NELES® INTELLIGENT VALVE CONTROLLER, SERIES NDX

Metso's Neles NDX is the next generation intelligent valve controller working on all single acting control valves and in all industry areas. It guarantees end product quality in all operating conditions with incomparable performance, unique diagnostics, and years of reliable service. The NDX is a future-proof investment with life-time support for asset management.

Total cost of ownership

- ☐ Fast and reliable installation process
- ☐ Low energy and air consumption
- ☐ Easy to use diagnostics simplify determining when valve maintenance is required
- ☐ Inherent high air capacity eliminates additional instrumentation
- ☐ One positioner that fits to small and big valves, rotary and linear:

Key features

- ☐ Reliable and robust design
- ☐ Industry leading pneumatic capacity
- ☐ Benchmark control performance
- ☐ Simple and fastest installation and commissioning
- ☐ Local / remote operation
- ☐ Wide language support
- ☐ Expandable architecture
- ☐ HART 6/7 communication as standard
- ☐ Diagnostics available in every unit
- ☐ Self-diagnostics
- ☐ Online diagnostics
- ☐ Communication diagnostics
- ☐ Extended off-line test capabilities
- ☐ Worldwide support for hazardous area approvals

Options

- ☐ Internal position transmitter
- ☐ Gauge block

Minimized process variability

- ☐ Linearization of the valve flow characteristics
- ☐ Excellent dynamic and static control performance
- ☐ Fast response to control signal change
- ☐ Accurate internal measurements

Easy installation and configuration

- ☐ Simple / fast configuration and calibration using one of the following:
  - ☐ Standard Local User Interface (LUI) assessable without opening the device cover
  - ☐ LUI can be rotated according to mounting position
  - ☐ Distributed Control System (DCS) asset management program
- ☐ Backwards compatible with retrofit kits for easy replacement of Metso NE700 and ND9000 positioners.
- ☐ Easy retro-fit to an extensive list of 3rd party control valves
- ☐ Installation to all common control systems

Open solution

- ☐ Metso is committed to delivering products that freely interface with software and hardware from a variety of manufacturers; NDX is no exception. This open architecture allows the NDX to be integrated with other field devices to give an unprecedented level of controllability.
- ☐ FDT and EDD based multi-vendor support configuration
- ☐ Support files for NDX are available from, www.metso.com/NDX

metso
Expect results

NDX mounting on actuators and valves

- ☐ Supports all single acting actuators
- ☐ Both rotary and linear valves
- ☐ Guided startup and automatic/manual calibration
- ☐ 1-point calibration feature enables mounting without disturbing the process

Product reliability

- ☐ Designed to operate in harsh environmental conditions
- ☐ Rugged modular design
- ☐ Excellent temperature characteristics
- ☐ Vibration and impact tolerant
- ☐ IP66 enclosure
- ☐ Protected against humidity
- ☐ Resistant to dirty air
- ☐ Wear resistant and sealed components
- ☐ Fully contactless position measurement

Predictive maintenance

- ☐ Easy access to collected data with FieldCare or any FDT/DTM software and drivers
- ☐ Intelligent diagnostics analysis to visualize control valve health and performance
- ☐ Patented on-line valve signature
- ☐ Logical trend and histogram collection
- ☐ Diagnostics collected continuously while the process is running
- ☐ Extensive set of off-line tests with accurate key figure calculations
- ☐ Clear notifications with on-line alarms
- ☐ Condition monitoring tools available

