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Metso positioner manual pdf

Page 1 INTELLIGENT VALVE CONTROLLER ND7000H ND9000H, ND9000F, ND9000P Rev. 4.0 Installation, Maintenance and Operating Instructions...
Exploded view ND9100 /D_, ND9100 /I_, MOUNTING10 ND9100 /K0_ and ND9100 /B0643 General10 12.3 Exploded view ND9200, ND9300, For mounting parts for Metso actuators, see ND720044 12.5-12.10.Mounting on Metso actuators 12.4 Exploded view ND9200_/D_, ND9200_/I_, with VDI/VDE mounting face.....10... 7 ND90 71 en PRODUCT FAMILY SUMMARY 1.1.6 Open solution ND9000 Metso is committed to delivering products that freely inter- face with software and hardware from a variety of manufac- 1.1.1 Key features turers; and the ND9000 is no exception.



7 ND90 71 en PRODUCT FAMILY SUMMARY 1.1.6 Open solution ND9000 Metso is committed to delivering products that freely inter- face with software and hardware from a variety of manufac- 1.1.1 Key features turers; and the ND9000 is no exception. This open architecture allows the ND9000 to be integrated with other ... The measurements include: 1.2.5 Open solution Input signal Valve position with contactless sensor Metso is committed to delivering products that freely interface Actuator pressures, 2 independent measurements with software and hardware from a variety of manufacturers; Supply pressure and the ND7000 is no exception. 7 ND90 71 en side of the actuator. The increasing pressure will move the Note, that in ND9200 and ND9300 models there may have diaphragm piston. The actuator and feedback shaft rotate two identification plates if there is double approval (type clockwise. Page 6 7 ND90 71 en ND9300 and ND9400 Performance with moderate constant-load actuators Material: Full stainless steel enclosure (ND9300) Values at 20 °C / 68 °F and without any additional instru- Stainless steel housing and polymer ments, such as boosters or quick exhaust valves etc. composite cover (ND9400) Dead band: ≤... Page 7 7 ND90 71 en Approvals Table 1 Approvals and electrical values, HART Certificate Approval Electrical values ATEX ND X II 1G Ex ia IIC T6...T4 Ga Input: Ui ≤ 28 V, Ii ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, Li ≤ 53 µH. VTT 09 ATEX 033X II 1D Ex ta IIIC T90 °C Da Output: Ui ≤... Page 8 7 ND90 71 en Table 2 Approvals and electrical values, F fieldbus and Profibus PA OUNDATION Certificate Approval Electrical values ATEX ND X II 1G Ex ia IIC T6...T4 Ga Ui ≤ 24 V, Ii ≤ 380 mA, Pi ≤ 5.32 W, Ci ≤ 5 nF, Li ≤ 10 µH. VTT 09 ATEX 033X II 1D Ex ta IIIC T90 °C Da Comply with the requirements for FISCO field device... 7 ND90 71 en Optional parts Safety precautions ND9000H and ND7000H NOTE (ND9000, ND7000): Position transmitter Avoid earthing a welding machine in close proximity to an Output signal: 4-20 mA (galvanic isolation; ND valve controller.



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Increasing input signal to open valve (shown) Default setting: DIR = OPE ROT = cC (close valve to clockwise) ATYP = 2-A PFA = CLO A0, CUTL and VTYP according to valve type 2. Increasing input signal to close valve (not recommended) Default setting: DIR = CLO ROT = cC (close valve to clockwise) Page 15 7 ND90 71 en DOUBLE-ACTING

ACTUATOR Self closing Default setting: ROT = cC (close valve to clockwise) ATYP = 2-A PFA = CLO A0, CUTL and VTYP according to valve type DOUBLE-ACTING ACTUATOR REVERSED PIPING Self opening Default setting: ROT = cC (close valve to clockwise) ATYP = 2-A PFA = OPE A0, CUTL and VTYP according to valve type... 7 ND90 71 en Electrical connections ND9000F, ND9000P The ND9000F is powered by F fieldbus ND9000H, ND7000H OUNDATION (IEC 61158-2). The ND9000H and ND7000H is powered by a standard 4-20 The ND9000P is powered by Profibus PA (IEC 61158-2).

