut down P.C. server
   - **Min_off:** 3 (minutes of Stand-by UPS output OFF status)
   - **Schedule_type:** 1 (one shot)
2. The UPS waits 120 seconds before setting the output to OFF for 3 minutes. After this time the UPS forces the output ON.

EXAMPLE 2

External supervisor detects a MAINS FAILURE status and UPS must be switch off at the end of battery autonomy.

1. The external supervisor sets SCHEDULE DATA with the following values:
   - **Delay_off:** 120 (2x60 seconds) – time necessary to shut down P.C. server
   - **Min_off:** 1 (minutes of Stand-by UPS output OFF status)
   - **Schedule_type:** 4 (UPS shutdown management with restore time delay)
2. The UPS waits 120 seconds before setting output to OFF for 1 minute. Before this time the UPS forces the output ON.

NOTE:
The supervisor can cancel the SCHEDULE UPS action, when a **Schedule_type = 0** command is sent. After receiving this command, the UPS restarts immediately.

If a MAINS FAILURE event returns to normal status after the SCHEDULE is written, the UPS will set the output to OFF and next to ON to allow the PC operating system to restart.

3.8. BATTERY SCHEDULE DATA

AREA Base address index = 0xm5A0

This feature is available on MASTERYS:

BC	MC	EB	IP	GP
•(1)	•(1)	•(1)	•(1)	•(1)

(1) only mode test 1.

0 15	0 15
Word 0	**Word 1**
Batt_test_on	Mode_test

Batt_test_on:
test battery interval in days.

Mode_test:
0 = no test / only configuration;
1 = start the test as soon as possible; (see the Immediate Battery Test Command)

EXAMPLE:
1. Batt_test_on = XX and Mode_test = 0 sets the days between one test and another, but doesn't activate the test;
2. Batt_test_on = 00 and Mode_test = 0 disables the battery test;
3. Batt_test_on = XX and Mode_test = 1 sets the days between one test and another and starts it immediately;
4. Batt_test_on = 00 and Mode_test = 1 starts the battery test immediately but only once.

3.9. POWER SHARE DATA AREA

AREA Base address index = 0xm5A0

This feature is available on MASTERYS:

BC	MC	EB	IP	GP
	•	•	•	•

The power share feature manages up to four power plugs. Each plug can be switched on or off and the plug's priority can be changed, according to the battery capacity

Address	Nibble 3	Nibble 2	Nibble 1	Nibble 0
Word 0 : 0xm400	Not Used	Not Used	Not Used	Plugs Status
Word 1 : 0xm401	Plugs 0 management info			
Word 2 : 0xm402	Plugs 1 management info			
Word 3 : 0xm403	Plugs 2 management info			
Word 4 : 0xm404	Plugs 3 management info			

Word 0 [0xm400] = Status of the power share plugs – Read only (0x03 JBUS function)
Each bit of the word0 vector shows the status of the related power share plug. From 4 to 15 bits are reserved and will be set to 1. If a Plug is closed (powered), the related bit should set to 0.

Example:

PLUG STATUS			
Bit 3		Bit 0	
1	0	1	0

Plugs 1 and 3 are closed, and the output power is available on these plugs.
Only plugs 1,2,3 are available on this UPS, so the unused fourth bit is set to 1.

Word 1 – 4 = Plugs priority vector
Each word is related to one plugs (ie. The WORD 1 [0xm401] sees the priority value of the first plug).
Using these vectors' values you can change the management of each plug. You can also link the plug 'switch off' operation to the value of the Remaining Battery Capacity (%) or to the Remaining Backup Time (min) measurement.

Bits 14-15 = Type of management :
0x00 : Management OFF
0x01 : Battery capacity management ON
0x02 : Remaining Backup Time management ON
0x03 : Emergency Lighting ON (no parameters are needed)

Bits 13-14 = Reserved for future use

Bits 0-12 = References value. The UPS compares this value with the related measurement, and when this value is lower than the management value, the plug is switched to OFF. For the Emergency Lighting functionality, the UPS sets the related PLUG to OFF (opened) and closes it when the input power fails.

