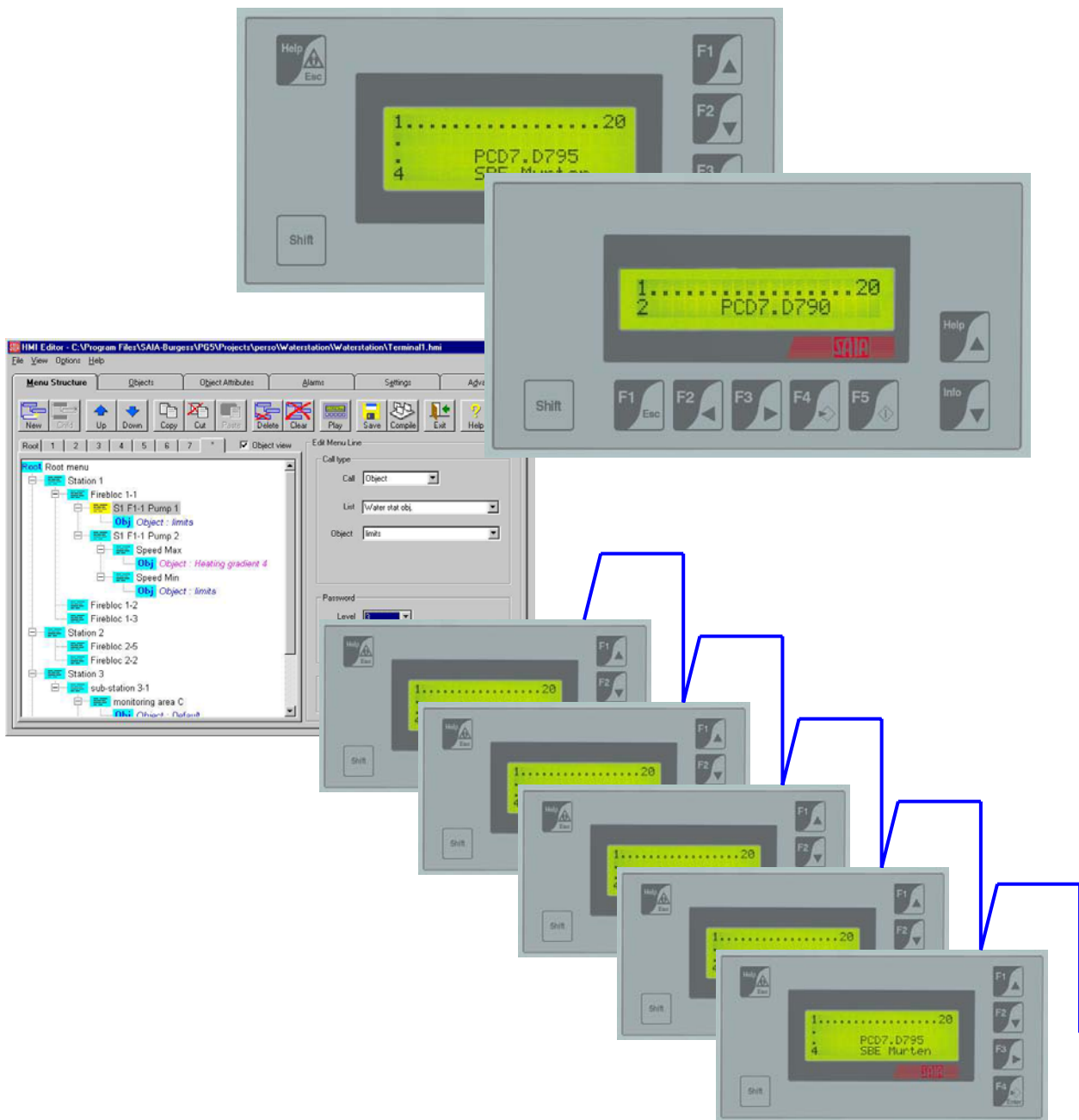


PCD7.D790 and PCD7.D795 with "protocol-free terminal driver" text terminals manual



Contents:

Sections 1 to 9 : Relevant when terminals are used with the HMI-Editor

Sections 10 and 11 : Advanced level information
(not relevant for use with the HMI-Editor).

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1 - General notes

PCD7.D790 and PCD7.D795 terminals dated 01/ 2002 (week 01 * of year 2002) and after are supplied with the protocol-free terminal driver.

The protocol-free terminal driver enables these terminals (PCD7.D790 and D795) to be used as PCD7.D170, D202 or D250 type terminals. This means that they will be fully integrated into the SAIA PCD environment and thus supported by the

HMI-Editor programming tool (from version 1.1.100)

with all its utilities for exchanging resources, etc..

Terminals manufactured after 01 / 2002, are therefore already set up for use with the HMI Editor .

However, terminals that do not have this driver (manufactured before 2002) can easily be converted. See explanation in sections 9 – 1 and 9 - 2.

It will not normally be necessary for you to know the description of the protocol-free terminal driver or its commands, since we strongly recommend using the HMI Editor to control these terminals. However, this manual includes a description of the driver and information about its display and keyboard commands.

2 – Quick Start.

