

BLU

***MODULAR PROCESS AND QUALITY CONTROL
SYSTEM FOR MACHINE TOOLS***



MARPOSS

Description of the System

MODULAR, DISTRIBUTED CONTROL SYSTEM FOR MACHINE TOOLS

BLÚ is the innovative modular, distributed system for process control and monitoring on machine tools. The solution is the result of over 60 years of experience in managing and optimising machining processes.

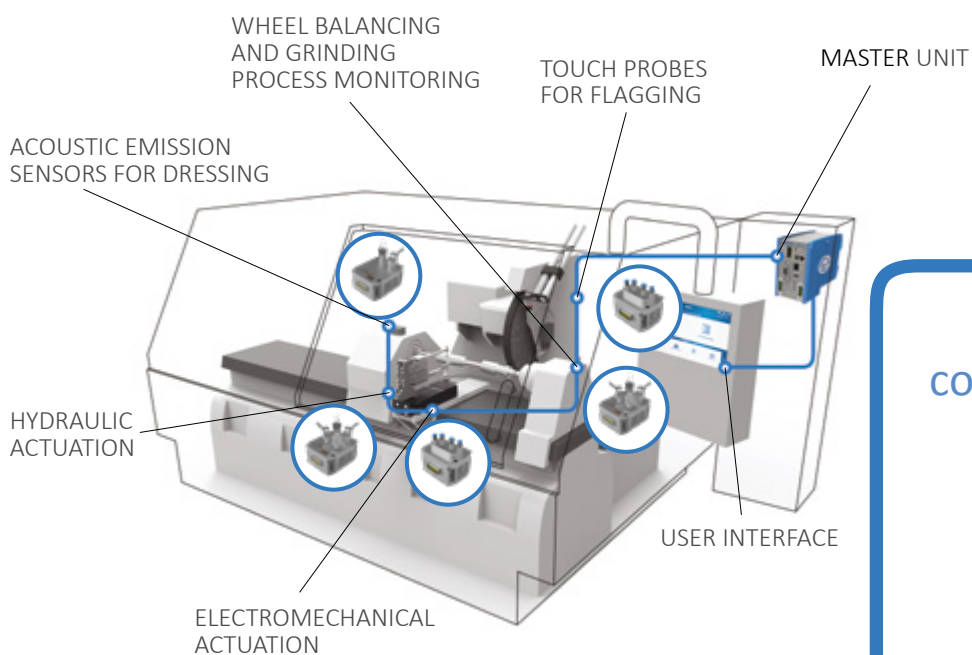
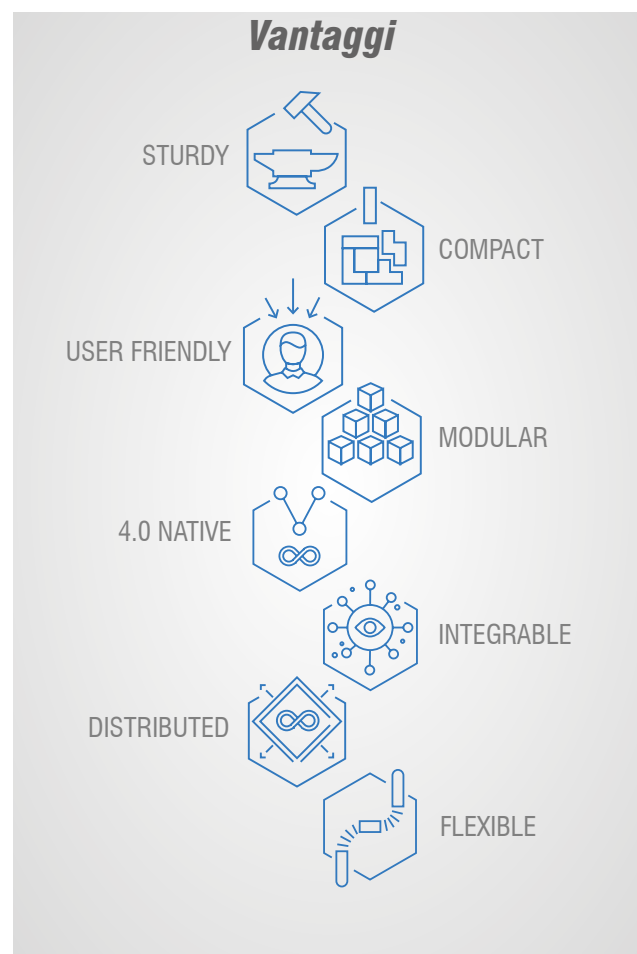
Connecting the sensors to their respective Function Nodes directly on the machine optimises the measurement system topography, reducing the number of connections drastically and hence minimising installation time and costs.