NOTE: When the UPS switches from 'On battery' status to 'On inverter' status, it has to set the available plugs to the default value:

Battery capacity management	Default status = CLOSE
Remaining Backup Time management	Default status = CLOSE
Emergency Lighting	Default status = OPEN

3.10. DATE AND TIME DATA AREA

This feature is available on MASTERYS:

BC	MC	EB	IP	GP
•	•	•	•	•

Word 1		Word 2		Word 3		Word 4	
High	Low	High	Low	High	Low	High	Low
Minuts	Seconds	Day	Hour	Month	Day (1)		Year
0-59	0-59	1-31	0-23	1-12	1(m) – 7(s)		00-99

If the date time value is not available, all the frame bytes should be set to 0xFF value.

This area is read/write.

3.11. IDENTIFIER DATA AREA

This table identifies the device with the following information:

Word 0	Word 1	Word 2	Word 3-7	Word 8-11	Word 12
UPS type	Power (*10)	Module	Serial num.	Event	Jbus code

UPS TYPE

CODE	UPS type	BC	MC	EB	IP	GP
26	MASTERYS 1/1 SYSTEM					
27	MASTERYS 1/1 UPS	•				•
28	MASTERYS 1/1 MODULE	•				•
86	MASTERYS 3/1 SYSTEM		•		•	
87	MASTERYS 3/1 UPS	•	•		•	•
88	MASTERYS 3/1 MODULE	•	•		•	•
256	MASTERYS 3/3 SYSTEM		•	•	•	
257	MASTERYS 3/3 UPS	•	•	•	•	•
258	MASTERYS 3/3 MODULE	•	•	•	•	•

POWER

UPS Nominal Power (kVA). The number should be in kVA*10 format.
Example: WORD1 = 200 -> UPS = 200/10 = 20 kVA

MODULE

Return the address of the module-addressed UPS.
0 > system (concentrator)
1—6 > modules

SERIAL NUM.

UPS serial number. ASCII characters are read from [0x003] to [0x007] data area.

LSB Char 1	MSB Char 2	LSB Char 3	MSB Char 4	LSB Char 5	MSB Char 6	LSB Char 7	MSB Char 8	LSB Char 9	MSB Char 10
Word 0		Word 1		Word 2		Word 3		Word 4	

A character with a ASCII code less than ASCII 32 (space) or greater than ASCII 123 (“z”), is not valid.

JBUS CODE

This word reports the SOCOMEC SICON JBUS protocol version and revision:

bit 0 bit 3	bit 4 bit 7	bit 8 bit 11	bit 12 bit 15
JBUS- Version	Version code	Version code	Reserved

> JBUS- Version: 0x02 = JBUS-P
0x04 = JBUS-PX (used for Masterys)
other codes are reserved.

> Version code: numeric code: Example 1 for 1.00
> Revision code: numeric code: Example 10 for 1.10

4. MODBUS TCP FOR MASTERYS

4.1. INTRODUCTION

GENERAL

MASTERYS can be provided with a MODBUS TCP Network interface for direct UPS connection to an Ethernet network.

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

ETHERNET INTERFACE

The interface offers 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 TCP-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 MASTERYS 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 an item of 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).

4.2. INSTALLATION OF THE MODBUS TCP PCB

LOCATION OF THE COM-SLOTS

The "com slots" include all communication interfaces.

CONFIGURATION OF THE MODBUS TCP INTERFACE

In case of MATERYS range, the JUMPER “MASTERYS” on the card must be closed, before installing in the com slot

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.

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.

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. 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.