mA current loop that also functions as a carrier to the HART communication. Page 17 7 ND90 71 en L L ND9000H Valve Positioner Position Transmitter X300 Ui (Vmax) = 28 V Ex i Barrier li (Imax) = 120 mA Pi (Pmax) = 1 W Uo (Voc) ≤ 28 V - Li = 53 uH Io (Isc) ≤ 120 mA Ci = 22 nF Po ≤ 1 W NOTE 1 Remote Mount ... Page 18 7 ND90 71 en L L ND9000F/P Valve Positioner FISCO 'ia' Fieldbus Input Power Supply / X102 Barrier Ui (Vmax) = 24 V li (Imax) = 380 mA Pi (Pmax) = 5.32 W Uo (Voc) ≤ 24 V - Li = 10 uH Io (Isc) ≤ 380 mA Ci = 5 nF Po ≤ 5.32 W NOTE 1 NOTE 1 NOTE 1 Earthing terminal NOTE 2 (internal) Remote Mount NOTE 9 Earthing Position Sensor Interface terminal Remote Mount (external) Position Sensor Uo (Voc) = 5.0 V Io (Isc) = 17.8 mA Po = 22.2 mW Ui (Vmax) ≥ 5.0 V Lo (La) = 10 uH... Page 19 7 ND90 71 en L L ND9000F/P Valve Positioner FISCO 'ic' Fieldbus Input Power Supply / X102 Barrier Ui (Vmax) = 32 V li (Imax) = 380 mA Pi (Pmax) = 5.32 W Uo (Voc) ≤ 32 V - Li = 10 uH Io (Isc) ≤ 380 mA Ci = 5 nF Po ≤ 5.32 W NOTE 1 NOTE 1 NOTE 1 Earthing terminal NOTE 2 (internal) Remote Mount NOTE 9 Earthing Position Sensor Interface terminal Remote Mount (external) Position Sensor Uo (Voc) = 5.0 V Io (Isc) = 17.8 mA Po = 22.2 mW Ui (Vmax) ≥ 5.0 V Lo (La) = 10 uH... Page 20 7 ND90 71 en HAZARDOUS LOCATION NONHAZARDOUS LOCATION Position Transmitter Control system Uout max 30 V ND9200H T ND7200H T Control system Uout max 30 V Fig. 12 Control wiring, ND9000 and ND7000, Ex d HAZARDOUS LOCATION NONHAZARDOUS LOCATION Associated ND9200F apparatus ND9200P Entity Parameters: Entity Parameters... Page 21 7 ND90 71 en 4.5.1 Remote mounting ND9100H,ND9100F, ND9100P, ND7100H For applications if there is e.g. heavy vibrations, environ- ment temperature is very high or access is difficult, there is available remote position measurement option. In this kind of applications position sensor is attached to actuator and ND9000 can be installed further away. Page 22 Use proper cable cland or blind plug for each cable entry. Connect positioner control (4,... 20mA) signal directly to ND or alternatively to Pass through terminals IN+ / IN-, and Metso ND9 control input cable to OUT+ / OUT-. • 4-20mA Pass Through connectors positive (+) ter- minals are internally shorted, and negative (-) ter- minals are internally shorted. 7 ND90 71 en LOCAL USER INTERFACE (LUI) The local user interface may be used to monitor the device behaviour as well as configuring and commissioning the controller during installation and normal operation.