Thanks to MMSB, the proprietary MARPOSS measurement bus, the signals acquired by the sensors are transmitted in totally digital form, thus guaranteeing robust, reliable communications.

The Master Unit has been designed to guarantee the maximum level of integration between the measurement system and the machine and the company network, in addition to the operator.

The interface software, BLÚ HMI, has been designed to render the system effective and easy to use.

BLÚ is the ideal solution for all applications featuring a high level of complexity.



MMSB for connection of all sensors

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.

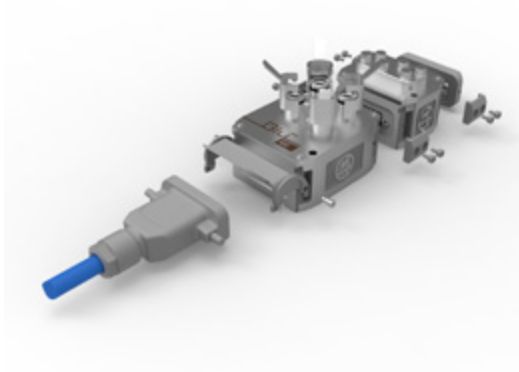
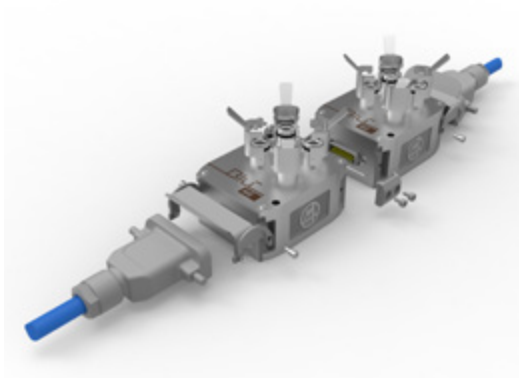


Example of node layout in working area (WET area).

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

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.



