Blu

MODULAR PROCESS AND QUALITY CONTROL SYSTEM FOR MACHINE TOOLS

MARPOSS

Description of the system

BLÚ includes, and surpasses, all the machine tool monitoring and/or process control devices that MARPOSS has been able to produced up until the present day, and all in a single system.
Thanks to a wealth of experience and suggestions received from our customers in every part of the world, it is safe to say that BLÚ is

BORN IN THE PAST... DESIGNED FOR THE FUTURE

BLÚ is the result of over 60 years of experience in the management and optimization of working processes on grinding machines and other machine tools.

It is a modular system consisting of a series of FUNCTION NODES interconnected to form a proprietary network using a single BUS managed by the MASTER UNIT, the system is normally positioned inside the machine cabinet.
The individual FUNCTION NODES are assigned a series of AUXILIARY NODES that, depending on the specifications of the various control functions, can be used to manage: additional physical I/O, measurement head finger retraction, the motors used to position or retool the different control systems (measurement heads or balancing heads) and to read the signals from the digital transducers.

The individual system elements that make up the control network may be connected together at various distances from each other, depending on the layout of the specific machine. The system also includes special NODES that can be positioned inside the cabinet and others that can be installed close to the working areas where environmental conditions may be highly critical.

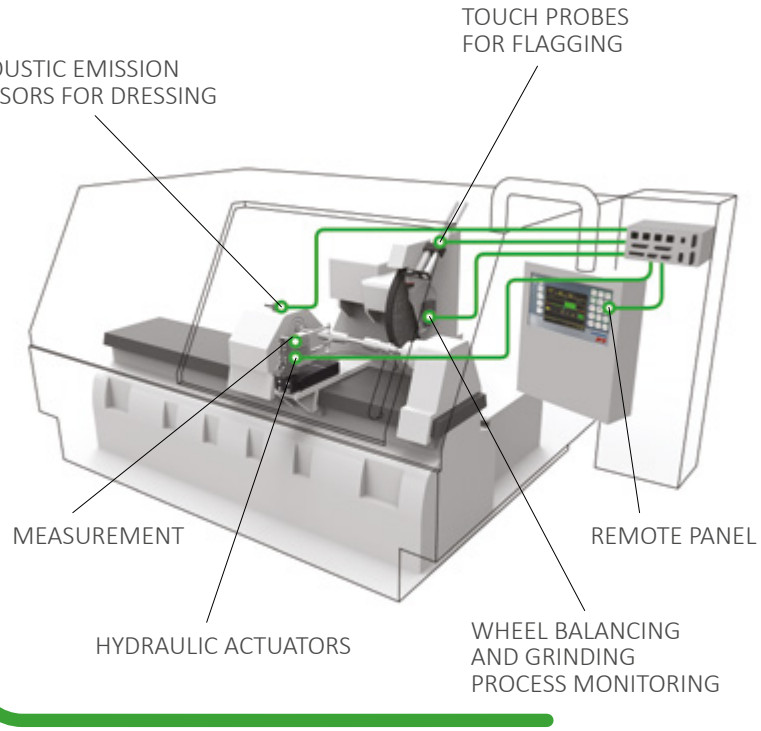
BLÚ has been designed to allow the maximum level of integrability within the machine tool.

Its HW components are manufactured to the highest technical and safety standards.
They are extremely reliable, thanks to the company's extensive experience of designing and manufacturing equipment and devices for use in workshop environments.

The BLÚ SW is organized along the lines of interactively programmable operating cycles displayed in user friendly language. The menus are designed to be intuitive and the parameters are displayed in the machine operator's language in order to provide clear and simple explanations of the specific measurements and values for each type of production process.

Yesterday

Star network topology.
Multiple cables for each sensor and gauge



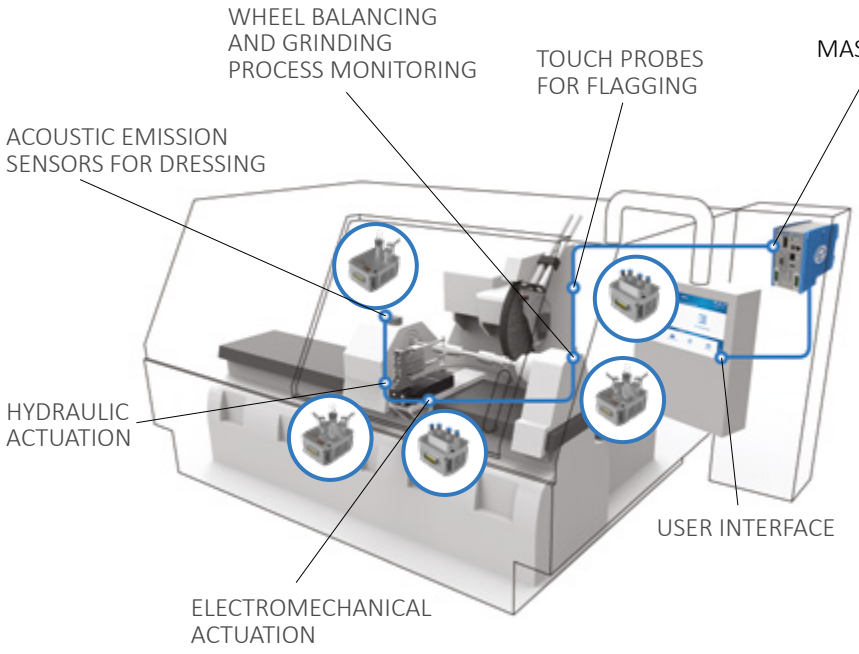
BLÙ has been designed so that the machine PLC logic management uses as few I/O signals as possible, in accordance with the simplified cyclograms supplied with the individual order documentation.