The local user interface consists of 2 row LCD and 4 button key- pad interface. 7 ND90 71 en Guided start-up Guided startup offers a fast view of the most critical param- eters of the ND controller, actuator and valve configuration. After verifying the parameters the valve travel calibration is recommended. The guided start-up is entered by pressing the = and ? keys simultaneously. Page 25 7 ND90 71 en HRTI HRTI HRTI — brief push — brief push Fig. 20 Configuration, ND9000H and ND7000H Fig. 21 Configuration, ND9000F 5.4.2 MAN During this mode the valve position may be controlled manually by using the keypad and pressing the + or - key. 7 ND90 71 en 5.5.1 Performance level, PERF If you want to change the tuning of the valve position con- trol, the PERF selection is available. The default factory value is C. Once PERF is displayed press the ? key to enter the edit state and PERF starts to blink. Page 27 5.5.8 Valve dead angle, A0 The α NOTE: setting is made for Metso segment and ball valves. This setting takes into account the "dead angle" α Perform valve calibration always when VTYP has been changed.

7 ND90 71 en Table 8 Dead angle in percentage The cut-off overrides the limit as follows: If the low cut-off > low limit, the low limit is not Valve series Valve active, T25, size QMBV QMBV SOFT QT25 If the low cut-off <... Page 29 7 ND90 71 en Fig. 27 Calibration selection If the last performed calibration has been MAN, and valve type is selected as LIn or FLI, it is not possible to run AUTO 5.6.1 AUTO calibration function calibration. AUTO CAL is disabled from the calibration menu. 7 ND90 71 en After the calibration sequence is finished, press the = key User can terminate linearization any time by press- ing the = key. Linearization is cancelled and device twice to get back to the measurement view. returns to basic measurement display. 7 ND90 71 en 5.7.3 Viewing of latest event Write protection, ND9000F, ND9000P The ND9000F/ND9000P is delivered from the factory with You may view the latest event by pressing the = and - HW write protection OFF as the default setting. Reading keys simultaneously in the measurement monitoring view.

7 ND90 71 en MAINTENANCE 6.1.2 Installation ND9100, ND9400 and ND7100 Ex d WARNING (ND9200, ND7200, ND9300): Service of the cylindrical flameproof joints is not Place a new O-ring (140) into the groove on the allowed, spool valve and press the prestage into place. Make This includes the diaphragm cover (part 171), flame arrester sure the nozzle is guided into the O-ring properly. 7 ND90 71 en Spool valve removal is only possible in the spring- 174 194 forced failsafe position of the spool. In the case of a stuck spool it might be necessary to remove the sec- ondary diaphragm cover (167), the spool spring (166) with its disc (164) and the secondary dia- phragm (162) with its plate. 7 ND90 71 en 6.5.2 Installation ERROR MESSAGES Failsafe errors Ex WARNING: Grounding of the circuit board is essential to explo- Display message Description sion protection. POSITION SENSOR FAILURE Position sensor measurement failed. Change the ND device to a new one.

