



Force Measurement Products

Millmate Strip Scanner Systems

Reliable solutions for your strip position
and width measurement

Power and productivity
for a better world™



Millmate Strip Scanner Systems

Imagine a position sensor with outstanding dependability

Among the most important parameters to measure in a rolling mill are the position and the width of the strip. If these are accurately determined, the strip can be guided in a correct and consistent lateral position in the mill and the roll actuators can be adjusted to reach the targeted flatness. Furthermore, edge trimming can be reduced to a minimum, and strip breakage due to over-stressed edges can be eliminated.

Millmate Strip Scanner systems (MSS) are widely used to measure strip edge position, off-center and strip width in rolling mills as well as in processing lines.

System overview

The MSS system is based on the PEC (Pulsed Eddy Current) technology, which uses weak magnetic fields for the measurement. This makes the sensor completely insensitive to anything in the measuring zone except the metal strip. The MSS System will therefore produce accurate position measurement unaffected by coolant, dirt, steam, air temperature variations etc.

Increased mill uptime

In a production process running 24 hours a day, every minute of production time is precious. Even so, no production line runs without downtime. Threading of a new strip into the mill can be time consuming as the lateral position must be very accurate to achieve the required quality. With Millmate Strip Scanner the threading time can be reduced to a minimum, thus leaving as much time as possible for real production.

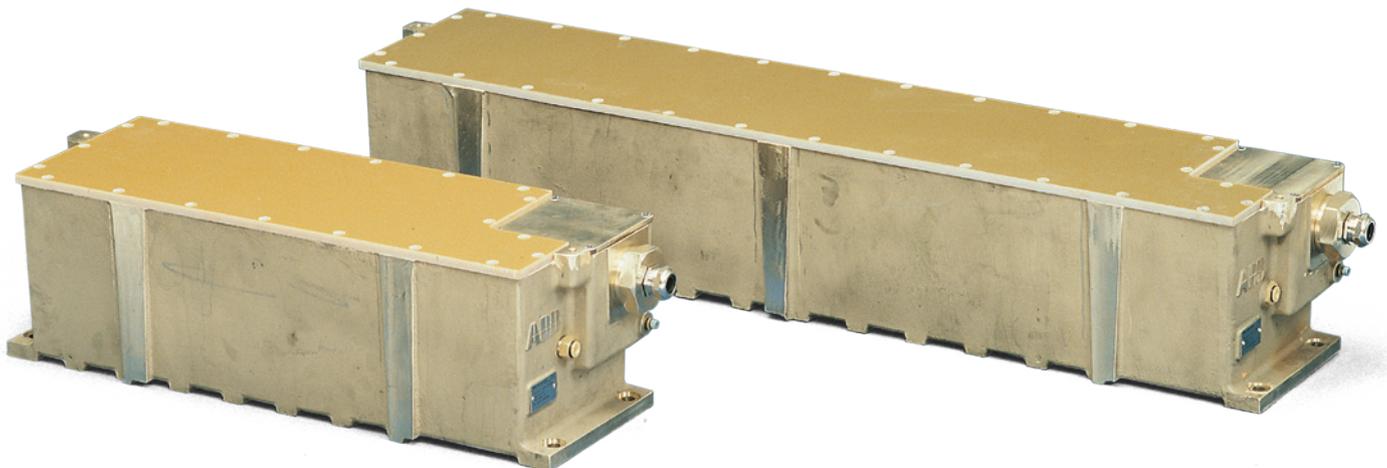
Furthermore, thanks to its robust design, the MSS works consistently without any need for maintenance of delicate equipment such as cleaning of optics.

Better positioning in the mill

With MSS Off-Center measurement your guiding equipment can rely on accurate data at all times. As the sensor is unaffected by mill environment, the measurement is extremely stable, even during the worst conditions. Mill coolant, steam, heat and dust do not affect the measurement. This makes it possible to e.g. recoil without imperfections such as telescoping.

Minimized edge trimming

A non-trimmed strip from a hot mill has a varying width that can be in the order of magnitude of 25 mm, with the wider part in the beginning and in the end of the strip. The strip edges need to be cut to create a uniform strip, but economy requires that the scrap is minimized. MSS supplies an accurate strip width measurement, and thus the minimum required edge trimming can be determined.





