



Terminal D400

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Advanced user manual

Index

∂.	FOREWORD TO THE ADVANCED USER MANUAL	2-	-7
10.	PROGRAMMING OF SERIAL LINE COMMUNICATION	2-	.9
	10.1 Symbols used		
	10.2 Strings		
	10.2.1 Cb (or Bilanciai) string		
	10.2.2 Extended string		
	10.2.3 Extraction string		
	10.2.4 Visual string		
	10.2.5 Idea string		
	10.2.6 Cma		
	10.2.7 On request with address	2-1	5
	10.3 Protocols for cyclic strings	2-1	6
	10.3.1 ACK-NAK protocol		
	10.3.2 Cyclic protocol		
	10.3.3 On request protocol		
	10.4 Remote commands protocol		
	10.4.1 Reply to an incorrect command		
	10.4.2 Reply to a correct command		
	10.4.3 Suspension of cyclic transmission		
	10.4.4 Resumption of cyclic transmission		
	10.4.5 Request for gross weight		
	10.4.6 Request for net weight		
	10.4.7 Request transmission of tare	2-1	9
	10.4.8 Request transmission of scale status		
	10.4.9 Request transmission of scale status (version EV2001)	2-2	21
	10.4.10 Scale zeroing		
	10.4.11 Tare acquisition	2-2	21
	10.4.12 Tare entering	2-2	21
	10.4.13 Cancellation of an entered tare	2-2	22
	10.4.14 Request transmission of general data table		
	10.4.15 Request for general data item "n"	2-2	22
	10.4.16 Request to enter the value "y" in the general data item "n"	2-2	22
	10.4.17 Request for transmission of the net weight and the scale status	3	
		2-2	22
	10.4.18 Request for transmission of net weight and scale status with 6	byte	S
		2-2	24
	10.4.19 Request for transmission of the net weight, tare and scale state	us	
	with 6 bytes	2-2	25
	10.4.20 Print request	2-2	25
	10.4.21 Read last weight acquired	2-2	25
	10.4.22 Cancel last acquired weight		
	10.4.23 Request division value	2-2	25
	10.4.24 Request for net weight in high resolution	2-2	26
	10.4.25 Request for maximum capacity value		
	10.4.26 Request for net weight without unit of measurement		
	10.4.27 Lock keypad and display		
	10.4.28 Unlock keypad and display		
	10.4.29 Lock keypad	2-2	27

	10.4.30 Unlock keypad	2-27
	10.4.31 Remote commands with checksum	
	10.4.32 Remote commands with addressing	2-28
	10.5 Remote commands for Input/Output management	
	10.5.1 How to set a single output	2-29
	10.5.2 How to zero-set a single output	
	10.5.3 How to test a single output	
	10.5.4 How to test a single input	2-32
	10.5.5 How to test all the outputs	
	10.5.6 How to change the status of all the outputs	
	10.5.7 How to test all the inputs	
	10.6 Remote commands for digital cells	
	10.6.1 Request for cell points	
	10.6.2 Request for cell temperature	2-37
	10.6.3 Request for version and release of cell software	
	10.6.4 Request for power supply	
	10.6.5 Request for cell serial numbers	
	10.6.6 Request for angle calibration coefficient	
	10.6.7 Request for number of cells in system	
	10.6.8 Request for cell status	2-30 2-30
	10.6.9 Request for digital scale status	
	10.7 Communication in MPP operation	
	10.7.1 Operation	
	10.7.2 Weighing request from keypad with data transmission on complete	
	of operation	Z-44
	10.7.3 Weighing request from serial command with transmission on	0.47
	completion of operation	2-47
	10.7.4 Weighing request from keypad and transmission request from s	
	command	
	10.7.5 Weighing and transmission request from serial command	
	10.7.6 MP and MC remote commands with checksum	2-48
11.	PERSONALIZATION	2-49
	11.1 Foreword	
	11.2 Accessing the parameter configuration function	
	11.3 Language	2-49
	11.4 Setup menu	2-50
	11.4.1 Conditioned menu	
	11.4.2 Entering numeric data	
	11.4.3 Validating input data	
	11.4.4 NOT MODIFIABLE parameter or menu	
	11.4.5 NOT AVAILABLE parameter or menu	
	11.5 Overview of the menu tree	2-51
	11.6 Descriptions of the main menus and parameters	2-51 2-51
	11.6.1 Setup Menu/Scale/Configurations/Metrological	
	11.0.2 Setup Manu/ANALOGUE cools/Analogue cools parameters	∠-55 2 F.E
	11.6.3 Setup Menu/ANALOGUE scale/Analogue scale parameters	
	11.6.4 Setup Menu/DIGITAL scale/Digital scale parameters	
	11.6.5 Setup Menu/Scale/Calibration/Display data	
	11.6.6 Setup Menu/Scale/Test	2-5 <i>/</i>
	11.6.7 Setup Menu/Personalizations/Operating modes	
	11.6.8 Setup Menu/Personalizations/Operating modes/MPP operation	2-60

D400

11.6.9 Setup Menu/Personalizations/Outputs/Serial/Com xy	2-61
11.6.10 Setup Menu / Personalizations / Outputs / Serial / String // C	om xy
configuration	2-62
11.6.11 Setup Menu/Personalizations/Outputs/Input-Output	2-63
11.6.12 Setup Menu/Personalizations/Outputs/Analogue output	2-65
11.6.13 Setup Menu/Personalizations/Outputs/BCD	2-65
11.7 Test procedures	2-66
11.7.1 Terminal Tests/Serial Ports	2-66
11.7.2 Terminal Tests/Inputs-Outputs	2-66
11.7.3 Terminal Tests/Keypad	
11.7.4 Terminal Tests/Terminal Configuration Report	2-67
11.7.5 Terminal Tests/Analogue output	2-67
11.7.6 Terminal Tests/Battery	2-67
11.8 Repeater scale	2-68
11.8.1 Setup Menu/Repeater scale/Repeater scale parameters/Serial	
port/Com xy	2-68
11.8.2 Setup Menu/Repeater scale/Repeater scale parameters/String	2-69

D400

9. FOREWORD TO THE ADVANCED USER MANUAL

This manual describes the procedures for terminal personalization in order to adapt it to the specific weighing system in which it is installed. It contains the software commands used to interface the terminal with a PC, PLC and host computers in general.



The personalization operations described herein do not in any way influence weighing functions but, unless correctly performed, they may compromise the operation of the system as a whole. The operations described in this section of the manual should only be entrusted to qualified technicians with specialised experience in this field.

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10. PROGRAMMING OF SERIAL LINE COMMUNICATION

10.1 Symbols used

The following conventions are used to denote the characters used in serial line communication.