2 – 1 Quick start for Multipoint terminal (RS 232)

Available with PCD7.D790

Key description
see chapter 5.1

F1 + F5 keys

VT-50 TERMINAL Vx.xx
READY

with or without READY according to the hw versions

VT Address: **00**
[Up] [Down] [Enter]

Baud Rate: **9600**
[Up] [Down] [Enter]

Param: **PN,8db,2sb**
[Up] [Down] [Enter]

VT-50 TERMINAL Vx.xx
READY

with or without READY according to the hw versions

Available with PCD7.D795

Key description
see chapter 5.2

Esc + F4 keys

VT-60 TERMINAL Vx.xx
READY

with or without READY according to the hw versions

VT Address: **00**
[Up] [Down] [Enter]

Baud Rate: **9600**
[Up] [Down] [Enter]

Param: **PN,8db,2sb**
[Up] [Down] [Enter]

VT-60 TERMINAL Vx.xx
READY

with or without READY according to the hw versions

Turn ON the terminal
(further info see section 8 – 1)

then press the
following keys together:

the first screen shows

first screen

press enter

address **00** is required

change with ▲ ▼
then press enter

Transmission rate by default
9600 bit/s

change with ▲ ▼
then press enter

Parameters **PN,8db,2sb** is
required
(Parity none, 8 data bit, 2 stop
bits)

change with ▲ ▼
then press enter

last screen

Go to RS 232 connection on
section 8 - 2

2 – 2 Quick start for bus terminals (RS 485)

Available with PCD7.D790

Key description
see chapter 5.1
F1 + F5 Keys

VT-50 TERMINAL Vx.xx
READY

with or without READY
according to the
HW versions

VT Address: **01**
[Up] [Down] [Enter]

Baud Rate: **9600**
[Up] [Down] [Enter]

Param: **PN,8db,2sb**
[Up] [Down] [Enter]

VT-50 TERMINAL Vx.xx
READY

with or without READY acc-
ording to the hw versions

Available with PCD7.D795

Key description
see chapter 5.2
Esc + F4 Keys

VT-60 TERMINAL Vx.xx
READY

with or without READY
according to the
HW versions

VT Address: **01**
[Up] [Down] [Enter]

Baud Rate: **9600**
[Up] [Down] [Enter]

Param: **PN,8db,2sb**
[Up] [Down] [Enter]

VT-60 TERMINAL Vx.xx
READY

with or without READY acc-
ording to the hw versions

Turn ON the terminal
(further info see section 8 – 1)

then press the
following keys together:

the first screen shows

first screen

press enter

addresses must be
between **01** and **31**
(as many terminals, as many
different addresses)

Change with ▲ ▼
then press enter

Transmission rate **9600** bit/s
is required

change with ▲ ▼
then press enter

Parameters **PN,8db,2sb** is
required
(Parity none, 8 data bit, 2 stop
bits)

change with ▲ ▼
then press enter

last Windows

Go to RS 485 connection on
section 8 - 3

3 –Using with HMI-Editor (an add-on tool PG5)

3 – 1 Software versions

Software PG5 V 1.1 and HMI editor V1.1 are required

In the setting tab of the HMI-Editor,
select serial line then
select type of serial line: "RS 485 short timing"

RS 485 short timing is recommended (that means MC5 Mode)

3 – 2 Firmware versions and restrictions

Only firmware version with MC5 mode is recommended to use these terminals with RS 485 Network connection.

See the table of firmware version with MC5 mode.

Systems	Actual \$ Version	Next official version
PCD1.M1xx	\$71 → ..	080
PCD2.M110 & PCD2.M120	\$81 → ..	090
PCD2.M150	\$B1 → ..	0C0
PCD2 and PCD4.M170*	\$0D → ..	010
PCD2.M910*	\$71 → (all versions)	080
PCD4.Mxx0	--	-- (no update anymore)
PCD4.M1x5 PCD4.M445	-- (next \$ version, \$E1)	--
PCD6.M100 & PCD6.M2x0	--	-- (no update anymore)
PCD6.M540	--	-- (no update anymore)
PCD6.M300	-- (next \$ version \$31)	040
PCS1.C8xx*	\$85 → (all versions)	090

* From now on these systems are delivered with \$ version.
Other \$ version are delivered on request.

4 – Single terminal / Multipoint RS 232 or Bus terminals RS 485

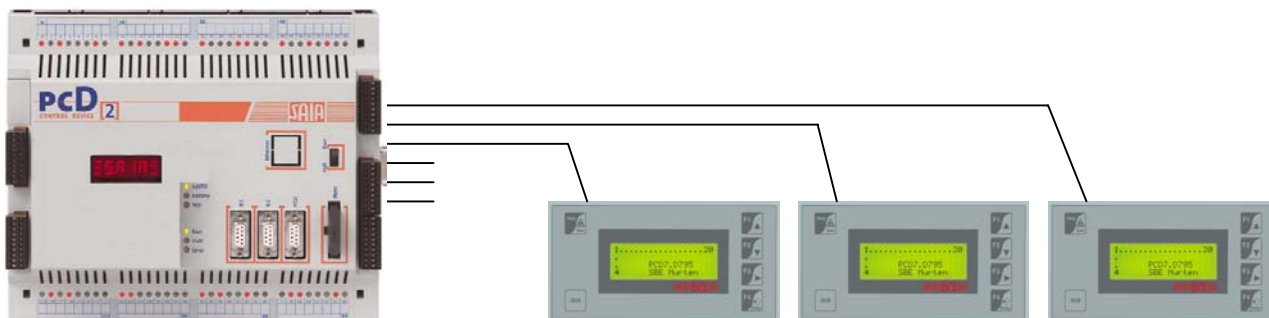
Using this driver and connecting the terminal to an intelligent peripheral (PCD), you can transmit characters to the terminal which are then displayed. Alternatively, by pressing keys on the terminal, you can transmit characters to the connected peripheral.

