



INSTALLATION and USER MANUAL

SW RELEASE V 6.3

E4N

This product complies with following European and U.S. standards:

EN61010-1 (SAFETY)

EN61326-1 (EMC)

47CFR Subpart C

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Manual code: D2040036U1

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MARPOSS S.p.A. does not take on the obligation of notifying possible further changes to the product. The descriptions reported in this book not authorize any tampering by non-authorized personnel. The warranty on the equipments will decay if such tamperings are found.

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INTRODUCTION

1

DESCRIPTION

1.1



The E4N column is an electronic gauge amplifier designed for the inspection of part dimensions and shape in the dynamic and static modes.

The E4N column is:

CONFIGURABLE

The E4N can be configured to manage a wide variety of measuring tasks and hardware set ups.

FLEXIBLE

All the functions of the E4N are managed by internal software.

The E4N column can be programmed from a personal computer using the E4N-PC LINK software which can also be used to collect measurement data.

Measurement results are displayed on a three-color LED status scale (RED = out-of-tolerance, YELLOW = pre-scrap, GREEN = within tolerance) and on two digital displays.

The lower section of the E4N houses a sensor signal amplifier module. Amplifier modules are interchangeable and are available in versions for connection to inductive sensors (LVDT and HBT), estensometer sensors (MRT) and air/electronic sensors (AIR).

The rear panel has connectors for the following functions:

- **Connection to a printer or a DIGIMATIC statistical analyzer**
- **Signal analog output**
- **Serial connection to a printer or personal computer**
- **Remote relay control of external devices (e.g. resume lamps)**
- **Connection to an external pushbutton panel**

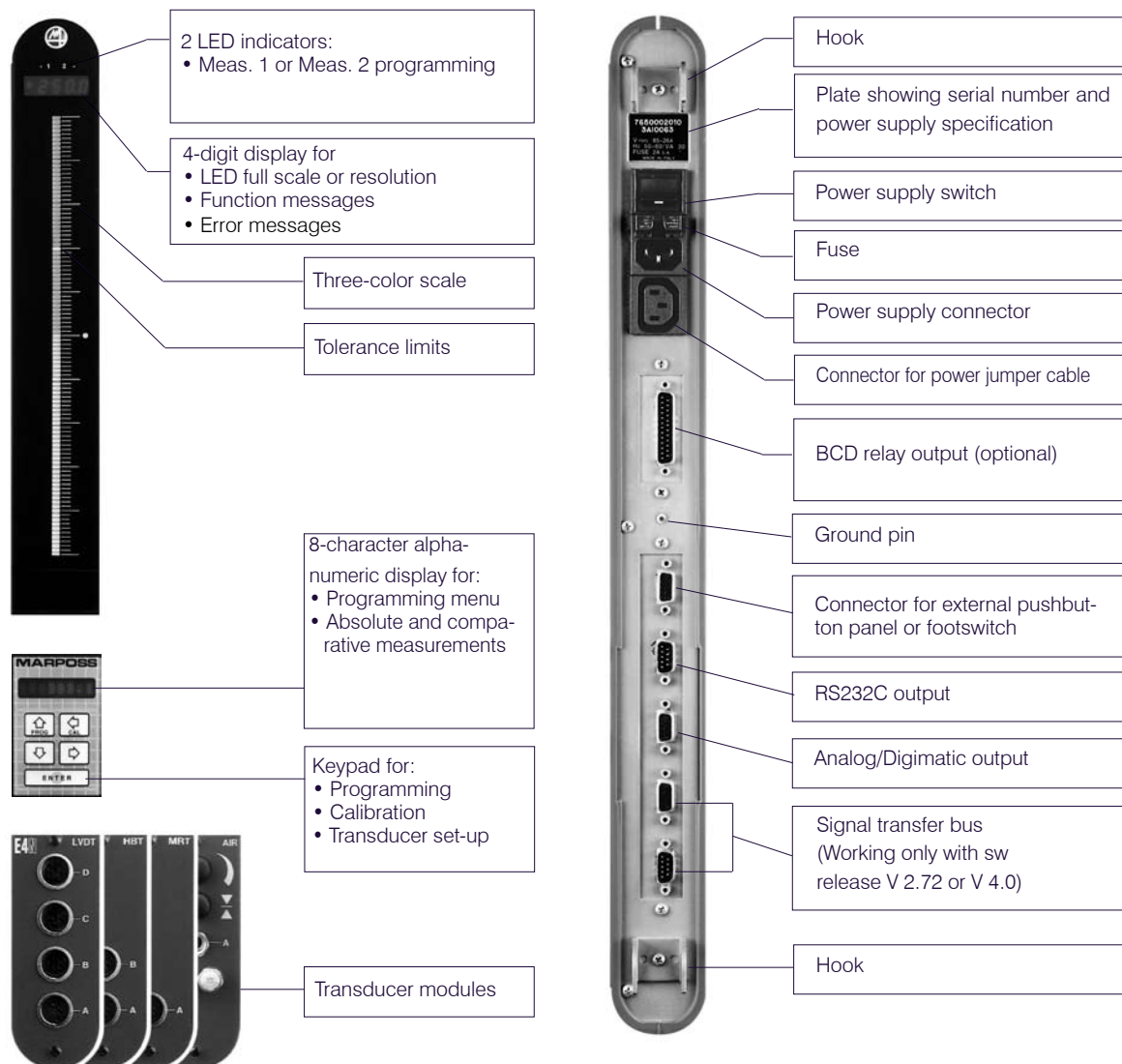
The column is equipped with self-test diagnostics; at power-on the self-test function checks the efficiency of all the column components and will display an error message in case of a system fault.

1

INTRODUCTION

1.2

FRONT AND REAR VIEWS



1.3

TECHNICAL SPECIFICATIONS

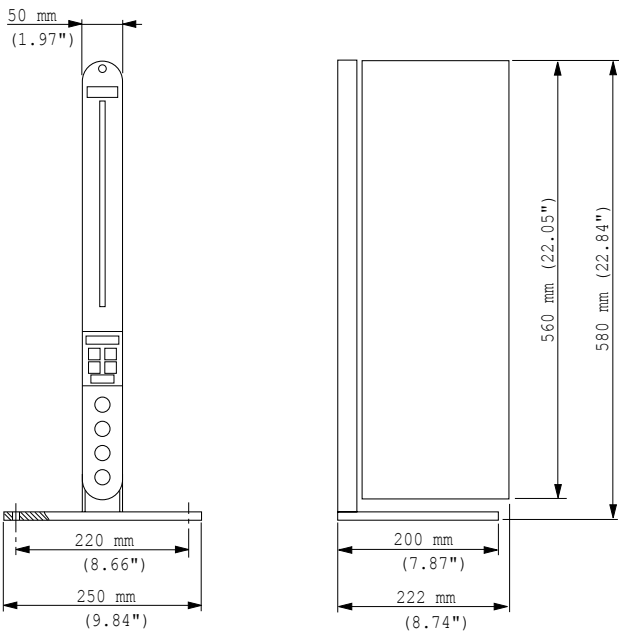
POWER SUPPLY	85/265 VAC 50/60 Hz
VOLTAGE VARIATION	± 10%
MAXIMUM CONSUMPTION	40 VA
FUSE	2A delayed
DEGREE OF PROTECTION	IP 50
STORAGE TEMPERATURE	-40/+60 °C
OPERATING TEMPERATURE	0/+50 °C
WEIGHT	3.7 kg. approx.

Reference Standards: EN61010-1 (safety); EN61326-1, EN61326-A1, EN61000-3-2, EN61000-3-3 (EMC)

LED DISPLAY	101 LED scale
BAR DISPLAY	3-color LED (automatic color change)
COLOR	257 mm (from bottom to centre)
HEIGHT	Brightness, response rate
PROGRAMMING	absolute or relative
8-FIGURE DOT MATRIX DISPLAY	
UNIT OF MEASUREMENT	millimeters, inches
TYPE OF MEASUREMENT	static dynamic Max Min (Max + Min) /2 Max - Min (Max - Min) /2
TRANSDUCERS	up to 4
TRANSDUCER PROGRAMMING: STANDARD MEASUREMENT RANGE	up to ± 1 mm (.04")
TRANSDUCER PROGRAMMING: WIDE MEASUREMENT RANGE	up to ± 5 mm (.2")
ARM RATIO	from 0.5 to 3.0 with 0.001 resolution
SENSITIVITY ADJUSTMENT	from 0.95 to 1.05 with 0.001 resolution
ACCURACY AT 20°C	± 0.5% ± resolution
MEASUREMENT THERMAL SHIFT	150 ppm/°C
MEASUREMENT THERMAL SHIFT PER CHANNEL	50 ppm/°C
SCALE	up to 10 programmable ranges from 0.005 to 5 mm (from .000250" to .2")
SCALE RESOLUTION	1/100 of scale range, from 0.1 to 100µm (from .000005" to .004")
CONNECTOR TYPE	
LVDT INPUT	6-pin (DIN 45322)
HBT INPUT	6-pin (DIN 45322)
MRT INPUT	7-pin (DIN 45329)

OVERALL DIMENSIONS

1.4



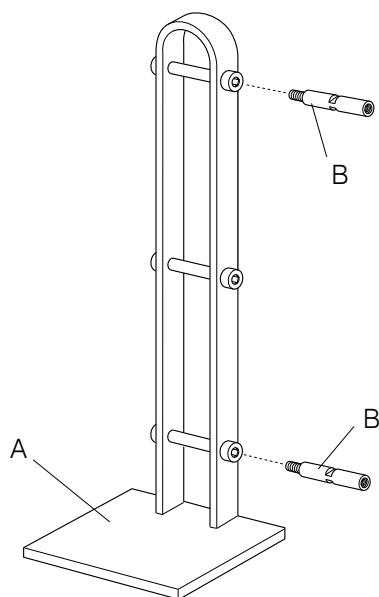
2

INSTALLATION AND USE

2.1

MECHANICAL INSTALLATION

E4N columns can be mounted singly or in groups of up to 5 units on a stand (for identification codes, see Section 11).



A : Stand.

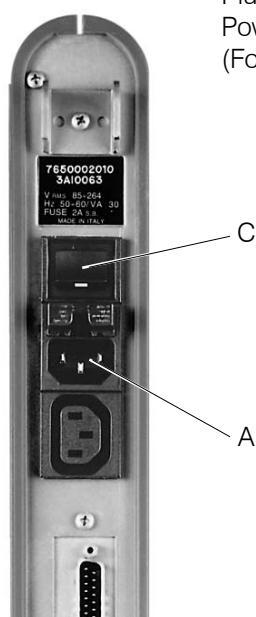
B : Extension pins.

2.2

CONNECTION OF A COLUMN TO THE MAINS POWER SUPPLY

The E4N can be used with a mains power supply in the range 85 to 265 V a.c. (50/60 Hz).

Plug the power supply cable (B) into the socket (A) on the rear of the column.
Power up the E4N at the switch (C).
(For identification codes, see Section 11).

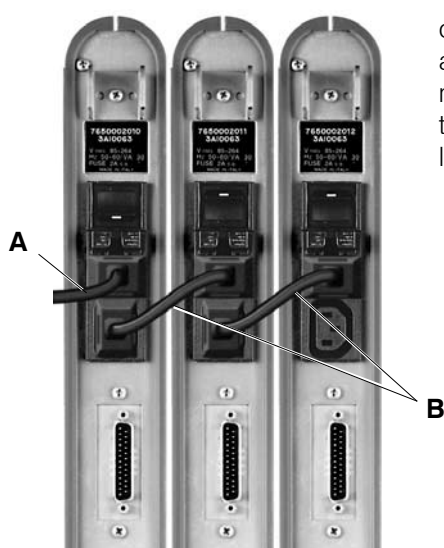


CONNECTIONS TO THE MAINS POWER SUPPLY OF A GROUPS OF E4N COLUMN

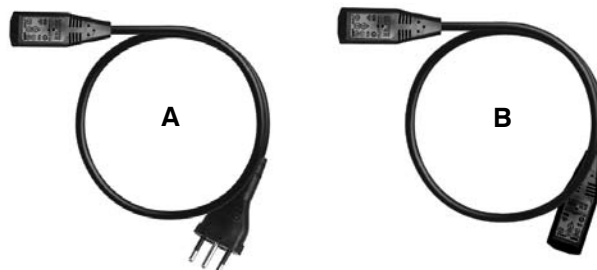
2.3



E4N columns can be mounted singly or in groups of up to 5 units on a single stand.



Groups of E4N columns must be connected to each other in series using the power jumper cables (B). To power up a group of columns, switch on the power supply switch of the module connected to the mains. The power supply switches of the other modules must be in the ON position and should be left in this position. (For identification codes, see Section 11).



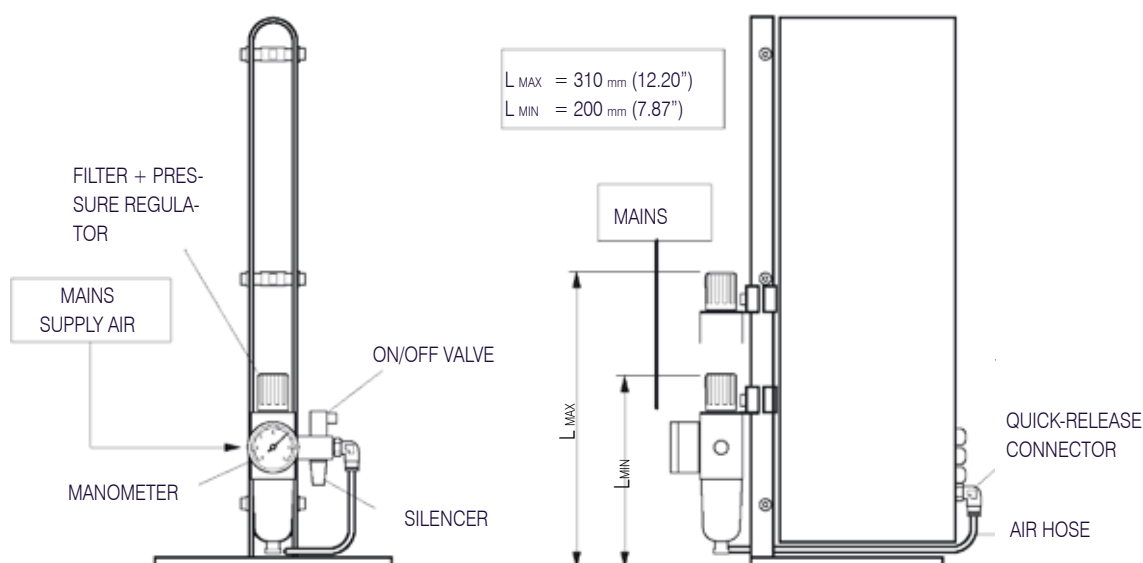
2

INSTALLATION AND USE

2.4

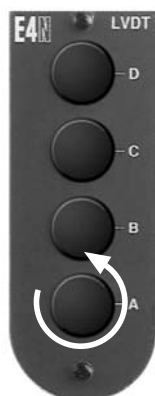
CONNECTION TO THE MAINS COMPRESSED AIR SUPPLY

E4N columns fitted with air/electronic modules must be connected to a mains compressed air supply. The air must be filtered and dry and must be at a nominal pressure of 3 bar or between 1.5 and 4 bar; the maximum permitted pressure deviation is 3% of nominal pressure. Columns must be fitted with a **FILTER-REGULATOR UNIT** mounted on the stand as shown in the figure below. (For identification codes, see Section 11).



2.5

CONNECTING TRANSDUCERS



Step 1

Unscrew the protective cap from the connector.



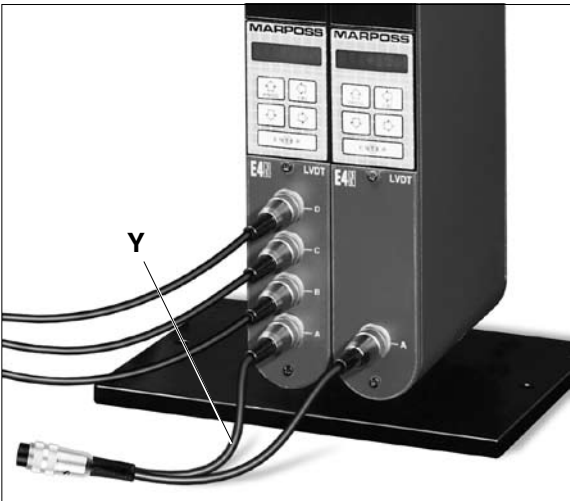
Step 2

Plug in the gauge connector and tighten the ring nut.

"Y" SIGNAL SPLITTER CABLE

2.6

A "Y" input signal splitter can be used to carry all the signals used by a group of columns. "Y" cables are only available for splitting signals from LVDT and MRT type sensors. (For identification codes, see Section 11).



Note: Signal splitter cables are not available for HBT and AIR sensors.

E4N COLUMN SELF TESTS AND IDENTIFICATION

2.7

At power-up, the E4N performs a self-test routine which checks the efficiency of the column components and functions.



The 7-segment upper display will show the message "TEST".

SELF-TEST ROUTINE:**DISPLAY SYSTEM TEST:**

The two displays and all of the LED's are lit up in sequence to show the entire LED scale lit up in RED, YELLOW and GREEN.

EPROM AND E2PROM CHECKSUM:

This test checks that the sum of bytes is equal to a preset value, and that the EPROM has not been accidentally modified.

RAM TEST:

This test checks that the RAM is operating correctly by performing a READ AFTER WRITE routine; the system sends a value to the RAM and then re-reads the contents of the RAM to check that the value has been received.

DIGITAL-ANALOG CONVERTER TEST:

This test calibrates and zero-sets the converter.

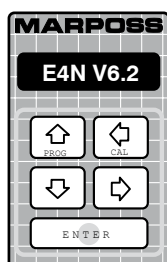
AMPLIFIER MODULE TEST:

This test checks that the module is correctly inserted and checks that the programming of the E4N column is compatible with that of the amplifier module.

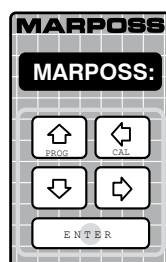
LED SCALE TEST:

This test checks that the CPU driving the LED scale is operating correctly and is compatible with the central CPU.

At the end of the self-test routine (duration approx. 10 seconds), the column will display the following two messages in succession:



**SW VERSION
INSTALLED ON
THE COLUMN**



**COLUMN IDENTIFI-
CATION DATA**

This section provides instructions on how to program the E4N column and make use of the column's full potential.

Use **"one ch."** programming for measuring tasks involving the use of one sensor only.

Use **"two ch."** programming for measuring tasks involving the use of two sensors to carry out one measurement or when two measurements have to be carried out with the same column, each using one sensor.

Use **"all"** programming for measuring tasks involving the use of up to four sensor to carry out one measurement, or when three or four measurements have to be carried out with the same column, each using one sensor.

Decide the type of programming you wish to use, then use the flow charts provided in Section 3.8 and 3.9 as a guide through the programming procedure for each variable.

PROGRAMMING TYPES

3.1

The table below shows the types of measurement tasks that the E4N column can perform for each of the programming types.

	one ch.	two ch.	all ch.
DIAMETER			
DISTANCE			
CONCENTRICITY			
PERPENDICULARITY			
ROUNDNESS (TRI-LOBE)			
CYLINDRICITY			
PARALLELISM			
T.I.R.			

3

HOW TO PROGRAM THE E4N COLUMN

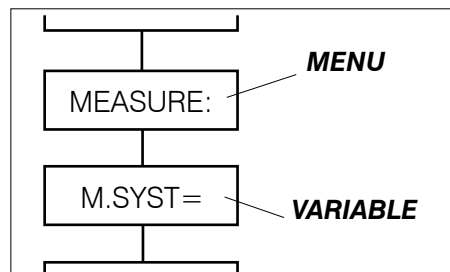
3.2

GENERAL EDITING RULES

The basic components of programming are as follows:

MEASURE:	MENUS (items followed by " : ")
TOLER+ =	VARIABLES (items followed by " = ")
metric	DEFAULT DATA
+0.0000	NUMERIC DATA
MARPOSS	STRINGS

FLOW-CHART example



3.3

USING THE KEYS

MENU

Go to the upper level menu

Access the menu selected

Note: Scrolling of menus on the same level is circular.

Go to the **PREVIOUS** menu on the same level

Go to the **NEXT** menu on the same level

VARIABLES

Go to the upper level

Edit a data item.
Confirm a data item.

Note: Scrolling of the variables on the same level is circular.

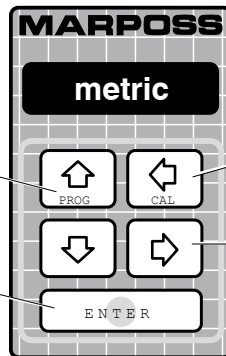
Go to the **PREVIOUS** variable in the same menu

Go to the **NEXT** variable in the same menu

DEFAULT DATA

Exit and confirm the initial data item

Confirm the data item and go to the **NEXT VARIABLE** in the same menu



Select the **PREVIOUS** item

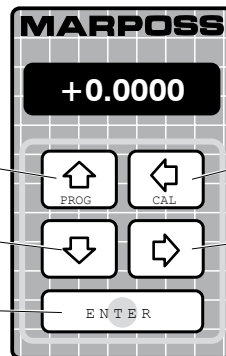
Select the **NEXT** item

NUMERIC DATA

INCREASE the figure of the flashing digit

DECREASE the figure of the flashing digit

Confirm the data item and go to the **NEXT VARIABLE** in the same menu



Select the digit at the **LEFT** of the flashing digit.

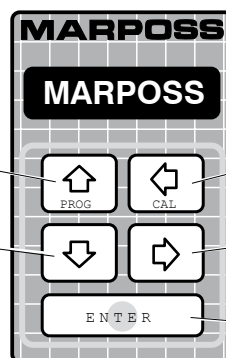
Select the digit at the **RIGHT** of the flashing digit.

Note: When the selected digit is the first on the left of the display, the UP and DOWN arrow keys also allow to **RESET** the numerical data (i.e. not to program it).

STRINGS

Select the **NEXT** character

Select the **PREVIOUS** character



Select the character to the **LEFT** of the flashing character

Select the character to the **RIGHT** of the flashing character

Confirm the data item and go to the **NEXT VARIABLE** in the same menu

ENTERING AND EXITING THE PROGRAMMING MODE

This section describes the procedure for entering and exiting the PROGRAMMING mode.

TO ENTER:

Step 1: To enter the programming mode, press the UP arrow key (**PROG**) for at least two seconds.

Step 2: Press the **ENTER** key to access the "**PROGRAM:**" menu.

Step 3: Use the LEFT and RIGHT arrow keys to select the type of programming required.

Step 4: Press the **ENTER** key to confirm the selection and to pass to the next menu.

Step 5: Use the LEFT and RIGHT arrow keys to select the menu required.

Step 6: Press the **ENTER** key to enter the menu selected and to start programming the variables in that menu.

TO EXIT:

Step 1: To exit from the PROGRAMMING mode, press the UP arrow key (**PROG.**) repeatedly.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data item required.
 (**SAVE** to save the programmed data)
 (**RESTORE** to restore the data previously programmed)
 (**RESET** to reset the programmed data and to return to the default values)

Step 3: Press the **ENTER** key to confirm and to pass to measurement operations.

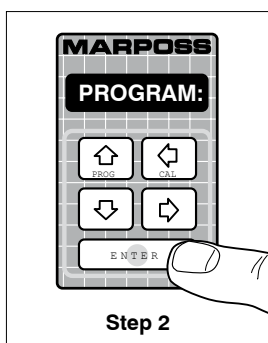
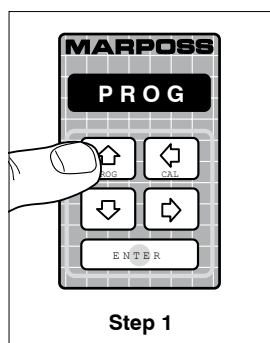
HOW TO PROGRAM THE E4N COLUMN

3

SELECTING THE PROGRAMMING LANGUAGE

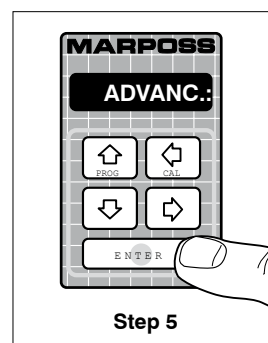
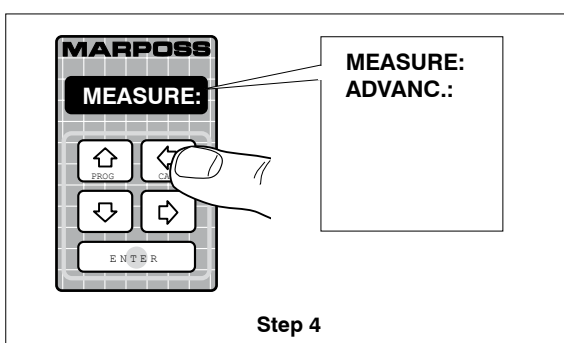
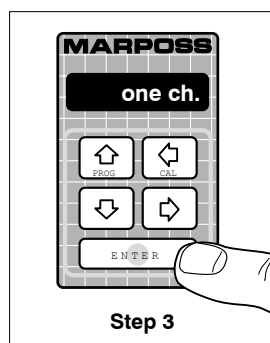
3.5

The E4N is supplied with English set as the default programming language. To change the language and display menu names, variables and other messages so that they correspond with the terms used in the instruction manual in your hands, proceed as follows:



Step 1: Press the UP arrow key (**PROG**) for at least two seconds to enter the PROGRAMMING mode.

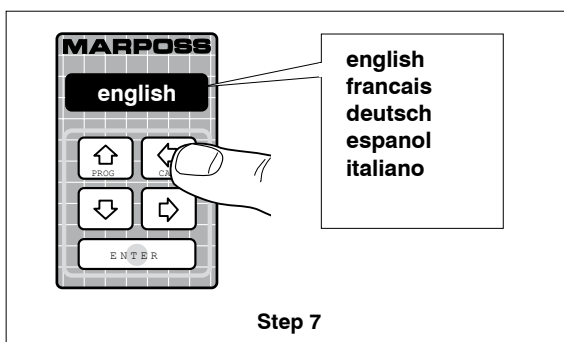
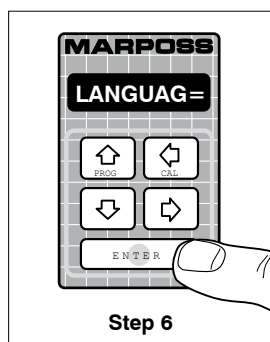
Step 2: Press the **ENTER** key to enter the "PROGRAM:" menu.



Step 3: Press the **ENTER** key again to access the next menu.

Step 4: Use the LEFT and RIGHT arrow keys to select the "ADVANC:." menu.

Step 5: Press **ENTER** to enter the "ADVANC:." menu.



Step 6: Press the **ENTER** key to set the "LANGUAGE=" variable.

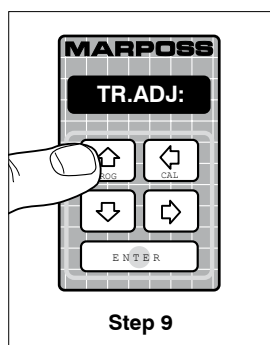
Step 7: Use the UP and DOWN arrow keys to select the language you require.

Step 8: Press the **ENTER** keys to confirm your selection.

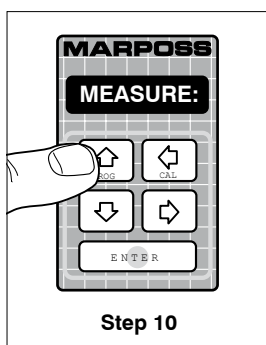
Note: The language selected immediately becomes the language used in programming displays.

3

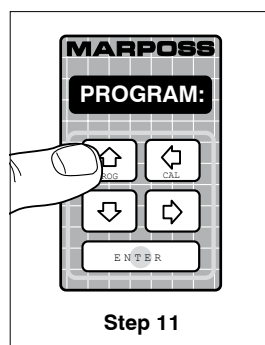
HOW TO PROGRAM THE E4N COLUMN



Step 9



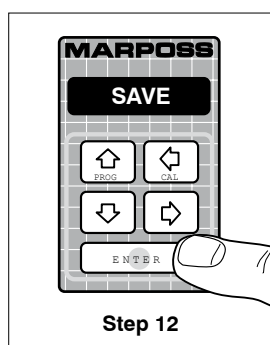
Step 10



Step 11



Step 12



Step 12

Steps 9-10-11-12: Press the UP arrow key (**PROG**) four times to leave the programming mode.

Step 13: Press the **ENTER** key to save your programming selections and to pass to the MEASUREMENT mode.

3.6

DEFAULT PROGRAMMING VALUES

The E4N column is already programmed with a set of default values for the use of a measuring gauge fitted with inductive sensors, extensometer sensors or pneumatic sensor.

The default values are designed for a column connected to a single sensor (i.e. "one ch." programming).

The next section describes the menu variables and their default values.

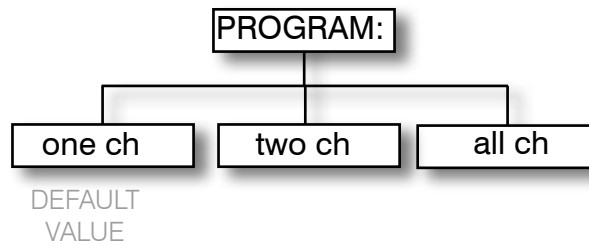
Note: For instructions on customised programming, see **Section 3, "How to program the E4N column"**.