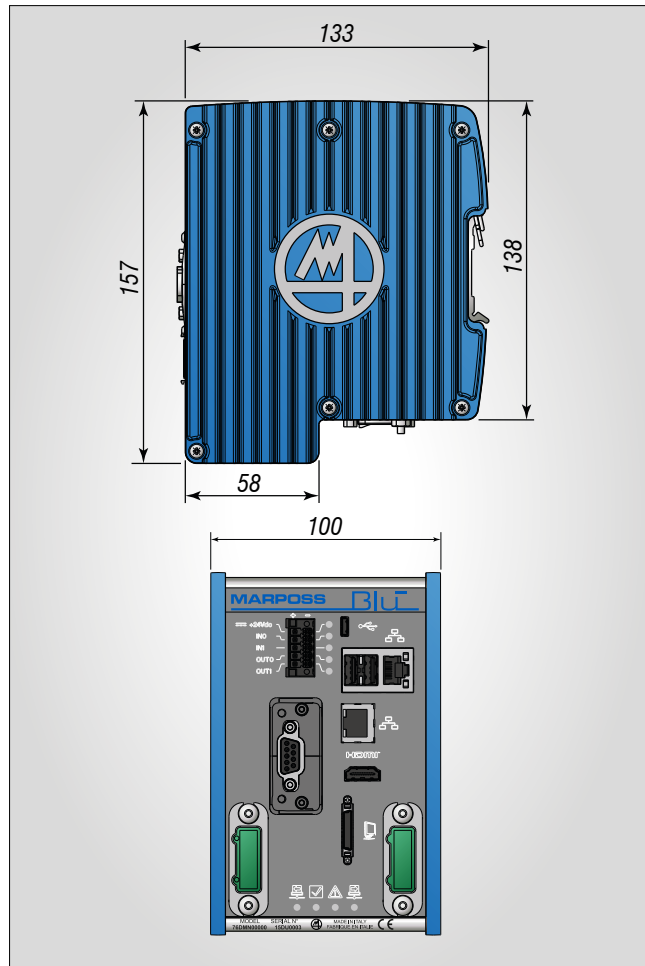
Master Unit

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 contains the fieldbus interface suitable for connection with the machine master. 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 mm ² (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
WORKING TEMPERATURE	5/45 °C
STORAGE TEMPERATURE	-20/70 °C
RELATIVE HUMIDITY	5-80% (non-condensing)
PERMISSIBLE VIBRATION	2g sinusoidal on three axes
OPERATING ALTITUDE	2000 m max

Available interfaces

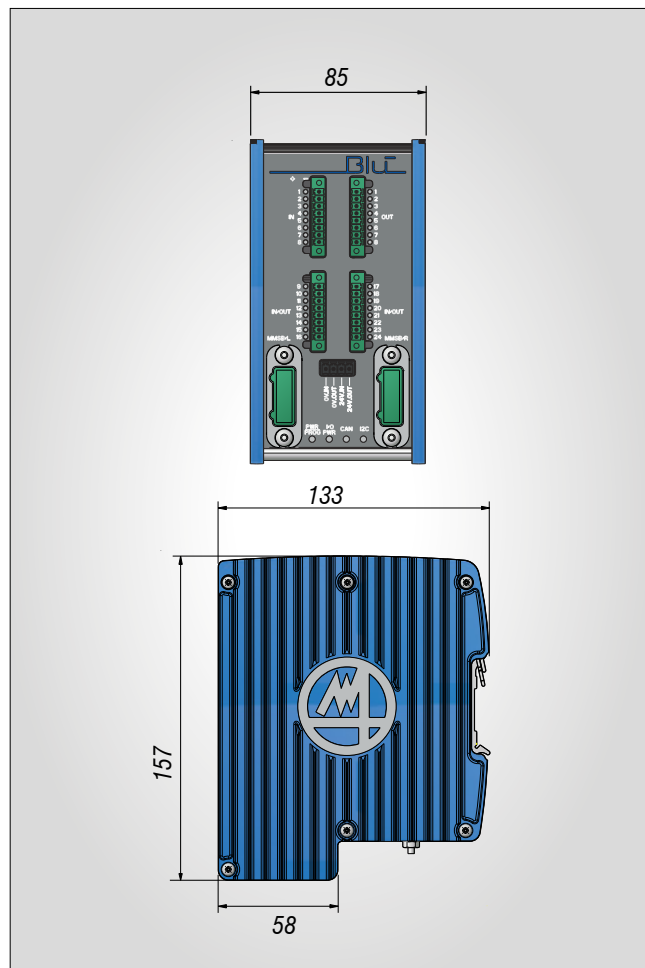
Ethernet HOST via RJ45 connector	10/100/1000 Mbps
Ethernet AUX via RJ45 connector	10/100 Mbps
HDMI for connection to a display	Version 2.0 Type A connector Connection distance 7 m (typical) Full HD monitor (with HDMI input)
Connector for Marposs remote panel	Panel formats available: 16.9", 7" TFT, capacitive touch RESOLUTION 800X 480, 256 K colours protection rating IP54
USB HOST	2 x PORTS, type A connector, version 2.0 HS, I _{max} 500 mA, Speed 480 Mbit/s, max. connection distance 4.5 m
FAST I/O for hard-wiring using 16/24 AWG cables	2 OUT, 24VDC isolated, Sink/Source, I _{out} = 100 mA Short circuit protected Commutation time <1 ms 2 IN in accordance with the specification IEN 61101-2 type 1/3
FIELDBUS	PROFIBUS DP V1 PROFINET SERCOS III ETHERNET IP OTHERS ON REQUEST
Connectors for MMSB (Marposs Measuring Sensor Bus)	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	5/45 °C
STORAGE TEMPERATURE	-20/70 °C
RELATIVE HUMIDITY	5-80% (non-condensing)
PERMISSIBLE VIBRATION	2g sinusoidal on three axes
OPERATING ALTITUDE	2000 m max

