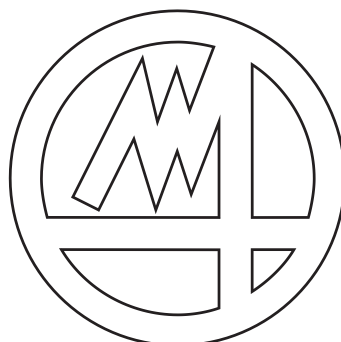


BUILT

**MONITORING
VIA ACOUSTIC SIGNALS
AE**



MARPOSS

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1 MAIN NAVIGATION CHART

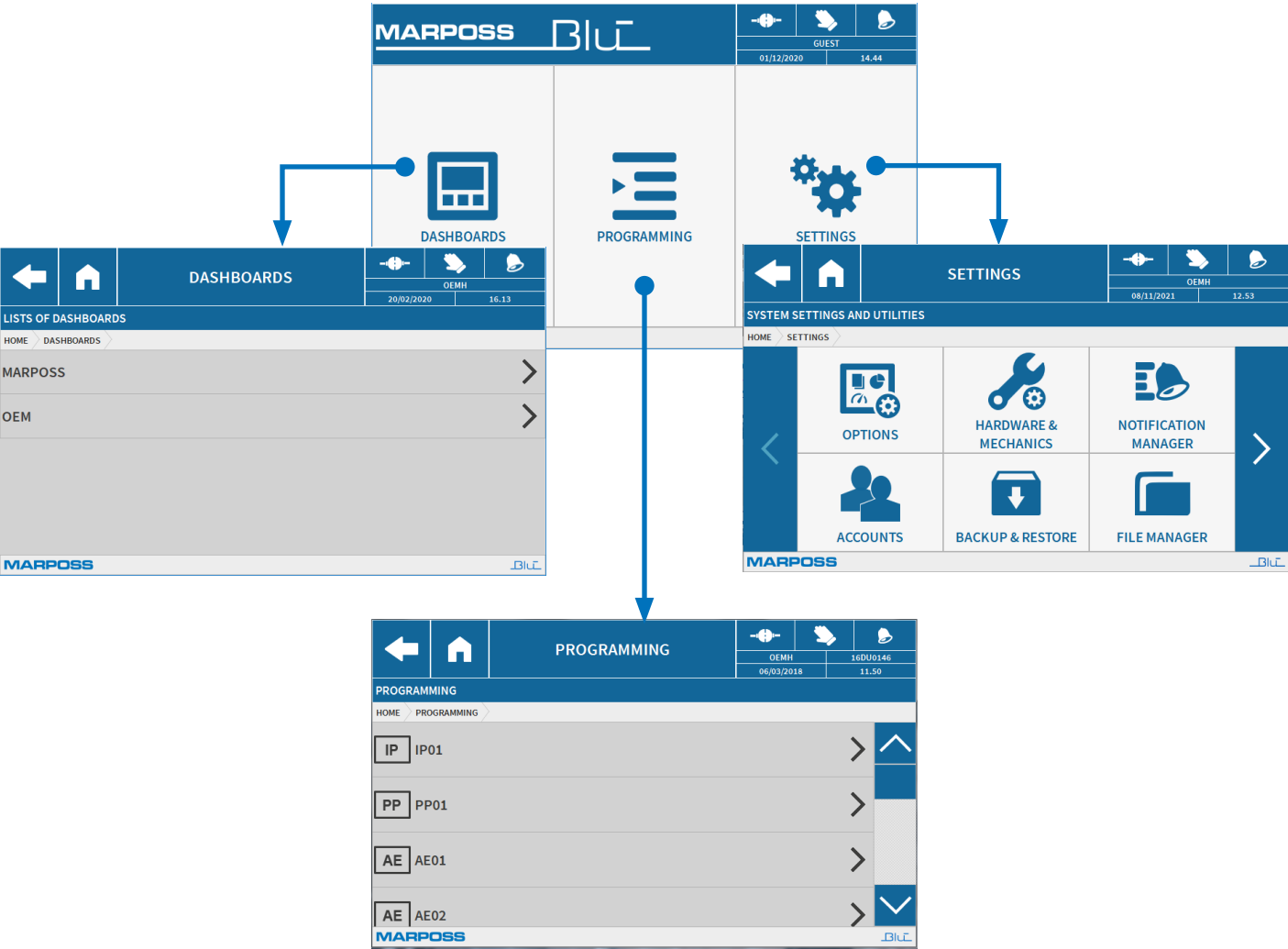
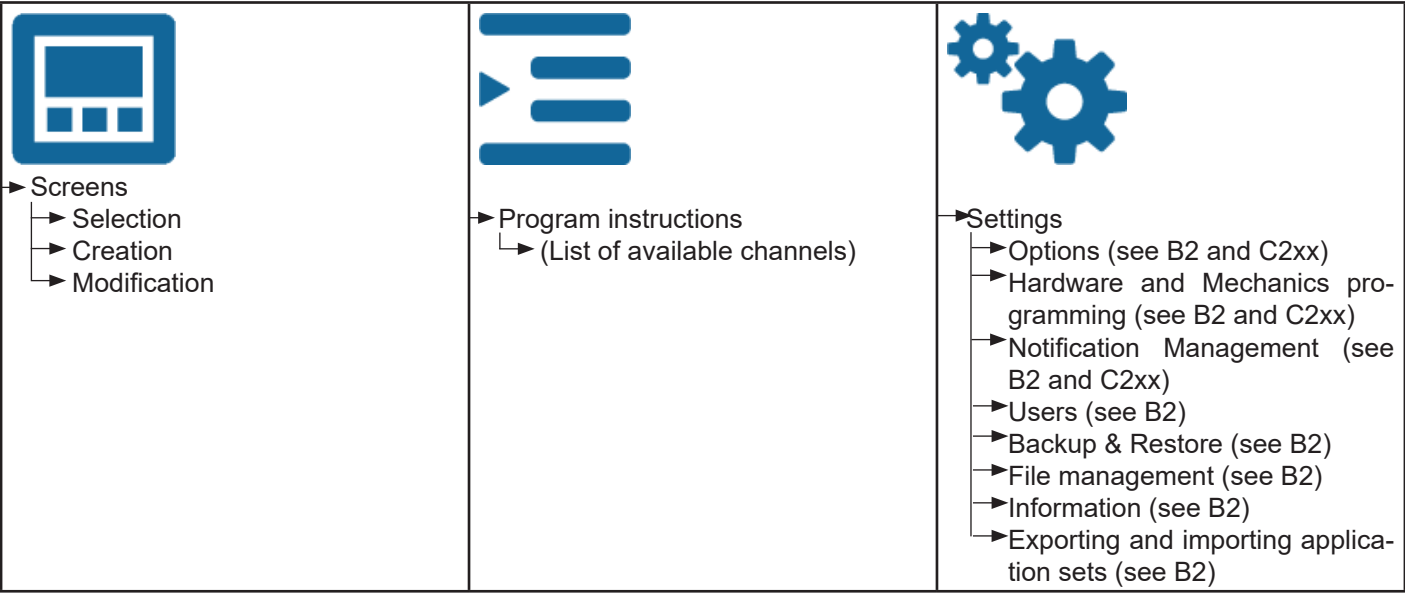


Fig.1. Main menus map



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2 SETTINGS



2.1 Options



See 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. The **HW Programming** screen corresponding to the **AE** node is described below.

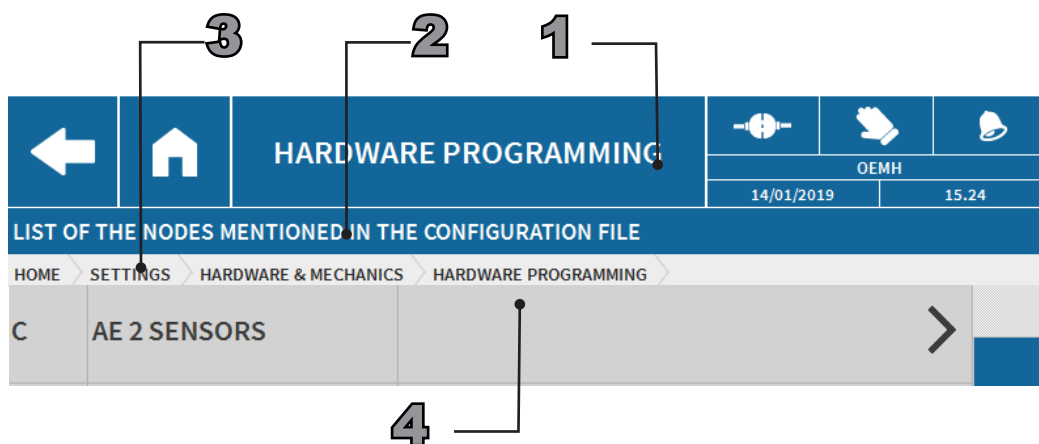


Fig.2. Main AE 2 sensors acoustic note hardware programming dashboard

Screen title: **HW Programming**.

1. Messages and descriptions area: **List of nodes mentioned in the configuration file.**
2. Navigation path: *Home > Settings > HW Programming*
3. Working area: List of installed nodes. In the example:
 - **AE 2 SENSORS.** Acoustic application with two piezoelectric type sensors.

2.2.1 Setting up an AE type2 Sensors acoustic node

Use the **AE 2 Sensors** dashboard to set-up the parameter sensors and obtain information about the connected node.

