

## NELES® ND9000 INTELLIGENT VALVE CONTROLLER

Metso's Neles ND9000 is a top class intelligent valve controller designed to operate on all control valve actuators and in all industry areas. It guarantees end product quality in all operating conditions with unique diagnostics and incomparable performance features. ND9000 is a reliable and future-proof investment with Metso FieldCare™ life-time support

### KEY FEATURES

- Benchmark control performance on rotary and linear valves
- Reliable and robust design
- Easy commissioning and operation
- Safety; IEC 61508 compliant up to and including SIL 2 by TUV
- Language selection: English, German and French
- Local / remote operation
- Expandable architecture
- Advanced device diagnostics including
  - Self-diagnostics
  - Online diagnostics
  - Performance diagnostics
  - Communication diagnostics
  - Extended off-line tests
  - Performance view
  - Online Valve Signature

### Options

- Interchangeable communication options:
  - HART 6 or 7 (H)
  - FOUNDATION fieldbus
  - Profibus PA
- Limit switches
- Position transmitter (in HART only)
- Full stainless steel enclosure
- Exhaust adapter
- Remote mounting
- Arctic version (up to -53 °C / -64 °F)

### Total cost of ownership

- Low energy and air consumption
- Future proof design allows further options at a reduced cost
- Optimized spares program minimizes spare part inventory
- Retro-fit to existing installations (Neles or 3rd party valves)

### Minimized process variability

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

## HOW TO ORDER

### INTELLIGENT VALVE CONTROLLER ND9000 / LIMIT SWITCH (ND9000/D\_, ND9000/I\_, ND9000/KO\_ or ND9000/B06)

1.	2.	3.	4.	5.	6.	7.	8.	9.
ND	9	2	03	H	E1	T	/	K05

1.	PRODUCT GROUP	
ND	Intelligent Valve Controller.	
2.	SERIES CODE	
9	Series 9000 valve controller with universal shaft and attachment face according to standard VDI/VDE 3845. Relevant shaft adapter included in mounting kits. When valve controllers are separate deliveries, shaft adapter kit is supplied.	
3.	ENCLOSURE	
1	Standard IP66 / NEMA 4X enclosure.	
2	Flameproof (Ex d) IP66 / NEMA 4X enclosure.	
3	Stainless steel flameproof (Ex d) IP66 / NEMA 4X enclosure.	
4	Stainless steel IP66 / NEMA 4X enclosure, polymer composite cover	
4.	SPOOL VALVE	PNEUMATIC CONNECTIONS (S, C1, C2)
02	Low capacity. Stroke volume of actuator < 1 dm <sup>3</sup> .	G 1/4 (ND9100), 1/4 NPT (ND9200/ND9300/ND9400).
03	Medium capacity. Stroke volume of actuator 1-3 dm <sup>3</sup> .	G 1/4 (ND9100), 1/4 NPT (ND9200/ND9300/ND9400).
06	High capacity. Stroke volume of actuator > 3 dm <sup>3</sup> .	G 1/4 (ND9100), 1/4 NPT (ND9200/ND9300/ND9400).
5.	COMMUNICATION / INPUT SIGNAL RANGE	
H	4-20 mA, HART (6 and 7) communication. Supply voltage 30 V DC. Load voltage: up to 9.7 V DC at 20 mA corresponding to 485 Ω (maximum voltage drop).	
F	FOUNDATION fieldbus, physical layer according to IEC 61158-2.	
P	Profibus PA, physical layer according to IEC 61158-2.	
6.	APPROVALS FOR HAZARDOUS AREAS	
N	No approvals for hazardous areas. M20 x 1.5 conduit entry. Temperature range -40° to +85 °C. Not applicable to 3. sign "20".	
X	<p><b>ATEX and IECEx certifications:</b>                      II 1 G Ex ia IIC T6...T4 Ga II 2 G Ex ib IIC T6...T4 Gb                      II 1 D Ex ta IIIC T90 °C Da II 2 D Ex tb IIIC T90 °C Db                      Temperature range: T4: -40° to +80 °C; T5: &lt; +65 °C; T6: &lt; +50 °C.</p> <p>II 3 G Ex nA IIC T6...T4 Gc II 3 D Ex tc IIIC T90 °C Dc                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.</p> <p>II 3 G Ex ic IIC T6...T4 Gc II 3 D Ex tc IIIC T90 °C Dc                      Ex ic IIC T6...T4                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.</p> Available without limit switches or with ATEX or IECEx certified inductive limit switches. M20 x 1.5 conduit entry. With limit switch temperature range is updated according to switch type. NOTE: Dust approval: II 1 D Ex ta IIIC T90 °C Da II 2 D Ex tb IIIC T90 °C Db II 3 D Ex tc IIIC T90 °C Dc not applicable to 3. sign "4".	
U	<p><b>cCSAus certifications:</b>                      IS Class I, Division 1, Groups A, B, C, D, T4...T6                      IS Class I, Zone 0, AEx ia, IIC T4...T6                      Temperature range: T4: -40° to +80 °C; T5: &lt; +65 °C; T6: &lt; +50 °C.</p> <p>NI Class I, Division 2, Groups A, B, C, D, T4...T6.                      NI Class I, Zone 2, Ex nA IIC T4...T6.                      Temperature range: T4: -40° to +85 °C; T5: &lt; +70 °C; T6: &lt; +55 °C.                      No Zener Barrier needed.                      Not applicable to 3. sign "2" or "4".                      1/2 NPT conduit entry.                      With limit switch temperature range is updated according to switch type.</p>	

