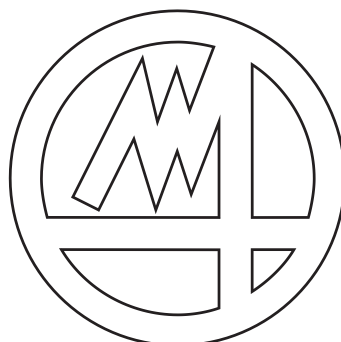


# BUILT

**IP - PP  
MEASUREMENT**



**MARPOSS**

**CONTENTS**

<b>1 MAIN NAVIGATION CHART .....</b>	<b>5</b>
<b>2 SETTINGS .....</b>	<b>7</b>
2.1 OPTIONS .....	7
2.2 HARDWARE & MECHANICAL PROGRAMMING.....	7
2.2.1 SETTING UP AN ME LVDT TYPE 4 SENSOR MEASUREMENT NODE .....	8
2.2.2 SETTING UP AN ME LVDT/HBT TYPE 2 SENSOR MEASUREMENT NODE .....	10
2.3 NOTIFICATION MANAGEMENT .....	12
2.4 USERS .....	12
2.5 BACKUP & RESTORE.....	12
2.6 FILE MANAGEMENT.....	12
2.7 INFORMATION.....	12
<b>3 PROGRAMMING .....</b>	<b>13</b>
3.1 IN-PROCESS MEASUREMENT APPLICATION.....	14
3.1.1 LIST OF CYCLES .....	14
3.1.2 AVAILABLE SETS.....	15
3.1.3 PROGRAMMABLE DATA .....	16
3.1.3.1 GENERAL.....	18
3.1.3.2 MEASUREMENT HEAD.....	19
3.1.3.3 MEASUREMENT .....	21
3.1.3.4 INTEGRAL.....	24
3.1.3.5 SURFACE.....	26
3.1.3.6 OVALITY.....	29
3.1.3.7 REMOVAL SPEED.....	30
3.1.3.8 TAPER .....	31
3.1.3.9 T.I.R. (TOTAL INDICATOR READING).....	32
3.1.3.10 STOCK METAL QUANTITY REMOVAL .....	33
3.1.3.11 MEASUREMENT FEEDBACK.....	35
3.1.3.12 DIRAC DIRECT COUPLING .....	36
3.1.3.13 PP-IP COUPLING .....	38
3.1.3.14 ZERO SHIFT. ....	40
3.2 POST PROCESS MEASUREMENT APPLICATION.....	42
3.2.1 LIST OF CYCLES .....	42
3.2.2 AVAILABLE SETS.....	43
3.2.3 PROGRAMMABLE DATA .....	44
3.2.3.1 GENERAL DATA .....	46
3.2.3.2 FEEDBACK METHOD.....	47
3.2.3.3 ARM RATIO ACQUISITION .....	49
3.2.3.4 GEOMETRICAL COEFFICIENTS .....	50
3.2.3.5 MEASUREMENT M(X) .....	51
3.2.3.6 MEASUREMENT CLASSES FOR M (X).....	59
3.2.3.7 STATISTICAL FEEDBACK DATA M(X) .....	60
3.2.3.8 MEASUREMENT STEP (X).....	62
3.2.3.9 FIRST TRANSDUCER TEST .....	64
3.2.3.10 AUTOMATIC ACQUISITION OF ARM RATIO (TX).....	65
3.2.3.11 AUTOMATIC PROGRAM START (X).....	66
3.2.3.12 TRANSDUCER THRESHOLDS FOR M(X).....	68
<b>4 DASHBOARDS .....</b>	<b>69</b>
4.1 SELECTING A MARPOSS/OEM PAGE.....	69
4.2 WIDGETS AND DASHBOARDS.....	70
4.2.1 MARPOSS DASHBOARDS FOR IN-PROCESS APPLICATION .....	70

4.2.2 WIDGETS FOR IN-PROCESS APPLICATION..... 71

4.2.3 MARPOSS DASHBOARDS FOR POST-PROCESS APPLICATION..... 73

4.2.4 WIDGETS FOR POST-PROCESS APPLICATION ..... 73

**5 OPERATING PROCEDURES ..... 79**

5.1 MECHANICAL MEASUREMENT HEAD ZERO-SETTING PROCEDURE ..... 79

5.1.1 MEASUREMENT HEAD MECHANICAL ZERO-SETTING ..... 81

5.1.2 RAPID ZERO-SETTING OF UNIMAR HEADS WITH LOCKING LEVER (FRICTIONED SUPPORT) ..... 84

5.1.3 MECHANICAL POSITIONAR ZERO-SETTING..... 86

5.1.4 ZERO-SETTING A MULTI-COMPARATOR APPLICATION..... 87

5.2 ARM RATIO SELF-LEARNING PROCEDURE ..... 88

5.3 RETRACTION THRESHOLD SELF-LEARNING PROCEDURE ..... 89

5.4 ELECTRICAL ZERO-SETTING PROCEDURE ..... 91

5.5 ZERO CORRECTIONS PROCEDURE..... 92

**6 ERRORS - WARNINGS - ALARMS..... 93**

6.1 IN-PROCESS APPLICATION ..... 93

6.1.1 ERRORS..... 93

6.1.2 ALARMS..... 95

6.2 POST-PROCESS APPLICATION ..... 96

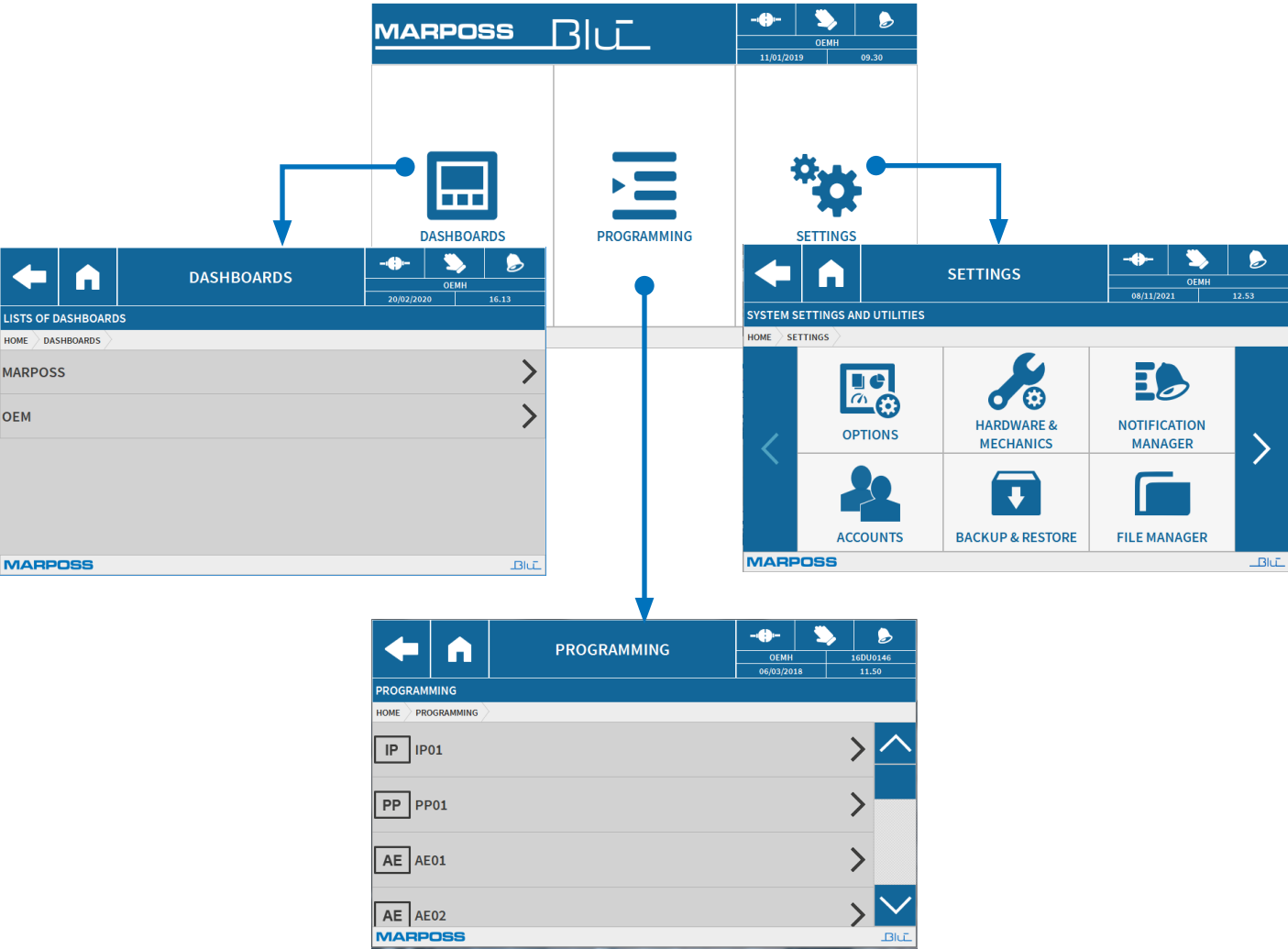
6.2.1 ERRORS..... 96

6.2.2 WARNINGS ..... 101

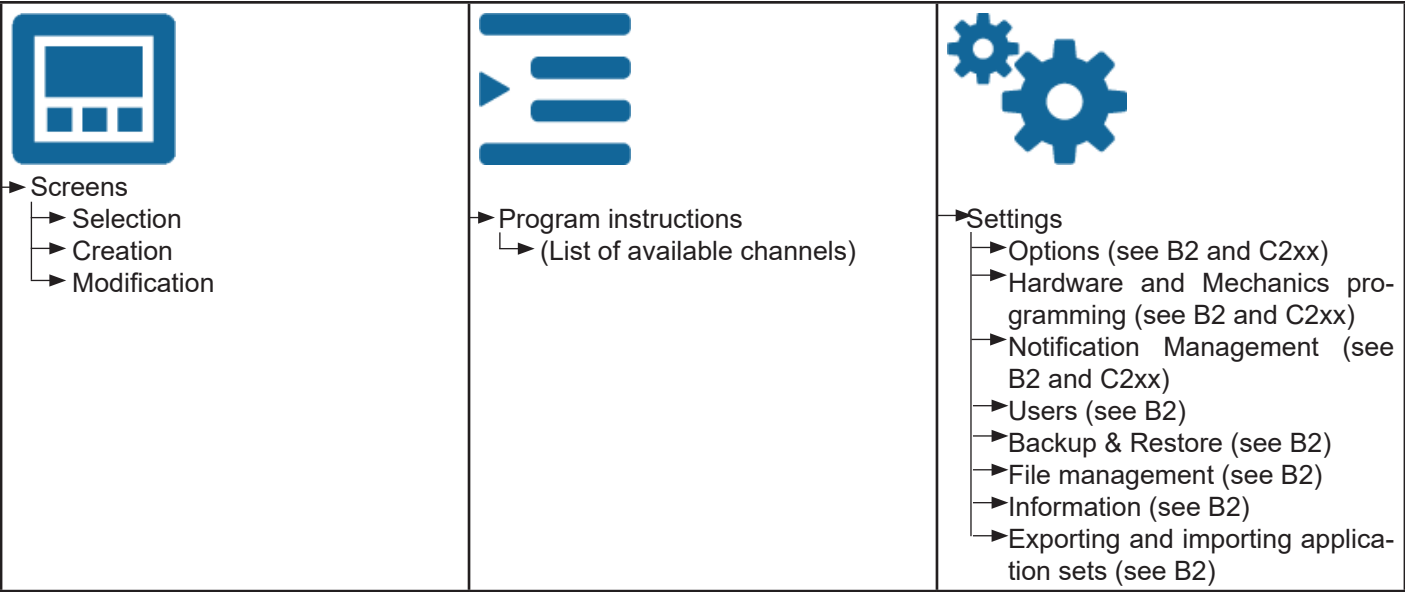
6.2.3 ALARMS..... 102

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1 MAIN NAVIGATION CHART



Figg.1. Main menus map



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## 2 SETTINGS



### 2.1 Options

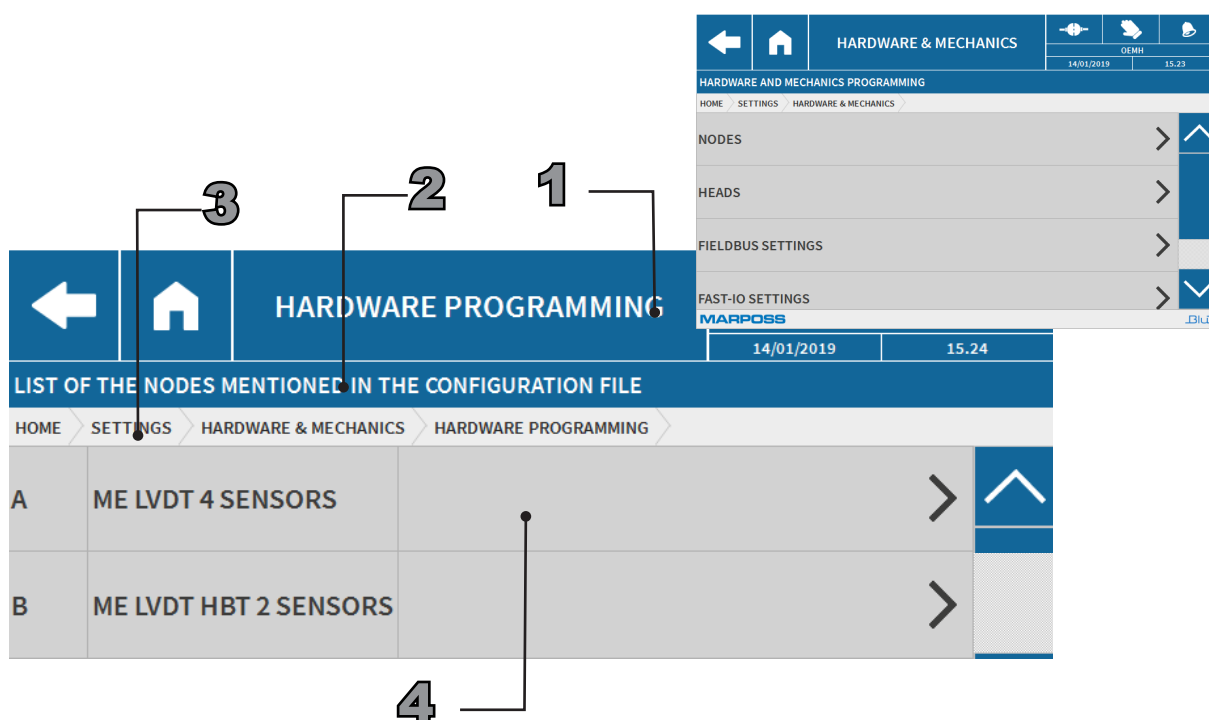


See chap. 3.1 on page 18 part. B2.

### 2.2 Hardware & Mechanical programming



The **Hardware and Mechanics Programming** screen may be used to select which hardware or mechanical components to intervene on. For a complete description, see Part B2, Chap. 3.2 on page 29. The **HW Programming** screen corresponding to the **ME** node is described below.



Figg.2. Main ME – LVDT 4 Sensor and ME – LVDT/HBT 2 Sensor measurement node hardware programming screen

Screen title: **HW Programming**.

- 1 Messages and descriptions area: List of nodes mentioned in the configuration file.
- 2 Navigation path: *Home* > *Settings* > **Hardware Programming**
- 3 Working area: List of **installed** nodes. In the example:
  - **ME LVDT 4 SENSORS**. **Measurement** application with four LVDT type sensors. See para. 2.2.1 on page 8.
  - **ME LVDT HBT 2 SENSORS**. **Measurement** application with two LVDT/HBT type sensors. See para. 2.2.2 on page 10.

2.2.1 Setting up an ME LVDT type 4 Sensor measurement node

Use the **ME LVDT 4 Sensors** dashboard to set-up the parameter sensors and obtain information about the connected node.

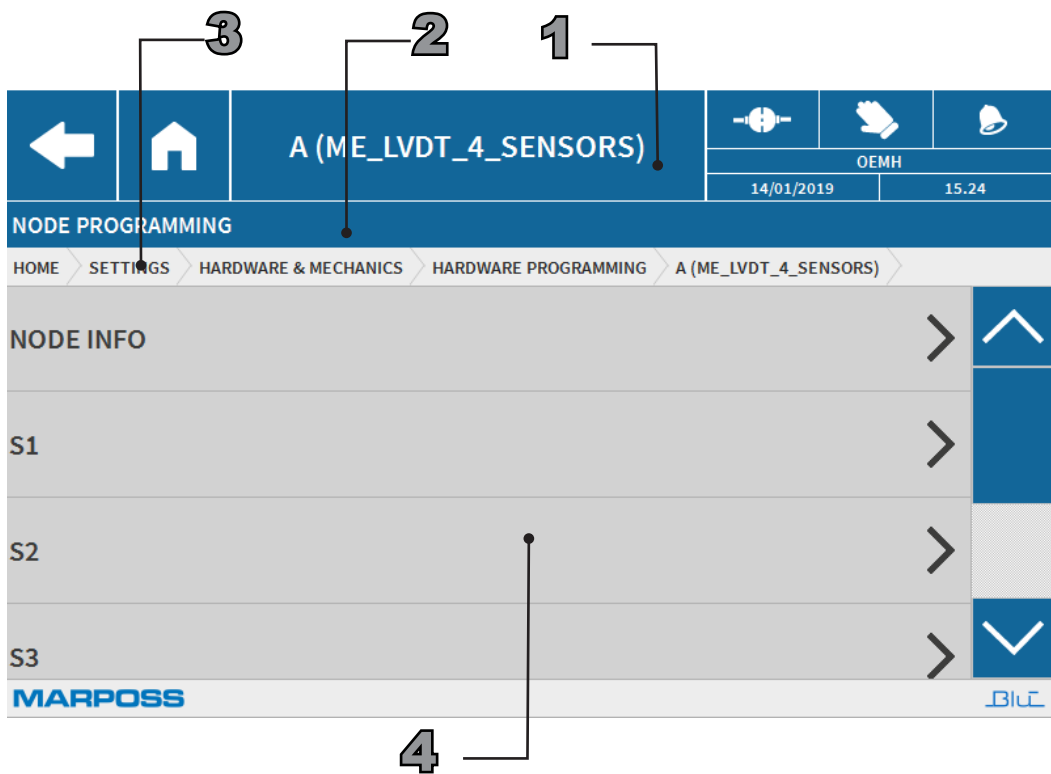


Fig.3. ME LVDT 4 Sensor measurement node set-up dashboard

- 1 Screen title: **ME LVDT 4 Sensors**.
- 2 Messages and descriptions area: **Programming the node**.
- 3 Navigation path: *Home > Settings > Hardware & Mechanics > HW Programming > ME LVDT 4 Sensors*.
- 4 Working area:
  - **Node information.** Use this command to enable the function node and access the corresponding identification information.

1	2	3	4	5	6
	NODE ENABLED				<input checked="" type="checkbox"/>
	TYPE			ME - LVDT 4 SENSORS	
	IDENTIFIER				1
	SERIAL NUMBER			SNNODE42	
	NUMBER OF SENSORS				4
	NUMBER OF AUXILIARIES				1

Fig.4. Function node information dashboard



1 **Enable node.** Enables/Disables the node functions.

**N.B.**  
Disable the function node only if the node itself is damaged.

- 2 **Type of node.** Displays the node name, as assigned by the configuration file.
- 3 **Node identification number.** Displays the node number, as assigned by the configuration file.
- 4 **Serial Number.** Displays the node serial number.
- 5 **Number of sensors.** Displays the number of sensors present on the node.
- 6 **Number of auxiliary elements.** Displays the number of auxiliary elements assigned in the configuration file for the node under examination.
- **S1-S2-S3-S4.** Customisable settings for the selected sensor.

	HEAD ENABLED	
	TRANSDUCER IDENTIFIER	T1
	HEAD USED IDENTIFIER	UNIMAR S26 1

Figg.5. ME - LVDT 4 sensors measurement node head parameters dashboard

- 1 **Head enabled.** Enables the head functions.
- 2 **Transducer identifier.** Available values: T1 - T48.

**N.B.**  
The transducer to be assigned to each individual socket (S1, S2, S3, S4) may be defined in the configuration file, therefore it is not selectable on this dashboard.

3 **Head used identifier.** Select the head to be used.

UNIMAR S26 1	<input checked="" type="radio"/>	
UNIMAR S26 2	<input type="radio"/>	
UNIMAR S26 3	<input type="radio"/>	

Figg.6. Select head to be used page

### 2.2.2 Setting up an ME LVDT/HBT type 2 Sensor measurement node

Use the **ME LVDT/HBT 2 Sensors** dashboard to set-up the parameter sensors and obtain information about the connected node.

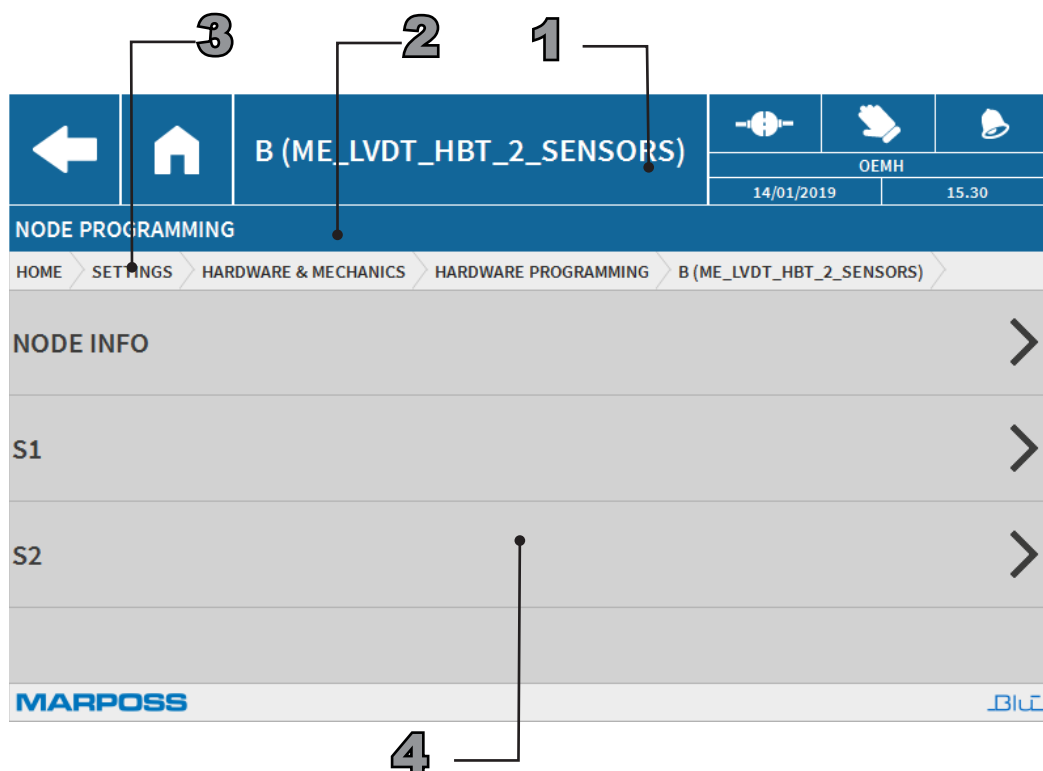


Fig.7. ME - LVDT/HBT 2 Sensors measurement node set-up dashboard

- 1 Screen title: **ME - LVDT/HBT 2 Sensors**.
- 2 Messages and descriptions area: Node programming
- 3 Navigation path: *Home > Settings > Hardware & Mechanics > HW Programming > ME - LVDT/HBT 2 Sensors*.
- 4 Working area: See following page.
  - **Node information.** Use this command to enable the node and access the corresponding identification information.

1	2	3	4		
	NODE ENABLED			<input checked="" type="checkbox"/>	
	TYPE		ME - LVDT/HBT 2 SENSORS		
	IDENTIFIER		2		
	SERIAL NUMBER		SNNODE43		
	NUMBER OF SENSORS		2		
	NUMBER OF AUXILIARIES		2		
5	6				

Fig.8. Node information dashboard.

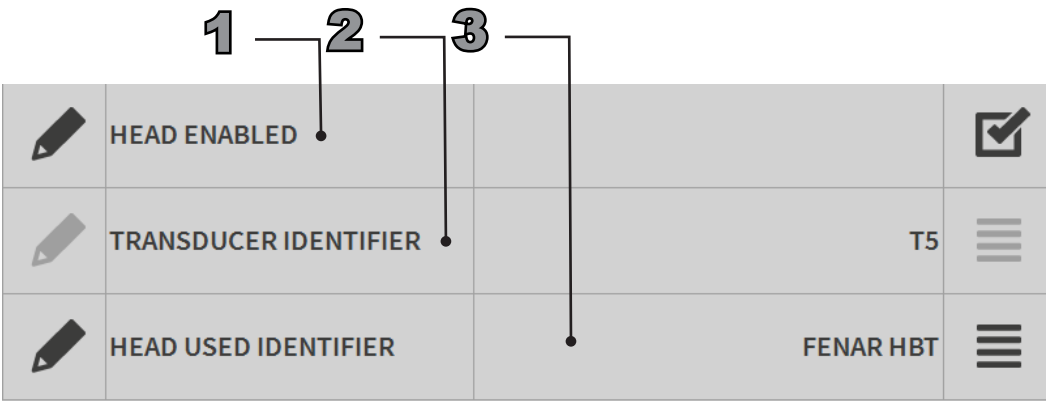
1 **Enable node.** Enables/Disables the node functions.

[

N.B.  
Disable the node only if the node itself is damaged.

]

- 2 **Type of node.** Displays the node name, as assigned by the configuration file.
- 3 **Node identification number.** Displays the node number, as assigned by the configuration file.
- 4 **Serial Number.** Displays the node serial number.
- 5 **Number of sensors.** Displays the number of sensors enabled on the node.
- 6 **Number of auxiliaries.** Displays the number of auxiliaries enabled on the node.
- **S1-S2.** Customisable settings for the selected sensor.



Figg.9. ME - HBT/LVDT 2 sensors measurement node head parameters dashboard

- 1 **Head enabled.** Enables the head functions.
- 2 **Transducer identifier.** Available values: T1 - T48.

[

N.B.  
The transducer to be assigned to each individual socket (S1, S2, S3, S4) may be defined in the configuration file, therefore it is not selectable on this dashboard.

]

3 **Head used identifier.** Select the head to be used.

E-FENAR HBT	<input checked="" type="radio"/>
E-FENAR-SLIM	<input type="radio"/>
E-FENAR-SLIM-2	<input type="radio"/>

Figg.10. Select head to be used page

## 2.3 Notification management

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See chap. 3.3 on page 46 part B2.

## 2.4 Users

---



See chap. 3.4 on page 51 part B2.

## 2.5 Backup & Restore

---



See chap. 3.5 on page 64 part B2.

## 2.6 File management

---



See chap. 3.6 on page 74 part B2.

## 2.7 Information

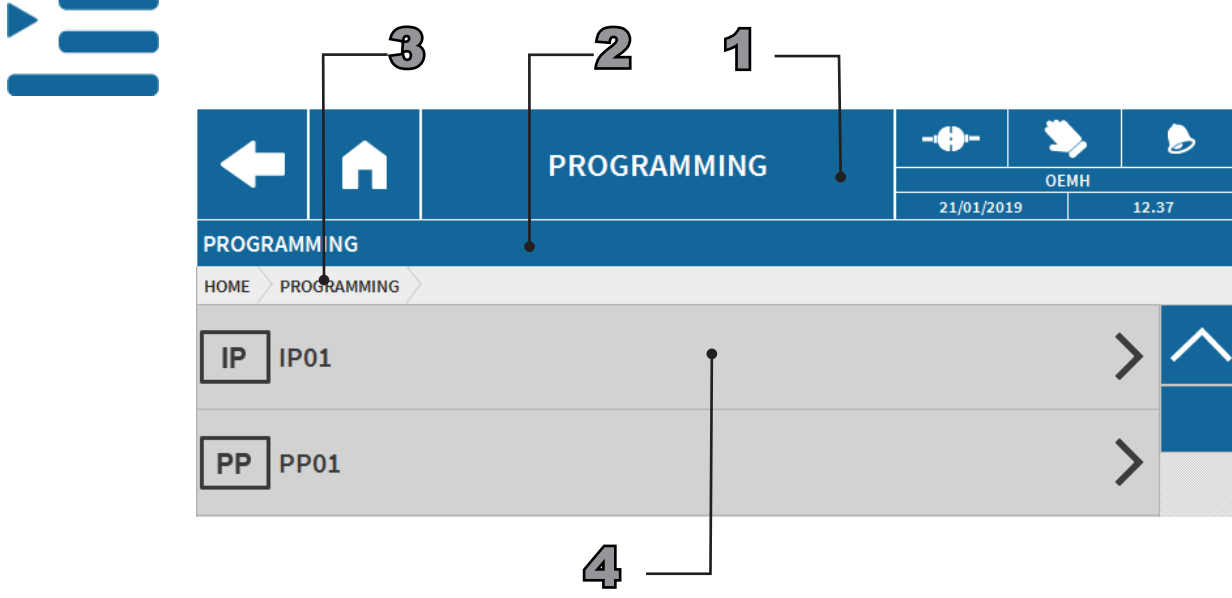
---



See chap. 3.7 on page 77 part B2.

### 3 PROGRAMMING

Use the **Programming** dashboard to customise the parameters of the sets included in the configuration file.



Figg.11. Available channels for installed system dashboard

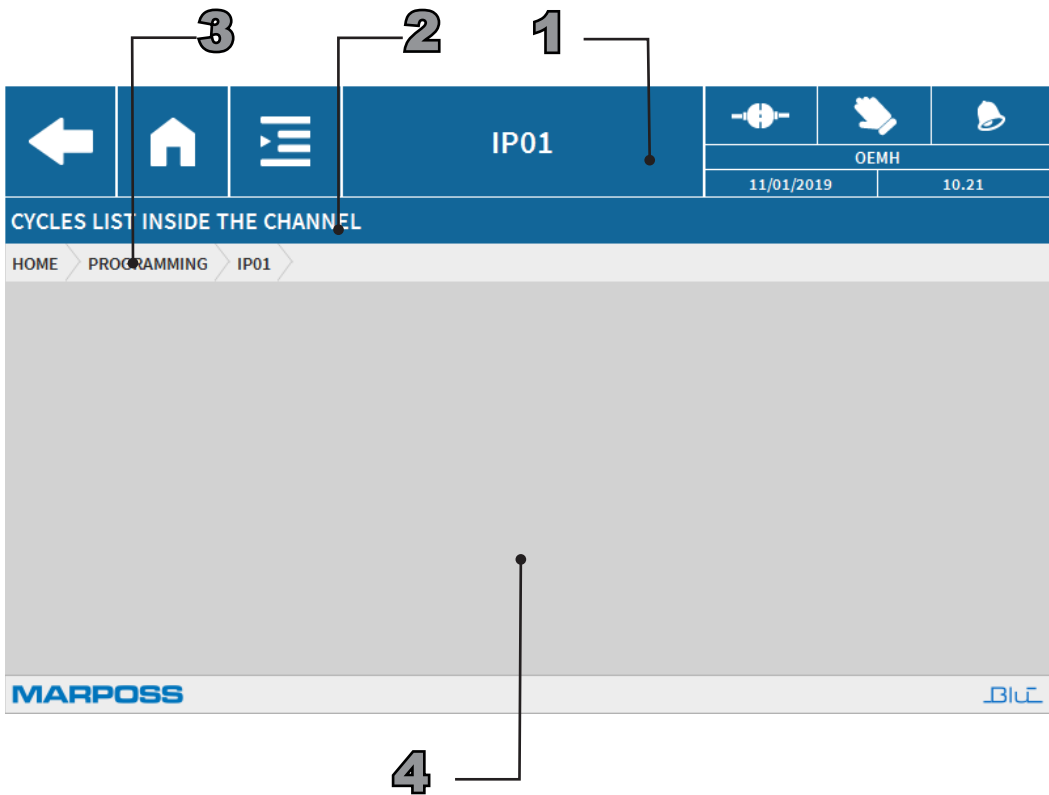
- 1 Screen title: Programming
- 2 Messages and descriptions area: Programming
- 3 Navigation path: *Home* > **Programming**.
- 4 Working area: List of installed nodes. In the example:
  - **IP0X. In-Process Measurement** Application See chap. 3.1 on page 14.
  - **PP0X. Post Process Measurement** Application See chap. 3.1.3.14 on page 40.

3.1 In-Process Measurement Application

3.1.1 List of cycles

IP

Use the **List of Cycles** present in the Channel screen (e.g. **IP01**) to add the sets available in the **List of Sets**. See chap. 3.1.2 on page 15.



Figg.12. Screen displaying a list of the cycles present in a channel before adding a set

- 1 Screen title: **IP0X** (name of the channel).
- 2 Messages and descriptions area: List of cycles present in the channel.
- 3 Navigation path: *Home > Programming > IP0X* (name of the channel).
- 4 Working area: List of selected sets. In the example: no set added. See chap. on page 14.

			0	SINGLE IN-PROCESS	>	
			1	CONCURRENT IN-PROCESS	>	
			2	ACTIVE POSITIONING	>	

Figg.13. Dashboard displaying a list of the cycles present in a channel after adding a set

GENERAL NOTES

[



If the name of a string is modified, the new name will remain the same, irrespective of the selected language (see para. For more information, see Part B2 para. 4.2 on page 83). The (x), when present, represents the number assigned by the operator during the programming phase. Example: Measurement M (x) -> Measurement M1.

### 3.1.2 Available sets



The **Sets List** dashboard displays the various cycles included in the configuration that can be selected. See Chap. 3.1.1 on page 14.