DESCRIPTION OF LEDS

Yellow LED RJ45:	ON:	Line detected
	Blinking:	Searching line (If any WiFi option)
	OFF:	No Ethernet line
Green LED RJ45:	ON:	
	OFF:	No traffic
	Blinking:	MODBUS TCP Traffic
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

4.3. DEFAULT SETTINGS OF THE MODBUS TCP INTERFACE

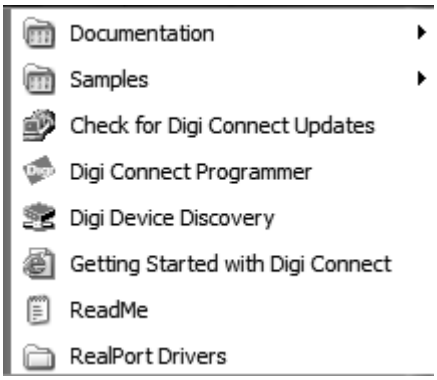
DEFAULT SETTING

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.

4.3-1



SEARCHING UPS CONNECTED TO THE ETHERNET

The utility programme "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.

4.4. 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	
b15	b0	b15	b0	b15	b0	b15	b0	b15	b0	b15	b0
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)

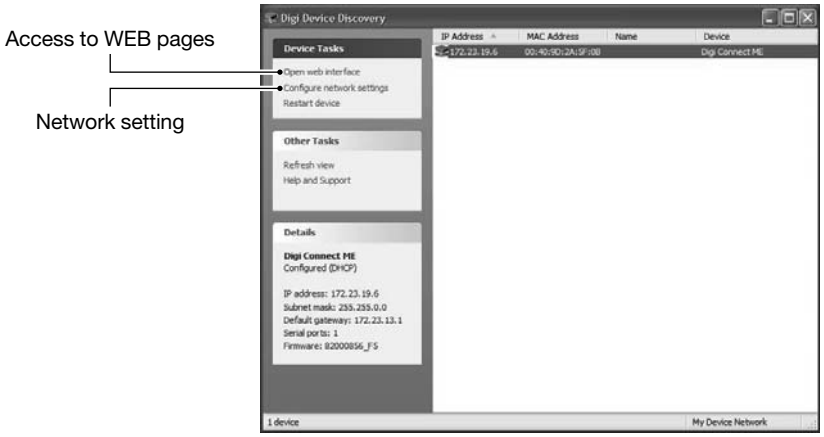
‘CONCENTRATOR MODE’ IN A PARALLEL SYSTEM

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

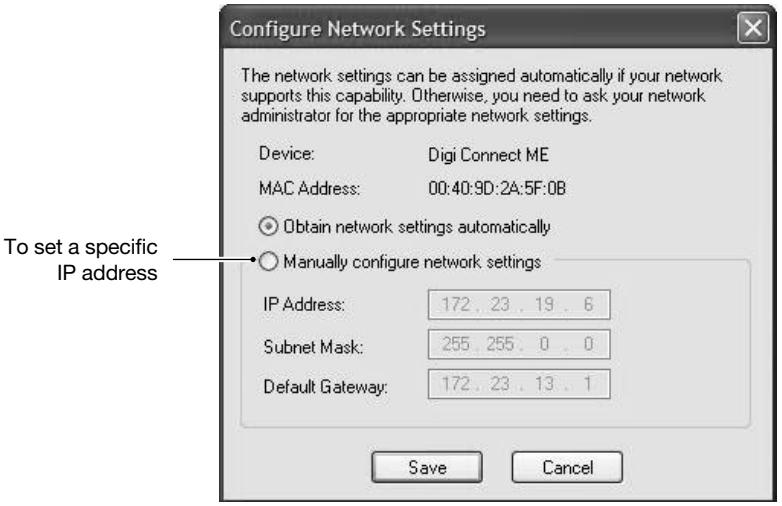
Binary data	Logic combination in a redundant system	Logic combination in a non redundant system
S00	OR	AND
S05	AND	OR
S15	AND	OR
A02	AND	OR
A07	AND	OR
A31	AND	OR