The board is grounded to the housing by the mounting SETPOINT SENSOR FAILURE mA measurement failed. 7 ND90 71 en Warnings POSITION CALIBRATION FAILED Travel calibration failed. Check the configuration parameters and controller mounting. Check that Display message Description the controller shaft is correctly TOTAL OPERATION TIME WARNING Operating time exceeded limit. aligned. VALVE FULL STROKES WARNING Valve stroke counter limit reached. 7 ND90 71 en Notifications TROUBLE SHOOTING Mechanical/electrical defects Display message Description 1. A change in the valve position setpoint will not affect the POSITION CALIBRATION Position calibration successfully SUCCESSFUL performed. position of the actuator LINEARIZATION SUCCESSFUL 3P/9P linearisation successfully ... 7 ND90 71 en ND9000 WITH LIMIT SWITCHES ND9100F/B06 and ND9100P/B06 Introduction ND9100F/B06 and ND9100P/B06 have two bus powered mechanical micro switches which are connected to the FBI 9.1.1 General description circuit board. Thus the limit information is available directly on the bus through the DI function blocks. Page 38 7 ND90 71 en 9.1.2 Markings 2 proximity 2 cams switches The limit switch is provided with an identification plate, see Fig. 46 and 47. Identification plate markings include: Type designation terminals Electrical values Enclosure class Temperature range ground ... Page 39 7 ND90 71 en 9.1.3.2 ND9000 /I_ 9.1.4 Electric data and ambient temperatures Proximity switch type:Inductive P+F NJ2-12GK-SN (i02) Table 9 P+F NCB2-12GM35-N0 (i09) OMRON E2E-X2Y1 (i32) Switch type Electrical data P+F NJ4-12GK-SN (i41) P+F NJ3-18GK-S1N (i45) IFM IFC2002-ARKG/UP (i56) Electrical values: According to switch type, 2-wire, DC voltage proximity switches: check connection diagram from... 7 ND90 71 en Table 13 Ambient temperatures, ND9 N Table 19 Ambient temperatures, ND9 Z Imetro Variant type Ambien temperature ranges Variant type Ex d IIC T4/T5/T6 Gb Ex tb IIIC T100 °C Db IP66 ND N_ 40° to +85 °C Ambient temperature ranges ND N /i02 ND N /K05 ND N /K06... 7 ND90 71 en Electrical connections ND9200, ND9300 Remove the cover (100) and the pointer (109). Before connecting the power, make sure that the electrical Loosen the screws (314) in the cam disks (313) and specifications and the wiring meet the installation condi- remove the cam disks and spacers (346) from the tions. 7 ND90 71 en DRAWINGS AND PARTS LISTS 12.1 Exploded view ND9100, ND9400, ND7100 437 439 Item Description Spare part modules Housing Exhaust cover Screw Shaft O-ring Washer Wave spring Bushing Grounding screw Electronics cover Screw Prestage cover Screw Screw Screw Screw Cover... 7 ND90 71 en 12.2 Exploded view ND9100 /D_ ND9100 /I_ ND9100 /K0 and ND9100 /B06 Item Description Grounding screw Cover Screw Pointer Screw Local user interface (LUI) Housing Gasket Screw Screw Bracket Screw Bed of Local User Interface (LUI) Screw Screw Shaft Screw Cam disc Screw Terminal block... 7 ND90 71 en 12.3 Exploded view ND9200, ND9300, ND7200 ND9300, ND9200 E2 437 439 162** ND9200 ND7200 437 439 436 ND9300 169**... Page 45 7 ND90 71 en Item Description Spare part modules Housing O-ring Washer Wave spring Bushing Grounding screw Inner cover Screw Screw Conduit entry adapter Spool valve cover Gasket Cover ND92 E1 = H087634, ND92 E2 = H087617, ND9300 = H087628 ND72 E1 = H087634, ND72 E2 = H087617 O-ring Screw Pointer... 7 ND90 71 en 12.4 Exploded view ND9200 /D_ ND9200 /I_ ND9200 /K0_ ND9200 /B06, ND9300 /D_ ND9300 /I_ ND9300 /K0_ ND9300 /B06 ND9300 ND9300 ND9200... Page 47 7 ND90 71 en Item Description Cover O-ring Screw Pointer Stop screw Spring (ND9200) Local user interface (LUI) Housing O-ring Screw Bracket Screw Bracket Screw Screw Extension shaft Screw 2 or 4 Cam disc 2 or 4 Screw Terminal block Proximity switch Screw Base plate... 7 ND90 71 en 12.5 Mounting parts for B1C/B1J 6-20 actuators ND9100, ND7100 ND9100 ND9100 ND7100 VDI/DE 3845 Neles attachment face attachment face Item Description Mounting bracket Mounting bracket Draught piece Washer Washer Screw Screw Screw Hexagon nut Couplings jacket... 7 ND90 71 en 12.6 Mounting parts for B1C/B1J 25-50, B1C 502 and B1J322 actuators ND9100, ND7100 Item Description Mounting bracket Draught piece Washer Screw Washer Screw Coupler socket Screw Plug (Bj actuators only) Plug ND9100 ND7100 ND9200, ND9300, ND7200 Note: Old series B actuators new hole drilled ø5.5 through... 7 ND90 71 en Ø 12.7 Mounting parts for Quadra-Power actuators ND9100, ND7100 Item Description Mounting bracket Screw Screw Screw Screw Adapter plug ND9100 (QP II 1/5- 6/S only) ND7100 Adapter plate (QP II 2B/K thr. 6 /K) Couplings jacket Coupler socket Screw Plug Plug... 7 ND90 71 en 12.8 Mounting on Neles VC and VD actuators or linear actuators with IEC 60534 mounting face. ND9100, ND7100 Feedback lever in horizontal position at mid travel of stroke. Stroke 10 - 120 mm Plane in the shaft in this position with feedback lever 45-90°... Page 52 7 ND90 71 en ND9200, ND9300, ND7200 Feedback lever in horizontal position at mid travel of stroke. Stroke 10 - 80 mm Stroke 60 - 120) mm Plane in the shaft in this position 45° with feedback lever 45° Scale on this side 45°... 7 ND90 71 en 12.9 Connection diagrams See Section 9.1.3 for additional limit switch data. ND9000/D33 SOL 1 SOL 2 SOL PWR 1 SOL PWR 2 TOP SW NO TOP SW C BTM SW NO BTM SW C Connections SOL1, SOL2, SOL PWR1 and SOL PWR2 are not used. TOP SW NO: Positive connection for top switch TOP SW C:... Page 54 7 ND90 71 en blue ND9000/i02, i09 OPEN brown blue CLOSED brown Factory adjustment Active faces of proximity switches are covered when actuator is in intermediate position. Active face A (upper switch) becomes free at open limit of travel and face K (lower switch) at closed limit. Function can be inverted on site by re-adjusting the cam discs, Page 56 7 ND90 71 en ND9000/K_ OPEN blue black blue CLOSED black Connection diagram shows limit switch when actuator is in intermediate position.