The BLÙ operating logic has been designed for various different OPERATING MODES, which include all the displays/functions that the user requires in order to carry out the various operations he/she is required to perform, i.e.:

- SETUP mode for setting up the system and calibrating the various sensors
- MANUAL mode enables the user to select the pages corresponding to the individual functions without having to be connected to the machine logic
- AUTOMATIC mode all the operations are performed by the machine logic

Advantages

- The physical size of the single nodes means they are easy to install both in the machine cabinet and inside the working area
- HW and SW modularity and scalability mean that the system can be configured for use with a wide range of machine requirements
- Connection flexibility
- Can be integrated as a slave in all current PLC networks (PROFIBUS, PROFINET, SERCOS...)
- Optimized Human Interface provides real time information about the process being monitored and can be customized by the user
- HI can be integrated into the machine operator interface
- Mechanical reliability guaranteed by the choice of materials such as stainless steel for all the nodes used in Wet areas. The ingress protection rating of the individual nodes, and the components used to interconnect them, is such that they are suitable for use even in the most aggressive machining environments, guaranteeing immunity to the presence of processing waste, coolants, vibration and variations in temperature.



Today

Series connection.
One cable for the entire network.

Examples of node layouts

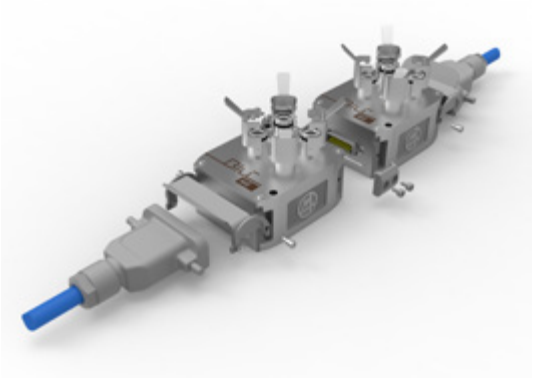
Example of node layout inside a cabinet (DRY area) using the frontal, “Bridge” type connection.

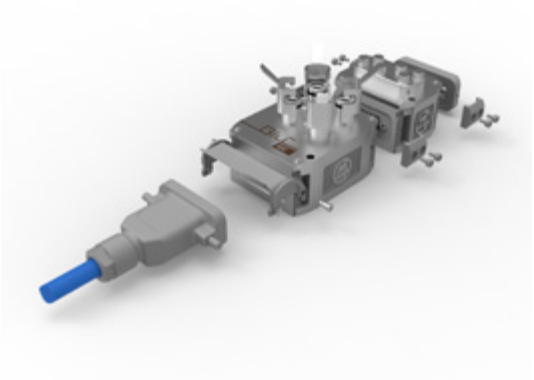
DIN guide coupling for rear mounting.

Example of node layout in working area (WET area).

1. Function node and auxiliary node.
2. Two function nodes

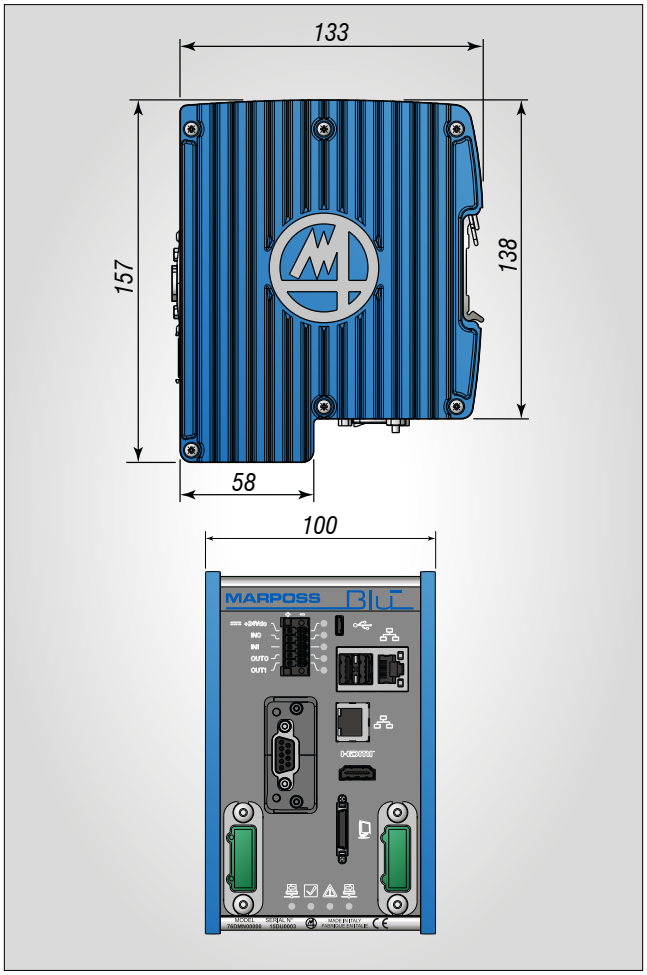
To guarantee the connection between the various nodes, use the accessories supplied with them (clamps, brackets, connectors).
The nodes may be secured to the structure using just 4 screws.





