VMx5 HMI

User

VM15 HMI - User

1. Use of the VMx5 HMI

1.1. VMx5 HMI Startup from a stand alone PC

The installation procedure ends, creating a desktop shortcut to launch the application VMx5 HMI.

Start up the BSVM25HMI.exe and wait for the connection.

1.2. VMx5 HMI startup inside the ®Siemens HMI

Press the SOFTKEY "VMx HMI" reserved by the machine OEM (see example in the picture below).
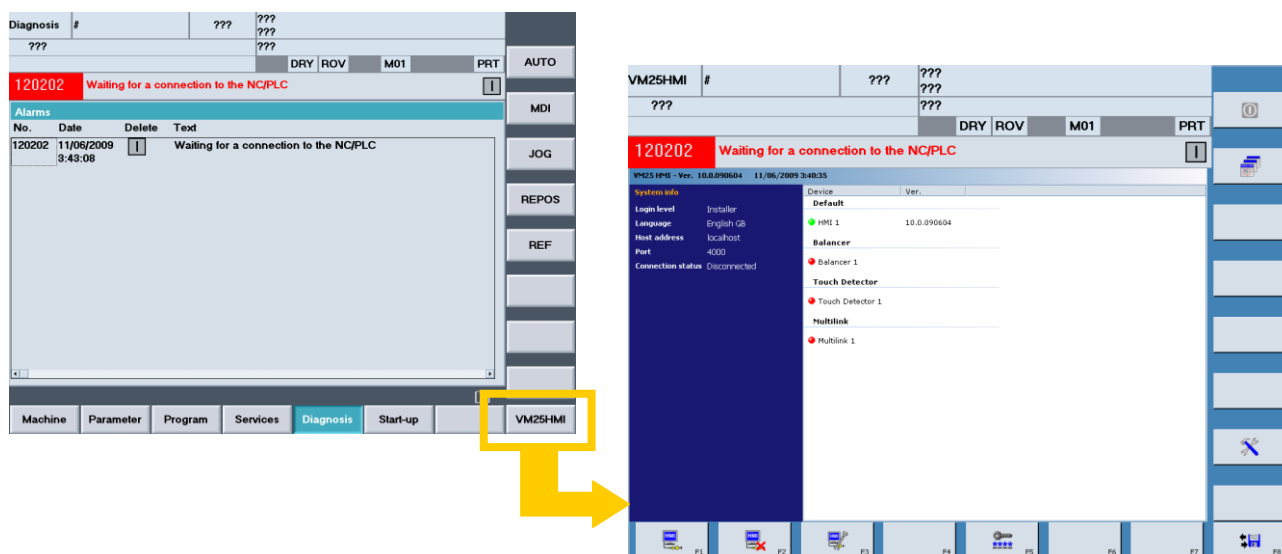
The application will close while the ®Siemens HMI shuts down.

1.3. VMx5 HMI startup inside the ®Fanuc HMI

Press the SOFTKEY "VMx HMI" reserved by the machine OEM.

1.4. Operating with a panel connected to the VMx5 rack

It is possible to run the VMx5 HMI application even when the system is already equipped with a VMx5control panel.

Local VMx5 HMI

Ethernet TCP/IP

USB / RS485

Remoted VMx5 HMI Panel
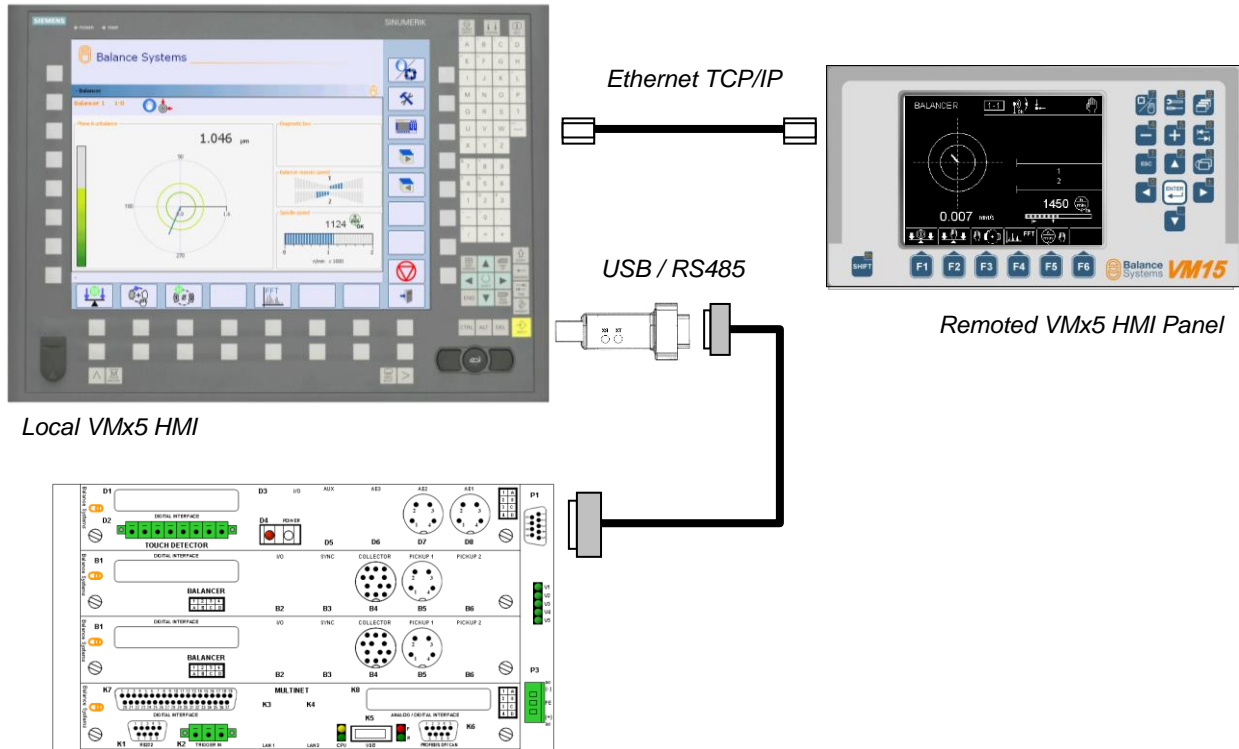
Picture a: Connection through BsLink

Remoted VMx5 HMI

Ethernet TCP/IP

RS485

Local VMx5 HMI Panel
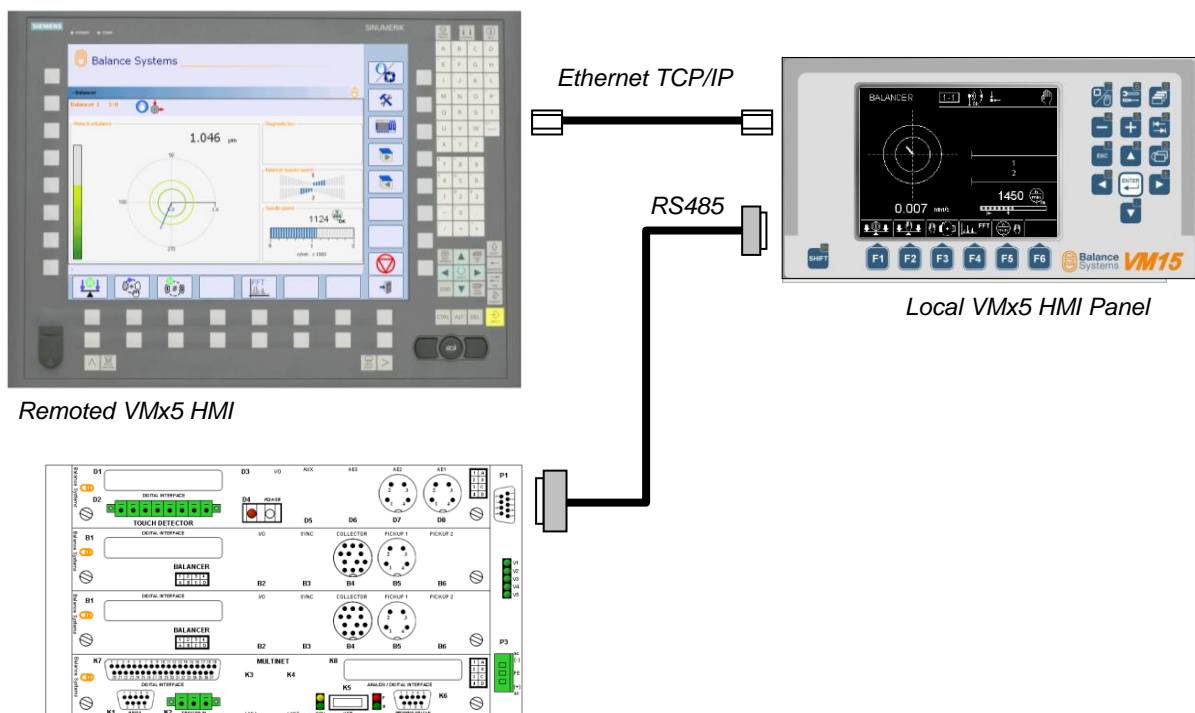
Picture b: Connection through ethernet TCP/IP

1.5. Exit from VM15 HMI

To exit the VMx5 HMI:

- Push the button **System** 🖥**HMI**   **[Shift+F1]**

- Push the button **HMI Exit** 🔲   **[Shift+F1]**

```
VM25 HMI - Ver. 12.0.170209   17/02/2017 15:51:00
System info
Login level        Balance Systems
Language           English US
Host address       10.168.0.69
Port               4000
Connection status  Connected

Device                Ver.
HMI 50                12.0.170209
Balancer 1            12.0.161202
Gauge 1
Touch Detector 1      12.0.170119
MultiNet 2            12.0.170201

BS VM25 HMI

The application will be terminated!
Continue?
```
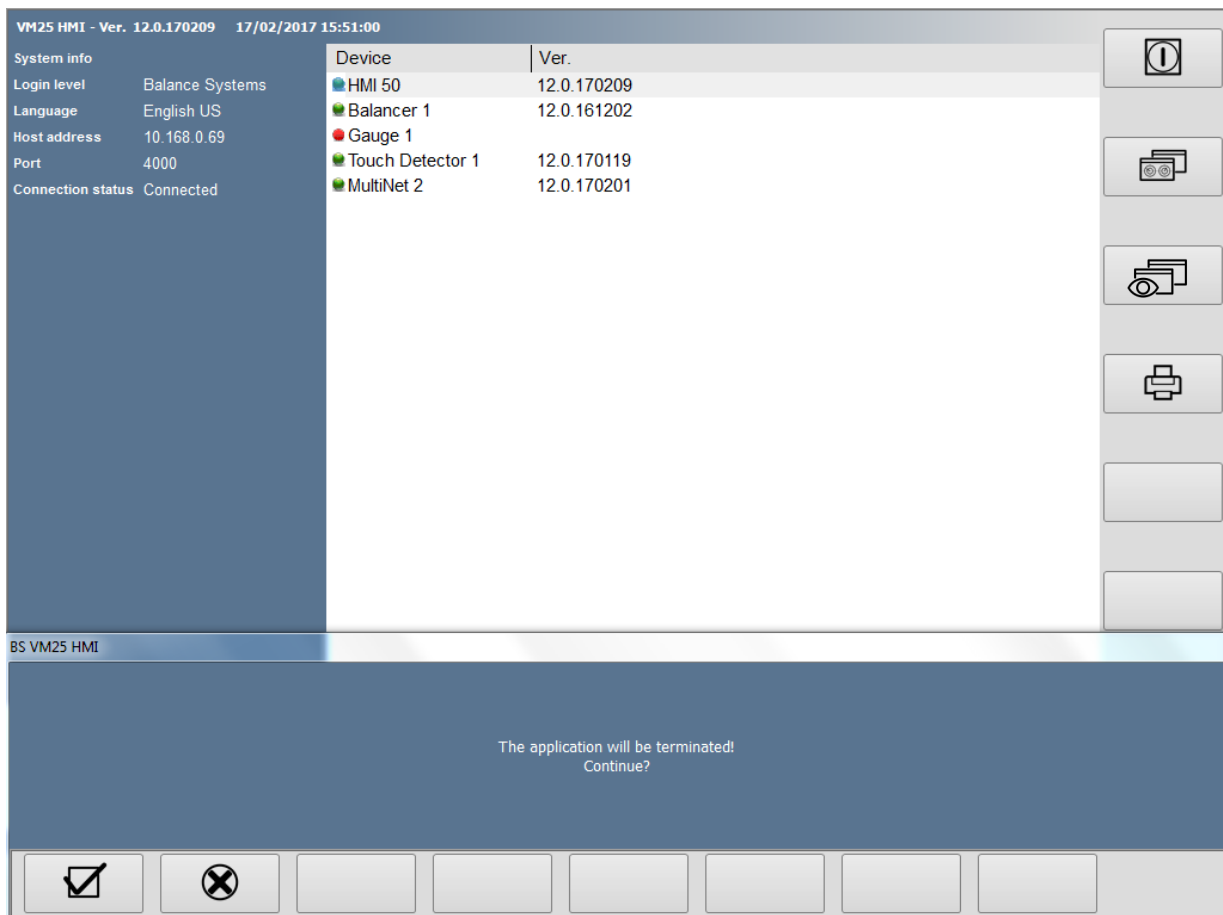
- Select **Yes [F1]**

NOTE: [®]*Siemens HMI will close the VM15 HMI without any alert to the operator.*

1.6. Pages description

1.6.1. System and Startup page
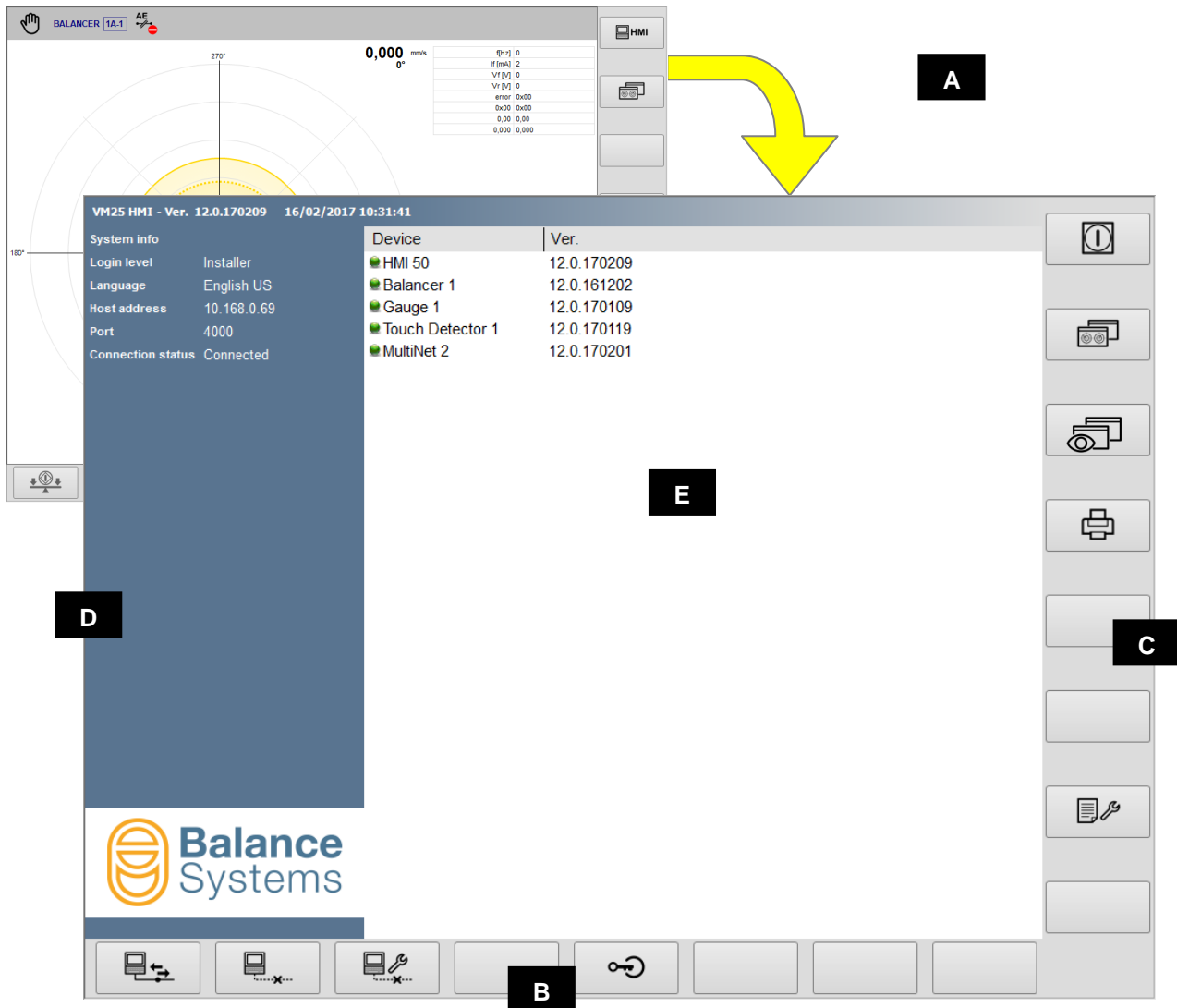
The following areas are identified on the screen:

A. Header (empty in case of application installed on Siemens HMI)
B. Horizontal control bar associated with the keys **[Fx]**
C. Vertical control bar associated with the keys **[Shift+Fx]**
D. System connection configuration summary
E. List of installed devices:

- Device name
- Software version
- Memory version

The commands available are summarized in the following table

				System commands
Icon	**ID**	**Command name**	**Button**	**Description**
	0001	Quit HMI	Shift+F1	Close the VMx5 HMI
	0010	Change Page	Shift+F2	Switch betwen the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print the displayed screen
	0013	Parameters	Shift+F7	Access parameter management for system configuration
	0002	Connect	F1	Start the connection procedure between the VMx5 HMI interface and the VMx5 rack
	0003	Disconnect	F2	Stop the communication between the VMx5 HMI interface and the VMx5 rack
	0004	Service	F3	Switch to "**service**" mode for mainteniance operations
	0005	Login	F5	Access login levels management

Once the startup is completed, after few seconds, the status page of the first device in the configuration list will be displayed.
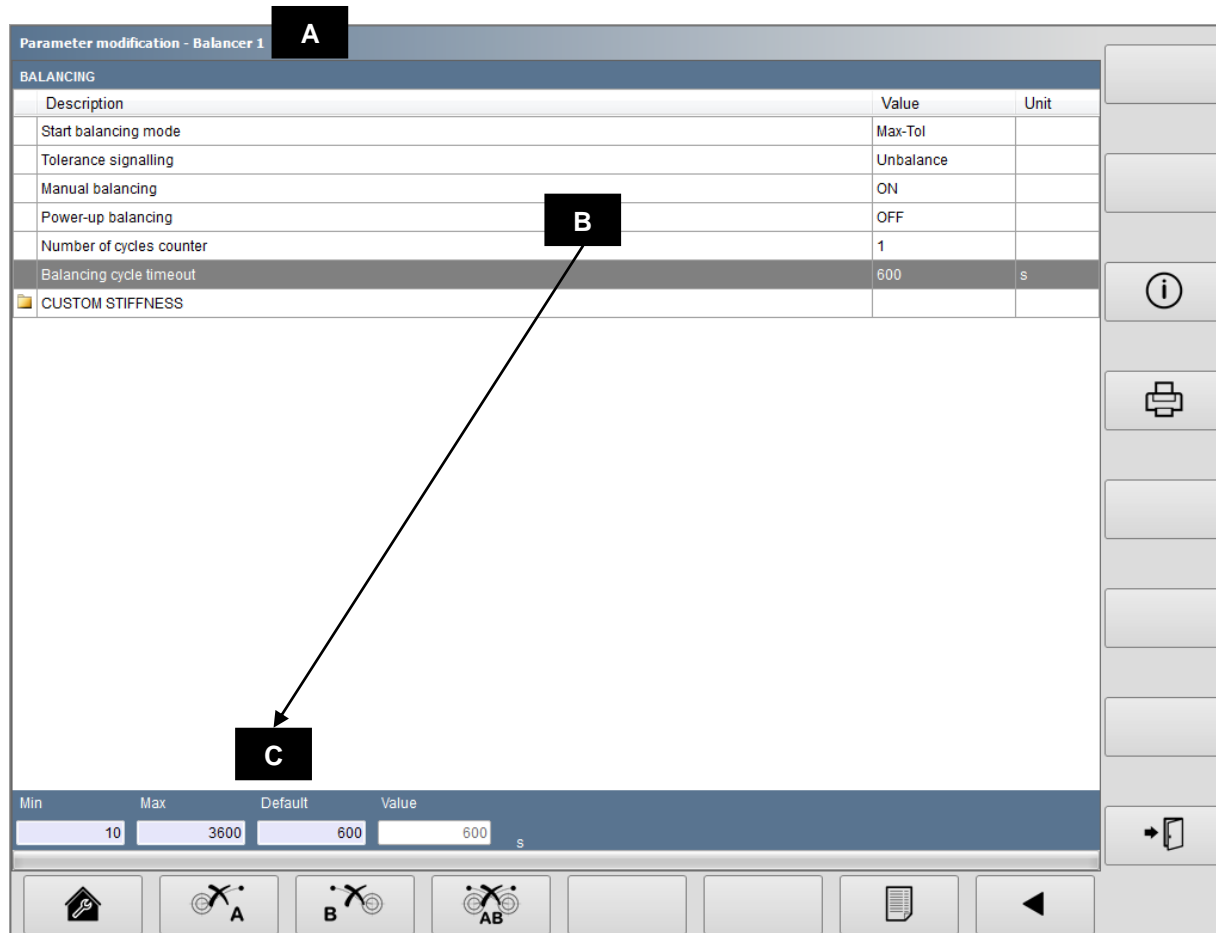
1.6.2. Device status page
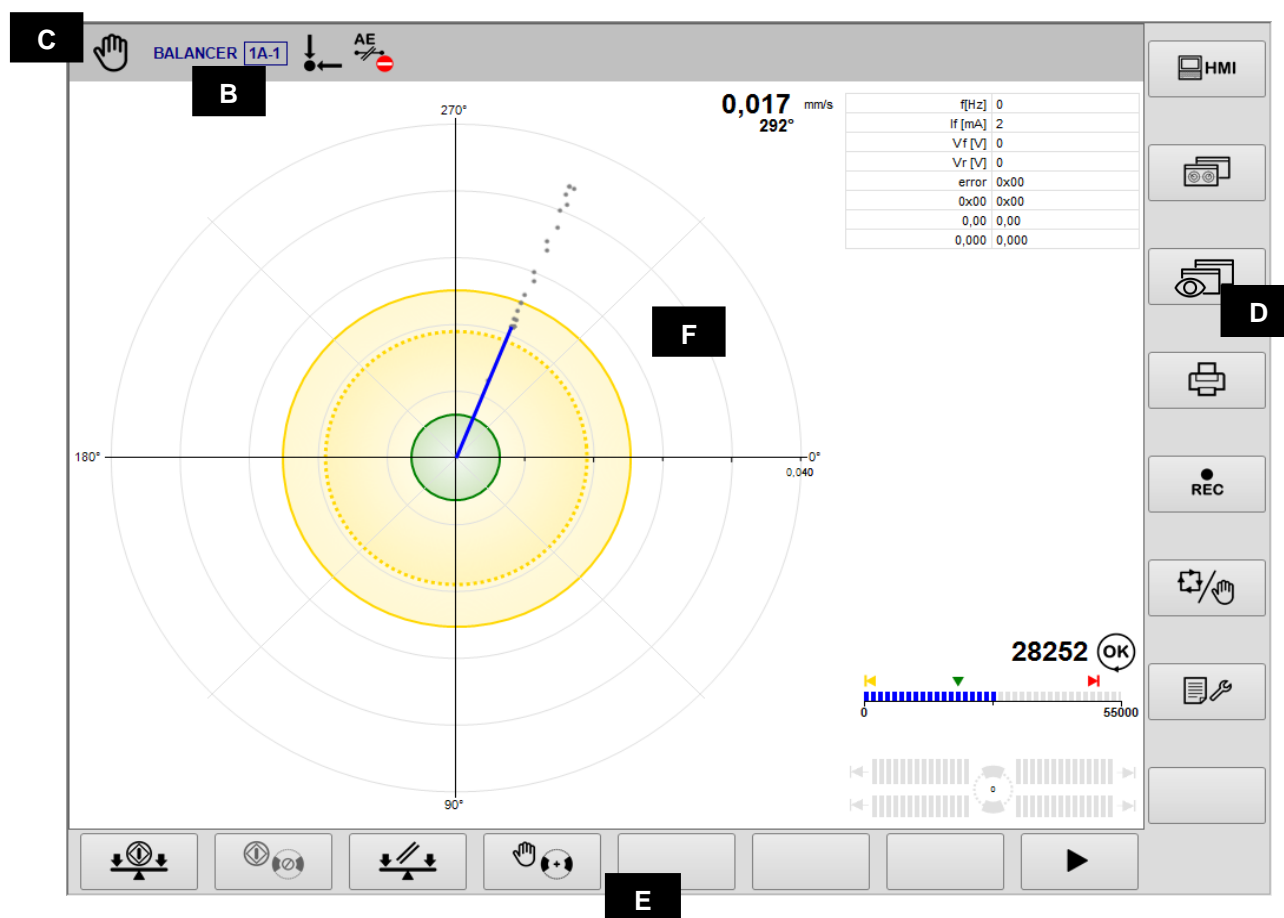
The following areas are identified on the screen:

A. Header (empty in case of application installed on [®]Siemens HMI)
B. Device name or page name.

C. Operating mode (Automatic ⬚/✋ Manual)
D. Vertical control bar associated with the keys **[Shift+Fx]**. Generally system's commands.
E. Horizontal control bar associated with the keys **[Fx]**. Generally device's commands.
F. Graphis area to display the device's process. See details in each device paragraph.

1.6.3. Parameters page

In the parameter modification page are present the following areas:

- A. Actual parameter page and position in the device parameter tree
- B. For each parameter are indicated:

  - Description (parameter's name)
  - Actual value
  - Measuring unit

In case of extended information through the command **Info** ⓘ **[Shift - F3]**

  - ID, Id number of the parameter
  - AL, access level required to modify the value

	ID	Description	Value	Unit	Login level
NL.STP/NLSTEQ					
	100563	Start balancing mode	Max-Tol		Installer
	100121	Tolerance signalling	Unbalance		Installer
	100390	Manual balancing	ON		Installer
	100118	Power-up balancing	OFF		Installer
	100119	Number of cycles counter	1		Installer
	100120	Balancing cycle timeout	600	s	Installer
📁	NLSTRB	CUSTOM STIFFNESS			Installer

C. For each parameter with **<u>numerical</u>** format, are indicated:

- Min value
- Max value
- Defualt value (factory preset)
- Actual value

For each parameter with **<u>list</u>** format, are indicated:

- Defualt value (factory preset)
- Actual value

The commands available are summarized in the following table

Icon	ID	Command name	Button	Description
🖶	0011	Print	Shift+F4	Print the current parameter page
⚒	0019	Factory preset	F1	Load the default value (factory preset)
ⓘ	0008	Info	Shift+F3	Additional information about the parameters, for diagnostic purposes. Helpful in case of guided procedure by Balance Systems's service personnel.
TEST	0036	I/O Test	F2	Access to the I/O Test function to check the device digital interface wiring.
📄	0021	Parameter list display	F7	Explore the parameters tree
◀	0033	Previous menu	F8	One level back in the parameters tree
PP	0086	Part-program copy	F2	Menu to copy part-program "SOURCE" to "DESTINATION"
📄	0087	Setup copy	F3	Menu to copy setup "SOURCE" to "DESTINATION"

1.6.3.1. Selection and parameter modification

<u>**Selection**</u>

Using the mouse or touch screen "click" on the parameter name.

