



Manuale d'uso

User manual

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THESE INSTRUCTIONS**

CAREL
Technology & Evolution



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Vi assicuriamo che la completa lettura di questo manuale vi garantirà una corretta installazione ed un sicuro utilizzo del prodotto descritto.

We wish to save you time and money!

We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

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1. Carel Gateway for interfacing to systems using a standard ModBus-JBus protocol

1.1 Introduction

The GATEWAYMB0 (hereinafter called the Gateway) allows Carel systems to be interfaced to systems that communicate using the standard Modbus-Jbus protocol, a commonly used protocol by almost all BMS manufacturers.

The device automatically translates the Carel transmission protocol into the Modbus-Jbus communication protocol.

The protocol translator has been designed to ensure the connection of all Carel instruments to Modbus-Jbus systems using a standard gateway, thus avoiding expensive software modifications.

1.2 General characteristics

The standard Modbus-Jbus protocol referred to (hereinafter simply called Modbus), is described in the official document:

***Modicon Modbus Protocol
Reference Guide
March 1992, PI-MBUS-300 Rev. D***

The transmission mode used is RTU (Remote Terminal Unit).

The following connections are available on the Gateway:

- serial 232 or 485 to the Modbus supervisor;*
- serial 422 or 485 to the Carel peripherals;*
- serial 232 for configuring the Gateway.*

The power supply can be selected from three values: 220Vac, 120Vac or 24Vac.

Up to 16 Carel peripherals can be connected to the Gateway.

The product is supplied with a computer program for configuring the Gateway based on the specific requirements of the application and the network of peripherals being supervised.

2. Connections

The connectors on the rear panel allow the connections between the Gateway, the Carel network and the supervisory system that communicates using the Modbus protocol.

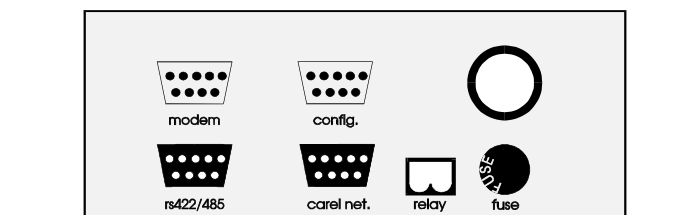


Fig. 2.1 - Rear panel of the Gateway

modem

Standard 9-way male connector. Used in alternative to the RS422/485 connector to connect the Gateway to the supervisory computer in 232 mode with the Modbus protocol.

RS422/485

Standard 9-way female connector, used in alternative to the previous connector, for the connection to a supervisory PC operating in 485 mode with the Modbus protocol.

config

Standard 9-way male connector, used only for configuring the Gateway. It must be connected to the RS232 serial port on the computer running the configuration program.

carel net

Standard 9-way female connector, used for connecting the Carel peripherals in 422 or 485 mode, with the standard Carel private protocol.

Relay output

Not used in this Gateway model.

3. User interface

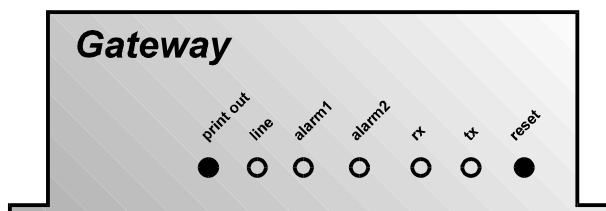


Fig. 3.1 - Front panel of the Gateway

Print-out button.

If the Gateway is connected to a terminal or a PC in terminal emulation (using the config connector - settings: 9600, 8, NO, 1), the print-out button displays the list of configuration parameters and the version of the program installed in the Gateway.

Reset button:

Resets the Gateway, starting the reading procedure of the Gateway configuration and the complete inquiry procedure for all the connected Carel peripherals.

Line LED (yellow)

Signals the power supply

Rx and tx LEDs (green)

Continuous blinking signals correct communication.

Alarm1 LED (red)

If on, signals an anomaly in the initial parameter configuration. In this case, reset the Gateway. If the problem persists, the Gateway must be reconfigured using the program supplied (see Initial configuration procedure).

Alarm2 LED (red)

If blinking, signals anomalies in the communication between the Gateway and the Carel peripherals.

The cause may be inconsistencies between the configuration and the actual status, that is, the number of peripherals recognised by the Gateway is less than the number of peripherals configured.

WARNING: the LED blinks whenever the Gateway is turned on, until it has acquired all the variables from the peripherals connected. In this case, then, the blinking of the LED is normal and does not signal an anomaly, but rather simply indicates the variable acquisition procedure is in progress.