TECHNICAL DESCRIPTION

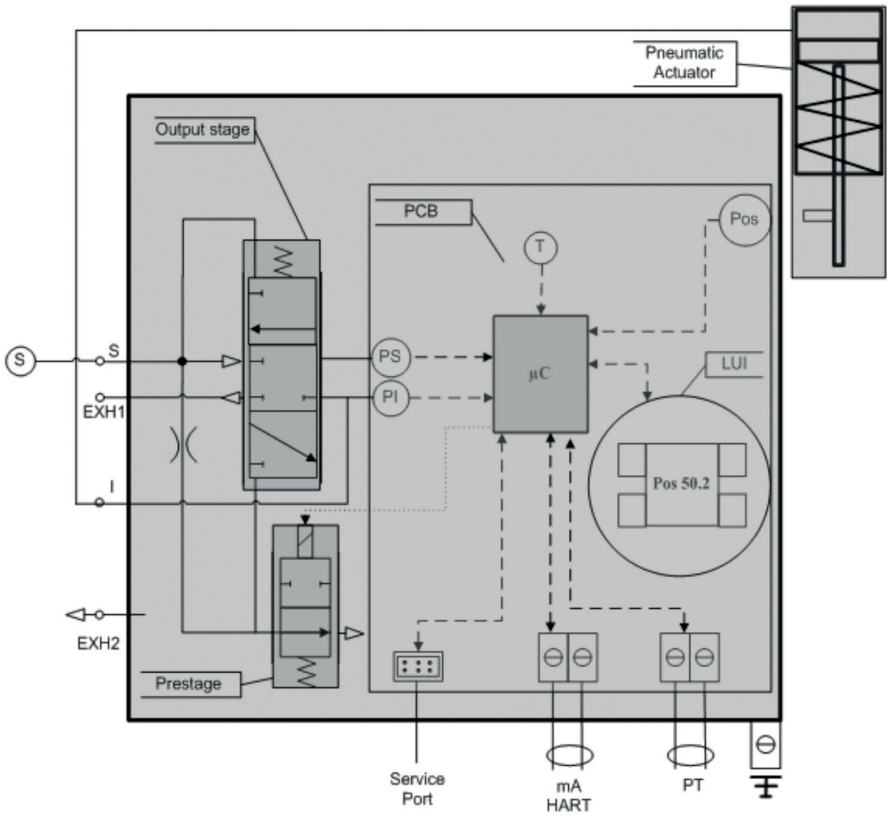
The NDX is a 4–20 mA powered microcontroller based intelligent valve controller. The device contains a local user interface enabling configuration and operation without opening the device cover. Configuration and operation can also be made remotely by PC with asset management software connected to the control loop.

After connections of electric signal and pneumatic supply, the micro controller continuously reads measurements:

- ☐ Input signal
- ☐ Valve position with contactless sensor
- ☐ Actuator pressure
- ☐ Supply pressure
- ☐ Device temperature

Advanced self-diagnostics guarantee that all measurements operate correctly.

Powerful microcontroller calculates a control signal for I/P converter. I/P converter controls the operating pressure to the pneumatic relay. Pneumatic relay moves and actuator pressures change accordingly. The changing actuator pressure moves the control valve. The position sensor measures the valve movement. The control algorithm modulates the I/P converter control signal until the control valve position is according to the input signal.



TECHNICAL SPECIFICATIONS
NDX INTELLIGENT VALVE CONTROLLER

General

Loop powered, no external power supply required.

Suitable for linear and rotary valves. Actuator connections in accordance with VDI/VDE 3845 and IEC 60534-6 standards.

Action:	Single acting, direct or reverse
Travel range:	Linear; 5...120 mm / 0.2...4.7 in Rotary; 30...160 degrees.

Environmental influence

Standard temperature range:
-40° to +85 °C / -40° to +185 °F

Influence of temperature on valve position:
Rotary, 0.5 % /10 °C
Linear, 0.1 mm /10 °C

Temperature cycling/Dry heat:
IEC 60068-2-2

Humidity limits: According to IEC 60068-2-30

Influence of vibration on valve position:
< 1 % under 2g 5–150 Hz,
1g 150–300 Hz, 0.5g 300–2000 Hz

Magnetic fields: Negligible at 30 A/m (IEC 61000-4-8)

Electromagnetic protection

Emission acc. to IEC 61000-6-4

Immunity acc. to EN 61000-6-2

Enclosure

Housing material:	Epoxy coated anodized aluminum alloy, EN1706 AC - AlSi12 (b), copper free, Cu content max 0.4 %
Cover material:	Polycarbonate, Lexan EXL1434 + Lexan 943A
Magnet holder:	Glass fiber reinforced polyamide, PA66GF20
Protection class:	IP66, NEMA 4X IP67 for storage and transport
Pneumatic ports	
Supply air:	1/4 NPT, G1/4 with gauge block
Actuator:	1/4 NPT, G1/4 with gauge block
Exhausts:	2 pcs. 3/8 NPT, G3/8 with gauge block
Cable entry:	2 pcs. 1/2" NPT (M20 with adapter)
Weight:	1.9 kg / 4.1 lbs