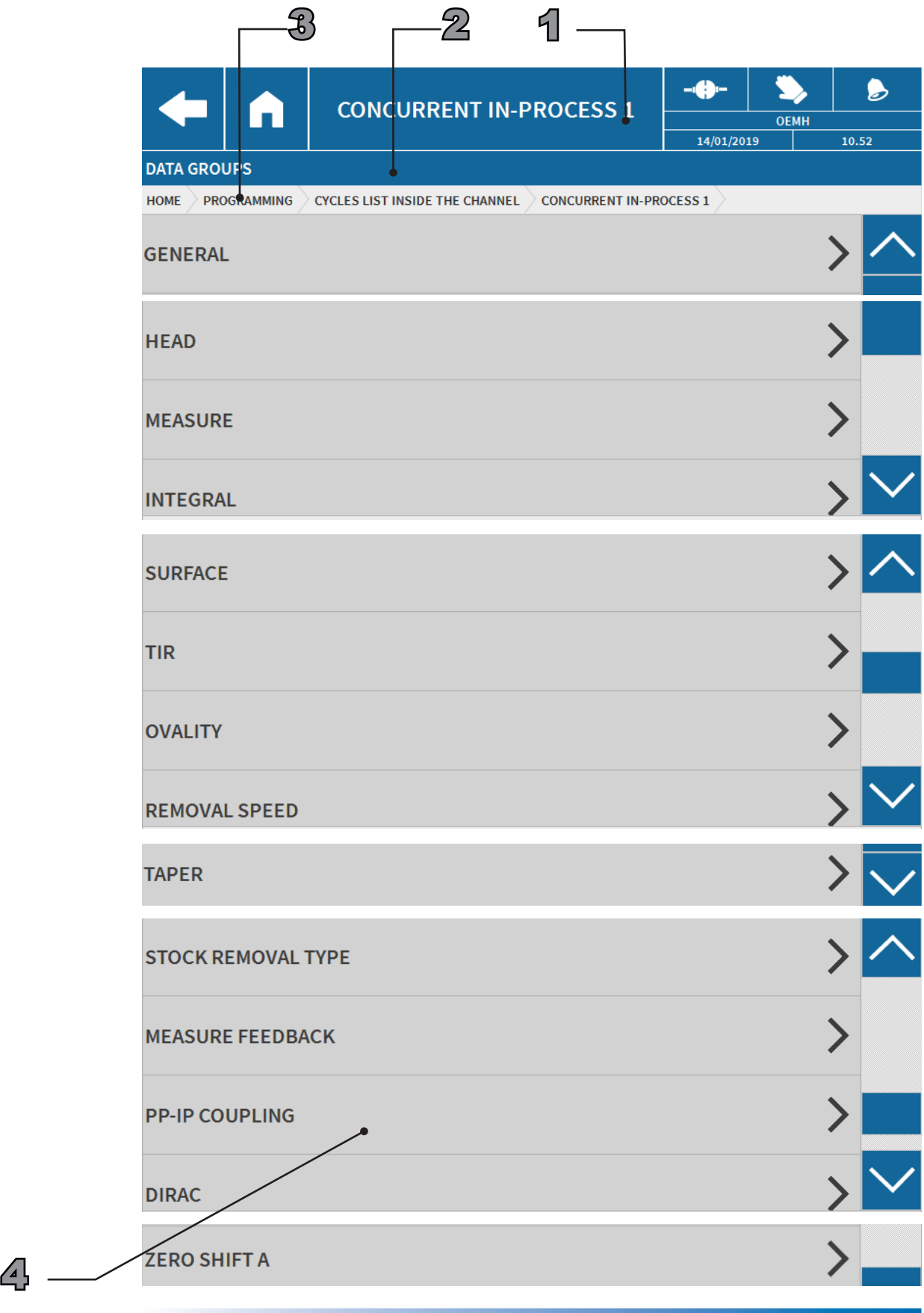


Fig. 14. List of available sets. Their respective availability depends on the configuration file.

- 1 Screen title: **List of Sets.**
- 2 Messages and descriptions area: **List of Sets.**
- 3 Navigation path: *Home > Programming > AE01 (name of the channel) > List of Sets.*
- 4 Working area: List of available sets:
  - **Single In-Process.**
  - **Concurrent In-Process.**
  - **Active positioning.**
  - **Passive positioning.**
  - **Length.**
  - **Active centring.**
  - **Passive Centring.**
  - **Single Post-Process.**
  - **Concurrent Post-Process.**

3.1.3 Programmable data

The data for the selected set may be customised on the dashboard corresponding to each individual set.



Figg.15. Programmable values screen. *Not available in all the sets.*



- 1 Screen title: **Concurrent In-Process** (example of a set)
- 2 Messages and descriptions area: Data groups.
- 3 Navigation path: Home > Programming > IP01 (for example) > Single In-Process (for example) > **Single In-Process** (example)
- 4 Working area:
  - **General**. See para. 3.1.3.1 on page 18.
  - **Head**. See par. 3.1.3.2 on page 19
  - **Measurement**. See para. 3.1.3.3 on page 21.
  - **Integral**. See para. 3.1.3.4 on page 24.
  - **Surface**. See para. 3.1.3.5 on page 26.
  - **Ovality**. See para. 3.1.3.6 on page 29.
  - **Removal speed**. See para. 3.1.3.7 on page 30.
  - **Taper**. See para. 3.1.3.8 on page 31.
  - **T.I.R.** See para. 3.1.3.9 on page 32.
  - **Stock quantity removal percentage**. See para. 3.1.3.10 on page 33.
  - **Measurement correction**. See para. 3.1.3.11 on page 35.
  - **DIRAC direct coupling**. See para. 3.1.3.12 on page 36.
  - **PP-IP coupling**. See para. 3.1.3.13 on page 38.
  - **Zero shift**. See para. 3.1.3.14 on page 40.

**N.B.**

In each data group (e.g.: **General**, **Head**, **Measurement**, etc...) all the programmable parameters are described, which are not available in equal measures for all the sets.

## 3.1.3.1 General

Available for the following sets:

- **Concurrent In-Process.**
- **Concurrent Post-Process.**

The **General** dashboard contains the data that are common to all the measurement heads in the same Set.

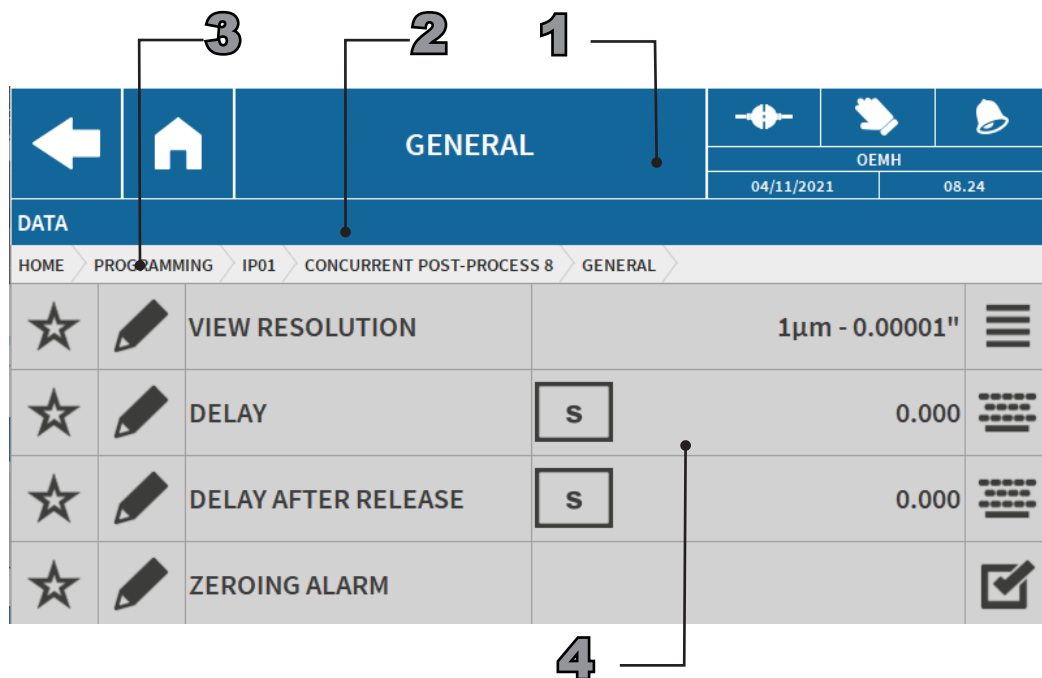


Fig.16. General data dashboard.

- 1 Screen title: **General**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Concurrent In-Process (example) > General.*
- 4 **Working area.** List of common data. In the example:
  - **Display resolution.** Sets the measurement display resolution for the current set to one of the following values:
    - 1 µm / 0.1 µm / 0.01 µm
    - 0.00001" / 0.000001" / 0.0000001".
  - **Delay.** Indicates the delay time between the moment the "Cycle request" signal is generated by the PLC and the start of the measurement.
  - **Delay after release.** Applies to "Concurrent Post-Process" sets only. Indicates the time the head takes to guarantee that the contact is touching the part correctly.
  - **Zeroing alarm.** Use this function to enable the warning that notifies that zero-setting has not been performed at the start of the cycle (by clicking on ☒ icon).

### 3.1.3.2 Measurement head

Available for the following sets:

- Single In-Process.
- Concurrent In-Process.
- Active positioning.
- Passive positioning.
- Length.
- Active Centring.
- Passive Centring.
- Single Post-Process.
- Concurrent Post-Process.

The **Head** dashboard contains the measurement head data and may vary depending on the selected set. There are two available measurements (**A** and **B**), which may be taken Concurrently during the same cycle when two heads are in use at the same time. **This function is activated when the "Compound In-Process" set is selected.**

The screenshot shows the 'HEAD' dashboard interface. At the top, there is a navigation bar with a back arrow (1), a home icon (2), and the title 'HEAD' (3). To the right of the title are icons for a probe, a hand, and a bell. Below these icons, the text 'OEMH' is displayed, followed by the date '11/01/2019' and the time '10.18'. Below the navigation bar is a breadcrumb trail: 'HOME > PROGRAMMING > CYCLES LIST INSIDE THE CHANNEL > SINGLE IN-PROCESS 0 > HEAD'. The main content area is a table with 8 rows. Each row has a star icon, a pencil icon, a text field, a unit field, a value field, and a list icon. The rows are: T1A, T2A, NOMINAL VALUE, MASTER DEVIATION, VIEW RESOLUTION, RESET ZERO ADJUST ENABLED, OVR LIMIT ENABLED, +OVR, and -OVR. The units for NOMINAL VALUE, MASTER DEVIATION, +OVR, and -OVR are 'mm' and 'µm' respectively. The values for NOMINAL VALUE, MASTER DEVIATION, +OVR, and -OVR are 40.000, 0.000, 1000, and -1000 respectively. The text 'VIEW RESOLUTION' has a value of '1µm - 0.00001"'. The text 'RESET ZERO ADJUST ENABLED' and 'OVR LIMIT ENABLED' have a checked checkbox. The text '+OVR' and '-OVR' have a list icon. Callout 1 points to the 'HEAD' title. Callout 2 points to the home icon. Callout 3 points to the 'HEAD' title. Callout 4 points to the unit field for the +OVR row.

Star	Pencil	Text	Unit	Value	List
★	✎	T1A		T1	☰
☆	✎	T2A		T2	☰
★	✎	NOMINAL VALUE	mm	40.000	☰
☆	✎	MASTER DEVIATION	µm	0.000	☰
☆	✎	VIEW RESOLUTION		1µm - 0.00001"	☰
☆	✎	RESET ZERO ADJUST ENABLED		<input checked="" type="checkbox"/>	☑
☆	✎	OVR LIMIT ENABLED		<input checked="" type="checkbox"/>	☑
☆	✎	+OVR	µm	1000	☰
☆	✎	-OVR	µm	-1000	☰

Fig.17. Head data dashboard.

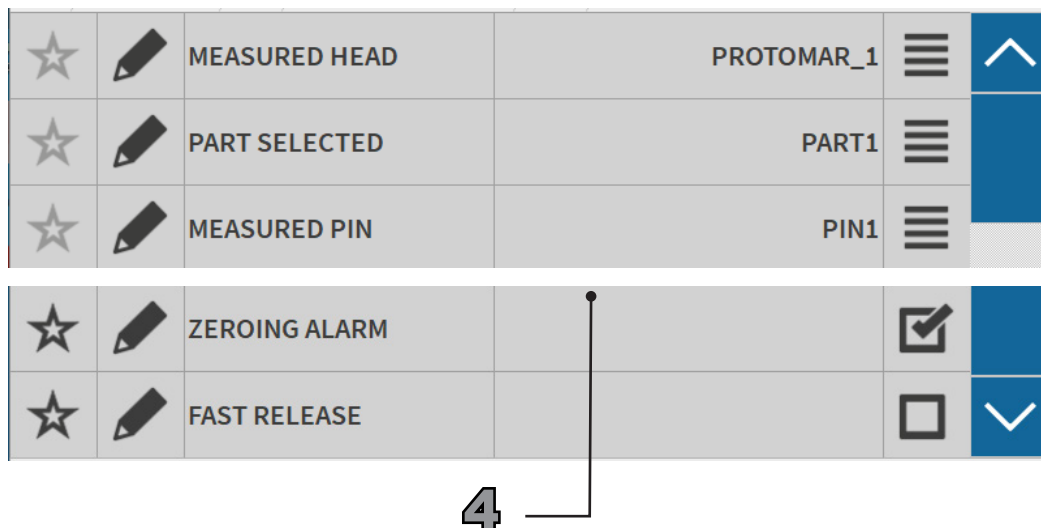


Fig. 18. Head data dashboard.

- 1 Screen title: **Head**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > Head.*
- 4 **Working area.** List of common data. In the example:
  - **T1A - T2A.** Associates the transducer present on the head (**T1A - T2A**) with the sensor on the measurement node.
  - **Nominal value.** Assigns the nominal measurement value. The widget may be programmed so as to display the measurement as an absolute, rather than relative, value.  
*Example:*  
 Nominal value: 53,500 mm (final diameter).  
 Stock metal: 550 µm.  
 At the start of the process the value 54,050 mm is displayed and the zero command is triggered when the value reaches 53,500 mm.
  - **Master deviation.** This value represents the difference between the real value of the work piece used as the MASTER and the nominal value of the MASTER itself.
  - **Display resolution.** Sets the measurement display resolution for the current set to one of the following values:
    - 1 µm / 0.1 µm / 0.01 µm
    - 0.00001" / 0.000001" / 0.0000001".
  - **Reset zero adjust enabled.** Enables (☑) the Zero-adjust function reset:
    - Active ☑: The zero adjust will also be reset following an electrical reset.
    - Deactivated ☐: The previously programmed zero adjust data will be retained when an electrical reset is performed.
  - **Over Range Limits (OVR Limit).** Use the "Over Range Limits" (OVR Limit) function to define the valid measurement values range. If the programmed values are modified, during the measurement cycle, the message "+OVR" (positive limit value, above which the measurement is outside tolerance), or "-OVR" (negative limit value, below which the measurement is outside tolerance). Activate this function (by clicking on the ☑ icon) to program the positive and negative limit of the measurement tolerance range, which may not exceed the indicated default value. If this function is not selected, the operating range limit of the measurement heads pre-defined in the "Configuration file" is used; this value corresponds to the indicated default value.
  - **Measured head.** Select the head to be used for the measurement.
  - **Part selected.** Select the part to be measured. To program the part, see Chap. 4.3 on page 85 part B2.
  - **Measured pin.** Select the pin to be measured. To program the pin, see Chap. 4.3 on page 85 part B2.
  - **Zeroing alarm.** Use this function to enable the warning that notifies that zero-setting has not been performed at the start of the cycle (by clicking on ☑ icon).
  - **Fast release.** Permits the operator to enable the function (by clicking on the ☑ icon)

### 3.1.3.3 Measurement

Available for the following sets:

- Single In-Process.
- Concurrent In-Process.
- Active positioning.
- Passive positioning.
- Length.
- Active Centring.
- Passive Centring.
- Single Post-Process.
- Concurrent Post-Process.
- Protomar In-Process.
- Protomar Post-Process.

The **Measurement** dashboard contains the programmable measurement parameters, which vary according to the application used for the measurement cycle.

The screenshot shows the 'MEASURE' dashboard interface. At the top, there is a navigation bar with a back arrow, a home icon, and the title 'MEASURE'. To the right of the title are icons for a plug, a hand, and a bell, along with the text 'OEMH' and the date '29/04/2019' and time '16.03'. Below the navigation bar is a 'DATA' section with a list of tabs: 'HOME', 'PROGRAMMING', 'CYCLES LIST INSIDE THE CHANNEL', 'SINGLE IN-PROCESS 1', and 'MEASURE'. The 'MEASURE' tab is currently selected. The main content area is a table with 10 rows, each representing a measurement parameter. Each row has a star icon, a pencil icon, a text field, a unit box, a value, a bar chart icon, and a chevron icon. The parameters are: DELAY (unit: s, value: 0.000), RPM (value: 30), K1 (value: 1.000), MEAS EQUATION (value:  $K1 \cdot T1A + K2 \cdot T2A$ ), CONTROLS NUMBER (value: 3), IN-PROC MEAS. NEG. CTRL (unit:  $\mu m$ , value: -10.000), IN-PROC MEAS. CTRL 1 (unit:  $\mu m$ , value: 150.000), MEASURE SIGN (value: +), POSITIONING MODE (value: RELEASE), and ACT-POS CTRL TYPE (value: MC\_SELF\_LO...). Callout 1 points to the 'MEASURE' title, callout 2 points to the 'MEASURE' tab, callout 3 points to the 'PROGRAMMING' tab, and callout 4 points to the 'ACT-POS CTRL TYPE' parameter.

Star	Pencil	Parameter	Unit	Value	Bar Chart	Chevron
☆	✎	DELAY	s	0.000	████████	⬆
☆	✎	RPM		30	████████	
☆	✎	K1		1.000	████████	
☆	✎	MEAS EQUATION		$K1 \cdot T1A + K2 \cdot T2A$	████████	⬆
☆	✎	CONTROLS NUMBER		3	████████	
☆	✎	IN-PROC MEAS. NEG. CTRL	$\mu m$	-10.000	████████	
☆	✎	IN-PROC MEAS. CTRL 1	$\mu m$	150.000	████████	⬇
☆	✎	MEASURE SIGN		+	████████	
☆	✎	POSITIONING MODE		RELEASE	████████	⬆
☆	✎	ACT-POS CTRL TYPE		MC_SELF_LO...	████████	

Fig.19. Measurement data dashboard.

☆	✎	ACT-POS NEG. CTRL	μm	-100	=====	
☆	✎	ACT-POS CTRL 1	μm	10	=====	
☆	✎	ACT.CENTERING MODE		RELEASE	=====	^
☆	✎	ACT. CENTERING CTRL TYPE		MC_SELF_LO...	=====	
☆	✎	ACT-CENT NEG. CTRL	μm	-100	=====	
☆	✎	ACT-CENT CTRL 1	μm	10	=====	
☆	✎	POST-PROC MEAS. A CTRL +3	μm	300	=====	^
☆	✎	POST-PROC MEAS. A CTRL +2	μm	200	=====	
☆	✎	POST-PROC MEAS. A CTRL +1	μm	100	=====	
☆	✎	DELAY AFTER RELEASE	s	0.000	=====	

4

Figg.20. Measurement data dashboard.

- 1 Screen title: **Measurement**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: Home > Programming > IP01 (for example) > Single In-Process (for example) > **Measurement**
- 4 Working area: List of common data. In the example:
  - **Delay.** Indicates the measurement start delay time.
  - **RPM.** Number of revolutions per minute for integral measurement processing.
  - **K1/K2.** Indicates the multiplication coefficient applied to the transducer associated with **T1A** and **T2A** in the measurement equation. May be set to values between: 0.001 - 100,000
  - **Measurement equation.** Use this command to select the measurement equation with the programmed transducers. The direction and polarity of the contacts **T1A** and **T2A** (or **T1B** and **T2B**) determine the measurement value. The following elaboration procedures may be used:
    - **K1+T1A+K2+T2A**
    - **K1+T1A-K2+T2A**
    - **-K1+T1A-K2+T2A**
    - **K2+T2A-K1+T1A**
    - **K1+T1A**
    - **K2+T2A**
    - **-K1+T1A**
    - **-K2+T2A**
  - **Number of controls.** Use this command to set-up the number of available checks. Each gauge is pre-configured with a fixed number process checks, depending on the application. It is possible to enter values between “1 and 7” and “-1”, if programmed in the “Configuration File”.  
The following rule applies to all the values: 7>6>5>4>3>2>1>0>-1.

- **In-Process Measurement negative control Not valid for Post Process applications.** Permits the operator to enter the sub-zero command activation threshold values (negative value).
- **In-Process Measurement control 1, 7, etc. - Not valid for Post Process applications.** Use this command to enter the command activation threshold values. The commands are pre-set to default values, and the command "0" cannot be modified since it refers to the final size of the work piece.
- **Measurement sign – Applies to Active Positioning and Passive Positioning only** - This function may be used to select the measurement type:
  - "+" = normal measurement;
  - "-" = inverted measurement.
- **Positioning mode – Applies to Active Positioning only** - This function may be used to select the type of movement executed by the contact during the positioning phase:
  - Release = the piece moves away from contact;
  - Press = the piece moves towards contact.
- **Active positioning ctrl type - Applies to Active Positioning only** - The Blú system includes a fixed number of machining commands, including the zero command, and the selection is defined during the system configuration phase. The positioning commands may be "Self-latching" or "Selectable".
- **Active Positioning negative ctrl - Applies to Active Positioning only** - This function may be used to enter the below zero command activation threshold value (negative value).
- **Active Positioning ctrl 1, 2 etc. - Applies to Active Positioning only** - This function may be used to enter the command activation threshold value.
- **Active centring ctrl type - Applies to Active Centring only** - The Blú system includes a fixed number of machining commands, including the zero command, and the selection is defined during the system configuration phase. The centring commands may be "Self-latching" or "Selectable".
- **Active Centring negative ctrl - Applies to Active Centring only** - This function may be used to enter the below zero command activation threshold value (negative value).
- **Active Centring ctrl 2 etc. - Applies to Active Centring only** - This function may be used to enter the command activation threshold value.
- **Post-Process measurement ctrl (+1, -1, etc.)** A fixed number of processing commands are available, this number is defined in the Configuration File. Each command is set to a default value when activated. It is possible to program the barriers of the controls with values between +2000 and -2000 microns; they must be consecutive and assigned values in ascending order from the highest negative barrier to the highest positive barrier (e.g. -50 to +100 microns). It is essential to assign the barrier of the first positive command.
- **Delay after release – Applies to Passive Positioning, Single Post-Process and Concurrent Post-Process only** - Indicates the time the head takes to guarantee that the contact is touching the part correctly.

## 3.1.3.4 Integral

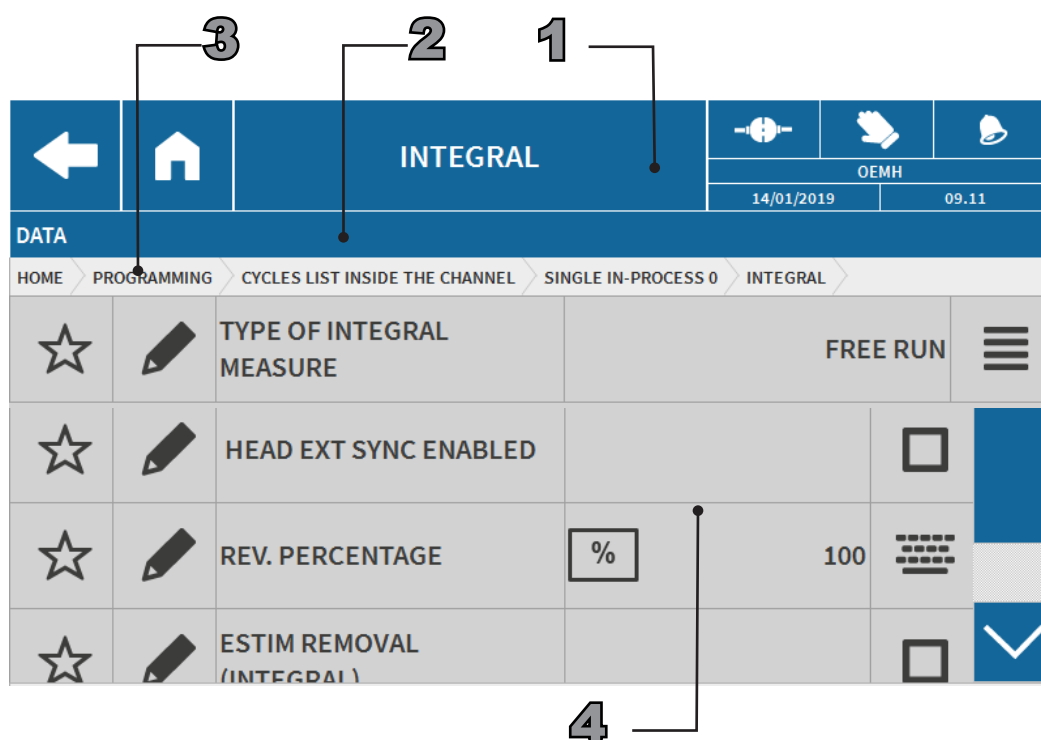
Available for the following sets:

- **Single In-Process.**
- **Concurrent In-Process.**
- **Active positioning.**
- **Passive positioning.**
- **Length.**
- **Active Centring.**
- **Passive Centring.**
- **Protomar In-Process.**
- **Protomar Post-Process.**

Use the **Integral** dashboard to select the integral measurement type.

**N.B.**

This function is only available if enabled during the configuration phase.

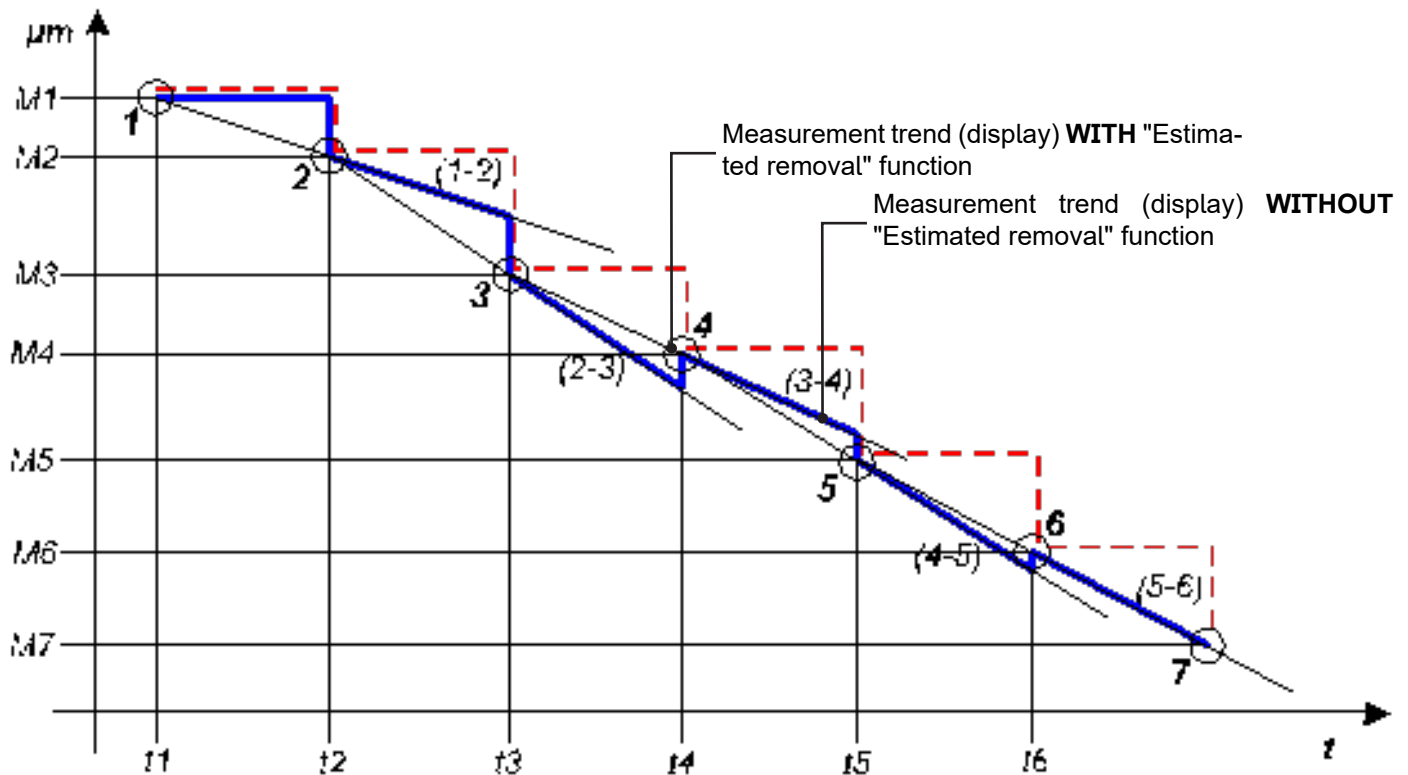


*Fig.21. Integral measurement data dashboard.*

- 1 Screen title: **Integral**
- 2 Messages and descriptions area: **Data**.
- 3 Navigation path: *Home > Programming > IP01 (for example) > Single In-Process (for example) > Integral*.
- 4 Working area: List of common data. In the example:
  - **Type of integral measurement.** Select the type of measurement calculated using a sequence of samples:
    - **Free measurement** - Instantaneous measurement value;
    - **Maximum measurement** = Displays the maximum value;
    - **Minimum measurement** = Displays the minimum value;
    - **Average measurement** = Displays the average value;
    - **Moving average** = Calculated by processing the moving average
  - **External synchronisation enabled.** Use this command to enable the measure by means of an external synchronisation signal (by clicking on the ☒ icon). This means that the measurement processing self learns the speed of the work piece rotation and performs the integral measurement requested, taking the interval between two clock pulses as time.



- **Estim removal (Integral).** This feature enables the operator to estimate the stock removal trend (measurement trend) up to the end of the cycle (continuous curve processing), by clicking on the ☒ icon. A series of consecutive measurements are made in order to provide a continuous indication of the measurement trend, which closely tracks the actual machining trend. In this way it is possible to obtain more precise control over the machining commands trigger, and in particular the zero command.



- 1, 2, 3, 4, -- Measurement sample points.  
 (1-2), (2-3), -- Corresponding measurement point interpolation line

The measurement is updated continuously and not after each part revolution: two previous measurement samples are interpolated in order to define the measurement trend until the next "sample measurement"; this is repeated using the next sample measurement, interpolating to define the measurement trend until the subsequent sample point, and so on until reaching "zero".

*Figg.22. Sample removal estimate processing (continuous curve)*

**N.B.**

The measurement type selection depends on the selected "Surface processing type".

- **Rev. percentage** Can be used to set-up a value, between 1% and 1000%, corresponding to the percentage of the part revolution used to process the integral measurement, **The default value is 100% = 1 part revolution.**

### 3.1.3.5 Surface

Available for the following sets:

- **Single In-Process.**
- **Concurrent In-Process.**
- **Active positioning.**
- **Passive positioning.**
- **Length.**
- **Active Centring.**
- **Passive Centring.**
- **Single Post-Process.**

The **Surface** dashboard permits the operator to select the part type to be processed, depending on its surface characteristics (presence of interruptions). The process may be divided into several groups, which require different settings.

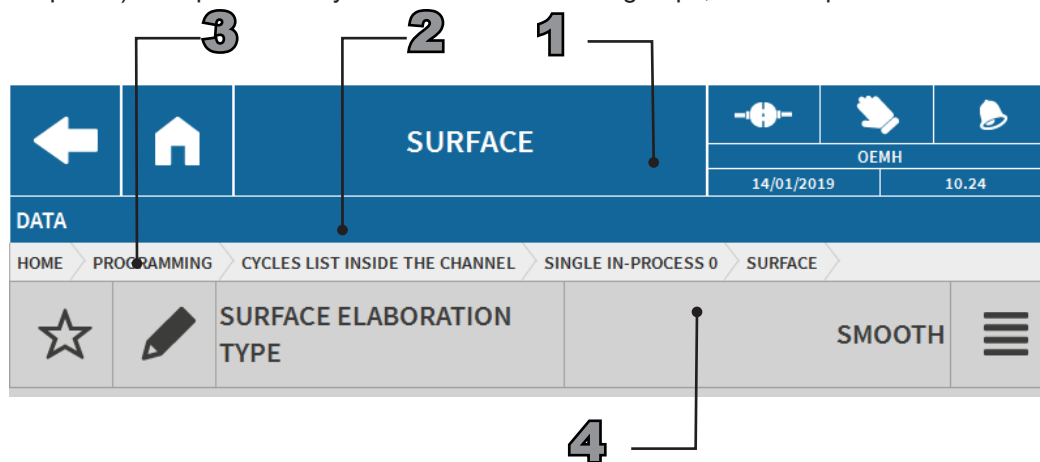


Fig.23. Select surface type dashboard.

- 1 Screen title: **Surface**
- 2 Messages and descriptions area: Type of measurement calculated by integrating a series of samples.
- 3 Navigation path: *Home > Programming > IP01 (for example) > Single In-Process (for example) > Surface*
- 4 Working area:
  - 1 **Surface elaboration type.** Displays the type of measurement calculated on the basis of the surface defined in the configuration file.
    - *Smooth.* No special programming is required when processing smooth parts.
    - *Interrupted symmetrical/asymmetrical surfaces and keyways.* Interrupted surface measurements are electrically filtered, and this filtering action must be linked both to the part type and the rotation speed. The damping ensures the measurement remains stable in the presence of interruptions.