This terminal driver is described as "protocol-free" because the exchange of data between the terminal and the PCD does not follow any particular protocol. As characters arrive they are simply displayed and key depressions are sent to the serial port. The terminal is, in this case, both slave and master PCD.

Two different connections are possible between the D790 /D795 terminals and the PCD.

4 –1 Multipoint topology (RS 232)

Below is a diagram of connections between the PCD and up to 6 terminals of the same type.



See section 8 – 2: connection

Number of connections possible :
PCD2.M120/150 series: up to 4 RS 232
PCD2.M170 series: up to 6 RS 232 (including PGU)
available with PG5 V1.1

Port performance with PCD2.M170 series.
(instructions nop and sth)

- 1) with 5 ports @ 9600 bit/s (PGU not online)
instruction times: increase about + 10%
- 2) with 3 ports @ 19200 bit/s (PGU not online)
instruction times: increase about + 30%
- 3) with 6 ports @ 19200 bit/s (including PGU port)
instruction times: increase about + 70%

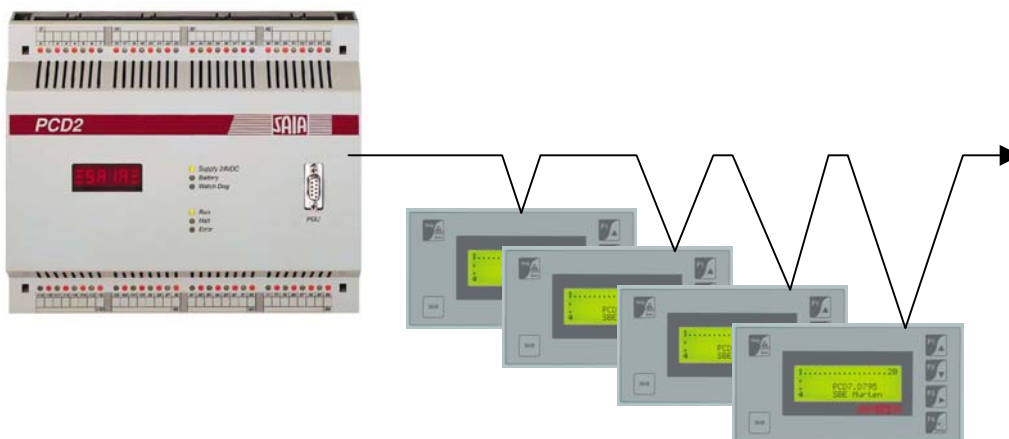
Address of terminals

The protocol-free terminal driver must be loaded on each terminal and they should have address 00, the default address.

4 - 2 Bus terminals topology RS 485 (network connection)

Terminals with the protocol-free terminal driver can also be part of an RS485 network, so that a PCD (master) can display or request information from different terminals which are connected together.

The following diagram shows a typical connection:



RS 485 link to a PCD and one to 31 terminals of the same type.
See section 8 – 3 : Connections

RT = termination resistance of 220 Ohms Max. terminals in network = 31 (+ the master).

Adresses

Each terminal connected in this network must have the protocol-free terminal driver loaded and a network address that is different from all other addresses in the network, but which is not zero. If the address is zero (default address) it will behave like a stand-alone terminal, i.e. as if it were not connected to a network.

Addresses between 1 and 31 are for networked terminals.

To "address a terminal" is to open communication with it. When a terminal has been addressed, it will respond to all commands just as if it were the only one connected to the PCD, while the other terminals will ignore anything passing through the network.

NOTE: The protocol-free terminal driver allows up to 31 PCD7.D790 or D795 terminals to be connected in a network with just one PCD. See chapter 8.3 "RS485 connection (B)".

Port performance with PCD2.M170 series.(instructions nop and sth)

with 5 ports @ 9600 bit/s (PGU not online)
instruction times: increase about + 10%

Transmission rate with RS 485 network connection:

9600 bit/s max is required with the PCD7.D790 or D795 terminals

5 – PCD7.D790 and D795 terminal keyboards

5 – 1 PCD7.D790 keyboard

by pressing the Keys

Keys	Function
Shift + F1	Function key F1
Shift + F2	Function key F2
Shift + F3	Function key F3
Shift + F4	Function key F4
Shift + F5	Function key F5

by pressing the Key

Key	Function
F1	<i>escape</i>
F2	<i>Moves the cursor between field</i>
F3	<i>Moves the cursor between field / edit or move between number*</i>
F5	<i>Enter / edit*</i>
Help	<i>Moves the cursor / increment a number*</i>
info	<i>Moves the cursor / decrement a number*</i>

5 – 2 PCD7.D795 keyboard

by pressing the Keys

Keys	Function
Shift + F1	Function key F1
Shift + F2	Function key F2
Shift + F3	Function key F3
Shift + F4	Function key F4

by pressing the Key

Key	Function
F1	<i>Moves the cursor / increment a number*</i>
F2	<i>Moves the cursor / decrement a number*</i>
F3	<i>Moves the cursor /edit or move between number*</i>
F4	<i>Enter / edit*</i>
Esc	<i>escape</i>

* to enter a value or a password and change a status

5 – 3 Password numbers without keyboard

- Edit "root menu" in the HMI-Editor

- 1) Edit "root menu" and enter the variable "code" and the format "visible".
- 2) In the tab "settings", open the screen "password" and select a fix number of digits (4 digits or 8 digits).