- ✓ Normal characters are indicated with their usual symbols.
- ✓ Control characters appear in brackets and are written in uppercase. For example:
 - <CR> indicates the carriage return character.
 - <SP> indicates the space character.
- Where necessary, the hexadecimal value of the character is given in numbers and uppercase letters.
 - For example: <CR>(0DH) o \$(24H).
- ✓ Variables are written in lower case between brackets.

For example:

<um>= unit of measurement.

This may assume the following values:

kg = kilogrammes

<SP>g = grammes

lb = pounds

<SP>t = tonnes

✓ Numeric fields are indicated with n and y, and may include initial spaces, a decimal point and a minus sign.

10.2 Strings

The terminal has two serial output ports which may be used for the connection of external devices, such as printers, personal computers, PLCs, etc.. The user can choose the type of transmission protocol to be used from among those already present on the terminal. The user may also personalize the serial transmission parameters using the specific menu (see *par. 11.6.10 on page 2-62*).

10.2.1 Cb (or Bilanciai) string

1 st character	\$(24H)	start string character
2 nd character	<\$>	s=stability s=0 weight stable s=1 weight not stable s=3 weight not valid (negative or overload)
3 rd -7 th character		net weight if the weight consists of more than 5 digits, the least significant digits will not be transmitted;
8 th character	<cr>(ODH)</cr>	end string character

The following protocols are available: Cyclic (see *par. 10.3.2 on page 2-16*), On request (see *par. 10.3.3 on page 2-16*), ACK-NAK (see *par. 10.3.1 on page 2-16*).

10.2.2 Extended string

1 st character	\$(24H)	start string character
2 nd -10 th character		net weight with sign and decimal point (if present)
11 th character	<sp>(20H)</sp>	space
12 th -20 th character		tare with sign and decimal point (if present)
21 st character	<sp>(20H)</sp>	space
22 nd -23 rd character	<um></um>	Unit of measurement
24 th character	<sp>(20H)</sp>	space
25 th character	<s1></s1>	scale status
26 th character	<s2></s2>	scale status
27 th character	<s3></s3>	scale status
28 th character	<s4></s4>	scale status
29 th character	<cr>(0DH)</cr>	
30 th character	<lf>(0AH)</lf>	

The characters <s1>, <s2>, <s3>, <s4> are ASCII characters that must be interpreted as hexadecimal values. Each character represents 4 bits of different significance; for example, the incoming ASCII character "A" must be interpreted as the hexadecimal digit "A";

1	0	1	0
bit3	bit2	bit1	bit0

When a bit assumes the value "1" the corresponding signal is "true"; the significance of the signals is as follows:

<s1></s1>	bit 0	minimum weighment signal	
	bit 1	tare locked signal	
	bit 2	tare preset(1)/self-weighed (0) entered signal	
	bit 3	centre zero signal	
<s2></s2>	bit 0	LSB weighing extension signal (ME only)	
	bit 1	weight stable signal	
	bit 2	overload signal	
bit 3		MSB weighing extension signal (ME only)	
<s3></s3>	bit 0	tare entered signal	
	bit 1	tare locked cancelled signal (ME only)	
	bit 2	weight not valid	
	bit 3	printing in progress	
<s4></s4>	bit 0	approved instrument	
	bit 1	converter fault	
	bit 2	scale configuration parameters error	
	bit 3	not utilised	

The following protocols are available: Cyclic (see *par. 10.3.2 on page 2-16*), On request (see *par. 10.3.3 on page 2-16*), ACK-NAK (see *par. 10.3.1 on page 2-16*), Remote commands (see *par. 10.4 on page 2-17*).

10.2.3 Extraction string

In the case of loading or unloading extraction operation, the net weight and tare (2nd to 10th characters and 12th to 20th characters in the Extended string) are replaced respectively by the extracted weight and gross weight characters.

1 st character	\$(24H)	start string character
2 nd -10 th character	0(30H)	extracted weight with sign and decimal point (if present)
11 th character	<sp>(20H)</sp>	space
12 th -20 th character		gross weight with sign and decimal point (if present)
21 st character	<sp>(20H)</sp>	space
22 nd -23 rd character	<um></um>	Unit of measurement
24 th character	<sp>(20H)</sp>	space
25 th character	<s1></s1>	scale status (see note)
26 th character	<s2></s2>	scale status (see note)
27 th character	<s3></s3>	scale status (see note)
28 th character	<s4></s4>	scale status (see note)
29 th character	<cr>(0DH)</cr>	
30 th character	<lf>(0AH)</lf>	

10.2.4 Visual string

1 st character	\$(24H)	start string character
2 nd character	0(30H)	fixed zero character
3 rd character	<\$>	s=stability s=0 weight stable s=1 weight not stable s=3 weight not valid (negative or overload)
4 th -8 th character		net weight with sign; if the weight consists of more than 5 digits, the least significant digits will not be transmitted; if the value includes a decimal point, the length of the string will be increased by 1 character
9 th character	<cr>(0DH)</cr>	end string character

10.2.5 Idea string

1 st character	<cis></cis>	cis=@(40H) Start string character on pressing o cis=\$(24H) Start string character in other cases
2 nd character	<\$>	s=stability s=0 weight stable s=1 weight not stable s=3 weight not valid (negative or overload)
3 rd -7 th character		net weight if the weight consists of more than 5 digits, the least significant digits will not be transmitted;
8 th character	<cr>(ODH)</cr>	end string character

10.2.6 Cma

Reserved string, not to be used. Further information supplied on ordering.

10.2.7 On request with address

Selecting this option disables the transmission of cyclic strings. Uses remote commands followed by terminal identification number (see par. 10.4.32 on page 2-28).

10.3 Protocols for cyclic strings

10.3.1 ACK-NAK protocol

The string is only sent on request of the user via the request

transmission key or from an external input (see *par. 11.6.11 on page 2-63*). After transmission of the weight, the terminal behaves as follows:

- ✓ if it receives the "ACK" character (06H), it awaits a new transmission request;
- ✓ if it receives the "NAK" character (15H), it sends the string again because the previous transmission was not completed successfully;
- ✓ if it receives three "NAK" characters in succession, the terminal displays the "NO ACK" message (transmission error).

10.3.2 Cyclic protocol

The selected string (see *par. 10.2 on page 2-10*) is transmitted cyclically at a rate of 3 times per second.