Available functions

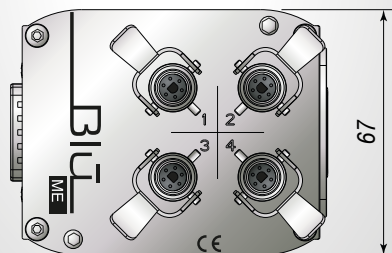
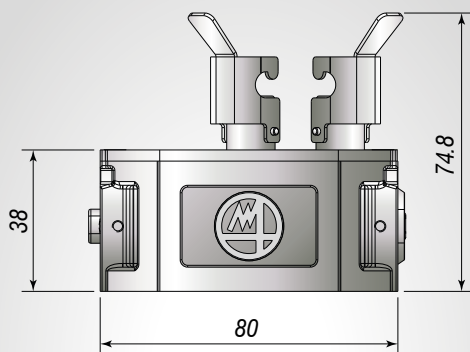
N° 8 inputs	Inputs. Green LED = Input Active Cable cross section 0.5 - 1.5 mm ² . 24VDC SELV (as defined by EN 60950-1) -15 + 20 %, Sink/Source, (Sink in accordance with IEC 61131-2). Short circuit protection. Switching time < 5 ms.
N° 8 Outputs	Outputs. Green LED = output active. Red LED = output active but in short circuit. Cable cross section 0.5 - 1.5 mm ² . 24VDC SELV (as defined by EN 60950-1) -15 + 20 %, Sink/Source, (Sink in accordance with IEC 61131-2). I _{max} = 250 mA. Short circuit protection Switching time < 1 ms.
N° 16 configurable Inputs/Outputs	Inputs/Outputs. Cable cross section 0.5 - 1.5 mm ² . 16 IN/OUT configurable individually. I _{max} = 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.

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.



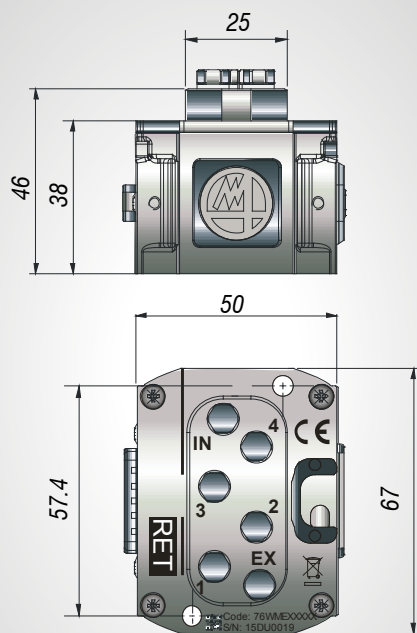
PROTECTION RATING (IEC 60259)	I66, IP67
DISTANCE FROM THE SINGLE MEASUREMENT HEAD	9m MAX for 4LVDT node 30m MAX for 2LVDT/2HBT node
OPERATING TEMPERATURE RANGE	5/55 °C
STORAGE TEMPERATURE RANGE	-20/70 °C

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 output (8 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)		I66, IP67
NUMBER 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
STORAGE TEMPERATURE RANGE		-20/70 °C