6.	APPROVALS OF STANDARD ENCLOSURE VALVE CONTROLLER
Z	<p><b>INMETRO certifications:</b>                      Ex ia IIC T4/T5/T6 Ga Ex ia IIC T4/T5/T6                      Ex ia IIC T4/T5/T6 Gb                      Temperature range: T4: -40° to +80 °C; T5: &lt; +65 °C; T6: &lt; +50 °C.</p> <p>Ex nA IIC T4/T5/T6 Gc                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.</p> <p>Ex ic IIC T4/T5/T6 Gc Ex ic IIC T4/T5/T6                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.</p> Not applicable to 3. sign "2" or "4". Available without limit switches or with IECEx certified inductive limit switches. M20 x 1.5 conduit entry. With limit switch temperature range is updated according to switch type.
E1	<p><b>ATEX and IECEx certifications:</b>                      II 2 G Ex d IIC T6...T4 Gb                      II 2 D Ex tb IIIC T80 °C...T105 °C Db                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.                      Not applicable to 3. sign "1" or "4".                      M20 x 1.5 conduit entry</p>
E2	<p><b>cCSAus certification:</b>                      Class I, Div 1, Groups B, C, D; Class II, Div 1, Groups E, F, G; Class III; T4...T6, Enclosure type 4X                      Ex d IIC T4...T6                      AEx d IIC T4...T6                      Ex tb IIIC T100 °C IP66                      AEx tb IIIC T100 °C IP66                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.                      Not applicable to 3. sign "1" or "4".                      1/2 NPT conduit entry.</p>
E4	<p><b>TIIS (JIS) certifications:</b>                      Ex d II C T6                      Temperature range: T6: -20° to +60 °C.                      Applicable only to 3. sign "2".                      Applicable only to 5. sign "H".                      Not available with any limit switches (8. sign "I" or "K").                      G 1/2 or 1/2 NPT conduit entry.                      Delivered always with TIIS (JIS) approved cable gland and conduit entry nipple (accessory CG42 or CG41), see type code from Accessories for Positioners item 10:  <b>CG42:</b> G 1/2 Conduit entry and Cable entry adapter.  <b>CG41:</b> 1/2 NPT Conduit entry and Cable entry adapter.</p>
E5	<p><b>INMETRO certification:</b>                      Ex d IIC T4/T5/T6 Gb                      Ex tb IIIC T100 °C Db IP66                      Temperature range: T4: -40° to +85 °C; T5: &lt; +75 °C; T6: &lt; +60 °C.                      Not applicable to 3. sign "1" or "4".                      M20 x 1.5 conduit entry.</p>