Using the keyboard press the directional button "↑", "↓", "←", "→" and TAB "⇆"

<u>**Modification**</u>

The selected parameter can be modified by digiting the new value or by select the new option in the filed list. Press "Enter ↵ " to activate the new value

NOTE: *If the new value is not in the range, the value will not change.*

1.6.4. Copy commands
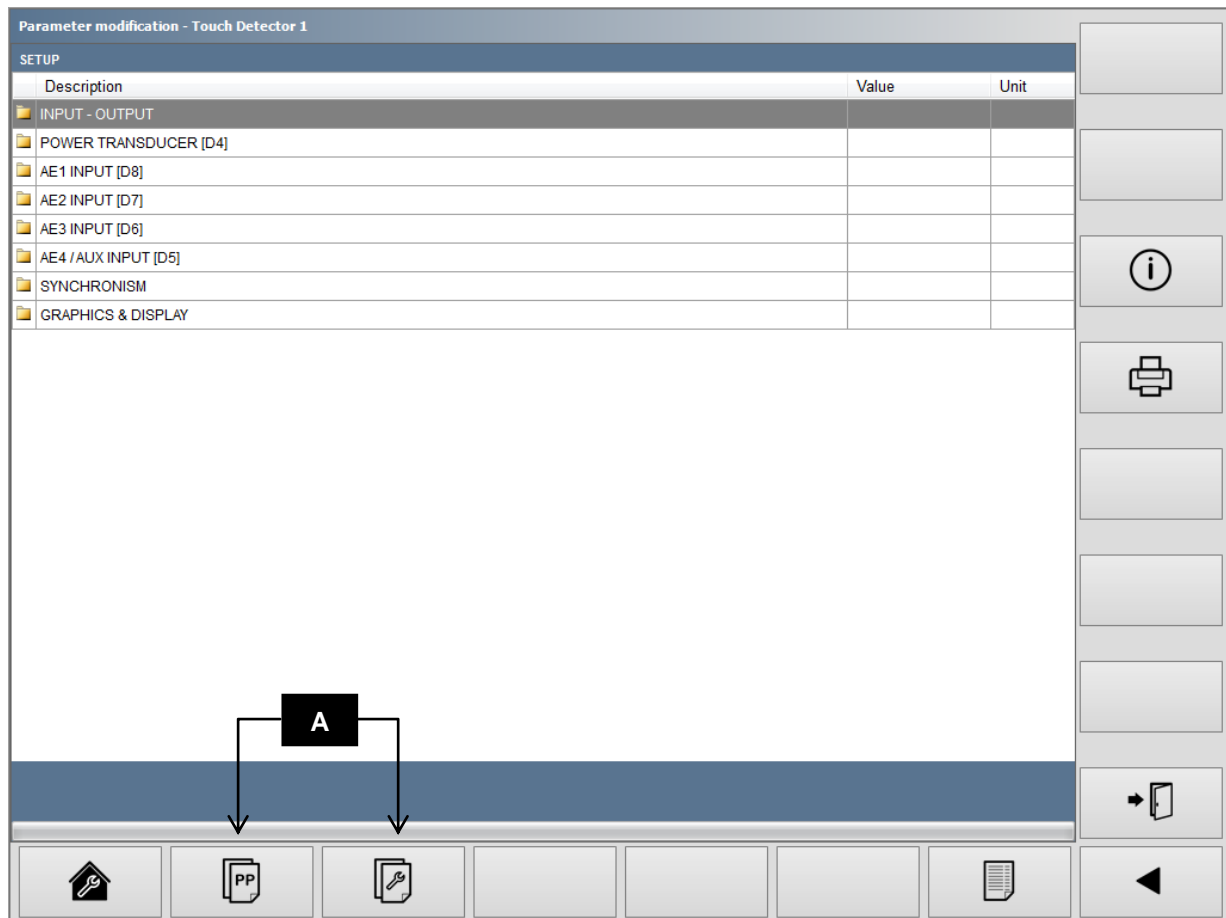
A. In the setup parameter page are available one or two command to copy part-program

and setup .

Copy commands			
Device	**Part-Program**	**Setup**	**Applicable to:**
Balancer	☒	☒	Part-program
Touch detector	☑	☑	Part-program and Section
Gauge	☑	☒	Part-program and Section
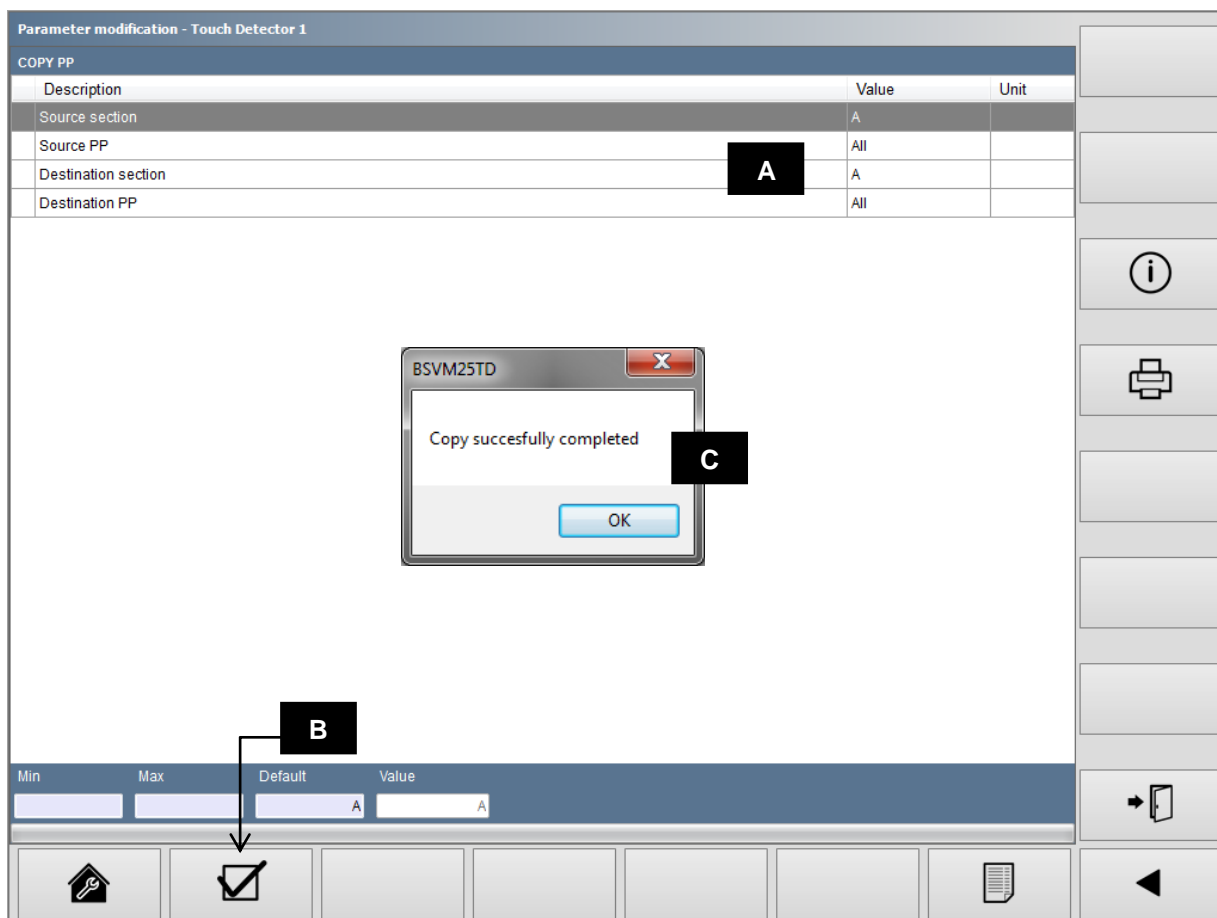
A. In the top area SOURCE and DESTINATION must be selected

B. Then press F2 ☑ to apply execute the copy
C. Wait for the message box which confirms the success of the operation.

Examples:

1) On Touch Detector card, by selecting

- Source section = A
- Source Part-Program = 1
- Destination section = B
- Destination Part-Program = 1

All the parameters of the part program 1 section A, will be copied into the part program 1 of the section B.

2) On Balancer card, by selecting

- Source Part-Program = 1
- Destination Part-Program = All

All the parameters of the part program 1, will be copied into all the other part program 1.

1.7. Auxiliary functions (optional)

The auxiliary functions are available for each device enabled.

1.7.1. Data recording

From the individual device page it is possible to record on a file a number of process variables with a given sampling rate for analysis and documentation purposes.

To access the data recording option setting, use the **Parameters** 📄🔧 **[Shift+F7]** command on the System page.
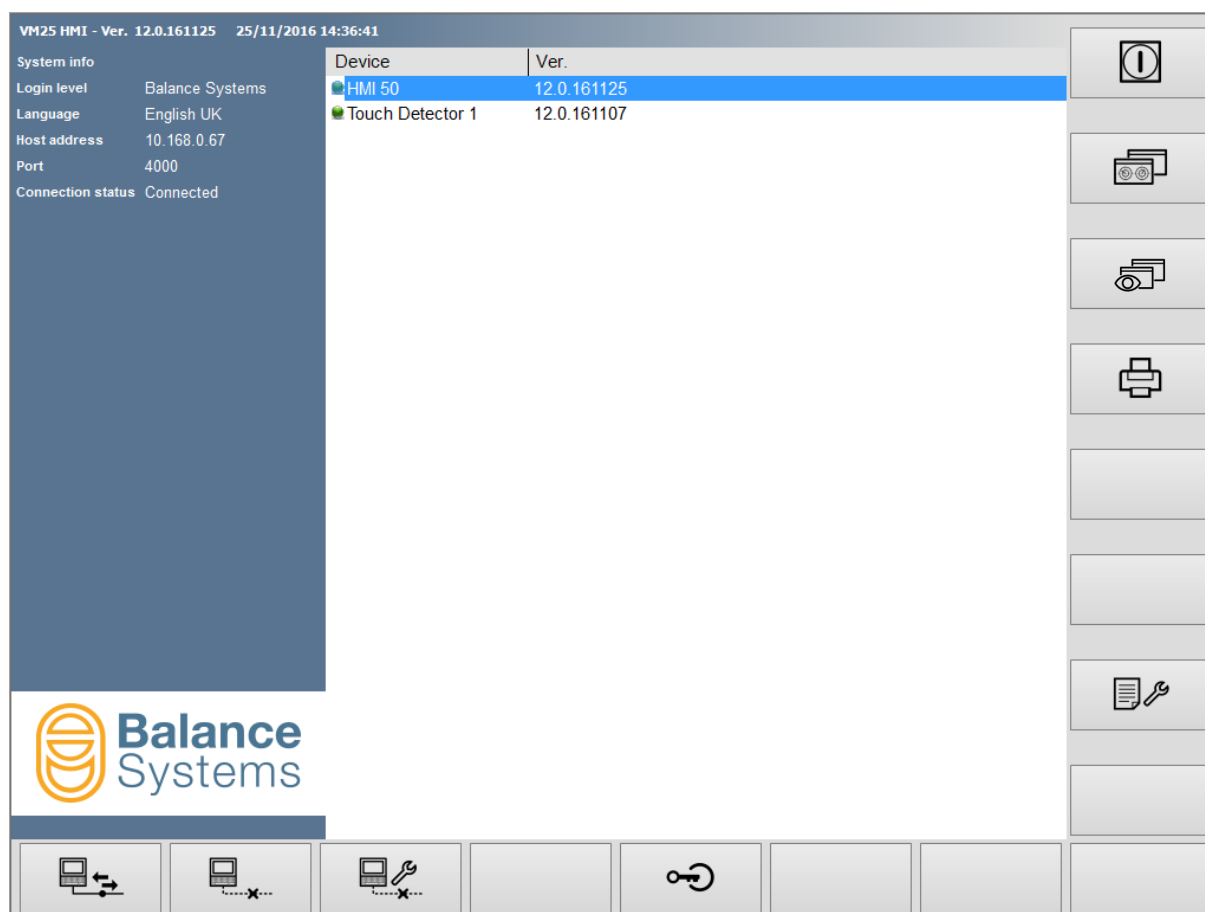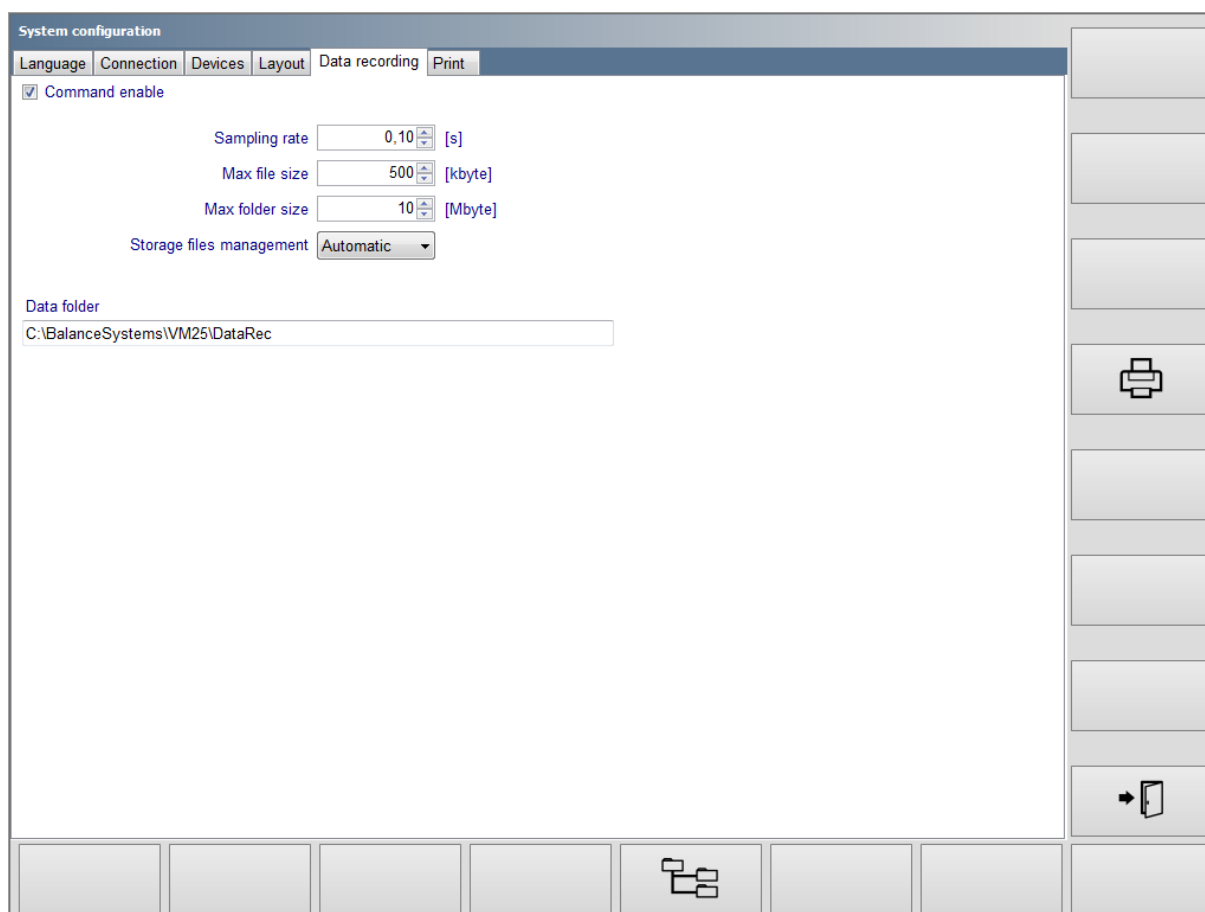
1.7.1.1. Setup

▪ Select the **Data recording** tab

Parameter	Description
Command enable ☐	(check box). Enables the **Record** command on each device.
Sampling rate [s] **[0.1 s]**	Indicates the time interval between the recorded samples
Max file size [kbyte] **[500 kb]**	When the maximum size is reached, the file is closed and a new file is opened.
Max folder size [Mbyte] **[10 Mb]**	Maximum size of the archive folder of the recordings. When the maximum size is reached a notify message is issued for the operator (see also below "Storage file management")
Data folder **<Drive>:\BalanceSystems\VMx5\DataRec**	Definition of the destination folder where the data files will be stored.
Storage file mangement **[Automatic]**	Automatic: when DataRac folder is full the system will apply FIFO management: older files will be deleted. Manual: when DataRac folder is full the system will display a message box. The operator should remove manually the older files.

The available commands in the Data recording setup page, are defined in the following table.

Icon	ID	Command name	Button	Description
🖶	0011	Print	Shift+F4	Print the displayed screen
🗂	0020	Browse	F5	Allow the archiving folder of the REC files to be selected
➡️🚪	0017	Exit	Shift+F8	Exit & save the configuration
🖶	0011	Print	Shift+F4	Print the displayed screen

The table above is titled **System commands**.

The REC files are archived in ASCII format in the default folder (see parameters table) with the following name:

BSREC_AAMMDD_hhmmss.txt

where:

AA	year
MM	month
DD	day
hh	hour
mm	minute
ss	second

The following example shows the format of the text file content generated for the Touch Detector card. The REC file contents is strictly related with the part-program in use.

Example "BSREC_161118_135239.txt" contains data recorded on 18 November 2016 starting at 13:52:39.

```
//BalanceSystems S.r.l.
//VM25 Record file [BSREC_161118_135239.txt]
//File Version = 12.0
//
//Machine = BSVM25 Machine
//Number = 123456789
//Oem = Balance Systems
//End user = Balance Systems
//
//TouchDetector
//ID [1];Date;Hour;V1: Am;V1: Ip;V1: Im;L1;L2;L3;L4;//

1;16/11/18;13:52:39;12.4;14.4;10.9;True;True;True;True;
1;16/11/18;13:52:39;12.4;14.8;10.9;True;True;True;True;
1;16/11/18;13:52:39;12.1;14.8;10.7;True;True;True;True;
1;16/11/18;13:52:40;13.3;15.6;10.4;True;True;True;True;
1;16/11/18;13:52:40;13.0;15.6;11.0;True;True;True;True;
1;16/11/18;13:52:40;12.0;15.6;10.8;True;True;True;True;
1;16/11/18;13:52:40;12.3;15.4;10.6;True;True;True;True;
1;16/11/18;13:52:40;12.4;14.4;10.6;True;True;True;True;
```

The following table summarizes the format of the recorded values for each device.

Device	Device ID	Date - Time	Date
Touch Detector	1..4	yy/mm/dd hh:mm:ss	"Vx: Am" average value "Vx: Ip" max value "Vx: Im" min value "L1" output status "L2" output status "L3" output status "L4" output status

IMPORTANT: The system will record the data of the current device displayed.

From the individual device screens it is possible to record a set of system status and variable values with a given frequency on a file for analysis and documentation purposes.
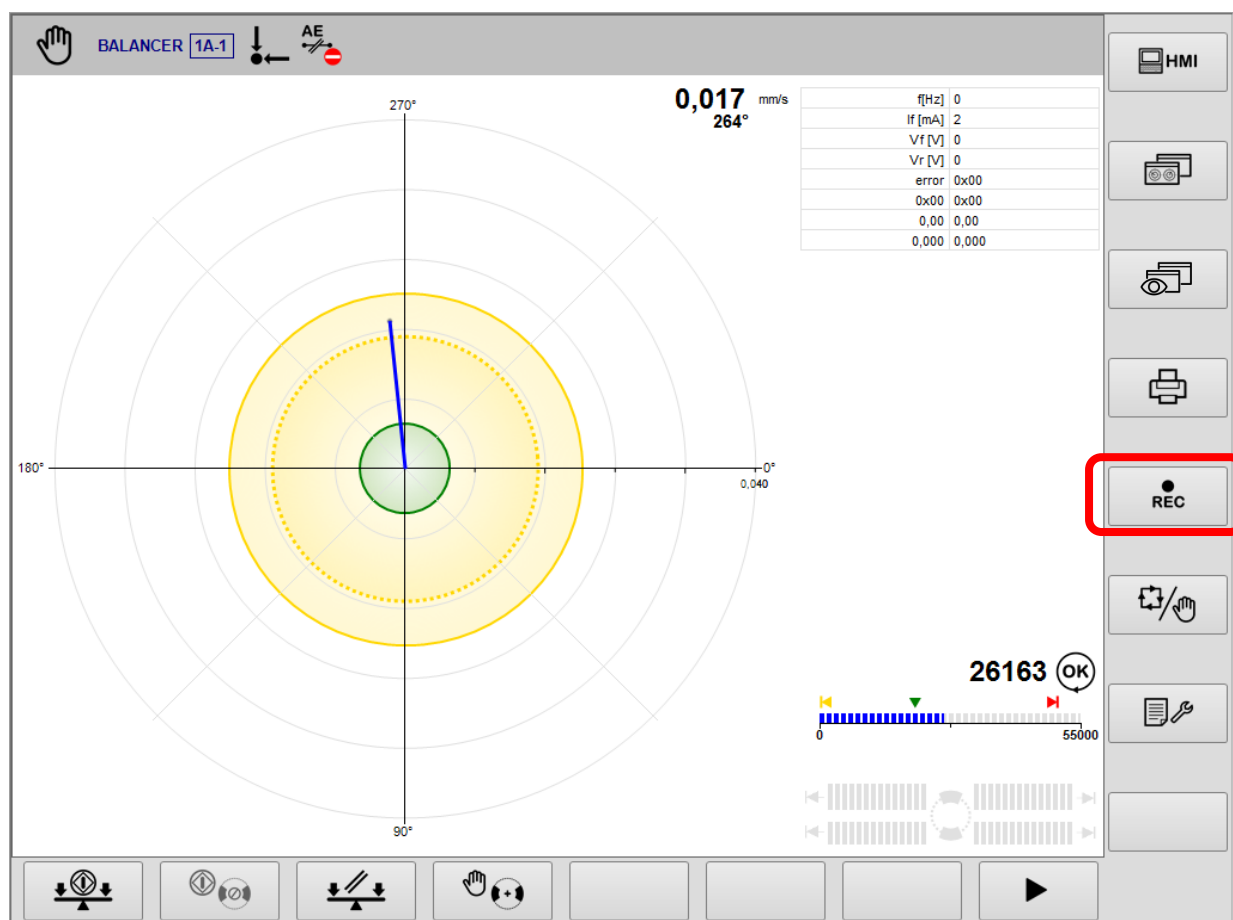
Using the command **Record** ● REC [Shift+F5] it is possible to start the registration on data process files of the devices. The files are archived in a specific folder with the following name:

<Drive:>\BalanceSystems\VMx5\DataRecBSREC_AAMMGG_hhmmss.txt

Data recording commands				
Icon	ID	Command name	Button	Description
● REC	0059	Record	Shift+F5	Start recording.
■ STOP	0060	Stop	Shift+F5	Stop recording and file close.
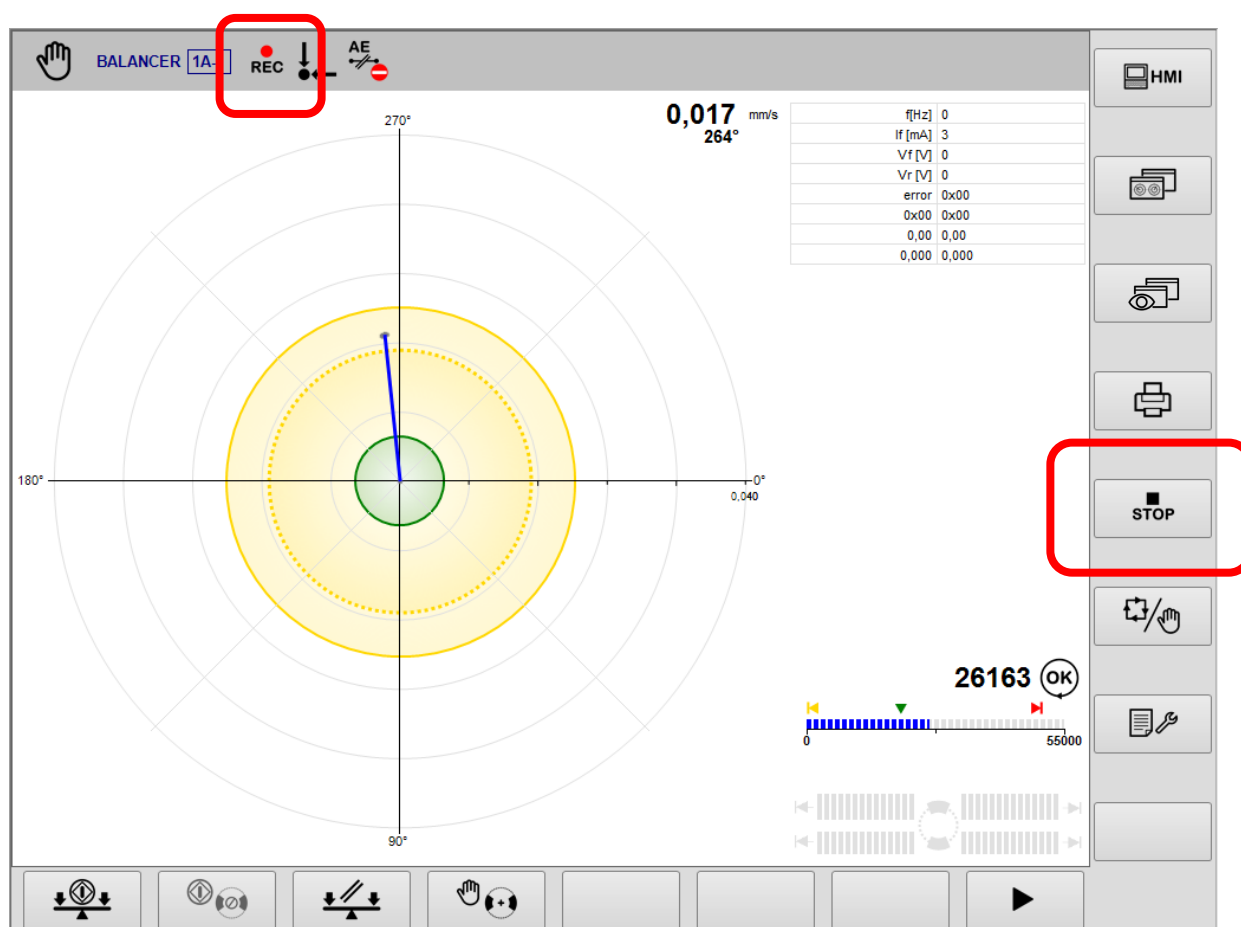
The maximum file size, the sampling frequency and the maximum folder size are defined by the system's installer and can be changed through the system setup.

A message will appears in case of max size reached. A new file will open automatically.
A message will notify the operator when the reserved disk space has been exhausted. In this case the operator will decide to move the recorded file in a backup device or to allow the system to cancel the older files to free space.

The files are in the text format, as record with fields separated by semicolon ";" for an easy importing in management package (ex MS Excel ®, MS Access ®, etc.).

1.7.2. Print

It performs the print of the current page on the default printer defined in the oprative system (printer or pdf)
The print layout will include the following data filled by the system's installer.

Parameter	Description
OEM	Machine OEM's name
Machine	Machine type
Matricula	Machine number
End User	End user's name

1.8. Manual commands

NOTE: *The access and the execution of the manual commands is context based. Depending on the choices of the system installer or on the operating conditions, some commands may not be available for execution or not accessible. The commands, which are not accessible, does not appear in the menu. The commands, which are not executable due to the context conditions, will appear disabled. (grey on grey icons).*

Icon	Description
	Executable command
	Not executable command

2. 1 Plane Balancer [BN type]

2.1. Introduction

The VMx5 balancer is the device dedicated to the automatic balancing of the grinding wheel and spindle assembly.
Depending on model and configuration, the VMx5 system is able to support one balancing equipment.
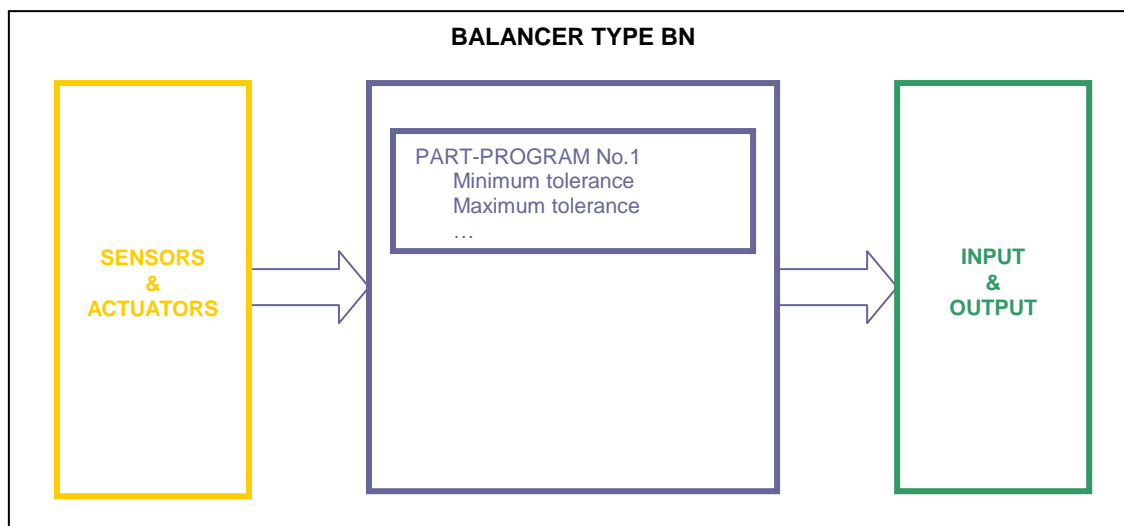
The available functions depend on the acces level defined by the system installer.