3.1 Behaviour of the LEDs at power on

Each time the Gateway is turned on, the LEDs behave as follows:

- in **422 configuration to the Carel network**, the rx LED remains off while the tx LED blinks 8 times for 2 seconds before turning off for an instant;
- in **485 configuration to the Carel network**, the tx and rx LEDs blink at the same time 8 times in 2 seconds before turning off for an instant.

This procedure confirms the correct start of the application.

Immediately after this, the tx and rx LEDs blink continuously, meaning the correct connection of the Carel peripherals.

The alarm LEDs, on the other hand, turn on at the same time for an instant when the Gateway is reset, and then remain off in normal operation.

4. Installation

4.1 Hints for correct installation

WARNING. NEVER perform installation and hardware settings when the Gateway is powered.

- Do not install the Gateway near power cables or radio-transmitters.
- When handling internal jumpers (see **Jumpers**), do not touch the electronic components, to avoid electrostatic discharges that may seriously damage the components.
- Make sure the correct supply voltage has been selected, using the faston connectors located on the electronic board inside the metal case of the Gateway (see **Power supply**).
- Earth the chassis of the Gateway, using the stud marked with the yellow label.
- Make sure all the cables are connected correctly.
- Carefully follow the diagrams shown in **Connection cables and hardware settings**: the wrong connection of just one wire will affect the operation of the entire system.
- During the configuration of the Gateway, strictly heed the instructions on the use of the corresponding program.
- As concerns the set-up of a 485 network of Carel peripherals:
 - use the cable indicated in **Connection cables from Gateway - Carel peripherals**.
 - FOLLOW THE EXACT POLARITY shown on the terminals or on the silk-screening on the board;
 - fasten the shield or the continuity wire to the terminal, making sure that THE SHIELD DOES NOT COME INTO CONTACT WITH THE METAL PARTS OF THE PANEL OR WITH OTHER WIRES. If the shield is frayed, use heat-shrink sheathing.
 - THE SHIELD MUST NEVER BE EARTHED AT ANY POINT OF THE NETWORK: the only points of contact must be the terminals in the instruments.
 - The serial cable arrives at the terminal of each instrument and the leaves to the next instrument without branching.
 - The Carel 485 network must be terminated with a 120 Ohm resistor.

4.2 Selecting the power supply

The Gateway can be supplied at 3 selectable voltage values:

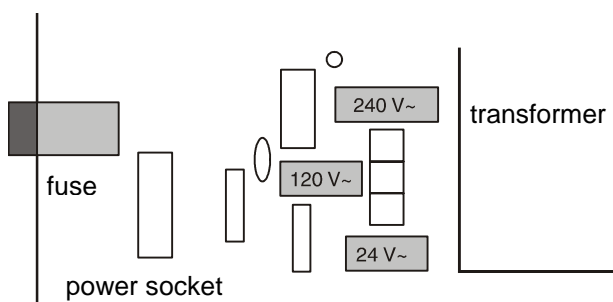
- 240Vac 50/60 Hz (default value),
- 120Vac
- 24Vac.

The power supply terminals, marked by silk-screening on the printed circuit board, are near the transformer.

If the power supply voltage is different from the value set by the manufacturer, proceed with maximum care when performing the following operations:

- disconnect power;
- open the cover;
- remove the faston connector with cable from the default power supply terminal (240Vac);
- remove the faston and corresponding protective device from the terminal corresponding to the new voltage (e.g. 24Vac);
- insert the faston and corresponding protective device in the terminal of default power supply;
- connect the faston connector with cable to the terminal corresponding to the new voltage;
- replace the fuse on the rear of the Gateway according to the new voltage; for the rated currents see Table. 4.2.1;
- close the cover, earth the casing of the Gateway, and reconnect the power.

N.B. In general, the fuse is type T slo-blo, rated voltage 250 V, dimensions 5x20mm.



| Power supply | Rated fuse current |
|--------------|--------------------|
| 240 Vac | 250 mA |
| 120 Vac | 250 mA |
| 24 Vac | 1 A |

Table. 4.2.1

Fig. 4.2.1 - Gateway power supply

5. Configuration

WARNING. To operate the Gateway it first needs to be configured.

Configuration is performed using a program supplied with the Gateway (Carel code 98C429P008) to be installed on a PC. The Gateway configuration program allows the following parameters to be read or write, which are necessary for the correct operation of the device:

- Gateway address in the Modbus network.
- Number of peripherals in the Carel network.
- Communication baud-rate between the Gateway and the Carel peripherals.

Communication baud-rate between the Gateway and the Modbus supervisor:

- Baud-rate
- Word bit number (read only).
- Stop bit.
- Parity.