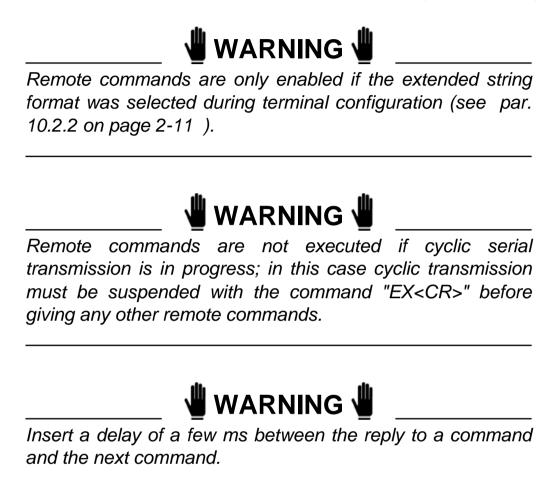
10.3.3 On request protocol

The selected string is transmitted:

- ✓ or on the activation of an input (see par. 11.6.11 on page 2-63).

10.4 Remote commands protocol

There are a number of serial line commands with which various operations can be commanded from a remote device (PC, PLC etc.).



10.4.1 Reply to an incorrect command

??<CR><LF>

This reply string is sent:

- ✓ if the command syntax is incorrect;
- ✓ if the command cannot be executed.

10.4.2 Reply to a correct command

In the case of the command being accepted, if the command requests the transmission of information, the reply will consist of the transmission of the requested data item; in other cases the reply will consist of the following string:

OK<CR><LF>

10.4.3 Suspension of cyclic transmission

This command is not available with the RS485 protocol, in which transmission is on request only

EX<CR>

10.4.4 Resumption of cyclic transmission

This command is not available with the RS485 protocol, in which transmission is on request only

SX<CR>

10.4.5 Request for gross weight

XB<CR>

The terminal responds with the following string:

n<SP><um><SP>B<CR><LF>

10.4.6 Request for net weight

XN<CR>

The terminal responds with the following string:

n<SP><um><SP>NT<CR><LF>

10.4.7 Request transmission of tare

XT<CR>

The terminal responds with the following string:

n<SP><um><SP>TE<CR><LF>

if the tare has been entered manually;

n<SP><um><SP>TR<CR><LF>

if the tare has been acquired.

10.4.8 Request transmission of scale status

XZ<CR>

The terminal responds with the following string:

<s1><s2><s3><s4><CR><LF>

The characters s1, s2, s3 and s4 are ASCII characters which must be interpreted as hexadecimal values. Each character represents 4 bits of different significance; for example, the incoming ASCII character "A" must be interpreted as the hexadecimal digit "A";

1	0	1	0
bit3	bit2	bit1	bit0

When a bit assumes the value "1" the corresponding signal is "true"; the significance of the signals is as follows:

<s1></s1>	bit 0	minimum weighment signal	
	bit 1	tare locked signal	
	bit 2	tare preset(1)/self-weighed (0) entered signal	
	bit 3	centre zero signal	
<s2></s2>	bit 0	LSB weighing extension signal (ME only)	
	bit 1	weight stable signal	
	bit 2	overload signal	
	bit 3	MSB weighing extension signal (ME only)	
<\$3>	bit 0	tare entered signal	
	bit 1	tare locked cancelled signal (ME only)	
	bit 2	weight not valid	
	bit 3	printing in progress	
<s4></s4>	bit 0	approved instrument	
	bit 1	converter fault	
	bit 2	scale configuration parameters error	
	bit 3	not utilised	

10.4.9 Request transmission of scale status (version EV2001)

XS<CR>

In the case of a positive reply, the terminal responds with the following string:

<s1><s2><CR><LF>

The characters s1 and s2 are ASCII characters that must be interpreted as hexadecimal values.

The bits indicate the scale status as follows.

<\$1>	bit 0	in range
	bit 1	weight stable
	bit 2	centre zero
	bit 3	displayed net weight
<s2></s2>	bit 0	not utilised
	bit 1	not utilised
	bit 2	not utilised
	bit 3	print request: the print key has been pressed or input n° 3 is activated.

10.4.10 Scale zeroing

AZ<CR>

10.4.11 Tare acquisition

AT<CR>

10.4.12 Tare entering

nAT<CR>

The command AT must be preceded by a weight expressed in a maximum of 7 characters comprising the decimal point, if present.

10.4.13 Cancellation of an entered tare

CT<CR>

This command cancels any tare value in memory.

10.4.14 Request transmission of general data table

ND<CR>

The terminal responds to this command with a sequence of strings terminating in <CR><LF> each containing the number of the data item and its description; the following is an example data table:

- 1 Date
- 2 Time
- 3 Extracted
- 4 Gross
- 5 Tare
- 6 Net
- 7 Status

10.4.15 Request for general data item "n"

XIn<CR>

With this command it is possible to read the current value of any of the general data.

10.4.16 Request to enter the value "y" in the general data item "n"

yXIn<CR>

where "y" is the value you wish to assign to the data item "n". Obviously the value to be entered must conform to the format of the data item. Values for some of the general data cannot be entered (e.g. gross weight, net weight, scale status, etc).

10.4.17 Request for transmission of the net weight and the scale status

Xn<CR>

N.B.: the command sent is comprised of an uppercase X and lowercase n (not to be confused with generic significance assigned to the lowercase n described in *par. 10.1 on page 2-9*).

In the case of a positive reply, the terminal responds with the following string:

n<SP><um><SP><s1><s2><s3><s4><CR><LF>

The characters s1, s2, s3 and s4 are ASCII characters the meaning of which is explained in *par. 10.4.8* on page 2-19.

10.4.18 Request for transmission of net weight and scale status with 6 bytes

YS<CR>

When the command is received, the terminal replies with the following string:

n<SP><um><SP><s1><s2><s3><s4><s5><s6><CR><LF>

The meaning of the $\langle s1 \rangle$, $\langle s2 \rangle$, $\langle s3 \rangle$ and $\langle s4 \rangle$ bits is described in *par.* 10.4.8 on page 2-19 .

The meaning of the <s5> and <s6> bits is as follows:

<s5></s5>	bit 0	not utilised
	bit 1	not utilised
	bit 2	battery low indication
	bit 3	Print made, weight acquired
<s6></s6>	bit 0	tare changed
	bit 1	not utilised
	bit 2	not utilised
	bit 3	not utilised

The bit2 of <s5> is zero-set immediately after the 6 byte status transmission.

The bit3 of <s5> is zero-set immediately after the CP remote command has been received (par. 10.4.22 on page 2-25). You can read the last weight acquired by means of the PA command (par. 10.4.21 on page 2-25).

The bit0 of <s6> is zero-set after the response has been transmitted to remote command XT (par. 10.4.7 on page 2-19) or YT (par. 10.4.19 on page 2-25).

Remember that in multi-expansion terminals, the tare is rounded off to the extension change but the changed tare bit is not altered (the operator must ask for the tare whenever the extension changes; this change can be checked through bit0 and bit3 of <s2>).