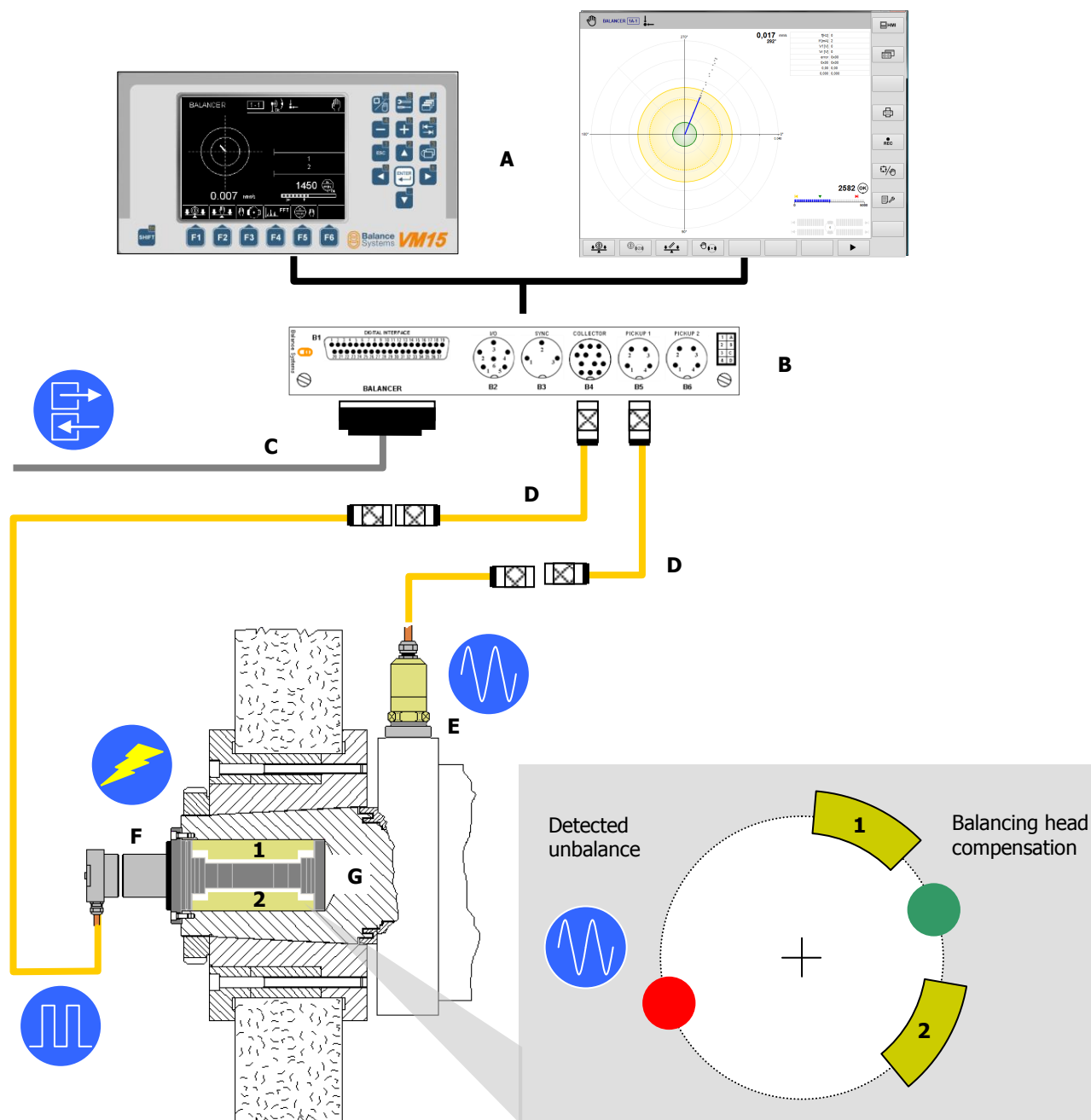The balancer can work both in automatic and in manual mode.
In automatic mode all the commands and the status signalling are excanghed through the digital interface connected to the machine PLC/NCU; the VMx5 HMI shows the status of the actual process.
In manual mode all the available commands are launched by the operator through the VMx5 HMI while the status signalling to the machine PLC/NCU are manteined.

ORGANIZATION SCHEME

BALANCER TYPE BN

| SENSORS & ACTUATORS | → | PART-PROGRAM No.1
Minimum tolerance
Maximum tolerance
… | → | INPUT & OUTPUT |

The components of the balancing system are shown in the following picture

Component	Description
A	User interface: VMx5 Panel or VMx5 HMI PC [®]Windows
B	Balancer card unit
C	Digital interface (I/O signals)
D	Extension cable
E	Vibration transducer (accelerometer)
F	Collector: static and rotating part. Power signals for the balancing head and rotation speed detection
G	Balancing head

2.2. Status page
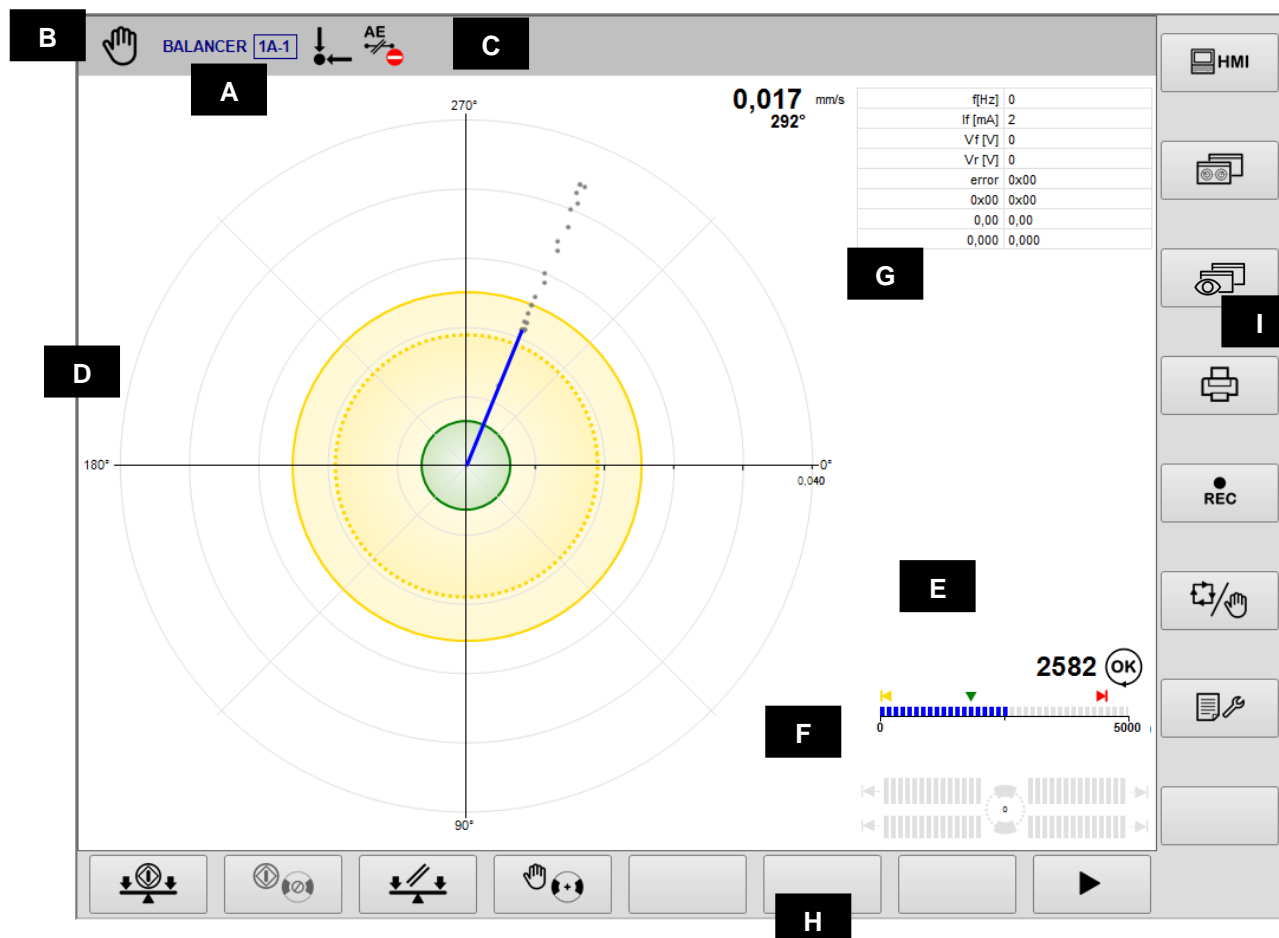
A. Device name

BALANCER 1 – 1 indicates **BALANCER 1, Part-Program 1**

B. Operating mode (Automatic / Manual)
C. Area reserved to status signalling
D. Graphic area to rappresent the unbalance diagram:
  - Diagram
  - Programmed tolerance limits
  - Unbalance value
E. Spindle rotation speed diagram: rotation status, limits.
F. Balancing head diagram. The indication in the bar graphs are proportional to the speed of the weights. The symbol "➡I" indicates that the two compensation weights are in contact.
G. Messages and diagnostic data display area
H. Horizontal command line, accessible by [Fx] buttons.
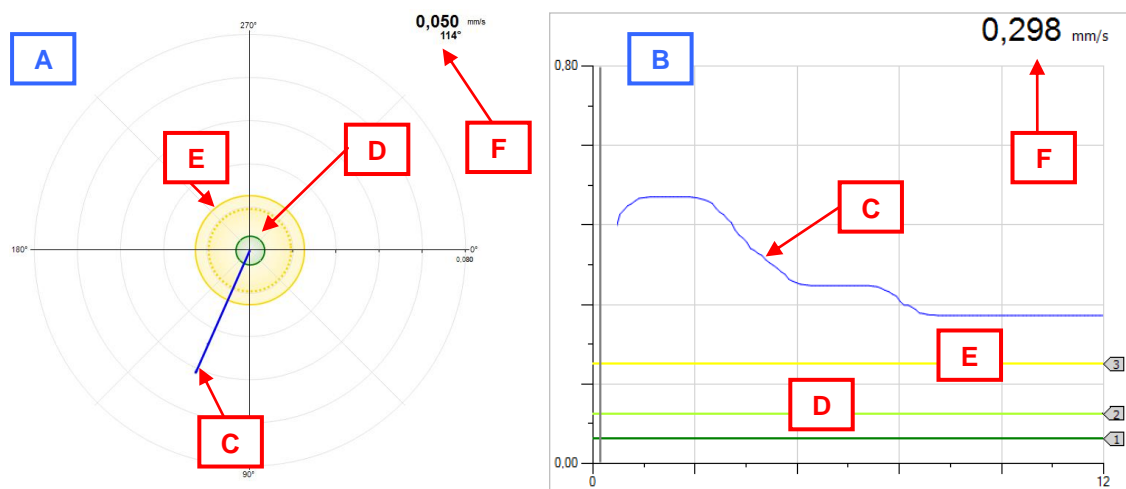I. Vertical command line, accessible by [Shift+Fx] buttons.

In details:

Area C: Status and Alarm signalling

A. Icons which rappresent the status of the device (see next paragraph for further details)
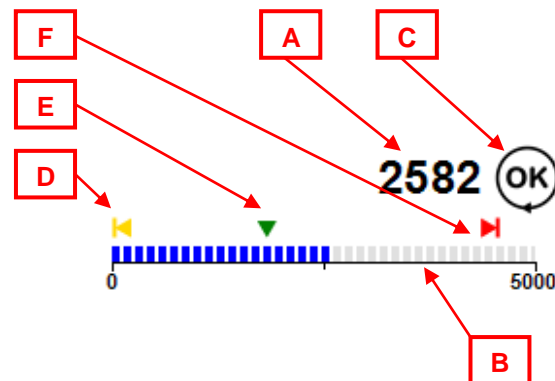
Area D: Unbalance diagram

A. Polar diagram
B. Trend diagram: Unbalance vs time
C. Unbalance rappresentation
D. Minimum tolerance
E. Maximum tolerance
F. Unbalance value (magnitude)

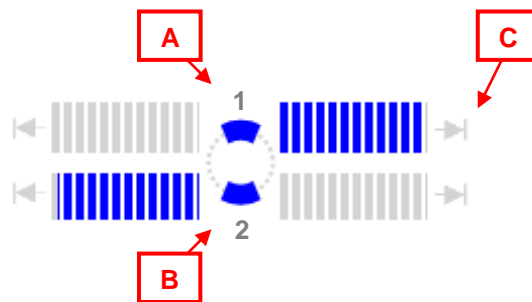**Area E: Rotation speed diagram**

A. Value of the spindle rotation speed [rpm]
B. Bar graph diagram of the rotation speed
C. Rotation speed status (see next paragraph for further details)
D. Minimum rotation speed
E. Nominal rotation speed
F. Maximum rotation speed

Area F: Balancing head diagram

A. Graphic rappresentation of the movements of the compensation weight No.1. The movement is bidirectional and the bar graph filling is proportional to the speed of the weight.
B. As "A" but referred to compensation weight No.2
C. Current protection. It indicates that the two compensation weights are in contact or that one weight is locked due to short circuit.

2.3. Status and alarm signalling

During the normal operating mode some variable are continously monitored and when necessary, some icons or messages are displayed to inform the operator about such conditions.

NOTE: When the condition can be dangerous both for the machine integrity and the operator safety a number of signalling to the machine PLC/NCU are generated and icons on the screen will appear for the operator.

Unbalance signalling			
Icon	**ID**	**Status name**	**Description**
	3002	UNBALANCE INSIDE MIN TOLERANCE	The spindle is balanced within the programmed min tolerance limit
	3001	UNBALANCE OUT OF TOLERANCE	The spindle is out of balance conditions
	3022	ALARM: MAX VIBRATION	The out of balance value is too high to execute an automatic balancing cycle. It is necessary to reduce the unbalance using the manual procedure (see next paragraph), to reduce the unbalance value under the 50% of the value programmed in the parameter "MAXIMUM VIBRATION". Then it will be possible to run an automatic cycle again. *NOTE: This condition should be investigated because can be due to a defect or a damage in the grinding wheel.*

Spindle rotation speed signalling			
Icon	**ID**	**Status name**	**Description**
	3008	SPINDLE STEADY	The spindle is stopped. It depends on the choiche of the system installer if this condition means that the spindle speed is lower than 60 rpm (default) or lower than a programmed value.
	3005	SPINDLE NOT AT NOMINAL SPEED	The spindle rotation speed has not reached the nominal conditions
	3004	SPINDLE AT NOMINAL SPEED	The spindle rotation speed has reached the nominal conditions and it is stable
	3006	ALARM: SPINDLE SPEED OVER MAX LIMIT	The spindle rotation speed is greather than the maximum value programmed
	3007	ALARM: ROTATION SPEED FAULT	The rotation speed sensor might be damaged or not connected

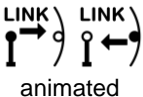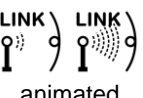| Balancing head signalling			
Icon	**ID**	**Status name**	**Description**
	3020	WARNING: MOTORS ERROR OR FAULT. NEUTRAL CYCLE REQUIRED.	The balancing head is not ready. A neutral ccycle is required in order to reset.

Vibration transducer (pick-up) signalling			
Icon	**ID**	**Status name**	**Description**
PICKUP	3003	ALARM: Pickup error or fault	The vibration transducer might be damaged or not connected

Alarm signalling			
Icon	**ID**	**Status name**	**Description**
	1004	ALARM (generic)	Generic alarm condition

Automatic cycles signalling (balancing and neutral positioning)			
Icon	**ID**	**Status name**	**Description**
blinking	1002 1001	CYCLE IN PROGRESS...	Automatic cycle in progress (e.g. balancing or neutral positioning)
	3037	LEARNING CYCLE ACTIVE	A learning cycle is in execution to adjust automatically the balancing parameters.
	3039	WARNING: AUTOMATIC BALANCING IMPOSSIBLE	The system detected bad conditions to execute the automatic balancing cycle. This signal can be generated by: ▪ Insufficient compensation capacity ▪ Balancing adjusted incorrectly ▪ Permanent MAXIMUM VIBRATION conditions ▪ Permanent balancing timeout
	3038	WARNING: BALANCING TIMEOUT EXPIRED	The balancing cycle was aborted due to timeout. The balancing timeout is programmed by the system installer.

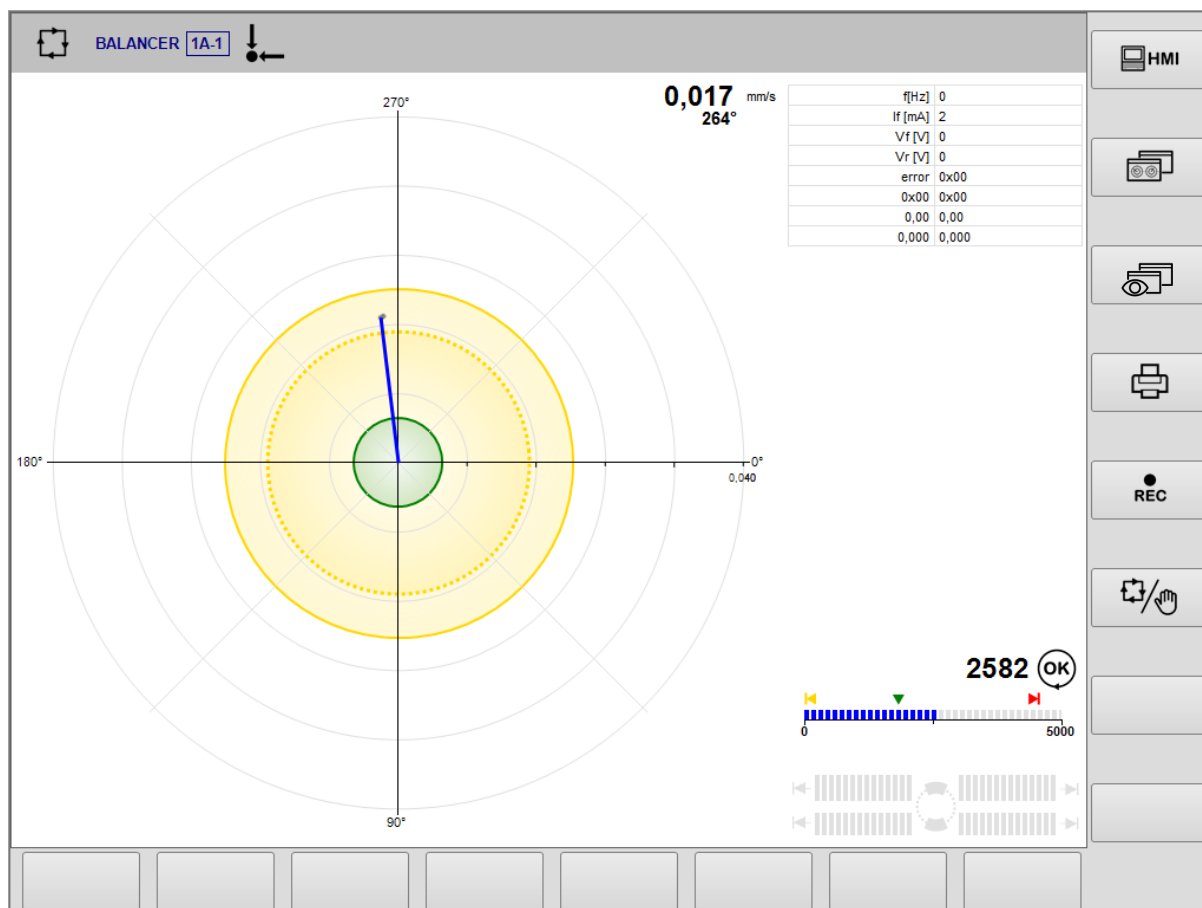| Automatic cycles signaling (manacing an neutral weight)			
Icon	ID	Status name	Description
MAX	3021	WARNING: MAX COMPENSATION REACHED	During the balancing cycle, the balancing head reached the maximum compensation capacity. If this message occurs while the unbalance is greather than the programmed tolerance, means that the balancing head is not able to compensate the actual unbalance.
	3017	NEUTRAL POSITION REACHED	The two compensation weights reached the neutral position (weights at 180°).
	3018	WARNING: NEUTRAL CYCLE IMPOSSIBLE	The balancing head installed does not allow the neutral cycle.
	3019	WARNING: NEUTRAL CYCLE FAIL	The neutral cycle cannot be completed succesfully. Try to repeat the command. If the alarm does not desappear check the integrity of the system.

Brushes collector type signalling			
Icon	ID	Status name	Description
ON	3016	BRUSHES COLLECTOR: POWER ON	Indicates that the command to switch on the collector was activated
ON	3036	RING COLLECTOR: ELECTROVALVE ON	Indicates that the control command for the pneumatic driver was activated

NoLink collector type signalling			
Icon	**ID**	**Status name**	**Description**
	3031	WARNING: COLLECTOR NOT READY	The static and the rotating part of the collector are not coupled
(animated)	3029 3030	HARDWARE LINK IN PROGRESS...	The hardware coupling between the static and the rotating part of the collector is in progress. The signal disappears as soon as the coupling is optimized.
(animated)	3027	COMMUNICATION LINK IN PROGRESS…	The communication link between the static and the rotating part of the collector is in progress. The signal disappears as soon as the communication is stable.
	3032	COLLECTOR CONNECTED	The static and the rotating part of the collector are correctly coupled
	3010	WARNING: STATIC PART PROTECTION	An extra current was detected on the static part of the collector. After a while, the system restarts automatically to optimize the coupling parameters.
	3013	WARNING: ROTATING PART PROTECTION	An extra voltage was detected on the rotating part of the collector. After a while, the system restarts automatically to optimize the coupling parameters.
	3011	WARNING: STATIC PART	An extra current is permenently detected on the static part of the collector. The system retries a new optimization only if a command which involve the movement of the weights is sent (e.g. balancing, neutral positioning, manual moving).
	3014	WARNING: ROTATING PART	Despite a number of trials it is not possible to estabilish a link between the static and the rotating part. The rotating part maight be missing or too far. The system retries a new optimization only if a command which involve the movement of the weights is sent (e.g. balancing, neutral positioning, manual moving).
	3009	ALARM: TEMPERATURE ON STATIC PART	The temperature on the static part has reached the limit of 80°C.
	3012	ALARM: TEMPERATURE ON ROTATING PART	The temperature on the rotating part has reached the limit of 80°C.
	3033	WARNING: ACTIVE AE LINK IMPOSSIBLE	The static and the rotating part of the collector are not coupled in oreder to supply power to the active AE sensor
	3034	ACTIVE AE SENSOR OK	The static and the rotating part of the collector are correctly coupled to manage the active AE sensor
	3035	WARNING: ACTIVE AE SENSOR NOT READY	The active AE sensor is not ready (disconnected or faulty)

2.4. Commands

2.4.1. Automatic mode

All the commands related to the automatic cycles are managed through the PLC/NCU.
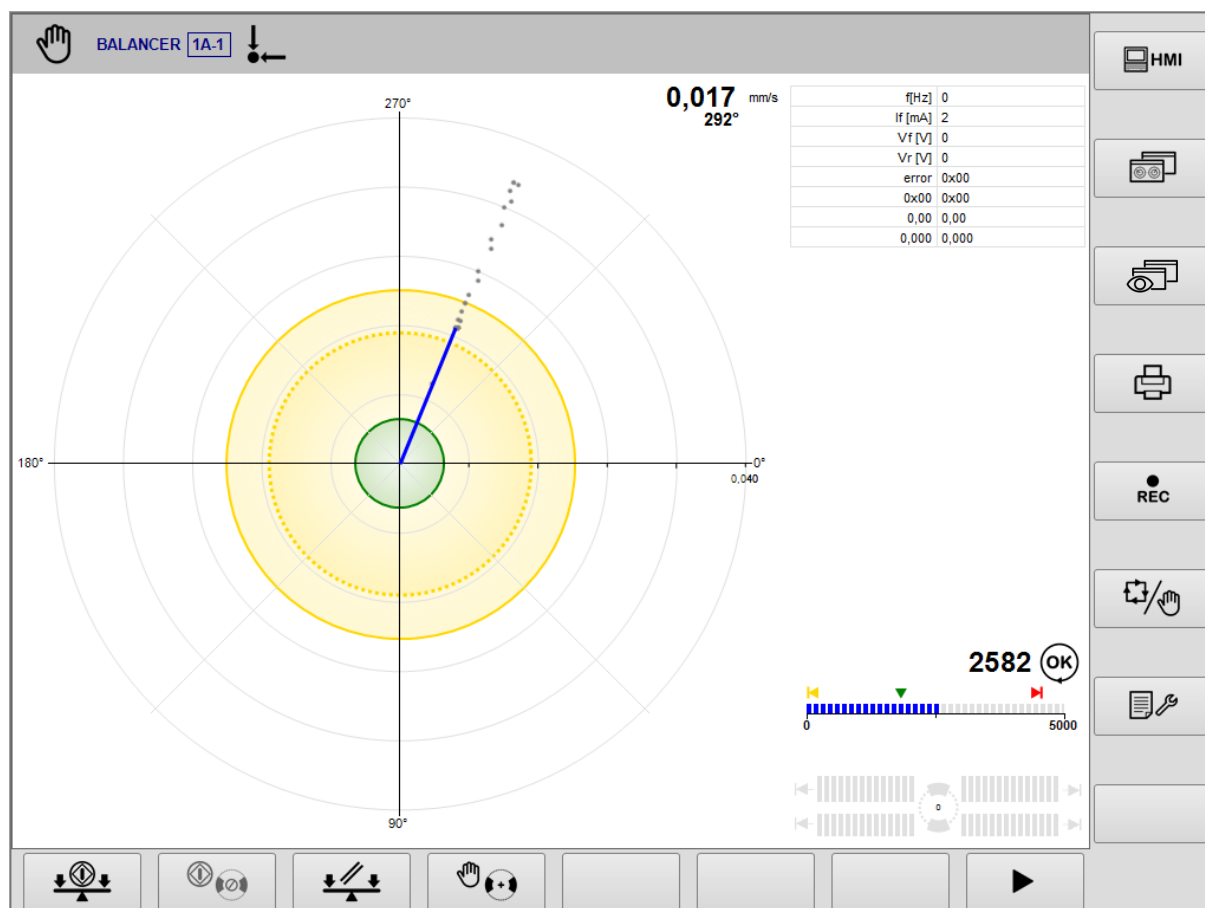

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches the balancer device between automatic and manual mode

2.4.2. Manual mode

In manual mode the operator can verify or use the balancer independent from the machine PLC/NCU. This can be useful during the parameters setup of the balancing system, to direct access to the commands without necessarily to involve the PLC/NCU cycle.

In addition, the operator can carry out research on the behavior of the machine and the interaction between its components, e.g. determine vibrations produced by other unbalances than that of the grinding wheel (see here after).

The manual mode is accessible only at programmer level (or higher).

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
🖥️HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
🖨️	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches the balancer device between automatic and manual mode
	0013	Parameters	Shift+F7	Access to balancer parameter pages

2.5. WORK parameters

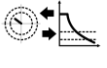To access the WORK parameters press **Parameters**   **[Shift+F7]**.

For the description of the WORK parameter, refer to the document present at the link <u>Parameter setup</u>

2.6. Automatic cycles

|				Automatic cycle commands
Icon	**ID**	**Command name**	**Button**	**Description**
	2001 2002	Start / Stop balancing	F1	Carries out the automatic balancing cycle. During the balancing procedure, the system may also activate automatically the acquisition cycle (self-learning).
	2038 2039	Start / Stop neutral positioning	F2	Positions the compensation weights of the balancing head into their minimum compensation condition (weights at 180°). In this way, the effect of the balancing head is neutralized. *NOTE: It is recommended to start a neutral positioning cycle after each replacement of the grinding wheel or removal of the balancing head.* *NOTE: For safety reason, the neutral positioning cycle must be excuted when the spindle is steady. If the spindle is still rotating the command will not be carried out. If the spindle is started, after having given the command, the cycle will in any case be executed.*
	2003 2002	Start / Stop balancing With learning cycle	F3	Starts automatic balancing cycle and execute autolearning . All the conditions previously learn are cancelled.