Furthermore, the read-only display of the following is possible:

- Indication of the operating mode, 422 or 485, with the Carel peripherals (recognised only upon the reset of the Gateway).

5.1 Using the configuration software

To configure the Gateway Modbus requires a PC with DOS 3.0 operating system or higher, RS232 serial port and 3.5" floppy disk drive.

The 232 serial port on the computer is connected to the config connector on the rear of the Gateway using a cable with a 25 or 9 pin female connector on the PC side, and 9 pin female connector on the Gateway side.

For the pin layout of the cable, follow the diagram provided in **Connection cables: Gateway - configuration terminal**.

Insert the diskette supplied with the Gateway into the computer and type on the command line:

to read the Gateway configuration parameters:

>a:readmb0 /com1 <enter> or alternatively **>a:readmb0 /com2 <enter>**

depending on whether serial com1 or com2 is used.

to write the Gateway configuration parameters:

>a: writemb0 /com1 list of parameters<enter> or alternatively **a:writemb0 /com2 list of parameters<enter>**

depending on whether serial com1 or com2 is used.

For a more detailed description of the commands, please see the following paragraphs.

5.1.1 Read parameters

The command

readmb0 serial port

will display the configuration of the Gateway and the information relating to the version of the software installed in the Gateway.

Example:

To a read command, a Gateway with the following configuration:

Modbus address 1; 1 Carel peripheral; operating parameters for the Modbus network: 9600, 8, 1, NO; baudrate to the Carel peripherals 1200, 485 mode

responds by sending the following strings to the screen:

VERSION: MB0 software version and release date

ADDRESS: 01

SLAVES: 01

MODBUS PORT PARAMETER

baud: 9600

bits: 8

stop: 1

parity: NONE

CAREL PORT BAUDRATE: 1200 Mode: Rs485

If the Gateway is not connected or does not respond, the following string will appear on the screen:

***** **ERROR READING GATEWAY CONFIGURATION** *****

In this case, check:

- the connection and the pin layout of the configuration cable (see **Connection cables**),
- the power supply to the Gateway (Yellow LED on).

5.1.2 Write parameters

The command writemb0 is used to set the Gateway operating parameters, with the following syntax:

writemb0 /serial port <Gateway address> <number of slaves present> <CAREL baud-rate> <MODBUS baud-rate>
<stop bits> <word bits> <parity>

Typing only writemb0 without the other parameters, or if some parameters are not defined, the program displays the correct syntax required.

WARNING. Each parameter must be separated from the following one by a space.

The parameters that need to be set are:

- **Gateway address:** address of the Gateway in the Modbus network;
- **number of slaves present:** number of Carel peripherals connected to the Gateway; the peripherals must be set with successive network addresses starting from address 1, and all addresses must be present up to the number of slaves present.
Thus with number of slaves present = 5, the peripherals 1, 2, 3, 4 and 5 must be in the network.
- **CAREL baudrate:** baudrate to the Carel network (1200, 2400, 4800, 9600, 19200);
- **MODBUS baudrate:** baudrate to the Modbus network (1200, 2400, 4800, 9600);
- **MODBUS stop bits:** number of stop bits to the Modbus network (1, 2);
- **MODBUS parity:** parity to the Modbus network (ODD, EVEN, MARK, SPACE, NONE).

EXAMPLE

writemb0 /COM1 1 8 19200 9600 1 NONE

to configure a Gateway connected to COM1 of the computer, with Modbus address 1, 8 Carel peripherals connected, a baudrate of 19200 to the Carel network and 9600 to the Modbus network, 1 stop bit and no parity to the Modbus network.

If the programming is performed correctly, the following text will be displayed:

*** **GATEWAY PROGRAMMED** ***

IMPORTANT WARNING. Once the Gateway has been programmed, it must be reset (pressing the reset button or turning the Gateway off and on again).

If the Gateway is not connected or does not respond, the following string will appear on the screen:

***** **ERROR SENDING GATEWAY CONFIGURATION** *****

In this case, check:

- the connection and the pin layout of the configuration cable (see **Connection cables**),
- the power supply to the Gateway (Yellow LED on).

6. Operation

6.1 General characteristics

The Gateway is identified by the Modbus supervisor using the unique address assigned within the Modbus network. The address of the Gateway is set during the configuration phase.

Up to 16 Carel peripherals can be connected to the Gateway.

The communication to the Carel peripherals is managed according to a master-slave structure in polling, where the master is the Gateway and the slaves are the Carel peripherals. The transmission protocol between the Gateway and the peripherals is the standard Carel private protocol.