"PROGRAM:" MENU

3.6.1

The main menu "PROGRAM:" contains three programming options:

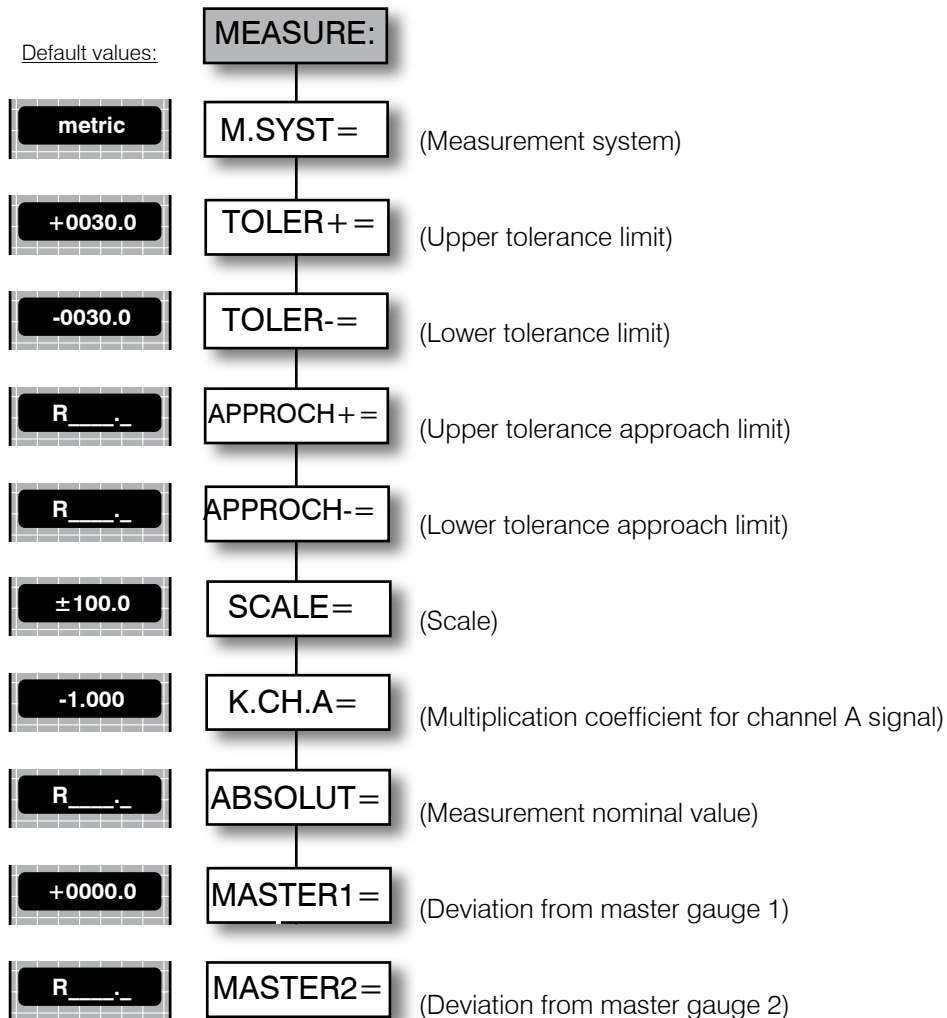
- **one ch.** (programming for one transducer)
- **two ch.** (programming for two transducers)
- **all** (programming for a maximum of four transducers)



"MEASURE:" MENU

3.6.2

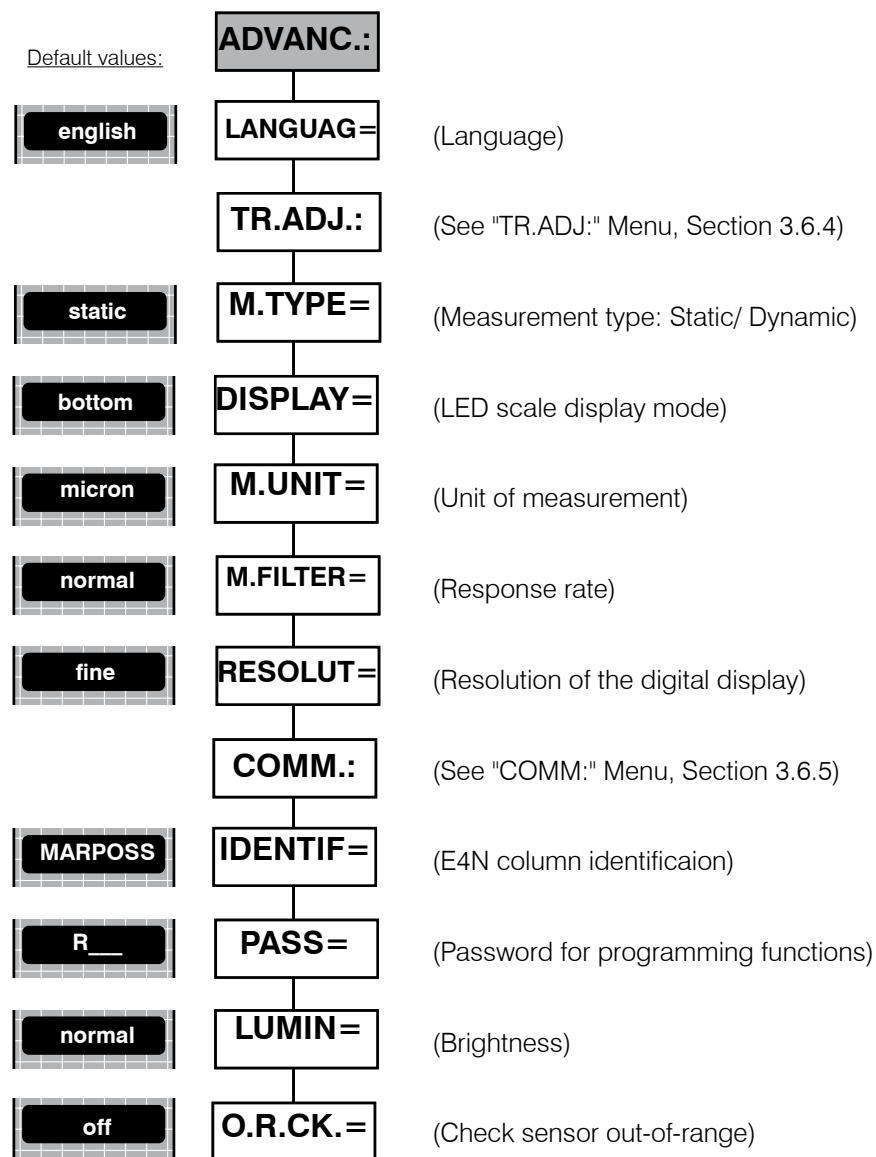
The "MEASURE:" menu is used to program the basic variables for the measurement to be carried out.



3.6.3

"ADVANC.:" MENU

The "ADVANC.:" menu allows to program the advanced variables used in the E4N column.



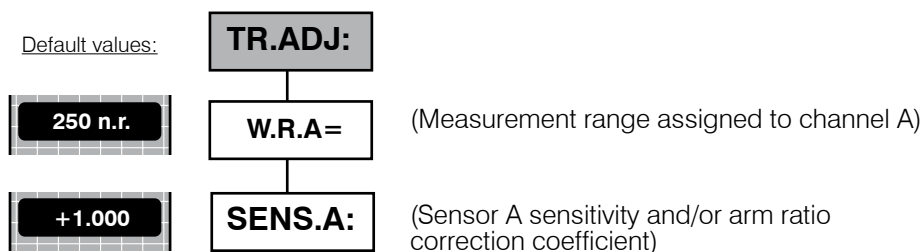
HOW TO PROGRAM THE E4N COLUMN

3

"TR.ADJ.:" MENU

3.6.4

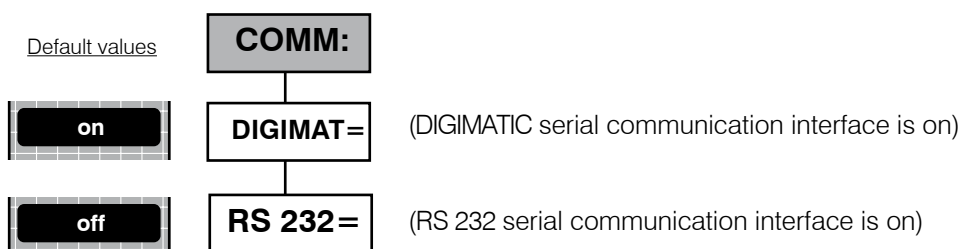
The "TR.ADJ.:" menu contains the variables to program the measurement range and the sensitivity of the sensors.



"COMM.:" MENU

3.6.5

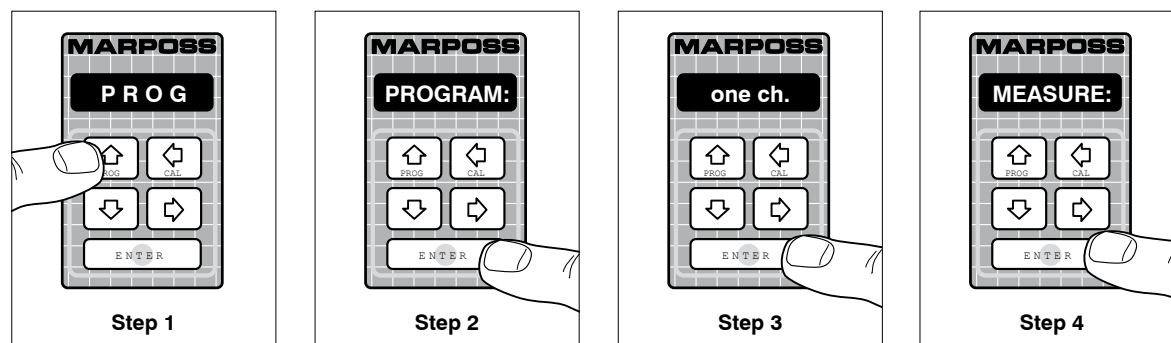
The E4N column can be used to transfer measurement data to additional equipment such as statistical analyzers and printers. The communication mode must be programmed by setting the variables in this menu.



HOW TO RESTORE THE DEFAULT VALUES

3.7

If you wish to return to the programmed default settings for the E4N column, proceed as follows:



Step 1: Press the UP arrow key (PROG) for at least two seconds in order to enter the PROGRAMMING mode.

Step 2: Press the **ENTER** key to access the "PROGRAM:" menu.

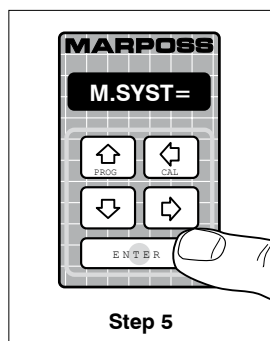
Step 3: Press the **ENTER** key again to access the next menu.

Step 4: Press the **ENTER** key again to enter the "MEASURE:" menu.

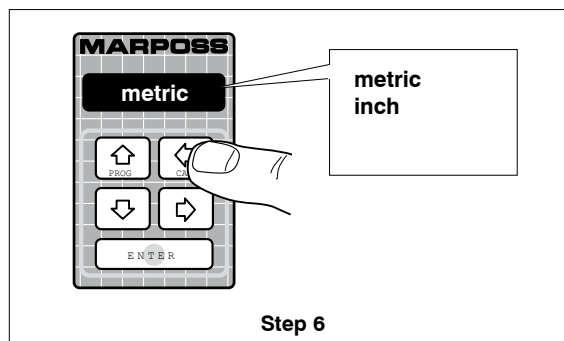
3

HOW TO PROGRAM THE E4N COLUMN

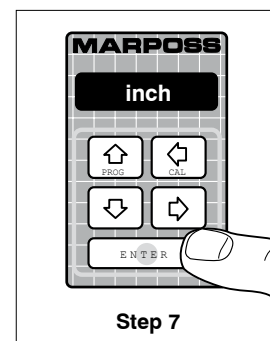
Note: To restore the default values, you must first select and modify the value for any variable and exit from that variable in order to access the SAVE/RESTORE/RESET mode.



Step 5



Step 6

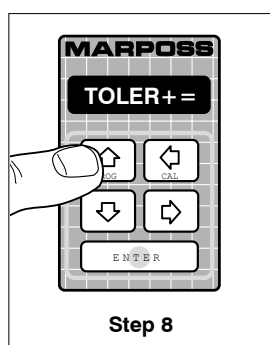


Step 7

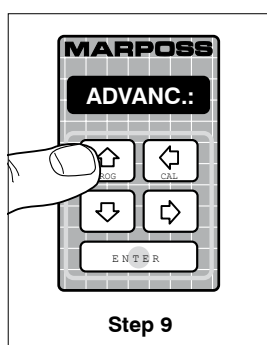
Step 5: Press the **ENTER** key to access the variable.

Step 6: Use the LEFT and RIGHT arrow keys to modify the value of the variable.

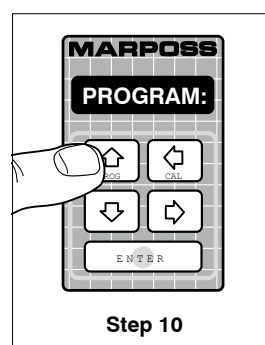
Step 7: Press the **ENTER** key to confirm your entry.



Step 8

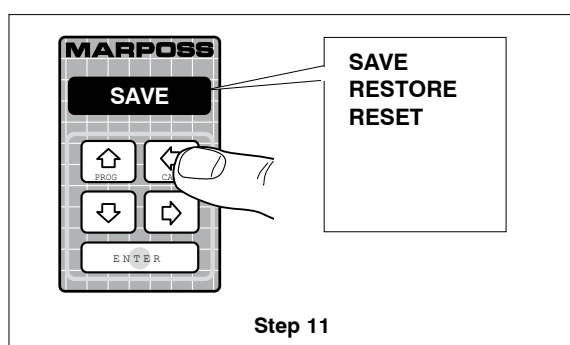


Step 9

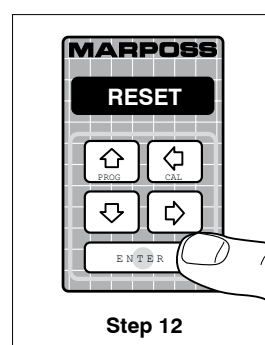


Step 10

Steps 8-9-10: Press the UP arrow key (**PROG**) to exit the programming mode.



Step 11



Step 12



Step 13

Step 11: Use the LEFT and RIGHT arrow keys to select the **"RESET"** option.

Step 12: Press the **ENTER** key to cancel the current programming.

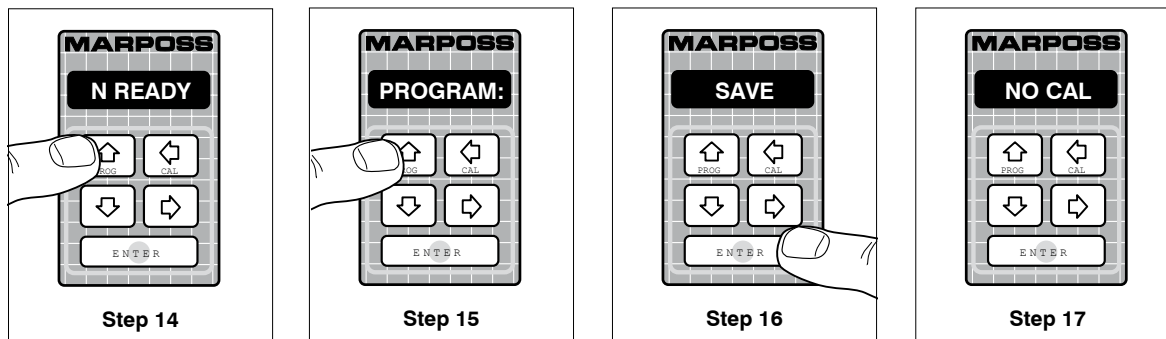
Step 13: The alphanumeric display will display the message "N READY" (NOT READY) to indicate that the column cannot be used after completion of the RESET operation.

Note: In order to be able to use the E4N column at this point you must either restore the default values or program and customise the variables to your requirements. For instructions on programming the variables to your requirements, see Section 3.

HOW TO PROGRAM THE E4N COLUMN

3

To restore the default values, proceed as follows:



Step 14: Press the UP arrow key (**PROG**) for at least two seconds to enter the programming mode.

Step 15: Press the UP arrow key (**PROG**) again to exit the programming mode.

Step 16: Press the **ENTER** key to confirm the SAVE operation.

Step 17: The message "**NO CAL**" will now appear on the alphanumeric display and flash to indicate that the E4N column must be calibrated. The column must be calibrated before the default values become operative. For instructions on calibrating the E4N column, see **Section 6**).

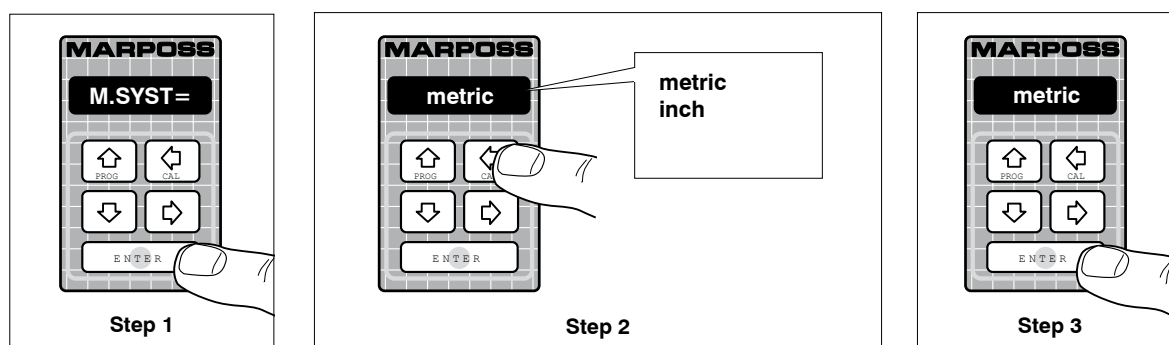
VARIABLES IN THE "MEASURE:" MENU

3.8

M.SYST= (System of measurement)

3.8.1

This variable defines the system of measurement used to display the measurements. All measurements are displayed in the system of measurement set using this function.



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

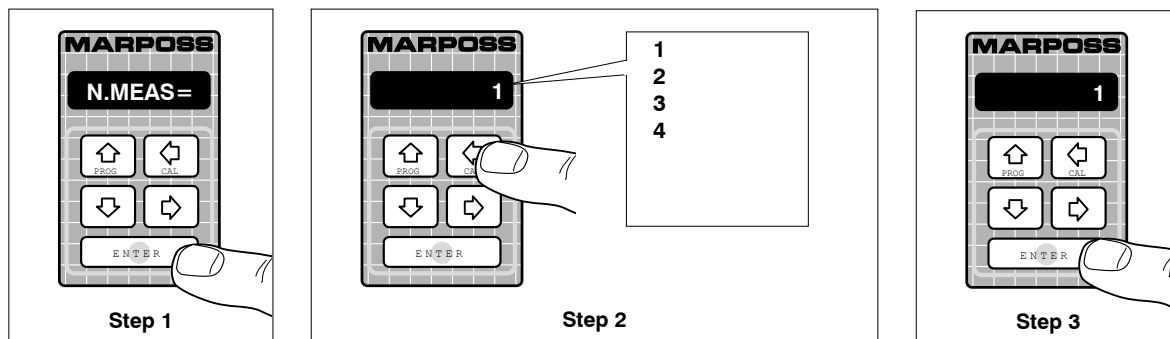
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

3

HOW TO PROGRAM THE E4N COLUMN

3.8.2

N.MEAS= (Number of measurements to be carried out)



Step 1: Press the **ENTER** key to set the variable.

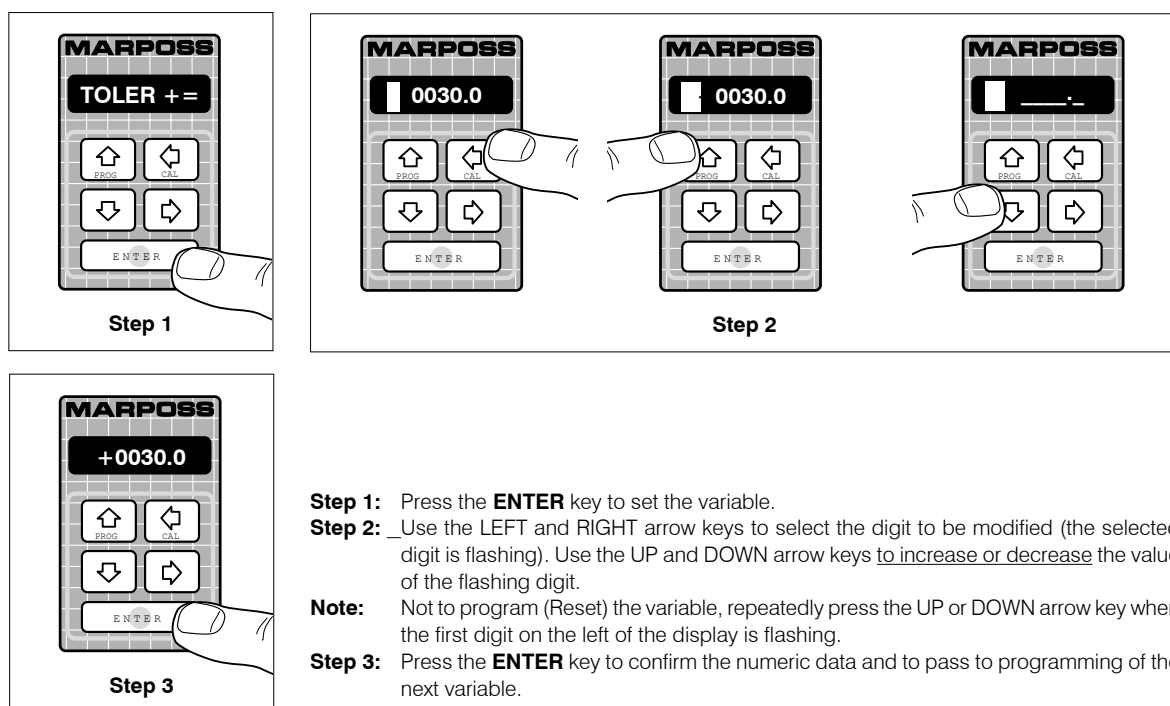
Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the table data item required.

Step 3: Press the **ENTER** key to confirm the table data item selected and to pass to programming of the next variable.

Note: If N.MEAS > 1, only static measurements can be elaborated

3.8.3

TOLER += (Upper tolerance limit)



Step 1: Press the **ENTER** key to set the variable.

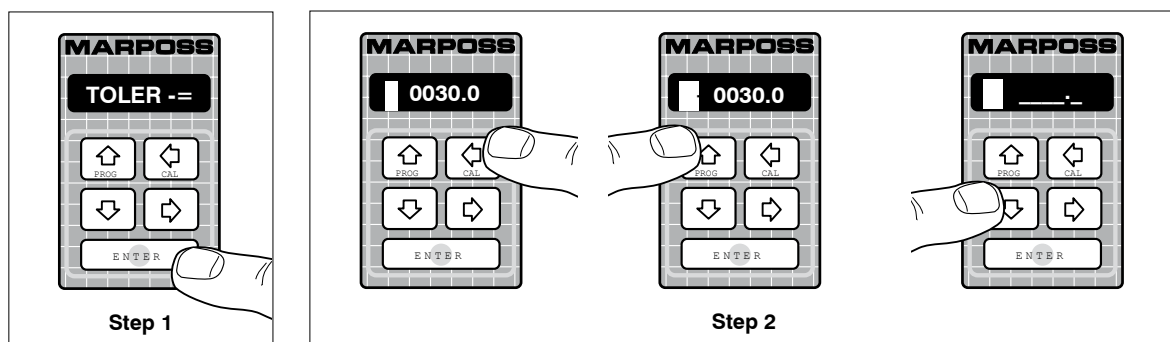
Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the digit to be modified (the selected digit is flashing). Use the **UP** and **DOWN** arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the **UP** or **DOWN** arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

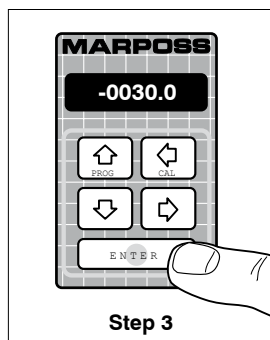
3.8.4

TOLER -= (Lower tolerance limit)



HOW TO PROGRAM THE E4N COLUMN

3



Step 1: Press the **ENTER** key to set the variable.

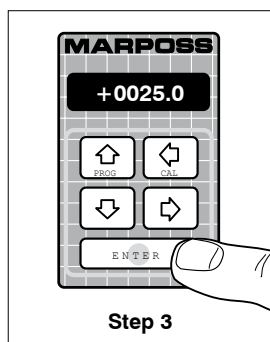
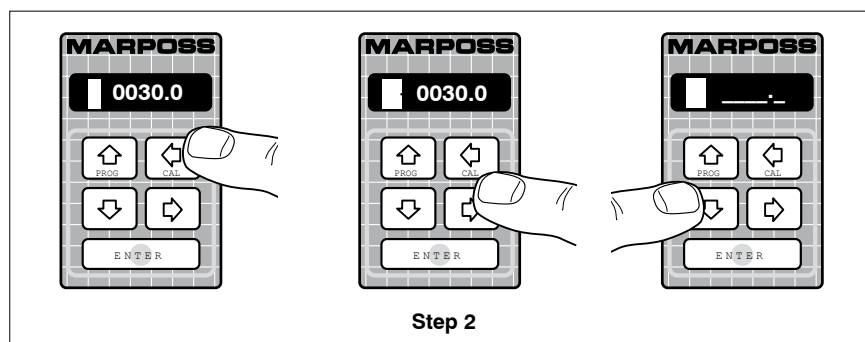
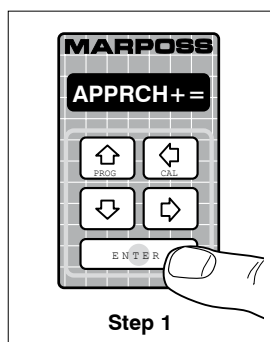
Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

APPRCH+= (Upper tolerance approach limit)

3.8.5



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

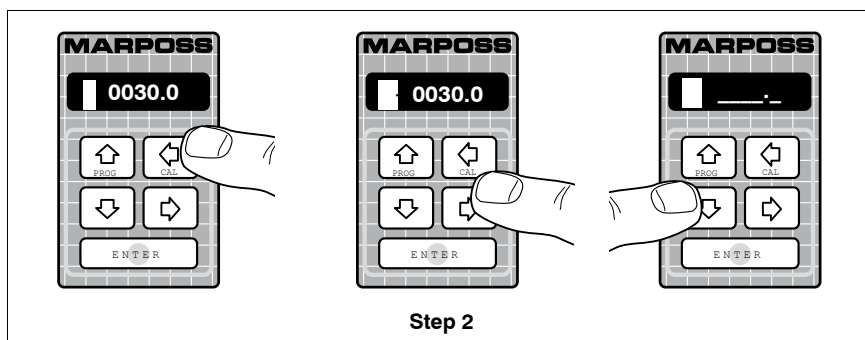
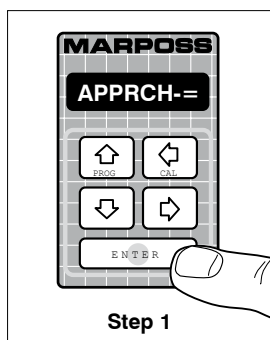
Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

Note: The maximum and minimum values that can be set are the same as the programmed upper and lower tolerance limits (see Sections 3.8.3 and 3.8.4).

APPRCH-= (Lower tolerance approach limit)

3.8.6



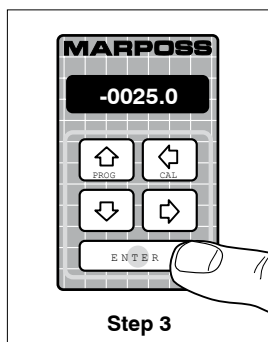
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

3

HOW TO PROGRAM THE E4N COLUMN



Step 3

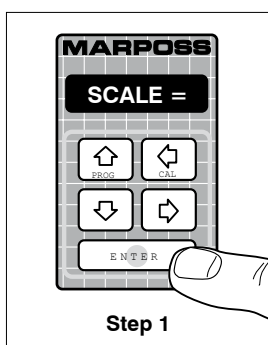
Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

Note: The maximum and minimum values that can be set are the same as the programmed upper and lower tolerance limits (see Sections 3.8.3 and 3.8.4).

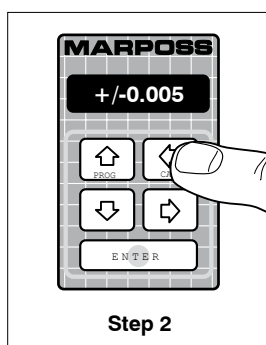
3.8.7

SCALE= (Measurement scale display)

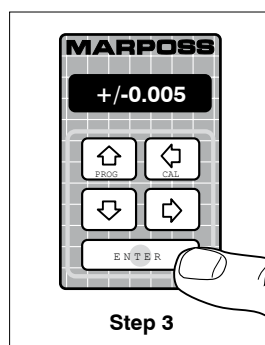
This variable defines the full scale range shown on the LED scale.



Step 1



Step 2



Step 3

Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data (see the table below).

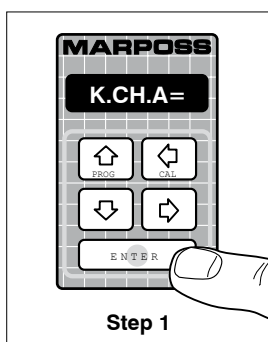
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

FULL SCALE RANGE VALUES BY UNIT OF MEASUREMENT				
mm	micron	inch	.001"	.000001"
±0.005	±5.000	-	±0.250	±250.0
±0.010	±10.00	±0.0005	±0.500	±500.0
±0.025	±25.00	±0.0010	±1.000	±1000
±0.050	±50.00	±0.0025	±2.500	±2500
±0.100	±100.0	±0.005	±5.000	±5000
±0.250	±250.0	±0.010	±10.00	-
±0.500	±500.0	±0.025	±25.00	-
±1.000	±1000	±0.050	±50.00	-
±2.500	±2500	±0.100	±100.0	-
±5.000	±5000	±0.250	±250.0	-
auto	auto	auto	auto	auto

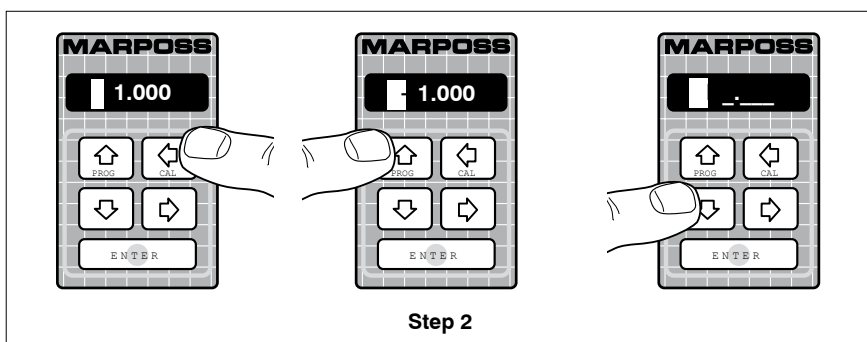
Note: If **SCALE=auto** is programmed, the system automatically calculates the range value of the analog bar scale based on the programmed values of the tolerance limits. The tolerance center is always positioned in the central led of the analog bar scale and the tolerance limits are positioned symmetrically with respect to the tolerance center.