2.7. Procedures and auxiliary functions

Procedures and Auxiliary functions commands				
Icon	**ID**	**Command name**	**Button**	**Description**
	2015	Motors	F4	Permits to move manually the two motors which control the two compensation weights inside the balancing head
	2044	Manual balancing	F2	Accesses the guided procedure of Manual Balancing (or Pre-Balancing) on 1 plane
	2014	Unbalance Diagram	F7	Switch through different style of unbalance diagram

Those commands which require a more detailed description will be analyzed in the next paragraphs, and in addition, some typical procedures are described.

2.7.1. *Manual movement of the compensation weights (Motors)*

By the command **Motors** [F4] it is possible to move manually the compensation weights inside the balancing head.

COMBINED mode
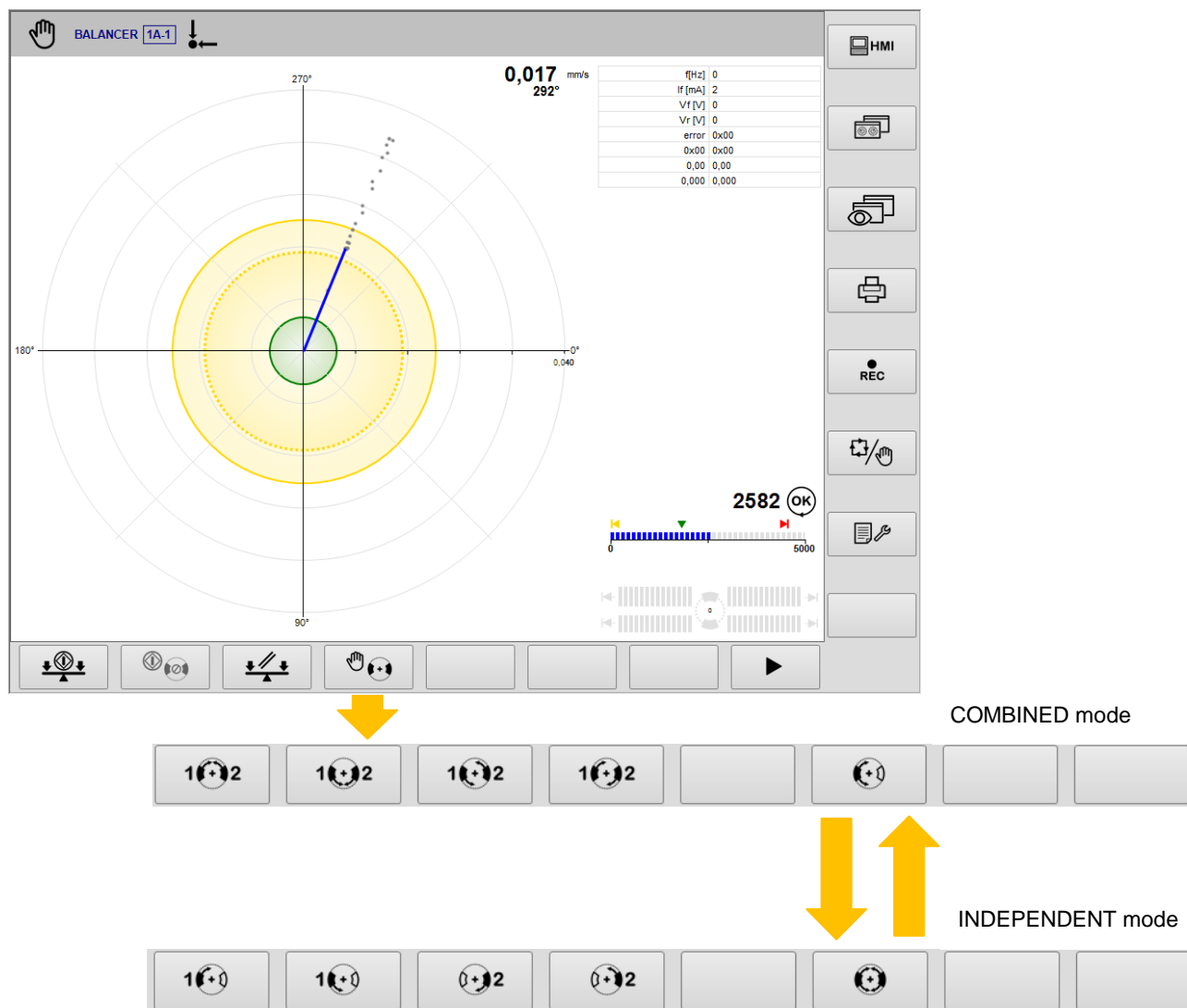
INDEPENDENT mode

The commands menu permits to move the weights either in combined mode (in couple) or in independent mode, using function keys F1, F2, F3, F4.

During the manual movement of the weights, with the grinding wheel rotating, on the screen one can note the variation of the unbalance. When keeping one of the buttons F1, F2, F3, F4 pressed, the shifting speed of the weights increases gradually until reaching its maximum value. One can observe this in that area of the screen dedicated to the motors.

If in this area the symbol "→I" or "I←" appears, this indicates that the compensating weights have collided and that consequently, continuing the movement of the weight in this direction, one will not obtain any variation of the unbalance. In the case of collision a protection system for the balancing head intervenes.

				Manual movement of the compensation weights commands: COMBINED mode
Icon	**ID**	**Command name**	**Button**	**Description**
	2031	Cross forward	F1	The two compensation weights will move in opposite direction. Forward.
	2030	Cross backward	F2	The two compensation weights will move in opposite direction. Backward.
	2032	Parallel forward	F3	The two compensation weights will move both in the same direction. Forward.
	2033	Parallel backward	F4	The two compensation weights will move both in the same direction. Backward.
	2018	Independent mode	F6	Switch to independent mode
	0017	Exit	Shift+F8	Exit

				Manual movement of the compensation weights commands: INDEPENDENT mode
Icon	**ID**	**Command name**	**Button**	**Description**
	2020	Weigth 1 forward	F1	Move weight #1. Forward.
	2019	Weigth 1 backward	F2	Move weight #1. Backward.
	2022	Weigth 2 forward	F3	Move weight #2. Forward.
	2021	Weigth 2 backward	F4	Move weight #2. Backward.
	2029	Combined mode	F6	Switch to combined mode
	0017	Exit	Shift+F8	Exit

2.7.1.1. Manual balancing procedure

The procedure of manual balancing is very simple and must be done at small steps, until reaching the best possible results, namely an unbalance which is smaller than the minimum threshold of tolerance.

Although it is inefficient to balance manually, nevertheless, here after one explains how to proceed, because it is considered useful to know the criterion of the shifting of the compensating weights, which has to be done in the case of exceeding the maximum vibrations threshold. In fact, this condition, as already explained, causes blocking of the automatic balancing function.

Here after, a simple description is given, but it is recommended to read the whole paragraph prior to staring with the procedure.

PROCEDURE

1. Run up the spindle and look at the unbalance behaviour.
2. Activate the manual movement as INDEPENDENT mode.
3. Press [F1] Weight #1 forward.
4. If the unbalance value increases, invert the moving direction: [F2] Weight #1 backward.
5. Continue to move the weight in the direction of unbalance decreasing until the unbalance value crosses the minimum. As soon as the unbalance value starts to increase, stop the movement.
6. Move the weight #2 in the same direction; if the previous minimum was reached with F1, then press [F3] Weight #2 forward. Otherwise, press [F4] Weight #2 backward.
7. The unbalance value will decrease. Continue to move the weight in the direction of unbalance decreasing until the unbalance value crosses a new minimum.

    a. If this new minimum is lower than the previous (point 5), continue to alternate [F3] and [F1], each time waiting for a new minimum, until the unbalance value reaches the tolerance value.
    b. If this new minimum is greather than the previous (point 5), change the direction of moving. Alternate [F2] and [F4], each time waiting for a new minimum, until the unbalance value reaches the tolerance value.
8. If after a sequence the tolerance value is skipped, change the direction of moving and repeat.

NOTE: During all the phases of movement of the weights one should monitor that there is no collision between the two weights (indicated by symbol "→I" and/or "I←"). Should this, however, happen, one has to move the weights into the opposite direction.

NOTE: The described method is only indicative. Once having reached a certain security with the procedure, the operator will be able to decide for himself how to best balance manually, also using combined motors.
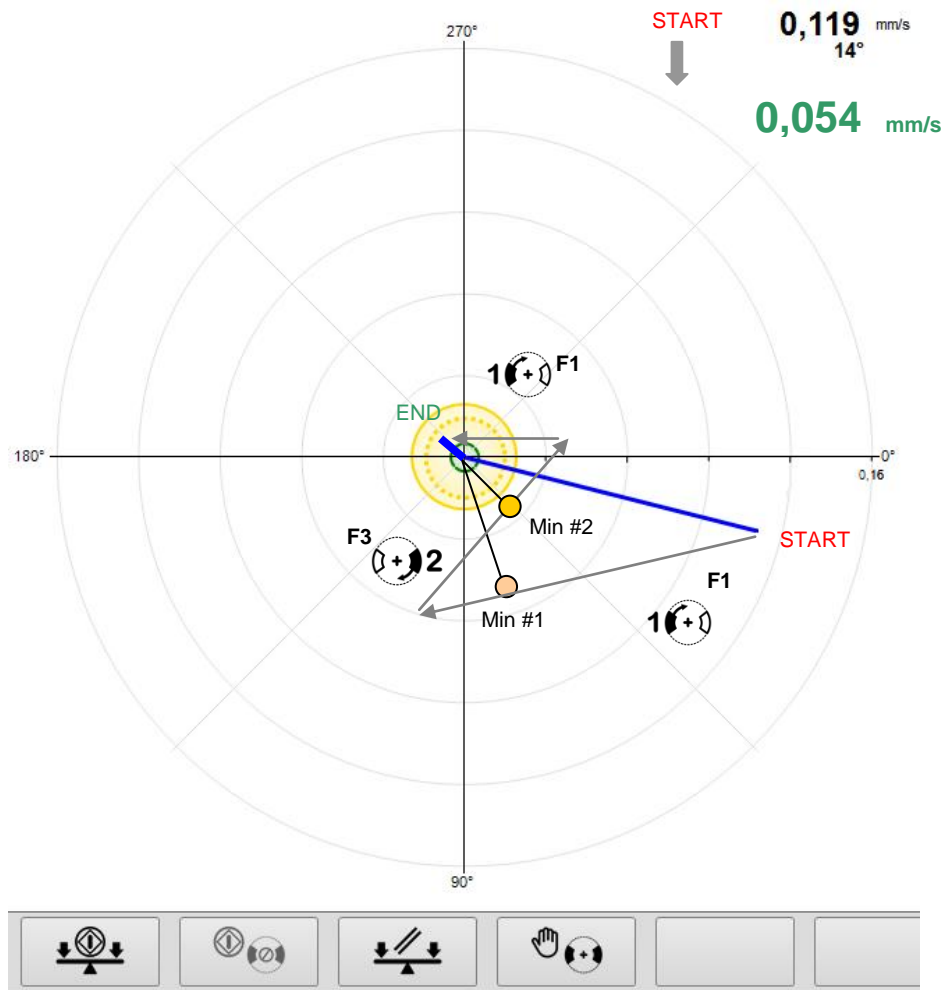
2.7.2. Manual Balancing or PRE-Balancing on 1 plane

2.7.2.1. Introduction

This optional procedure for Manual Balancing or PRE-Balancing on 1 plane with the grinding wheel installed in the machine makes possible reduce the initial unbalance of a new grinding wheel so that the balancing head maintain a satisfactory margin of adjustment even when, due to lack of available space, it is not possible to size the balancing head to the maximum grinding wheel unbalance permitted (according with ISO 6103 regulation). This procedure is also useful in all those cases where it is not possible to equip the machine with an automatic balancing system.
The balancing precision which can be reached depends solely on the accuracy with which the balancing weights are positioned, based on the indications of the system.

It is possible to execute the balancing procedure by three different COMPENSATION METHOD:

- DISPLACEMENT: two identical weights permanently installed on grinding wheel flange will be displaced during the calibration and correction steps to achieve the best final result.
- ADDITION: two identical weights will be added during the calibration and correction steps to achieve the best final result.
- WEIGHTS: a number of defined or acquired weights (i.e. grub screw) can be screwed in threaded holes prepared around the circumference of the rotating body.

The procedure is fully step by step guided by system.

2.7.2.2. Status page
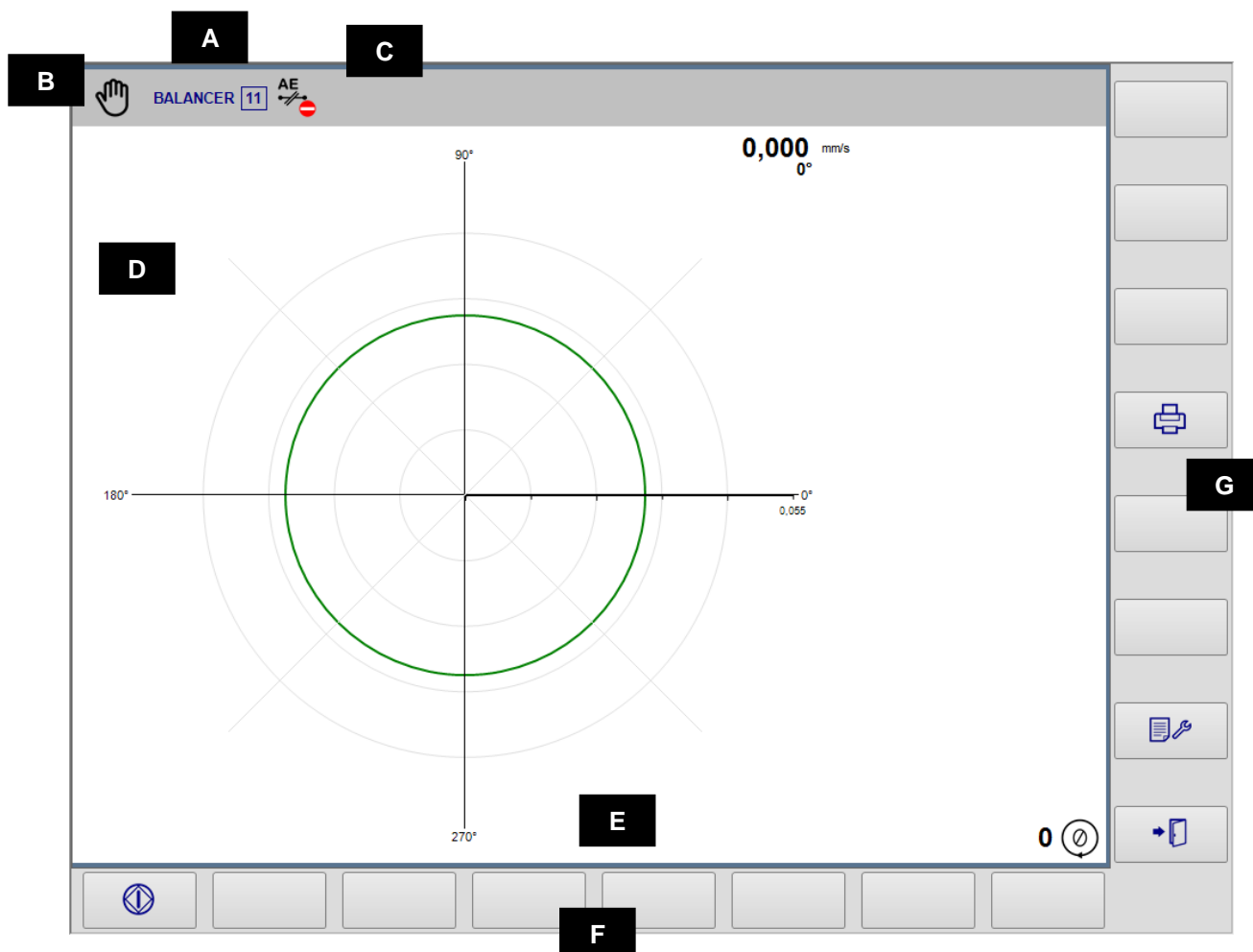
A. Device name
B. Manual operating mode
C. Area reserved to status signalling
D. Graphic area to rappresent the unbalance diagram:

- Diagram
- Programmed tolerance limits
- Unbalance value
- Rotation speed
- Balancing positions

E. Messages area
F. Command line, accessible by [Fx] buttons.
G. Vertical Command line, accessible by [Shift+Fx] buttons

NOTE
According to the settings foreseen by the installer of the system, it is possible that the balancer card may work exclusively with the Manual Balancing or PRE-Balancing function (that means without the part of the managing of the automatic balancing through balancing head). In this case the PRE-Balancing status page becomes the main page of the device.

2.7.2.3. WORK parameters

To access the working parameters:

- Press **Manual Balancing (Pre-Balancing)** **[F2]**

- Press **Parameters** **[Shift+F7]**

For the description of the WORK parameters, refer to the document present at the link Parameter setup
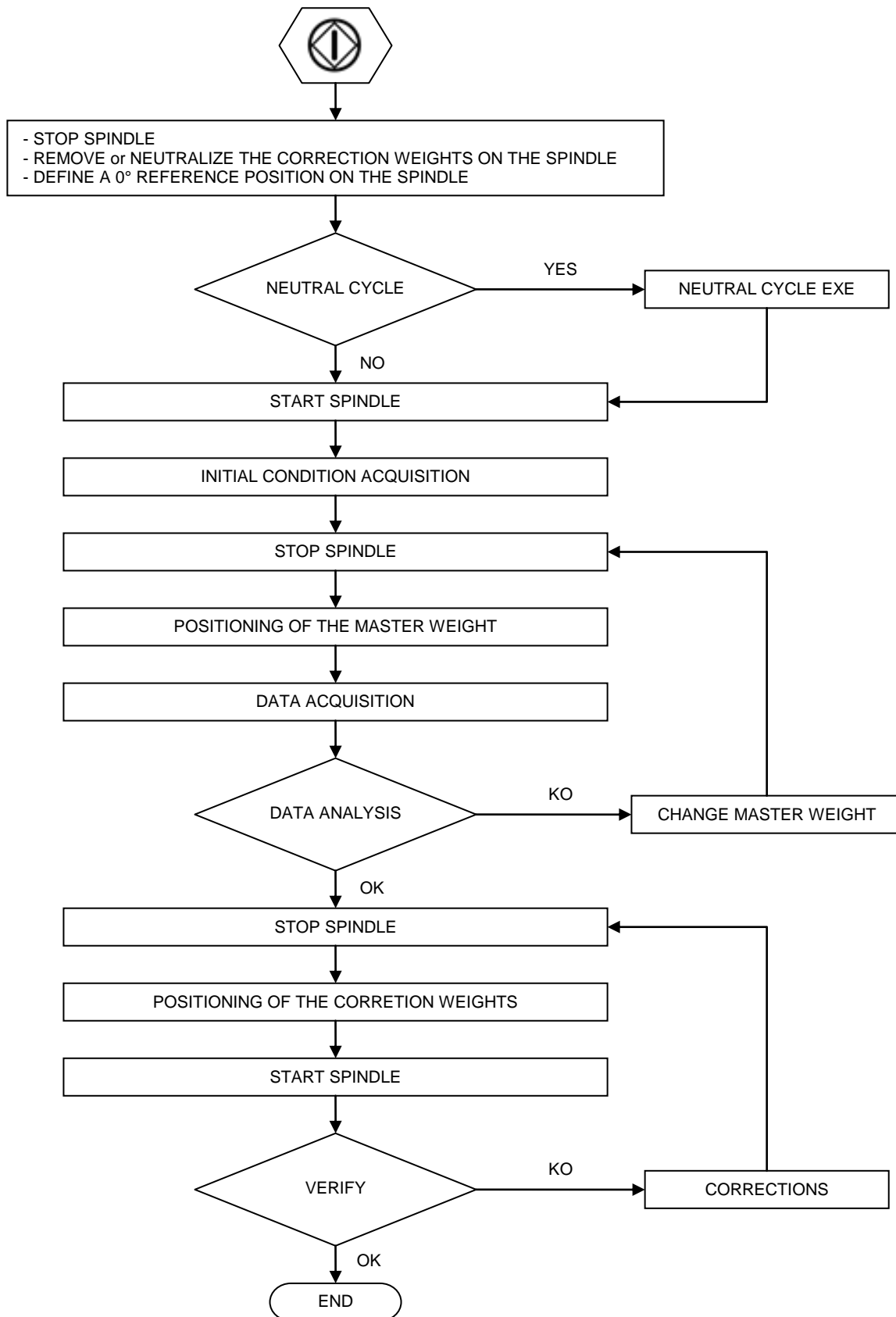
2.7.2.4. Balancing procedure

The procedure starts by **Manual Balancing** [F2] command.
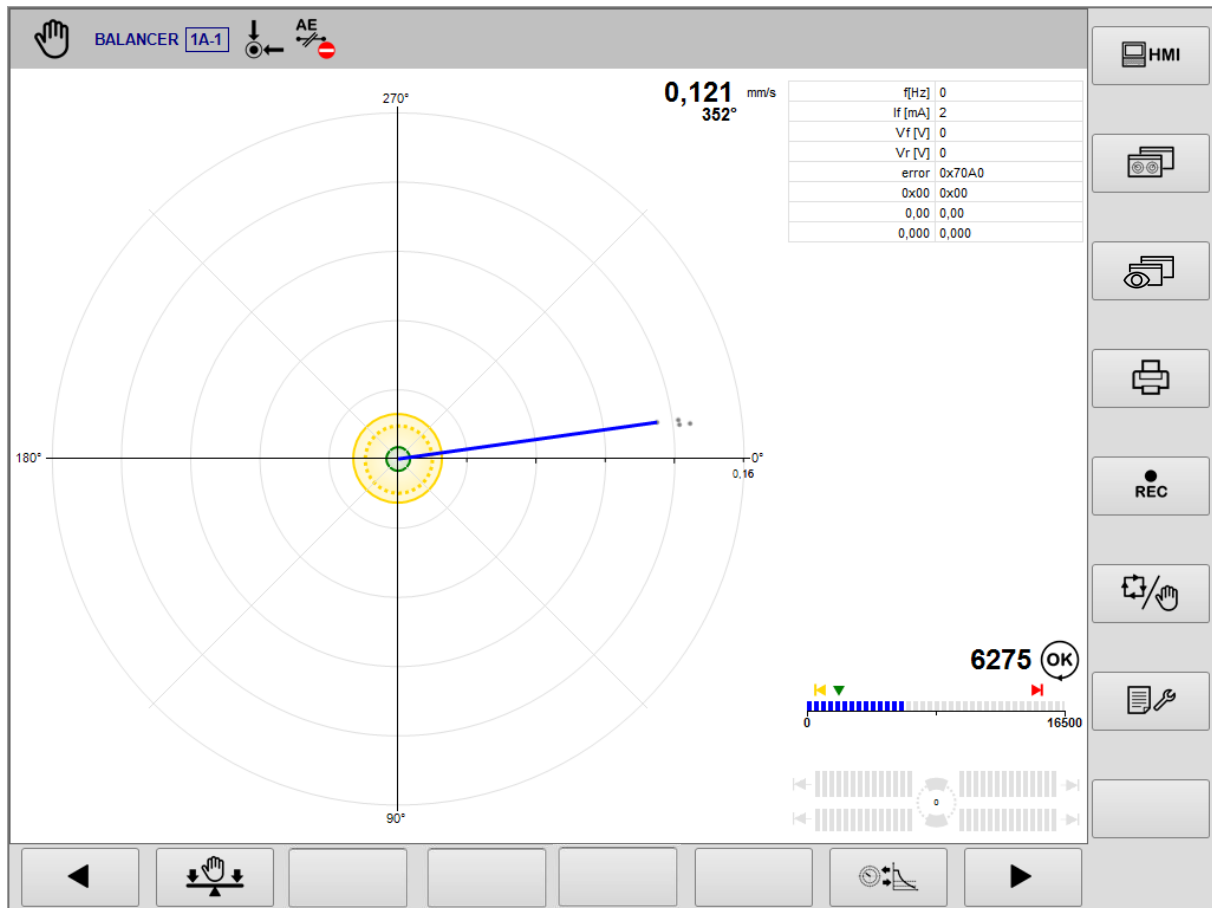
Manual Balancing / PRE-Balancing commands				
Icon	ID	Command name	Button	Description
	0047	Start	F1	Start the procedure
	0048	Stop	F6	Stop the procedure
	0034	Next	F1	Permission to go to the next stage in the procedure. The system automatically checks that the operator's confirmations are reasonable and shows, in the message area, any operations or conditions that must be achieved in order to carry on.
	2048	Ignore	--	Ignore the suggestion and go straight to the next step
	2062	Change	--	Change some of the conditions during the procedure without having to cancel it
	2029	Correction	--	Following the checking operation, this indicates the amount of correction to be made to the position of the weights by displaying a diagram giving the ideal position (solid weights) and the actual position (blank weights).
	2046	Start weights acquisition	--	Using the "Compensation method = WEIGHTS" and "Weights type = ACQUIRED", starts the procedure to acquire the effect of the master weights.
	2047	Stop weights acquisition	--	Using the "Compensation method = WEIGHTS" and "Weights type = ACQUIRED", stops the procedure to acquire the effect of the master weights.
	2049	Calibration	--	Start the calibration procedure
	0024	Save calibration	--	Save calibration data
	0011	Print	Shift+F4	Print the actual page
	0013	Parameters	Shift+F7	Parameters setup
	0017	Exit	Shift+F8	Exit

2.7.2.5. Procedure flow chart

```
                    ( START )
                        │
    ┌───────────────────────────────────────────────────┐
    │ - STOP SPINDLE                                      │
    │ - REMOVE or NEUTRALIZE THE CORRECTION WEIGHTS ON THE SPINDLE │
    │ - DEFINE A 0° REFERENCE POSITION ON THE SPINDLE     │
    └───────────────────────────────────────────────────┘
                        │
                        ▼
              ╱─────────────────╲          YES    ┌──────────────────┐
             ╱   NEUTRAL CYCLE    ╲────────────────│ NEUTRAL CYCLE EXE │
              ╲─────────────────╱                  └──────────────────┘
                        │ NO                              │
                        ▼                                 │
    ┌───────────────────────────────────┐◄───────────────┘
    │           START SPINDLE            │
    └───────────────────────────────────┘
                        │
                        ▼
    ┌───────────────────────────────────┐
    │     INITIAL CONDITION ACQUISITION  │
    └───────────────────────────────────┘
                        │
                        ▼
    ┌───────────────────────────────────┐◄───────────────┐
    │            STOP SPINDLE            │                │
    └───────────────────────────────────┘                │
                        │                                 │
                        ▼                                 │
    ┌───────────────────────────────────┐                │
    │   POSITIONING OF THE MASTER WEIGHT │                │
    └───────────────────────────────────┘                │
                        │                                 │
                        ▼                                 │
    ┌───────────────────────────────────┐                │
    │          DATA ACQUISITION          │                │
    └───────────────────────────────────┘                │
                        │                                 │
                        ▼                                 │
              ╱─────────────────╲          KO    ┌────────────────────┐
             ╱   DATA ANALYSIS    ╲───────────────│ CHANGE MASTER WEIGHT│
              ╲─────────────────╱                 └────────────────────┘
                        │ OK
                        ▼
    ┌───────────────────────────────────┐◄───────────────┐
    │            STOP SPINDLE            │                │
    └───────────────────────────────────┘                │
                        │                                 │
                        ▼                                 │
    ┌───────────────────────────────────┐                │
    │ POSITIONING OF THE CORRETION WEIGHTS│               │
    └───────────────────────────────────┘                │
                        │                                 │
                        ▼                                 │
    ┌───────────────────────────────────┐                │
    │           START SPINDLE            │                │
    └───────────────────────────────────┘                │
                        │                                 │
                        ▼                                 │
              ╱─────────────────╲          KO    ┌────────────────────┐
             ╱      VERIFY         ╲──────────────│    CORRECTIONS     │
              ╲─────────────────╱                 └────────────────────┘
                        │ OK
                        ▼
                    (  END  )
```

2.7.2.6. Notes for correctly executing the procedure

❑ The procedure is completely assisted by the machine and the instructions for the operator are visualized on the control panel step by step, in the operator message area.