Tighter flatness tolerances

With an accurately determined strip position, your flatness system can measure and control the strip flatness along the whole cross section of the strip, even at the very edges. This leads to better flatness control, tighter strip tolerances and less scrap. With MSS you can trust your flatness values all the way to the edges.

Less strip breaks

Even with a rather small unknown lateral displacement, the actual strip deformation may differ from the target, especially at the edges. This can result in over-stressed strip edges that easily introduce cracks and thus strip breaks. With MSS the guiding system can center the strip position accurately, and the number of strip breaks will be reduced or even eliminated.

Negligible cost for maintenance

Share the experience of a virtually maintenance free sensor with a large number of MSS users. A robust sensor design without fragile and ageing components makes this possible. No sensitive optical components or delicate precision mechanics that needs to be tended to.

Short payback time

Each application has potential for process improvement – leading to cost reduction and increased earnings.

Add up your existing costs for mill downtime, non-conforming material, maintenance, spare parts and calibration. Calculate the earnings you will get with MSS. You will find that MSS offers you a short and competitive payback time.

The measurement is independent of material and pass-line variations and will stay accurate, stable and reliable – year after year.

Unlike other sensors

Independent of the mill environment, material properties and operator and maintenance procedures



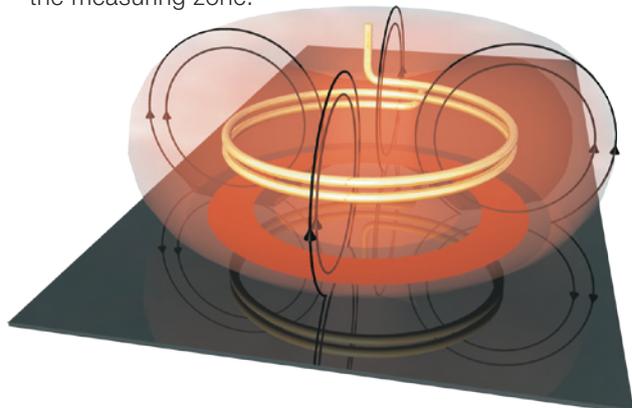
The Basic version of a Millmate Strip Scanner System comprises a pair of edge sensors (PMSG 123-A or PMSG 125-A) suitable for the measuring range together with a control unit Millmate Controller 400, including a Millmate Operator Unit 400 and an interface unit PMSA 122. Cables between interface unit and control unit and between interface unit and edge sensors are also included. The control unit can be installed in a floor-standing cabinet or a wall cabinet.

Millmate Strip Scanner in rolling mills with flatness measurement

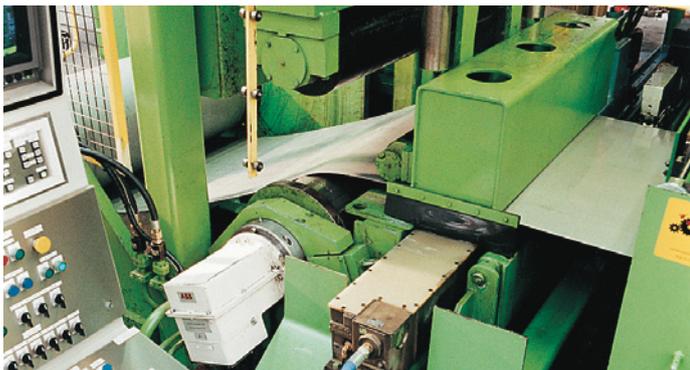
A Stressometer® Flatness Measurement Roll measures the edge stress even with a small coverage of the force sensor at the strip edge. The output from the force sensor at the edge zone is a completely linear function of the strip coverage (edge position) of the zone. A zone covered with as little as 1 - 5 mm can be compensated with high accuracy with the MSS strip edge position measurement system.

Pulsed Eddy Current (PEC) technology

The Millmate Strip Scanner is based on the PEC technology, which uses magnetic fields for measurement of the strip position. The interaction between an applied magnetic field and the electrically conductive strip indicates the position – without influence from the material composition or conditions in the measuring zone.



A Strip Scanner Edge Sensor mounted together with a Stressometer® Flatness Measurement Roll gives perfect control of edge flatness.



Reference installations

We have done it before!

The fundamental requirements for measuring strip edge position with the Millmate Strip Scanner System is that the edge sensor should be positioned so that the edge of the strip runs over the active measuring area of the edge sensor. One edge sensor is required for each strip edge. The sensor is mounted in the cross line of the strip and ideally, the top of the sensor should be parallel to the surface of the strip.