3.8.8

K.CH.A= (Multiplication coefficient for the channel A signal)



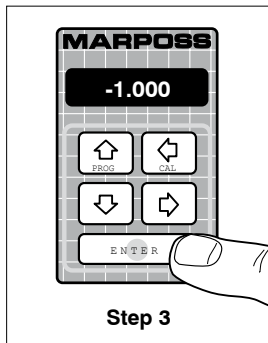
Step 1



Step 2

HOW TO PROGRAM THE E4N COLUMN

3



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

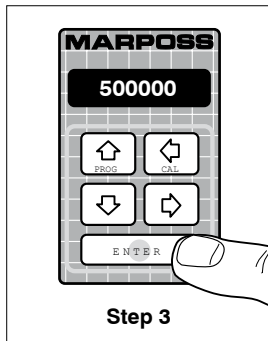
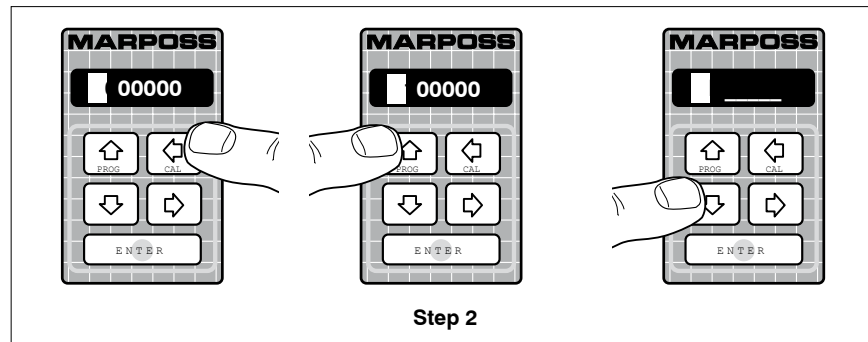
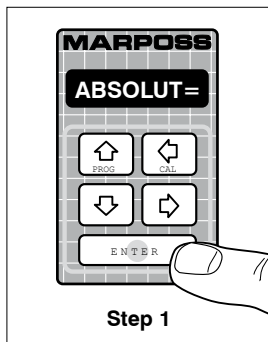
Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

Note: In cases where more measurements are present, a channel coefficient can be assigned to only one measurement and is automatically excluded from further assignments.

To program the variable "K.CH.B=" "K.CH.C=" "K.CH.D=" follow the same procedure.

ABSOLUT= (Measurement nominal value)

3.8.9



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

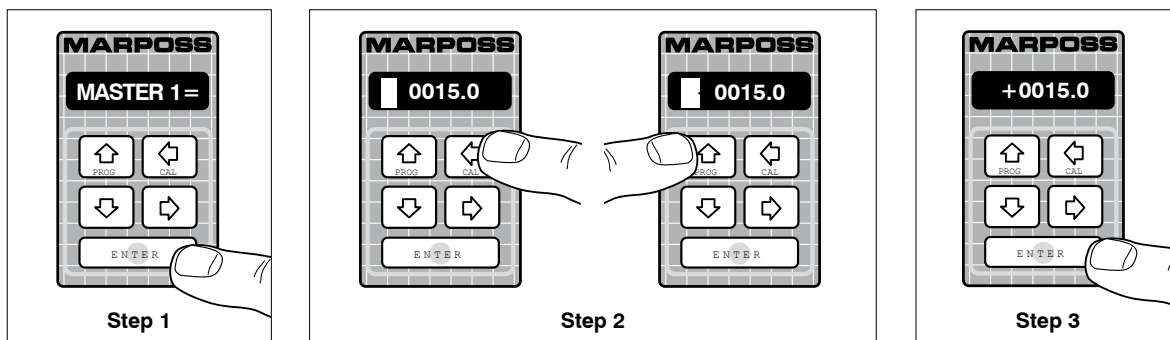
Note: If the "ABSOLUT=" variable is programmed:

- The column automatically displays the absolute value of a measurement. If this variable is not programmed, the column will display the relative value of the measurement.
- The column will automatically convert MICRONS into MILLIMETRES. You can display the measurement in the unit of measurement you require by modifying the value of the "M.UNIT=" variable (see Section 3.9.6).
- The measurement scale will BE automatically set as "auto".

HOW TO PROGRAM THE E4N COLUMN

3.8.10

MASTER 1= (Deviation of master gauge 1)



Step 1: Press the **ENTER** key to set the variable.

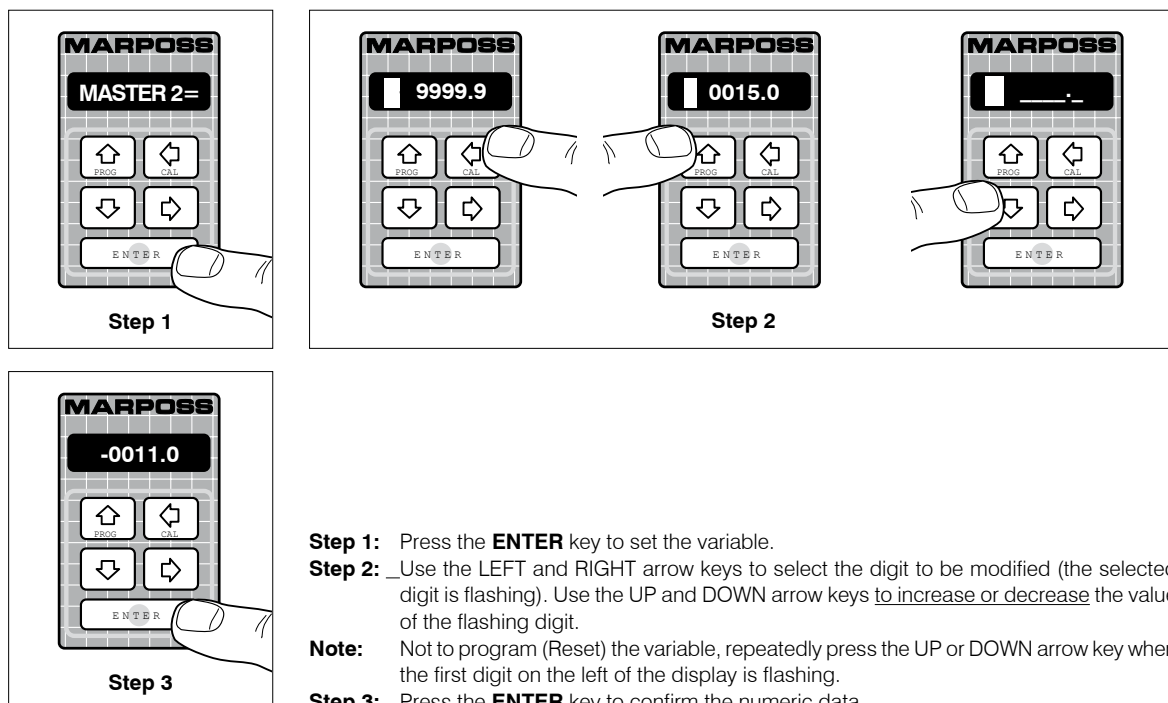
Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

3.8.11

MASTER 2= (Deviation of master gauge 2)

On applications requiring sensitivity correction, the previous function (Master 1) can be used to zero the measurement and this function (Master 2) can be used to correct sensitivity.



Step 1: Press the **ENTER** key to set the variable.

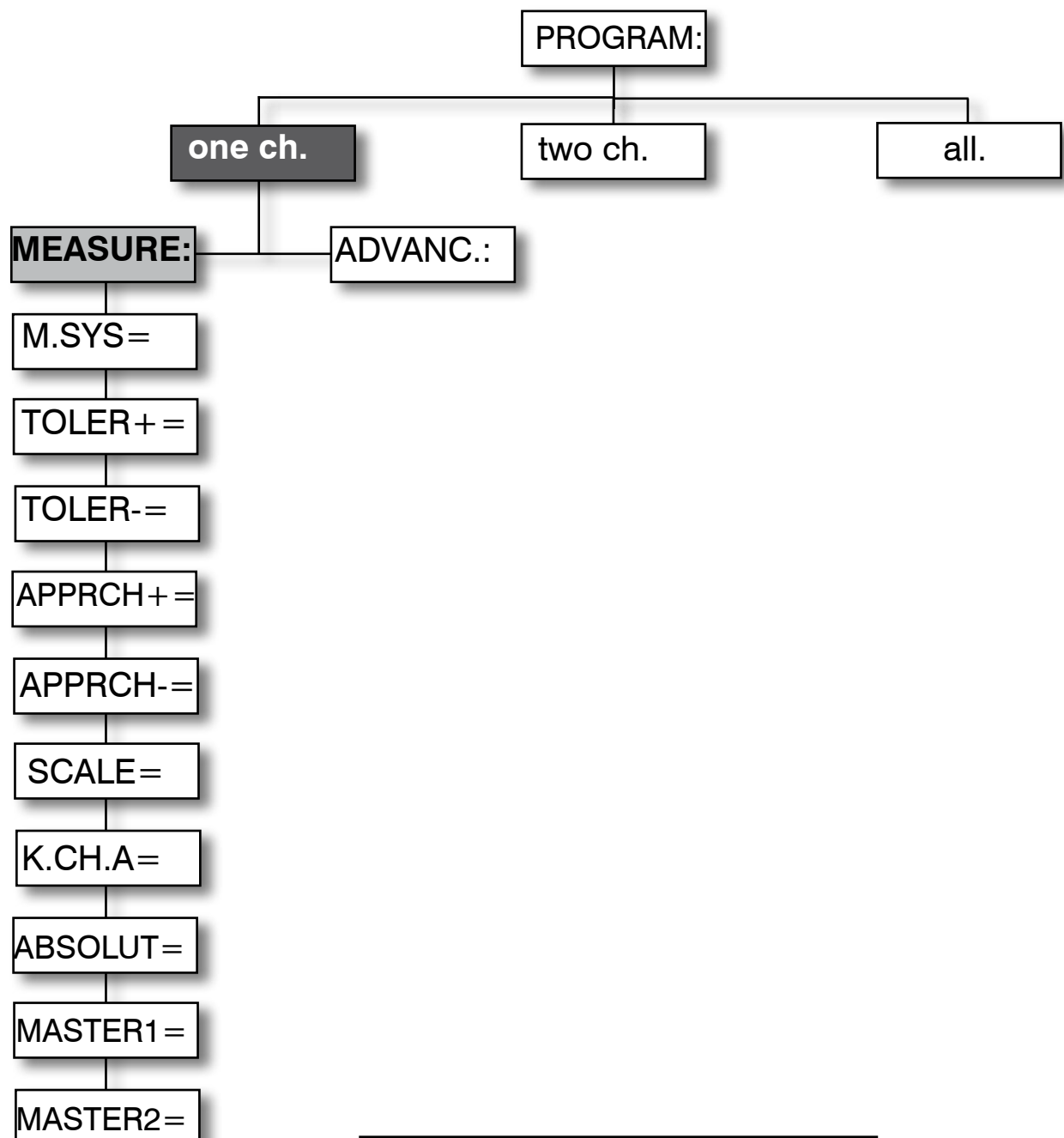
Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data.

PROGRAMMING "one ch."

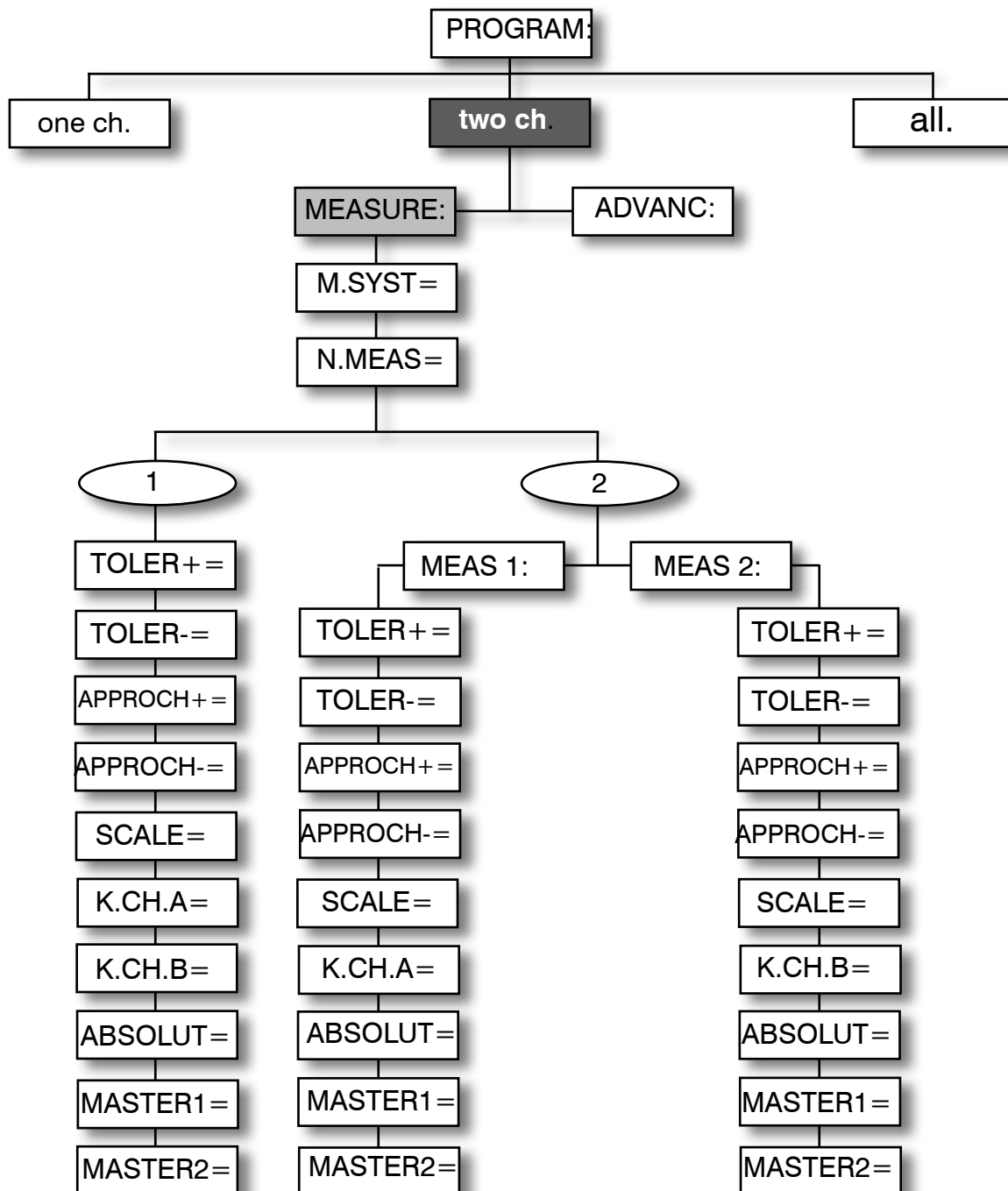
MENÙ "MEASURE:"



The variable of "MEASURE:" menù are listed in section 3.8.

PROGRAMMING "two ch."

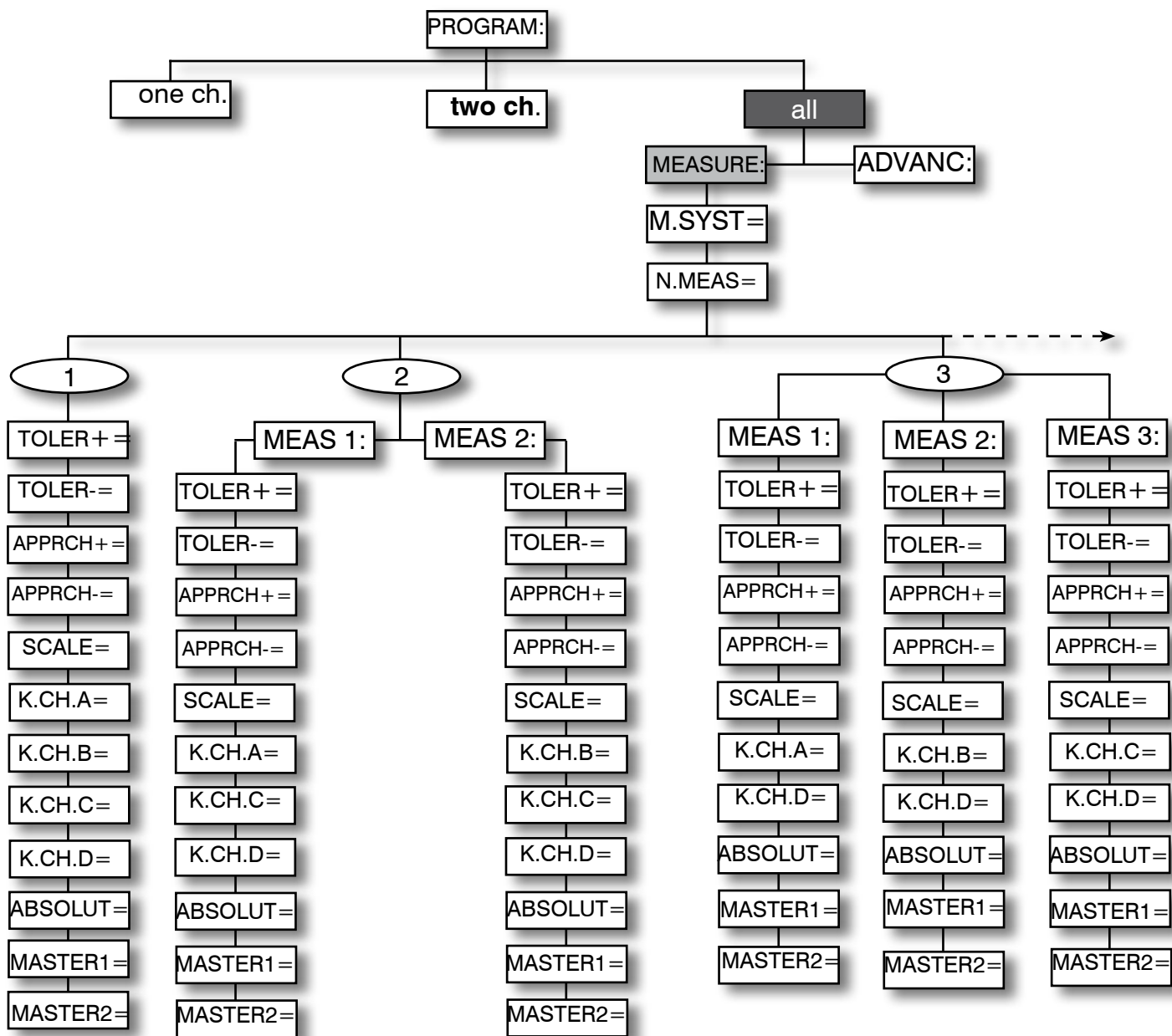
MENÙ "MEASURE:"



The variable of "MEASURE:" menù are listed in section 3.8.

PROGRAMMING "all."

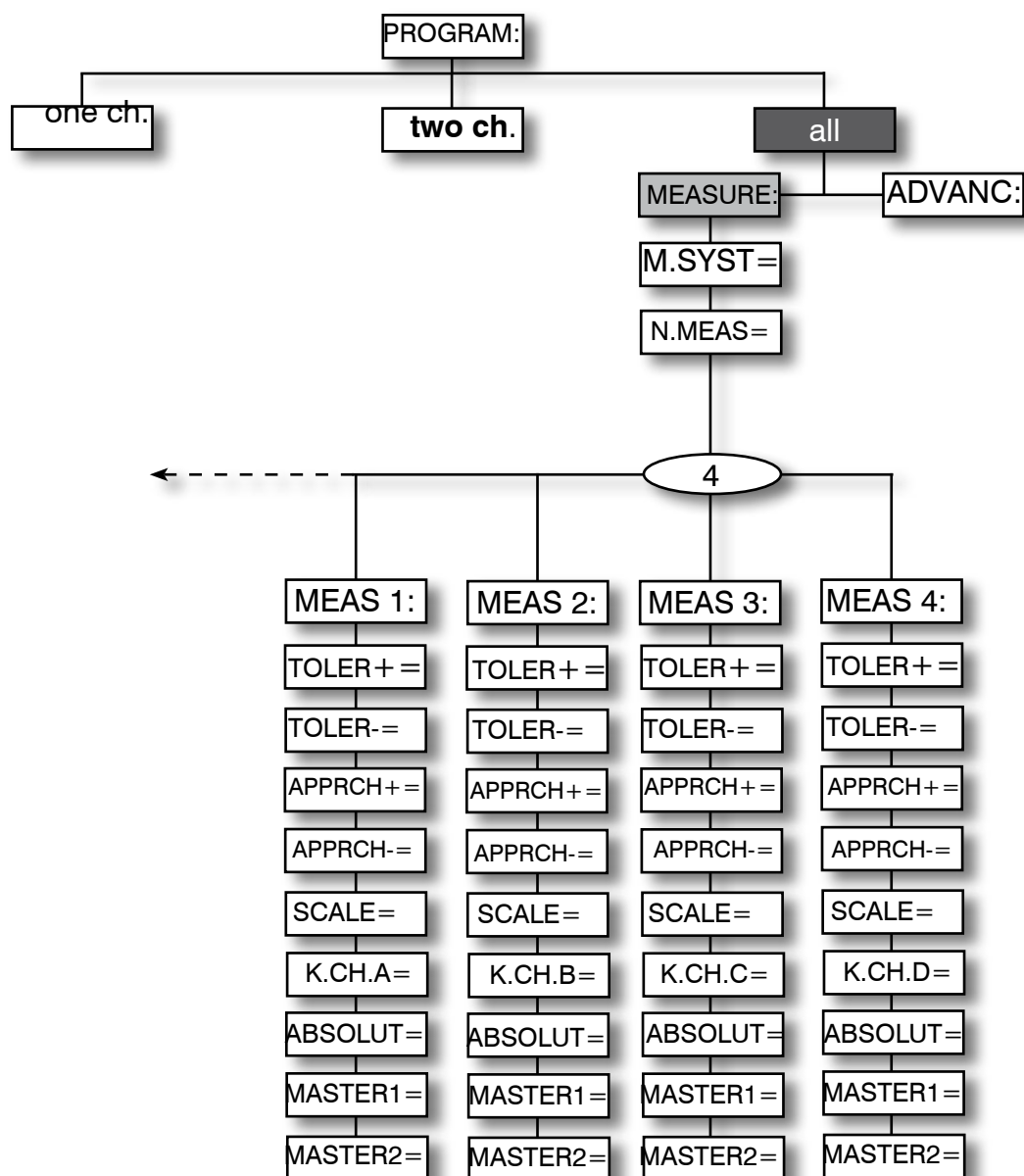
MENÙ "MEASURE:"



The variable of "MEASURE:" menù are listed in section 3.8.

PROGRAMMING "all."

MENÙ "MEASURE:"



The variable of "MEASURE:" menù are listed in section 3.8.

HOW TO PROGRAM THE E4N COLUMN

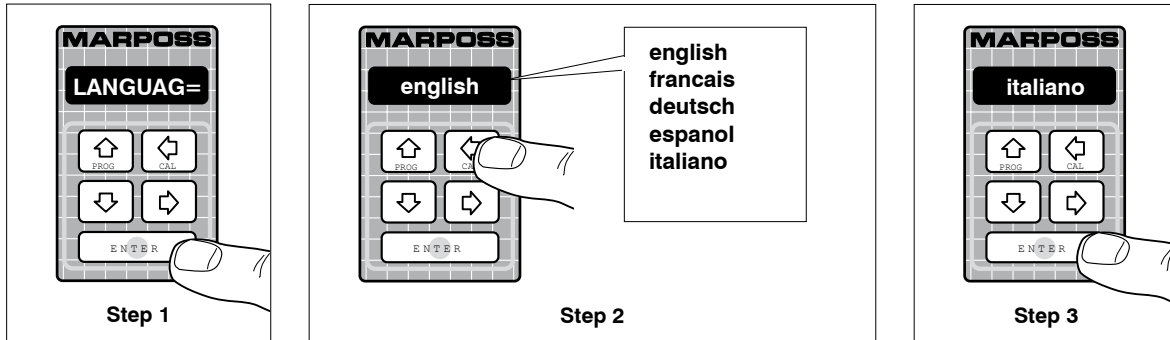
3

VARIABLES IN THE "ADVANC.:" MENU

3.9

LANGUAG= (Language)

3.9.1



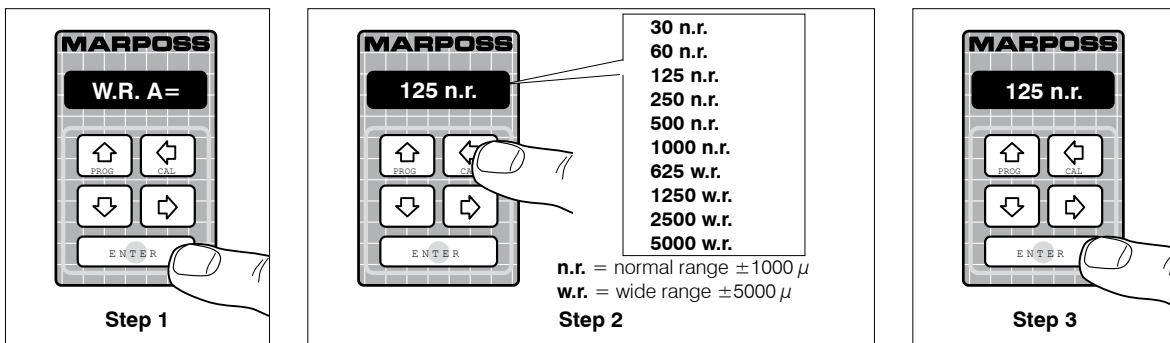
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

W.R. A= (Working range assigned to channel A)

3.9.2



Step 1: Press the **ENTER** key to set the variable.

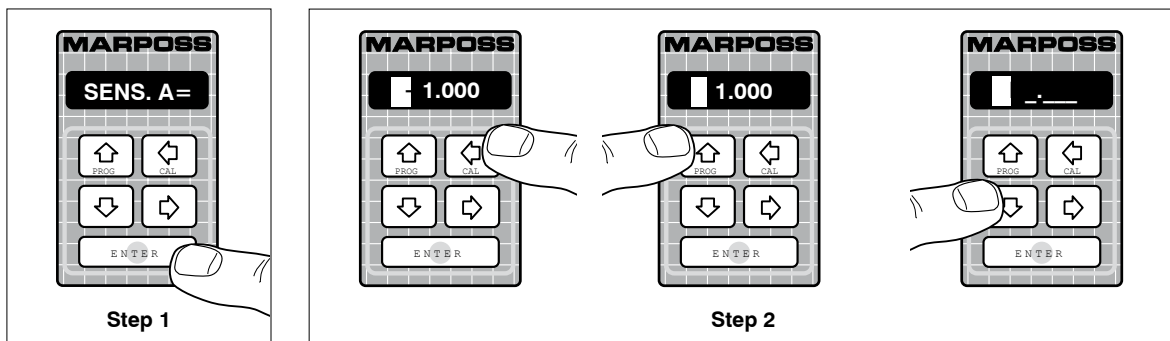
Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

Note: To program the variable "W.R.B=" "W.R.C=" "W.R.D=" follow the same procedure.

SENS. A= (Sensitivity correction coefficient)

3.9.3



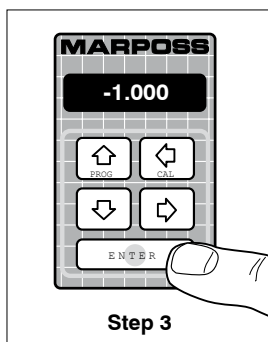
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

3

HOW TO PROGRAM THE E4N COLUMN



Step 3

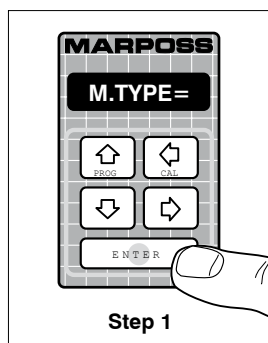
Step 3: Press the **ENTER** key to confirm the numeric data.

Note: To program the variable "SENS. B=" "SENS. C=" "SENS. D=" follow the same procedure.

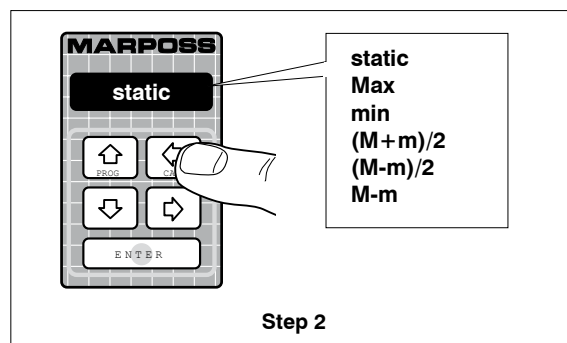
3.9.4

M.TYPE= (Type of measurement: Static/Dynamic)

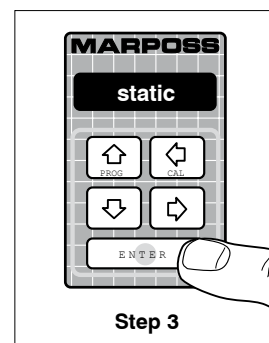
This variable will be displayed for a single measurement only. This variable sets the E4N column for the static or dynamic measurement modes.



Step 1



Step 2



Step 3

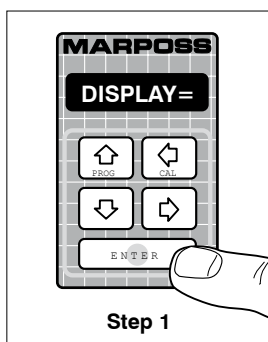
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the table data required.