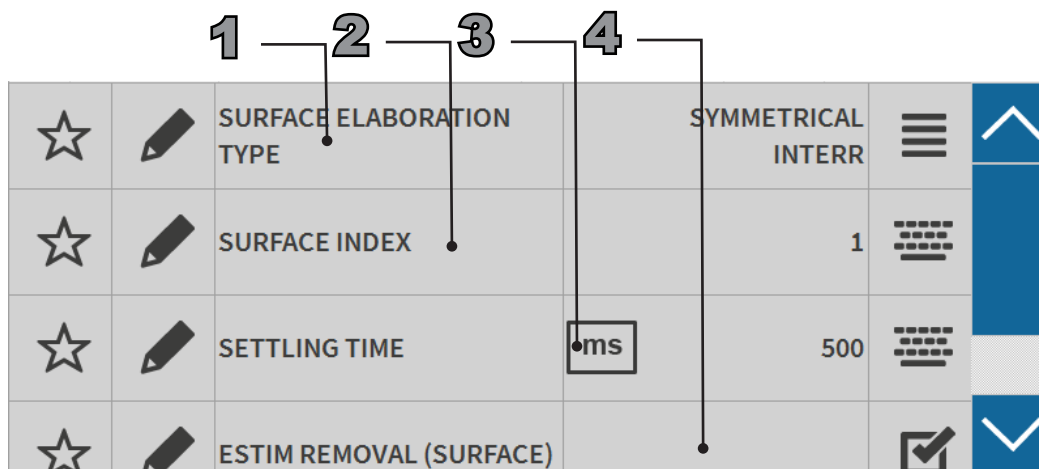
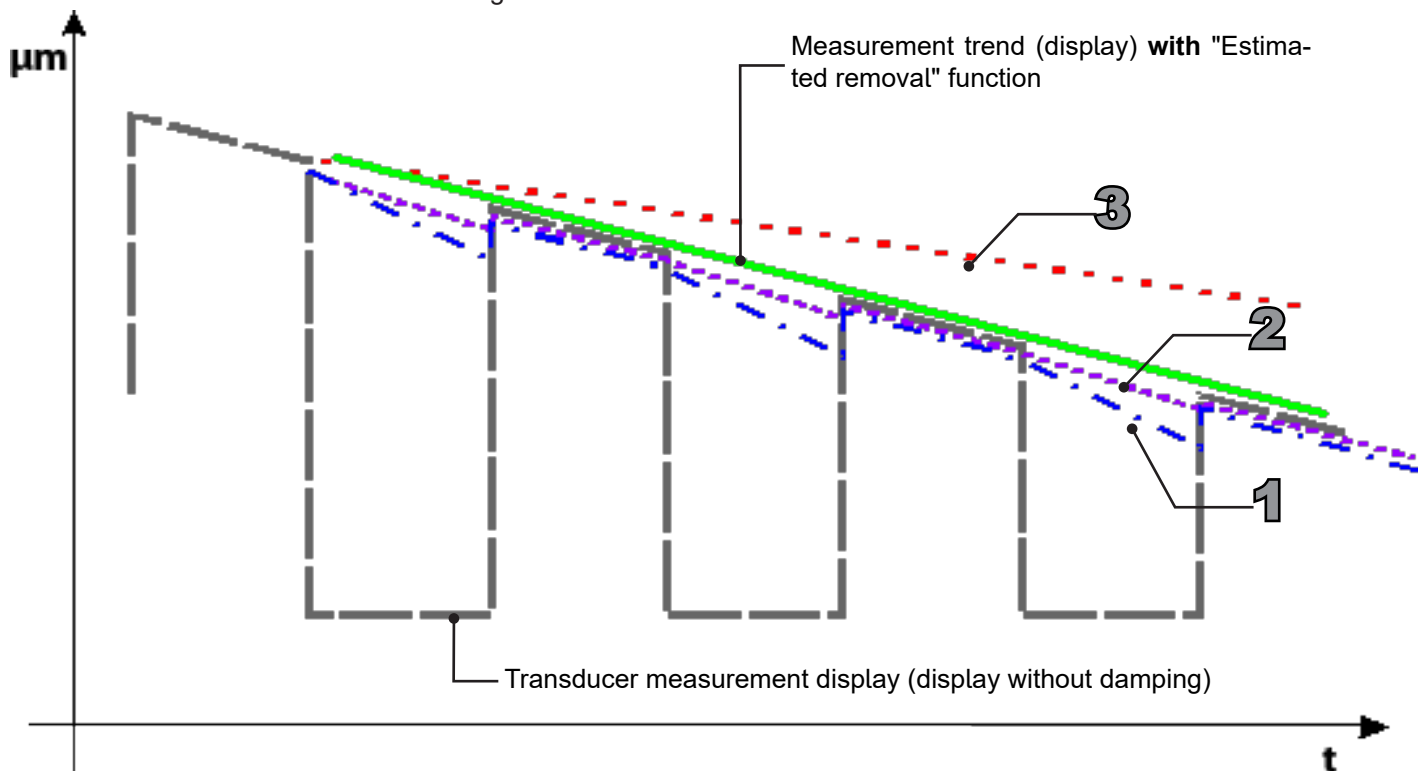


Fig.24. Interrupted surfaces dashboard.

- 2 **Surface Index.** Measurement damping filter for interrupted surfaces. The interrupted surface measurement processing algorithms include a series of filter parameters, which can be selected using three different, pre-defined coefficients (1, 2, 3).

- 3 **Settling time.** The delay between the start cycle signal and the moment when the software starts processing the damped measurement.
- 4 **Estimated removal.** This function estimates the stock removal trend (measurement trend) until the end of the cycle. The maximum estimated removal signal slope is the same as the slew rate value, which, in turn, depends on the programmed surface processing coefficient value. The calculated damping value automatically adapts each time the removal rate changes.



1, 2, 3 Measurement trend (display) with programmed damping, WITHOUT "Estimated Removal" function. The measurement display is a function of the damping value defined by programming the "Surface processing coefficient" (1, 2 or 3).

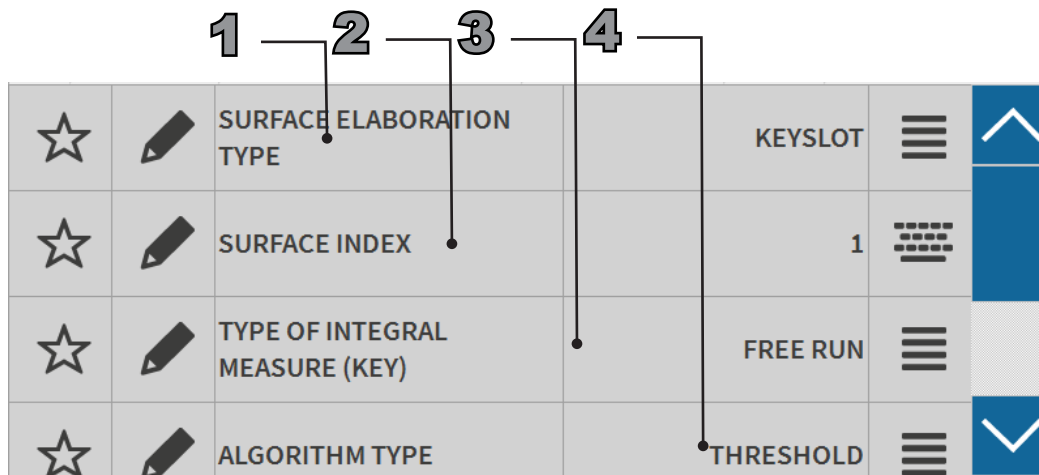
**N.B.**

In the example shown, setting 3 is incorrect: the measurement damping speed is slower than the stock removal rate

Settings 1 and 2 are correct.

*Figg.25. Sample removal estimate processing for grooved part measurements.*

- **Key.** The purpose of web surface measurement settings is to recognise the features of the part to be measured.



*Figg.26. Key surfaces dashboard.*

- 1 Surface elaboration type.** Select the surface type.
- 2 Surface Index.** Measurement damping filter for interrupted surfaces. The interrupted surface measurement processing algorithms include a series of filter parameters, which can be selected using three different, pre-defined coefficients (1, 2, 3).
- 3 Type of integral measurement.** This is used to select the integral measurement type for the period during which the measurement is valid. The following modes are available:
  - **Free measurement.** Instantaneous measurement value.
  - **Maximum measurement.** Maximum value processing.
  - **Minimum measurement.** Minimum value processing.
  - **Average measurement.** Average value processing
- 4 Type of algorithm.** The programmable algorithm type depends on the programmed "Index of surface elaboration" value.
  - **Threshold:** Sampling memory. Four consecutive measurement samples, taken at intervals from one another equivalent to the "sampling time" setting, are processed. Based on the processing algorithm, if the measurement exceeds the threshold, it is frozen, whereas if it is below the threshold, the measurement is updated.
  - **External synchronization.** Measurement performed with clock signal from outside. The measurement processing and the requested supplementary measurement are enabled or disabled by the synchronism signal. It is important to remember that there is only one digital synchronization signal available, so the measurement processing with external synchronism can be performed either on the integral measurement or the surface processing.
  - **Derivative.** Derivative memory. The algorithm recognises the measurement variation rate and, if it exceeds the predefined value, freezes it; otherwise, it is updated.

### 3.1.3.6 Ovality

Available for the following sets:

- **Single In-Process.**
- **Concurrent In-Process.**
- **Single Post-Process.**
- **Protomar In-Process.**
- **Protomar Post-Process.**

Use the **Ovality** dashboard to check the ovality value of the work piece being measured.

**N.B.**

The ovality check is not available for interrupted surfaces.

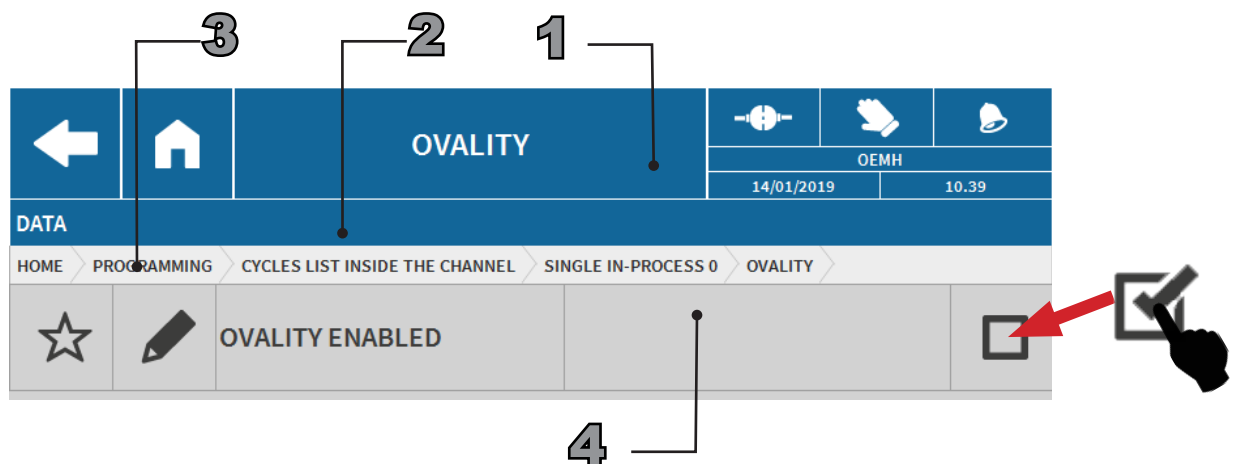


Fig.27. Activate ovality function dashboard

**N.B.**

Select the correct Set (Part/Cycle) before programming.

- 1 Screen title: **Ovality**
- 2 Messages and descriptions area: **Data**
- 3 Navigation path: *Home > Programming > IP01 (for example) > Single In-Process (for example) > Ovality.*
- 4 Working area:
  - **Ovality enabled.** Use this command to enable the function and set-up the following parameters (by clicking on the icon ☒):

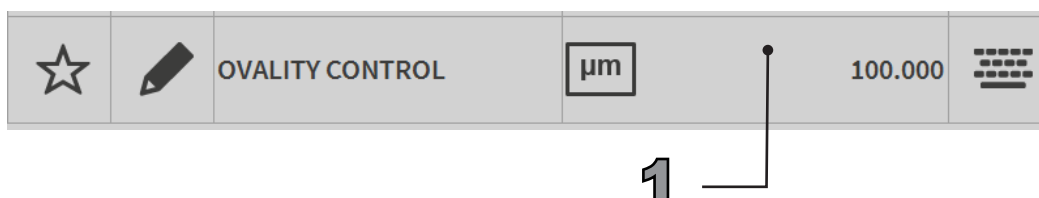


Fig.28. Ovality value check data dashboard

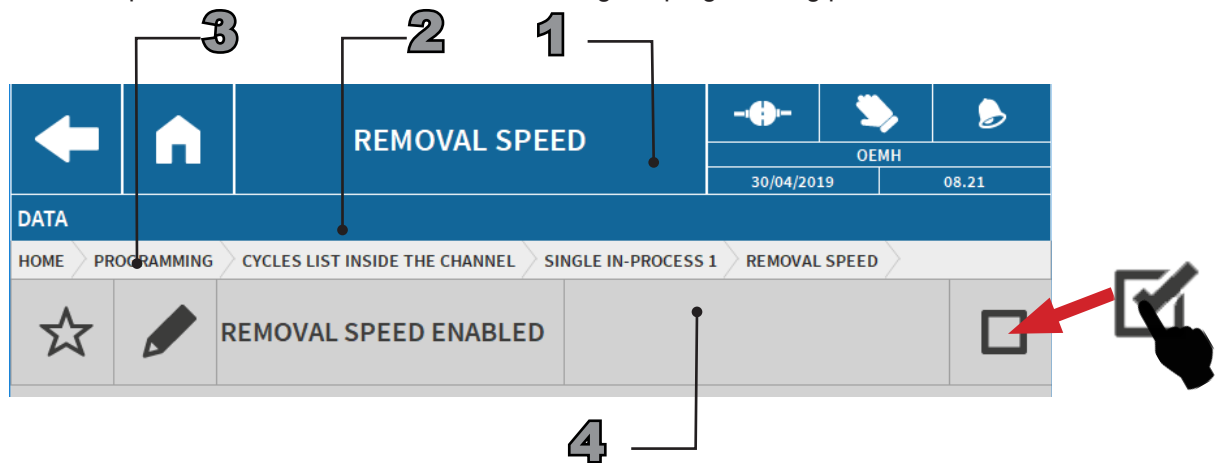
- 1 **Ovality control.** If the ovality measurement value exceeds this limit it is considered out of tolerance.

3.1.3.7 Removal speed

Available for the following sets:

- **Single In-Process.**
- **Concurrent In-Process.**
- **Protomar In-Process.**
- **Protomar Post-Process.**

Use the **Removal speed** dashboard to perform the stock metal removal speed check (by clicking on the ☒ icon). If the value is above or below the control limits, a signal is sent to the machine logic. It is possible to activate/deactivate the "Removal Speed check" option and define its characteristics during the programming phase.

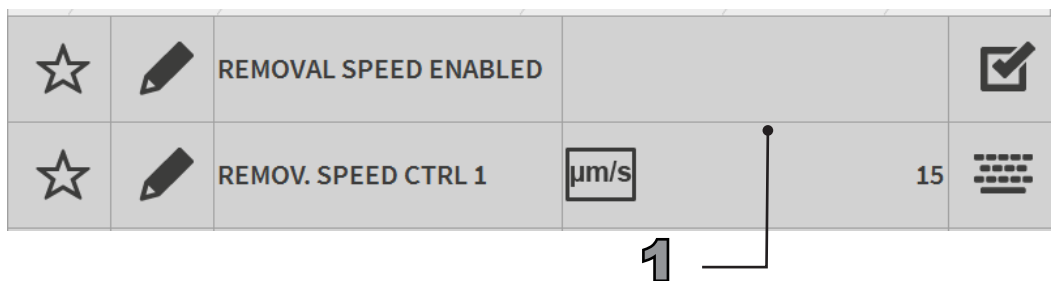


Figg.29. Stock metal removal speed activation dashboard

**N.B.**  
Select the correct Set (Part/Cycle) before programming.

- 1 Screen title: **Removal speed**
- 2 Messages and descriptions area: **Data**
- 3 Navigation path: *Home > Programming > IP01 (for example) > Single In-Process (for example) > Removal speed.*
- 4 Working area:
  - **Removal speed enabled.** Use this command to enable the function and set-up the following parameters (by clicking on the icon ☒):

**N.B.**  
Select the correct Set (Part/Cycle) before programming.



Figg.30. Ovality value check data dashboard

- 1 **Removal speed ctrl.** Use this command to set-up the optimum speed value (CTRL 1 = min. and CTRL 2 = max.) for the current process.

### 3.1.3.8 Taper

Available for the following sets:

- **Concurrent In-Process.**
- **Concurrent Post-Process.**

Use the **Taper** dashboard to enter the parameters for the taper check on the piece being measured.

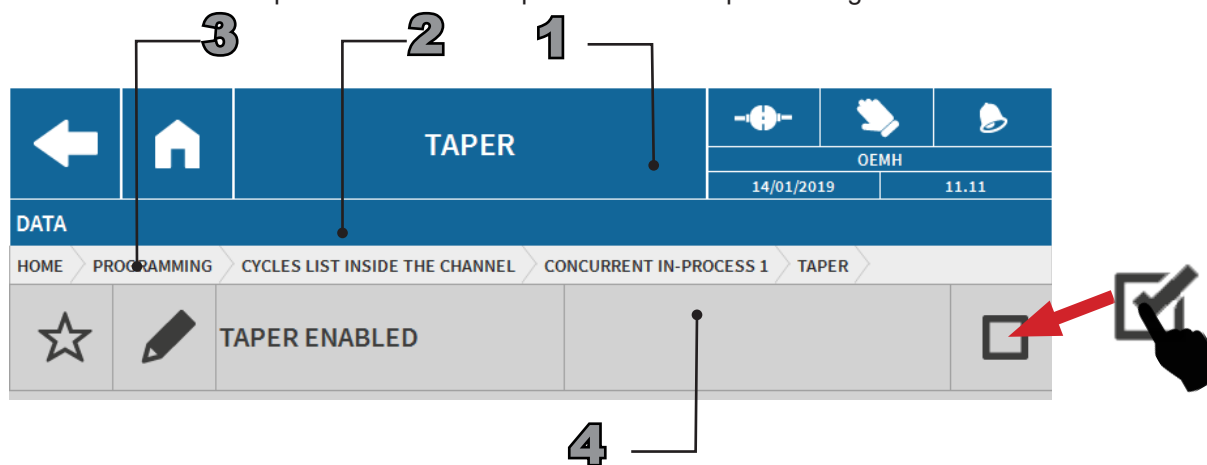


Fig.31. Taper activation dashboard

- 1 Screen title: **Taper**
- 2 Messages and descriptions area: **Taper enabled**
- 3 Navigation path: *Home > Programming > IP01 (for example) > Single In-Process (for example) > Taper.*
- 4 Working area:

- **Taper** Use this command to enable the function and set-up the following parameters (by clicking on the icon ☒):

1	2	3	4	5
☆	✎	TAPER PAIRS CONTROLS		3
☆	✎	TAPER CTRL +1	μm	25.000
☆	✎	AREA CTRL LOWER 2	μm	-75.000
☆	✎	AREA CTRL UPPER 3	μm	25.000
☆	✎	AREA CTRL LOWER 3	μm	-25.000
☆	✎	TAPER COEFFICIENT A		1.000

Fig.32. Taper value check data dashboard

- 1 **Bevel gear check.** Use this command to set-up the number of checks performed on the taper measurement value.
- 2 **Taper check +1/-1/+2/-2/+3/-3.** Use this command to set-up the taper measurement check positive/negative limits.
- 3 **Upper control area.** Use this field to set-up the upper value of the taper measurement interval within which the (non self-retaining) command is triggered.
- 4 **Lower control area.** Use this field to set-up the lower value of the taper measurement interval within which the (non self-retaining) command is triggered.
- 5 **Taper coefficient.** Use this function to set up the taper coefficient in the measurement equation.

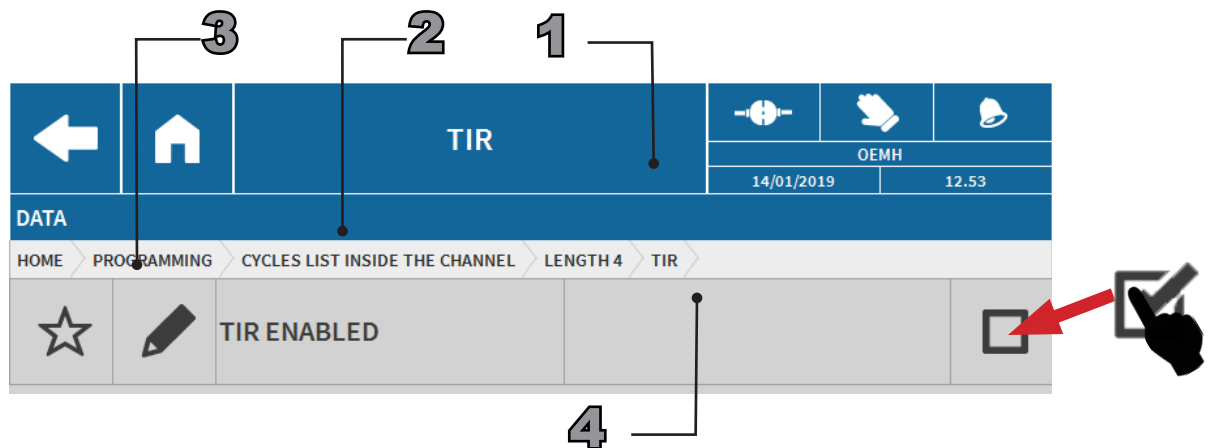
### 3.1.3.9 T.I.R. (Total Indicator Reading)

Available for the following sets:

- **Single In-Process.**
- **Concurrent In-Process.**
- **Length.**
- **Single Post-Process.**
- **Concurrent Post-Process.**

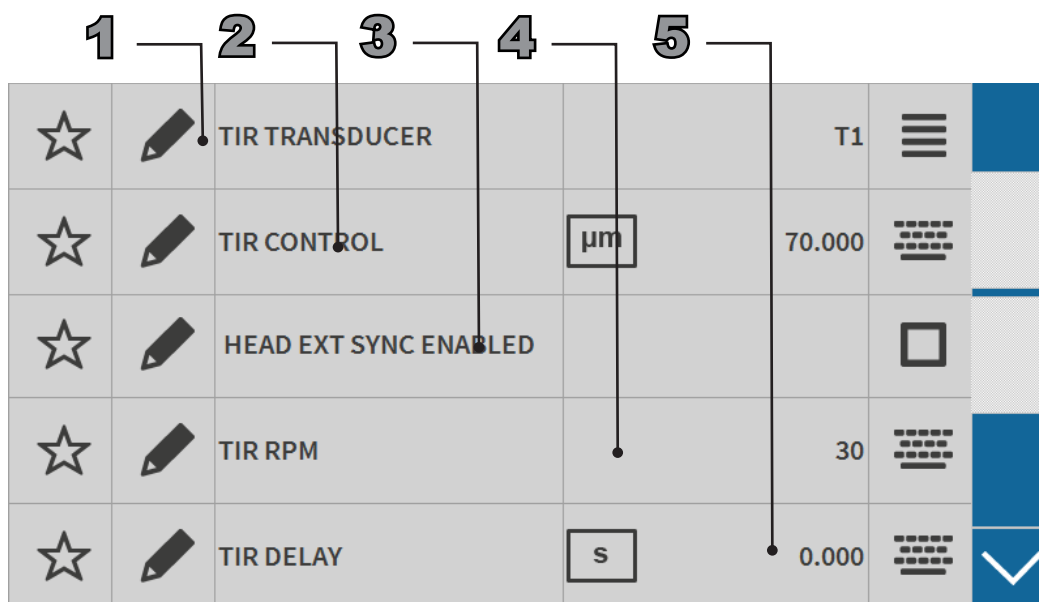
N.B.

The T.I.R. check is not available for interrupted surfaces.



Figg.33. Activate T.I.R. function page

- 1 Screen title: **TIR**
- 2 Messages and descriptions area: **Data**.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > TIR.*
- 4 Working area:
  - **T.I.R. enabled.** Use this command to enable the function and set-up the following parameters (by clicking on the icon ☒):



Figg.34. T.I.R. function data page.

- 1 **T.I.R. transducer** Select the transducer used for the T.I.R. check
- 2 **T.I.R. control** May be used to set-up the value above which the T.I.R. measurement value is considered out of tolerance.



- 3 **Head ext. synch. enabled.** Enables the product measurement with an external synchronism signal. This means that the measurement processing self learns the speed of the work piece rotation and performs the integral measurement requested, taking the interval between two clock pulses as time. **If enabled it is no longer possible to program the T.I.R. Rpm" value.**
- 4 **T.I.R. Rpm.** May be used to set-up the part rotation speed during the T.I.R. measurement. This value is used to calculate the duration of the T.I.R. measurement (at least one complete part revolution). If the "external synchronism signal" is enabled it is not possible to enter a value.
- 5 **T.I.R. delay** May be used to set-up the length of the delay before performing the T.I.R. measurement. I.e., it indicates the delay between the "Start Cycle" signal and the moment when the electronic unit actually starts performing the T.I.R. measurement.

### 3.1.3.10 Stock metal quantity removal

Available for the following sets:

- **Single In-Process**
- **Concurrent In-Process**
- **Length.**

The **Stock metal percentage quantity removal** dashboard permits the operator to carry out processing cycles where a pre-determined quantity of metal is removed, rather than reaching the zero level.

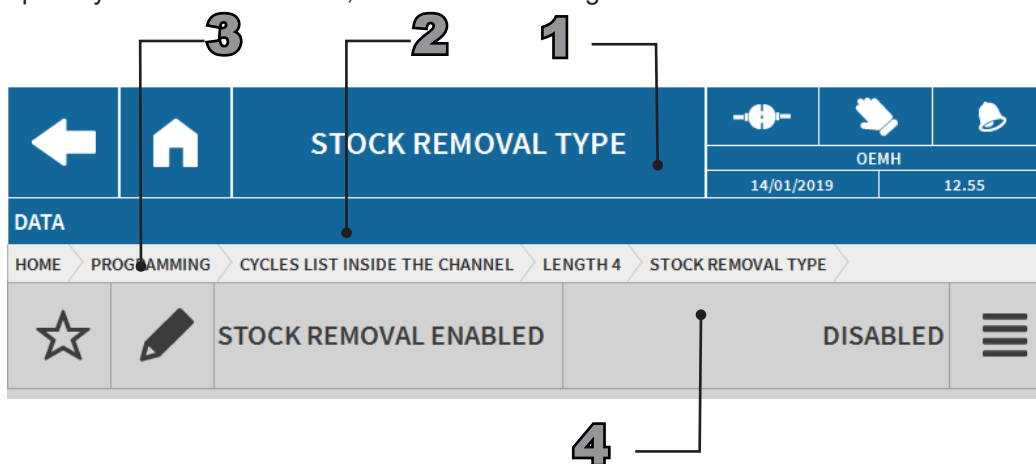


Fig.35. Activate stock removal quantity function dashboard

- 1 Screen title: **Stock removal enabled.**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > Stock metal quantity removal.*
- 4 Working area:
  - **Stock removal enabled.** Enables the operator to select the type of removal to carry out on the stock metal:

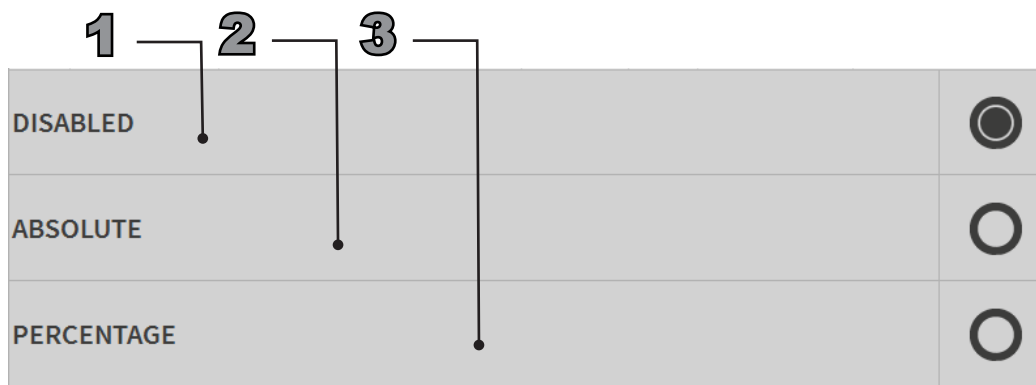









Fig.36. Stock removal type data page

- 1 **Disabled.** Stock metal removal function disabled. The effective stock metal quantity is removed from the part.

- 2 **Absolute.** This function may be used to remove a predetermined, constant quantity of stock metal. **Default value: 100  $\mu\text{m}$ , Range min 1 – max 2000  $\mu\text{m}$ .**








		STOCK REMOVAL ENABLED		ABSOLUTE	
		STOCK REMOVAL AMOUNT		100.000	

Figg.37. Absolute stock removal dashboard.

N.B.

When stock removal is enabled with external input (BCD, Binary or Field Bus), it is no longer possible to program the stock removal quantity: the stock metal value is received Automatically, before the cycle, and corresponds to the selected set. The last stock value received from the external input (Stock quantity) is displayed.

- 3 **Percentage.** This function may be used to enable removal of a quantity of stock metal expressed as a percentage. **Default value: 50%.**

		STOCK REMOVAL ENABLED		PERCENTAGE	
		STOCK REMOVAL PERCENTAGE		50	

Figg.38. Percentage stock removal dashboard

N.B.

When stock removal is enabled with external input (BCD, Binary or Field Bus), it is no longer possible to program the stock removal percentage (stock metal percentage): the stock metal value is received Automatically, before the cycle, and corresponds to the selected set. The last stock percentage value received from the external input (Stock Percentage) is displayed.

### 3.1.3.11 Measurement Feedback

Available for the following sets:

- **Single In-Process**
- **Concurrent In-Process**
- **Length.**

The **Measurement Feedback** dashboard may be used to define the In-Process measurement correction based on a certain Post Process measurement executed using a Marposs gauge.

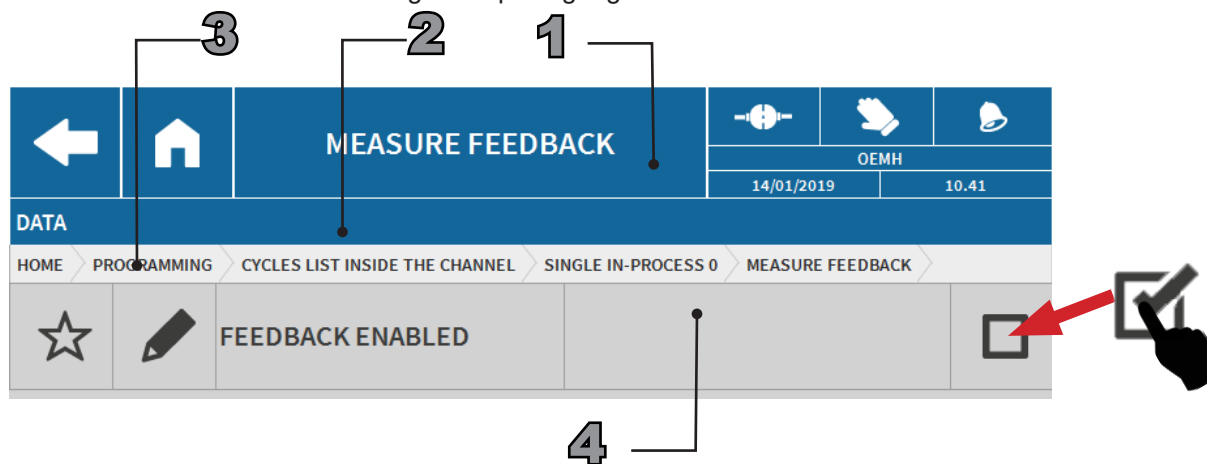


Fig.39. Activate measurement correction data page

- 1 Screen title: **Measurement correction.**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > Measurement Correction.*
- 4 Working area:

☆	✎	1	2	3	✓
☆	✎	FEEDBACK ENABLED			✓
☆	✎	PP CHANNEL FEEDBACK, ENABLE			✓
☆	✎	PP CHANNEL IDENTIFIER		PP01	☰

Fig.40. Measurement correction data page

- 1 **Measurement correction.** Use this command to enable the function and set-up the following parameters:
- 2 **PP channel feedback enabled** Permits the operator to enable the function (by clicking on the ☒ icon).
- 3 **PP channel identifier** Identifies the Post Process channel for feedback.

3.1.3.12 Dirac direct coupling.

Available for the following sets:

- Single In-Process.
- Concurrent In-Process.
- Length.
- Single Post-Process.
- Concurrent Post-Process.

The **Dirac** dashboard involves executing the part In-Process measurement (usually an external diameter) directly coupled with the Pre-Process measurement of another part (usually an internal diameter - hole)

[

N.B.  
Select the correct Set (Part/Cycle) before programming.

3

2

1

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🏠

DIRAC

🔌

🧤

🔔

OEMH

14/01/2019

10.50

DATA

HOME

PROGRAMMING

CYCLES LIST INSIDE THE CHANNEL

SINGLE IN-PROCESS 0

DIRAC

☆	✎	DIRAC ENABLED		<input type="checkbox"/>	<div><input checked="" type="checkbox"/></div>
☆	✎	CORRECTION SOURCE	FROM ANOTHER PP ...	☰	■
☆	✎	CORRECTION SIGN	+	☰	■
☆	✎	ONE DIRAC CORRECTION AT A CYCLE		<input checked="" type="checkbox"/>	■
☆	✎	PP CHANNEL IDENTIFIER	PP01	☰	▼
☆	✎	CORRECTION CODE A	1	☰	■
☆	✎	CORRECTION MODE A	SINGLE	☰	■
☆	✎	CLEARANCE A	<div>μm</div> 0	☰	▼

4

Figg.41. Dirac direct coupling data page

- 1 Screen title: **Dirac**.
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > Dirac*.
- 4 Working area:
  - **Correction source.** Indicates the correction source for direct coupling which can be selected from either:
    - *Inside the In-Process channel.*
    - *From another Post Process channel.*
  - **Correction sign.** Select the Dirac correction polarity (+ or -).
    - *+ polarity (default):* Standard Dirac application. E.g.: Post-Process measurement -> internal diameter/In-Process measurement -> external diameter.
    - *Polarity "-":* Special Dirac applications (the correction polarity is inverted). E.g.: Post-Process measurement external diameter / In-Process measurement internal diameter.

+	<input checked="" type="radio"/>
-	<input type="radio"/>

*Figg.42. Select Dirac correction sign page*

- **One Dirac correction per cycle:** Use this function to enable the Dirac correction (by clicking on the ☒ icon) a single time (in the case of a single cycle) or multiple times (in the case of multiple cycles):
  - *Function active* ☒. By setting up a Dirac, the correction will be applied to the first part only, after which the normal cycle resumes.
  - *Function not active* ☐. The correction applied to the part will always be repeated.
- **PP channel identifier** Identifies a Post Process channel for direct coupling.
- **Correction code.** This function associates a code with the measurement that the Dirac correction is to be applied to. The default value is generated automatically when the set is created, based on the part and cycle codes.
- **Correction mode.** Defines the correction mode for direct coupling.