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

AE Function

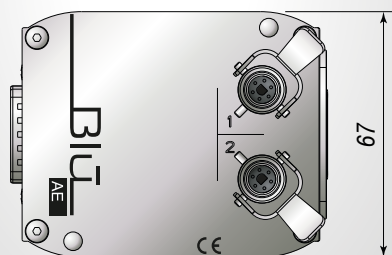
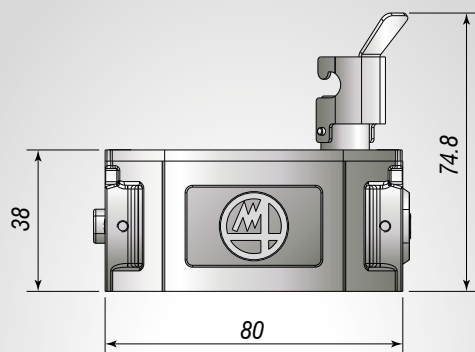
This is an AE (Acoustic Emission) Monitoring Node that can be used to connect up to 2 sensors via quick-release connectors. In order to meet the application monitoring requirements for machining processes and dressing on grinding machines, various types of AE sensor are available:

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

The AE Node 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)	I66, IP67
DISTANCE FROM SINGLE SENSOR	30 m max
OPERATING TEMPERATURE RANGE	5/55 °C
STORAGE TEMPERATURE RANGE	-20/70 °C

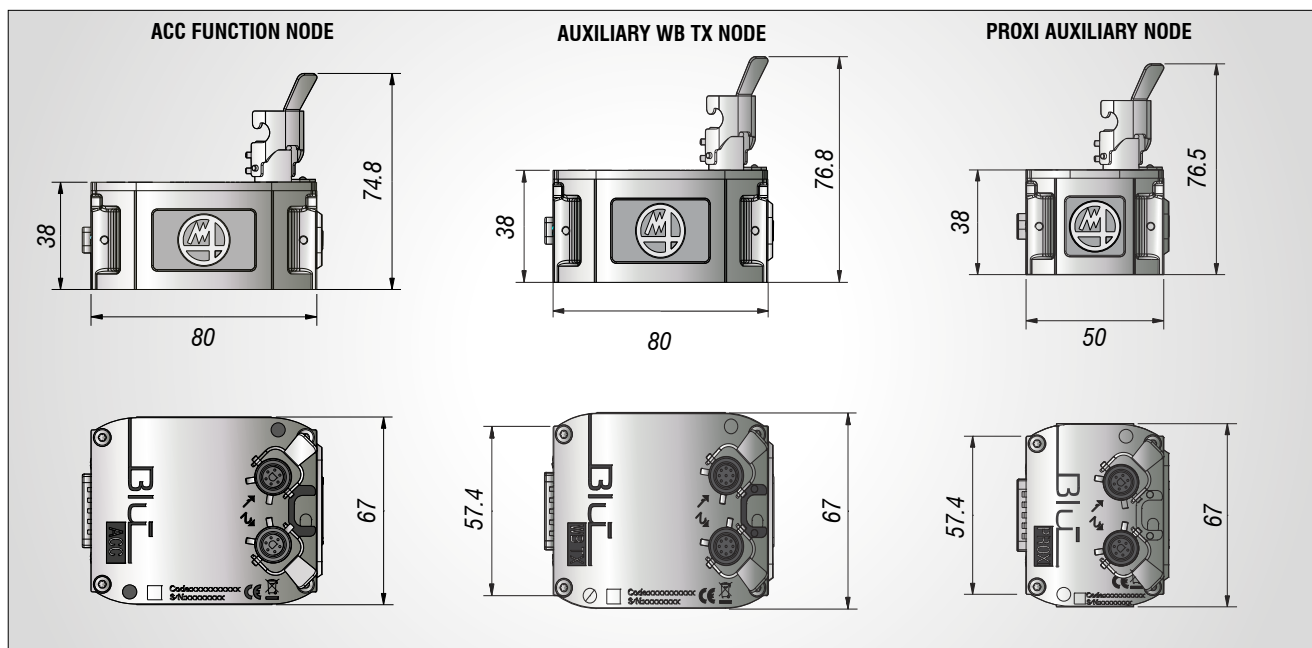
WB (Wheel Balancing) Function

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 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.