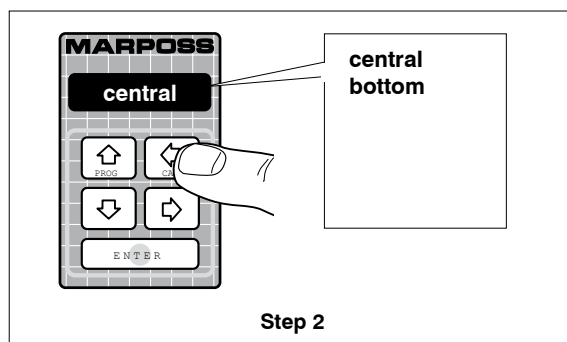
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

3.9.5

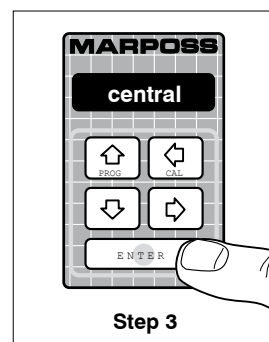
DISPLAY= (LED scale display mode)



Step 1



Step 2



Step 3

Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the table data required.

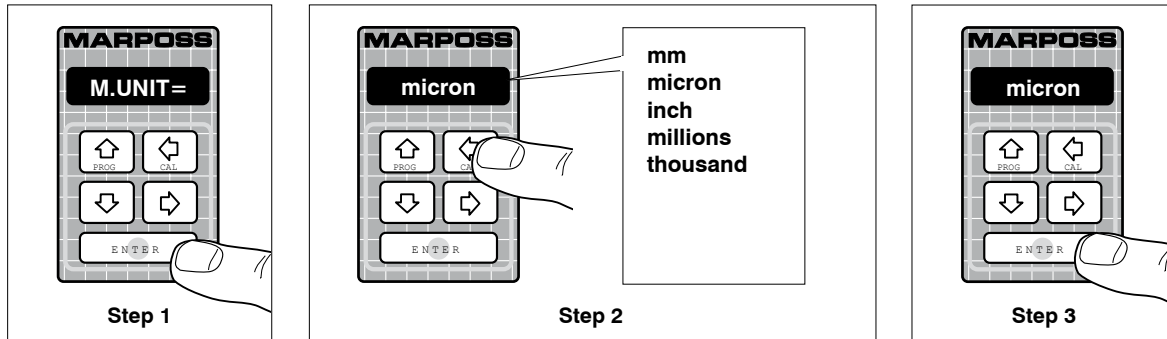
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

HOW TO PROGRAM THE E4N COLUMN

3

M.UNIT= (Unit of measurement)

3.9.6



Step 1: Press the **ENTER** key to set the variable.

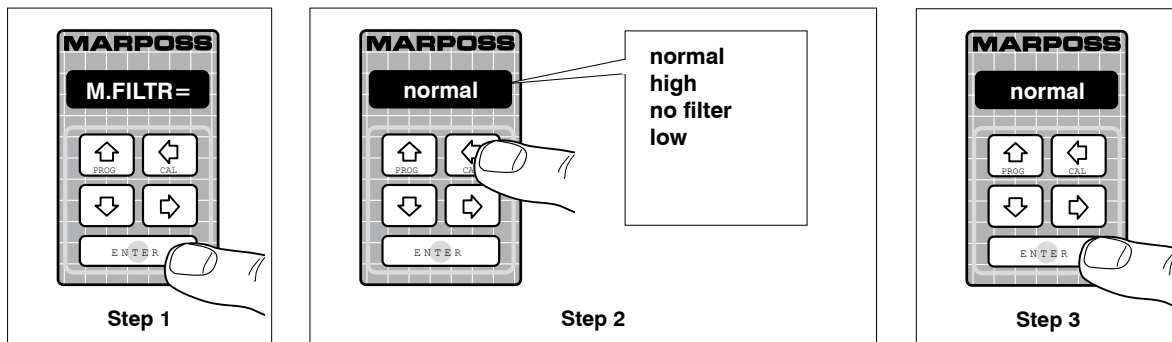
Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

M.FILTR= (Response rate)

3.9.7

The "M.FILTR=" variable defines the response rate of the LED scale by modifying the measurement filter.



Step 1: Press the **ENTER** key to set the variable.

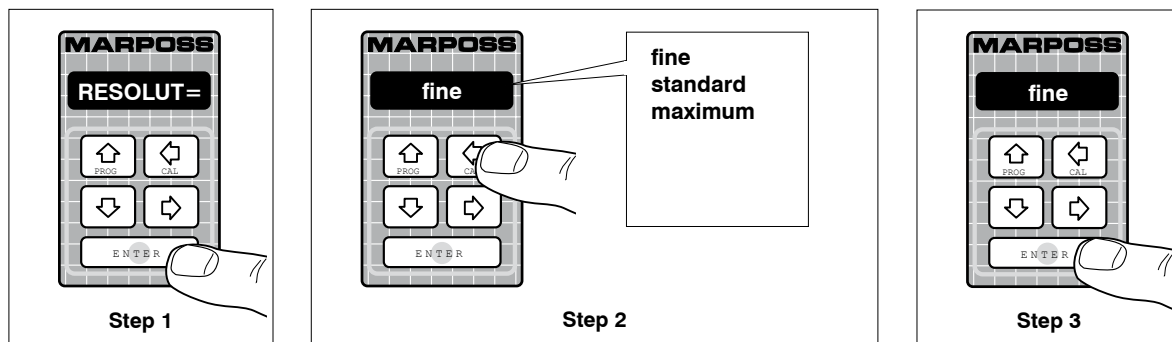
Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

RESOLUT= (Resolution of the digital display)

3.9.8

The variable "RESOLUT=" in combination with the working range assigned to the measurement channels, allow to set the resolution of the digital display.



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

3.9.9

THRESH.= (Threshold value for automatic switching)

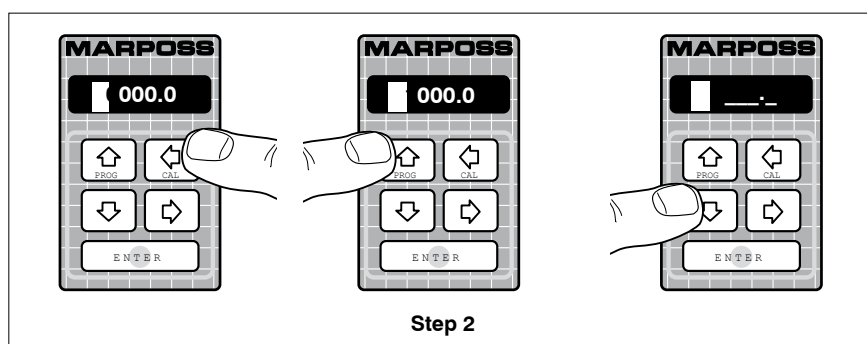
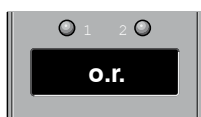
This parameter appears only if the number of programmed measurements is bigger than one. The automatic switch among the measurements is therefore possible only if they are static.

AUTOMATIC SWITCH BETWEEN TWO STATIC MEASUREMENTS

More measurements can be carried out on the same column if

- they are obtained as a linear combination of different transducers
- the total number of involved transducers is between two and four

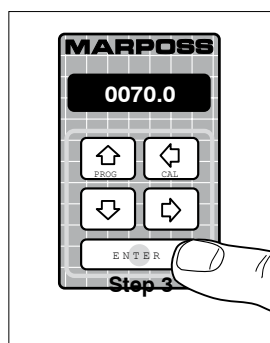
The measurements are not displayed at the same time and each measurement is displayed according to validity and programmed threshold. If they are not valid nor within the programmed threshold, the message o.r. (OVER RANGE) is displayed. This working mode requires the COMMUT parameter to be programmed as AUTO (see paragraph 3.9.10).



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.



Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

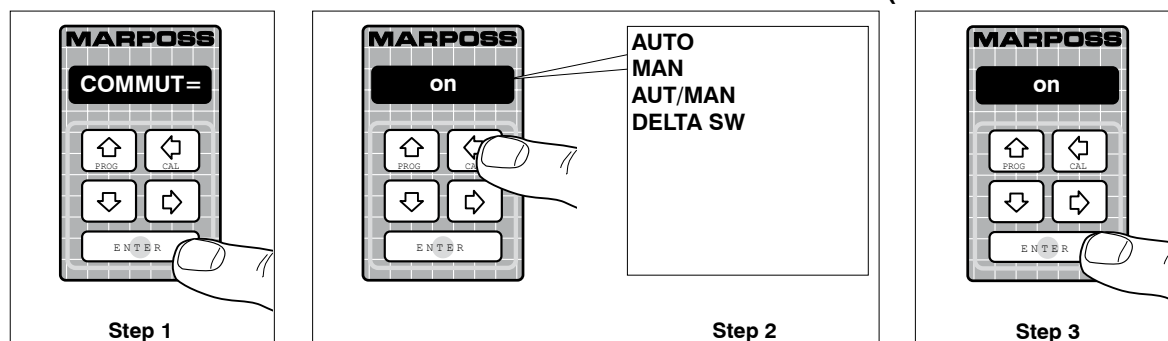
Note: If this variable is programmed (i.e. assigned a numeric value), the column will switch from one measurement to another at the threshold value defined in this menu.

HOW TO PROGRAM THE E4N COLUMN

3

COMMUT= (Commutation mode)

3.9.10



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

Note:

COMMUT = AUTO: the measurement value is displayed if only one transducer is in range and any other transducer is over range or over the threshold for automatic switch. The number of the measurement is shown in the upper digital display.

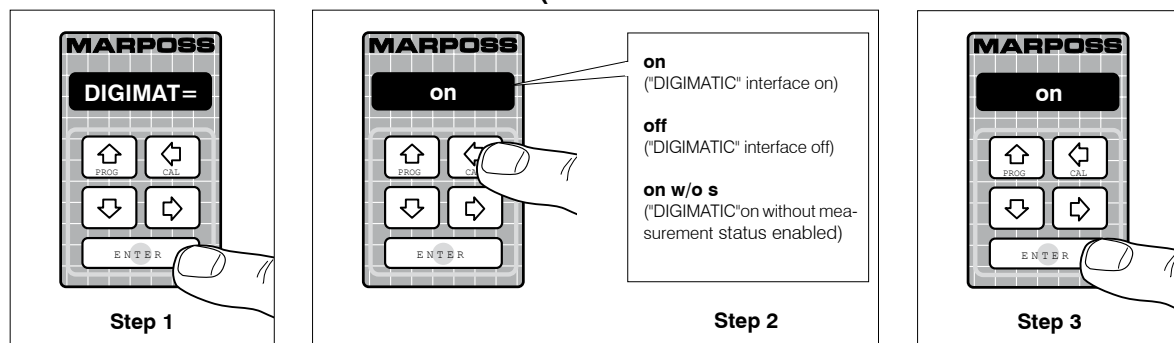
COMMUT = MAN: in this mode all transducers can be in range at the same time. The measurement values are displayed in sequence by pressing the right arrow key for two seconds. The number of the measurement is shown in the upper digital display and, at switching, even in the lower digital display as Meas.No1, Meas.No2, Meas.No3, Meas.No4.

COMMUT = AUT/MAN: it is possible anytime to switch from the automatic mode to the manual mode without entering the programming mode, just by pressing at the same time the right arrow key and the ENTER key for two seconds.

COMMUT = DELTA SW: this mode requires for each measurement the programming of the DELTA and TIME parameters which are in the MEAS submenu of the Advanced menu. DELTA represents the value of the transducer movement; if this value is detected by the column within the programmed TIME period, the measurement related to such transducer is automatically displayed. The programmable range for TIME is from 1 to 20, each unit corresponds to 40 msec. The number of the displayed measurement is shown in the upper digital display.

DIGIMAT= ("DIGIMATIC" serial communications interface)

3.9.11



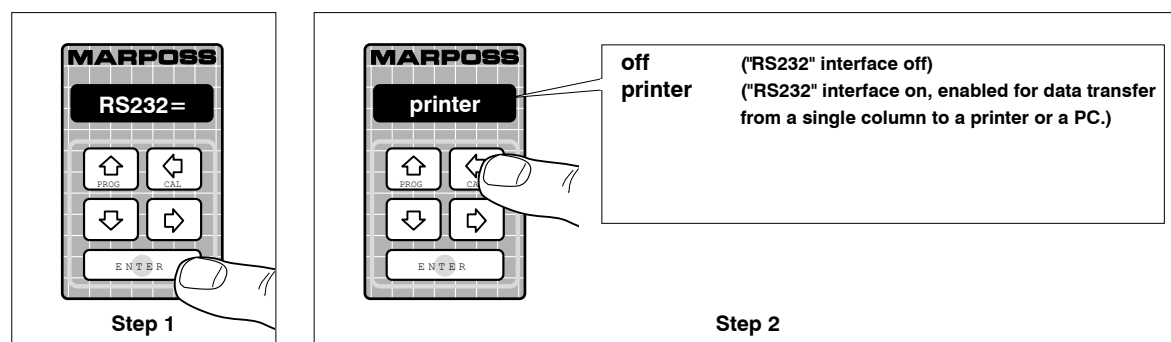
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

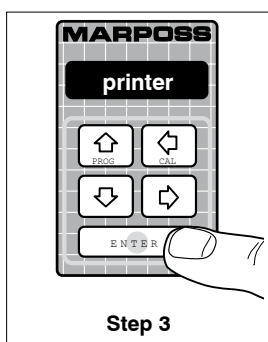
RS232= (RS232 serial communications interface)

3.9.12



3

HOW TO PROGRAM THE E4N COLUMN



Step 3

Step 1: Press the **ENTER** key to set the variable.

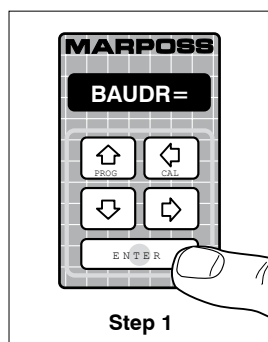
Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

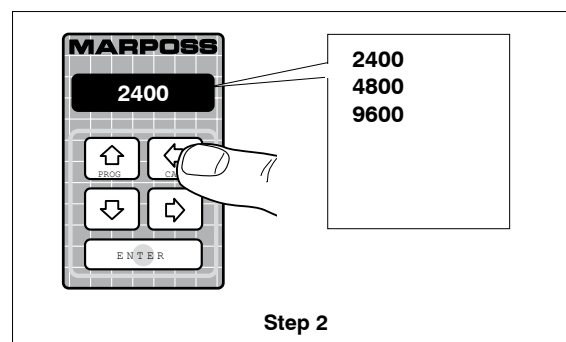
Note: If the "RS232=" variable has been set to "printer", the E4N column will display a series of other variables for customising the print protocol ("BAUDR=", "DATA-BIT=", "PARITY=", "HAND-SH=", "LINxPAG=" and "LIN_TER="). For instructions on the print protocol, see Section 9.3.

3.9.13

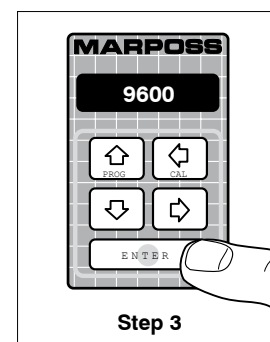
BAUDR= (Data transmission speed in BIT/sec.)



Step 1



Step 2



Step 3

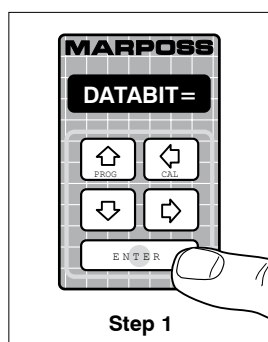
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

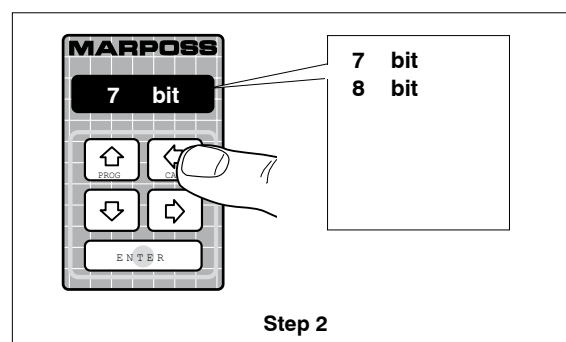
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

3.9.14

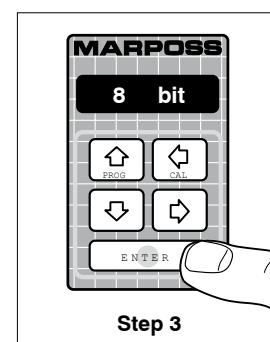
DATABIT= (Number of BIT/character)



Step 1



Step 2



Step 3

Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

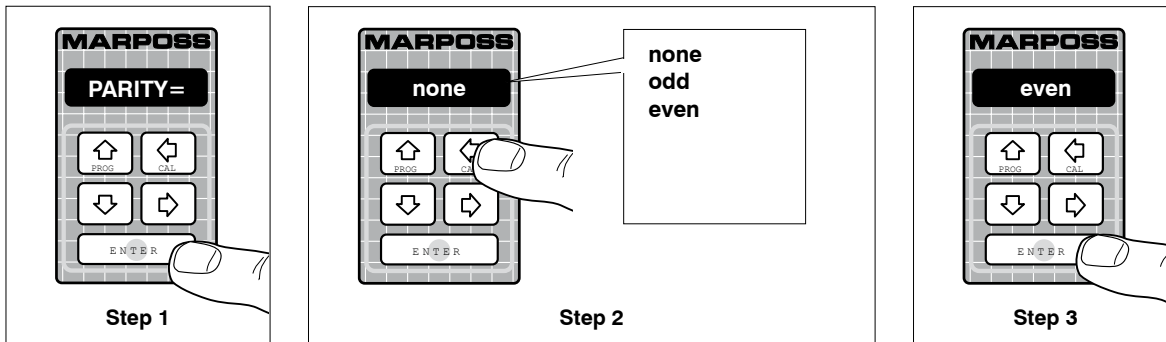
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

HOW TO PROGRAM THE E4N COLUMN

3

PARITY= (Parity BIT)

3.9.15



Step 1: Press the **ENTER** key to set the variable.

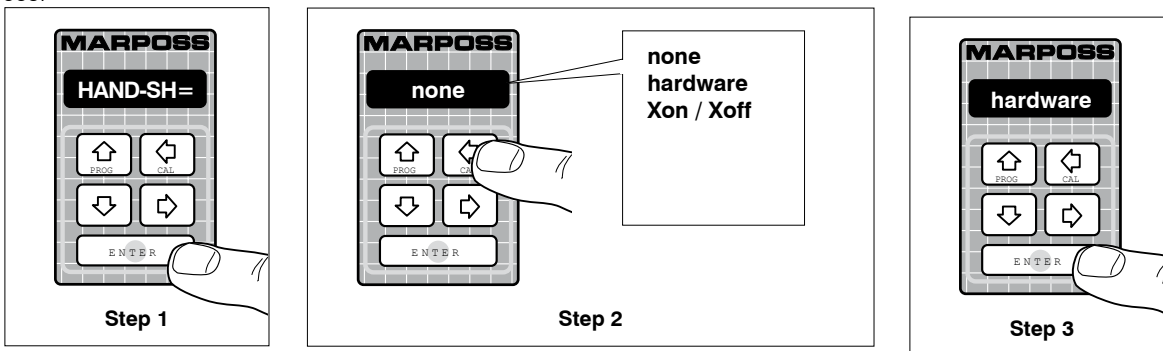
Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

HAND-SH= (Synchronizing)

3.9.16

The "**HAND-SH=**" variable specifies the synchronising mode used between the E4N column and external devices.



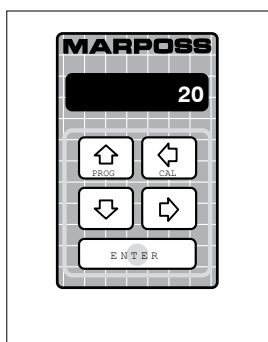
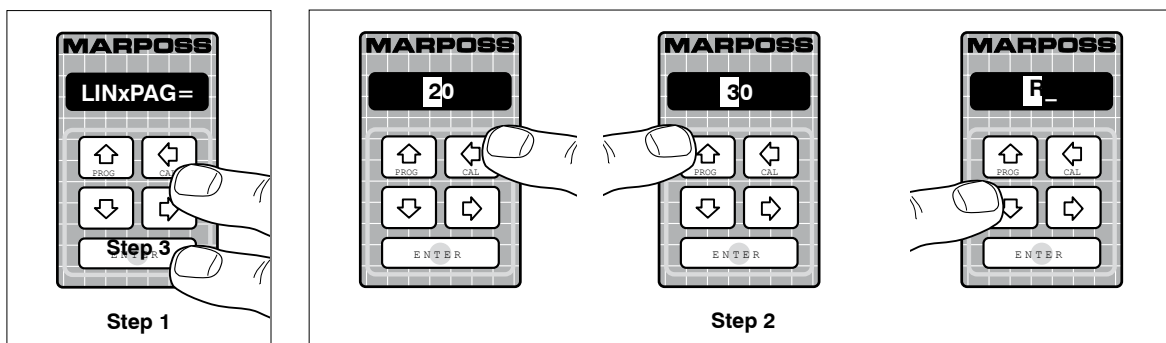
Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

LINxPAG= (Number of data lines per print-out page)

3.9.17



Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the digit to be modified (the selected digit is flashing). Use the **UP** and **DOWN** arrow keys to increase or decrease the value of the flashing digit.

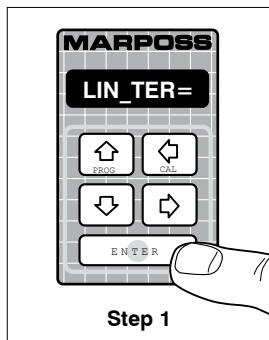
Note: Not to program (Reset) the variable, repeatedly press the **UP** or **DOWN** arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

HOW TO PROGRAM THE E4N COLUMN

3.9.18

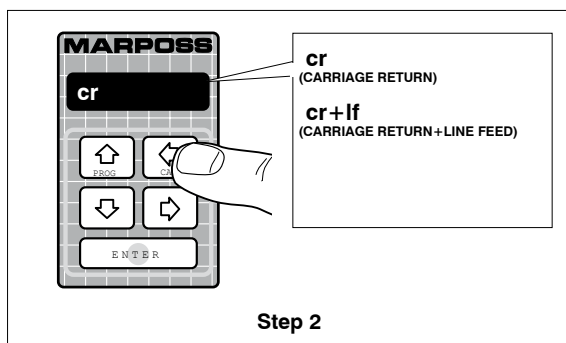
LIN_TER= (Value line close)



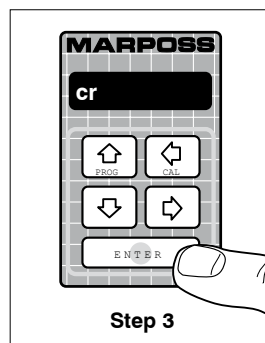
Step 1

This variable defines the method for closing a line of values.

Step 1: Press the **ENTER** key to set the variable.



Step 2



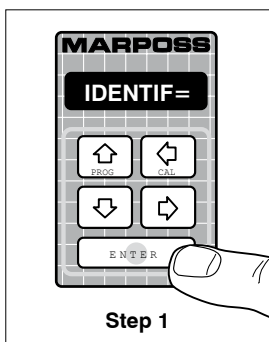
Step 3

Step 2: Use the LEFT and Right arrow keys to select the table data required.

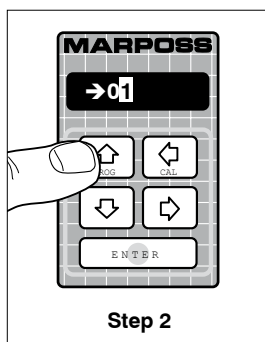
Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

3.9.19

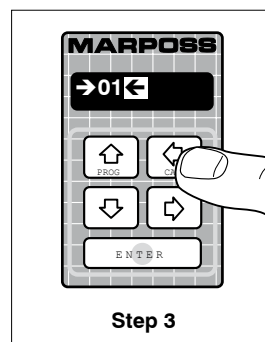
IDENT.= (E4N column identification name)



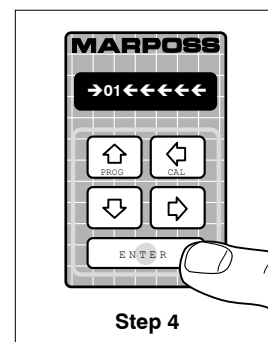
Step 1



Step 2



Step 3



Step 4

Step 1: Press the **ENTER** key to set the variable.

Step 2: Use the UP and DOWN arrow keys to set the alphanumeric data.

Step 3: Use the LEFT and RIGHT arrow keys to select the characters required.

Step 4: Press the **ENTER** key to confirm the string and to pass to programming of the next variable.

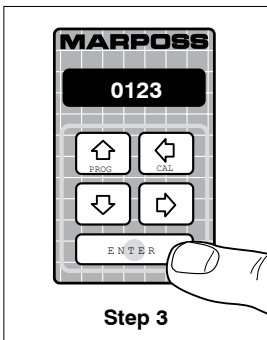
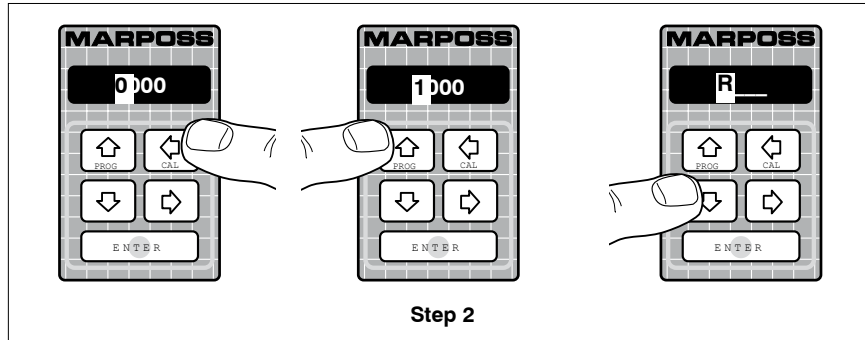
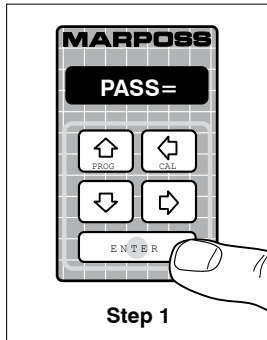
Note: The identification name is MARPOSS by default. To transmit data an identification number has to be programmed within opening and closing characters (see above example). If more than one column is connected to the same PC the identification number must be unique for each column.

HOW TO PROGRAM THE E4N COLUMN

3

PASS= (Programming password)

3.9.20



Step 1: Press the **ENTER** key to set the variable.

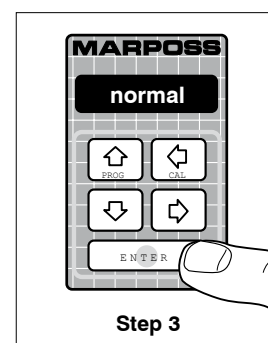
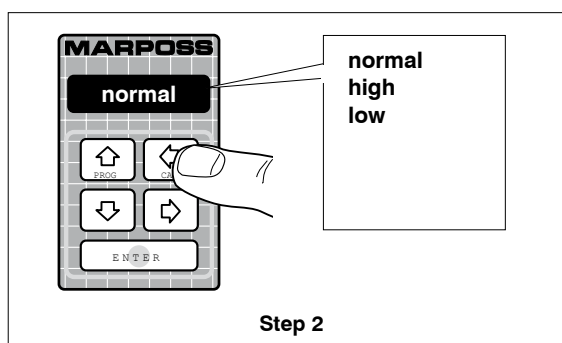
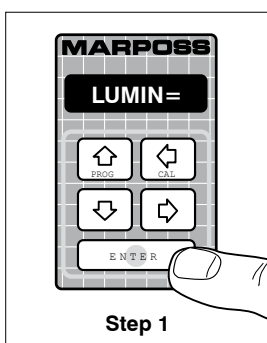
Step 2: Use the LEFT and RIGHT arrow keys to select the digit to be modified (the selected digit is flashing). Use the UP and DOWN arrow keys to increase or decrease the value of the flashing digit.

Note: Not to program (Reset) the variable, repeatedly press the UP or DOWN arrow key when the first digit on the left of the display is flashing.

Step 3: Press the **ENTER** key to confirm the numeric data and to pass to programming of the next variable.

LUMIN= (Scale brightness)

3.9.21



Step 1: Press the **ENTER** key to set the variable.

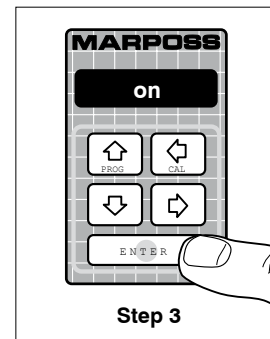
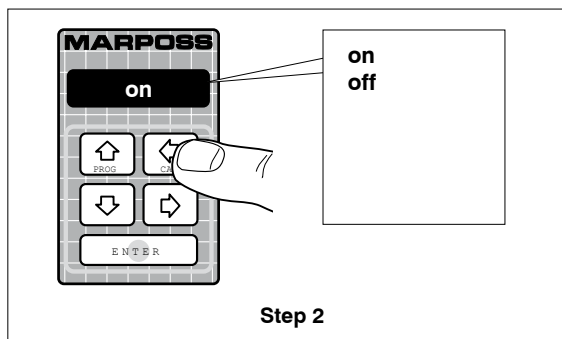
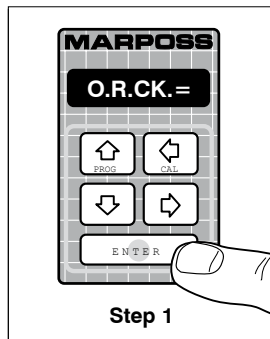
Step 2: Use the LEFT and RIGHT arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

HOW TO PROGRAM THE E4N COLUMN

3.9.22

O.R.CK.= (Out-of-range sensor check)



Step 1: Press the **ENTER** key to set the variable.

