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 applications that MARPOSS has been able to produce with its own instruments 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 50 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 NODE, 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.

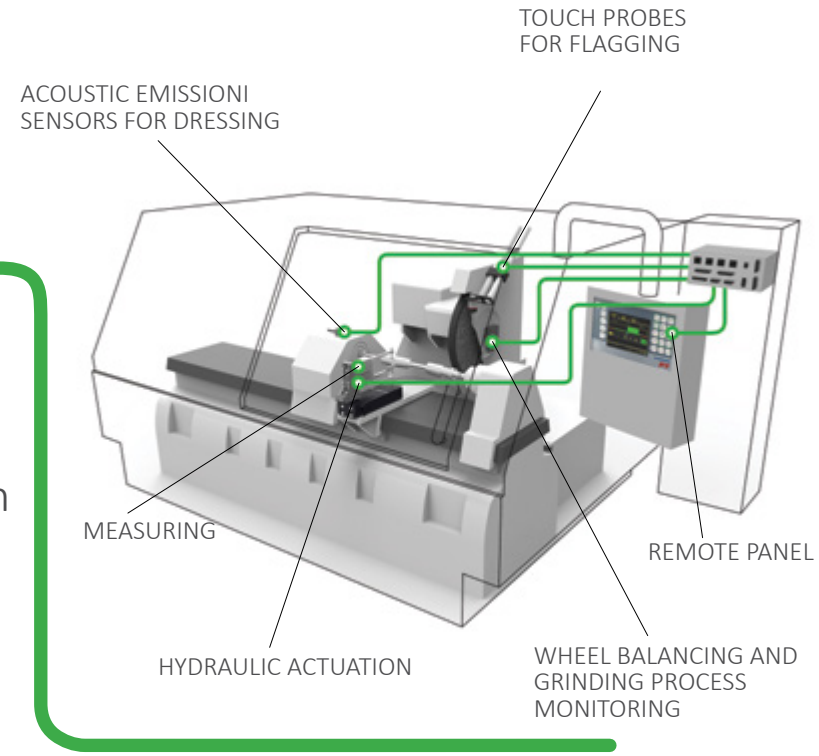
BLÚ has been designed to allow the maximum level of integrability within the machine tool.

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



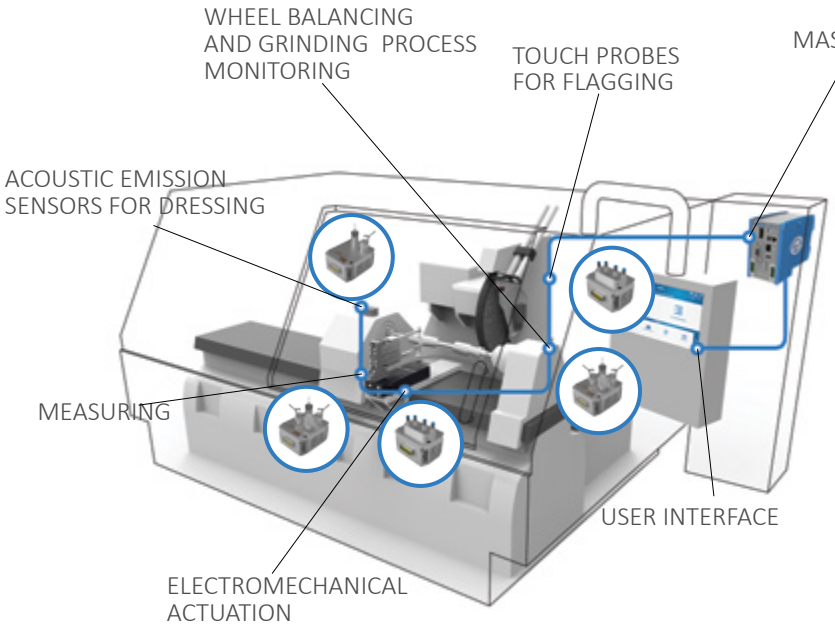
BLÙ has been designed so that the machine PLC logic management uses as few I/O signals as possible, in accordance with the simplified cyclograms supplied with the individual order documentation.