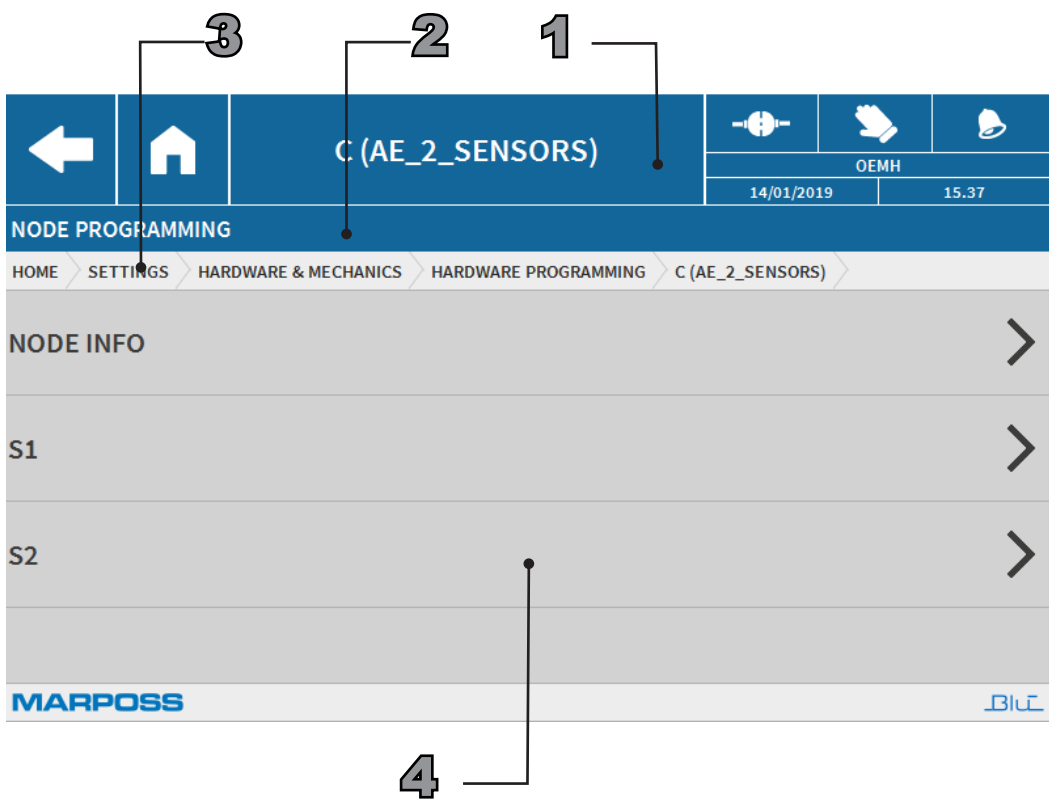


Fig.3. AE2 Sensors acoustic node set-up dashboard

- 1. Screen title: **AE 2 Sensors**
- 2. Messages and descriptions area: **Programming the node.**
- 3. Navigation path: *Home > Settings > Hardware and Mechanical > HW Programming > C-AE2 Sensors.*
- 4. Working area:
 - **Node information.** Use this command to enable the function node and access the corresponding identification information.

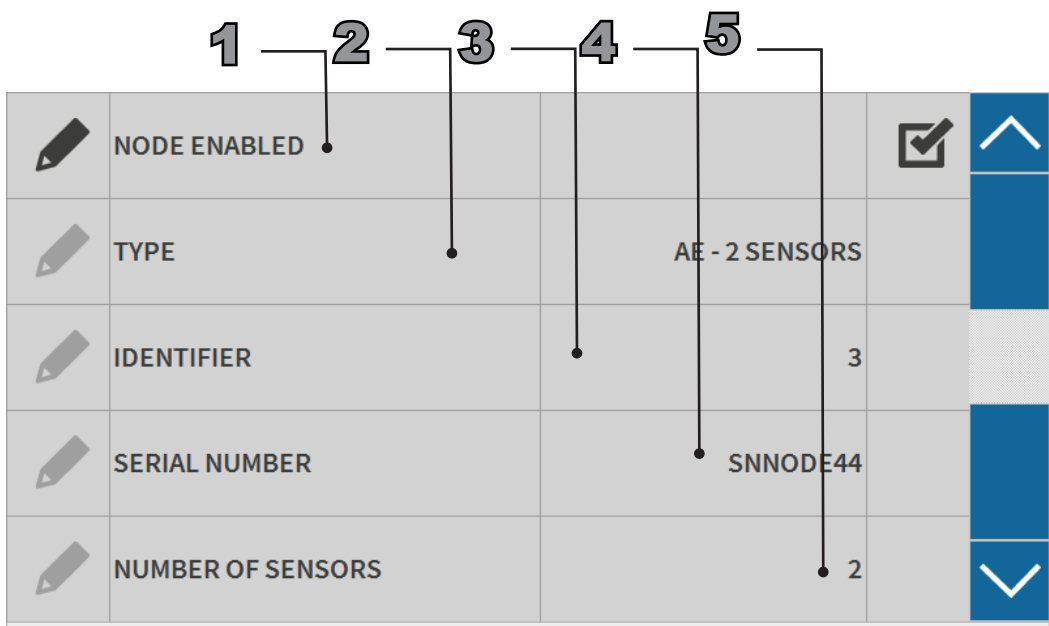


Fig.4. Function node information dashboard

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 enabled on the node.
- **S1-S2.** Customisable settings for the selected sensor.

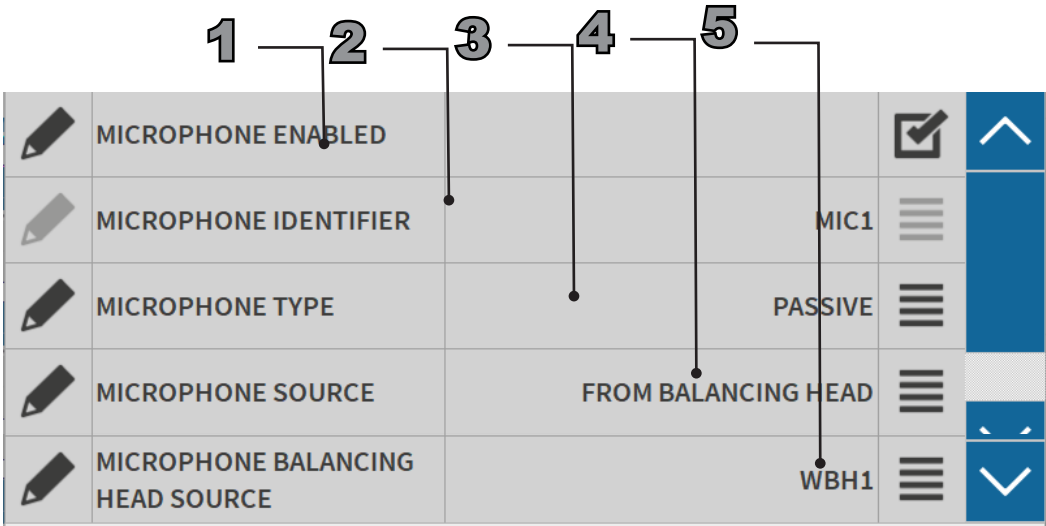


Fig.5. AE 2 Sensors acoustic node properties dashboard

1. **Microphone enabled.** Enables the microphone.
2. **Microphone ID.** Selects which microphone to link to the sensor.

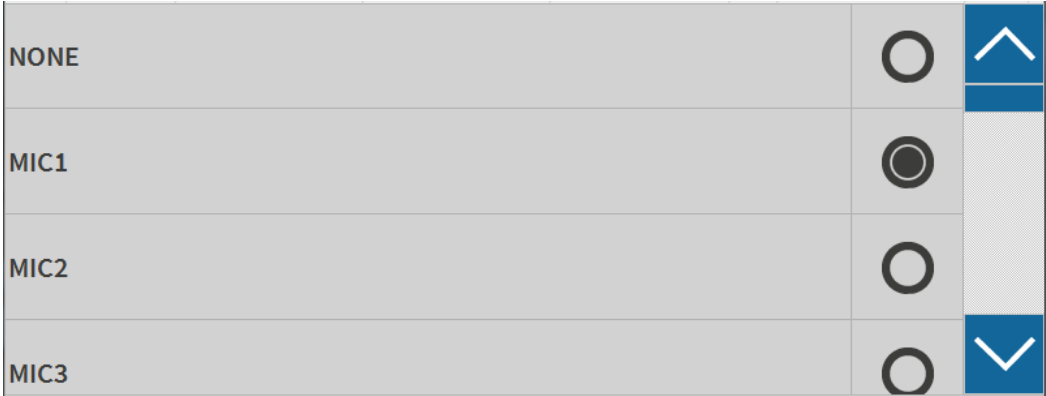


Fig.6. Microphone to link selection

3. **Type of microphone.** Sets the microphone in active or passive mode.

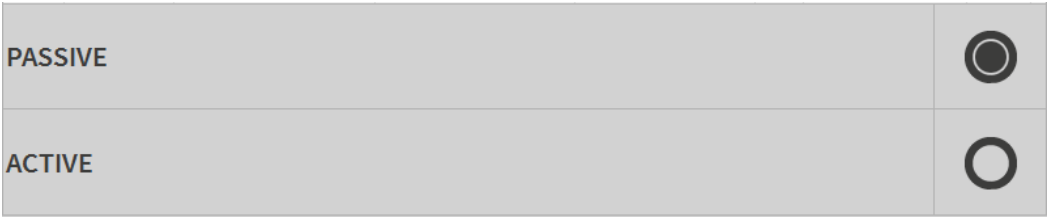


Fig.7. Microphone operating mode selection

4. **Microphone source.** Selects the type of source linked to the microphone selected.

LOCAL	<input type="radio"/>
FROM BALANCING HEAD	<input checked="" type="radio"/>

Fig.8. Type of source linked to the microphone selected.

5. **Balancing head microphone source.** Selects the type of balancing head used as the source for the selected microphone.

WBH1	<input checked="" type="radio"/>
WBH2	<input type="radio"/>
WBH5	<input type="radio"/>

Fig.9. Selects the type of balancing head used associated with the selected microphone.

2.3 Notification management



See part B2.

2.4 Users



See part B2.

2.5 Backup & Restore



See part B2.

2.6 File management



See part B2.

2.7 Information



See part B2.