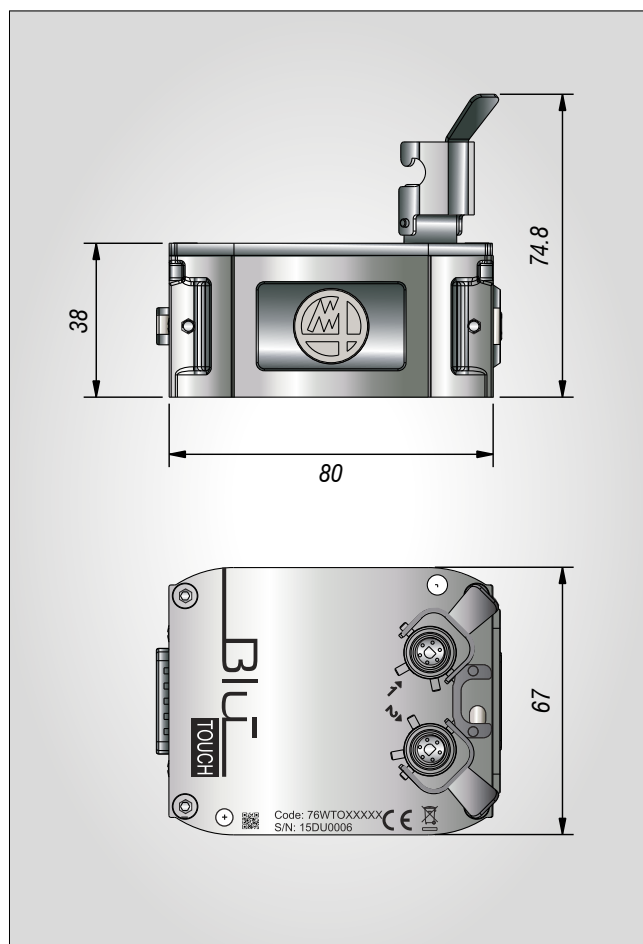
PROTECTION RATING (IEC 60259)	I66, IP67
DISTANCE FROM SINGLE SENSOR	30 m max
OPERATING TEMPERATURE RANGE	5/55 °C
STORAGE TEMPERATURE RANGE	-20/70 °C

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)	IP66, IP67
DISTANCE FROM THE SINGLE PROBE	30 m max
OPERATING TEMPERATURE RANGE	5/55 °C
STORAGE TEMPERATURE RANGE	-20/70 °C

COM Function

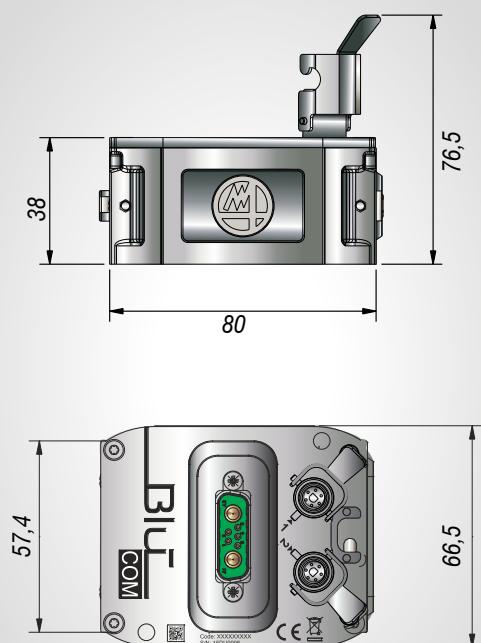
The COM node is designed to pilot and control electro-mechanical devices such as eFenar and eSlide.

The electro-actuated device, which communicates with the system via the COM node, provides movement and diagnostics performance that would not be attainable with traditional devices.

The movement, position control and diagnostics functions are fully supported by the system.

The actuators connect to the node via quick-release connectors.