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 modules 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 is guaranteed by the correct protection rating of the various modules and the use of connection components (cables and connects) that are designed to withstand even the most aggressive working environments and the presence of waste materials produced by the machining process, coolants, vibration and temperature variations



Today

Daisy chain
network topology

Example showing connection between modules

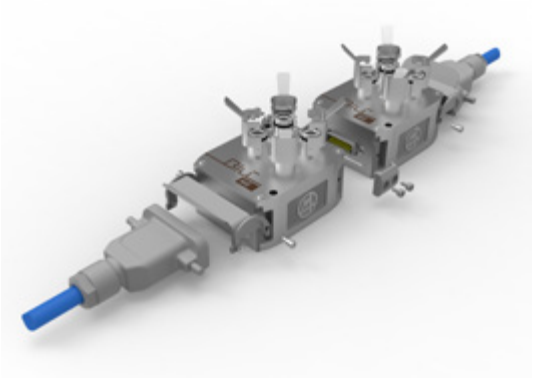
Example showing modules installed in cabinet (DRY) area using the front panel "Bridge" type connection.

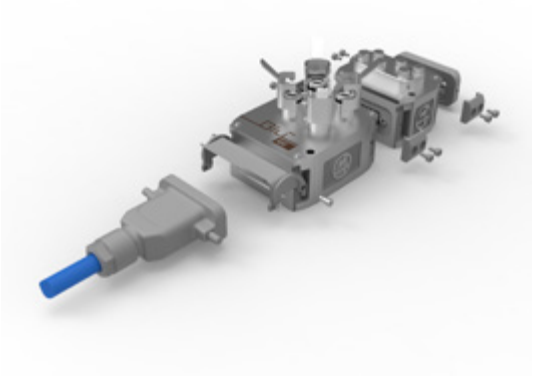
The DIN guide may be used for rear panel mounting.

Example showing modules installed in the working area (WET area).

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

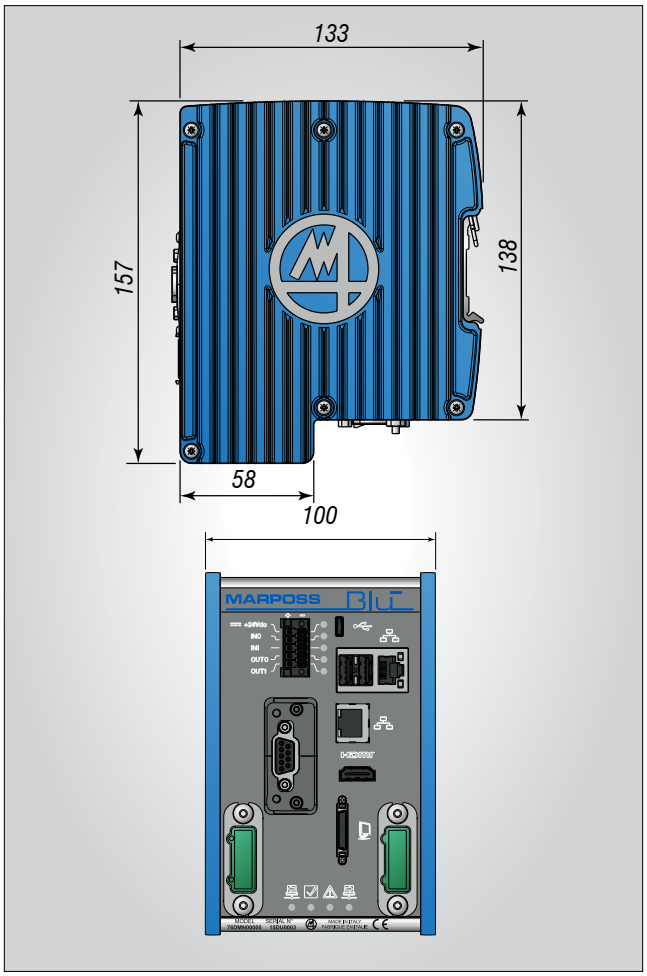
Use the accessories provided (fasteners, brackets, connectors) in order to guarantee the connections between the nodes.
4 screws are sufficient to secure the modules to the structure.





Master Node

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 specific configuration; it manages data storing and the Human Interface for the entire system.
This is where the MMSB (Marposs Measure System 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 specific configuration must be slaved to. The connectors located to the side at the bottom of the front panel can be used to connect other BLÚ system modules designed to be housed in the cabinet (e.g. the module for physical I/O or other function nodes).