- Enter a password numbers without keyboard

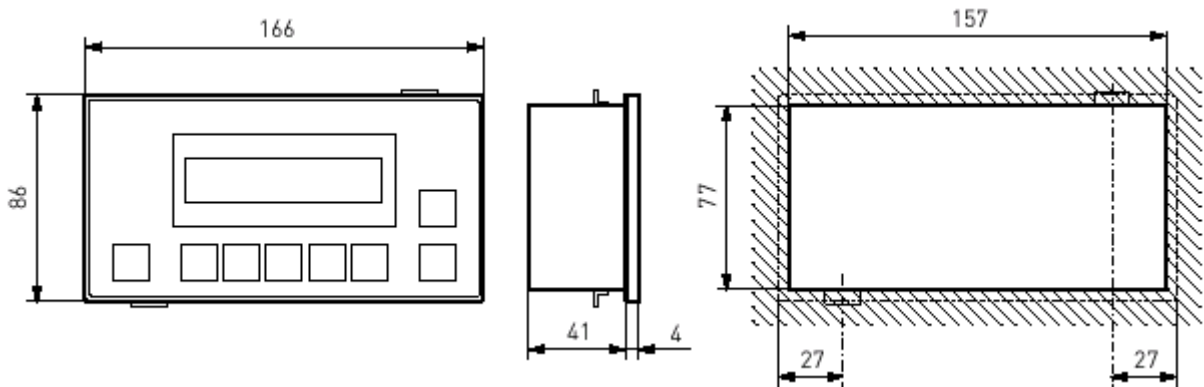
- 1) Press the keys ▲ and ▼ on terminal to increment and decrement the value. and press the key ▶ to move to the next digit, repeat the procedure or press enter when it is finished.

6 – Technical description

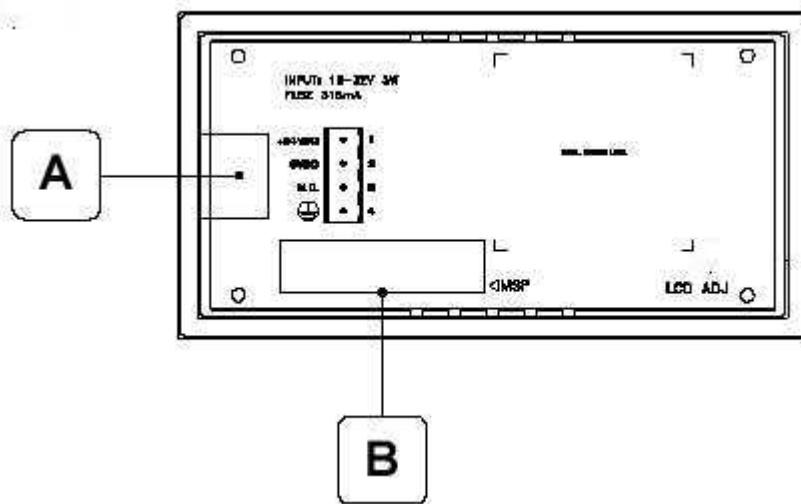
Type designation	PCD7.D790 3)	PCD7.D795 3)
Display	2 ×20 characters 74 ×12 mm	4 ×20 characters 70 ×21 mm
Type		
Display dimension (w x h)	5 ×7 pixels 2.95 ×4.75 mm	5 ×7 pixels 2.95 ×4.75 mm
Character size (w ×h)		
Contrast adjustment	potentiometer	potentiometer
Back-lighting	–	–
Character fonts	ASCII (0 ...127)	ASCII (0 ...127)
Keyboard		
Function keys,customizable	5	4
LEDs for function keys	-	-
System keys /numeric keys	8	6
Alphanumeric keys	-	-
Diagnostic LEDs	-	-
Memory		
Text and data	Entire text and data memory of PCD controller, i.e.from max.140 KByte for PCD1 to max.1 Mbyte for PCD2/4.M17n.and PCD6	
Interfaces		
to SAIA @PCD	RS 232 /RS 485 25-pole,D-type	
Performance and programming		
Performance features	All performance features of PCD controllers are also available for terminals, such as:up to 8000 texts,data in any format,alarm handling,password protection,real time clock	
Programming software	HMI-Editor 5)	HMI-Editor 5)
General data		
Supply voltage Un	24 VDC –25 %/+30 %	24 VDC –25 %/+30 %
Power consumption at Un	5 W	5 W
Interference immunity	CE mark according to EN 50 081-1 and 50 082-2	
Protection class (front)	IP 65	IP 65
Operating temperature	0 ...50 °C	0 ...50 °C
Storage temperature	–20 ...+60 °C	–20 ...+60 °C
Humidity (without condensation) DIN 40 040 class F	=85 %	=85 %

- 3) Version with "free terminal protocol " is required..
5) HMI-Editor from V 1.1 is required.