SINGLE	<input checked="" type="radio"/>	^
MAX (A,B)	<input type="radio"/>	^
MIN (A,B)	<input type="radio"/>	
AVERAGE (A,B)	<input type="radio"/>	v

*Figg.43. Direct coupling mode selection dashboard*

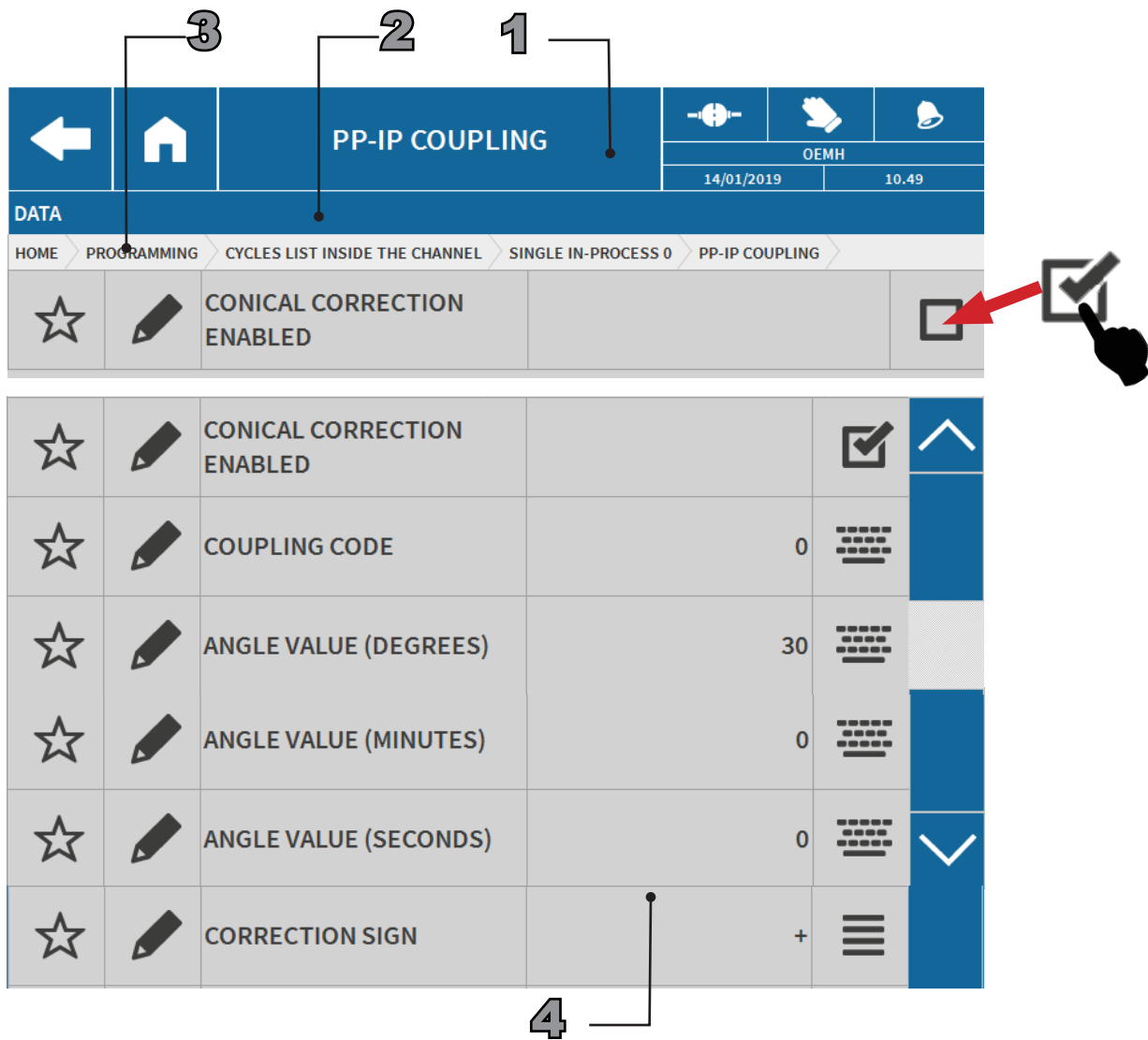
- **Clearance.** Sets the clearance value required to pair the two parts (male/female) in the case of Dirac applications.

3.1.3.13 PP-IP coupling

Available for the following sets:

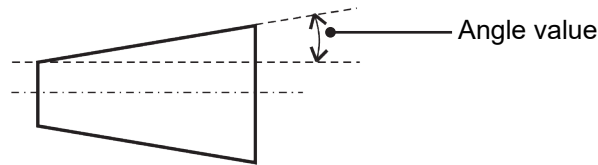
- **Single In-Process.**
- **Passive positioning.**

The **PP-IP coupling** page may be used to associate one or more Pre/Post Process measurements with an In-Process diameter measurement. The taper compensation is calculated based on the last positioning cycle performed as the moment the In-Process cycle is selected. If no Passive Positioning sets are associated with the current In-Process diameter set, i.e. if at least one associated Passive Positioning cycle is not performed in advance, the compensation will be null. In the event that more than one Passive Positioning set is associated with the same In-Process diameter set, the compensation will be implemented using the last positioning cycle that was performed. When switching to manual mode the passive positioning measurement will be reset; if automatic mode is reselected subsequently, the compensation will be null until a new Positioning cycle is performed. If the event that the calculated compensation is higher that the maximum zero correction permitted, the "Excessive taper compensation" alarm will be generated. In this case the corresponding compensation will not be applied (even if the alarm is cleared) until the next positioning cycle or the part taper angle is reprogrammed. No taper compensation is performed with if the absolute positioning value is greater than 2000 µm.



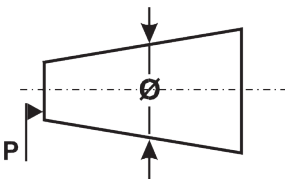
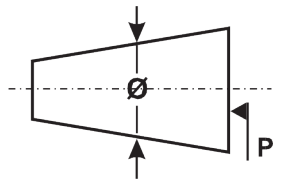
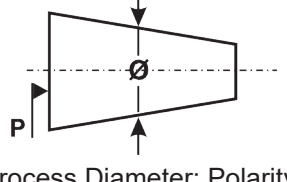
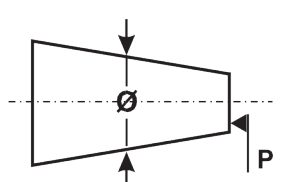
Figg.44. PP-IP pairing data dashboard

- 1 Screen title: **PP-IP coupling.**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > PP-IP coupling.*
- 4 Working area:
  - **Coupling Code.** Code used for associating the sets (1 to 31). Code "0" indicates no coupling.
  - **Angle value (degrees, minutes and seconds).** Value of the taper angle. The angle value can be set to any value between 0 and 44° 59' 59".



Figg.45. Angle measurement for taper connection

- **Correction sign.** Taper angle polarity setting. May be set to "+" or "-" depending on the taper direction and the position of the measurement head. The following diagram illustrates an example of how to select the polarity setting.

 <p>In-process Diameter: Polarity = + Passive Positionar: Measurement polarity = +</p>	 <p>In-process Diameter: Polarity = - Passive Positionar: Measurement polarity = +</p>
 <p>In-process Diameter: Polarity = - Passive Positionar: Measurement polarity = +</p>	 <p>In-process Diameter: Polarity = + Passive Positionar: Measurement polarity = +</p>

P = Positionar measuring head

Figg.46. Descriptive diagram for taper correction.

3.1.3.14 Zero shift.

Available for the following sets:

- Single In-Process.
- Concurrent In-Process.
- Active positioning.
- Passive positioning.
- Length.
- Active Centring.
- Passive Centring.
- Single Post-Process.

The Zero shift dashboard may be used to select which type of zero shift to apply.

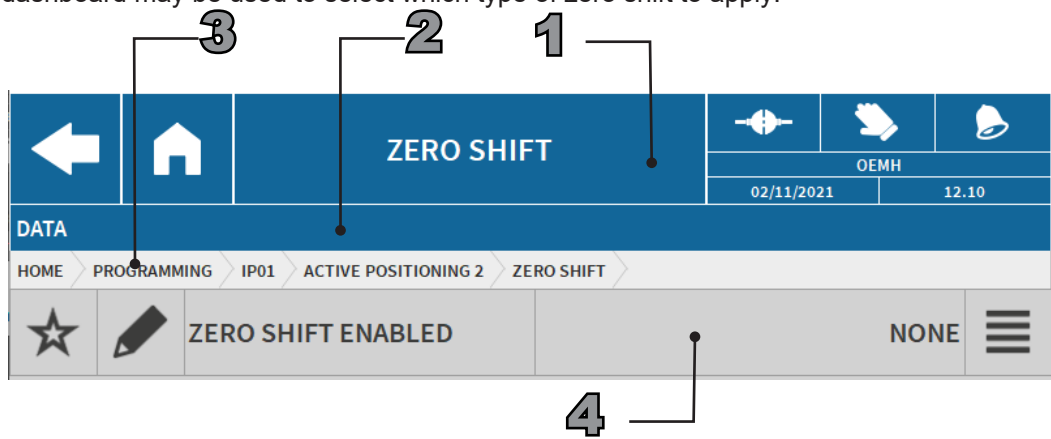


Fig.47. Select zero shift type dashboard

- 1 Screen title: **Zero shift.**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > IP01 (name of the channel) > Single In-Process (example) > Zero shift.*
- 4 Working area:
  - **None.** Function not active
  - **Calculated.** This function may be used to execute the zero shift calculation based on the parameters set -up in the measurement heads programming phase (see para. 3.2.1 on page 30). The following examples describes how it is used.
    - Let us assume it is necessary to create two Sets having the following nominal diameter values:
      - Set 0 = 71.500 (mm).
      - Set 1 = 77.530 (mm)

	NOMINAL ARM RATIO		6.670000		
	MAX DIAMETER		84.0000		
	MIN DIAMETER		59.0000		
	NOMINAL DIAMETER		71.5000		

Fig.48. "Set 0" dashboard



- The zero shift (Calculation) has been enabled in both Sets

NONE	<input type="radio"/>
CALCULATED	<input checked="" type="radio"/>

*Figg.49. Calculated selected to activate parameter*

- Activate the “IP mechanical reset” and “Set selection” widgets and execute the measurement for each Set.
- In “Set 0”, the nominal value coincides with the central value (71.500 mm); mechanical reset close to zero.

*Figg.50. Measurement with “Set 0” selected*

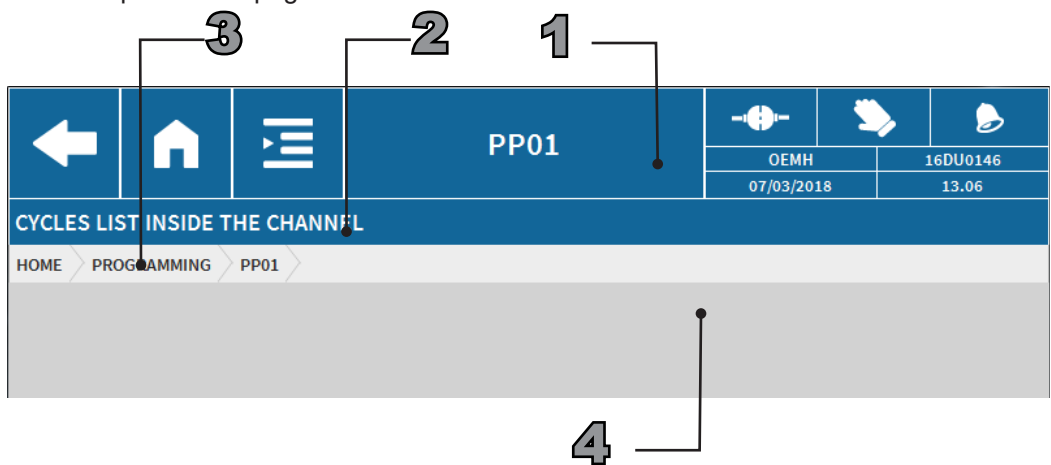
- In “Set 1”, without moving the contact the value remains practically identical (+1.6 μm), while the nominal value (77.530 mm) varies by 6.528 μm.

*Figg.51. Measurement with “Set 1” selected*

3.2 Post Process Measurement Application

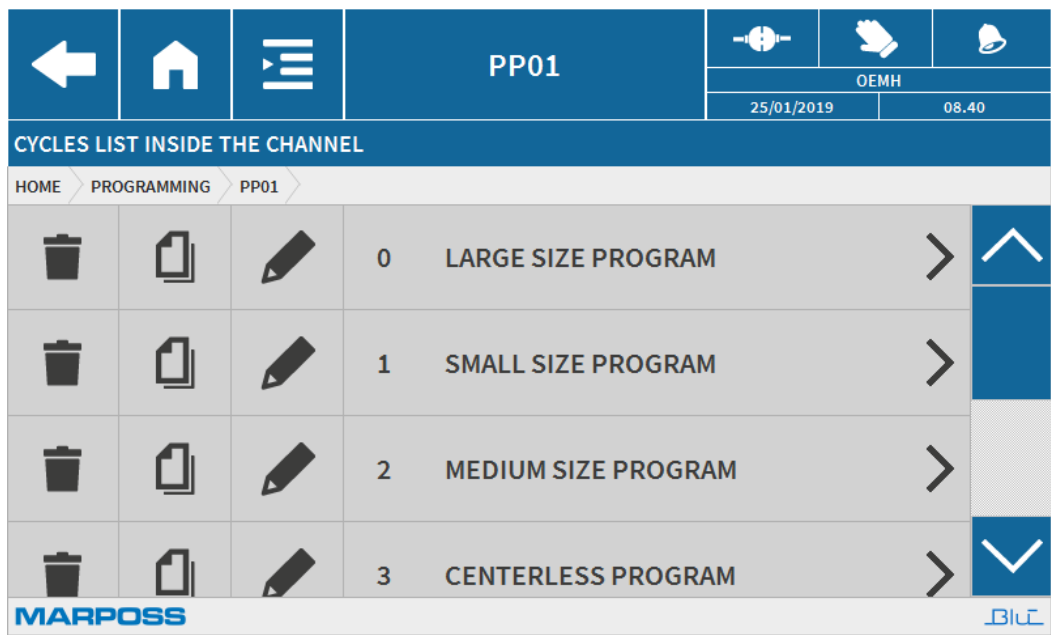
3.2.1 List of cycles

**PP** Use the **List of Cycles** present in the Channel dashboard (e.g. **PP01**) to add the sets available in the **List of Sets**. See chap. 3.2.2 on page 43.



Figg.52. Dashboard displaying a list of the cycles present in a channel before adding a set.

- 1 Screen title: **PP01** (name of the channel).
- 2 Messages and descriptions area: List of cycles present in the channel.
- 3 Navigation path: *Home > Programming > PP01* (name of the channel).
- 4 Working area: List of selected sets. In the example: no set added. See chap. 3.2.2 on page 43.



Figg.53. Dashboard displaying a list of the cycles present in a channel after adding a set.

### 3.2.2 Available sets



Use the **List of Sets** screen to select those to be included in the cycles list. See Chap. 3.2.1 on page 42.

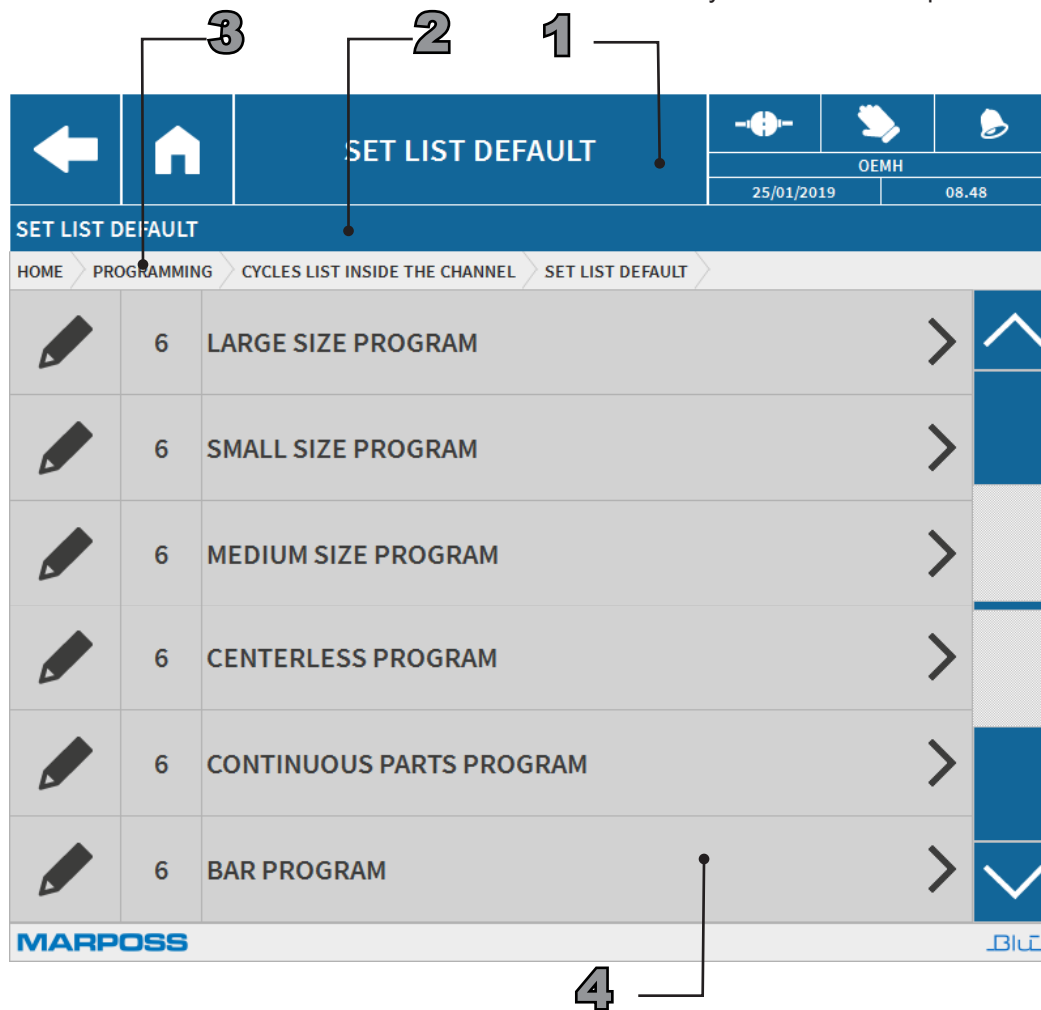
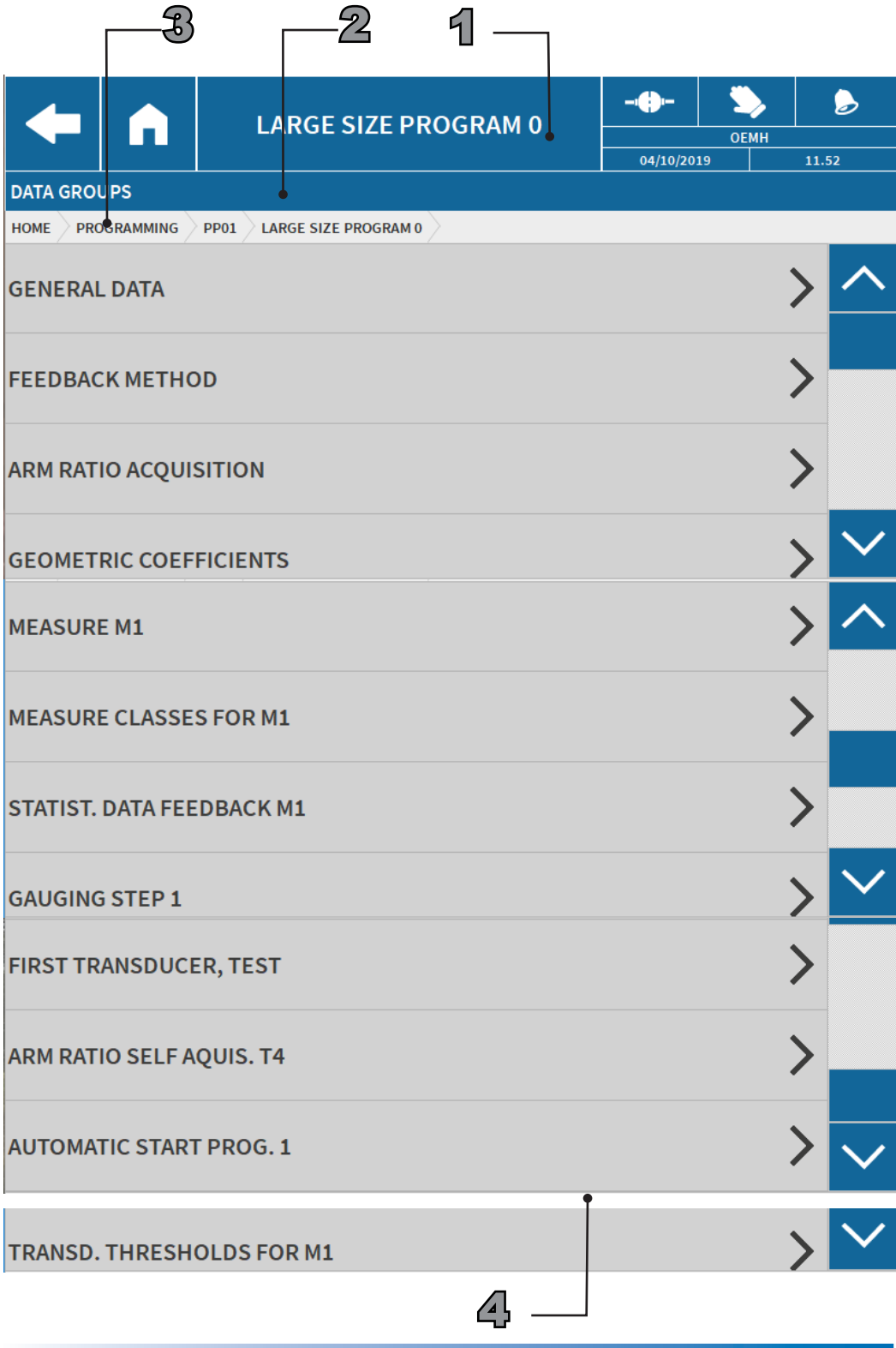


Fig.54. List of available sets. Their respective availability depends on the configuration file.

- 1 Screen title: **List of Sets**.
- 2 Messages and descriptions area: **List of Sets**.
- 3 Navigation path: *Home > Programming > PP01 (name of the channel) > Data groups*.
- 4 Working area: List of available sets (in the example):
  - **Large size program (Expanded program).**
  - **Small size program (Reduced program).**
  - **Medium size program.**
  - **Centreless program.**
  - **Continuous parts program.**
  - **Bar program.**

3.2.3 Programmable data

The data for the selected set may be customised on the dashboard corresponding to each individual set.



Figg.55. Programmable values screen.

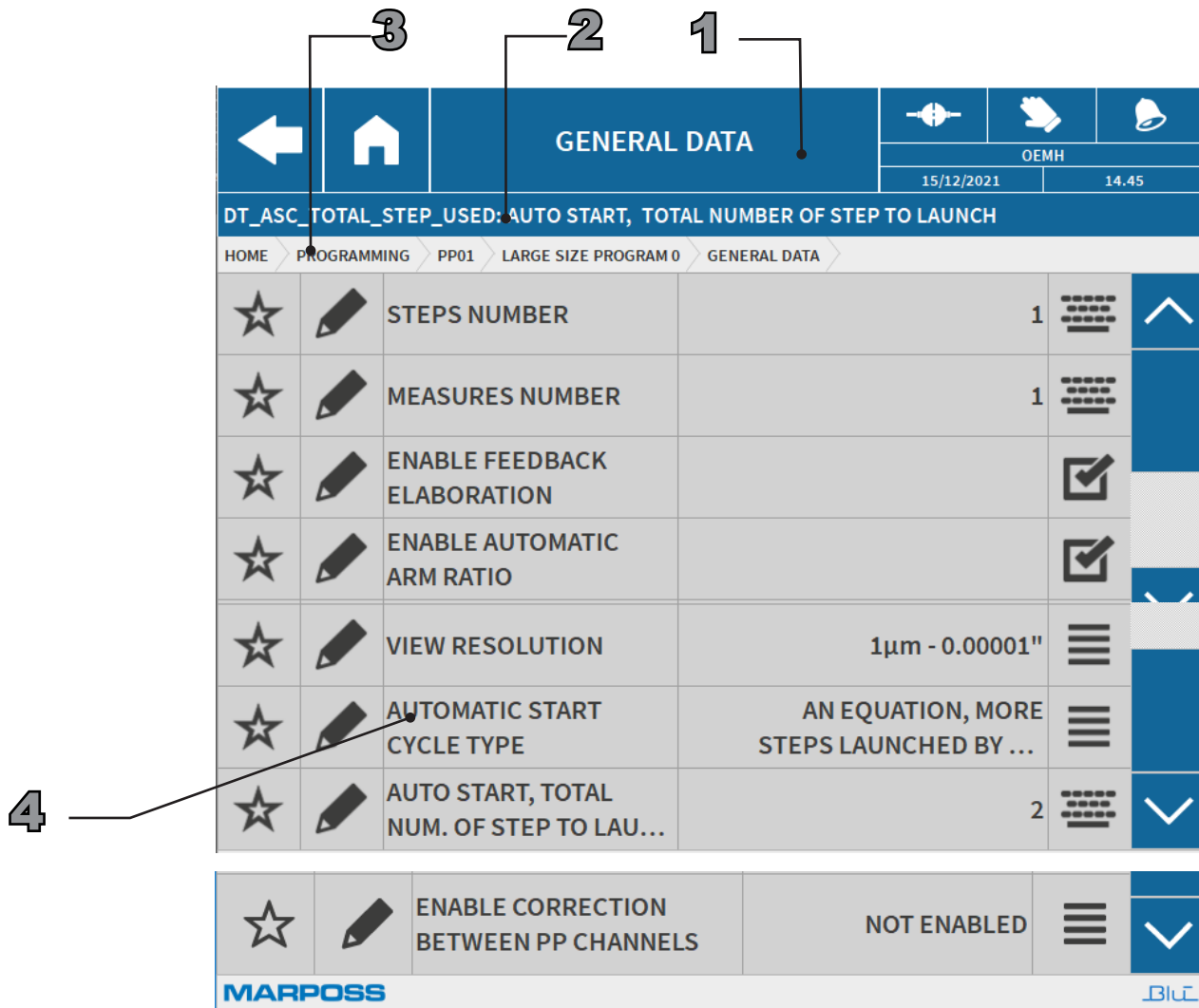
- 1 Screen title: **Large Size Program** (example of a set)
- 2 Messages and descriptions area: Data groups.
- 3 Navigation path: *Home > Programming > PP01 (example) > Large Sized Program* (example).
- 4 Working area: List of programmable values. In the example:
  - **General data.** See para. 3.2.3.1 on page 46.
  - **Feedback method.** See para. 3.2.3.2 on page 47.
  - **Arm ratio acquisition.** See para. 3.2.3.3 on page 49.
  - **Geometric coefficients.** See para. 3.2.3.4 on page 50.
  - **Measurement M(x).** See para. 3.2.3.5 on page 51.
  - **Measurement classes for M(x).** See para. 26 on page 58.
  - **Statistical feedback data M(x).** See para. 3.2.3.7 on page 60.
  - **Gauging step (x).** See para. 3.2.3.8 on page 62.
  - **First Transducer test.** See para. 3.2.3.9 on page 64.
  - **Arms ratio self aquis.** See para. 3.2.3.10 on page 65.
  - **Start automatic program.** See par. 3.2.3.11 on page 66
  - **Transduc. Threshold for M(x).** See para. 3.2.3.12 on page 68.

### 3.2.3.1 General data

Available for the following sets:

- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program
- Continuous parts program.
- Bars program.

The **General** dashboard contains the data that are common to all the measurement heads.



Figg.56. General data dashboard.

- 1 Screen title: **General data**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized program (example) > General Data.*
- 4 Working area:
  - **Steps number.** Sets up the number of steps used in the set. Within a Set it is possible to perform various measurement steps (max. 8), which must be associated with the corresponding measurements.
  - **Measurements number.** Sets up the number of measurements included in the set.
  - **Enable feedback elaboration.** Enables feedback processing for machine tool corrections.
  - **Enable automatic arm ratio.** Enables the auto-acquisition of the arm ratio via PLC.
  - **Display resolution.** Sets the measurement display resolution for the current measurements to one of the following values:
    - 1 µm / 0.1 µm / 0.01 µm
    - 0.00001" / 0.000001" / 0.0000001".
  - **Automatic start cycle type.** Sets the mode with which the automatic measuring cycle will start.
  - **Automatic start-up, total number of steps to launch.** Set-up the total number of steps. This parameter is only present with certain types of automatic cycle start-up.
  - **Enable correction between PP channels.** Enables the correction between Post Process channel cycles.

### 3.2.3.2 Feedback method

Available for the following sets:

- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program.
- Continuous parts program.
- Bars program.

The Feedback Method dashboard may be used to select the statistical processing method for the machine compensation. The selected method is applied to all the measurements included in the same set.

N.B.

The Feedback Method dashboard is available only if feedback processing is enabled.

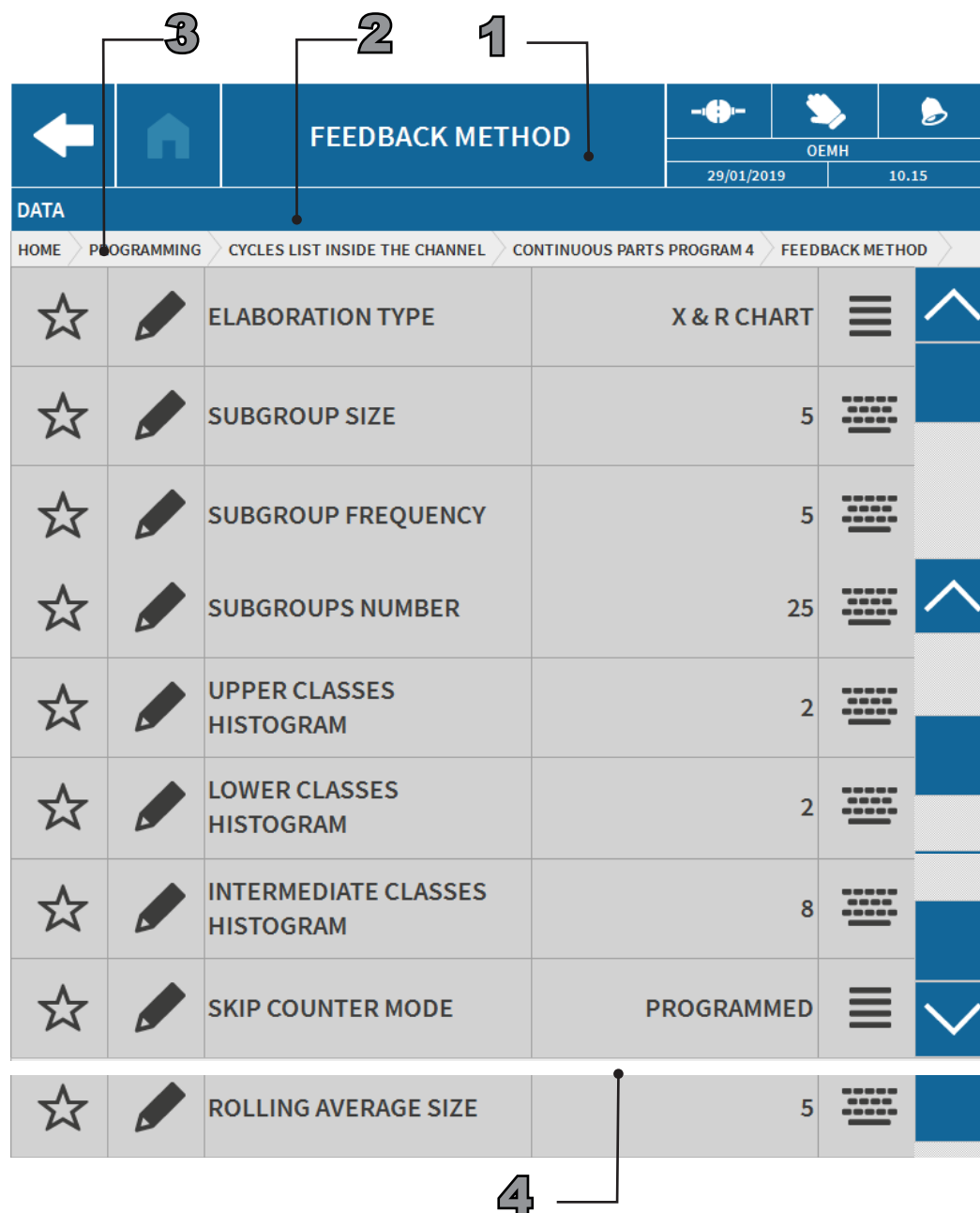


Fig.57. Feedback Method dashboard.

- 1 Screen title: **Feedback method**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Feedback method.*
- 4 Working area:
  - **Elaboration Type.** Allows the operator to select the machine compensation statistical processing method, the options are:
    - *Chart X & R.*
    - *Chart X & S.*
    - *Trend.*
    - *Rolling average.*
    - *Counters.*
  - **Sub-group size.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S.** Sets up the number of parts measured per sub-group.
  - **Sub-group frequency.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S.** Sets up the size of the batch of parts from which those used for the sub-group are extracted.
  - **Subgroups number.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S.** Sets up the number of sub-groups used for the statistical calculation.
  - **Upper classes histogram** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters.** Sets up the number classes above the upper measurement limit on the histogram that are taken into consideration.
  - **Lower classes histogram** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters.** Sets up the number classes below the lower measurement limit on the histogram that are taken into consideration.
  - **Continuous size of rolling average.** Applicable in the case of the following processing methods: **Rolling average.** Sets up the number of parts used for the continuous rolling average calculation.
  - **Intermediate classes histogram** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters.** Sets up the number of classes between the upper and lower measurement limits on the histogram.
  - **Skip counter mode.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters.** Enables the operator to manage Skip Counter mode following a feedback reset. The following modes may be selected:
    - *Programmed.* Use this mode to reset the programmed value.
    - *Zeroing.* Use this mode to set the counter to zero after the correction.
    - *Retained.* If this mode is selected, the counter retains the value it had reached at the moment of the reset.
  - **Rolling average size.** Inserts the number of samples used to calculate the rolling average.



### 3.2.3.3 Arm ratio acquisition

Available for the following sets:

- **Large Sized Program.**
- **Small Sized Program.**
- **Medium program.**
- **Centreless program.**
- **Continuous parts program.**
- **Bars program.**

The **Arm ratio acquisition** dashboard allows you to set the parameters used in the "auto-acquisition" procedure of the arm ratio".

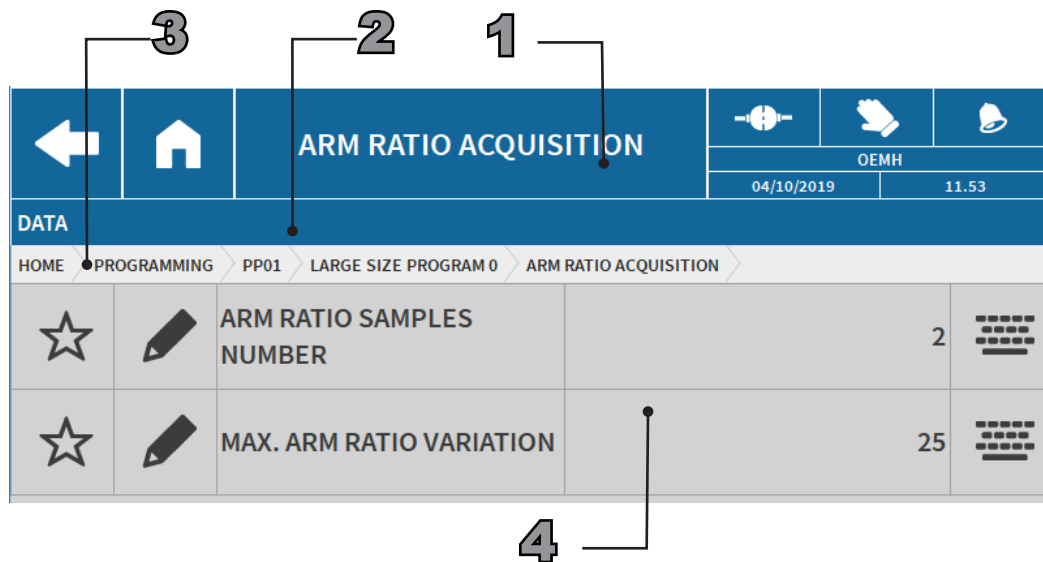


Fig.58. Arms ratio acquisition dashboard.