❑ In case of correction for adding or displacement, once selected master weight, the system elaborates the acquired data and to make the angular positions in which two balancing weights must be fixed, that weights must be equal to master weights.

❑ The 0° reference position is very important. We suggest you graduate the rotating system in degrees (on the spindle body or on a flange or on the toolholder).
If the rotating system already has a vernier graduated in degrees, we suggest you utilize the "0" as a reference position. it is important that, once the "0" reference position and the graduation direction (clockwise or counter-clockwise) have been established, the relative work parameter is set accordingly. In this way, the machine will correctly indicate the final positions of the correction weights.

❑ The angular positions of the correction weights are counted beginning from the "0" reference position, turning the spindle in the nominal direction of rotation.

❑ Once a calibration has been memorized, it remains valid only if the work parameters and the position of the sensors in the machine are not modified If they are modified, calibration will have to be carried out again. In particular, if after having memorized the calibration the indicated correction positions are not correct (balance cannot be obtained), check if.

- the transducer and/or the rotation sensor have been moved;
- the type of sample weight has been substituted;
- the spindle rotation speed has been changed
- the machine has been turned off.

In these cases, calibration must be repeated.

❑ The machine signals and advises the operator when the weights offer an insufficient compensation capacity.

❑ In order to guarantee adequate precision, the weights must be positioned so that the middle of the weight corresponds to the angular position indicated by the machine.

❑ If you are unable to obtain the set TOLERANCE value although the procedure is correctly carried out, check if:

- the TOLERANCE value is not too small;
- the detected unbalance is unstable and fluctuates in and out of the set TOLERANCE circle. In these cases, you can go ahead by either increasing the tolerance value in the work parameter or checking that the reading instability is not caused by external factors (see section on PROBLEM SOLVING);
- there are some moving objects that disturb the vibration transducer reading (i.e., presence of a socket near the work area or cables or cooling pipes that come into contact with the transducer body);
- the settings of the "rotation direction" and "graduation direction" parameters do not correspond to the actual situation and, therefore, they have to be modified so that they are coherent with what can be seen by the operator.

❑ If, during the calibration or balancing procedure, the control panel constantly displays "WAITING FOR NOMINAL RPM" in the operator message area, check the following:

- The spindle was not started up.
- The spindle rotates at a speed of less than 100 rotations/min.
- The rotation sensor is not regulated well or has broken down.

❑ If, during the calibration or balancing procedure, the control panel constantly displays "WAITING FOR SPINDLE 0 RPM" in the operator message area, check the following:

- The spindle was not stopped.
- There are moving objects that disturb the rotation sensor reading.

3. Touch Detector [TD type]

3.1. Introduction

The TOUCH DETECTOR (or GAP CONTROLLER) of the VMx5 series permits to reduce the cycle times by increasing the infeed of the grinding wheel to the piece. It prevents the problem of burning and is a valid system for monitoring and control during the whole working process.

Depending on model and configuration, the VMx5 system is able to support up to four touch detector cards. All the working phases can be controlled by means of the interface with the PLC/NCU of the grinding machine.The card allows to control one proccess (section A) of touch detection, which may be used contemporarily for different purposes, e.g. grinding and dressing, or grinding with twin head. The four sections have completely independent inputs, outputs and programming, and correspond to up to four distinct touch detector systems on a single card. Each section allows up to 16 part-programs, which may be activated one at a time, manually or via the PLC/NCU. Each program is dedicated to a particular setup of the signaling thresholds for limit 1 (i.e. touch), limit 2, limit 3 (i.e. warning or burning) and limit 4 (i.e. anti-crash alarm). (See the organization scheme of the touch detector).

ORGANIZATION SCHEME
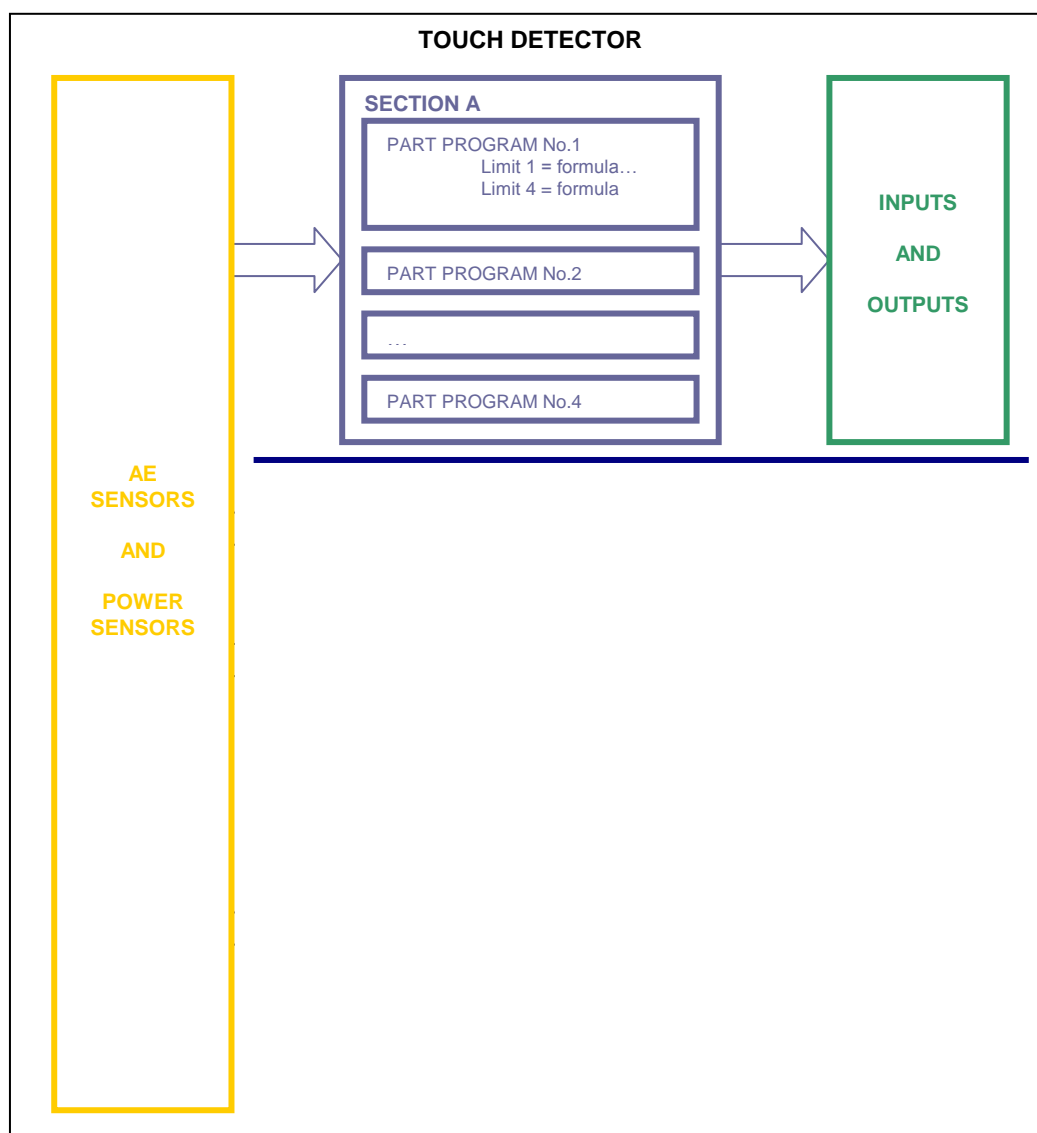
The components of the touch detector system are shown in the following picture.

Touch detection & anticrash

Gap elimination

Dressing optimization
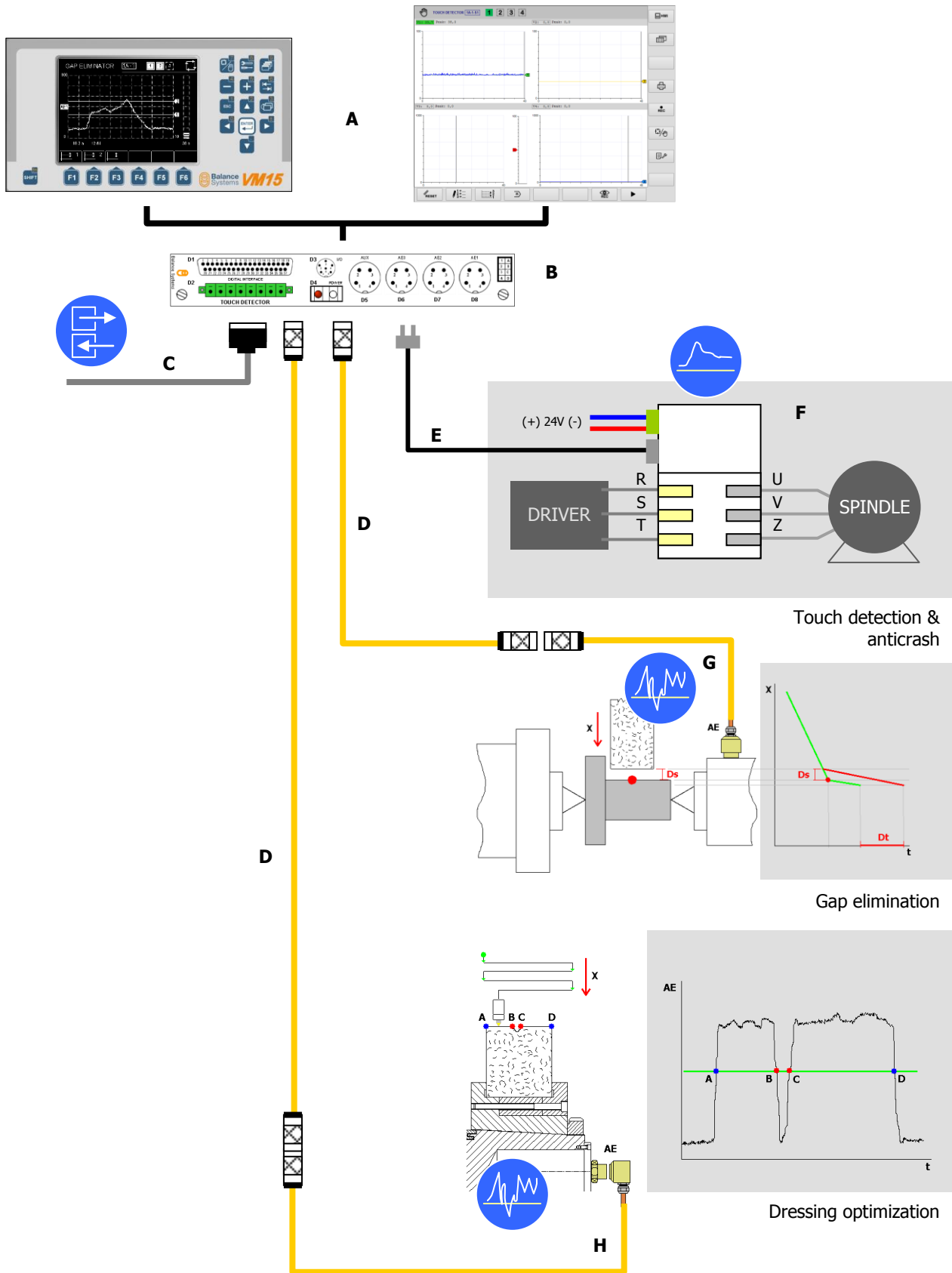
Component	Description
A	User interface: VMx5 Panel or VMx5 HMI PC ®Windows
B	Touch detector card unit
C	Digital interface (I/O signals)
D	Extension cable
E	Fibre optic cable for power data transmission
F	Power transducer
G	Acoustic Emission sensor (static type)
H	Acoustic Emission sensor (wireless type)

The available functions depend on the acces level defined by the system installer.

The touch detector can work both in automatic and in manual mode.
In automatic mode all the commands and the status signalling are excanghed through the digital interface connected to the machine PLC/NCU; the VMx5 panel shows the status of the actual process.
In manual mode all the available commands are launched by the operator through the VMx5 panel while the status signalling to the machine PLC/NCU are manteined.

3.2. Status page
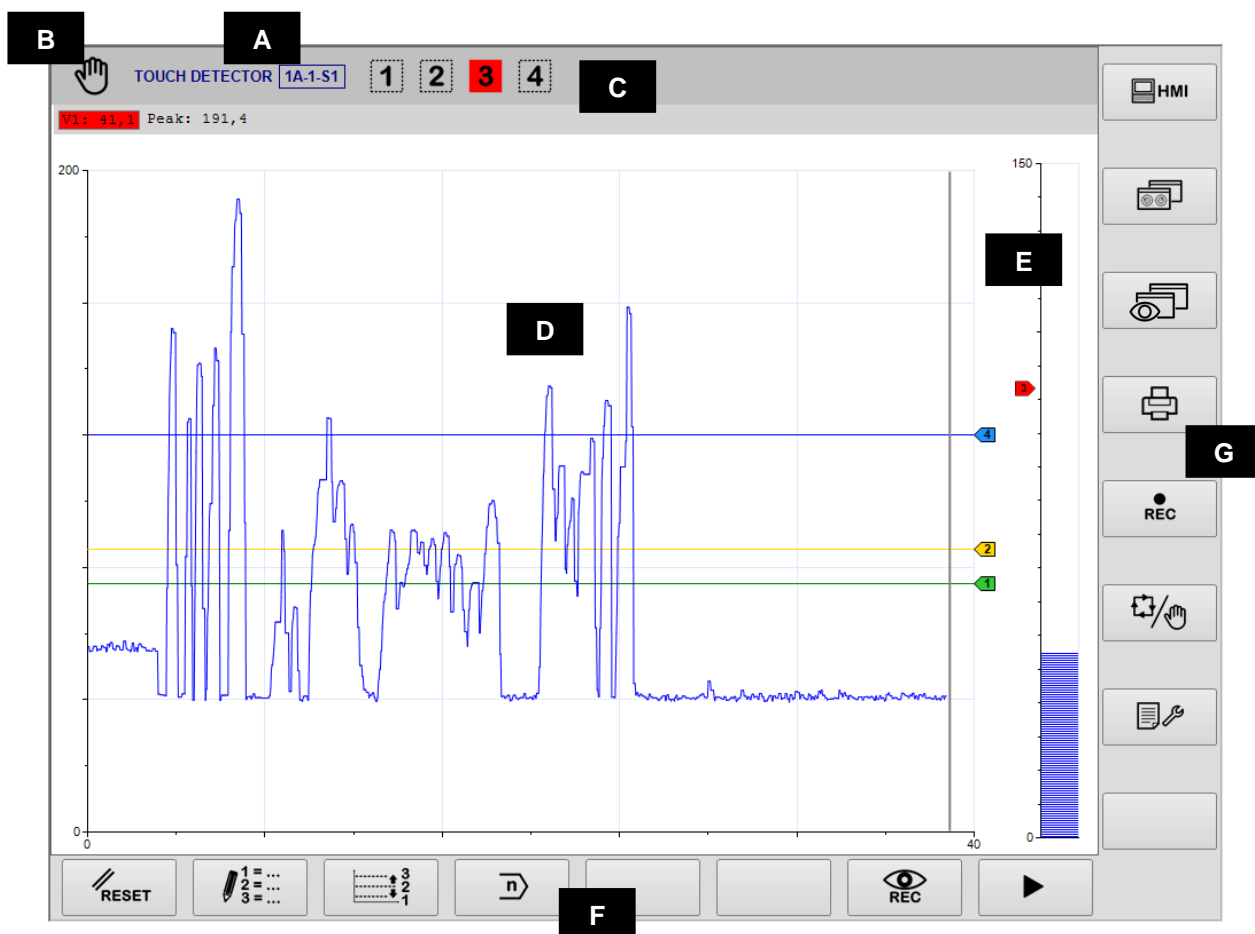
A. Device name:

   TOUCH DETECTOR 1 - A1 - S1 indicates **TOUCH DETECTOR 1 Section A, Part-Program 1, Setup 1**

B. Operating mode (Automatic / Manual)
C. Area reserved to status signalling.
D. Graphic area to rappresent the diagrams of the sources used to activate the limits 1, 2 and 3. The number of the diagrams displayed depends on the active part-program.
   - Source vs time diagram
   - Programmed limits
   - Status of the programmed limits
   - Numerical value of the sources
E. Graphic area to rappresent the source for an independent control of the limit 3. In this case the source is rappresented with a bar graph.
F. Horizontal command line, accessible by [Fx] buttons.
G. Vertical command line, accessible by [Shift+Fx] buttons.

3.3. Status and alarm signalling

During the normal operating mode some variable are continously monitored and when necessary, some icons or messages are displayed to inform the operator about such conditions.

NOTE: When the condition can be dangerous both for the machine integrity and the operator safety a number of signalling to the machine PLC/NCU are generated and icons on the screen will appear for the operator.

Limits signalling			
Icon	ID	Status name	Description
1 1	5001 5003	Limit 1	Not Activ / Activ status of the output Limit 1
2 2	5004 5006	Limit 2	Not Activ / Activ status of the output Limit 2
3 3	5007 5009	Limit 3	Not Activ / Activ status of the output Limit 3
4 4	5010 5012	Limit 4	Not Activ / Activ status of the output Limit 4

Sensors signalling			
Icon	ID	Status name	Description
	5016	Warning: Sensor not ready	Sensor not ready (faulty or disconnected)
P	5017	Warning: Power sensor not ready	Power sensor not ready (faulty or disconnected)
POWER	5018	Warning: Power sensor error or fault	Power sensor error or fault
AE1	5019	Warning: AE1 sensor not ready	AE1 sensor not ready (faulty or disconnected)
AE1	5020	Warning: AE1 sensor error or fault	AE1 sensor error or fault
AUX	5027	Warning: AUX sensor not ready	AUX sensor not ready (faulty or disconnected)
AUX	5028	Warning: AUX sensor error or fault	AUX sensor error or fault
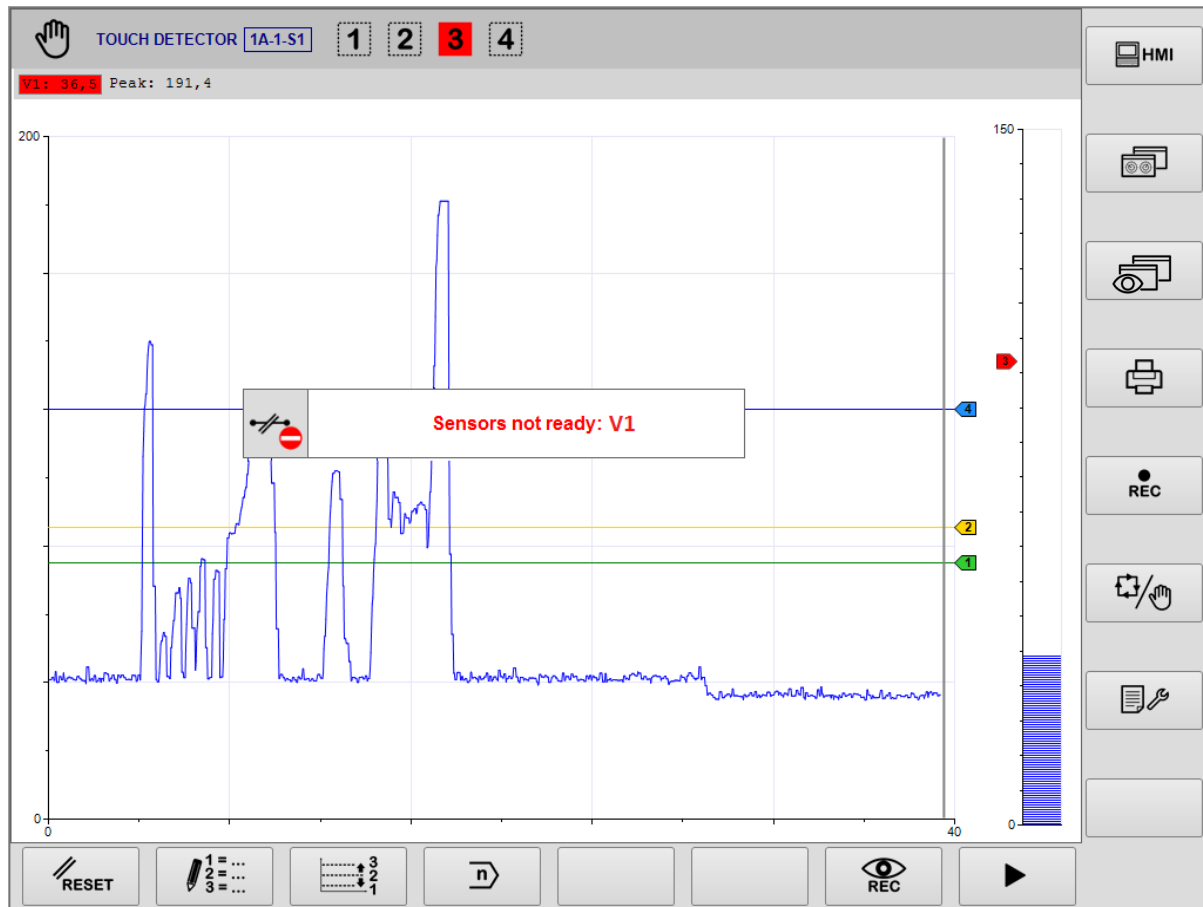
This signalling means that the sensor is not operating properly. With this conditions the touch detector card stops the monitoring and move an alarm to the PLC/NCU of the machine.

3.3.1. Envelope signalling

Envelope function compares the current AE or Power process signal of a wheel dress to a stored Master shape of a known good dress to determine and report when the dressing process has been successfully completed, maximizing the efficiency and the shape quality of the dressing process.

Envelope signalling			
Icon	**ID**	**Status name**	**Description**
MASTER	5056	No stored time duration	Time duration is not saved. It appears if "Self learning process duration" parameter is ON. Time duration learning is required
MASTER	5043	Time duration learning in progress	Time duration learning is in progress. It appears if "Self learning process duration" parameter is ON.
MASTER	5049	Time duration learning error	Some errors occurred during time duration learning. New time duration learning is required
MASTER	5050	Time duration learning correct executed	Time duration learning correct executed
MASTER	5030	No stored master	No master saved. Learning cycle is required.

Envelope signalling			
Icon	**ID**	**Status name**	**Description**
MASTER	5042	Master learning in progress	Master Learning in progress
MASTER	5054	Master learning error	Some errors occurred during master shape acquisition. New learning cycle is required
MASTER	5053	Master learning good	Master shape has been acquired successfully
	5031	Process timeout	Process executed without any STOP signal. Stop process signal has not been received after process duration (learned or defined by related parameter).
	5032	Autostart timeout	No trigger signal occurs after START signalling. It can appear if AUTOSTART parameter is different by OFF.
GO animated	5034	Envelope in progress	Comparison process in progress (in-cycle).
STOP	5046	Process stopped	Process has been stopped
MAX	5040	Zone over tolerance	Output is no-latched, comparison process is in progress (in-cycle) and the signal is over defined tolerance in current zone (current zone assumes ORANGE color).
MIN	5041	Zone below tolerance	Output is no-latched, comparison process is in progress (in-cycle) and the signal is lower defined tolerance in current zone (current zone assumes YELLOW color).
MAX - MIN	5055	Zones out of tollerance	Output is latched, comparison process is in progress (in-cycle) and the signal is out defined tolerance in more than one zone (current zone assumes ORANGE color).
MAX	5044	Ip max	Outputs is no latched and instantaneous signal value is over IP max limit (in-cycle).
MIN	5047	Ip min	Outputs is no latched and instantaneous signal value is lower IP min limit (in-cycle).

Envelope signalling			
Icon	**ID**	**Status name**	**Description**
MAX - MIN	5051	Ip max – min	Output is latched and instantaneous signal value is out of set limits (max and min) (in-cycle).
END	5028	Envelope End	Process correctly executed (end cycle) Stop process signal has been sent to VM system before process timeout signalling.
GOOD	5033	Envelope good	Comparison process has been executed (end cycle) and the signal is inside defined tolerance in all zones (GREEN).
MAX	5045	Process over tolerance	Comparison process has been executed (end cycle) and the signal is over defined tolerance in one or more zones (ORANGE).
MIN	5048	Process below tolerance	Comparison process has been executed (end cycle) and the signal is lower defined tolerance in one or more zones (YELLOW).
MAX - MIN	5052	Process out of tolerance	Comparison process has been executed (end cycle) and the signal is over defined tolerance in one or more zones (ORANGE) and lower defined tolerance in one or more zones (YELLOW).

Percentage of number of zones in which the process is inside defined tolerances is continuously updated and displayed on the screen.

ECTOR 1A-1

9 Env: 79%

3.4. Commands

3.4.1. Automatic mode

All the commands related to the automatic cycles are managed through the PLC/NCU.

The only exceptions which permit the operator to interfere from the keyboard apply to the possibility to carry out manual corrections of the numerical value of the thresholds and the possible commutation to manual mode, with which all manual commands are again available.
During automatic functioning, the proceeding in time of the quantities concerned are shown. In addition, the possible activation of the imposed thresholds are marked.

NOTE: The digital outputs available depend on the set-up done by the system's installer.

NOTE: The availability of independent sources for signaling Limit 1, 2, 3 and 4 depends on the setup done by the system's installer.

				System commands
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches the balancer device between automatic and manual mode

				Correction commands
Icon	**ID**	**Command name**	**Button**	**Description**
1	4001	Limit 1 Correction	F1	Fine adjustment of the thresholds related to limit 1 in the formula
2	4002	Limit 2 Correction	F2	Fine adjustment of the thresholds related to limit 2 in the formula
3	4003	Limit 3 Correction	F3	Fine adjustment of the thresholds related to limit 3 in the formula
4	4004	Limit 4 Correction	F4	Fine adjustment of the thresholds related to limit 4 in the formula

3.4.2. Manual mode
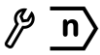
In manual mode, the device operates completely independent from the CNC of the grinding machine. All the commands to the device are given by the user via keyboard. The signalings to the CNC of the machine are, however, maintained.

The manual mode is accessible only at programmer level (or higher).

Icon	ID	Command name	Button	Description
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches the balancer device between automatic and manual mode
	0013	Parameter	Shift+F7	Access to balancer parameter pages

System commands

Correction commands				
Icon	ID	Command name	Button	Description
RESET	0042	Reset Limits	F1	The reset of the outputs Limits 1, 2, 3 and 4 executes the following operations: 1. Resets the outputs signalling of Limit 1, 2, 3, 4. 2. If modifications have been made on the thresholds in the formula, the new values imposed for the positioning of the thresholds are activated. 3. If the incremental values are used in formula, the new reference value for the calculation of the thresholds will be adjusted.
1 = … 2 = … 3 = …	4006	Formula	F2	Access to formula editing
3 2 1	4005	Limit Correction Menu	F3	Access to fine adjustment of the thresholds related to the limits
1	4001	Limit 1 Correction	F1	Fine adjustment of the thresholds related to limit 1 in the formula
2	4002	Limit 2 Correction	F2	Fine adjustment of the thresholds related to limit 2 in the formula
3	4003	Limit 3 Correction	F3	Fine adjustment of the thresholds related to limit 3 in the formula
4	4004	Limit 4 Correction	F4	Fine adjustment of the thresholds related to limit 4 in the formula
n⟩	0041	Change Part Program	F4	Part-Program selection for manual mode operations. With this parameter one imposes one of the available part-programs for the section of the touch detector. The part-programs are numbered from 1 to n. By imposing "0", the part-program selected by the PLC/NCU of the machine will be activated. When selecting a number from 1 to n, a specific program will be imposed, which does not give the possibility to the PLC/NCU, to use a different program. **NOTE:** *Operating in automatic mode the selection made by PLC/NCU has the priority.*
REC	0061	View Recorder	F7	Access to the viewer of recorded traces and data
V1	4061	Variable V1 setup	F2	Access to frequency analysis function to setup the V1 variable
V2	4064	Variable V2 setup	F3	Access to frequency analysis function to setup the V2 variable

Correction commands				
Icon	**ID**	**Command name**	**Button**	**Description**
	4079	Power sensor setup	F6	Direct access to setup parameter page of the POWER channel [Connector D4]
	0034	Next	F8	Go to next menu
	4007	Change Setup	F1	Setup selection for manual mode operations. With this parameter one imposes one of the four available setup for the variables. The setup are numbered from 1 to 4. By imposing 0, the setup selected by the PLC/NCU of the machine will be activated. When selecting a number from 1 to 4, a specific setup will be imposed, which does not give the possibility to the PLC/NCU, to use a different setup. ***NOTE:** Operating in automatic mode the selection made by PLC/NCU has the priority.*

Those commands which require a more detailed description will be analyzed in the next paragraphs, and in addition, some typical procedures are described.