3 PROGRAMMING

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

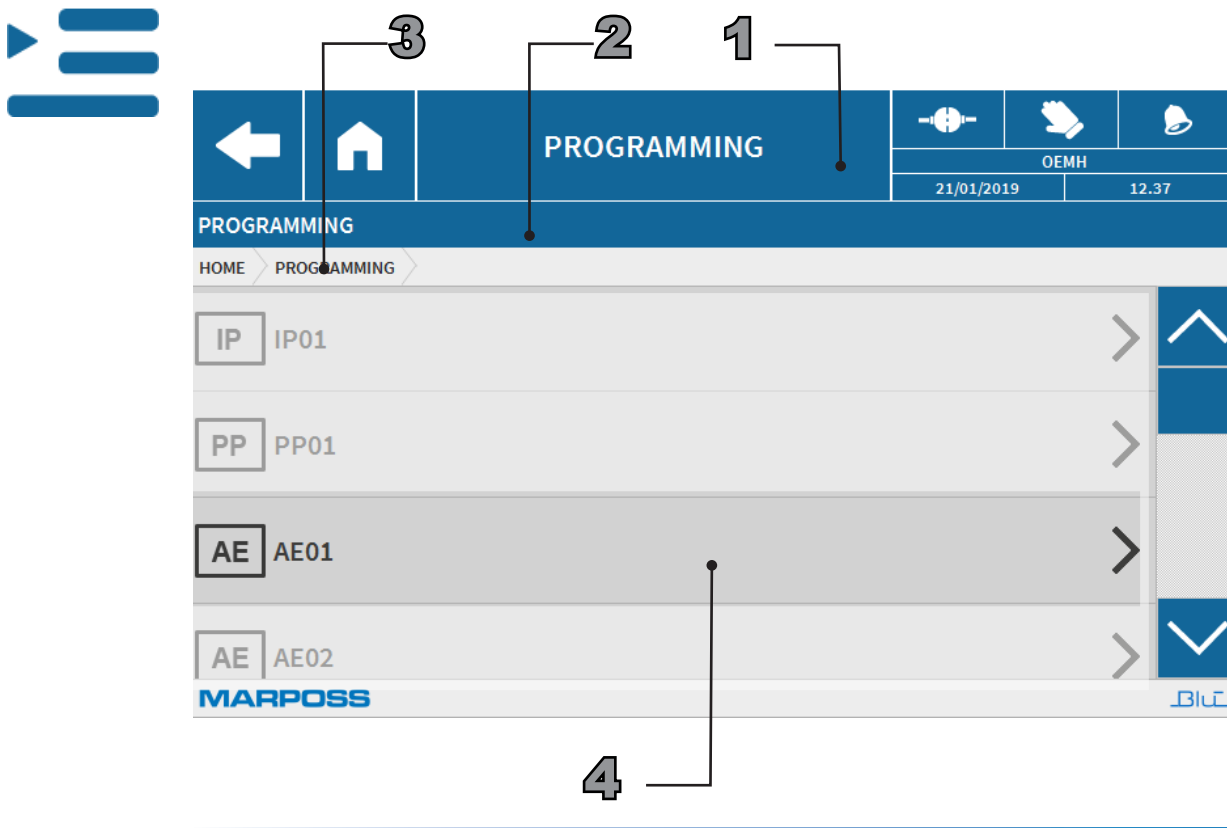


Fig.10. Available nodes for installed system screen

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:
 - **AE0X**. Acoustic application

3.1 List of cycles

AE Use the **List of Cycles** present in the Channel screen (e.g. **AE01**) to add the sets available in the List of Sets.

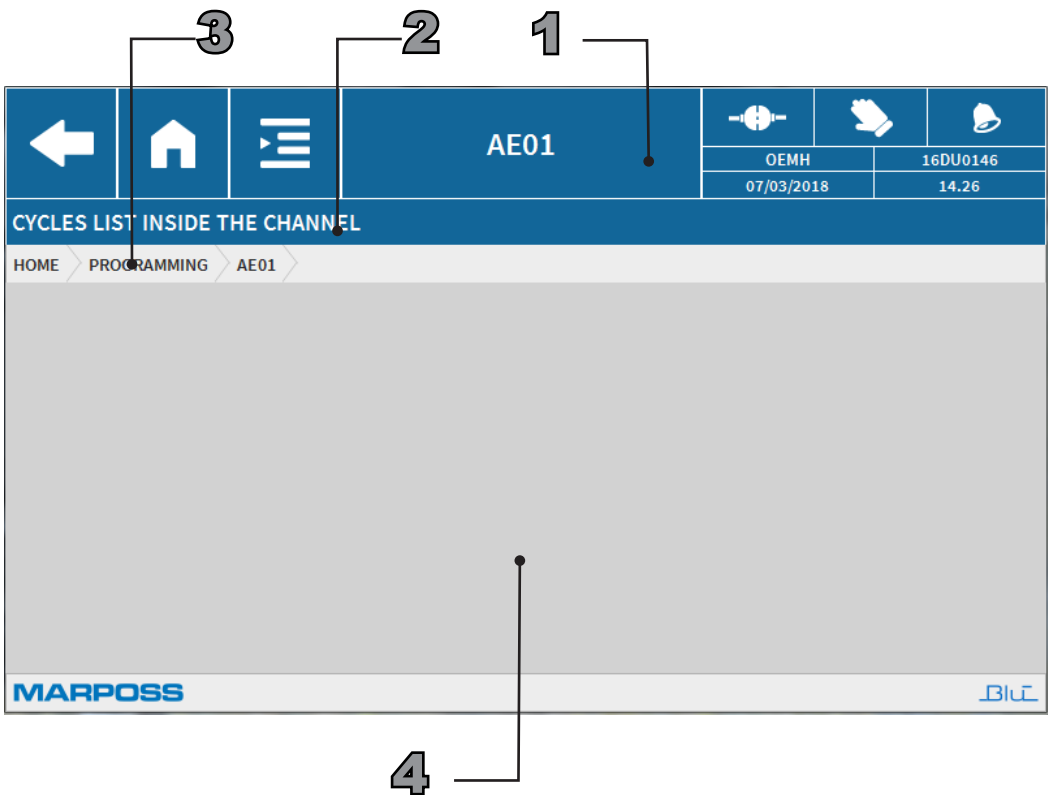


Fig.11. Screen displaying a list of the cycles present in a channel before adding a set

- 1. Screen title: **AE0X** (name of the channel).
- 2. Messages and descriptions area: **List of cycles present in the channel**.
- 3. Navigation path: *Home > Programming > AE0X* (name of the channel).
- 4. Working area: List of selected sets. In the example: no set added.

	0	GAP - CRASH	>
	0	GAP - CRASH - SURVEY	>
	0	ACOUSTIC INTEGRATED INSIDE ROTOR	>

Fig.12. Screen displaying a list of the cycles present in a channel after adding a set

3.2 Available sets



Use the **List of Sets** screen to select those to be included in the cycles list.

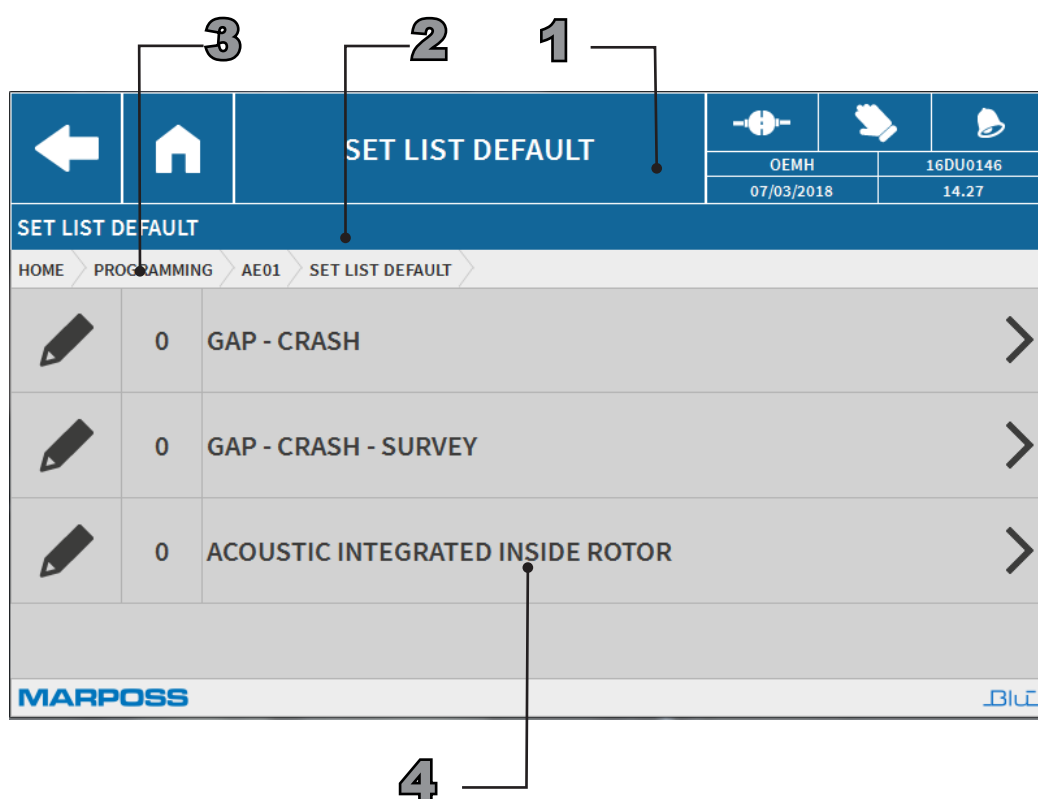


Fig.13. List of available sets

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:
 - **Gap - Crash**. The set can be used to manage two logic outputs (GAP and CRASH), associated to the monitored acoustic signal.
 - **GAP** function: it is usually used for:
 - **Grinding wheel<->work-piece contact check**. Detects the contact between the grinding wheel and the work-piece to change from the approach speed to the material intake speed.
 - **Grinding wheel<->dressing unit contact check**. Detects the contact between the grinding wheel and the dressing unit to execute the correct dressing cycle.
 - **Other functions**: The GAP can be used also for other functions, such as determining the position and dimensions of the grinding wheel or the work-piece.
 - **CRASH** function: it is usually used for:
 - **Detecting collisions between the machine parts**.
 - **Gap - Crash - Monitoring** Performs all the functions of the previous set, adding two logic outputs (**SV1** and **SV2**) to the GAP and CRASH outputs.
 - **SURVEY** function: it is usually used for:
 - **Dressing continuity check (grinder dressing)**. By monitoring the acoustic emissions during the grinder dressing process it is possible optimize this cycle. The profile of the acoustic emission is used to establish whether the dressing cycle has been completed.
 - **Acoustic sensor integrated into the rotor**. If the balancing head is equipped with an integrated acoustic sensor it is necessary to use the set.

3.3 Programmable data

Use the dashboard associated with each individual set (e.g. **Gap - Crash - Survey** the data of the set selected are customised).