Based on experience there is minimum maintenance and hardly any stoppages even in harsh rolling mill environments. A simple installation in a strip guide table gives more than ample protection.



Even mounted in the exit of the mill housing, there is no influence on the measurement from oil, dirt, steam or washing coolants.



Customer feedback

Mr Lars Westerholm, Outokumpu Långshyttan, Sweden comments: "The MSS-sensors have been running perfectly for many years in operation. We are very satisfied with the performance of the Millmate Strip Scanner systems."

Best measurement results

An outstanding measurement result will be obtained if the following points are borne in mind when installing the system:

- no metal objects in the zone immediately above the edge sensor other than the strip itself
- edge sensor to be protected from severe impacts from the end of the strip
- strip to pass close to the edge sensor at smallest possible distance, 20 - 40 mm recommended



The Millmate Strip Scanner System offers flexible solutions. Here the Edge Sensors are mounted upside down with connections from the bottom to achieve the best possible measurement results. The measurement is used for Center Position Control (CPC) in a continuous stainless steel mill.

Edge Sensor

With opportunities you didn't know existed

The Millmate Strip Scanner Edge Sensor is a brilliant solution to the problem of determining strip edge position during the rolling and post-treatment of metal strip. Satisfactory measurement and control of the edge position can lead to a significant improvement in production economy

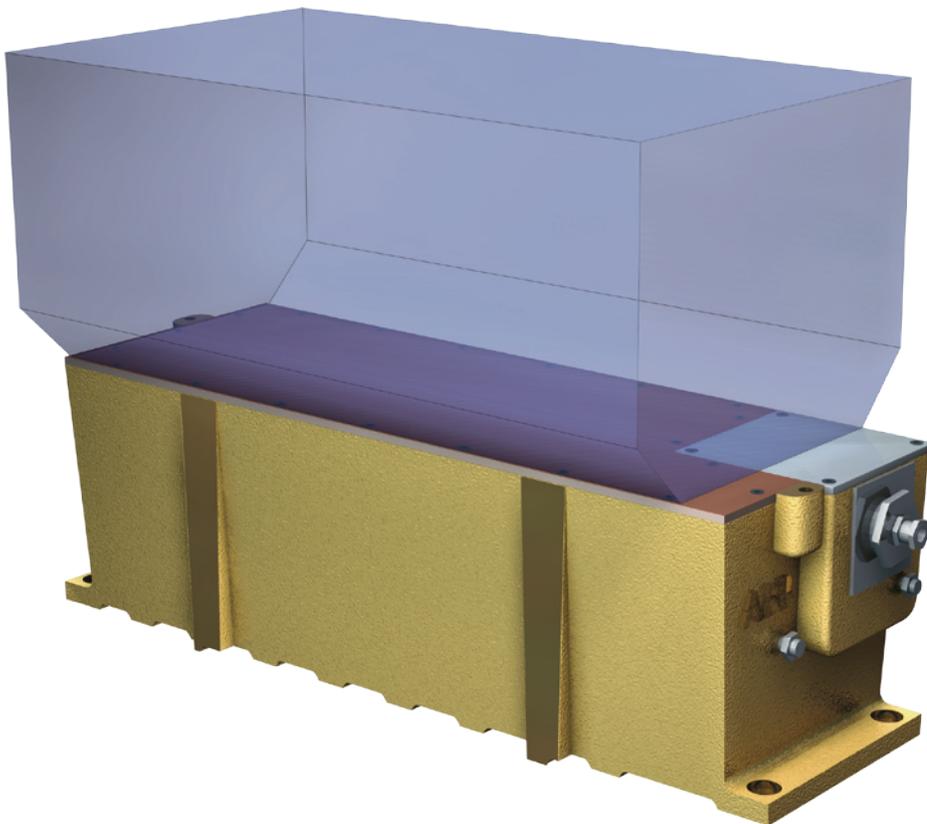
Metal-free zone above edge sensor

There must be a metal-free zone above the edge sensor. Of course, this does not apply to the strip itself, which should run close to the edge sensor. For full accuracy at maximum measurement distance there must not be any metal objects in the metal-free zone.