The following can be managed for each peripheral:

up to 128 analogue variables (including I/O and other internal program variables)

up to 128 integer variables

up to 200 digital variables (including I/O and other internal program variables)

The database of the variables used by each individual Carel peripheral is available upon request. This database will be of reference to the supplier of the supervisory system, so as to be able to assign a suitable meaning to the variables.

The variables can be read and/or written by the supervisor according to the peripheral connected and the application software used. Assigning a value from the supervisor to a read-only variable will have no effect.

6.2 General information on the Modbus-Jbus protocol

The Modicon Modbus Protocol implemented in the Carel Gateway follows the protocol described in the document:

**Modicon Modbus Protocol
Reference Guide
March 1992, PI-MBUS-300 Rev. D**

The Modbus-Jbus protocol implemented is RTU, with synchronicity based on the time between the characters.

The configuration is multi-point in 485 or alternatively point-point in 232.

The address sent in the Modbus package is the address specified during configuration by the command writemb0.

6.2.1 Communication parameters

The following communication data between the Modbus supervisor and the Gateway can be set by the user:

| Parameter | Values that can be set |
|---------------------|------------------------------|
| baud rate | 1200 - 2400 - 4800 - 9600 |
| parity | None, Odd, Even, Mark, Space |
| number of stop bits | 1 - 2 |

Table 6.2.1.1

6.2.2 Representation of the data

The variables transferred by the Gateway to the supervisor are digital, analogue and integer.

The digital variables are coded by bits; in every byte read (commands 01, 02), or written (commands 05, 15), the lower address variable is assigned to the less significant bit, and the higher address to the more significant bit.

The analogue and integer variables are transferred using commands 03-04, 06-16, corresponding to 16 bit WORD registers. The coding used is binary with two's complement.

The analogue variables are represented in tenths (for example, the value 10.0 is transmitted as 0064h = 100d), the integers, on the other hand, are transferred using the effective value (for example, 100 is transmitted as 0064h = 100d).

6.2.3 Maximum database limits

The maximum number of variables that can be transferred by an individual Carel peripheral to the Gateway is the following:

| Variable type | Maximum number |
|---------------|----------------|
| digital | 200 |
| analogue | 128 |
| integer | 128 |

Table 6.2.3.1

As regards the Modbus, this translates into:

| Variable type | Maximum number |
|----------------------|-----------------------|
| digital | 200 |
| WORD register | 256 |

Table. 6.2.3.2

WARNING: the Carel analogue and integer variables are managed by the Modbus protocol as WORD variables (registers).

The analogue, integer and digital variables with address 0 are not managed by the Carel peripherals.

6.2.4 Modbus-Jbus compatibility

The commands of the Modbus-Jbus protocol guarantee the compatibility between Modbus and Jbus. In fact, the basic commands that are in common between Modbus and Jbus having the same meaning.

These are the following:

| Commands implemented | 1 | 2 | 3 | 4 | 5 | 6 | 15 | 16 |
|-----------------------------|---|---|---|---|---|---|----|----|
|-----------------------------|---|---|---|---|---|---|----|----|

Table. 6.2.4.1

6.2.5 Description of the commands implemented

The following are commands implemented in the Gateway program:

| MODBUS COMMANDS | MEANING | NOTES |
|------------------------------|--------------------------------------|--|
| 01: read coil status | read digital variable(s) | obtains the current status of a group of digital variables |
| 02: read input status | read digital variable(s) | obtains the current status of a group of digital variables |
| 03: read holding register | read analogue variable(s) | obtains the current value of one or more analogue variables |
| 04: read input register | read analogue variable(s) | obtains the current value of one or more analogue variables |
| 05: force single coil | write individual digital variable | forces the individual digital variable to ON or OFF |
| 06: preset single register | write individual analogue variable | forces an analogue variable to a specific value |
| 15: force multiple coils | write a series of digital variables | forces a consecutive series of digital variables to a defined status, ON or of OFF |
| 16: preset multiple register | write a series of analogue variables | forces a consecutive series of analogue variables to specific values |

Table. 6.2.5.1

Note that given the variety of machines available, Carel does not distinguish between input variables (read only) and output variables (read/write), so that the knowledge and management of the database is entrusted to the part present on the supervisor.

Carel or the manufacturer of the units connected will be able to provide tables of the meanings of the individual variables present in the controls.

Also note that given the general nature of the system, the Gateway responds to more than one Modbus command in the same way.

6.2.6 Construction of a Modbus database from a Carel one

The construction of a database that can be implemented on a Modbus supervisor managing a Carel peripheral, with address 1, is carried out as follows.