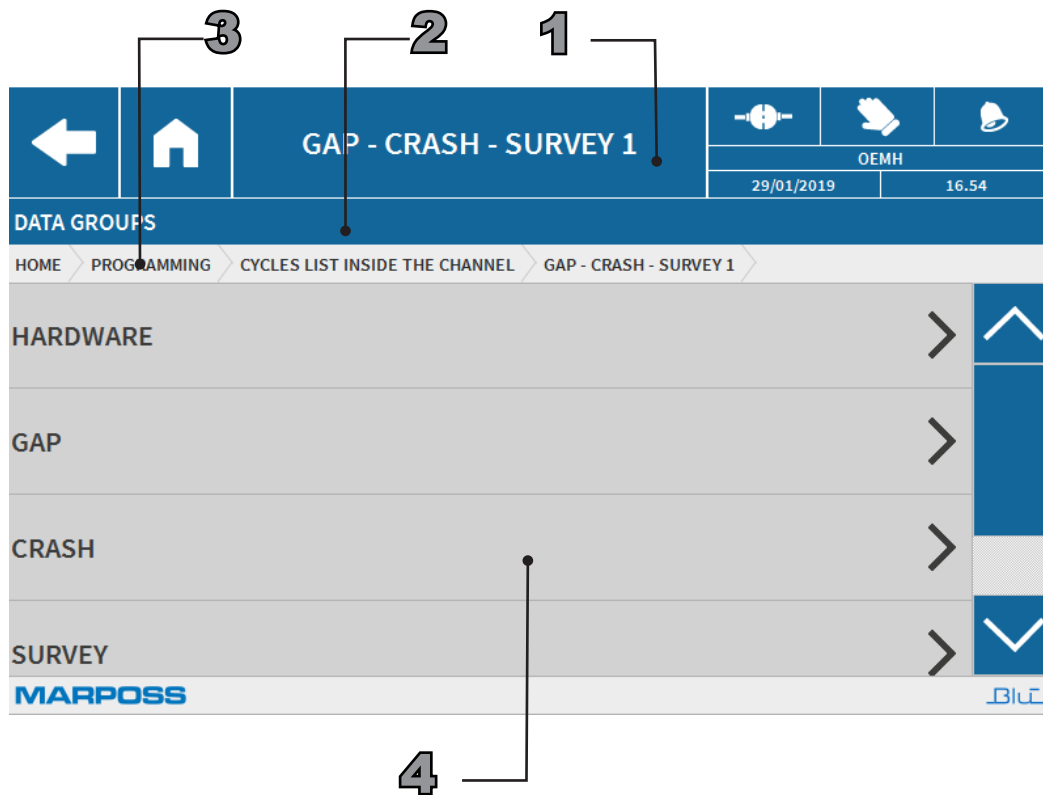


Fig.14. Programmable values screen

1. Screen title: **Gap - Crash - Survey** (example of a set)
2. Messages and descriptions area: **Data groups**.
3. Navigation path: *Home > Programming > AE01 (e.g.) > Gap - Crash - Survey*
4. Working area:
 - **Hardware.**
 - **Gap.**
 - **Crash.**
 - **Monitoring.**

3.3.1 Hardware

Available for the following sets:

- Gap - Crash;
- Gap - Crash - Survey;
- Acoustic sensor integrated into the rotor.

The **Hardware** dashboard is used to set the operating fields of the microphone.

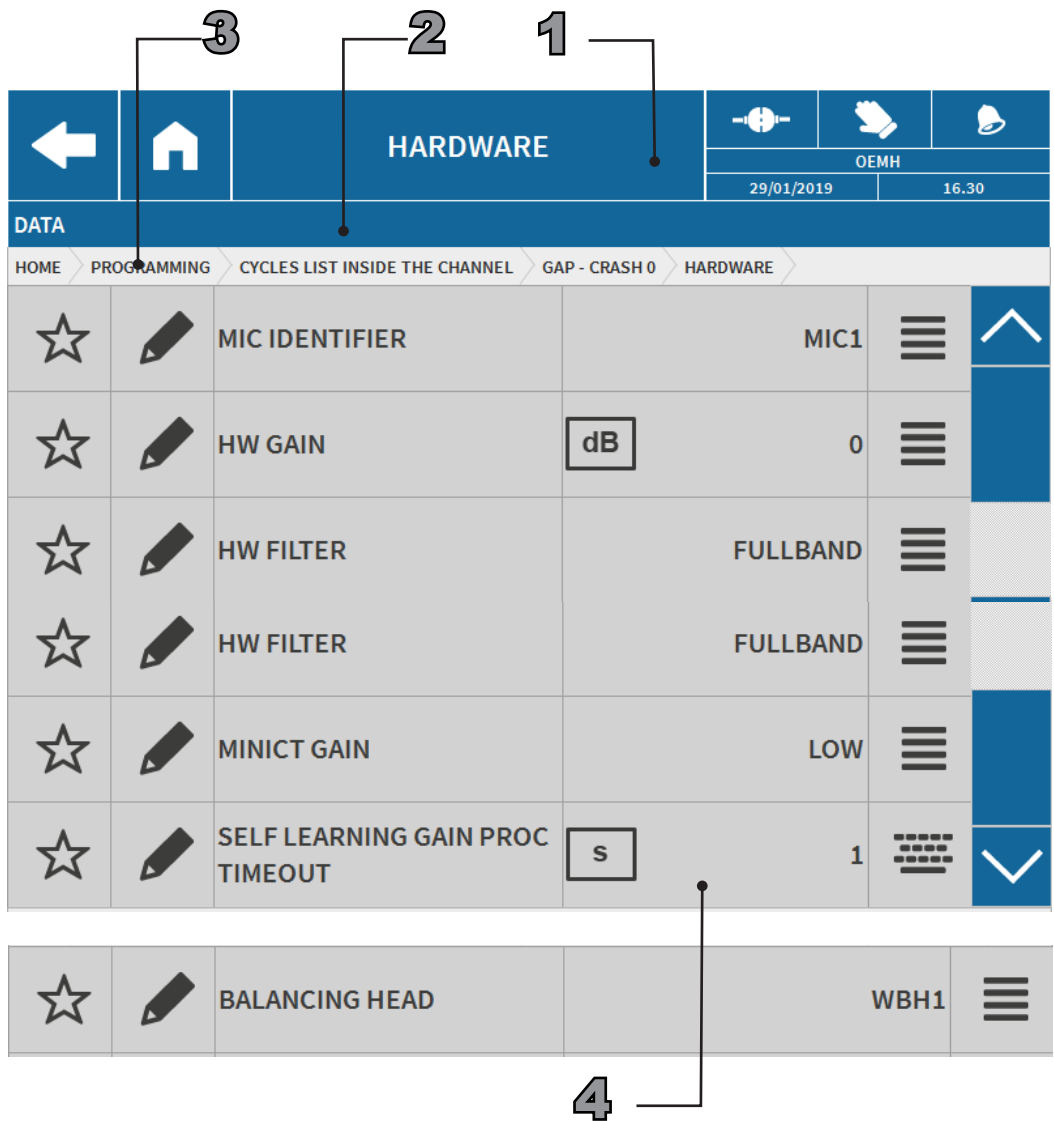


Fig.15. Hardware data dashboard

1. Screen title: **Hardware**
2. Messages and descriptions area: **Data**.
3. Navigation path: *Home > Programming > AE01 (name of the channel) > Gap-Crash-Survey (example) > Hardware*.
4. Working area:
 - **Microphone ID**. Selects which microphones in the configuration to use.

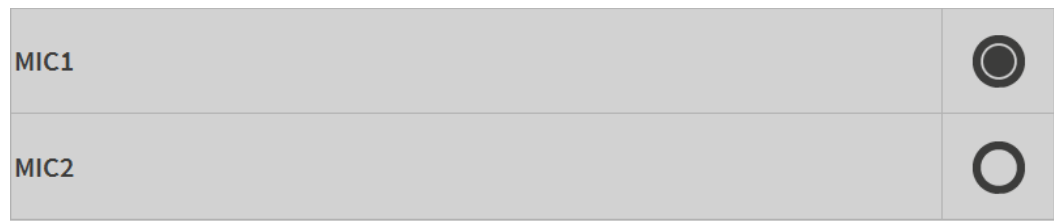


Fig.16. Microphone selection dashboard

- **Hardware gain.** Sets the gain of the HW stage.
 - The gains allowed are: 0dB, 10dB, 20dB, 30dB and 40dB. The hardware gain can be used to amplify the signal from the microphone, before its analogue/digital conversion. The hardware gain should be programmed so that it never exceeds half of the dynamic available in the worst working conditions (at maximum noise, the HW-STAGE value must be less than 30).


0	<input checked="" type="radio"/>	
10	<input type="radio"/>	

Fig.17. Gain value selection dashboard

- **Hardware filter.** It is used to set a "High Pass" hardware filter to limit the low frequency noise components, typically affected by the mechanical disturbances of the process, which could saturate the analogue/digital converter that works on the input signal from the microphone. The values allowed are: Fullband, HP, HF:
 - **Fullband.**
 - **HP.** High Pass Filter with cut off frequency at 80 kHz.
 - **HF.** High Pass Filter with cut off frequency at 400 kHz.

FULLBAND	<input checked="" type="radio"/>
HP	<input type="radio"/>
HF	<input type="radio"/>

Fig.18. Parameter selection dashboard

- **Minict Gain.** Permits the operator to set-up the amplification factor (programmable gain) applied to the signal from the acoustic acquisition channel associated with the remote sensor, built into a balancing head.
 - **Low.** Low (default)
 - **Med.** Medium.
 - **High.** High.

LOW	<input checked="" type="radio"/>
MED	<input type="radio"/>
HIGH	<input type="radio"/>

Fig.19. Minict gain level selection dashboard

- **ACQ auto type.** Allows for gain and filtering parameters to be set, to be used to calculate the best "Contact signal/Background noise" ratio in the set up procedure. The following options can be selected:
 - **No AGC.** Changes the "SW Gain-GAP" parameters, "GAP upper/lower frequency" and "SW Gain-CRASH".
 - **AGC Fullband.** As well as the parameters foreseen in "**No AGC**", the "Hardware Gain" is also modified, by analysing the acoustic signal in full band. The set-up procedure automatically sets the "Fullband" hardware filter.
 - **AGC HP.** As well as the parameters foreseen in "**No AGC**", the "Hardware Gain" is also modified, by analysing the acoustic signal with a cut-off frequency at 80 kHz. The set-up procedure automatically sets the hardware filter in "HP".
 - **AGC HF.** As well as the parameters foreseen in "**No AGC**", the "Hardware Gain" is also modified, by analysing the acoustic signal with a cut-off frequency at 400 kHz. The set-up procedure automatically sets the hardware filter in "HF".

NO AGC	<input checked="" type="radio"/>	⬆
AGC FULLBAND	<input type="radio"/>	
AGC HP	<input type="radio"/>	
AGC HF	<input type="radio"/>	⬇

Fig.20. Selection dashboard for the kind of parameter to be used

- **Balancing head.** This function may be used to select which of the available balancing heads to use.