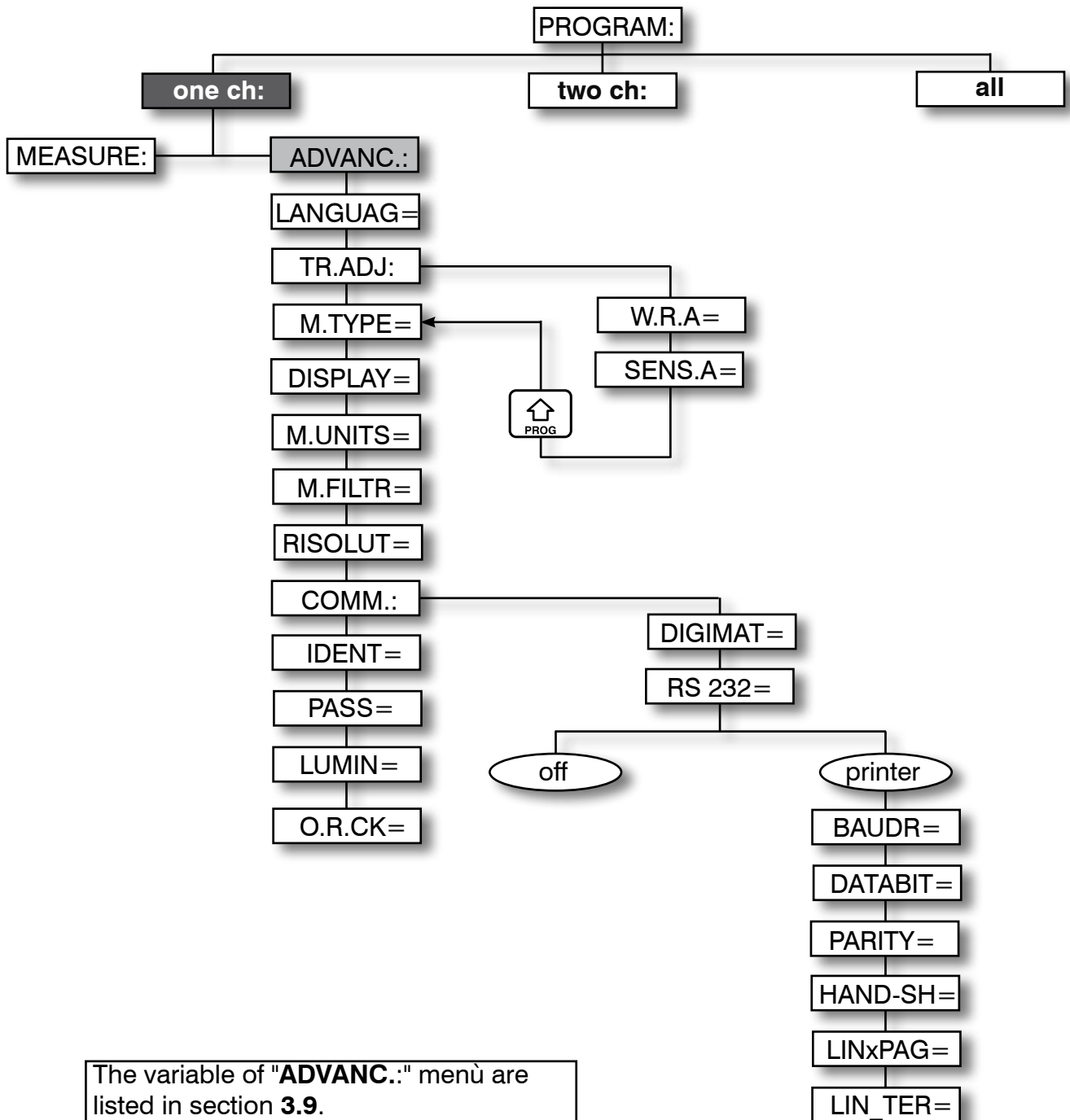
Step 2: Use the **LEFT** and **RIGHT** arrow keys to select the table data required.

Step 3: Press the **ENTER** key to confirm the table data and to pass to programming of the next variable.

Note: When enabled on columns connected to two or more sensors, this function checks that the sensors are actually over range when the column itself is OVER RANGE. If only one of the sensors is in range and all the other sensors are over range, the column will display the message "p.o.r." (partial over range).

only one measure
PROGRAMMING "one ch."

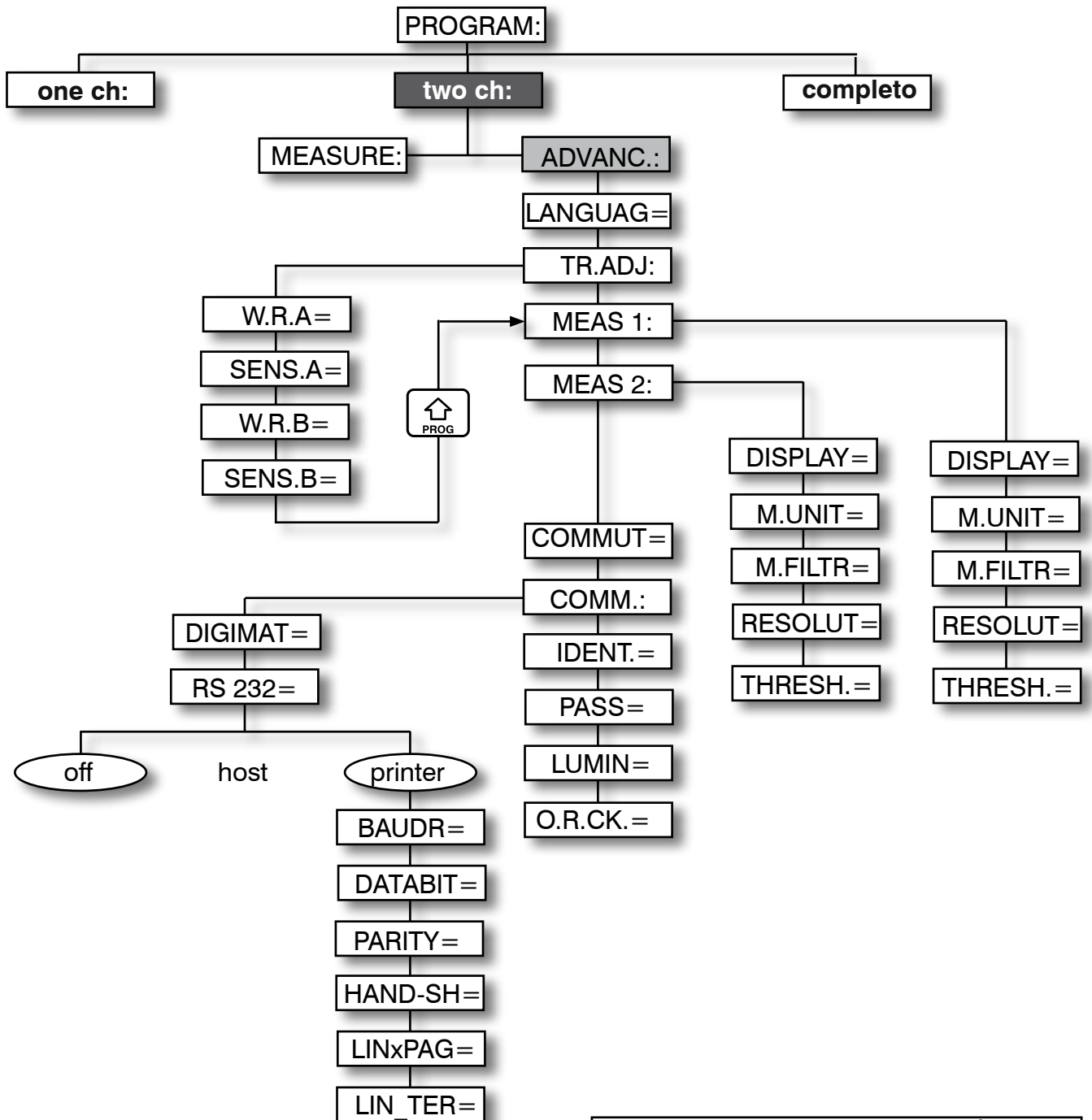
MENÙ "ADVANC.:"



two measure**PROGRAMMING "two ch."**

Programming example with COMMUT=
AUTO, MAN, AUT/MAN

MENÙ "ADVANC.:"



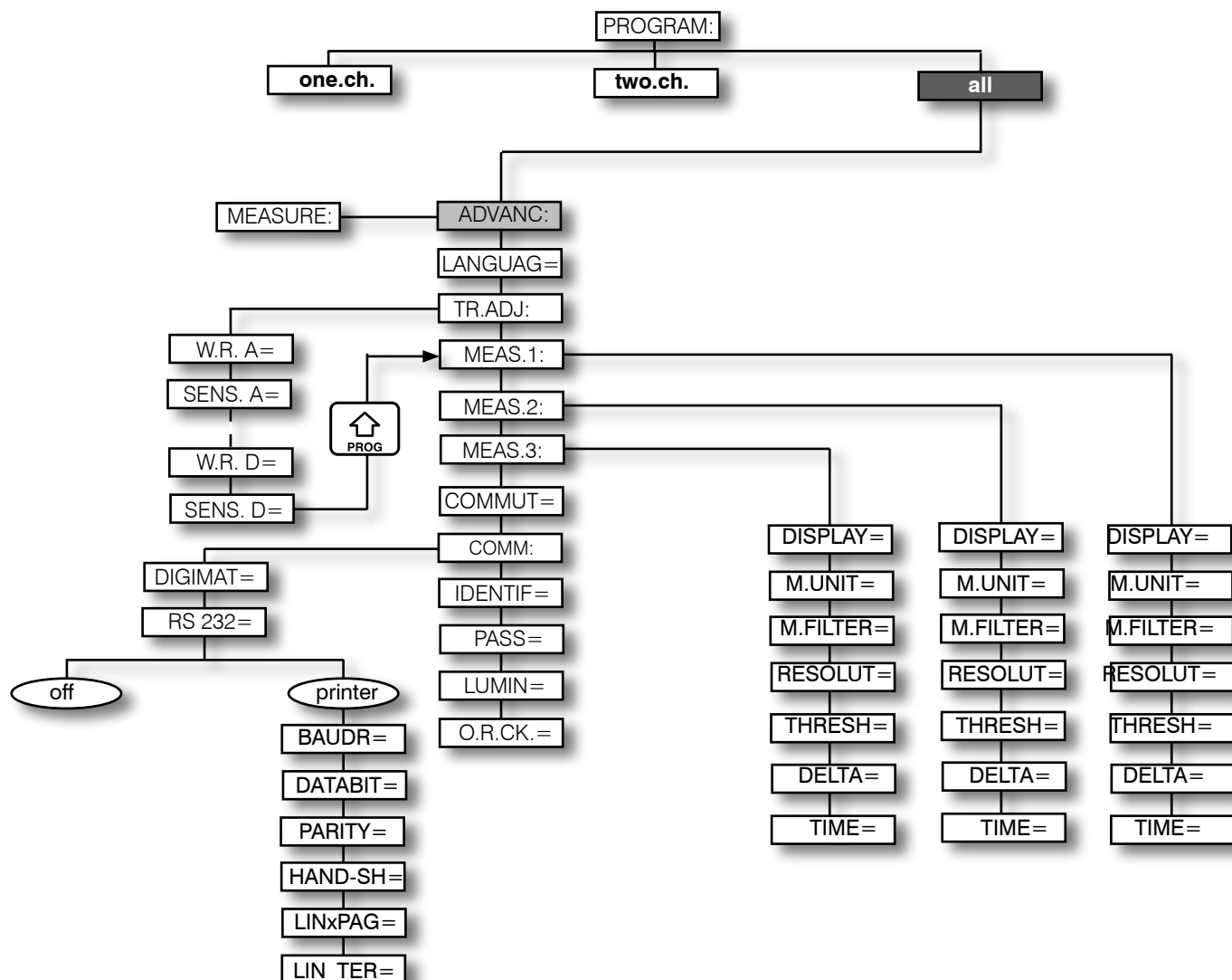
The variable of "ADVANC.:" menù are listed in section 3.9.

Note: In the same way the ALL programming can be made by three or four measurements.

three measure PROGRAMMING "all"

Programming example with COMMUT=
con COMMUT=delta sw

MENÙ "ADVANC.:"



The variable of "ADVANC.:" menù are listed in section 3.9.

Note: In the same way the ALL programming can be made by three or four measurements.

PROGRAMMING EXAMPLES FOR THE E4N COLUMN

4

The section provides four examples of how to program the E4N column. Use the programming data sheet given in the Appendix as a guide.

HOW TO PROGRAM A MEASUREMENT FORMULA

4.1

Programming the measurement formula means programming the coefficients (K) of the following mathematical expression linking the sensor signals:

$$\text{MEAS.} = K_1A + K_2B + K_3C + K_4D$$

Where A, B, C and D indicate the sensor signal connected to channel A, B, C, D respectively. Once the sensors have been connected to a column you should customise the measurement formula by programming the coefficients with the mathematical sign required (+ or -). See Section 3.8.8.

MEASURING AN OUTER DIAMETER WITH ONE SENSOR

4.2

EQUIPMENT REQUIRED:

- 1 - E4N COLUMN
- 1 - MARPOSS M4 MANUAL RING GAUGE
- 1 - MASTER GAUGE

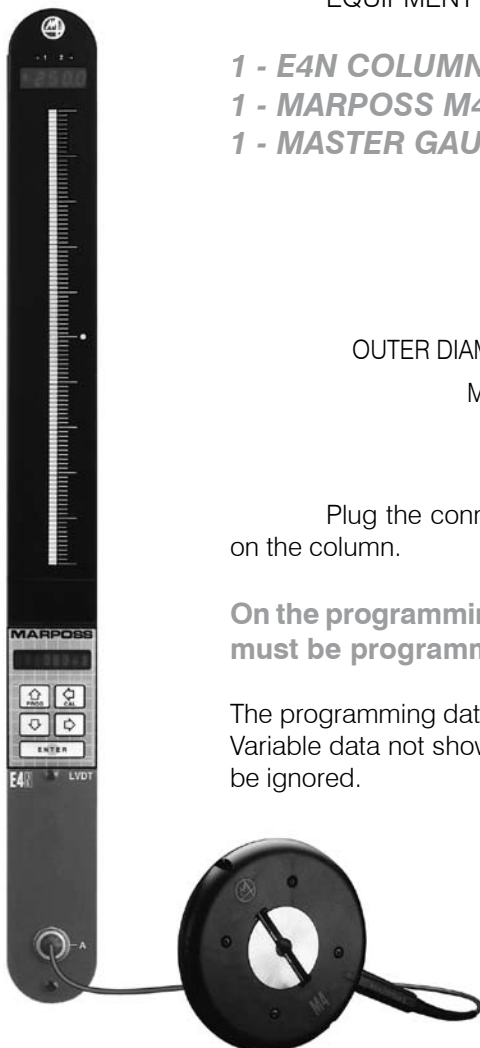
DATA:

PART TO BE MEASURED = PIN
OUTER DIAMETER NOMINAL DIMENSION = 50.000 mm $\pm$ 0.025
MASTER GAUGE DIMENSIONS = 50.006 mm

Plug the connector of the manual ring gauge into the CHANNEL A on the column.

On the programming data sheet the parameters for which a value must be programmed are shown in bold type.

The programming data sheet also shows the default values. Variable data not shown are not part of this measurement example and can be ignored.





MARPOSS

PROGRAMMING DATA SHEET
FOR E4N COLUMN

DATE:
E4N COLUMN:
SERIAL NUMBER:

DEPARTMENT:
OPERATOR:
PART DESCRIPTION:
MACHINE:
PART NUMBER:

PROGRAM: ☒ ONE CH.
☐ TWO CH.

MEASURE: MENU

M.SYST= ☒ METRIC
☐ INCH

N.MEAS= ☐ 1
☐ 2

MEAS 1: MENU

TOLER+= **+ 25.0**
TOLER-= **- 25.0**
APPRCH+= **+ 20.0**
APPRCH-= **- 20.0**
SCALE= **± 50.00**
K.CH.A= **+ 1.000**
K.CH.B=
ABSOLUT= **R**
MASTER1= **+ 0006.0**
MASTER2= **R**

MEAS 2: MENU

TOLER+=
TOLER-=
APPRCH+=
APPRCH-=
SCALE=
K.CH.A=
K.CH.B=
ABSOLUT=
MASTER1=
MASTER2=

ADVANC: MENU

LANGUAG= ☒ ENGLISH
☐ FRANCAIS
☐ DEUTSCH
☐ ESPANOL
☐ ITALIANO

TR.ADJ: MENU

W.R. A= **250 n.r.**
SENS. A= **1.000**
W.R. B=
SENS. B=

MEAS 1: MENU

M.TYPE= ☒ static
☐ max
☐ min
☐ (M+m)/2
☐ (M-m)/2
☐ M-m
☐ CENTRAL
☒ BOTTOM
M.UNIT= ☒ mm
☒ micron
☐ degree
☐ millrad
☐ gram

M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW
RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM

THRESH=

MEAS 2: MENU

DISPLAY= ☐ CENTRAL
☐ BOTTOM

M.UNIT= ☐ mm
☐ micron

M.FILTER= ☐ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW

RESOLUT= ☐ FINE
☐ STANDARD
☐ MAXIMUM

THRESH=

COMM: MENU

DIGIMAT= ☒ ON
☐ OFF
☐ ON W/O S
RS 232= ☐ OFF
☐ PRINTER

BAUDR= ☐ 2400
☐ 4800
☐ 9600
DATABIT= ☐ 7 bit
☐ 8 bit

PARITY= ☐ NONE
☐ ODD
☐ EVEN

HAND-SH= ☐ NONE
☐ HARDWARE
☐ X ON/X OFF

LINxPAG=

LIN TER= ☐ CR
☐ CR + LF

IDENTIF=

PASS= **R**

LUMIN= ☒ NORMAL
☐ HIGH
☐ LOW

PROGRAMMING EXAMPLES FOR THE E4N COLUMN

4

MEASURING AN INNER DIAMETER AND AN OUTER DIAMETER WITH TWO SENSORS

4.3

EQUIPMENT REQUIRED:

1 - E4N COLUMN

1 - MARPOSS M4 MANUAL RING GAUGE

1 - MARPOSS M1 PLUG GAUGE

DATA:

FIRST PART TO BE MEASURED = RING

RING INNER DIAMETER NOMINAL DIMENSION = 40.000 mm $\pm$ 0.015

MASTER GAUGE NOMINAL DIMENSION = 39.997 mm

SECOND PART TO BE MEASURED = PIN

PIN OUTER DIAMETER NOMINAL DIMENSION = 60.000 mm $\pm$ 0.020

GAUGE NOMINAL DIMENSION = 60.009 mm

Note: For **Measurement 1** set the **NOMINAL VALUE** by setting the variable **ABSOLUT** = 040.000.

Set the **SCALE** = variable to "auto".

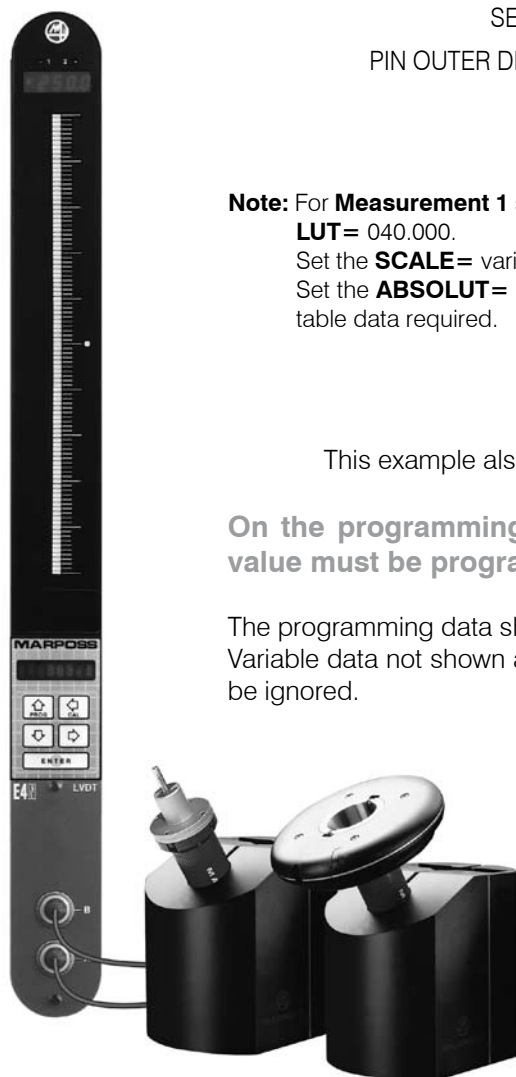
Set the **ABSOLUT** = variable first and then set the **SCALE** = variable with the table data required.

This example also includes programming of the PASSWORD.

On the programming data sheet, the parameters for which a value must be programmed are shown in bold type.

The programming data sheet also shows the default values.

Variable data not shown are not part of this measurement example and can be ignored.





MARPOSS

PROGRAMMING DATA SHEET
FOR E4N COLUMN

DATE:
E4N COLUMN: 7651012060
SERIAL NUMBER: XXXXXX

DEPARTMENT:
OPERATOR: MACHINE:
PART DESCRIPTION: PART NUMBER:

PROGRAM: ☐ ONE CH.
☒ TWO CH.

MEASURE: MENU

M.SYST= ☒ METRIC
☐ INCH

N.MEAS= ☐ 1
☒ 2

MEAS 1: MENU

TOLER+= + 15.0

TOLER-= - 15.0

APPRCH+= + 12.0

APPRCH-= - 12.0

SCALE= auto

K.CH.A= - 1.000

K.CH.B=

ABSOLUT= 040.000

MASTER1= - 0.0030

MASTER2=

MEAS 2: MENU

TOLER+= + 20.0

TOLER-= - 20.0

APPRCH+= + 17.0

APPRCH-= - 17.0

SCALE= ± 50

K.CH.A=

K.CH.B= + 1.000

ABSOLUT=

MASTER1= + 0009.0

MASTER2=

ADVANC: MENU

LANGUAG= ☒ ENGLISH
☐ FRANCAIS
☐ DEUTSCH
☐ ESPANOL
☐ ITALIANO

TR.ADJ: MENU

W.R. A= 250 n.r.

SENS. A= 1.000

W.R. B= 250 n.r.

SENS. B= 1.000

MEAS 1: MENU

M.TYPE= ☒ static
☐ max
☐ min
☐ (M+m)/2
☐ (M-m)/2
☐ M-m

DISPLAY= ☒ CENTRAL
☐ BOTTOM

M.UNIT= ☒ mm
☐ micron
☐ degree
☐ millrad
☐ gram

M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW

RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM

THRESH= R . .

MEAS 2: MENU

DISPLAY= ☒ CENTRAL
☐ BOTTOM

M.UNIT= ☐ mm
☒ micron

M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW

RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM

THRESH= R . .

COMM: MENU

DIGIMAT= ☒ ON
☐ OFF
☐ ON W/O S
☐ OFF
☐ PRINTER

RS 232=

BAUDR= ☐ 2400
☐ 4800
☐ 9600

DATABIT= ☐ 7 bit
☐ 8 bit

PARITY= ☐ NONE
☐ ODD
☐ EVEN

HAND-SH= ☐ NONE
☐ HARDWARE
☐ X ON/X OFF

LINxPAG=

LIN TER= ☐ CR
☐ CR + LF

IDENTIF=

PASS= 1408

LUMIN= ☒ NORMAL
☐ HIGH
☐ LOW

PROGRAMMING EXAMPLES FOR THE E4N COLUMN

4

GAP MEASUREMENT WITH TWO SENSORS

4.4

The following example is related to the gap measurement between a pin and its seat.

EQUIPMENT REQUIRED:

A FOUR-CHANNEL E4N COLUMN
A MANUAL RING GAUGE TYPE MARPOSS M4
A MANUAL BORE GAUGE TYPE MARPOSS M1 STAR EBG
TWO SIGNAL SPLITTING CABLES

DATA:

FIRST PART TO BE MEASURED: SEAT

NOMINAL VALUE OF THE INTERNAL DIAMETER = 4.000 mm +0/+0.010

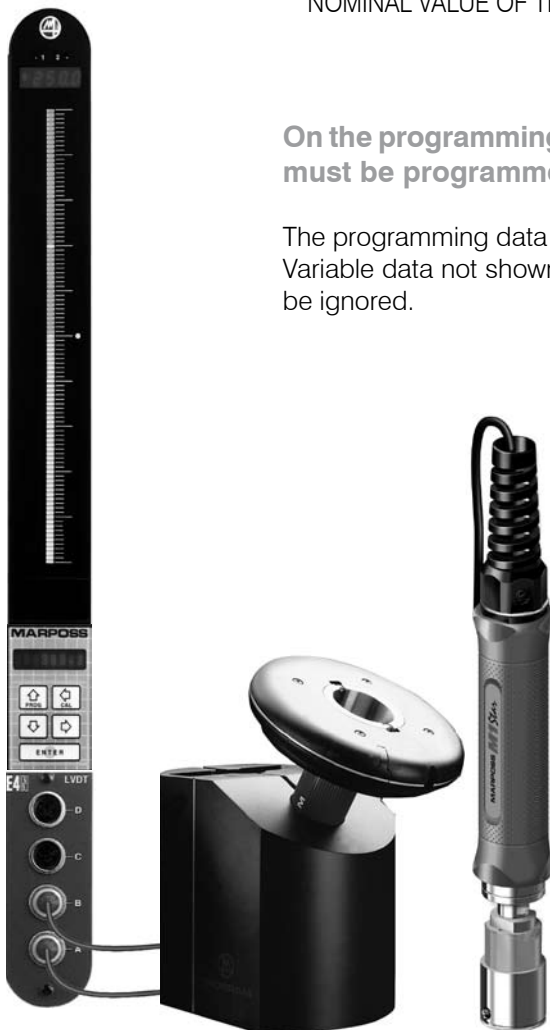
SECOND PART TO BE MEASURED: PIN

NOMINAL VALUE OF THE EXTERNAL DIAMETER = 4.000 mm -0.005/+0.007

GAP = 0.004 mm +/- 0.001

On the programming data sheet the parameters for which a value must be programmed are shown in bold type.

The programming data sheet also shows the default values.
Variable data not shown are not part of this measurement example and can be ignored.





MARPOSS

PROGRAMMING DATA SHEET FOR E4N COLUMN

DATE: _____
 E4N COLUMN: _____
 SERIAL NUMBER: _____
 DEPARTMENT: _____
 OPERATOR: _____ MACHINE: _____
 PART DESCRIPTION: _____ PART NUMBER: _____

PROGRAM: ☐ ONE CH.
☐ TWO CH.
☒ ALL

MEASURE MENU:

M.SYST= ☒ METRIC
☐ INCH
 N.MEAS= ☐ 1
☐ 2
☒ 3
☐ 4

MEAS 1 MENU:

TOLER+= +0010.0
 TOLER-= +0000.0
 APPRCH+= R----
 APPRCH-= R----
 SCALE= ± 25.00
 K.CH.A= - 1.000
 ABSOLUT= 004.000
 MASTER1= +0000.0
 MASTER2= R----

MEAS 2 MENU:

TOLER+= +0007.0
 TOLER-= -0005.0
 APPRCH+= R----
 APPRCH-= R----
 SCALE= ± 25.00
 K.CH.B= - 1.000
 ABSOLUT= 004.000
 MASTER1= +0000.0
 MASTER2= R----

MEAS 3 MENU:

TOLER+= +0001.0
 TOLER-= -0001.0
 APPRCH+= R----
 APPRCH-= R----
 SCALE= ± 25.00
 K.CH.C= + 1.000
 K.CH.D= - 1.000
 ABSOLUT= 004.000
 MASTER1= +0000.0
 MASTER2= R----

ADVANC MENU:

LANGUAG= ☒ ENGLISH
☐ FRANCAIS
☐ DEUTSCH
☐ ESPANOL
☐ ITALIANO

TR.ADJ MENU:

W.R. A= 500 n.r.
 SENS. A= + 1.000
 W.R. B= 500 n.r.
 SENS. B= + 1.000
 W.R. C= 500 n.r.
 SENS. C= + 1.000
 W.R. D= 500 n.r.
 SENS. D= + 1.000

MEAS 1 MENU:

DISPLAY= ☐ CENTRAL
☒ BOTTOM

M.UNIT= ☐ mm
☒ micron
 M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW
 RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM
 THRESH= R----

MEAS 2 MENU:

DISPLAY= ☐ CENTRAL
☒ BOTTOM
 M.UNIT= ☐ mm
☒ micron
 M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW
 RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM
 THRESH= R----

MEAS 3 MENU:

DISPLAY= ☐ CENTRAL
☒ BOTTOM
 M.UNIT= ☐ mm
☒ micron
 M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW
 RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM
 THRESH= R----

COMMUT MENU:

COMMUT= ☐ AUTO
☒ MAN
☐ AUT/MAN
☐ DELTA SW

COMUNIC MENU:

DIGIMAT=	☐ ON
	☒ OFF
	☐ ON W/O S
RS 232=	☒ OFF
	☐ PRINTER
BAUDR=	☐ 2400
	☐ 4800
	☐ 9600
DATABIT=	☐ 7 bit
	☐ 8 bit
PARITY=	☐ NONE
	☐ ODD
	☐ EVEN
HAND-SH=	☐ NONE
	☐ HARDWARE
	☐ X ON/X OFF
LINxPAG=	.....
LIN TER=	☐ CR
	☐ CR + LF
IDENTIF=	MARPOSS.....
PASS=	R---.....
LUMIN=	☒ NORMAL
	☐ HIGH
	☐ LOW
O.R.CK=	OFF.....

4

PROGRAMMING EXAMPLES FOR THE E4N COLUMN

4.5 TAPER MEASUREMENT WITH FOUR TRANSDUCERS

EQUIPMENT REQUIRED:

*TWO FOUR-CHANNEL E4N COLUMNS
ONE MANUAL BENCH GAUGE TYPE MARPOSS QUICK SET
FOUR PENCIL PROBES TYPE MARPOSS RED CROWN
FOUR SIGNAL SPLITTING CABLES*

DATA:

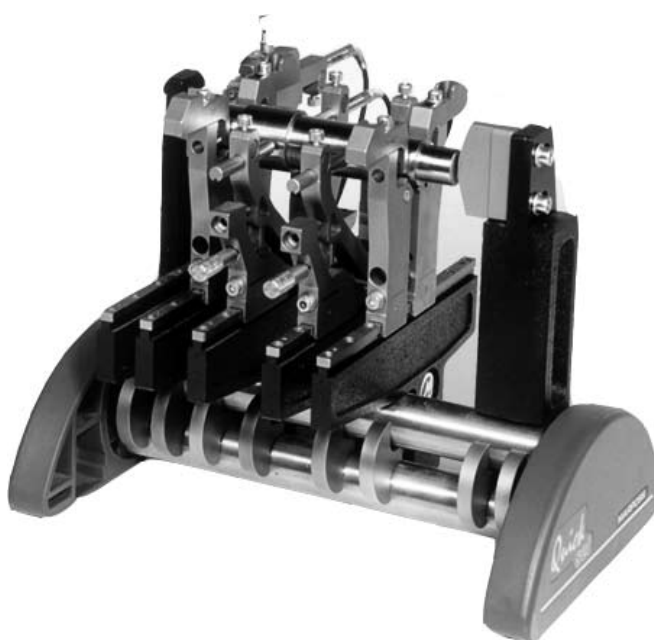
PART TO BE MEASURED: SHAFT

EXTERNAL DIAMETER VALUE = 60.000 mm +/- 0.030

TAPER VALUE = 0.010

On the programming data sheet the parameters for which a value must be programmed are shown in bold type.