Pneumatics

Supply pressure:	1.4–8 bar / 20–116 psi
Supply media:	Air, Nitrogen

Effect of supply pressure on valve position:
< 0.1 % at 10 % difference in inlet pressure

Air quality:	Acc. to ISO 8573-1
Solid particles:	Class 7 (40 µm filtration)
Humidity:	Class 1 (at minimum dew point 10 °C/ 18 °F below minimum temperature is required)
Oil class:	3 (or < 1 ppm)
Air capacity[1]:	80 Nm^3 /h / 47.1 scfm

Air consumption in steady state position:
< 0.1 Nm^3/h / 0.06 scfm

[1] rated at 4 bar / 60 PSI supply pressure

Electronics

HART	Protocol rev. 6 / 7
Supply power:	Loop powered, 4–20 mA
Min. control signal:	3.8 mA
Current max:	120 mA
Load voltage:	9.7 VDC at 20 mA 9.0 VDC at 4 mA
Impedance at 20mA:	485 Ω
Maximum voltage:	30 VDC
Rev. polarity protection:	-30 VDC
Over current protection:	active over 35 mA
Wire size:	2.5/0.5 mm2 (14/20 awg)

Performance with moderate constant-load actuators in ambient temperature[2]

Dead band:	≤ 0.2 %
Hysteresis:	< 0.5 %
Linearity error:	< 0.5 %
Repeatability:	< 0.2 %

[2]Tests according to IEC61514

Local User Interface (LUI) functions

Accessible with the cover installed.

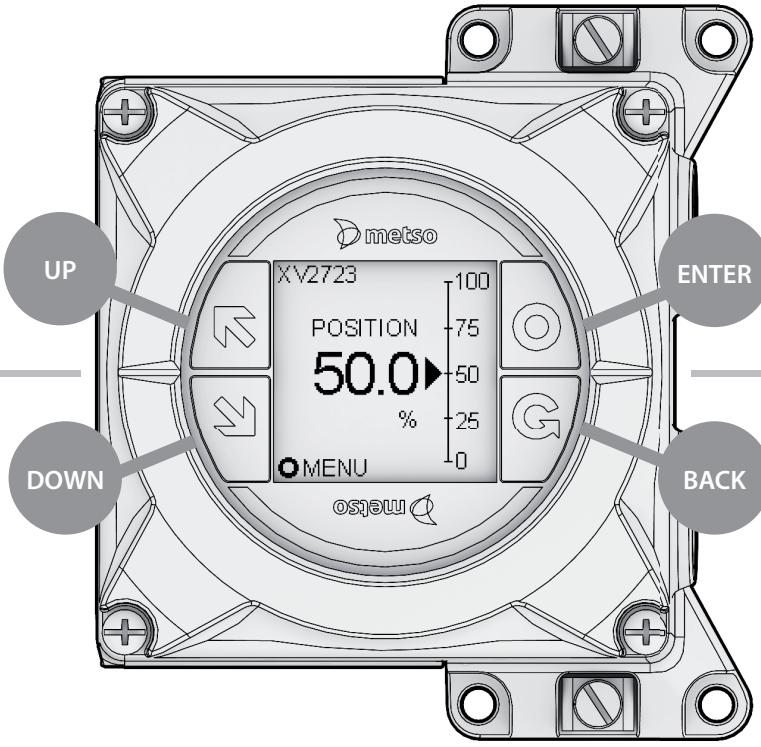
- ☐ PIN code lock to prevent unauthorized / unintended access with the cover installed or permanently (if configured).
- ☐ Guided-startup wizard
- ☐ Language selection; English, Chinese
- ☐ Calibration: Automatic / Manual / 1-point
- ☐ 3-point measurement linearization
- ☐ Configuration of the control valve
  - ☐ Actuator type & valve type
  - ☐ Valve dead angle
  - ☐ Safety cut-off range
  - ☐ Input signal direction
  - ☐ Positioner fail action
- ☐ Monitoring of valve position, target position, input signal, temperature, supply and actuator pressure
- ☐ Manual control of the valve from Local User Interface