4.5. ANNEXE 1: SETTING OF THE INTERFACE USING DIGI® DEVICE DISCOVERY

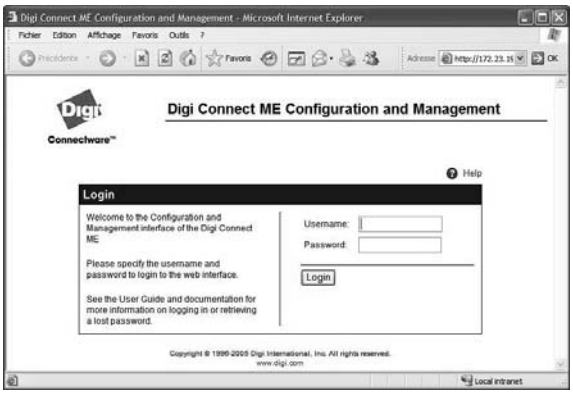
4.5-1 Search window for UPSs connected to the network



4.5-2 Network settings



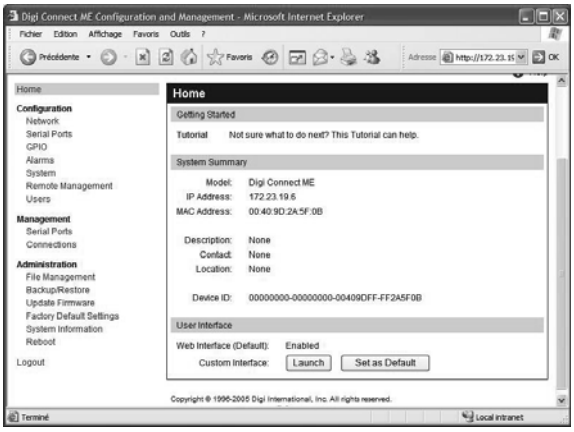
4.5-3 Access to HTTP pages



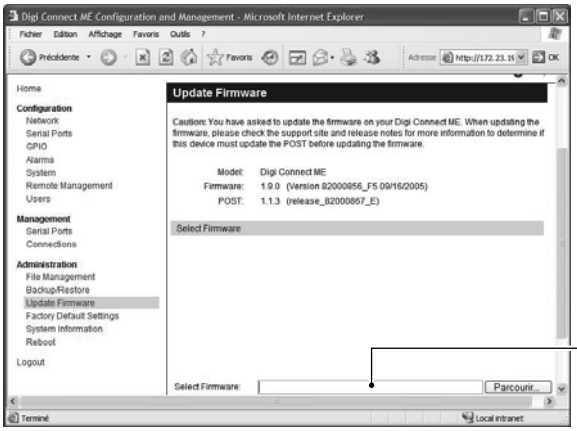
Login:	root
Password:	dbps

socomec
Innovative Power Solutions

4.5-4 Home Page



4.5-5 Updating of the firmware



Version of firmware:
MODBUS TCP: 82001164.bin
REAL PORT: 82000856_F5.bin

Click on Update

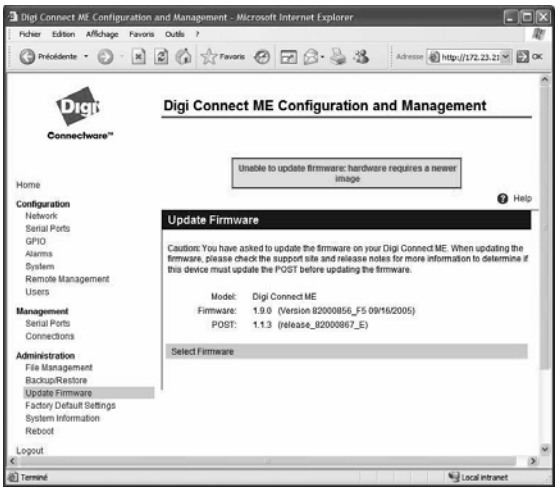
Help opens an on-line help window and a link to DIGI site if necessary.

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.

4.5-6 Updating of the firmware



4.6. 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 MODBUS 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 MODBUS frame.

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