10.4.19 Request for transmission of the net weight, tare and scale status with 6 bytes

YT<CR>

When the command is received, the terminal replies with the following string:

n<SP><um>y<SP><um><SP><s1><s2><s3><s4><s5><s6><CR><LF>

where:

n = net weight

y = tare

The meaning of the <s1>, <s2>, <s3>, <s4>, <s5> and <s6> bits has been described previously (par.~10.4.18 on page~2-24~ and par.~10.4.8 on page~2-19~).

10.4.20 Print request

PR<CR>

Any "printing not performed" message will be signalled only on the display.

10.4.21 Read last weight acquired

PA<CR>

The terminal responds by sending the last net weight to be acquired by pressing the print key or in response to the remote command PR; the reply string is as follows:

n<SP><um><SP>PA<CR><LF>

10.4.22 Cancel last acquired weight

CP<CR>

10.4.23 Request division value

Xe<CR>

The terminal responds with the string:

e= n<SP><um><CR><LF>

10.4.24 Request for net weight in high resolution

YN<CR>

The reply string is:

n<SP>y<SP><um><SP><s1><s2><s3><s4><CR><LF>

n= net weight

y= net weight in high resolution

s1,s2,s3,s4=see STATUS in extended string (par. 10.2.2 on page 2-11).

10.4.25 Request for maximum capacity value

XM<CR>

The reply string is:

Max= n<SP><um><CR><LF>

10.4.26 Request for net weight without unit of measurement

YP<CR>

The reply string is:

n<CR><LF>

where:

n= significant digits of weight only

This string does not include the unit of measurement and insignificant leading zeroes are not transmitted.

10.4.27 Lock keypad and display

LD<CR>

The message "DISPLOCK" is displayed in place of the weight and all keys are disabled.

10.4.28 Unlock keypad and display

UD<CR>

The keypad and display are re-enabled.

10.4.29 Lock keypad

LK<CR>

Only the keypad is locked and the terminal displays the message "KEYLOCK".

10.4.30 Unlock keypad

UK<CR>

The keypad is unlocked.

10.4.31 Remote commands with checksum

Management of remote commands with checksum can be enabled during the installation phase (par. 11.6.9 on page 2-61).

Checksum mode increases security when the terminal and PC dialogue with each other since the following precautions are taken:

- each remote command transmitted to the terminal must contain two checksum characters in a dedicated position;
- each reply with data that the terminal transmits to the PC after a remote command must contain two checksum characters in a dedicated position.

The position of the two checksum characters is immediately prior to the <CR> character..

Checksum calculation involves making the XOR (exclusive OR) of all the characters in the string up to the first checksum character excluded. The result is expressed by two hexadecimal characters.

An example of a gross weight transmission with checksum is given below:

XB chk1chk2 <CR>

where, supposing that value 1A is obtained from XOR: **chk1** is the first checksum character ("1" or rather 31H) **chk2** is the second checksum character ("A" or rather 41H).

The terminal replies with the following string:

n<SP><um><SP>B chk1chk2 <CR><LF>

10.4.32 Remote commands with addressing

When using the string "On request with address" or if the RS485 communication interface is selected, the remote commands described in *par. 10.4 on page 2-17* will also have to include the number of the terminal to be interrogated..

The system is comprised of one Master terminal (e.g. a PC) and a number of Slave terminals (e.g. weighing terminals).

Each weighing terminal is identified by a unique "terminal number" (see par. 11.6.9 on page 2-61).

In this way you can create a network of weighing terminals that can be interrogated by the Master terminal.

The syntax of the remote commands has to be modified by the addition of the two characters of the terminal number.

For example, the gross weight transmission command XB <CR> becomes XB 01 <CR> to indicate that the request from the Master terminal is addressed to the terminal number 01.

Similarly, in checksum mode the gross weight transmission command becomes XB01 chk1 chk2 <CR>.

No reply will be sent by the terminal if there are checksum errors.

10.5 Remote commands for Input/Output management

10.5.1 How to set a single output

Output n2 of slot n1 can be set by means of the following command:

SO n1 n2 < CR>

where:

n1 is 1 hexadecimal character that defines the slot position of the output; n2 is 1 hexadecimal character that defines the number of the output on slot n1.

n1 = 0 (30H) output on the terminal

n1 = 1 (31H) output on slot 1

n1 = 2 (32H) output on slot 2

n2 = 1 (31H) output number 1

n2 = 2 (32H) output number 2

n2 = 3 (33H) output number 3

n2 = 4 (34H) output number 4

10.5.2 How to zero-set a single output

Output n2 of slot n1 can be zero-set by means of the following command:

RO n1 n2 <CR>

where:

n1 is 1 hexadecimal character that defines the slot position of the output; n2 is 1 hexadecimal character that defines the number of the output on slot n1.

n1 = 0 (30H) output on the terminal

n1 = 1 (31H) output on slot 1

n1 = 2 (32H) output on slot 2

n2 = 1 (31H) output number 1

n2 = 2 (32H) output number 2

n2 = 3 (33H) output number 3

n2 = 4 (34H) output number 4

10.5.3 How to test a single output

The status of each output can be requested by means of the following command:

TO n1 n2 < CR>

where:

n1 is 1 hexadecimal character that defines the slot position of the output; n2 is 1 hexadecimal character that defines the number of the output on slot n1.

n1 = 0 (30H) output on the terminal

n1 = 1 (31H) output on slot 1

n1 = 2 (32H) output on slot 2

n2 = 1 (31H) output number 1

n2 = 2 (32H) output number 2

n2 = 3 (33H) output number 3

n2 = 4 (34H) output number 4

The terminal replies with one of the following messages:

- ✓ 1<CR><LF> if the output is activated;
- ✓ 0<CR><LF> if the output is not activated;
- ✓ -<CR><LF> if there is no slot.

10.5.4 How to test a single input

The status of each input can be requested by means of the following command:

TI n1 n2 < CR >

where:

n1 is 1 hexadecimal character that defines the slot position of the input;

n2 is 1 hexadecimal character that defines the number of the input on slot n1.

n1 = 0 (30H) input on the terminal

n1 = 1 (31H) input on slot 1

n1 = 2 (32H) input on slot 2

n2 = 1 (31H) input number 1

n2 = 2 (32H) input number 2

n2 = 3 (33H) input number 3

n2 = 4 (34H) input number 4

The terminal replies with one of the following messages:

✓ 1<CR><LF> if the input is activated;

✓ 0<CR><LF> if the input is not activated;

✓ -<CR><LF> if there is no slot.