- the Carel digital variables are transferred with their addresses to the Modbus database and are read, as seen above, using commands 1 or 2.
- the Carel analogue variables are transferred with their addresses to the Modbus database and are read, as seen above, using commands 3 or 4.
- the Carel integer variables are sent together with the analogue variables and are then transferred, with their addresses summed to the offset 128 (dec), to the Modbus database and are also read, as seen above, using commands 3 or 4.

The other peripherals are positioned as for the first, starting from the offsets shown in table:

| Carel peripheral | Digital variable offset | Analogue variable offset | Integer variable offset |
|-------------------------|--------------------------------|---------------------------------|--------------------------------|
| peripheral 1 | 0 | 0 | 128 |
| peripheral 2 | 200 | 256 | 384 |
| peripheral 3 | 400 | 512 | 640 |
| peripheral 4 | 600 | 768 | 896 |
| ... | ... | ... | ... |
| peripheral n | $(n-1)*200$ | $(n-1)*256$ | $(n-1)*256+128$ |
| ... | ... | ... | ... |
| peripheral 16 | 3000 | 3840 | 3968 |

Table. 6.2.6.1

The Modbus address is then calculated by adding the Carel address of the variable to the offset taken from the previous table, based on the serial address of the peripheral that the variable belongs to.

General rule:

- digital variables: $Modbus\ address = Carel\ address + 200 * (peripheral\ serial\ address - 1)$
- analogue variables: $Modbus\ address = Carel\ address + 256 * (peripheral\ serial\ address - 1)$
- integer variables: $Modbus\ address = Carel\ address + 128 + 256 * (peripheral\ serial\ address - 1)$

EXAMPLE.

ADDRESSING PERIPHERAL NO. 1

| Type of Carel variable | Carel address | Type of Modbus variable | Modbus address |
|------------------------|---------------|-------------------------|----------------|
| Digital | 1 | Coil | 1 |
| Digital | 2 | Coil | 2 |
| Digital | | ... | ... |
| Digital | 181 | Coil | 181 |
| Digital | 182 | Coil | 182 |
| | | | |
| Analogue | 1 | Register | 1 |
| Analogue | 2 | Register | 2 |
| Analogue | ... | ... | ... |
| Analogue | 91 | Register | 91 |
| Analogue | 92 | Register | 92 |
| | | | |
| Integer | 1 | Register | 129 |
| Integer | 2 | Register | 130 |
| Integer | ... | ... | ... |
| Integer | 116 | Register | 244 |
| Integer | 117 | Register | 245 |

ADDRESSING PERIPHERAL NO.2

| Type of Carel variable | Carel address | Type of Modbus variable | Modbus address |
|------------------------|---------------|-------------------------|-------------------|
| Digital | 1 | Coil | 201 (1+200) |
| Digital | 2 | Coil | 202 (2+200) |
| Digital | | ... | ... |
| Digital | 181 | Coil | 381 (181+200) |
| Digital | 182 | Coil | 382 (182+200) |
| | | | |
| Analogue | 1 | Register | 257 (1+256) |
| Analogue | 2 | Register | 258 (2+256) |
| Analogue | ... | ... | ... |
| Analogue | 91 | Register | 347 (91+256) |
| Analogue | 92 | Register | 348 (92+256) |
| | | | |
| Integer | 1 | Register | 385 (1+128+256) |
| Integer | 2 | Register | 386 (2+128+256) |
| Integer | ... | ... | ... |
| Integer | 116 | Register | 500 (116+128+256) |
| Integer | 117 | Register | 501 (117+128+256) |

ADDRESSING PERIPHERAL NO.3

| Type of Carel variable | Carel address | Type of Modbus variable | Modbus address |
|------------------------|---------------|-------------------------|-------------------|
| Digital | 1 | Coil | 401 (1+400) |
| Digital | 2 | Coil | 402 (2+400) |
| Digital | ... | ... | ... |
| Digital | 181 | Coil | 581 (181+400) |
| Digital | 182 | Coil | 582 (182+400) |
| | | | |
| Analogue | 1 | Register | 513 (1+512) |
| Analogue | 2 | Register | 514 (2+512) |
| Analogue | ... | ... | ... |
| Analogue | 91 | Register | 603 (91+512) |
| Analogue | 92 | Register | 604 (92+512) |
| | | | |
| Integer | 1 | Register | 641 (1+128+512) |
| Integer | 2 | Register | 642 (2+128+512) |
| Integer | ... | ... | ... |
| Integer | 116 | Register | 746 (116+128+512) |
| Integer | 117 | Register | 747 (117+128+512) |

NOTE: Modbus address means the address received in the package sent by the supervisor.

6.2.7 Database seen from the Modbus supervisor

In the Modbus supervisor, the operator must reserve 25 bytes for the digital variables (200 digital variables) and 512 bytes for the analogue variables (128 analogue and 128 integer variables), a total of 456 variables for each peripheral.