The node is manufactured in stainless steel and is designed to be positioned inside the machine working area (Wet Area).



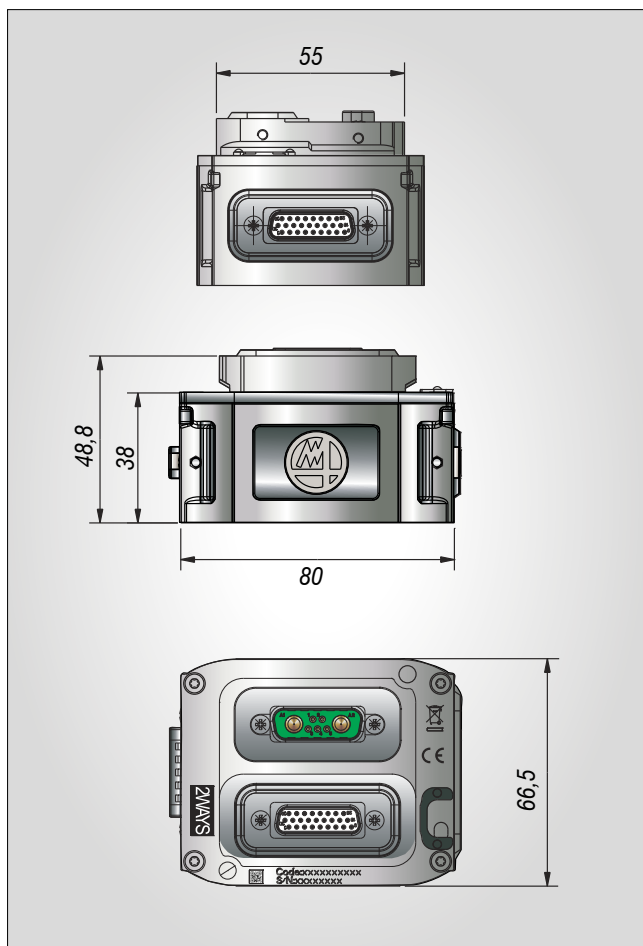
PROTECTION RATING (IEC 60259)	IP66, IP67
OPERATING TEMPERATURE RANGE	5/55 °C
STORAGE TEMPERATURE RANGE	-20/70 °C

2Ways Function

The 2Ways node extends the flexibility of the MMSB network further by performing switch, repeater and power boost functions. It allows splitting of the bus to support particularly complicated machine topologies and reconditioning of the same to adapt to large-scale plants.

Both the MMSB network cables and auxiliary 24 V cables, which allow power boosting on the bus, are connected to the node via quick-release connectors.

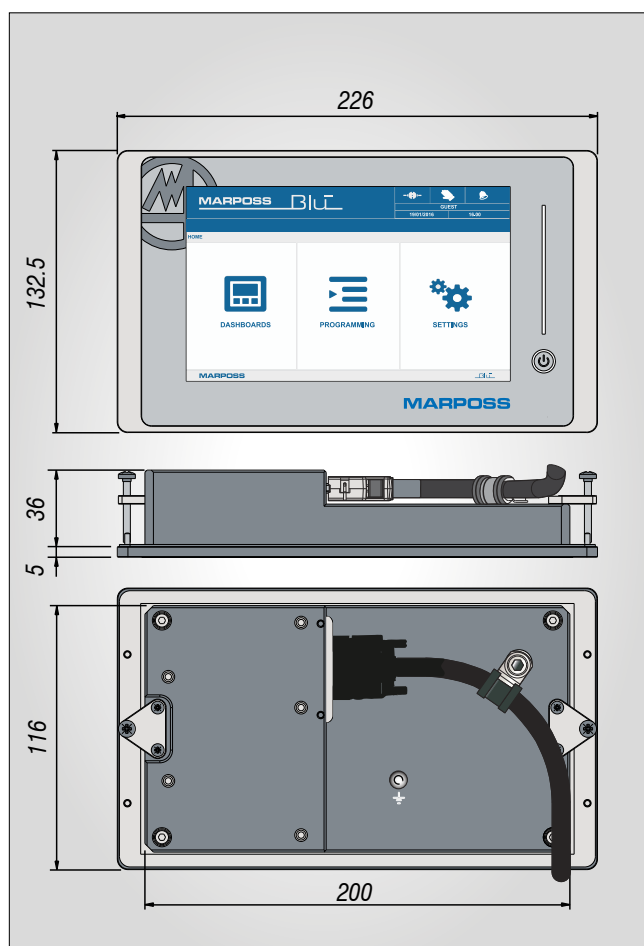
The node is manufactured in stainless steel and is designed to be positioned inside the machine working area (Wet Area).