10.5.5 How to test all the outputs

The status of all the slot outputs can be requested by means of the following command:

LO<CR>

The terminal replies with the following string:

n1n2n3<CR><LF>

where:

n1 is 1 character that is the logic combination of the status (0 or 1) of the outputs (max. 2) on the terminal. Its values can be 0 0 (30H) to 3 (33H).

n2 is 1 character that is the logic combination of the status (0 or 1) of the outputs (max. 4) on slot 1. Its values can be 0 (30H) to F (46H). If there is no slot 1, the value of n2 will be " - " (2DH).

n3 is a character that is the logic combination of the status (0 or 1) of the outputs (max. 4) on slot 2. Its values can be 0 (30H) to F (46H). If there is no slot 1, the value of n2 will be " - " (2DH).

The lines will be arranged in the following way:

bit3	bit2	bit1	bit0
line 4	line 3	line 2	line 1

where the values of the lines are 0 or 1.

For example, if the following command is received:

184<CR><LF>

1	8	4
01	1000	0100

where:

01 lines on slot 1: line 1 activated (bit 0 = 1), line 2 (bit 1 = 0) not activated;

1000 lines on terminal: line 1 (bit 0 = 0), 2 (bit 1 = 0), 3 (bit 2 = 0) not activated, line 4 (bit = 1) activated;

0100 lines on slot 2: line 1 (bit 0 = 0), 2 (bit 1 = 0), 4 (bit 3 = 0) not activated, line 3 (bit 2 = 1) activated.

10.5.6 How to change the status of all the outputs

The status of all the slot outputs can be changed by means of the following command:

n1n2n3WO<CR>

where:

n1 is 1 character that is the logic combination of the status (0 or 1) of the outputs (max. 2) on the terminal. Its values can be 0 (30H) to 3 (33H).

n2 is 1 character that is the logic combination of the status (0 or 1) of the outputs (max. 4) on slot 1. Its values can be 0 (30H) to F (46H).

n3 is a character that is the logic combination of the status (0 or 1) of the outputs (max. 4) on slot 2. Its values can be 0 (30H) to F (46H).

10.5.7 How to test all the inputs

The status of all the slot inputs can be requested by means of the following command:

LI<CR>

The terminal replies with the following string:

n1n2n3<CR><LF>

where:

n1 is 1 character that is the logic combination of the status (0 or 1) of the inputs (max. 2) on the terminal. Its values can be 0 (30H) to 3 (33H).

n2 is 1 character that is the logic combination of the status (0 or 1) of the inputs (max. 4) on slot 1. Its values can be 0 (30H) to F (46H). If there is no slot 1, the value of n2 will be " - " (2DH).

n3 is a character that is the logic combination of the status (0 or 1) of the inputs (max. 4) on slot 2. Its values can be 0 (30H) to F (46H). If there is no slot 1, the value of n2 will be " - " (2DH).

10.6 Remote commands for digital cells

The following conventions will now be used besides the symbols already given in *par. 10.1 on page 2-9*:

- ✓ c number that identifies the digital cell;
- ✓ n and m indicate numerical fields with possible spaces at the beginning, decimal separator, - sign and + sign.

10.6.1 Request for cell points

DPc<CR>

The terminal replies with this string:

n<CR><LF>

n = number of points (0 to 200000)

10.6.2 Request for cell temperature

DTc<CR>

The terminal replies with this string:

n<CR><LF>

n = cell temperature in °C (- 40.0 to 100.0)

10.6.3 Request for version and release of cell software

DVc<CR>

The terminal replies with this string:

n<SP>m<CR><LF>

n = cell software versionm = cell software release

10.6.4 Request for power supply

DAc<CR>

The terminal replies with this string:

n<SP>m<CR><LF>

n = cell power supply voltage rating;m = strain gauge power supply voltage rating.

10.6.5 Request for cell serial numbers

DMc<CR>

The terminal replies with this string:

n<SP>m<CR><LF>

n = cell serial number recorded on the cellm = cell serial number recorded on the terminal

10.6.6 Request for angle calibration coefficient

DCc<CR>

The terminal replies with this string:

n<SP>m<CR><LF>

n = angle calibration coefficient loaded in cellm = angle calibration coefficient loaded in terminal

n and m can also take on the exponential format in this case.

$\boldsymbol{\nu}$

10.6.7 Request for number of cells in system

DN<CR>

The terminal replies with this string:

n<CR><LF>

n = number of cells that form the system

10.6.8 Request for cell status

DSc<CR>

The terminal replies with this string:

<s1><s2><s3><s4><CR><LF>

Characters s1, s2, s3, s4 are ASCII characters that must be interpreted as hexadecimal value. Each character represents 4 bits with different meanings. For example, the ASCII "A" character on the input must be interpreted as hexadecimal figure "A":

1	0	1	0
bit3	bit2	bit1	bit0

When the value of a bit is "1", this means that the corresponding signal is in the true status. The meaning of the signals is as follows:

<s1></s1>	bit 0	temperature error
	bit 1	not utilised
	bit 2	not utilised
	bit 3	not utilised
<s2></s2>	bit 0	cell not connected
	bit 1	cell not configured
	bit 2	serial number error
	bit 3	voltage error
<s3></s3>	bit 0	reserved
	bit 1	reserved
	bit 2	not utilised
	bit 3	cell in warm up status
<s4></s4>	bit 0	offset
	bit 1	temperature reading phase
	bit 2	voltage reading phase
	bit 3	calibration reading phase

D400

10.6.9 Request for digital scale status

DB<CR>

The terminal replies with this string:

<s1><s2><s3><s4><CR><LF>

Characters s1, s2, s3, s4 are ASCII characters that must be interpreted as hexadecimal value. Each character represents 4 bits with different meanings. For example, the ASCII "A" character on the input must be interpreted as hexadecimal figure "A":

1 0 1 0 bit3 bit2 bit1 bit0 When the value of a bit is "1", this means that the corresponding signal is in the true status. The meaning of the signals is as follows:

<s1></s1>	bit 0	not utilised
	bit 1	not utilised
	bit 2	not utilised
	bit 3	not utilised
<s2></s2>	bit 0	voltage error in a cell
	bit 1	not utilised
	bit 2	not utilised
	bit 3	not utilised
<s3></s3>	bit 0	at least one cell with temperature value off-range
	bit 1	new system
	bit 2	scale board replaced
	bit 3	one single cell in multiple cell system replaced
<s4></s4>	bit 0	at least one cell not connected
	bit 1	at least one cell not configured
	bit 2	at least one cell with serial number error
	bit 3	cell power supply voltage error

10.7 Communication in MPP operation

10.7.1 Operation

Terminals equipped with the MPP option can operate in the four different modes described in the following paragraphs.