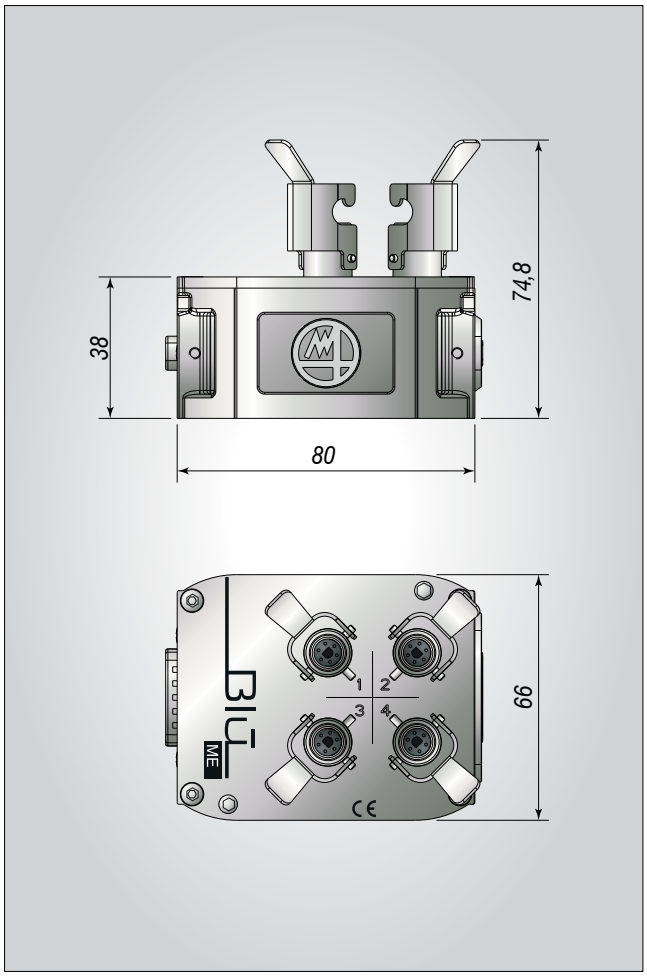
POWER SUPPLY	24 VDC SELV (EN 60950-1) -15 +20%
CURRENT CONSUMPTION	6 A max Max. conductor cross section 1,5 mm² (AWG 16) Overload protection: replaceable quick-blow fuse
REAR MECHANICAL MOUNTING	35 x 7.5 mm EN 50022 DIN guide
PROTECTION RATING *(IEC 60259)*	IP40
MEMORY	16 GB eMMC (multimedia card) - 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 specfication IEN 61101-2 type 1/3
AUX I/O (fieldbus)	PROFIBUS DP V1 PROFINET SERCOS III
Connectors for MMSB (Marposs Measuring System Bus)	Bus loop time (typical) 1 ms with 4 NODES connected Max length single section 30 m Total network length 100 m

Measurement Node

Marposs has designed measurement Nodes for 2 and 4 LVDT transducers and 2 HBT transducers that can be connected using quick-release connectors together with the same number of single probes (Unimar, FENAR L, Nanounimar, etc).
Each Measurement Node is manufactured in stainless steel and may be installed directly in the working area (WET area), at a short distance (typically 3 m) from the single transducers.
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 System Bus) in digital format, thus avoiding the Signal to Noise ratio quality 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.