The Millmate Strip Scanner Edge Sensor is a complete unit, encased in corrosion-resistant bronze. In the edge sensor there are a number of electrical coils and certain circuits for signal processing. The interior of the edge sensor is well protected by the rugged case and tight-fitting cover. The sensor can easily withstand dirt, liquids and a corrosive environment. Measurement is not influenced in any way by mill coolants. The immunity means that the edge sensor can be placed very close to or even inside the mill stand. However, there must be a metal-free zone above the edge sensor.

Air pressure for guaranteed sealing

Sealing of the edge sensor is further guaranteed by an over pressure, achieved by connecting a regulator to a standard industrial air supply, between 2 - 16 bar. The over pressure is reduced to 0.5 bar by the regulator, which contains an extra filter. The air consumption is about 1 dm³/s for each edge sensor.



Connection cable

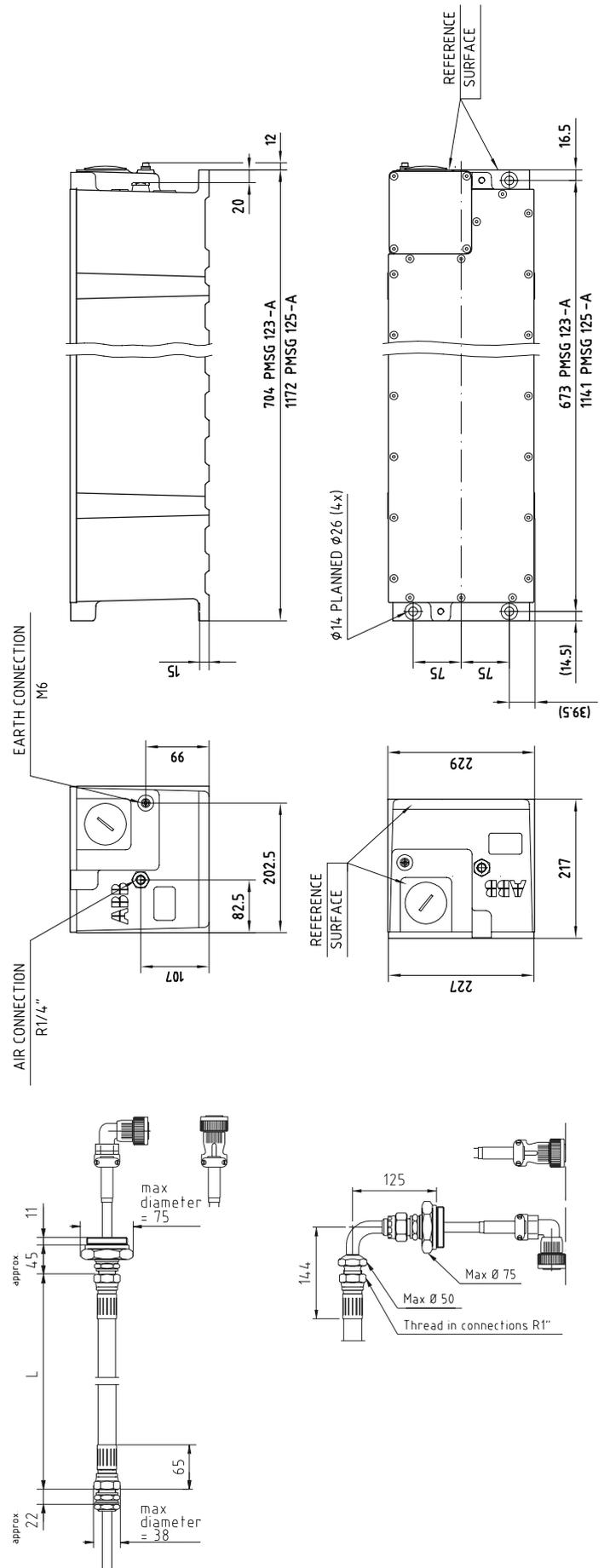
The connection cables are used to get a mill-proof connection between the edge sensors and the interface unit. Standard and kerosene-resistant versions are available. The cables are pre-assembled for one of three connection directions to the edge sensor.

The cable connector is protected in a separate compartment in the edge sensor. Together with the cable protection hose the result is a rugged and well proven solution.