The operating mode used for MPP memory operation is selected during installation (par. 11.6.8 on page 2-60).

10.7.2 Weighing request from keypad with data transmission on completion of operation

After having enabled the MPP memory (consult the Options chapter of the user manual), load the weight onto the scale, wait for weight stable

signal, then press

The terminal will save the weight data in memory and then transmit them.

If the Standard item has been selected in the Setup Menu (par. 11.6.8 on page 2-60), the data transmitted are:

1 st character	\$(24H)	
2 nd character	M(4DH)	
3 rd character	P(50H)	
4 th -10 th character		MPP identification code or scale status indications: NO <sp>STAB weight not stable NO<sp>VAL<sp> weight not valid ERRMEM<sp> weight memorisation error</sp></sp></sp></sp>
11 th -18 th character		Weight with sign and decimal point, if present
19 th -20 th character	<um></um>	Unit of measurement
21 st -22 nd character	<crc></crc>	String check field; calculated by performing an XOR operation (exclusive OR) of all the preceding characters. The value calculated is expressed in two hexadecimal characters, e.g. if the result is 62H, the two checksum characters are "6" (36H) and "2" (32H).

If the $Terminal\ number$ item has been selected in the $Setup\ Menu$ ($par.\ 11.6.8$ on page 2-60), the data transmitted are:

1 st character	\$(24H)	
2 nd character	M(4DH)	
3 rd character	P(50H)	
4 th -6 th character		MPP terminal number
7 th -13 th character		MPP identification code or indications about the scale status: NO <sp>STAB weight not stable NO<sp>VAL<sp> weight not valid ERRMEM<sp> weight memorizing error</sp></sp></sp></sp>
14 th -21 st character		Weight with sign and possibly a decimal separator
22 nd -23 rd character	<um></um>	Unit of measurement
24 th -25 th character	<crc></crc>	String monitoring field.

If the Serial Number item has been selected in the Setup Menu (par. 11.6.8 on page 2-60), the data transmitted are:

1 st character	\$(24H)	
2 nd character	M(4DH)	
3 rd character	P(50H)	
4 th -11 th character		Serial number
12 th -18 th character		MPP identification code or indications about the scale status: NO <sp>STAB weight not stable NO<sp>VAL<sp> weight not valid ERRMEM<sp> weight memorizing error</sp></sp></sp></sp>
19 th -26 th character		Weight with sign and possibly a decimal separator
27 th -28 th character	<um></um>	Unit of measurement
29 th -30 th character	<crc></crc>	String monitoring field.

The computer replies with:

- ✓ <ACK> if the string has arrived correctly;
- ✓ <NAK> if the string has not arrived correctly; in which case the terminal retransmits the data packet. After three negative replies or no reply, the terminal displays an error message.

Any characters other than <ACK> and <NAK> are interpreted as <NAK>.



The ACK/NACK protocol (see par. 10.3.1 on page 2-16) is automatically enabled in MPP operation.

10.7.3 Weighing request from serial command with transmission on completion of operation

After having loaded the weight on the scale, send the memorise weight and data request command via the computer:

MP<CR>

If the response is affirmative, the terminal will transmit one of the strings described in *par.* 10.7.2 on page 2-44 in the same mode, depending on the item selected in the Setup menu (Standard, Terminal number, Serial number).

10.7.4 Weighing request from keypad and transmission request from serial command

After loading the weight on the scale, wait for the weight stable indication

and then press ; the terminal will memorise the data.

The computer may request the weight data from the terminal with the command:

MP<CR>

The weighing terminal replies:

✓ with one of the strings described in par. 10.7.2 on page 2-44;

✓ NP<CR><LF>

if no weight has been memorised;

The data may requested more than once with the command **MP<CR>**. At the end of the operation, the computer must transmit the command to enable the terminal to carry out a new weighing operation:

MC<CR>

10.7.5 Weighing and transmission request from serial command

After loading the weight on the scale, send the memorise weight command from the computer:

MP<CR>

Once the weight validity conditions are satisfied, the terminal memorises the data.

The external computer must then transmit the data request command:

MP<CR>

The terminal responds with the string described in *par. 10.7.2 on page 2-44*.

10.7.6 MP and MC remote commands with checksum

Remote commands MP and MC modify their structure for entry of the checksum characters. Their format becomes the one below:

MP 1 D < CR>

MC 0 E < CR>

11. PERSONALIZATION

11.1 Foreword



Personalization procedures are strictly reserved for specialised personnel only.

However, the user is permitted to modify certain of the terminal operating parameters.

We recommend that extreme care is taken when modifying these parameters to prevent possible malfunctions caused by incorrect settings.

The only parameters that may be modified are those directly related to the program installed on the terminal.

11.2 Accessing the parameter configuration function

To access non-metrological parameters only:

✓ press on switching on the terminal.

11.3 Language

On entering setup, you can select the language in which you want the menu to be displayed.

After selecting the setup menu language, the following information is briefly displayed:

- ✓ program code
- ✓ version
- ✓ serial number of terminal (if other than zero, it will match the s/n (serial number) on the data plate).

11.4 Setup menu

The personalization parameters menu is a tree structure which can be followed from the roots to the branches using the navigation keys described in the Use of the terminal chapter of the user manual.

11.4.1 Conditioned menu

During the parameter personalization procedure, the menu adapts according to the selections made. Some parameters will therefore not be displayed as they are not required in the selected configuration.

11.4.2 Entering numeric data

See the Use of the terminal chapter of the user manual.

11.4.3 Validating input data

All data entered are validated and if they do not fall within the permitted ranges, an error message is displayed and you are asked to enter the data again.

11.4.4 NOT MODIFIABLE parameter or menu

The message "not modifiable" indicates that the parameter displayed cannot be modified if the setup menu was accessed by pressing the relative key on power up.

11.4.5 NOT AVAILABLE parameter or menu

The message "not available" indicates that the parameter will only be available in future versions.

11.5 Overview of the menu tree

The menu tree expanded to the third level is reported below. For details, refer to the specific paragraphs in this section or the installation section of the manual.

ANALOGUE scale

Configurations Metrological General

Analogue scale parameters

Conversion rate

Calibration Execute Display data Correction

Test

Display points Display weight Converter test

DIGITAL scale

Configurations Metrological General

Digital scale parameters

N. of load cells
Baud Rate
Calibration
Execute
Display data
Angle calibr.
Correction

Test

Display points
Display weight
Temperature
Power supply
Angular coefficient
Serial number
Program Release (cells)

Terminal data storage
Terminal data reinstatement

Personalizations

Operating modes

Terminal language Decimal separator

Operation Printer

Automatic printing MPP operation

Connection to external

processor

Outputs

Serial

Input/Output

Analogue output

Terminal test

Serial ports

Serial communication ports

Com01

Com₀₂

Inputs/outputs

Manual

Automatic

Keypad

Terminal configuration port

Analogue output

Voltage calibr.