3.4.3. Procedures and auxiliary functions

3.4.3.1. Limits 1, 2, 3 and 4 correction

This function is available both in automatic and in manual operating mode.

The commands Limit 1, 2, 3, 4 Corrections permits to modify only the numerical value of the thresholds imposed in the formulas of the program used. In this way it is possible to make a fine adjustment which permit to improve the signaling on the basis of the working conditions.

To modify the limits 1, 2, 3 and 4:

- Access the pages to modify the limits 1, 2, 3 and 4 using the commands

Limit 1 correction   **[F1]**

Limit 2 correction   **[F2]**

Limit 3 correction   **[F3]**

Limit 4 correction   **[F4]**

- use the   **[F2]** and   **[F3]** to setup the new value

- use the   **[F1]** and   **[F4]** to select the previous or the next term to be adjusted

- Press **Exit**   **[Shift+F8]** to return to the main status page

NOTE: *The limits correction affect the thresholds in the forula of the active part-program*

				Correction commands
Icon	**ID**	**Command name**	**Button**	**Description**
◀	0033	Previous term	F1	Select the previous term to be adjusted
—	0032	Decrement	F2	Increment (move up) the threshold of the highlighted source
+	0031	Increment	F3	Decrement (move down) the threshold of the highlighted source
▶	0034	Next term	F4	Select the next term to be adjusted
➡🚪	0017	Exit	Shift+F8	Exit

3.4.3.2. Part-Program change

To change the actual part-program press **Part-Program** [F4]
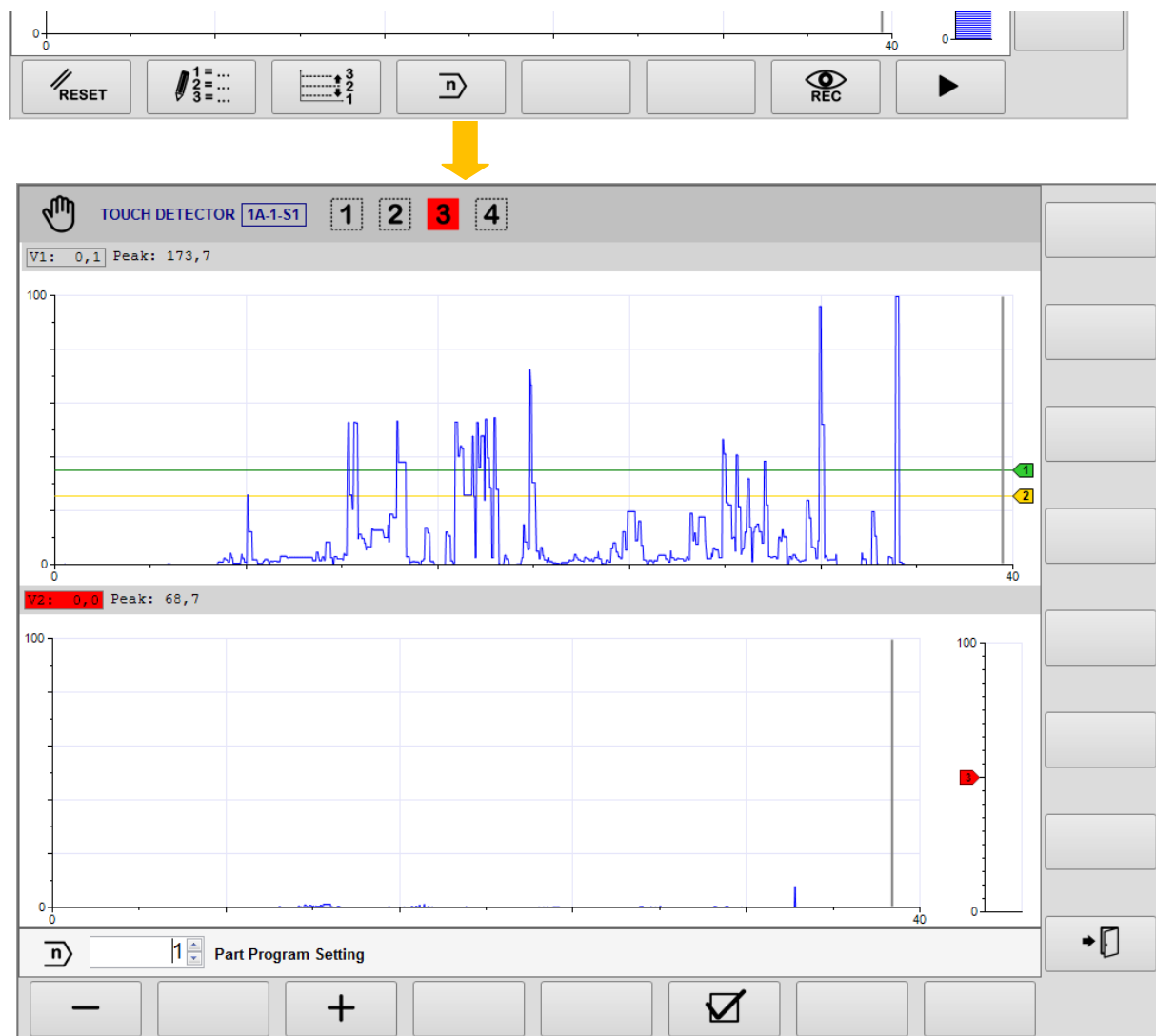
- use the **[F1]** and **[F3]** to setup the new value and press **[F6]** to confirm

- Press **Exit** **[Shift+F8]** to return to the main status page

- Activate the new part-program by RESET **[F1].**

NOTE: Selecting the "0" value, the system will use the part-program selected by the NCU/PLC through the automatic interface (digital inputs or profibus).

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
🖥️HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
🖨️	0011	Print	Shift+F4	Print page
● REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches the balancer device between automatic and manual mode
	0013	Parameters	Shift+F7	Access to balancer parameter pages

3.4.3.3. Formula editing

The four outputs signalling definition (Limit 1, 2, 3 and 4) are related to four simple formulas which are defined in each part-program.

To edit the formula of the actual part-program:

- Press **Formula** ✏ $\begin{matrix} 1 = \dots \\ 2 = \dots \\ 3 = \dots \end{matrix}$ **[F2]**

- Press the ◀ **[F3]** e ▶ **[F5]** buttons, the mouse or touch screen, to select the formula components.
- Setup the parameter value and press "Enter ↵ " to save each modification.

- Activate the new values by **RESET [F1]**.

NOTE: *If the value selected is not consistent with the formula, the value will not be changed.*

NOTE: *The method to compile the formula and all the details on each the terms are arguments for the system installer and are described in the document present at the link* *Parameter Setup*

3.4.3.4. Envelope

Envelope function has been developed to provide process control enhancement to grinding machines.
It provides process monitoring of the quality and consistency of straight or profiled wheel contact in the dressing or grinding process in order to increase grinding machine efficiency.
Envelope function is provided assuring that maximum or minimum degree of wheel contact is maintained throughout a dress or grind cycle.
Envelope function also includes gap and crash control for background continuous monitoring. Dedicated signals allows to enable Envelope monitoring with precise triggers, while a traditional part-program defined through formula and limits is active.

It compares the current AE or Power process signal of a wheel dress to a stored Master shape of a known good dress to determine and report when the dressing process has been successfully completed, maximizing the efficiency and the shape quality of the dressing process.

Envelope function allows to:
- determine if the wheel is being dressed with a proper defined shape
- Recognition of small defects in the dressed form
- Monitoring of the grinding wheel contour to ensure the accuracy of shape

- **Gray:** Learned Master shape shown in background
- **Dark green.** Zone matches the master
- **Light Green.** Borderline zone nearing lower limit
- **Yellow.** zone below lower shape
- **Orange.** zone over higher shape
- **Red.** zone over Crash limit
- **Blue.** Zone below the Noise level
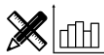
To access to envelope function, please refer to following steps:
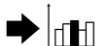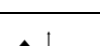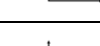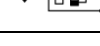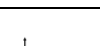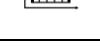
Envelope commands				
Icon	**ID**	**Command name**	**Button**	**Description**
RESET	0042	Reset Limits	F1	The reset of the outputs Limits 1, 2, 3 and 4 executes the following operations: ▪ Resets the outputs signalling of Limit 1, 2, 3, 4. ▪ If modifications have been made on the thresholds in the formula, the new values imposed for the positioning of the thresholds are activated. ▪ If the incremental values are used in formula, the new reference value for the calculation of the thresholds will be adjusted. ▪ Resets all the envelope outputs signalling
	4106 4107	Start process Stop process	F2	Start / stop following processes: ▪ Learning cycle (master shape performing) ▪ Dressing or grinding process (to be compared with master shape)
	4109 4110	Start learning Stop learning	F3	Learning cycle enabling / disabling (master shape performing)
	4098	Master delete	F4	Delete current stored master shape
	4099	Edit mode	F7	Access to Edit mode page. Allows to manually edit current stored master shape
▶	0034	Next	F8	Go to next menu

3.4.3.4.1 Master shape edit mode page

Once master shape is correctly recorded press edit mode button ![edit icon] to access to edit page in order to manually change the tollerances.

Envelope commands – Edit mode page				
Icon	ID	Command name	Button	Description
←	4104	Move left and select	F1	Move left the cursor to select the zone to edit
→	4105	Move right and select	F2	Move right the cursor to select the zone to edit
↑	4103	Increase top selected	F3	Increase upper allowed tolerance level of selected zone
↓	4097	Decrease top selected	F4	Decrease upper allowed tolerance level of selected zone
↑	4102	Increase bottom selected	F5	Increase bottom allowed tolerance level of selected zone
↓	4096	Decrease bottom selected	F6	Decrease bottom allowed tolerance level of selected zone
⏻	4111	Disable selected	F7	Enable or disable selected zone in order to edit it
⏻	4112	Enable selected		
↓	4095	Decrease top curve	F1	Decrease upper allowed tolerance level of all zones
↑	4101	Increase top curve	F2	Increase upper allowed tolerance level of all zones
↓	4094	Decrease bottom curve	F3	Decrease bottom allowed tolerance level of all zones
↑	4100	Increase bottom curve	F4	Increase bottom allowed tolerance level of all zones
←→	4114	Stretch out	F5	For each zone, it copies the upper tolerance level to adjacent zones if adjacent zones level are lower and it copies the bottom tolerance level to adjacent zones if adjacent zones level are higher
→←	4113	Stretch in	F6	For each zone, it copies the upper tolerance level to adjacent zones if adjacent zones level are higher and it copies the bottom tolerance level to adjacent zones if adjacent zones level are lower
	4115	Enable draw mode	Shift + F3	Switch between draw mode editing and zone selection mode editing
	4116	Enable selected mode		
🖶	0011	Print	Shift+F4	Print the current parameter page

Envelope commands – Edit mode page				
Icon	**ID**	**Command name**	**Button**	**Description**
↺	0093	Undo	Shift + F5	Undo last modification done to the master shape
↻	0094	Redo	Shift + F6	Redo last modification done to the master shape
💾 📊	4108	Master save	Shift + F7	Save modified master shape
➡🚪	0017	Exit	Shift+F8	Exit
▶	0034	Next	F8	Go to next menu

Vertical colored bar on the left of the screen, shows current tolerances levels in each zone.

There are different ways to edit the master shape.

1. Edit a single zone

   ▪ Select the zone to edit using ⬅️📊 or ➡️📊 .

   ▪ Once the zone has been selected, press on Enable selected button ⏻📊 .

   ▪ Edit the zone using ⬆️📊 ⬇️📊 or ⬆️📊 ⬇️📊 .

   ▪ Press on disable selected button ⏻📊 .

   ▪ Save the master pressing 💾📊 button.

2. Edit the entire shape

   ▪ Enable the selected mode pressing 📊 📊 .

   ▪ Edit the entire shape using ⬆️📊 ⬇️📊 or ⬆️📊 ⬇️📊 .

   ▪ Save the master pressing 💾📊 button.

3. <u>Edit the master shape using the mouse:</u>

▪ Enable the draw mode pressing

▪ Select upper or lower tolerance to edit with   or   .
▪ Move the mouse on the screen keeping left click pressed
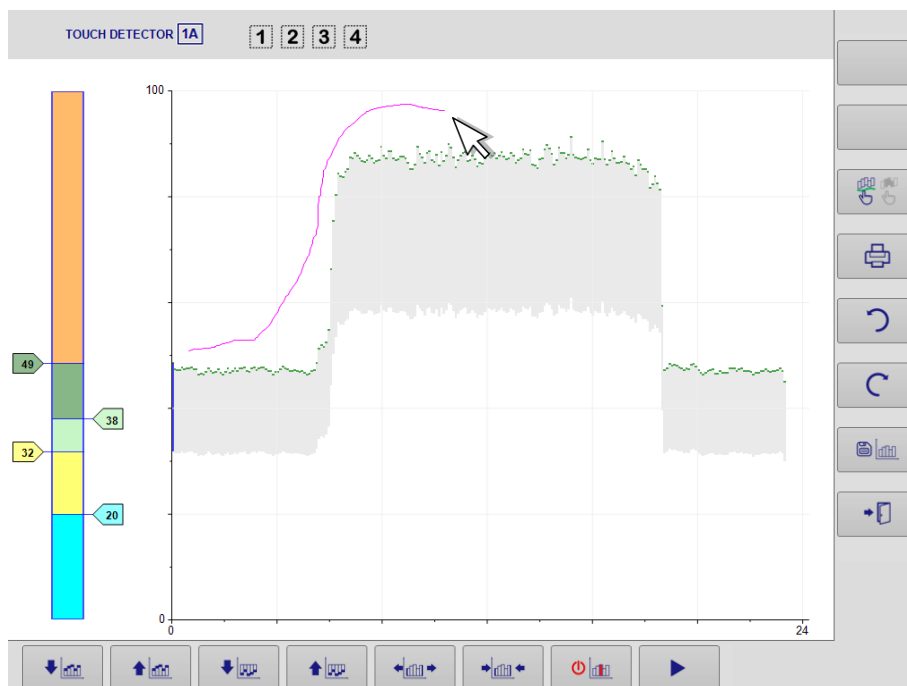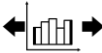
▪ Master shape will change as follow:
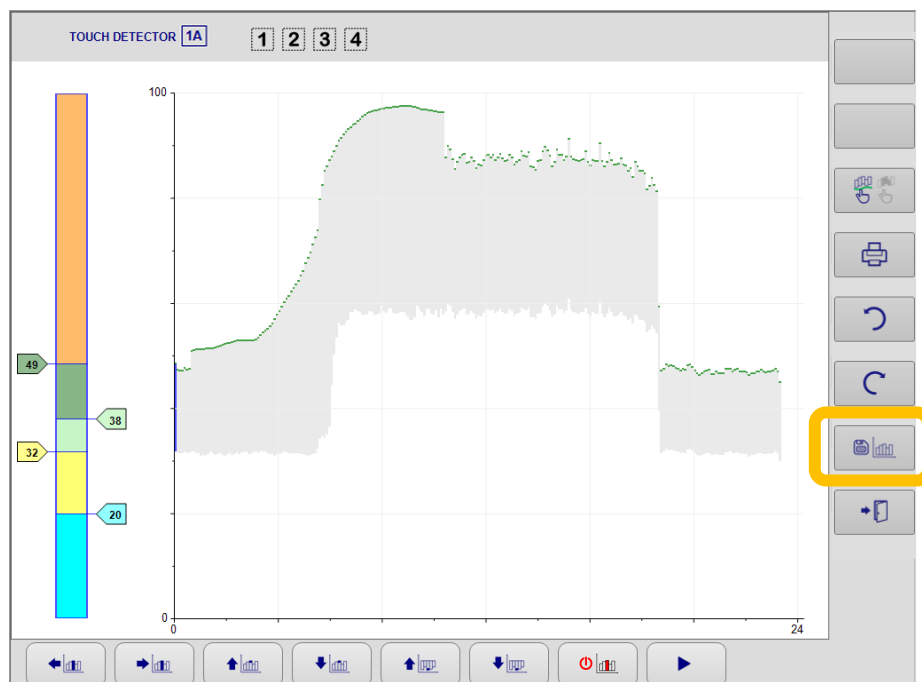
▪ Save the new master shape pressing   button.

4. Edit the master shape using stretch out and stretch in:

If signal variation is too fast, could be useful stretch out some or all zones in order to enlarge tolerance area.

- Clicking one time on "stretch out" button , upper tolerances level of each zone will be copied to adjacent zones if adjacent zones level is lower and, bottom tolerances level of each zone will be copied to adjacent zones if adjacent zones level is higher
Result is shown below.
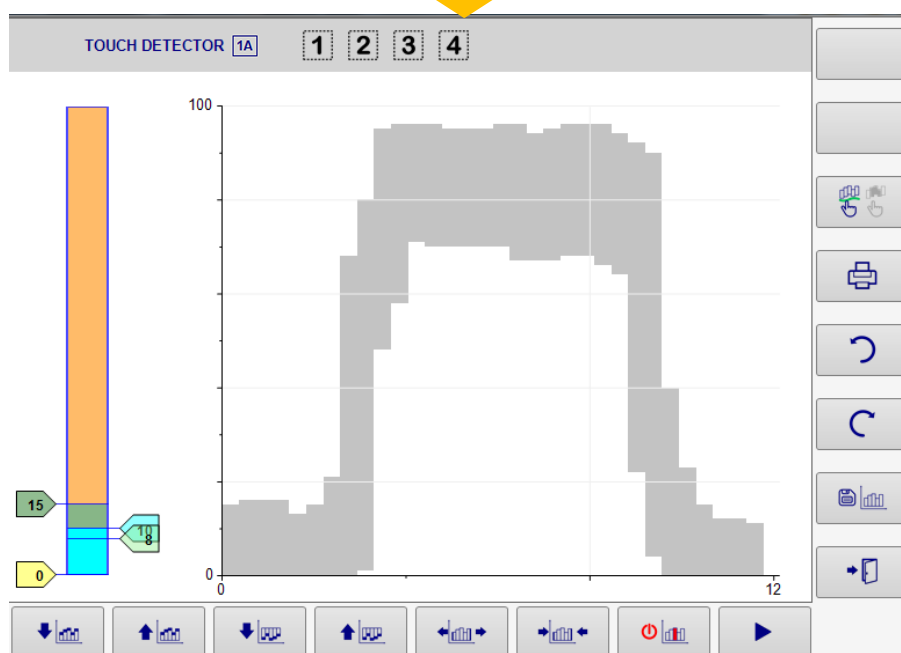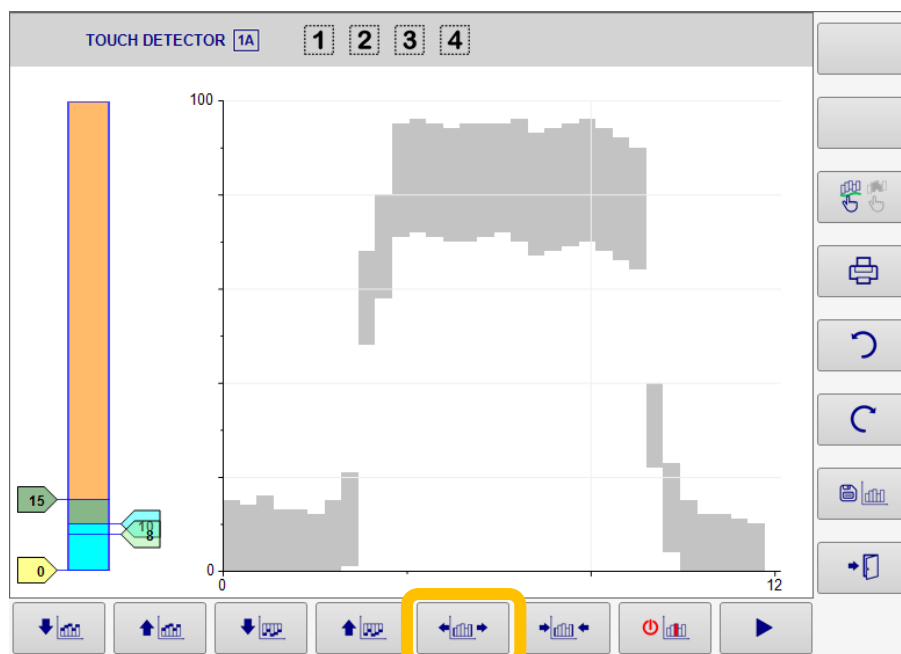
- Save the new master shape pressing button or undo last modification pressing .

It is also possible to stretch-out only some zones as follow:

- Enable the selected mode pressing
- Manually select the zones to stretch out keeping mouse left click pressed
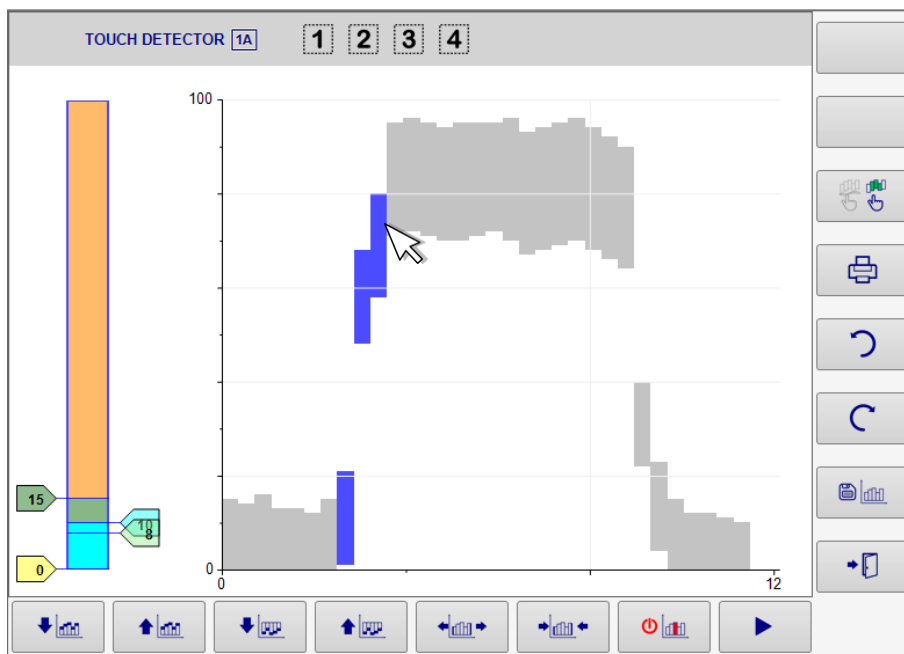
- Clicking one time on "stretch out" button , upper tolerances level of selected zones will be copied to adjacent zones if adjacent zones level is lower and, bottom tolerances level of each zone will be copied to adjacent zones if adjacent zones level is higher
  Result is shown below.
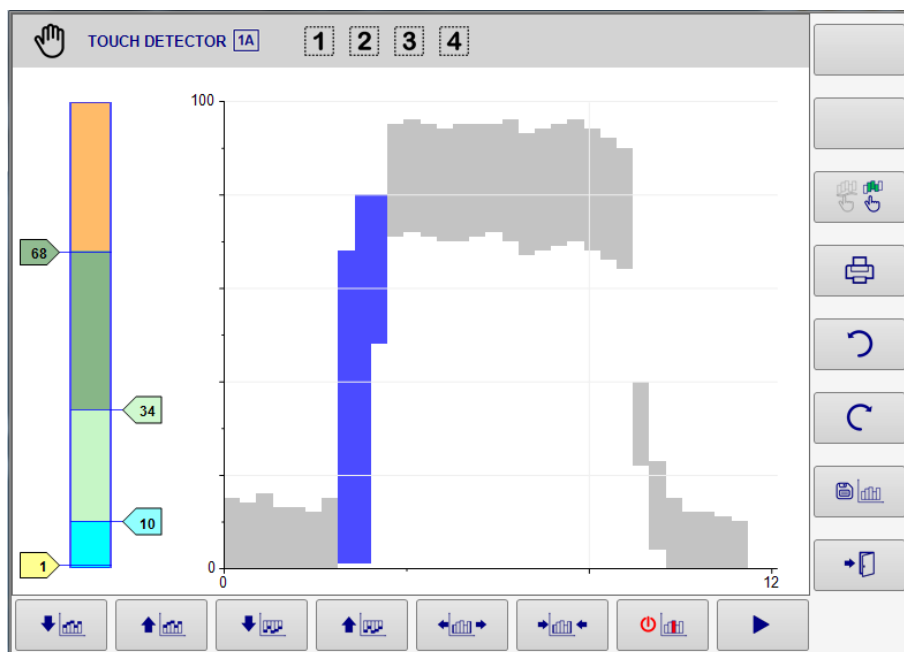
- Save the new master shape pressing button or undo last modification pressing .

3.4.3.4.2 Typical flow chart of the process
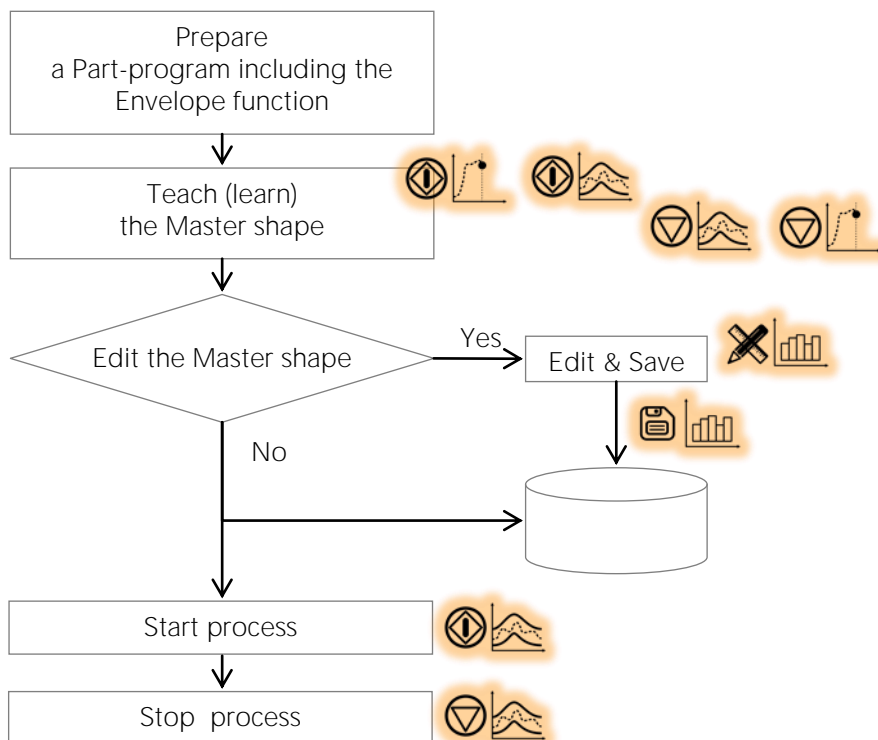
3.5. WORK parameters

To access the WORK parameters press **Parameters**   **[Shift+F7]**.

For the description of the WORK parameters, refer to the document present at the link Parameter Setup

4. Gauge [GA - NG type]

4.1. Introduction

The gauging system, or more precisely the precision comparator, is used in-process as post-process.

- with the in-process mode the system controls the dimension during the work phase of the piece.
- with the post-process mode the system checks the final dimension of the finished piece.

Depending on model and configuration, the VMx5 system is able to support up to four gauging cards.
All the working phases can be controlled by means of an interface with the CNC of the grinding machine.
The card can provides for two independent gauging processes (Section A and Section B), which may be used simultaneously e.g. diameter measure and flagging control. The two processes (sections) have completely independent inputs-outputs signals and part-programs. The processes can share the same gauge sensors (gauge heads).
Each section can accept up to sixteen part-programs, which may be activated one by one, manually or by means of the CNC, where each one is dedicated to a particular set-up of the thresholds of signalling and programming of the gauging heads (see the organization chart of the gauge).