- 1 Screen title: **Arm ratio acquisition**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Acquire arms ratio.*
- 4 Working area:
  - **Arms ratio samples number.** Number of samples used in the procedure (min. 2 max. 3).
  - **Maximum arm ratio variation.** Maximum permitted arm ratio percentage variation.

### 3.2.3.4 Geometrical coefficients

Available for the following sets:

- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program.
- Continuous parts program.
- Bars program.

The **Geometric Coefficients** dashboard allows the operator to set-up the multiplication factor used for the transducer measurement equation.

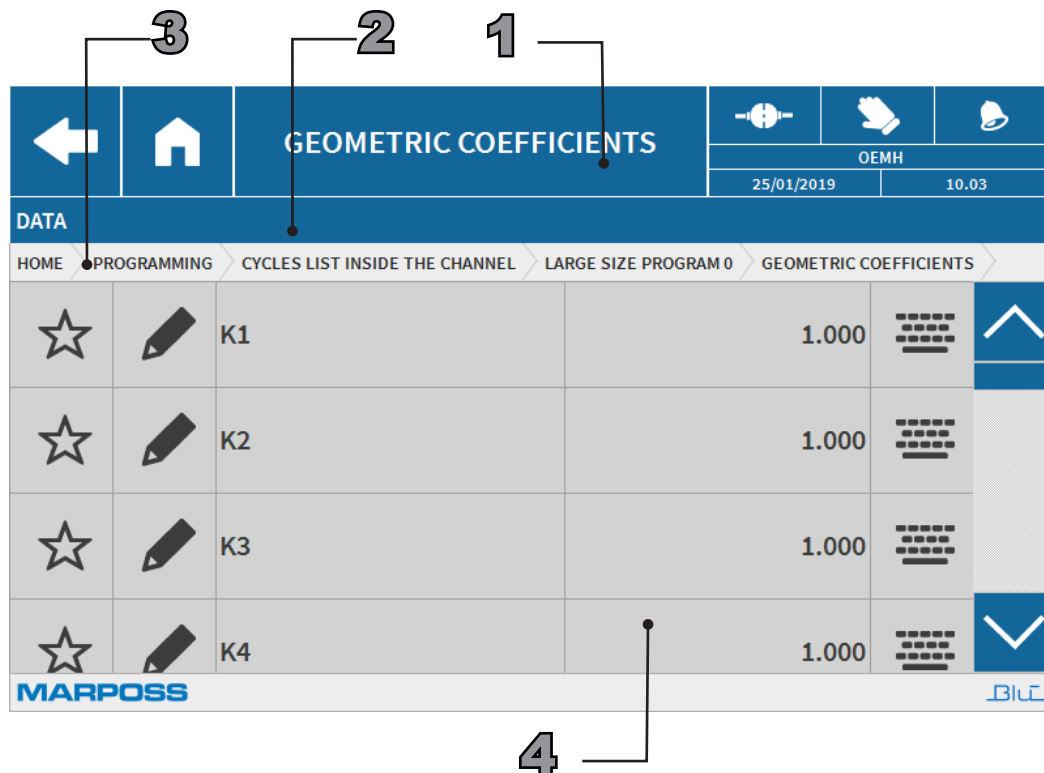


Fig.59. Geometric coefficients dashboard

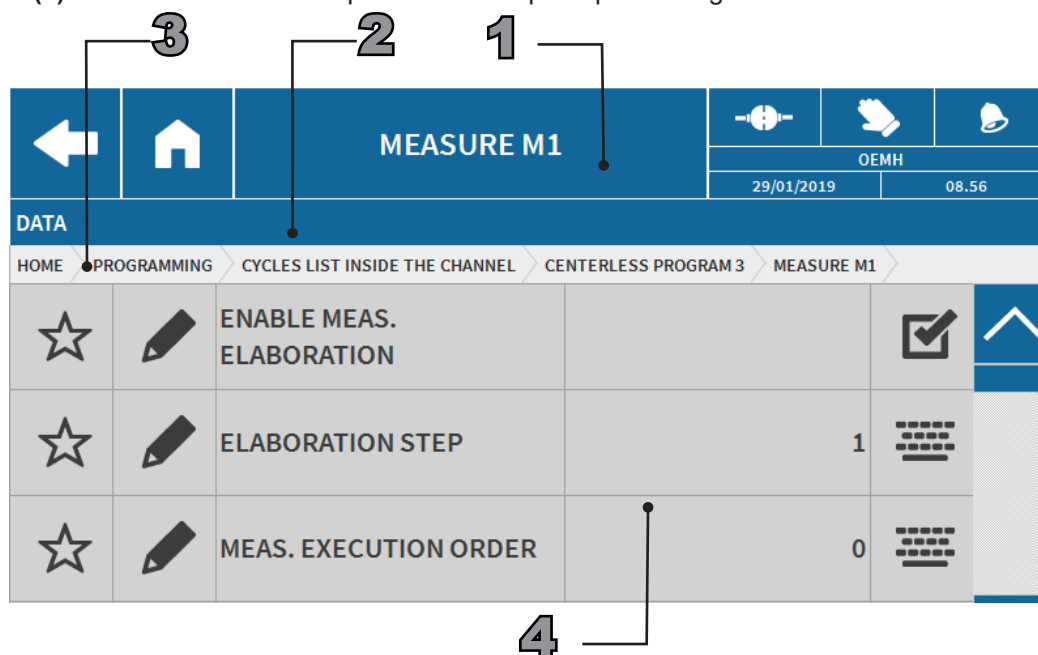
- 1 Screen title: **Geometrical coefficients**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Geometric Coefficients.*
- 4 Working area:
  - **K1 - K25.** Sets up the multiplication factor used for the transducer measurement equation. The value may be either positive (+) or negative (-).

### 3.2.3.5 Measurement M(x)

Available for the following sets:

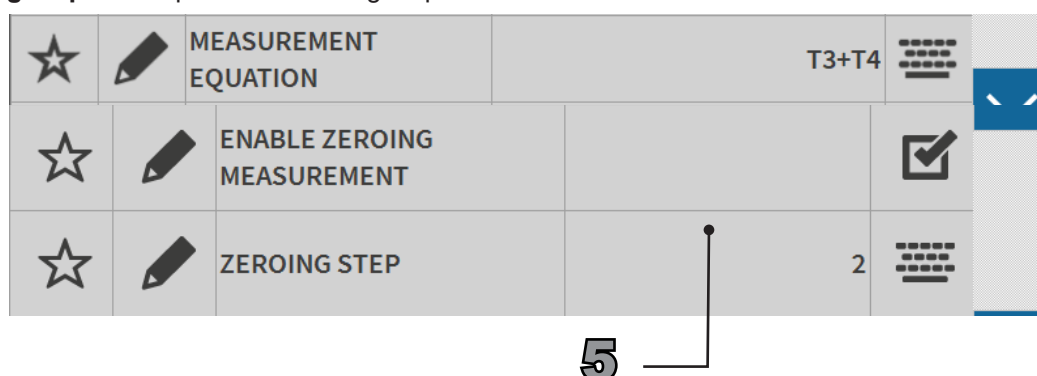
- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program.
- Continuous parts program.
- Bars program.

The **Measurement M (x)** dashboard allows the operator to set-up the processing data for the current measurement.



Figg.60. Measurement M1 dashboard.

- 1 Screen title: **Measurement M (x)**.
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Measurement M1 (example)*.
- 4 Working area (Figg.60 on page 51):
  - **Enable measurement elaboration.** Enables the measurement processing function.
  - **Elaboration step.** Sets up the number of the step used when processing the current measurement.
  - **Measurement execution order.** Sets up the sequence in which the measurements are performed within the ambit of the step.
- 5 Working area (Figg.61 on page 51):
  - **Measurement equation.** Sets up the equation programming for the current measurement.
  - **Enable zeroing measurement.** Enables electrical zero-setting of the current measurement.
  - **Zeroing step.** Sets up the zero-setting step for the current measurement.



Figg.61. Measurement M1 dashboard.

## 6 Working area (Figg.62 on page 52):

- **Type of integral measurement.** Permits the operator to select the type of measurement calculated by integrating a series of samples, the available options are as follows::
  - Maximum Value ->  $V = \text{Max}(V_i)$
  - Minimum Value ->  $V = \text{Min}(V_i)$
  - Average Value ->  $\sum_{i=1}^n (V_i)/n$
  - Ovality ->  $V = \text{Max}(V_i) - \text{Min}(V_i)$
  - Radial ovality ->  $V = [\text{Max}(V_i) - \text{Min}(V_i)]/2$
  - Average value ->  $V = [\text{Max}(V_i) + \text{Min}(V_i)]/2$
  - Absolute maximum value -> if  $[\text{abs}(\text{Max}) > \text{abs}(\text{Min})]$  then  $V = \text{abs}(\text{Max})$ ; or  $V = \text{abs}(\text{Min})$
  - Worst case value -> if  $[\text{abs}(\text{Max}) > \text{abs}(\text{Min})]$  then  $V = \text{Max}$ ; or  $V = \text{Min}$
- **Surface type.** Permits the operator to select the elaboration type depending on the part surface.
- **Enable re-working limit.** Enables the part re-reworking limit for the current measurement.
- **Re-working limit.** Sets up the part re-reworking limit for the current measurement.

☆		TYPE OF INTEGRAL MEASURE		MAX VALUE	☰	⬆
☆		SURFACE ELABORATION TYPE		SMOOTH	☰	⬆
☆		ENABLE REWORKING LIMIT			☑	⬆
☆		REWORKING LIMIT	μm	100	☰	⬇

6

Figg.62. Measurement M1 dashboard.

## 7 Working area (Figg.63 on page 52):

- **Enable reject limit.** Enables the reject non-reworkable part limit for the current measurement.
- **Reject limit.** Sets up the reject non-reworkable part limit for the current measurement.
- **Master deviation.** This value represents the difference between the real value of the work piece used as the MASTER and the nominal value of the MASTER itself.

☆		ENABLE REJECT LIMIT			☑	⬆
☆		REJECT LIMIT	μm	-100	☰	⬆
☆		MASTER DEVIATION	μm	0	☰	⬇

7

Figg.63. Measurement M1 dashboard.

- 8 Working area (Figg.64 on page 53):
- **Zero adjustment.** May be used to set-up a correction value in the event of a small variation with respect to the nominal value.
  - **Nominal value.** Sets up the nominal value for the current measurement.
  - **Measurement resolution.** Permits the operator to set-up the measurement data display resolution. (Figg.65 on page 53).

		ZERO ADJUST	<div>μm</div>	0		
		NOMINAL VALUE	<div>mm</div>	40.000		
		MEASURE RESOLUTION		1μm - 0.00001"		

8

Figg.64. Measurement M1 dashboard.

1	
0.1	
0.01	

Figg.65. Select measurement resolution level dashboard.

- 9 Working area (Figg.66 on page 53):
- **Part code.** Indicates the present/not present logic applied to the part associated with the current measurement.
  - **Upper zeroing limit.** Sets up the upper limit within which the electric zero-reset must be performed.
  - **Lower zeroing limit.** Sets up the lower limit within which the electric zero-reset must be performed.

		PART CODE		1		
		UPPER ZEROING LIMIT	<div>μm</div>	100		
		LOWER ZEROING LIMIT	<div>μm</div>	-100		

9

Figg.66. Measurement M1 dashboard.

10 Working area: (Figg.67 on page 54)

- **BCD/Binary Output request code.** Assigns a unique identification code to the measurement used when exchanging data via the BCD/Binary output.
- **BCD/Binary Output Interface N.** Sets up an interface number for the BCD/Binary output.
- **Enable absolute view.** Enables the display of the measurement as an absolute value.

☆	✎	BCD/BINARY OUTPUT, REQUEST CODE		1		
☆	✎	BCD/BINARY OUTPUT, INTERFACE NUMBER		1		
☆	✎	ENABLE ABS VIEW			<input type="checkbox"/>	▼

10

*Figg.67. Measurement M1 dashboard.*

11 Working area: (Figg.68 on page 54)

- **Enable max. zeroing variation.** Enables the maximum variation permitted with respect to the previous zero-setting value.
- **Enable min. zeroing variation.** Enables the minimum variation permitted with respect to the previous zero-setting value.
- **Enable single forward compensation.** Enables the single forward compensation.

☆	✎	ENABLE MAX ZEROING VARIATION			<input type="checkbox"/>	
☆	✎	ENABLE MIN ZEROING VARIATION			<input type="checkbox"/>	
☆	✎	ENABLE SINGLE FORWARD COMP.			<input type="checkbox"/>	▼

11

*Figg.68. Measurement M1 dashboard.*

12 Working area: (Figg.69 on page 54)

- **Enable single backward compensation.** Enables the single backward compensation. If enabled it is necessary to set-up the respective value (see Figg.72 on page 55).
- **Enable double forward compensation.** Enables the double forward compensation. If enabled it is necessary to set-up the respective value (see Figg.72 on page 55).
- **Double forward compensation value.** Sets the tolerance limit to activate double forward compensation.

☆	✎	ENABLE SINGLE BACKWARD COMP.			<input type="checkbox"/>	
☆	✎	ENABLE DOUBLE FORWARD COMP.			<input type="checkbox"/>	▼
☆	✎	DOUBLE FORWARD COMP. VALUE		90		

12

*Figg.69. Measurement M1 dashboard.*

13 Working area: (Figg.70 on page 55)

- **Algorithm type.** Permits the operator to select the gap recognition mode used when checking interrupted surfaces:
  - *Threshold algorithm;*
  - *Derivative algorithm;*
  - *External hardware synchronisation.*
- **Threshold.** The threshold value ( $\mu\text{m}$ ) at which the measurement is acquired or held:
  - If the difference between them is more than 5  $\mu\text{m}$  (threshold value) the measurement is held.
  - If the difference between them is less than 5  $\mu\text{m}$  (thresholds value) the measurement is acquired.
- **Sampling time.** Use this field to set-up the duration of the period (in ms) during which four successive measurement samples are processed (sample step: 8ms).

		ALGORITHM TYPE		THRESHOLD		
		THRESHOLD	$\mu\text{m}$	5		
		SAMPLE TIME	ms	8		

13

Figg.70. Measurement M1 dashboard.

14 Working area: (Figg.71 on page 55)

- **Max. zeroing variation.** Sets up the maximum variation permitted with respect to the previous zero-setting value.
- **Min. zeroing variation.** Sets up the minimum variation permitted with respect to the previous zero-setting value.
- **Clearance.** In the case of DIRAC applications, the operator may use this function to set-up the clearance value necessary to couple the two parts (male/female).

		MAX ZEROING VARIATION	$\mu\text{m}$	20		
		MIN ZEROING VARIATION	$\mu\text{m}$	10		
		CLEARANCE	$\mu\text{m}$	0		

14

Figg.71. Measurement M1 dashboard.

15 Working area: (Figg.72 on page 55)

- **Single forward compensation value.** Sets up the tolerance limit at which the single forward compensation is activated.
- **Double forward compensation value.** Sets up the tolerance limit at which the double forward compensation is activated.

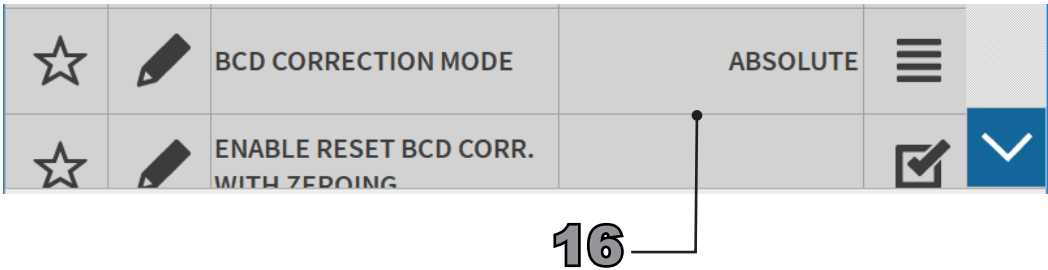
		SINGLE FORWARD COMP. VALUE	$\mu\text{m}$	80.0		
		SINGLE BACKWARD COMP. VALUE	$\mu\text{m}$	-80.0		

15

Figg.72. Measurement M1 dashboard.

16 Working area: (Figg.73 on page 56)

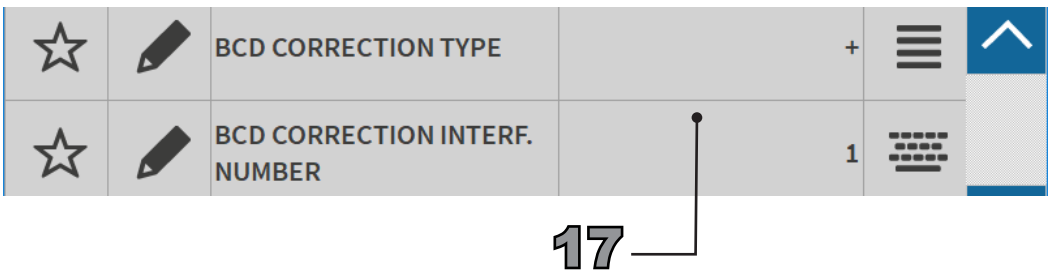
- **BCD correction mode.** Sets the BCD input correction mode.
- **Enable reset BCD corr. with zeroing.** Sets the BCD correction value reset during zeroing.



Figg.73. Measurement M1 dashboard.

17 Working area: (Figg.74 on page 56)

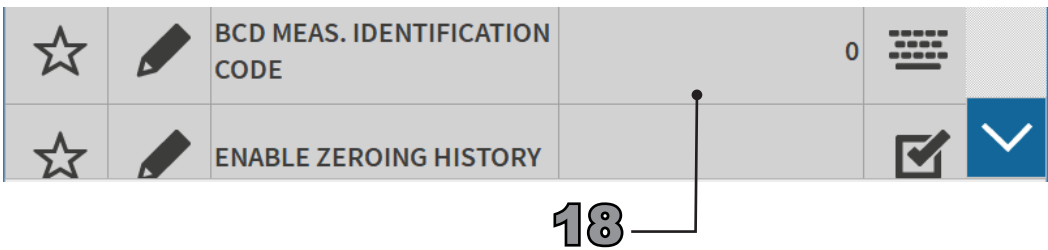
- **BCD correction type.** Indicates the type of calculation for the value of the BCD input correction.
- **BCD correction interface number.** Indicates the interface number associated with the BCD input correction.



Figg.74. Measurement M1 dashboard.

18 Working area: (Figg.75 on page 56)

- **BCD measurement identification code.** Indicates the measurement identification code for the BCD input correction.
- **Enable zeroing history.** Enables the electrical zeroing log.

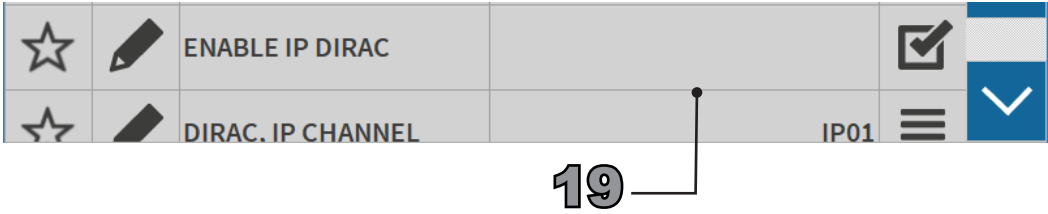


Figg.75. Measurement M1 dashboard.



19 Working area: (Figg.76 on page 57)

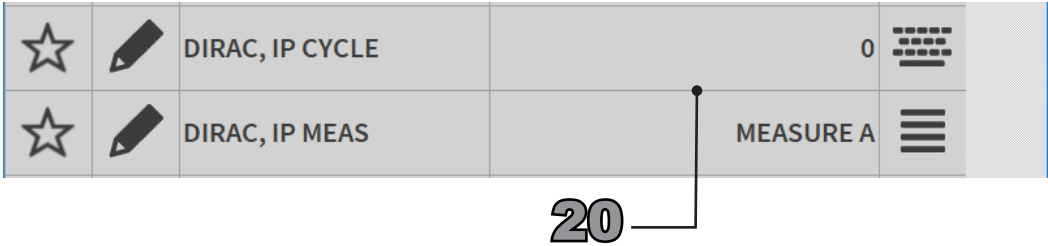
- **Enable IP Dirac.** Enables the current measurement for direct coupling with an In-Process channel.
- **Dirac, IP channel.** Indicates the number of an In-Process channel that the correction in the current set is applied to.



Figg.76. Measurement M1 dashboard.

20 Working area: (Figg.77 on page 57)

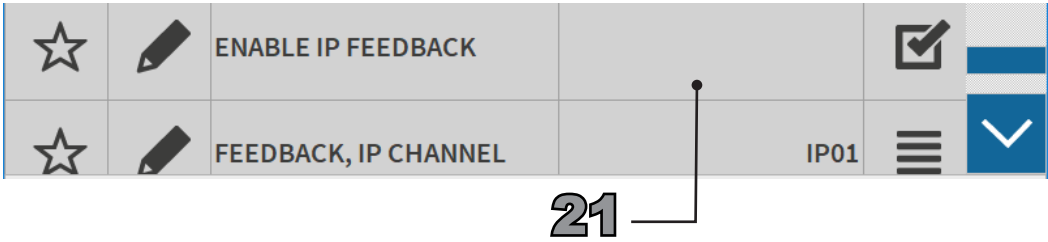
- **Dirac, IP cycle.** Indicates the number of a paired In-Process cycle.
- **Dirac, IP measurement.** Indicates which measurement an In-Process cycle is paired with.



Figg.77. Measurement M1 dashboard.

21 Working area: (Figg.78 on page 57)

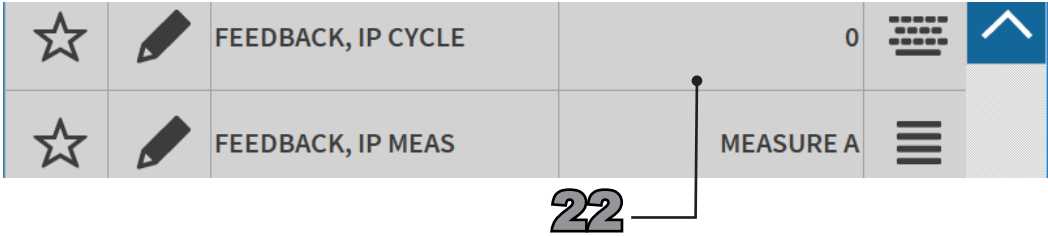
- **Enable IP feedback.** Enables feedback towards a paired In-Process channel.
- **Feedback, IP channel.** Selects the number of an In-Process channel to be paired.



Figg.78. Measurement M1 dashboard.

22 Working area: (Figg.79 on page 57)

- **Feedback, IP cycle.** Indicates the number of an In-Process cycle to be paired.
- **Feedback, IP measurement.** Indicates which In-Process measurement should be paired.



Figg.79. Measurement M1 dashboard.

23 Working area: (Figg.80 on page 58)

- **Feedback, correction type.** Selects the type of correction to be implemented.
- **Correction between PP, enable measurement.** Enables the individual measurement.

		FEEDBACK, CORRECTION TYPE		DIRECT COMP.		
		CORRECTION BETWEEN PP, MEAS ENABLE				

23

Figg.80. Measurement M1 dashboard.

24 Working area: (Figg.81 on page 58)

- **Correction between PP, PP channel.** Indicates the number of a data recipient Post-Process channel
- **Correction between PP, PP cycle.** Indicates the number of a data recipient Post-Process cycle.

		CORRECTION BETWEEN PP, CHANNEL		PP01		
		CORRECTION BETWEEN PP, CYCLE		0		

24

Figg.81. Measurement M1 dashboard.

25 Working area: (Figg.82 on page 58)

- **Correction between PP, PP measurement.** Indicates the code of a data recipient Post-Process measurement.

		CORRECTION BETWEEN PP, MEAS		1		
--	--	-----------------------------	--	---	--	--

25

Figg.82. Measurement M1 dashboard.

26 Working area: (Figg.83 on page 58)

- **Thermal coefficient KI.** Indicates the thermal coefficient K used to compensate for the temperature difference between the part and the working environment.
- **Enable BCD/Binary correction.** Enables the BCD/Binary input correction for the current measurement.

		THERMAL COEFF. KI		0.000		
		ENABLE BCD/BINARY CORRECTION				

26

Figg.83. Measurement M1 dashboard.

27 Working area: (Figg.84 on page 58)

- **Description of the measurement.** May be used to add a description of the measurement.

		MEASUREMENT DESCRIPTION		User Desc.		
--	--	-------------------------	--	------------	--	--

27

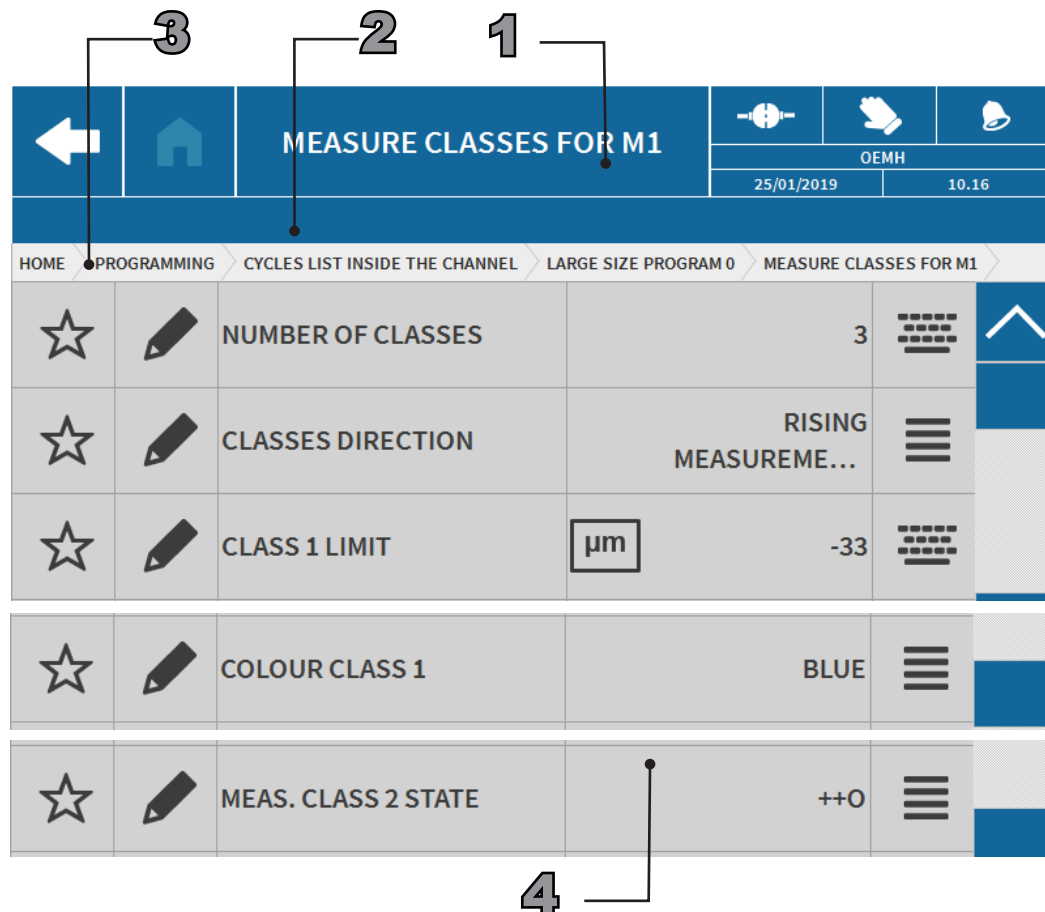
Figg.84. Measurement M1 dashboard.

### 3.2.3.6 Measurement classes for M (x)

Available for the following sets:

- **Large Sized Program.**
- **Small Sized Program.**
- **Medium program.**
- **Centreless program.**
- **Continuous parts program.**
- **Bars program.**

The **Measurement Classes for M (x)** dashboard allows the operator set-up the number of classes into which the measurement is divided.



Figg.85. Measurement Classes for M (x) dashboard

- 1 Screen title: **M (x) Measurement classes.**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Centreless program (example) > M1 Measurement Classes.*
- 4 Working area:
  - **Number of classes.** Sets up the number of classes into which a measurement is divided.
  - **Direction of the classes.** Select the class numbering direction from:
    - *Ascending measurement class.*
    - *Descending measurement class.*
  - **Class limit (x).** Sets up the class separation limits.
  - **Class colour (x).** Sets up the colour used to display the selected class.
  - **Class measurement status (x).** Associates a symbol with the selected class.

### 3.2.3.7 Statistical feedback data M(x)

Available for the following sets:

- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program.
- Continuous parts program.
- Bars program.

The Statistical Feedback Data M (x) dashboard allows the user to program the feedback processing parameters (see para. 3.2.3.2 on page 47) for each measurement based on the adopted method and statistical processing parameters.

Star	Pencil	Parameter	Unit	Value	Bar Chart	Blue Arrow
		ENABLE STATISTICS			<input checked="" type="checkbox"/>	Up Arrow
		UPPER CONTROL LIMIT	µm	33	Bar Chart	Blue Arrow
		LOWER CONTROL LIMIT	µm	0	Bar Chart	Blue Arrow
		CP/CPK START CALCULATION		20	Bar Chart	Up Arrow
		CP/CPK RECALCULATION PERIOD		1	Bar Chart	Blue Arrow
		ADDIT. COMPENSATION VALUE	µm	0	Bar Chart	Blue Arrow
		CORRECTION FACTOR		1.000	Bar Chart	Up Arrow
		FAST TREND BASE VALUE		2	Bar Chart	Blue Arrow
		SLOW TREND BASE VALUE		5	Bar Chart	Blue Arrow
		REJECT COUNTER		0	Bar Chart	Blue Arrow
		SKIP COUNTER		0	Bar Chart	Down Arrow

Figg.86. Statistical feedback data M (x)

- 1 Screen title: **Statistical feedback data M(x)**.
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Statist. Feedback Data M1 (example)*.
- 4 Working area:
  - **Enable statistics.** Enables statistical processing.
  - **Upper control limit.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up the upper control limit for the signal correction.
  - **Lower control limit.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up the lower control limit for the signal correction.
  - **Initial CP/CPK calculation.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up the number of valid sub-groups before initiating the CP/CPK calculation.
  - **CP/CPK recalculation period.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up the number of sub-groups for the CP/CPK recalculation.
  - **Additional compensation value.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up an additional value for the machine compensation.
  - **Correction factor.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Multiplication factor applied to the correction applied to the machine.
  - **Reject counters.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up the consecutive reject parts counter limit value. A variable counts the consecutive parts rejected at measurement. Each good part resets the counter to zero. If the counter exceeds the limit value set, the gauge sends an alarm signal, which stops the machine.
  - **Skip Counter.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Trend, Moving Average, Counters**. Sets up the number of parts that must be evaluated when calculating the feedback immediately following a correction. This value corresponds to the number of parts present between the measurement station and the work station.
  - **Control chart central value.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S**. Sets up the centre value with respect to the upper and lower limits on the control chart.
  - **Enable double correction upper limit** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Counters**. Enables the upper control limit for the double correction.
  - **Double correction upper limit.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Counters**. Sets up the upper control limit for the double correction.
  - **Enable double correction lower limit** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Counters**. Enables the lower control limit for the double correction.
  - **Double correction lower limit.** Applicable in the case of the following processing methods: **Chart X & R, Chart X & S, Counters**. Sets up the lower control limit for the double correction.
  - **Fast trend base value<sup>1)</sup>**. Applicable in the case of the following processing methods: **Trend**. Sets up the measurement trend base value used for the fast process measurement adaptation.
  - **Slow trend base value<sup>1)</sup>**. Applicable in the case of the following processing methods: **Trend**. Sets up the measurement trend base value used for slow process measurement adaptation.
  - **Forward counter delay<sup>2)</sup>**. Applicable in the case of the following processing methods: **Counters**. Sets up the count number at which the forward compensation is activated.
  - **Backward counter delay<sup>2)</sup>**. Applicable in the case of the following processing methods: **Counters**. Sets up the count number at which the backward compensation is activated.

N.B.<sup>1)</sup>

Setting a higher trend base value will reduce the sensitivity of the trend to variations in the measurement value. The slow trend base value is greater than the fast trend base value.

N.B.<sup>2)</sup>

Each time a measurement reaches the tolerance limit defined for the forward or backward compensation, the corresponding delay counter is increased by one unit. When the delay counter exceeds the programmed value, the compensation command is sent to the output.

### 3.2.3.8 Measurement step (x)

Available for the following sets:

- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program.
- Continuous parts program.
- Bars program.

The **Measurement step (x)** dashboard allows the operator to select the measurement type and the specific parameters for the selected step type.

The dashboard is titled "GAUGING STEP 1". It features a top navigation bar with icons for back, home, and a bell. Below the title, there are status indicators for "OEMH" and a date/time display "04/11/2021 16.41". A breadcrumb trail shows the path: HOME > PROGRAMMING > PP01 > CENTERLESS PROGRAM 3 > GAUGING STEP 1. The main area contains a list of parameters for configuration, each with a star icon, an edit icon, a label, a unit selector, a value field, and a confirmation icon.

STEP TYPE	VARIABLE LENGTH
ACQUISITION DELAY TIME	0.000
ENABLE MEAS. ACQUISIT. TIME	
MEAS. OBSCURATION TIME	0.000
MEAS. ACQUISIT. TIME	2.000
ENABLE REQUEST PERFORMED TIME	
REQUEST PERFORMED TIME	2.000
NUMBER OF MEASURE ACQUISITIONS	10

Callouts: 1 points to the title "GAUGING STEP 1"; 2 points to the breadcrumb trail; 3 points to the "PROGRAMMING" breadcrumb; 4 points to the "NUMBER OF MEASURE ACQUISITIONS" parameter row.

Fig. 87. Measurement Step (x) dashboard.

- 1 Screen title: **Measurement step (x)**.
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Measurement step 1 (example)*.
- 4 Working area:
  - **Step type**. Select one of the following measurement type options:
    - *Static*. Valid for Large Sized Program, Small Sized Program, medium program.
    - *Dynamic*. Valid for Large Sized Program, Small Sized Program, medium program.
    - *Variable length*. Valid for Centreless program.
    - *Continuous advance*. Valid for continuous parts programs.
    - *Bars*. Valid for bar programs.