7.	OPTIONS OF VALVE CONTROLLER
T	<p>Internal 2-wire (passive) position transmitter. Analog position feedback signal, output 4-20 mA, supply voltage 12-30 V DC, external load resistance 0-780 Ω.</p> <p><b>ND91_HXT, ND91_HZT, ND92_HXT, ND93_HXT, , ND93_HZT, ND94_HXT:</b>            II 1 G Ex ia IIC T6...T4 Ga            II 1 D Ex ta IIIC T90 °C Da            II 2 G Ex ib IIC T6...T4 Gb            II 2 D Ex tb IIIC T90 °C Db            Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 53 µH,            external load resistance 0-690 Ω.</p> <p><b>ND91_HXT, ND91_HZT, ND92_HXT, ND93_HXT, ND93_HZT, ND94_HXT:</b>            II 3 G Ex nA IIC T6...T4 Gc            II 3 D Ex tc IIIC T90 °C Dc            Ui ≤ 30 V, Ii ≤ 152 mA            II 3 G Ex ic IIC T6...T4 Gc            II 3 D Ex tc IIIC T90 °C Dc            Ui ≤ 30 V, Ii ≤ 152 mA, Pmax = device limits itself, Ci ≤ 22 nF,            Li ≤ 53 µH, external load resistance 0-780 Ω.</p> <p><b>ND91_HU1T and ND93_HU1T:</b>            Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W. Ci ≤ 22 nF, Li ≤ 53 µH,            external load resistance 0-690 Ω.</p> <p><b>ND91_HU2T and ND93_HU2T:</b>            Ui ≤ 30 V, Pmax = device limits itself, Ci ≤ 22 nF, Li ≤ 53 µH,            external load resistance 0-780 Ω.</p> <p><b>ND92_HE1T, ND92_HE2T, ND92_HE4T, ND92_HE5T,            ND93_HE1T, ND93_HE5T:</b>            Ui ≤ 30 V, Pmax = device limits itself,            external load resistance 0-780 Ω.            Applicable to 5. sign "H".</p>
R	<p>Remote mounting            Applicable only to 3. sign "1"            Applicable only to 6. sign "N"            Requires always external position measurement. For rotary actuator see accessories type code.</p> <p>NOTE Dust approval:            II 1 D Ex ta IIIC T90 °C Da            II 2 D Ex tb IIIC T90 °C Db            II 3 D Ex tc IIIC T90 °C Dc            Not applicable to 6. sign "X"</p>
C	<p>Arctic temperature option.            Temperature range -53 - +85 °C / -64 - +185 °F            Applicable to 3. sign "2 or 3"            Applicable to 6. sign "X" or "E1"            Note, Limit switch may limit the temperature range</p>
J	<p><b>ND91_H, ND94_H, ND92_H and ND93_H:</b>            External junction box for all 4-20 mA wirings, including position transmitter, if applicable. Junction box is connected to the enclosure, 2 pcs. M20 x 1.5 conduit entry.</p> <p><b>ND91_F, ND92_F, ND94_F, ND93_F, ND91_P, ND92_P, ND94_P and ND93_P:</b>            External junction box for wirings, including option for parallel connection of external surge protector.            Junction box is connected to the enclosure,            2 pcs. M20 x 1.5 conduit entry.            Applicable to 6. sign "N", "X", "Z", "E1" pending.</p>
G	Exhaust adapter. ND9100 and ND9400: 1x 1/2 NPT thread, ND9200 and ND9300: 2 x 1/2 NPT thread.
Y	Special construction.