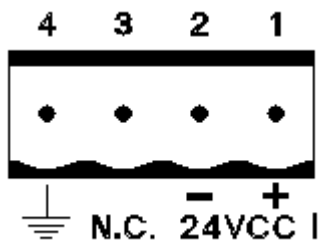
7 - Dimensions



8 – Connections



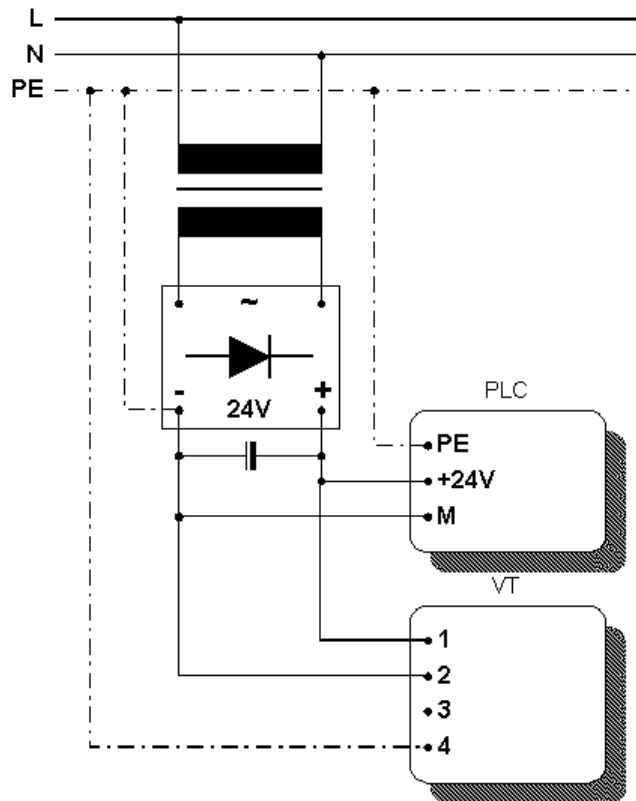
8- 1 Power connection (A)



4-pole power connector

- 1 +L Power input 24VCC
- 2 M Power input 0 V
- 3 N.C.
- 4 PE Protective Earth

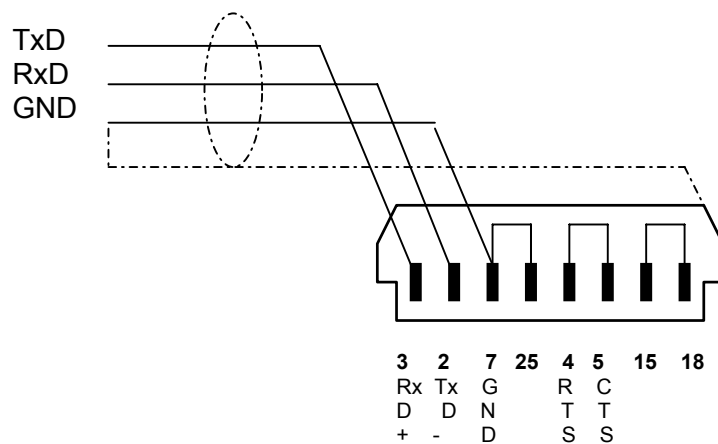
IMPORTANT
 Correct grounding is an absolute requirement.



Power supply with 0V (M) wired to PE

8 – 2 RS 232 connection (B)

Wiring diagram for RS 232 link between one terminal (D-type, 25 pin) and one PCD.