**N.B.**

**A step can only include measurements of the same type. For example: only static measurements in a static step, only dynamic measurements in a dynamic step.**

- **Acquisition time delay**. Valid for **Large Sized Program, Small Sized Program, medium sized program, centreless program, bar program**. Sets up the acquisition delay time following the start of the cycle.
- **Enable measurement acquisition time**. Valid for **centreless program, bar program**. Enables the following function.
- **Measurement acquisition time**. Valid for **centreless program, bar program**. Sets up the interval during which the measurement samples are acquired.
- **Measurement blanking time**. Valid for **centreless program, bar program**. Sets up the blanking time, during which no data are acquired.
- **Enable the Request Performed time**.
- **Request Performed signal duration**. Valid for **centreless program**. Use this function to set-up the interval during which the "Request Performed" signal is maintained high, irrespective of the programmed measurement step sequence.
- **Number of measurement acquisitions**. Valid for bar programs. Use this function to set-up the maximum number of sub-cycles.



### 3.2.3.9 First Transducer Test

Available for the following sets:

- **Large Sized Program.**
- **Small Sized Program.**
- **Medium program.**

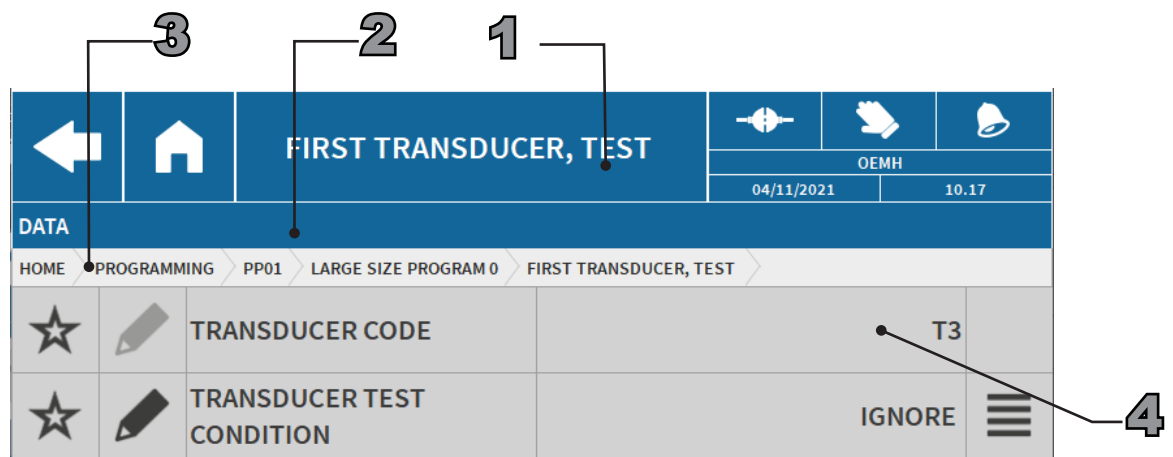
Use the **First Transducer test** page to set-up the measurement transducer conditions during the functional test.

[

N.B.



If any other condition than that selected is detected, the corresponding alarm is activated.



Figg.88. Transducer T1 Test dashboard

- 1 Screen title: **First Transducer test.**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 > Large Sized Program (e.g.) > First Transducer Test T.*
- 4 Working area:

- **Transducer condition test.** Select which of the following conditions are considered acceptable during the transducer test:
  - *Ignore.* No checks are carried out on the transducer condition.
  - *+ Overrange.* During the test a check is carried out to verify that the transducer contact is in “+ overrange”.
  - *– Overrange.* During the test a check is carried out to verify that the transducer contact is in “- overrange”.
  - *Positive transducer limit.*
    - Test value upper threshold. Sets up the measurement range upper threshold limit.

☆	✎	TRANSDUCER TEST CONDITION	POSITIVE TRANSD. LIMIT	☰
☆	✎	UPPER TEST THRESHOLD VALUE	μm 100	☰

Figg.89. Upper test threshold dashboard.

- *Negative transducer limit.*
  - Test value lower threshold. Sets up the measurement range lower threshold limit.

☆	✎	TRANSDUCER TEST CONDITION	NEGATIVE TRANSD. LIMIT	☰
☆	✎	LOWER TEST THRESHOLD VALUE	μm -100	☰

Figg.90. Lower test threshold dashboard.

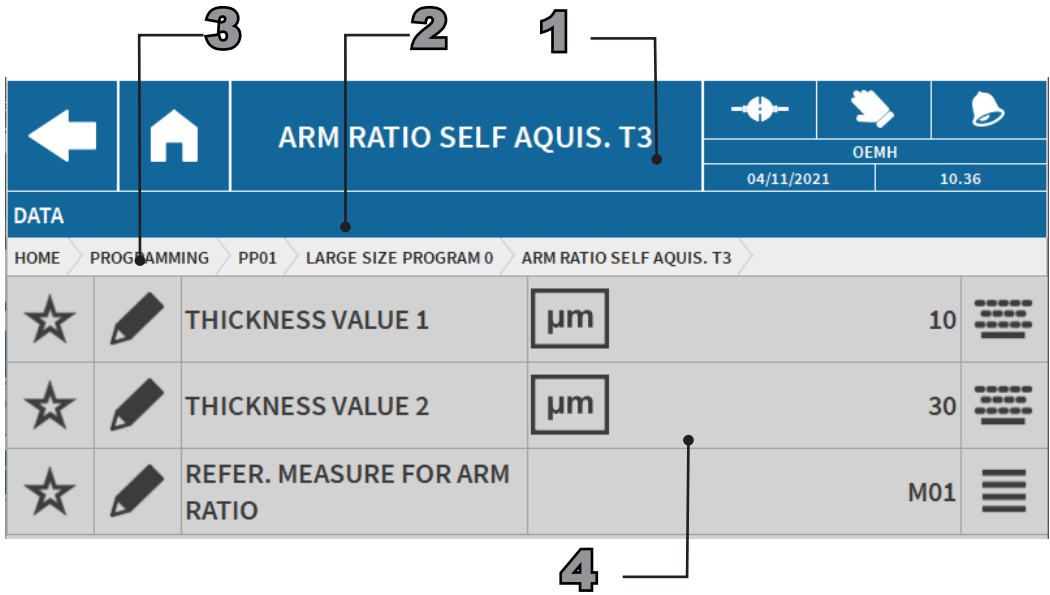


3.2.3.10 Automatic acquisition of arm ratio (Tx)

Available for the following sets:

- Large Sized Program.
- Small Sized Program.
- Medium program.
- Centreless program.

The Arm ratio auto-acquisition (Tx) dashboard allows you to set the parameters relating to the arm ratio:



Figg.91. Arms ratio self-learning data dashboard

- 1 Screen title: **Automatic acquisition of arm ratio (Tx).**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 > Large Sized Program (e.g.) > Arms ratio auto-acquisition.*
- 4 Working area:
  - **Thickness value 1/2.** Sets the thickness value for the auto-acquisition of the arm ratio
  - **Arm ratio reference measurement.** Selects which reference measurement to use.

NONE	<input type="radio"/>	
M01	<input checked="" type="radio"/>	
M02	<input type="radio"/>	

Figg.92. Selection dashboard of the reference measurement in the arm ratio auto-acquisition

[

**N.B.**  
 The number of thicknesses depends on the value programmed for the “Number of samples for arms ratio” parameter (see para. 3.2.3.3 on page 49).

### 3.2.3.11 Automatic program start (x)

Available for the following sets:

- **Large Sized Program.**
- **Small Sized Program.**
- **Medium program.**
- **Centreless program.**
- **Continuous parts program.**
- **Bars program.**

The **Automatic cycle start (x)** dashboard may be used to select the type of mode used to start the measurement automatically. Executes measurement cycles at programmed time intervals. It is activated only after the first AUTOSTART cycle has been executed with the measurement equation and respective limit threshold. The following modes are available:

- **None.** Function not active.
- **An equation, a single step executed once.** This cycle consists of a single measurement step. It is activated when the part measurement value is within the programmed range.
- **An equation, multiple passed executed at timed intervals.** This cycle consists of multiple measurement steps (max. 8) on the same part. The first step starts with a measurement equation, provided this measurement is within the programmed range. The following steps start with the same equation, but after a time interval and only if the measurement is within the programmed range. Each time interval starts when the preceding one ends.
- **An equation, multiple passed executed when triggered.** This cycle consists of multiple measurement steps (max. 8) with multiple measurement sections within the same part. Each measurement step may be assigned a different threshold value (measurement interval), but the equation remains the same for all steps.
- **Multiple equations, multiple passed executed when triggered.** Executes multiple measurement steps within the same part. Each measurement step may be assigned a different measurement equation (max. 8), and a different threshold value (measurement interval).

Once the desired measurement mode has been selected, it is necessary to set-up the parameters on the following page:

The screenshot shows the 'AUTOMATIC START PROG. 1' dashboard. At the top, there is a navigation bar with a back arrow, a home icon, and the title 'AUTOMATIC START PROG. 1'. To the right of the title are icons for a gauge, a hand, and a bell, along with the text 'OEMH' and dates '07/10/2019' and '11.16'. Below the navigation bar is a 'DATA' section with a breadcrumb trail: 'HOME > PROGRAMMING > PP01 > MEDIUM SIZE PROGRAM 2 > AUTOMATIC START PROG. 1'. The main area contains a table with six rows of parameters. Each row has a star icon, a pencil icon, a text label, a unit, a value, a list icon, and a chevron icon. The parameters are: 'MEASURE STEP NUMBER TO BE LAUNCHED BY AUTO S...' with value 1; 'EQUATION TYPE FOR AUTO START' with value NONE; 'TRANSDUCER IDENTIFIER A FOR EQUATION' with value NONE; 'TRANSDUCER IDENTIFIER B FOR EQUATION' with value NONE; 'UPPER THRESHOLD LIMIT FOR EQUATION' with unit μm and value 0; and 'LOWER THRESHOLD LIMIT FOR EQUATION' with unit μm and value 0. Below this table is a row for 'AUTO START CYCLE TIME' with unit ms and value 0. Numbered callouts point to: 1. The title 'AUTOMATIC START PROG. 1'; 2. The breadcrumb trail; 3. The 'MEASURE STEP NUMBER TO BE LAUNCHED BY AUTO S...' parameter; 4. The 'AUTO START CYCLE TIME' parameter.

Star	Pencil	Text	Unit	Value	List	Chevron
☆	✎	MEASURE STEP NUMBER TO BE LAUNCHED BY AUTO S...		1	☰	⬆
☆	✎	EQUATION TYPE FOR AUTO START		NONE	☰	⬆
☆	✎	TRANSDUCER IDENTIFIER A FOR EQUATION		NONE	☰	⬆
☆	✎	TRANSDUCER IDENTIFIER B FOR EQUATION		NONE	☰	⬆
☆	✎	UPPER THRESHOLD LIMIT FOR EQUATION	μm	0	☰	⬆
☆	✎	LOWER THRESHOLD LIMIT FOR EQUATION	μm	0	☰	⬆
☆	✎	AUTO START CYCLE TIME	ms	0	☰	⬆

Fig.93. Measurement correction data page

- 1 Screen title: **Automatic program start (x).**
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 > Medium Program (e.g.) > Automatic program start (x).*
- 4 Working area:
  - **Step No. for automatic cycle start.** Defines the measurement step that is started when the equation becomes valid. The default value is 1.
  - **Type of equation for automatic cycle start.** May be used to select the type of equation used to initiate the automatic cycle from the available options. TA and TB represent the identification codes of the generic transducers connected to each measurement step. Two threshold values (upper and lower) are used to define a measurement interval for each equation.

-TA	<input type="radio"/>	
TA+TB	<input type="radio"/>	
TA-TB	<input type="radio"/>	▼

Figg.94. Select type of equation for automatic cycle page.

- **Transducer A/B identifier for equation.** Selects which specific transducer to assign to the measurement equation carried out using TA and TB.

NONE	<input type="radio"/>	▲
T1	<input type="radio"/>	
T2	<input type="radio"/>	
T3	<input type="radio"/>	▼

Figg.95. Select transducer identifier dashboard.

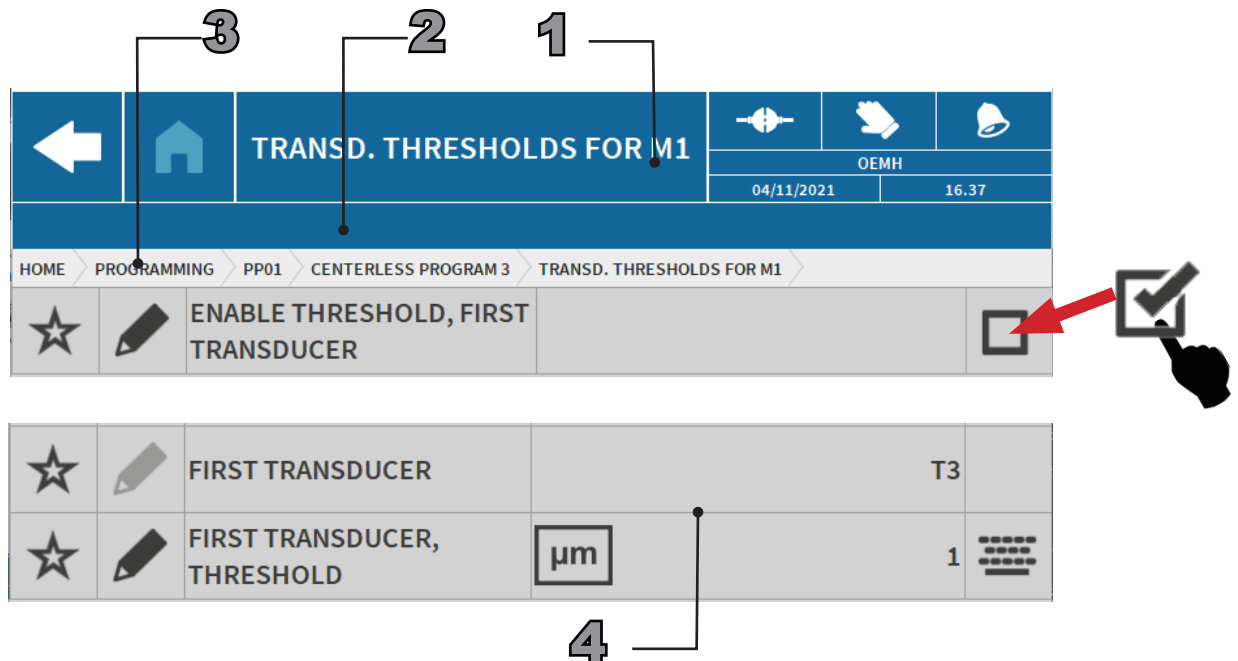
- **Upper threshold limit.** Defines the value used to determine the upper limit of the equation measurement interval. Together with the lower threshold value, these limits may be asymmetrical and need not necessarily have the same sign.
- **Lower threshold limit.** Defines the value used to determine the lower limit of the equation measurement interval. Together with the upper threshold value, these limits may be asymmetrical and need not necessarily have the same sign.
- **Time for automatic cycle start.** This parameter may be used to execute measurement cycles at programmed time intervals. It is activated only after the first AUTOSTART cycle has been executed with the measurement equation and respective limit threshold.

### 3.2.3.12 Transducer Thresholds for M(x).

Available for the following sets:

- **Large Sized Program.**
- **Small Sized Program.**
- **Medium program.**
- **Centreless program.**

The **Transducer Thresholds for M (x)** allows the operator set-up the threshold conditions to be applied during the measurement.



Figg.96. Transducer Thresholds for M1 dashboard.

- 1 Screen title: **Transduc. Thresholds for M (x)**.
- 2 Messages and descriptions area: Data.
- 3 Navigation path: *Home > Programming > PP01 (channel name) > Large Sized Program (example) > Transducer Thresholds for M1.*
- 4 Working area:
  - **Enable threshold T (x).** Enables the function the allows the operator to set-up the transducer threshold value to be used during the measurement.
  - **Threshold T (x).** Use this function to set-up the transducer threshold value at which the measurement acquisitions are initiated or terminated. Its use depends on the selected step type.

## 4 DASHBOARDS



For instructions on creating, modifying and deleting dashboards, see Part B2, Chap. 4 on page 81. For the navigation map between the menus, see **Navigation map, Sect. E**.

### 4.1 Selecting a Marposs/OEM page

When it is switched on, the **BIU** system permits the operator to select either the page corresponding to the installed application (**Marposs**), or between the ready to use options created by the customer (**OEM**) (see B2 chap. 5.2 on page 88). (See Fig.97 on page 69).

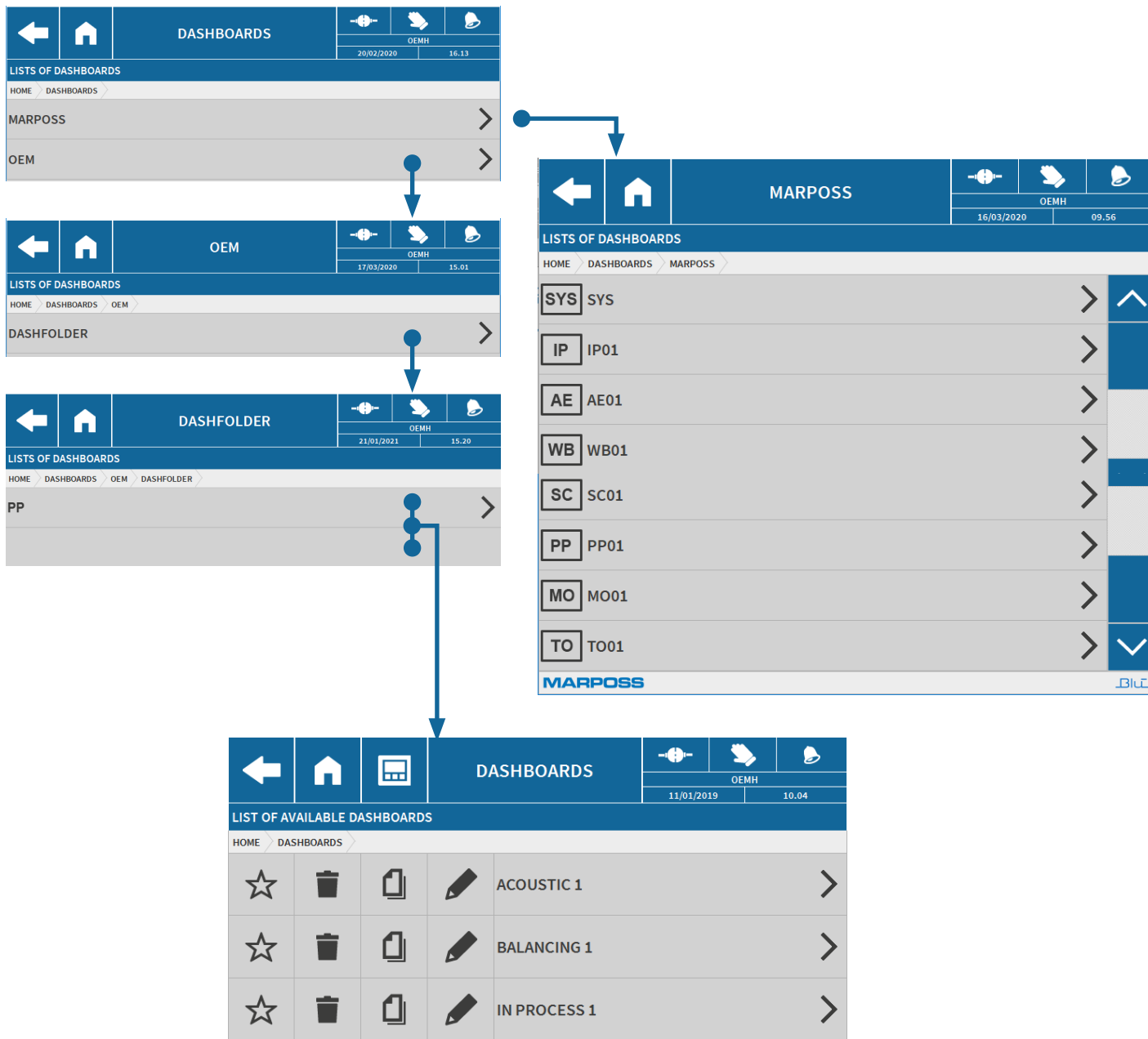


Fig.97. Pre-compiled Marposs page and pages created by the OEM customer

4.2 Widgets and dashboards

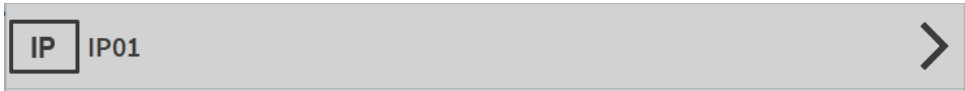


The In-Process (IP), Post Process (PP), Shape Control (SC) measurement application widgets can be used for sensors associated with various functions (Mic1, RPM, etc.) There are two types of widget available:

- **Marposs.** Group of pages, pre-compiled by Marposs, containing widgets that are ready for use with the current applications.
- **OEM.** Group of pages, created by OEM, containing widgets that are ready for use with the current applications.

For instructions on creating and managing the dashboards, see Sect. B2 Chap. 5.1 on page 87 And Chap. 5.2 on page 88.

4.2.1 Marposs dashboards for In-Process Application



For a description of the individual widgets present and their characteristics, see para. 4.2.2 on page 71 and subsequent paragraphs.

Table 1. List of Marposs dashboards > Process view	
Page name	Page
IP01 MEAS A AND B	

Table 2. List of Marposs pages > Setup	
Page name	Page
IP01 SETUP MEASURE A	

Table 2. List of Marposs pages > Setup	
Page name	Page
IP01 SETUP MEASURE B	

4.2.2 Widgets for In-Process Application

IP

MARPOSS WIDGETS FOR IN PROCESS APPLICATION

>

Table 3. List of Widgets for In-Process Application				
Icon	Widget	System Description/Status		
	<div><div>IP</div><div>Measurement zero adjustment</div><div></div></div>			
		This widget may be used to correct the measurement within the selected Set		
	<div><div>IP Measurement checks</div><div></div></div>			
		This widget may be used to display the command triggers (when the cycle is active).		

Table 3. List of Widgets for In-Process Application


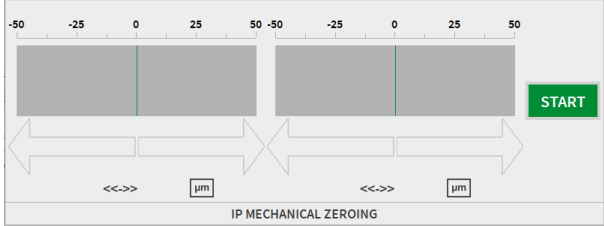




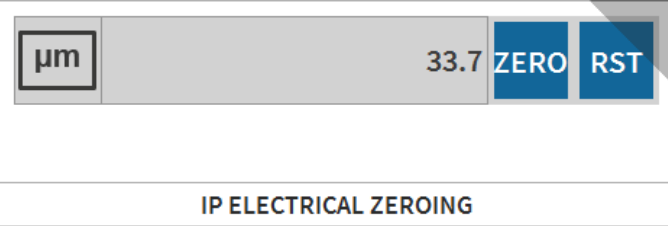



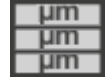
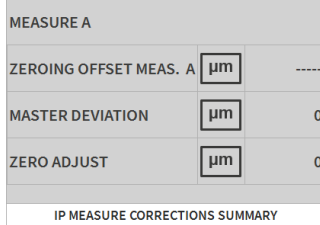









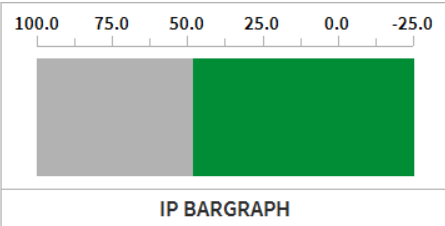




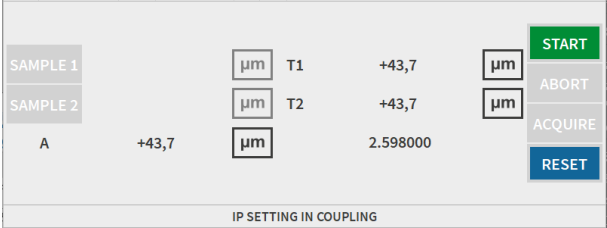



Icon	Widget	System Description/Status		
	<b>IP Mechanical zero-setting</b> 			
		This widget may be used to carry out the measurement head mechanical zeroing procedure		
	<b>IP Electric zeroing</b> 			
		Use this command to zero-set the selected measurement electrically.		
	<b>IP Measurement corrections summary</b> 			
		This widget may be used to display the list of all the IP measurement corrections for the selected Set and channel.		
	<b>IP Retraction control</b> 			
		This widget may be used to activate the retract auxiliary node command RET.		
	<b>IP Bargraph</b> 			
		This widget may be used to display the value measured by the selected Set.		



Table 3. List of Widgets for In-Process Application		
Icon	Widget	System Description/Status
	<div><p><b>IP Setting in Coupling</b></p></div>	<div></div> <p>Allows for the arm ratio of the T2 transducer to be changed, keeping that of transducer T1 stable at the previous value calculated, to achieve greater coupling precision of the sensitivity of the two transducers. This should be done after the arm ratio auto-acquisition.</p>

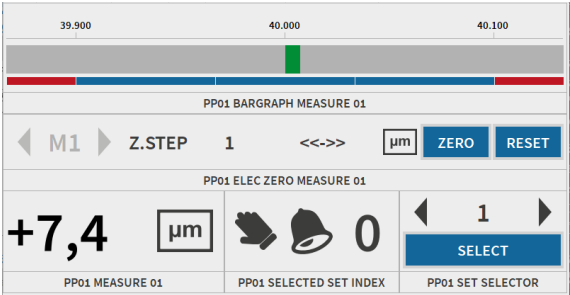
4.2.3 Marposs dashboards for Post-Process Application

PP

PP01

>

For a description of the individual widgets present and their characteristics, see para. 4.2.4 on page 73 and subsequent paragraphs.

Table 4. List of Marposs dashboards > Process view	
Page name	Page
<div><div>PP01 MEASURE 01</div></div>	

4.2.4 Widgets for Post-Process Application

PP

MARPOSS WIDGETS FOR POST PROCESS APPLICATION

>


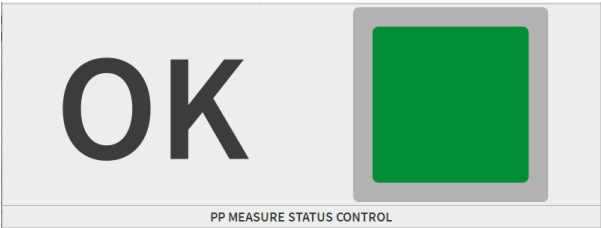



Table 5. List of Widgets for Post-Process Application		
Icon	Widget	System Description/Status
	<div><p><b>PP Measurement status check</b></p></div>	<div></div> <p>Indicates the status of the measurement.</p>

Table 5. List of Widgets for Post-Process Application


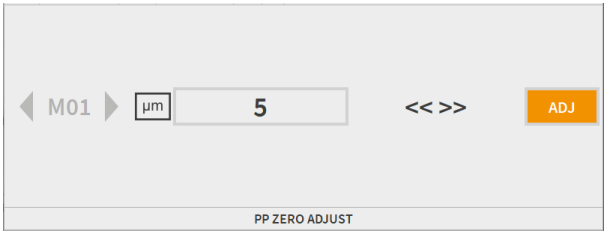




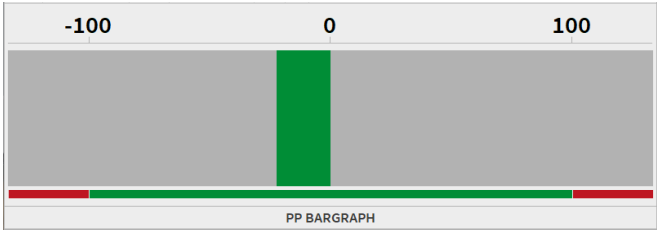









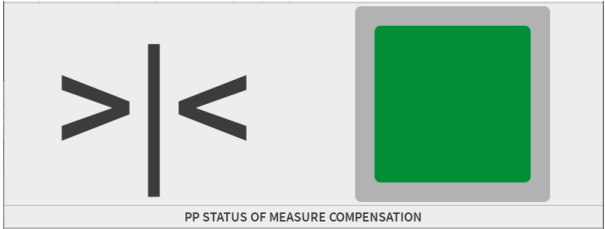




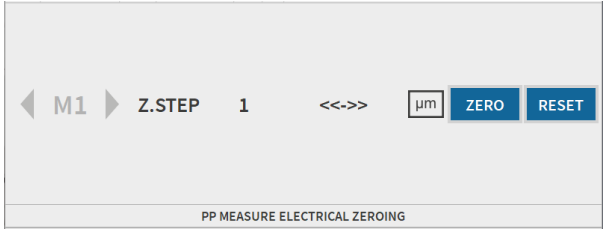




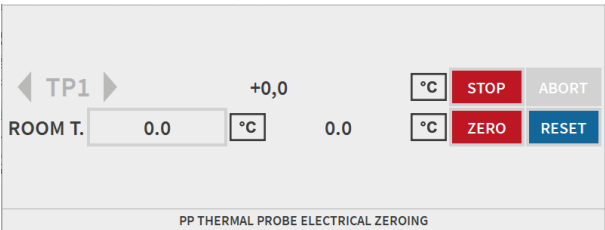



Icon	Widget	System Description/Status		
	<b>PP Zero Adjustment</b> 			
		This widget may be used to correct the measurement within the selected Set		
	<b>PP Bargraph</b> 			
		This widget may be used to display the measurement value and status.		
	<b>PP Step Selector</b> 			
		This widget may be used to select the measurement/zeroing step.		
	<b>PP Measurement compensation state</b> 			
		Indicates the state of the measurement compensation (if feedback is enabled).		
	<b>PP Electrical measurement zero-setting</b> 			
		This widget may be used to zero-set the measurement associated with the zero-setting Step		
	<b>PP Electrical zero-setting for thermal probes</b> 			
		Allows thermal probes to be calibrated, in order to prevent measurement errors caused by the effects of the temperature on the piece and on the measuring system itself.		

Table 5. List of Widgets for Post-Process Application


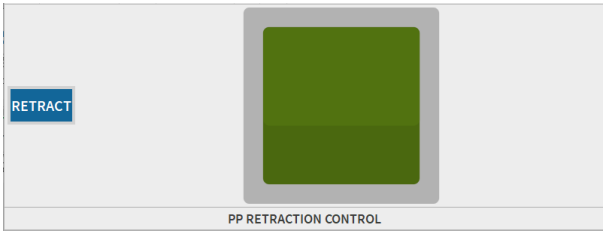



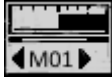
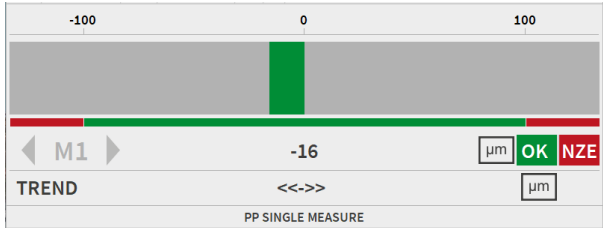



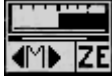
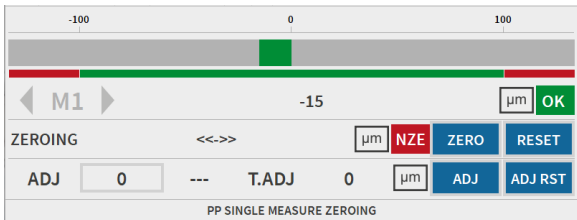




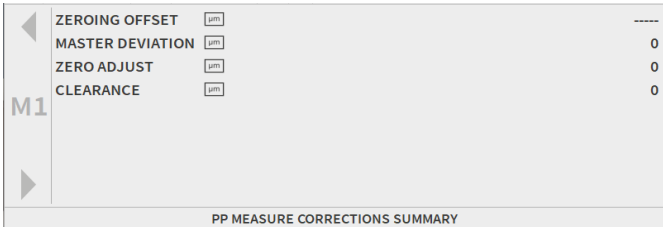



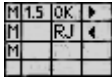
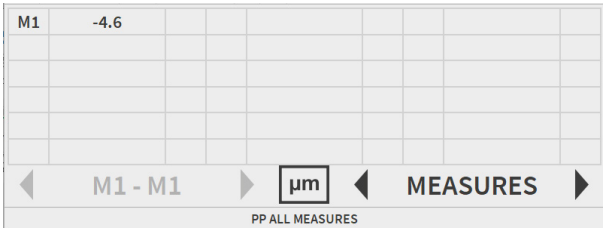



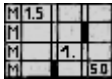
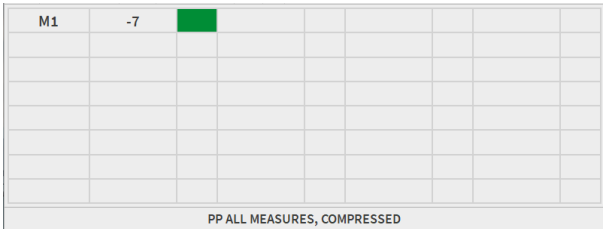



Icon	Widget	System Description/Status		
	<b>PP Retraction check</b> 			
		May be used to retract the measurement head		
	<b>PP Single measurement</b> 			
		May be used to check the single measurement and whether it is within tolerance.		
	<b>PP Reset single measurement</b> 			
		May be used to check the single measurement and whether it is within tolerance, as well zeroing and resetting it.		
	<b>PP Measurement corrections summary</b> 			
		Groups together all the measurement correction measurements.		
	<b>PP All measurements</b> 			
		May be used to view the values of all the measurements currently in progress.		
	<b>PP All measurements, compressed</b> 			
		May be used to view the values of all the measurements currently in progress, compressed.		

Table 5. List of Widgets for Post-Process Application

Icon	Widget	System Description/Status		
	<b>PP All measurements with descriptions</b> 			
		May be used to view all the measurement values.		
	<b>PP First four Measurements and more</b> 			
		May be used to view the first four measurement values.		
	<b>PP Reset feedback data</b> 			
		May be used to reset the feedback data.		
	<b>PP Reset compensations</b> 			
		May be used to reset the compensation data.		
	<b>PP Measurement histogram</b> 			
		May be used to view the histogram trend during the measurement.		
	<b>PP Summary of statistical results</b> 			
		Displays a summary of the measurement statistics.		