Master Unit

This is the heart and mind of the BLÚ system; it has been designed to be housed inside the machine cabinet (DRY area). It is extremely compact and very easy to install, which means that it will fit into very small spaces.
The Master contains the basic system SW and the application part for each single configuration; it manages data storing and the Human Interface for the entire system.
This is where the MMSB (Marposs Measure Sensor Bus), which connects all the function nodes present on the network together, originates. The MMSB is used to transmit all the information regarding the management of the various processes elaborated by the single function nodes. The system uses connectors that do not require any additional wiring, and this, together with the simplicity of the software reconfiguration process, means that the modules can be connected rapidly, enabling the user to adapt the network to the specific requirements of each machine tool in real time.
One of the frontally accessible slots houses the interface for the fieldbus that the configuration must be slaved to. The BLÚ system modules for use in both the cabinet and the working area are connected via the connectors located laterally on the bottom of the front panel.



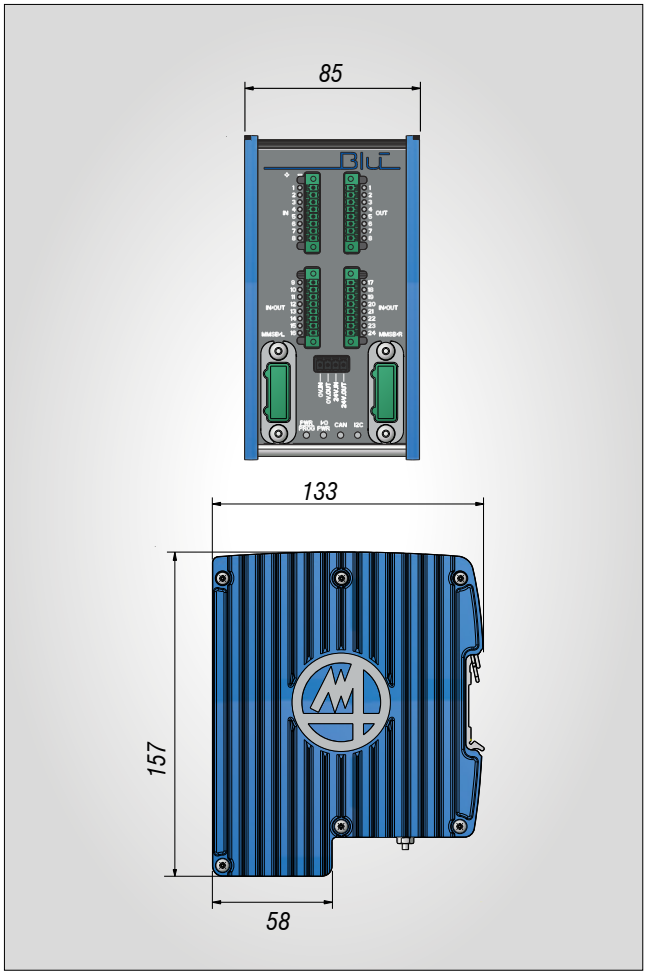
POWER SUPPLY	24 VDC SELV (EN 60950-1) -15 +20%
CURRENT CONSUMPTION	6 A max Max. conductor cross section 1,5 mm² (AWG 16) Overload protection: replaceable quick-blow fuse
REAR MECHANICAL MOUNTING	35 x 7.5 mm EN 50022 DIN guide
PROTECTION RATING *(IEC 60259)*	IP40
MEMORY	16 GB eMMC (multimedia card) - expandable RAM 1 GB - expandable
WORKING TEMPERATURE/HUMIDITY RANGE	5/45 °C - 50/95%
STORAGE TEMPERATURE/HUMIDITY RANGE	-20/70 °C - <50%
PERMISSIBLE VIBRATION	2g sinusoidal on three axes
OPERATING ALTITUDE	2000 m max