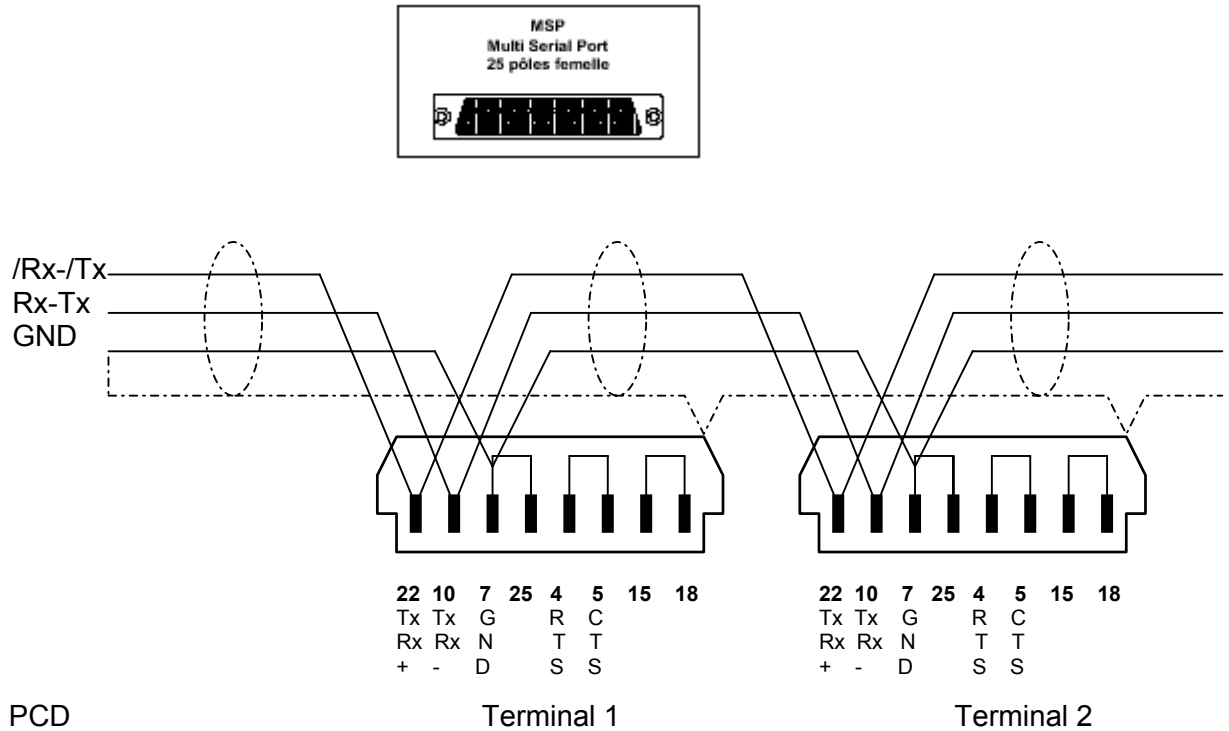


PCD

terminal

8 – 3 RS 485 connection (B)

Wiring diagram for RS 485 connection between 1 to 31 terminals (D-type, 25 pin) and one PCD.



RT = recommended line termination resistance : 220 Ohm max.(between TxRx+ and TxRx-)

8 – 4 MSP serial port

The MSP (Multi Serial Port) is present on PCD7.D790 and D795 terminals and is used to connect other devices including the PC used to transfer the project. It consists of a connector (D-Sub 25 pin female) and can communicate using RS232, RS485, (as well as RS422 and C.L./TTY-20mA).

MSP
Multi Serial Port
25 pin female



Pin	Signal	Notes
1	N.C.	Not connected
2	Tx OUT	RS232
3	Rx IN	RS232
4	RTS OUT	RS232
5	CTS IN	RS232
6	N.C.	Not connected
7	Signal GND	Internal reference 0Volt
8	N.C.	Not connected
9	Tx +OUT	C.L. (TTY-20mA) Current loop
10	Tx/Rx -IN/OUT	RS485
11	Tx -OUT	C.L. (TTY-20mA) Current loop
12	Tx -OUT	RS422
13	Rx +IN	RS422
14	IKT OUT	C.L. (TTY-20mA) Current loop
15	IKR OUT	C.L. (TTY-20mA) Current loop
16	+5Vdc (150mA Max.)	Reserved
17	N.C.	Not connected
18	Rx +IN	C.L. (TTY-20mA) Current loop
19	N.C.	Not connected
20	N.C.	Not connected
21	N.C.	Not connected
22	Tx/Rx +IN/OUT	RS485
23	Tx +OUT	RS422
24	Rx -IN	RS422
25	Rx -IN	C.L. (TTY-20mA) Current loop

! Pin 16 does not provide for commuting any kind of load (coils etc.); an input disturbance at Pin 16 can cause the terminal and therefore also the industrial process itself to malfunction.

! Strong input disturbances at Pin 16 could damage the terminal.

! Before connecting in RS422/485, check the polarities. With some devices the Tx+/Rx+ and Tx-/Rx- signals or the polarities are inverted.

9 - Transfer of protocol-free terminal driver to older PCD7.D790 / D795 terminals

This section describes how to transfer the protocol-free terminal driver to old terminals (REV.2) that do not already have it (i.e. PCD7.D790 and D795 terminals produced before 01/2002. This capability is reserved for users of PCD8.D81W software (VTWIN).

9 – 1 Setting up the terminal to receive

To prepare for the transfer, proceed as follows:

- Make sure the terminal is switched off.
- Check the serial connection (RS 232) between PC and terminal.
The cable to connect a PC to a terminal connection has ESA reference: CVCOM11102
 - This cable is supplied with the PCD8.D81W software and has the following configuration:

<u>D-type, 9 pin (PC side)</u>		<u>D-type, 25 pin (terminal side)</u>
3 (TxD)	↔	3 (RxD)
2 (RxD)	↔	2 (TxD)
5 (GND)	↔	7 (GND) ↔ 25
7 (RTS) ↔ 8 (CTS)		4 (RTS) ↔ 5 (CTS)
6 (DSR) ↔ 4 (DTR)		15 ↔ 18

- Turn on the terminal while pressing the F5- (for a PCD7.D790) or F4-key (for a PCD7.D795) and wait a few moments until the display shows: "VT 50 service page" or "VT 60 service page"

When it starts up, the protocol-free terminal driver has the following default communications parameters:

Transmission rate	9600 bit/s
Parity	N
Data bits	8
Stop bits	2

These default parameters are required for the transfer.

The display is now ready to receive the driver.

(These parameters can be modified by following the procedure described in section 11 - 3: Modification of serial port parameters via the keyboard.)