Table 5. List of Widgets for Post-Process Application


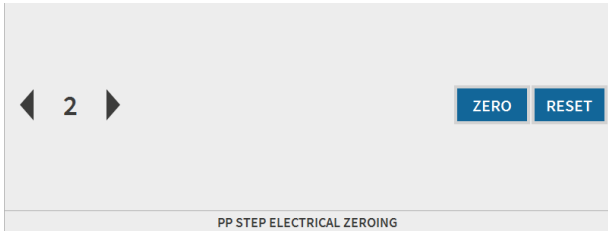



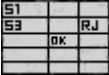




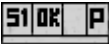
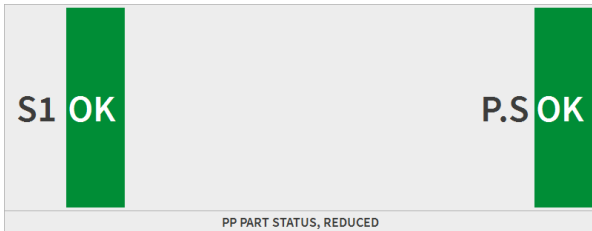



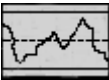
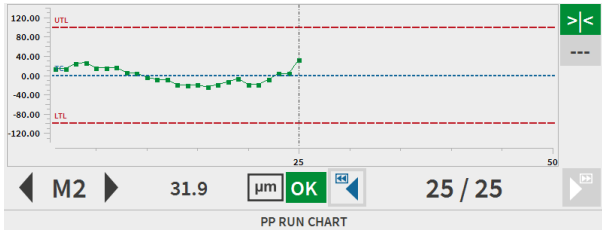



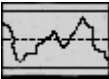
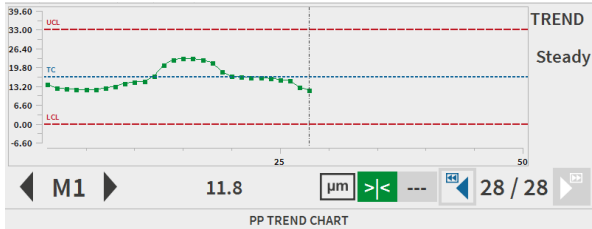



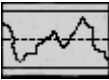
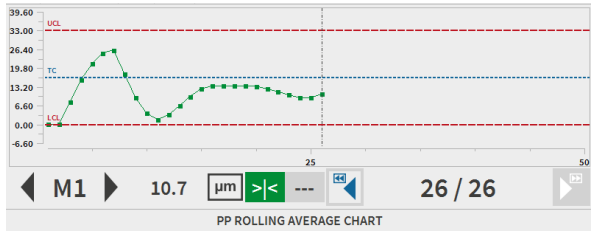















Icon	Widget	System Description/Status
	<b>PP Step electrical zeroing</b> 	   May be used to zero-set the measurement step.
	<b>PP Part Status</b> 	   May be used to provide information about the status of the measurement part.
	<b>PP Part Status, reduced</b> 	   May be used to provide information about the status of the measurement part.
	<b>PP Run Chart</b> 	   May be used to display the single measurement registered during the cycle.
	<b>PP Trend Chart</b> 	   May be used to display the trend measurement registered during the cycle.
	<b>PP Rolling average chart</b> 	   May be used to display the rolling average measurement registered during the cycle.

Table 5. List of Widgets for Post-Process Application		
Icon	Widget	System Description/Status
	<div>PP Counters Chart</div>	<div></div> <div>May be used to display the Counters measurement registered during the cycle.</div>
	<div>PP X/S or X/R Chart</div>	<div></div> <div>May be used to display the X&amp;R or X&amp;S measurement registered during the cycle.</div>
	<div>PP Zeroing history chart</div>	<div></div> <div>May be used to display the zero-setting step log.</div>
	<div>PP Zeroing history reset</div>	<div></div> <div>May be used to Reset the zero-setting step log.</div>

## 5 OPERATING PROCEDURES

### 5.1 Mechanical measurement head zero-setting procedure

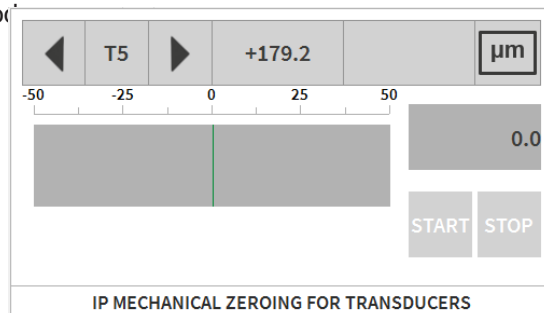


This procedure may be carried out in **Set-up** and **Manual** modes.



#### Mechanical transducer zero-setting..

To perform the measurement head zero-setting procedure, select the two widgets in Figg.98 on page 79 and Figg.99 on page 79.



Figg.98. Mechanical transducer zero-setting widget.

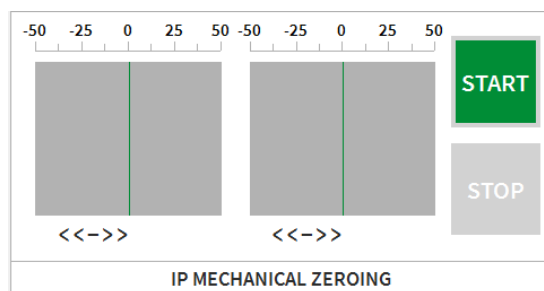
**N.B.**

The transducer mechanical zeroing widget (Figg.98 on page 79) must be used exclusively for HBT type sensors.

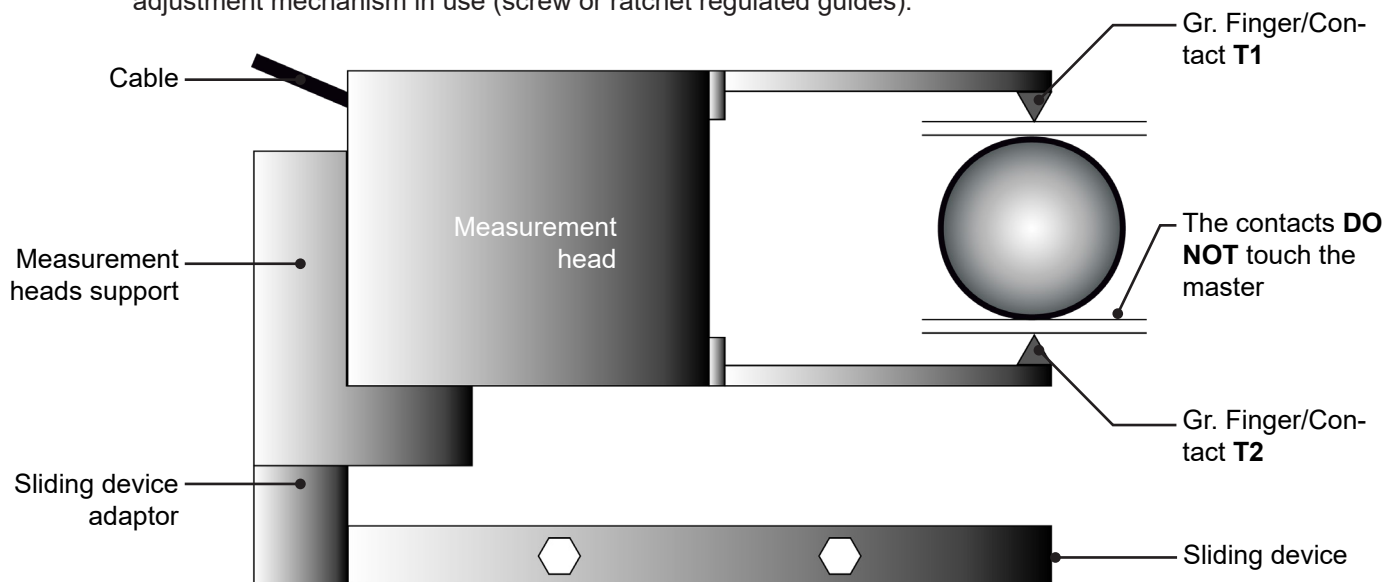


#### Mechanical zero-setting.

- Make sure that the measurement heads have been programmed correctly (**Chap. 3.1.3** on page 16).
- Select the dashboard based on the application to be monitored (**Chap. 4** on page 69).
- Proceed as follows:
  - 1 Position the master piece in the machine.
  - 2 Adjust the measurement head finger/contact units so that they can be inserted in the measurement position **while respecting the safety conditions**. The method used to adjust the finger/contact units depends on the type of adjustment mechanism in use (screw or ratchet regulated guides).



Figg.99. Mechanical zero-setting widget



Figg.100. Measurement head mechanical zero-setting diagram

START

3. Move the measurement head 1 to the measurement position, and then click **START** on the dedicated widget.

4. Adjust the upper finger/contact unit (**T1A**) so that the contact is touching the master, and the measurement value indicated on the digital display is approximately zero ( $\pm 10 \mu$ ). If a **red arrow** appears during this operation, it indicates that the programmed electrical zero-setting range has been exceeded; in this case the **+/-** character is also displayed, indicating the direction in which the range has been exceeded. If a **flashing arrow** appears on the bar graph, it indicates that the transducer is OVR (over range), see Figg.101 on page 80.

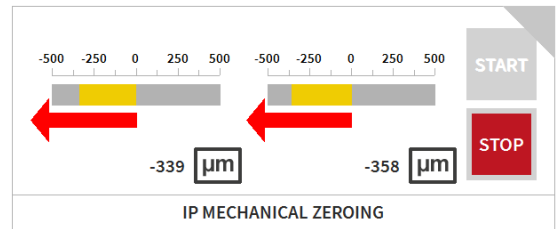
5. Next, repeat the above operation for the lower finger/contact unit (**T2A - if present**).

6. The mechanical zero-setting procedure is complete. Click **STOP** to complete the operation.

7. The **measurement A** mechanical zero-setting procedure is complete. Now, repeat the procedure starting from **point 2** for **measurement B** (if present in the application), using the dedicate widget.

8. Next, perform the electrical zero-setting procedure (see para. 5.4 on page 91).

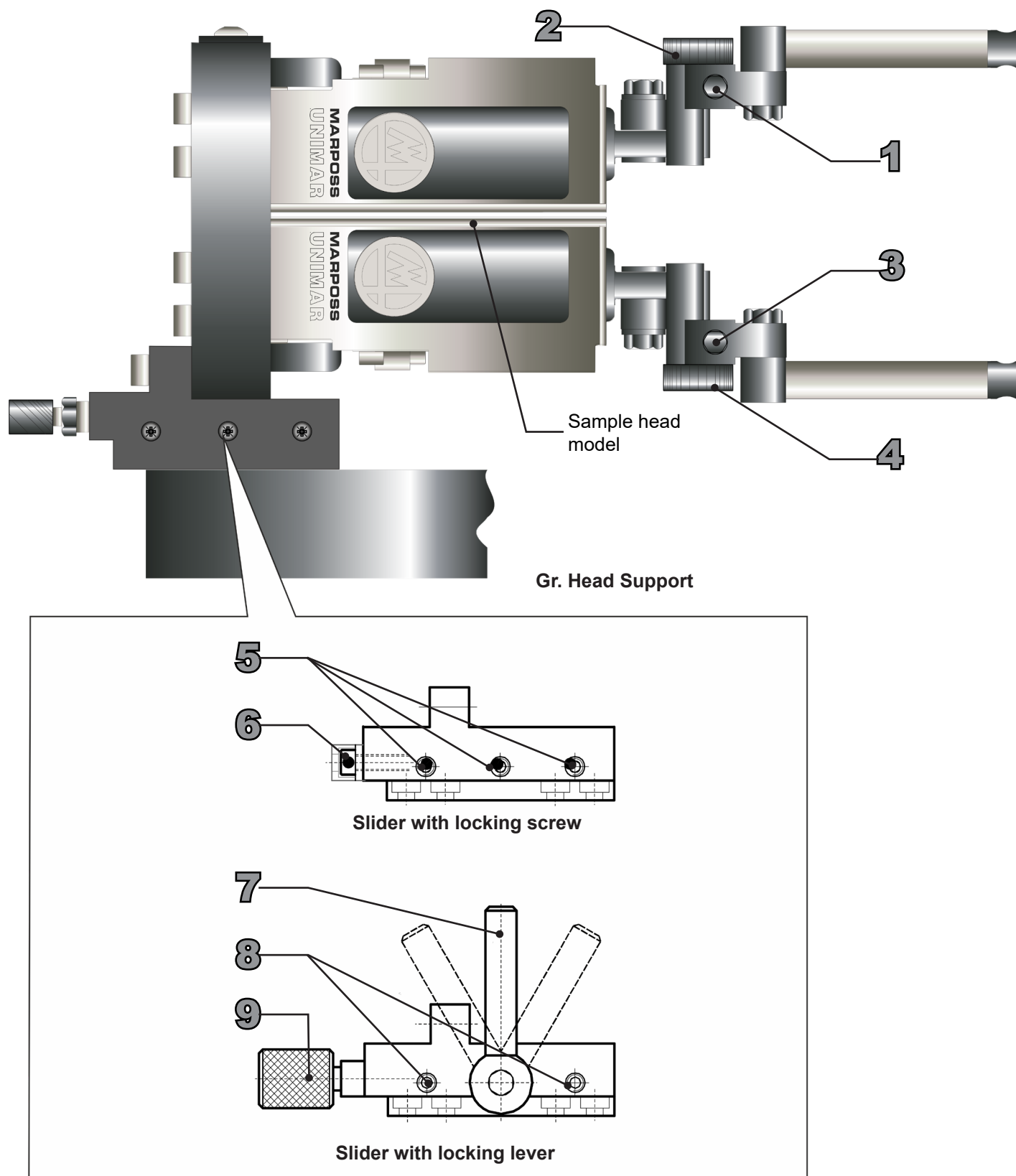
STOP



*Figg.101. Measurement over range*



### 5.1.1 Measurement Head Mechanical Zero-Setting



Figg.102. Measurement Head Mechanical Zero-Setting

## 1 Measurement head diameter alignment

(Refer to the examples in Figg.102 on page 81)

- Place a ground work piece in the spindle or between the tips.
- Loosen screws **1** and **3** to allow a frictioned movement of the guides.
- Rotate screws **2** and **4** (knob or hexagonal head screw) to position the styli so it is possible to insert the head in measuring position safely (without impact with the work piece).
- Move the measurement head to the measurement position.
- Rotate screws **2** and **4** so that the contacts are touching the work piece and are within range (refer to the readout of the individual transducers on the electronic unit).
- Tighten screws **1** and **3**.
- Now adjust the head support unit.

### Slider with locking screw version

- Loosen screws **5** maintaining the friction on them.

### Slider with locking lever version

- Release the movement of the head support by operating the lever **7**.
- Adjust screws **8** so as to allow frictioned movement of the head support.

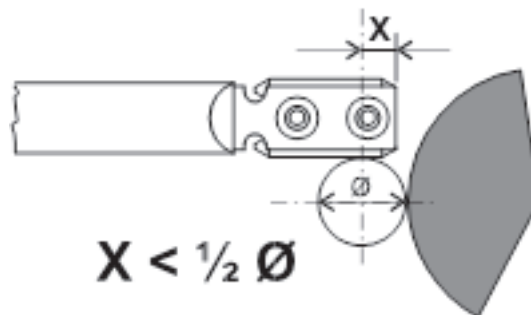
### Both versions

- Rotate the screw/knob **6/9**, moving the measuring head forwards/backwards until it reaches the position corresponding to the maximum measurement readout (contacts on diameter); refer to the diameter display on the widget. See the following **!!Attention!!** notification.
- Tighten the screws **5** (Slider with locking screws version), or block the head support by means of the lever **7** (Slider with locking lever version)
- Rotate the screw/knob **6/9** in the opposite direction to release it, in order avoid tensioning the adjustment system.

### !!ATTENTION!!

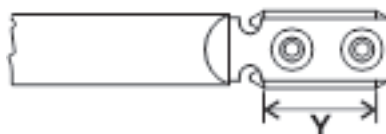
#### Measurement heads with bar contacts

When positioning the contacts longitudinally on the part (by moving the measurement head forward/backwards) it is important to ensure that the distance **X** is less than half the diameter of the diameter to be measured to avoid collisions between the stylus and the grinding wheel.



#### MEASURING GROOVED PARTS

When measuring grooved parts with interruptions  $\leq 10$  mm, the working portion **Y** of the contact should be greater than the interruption sector. If there be interruptions with different lengths, consider the longest one. Interruptions  $>10$  mm must be considered one at a time.



## 2 Adjusting the Upper Contact

(Refer to the examples in Figg.102 on page 81)

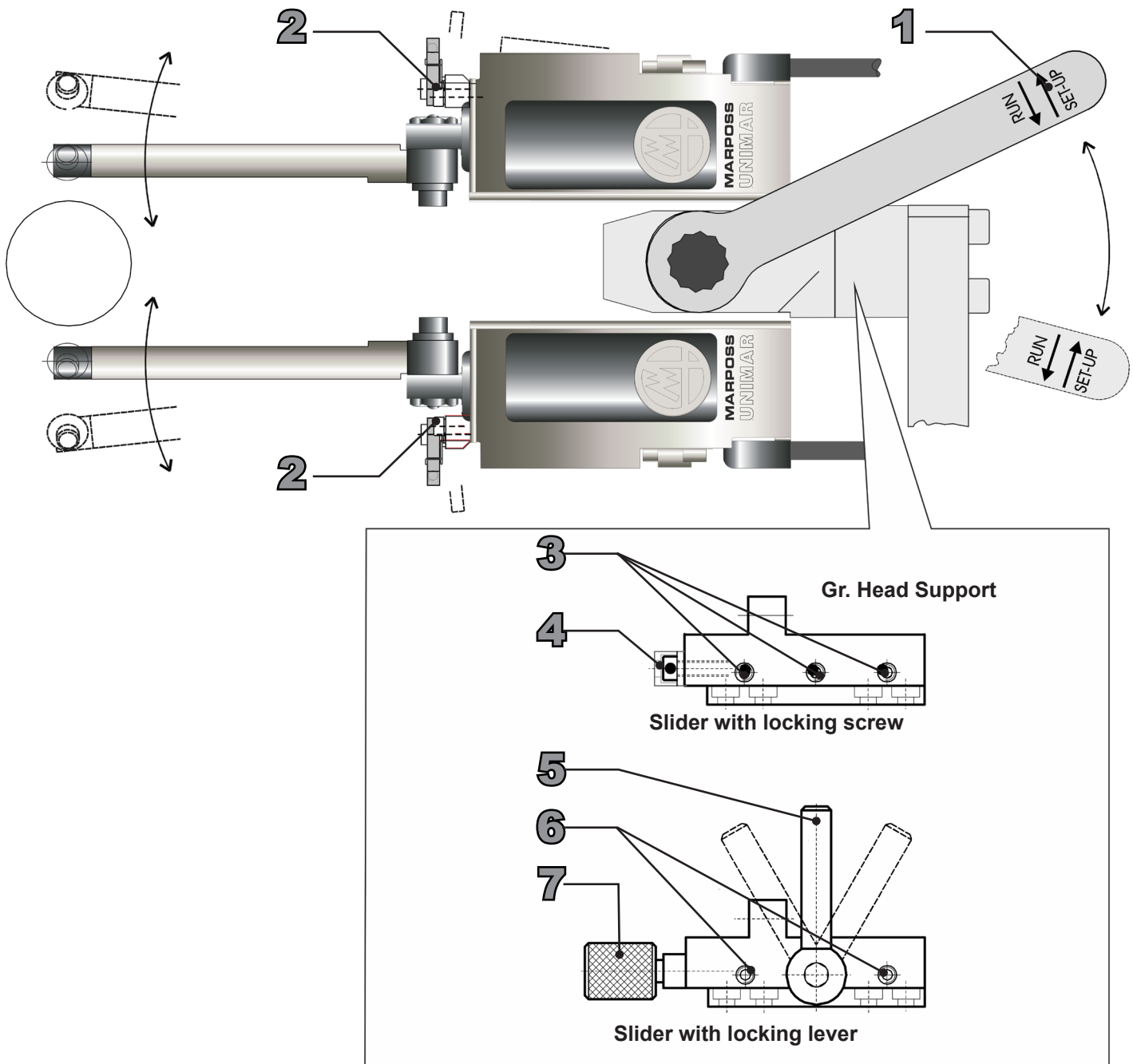
- Loosen screw **1** maintaining the friction on it.
- Rotate the screw **2** (knob or hexagonal head screw) so that the upper contact touches the master work piece and the measurement value that appears on the "Mechanical Zero-setting" widget (see Chap. 5.2 on page 88) is around zero ( $\pm 10 \mu\text{m}$ ).
- After completing these operations, tighten screw **1** and rotate screw **2** in the opposite direction until it is released in order to avoid tensioning the adjustment system.

## 3 Adjusting the Lower Contact

(Refer to the examples in Figg.102 on page 81)

- Loosen screw **3** maintaining the friction on it.
- Rotate the screw **4** (knob or hexagonal head screw) so that the lower contact touches the master work piece and the measurement value that appears on the "Mechanical Zero-setting" widget (see Chap. 5.2 on page 88) is around zero ( $\pm 10 \mu\text{m}$ ).
- After completing these operations, tighten screw **3** and rotate screw **4** in the opposite direction until it is released in order to avoid tensioning the adjustment system.
- Once the mechanical zero-setting operations described above have been completed successfully, carry out the electrical zeroing procedure (see Chap. 5.4 on page 91)

### 5.1.2 Rapid zero-setting of Unimar heads with locking lever (frictioned support)



Figg.103. Rapid zero-setting of Unimar heads with locking lever

**N.B.**

To make it easy to assemble the frictioned support and to adjust the rapid zero-setting units correctly (lever 2 and corresponding stop dowel) refer also to document "UNIMAR - Swing bracket application" (code D4340021M1).

## 1 Measurement head diameter alignment

**N.B.**

**Given the nature of the zero-setting system, we suggest you perform this adjustment based on the Average diameter of the application measurement range.**

(Refer to Figg.103 on page 84)

- Place a ground work piece in the spindle or between the tips.
- Rotate the locking lever **1** on the frictioned support to **"SET UP"**, so that a small degree of friction is applied to head **T1** and **T2** movements.
- Open the heads in order to insert them on the work piece safely.
- Move the heads to measurement position.
- Simultaneously, push the levers **2** on the rapid zero-setting unit, present on the finger holders, and close the heads with a single movement bringing the contacts into contact with the master work piece.
- While holding down levers **2**, rotate lever **1** to **"RUN"** until the heads are locked
- Release the **2** levers on the rapid zero-setting unit making sure they return to rest position.
- Now adjust the head support unit.

*Slider with locking screw version*

- Loosen screws **3** maintaining the friction on them.

*Slider with locking lever version*

- Release the movement of the head support by adjusting the handle **3b**.
- Adjust screws **3a** so as to allow frictioned movement of the head support.

*Both versions*

- Rotate the screw/knob **4**, moving the measuring head forwards/backwards until it reaches the position corresponding to the maximum measurement readout (contacts on diameter); refer to the diameter display on the widget.
- Tighten the screws **3** (Slider with locking screws version).
- Block the support using the lever **3b** (Slider with locking lever version)
- Rotate the screw/knob **4** in the opposite direction to release it and avoid tensioning the adjustment system.

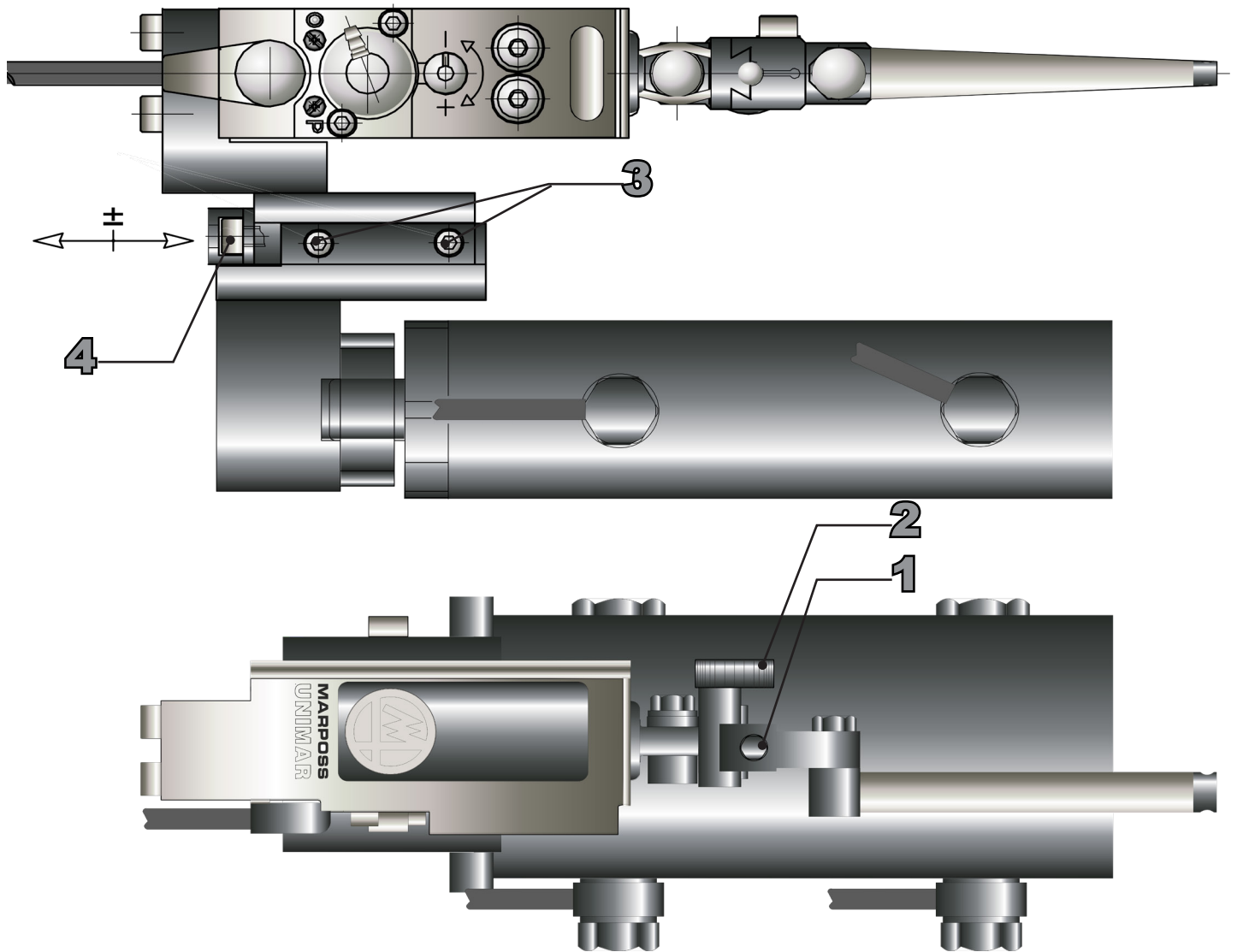
## 2 Zero-Setting on Diameter

(Refer to Figg.103 on page 84)

- Place a ground work piece in the spindle or between the tips.
- Rotate the locking lever **1** on the frictioned support to **"SET UP"**, so that a small degree of friction is applied to head **T1** and **T2** movements.
- Open the heads in order to insert them on the work piece safely.
- Move the heads to measurement position.
- Simultaneously, push the levers **2** on the rapid zero-setting unit, present on the finger holders, and close the heads with a single movement bringing the contacts into contact with the master work piece.
- While holding down levers **2**, rotate lever **1** to **"RUN"** until the heads are locked
- Release the levers **2** on the rapid zero-setting unit. Make sure that the **2** levers return to the rest position and that the contacts **T1** and **T2** measurement is within  $\pm 150 \mu\text{m}$  (refer to the readout of the individual transducers on the electronic unit).

Once the mechanical zero-setting operations described above have been completed successfully, carry out the electrical zeroing procedure (see Chap. 5.4 on page 91)

### 5.1.3 Mechanical Positionar Zero-Setting



*Figg.104. Mechanical Positionar Zero-Setting*

(Refer to Figg.104 on page 86)

- Place a ground work piece in the spindle or between the tips.
- Loosen screw **1** to allow a frictioned movement of the guide.
- Rotate screw **2** (knob or hexagonal head screw) so that the stylus is in a position where it is possible to insert the head in the measurement position in safely (without impacting the work piece).
- Move the measurement head to the measurement position.
- Loosen screws **3** maintaining the friction on them.
- Rotate screw **4** moving the measuring head backwards/forwards until you find the desired position.
- Tighten screws **3**.
- Rotate the screw/knob **4** in the opposite direction to release it and avoid tensioning the adjustment system.
- Rotate screw **2** so that the contact touches the master work piece and the measurement value that appears on the "Mechanical zero-setting" widget (chap. 5.2 on page 88) is approximately zero ( $\pm 10 \mu\text{m}$ ).
- Tighten screw **1**.

Once the mechanical zero-setting operations described above have been completed successfully, carry out the electrical zeroing procedure (see Chap. 5.4 on page 91)

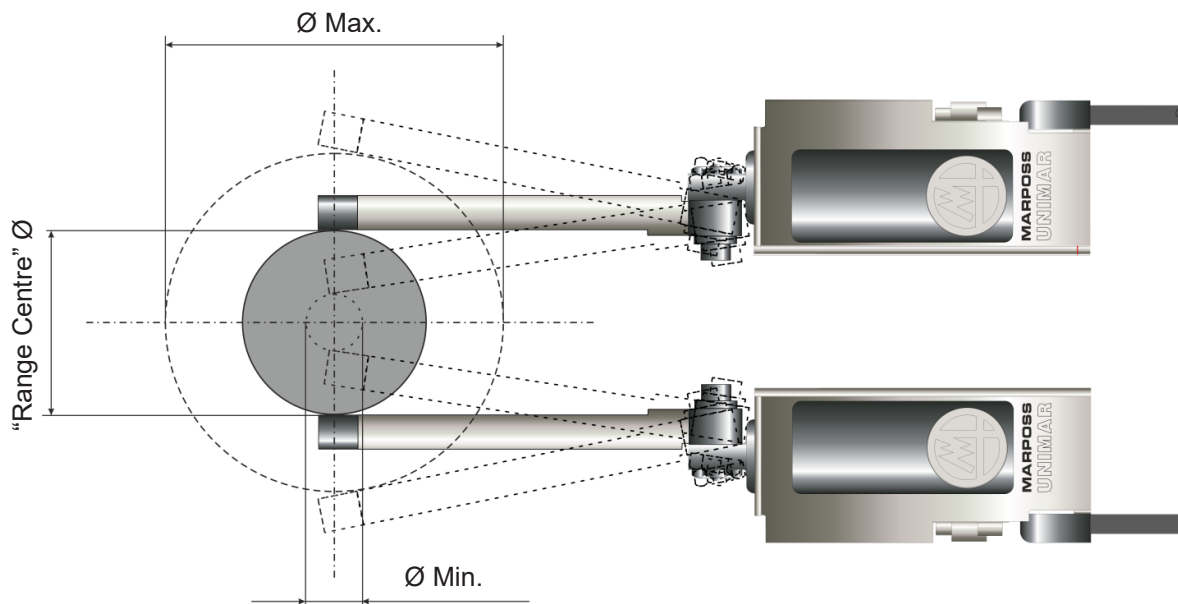
#### 5.1.4 Zero-Setting a Multi-comparator application

In the applications that use **Unimar** model **W** measuring heads it is possible to measure different diameters within a maximum range of  $\pm 12.7$  mm in relation to a diameter defined as "Range Centre", with a single mechanical zero-setting. This operation is made possible by the zero-settings obtained using the "zero shift" function. The value of the "Range Centre" diameter, i.e. the Average diameter of the diameters to be measured, must be defined as follows:

$$\text{Range Centre (Average diameter)} = \frac{\text{maximum diameter} + \text{minimum diameter}}{2}$$

**N.B.**

The "Range Centre" value is the same for all the Pieces/Cycles included in the measurement application configuration and mechanical settings (position obtained following the mechanical zero-setting operation).



*Figg.105. Zero-Setting a Multi-comparator application*

The extension to the maximum diameter and minimum diameter depends on the stroke range of the mechanical adjustments of measurement heads and/or zero-setting guides /contact tips.

**NOTE:**

The maximum range of  $\pm 12.7$  mm is only possible when using  $\geq 120$  mm fingers. When using shorter fingers, refer to the following table.

Finger length L =	Max. range (*) with 2 Unimar W measurement heads
40 mm	$\pm 5.1$ mm
50 mm	$\pm 6.0$ mm
60 mm	$\pm 7.0$ mm
70 mm	$\pm 7.9$ mm
80 mm	$\pm 8.9$ mm
90 mm	$\pm 9.9$ mm
100 mm	$\pm 10.8$ mm
110 mm	$\pm 11.8$ mm
120 mm	$\pm 12.7$ mm

(\*) Maximum range with  $\pm 500$   $\mu$ m measurement range and  $\pm 250$   $\mu$ m zero-setting range (default values) for each measuring head.

1 Mechanical measurement head zero-setting

- Mount a master work piece having a Nominal Diameter that is identical, or as close as possible, to the nominal diameter to be ground in the machine
- Program the Nominal Diameter value.
- Proceed as described above for the Unimar measurement heads.

Once the mechanical zero-setting operations described above have been completed successfully, carry out the electrical zeroing procedure (see Chap. 5.4 on page 91)


[

N.B.  
The electrical zero-setting must be performed on each programmed diameter.


[

N.B.  
For the Fenar-L measurement head mechanical zeroing procedure, refer to the corresponding manual.




5.2 Arm Ratio self-learning procedure




May only be performed in **Manual** mode.



The arm ration self-learning is performed using the widget in Figg.106 on page 88:

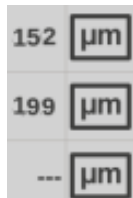
- 
- Use the cursors   to select the transducer (**T1**, **T2**, etc.) used when acquiring the arm ratio.
  - Click **START** to start the procedure for entering the values.

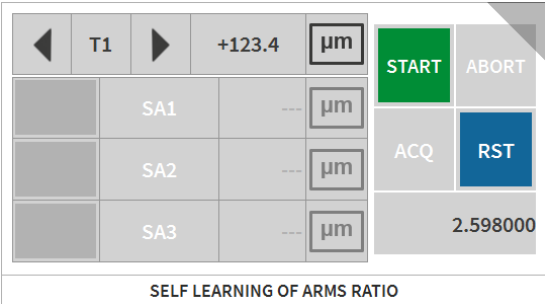
- 
- The fields **SA1**, **SA2** and **SA3** are activated.

- 
- Enter the known value (**SA1**, **SA2**, **SA3**) in the first column on the left. The measurement values correspond to three different positions of the contact.

[

N.B.  
The third sample is **NOT** obligatory, in fact two samples are sufficient providing the values are not the same.

- 
- Click on the SA1, SA2 and SA3 fields in each position to acquire the value read by the transducer.



Figg.106. Arm ratio self-learning widget





- Click **ACQ** so that the software calculates the arm ratio automatically. The operation is complete.



- Click **STOP** during the acquisition to interrupt the operation.