Available interfaces

Ethernet HOST via RJ45 connector	10/100/1000 Mbps
Ethernet AUX via RJ45 connector	10/100 Mbps
HDMI for connection to a display	Version 2.0 Type A connector Connection distance 7 m (typical) Full HD monitor (with HDMI input)
Connector for Marposs remote panel	Panel formats available: 16:9 , 7" TFT, capacitive touch RESOLUTION 800X 480, 256 K colours protection rating IP54 16:9 , 10.1" TFT, capacitive touch RESOLUTION 1280 X 800, 16 M colours protection rating IP54
RS232 service bus	
USB HOST	2 x PORTS, type A connector, version 2.0 HS, Imax 500 mA, Speed 480 Mbit/s, max. connection distance 4.5 m
USB (On The Go)	1 x PORT, type AB Micro USB connector, version 2.0 HS, Imax 500 mA, max. connection distance 4.5 m
FAST I/O for hard-wiring using 16/24 AWG cables	2 OUT, 24VDC isolated, Sink/Source, Iout =100 mA Short circuit protected Commutation time <1 ms 2 IN in accordance with the specification IEN 61101-2 type 1/3
AUX I/O (fieldbus)	PROFIBUS DP V1 - PROFINET - SERCOS III
Connectors for MMSB (Marposs Measuring Sensor Bus)	Bus loop time (typical) 1 ms with 4 NODES connected Max length single section 30 m Total network length 100 m

Digital I/O Function

The digital I/O node can be used to connect inputs and physical outputs (for example, push-buttons, cycle management boxes, relays, actuators, lamps, PLC/CNC, etc.) All inputs and outputs may be either SINK or SOURCE type, according to the requirements of the specific configuration.
Each module is capable of handling up to 32 24 VDC signals, divided as follows: 8 Inputs, 8 Outputs and 16 configurable Inputs or Outputs, depending on the specific configuration.
There are 4 connectors on the front panel, and each connector has 8 pins, which are assigned the indicated function.



INPUTS OUTPUTS POWER SUPPLY	24 VDC SELV (EN 60950-1) -15 +20%
PROTECTION RATING *(IEC 60259)*	IP40
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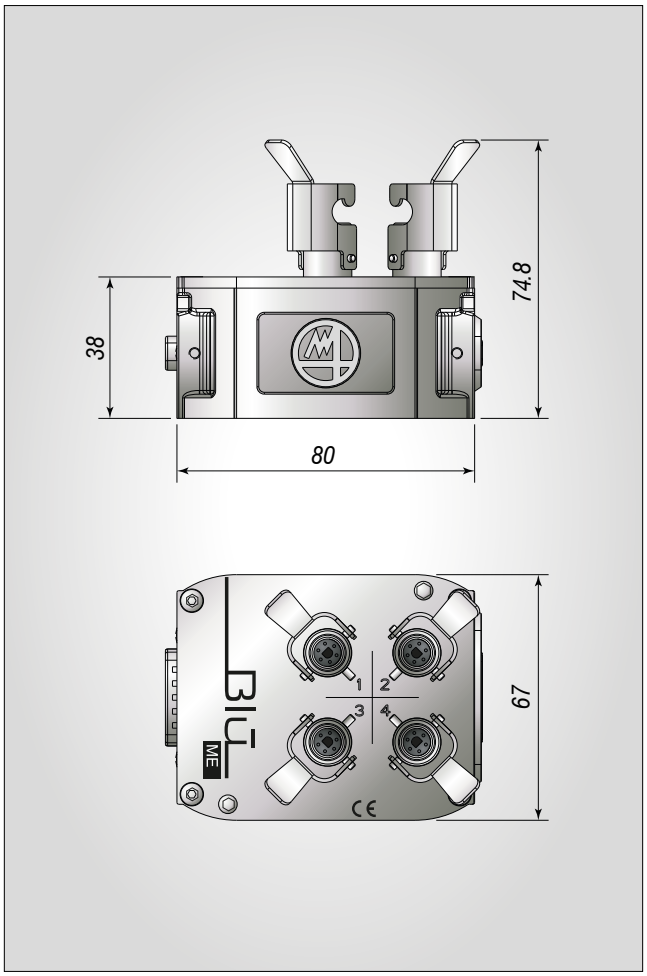
WORKING TEMPERATURE/HUMIDITY RANGE	5/45 °C - 50/95%
STORAGE TEMPERATURE/HUMIDITY RANGE	-20/70 °C - <50%
PERMISSIBLE VIBRATION	2g sinusoidal on three axes
OPERATING ALTITUDE	2000 m max

Available functions

N° 8 inputs	Inputs. Green LED = Input Active Cable cross section 0.5 - 1.5 mm2. 24VDC SELV (as defined by EN 60950-1) -15 + 20 %, Sink/Source, (Sink in accordance with IEC 61131-2). Short circuit protection. Switching time < 5 ms.
N° 8 Outputs	Outputs. Green LED = output active. Red LED = output active but in short circuit. Cable cross section 0.5 - 1.5 mm2. 24VDC SELV (as defined by EN 60950-1) -15 + 20 %, Sink/Source, (Sink in accordance with IEC 61131-2), Imax = 250 mA. Short circuit protection Switching time < 1 ms.
N° 16 configurable Inputs/Outputs	Inputs/Outputs. Cable cross section 0.5 - 1.5 mm2. 16 IN/OUT configurable individually. Imax = 100mA. in accordance with IEC 61131-2. • Inputs. Green LED = Input Active • Outputs. Green LED = output active. Red LED = output active but in short circuit.
Diagnostic LED	4 LEDs for diagnostic purposes 1. **PWR/PROG** • PWR (Power). Colour green. Module power supply correct. • PROG (Programming). Active during start up (acknowledgement between I/O node and Master node); deactivated upon completion. Remains on in the event of no acknowledgement. 2. **I/O POWER** I/O circuit power supply. Colour green. I/O power supply correct 3. **CAN** CAN network diagnostics. Colour green. Active connection between Master node and I/O function node 4. **I2C** I2C network diagnostics. Colour green. Active connection (test result positive) between I/O node and the respective auxiliary node.