ORGANIZATION SCHEME OF THE GAUGE
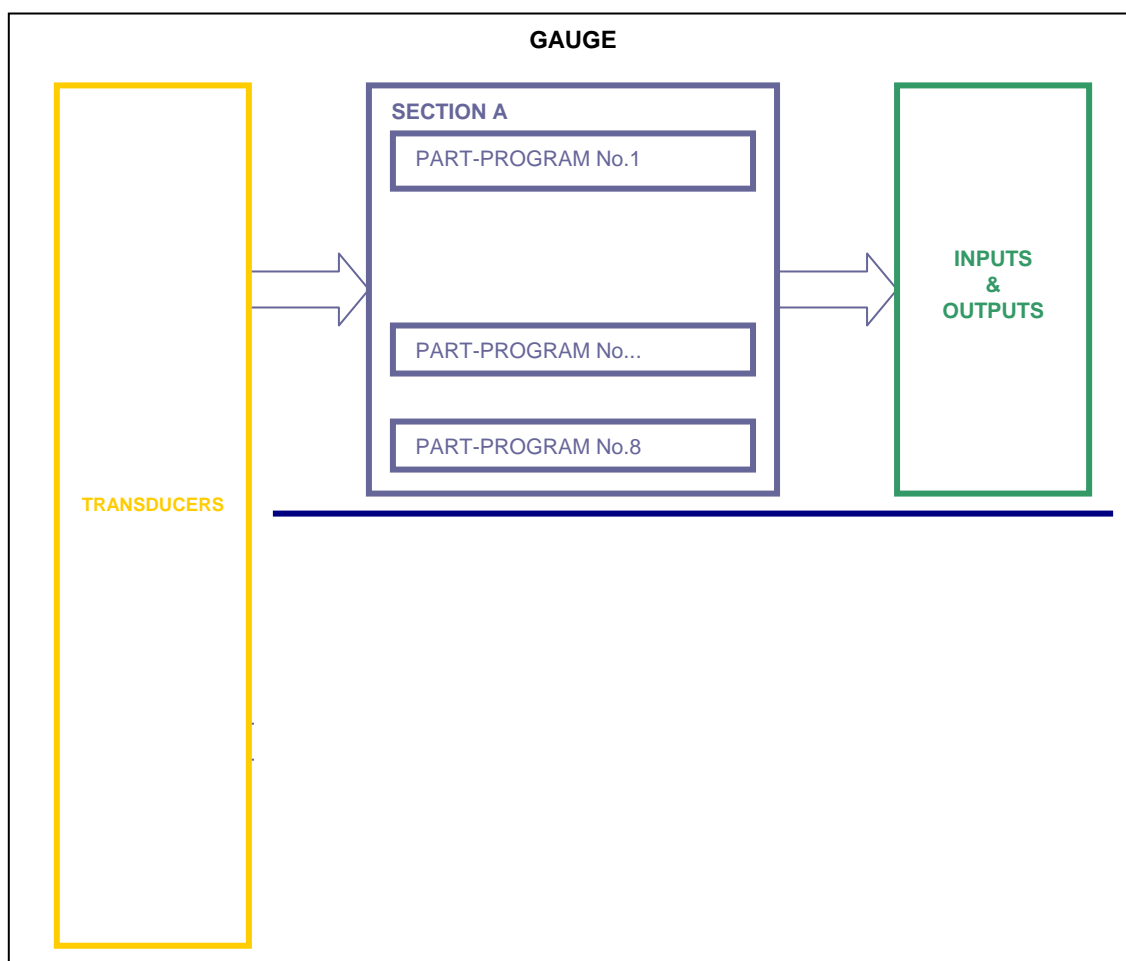
The components of the gauge system are shown in the following picture.
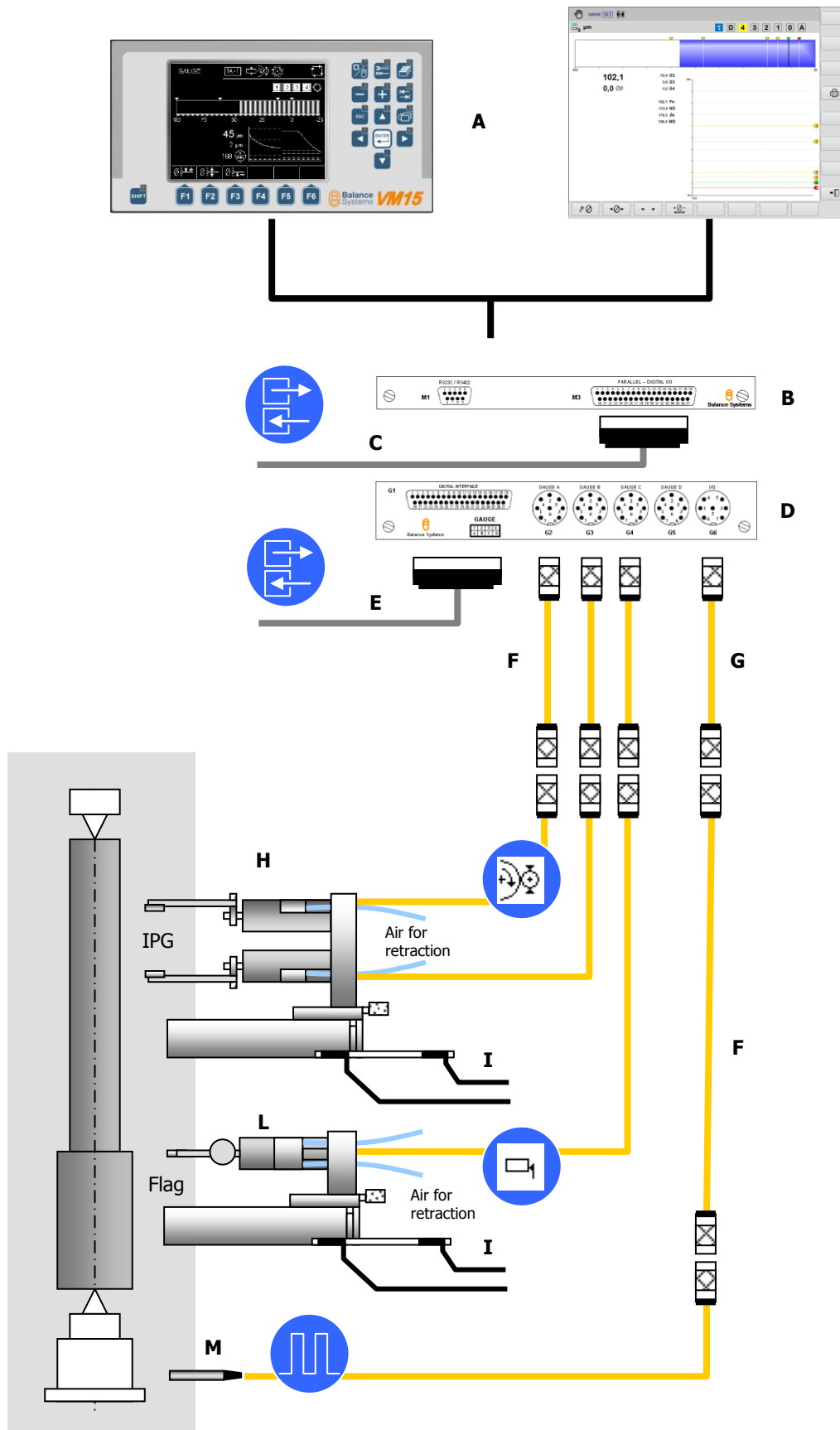
Component	Description
A	User interface: VMx5 Panel or VMx5 HMI PC $^®$Windows
B	Multilink card (opzional): BIN/BCD interface
C	Digital interface – dimension data in BIN/BCD format (position – flag)
D	Gauge card
E	Digital interface (I/O signals)
F	Extension cables
G	Synchronism cable adapter
H	Diameter gauge equipment
I	Sensors for slide positioning

The available functions depend on the acces level defined by the system installer.

The gauging function may be used in automatic or in manual mode. In automatic mode, all commands and possible signallings are carried out by means of the interface of the CNC of the machine. The operator panel provides only a monitoring of the functioning state, and gives the operator the only possibility to correct the offset values of the thresholds imposed in the formulas.
In manual mode, the gauging system carries out only those functions that may be selected from the command menu, maintaining the possible signallings towards the CNC of the machine.

4.2. Status page

4.2.1. GA Status page
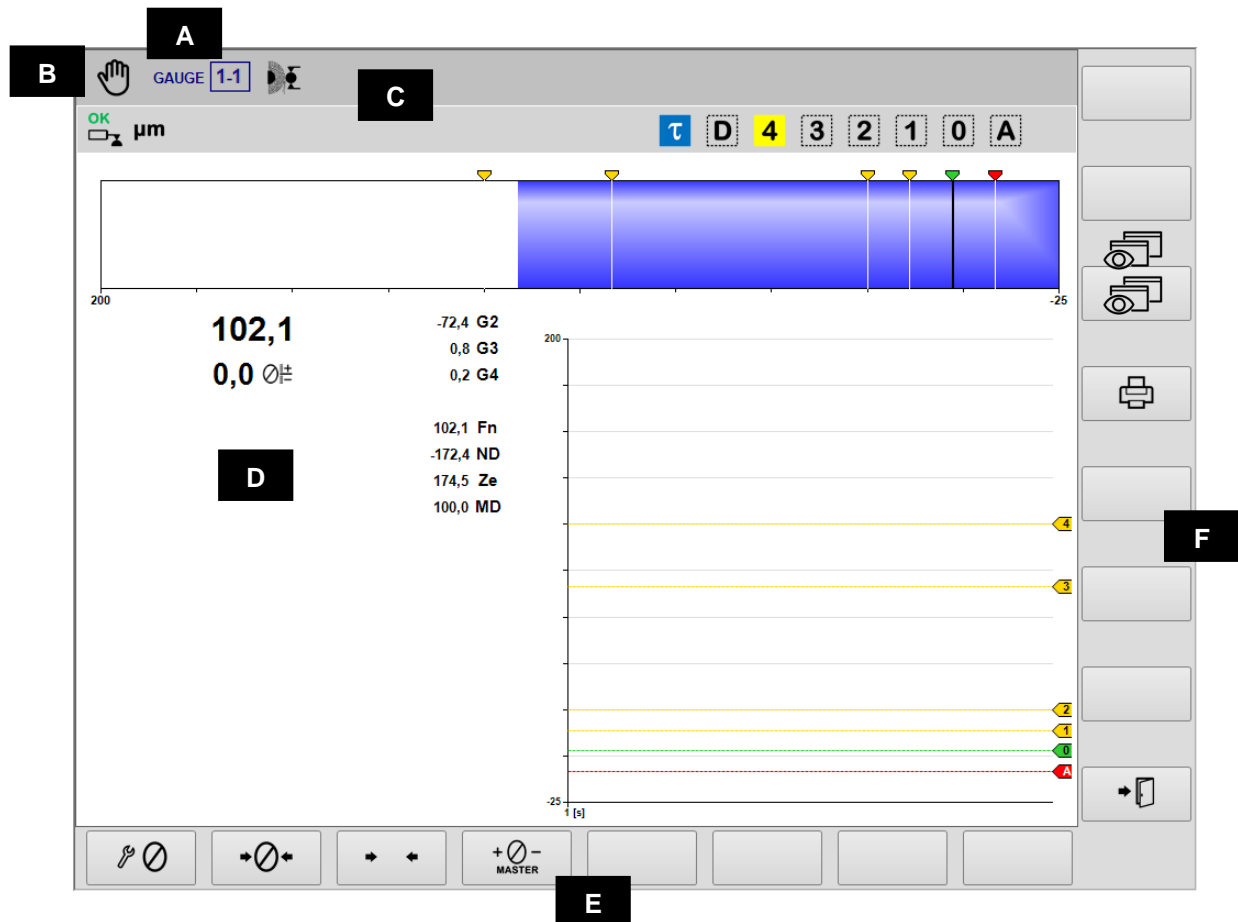
A. Device name:

   GAUGE 1 – 1 indicates **GAUGE 1, Part-Program 1**

B. Operating mode (Automatic / Manual)
C. Area reserved to status signalling.
D. Graphic area to rappresent the diagrams of the sources
   - Dimension diagram
   - Output commands status
   - Gauging head status
   - Numerical value of the dimension
   - Numerical value of the programmed offset
   - Rotation speed of the workhead
   - Numerical value of each gauging transducer
E. Command line, accessible by [Fx] buttons.
F. Vertical command line, accessible by [Shift+Fx] buttons.
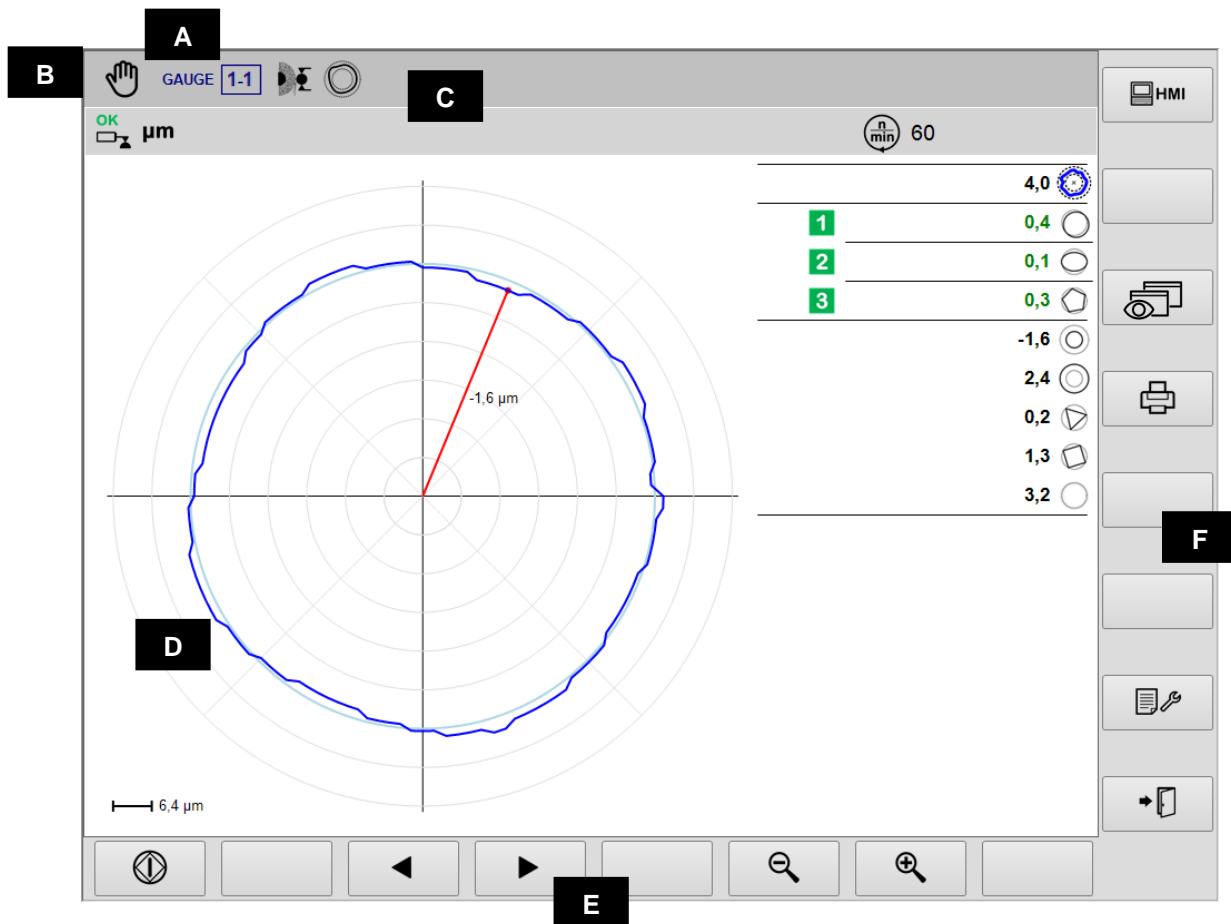
A. Device name:

GAUGE 1 – 1 indicates **GAUGE 1 , Part-Program 1**

B. Operating mode (Automatic / Manual)
C. Area reserved to status signalling.
D. Graphic area to rappresent the diagrams of the sources
  - Roundness diagram
  - Output commands status
  - Value of the shape components
  - Rotation speed of the workhead
  - Measuring unit
E. Command line, accessible by [Fx] buttons.
F. Vertical command line, accessible by [Shift+Fx] buttons

4.2.2. NG Status page

A. Current device Section & Part-Program

   GAUGE 1 – 1 indicates **GAUGE 1 , Part-Program 1**

B. Operating mode (Automatic / Manual). Blinks when cycle in progress
C. Area reserved to status icons.
D. Ruler
E. Output signalling
F. Graphic area to rappresent the diagrams of the sources
   -   Dimension diagram
   -   Output commands status
   -   Gauging head status
   -   Numerical value of the dimension
   -   Numerical value of the programmed offset
   -   Rotation speed of the workhead
   -   Numerical value of each gauging transducer
G. Command line, accessible by [Fx] buttons.
H. Vertical command line, accessible by [Shift+Fx] buttons.
I. Gauge heads rulers
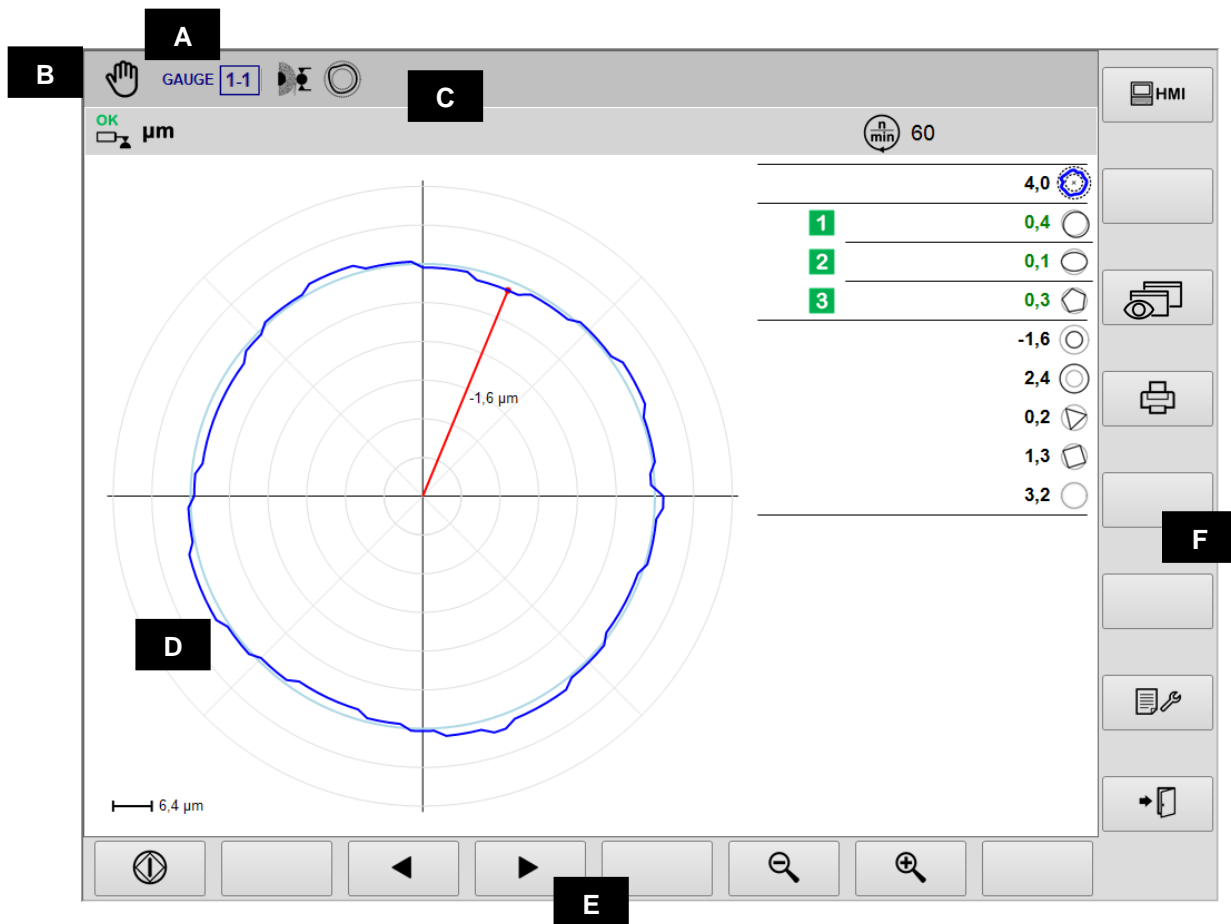
G. Device name:

GAUGE 1 – 1 indicates **GAUGE 1 , Part-Program 1**

H. Operating mode (Automatic / Manual)
I. Area reserved to status signalling.
J. Graphic area to rappresent the diagrams of the sources
   - Roundness diagram
   - Output commands status
   - Value of the shape components
   - Rotation speed of the workhead
   - Measuring unit
K. Command line, accessible by [Fx] buttons.
L. Vertical command line, accessible by [Shift+Fx] buttons

4.3. Status and alarm signalling

During the normal operating mode some variable are continously monitored and when necessary, some icons or messages are displayed to inform the operator about such conditions.

NOTE: When the condition can be dangerous both for the machine integrity and the operator safety a number of signalling to the machine PLC/NCU are generated and icons on the screen will appear for the operator.

Gauging mode signalling			
Icon	**ID**	**Status name**	**Description**
	7012	In-Process gauging	Part-program for in-Process gauging
	7013	Pre/Post-Process gauging	Part-program for Pre/Post-Process gauging
	7014	Flagging	Part-program for flagging
	7015	Roundness analysis	Part-program for roundness analysis
	7016	Synchronized dimension	Part-program for synchronized gauging
μm mil	7002 7001	Measuring unit	Measuring unit

Output commands signalling			
Icon	**ID**	**Status name**	**Description**
τ τ	7026 7024	Cycle start delay	Timer status Active / Expired to count the start cycle delay
D D	7044 7042	Dwell timeout	Dwell timeout: in-progress / expired
1 1	7038 7036	Command 1	Not Activ / Activ status of the command 1 output
2 2	7035 7033	Command 2	Not Activ / Activ status of the command 2 output
3 3	7032 7030	Command 3	Not Activ / Activ status of the command 3 output
4 4	7029 7027	Command 4	Not Activ / Activ status of the command 4 output (end cycle)
0 0	7041 7039	Command 0	Not Activ / Activ status of the command 0 output (Cycle end, part at the size)
A A	7047 7045	Warning – Part undersized	Not Activ / Activ status of the command A output (Warning: Part undersized)
	7050	Roundness impossible	Roundness & shape analysis impossible

Roundness signalling			
Icon	**ID**	**Status name**	**Description**
1 **1**	7062 7060	Roundness threshold 1	Roundness threshold No.1 Out / In tolerance
2 **2**	7065 7063	Roundness threshold 2	Roundness threshold No.2 Out / In tolerance
3 **3**	7068 7066	Roundness threshold 3	Roundness threshold No.3 Out / In tolerance
KO	7048	Roundness out of tolerance	Roundness out of tolerance
OK	7049	Roundness in tolerance	Roundness in tolerance

Roundness and shape components signalling			
Icon	**ID**	**Status name**	**Description**
	7051	Runout error	Total roundness error
	7053	Exernal deviation	Top profile dimension
	7052	Internal deviation	Bottom profile dimension
	7054	Excentricity	Value of the excentricity component
	7055	Ovality	Value of the ovality component
	7056	Tri-lobed	Value of the 3rd component
	7057	Four-lobed	Value of the 4th component
	7058	Five-lobed	Value of the 5th component
	7059	Residual	Value of the residual component

Gauge transducers signalling			
Icon	**ID**	**Status name**	**Description**
	7003	WARNING: Gauge head error or fault	WARNING: the gauge head is not able to measure
	7004	In measuring position	The gauge head is in measuring position
	7005	Retraction OK	The gauge head has retracted the fingers
	7006	WARNING: Retraction impossible	WARNING: the gauging head cannot proceed with fingers retraction
	7007	WARNING: Retraction error	WARNING: the gauge head is not avìble to reach the retraction limit
	7008	Data hold	The dimension is frozen by PLC command
	7009	WARNING: Retraction error while data hold	WARNING: a retraction error occurred while a data hold is command is active
	7017	Overrange	Out of measuring range
	7018	Max dimension	Gauge head on mechanical stopper

4.4. Commands

4.4.1. In Process gauge

4.4.1.1. Automatic mode

In automatic mode, the device is controlled entirely by the CNC of the machine. The only exceptions, where the operator may intervene from the keyboard, are the possibility to carry out manual corrections of the offset value of the master piece and the comutation to manual mode, where one accesses all commands.

In automatic mode, the operator can see on the monitor the quotes of the programs activated in the two sections, in numerical value as well as with graphics bar. In addition, the activated output commands are marked.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
⌨ HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
● REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode

Correction commands				
Icon	**ID**	**Command name**	**Button**	**Description**
⊘	6003	Offset increment	F1	Increments the offset value
⊘	6002	Offset decrement	F2	Decrements the offset value
⊘	6004	Offset reset	F3	Takes the offset value to zero
🔍⊕ 🔍⊖	0057 0058	Zoom in / out	F7	Zoom the diagram of the dimension vs time

4.4.1.2. Manual mode
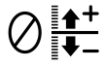
The manual operating mode is accessible at the PROGRAMMER level or higher.
In manual mode the device functions are completely indipendent from the CNC of the machine. All the commands to the device are entered by hand from the keyboard. The signallings towards the CNC of the machine are, however, maintained.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode
	0013	Parameters setting	Shift+F7	Access to parameter pages

Commands				
Icon	**ID**	**Command name**	**Button**	**Description**
RESET	0042	Reset	F1	The reset of the thresholds carries out the following operations: 1. Reset of the signallings refering to the four quote thresholds. Any signallings sent to the CNC of the machine are removed, and the four thresholds are reset, thereby bringing the system back to normal working conditions. 2. If modifications have been made to the general parameters, be it the formulas or the thresholds, the new values imposed will be activated.
⊘	6001	Offset correction	F2	Access to the modification of the numerical values of the offset
⊘	6005	Zeroing	F3	Access to the zeroing functions
n⟩	0041	Part-Program change	F2	Selection of the part-program which should be activated from the work-piece. The part-programs are numbered from 1 to 16. Selecting 0 the part program is managed by the NCU through the digital interface. Selecting a number between 1 and 16, the correspondent part-program willl be used and the NCU selection is ignored. **NOTE:** *In automatic mode the part-program is always selected by the CNC.*
◀	0033	Previous menu	F1	Go to previous menu
▶	0034	Next menu	F8	Go to next menu

4.4.2. In-Process gauging and Roundness analysis

Enabling the In-Process gauging with roundness analysis, the in-process gauging cycle previously described is followed by the roundness analysis process (described below).

NOTE: *A necessary condition both for automatic and manual modes (both in-process and post-process) is the synchronizing signal from which the piece rpm is detected.*

4.4.2.1. Automatic mode

The roundness analysis supplies to the machine's CNC a signal that means that the piece is within or off roundness tolerance based on the programmed max internal and external deviations. The signals act as follows, during the automatic cycle.

Once a cycle is started, the output commands (1...4) signals changes in order to allow the CNC control to switch to pre-programmed feed rates.

When the roundness analysis is enabled, the command 1 is also used to signal the work-piece roundness status to the NCU. During the working pheses the commands (1..4) are managed as follows:

1. At the start cycle the command 1 works as first skip signal (machine will reduce the feed rate)

2. After the command 2 activation, when usually starts the finishing phase, the output command 1 will be resetted.

3. Simoultaneasuly with the command 1 reset the system starts the roundness monitoring.

4. As soon as the command 4 (end cycle) will be activated, the output command 1 will be updated with the roundness status of the finished work-piece. In details:

Command 1 active   →   OK Roudness in tolerance

Command 1 not active (default state) →   KO Roudness out of tolerance

In automatic mode, to warrant the cycle-time, the roundness digram is not displayed. Only the roundness status is updated.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
🖥️ HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
🖨️	0011	Print	Shift+F4	Print page
● REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode

Correction commands				
Icon	**ID**	**Command name**	**Button**	**Description**
⊘	6003	Offset increment	F1	Increments the offset value
⊘	6002	Offset decrement	F2	Decrements the offset value
⊘	6004	Offset reset	F3	Takes the offset value to zero
⊕ ⊖	0057 0058	Zoom in/out	F7	Zoom in/out
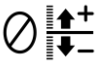
4.4.2.2. Manual mode

In manual mode, a detailed roundness analysis of the piece is possible. The system can display, with a programmed resolution, the roundness diagram; also the programming of the form components is permitted (deviations, eccentricity, ovality, etc.). The Output command 1 is still updated.