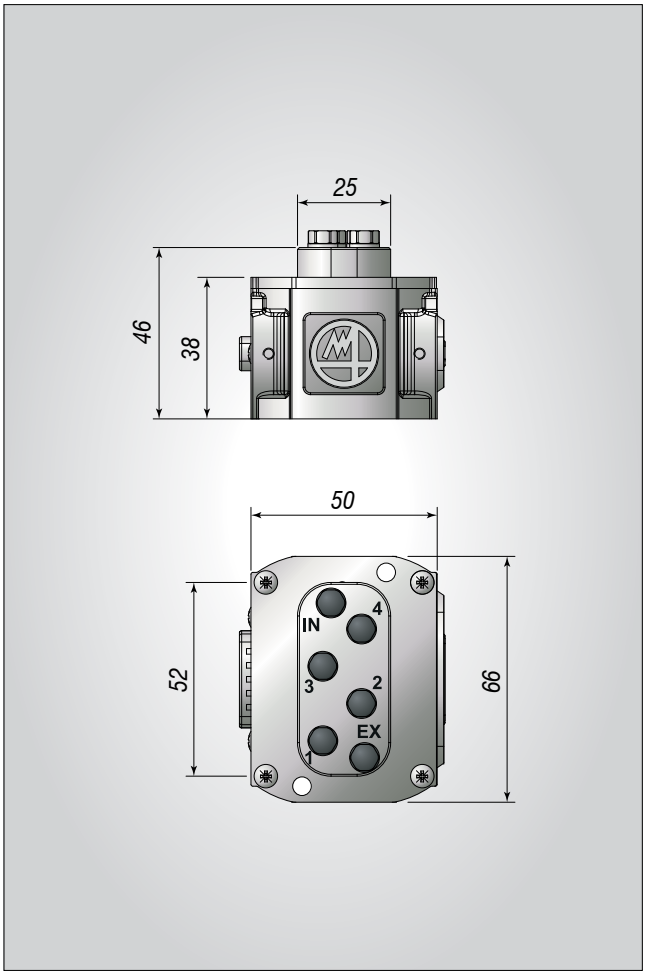


2/4 transducer Measurement Node

PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM THE SINGLE MEASUREMENT HEAD	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/60 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

Retraction Node

This an auxiliary node to the measurement node and is used to activate pneumatic finger retraction on measurement heads (Unimar).
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 is manufactured in stainless steel and 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		5/60 °C with 90% humidity
STORAGE TEMPERATURE RANGE		-20/70 °C

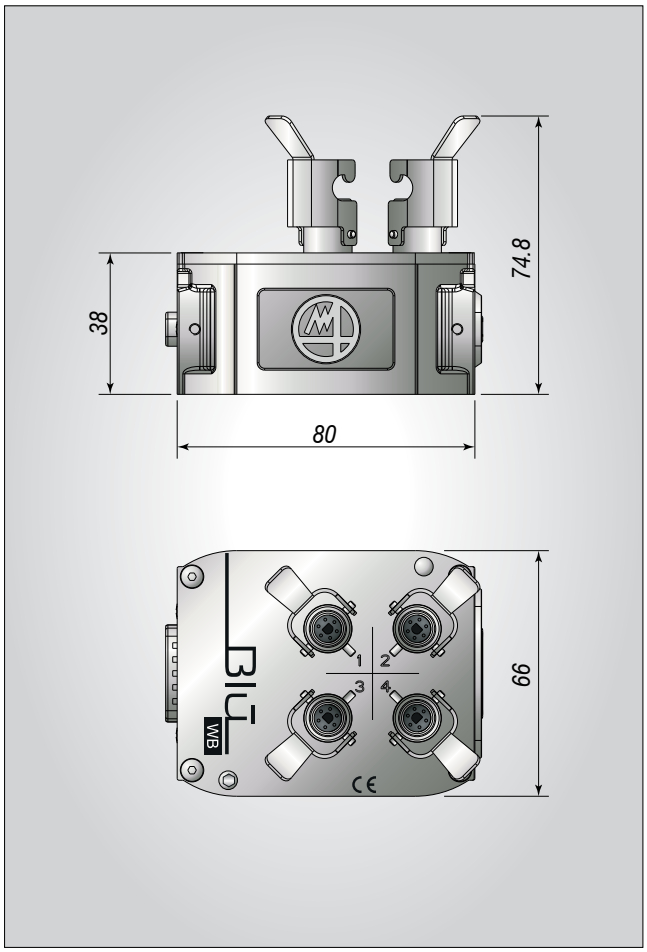
(*) = Type of hoses used: L = 3 m / Ø2 mm and 1/4 heads connected

WB Node

Marposs has designed WB (Wheel Balancer) Nodes for active vibration controls on grinding machines that can be used to compensate for wheel imbalance. The vibration (ACC) and rotation speed (RPM) sensors can be connected using quick-release connectors. In order to meet the active vibration control requirements in a wide range of applications, various different types of sensors are available:

- ACC - Vibration sensors with axial or radial cable output
- RPM - Inductive, magnetic or optical rotation speed sensors

Each WB Node is manufactured in stainless steel and may be installed directly in the working area (WET area), at a short distance (typically 3 m) from the single 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 System Bus) in digital format, thus avoiding the Signal to Noise ratio quality issues that affect analogue signals, and which are the result of the length of traditional cables.
The WB 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.