Data

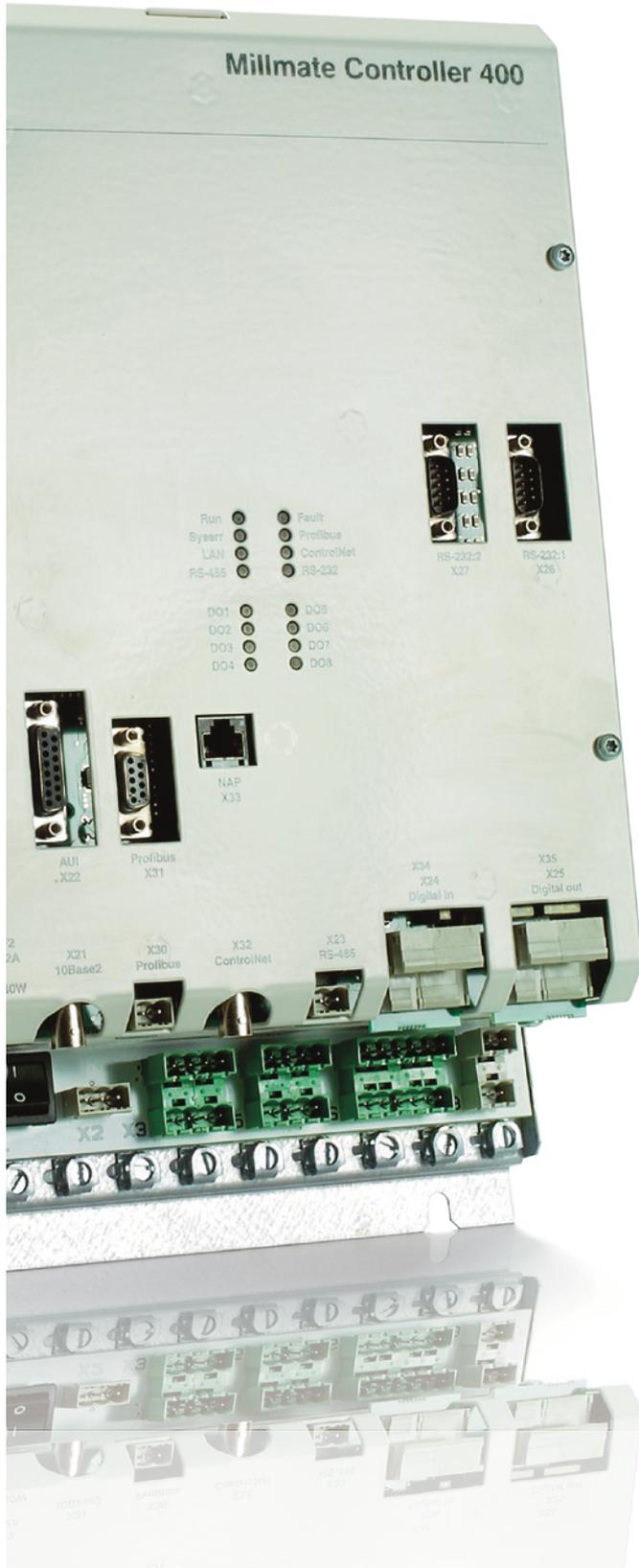
Edge sensor			
Strip thickness range	Aluminium	0.005 - 20 mm	
	Steel	0.1 - 20 mm	
	Stainless steel	0.3 - 20 mm	
Strip width	300 (200) - 3200 mm		
Edge position variations	PMSG 123-A	350 mm	
	PMSG 125-A	820 mm	
Measuring distance	0 - 50 mm		
Inaccuracy at	10 - 40 mm	0 - 10 mm	
		40 - 50 mm	
	Off-center	±0.5 mm	±1 mm
	Edge position	±0.5 mm	±1 mm
Weight	PMSG 123-A	50 kg	
	PMSG 125-A	75 kg	
Operation temperature	+5 - +70°C		
Protection	IP 65		
Measurement start time	300 ms at strip head		
Measurement time constant	$\tau \geq 10$ ms (selectable)		
Air consumption	1 dm ³ /s at 0.5 bar		

Connection cable	
Dimensions (Ø)	29 mm
Min. bending radius	120 mm
Length	max. 20 m
Weight	1 kg/m



Control Unit

Millmate Controller 400



The control unit communicates with the edge sensors, processes the measurement values and communicates the result to other systems. Communication can take place via digital inputs/outputs, analog inputs/outputs, TCP/IP-communication, RS-232 and as an option, via high-speed fieldbus.