WBH1	<input checked="" type="radio"/>
WBH2	<input type="radio"/>
WBH5	<input type="radio"/>

Fig.21. Select coupling with balancing head dashboard

3.3.2 GAP

Available for the following sets:

- **Gap - Crash;**
- **Gap - Crash - Survey.**
- **Acoustic sensor integrated into the rotor.**

The **Gap** dashboard is used to set the GAP measurement check parameters.

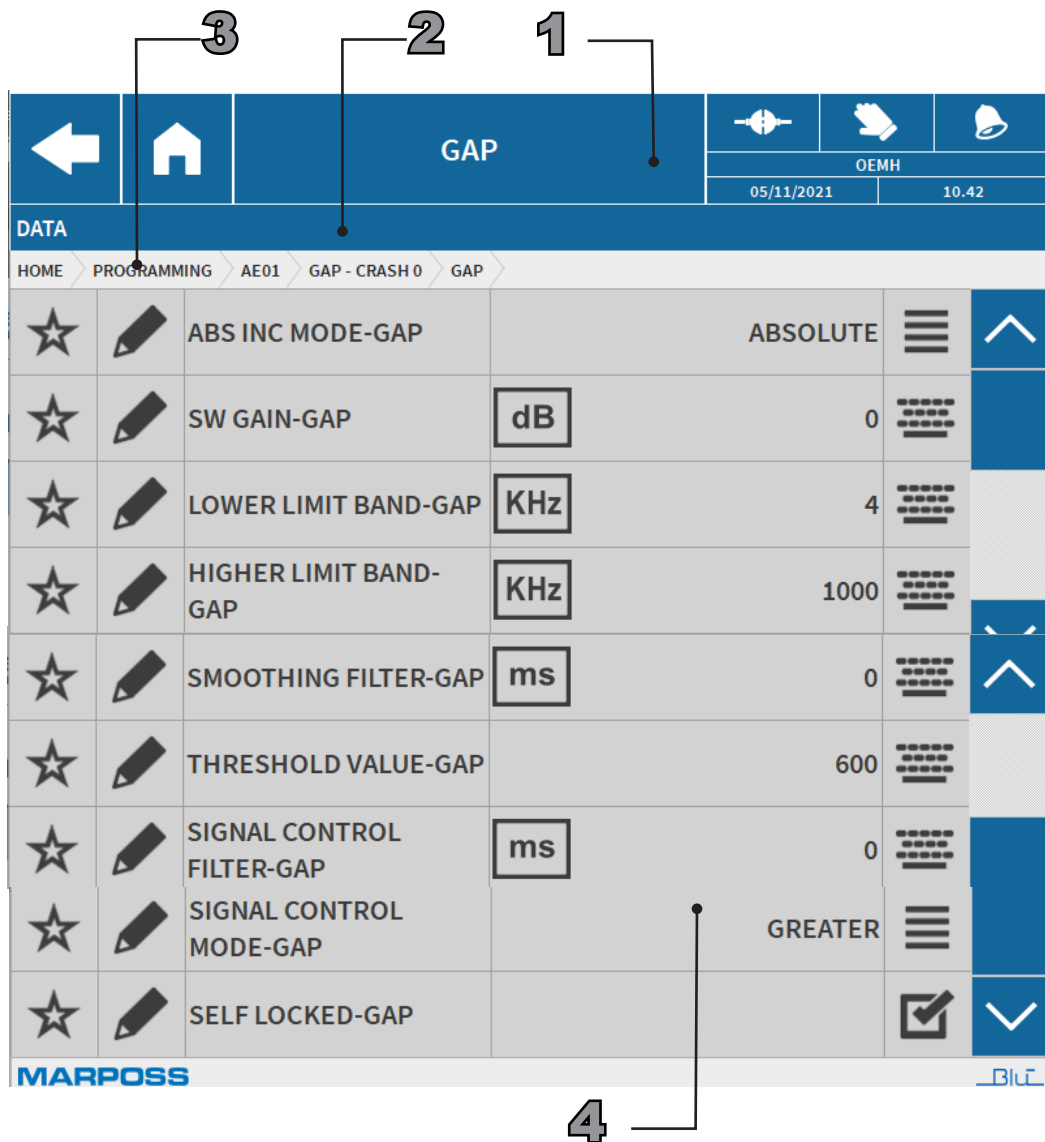


Fig.22. Hardware data dashboard

1. Screen title: **Gap**
2. Messages and descriptions area: **Data**.
3. Navigation path: *Home > Programming > AE01 (name of the channel) > Gap-Crash (example) > Gap*.
4. Working area:
 - **ABS INC mode-GAP**. Selects the type of signal processing: absolute (ABS) or incremental (INC).
 - **Absolute** = *Absolute mode*. The absolute noise value is detected;
 - **Incremental (MAX)** = *Maximum value incremental mode*. The maximum noise increment in relation to the background noise condition acquired in the zero-setting phase.

- **Incremental (MEAN)** = *Mean value incremental mode*. The mean noise increment in relation to the background noise condition acquired in the zero-setting phase.

ABSOLUTE	<input checked="" type="radio"/>
INCREMENTAL (MAX)	<input type="radio"/>
INCREMENTAL (AVERAGE)	<input type="radio"/>

Fig.23. Signal processing selection dashboard

- **SW-GAP gain**. Defines the software gain on the GAP channel of the acoustic signal (AE). Gain is expressed in dB; an increase of 6dB is equivalent to double the measured noise signal. The AE gain must allow the signal to exceed the **GAP check limit**. **Value programmable from 0 ÷ 100**.
- **Lower frequency-GAP**. Sets the minimum processing frequency [kHz] of the GAP measurement: below which either there is no useful signal contribution or the background noise of the machine is excessive. **Default value: 4 kHz**.
- **Upper frequency-GAP**. Sets the maximum processing frequency [kHz] of the GAP measurement: above which either there is no useful signal contribution or the background noise of the machine is excessive. **Default value: 1000 kHz**.
- **Signal filter-AP**. Filtering capacity of the ripple on the GAP signal. It is defined by indicating the time constant of the "low pass" digital filter applied to the GAP signal. **Values allowed: from 0 to 250 ms**.

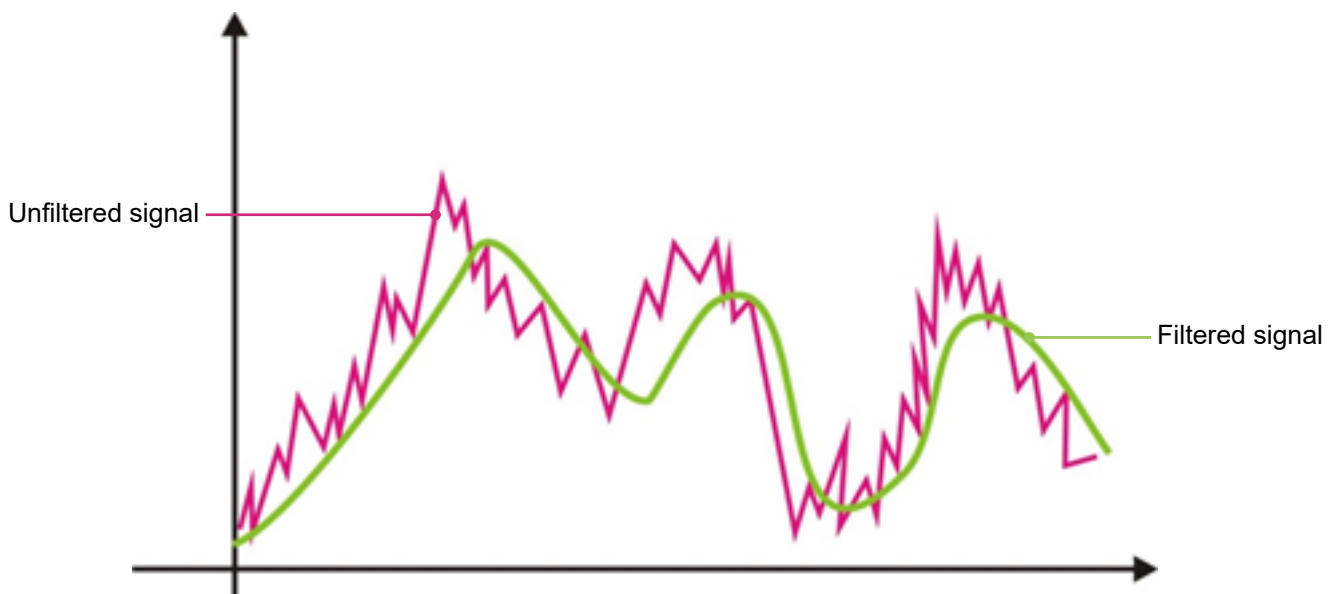


Fig.24. Ripple filtering effect on the GAP signal

- **Self-locking output-GAP**.
☒ = Self-locking control. The output control, once activated, remains active during the execution of the cycle.
☐ = NON self-locking control. The output control is reset when the check condition is not checked.
- **Check limit-GAP**. It is the limit for the comparison of the GAP signal on which to check the **GAP check condition**. **Values allowed: from 0 to 999 (per thousand)**.

- **Check filter-GAP.** Minimum permanence time of the **GAP check condition**, to activate the GAP output. Increasing the value avoids false GAP conditions caused by unwanted noise levels. A few milliseconds are usually enough for the optimal management of the signal. **Values allowed: from 0 to 20000 ms (default 2 ms).**

WARNING

The filter delays the output of the GAP signal from the electronic unit to the machine PLC. Excessive values could damage machine devices!

- **Check condition-GAP.** Four signal comparison modes can be selected with the **GAP check limit**:
 - **GREATER** = True condition if the signal value is greater than the limit value.
 - **LESS** = True condition if the signal value is less than the limit value.
 - **RISE** = True condition if the signal cross the limit during the cycle, starting from a lower value to a higher value.
 - **FALL** = True condition if the signal cross the limit during the cycle, starting from a higher value to a lower value.



GREATER	<input checked="" type="radio"/>	
LESS	<input type="radio"/>	
RISE	<input type="radio"/>	
FALL	<input type="radio"/>	

Fig.25. Limit crossing signalling selection dashboard

3.3.3 Crash

Available for the following sets:

- **Gap - Crash;**
- **Gap - Crash - Survey.**
- **Acoustic sensor integrated into the rotor.**

The **Crash** dashboard is used to set the noise limit parameters.