PROTECTION RATING (IEC 60259)	IP66, IP67
OPERATING TEMPERATURE RANGE	5/55 °C
STORAGE TEMPERATURE RANGE	-20/70 °C

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 (IEC 60259)	IP66, IP67
DISTANCE FROM ACTUATOR	15 m max
OPERATING TEMPERATURE RANGE	5/50 °C (dry area)
MAXIMUM CABLE LENGTH	6 m

BLÚ HMI

The BLÚ System features an extremely flexible user interface (BLÚ HMI).

BLÚ HI 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.



Software Cycles

Generate the signals and information necessary for checking and optimising working cycles in the machine.

Production and machine conditions are monitored.

Intuitive programming allows effective management of the parameters necessary for the main functions which are MEASUREMENT, ACOUSTIC EMISSION and GRINDING WHEEL BALANCING.

MEASUREMENT (ME)

Part dimension check, which can be performed either during (in-process) or before/after (pre /post-process) working.

Various in process cycles are available for measuring:

- positions (in "active/continuous" or "passive/one-shot" mode)
- internal and external diameters
- lengths

particular parts such as: cams, cam diameters, three-lobed parts

The measurements are usually taken by comparing with the reference master, but it is possible to manage "absolute measurement" heads which do not require the presence of a reference master

The same cycles may also be performed with "large range" measurement heads.

All of the cycles can be performed both on parts with continuous and interrupted surfaces.

Processing is possible for checking taper, ovality and adaptive cycles which indicate, at programmable intervals, the quantity of material removed.

There are also cycles for post-process and pre-process measurement such as T.I.R. and correction, compensation, coupling measurements.

ACOUSTIC EMISSION (AE)

A check run using ultrasound sensors for monitoring working cycles and machine conditions.

Cycles available:

- "Gap" - for determining contact between the grinding wheel and part, or grinding wheel and dressing wheel.
- "Crash" - for an immediate stop of moving parts in the event of a collision.
- "Monitoring" - for continuously checking working/dressing cycles.

GRINDING WHEEL BALANCING (WB)

Necessary both to guarantee the quality of parts produced and protection of machine parts.

Cycles available:

- Manual balancing/Pre-Balancing in single and double plane
- Automatic balancing in single and double plane

Manual balancing is performed using weights placed by the operator during interaction with the machine cycle.

Automatic balancing uses electro-actuated heads controlled by the system to automatically compensate for imbalances generated by rotating parts, without any interruption of productivity.

The new "deterministic balancing" cycles guarantee unparalleled performance.

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: IP66, IP67 (IEC 60259)
Maximum total network length: 100 m
Maximum length of single stretch: 30 m

SPRING CONECTOR

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.

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: IP66, 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: IP66 (IEC 60259)



BULKHEAD FOR 24 V



Bulkhead connector for 24 V power supply cable

Area: WET/DRY

Protection rating: IP66, IP67 (IEC 60259)

BULKHEAD FOR MMSB BUS

Bulkhead connector for MMSB Bus cable

Area: WET/DRY

Protection rating: IP66, IP67 (IEC 60259)



COUPLING CLAMP



Device used to secure the MMSB cable to the function node

Area: WET

One clamp per connection



www.marposs.com

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

D6104500G0 - Edition 11/2019 - Specifications are subject to modifications
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