Position transmitter (optional)

Output signal:	4–20 mA (galvanic isolation; 600 VDC)
Supply voltage:	12–30 VDC
Linearity:	< 0.05 % FS
Temperature effect:	< 0.35 % FS
Failsafe output:	3.5 mA or 22.5mA
Maximum external load:	690 Ω for I.S.
Ex ia IIC T6	Ui ≤ 28 V

LOCAL USER INTERFACE

The NDX Local User Interface (LUI) includes 4 capacitive touch buttons:



Move within menus & change values

Enter menu & select / accept value to change

Cancel actions & return up one level

NOTE
Buttons can be used with the cover installed or removed.

NOTE
When installing the cover make sure that the cover button symbols are at the same position as the symbols on the LUI module inside the device.

User LUI access can be restricted to guarantee safe and secure process operation. Any user is always able to see all LUI information without restrictions (read only mode), but modification of settings or activating any local command or function can be restricted.

Fig. 1. Local User Interface (LUI) enables easy parameterization and calibration without opening device cover. It also gives real time awareness of control parameters in the device at a glance.

APPROVALS AND ELECTRICAL VALUES

Approval: NDX1510_G-X__N0000	EC Type examination	Electrical values
II 1 G Ex ia IIC T6...T4 Ga II 1 D Ex ia IIIC T85 °C...T115 °C Da	VTT 15 ATEX 030X EN 60079-0:2012, EN 60079-11:2012	Input: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH. Output: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH, external load resistance 0–690 Ω
II 2 G Ex ib IIC T6...T4 Gb II 2 D Ex ib IIIC T85 °C...T115 °C Db		
II 3 G Ex nA IIC T6...T4 Gc (pending) II 3 G Ex ic IIC T6...T4 Gc II 3 D Ex ic IIIC T85 °C...T115 °C Dc	VTT 15 ATEX 031X EN 60079-0:2012, EN 60079-11:2012	Input: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH. Output: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH, external load resistance 0–690 Ω
Ex ia IIC T6...T4 Ga Ex ia IIIC T85 °C...T115 °C Da	IECEx VTT 15.0010X IEC 60079-0: 2011 IEC 60079-11: 2011	Input: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH. Output: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH, external load resistance 0–690 Ω
Ex ib IIC T6...T4 Gb Ex ib IIIC T85 °C...T115 °C Db		
Ex nA IIC T6...T4 Gc (pending) Ex ic IIC T6...T4 Gc Ex ic IIIC T85 °C...T115 °C Dc	IECEx VTT 15.0011X IEC 60079-0: 2011 IEC 60079-11: 2011	Input: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH. Output: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH, external load resistance 0–690 Ω

Approval: NDX1510_G-U__N0000	CSA certificate number	Electrical values
Class I, Division 1, Groups A, B, C, and D; T4/T5/T6 Ex ia IIC T4/T5/T6 Ga Class I, Zone 0 AEx ia IIC T4/T5/T6 Ga	70030683	Input: Ui ≤ 28V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 nF Output: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 100 µH, external load resistance 0–690 Ω