8.	LIMIT SWITCH TYPE
	<p><b>Inductive proximity switches, 2 pcs.</b>            IP66 / NEMA 4X enclosure. M20 x 1.5 conduit entry (2 pcs.).            Option E2: 1/2 NPT conduit entry (2 pcs.).            Limit switches applicable only with ND9100, ND9200 and ND9300.</p>
D33	Metso; SST Sensor Dual Module, NO, 8-125 V DC / 24-125 V AC Temperature range -40° to +82 °C / -40° to +179 °F. Applicable to 6. sign "N", "E1", "E2" and "E5".
D44	Metso; Namur Sensor Dual Module, 6-29 V DC, > 3 mA; < 1 mA. Temperature range -40° to +82 °C / -40° to +179 °F. Applicable to 6. sign "N", "U", "E1", "E2" and "E5".
I02	P+F; NJ2-12GK-SN, 2-wire type, DC; > 3 mA; < 1 mA, NAMUR NC. Temperature range: -40° to +85 °C / -40° to +185 °F. Not applicable to 6. sign "E4".
I09	P+F; NCB2-12GM35-N0, 2-wire type, DC; > 3 mA; < 1 mA, NAMUR NC Temperature range: -25° to +85 °C / -13° to +185 °F. Not applicable to 6. sign "E4" Usable up to SIL2 acc. to IEC61508.
I32	Omron E2E-X2Y1, 2-wire type; AC; <100 mA; 24-240 V AC. Temperature range: -40° to +85 °C / -40° to +185 °F. Applicable to 6. sign "N". Temperature range: -25° to +75 °C / -13° to +167 °F. Applicable to 6. sign "E1", "E2" and "E5".
I41	P+F; NJ4-12GK-SN, 2-wire, DC; > 3 mA; < 1 mA, NAMUR NC Temperature range -50 ... +85 °C / -58 ... 185 °F) Applicable to 6. sign "N", "X" and "E1" Note that device may limit temperature range.
I45	P+F; NJ3-18GK-S1N, 3-wire type, DC; > 3 mA; < 1 mA, NAMUR NO. Temperature range: -25° to +85 °C / -13° to +185 °F. Not applicable to 6. sign "E4". Usable up to SIL3 acc. to IEC61508
I56	ifm; IFC2002-ARKG/UP, 2-wire type, DC; 150 mA, 10-36 V DC, leakage current < 0.6 mA. Temperature range: -20° to +85 °C / -4° to +185 °F. Not applicable to 6. sign "X", "Z", "U", "E2" and "E4".
	<p><b>Mechanical micro switches, 2 pcs.</b>            IP66 / NEMA 4X enclosure.            M20 x 1.5 conduit entry (2 pcs.).            Option E2: 1/2 NPT conduit entry (2 pcs.).            Limit switches applicable only with ND9100, ND9200 and ND9300</p>
K05	Omron D2VW-5, 3 A - 250 V AC, 0.4 A - 125 V DC, 5 A - 30 V DC. Temperature range: -40° to +85 °C / -40° to +185 °F. Not applicable to 6. sign "X", "Z", "U" and "E4".
K06	Omron D2VW-01, gold plated contacts, 100 mA - 30 V DC / 125 V AC. Temperature range: -40° to +85 °C / -40° to +185 °F. Not applicable to 6. sign "X", "Z", "U" and "E4".
	<p><b>Bus powered mechanical micro switches, 2 pcs.</b>            Applicable to ND9000F and ND9000P only.            IP66 / NEMA 4X enclosure. M20 x 1.5 conduit entry (2 pcs.).            Option E2: 1/2 NPT conduit entry (2 pcs.).</p>
B06	Omron D2VW-01, gold plated contacts; Bus Powered, no external power needed. Temperature range: -40° to +85 °C / -40° to +185 °F. Not applicable to 5. sign "H". Not applicable to 6. sign "U" and "E4".

9.	OPTIONS OF LIMIT SWITCH
Y	Special construction.

## ADDITIONAL ACCESSORIES

FILTER REGULATOR	
K	Filter regulator for supply air. Filter size 5 µm. Pressure gauge, scale bar/psi/kPa, basic material brass, nickel plated, housing stainless steel, glycerine filled. Temperature range -40 °C...+82 °C / -40 °F... +180 °F. K option includes a thread nipple 1/4"NPT to 1/4"NPT which is suitable with ND9200 & ND9300 positioner options A3 and A5 (1/4NPT AIR CONNECTION)
K1	Filter regulator for supply air. Filter size 5 µm. Pressure gauge, scale bar/psi/kPa, basic material brass, nickel plated, housing stainless steel, glycerine filled. Temperature range -40 °C...+82 °C / -40 °F... +180 °F. K1 option includes a thread nipple 1/4"NPT to G1/4" which is suitable with ND9100 and ND9400 positioner and with option A1 (G1/4 AIR CONNECTION).
K2	Stainless steel (AISI 316) filter regulator for supply air. Filter size 5 µm. Pressure gauge, scale bar/psi/kPa/kg/cm2, silicone oil, AISI 316,
CONDUIT ENTRY NIPPLES	
CE07	1/2 NPT conduit entry nipples M20x1,5 / 1/2 NPT (ND9100 and ND9400)
CE08	R1/2 (PF1/2) conduit entry nipples M20x1,5 / R1/2 (ND9100 and ND9400)
CE09	1/2 NPT conduit entry nipples Brass M20x1,5 / 1/2 NPT, Exd approved (ND9200)
CE19	1/2 NPT conduit entry nipples Stainless Steel M20x1.5 / 1/2 NPT, Exd approved (ND 9300)

CABLE GLANDS	
	Not to be used together with conduit entry nipples (CE_) or connection plugs (P_).
CG5	M20x1.5 grey/plastic, IP66
CG6	M20x1.5 blue/plastic, IP66, Ex e
CG42	G 1/2 Conduit entry and Cable entry adapter, JIS approved (ND9200H)
CG41	1/2 NPT Conduit entry and Cable entry adapter, JIS approved (ND9200H)