The control unit can be manually operated using the Millmate Operator Unit 400 and by external units via a serial interface or digital/analog inputs. Setup and commissioning are easy following step-by-step menus.

Measured values are displayed on the operator unit, connected to analog outputs or transmitted via a serial interface to an external display or to other external units.

Features

The Millmate Controller 400 has been designed to offer a lot of functionalities and at the same time very easy to use.

The control unit covers all edge sensor installation possibilities. This means the user only has to follow the step-by-step menus in order to set up the control unit and to have correct strip edge, center position and width calculated.

Some examples of the built-in functionalities:

- Calculates true strip position and width in relation to the mill
- Filter times from 10 ms
- Easy configurable analog/digital inputs/outputs
- Digital edge position level detectors
- Digital min. and max. width level detectors
- Unit selection (mm, inch)
- Self-diagnostics test system including continuous edge sensor test
- Simulation mode for easy check of system integration

Data

External connections

- 2 analog inputs for nominal thickness and nominal width setup
- 4 analog outputs, voltage or current
- 8 digital inputs for control signals
- 8 digital outputs
- +24 V supply for external units, max 0.5 A
- Ethernet for connection to:
 - other Millmate control and operator unit
 - other control systems with VIP protocol
- 2 serial interfaces of type RS-232 for external displays, control, etc.
- High-speed fieldbus (optional)

Vendor Internet Protocol (VIP)

Other control systems can send control data and monitor measurement data with TCP/IP-communication. The Ethernet connection together with the Vendor Internet Protocol (VIP) is used for communication. The protocol uses configurable pre-defined data telegrams and the Millmate Controller 400 acts as a server. The sending procedure is cyclic and the receiving procedure reacts on incoming messages.

The PROFIBUS option

As an option the control unit can be equipped with PROFIBUS – a vendor-independent, open communication standard for automation in manufacturing and process control.

The Profibus interface in the Millmate Controller 400 is updated with a new complete set of measuring values every 12 milliseconds.

Millmate Controller 400		
Type	PFXA 401	
Dimensions (HxWxD)	380 x 235 x 90 mm	
Weight	5 kg	
Protection class	IP 20	
Main voltage	85 - 264 V	
Power consumption	140 VA	
Operating Temperature	0 - +70°C	
Storage temperature	-40 - +70°C	
Analog inputs	0 - 10 V, ± 10 V differential inputs	
Analog outputs	Voltage	0 - ± 10 V
	Current	0 - ± 20 mA, 4 - 20 mA insulated as group
	Step response	20 ms (0 - 90%)
Digital inputs	0/+24 V insulated 4 + 4	
Digital outputs	0/+24 V insulated 4 + 4	

VIP	
Network	10 Mbit/s Ethernet
Communication rate	10 messages/sec
Error handling	Automatic retransmission

Profibus-DP	
Station type	Slave
Max. speed	12 Mbit/s
Configuration	Printable GSD-file in control unit



Millmate Operator Unit 400

The Millmate Operator Unit 400 provides communication with the control unit and is designed for panel mounting.

The operator unit(s) and control unit(s) are interconnected on a common network. This common network can be a separate network for measuring objects or it can be part of a local area network (LAN).

The communication on the network is in accordance with the IEEE 802.3 standard and uses TCP/IP protocol.

Dimensions (H x W x D) 160 x 235 x 60 mm, IP 65 from the front when mounted on a panel acc. to IEC 529, EN 60-529, IP 20 in all other directions acc. IEC 529, EN 60-529, weight 1.3 kg



Interface Unit PMSA 122

The interface unit has a power supply for one pair of edge sensors and a modem with galvanic insulation for the communication between the control unit and the edge sensors.



Air regulator

The air regulator has double filters. The air from the unit is used in the edge sensor to ensure the sealing.



Insulation amplifier PXUB 201

The insulation amplifier can be used when improved electrical insulation is required.

Installation options

Wall cabinet

A control unit can be installed in the dust- and hose-proof wall cabinet. The operator unit can be mounted on the inside of the door or through the door.



Floor cabinet

The MNS floor cabinet can contain a combination of control units with Roll Force, Strip Tensiometer and Strip Scanner applications. They can be operated by one operator unit, optionally mounted through the door or inside the cabinet.



Relay board PFVK 128

Fitted with four relays with one changeover function per relay.



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3BSE035914R0101 Print: Edita Västra Aros, Västerås 2008-09