The manual operating mode is accessible at the PROGRAMMER level or higher.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode
	0013	Parameters setting	Shift+F7	Access to parameter pages

Commands				
Icon	ID	Command name	Button	Description
RESET	0042	Reset	F1	The reset of the thresholds carries out the following operations: 1. Reset of the signallings refering to the four quote thresholds. Any signallings sent to the CNC of the machine are removed, and the four thresholds are reset, thereby bringing the system back to normal working conditions. 2. If modifications have been made to the general parameters, be it the formulas or the thresholds, the new values imposed will be activated.
	6001	Offset correction	F2	Access to the modification of the numerical values of the offset
	6005	Zeroing	F3	Access to the zeroing functions
n⟩	0041	Part-Program change	F2	Selection of the part-program which should be activated for the work-piece. The part-programs are numbered from 1 to 16. Selecting 0 the part program is managed by the NCU through the digital interface. Selecting a number between 1 and 16, the correspondent part-program will be used and the NCU selection is ignored. **NOTE:** *In automatic mode the part-program is always selected by the NCU/PLC*
	6039	Roundness	F5	Access to the roundness & shape analysis functions
	0057 0058	Zoom in / Zoom out	F7	Zoom on dimension diagram
◀	0033	Previous menu	F1	Go to Previous menu
▶	0034	Next menu	F8	Go to Next menu

4.4.2.2.1 Roundness

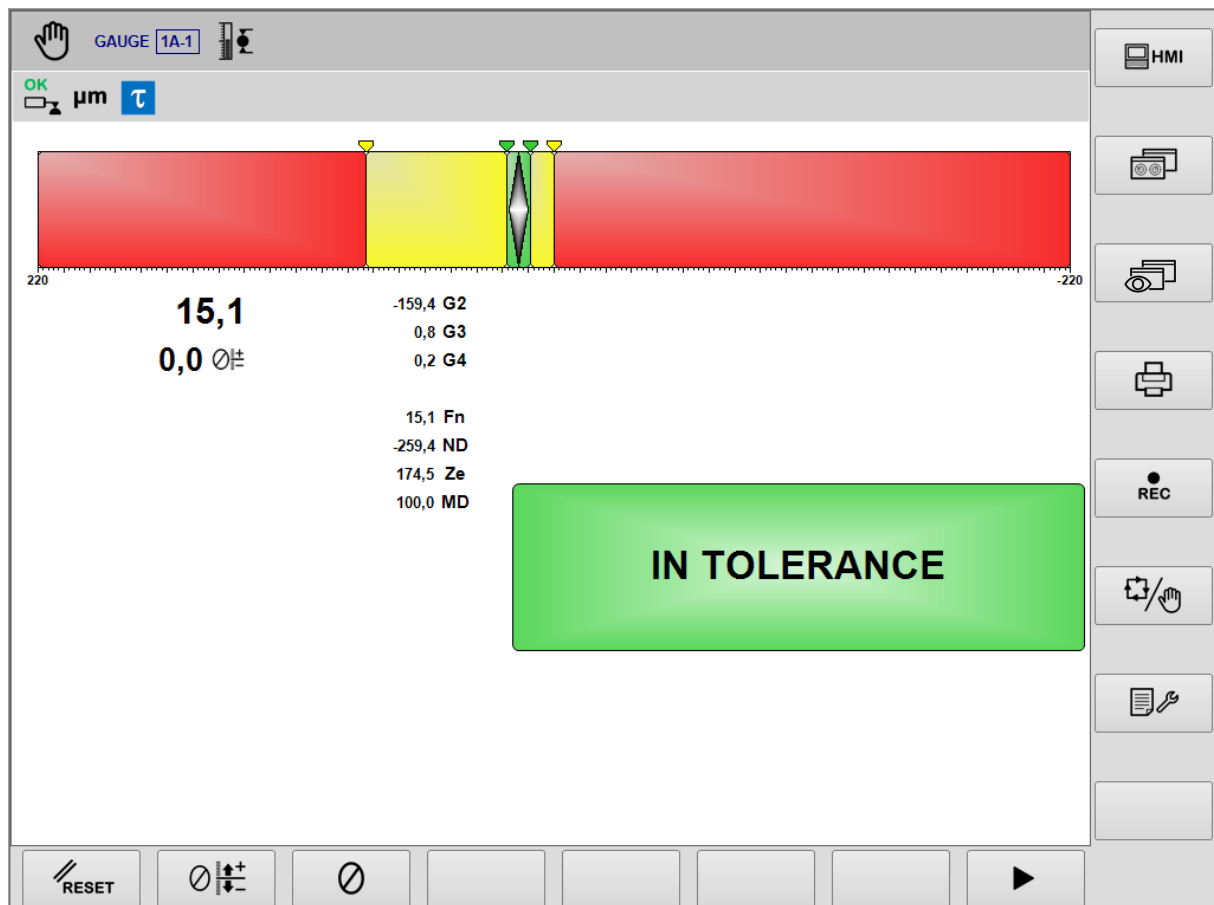To access the Roundness analysis function, press the **Roundness** [F5] button.

Commands				
Icon	**ID**	**Command name**	**Button**	**Description**
	0047 0048	Start / Stop	F1	Start / Stop the roundness procedure
	0033	Previous	F3	Go to previous menu
	0034	next	F4	Go to next menu
	0057	Zoom in	F6	Zoom in
	0058	Zoom out	F7	Zoom out
	0017	Exit	Shift + F8	Exit from the function

4.4.3. Post-Process gauging
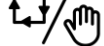
4.4.3.1. Automatic mode

In automatic mode, the NCU starts the gauging cycle. The system resets the output commands 1..4 and starts the measure acquisition. As soon as the command 4 (data ready) is triggered, the coded output commands 1..3 are ready to rapresent the dimensional status of the piece.

The system displays the dimension status of the piece according to the programmed tolerance and compensation limits.

| Upper tolerance limit | Upper compensation limit | Lower compensation limit | Lower tolerance limit |

| Reject | compensable | In tolerance | compensable | Reject |

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode

Correction commands				
Icon	**ID**	**Command name**	**Button**	**Description**
	6003	Offset increment	F1	Increments the offset value
	6002	Offset decrement	F2	Decrements the offset value
	6004	Offset reset	F3	Takes the offset value to zero
	0057 0058	Zoom in/out	F7	Zoom in/out

4.4.3.2. Manual mode

In manual mode the device functions are completely indipendent from the CNC of the machine. All the commands to the device are entered by hand from the keyboard. The signallings towards the CNC of the machine are, however, maintained.
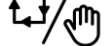
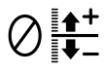By the command **RESET** **[F1]** the system resets the output commands 1..4 and starts the measure acquisition.

The manual operating mode is accessible at the PROGRAMMER level or higher.

The system displays the dimension status of the piece according to the programmed tolerance and compensation limits.
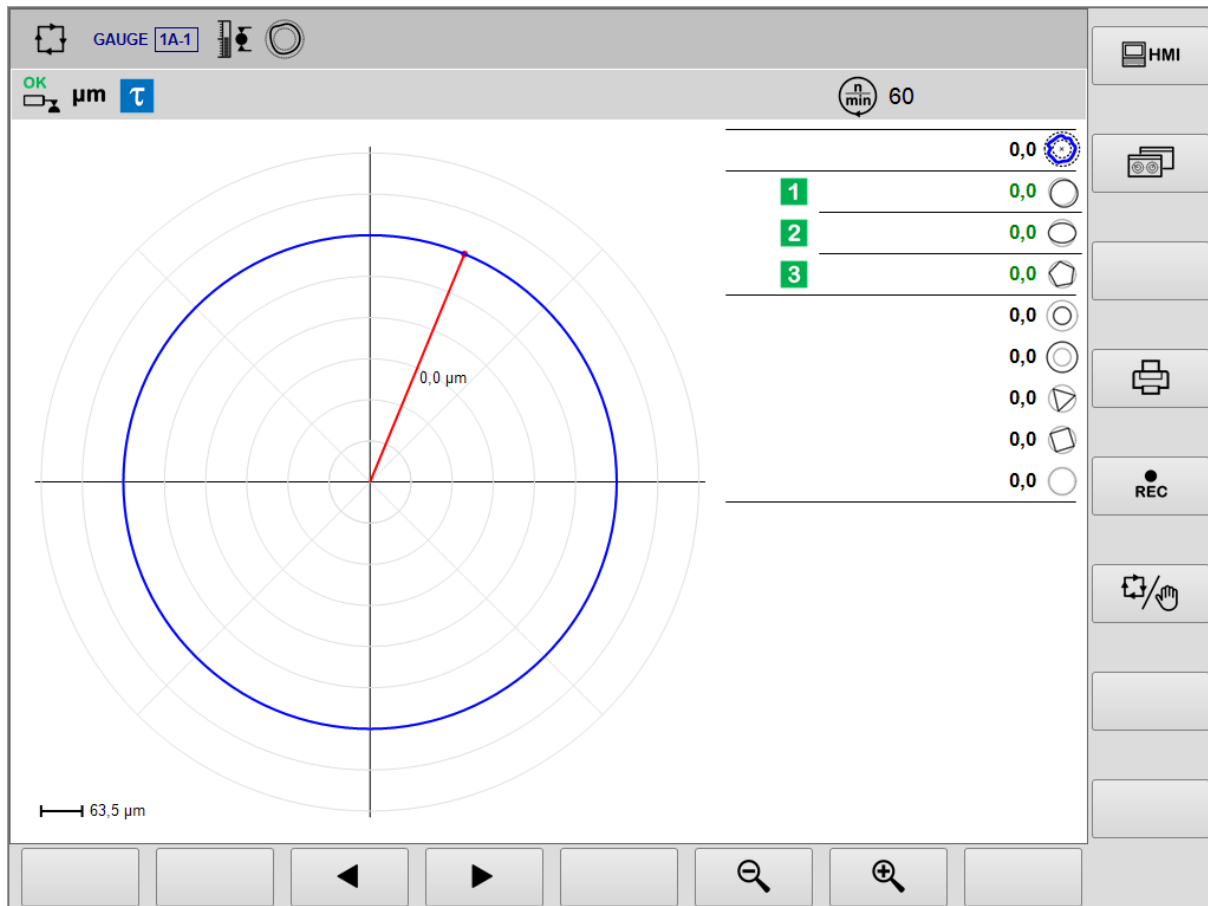
Upper tolerance limit

Upper compensation limit

Lower compensation limit

Lower tolerance limit

Reject

compensable

In tolerance

compensable

Reject

220

-220

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0095	Viewer page	Shift+F3	It displays last opened viewer page
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode
	0013	Parameters setting	Shift+F7	Access to parameter pages

Commands				
Icon	**ID**	**Command name**	**Button**	**Description**
RESET	0042	Reset	F1	The reset of the thresholds carries out the following operations: 1. Reset of the signallings refering to the four quote thresholds. Any signallings sent to the CNC of the machine are removed, and the four thresholds are reset, thereby bringing the system back to normal working conditions. 2. If modifications have been made to the general parameters, be it the formulas or the thresholds, the new values imposed will be activated.
	6001	Offset correction	F2	Access to the modification of the numerical values of the offset
	6005	Zeroing	F3	Access to the zeroing functions
n	0041	Part-Program change	F2	Selection of the part-program which should be activated for the work-piece. The part-programs are numbered from 1 to 8. Selecting 0 the part program is managed by the NCU through the digital interface. Selecting a number between 1 and 8, the correspondent part-program will be used and the NCU selection is ignored. *NOTE: In automatic mode the part-program is always selected by the NCU/PLC*
◀	0033	Previous menu	F1	Go to Previous menu
▶	0034	Next menu	F8	Go to Next menu

4.4.4. Post-Process roundness analysis

4.4.4.1. Automatic mode

In automatic mode, the NCU starts the gauging cycle. The system resets the output commands 1..4 and starts the measure acquisition. As soon as the command 4 is triggered, the output commands 1..3 are updated to rapresent the roundness status of the piece according to the related programmed parameters and formula.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
⬚/✋	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode
◀	0033	Previous menu	F1	Go to Previous menu
▶	0034	Next menu	F8	Go to Next menu

4.4.4.2. Manual mode

In manual mode the device functions are completely indipendent from the CNC of the machine. All the commands to the device are entered by hand from the keyboard. The signallings towards the CNC of the machine are, however, maintained.

The manual operating mode is accessible at the PROGRAMMER level or higher.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
HMI	0009	System	Shift+F1	Go to system's page
	0010	Change page	Shift+F2	Switches the displayed page between the installed devices
	0011	Print	Shift+F4	Print page
REC	0059	Record	Shift+F5	Start recording
	0012	Automatic / Manual	Shift+F6	Switches between automatic and manual mode
	0013	Parameters setting	Shift+F7	Access to parameter pages

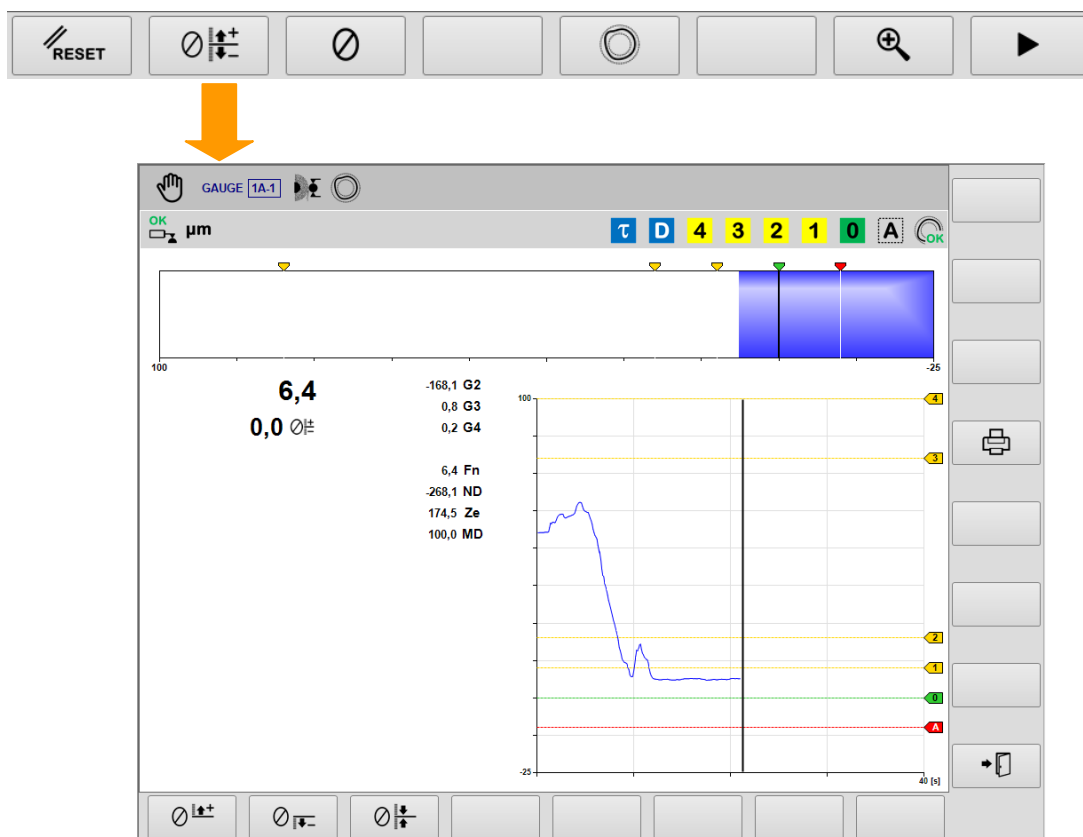| Commands				
Icon	**ID**	**Command name**	**Button**	**Description**
	0047 0048	Start / Stop	F1	Start / Stop the roundness procedure
	6008	Mechanical zeroing	F2	Access to the mechanical zeroing page
◀	0065	Move left	F3	Move left
▶	0066	Move right	F4	Move right
	0057	Zoom in	F6	Zoom in
	0058	Zoom out	F7	Zoom out
▶	0033	Next	F8	Go to next menu
◀	0034	Previous	F1	Go to previous menu
	0041	Part-Program change	F2	Selection of the part-program which should be activated for the work-piece. The part-programs are numbered from 1 to 8. Selecting 0 the part program is managed by the NCU through the digital interface. Selecting a number between 1 and 8, the correspondent part-program will be used and the NCU selection is ignored. **NOTE:** *In automatic mode the part-program is always selected by the NCU/PLC*
	0017	Exit	Shift + F8	Exit from the function

4.5. Commands details

4.5.1. Offset correction

To correct the offset:

- While in manual mode, use the command **Offset correction** **[F2]** to access the offset correction page related to the actual part-program.

- Use the buttons:

  - **[F1]** to increment the offset

  - **[F2]** to decrement the offset

  - **[F3]** to reset the offset

- While in manual mode, press **Exit** **[Shift+F8]** to return to the main page

NOTE: the offset is resetted by electronic zeriong procedure.

System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
➡️🚪	0017	Exit	Shift+F8	Exit from the function

4.5.2. Part-Program change

To change the actual part-program:

- Press the [icon] button to switch in manual mode

- Press the **Part-Program change** [n] **[F2]**

- Use the the **—** and **+** buttons to modify the value

- Press the **Exit** [icon] **[Shift+F8]** button to go back to the main page

- To activate the new part-program, press the **RESET** **[F1]** button.
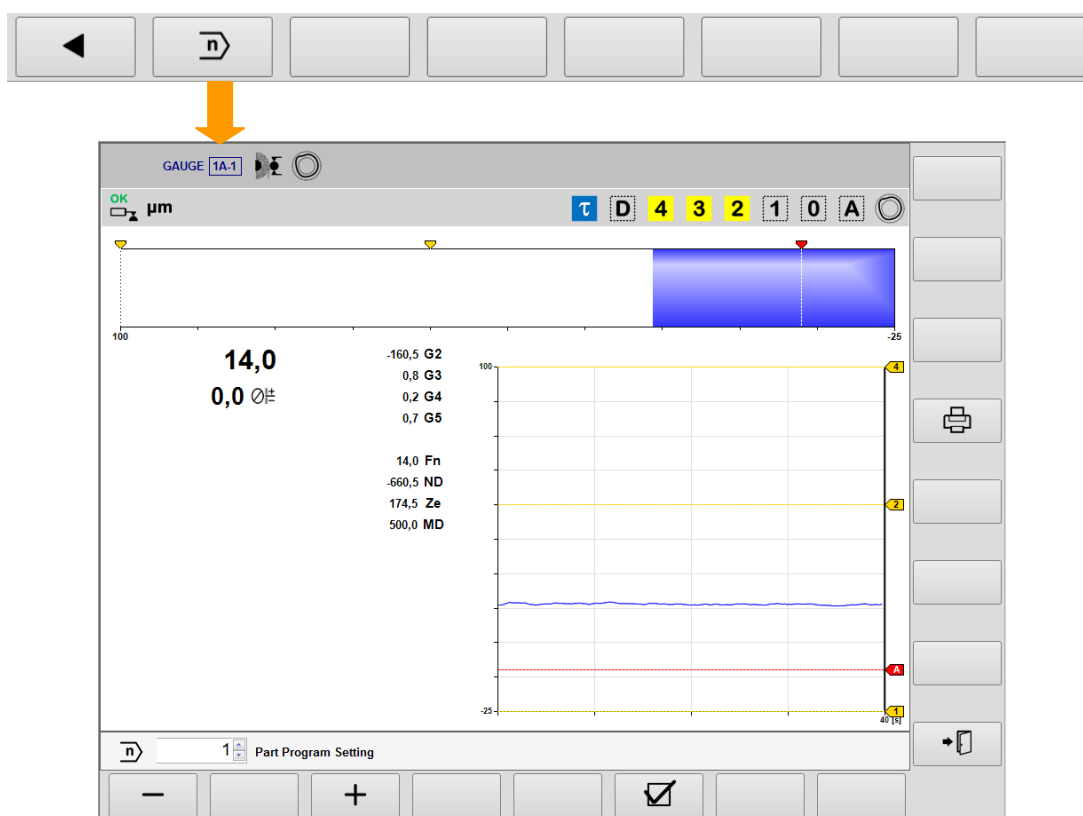
NOTE: Selecting "0" the system will activate the part-program selected by the NCU through the digital inputs.
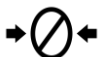
System commands				
Icon	**ID**	**Command name**	**Button**	**Description**
[icon]	0017	Exit	Shift+F8	Exit from the function

4.5.3. Zeroing

Prior to starting the working cycle, it is necessary to zero the gauging system. Since the work is done by removal, the zero point is the final quote of the worked piece.

Set-up of the work program to be used during the cycle and then press the **Zeroing** ⊘ **[F3]** button to access the zeroing page.

（保持）
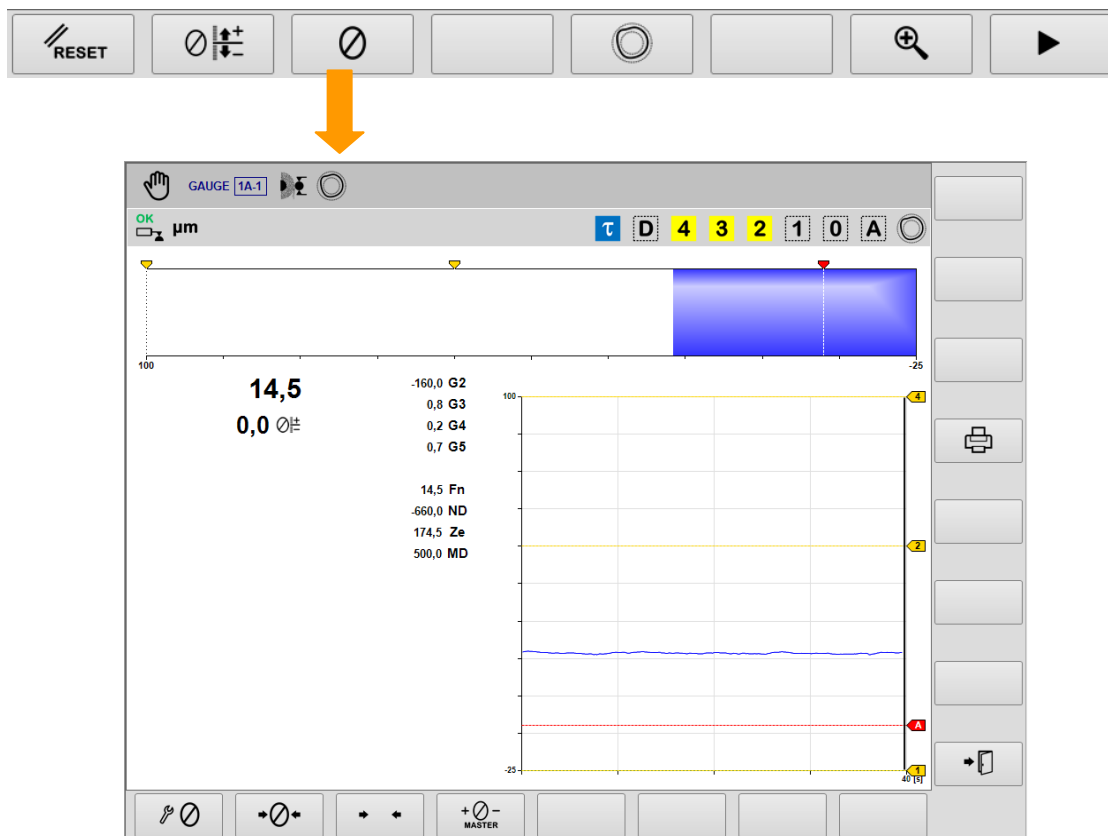
Commands				
Icon	**ID**	**Command name**	**Button**	**Description**
	6008	Mechanical zeroing	F1	Access to the mechanical zeroing page
	6006	Electronic zeroing	F2	Electronic zeroing execution of the active part-program
	6007	Reset of the electronic zeroing	F3	Delete the electronic zeroing value of the active part-program
	6009	Master deviation	F4	Access to the set up of the master deviation parameter
	6011	Enable/Disable synchronized dimension	F6	Disable or enable the synchronization of the dimension
	6010			
	0017	Exit	Shift+F8	Exit

4.5.3.1. Procedure

RAW adjustment of the tips

- Select the page **Mechanical zeroing** using 🔧⊘ **[F1]**
- Unlock the tips
- Shift each tip until a dimension in the range ±50.0 µm is displayed
- Lock both tips

Searching for the diameter (Max Dimension)

- Press **Exit** **[Shift+F8]** to go back to zeroing page
- Unlock the screws of the fine slide
- Rotate the knob to move back / forward the equipment until the MAX dimension is reached and displayed on the screen
- Lock the screw of the fine slide

Fine adjustment of the tips

- Select the page **Mechanical zeroing** using 🔧⊘ **[F1]**
- Unlock the tips again
- Shift each tip until a dimension in the range ±50.0 µm is displayed
- Lock both tips

Mechanical Zero

Electronic Zero

Continous surface → Static ZERO

Electronic Zero

- Press **Exit** **[Shift+F8]** to go back to the zeroing page
- Press **Electronic Zeroing [F2]**

NOTE: the electronic zeroing resets the offset

Interrupted surface → Synchronized ZERO

4.5.3.2. Master deviation from zero

To set up the master deviation from zero:

- Press the button **+⊘− MASTER** **[F4]**

- Use the **—** and **+** buttons to modify the value and press confirm **☑** **[F6]** button

- Press the **Exit** ➡🚪 **[Shift+F8]** button to go back to the main page
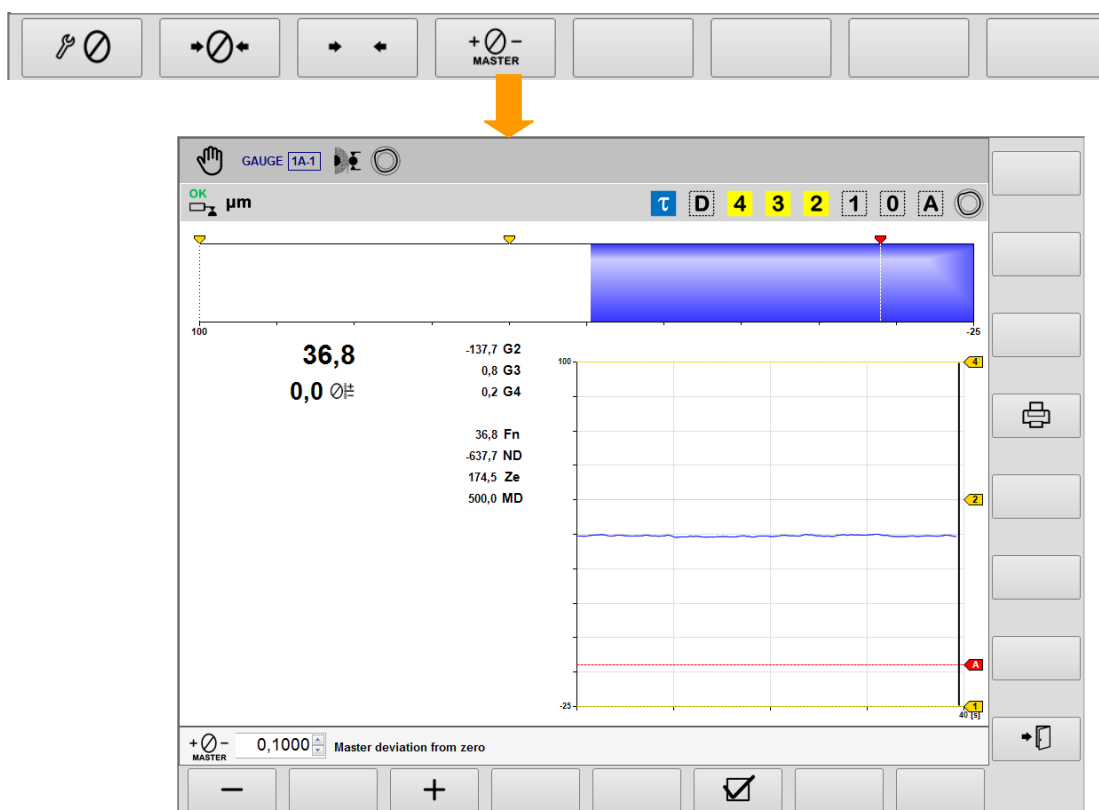
System commands				
Icon	ID	Command name	Button	Description
➡🚪	0017	Exit	Shift+F8	Exit

4.6. WORK parameter

To access the WORK parameters, press the **Parameters** button **[Shift+F7]**.

For the description of the WORK parameters, refer to the document present at the link [Parameter Setup](#)

5. Appendix

Documents referred to in the text		
Name document	**Paragraphs**	**Link**
Setup parameter	2.5,2.7.2.3, 4.4.3.3, 3.5, 4.6	9UMEN2505-1200 Parameter Setup.pdf