WB Node with 2 vibration sensors + 2 rpm sensors

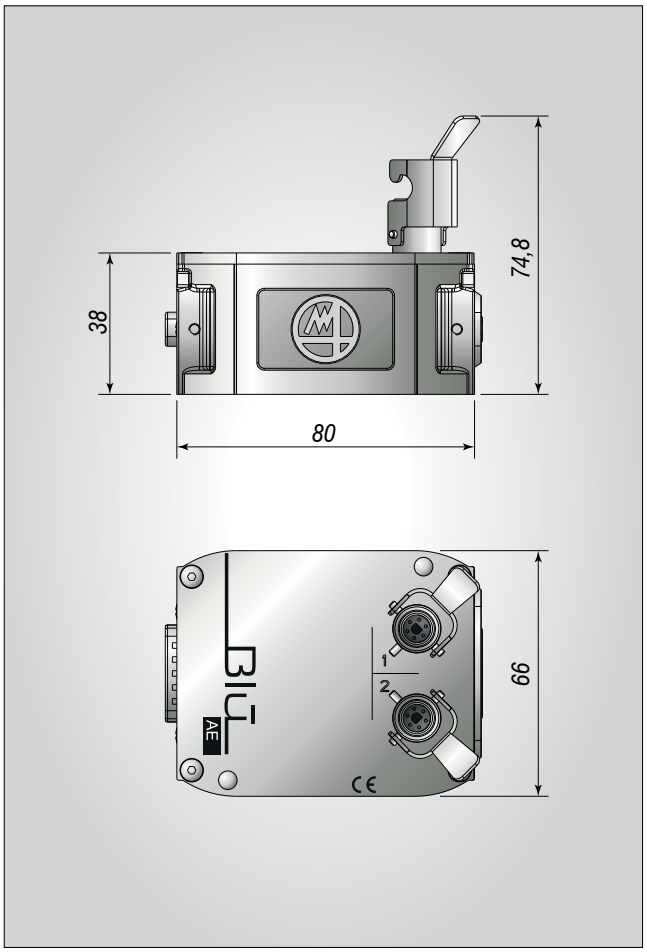
PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM SINGLE SENSOR	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/60 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

AE Node

Marposs has designed AE (Acoustic Emission) Monitoring Nodes for 2 sensors that can be connected using 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

Each AE Node is manufactured in stainless steel and may be installed directly in the working area (WET area), at a short distance (typically 3 m) from the single 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 System Bus) in digital format, thus avoiding the Signal to Noise ratio quality 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.

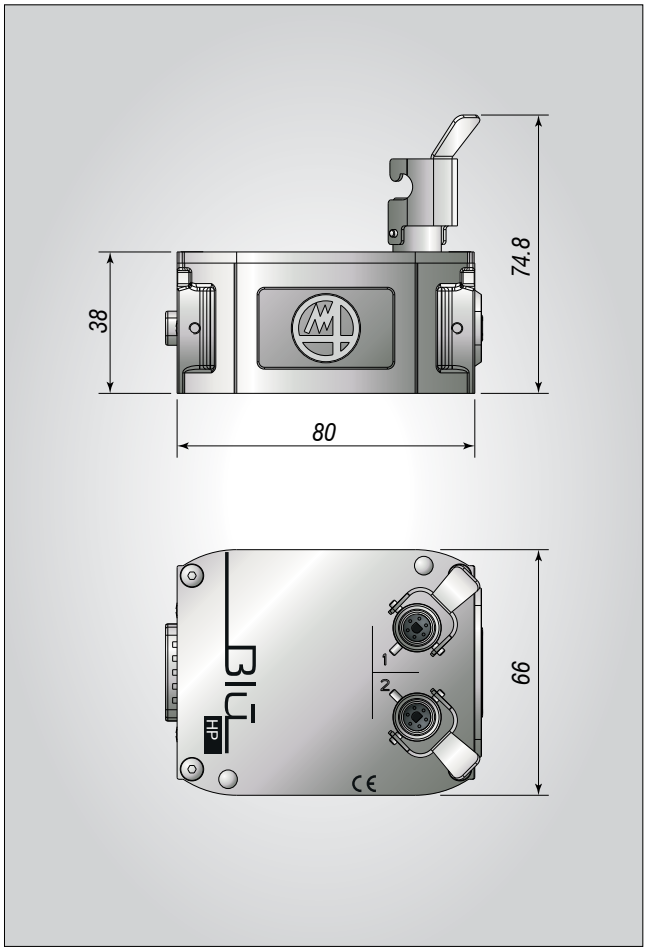


2 sensor AE Node

PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM SINGLE SENSOR	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/60 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

HP Node

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.
Just like all the other Measurement Nodes, the WET node is manufactured in stainless steel and has been designed to be installed inside the machine working area (wet area). The values are transferred to the system Master via the MMSB (Marposs Measure System Bus) in digital format, thus avoiding the Signal to Noise ratio quality 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.