Measurement Function

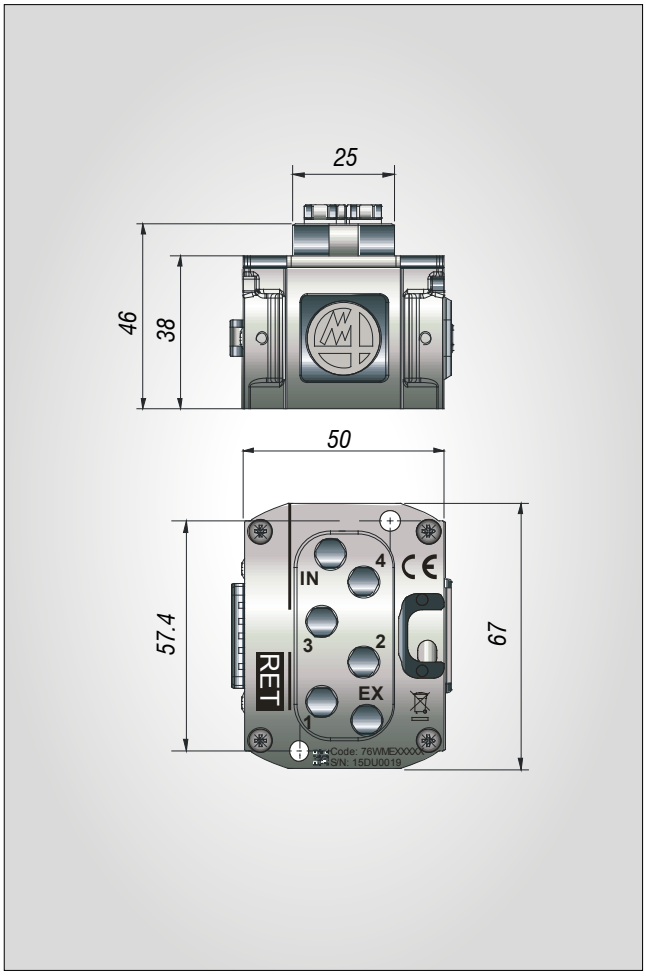
Measurement Nodes are available for 2 and 4 LVDT transducers and 2 HBT/LVDT transducers, these Nodes can be connected using quick-release connectors together with the same number of single probes (Unimar, FENAR L, Nanounimar, etc).
Each Measurement Node and may be installed directly in the working area (WET area), at a short distance (typically 3 m) from the individual measurement sensors.
The Nodes convert the analogue signals from the individual transducers to digital signals. In this way it is possible to transfer the values to the system Master via the MMSB (Marposs Measure Sensor Bus) in digital format, thus avoiding the Signal to Noise ratio issues that affect analogue signals, and which are the result of the length of traditional cables.
The Measurement Nodes can be connected together using the dedicated accessories or, depending on the topology of the network managed by the MMSB, by using the special cables, which have been designed, together with their connectors, to withstand the typical conditions inside the machine working area.



PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM THE SINGLE MEASUREMENT HEAD	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/55 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

Retraction Function

This is an auxiliary node of the Measurement Node, which is used to enable the Unimar measurement head fingers to open (pneumatic retraction); this function is essential for protecting the contacts during grinding processes.
The Retraction Node must be connected to a suitably filtered compressed air supply, which it delivers to the heads involved in the measurement cycle selected by the machine logic.
Each Retraction Node can be used to manage the retraction function independently on up to 4 heads. The Retraction Node has been designed to be installed inside the machine working area (WET area). It must be positioned close to the measurement head so that it is possible to use the short connection hoses (typically 3 m), in order to optimize retraction activation/deactivation times.



PROTECTION RATING *(IEC 60259)*		IP67
MAY BE CONNECTED TO ONE MEASUREMENT NODE		
NUMER OF OUTPUTS		4 max
AIR SPECIFICATIONS		Filtered < 5 µm
RESPONSE TIMES RANGE	Pressure 3 bar	ACTIVATION TIMES 600/750 ms with 1/4 transducers DEACTIVATION TIMES 240/250 ms with 1/4 transducers
	Pressure 6 bar	ACTIVATION TIMES 310/340 ms with 1/4 transducers DEACTIVATION TIMES 4200/450 ms with 1/4 transducers
OPERATING TEMPERATURE RANGE		5/55 °C with 90% humidity
STORAGE TEMPERATURE RANGE		-20/70 °C