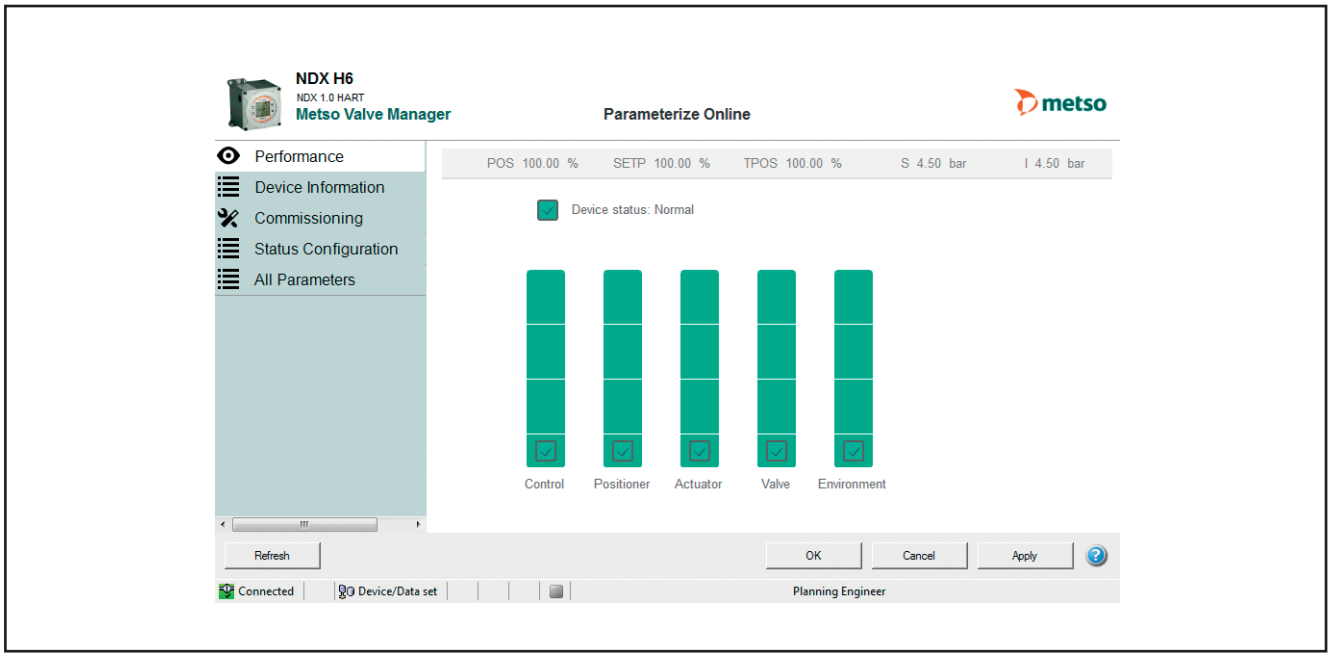
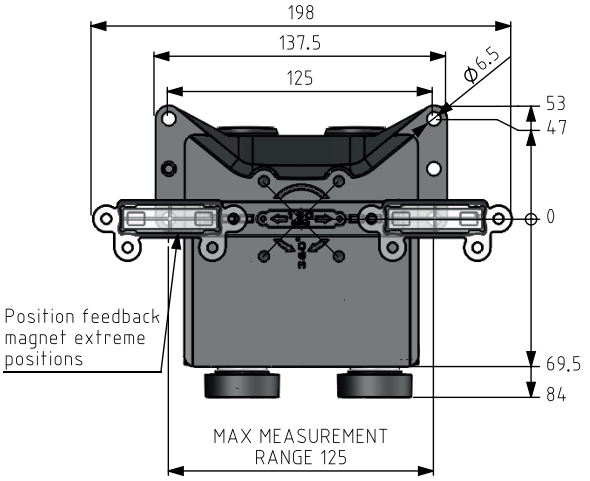


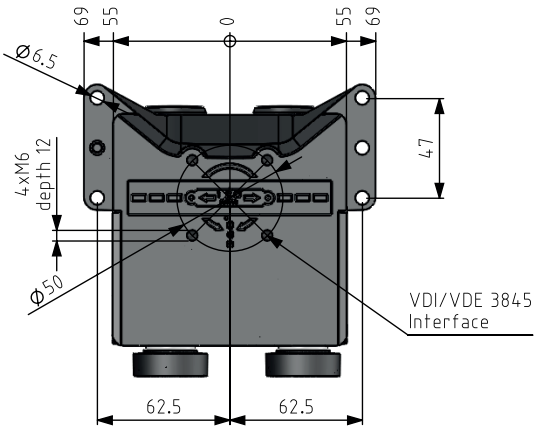
Fig. 2. The Performance View of the Metso Valve Manager graphically displays indexes of the valve, actuator and positioner, as well as indexes of control performance and the application environment. Report will show explanations of the status of each component and guidelines for recommended actions.