Current calibr.

Complete calibr.

Battery

Upgrade

Serial line

Maintenance

Serial number

Parameter report

Inizialization

REPEATER scale

Repeater scale parameters Serial port

String

Cancel MPP Board Test report Copy programme on board Cell emergency routine Reserved

D400)
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11.6 Descriptions of the main menus and parameters

Unless specified differently, the description of the parameters given in the following paragraphs is valid for both analogue and digital scales.

11.6.1 Setup Menu/Scale/Configurations/Metrological

The metrological parameters entered during the installation phase can be displayed (but not modified).

11.6.2 Setup Menu/Scale/Configurations/General menu

Digital filter	no, 4, 8, 16, 32, 64
	Serves to enable/disable a digital filter. Switches on or off a software filter on the output from the analogue/digital converter. The higher the number, the higher the degree of filtration.
Stability signalling	Very fast, Fast, Slow, Very slow
	Speed at which the weight stable indication appears. This parameter is also linked to the setting of digital filter parameter.
Tare lock	Defines tare management on unloading the scale.
	no
	Any entered or acquired tares will be automatically cancelled when the scale returns to zero, i.e. when the gross weight = 0
	yes
	Any entered or acquired tares will remain in memory when the scale is unloaded, i.e. when the gross weight = 0
Initial zero-setting	Defines the terminal operating mode on power up.
	calibrated zero
	On power up, the terminal performs the calibrated zero procedure, i.e. it indicates the weight on the scale relative to the zero value programmed during calibration.

autozero
On power up, the terminal performs the autozero procedure. In the case of a legally approved instrument, the autozero will be within a range of -5% and +15% of the full-scale value around the calibrated zero. In the case of a non-legal weighing instrument, the range is -50% to +50%.

11.6.3 Setup Menu/ANALOGUE scale/Analogue scale parameters

The number of conversions per second the AID converter makes can be displayed (but	
not modified).	

11.6.4 Setup Menu/DIGITAL scale/Digital scale parameters

N. of load cells	The number of cells in the system can be displayed.
Baud rate	The baud rate of the dialogue with the load cell selected during the installation phase can be displayed.

11.6.5 Setup Menu/Scale/Calibration/Display data

Calibration data (Zero, Full-scale, 1st intermediate point, 2nd intermediate point) are displayed both as weight values in the current unit of measurement and in internal conversion points.

11.6.6 Setup Menu/Scale/Test

Display points	 ✓ The number of points in the converter can be displayed if the scale is the analogue type. ✓ If the scale is the digital type, the number of output points of each individual scale (scale 0-200.000) can be displayed along with the number of points of the entire system, obtained by calculating the average of the points of all the cells. Each cell is identified by a number.
Display weight	Displays the weight currently present on the scale. On pressing the High Res. key, the display switches to high resolution for 5 seconds. Cyclic transmission of the string containing the weight in high resolution is enabled on Com 2 with the protocol 9600 8-N-1.
Converter test (*)	on inserting the optional accessory board 404031, the test 020000div. is performed
Temperature (**)	The operating temperature is indicated alongside the identification number of each cell. The message err . will appear if the operating temperature is not within the (-40 to +100) °C range.
Power supply (**)	The following information is indicated alongside the identification number of each cell: ✓ the power supply voltage rating of the cell; ✓ the power supply voltage rating of the strain gauge in the cell.

Angular coefficient (**)	The following information is indicated alongside the identification number of each cell: ✓ the correction made by means of angular cell calibration recorded in the cell; ✓ the same correction recorded in the terminal.
Serial number (**)	The following information is indicated alongside the identification number of each cell: ✓ the serial number of the cell recorded in the cell itself; ✓ the serial number of the cell recorded in the terminal; ✓ the cell reply address. This latter is represented by a whole number belonging to the (1 to 128) range. However, if this reply number is strictly higher than 32, it means that the cell is not addressed.
Program Release (cells) (**)	The following information is indicated alongside the identification number of each cell: ✓ the software program of the cell; ✓ the cell release; ✓ the response address of the cell.

- (*) Only with analogue cell.
- (**) Only with digital cell.

11.6.7 Setup Menu/Personalizations/Operating modes

Terminal language	Italian, English, Français, Deutsch, Español, Portugues
	The language used during normal operation (may differ from the menu display language)
Decimal separator	Point, Comma
Operation	Standard, Sum weighing, Unloading extraction, Loading extraction (see Use of the terminal chapter of the user manual)
Printer	NO, Com1, Com2
	Serves to configure a serial port for connection of a printer in text mode.
Automatic printing	NO, YES
MPP operation	See the Options chapter of the user manual and par. 11.6.8 on page 2-60
Connection to external processor	This function is to be used in conjunction with the personalization program supplied by the Manufacturer.

11.6.8 Setup Menu/Personalizations/Operating modes/MPP operation

Also consult the Options chapter of the user manual.

Weighing request	from keypad, from serial command
Data transmission	at end of weighing, from serial command
PC commun. port	NO, com01, com02
	if you select NO, it will not be possible to enable MPP operation
Memorise tare	YES, NO
Type of reply	Standard, Terminal number, Serial number
	If you select Terminal number you must enter the numerical value (max. 8 figures) as explained in the Use of the terminal chapter of the user manual.

11.6.9 Setup Menu/Personalizations/Outputs/Serial/Com xy

Com xy	string, not utilised
string	Extended, Cb, Visual, Idea, Cma, On request with address, Extraction
terminal number	editor
	Only for Cma and on Request with address
protocol	Cyclic, On request, Ack-Nak, Remote commands
Configuration	For the hardware characteristics of the serial port see par. 11.6.10 on page 2-62
Checksum mode	Select YES to enable the checksum mode, otherwise select NO . Can only be set if the selected string is Extended, Cma, Request with address or Extraction. Refer to par. 10.4.31 on page 2-27 for greater details

11.6.10 Setup Menu / Personalizations / Outputs / Serial / String /.../ Com xy configuration

After having selected the string type, you access the menu for configuration of the hardware characteristics of the serial port, which contains the following parameters:

Baud rate	600, 1200, 2400, 4800, 9600, 19200, 38400,
Bada rato	57600, 115200
	serial line transmission rate
Number of bits	7, 8
Number of stop bits	1, 2
Parity	Even, Odd, None
Communication interface	RS232, RS422, RS485
Serial com check	Hardware, Software, None
	Hardware: uses the CTS and RTS signals. The CTS input signal must be set to +12V to enable transmission on the TX pin. The terminal sets the RTS output to +12V to signal that it is ready to receive (available on COM1 only). Software: transmission of the character
	<xon>(11H) enables transmission;</xon>
	<xoff>(13H)</xoff>
	suspends transmission.