Fig.26. Hardware data dashboard

1. Screen title: **Crash**
2. Messages and descriptions area: **Data**.
3. Navigation path: *Home > Programming > AE01 (name of the channel) > Gap-Crash (example) > Crash*.
4. Working area:
 - **ABS INC mode-CRASH**. Type of detection of the signal from the acquisition channel:
 - **Absolute** = *Absolute mode*. The absolute noise value is detected. Setting cannot be changed;
 - **SW gain-CRASH**. Defines the software gain on the CRASH channel of the acoustic signal (AE). Gain is expressed in dB; an increase of 6dB is equivalent to double the measured noise signal. The AE gain must allow the signal to exceed the **CRASH check limit**. **Value programmable from 0 ÷ 100**.
 - **Lower frequency-CRASH**. Sets the minimum processing frequency [kHz] of the CRASH measurement: below which either there is no useful signal contribution or the background noise of the machine is excessive. **Default value: 4 kHz**.

- **Upper frequency-CRASH.** Sets the maximum processing frequency [kHz] of the CRASH measurement: above which either there is no useful signal contribution or the background noise of the machine is excessive. **Default value: 1000 kHz.**
- **Signal filter-CRASH.** Filtering capacity of the ripple on the CRASH signal. It is defined by indicating the time constant of the "low pass" digital filter applied to the CRASH signal. **Values allowed: from 0 to 250 ms.**

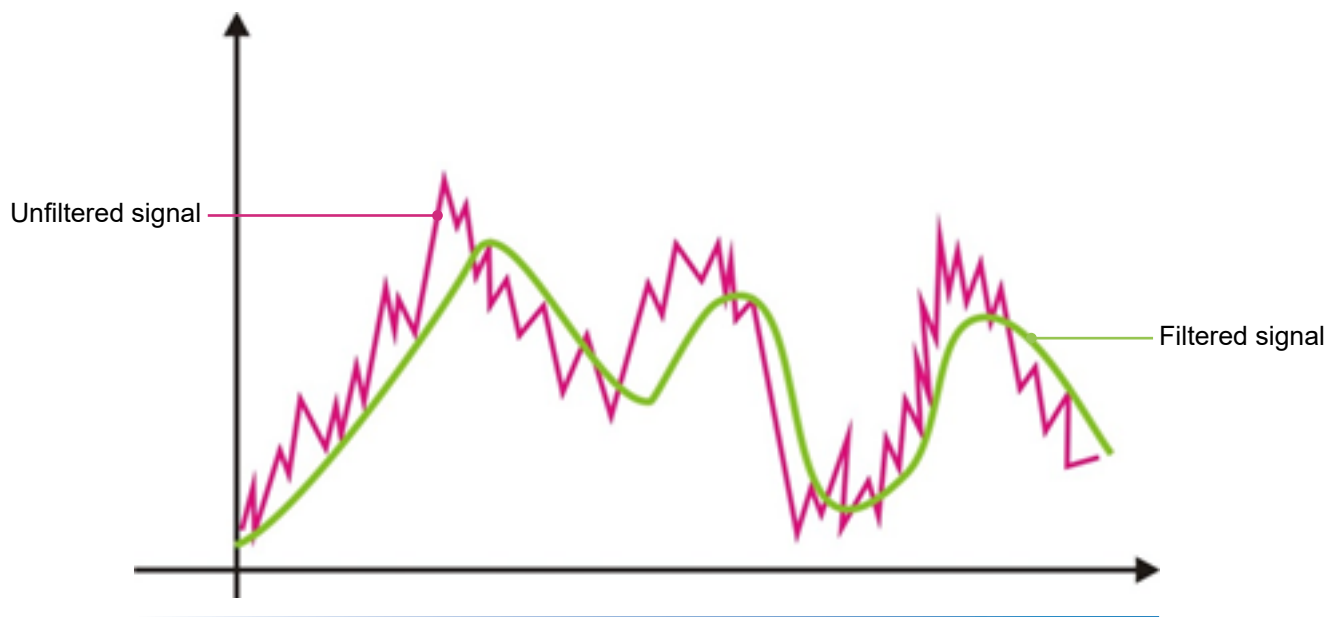


Fig.27. Ripple filtering effect on the CRASH signal

- **Self-locking output-CRASH.**
 - ☒ = Self-locking control. The output control, once activated, remains active during the execution of the cycle.
 - ☐ = NON self-locking control. The output control is reset when the check condition is not checked.
- **Check limit-CRASH.** It is the limit for the comparison of the CRASH signal on which to check the **CRASH check condition**. **Values allowed: from 0 to 999 (per thousand).**
- **Check filter-CRASH.** Minimum permanence time of the **CRASH check condition**, to activate the CRASH output. Increasing the value avoids false CRASH conditions caused by unwanted noise levels. A few milliseconds are usually enough for the optimal management of the signal. **Values allowed: from 0 to 20000 ms (default 2 ms).**

WARNING

The filter delays the output of the CRASH signal from the electronic unit to the machine PLC. Excessive values could damage machine devices!

- **Check condition-CRASH.** Four signal comparison modes can be selected with the **CRASH check limit**:
 - **GREATER** = True condition if the signal value is greater than the limit value.
 - **LESS** = True condition if the signal value is less than the limit value.
 - **RISE** = True condition if the signal cross the limit during the cycle, starting from a lower value to a higher value.
 - **FALL** = True condition if the signal cross the limit during the cycle, starting from a higher value to a lower value.

3.3.4 Monitoring

Available for the following sets:

- **Gap - Crash - Survey.**

Sets the monitoring parameters on the microphones.

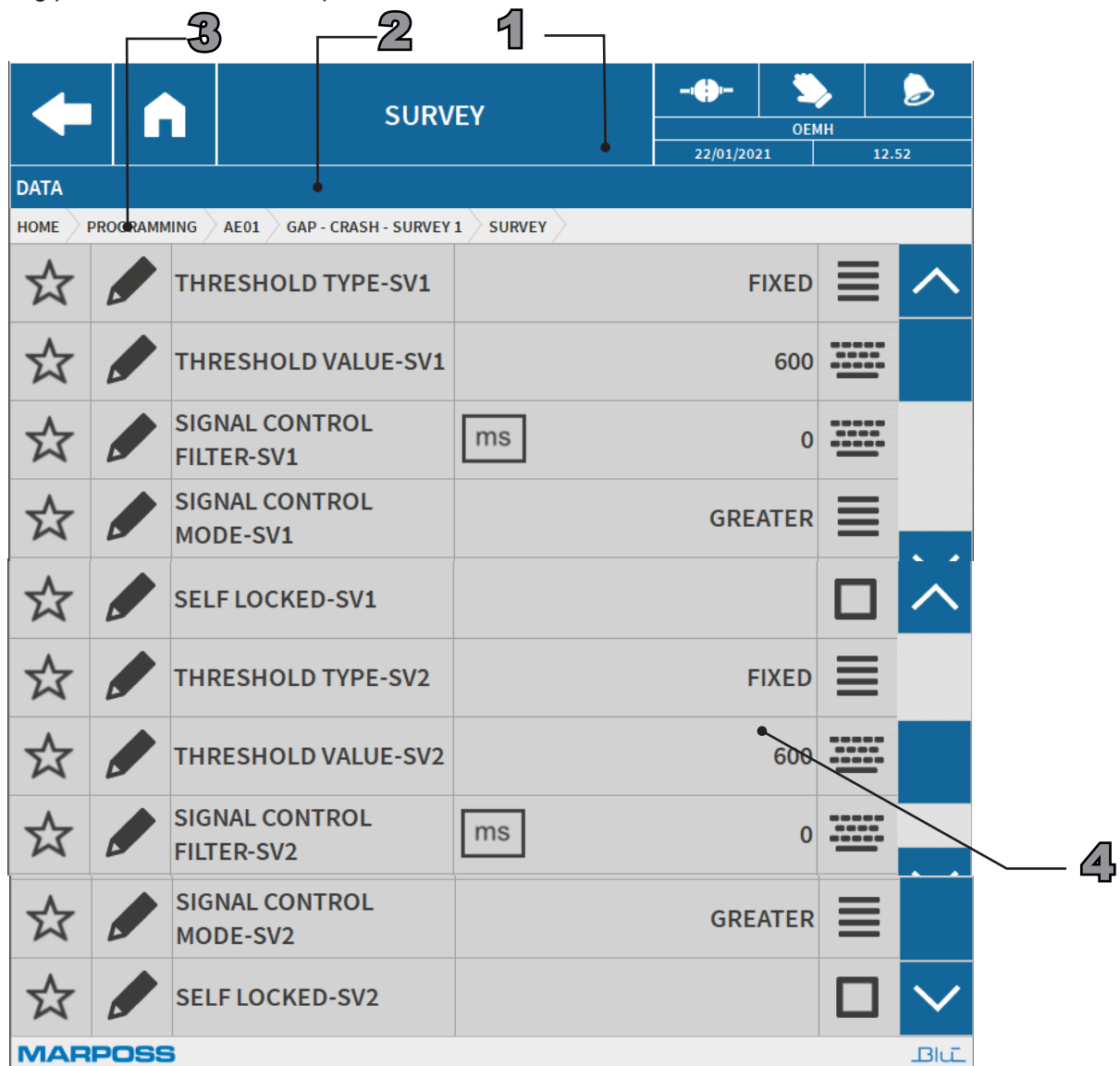


Fig.28. Monitoring data dashboard. Threshold type: Fixed

1. Screen title: **Monitoring**
2. Messages and descriptions area: **Data**.
3. Navigation path: *Home > Programming > AE01 (name of the channel) > Gap-Crash-Survey (example) > Survey*.
4. Working area:
 - **SV1 and SV2 threshold type** The offset corresponds to the difference between the signal and the threshold, while filter time (ms) represents the time constant of the “low pass” filter associated with the threshold. Available only if selected in the configuration file. Three selection options are available for each signal (SV1 or SV2);
 - SV1
 - *Fixed*;
 - *Upper dynamic*; centred on two parameters, Offset and Filter Time.
 - *Upper self-learn*; centred on three parameters. The right and left Temporal Shift Offset and the Offset (positive).
 - SV2
 - *Fixed*;
 - *Lower dynamic*; the only differences between this and the upper threshold are the polarity of the Offset and the type of signal condition.
 - *Lower Self-Learned*; the only differences between this and the upper threshold are the polarity of the Offset and the type of signal condition (Less).