The programming data sheet also shows the default values. Variable data not shown are not part of this measurement example and can be ignored.



FIRST COLUMN



MARPOSS

PROGRAMMING DATA SHEET FOR E4N COLUMN

DATE:

E4N COLUMN:

SERIAL NUMBER:

DEPARTMENT:

OPERATOR:

MACHINE:

PART DESCRIPTION:

PART NUMBER:

PROGRAM: ☐ ONE CH.
☐ TWO CH.
☒ ALL

MASTER1= +0000.0
MASTER2= R-....

M.UNIT= ☐ mm
☒ micron
M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
RESOLUT= ☐ LOW
☒ FINE
☐ STANDARD
☐ MAXIMUM
THRESH= R-....

MEASURE MENU:
M.SYST= ☒ METRIC
☐ INCH
N.MEAS= ☐ 1
☒ 2
☐ 3
☐ 4

ADVANC MENU:
LANGUAG= ☒ ENGLISH
☐ FRANCAIS
☐ DEUTSCH
☐ ESPANOL
☐ ITALIANO

COMMUT MENU:
COMMUT= ☐ AUTO
☒ MAN
☐ AUT/MAN
☐ DELTA SW

MEAS 1 MENU:
TOLER+= +0030.0
TOLER-= -0030.0
APPRCH+= R-....
APPRCH-= R-....
SCALE= ± 100.0
K.CH.A= - 1.000
K.CH.C= - 1.000
ABSOLUT= R-....
MASTER1= +0000.0
MASTER2= R-....

TR.ADJ MENU:
W.R. A= 500 n.r.
SENS. A= + 1.000
W.R. B= 500 n.r.
SENS. B= + 1.000
W.R. C= 500 n.r.
SENS. C= + 1.000
W.R. D= 500 n.r.
SENS. D= + 1.000

COMUNIC MENU:
DIGIMAT= ☐ ON
☒ OFF
☐ ON W/O S
RS 232= ☒ OFF
☐ PRINTER
BAUDR= ☐ 2400
☐ 4800
☐ 9600
DATABIT= ☐ 7 bit
☐ 8 bit

MEAS 2 MENU:
TOLER+= +0030.0
TOLER-= -0030.0
APPRCH+= R-....
APPRCH-= R-....
SCALE= ± 100.0
K.CH.B= - 1.000
K.CH.D= - 1.000
ABSOLUT= R-....

MEAS 1 MENU:
DISPLAY= ☐ CENTRAL
☒ BOTTOM
M.UNIT= ☐ mm
☒ micron
M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
RESOLUT= ☐ LOW
☒ FINE
☐ STANDARD
☐ MAXIMUM
THRESH= R-....

PARITY= ☐ NONE
☐ ODD
☐ EVEN
HAND-SH= ☐ NONE
☐ HARDWARE
☐ X ON/X OFF
LINxPAG=
LIN_TER= ☐ CR
☐ CR + LF
IDENTIF= MARPOSS
PASS= R-....
LUMIN= ☒ NORMAL
☐ HIGH
☐ LOW
O.R.CK= OFF

MEAS 2 MENU:
DISPLAY= ☐ CENTRAL
☒ BOTTOM

SECOND COLUMN



MARPOSS

PROGRAMMING DATA SHEET
FOR E4N COLUMN

DATE: _____
E4N COLUMN: _____
SERIAL NUMBER: _____
DEPARTMENT: _____
OPERATOR: _____ MACHINE: _____
PART DESCRIPTION: _____ PART NUMBER: _____

PROGRAM: ☐ ONE CH.
☐ TWO CH.
☒ ALL

MEASURE MENU:

M.SYST= ☒ METRIC
☐ INCH
N.MEAS= ☒ 1
☐ 2
☐ 3
☐ 4

MEAS 1 MENU:

TOLER+= +0010.0
TOLER-= -0000.0
APPRCH+= R----
APPRCH-= R----
SCALE= ± 50.00
K.CH.A= - 1.000
K.CH.B= + 1.000
K.CH.C= - 1.000
K.CH.D= + 1.000
ABSOLUT= R----
MASTER1= +0000.0
MASTER2= R----

ADVANC MENU:

LANGUAG= ☒ ENGLISH
☐ FRANCAIS
☐ DEUTSCH
☐ ESPANOL
☐ ITALIANO

TR.ADJ MENU:

W.R. A= 500 n.r.
SENS. A= + 1.000
W.R. B= 500 n.r.
SENS. B= + 1.000
W.R. C= 500 n.r.
SENS. C= + 1.000
W.R. D= 500 n.r.
SENS. D= + 1.000

MEAS 1 MENU:

M.TYPE= ☒ static
☐ max
☐ min
☐ (M+m)/2
☐ (M-m)/2
☐ M-m
DISPLAY= ☐ CENTRAL
☒ BOTTOM
M.UNIT= ☐ mm
☒ micron
M.FILTER= ☒ NORMAL
☐ HIGH
☐ NO FILTER
☐ LOW
RESOLUT= ☒ FINE
☐ STANDARD
☐ MAXIMUM
THRESH= _____

COMUNIC MENU:

DIGIMAT= ☐ ON
☒ OFF
☐ ON W/O S
RS 232= ☒ OFF
☐ PRINTER
BAUDR= ☐ 2400
☐ 4800
☐ 9600
DATABIT= ☐ 7 bit
☐ 8 bit
PARITY= ☐ NONE
☐ ODD
☐ EVEN
HAND-SH= ☐ NONE
☐ HARDWARE
☐ X ON/X OFF
LINxPAG= _____
LIN_TER= ☐ CR
☐ CR + LF
IDENTIF= MARPOSS
PASS= R---
LUMIN= ☒ NORMAL
☐ HIGH
☐ LOW
O.R.CK.= OFF

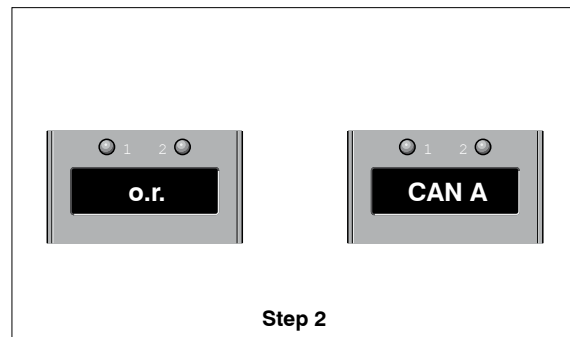
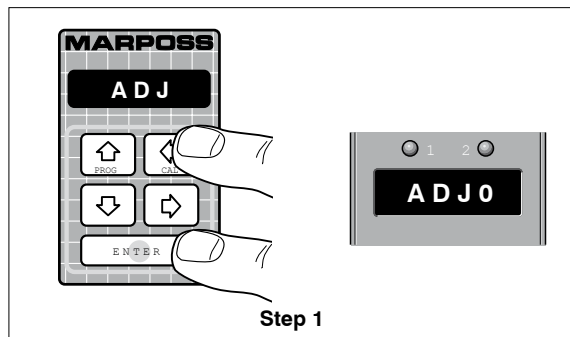


5

ADJUSTMENT PROCEDURE

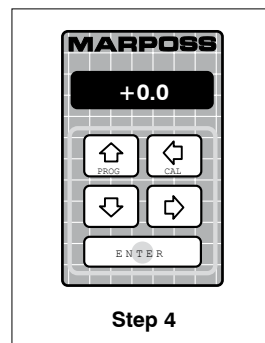
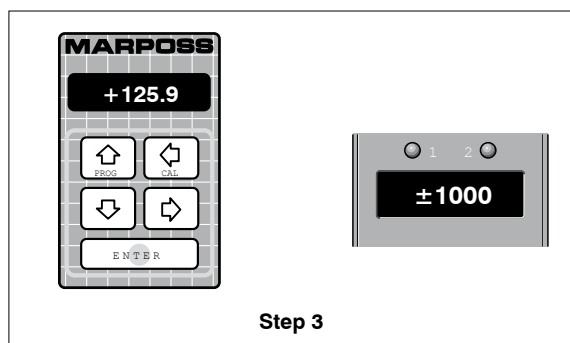
5.1

ADJUSTING LVDT, HBT AND MRT SENSORS



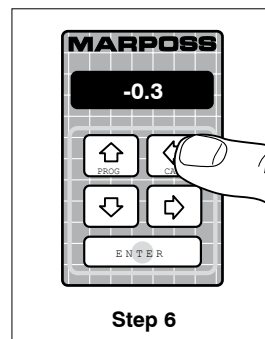
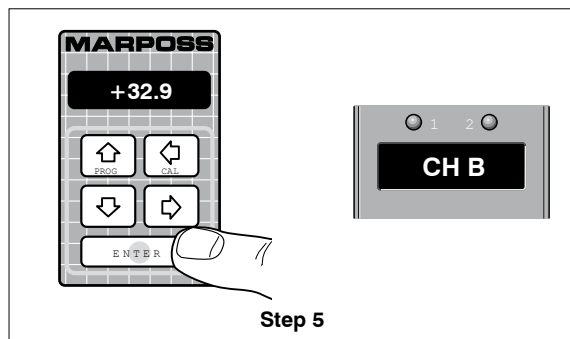
Step 1: Press the UP arrow key (**CAL**) and the **ENTER** key together for two seconds. The column will switch to the ADJUSTMENT mode. The message "ADJ" will appear on the alphanumeric display and the message "ADJO" will appear on the 7-segment display.

Step 2: Release the keys. If the sensor has not already been adjusted, the messages "CH A" and "o.r." will be displayed alternatively on the 7-segment display.



Step 3: Mechanically adjust the position of the sensor until the deviation shown on the display is as close as possible to zero. During this step the 7-segment display will alternatively display the channel number and the sensor working range (normal range = ± 1000 ; wide range = ± 5000).

Step 4: Lock the sensor in its zero position. Press the **ENTER** key to pass to adjustment of any other sensors connected to the column.



Step 5: Adjust the other sensor connected to the column in the way described previously for the first sensor.

Step 6: When both sensors have been adjusted, press the LEFT arrow key (**CAL**) to leave the ADJUSTMENT mode.

ADJUSTMENT PROCEDURE

5

ADJUSTING AIR/ELECTRONIC SENSORS

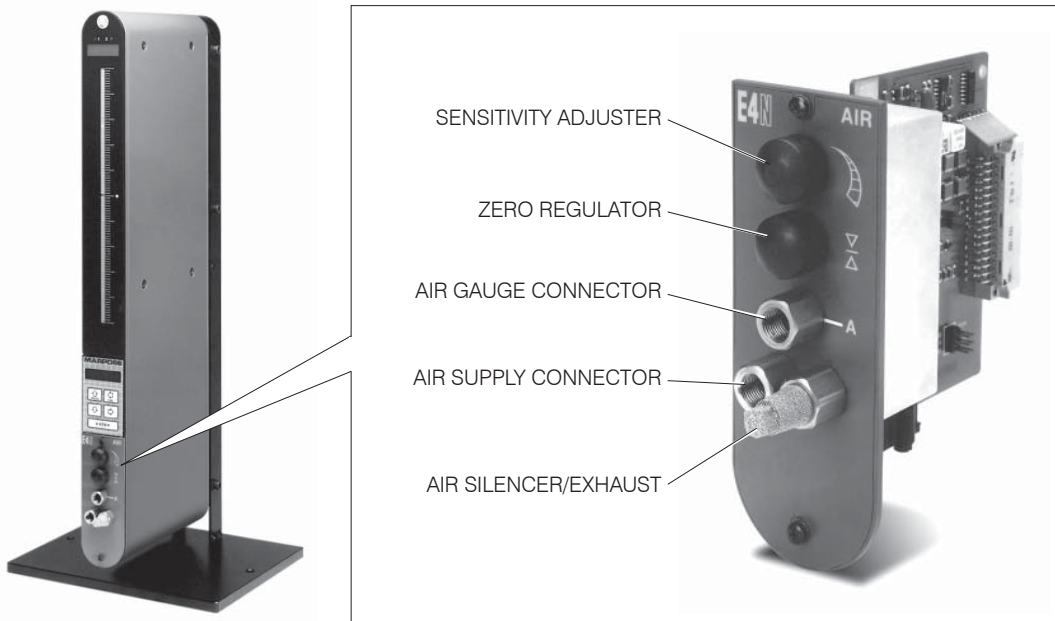
5.2

N.B.: Before performing the following procedures parameters K.CH. and SENS. must be programmed as:

K.CH. = -1.000

SENS. = +1.000

To adjust air/electronic sensors, start by adjusting the air supply pressure. Adjust using the pressure regulator and gauge. The pressure setting must be in the range 1.5 bar (min.) to 4 bar (max.). The ideal air supply pressure is 3 bar.



Note: The sensitivity and zero adjusters of the air/electronic converter module are turned fully to the right to the OFF position.

To adjust air/electronic sensors you require two master gauges, a min. master and a max. master.

Example 1:

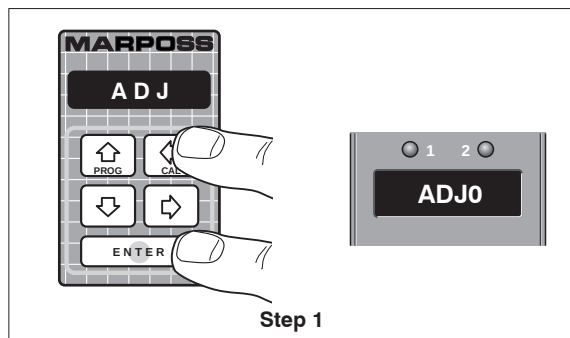
Inner diameter measurement with a pneumatic plug gauge.

Upper tolerance limit = 50.020 mm

Max master = 50.015 mm

Lower tolerance limit = 49.080 mm

Min. master = 49.082 mm



Step 1: Press the UP arrow key (**CAL**) and the **ENTER** key together for two seconds. The column will switch to the ADJUSTMENT mode. The message "ADJ" will appear on the alphanumeric display and the message "ADJO" will appear on the 7-segment display.

5

ADJUSTMENT PROCEDURE

Step 2: Take the values of the two master gauges and calculate the difference (or distance) between the two.

Example:

Max. master = 50.015 mm

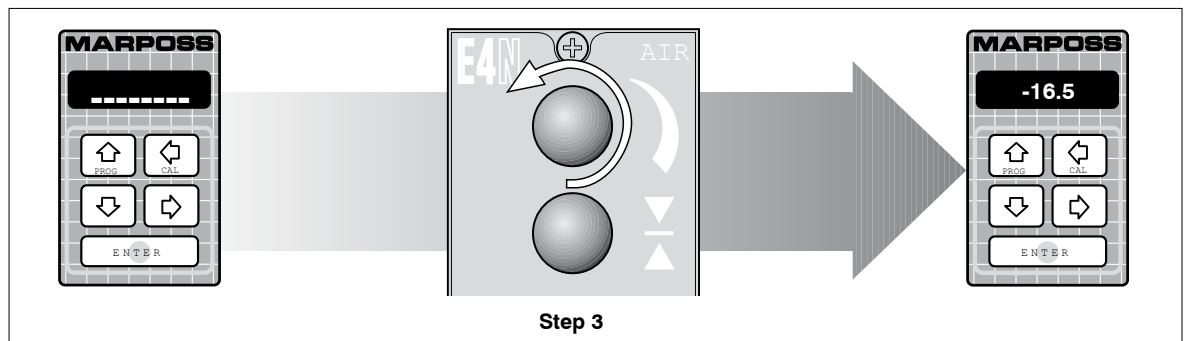
Min. master = 49.082 mm

Max. master - Min. master = 50.015 - 49.082 = 0.033 mm = 33 μ

33/2 = 16.5 μ

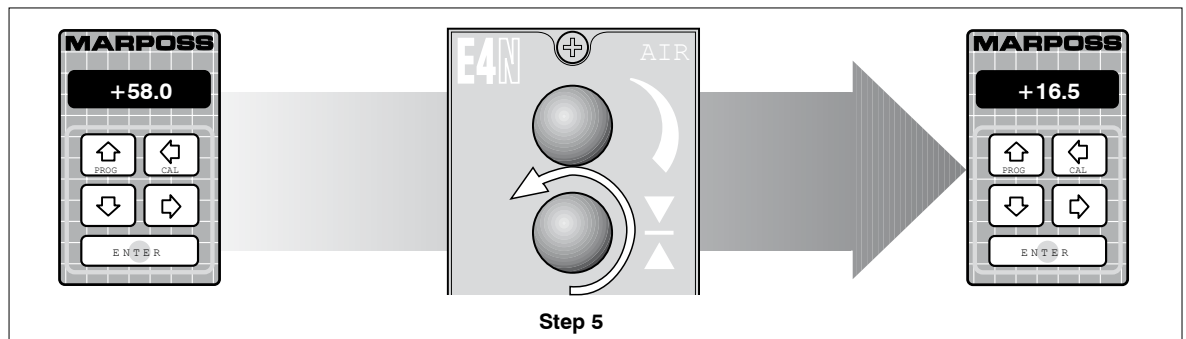
Upper limit = +16.5 μ

Lower limit = -16.5 μ



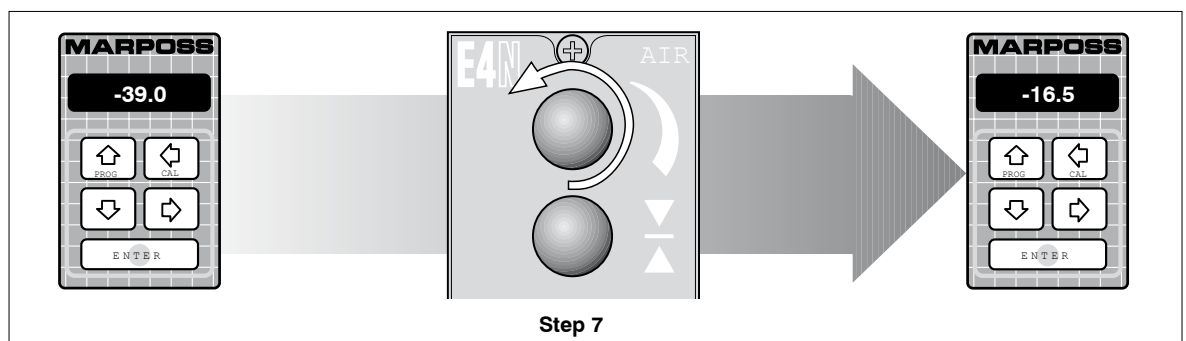
Step 3: Insert the Max. master in the measurement position. Turn the sensitivity adjuster until the value shown on the alphanumeric display is close to -16.5 (Lower limit).

Step 4: Remove the Max. master and insert the Min. master in the measuring position.



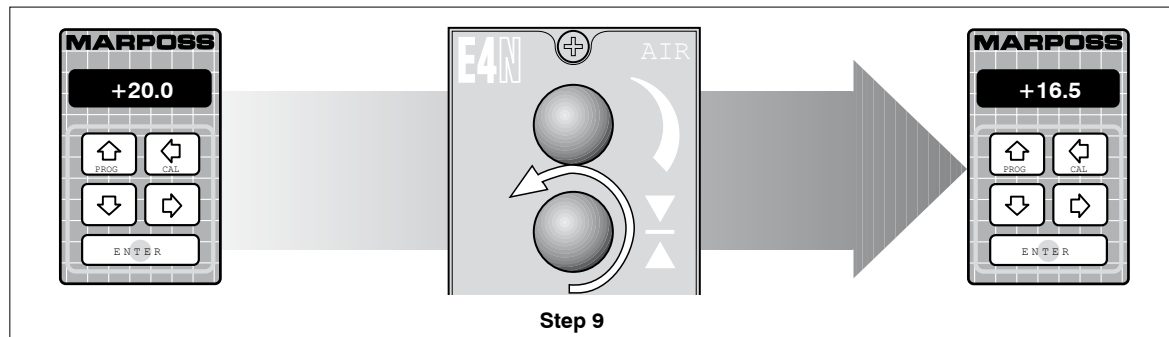
Step 5: Turn the zero adjuster until the value on the alphanumeric display is +16.5 (Upper limit).

Step 6: Remove the Min. master and insert the Max. master in the measuring position again.



Step 7: Turn the sensitivity adjuster until the value shown on the alphanumeric display is close to -16.5 (Lower limit).

Step 8: Remove the Max master and insert the Min.master in the measuring position.



Step 9: Turn the zero adjuster and correct the value shown on the alphanumeric display until it reads +16.5 (Upper limit).

Step 10: Repeat the steps above until the difference between the readings displayed for the two masters is less than 25% of the difference between the masters. In our example the difference should be $\leq 8 \mu\text{m}$.

Example 2:

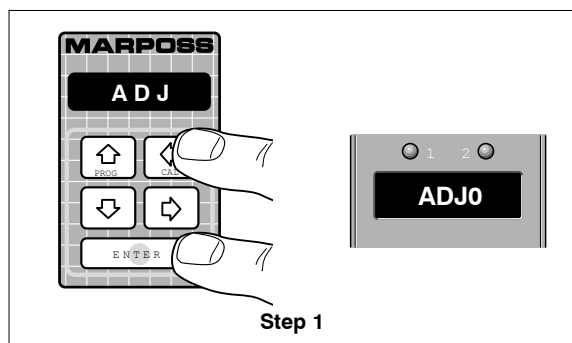
Outer diameter measurement with a pneumatic ring gauge

Upper tolerance limit = 50.020 mm

Max. master = 50.015 mm

Lower tolerance limit = 49.080 mm

Min. master = 49.082 mm



Step 1: Press the UP arrow key (**CAL**) and the **ENTER** key together for two seconds. The column will switch to the ADJUSTMENT mode. The message "**ADJ**" will appear on the alphanumeric display and the message "**ADJ0**" will appear on the 7-segment display.

Step 2: Take the values of the two master gauges and calculate the difference (or distance) between the two.

Example:

Max. master = 50.015 mm

Min. master = 49.082 mm

Max. master - Min. master = $50.015 - 49.082 = 0.033 \text{ mm} = 33 \mu$

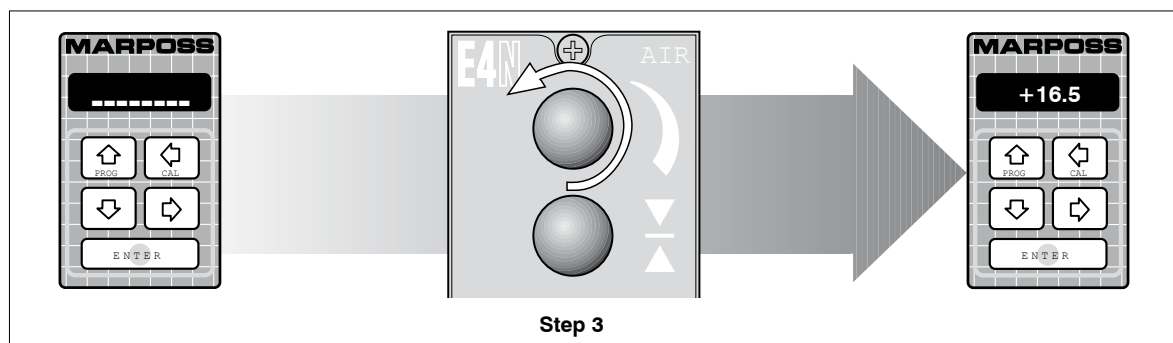
$33/2 = 16.5 \mu$

Upper limit = $+16.5 \mu$

Lower limit = -16.5μ

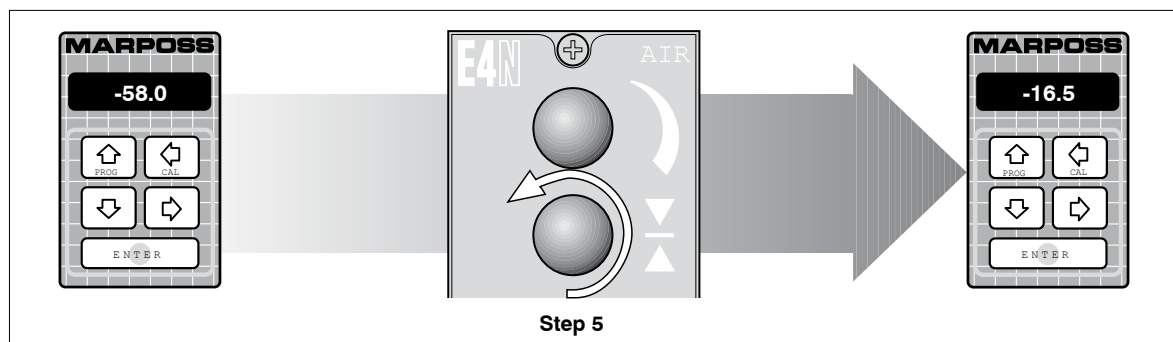
5

ADJUSTMENT PROCEDURE



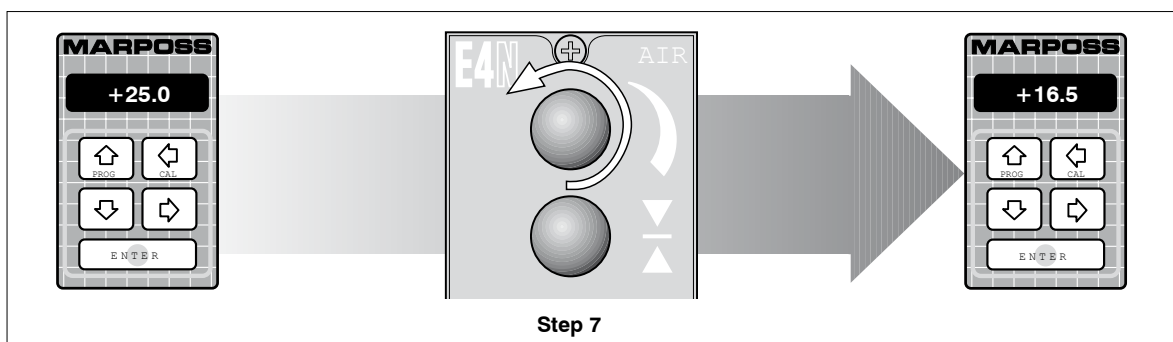
Step 3: Insert the Max. master in the measurement position. Turn the sensitivity adjuster until the value shown on the alphanumeric display is close to +16.5 (Upper limit).

Step 4: Remove the Max. master and insert the Min. master in the measuring position.



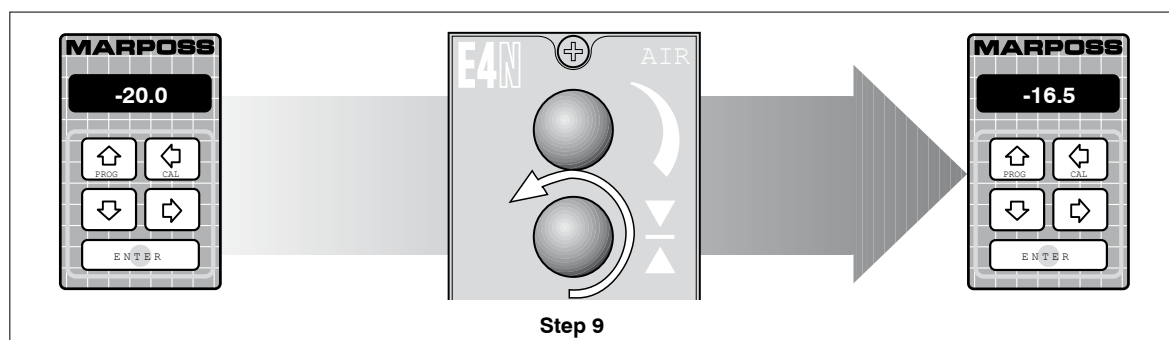
Step 5: Turn the zero adjuster until the value on the alphanumeric display is -16.5 (Lower limit).

Step 6: Remove the Min. master and insert the Max. master in the measuring position again.



Step 7: Turn the sensitivity adjuster until the value shown on the alphanumeric display is close to +16.5 (Upper limit).

Step 8: Remove the Max. master and insert the Min. master in the measuring position again.