- Click **RST** to restore the original arm ratio.



- Click **ABORT** during the acquisition to abort the operation.
- Repeat the above procedure for all the transducers installed on the application.

5.3 Retraction threshold self-learning procedure



May only be performed in **Manual** mode.

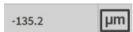


**N.B.**  
There are two possible transducer retraction self-learning modes, A and B.

Mode A



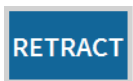
Use this command to acquire the retraction threshold for the selected head. Procedure with **selectable transducer** widget (Figure Figg.107 on page 89).



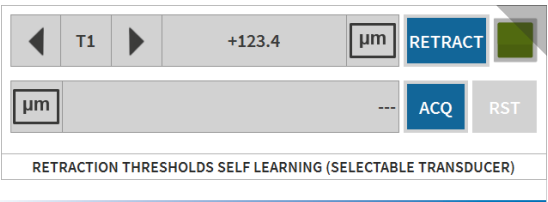
Before the self-learning procedure is carried out, the indicated value refers to the current status (retracted or released value).



Use the cursors **◀▶** to select the transducer (**T1**, **T2**, etc.) used when acquiring the retraction threshold.



- Click on **RETRACT** to activate retraction after it has been self-learned
- The icon changes from **RETRACT** to **RELEASE**. Click on **RELEASE** during this phase, to release the retraction and change the icon to **RETRACT**.



Figg.107. Retraction threshold Self-learning widget (selectable transducer)

**N.B.**  
If the transducer is retracted by an external command (machine managed), the **RETRACT** and **RELEASE** icons are used for checking only. The head must have received the retraction command from the machine already. Otherwise, the following alarm message is displayed.

CODE: MDEFAILEDOP26/10/2018 13:00

[

TRANSDUCER RETRACTION IS FAILED : T 1

CANCELSAVE



- The green LED confirms that the retraction has been performed after clicking on **RETRACT**.



- Click on **ACQ** to acquire the auto-retraction threshold value for the selected transducer. The operation is complete.



- At this point, the self-learned value is displayed.



- Click on **RST** to cancel the self-learned threshold value for the selected transducer.



- It is replaced by a series of dashes (- - -).

Mode B



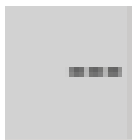
This widget may be used to acquire the retraction threshold for the selected transducer. Procedure with **fixed transducer** widget (Figg.108 on page 90).  
Before the self-learning procedure is carried out, the indicated value refers to the current status (retracted or released value).



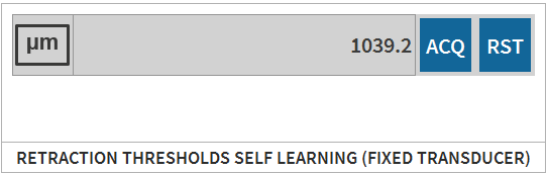
- Click on **ACQ** to acquire the auto-retraction threshold value for the transducer programmed in the widget. The operation is complete.



- Click on **RST** to cancel the self-learned threshold value for the selected transducer.



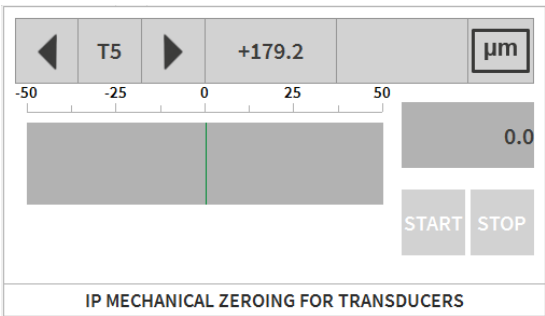
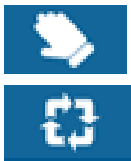
- It is replaced by a series of dashes (- - -).




Figg.108. Retraction threshold self-learning widget (fixed trasd.)

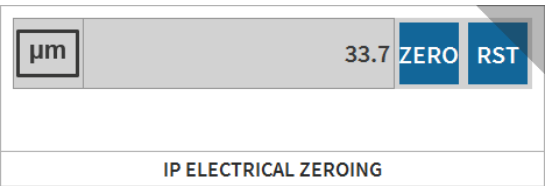
5.4 Electrical zero-setting procedure

May be performed in **Manual** and **Set-up** modes by the operator, or in **Automatic** mode by the PLC.



Figg.109. Mechanical transducer zero-setting widget.

-  Use this command to zero-set the selected measurement electrically. Electrical zero-setting **MUST** be performed:
- In static mode on a master work-piece.
  - In dynamic mode on the master grooved part, i.e. with the master work piece rotating
  - At regular intervals: we recommend performing the electrical zero-setting procedure at the start of each shift.



Figg.110. Electrical zero-setting widget

**N.B.**

Each measuring head that has been defined in the application **MUST** be electrically zero-set for each work cycle that uses it. In the case of double cycles, (measurement A + measurement B), the following operation must be repeated for both measurements. It is possible to zero-set each the individual measurements separately, or both of them simultaneously.

- Proceed as follows:
- Zero-set the measurement heads mechanically. See chap. 5.2 on page 88.
  - In the case of electrical zero-setting, in both **Manual** and **Set-up** modes, use the widget (Figg.110 on page 91) corresponding to the measurement associated with the transducers that were mechanically zero-set previously.



- 1 Once the above operation has been performed, the value representing the electrical correction that the system applied automatically in order to carry out the requested zero-setting procedure is displayed. This value must be within the programmed zero range.
- 2 Click on **ZERO** to activate the zero-setting.

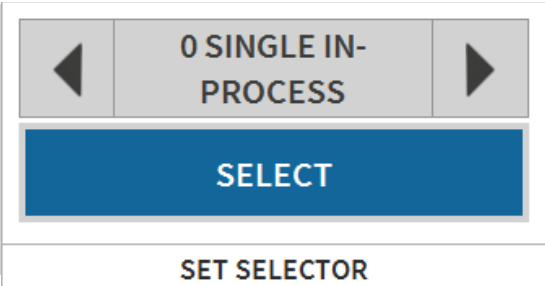


- 3 Click on **RST** to cancel the offsets that the system generated during the last electrical zero-setting procedure. The numerical value is replaced on the display by a series of dashes (- - -), which indicate that the electrical zero-setting procedure has not been performed, or that it has been cancelled. This operation should be carried out after making mechanical modifications to the system; or the maximum available Zero Correction value has been reached (see Chap. 5.5 on page 92).






**N.B.**

When performing the electrical zero-setting procedure we recommend using a screen where both the “Electrical zero-setting” widget (Figg.110 on page 91), and the “Select cycle” widget (Figg.111 on page 91) are present, so that it is possible to select the cycle on which to proceed.

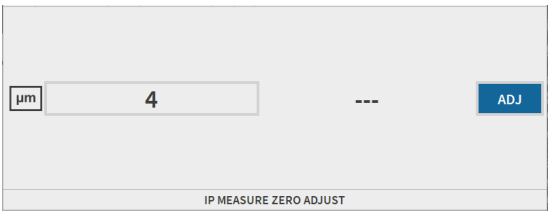


Figg.111. Select cycle widget

5.5 Zero Corrections procedure





This procedure may be carried out in **Automatic, Manual and Set-up** mode (by the operator).



Figg.112. Zero correction widget

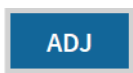
Two different types of correction may be carried, using the following methods:

- 
- **Internal diameters cycle**  
This cycle is used when measuring bores:
    - A **positive** adjustment value = a **decrease** in the diameter of the bore,
    - A **negative** adjustment value = an **increase** in the diameter of the bore,
  - **External diameters cycle.**


This cycle is used when measuring external diameters:




- A **positive** adjustment value = an **increase** in the finished external diameter,
- A **negative** adjustment value = a **decrease** in the finished external diameter.

It is possible to enter the (absolute) correction value, complete with respective polarity ( $\pm$ ), in the area where the value is displayed (using the virtual numerical keypad). Once this has been done, click on “**OK**” to confirm the value and close the keypad.



Click on “**ADJ**” to apply the correction value to the measurement. In the case of dual cycles (**Measurement A** and **Measurement B**), it is necessary to create a dashboard containing two widgets, one for **Measurement A** and one for **Measurement B**.

- 
- By using the Edit function it is possible to select:
- incremental mode
  - execution of the zero correction for the Set

SETTINGS		
LABEL POSITION	BOTTOM CENTER	
CHANNEL	ip01	
MEASURE	MEASURE A	
INCREMENTAL MODE		<input type="checkbox"/>
ZERO ADJUST FOR SET		<input type="checkbox"/>
CANCEL		OK

Figg.113. Zero correction widget.

## 6 ERRORS - WARNINGS - ALARMS

### 6.1 In-Process Application

#### 6.1.1 Errors

Table 6.In-Process Errors			
Code	Message	Cause	Remedy
1	The selected transducer cannot be used	The head selected in the current set has been declared as being absent or not belonging to the hardware configuration.	Restore the missing head or modify the hardware settings.
2	TIR measurement enable not permitted	Function not permitted or incompatible with the type of surface.	Change the surface type.
3	Removal speed measurement enable not permitted	Function not permitted or incompatible with the type of surface.	Change the surface type.
4	Ovality measurement enable not permitted	Function not permitted or incompatible with the type of surface.	Change the surface type.
5	The currently selected integration type is not permitted.	The selected integration type is not permitted for the current set or incompatible with the surface type.	Change the integration type.
6	Measurement programming error checks	At least one of the checks is not in ascending order with respect to the contiguous steps	Program the checks in ascending order
7	Removal speed checks programming error	The checks are not programmed in ascending order	Program the checks in ascending order
8	The measurement RPM value is too large or the revolution percentage is too small	The measurement RPM value or the revolution percentage is inconsistent with the processing capacity of the measurement system	Increase or decrease one of the two parameters
9	DIRAC correction enable not permitted	This requested function is not permitted due to a restriction on the system configuration	None, the only option is to avoid generating this request when inconsistent with the system configuration.
10	Feedback correction not permitted	This requested function is not permitted due to a restriction in the system configuration	None, the only option is to avoid generating this request when inconsistent with the system configuration.
11	The feedback and DIRAC interface numbers must be different	The external feedback and DIRAC correction interface numbers have been set to the same value.	Use two different values for the external feedback and dirac correction interface numbers
12	A cycle uses the same transducer for a single measurement or for both measurements	A measurement with two identical transducers or with two measurements that use the same transducer	Change the transducer used for one of the measurements
13	The surface processing type is not permitted	The selected surface type may not be associated with the programming parameters	Change the surface type.
14	Taper compensation not permitted	No pre-process set paired	Changed the pre-process coupling code

Table 6. In-Process Errors			
Code	Message	Cause	Remedy
15	All the dynamic memory space is in use	No space remains in the memory.	None.
16	The measurement type value is not permitted for internal measurements	Measurement type incompatible with internal measurements	Change the measurement type.
17	The stock removal function is not permitted for internal measurements	The stock removal function is not compatible with internal measurements	Eliminate the internal measurements or the stock removal function
18	The taper function is not permitted for internal measurements	The taper measurement function has been enabled together with another measurement from the set defined for internal elements	Disable the internal measurement or the tape type measurement
19	Static zero-setting is not permitted	Static zero-setting has been enabled for an incompatible surface type	Disable static zero-setting or select another surface type
20	IT is not permitted to enable the polar graph	Function not permitted or incompatible with the selected surface	Change the surface type.
21	Polar graph limits programming error	One of the limits of the polar graph has been programmed so that the lower limit is greater than the upper limit.	Program the polar graph limits in the correct order
22	Error value when programming the measurement checks for the taper measurement	AN error was made during the programming process	Program the taper measurement checks correctly
23	At least on upper area check limit is smaller than the corresponding lower check limit	One of the area checks has been programmed so that the lower limit is greater than the upper limit	Program the area type checks correctly
24	One of the transducers selected for the current set does not belong to the current IPX application	One of the transducers selected for the current set does not belong to the corresponding application	Modify one of the sensor application fields associated with the identification number of the transducer in question on the hardware programming page or modify the identification number of the transducer in the current set.
25	The DIRAC correction sources for measurement A and measurement B are different.	The DIRAC correction sources for measurement A and measurement B are different.	Program the sources so that they are consistent
26	Sample not valid.	The measurement sample is not valid due to the measurement status (OVR...)	Repeat sampling with a valid measurement
27	The self-learned arms ratio value is not valid	Insufficient number of samples or arms ratio value excessively different to nominal value	Repeat sampling
28	The mechanical values have not been set-up correctly	One or more mechanical value has not been entered.	Check whether the information regarding the parts, pins or head have been entered correctly.
29	No sensor has been defined for this head.	No sensors have been selected for the head used in the set.	Select a sensor for the head being used in the set.
30	Outside head measurement range	$(Pco + \text{stock removal} + \text{nominal value}) > (\text{maximum diameter})$ or $(\text{nominal value} - pco) < (\text{minimum diameter})$	Modify the part centring offset (pco) value or one of the two values involved

Table 6. In-Process Errors			
Code	Message	Cause	Remedy
31	The selected transducer belongs to the Protomar	The transducer must not belong to a Protomar	Select a transducer that does not belong to the Protomar
32	Measurement checks number programming error	The number of checks enabled exceeds the number permitted by the configuration	Reduce the number of enabled checks
33	Taper measurement checks number programming error	The number of checks enabled exceeds the number permitted by the configuration	Reduce the number of enabled checks
34	Measurement area checks number programming error	The number of checks enabled exceeds the number permitted by the configuration	Reduce the number of enabled checks

### 6.1.2 Alarms

Table 7. In-Process Alarms			
Code	Message	Cause	Remedy
8001	Electrical zeroing failed.	In automatic mode, when an electrical zero-setting is performed with the measurement value out of the zeroing range.	To reset: disable the machine logic selection, then switch modes from automatic to manual and back to automatic. Check that the measurement value is within the zeroing range, then repeat electric zero-setting.
8002	Retraction failed.	There is an error in the retraction threshold self acquisition procedure requested from a remote control via the field bus.	To reset: disable the machine logic "setup" and "Retraction thresholds self acquisition" selections, then switch to manual mode. Check that the measuring head is retracted.
8003	Measuring mode not allowed for the current set.	This alarm is generated when a measurement option (e.g. TIR, taper) that is not enabled for the current cycle is selected when in automatic mode.	To reset: disable the machine logic selection, then switch modes from automatic to manual. Enable the measurement option for the cycle, then switch back to automatic.
8004	Total feedback correction out of limits.	In automatic mode, when an additional feedback correction exceeds the maximum limits.	to reset: switch modes from automatic to manual and back to automatic. The gauge system will return to the conditions present before the last feedback correction. To reset the corrections, perform electric zero-setting.
8005	Cycle request active with invalid set selected	The 'start cycle' input is enabled in an invalid set.	Activate the 'start cycle' selection after correcting the invalid set.
8006	Too may consecutive rejects.	An error in the control cycle is causing an excessive number of parts to be rejected.	Check the control cycle.
8007	Stock metal removal quantity or percentage not enabled.	The stock metal removal function has not been enabled.	Enable stock metal removal.
8008	The DIRAC correction is too high.	The DIRAC correction exceeds the maximum permitted value and cannot be implemented.	The pre-process measurement must generate a lower value.
8009	Feedback correction from another post-process channel not enabled.	Feedback correction from another post-process channel not enabled.	Enable feedback from PP channel.



Table 7. In-Process Alarms

Code	Message	Cause	Remedy
8010	Excessive taper compensation.	The calculated taper compensation exceeds the maximum value and cannot be implemented.	The passive positioning cycle must be repeated in order to implement the taper compensation.
8011	Insufficient memory for creation of zero-setting log.	The space available in the RAM memory is not sufficient to create the feedback working area.	Contact Marposs customer service
8012	Insufficient memory for creation of zero-setting log archives.	The space available on the virtual disc is not sufficient to create the zero-setting logs data working area.	Contact Marposs customer service
8013	Critical error at start-up		
8014	Critical error in flow control		
8015	Critical error on the Field Bus		
8016	Critical error in processing		
8017	Current part does not match the head range.	One or both measurements are in +OVR or -OVR for the active centring application.	Cancel the alarm and determine why the measurements are in ovr
8018	Cycle not zeroed	The cycle is not zeroed at the start of the cycle	Zero-set the current measurement
8019	Part dimensions incorrect for application of stock removal	The measurement is in +OVR at the start of the cycle or -OVR at the end of the process	Cancel the alarm and determine the reason for the measurement error conditions. Probably the part has incorrect stock values and must be scrapped.
8020	Head not calibrated	It is not possible to perform a cycle if the head has not been calibrated	Calibrate the head
8021	Electrical zero-setting not permitted	Electrical zero-setting not permitted on a Protomar head	Do not perform electrical zero-setting

## 6.2 Post-Process application

### 6.2.1 Errors

Table 8. Post Process errors

Code	Message	Cause	Remedy
1	Syntax error in the measurement equation	The measurement equation includes invalid characters	Check the measurement equation and correct it as necessary
2	The selected transducer cannot be used	The selected transducer has been declared absent or disabled.	Re-enable the transducer.
3	One of the transducers selected from the current set cannot be used by the channel the set is associated with	One of the transducers selected from the current set cannot be used by the channel the set is associated with	Use another transducer or enable it for use with the current channel.
4	Memory allocation error.	Insufficient memory.	Contact Marposs customer service
5	Requested performed signal duration error.	The duration of the "requested performed" signal in a continuous measurement set must be less than the measurement time.	Modify the duration of the "requested performed" signal.
6	Wrong configuration of tolerance limits.	Tolerance limits do not conform: <ul style="list-style-type: none"> <li>Equal tolerances with the same sign (e.g. +100; +100)</li> <li>One-sided tolerance with negative sign.</li> </ul>	Correct the values.



Table 8. Post Process errors

Code	Message	Cause	Remedy
7	<b>Monolateral measurement cannot be divided into classes.</b>	Measurement classes associated with a monolateral measurement.	Either remove the classes or change the measurement into bilateral.
8	<b>Wrong configuration of class limits.</b>	Classes with values not in sequence.	Correct the values.
9	<b>Yellow limits setting error.</b>	The yellow limits do not conform - should be double forward > single forward > single backward or double forward < single forward < single backward.	Please correct the values.
10	<b>Measure Type/Processing Step Incompatible.</b>	The operator has attempted to associate a "variable lengths" measuring step with a measurement which is not of the "Variable length" type (or vice versa).	Change the type of measuring step, or the type of measurement.
11	<b>Variable length measurement associated with the wrong surface processing step.</b>	A variable length measurement has been associated with a prohibited surface processing step.	Change the measurement surface processing step to variable length.
12	<b>Maximum zeroing variation too large.</b>	The value assigned to the periodic zeroing maximum variation range exceeds the tolerance range.	Correct the values.
13	<b>Minimum zeroing variation too large.</b>	The value assigned to the periodic zeroing minimum variation range exceeds the maximum variation or the tolerance range.	Correct the values.
14	<b>Wrong configuration of zeroing limits.</b>	Zeroing limits non conforming: • Equal values with the same sign (e.g. +100; +100) • Value with negative sign for one-sided measurement.	Correct the values.
15	<b>Variable Length measure associated with wrong zeroing step.</b>	A variable length measurement was associated with a different type of zeroing step during the programming phase.	Modify the programmed data by associating the Variable Length measurement with a zeroing step of the same type.
16	<b>Compensation limit exceeds the tolerance range.</b>	The value of the compensation limit exceeds the tolerance range.	Correct the values.
17	<b>Incorrect Trend values.</b>	The slow trend value is lower than fast trend value.	Correct the values.
18	<b>Upper and lower control limit setting errors.</b>	The lower control limit is greater than the upper limit.	Modify the control limit settings.
19	<b>Long Bar measurement step must be unique.</b>	Indicates that more than one measurement step has been used in a set that uses a step for measuring bars.	Modify programmed data by associating each measurement with the same measurement step.
20	<b>One or more of the reference dimensions used for the automatic arms ratio self-learning function on a measurement head are identical.</b>	When programming the values for the automatic arms ratio self-learning function on a measurement head, the dimensions used as references when acquiring different samples were assigned the same value.	Change the value of one or more reference dimension, so that they are all different.

Table 8. Post Process errors

Code	Message	Cause	Remedy
21	The “reference measurement” used for the automatic arms ratio self-learning function on a measurement head is incorrect.	The operator has attempted to acquire the arm ratio for a given transducer using a measurement that does not include the respective transducer in the equation.	Modify the arm ratio acquisition programming for the respective transducer.
22	The type of equation used for the function automatic cycle start recognition function has not been programmed.	The type of equation for the automatic cycle start function has not been programmed, but the function has been enabled.	Correct the type of equation value or disable the automatic cycle start function.
23	The identifier for the TA used in the automatic cycle start recognition function has not been defined.	The identifier for the TA used in the automatic cycle start recognition function has not been defined.	Correct the transducer TA value or disable the automatic cycle start function.
24	One of the transducers selected in the current set, and used in the automatic cycle start recognition function, cannot be used.	One of the transducers selected in the current set, and used in the automatic cycle start recognition function, cannot be used because it does not belong to the set of transducers defined by the application hardware parameters.	Use a different transducer, or add the desired transducer to the application hardware parameters.
25	The two transducers TA and TB selected in the current set, and used in the automatic cycle start recognition function, are identical.	The two transducers TA and TB selected in the current set, and used in the automatic cycle start recognition function, are identical.	Modify at least one of the two transducers TA or TB.
26	The upper and lower threshold limits selected in the current set, and used in the automatic cycle start recognition function, are identical.	The upper and lower threshold limits selected in the current set, and used in the automatic cycle start recognition function, are identical, or the upper limit is lower than the lower limit.	Modify at least one of the threshold limits.
27	The time interval that must elapse between two consecutive measurement steps, before it is possible to execute the associated measurement step, is null. Used in the start cycle recognition function in automatic mode.	The time interval that must elapse between two consecutive measurement steps, before it is possible to execute the associated measurement step automatically, is null.	Correct the parameter value.
28	The measurement step, to be executed when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is null or exceeds the permitted value. Used in the start cycle recognition function in automatic mode.	The measurement step, to be executed automatically when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is null.	Correct the parameter value.

Table 8. Post Process errors

Code	Message	Cause	Remedy
29	One of the measurement steps to be executed automatically when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, has been used multiple times. Used in the start cycle recognition function in automatic mode.	The measurement step, to be executed automatically when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is null.	Correct the parameter value.
30	Number of incorrect step.	The measurement processing or zeroing step is greater than the number of programmed steps.	Check or correct the step number.
31	Two or more measurements that use the same transducer have different zeroing steps but the same processing step.	Error when programming the measurement equations or assigning the measurement processing and zeroing steps.	Modify the measurement equations or reassign the processing and zeroing steps or the zeroable measurement.
32	The measurement step, to be executed when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is greater than the number of processing steps. Used in the start cycle recognition function in automatic mode.	The measurement step, to be executed when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is greater than the number of processing steps. Used in the start cycle recognition function in automatic mode.	Correct the parameter value.
33	The total number of steps to be executed, used for the automatic cycle start recognition function, is incorrect.	The total number of steps to be executed, used for the automatic cycle start recognition function, is incorrect.	Correct the parameter value.
34	The selected thermal probe cannot be used.	The thermal probe in use has been declared absent or has not be configured.	Re-enable the thermal probe or add it to the hardware configuration, if possible.
35	The direct coupling and feedback towards an IN PROCESS channel are using the same channel and the same cycle and measurement values.	It is not possible to use direct coupling and feedback towards an IN process channel with the same channel and the same cycle and measurement values.	Correct the indicated parameter values.
36	The feedback towards an IN PROCESS channel has been enabled for a measurement that is not include in the feedback process.	The feedback towards an in process channel has been enabled for a measurement that is not include in the feedback process.	Include the measurement in the feedback or disable feedback towards the in-process channel.
37	Semantic error in the measurement equation	The measurement equation includes invalid characters	Check the measurement equation and correct it as necessary
38	Two or more measurements that use direct coupling towards an IN-PROCESS channel are connected to the same IP channel and share the same cycle and measurement values.	It is not correct to program two or more measurements that use direct coupling towards an IN-PROCESS channel with the same ip channel and the same cycle and measurement values.	Correct the indicated parameter values.

Table 8. Post Process errors

Code	Message	Cause	Remedy
39	Two or more measurements that use feedback towards an IN-PROCESS channel are connected to the same IP channel and share the same cycle and measurement values.	It is not correct to program two or more measurements that use feedback towards an IN-PROCESS channel with the same IP channel and the same cycle and measurement values.	Correct the indicated parameter values.
40	Two or more measurements that use the same BCD / binary output interface have been programmed with the same request code.	It is not permitted to program two or more measurements that use the same BCD / binary output interface and the same request code.	Correct the indicated parameter values.
41	Requested performed signal duration error.	Modify the duration of the "requested performed" signal.	The duration of the "requested performed" signal in a continuous measurement set must be less than the acquisition time. Measurement + acquisition delay + masking time.
42	Too many transducers used by the current set.	The total number of transducers used by the various measurements in the set exceeds the maximum permitted number.	Check the measurement equations, reducing the number of transducers used in one or several of them.
43	The POST PROCESS cycle coincides with the current cycle in the post process correction parameters.	In a post process correction, the cycle that generates the measurements may not send them to itself.	Modify the PP channel number or the PP cycle.
44	Multiple measurements are using different in process channels for direct coupling (DIRAC) towards an IN-PROCESS channel.	All the measurements must use the same IN-PROCESS channel destination value for direct coupling (DIRAC) towards an IN-PROCESS channel.	Correct the direct coupling (DIRAC) programming parameter values for the IP channels.
45	Multiple measurements are using different IN-PROCESS in process channels for the feedback on an in process channel.	All the measurements must use the same IN-PROCESS channel destination value for feedback an in-process channel.	Correct the feedback programming parameter values for the IP channels.
46	Two or more measurements that use the corrections between the POST PROCESS channels are connected to the same PP channel and share the same cycle and measurement values.	It is not correct to program two or more measurements that use corrections between POST PROCESS channels with the same PP channel and the same cycle and measurement identifier.	Correct the indicated parameter values.
47	Multiple channels are using a different POST PROCESS channel for the corrections towards a post process channel.	All the measurements must use the same POST PROCESS channel destination value for the corrections towards a post process channel.	Correct the correction programming parameter values for the PP channels.
48	A measurement having a variable length type zero-setting step.	A measurement having a variable length type zero-setting step does not permit zero-setting.	Correct the indicated parameter value.
49	A measurement having static type processing and zero-setting steps.	A measurement having static type processing and zero-setting steps is not permitted in a centreless type set.	Correct the indicated parameter values.

Table 8. Post Process errors

Code	Message	Cause	Remedy
50	The measurement step to be executed when the measurement value falls within the interval defined by the threshold limits is a zero-setting step.	The zero-setting step has been selected, erroneously, as the measurement step to be executed when the measurement falls within the interval defined by the threshold limits. Used in the start cycle recognition function in automatic mode.	Correct the indicated parameter value.
51	Serial protocols programming error	Both the Q-SPC and the printer protocols have been enabled	Disable the protocol for Q-SPC or the printer
52	Baud rate for the QSPC protocol incorrect.	The baud rate for the QSPC protocol is different to 9600.	Set the serial device baud rate to 9600 for the QSPC protocol.
53	Data bits for the QSPC protocol incorrect.	The data bits for the QSPC protocol are not set to 8.	Set the serial device data bits to 8 for the QSPC protocol.
54	Set the serial device stop bits to 8 for the QSPC protocol.	The stop bits for the QSPC protocol are not set to 2.	Set the serial device stop bits to 2 for the QSPC protocol.
55	Parity for the QSPC protocol incorrect.	The Parity for the QSPC protocol is not even.	Set the serial device parity for the QSPC protocol to even.
56	Double corr. Upper limit $\leq$ corr. Upper limit or double corr. Lower limit $\geq$ corr. Lower limit.	$D_{cul} \leq ucl$ or $d_{cll} \geq lcl$ for processing feedback counters.	Correct the indicated parameter values.
57	The measurement description is too long.	The measurement description exceeds 10 characters.	Reduce the maximum description length to 10 characters.
58	The measurement step, to be executed when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is less than or equal to one when not permitted. Used in the start cycle recognition function in automatic mode.	The measurement step, to be executed automatically when the measurement value falls within the interval delimited by the threshold values or once the programmed delay period has elapsed, is incorrect.	Correct the parameter value.

## 6.2.2 Warnings

Table 9. Post Process warnings

Code	Message	Cause	Remedy
9001	The current set has not been zeroed.	The current set has not been zeroed or the last zero-setting has been cancelled.	Zero the set.
9002	A part has been lost by the automatic cycle start detector.	A part has been lost by the automatic cycle start detector.	Reduce the part flow rate, if possible, or enable the function at differing time intervals.
9003	While processing the automatic cycle start recognition, the start of a measurement step was detected before the previous step processing was complete.	The speed of the process parts is too high or the values associated with the function have been programmed incorrectly.	Reduce the process parts flow rate or modify the function parameter program values.
9004	The transducer test has been interrupted.	Another function WAS requested while the transducer test was still enabled.	Remember to disable the transducer test before requesting a new function.



Table 9. Post Process warnings

Code	Message	Cause	Remedy
9005	The measurement head arms ratio self-learning has been interrupted.	Another function was requested while an arms ratio self-learning was still in progress.	Remember to terminate the arms ratio self-learning before requesting another function.
9006	The transducer test cannot be performed because the heads are retracted.	The transducer test cannot be performed because at least one of the measurement heads used by the test is retracted.	Release the heads before starting the test.
9007	The transducer test cannot be performed because another function is active.	The transducer test was requested while another function was still active.	Terminate the measurement cycle or arms ratio self-learning before requesting the transducer test.
9008	The feedback data files are corrupt or in a previous version that is no longer supported.	The gauge was switched off while the feedback data were still being processed or saved. Or, the data associated with the installed software version are not compatible with those associated with the previous version.	None, the previous data have been lost, but the software is capable of functioning correctly.
9009	The request has been rejected because an automatic cycle start recognition is in progress.	A new function was requested while the automatic cycle start recognition was still in progress.	Disable the automatic cycle start recognition function before requesting the new function.
9010	The automatic cycle start recognition has been interrupted.	An automatic cycle start recognition session has been interrupted by a retraction request.	Disable the automatic cycle start recognition before requesting a measurement head retraction.
9011	The transducer test has not been executed because it was not programmed.	The transducer test has not been executed because it was not programmed.	Program the transducers test.
9012	The arms ratio self-learning has not been executed because it was not programmed.	The arms ratio self-learning has not been executed because it was not programmed.	Program the arm ratio self-learning
9013	The zeroing log data files are corrupt or in a previous version that is no longer supported.	The gauge was switched off while the zeroing log data were still being processed or saved. Or, the data associated with the installed software version are not compatible with those associated with the previous version.	None, the previous data have been lost, but the software is capable of functioning correctly.
9014	At least one part not present during zeroing.	At least one part present input signal is inactive.	Enable all the requested part present signals.
9015	At least one part not present during cycle start.	At least one part present input signal is inactive.	Enable all the requested part present signals.
9016	Step not permitted because the transducer test is in progress.	Step not permitted because the transducer test is in progress.	Terminate the transducer test.

### 6.2.3 Alarms

Table 10. Post Process warnings

Code	Message	Cause	Remedy
9001	Zero-setting failed	At least one measurement value is outside the programmed limits or the part present signal is absent.	Repeat the zero-setting procedure selecting the correct part present signal in automatic mode.
9002	Set-up mode activated when cycle start active	Set-up mode activated when cycle start active	Change mode without cycle starts active
9003	Set loaded when cycle start active	Set loaded when cycle start active	Load or reload the set without cycle starts active

Table 10. Post Process warnings

Code	Message	Cause	Remedy
9004	Cycle start with step not reset	Cycle start with step not reset	Reset the step
9005	Step not programmed	The requested step has not been programmed in the current set	Select a programmed step, or program the selected step.
9006	Transducers Test failed	The transducer measurement values are outside the programmed limits	Check the transducer
9007	The transducer has not been reset	The transducer has not been reset	Reset the transducer
9008	Retract request rejected.	In "in cycle" retraction mode, a retraction was requested without the set being selected.	Select a valid set before retracting the heads.
9009	Arm ratio acquisition procedure failed	Arm ratio acquisition procedure failed	Check the transducers, the master and the programmed values, then repeat the operation.
9010	FAILED to create at least one feedback data file	The operating system for creating feedback data files has generated an error code	Attempt to load the set again or disable feedback
9011	Failed to read at least one feedback data file	The operating system for reading feedback data files has generated an error code	Attempt to load the set again or disable feedback
9012	Failed to delete at least one feedback data file	The operating system for deleting feedback data files has generated an error code	Attempt to load the set again or disable feedback
9013	Failed to write at least one feedback data file to the shared memory	Failed to write at least one feedback data file to the shared memory	Attempt to load the set again or disable feedback
9014	Failed to create at least one zeroing log data file.	The operating system for creating a zeroing log data file has generated an error code	Attempt to load the set again or disable zeroing.
9015	Failed to read at least one zeroing log data file.	The operating system for reading a zeroing log data file has generated an error code	Attempt to load the set again or disable zeroing.
9016	Failed to delete at least one zeroing log data file.	The operating system for deleting a zeroing log data file has generated an error code	Attempt to load the set again or disable zeroing.
9017	Failed to write at least one zeroing log data file to the shared memory	Failed to write at least one zeroing log data file to the shared memory	Attempt to load the set again or disable zeroing.
9018	The thermal probe zeroing failed.	The probe values are outside the range of configured values.	Repeat the zeroing procedure.
9019	Too many PP channels are attempting to send direct coupling (DIRAC) information on the IP channels.	The system is not capable of handling too many mixed connections.	Correct the parameter values corresponding to the mixed PP-IP channel connections for direct coupling (DIRAC).
9020	Too many pp channels are attempting to send feedback information on the IP channels.	The system is not capable of handling too many mixed connections.	Correct the parameter values corresponding to the mixed PP-IP channel connections for feedback.
9021	Critical error on the processed data		
9022	Critical error in flow control		
9023	Critical error in processing		
9024	Critical error on the fieldbus		

Table 10. Post Process warnings

Code	Message	Cause	Remedy
9025	Critical error on the tracer		
9026	Too many pp channels are attempting to send correction information on other PP channels.	The system is not capable of handling too many connections between channels.	Correct the parameter values corresponding to the mixed PP channel connections for the corrections.
9027	The post process correction has exceeded the maximum permitted value	This alarm occurs in automatic mode, when the measurement from a set of another post process channel exceeds the maximum permitted value for the post process correction.	To reset this alarm, switch from automatic to manual mode, and then back to automatic mode. The measurement system resets the post process correction implemented previously.
9028	Input in automatic mode when cycle start active	Input in automatic mode when cycle start active	Change mode without cycle starts active.



**Note:**

[illegible]