11.6.11 Setup Menu/Personalizations/Outputs/Input-Output

status at rest	Norm. open (normally open)
	Norm. closed (normally closed)
operation (input)	Disab. (disabled)
	Zero-set scale
	Acquire tare
	Cancel tare
	Acq/Del. tare (acquire/delete tare)
	Print weight
	Disab. weigh (disables weighing)
	Send (executes a transmission)
	Disab. settings (disables settings)
	Start
	In extraction mode (consult the Use of the terminal chapter of the user manual), this handles the START operation by supplying the Output 1 (Request) and Output 2 (Slow) output contacts. The same operation can be carried out by pressing START on the display of the terminal. The next START operation is accepted when the value entered for Set Point 01 has been reached or after a STOP request.

Stop

In extraction mode (consult the Use of the terminal chapter of the user manual), this forces the cycle itself to end by deactivating the Output 1 (Request) and Output 2 (Slow) contacts.

The same operation can be carried out by pressing *STOP* on the display of the terminal.

operation (output)

Disab. (disabled)

Set point

Range

Requested

Can only be selected on output 1. It is activated when a START operation is requested in extraction mode (consult the Use of the terminal chapter of the user manual) and is deactivated when the value entered for Set Point 01 has been reached.

Slow

Can only be selected on output 2. It is activated when a START operation is requested in extraction mode (consult the Use of the terminal chapter of the user manual) and is deactivated when the extracted weight reaches the value obtained by the difference between the value set for Set point 01 and the value set for Set Point 02.

Print ok

Transmiss. ok (transmission ok)

11.6.12 Setup Menu/Personalizations/Outputs/Analogue output

output data	Gross, Net
Output type	Voltage 0-10 V
	Current 0-20 mA
	Current 4-20 mA

11.6.13 Setup Menu/Personalizations/Outputs/BCD

updating time	editor
	expresses updating time of the port in hundredths of a second
data not valid time	editor
	expresses time in ms
Status	HIGH, LOW
	Select the activated status of DATA VALID
negative	HIGH, LOW
	Select the activated status.
output data	GROSS, NET
terminal number	editor
	The outputs assume three-state when the terminal cannot be selected. To select the terminal number n, set the CALCO5 inputs to positive logic.
	Also consult the Options chapter of the user manual.

11.7 Test procedures

To access terminal function tests, press on power up and follow the menu path:

select language>Terminal Tests>select test

11.7.1 Terminal Tests/Serial Ports

✓ Connect the "blind" connector to the ports.

The term "blind" connector denotes a connector that connects the inputs to the outputs.

For RS232, TX with RX and CTS with RTS.

For RS422, TX+ with RX+, TX- with RX-.

(See drawings in the Consignment and installation chapter of the user manual)

11.7.2 Terminal Tests/Inputs-Outputs

As in the serial port tests, you will need to prepare blind connectors that connect the inputs directly to the outputs of the same number.

For example, connect input 01 with output 01. Refer to the Consignment and installation chapter and Options chapter of the user manual for these connections.

11.7.3 Terminal Tests/Keypad

Follow the instructions given on the display.

11.7.4 Terminal Tests/Terminal Configuration Report

If a printer port has been enabled through the relative menu, the terminal configuration report will be printed via this port. If no port has been enabled, connect a printer and a PC to the COM1 serial port with fixed 9600,8,N,1 configuration.

The overall setup of the terminal will be transmitted to it.

11.7.5 Terminal Tests/Analogue output

To calibrate the output voltage, connect a tester with 10V capacity to the terminals. Adjust the output using the keys indicated on the display to obtain a voltage reading between 0 and 10V.

To calibrate the output current, proceed in the same way using an ammeter.

You can also select the *Complete calibr*. item of the menu to calibrate both values (current and voltage)..

11.7.6 Terminal Tests/Battery

Indicates the voltage of the internal lithium battery.

11.8 Repeater scale

The following paragraphs describe the parameters required to set up the repeater scale Refer to all paragraphs from *par.* 11.6.7 on page 2-59 to *par.* 11.6.13 on page 2-65 for the Customizing Menu and *par.* 11.7 on page 2-66 for the Test procedures.

11.8.1 Setup Menu/Repeater scale/Repeater scale parameters/Serial port/Com xy

The parameters listed below must be entered in an identical way to the ones in the main terminal if this latter is to dialogue with the slave.

Baud rate	600, 1200, 2400, 4800, 9600, 19200, 38400,57600,115200
Bit number	7,8
Stop bit number	1,2
Parity	Even, Odd, None
Communication interface	RS232, RS422, RS485
Serial com control	Hardware, Software, None
	Hardware: the CTS and RTS signals are used. The CTS input signal must be set to +12V to enable transmission on the TX pin. The terminals sets the RTS output signal at +12V to signal that it is ready to receive (only available on COM1). Software: transmission of character <xon>(11H) enable transmission; <xoff>(13H) suspend transmission.</xoff></xon>

11.8.2 Setup Menu/Repeater scale/Repeater scale parameters/String

Extended

See par. 10.2.2 on page 2-11

Comunication

You can select the type of dialogue between the slave and main terminal:

- ✓ Full-duplex: the communication signals can be transferred at the same time in both directions;
- ✓ Half-duplex: the signals can flow in one single direction at a timer along the transmission line.

Automatic printing

Select **YES** to enable the extended string to be automatically printed, otherwise select **NO**.

Ranges

The range selected in the installation phase can be displayed.

Division

This displays the division value (in the selected unit of measurement) entered during the installation phase.

Capacity

This displays the capacity value entered during the installation phase.

1st range capacity

This displays the 1st range capacity value entered during the installation phase.

	2 nd range capacity
	This displays the 2 nd range capacity value entered during the installation phase.
СВ	See par. 10.2.1 on page 2-10
	Unit of measurement
	Displays the unit of measurement selected during the installation phase.
	Division
	Displays the minimum division value (expressed in the selected unit of measurement) selected during the installation phase.
Visual	See par. 10.2.4 on page 2-14
	Unit of measurement
	Displays the unit of measurement selected during the installation phase.
	Division
	Displays the minimum division value (expressed in the selected unit of measurement) selected during the installation phase.
Cma	See par. 10.2.6 a pag. 2-15
	No. terminal to interrogate: enter as explained in the Use of the terminal chapter of the user manual.
	Repeater terminal No.: enter as explained in the Use of the terminal chapter of the user manual.



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service apres-vente serviço pós-venda