PRESSURE GAUGES AND CONNECTION BLOCKS	
A1	Pressure gauges, scale bar/psi/kPa, basic material brass, nickel plated, housing stainless steel, glycerine filled. Temperature range -40 ... +85 °C / -40 ... +185 °F. Pneumatic connection block, material AISI1Mg, anodized grey. Connections G1/4 (S, C1, C2).
A3	Pressure gauges, scale bar/psi/kPa, basic material brass, nickel plated, housing stainless steel, glycerine filled. Temperature range -40 ... +85 °C / -40 ... +185 °F. Pneumatic connection block, material AISI1Mg, anodized grey. Connections 1/4 NPT (S, C1, C2), converts also ND91_ connections to 1/4 NPT.
A5	Pneumatic connection block, converts ND91_ connections to 1/4 NPT. Material AISI1Mg, anodized grey. Connections 1/4 NPT (S, C1, C2). Only for ND9100.
A6	Pressure gauges with connections G1/4. Material AISI 316. Only for ND9100 and ND9400
A7	Pressure gauges with connections 1/4 NPT. Material AISI 316. Only for ND9100 and ND9400
A10	Pressure gauges with connections 1/4 NPT for ND9300 or ND9400 AISI 316, pressure gauges for severe off-shore use, safety glass window.

CONNECTION PLUGS	
	Not to be used together with conduit entry nipples (CE_) or cableglands (CG_).
P1H	ND9000H (HART): Connection plug according to M20x1.5 / DIN 43650A (ISO 4400).  Not applicable with 5.sign "F" and "P".
P4H	Valve controller and limit switch with connection plugs (1 + 1 pc) ND9000 (HART): M20x1.5 / DIN 43650A (ISO 4400). ND9000/K00 or 2 wire ND9100/100.  Not applicable with 5.sign "F" and "P".
P2F	ND9000F and ND9000F/B06 (FOUNDATION fieldbus): Connection plug male eurofast, Turck FSV49, M20x1.5 / M12.  Not applicable with 5.sign "H" and "P".
P3F	ND9000F and ND9000F/B06 (FOUNDATION fieldbus): Connection plug male minifast, Turck RSFV49, M20x1.5 / 7/8".  Not applicable with 5.sign "H" and "P".
P2P	ND9000P and ND9000P/B06 (Profibus PA): Connection plug male, Weidmuller 842593, M20x1.5 / M12.  Not applicable with 5.sign "H" and "F".
P3P	ND9000P and ND9000P/B06 (Profibus PA): Connection plug male minifast, Turck RSFV48, M20x1.5 / 7/8".

DRIVER SETS	
	Driver sets including the needed parts when assembling ND9000 on rotary actuators with VDI/VDE 3845 attachment face, Neles E series actuators or Neles standard mounting faces. Select the correct driver set according to the actuator and the pneumatic connections of valve controller or gauge block when applicable. <b>Note!</b> Earlier the DS04 was delivered with bareshaft positioners as default. This practice is no longer valid, the needed driver set must be ordered as an accessory.
DS01	Driver set for ND7100 / ND9100 / ND9400 on actuators with VDI/VDE3845 attachment face. Set includes the G1/4 plug for single acting actuators. The driver set should also be applied with all ND7/9 with gauge blocks A1, A2 or A6.
DS02	Driver set for ND72/92/93 on actuators with VDI/VDE 3845 attachment face. Set includes the 1/4NPT plug for single acting actuators. The driver set should also be applied with all ND with gauge blocks A3, A5, A7 or A10.
DS04	General driver set for ND71/72/91/92/94/93 on actuators with VDI/VDE 3845, Neles E-series actuators and Neles standard attachment face (e.g. when replacing NE/NP7 or ND800 with S2 shaft). Earlier default driver set.  Includes 1/8NPT, 1/4NPT and G1/4 plugs when used with single acting actuators or flush mounted on E-series actuators.

3RD PARTY MOUNTING SETS	
	Mounting sets between the ND9000 generation valve controllers and linear actuators, including bracket and ball joint based feedback system. <b>Note!</b> Sets are including the 1/4" pneumatic plugs needed when used with single acting actuators.
MS01	Mounting set for linear actuators, attachment face according to IEC 60534-6, stroke length 10-55 mm. (H116240)
MS02	Mounting set for linear actuators, attachment face according to IEC 60534-6, stroke length 55-120 mm. (H120404)
MS03	Mounting set for Masoneilan 87/88 actuators, sizes 6...23. Stroke length 12-64 mm. (H120809)

REMOTE MOUNTING ACCESSORIES		
	ID code	Description
RR01	MA0054129	ND remote mount rotary sensor QN50K05HDM-MET77
RC01	H126144	Cable assembly remote mount sensor cable 1.2 m, straight connector
RC02	H126145	Cable assembly remote mount sensor cable 3.0 m, angle connector
RC03	H127093	Cable assembly remote mount sensor cable 30 m, angle connector