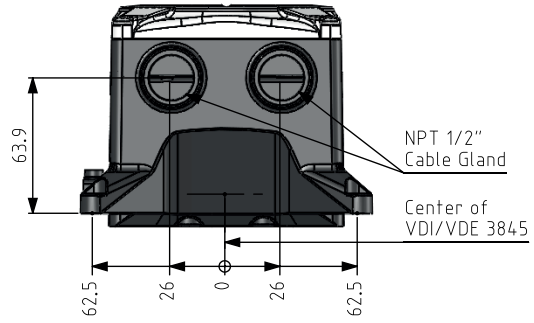
DIMENSIONS

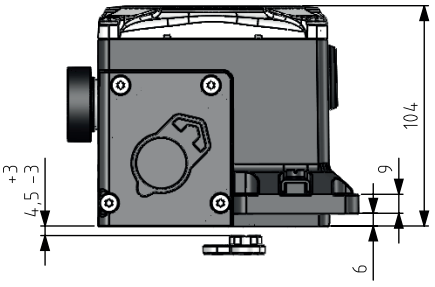
LINEAR APPLICATION

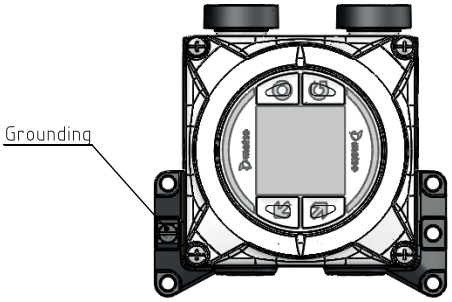


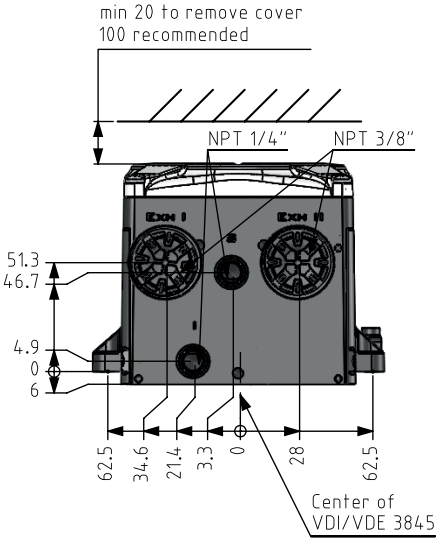
ROTARY APPLICATION



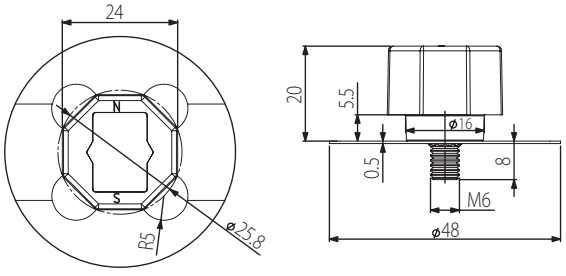




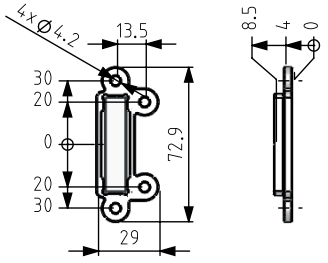




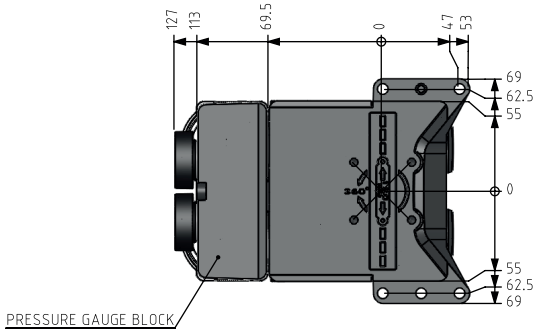
POSITION FEEDBACK MAGNET FOR ROTARY ACTUATORS

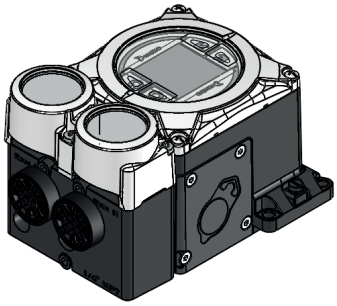


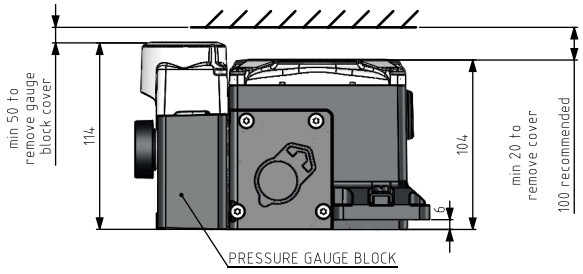
POSITION FEEDBACK MAGNET FOR LINEAR ACTUATORS

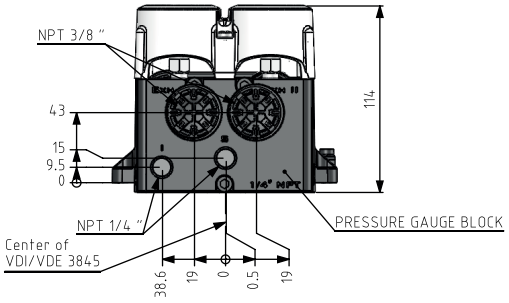


Gauge block module









HOW TO ORDER
INTELLIGENT VALVE CONTROLLER NDX

1																**PRODUCT GROUP**
NDX																Neles Intelligent Valve Controller Series NDX
	2															**PNEUMATIC ACTION**
	1															Single Acting
		3														**PNEUMATIC CAPACITY**
		5														Normal Capacity (80 Nm^3/h)
			4													**FAIL ACTION**
			1													Fail safe
				5												**ENCLOSURE**
				0												Compact - Aluminum with Composite Cover
					6											**COMMUNICATION / INPUT SIGNAL RANGE**
					H											HART / 4-20 mA
					T											HART / 4-20 mA and 4-20 mA Position Transmitter
						7										**TEMPERATURE RANGE**
						G										General: -40 ... +85 °C
								9								**GLOBAL APPROVALS FOR HAZARDOUS AREAS**
								N								No approval
								X								IEC/ATEX (Ex i)
									10							**LOCAL APPROVALS FOR HAZARDOUS AREAS**