☆	✎	THRESHOLD TYPE-SV1	FIXED	☰	⬆
☆	✎	THRESHOLD TYPE-SV2	FIXED	☰	
☆	✎	THRESHOLD TYPE-SV1	DYNAMIC UPPER	☰	⬆
☆	✎	THRESHOLD TYPE-SV2	DYNAMIC LOWER	☰	
☆	✎	THRESHOLD TYPE-SV1	SELF LEARNING UPPER	☰	⬆
☆	✎	THRESHOLD TYPE-SV2	SELF LEARNING LOWER	☰	⬆

N.B.

The threshold type must be selected for the Threshold Types SV1 and SV2.

- **SV1 and SV2 control thresholds.** It is the limit for the comparison of the GAP signal on which to check the **GAP check condition**. **Values allowed: from 0 to 999 (per thousand)**. May be programmed for the following threshold types: Fixed, Dynamic Upper and Lower, Upper and Lower Self-Learned.

☆	✎	THRESHOLD VALUE-SV1	600	☰	
☆	✎	THRESHOLD VALUE-SV2	600	☰	

- **Check filters-SV1 and SV2.** It is the minimum permanence time of the SV1 and SV2 check condition, to activate the corresponding outputs. Increasing the value avoids false conditions on the outputs caused by unwanted noise levels. A few milliseconds are usually enough for the optimal management of the signal. **Values allowed: from 0 to 20000 ms**. May be programmed for the following threshold types: Fixed, Dynamic Upper and Lower, Upper and Lower Self-Learned.

WARNING

The filter delays the output of the SV1 and SV2 signals from the electronic unit to the machine PLC. Excessive values could damage machine devices!

☆	✎	SIGNAL CONTROL FILTER-SV1	ms	0	☰	
☆	✎	SIGNAL CONTROL FILTER-SV2	ms	0	☰	

- **Check condition-SV1 and SV2.** Four signal comparison modes can be selected with the **GAP check limit**. May be programmed for the following threshold types: Fixed, Dynamic Upper and Lower.

☆	✎	SIGNAL CONTROL MODE-SV1	GREATER	☰	
☆	✎	SIGNAL CONTROL MODE-SV2	GREATER	☰	

- **GREATER** = True condition if the signal value is greater than the limit value.
- **LESS** = True condition if the signal value is less than the limit value.
- **RISE** = True condition if the signal cross the limit during the cycle, starting from a lower value to a higher value.
- **FALL** = True condition if the signal cross the limit during the cycle, starting from a higher value to a lower value.

GREATER	☉	⬆
LESS	◯	
RISE	◯	
FALL	◯	⬇

Fig.29. Limit crossing signalling selection dashboard

- **Self-locking output-SV1 and SV2.** May be programmed for the following threshold types: Fixed, Dynamic Upper and Lower, Upper and Lower Self-Learned.

☒ = Self-locking control. The output control, once activated, remains active during the execution of the cycle.

☐ = NON self-locking control. The output control is reset when the check condition is not checked.

☆	✎	SELF LOCKED-SV1	<input type="checkbox"/>	⬆
☆	✎	SELF LOCKED-SV2	<input type="checkbox"/>	⬇

- **SV1 and SV2 threshold offset.** Defines by how much the upper threshold must be increased (SV1) or reduced if lower (SV2) than the acoustic signal. Programmable for the self-learned and dynamic thresholds. In particular:
 - *Self-Leaned Threshold.* A positive value of SV2 indicates a lower threshold distance that is below the acoustic signal;
 - *Dynamic Threshold.* A negative value of SV2 indicates that the check is performed for values that are lower than the acoustic signal, while a positive value that it is performed for values that are higher than the acoustic signal.

☆	✎	THRESHOLD OFFSET- SV1	100	☰	
☆	✎	THRESHOLD OFFSET- SV2	100	☰	

- **SV1 and SV2 threshold time filter.** Use this function to set-up the time interval during which it is evaluated whether the threshold (SV1 and SV2) Offset has been exceeded. May be programmed for the following threshold types: Dynamic Upper and Lower.

☆	✎	THRESHOLD FILTER TIME-SV1	ms	200	☰	
☆	✎	THRESHOLD FILTER TIME-SV2	ms	200	☰	⬇

- **Threshold right temporal shift - SV1 e SV2.** Defines the delay tolerance value between the self-learned threshold and the acoustic signal.

		THRESHOLD RIGHT TEMPORAL SHIFT-SV1	<div>ms</div>	2	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div></div>
		THRESHOLD RIGHT TEMPORAL SHIFT-SV2	<div>ms</div>	2	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div></div>

- **Threshold left temporal shift - SV1 e SV2.** Defines the advance tolerance value between the self-learned threshold and the acoustic signal.

		THRESHOLD LEFT TEMPORAL SHIFT-SV1	<div>ms</div>	2	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div></div>
		THRESHOLD LEFT TEMPORAL SHIFT-SV2	<div>ms</div>	2	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div></div>

- **Self-learned thresholds SV1 and SV2 monitoring time.** Defines the signal learning time necessary to create the self-learned thresholds corresponding to the subsequent monitoring time. May be programmed for the following threshold types: Dynamic Upper and Lower.

[

N.B.

Outside the monitoring time, the threshold values set-up in the parameter “SV1 and SV2 control thresholds” are valid.

		THRESHOLDS LEARNING TIME-SV1-SV2	<div>ms</div>	5000	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div></div>
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4 DASHBOARDS



For instructions on creating, modifying and deleting dashboards, see Part B2. 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 **Blú LT** 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 Sect. B2).

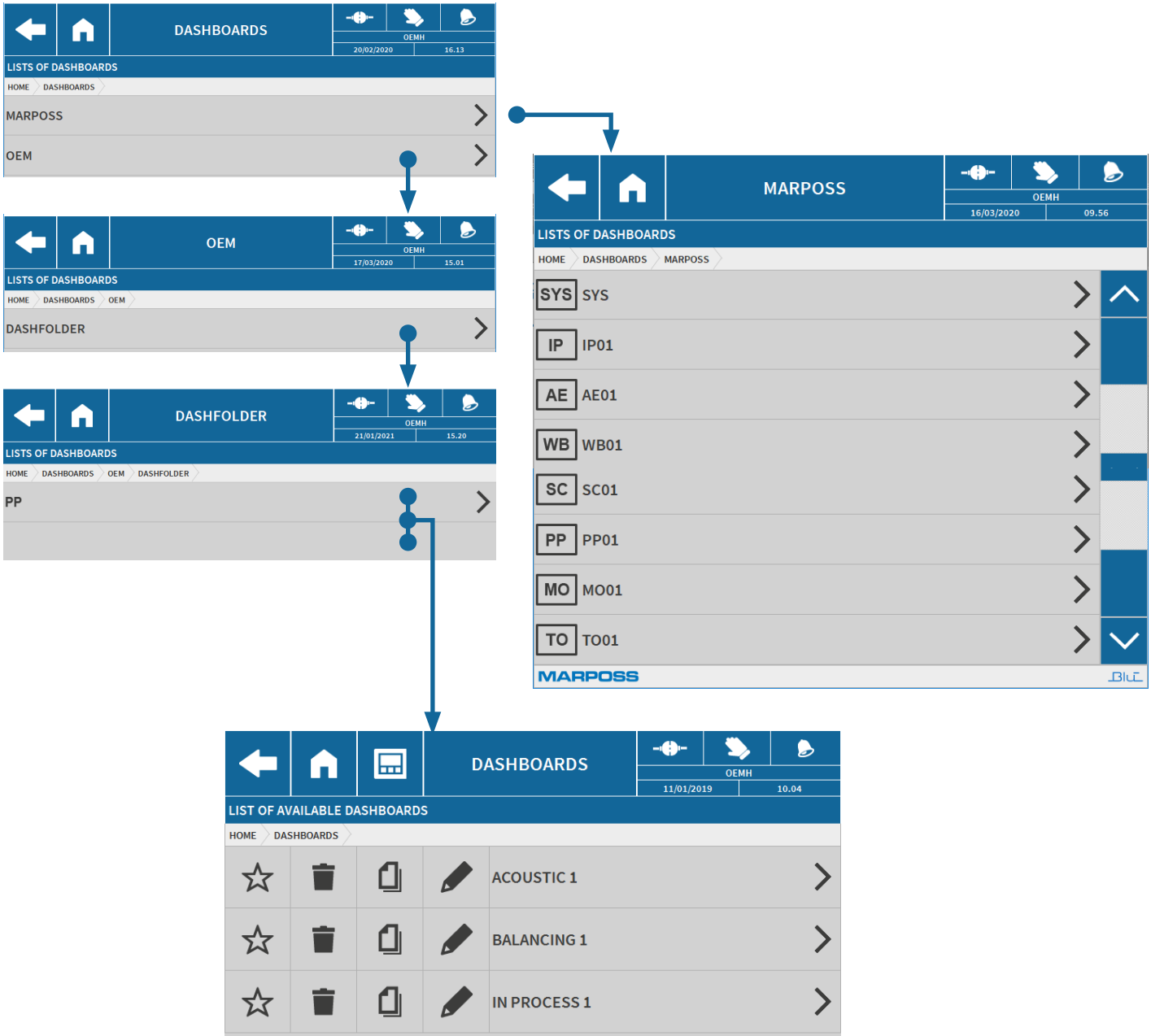


Fig.30. Pre-compiled Marposs page and pages created by the OEM customer

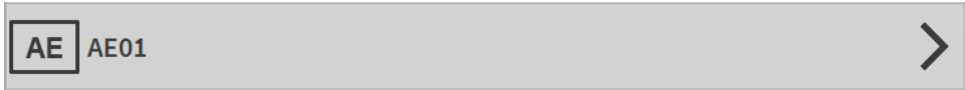
4.2 Widgets and dashboards

The acoustic application (AE) widgets are those that can be used for sensors assigned to different 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.

4.2.1 Marposs dashboards for Acoustic applications



For a description of the individual widgets present and their characteristics, see subsequent paragraphs.