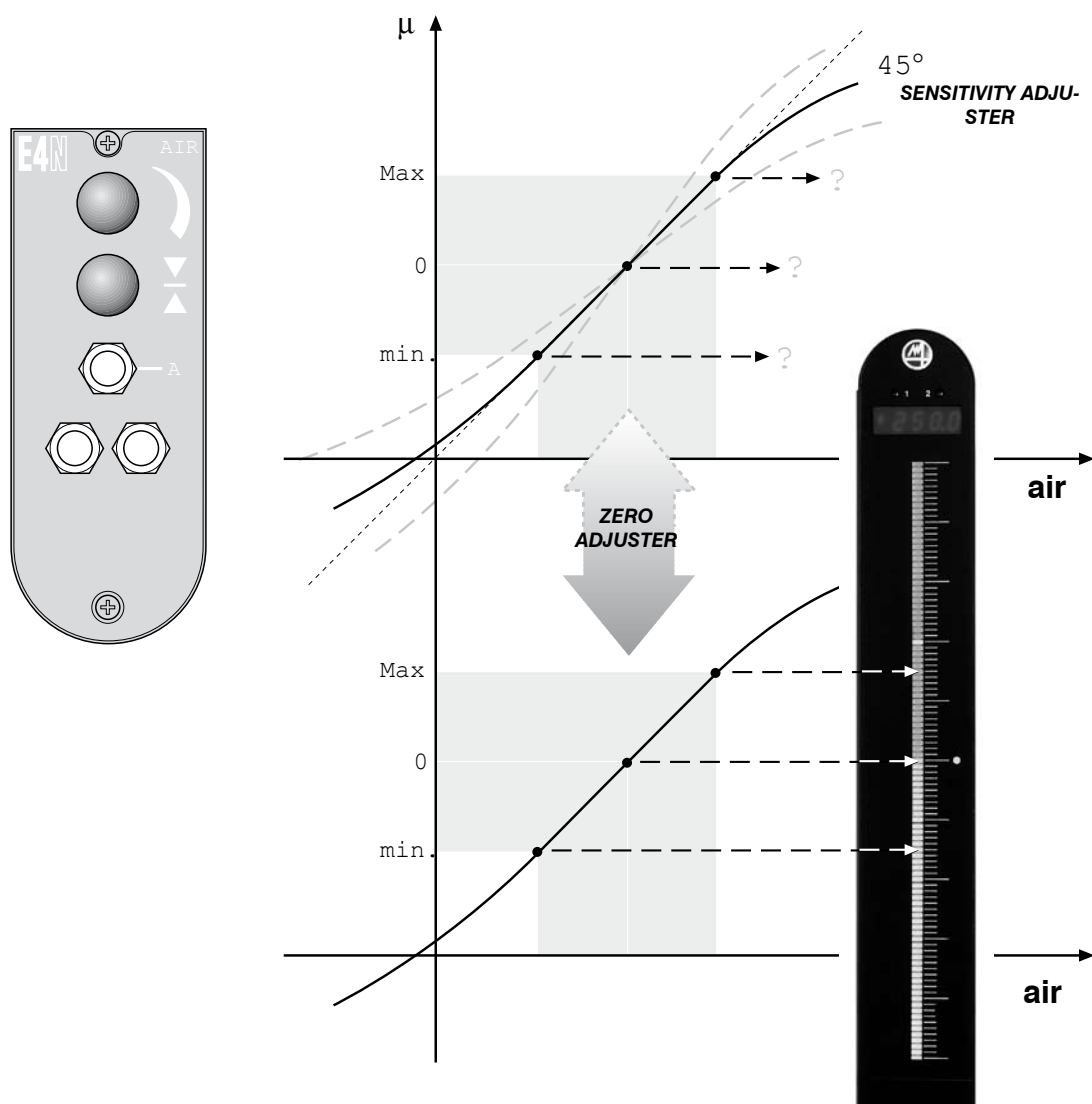


Step 9: Turn the zero adjuster and correct the value shown on the alphanumeric display until it reads -16.5 (Lower limit).

Step 10: Repeat the steps above until the difference between the readings displayed for the two masters is less than 25% of the difference between the masters. In our example the difference should be $8 \mu\text{m}$.

FUNCTION OF THE TWO ADJUSTERS ON THE AIR/ELECTRONIC MODULE

5.3



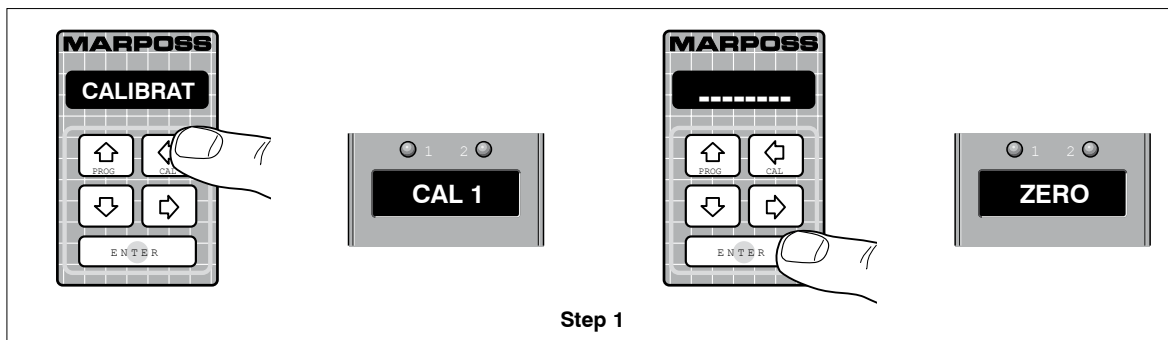
6

CALIBRATION PROCEDURE

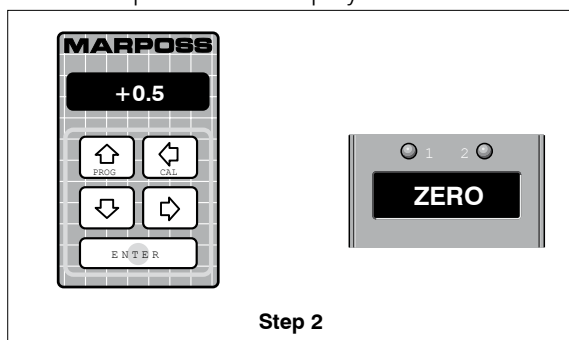
Before the E4N column can be used, the measuring equipment has to be mechanically and electronically calibrated.

6.1

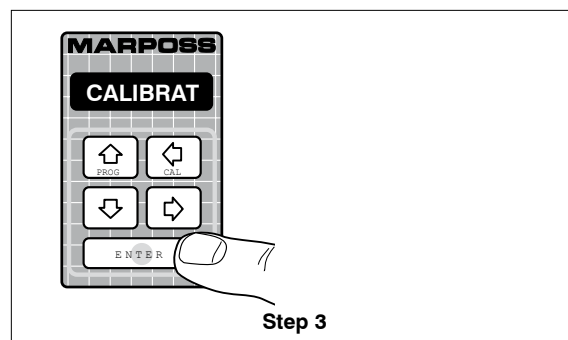
CALIBRATION OF ONE OR MORE MEASUREMENTS, EACH WITH ONE MASTER



Step 1: Press the left arrow key ("CAL") for two seconds. The E4N column will switch to the calibration mode. The message "CALIBRAT" will appear on the alphanumeric display and the message "CAL" will appear on the upper display if only one measurement has been programmed, otherwise the message "CAL 1" will appear if two or more measurements have been programmed. The column sets for calibration showing the transducers value on the alphanumeric display and the message "ZERO" on the upper display. Should the transducers be in over range, the alphanumeric display will show "-----".



Step 2



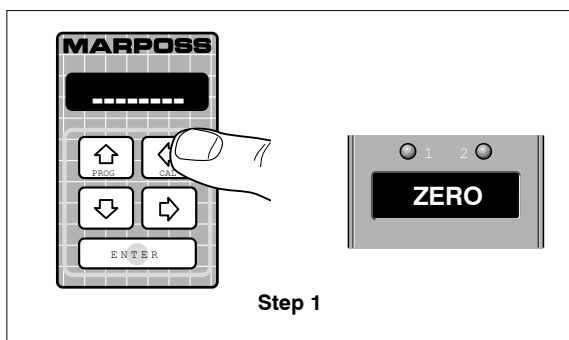
Step 3

Step 2: Insert the first gauge (for example a bore gauge) in its master. The value of the transducers is displayed.

Step 3: Press **ENTER** to confirm the calibration of the first measurement and return to measuring mode if only one measurement has been programmed, or to pass to the calibration of the next measurement if two or more measurements have been programmed. In the first case the value of the programmed scale is shown on the upper display; in the second case the message "CAL 2" is shown on the upper display, while the message "CALIBRAT" appears on the alphanumeric display. If more measurements are programmed, at the end of calibration procedure the upper display shows the programmed scale value alternatively to the number of the measurement. By default the column sets for measurement No.1 after calibration.

6.2

CALIBRATION OF ONE OR MORE MEASUREMENTS, EACH WITH TWO MASTERS

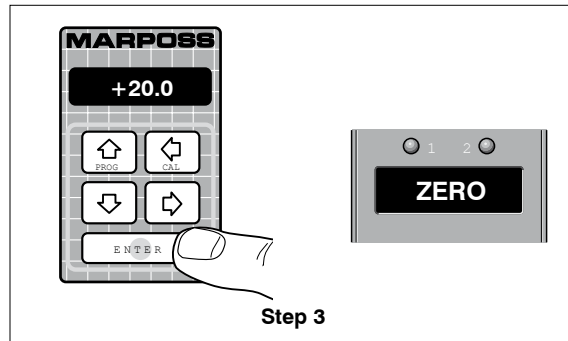
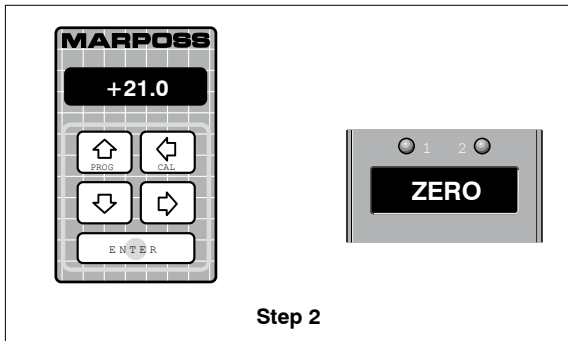


Step 1

Step 1: Press the left arrow key (CAL) for two seconds.

The E4N column will switch to the calibration mode.

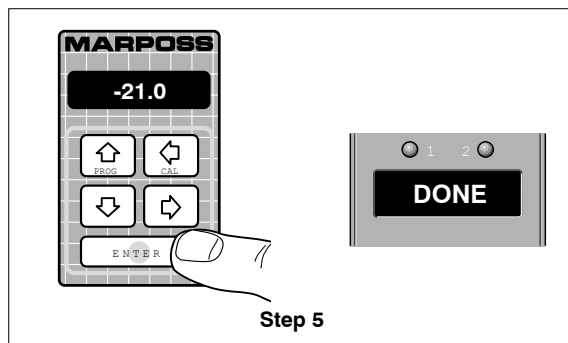
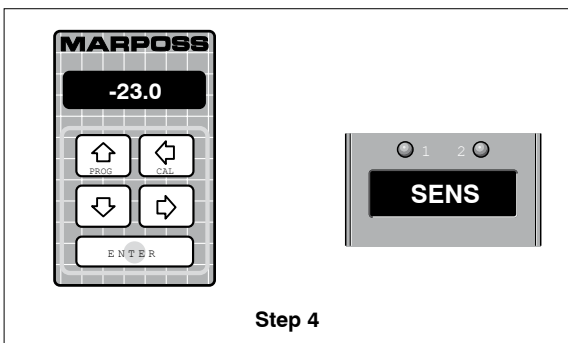
The message "-----" will appear on the alphanumeric display and the message "ZERO" will be shown on the upper display.



Step 2: Insert the gauge in its zeroing master.

Note: The value to be programmed as MASTER1 (see par 3.8.10) is the deviation of the min. master or of the max. master respectively according to which master has been chosen as zeroing master (min. or max. master respectively).

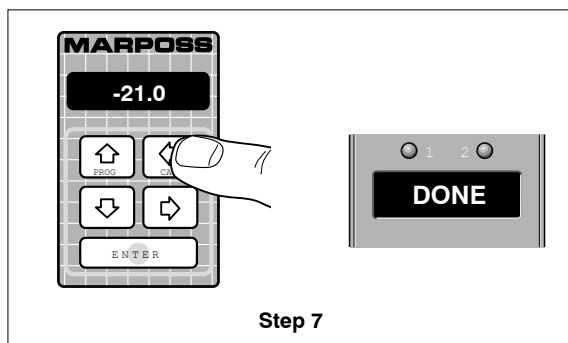
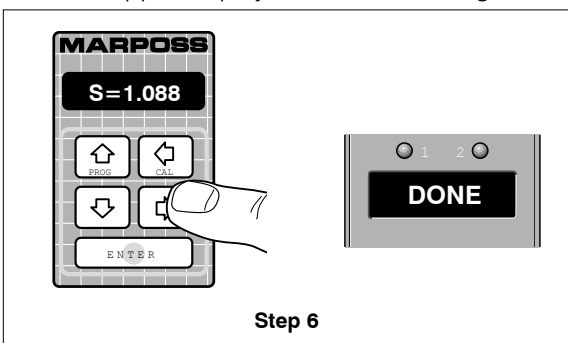
Step 3: Press **ENTER** to confirm the calibration.



Step 4: Insert the gauge in the second master to correct the sensitivity.

Note: The value to be programmed as MASTER2 (see par 3.8.11) is the deviation of the max. master or of the min. master respectively according to which master has been chosen as zeroing master (max. or min. master respectively).

Step 5: Press **ENTER** to confirm the calibration. If the sensitivity adjustment has been successful the upper display shows the message **"DONE"**.



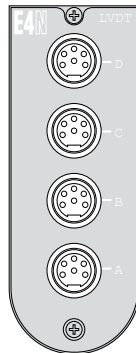
Step 6: Press the right arrow key to display the sensitivity correction coefficient which the column has automatically calculated.

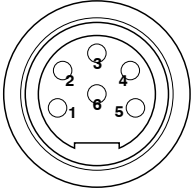
Step 7: Press the left arrow key (**CAL**) to exit the calibration mode if only one measurement has been programmed or to pass to next calibration if to or more measurements have been programmed. In the first case the upper display shows the programmed scale value alternatively to the measurement number; in the second case the upper display shows the message **"CAL 2"** while in the alphanumeric display the message **"CALIBRAT"** is shown. If more measurements are programmed, at the end of calibration procedure the upper display shows the programmed scale value alternatively to the number of the measurement. By default the column sets for measurement No.1 after calibration.

The E4N column can be fitted with four types of of signal amplifier module.

7.1

AMPLIFIER MODULE FOR LVDT SENSORS



CONNECTOR	PIN	SIGNAL
	1	OSCILLATOR
	2	GROUND (OSCILLATOR)
	3	NOT CONNECTED
	4	GROUND (SIGNAL)
	5	SIGNAL INPUT
	6	NOT CONNECTED

Versions available:

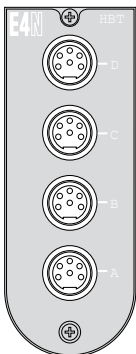
1-CHANNEL LVDT
2-CHANNEL LVDT
4-CHANNEL LVDT

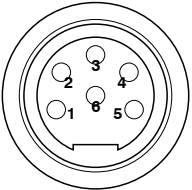
The connector is a KFR60 for SV50/6 screw plugs.

Unscrew the protective cap from the connector socket, carefully push the plug into the socket and then tighten.

7.2

AMPLIFIER MODULE FOR HBT SENSORS



CONNECTOR	PIN	SIGNAL
	1	OSCILLATOR
	2	GROUND
	3	SIGNAL INPUT
	4	NOT CONNECTED
	5	OSCILLATOR
	6	NOT CONNECTED

Versions available:

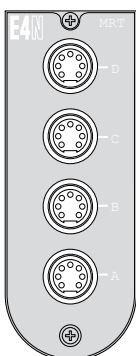
1-CHANNEL HBT
2-CHANNEL HBT
4-CHANNEL HBT

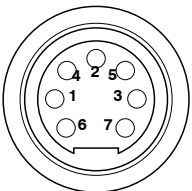
The connector is a KFR60 for SV50/6 screw plugs.

Unscrew the protective cap from the connector socket, carefully push the plug into the socket and then tighten.

7.3

AMPLIFIER MODULE FOR MRT SENSORS



CONNECTOR	PIN	SIGNAL
	1	SIGNAL INPUT
	2	NOT CONNECTED
	3	GROUND
	4	+VRP JUMPER POWER
	5	SUPPLY
	6	NOT CONNECTED
	7	-VP POWER SUPPLY

Versions available:

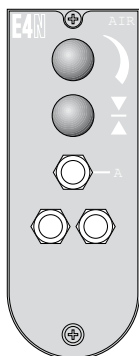
1-CHANNEL MRT
2-CHANNEL MRT
4-CHANNEL MRT

The connector is a KFR71 for SV71 screw plugs.

Unscrew the protective cap from the connector socket, carefully push the plug into the socket and then tighten.

AMPLIFIER MODULE FOR AIR/ELECTRONIC SENSORS

7.4



There are two versions of the amplifier module for AIR/ELECTRONIC sensors:

VERSION WITH METRIC CONNECTOR (1/8 GAS)
VERSION WITH IMPERIAL CONNECTOR (1/8 NPT)

The letter **A** on the amplifier panel indicates the air gage connector. This is a connector for quick-release fittings.

Connect the measuring air hose to the quick-release connector. This connector supplies the air for the measuring unit and must be securely connected.

Both versions of the air/electronic can be fitted with protective covers:

- **cover for the sensitivity adjustment knob**
- **cover for the sensitivity and zero-set knob**

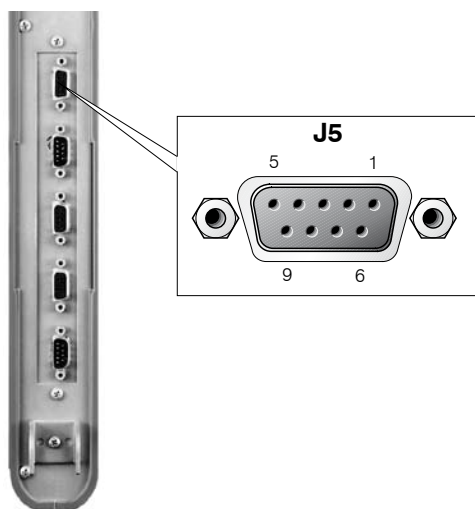
The covers prevent accidental changes to knob settings. The covers are fitted to the upper retaining screws on the module housing. (For identification codes, see Section 11).

8

CONNECTION TO EXTERNAL DEVICES

8.1

CONNECTION TO AN EXTERNAL PUSHBUTTON BOX OR A FOOTSWITCH

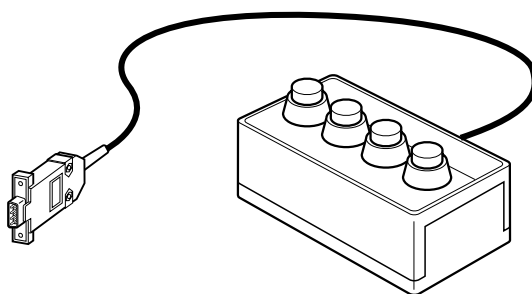


PIN	SIGNAL
1	SHIELD
2	SIGNAL GROUND
3	Z_SHIFT (ZEROING).
4	HOLD (A) / DIN_ELAB (B)
5	SEND
6	RUN (ZEROING)
7	-
8	-
9	-

Note: **A.** Enabled for static measurements
B. Enabled for dynamic measurements

8.1.1

EXTERNAL PUSHBUTTON BOX



The E4N column can be fitted with an external pushbutton box with four pushbuttons. The function and use of the pushbuttons depend on the measuring mode (static or dynamic) selected.

PUSHBUTTON FUNCTIONS IN THE STATIC MEASURING MODE

HOLD When pressed, this pushbutton freezes the value shown on the display; the upper display will display the HOLD message.

SEND When pressed, this pushbutton transmits the measurement value to the serial interface currently enabled. During transmission the upper display on the column will display the SEND message for at least 0.5 seconds; if the measurement is frozen, only a single transmission command will be accepted.

ZEROING When the Z-SHIFT (pin 3) and RUN (pin 6) pushbuttons are pressed together for at least 0.5 seconds, the column will switch to the CALIBRATION mode; when the two pushbuttons are released the measurement will automatically be zeroed irrespective of the calibration mode currently programmed. This function can be used to zero set the column but not to correct column sensitivity.

PUSHBUTTON FUNCTIONS IN THE DYNAMIC MEASURING MODE:

DIN-ELAB When pressed, this pushbutton outputs the current measurement value; when the pushbutton is released the result of dynamic processing will be displayed.

RUN When pressed and held down, this pushbutton initialises and enables dynamic processing; the pushbutton must be held pressed down during dynamic processing. When the pushbutton is released, the measurement value will be frozen and the 7-segment display will show the "HOLD" message.

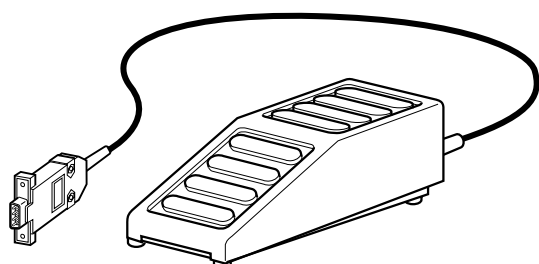
SEND When pressed, this pushbutton transmits the measurement value to the serial interface currently enabled. During transmission the upper display on the column will display the SEND message for at least 0.5 seconds; if the measurement is frozen, only a single transmission command will be accepted.

ZEROING When the Z-SHIFT (pin 3) and RUN (pin 6) pushbuttons are pressed together for at least 0.5 seconds, the column will switch to the CALIBRATION mode; when the two pushbuttons are released the measurement will automatically be zeroed irrespective of the calibration mode currently programmed. This function can be used to zero set the column but not to correct column sensitivity.

For identification codes, see Section 11.

FOOTSWITCH

8.1.2

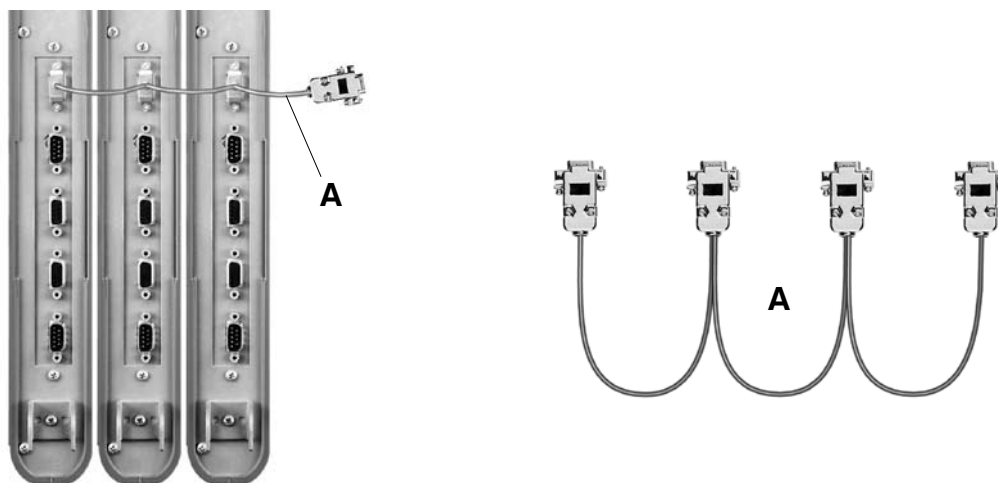


The E4N column can also be fitted with an external footswitch. The footswitch can be connected to the pushbutton box or directly to the J5 socket on the column. When pressed the footswitch starts the RUN function.

For identification codes, see Section 11.

CONNECTING EXTERNAL DEVICES TO A GROUP OF COLUMNS

Single pushbutton boxes and footswitches can be connected to a group of several E4N columns using the special connector cables provided (for identification codes, see Section 11).





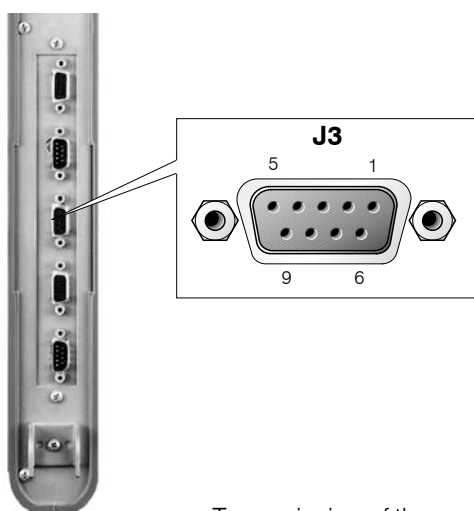
The column has three interfaces:

DIGIMATIC INTERFACE
RS232 INTERFACE
ANALOG INTERFACE

9.1

DIGIMATIC INTERFACE

The "DIGIMATIC" serial interface is used to transfer the measurement value to a statistical analyzer or a concentrator.



PIN	SIGNAL
1	SHIELD
2	-
3	-
4	-
5	DATA
6	CLOCK
7	RDY
8	REQUEST
9	GND

Note: The **RDY** and **REQUEST** signals are active when the logic level is LOW.

Transmission of the measurement value can be enabled and disabled using a programming parameter. The data transmission request can be made from the statistical analyzer or by pressing the SEND button on the pushbutton box. The measurement value will only be transmitted with the column switched to the measurement mode.

9.1.1

PRINTING TOLERANCE LIMITS WITH DIGIMATIC

The E4N column can output the values for the upper and lower tolerance limits on the DIGIMATIC output socket.

This function is only available on columns fitted with a local programming module. To output the upper and lower tolerance limits to the DIGIMATIC, proceed as follows:

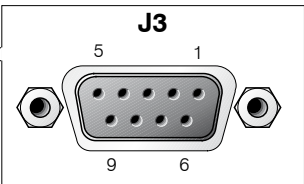
- Program the column and enable the DIGIMATIC output.
- Press the UP arrow key (PROG) and the ENTER key together for at least three seconds.
- Press the SEND button on the external pushbutton box or press the data acquisition key on the DIGIMATIC to send the upper tolerance limit value to the DIGIMATIC. This operation can only be performed once.
- Press the DOWN arrow key and the ENTER key together for at least three seconds.
- Press the SEND button on the external pushbutton box or press the data acquisition key on the DIGIMATIC to send the lower tolerance limit value to the DIGIMATIC. This operation can only be performed once.

ANALOG OUTPUT INTERFACE

9.2

The analog output interface is used to transfer the measurement value to a statistical analyzer or a recorder. The analog signal is transmitted with two full scale ranges:

± 2.4 Volt on pin 3
± 10 Volt on pin 4



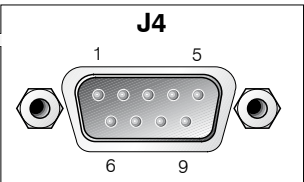
PIN	SIGNAL
1	SHIELD
2	-
3	ANOUT 2.4
4	ANOUT 10
5	-
6	-
7	-
8	-
9	GND

The full scale range value of the analog output is the same as the display scale value set for the LED scale on the column front panel. The analog output resolution is double the LED scale resolution.

RS232 INTERFACE

9.3

The RS232 is used for connections to serial printers or host computers. During programming, enable the option required and then customize the standard communications protocol.



PIN	SIGNAL
1	-
2	RXD
3	TXD
4	DTR
5	SIGNAL GROUND
6	-
7	RTS
8	CTS
9	-
CASE	SHIELD

Note: Compatible with a PC/AT serial connector and, using a 9-to-25 pin adapter, with a PC/XT and PS 2 serial connector.

9.3.1

"PRINT" MODE

The print mode is used to connect the E4N column over an RS232 interface to a printer or other external devices such as a personal computer and to transmit measurement data to these devices. The "PRINT PROTOCOL" sends a string of 80 printing ASCII characters followed by a carriage return or a carriage return and a line feed command to the external device. The format of the print protocol string is as follows.

CHARACTERS	USE	DESCRIPTION
1 to 8		Column identification
9		space
10 to 17	For a static measurement For two static measurements For a dynamic measurement	space M1 M2 MAX min $(M + m) / 2$ $(M - m) / 2$ M - m
18		space
19 to 26		Measurement value
27		space
28 to 35		Unit of measurement
36		space
37 to 38	Measurement status: + LIM < M + APPRCH < M + LIM - APPRCH M + APPRCH - LIM M - APPRCH M < - LIM	"* +" ">" "@" "<" "*"
39 to 42	If the measurement is not classified If the measurement is classified nn = number of classes	space nn
43		"("
44 to 51		Upper tolerance limit
52		" , "
53 to 60		Lower tolerance limit
61		")"
62 to 80	If no ZERO SHIFTS are present If ZERO SHIFTS are present n = number of zero shifts XXXXXXXX = zero shift value	space "SHIFT n = XXXXXXXX"

The command to transmit the string can be given as follows:

- 1 - Press the **SEND** button of the pushbutton box connected to the J5 socket on the column
- 2 - Transmit the character M (upper case) on the E4N column serial line.

EXAMPLE: TRANSMISSION OF MEASUREMENT DATA TO A PC

This is an example of a BASIC PROGRAM used to transmit measurement data to a personal computer. The command is transmitted by pressing the ENTER key on the PC keyboard.

```

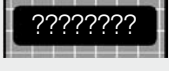
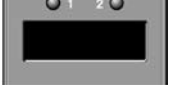
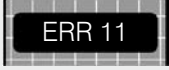
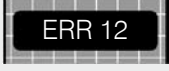
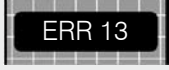
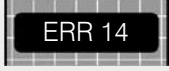
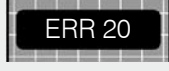
10 OPEN "COM1:9600,N,8,1" AS #1
30 INPUT "PRESS ENTER",A$
35 PRINT
40 PRINT #1, "M";
50 INPUT #1,S$
60 PS$=MID$(S$,1,8)
70 PRINT "IDENTIF =",PS$
80 PS$=MID$(S$,9,8)
90 PRINT "TYPE =",PS$
100 PS$=MID$(S$,20,8)
110 PRINT "VALUE =",PS$
120 PS$=MID$(S$,28,8)
130 PRINT "UNIT =",PS$
140 PS$=MID$(S$,37,2)
150 PRINT "STATUS =",PS$
160 PS$=MID$(S$,40,2)
170 PRINT "CLASS =",PS$
180 PS$=MID$(S$,44,8)
190 PRINT "+LIMIT =",PS$
200 PS$=MID$(S$,53,8)
210 PRINT "-LIMIT =",PS$
220 PS$=MID$(S$,62,8)
230 PRINT PS$, " "
240 PS$=MID$(S$,70,8)
250 PRINT PS$
260 PRINT
270 GOTO 30

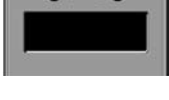
```

E4N column programming:

RS 232=	printer
BAUDR=	9600
DATABIT=	8
PARITY=	none
HAND-SH=	none
LINxPAG=	20
LIN_TER=	CR + LF

For the details of the cables needed to connect the PC to the E4N, see Section 11.