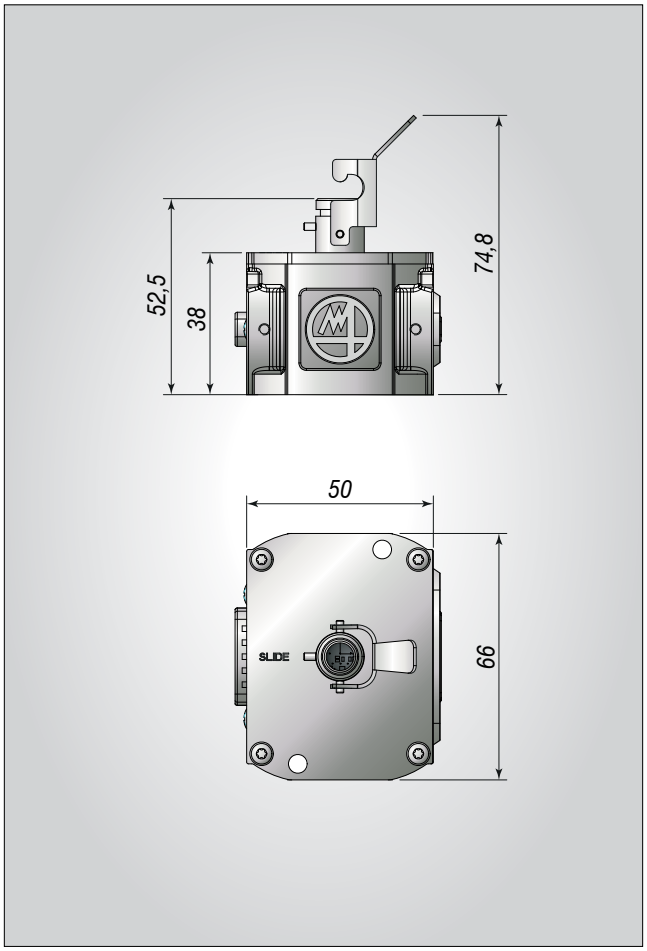


2 sensor HP Node

PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM THE SINGLE PROBE	9 m max
SAMPLING RATE	2 kHz
OPERATING TEMPERATURE RANGE	5/60 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

Slide Node

This an auxiliary node to the measurement node and is used to operate the electro-mechanical slide, which moves the measurement probe within the grinding environment.
The carriage is connected directly to the electro-mechanical slide node via a quick-release connector.
It is capable of handling all the slide I/O signals: this means that the movement, position reading and output management functions are all fully integrated into the BLÚ system.
It is manufactured in stainless steel and has been designed to be installed inside the machine working area (WET area).



PROTECTION RATING *(IEC 60259)*	IP67
DISTANCE FROM ACTUATOR	15 m max
OPERATING TEMPERATURE RANGE	5/60 °C with 90% humidity
STORAGE TEMPERATURE RANGE	-20/70 °C

Accessories

MMSB (Marposs Measure Sensor Bus) CABLE

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

Master side connector with protection rating: IP40 (IEC 60259)
NODE side connector with protection rating: IP67 (IEC 60259)
Total maximum network length: 100 m
Maximum length single section: 30 m

JOINT FASTENER

Device for securing the MMSB cable to the function Node.
Area: WET

One per connection

COUPLING BRACKET

Device for coupling two function Nodes together
Area: WET

Guarantees mechanical connection between two nodes.
Two per connection

"BRIDGE" CONNECTOR

Used for connecting two modules together inside the cabinet.
Area: dry

Transfers the MMSB BUS when the modules are installed close together inside a cabinet.
One per connection
Protection Rating: IP40 (IEC 60259)

PLUG FOR FUNCTION NODE

Terminal used to close the last node on the network
Area: WET

Closes and protects the MMSB BUS connection
Protection Rating: IP67 (IEC 60259)

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

D6I04500I0 - *Edition 09/2015 - Specifications are subject to modifications*

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

www.marposs.com