The Gateway sends any variables not present on the peripheral, if required by the supervisor, with the value 0.

In this way, the traffic on the line is greater than necessary, yet this maintains the general nature of the application, in the sense that the database is sized for the Carel peripheral with the greatest number of variables.

6.2.8 Error codes

The error messages returned by the Gateway conform to the Modbus specifications, which involve the retransmission of the function code, with the more significant bit set to 1, and the following byte indicating the type of error.

The following commands are implemented in the Gateway program:

| Code | Modbus description | Condition |
|------|--------------------|--|
| 1 | Illegal function | Message not supported or number of variables required greater than limit allowed |
| 4 | Failure in device | Peripheral not yet initialised or not present |

Table. 6.2.8.1**WARNING**

Please note that each Gateway is seen by the Modbus supervisor as a **single** Modbus peripheral, and that each Gateway may in turn control a network of 16 peripherals communicating with the Carel protocol.

The Gateway responds to the Modbus supervisor with the **code 4** message error when a request is made for a variable from a peripheral in the Carel network that is off-line.

The Modbus supervisor, based on the address of the requested variable to which the error corresponds, is able to identify which Carel sub-network peripheral has been interrogated and considers only that one to be off-line.

In fact, all the peripherals that are still on-line continue to respond (via the Gateway) to the requests from the supervisor.

7. Connection cables and hardware settings

7.1 Connection cables

7.1.1 Connection cables from Gateway - Carel peripherals in RS485 mode

- The connection cable from the Gateway to the Carel peripherals (Carel Net connector) in **RS485** mode recommended by Carel must feature:
- twisted pair,
- shielded, preferably with continuity wire,
- cross-section AWG20 (0.5 mm²) or AWG22 (0.32±0.38 mm²),
- capacitance between the wires less than 100pF/m
(Belden models 8761 and 8762, for example, meet the above requisites)
- with the following pin layout:

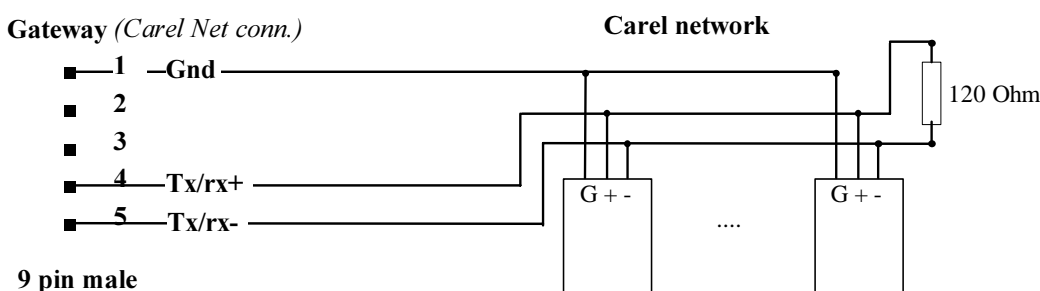


Fig. 7.1.1.1 - Connection in 485 mode

7.1.2 Connection cables from Gateway - Carel peripherals in RS422 mode

The connection cable from the Gateway to the Carel peripherals (Carel Net connector) in **RS422** mode recommended by Carel (code 98C136C004) must feature:

- 6 wires,
- shielded, preferably with continuity wire,
- cross-section AWG24.
- with the following pin layout:

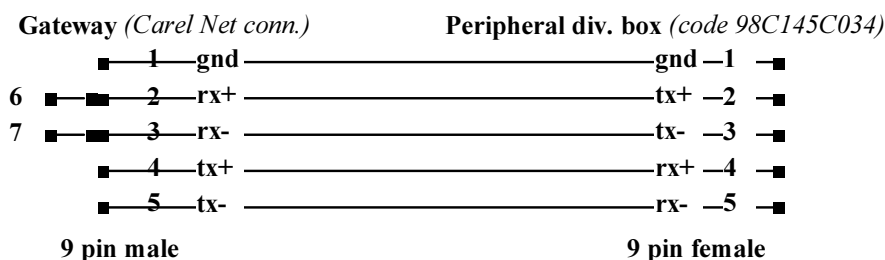


Fig. 7.1.2.1 - Connection in 422 mode

WARNING. Pay attention to pins 6 and 7 of the connector on the Gateway side. These must be short-circuited as shown in the figure: 6 short-circuited with 2; 7 short-circuited with 3.

7.1.3 Connection cables from Gateway - configuration terminal

This cable allows the Gateway (config connector) to be connected to a terminal or computer for the initial configuration using the program loaded on the diskette supplied. Once the configuration is completed, the cable should be removed.