9 – 2 Downloading the protocol-free driver into the terminal

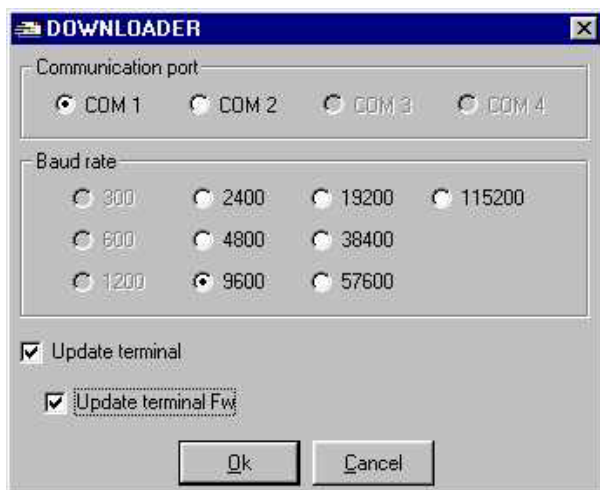
It is not possible to download to more than one terminal at a time.
The VTWIN software must be installed on the PC so that the driver can be accessed.

A – Execute program "Free terminal.exe" or click on "PCD8.D81W" then "free terminal"



Select always VT 50 (Rev.2) if the terminal you are using is a PCD7.D790 (Rev 1 or Rev 2) or select always VT 60 (Rev.2) for a PCD7.D795 (Rev 1 or Rev 2).

B - Select the communications port used by the PC.



Select the data transfer speed.

then tick the checkbox
 Update terminal Fw.

This enables the protocol-free terminal driver to be transferred.

C – Check the terminal.

Turn OFF then turn ON the terminal.

The display should show :

With PCD7.D790 (Rev 1)

VT-50 TERMINAL Vx.xx

or

With PCD7.D795 (Rev 1)

VT-60 TERMINAL Vx.xx

OR

With PCD7.D790 (Rev 2)

VT-50 TERMINAL Vx.xx
READY

or

With PCD7.D795 (Rev 2)

VT-60 TERMINAL Vx.xx
READY

with or without READY
according to the hw versions

9 – 3 Use of PCD7.D790 and D795 terminals with PCD8.D81W

These terminals can be used with PCD8.D81W program.

A – execute the PCD8.D81W program

B – write the project

After compiling the project, do not forget to download the right firmware.

To do this, tick the checkbox

Update terminal Fw

This enables the right firmware to be transferred for use with the PCD8.D81W program.

10 - Description of the "protocol-free terminal driver"

This part of the manual (sections 10 and 11) is intended for those who are not yet using the HMI Editor programming tool.

10 – 1 Control characters of the open terminal

PCD7.D790 and D795 terminals provide a set of characters which, when transmitted in the correct manner, assume the function of commands and cause the VT to execute specific operations.

To be recognized as a command, characters must be preceded by the control character <ESC> and terminated by the control character <EOT>.

The following table lists the control characters that can be used and the commands.

Character	Code	Meaning	Effect
<BS>	8	Backspace	Moves cursor back, deleting the character.
<CR>	13	Carriage return	Returns cursor to margin and executes a line feed.
<LF>	10	Line feed	Executes a line feed.
<ESC>	27	Escape	Signals the start of a command.
<EOT>	4	End of text	Signals the end of a command. Can be used to clear the terminal.

NOTE: If the <EOT> character is sent several times in succession, it can be used to clear a terminal that has been jammed by the transmission of invalid commands.

The special characters <ESC> and <EOT> signal respectively the start and end of a command transmitted to the terminal.

11 - The commands

11 – 1 Display commands

Commands can be transmitted by a connected peripheral device that enable certain terminal features to be used or special functions executed.

A command is bracketed between the characters <ESC> and <EOT> forming the syntax:
<ESC>Command and parameters<EOT>

A command can be up to 32 characters long, including its parameters and the ESC and EOT characters.

Command	Parameters	Effect
<ESC>Y<EOT>	--	Check connection between terminal and peripheral. If the connection is correct, the terminal responds with the string "OK"
<ESC>C<EOT>	--	Clears the display, repositioning the cursor at 0.0
<ESC>Ayyxx<EOT>	yy = 0...1 (D790) yy = 0...3 (D795) xx = 0...19(D790 and D795)	Positions the cursor at the yy.xx coordinates
<ESC>Bss<EOT>	ss = 00 -> cursor off 01 -> cursor flashing (default)	Modifies the status of the cursor: off / flashing
<ESC>Fddxx<EOT>	dd = 00 -> up 01 -> right 02 -> down 03 -> left xx = no. of character/line spaces	Moves cursor relative to current position.
<ESC>Z<EOT>	--	Clears display and repositions cursor at 0.0. Same as C command
<ESC>Pbbpp<EOT>	bb = 00 -> 300 01 -> 600 02 -> 1200 03 -> 2400 04 -> 4800 05 -> 9600 (default) 06 -> 19200 07 -> 38400 08 -> 57600 09 -> 115200 pp = 00 -> EVEN, 7, 1 01 -> EVEN, 7, 2 02 -> EVEN, 8, 1 03 -> EVEN, 8, 2 04 -> ODD, 7, 1 05 -> ODD, 7, 2 06 -> ODD, 8, 1 07 -> ODD, 8, 2 08 -> NONE, 7, 1 09 -> NONE, 7, 2 10 -> NONE, 8, 1 11 -> NONE, 8, 2 (default)	Set of serial communication parameters Parameter bb = transmission rate in Bit/s 9600 bit/s is required with D790/795 with RS 485 network connection Parameter pp = parity Meaning of numeric values: 7, 1 means 7 data bit & 1 stop bit 8, 2 means 8 data bit & 2 stop bit etc. pp = 11 is default, i.e. N = no parity check, 8 data bit & 1 stop bit

11 – 2 Keyboard commands

Whenever a key is depressed, the associated code is transmitted to the serial port for verification by the peripheral device connected to it.