ALPHANUMERIC DISPLAY	7-SEGMENT DISPLAY	ERROR TYPE	DESCRIPTION	MENU	ACTION
		Programming	Column waiting for programming to be completed		Please wait
		Hardware	Sensor not connected Measurement out of range		Connect the sensor. Check that the sensor is touching the part. Program another measurement range.
		Programming	Data value not programmed		Program the value
		Programming	Column not programmed		Program the column
		Programming	The distance between the MIN and MAX masters is too small	MEASURE:	Check that the correct masters are being used or program the correct tolerance limits
		Programming	N.MEAS=2 M.TYPE= not programmed or N.MEAS=1 M.TYPE= not programmed	ADVANC.:	Program M.TYPE=STATIC
		Programming	Measurement system not programmed	MEASURE:	Program M.TYPE=STATIC or MAX, MIN, (M+m)/2, (M-m)/2 or (M-m)
		Programming	Programming error in LANGUAG= parameter	ADVANC.:	Program LANGUAG=ENGLISH or ITALIANO, FRANCAIS, DEUTSCH, ESPANOL
		Programming	System of measurement (metric or imperial) and unit of measurement (mm, micron, inch, ecc.) are incompatible	MEASURE: / ADVANC.:	Program M.SYST= and M.UNIT= so that they are compatible
		Programming	N.MEAS= not programmed	MEASURE:	N.MEAS= 1 or 2
		Programming	IDENT.= incorrectly programmed	ADVANC.:	Program IDENT.=
		Programming Hardware	Amplifier module incompatible with programming (no. sensors or inputs are incompatible)	MEASURE:	Modify the program so that the number of inputs or sensors is correct, or install a different amplifier module

ALPHANUMERIC DISPLAY	7-SEGMENT DISPLAY	ERROR TYPE	DESCRIPTION	MENU	ACTION
ERR 22		Programming	SENS.X= not programmed X = channel	TR.ADJ.: (ADVANC.):	Program SENS X= from 0.750 to 1.250 X = channel
ERR 23		Programming	W.R. X= not programmed X = channel	TR.ADJ.: (ADVANC.):	Program W.R. X= from 0.750 to 1.250 X = channel
ERR 24					
ERR 26		Programming	Input channel not active	MEASURE:	Program at least 1 channel for 1 measurement or 2 channels for 2 measurements
ERR 27		Programming	Input channel not active	MEASURE:	Program the channel selected
ERR 30		Programming	M.UNIT= not programmed	ADVANC.:	Program M.UNIT=
ERR 31		Programming	K.CH.A= K.CH.B= are not programmed correctly	MEASURE:	When N°MEAS= 2, each sensor must be programmed for its measurement only and all the other channels must be OFF If the gauge has more than one sensor, sensors must be programmed with its own channel
ERR 32		Programming	N.MEAS= 2 but only one measurement has been programmed	MEASURE:	Program both measurements (MEASURE 1 and 2). Each MEASUREMENT must use at least 1 CHANNEL and not more than 2 channels.
ERR 33		Programming	K.CH.A= ... incorrectly programmed	MEASURE:	Program K.CH.A= ...
ERR 35		Programming	M.FILTR= not programmed	ADVANC.:	Program M.FILTR= low, normal, high, no filter
ERR 36		Programming	ABSOLUT.= incorrectly programmed	MEASURE:	Program a value for ABSOLUT.= or select OFF (not programmed)

PROGRAMMING ERROR MESSAGES AND SOLUTIONS

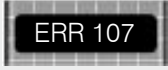
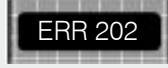
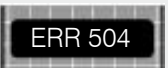
ALPHANUMERIC DISPLAY	7-SEGMENT DISPLAY	ERROR TYPE	DESCRIPTION	MENU	ACTION
ERR 37		Programming	THRESH.= error	ADVANC.:	Program THRESH= to a lower value or OFF (not programmed)
ERR 38		Programming	The measurement resolution is incompatible with the operating range of 1 or more sensors	ADVANC.: / TR.ADJ.: (ADVANC.):	Modify RESOLUT= or W.R.X= (X = channel)
ERR 39					
ERR 40		Programming	TOLER+= or TOLER-= are not programmed TOLER-= is set higher than TOLER+= or the tolerance is outside the programmed range.	MEASURE:	Program Correct values for TOLER+= or TOLER-=
ERR 41		Programming	The tolerance pre-limit is incorrectly programmed. APPRCH+= is higher than TOLER+= or APPRCH-= is lower than TOLER-= or APPRCH-= is higher than APPRCH+=	MEASURE:	Program APPRCH+= or APPRCH-= correctly or select OFF (not programmed)
ERR 42		Programming	DELTA and TIME values are not programmed	MEASURE:	Program DELTA and TIME
ERR 60		Programming	SCALE= incompatible with M.UNIT= and M.SYST= already programmed	MEASURE:	Program SCALE= to a correct value
ERR 70		Programming	ABSOLUT.= not programmed	MEASURE:	Program ABSOLUT.= to a correct value or to OFF
ERR 71		Programming	DISPLAY= not programmed	ADVANC.:	Program DISPLAY= CENTRAL or BOTTOM
ERR 72		Programming	LUMIN= not programmed	ADVANC.:	Program LUMIN= NORMAL, HIGH or LOW
ERR 80		Programming	MASTER 1= not programmed or master value (MASTER1, MASTER2) is missing or incorrect	MEASURE:	Program MASTER 1= and/or MASTER 2= correctly. Check that the correct master is being used.

PROGRAMMING ERROR MESSAGES AND SOLUTIONS

10

ALPHANUMERIC DISPLAY	7-SEGMENT DISPLAY	ERROR TYPE	DESCRIPTION	MENU	ACTION
ERR 90		Programming	BAUDR= not programmed	COMM: (ADVANC.:)	Program BAUDR= 2400, 4800 or 9600 (select the correct DATABIT for the current printer)
ERR 91		Programming	DATABIT= not programmed	COMM: (ADVANC.:)	Program DATABIT= 7 or 8 (select the correct DATABIT for the current printer)
ERR 92		Programming	PARITY= not programmed	COMM: (ADVANC.:)	Program PARITY= NONE, ODD or EVEN (select the correct PARITY for the current printer)
ERR 93		Programming	Serial mode selected is incorrect	COMM: (ADVANC.:)	Program DIGIMAT=ON or RS232= HOST or PRINTER
ERR 94		Programming	HAND SH= not programmed	COMM: (ADVANC.:)	Program HAND SH= NONE, HARDWARE, Xon/Xoff (select the correct value for the current printer used)
ERR 95		Programming	LINxPAG= not programmed	COMM: (ADVANC.:)	Program LINxPAG= no. of lines separating the print-out header.
ERR 96		Programming	DIGIMAT= not programmed	COMM: (ADVANC.:)	Program DIGIMAT= OFF, ON or ON W/O S
ERR 97		Programming	RS232= not programmed	COMM: (ADVANC.:)	Program RS232= HOST or PRINTER
ERR 99		Programming	LIN_TER= not programmed	COMM: (ADVANC.:)	Program LIN_TER= CR (carriage return) or CR+LF (carriage return + line feed)
E 101		Programming Hardware	E2PROM checksum error in column programming		Re-program the column

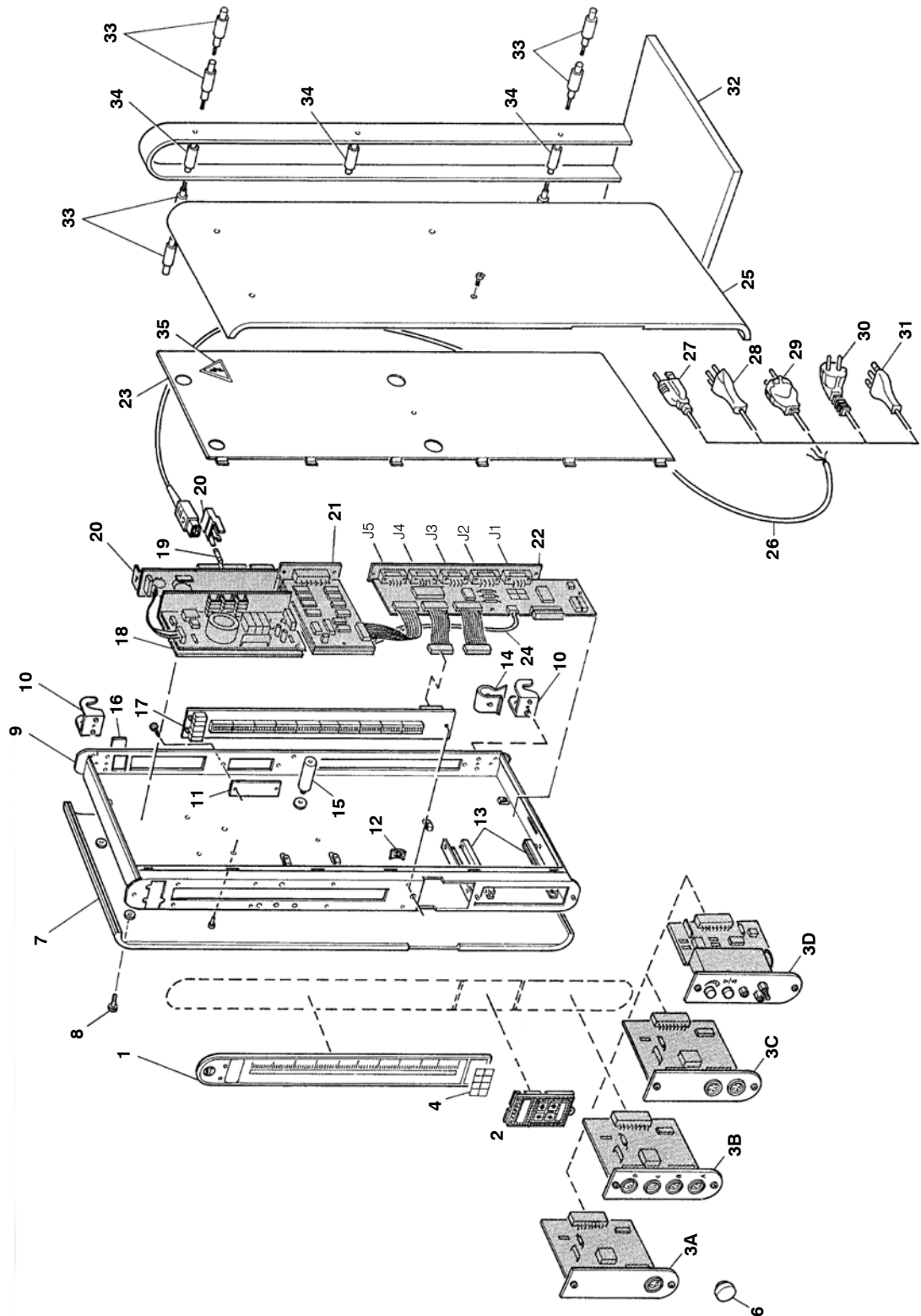
PROGRAMMING ERROR MESSAGES AND SOLUTIONS

ALPHANUMERIC DISPLAY	7-SEGMENT DISPLAY	ERROR TYPE	DESCRIPTION	MENU	ACTION
		Software	System software error (The current measurement ID is incorrect).		Switch the column OFF and then ON again. If the problem persists, call a Marposs Service Centre.
		Programming	The E2PROM is incompatible with the column programming		Press ENTER to reset the column; re-program the column.
		Hardware	RS232= error, HAND_SH= incorrect for the current printer	COMM: (ADVANC.)	Press ENTER to reset the column and check that the HAND_SH= variable is correctly programmed
		Hardware Software	Communications error between CPU and the Relay-BCD card		Switch the column OFF and then ON again. If the problem persists, call a Marposs Service Centre.
		Hardware	E2PROM checksum error		Switch the column OFF and then ON again; re-program the column. If the problem persists, call a Marposs Service Centre.
		Hardware	RAM error		Switch the column OFF and then ON again. If the problem persists, call a Marposs Service Centre.
		Calibration	During calibration of the two masters, the automatically calculated sensitivity adjustment has exceeded the permitted range ($\pm 25\%$ of the difference between the masters)	MEASURE:	Check the masters for wear. Check that the masters are correct for the current type of gauge. If the problem persists, call a Marposs Service Centre.
		Programming	The measurement value is outside the LED scale range or is incompatible with the LED scale	MEASURE:	Modify the scale, the measurement coefficient or the nominal value
		Hardware	Error in the LED scale configuration		Contact a Marposs Service Center

PROGRAMMING ERROR MESSAGES AND SOLUTIONS

10

ALPHANUMERIC DISPLAY	7-SEGMENT DISPLAY	ERROR TYPE	DESCRIPTION	MENU	ACTION
		Hardware Software	LED scale fault		Contact a Marposs Service Center
		Hardware	Communications error between the CPU and the LED scale.		Contact a Marposs Service Center
					
		Calibration	Calibration not completed		Calibrate the column



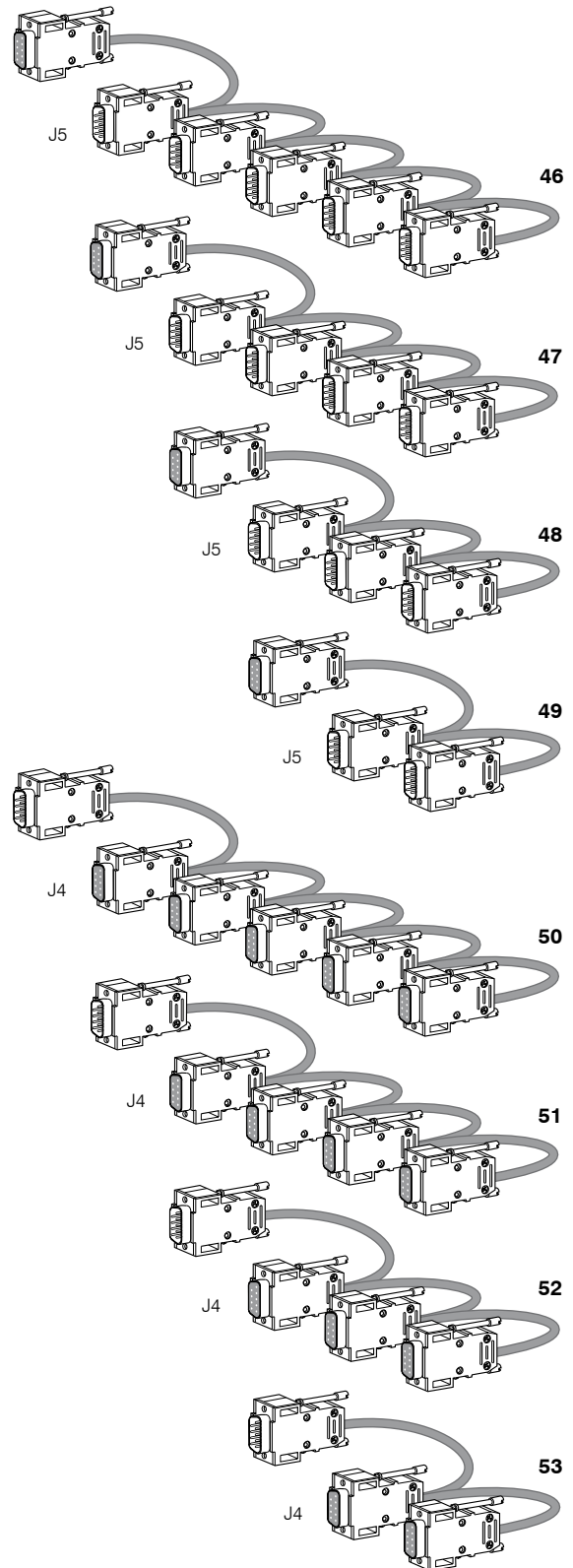
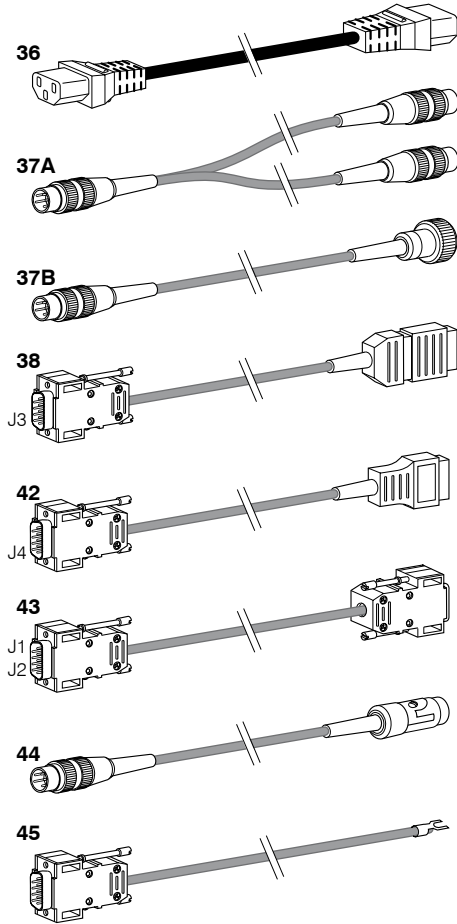
ACCESSORIES AND SPARE PARTS

11

SPARE PARTS AND POWER SUPPLY CABLES

11.1

ref. n°	Description	code n°
1	ABS BARGRAPH+ 3-COLOUR POLYESTER LENS.....	6131910210
2	LOCAL PROGRAMMING MODULE.....	6344450100
3A	1 LVDT AMPLIFIER FITTING KIT.....	6876004013
3A	1 INPUT HBT AMPLIFIER, STANDARD MARPOSS.....	6876004005
3A	1 INPUT MRT AMPLIFIER.....	6876004008
3B	4 LVDT AMPLIFIER FITTING KIT.....	6876004011
3B	4 INPUT HBT AMPLIFIER, STANDARD MARPOSS.....	6876004003
3B	4 INPUT MRT AMPLIFIER.....	6876004006
3C	2 LVDT AMPLIFIER FITTING KIT.....	6876004012
3C	2 INPUT HBT AMPLIFIER, STANDARD MARPOSS.....	6876004004
3C	2 INPUT MRT AMPLIFIER.....	6876004007
3D	1 INPUT AIR/ELECTRONIC AMPLIFIER METRIC VERSION.....	6876004009
3D	1 INPUT AIR/ELECTRONIC AMPLIFIER NPT VERSION.....	6876004010
4	MEASUREMENT SYNOPTIC ADHESIVE LABELS.....	1529040460
6	CAP FOR AMPLIFIER MODULE CONNECTORS.....	1529040450
7	LEFT SHELL UNIT WITH RUBBER GASKET.....	6131910190
8	SPECIAL SCREW FOR LEFT SHELL (5).....	1529040480
-	WRENCH FOR SPECIAL SCREW, CODE 1529040480.....	1320254000
9	STEEL CHASSIS UNIT (WITH SCREW BUSHES).....	6131910290
10	REAR SUPPORT ANCHORS (2).....	1529040080
11	AUXILIARY CLOSURE FOR BCD MODULE.....	1529040130
12	SPRINGS LOCKING THE ABS BARGRAPH TO THE CHASSIS (9).....	4358000017
13	AMPLIFIER CARD GUIDE (2).....	1529040440
14	FIXING HOOK (1).....	1529040470
15	SHELL SPACERS (4).....	1529040070
16	CODE/SERIAL NUMBER + VOLTAGE/CURRENT PLATE.....	1529040630
17	3-COLOR BARGRAPH MODULE.....	6344410300
18	POWER SUPPLY UNIT (COMM.) ELCO PMC30E-2.....	4147101504
19	FUSE 2A.....	4143102000
20	INPUT MODULE FOR VOLTAGE + MAINS FILTER.....	6344180300
21	BCD RELAY MODULE.....	6344360100
22	CPU CARD.....	6344600400
23	STEEL COVER FOR INTERNAL CLOSURE OF CHASSIS.....	1529040020
24	CONNECTION CABLE BETWEEN CPU AND POWER SUPPLY UNIT.....	6131900010
25	RIGHT PLASTIC SHELL.....	1529040030
26	POWER SUPPLY CABLE WITHOUT MAINS PLUG (L = 2 mt.).....	6739696034
27	U.S.A. POWER SUPPLY CABLE (L = 2 mt.).....	6739696030
28	SWISS POWER SUPPLY CABLE (L = 2 mt.).....	6739696031
29	F - D POWER SUPPLY CABLE (L = 2 mt.).....	6739696033
30	SPANISH POWER SUPPLY CABLE (L = 2 mt.).....	6739696035
31	ITALIAN POWER SUPPLY CABLE (L = 2 mt.).....	6739696036
32	REAR SUPPORT FOR COLUMN UNITS.....	6131410040
33	AUXILIARY PIN FOR COLUMN SUPPORT.....	1529040210
34	CENTRAL PIN FOR COLUMN SUPPORT.....	1529040090
35	SAFETY PRECAUTION PLATE.....	1526010070
-	COVER FOR CANNON 9P SOCKET.....	4140M00005
-	COVER FOR CANNON 9P SOCKET.....	4140M00006
-	COVER FOR CANNON 9P SOCKET.....	4140M00007
-	LOCKING SCREWS FOR RIGHT SHELL (5).....	4325040805
-	SCREWS FIXING PSU TO CHASSIS (2).....	4326040641
-	CARDS/FRAME LOCKING SCREWS (13).....	4327798104
-	BARGRAPH/FRAME LOCKING SCREWS (2).....	4327798110
-	STANDARD SOFTWARE.....	S000420004



ACCESSORIES AND SPARE PARTS

11

ACCESSORIES

11.2

CABLES

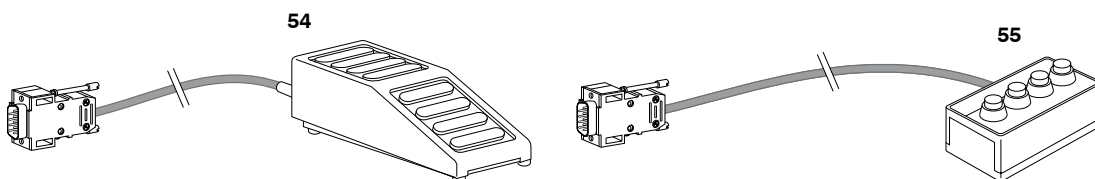
11.2.1

ref. n°	Description	code n°
36	POWER SUPPLY JUMPER.....	6739696029
37A	TWIN EXTENSION CABLE FOR LVDT SENSORS (L = 1.2 mt.).....	6735932014
37B	TWIN EXTENSION CABLE FOR MRT SENSORS (L = 1.2 mt.).....	6739796001
38	CABLE CONNECTING E4N TO MITUTOYO DP1-DP2-DP3 (L = 1mt.).....	6738099016
42	RS232 CONNECTING CABLE FOR PC PS/2-XT (L = 3mt.).....	6737916000
42	RS232 CONNECTING CABLE FOR PC AT (L = 3mt.)	6737957002
43	BUS SENSOR CABLE.....	6738057011
	(To be used only to guarantee the phase oscillation of the transducers when they are splitted on more columns by means of the cable 37A)	
44	ADAPTER CABLE BETWEEN E4 ANALOG OUTPUT AND E4N ANALOG OUTPUT (L = 30 cm)	6738036000
45	CABLE CONNECTING ANALOG OUTPUT TO EXTERNAL DEVICE	6738098009
	(CONNECTOR ON ONE SIDE ONLY) (L = 3mt.)	
46	CABLE CONNECTING 5 E4N TO PUSHBUTTON BOX OR FOOTSWITCH	6738097012
47	CABLE CONNECTING 4 E4N TO PUSHBUTTON BOX OR FOOTSWITCH	6738097011
48	CABLE CONNECTING 3 E4N TO PUSHBUTTON BOX OR FOOTSWITCH	6738097010
49	CABLE CONNECTING 2 E4N TO PUSHBUTTON BOX OR FOOTSWITCH	6738097009
50	RS232 CABLE CONNECTING 5 E4N TO PC.....	6739797027
51	RS232 CABLE CONNECTING 4 E4N TO PC.....	6739797028
52	RS232 CABLE CONNECTING 3 E4N TO PC.....	6739797029
53	RS232 CABLE CONNECTING 2 E4N TO PC.....	6739797030
-	CABLE BETWEEN DIGIMATIC OUTPUT AND DATA MYTE 862.....	92162
-	CABLE BETWEEN DIGIMATIC OUTPUT AND DATA MYTE 529-15	92160

PUSHBUTTON BOX AND FOOTSWITCH

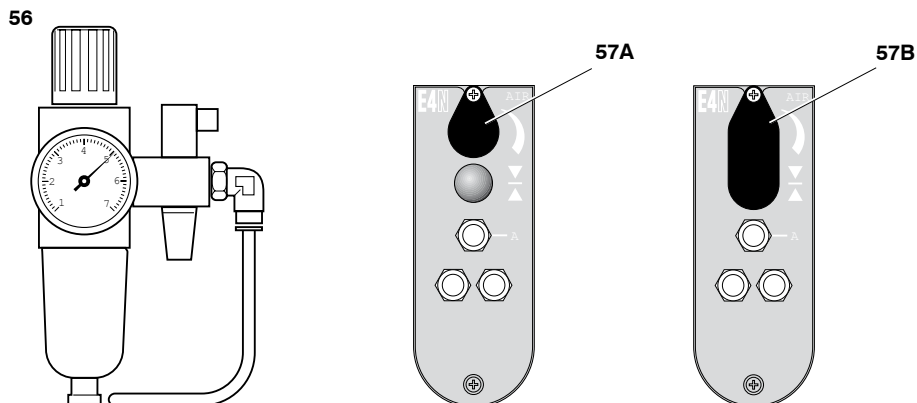
11.2.2

ref. n° ex. draw.	Description	MARPOSS code n°
54	FOOTSWITCH FOR DYNAMIC CYCLE (cable L = 2 mt.).....	6738099015
55	PUSHBUTTON BOX FOR REMOTE CONTROL (cable L = 1,5 mt.)	6139012600



11.2.3

ACCESSORIES FOR E4N AIR COLUMN



ref. n°	Description	code n°
56	AIR FILTER REGULATOR UNIT FOR COLUMN	2915490053
-	TWO 90° QUICK-RELEASE CONNECTORS.....	2915490052
-	TWO STRAIGHT QUICK-RELEASE CONNECTORS.....	2915490050
57A	SENSITIVITY ADJUSTER CAP	1015420614
57B	SENSITIVITY ADJUSTER AND ZERO REGULATOR CAP	1015420615

11.2.4

MANUALS

ref. n°	Description	code n°
-	E4N USE AND PROGRAMMING MANUAL (VERS. 6.3) ENGLISH	D2040036U1
-	E4N USE AND PROGRAMMING MANUAL (VERS. 6.3) ITALIAN.....	D2040036I1
-	E4N USE AND PROGRAMMING MANUAL (VERS. 6.3) GERMAN	D2040036D1
-	E4N USE AND PROGRAMMING MANUAL (VERS. 6.3) SPANISH.....	D2040036E1
-	E4N USE AND PROGRAMMING MANUAL (VERS. 6.3) FRENCH	D2040036F1



MARPOSS

PROGRAMMING DATA SHEET FOR E4N COLUMN

DATE:.....
E4N COLUMN:.....
SERIAL NUMBER:.....

DEPARTMENT:.....
OPERATOR:.....
PART DESCRIPTION:.....

MACHINE:.....
PART NUMBER:.....

PROGRAM: ☐ ONE CH. ☐ TWO CH. ☐ ALL	K.CH.A=..... K.CH.B=..... K.CH.C=..... K.CH.D=..... ABSOLUT=..... MASTER1=..... MASTER2=.....	K.CH.A=..... K.CH.B=..... K.CH.C=..... K.CH.D=..... ABSOLUT=..... MASTER1=..... MASTER2=.....
MEASURE MENU:		
M.SYST= ☐ METRIC ☐ INCH		
N.MEAS= ☐ 1 ☐ 2 ☐ 3 ☐ 4		
MEAS 1 MENU:		
TOLER+=..... TOLER-=..... APPRCH+=..... APPRCH-=..... SCALE=..... K.CH.A=..... K.CH.B=..... K.CH.C=..... K.CH.D=..... ABSOLUT=..... MASTER1=..... MASTER2=.....	MEAS 3 MENU:	
ADVANC MENU:		
LANGUAG= ☒ ENGLISH ☐ FRANCAIS ☐ DEUTSCH ☐ ESPANOL ☐ ITALIANO		
TR.ADJ MENU:		
W.R. A=..... SENS. A=..... W.R. B=..... SENS. B=..... W.R. C=..... SENS. C=..... W.R. D=..... SENS. D=.....		
MEAS 2 MENU:		
MEAS 4 MENU:		
MEAS 1 MENU:		
M.TYPE= ☐ static ☐ max ☐ min ☐ (M+m)/2 ☐ (M-m)/2 ☐ M-m		
DISPLAY= ☐ CENTRAL ☐ BOTTOM		

M.UNIT=	☐ mm ☐ micron
M.FILTER=	☐ NORMAL ☐ HIGH ☐ NO FILTER ☐ LOW
RESOLUT=	☐ FINE ☐ STANDARD ☐ MAXIMUM
THRESH=	.....
DELTA=	.....
TIME=	.....

MEAS 2 MENU:

DISPLAY=	☐ CENTRAL ☐ BOTTOM
M.UNIT=	☐ mm ☐ micron
M.FILTER=	☐ NORMAL ☐ HIGH ☐ NO FILTER ☐ LOW
RESOLUT=	☐ FINE ☐ STANDARD ☐ MAXIMUM
THRESH=	.....
DELTA=	.....
TIME=	.....

MEAS 3 MENU:

DISPLAY=	☐ CENTRAL ☐ BOTTOM
M.UNIT=	☐ mm ☐ micron
M.FILTER=	☐ NORMAL ☐ HIGH ☐ NO FILTER ☐ LOW
RESOLUT=	☐ FINE ☐ STANDARD ☐ MAXIMUM
THRESH=	.....
DELTA=	.....
TIME=	.....

MEAS 4 MENU:

DISPLAY=	☐ CENTRAL ☐ BOTTOM
M.UNIT=	☐ mm ☐ micron
M.FILTER=	☐ NORMAL ☐ HIGH ☐ NO FILTER ☐ LOW
RESOLUT=	☐ FINE ☐ STANDARD ☐ MAXIMUM
THRESH=	.....
DELTA=	.....
TIME=	.....

COMMUT MENU:

COMMUT=	☐ AUTO ☐ MAN ☐ AUT/MAN ☐ DELTA SW
---------	--

COMUNIC MENU:

DIGIMAT=	☐ ON ☐ OFF ☐ ON W/O S ☐ OFF ☐ PRINTER
RS 232=	
BAUDR=	☐ 2400 ☐ 4800 ☐ 9600 ☐ 7 bit ☐ 8 bit
DATABIT=	
PARITY=	☐ NONE ☐ ODD ☐ EVEN
HAND-SH=	☐ NONE ☐ HARDWARE ☐ X ON/X OFF
LINxPAG=	.....
LIN_TER=	☐ CR ☐ CR + LF
IDENTIF=	.....
PASS=	.....
LUMIN=	☐ NORMAL ☐ HIGH ☐ LOW
O.R.CK=	.....