Fig. 7.1.3.1

7.1.4 Connection cables from Gateway - supervisor PC in RS232 mode

The connection cable between the Gateway and the supervisor PC in Modbus may be an RS232 standard (connected to the modem connector) or alternatively RS485 (connected to the rs422/485 connector).

The following diagrams show the **RS232** connection:

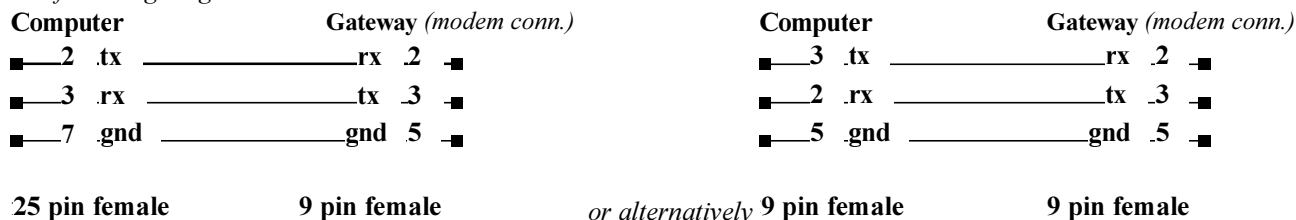


Fig. 7.1.4.1

In any case refer to the specifications of the supervisor PC for other types of connection. The Gateway manages only the tx and rx signals.

7.1.5 Connection cables from Gateway - supervisor PC in RS485 mode

The connection cable between the Gateway and the supervisor PC in Modbus may be an RS232 standard (connected to the modem connector) or alternatively RS485 (connected to the rs422/485 connector).

The following diagrams show the **RS485** connection:

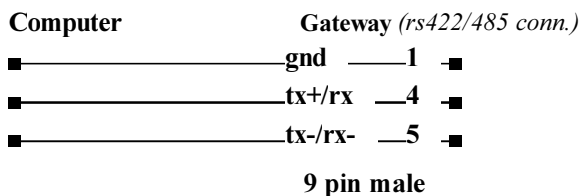


Fig. 7.1.5.1

The pin layout on the PC side is not shown, in that this varies depending on the supervisory system used.

7.2 Jumpers

Opening the cover of the Gateway (refer to the warnings described in **Installation**) allows access to the four jumpers present on the board, marked A, B, C, D, the meanings of which are shown in the following table.

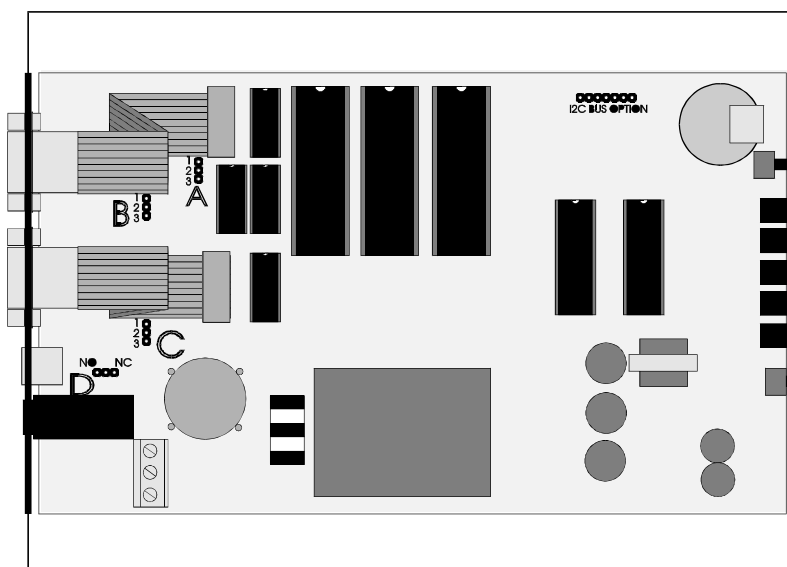


Fig. 7.2.1

The meanings of the jumpers A, B, C, D shown in Fig. 7.2.1, are the following:

| Jumpers | Description | Managed in the Modbus Gateway |
|--------------------------|--|--------------------------------------|
| <i>A in position 1-2</i> | <i>enable 232 serial port to the supervisor (consequently disabling RS422/485 mode and the corresponding port)</i> | yes |
| <i>A in position 2-3</i> | <i>enable RS422/485 serial port to the supervisor (consequently disabling 232 mode and the corresponding modem port)</i> | yes |
| <i>B in position 1-2</i> | <i>if jumper 'A' is in position 2-3, enables communication in 485 mode with output through the RS422/485 port</i> | yes |
| <i>B in position 2-3</i> | <i>if jumper 'A' is in position 2-3 enables communication in 422 mode with output through the RS422/485 port</i> | no |
| <i>C in position 1-2</i> | <i>enable communication to the network of Carel instruments (output through the carel net port) in 485 mode</i> | yes |
| <i>C in position 2-3</i> | <i>enable communication to the network of Carel instruments (output through the carel net port) in 422 mode</i> | yes |
| <i>D in position NO</i> | <i>the signal relay is Normally Open (power relay 30W/50VA - 1A)</i> | no |
| <i>D in position NC</i> | <i>the signal relay is Normally Closed (power relay 30W/50VA - 1A)</i> | no |

Table. 7.2.1

In summary

Position of the jumpers for communication to the Carel peripherals:

| Jumpers | Carel side in 485 | Carel side in 422 |
|----------------|--------------------------|--------------------------|
| <i>C</i> | <i>1-2</i> | <i>2-3</i> |

Table. 7.2.2

Position of the jumpers for communication to the supervisor:

| Jumpers | Modbus side in 232 | Modbus side in 485 |
|----------------|---------------------------|---------------------------|
| <i>A</i> | <i>1-2</i> | <i>2-3</i> |
| <i>B</i> | <i>indifferent</i> | <i>1-2</i> |

Table. 7.2.3

7.3 Default configuration

The default configuration sees the following connections:

- 232 to the computer for configuration,
- 485 to the Modbus supervisory system,
- 485 to the Carel network (starting from software version 2.0)

Power supply 240Vac

8 Technical specifications

| | |
|------------------------------------|---|
| Power supply | The power supply options available (can be selected using faston terminals inside the box) are: 240Vac (+10%, -15%) <u>default</u> 120Vac (+10%, -15%) 24Vac (+10%, -15%) |
| Power | 5VA |
| Operating temperature | 0 ÷ 60 °C |
| Storage temperature | -10 ÷ 70 °C |
| Operating conditions | 0 ÷ 85%RH non-condensing |
| Storage conditions | 0 ÷ 80%RH non-condensing |
| Microprocessor | Intel 8032, 12 MHz |
| Program | resident in 64KB EPROM. |
| Hardware configuration | The default configuration features the following connections: RS232 to the computer for configuration RS485 to the Modbus supervisor PC (jumper A in 2-3 and B in 1-2) RS485 to the network of Carel peripherals |
| Protocol on peripheral side | RS422/RS485 with Carel private communication protocol |
| Protocol on supervisor side | RS232/RS485 with Modbus-Jbus communication protocol |

Table. 8.1

8.1 Mechanical dimensions

The following shows the dimensions of the Gateway case (mm)

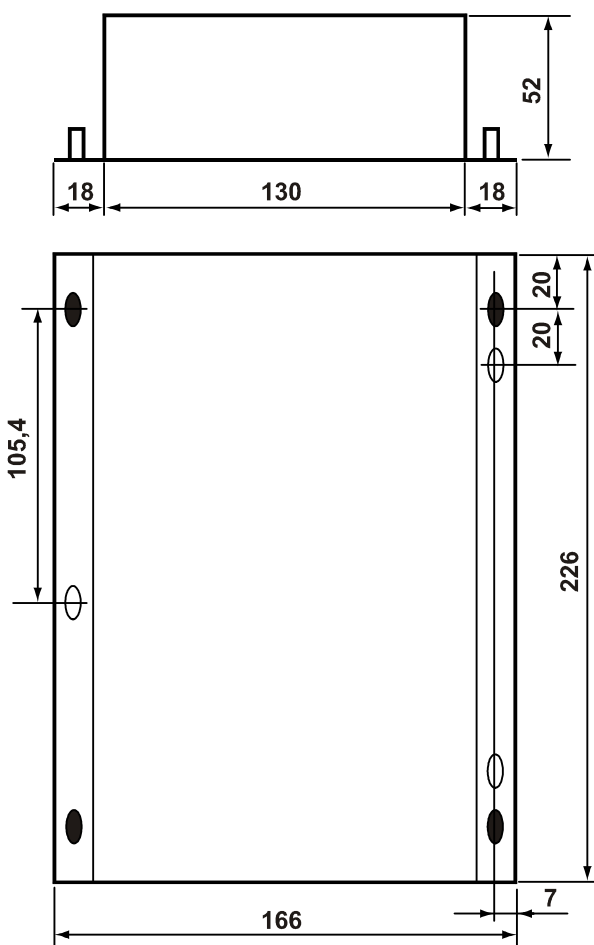


Fig. 8.1.1

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