The code transmitted depends on whether or not the SHIFT key is also depressed.

KEY CODE TABLE (hexadecimal)

Terminal: PCD7.D790

Key	without SHIFT	with SHIFT
F1 / ESC	09	14
F2 / LEFT	04	15
F3 / RIGHT (edit)	02	16
F4 / --	0B	17
F5 / ENTER	0D	18
-- / UP	01	12
INFO / DOWN	03	10

Terminal: PCD7.D795

Key	without SHIFT	with SHIFT
F1 / UP	01	14
F2 / DOWN	03	15
F3 / RIGHT (edit)	02	16
F4 / ENTER	0D	17
-- / ESC	09	12

11 – 3 Modification of serial port parameters via the keyboard

Serial port parameters can also be modified via the terminal's keyboard. These parameters will then be saved in the terminal's non-volatile memory. It is not therefore necessary to reconfigure the terminal each time with the P command.

To enter the mode in which parameters can be programmed, press the <ESC> and <ENTER> buttons simultaneously while the terminal is in normal operation.

The terminal displays one after each other the parameters that can be modified.

1. Network address (00 to 31) of the terminal (see chapter 4 – 1 and 4 – 2).
Change with ▲ ▼ , then press enter.
2. Transmission rate over the serial interface (300 to 115200 Bit/s)
Change with ▲ ▼ , then press enter .
3. Parity (PE=even, PO=odd, PN=none), data bit (7db=7 bit, 8db=8 bit) and stop bit (1sb= 1 stop bit, 2sb=2 stop bit)
Change with ▲ ▼ , then press enter .

When <ENTER> is pressed for this third parameter, the system restarts with the new parameters. Each time it is powered up, the terminal will start with the new parameters.

Procedure if new values defined by error should NOT be saved:

- Do not press <ENTER> but switch power OFF / ON only.

NOTE:

If another software and/or project is loaded into the terminal, the parameters of the open terminal will be deleted and the next time the protocol-free terminal driver is loaded, the parameters will be reset to their default values, i.e.

Address	00
Transmission rate	9600 bit/s
Parity	N = none
Data bit	8
Stop bit	2

11 – 4 Activating a terminal

Command	Effect
<ESC>Ixx<EOT>	Activates (i.e. enables for communication) a terminal with protocol-free terminal driver in the network. xx = 01...31 : address of terminal.

Once this command has been received, the terminal with the specified address is preset to receive commands and characters over the serial line, while other terminals in the network ignore everything until another I command is transmitted.

The active terminal can be sent characters (that are displayed) and commands, according to the format shown on previous pages.

To close communication with this terminal, just activate another one (not necessarily a terminal which exists in the network).

11 – 5 Key code buffer of bus-terminals

In a terminal with the protocol-free driver connected as a stand-alone terminal, any key pressed is immediately sent to the serial port and received by the PC connected to it.

Operation is different for bus-terminals connected in a network. Keys must not be transmitted automatically over the network, because network transmission by more than one terminal at a time would result in conflict and the master (PC) would not understand what was happening. Consequently, the default behaviour of a bus-terminal (address 01 to 31) with the protocol-free terminal driver is as follows:

The keys are never transmitted serially.

The keys are stored in a buffer (64 keys in length) that can be read one key at a time using the following command:

Command	Effect
<ESC>T<EOT>	Requests a key from the key buffer within the terminal. The terminal's response is composed of 4 ASCII characters, with format "xxyy" xx = number (hexadecimal) of key codes (including the one being requested) present in the terminal's key buffer. yy = requested key code (hexadecimal).

For example: if the terminal's buffer contained three keys (UP, DOWN and, RIGHT), the first time the command <ESC>T<EOT> was sent, the terminal would respond with "0331" (3 keys in the buffer, the first with the code 01h). With the second command <ESC>T<EOT>, the response would be "0203" (2 keys, code 03h). The answer for the third command <ESC>T<EOT> would be "102" (1 key, code 02h).

Subsequent commands <ESC>T<EOT>, will be answered by the terminal with "0000" to indicate that no more key codes are in the buffer.

The default behaviour of bus-terminals connected in a network can be modified with the following command:

Command	Effect
<ESC>Dkkmm<EOT>	Modifies the behaviour of bus-terminals in a network. kk = 00 no key is ever sent over the serial port (default) kk = 01 sends the key over the serial port only when the terminal is addressed or has the address zero. mm = 00 always stores the key in the key buffer within the terminal (default) mm = 01 stores the key in the buffer only when the terminal is not being addressed.

The terminal's key buffer can be read using the command <ESC>T<EOT> as seen above.