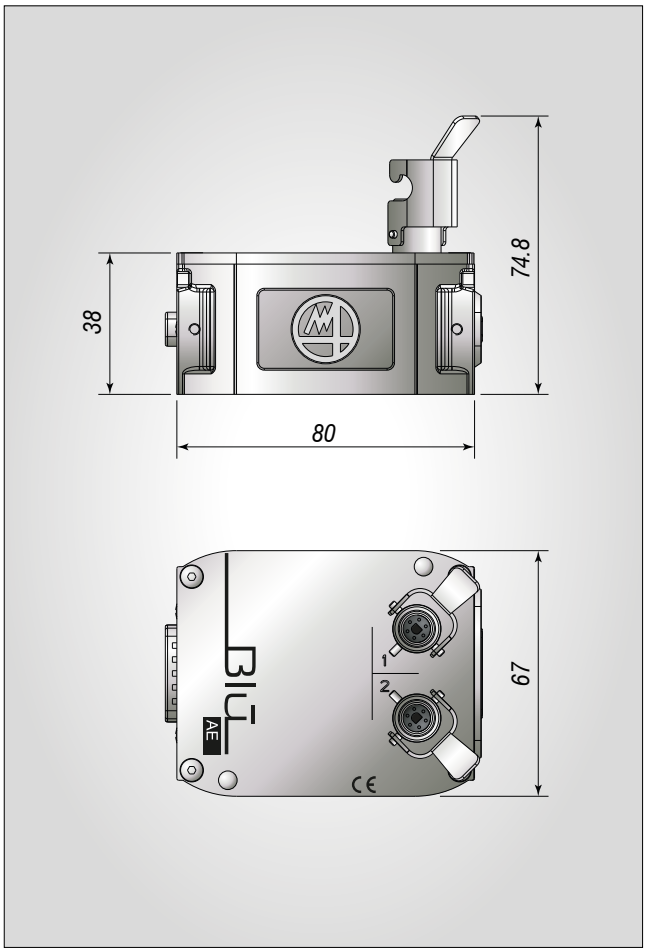
(*) = Type of hoses used: L = 3 m / Ø2 mm and 1/4 heads connected

AE Function

This is an AE (Acoustic Emission) Monitoring Node that can be used to connect up to 2 sensors via quick-release connectors. In order to meet the application monitoring requirements for machining processes and dressing on grinding machines, various types of AE sensor are available:

- AE - Liquid sensor
- AE - Ring sensor
- AE - Fixed sensor
- AE - Internal spindle sensor
- AE - Rotating sensor

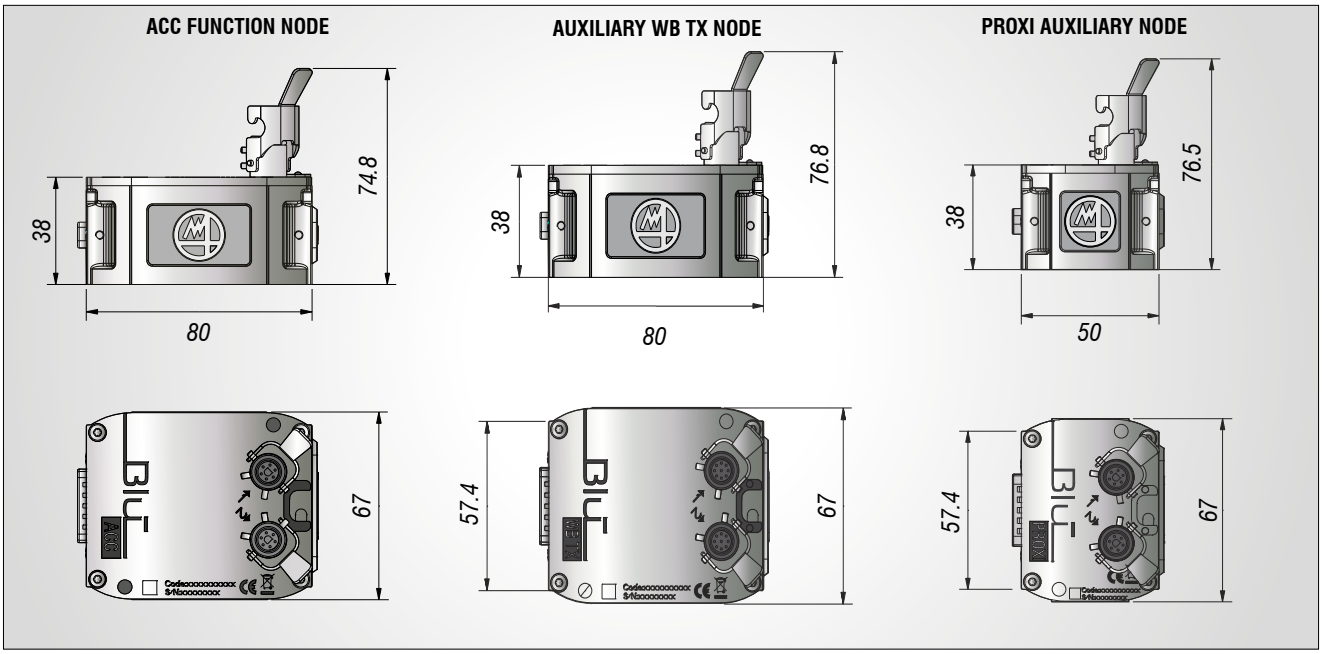
The AE Node and may be installed directly in the working area (WET area), at a short distance (typically 3 m) from the individual sensors.
The Nodes convert the analogue signals from the individual sensors to digital signals. In this way it is possible to transfer the values to the system Master via the MMSB (Marposs Measure Sensor Bus) in digital format, thus avoiding the Signal to Noise ratio issues that affect analogue signals, and which are the result of the length of traditional cables.
The AE Nodes can be connected together using the dedicated accessories or, depending on the topology of the network managed by the MMSB, by using the special cables, which have been designed, together with their connectors, to withstand the typical conditions inside the machine working area.



PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM SINGLE SENSOR	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/55 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

WB (Wheel Balancing) Function

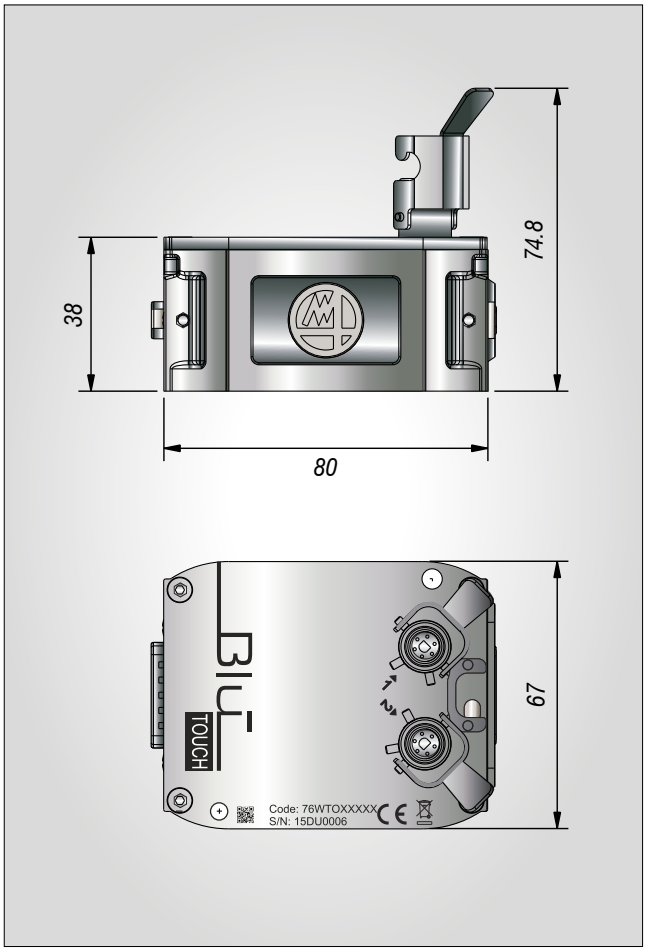
The WB (Wheel Balancing) function is available for controlling the mechanical vibration of the wheel during grinding processes. This function works by analysing the vibration via the ACCNode, which, when coupled with the PROXI auxiliary node, may be used to Pre-Balance the grinding wheel and, when coupled with the WB TX auxiliary node, may be used to execute the Automatic Balancing cycle.
The WB function Nodes can be installed side by side using the dedicated accessories or, depending on the topology of the network managed by the MMSB, by using the special cables, which have been designed, together with their connectors, to withstand the typical conditions inside the machine working area.
Each function Node and may be installed directly in the working area (WET area), at a short distance (typically 3 m) from the individual sensors.
The Nodes convert the analogue signals from the individual sensors to digital signals. In this way it is possible to transfer the values to the system Master via the MMSB (Marposs Measure Sensor Bus) in digital format, thus avoiding the Signal to Noise ratio issues that affect analogue signals, and which are the result of the length of traditional cables.



PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM SINGLE SENSOR	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/55 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

Touch Function.

The WET node for MIDA applications is an auxiliary node that can be used to manage up to 2 touch probes connected via cables fitted with quick-release connectors.
It may be installed directly in the working area (WET area). The Touch probe deflection information is transferred to the system Master via the MMSB (Marposs Measure Sensor Bus) in digital format, thus avoiding the Signal to Noise ratio issues that affect analogue signals, and which are the result of the length of traditional cables.
The application can manage up to two probes. It can be used with both traditional T25 probes and the new T25P version, which are based on piezo-electric technology and designed for use in applications requiring a high level of measurement accuracy.



PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM THE SINGLE PROBE	30 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/55 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

BLÚ HMI

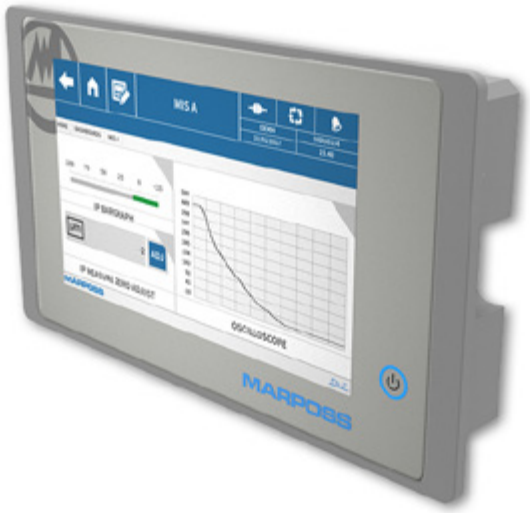
The BLÚ System features an extremely flexible user interface (BLÚ HMI).
BLÚ HMI has various easy to adapt dashboards which can easily be integrated on devices of the BLUE line (i.e. the operator panel) or on external devices such as machine PCs.
Users, with the correct passwords, can create new dashboards or change existing ones.
BLÚ HMI contains all the functions necessary in the Smart Factory, requiring flexibility in production contexts and ease of use for users.