									0							No approval
									U							cCSAus (Ex i)
										11						**PNEUMATIC CONNECTIONS & GAUGES**
										0						1/4 NPT without gauges (no block, no gauges)
										1						1/4 NPT with gauges (block with 1/4NPT threads + gauges)
										2						G1/4 without gauges (block with G1/4 threads)
										3						G1/4 with gauges (block with G1/4 threads + gauges)
NDX	**1**	**5**	**1**	**0**	**H**	**G**	**-**	**X**	**0**	**1**	**N**	**0**	**0**	**0**	**0**	**SAMPLE MODEL CODE (char = 16)**
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

Subject to change without prior notice.

Metso Flow Control Inc.
Europe, Vanha Porvoontie 229, P.O. Box 304, FI-01301 VANTAA, Finland.
Tel. +358 20 483 150. Fax +358 20 483 151

North America, 44 Bowditch Drive, P.O. Box 8044, Shrewsbury, MA 01545, USA.
Tel. +1 508 852 0200. Fax +1 508 852 8172

South America, Av. Independéncia, 2500- Iporanga, 18087-101, Sorocaba-São Paulo, Brazil.
Tel. +55 15 2102 9700. Fax +55 15 2102 9748/49

Asia Pacific, Haw Par Centre #06-01, 180 Clemenceau Avenue, Singapore 239922.
Tel. +65 6511 1011. Fax +65 6250 0830

China, 11/F, China Youth Plaza, No.19 North Rd of East 3rd Ring Rd, Chaoyang District,
Beijing 100020, China. Tel. +86 10 6566 6600. Fax +86 10 6566 2583.

Middle East, Roundabout 8, Unit AB-07, P.O. Box 17175, Jebel Ali Freezone, Dubai,
United Arab Emirates. Tel. +971 4 883 6974. Fax +971 4 883 6836

www.metso.com/valves