Table 1. List of Marposs dashboards > Process view

Page name	Page
AE01 CONTROLS	

Table 2. List of Marposs pages > Setup

Page name	Page
AE01 SPECTRAL ACQ	

4.2.2 Widgets for acoustic applications

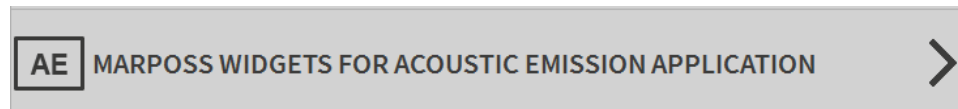

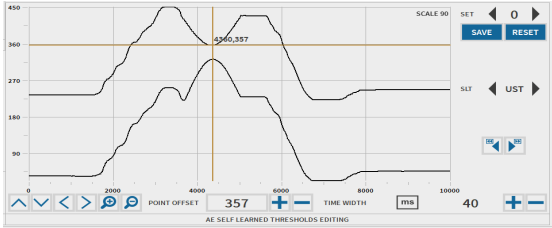






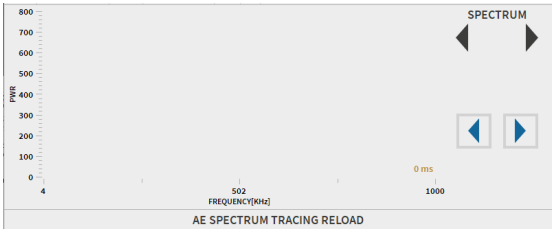






Table 3. List of Widgets for Acoustic Emission Application

Icon	Widget	System Description/Status
	AE Spectrum acquisition 	 <p>This widget may be used to acquire and optimise the acoustic emission on contact with respect to the background noise acoustic emission.</p>
	AE Zero-setting Widget 	 <p>This widget may be used to zero the background noise when "Incremental" (INC) mode is selected.</p>
	AE Spectrum analysis 	 <p>This widget may be used to display all the harmonic components of the signal generated by the acoustic sensor.</p>
	AE Checks 	 <p>This widget may be used to display the status of the GAP and CRASH output checks. LED Colour:</p> <ul style="list-style-type: none"> Grey = Cycle not active. Dark green = Cycle in progress. Command not triggered Light green = Command triggered.
	AE Gain cycle in progress 	 <p>Shows the "SW Gain", "Band-width" and "Check limits" for the GAP signal and CRASH in the cycle in progress. These parameters can also be changed using the key</p>

Table 3. List of Widgets for Acoustic Emission Application		
Icon	Widget	System Description/Status
	<div>Modifying the self-learning thresholds</div> 	<div></div> <p>It may be used to modify the self-learned threshold values:</p> <p>◀ UST ▶ = Select threshold to be monitored.</p> <p> = Select point on the curve to be modified.</p> <p> = Set-up the time interval to which the modification to the selected point is extended.</p>
	<div>Reload the spectrum trace</div> 	<div></div> <p>Displays the spectral analyses recorded using the  “AE Spectrum analysis” widget</p>

5 OPERATING PROCEDURES

5.1 Auto set-up

In order to optimise the acquisition of the acoustic emission values, the measuring filters must be set-up with the following automatic spectrum acquisition procedure (auto set-up).

It can be carried out in **Manual** and **Setup** mode.



The acquisition of the auto set-up is performed by selecting the **AE SPECTRAL ACQUISITION** widget and proceeding as described below.

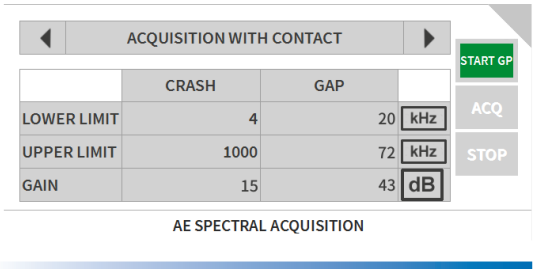
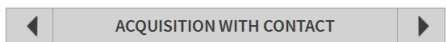


Fig.31. Auto set-up widget



Select **START GP**.

5.1.1 Acoustic emission acquisition with contact



Use the cursors ◀ ▶ to select **ACQUISITION WITH CONTACT**

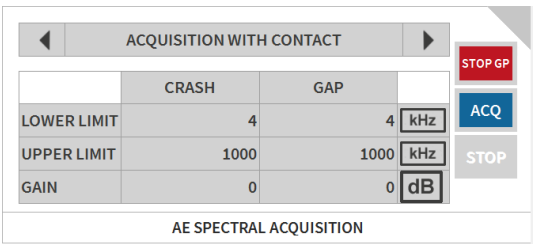
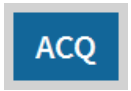


Fig.32. Acquisition in contact widget



Select **ACQ** to start the acquisition of the acoustic emission in contact. At the end of the operation there is the automatic stop and the information acquired is saved.



During the acquisition procedure the operation can be interrupted by pressing **STOP**.

Now proceed as described below.

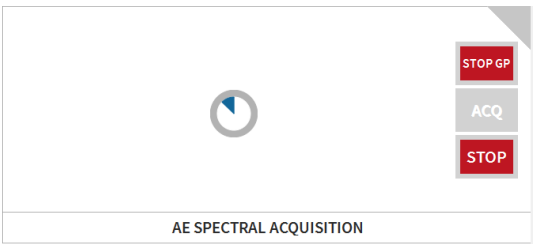


Fig.33. Acquisition in progress widget

5.1.2 Background noise acquisition without contact

◀

ACQUISITION WITHOUT CONTACT

▶

Use the cursors ◀ ▶ to select **ACQUISITION WITHOUT CONTACT**

	CRASH	GAP	
LOWER LIMIT	4	4	kHz
UPPER LIMIT	1000	1000	kHz
GAIN	0	0	dB

AE SPECTRAL ACQUISITION

STOP GP

ACQ

STOP

Fig.34. Background noise acquisition without contact widget

ACQ

STOP

Select **ACQ** to start the acquisition of the acoustic emission in the non-contact phase. At the end of the operation there is the automatic stop and the information acquired is saved.

During the acquisition procedure the operation can be interrupted by pressing **STOP**.

Now proceed as described below.

STOP GP

ACQ

STOP

AE SPECTRAL ACQUISITION

Fig.35. Acquisition in progress widget

5.1.3 Automatic calculation

◀

CALCULATION FOR SETUP

▶

Use the cursors ◀ ▶ to select **CALCULATION FOR SET-UP**.

	CRASH	GAP	
LOWER LIMIT	4	20	kHz
UPPER LIMIT	1000	72	kHz
GAIN	15	43	dB

AE SPECTRAL ACQUISITION

STOP GP

ACQ

STOP

Fig.36. Automatic calculation widget

ACQ

Select **ACQ** to start the **automatic calculation of the software band for the GAP signal and optimal software gains for the GAP and CRASH signals**.

They are recalculated automatically:

1. The upper and lower limit frequency of the **GAP (LOWER LIMIT BAND-GAP, (HIGHER LIMIT BAND-GAP)**.
2. The software gain of the **GAP (SW GAIN-GAP) and CRASH (SW GAIN-CRASH)** measurements.

☆	✎	SW GAIN-GAP	dB	0	
☆	✎	LOWER LIMIT BAND-GAP	KHz	4	
☆	✎	HIGHER LIMIT BAND-GAP	KHz	1000	
☆	✎	SMOOTHING FILTER GAP	ms	0	
☆	✎	SW GAIN-CRASH	dB	0	
☆	✎	LOWER LIMIT BAND-CRASH	KHz	4	
☆	✎	HIGHER LIMIT BAND-CRASH	KHz	1000	
☆	✎	SMOOTHING FILTER-CRASH	ms	0	

Fig.37. GAP and CRASH programming dashboards

STOP

During the automatic calculation procedure the operation **CANNOT** be interrupted. The **STOP** selection remains inhibited.

STOP GP

ACQ

STOP

AE SPECTRAL ACQUISITION

Fig.38. Calculation in progress widget

best ratio between contact noise and background noise. The SW gain (**SW GAIN-GAP**) is automatically set so that an hypothetical limit of 600 units of noise is exceeded when there is contact between **grinding wheel<->work-piece or grinding wheel<->dressing-unit**.

In the **CRASH** acquisition channel the software filters are set at wide band. The SW gain (**SW GAIN-CRASH**) is set so that an hypothetical limit of 800 units of noise is not exceeded when there is contact between **grinding wheel<->work-piece or grinding wheel<->dressing-unit**.

N.B.

The Auto set-up procedure must be considered a utility to facilitate the programming of the acoustic channel. The effectiveness of the programming obtained must be checked by the operator, who can subsequently change or correct it.

If **AGC** (Fullband, AGC HP, AGC HF) options are selected, the set-up procedure also sets the hardware gain and relative hardware filter.

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6 ERRORS - WARNINGS - ALARMS

6.1 Errors

Table 4. Errors			
Code	Message	Cause	Remedy
1	The selected microphone is not valid	The name of the microphone is not valid	Select another microphone
2	The band width is not valid	The band width must be at least 40 kHz	Modify the band width
3	Memory heap full	Memory heap full	Switch off and on again
4	The selected sensor cannot be used with the HW that is present	The selected sensor cannot be used with the HW that is present	Check the compatibility between the nodes and the sensors
5	The selected balancing head cannot be used.	The selected balancing head cannot be used	Check the compatibility between the nodes and the sensors
6	It is not permitted to enable the variable thresholds	This function is not permitted	Create a new valid set
7	Threshold type programming error	One of the thresholds has been programmed with a different type to the other one	Select thresholds of the same type

6.2 Warnings

Table 5. Warnings			
Code	Message	Cause	Remedy
11001	Disable the preceding bit		

6.3 Alarms

Table 6. Alarms			
Code	Message	Cause	Remedy
11001	AE cycle request not permitted	It is not permitted to execute a cycle at this moment	Eliminate the concurrent cycle that is preventing the current cycle from being executed
11002	Crash cycle request not permitted	The crash cycle request is not currently permitted	Eliminate the concurrent cycle that is preventing the current cycle from being executed
11003	Zero-setting procedure alarm	The background noise zero-setting request failed	Repeat the operation
11004	The balancer transmission is not available for the current cycle	The balancer transmission is not available for the current cycle	Repeat the operation when the balancer transmission is not in use
11005	The acoustic sensor is not available for the current cycle	The acoustic sensor is not available for the current cycle	Repeat the operation when the acoustic sensor is not in use
11006	Manual AE set-up failed	Manual AE set-up failed	Repeat the procedure
11007	Critical error in flow control		
11008	Critical error on the processed data		
11009	Critical error on the FIELD BUS		
11010	Critical error at start-up		
11011	HW gain calculation failed during manual set-up contact phase	HW gain calculation failed during manual set-up contact phase	Repeat the acquisition
11012	Gain and band limits calculation failed	Gain and band limits calculation failed	Repeat the acquisition
11013	Acoustic sensor not connected	Acoustic sensor not connected	Connect the acoustic sensor

MARPOSS

End of Application Monitoring via acoustic signals

BLULT