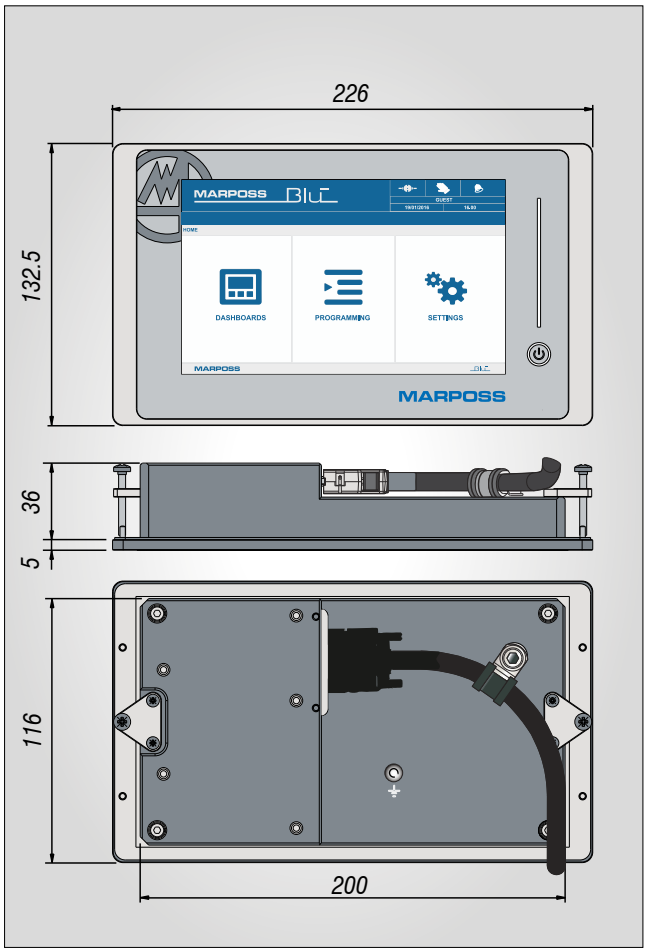
Widgets

All the dashboards are created with the basic widgets available in the library of the software version being used.

Operator Panel

The BLÚ operator panel is equipped with 16:9 format, capacitive touch screen display (resolution 800 x 480 pixels - dimensions 7” - 256 K colours) that can be used to program and view the BLÚ system functions.





PROTECTION RATING	IP54
DISTANCE FROM ACTUATOR	15 m max
OPERATING TEMPERATURE RANGE	5/50 °C (dry area)
MAXIMUM CABLE LENGTH	6 m

Accessories

MMSB (Marposs Measure Sensor Bus) CABLE

Master/node or node/node MMSB connection bus
Area: DRY/WET (master/node connection)
WET (node/node connection)

Master side connector, protection rating: IP40 (IEC 60259)
NODE side connector, protection rating: IP67 (IEC 60259)
Maximum total network length: 100 m
Maximum length of single stretch: 30 m

COUPLING CLAMP

Device used to secure the MMSB cable to the function node
Area: WET

One clamp per connection

CLAMPING BRACKET

Device use to secure the two function nodes
Area: WET

Guarantees the mechanical connection between two nodes.
Two brackets per connection

"BRIDGE" CONNECTOR

Connector for connecting two cabinet modules
Area: DRY

Transfers the MMSB BUS when the modules are installed close together in a cabinet
One connector per connection
Protection rating: IP40 (IEC 60259)

FUNCTION NODE TERMINATION

Used to terminate the last node on the network
Area: WET

Closes the MMSB BUS connection and protects it.
Protection rating: IP67 (IEC 60259)

FUNCTION NODE TERMINATION Used to terminate the last node on the network Area: DRY *Closes the MMSB BUS connection and protects it.* *Protection rating: IP67 (IEC 60259)*	
SPRING CONENCTOR Connector for connecting two stretches of MMSB together Area: WET Used for MMSB connections in cases where no Nodes are present (permits future expansion after installation in the machine) Used to secure the 24 V connector cover cap to the 2WAYS “T” Node.	
BULKHEAD FOR MMSB BUS Bulkhead connector for MMSB Bus cable Area: WET/DRY	
BULKHEAD FOR 24 V Bulkhead connector for 24 V power supply cable Area: WET/DRY	

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For a full list of address locations, please consult the Marposs official website

D6I04500G0 - *Edition 08/2017 - Specifications are subject to modifications*

Marposs has an integrated Company quality, environment and safety management system, certified by ISO 9001, ISO 14001 and OHSAS 18001 certifications. Marposs has also been awarded the EAQF 94 qualification and the Q1-Award.