Switch A (upper) is activated at the open limit of the travel and switch K (lower) at the closed limit. ND9000F/B06 1: L51 (open) 2: L52 (closed) Page 57 7 ND90 71 en ND9000H J ND9000H ND9000F J, ND9000P J ND9000F/P Surge protection... 7 ND90 71 en DIMENSIONS ND9100, ND9400, ND7100 ND9100/D, ND9100/I, ND9100/K and ND9100/B ND9100, ND9400, ND7100 Linear actuator M20 x 1.5 27.5 Flush mounting for EC/Eg actuators M20x1.5 M20x1.5 A1 (G1/4) A3 (1/4 NPT) G (1/2 NPT) 23.5 Ar (Rc 1/4) (35.4) M6/10 G1/4... Page 59 7 ND90 71 en ND9300 ND9300/D, ND9300/I, ND9300/K and ND9300/B ND9300 Linear actuator The feedback lever according to actuator M20x1.5 ND930 E1, E5, E7: M20x1.5 ND930 E2: M20x1.5/1/2 NPT (CONDUIT ENTRY NIPPLE) ND930 E4: 1/2 NPT, G1/2 (CONDUIT ENTRY NIPPLE AND CABLE ENTRY ADAPTER) VDI/VDE 3845 F05-ø50 (35.4) 7 ND90 71 en EC DECLARATION OF CONFORMITY EC DECLARATION OF CONFORMITY Manufacturer: Metso Oy 01301 Vantaa Finland Product: Intelligent Valve Controller Neles ND 9000- and ND 7000-series Approvals: Type Approval EC Type examination Certificate ND9..._PA(Profibus PA) EMC 2014/30/EU SGS Fimko 278969-1 ND9...F (Foundation Fieldbus) 4-20 mA INPUT: (9.5 V DC/20 mA/475 Ohm) Ui: 30 V DC SUPPLY PRESSURE: 1.4-8 bar / 20-115 psi SEAL AT CONDUIT ENTRY WARNING: DO NOT OPEN WHEN ENERGIZED ID: C00012345 *INO: PH12240004 METSO AUTOMATION OY VANHA PORVOONTIE 229, 01380 VANTAA, FINLAND Japanese Ex-d Certification:... 7 ND90 71 en TYPE CODING INTELLIGENT VALVE CONTROLLER ND9000 / LIMIT SWITCH (ND9000/D_ ND9000/I_ ND9000/K0_ ND9000/B06) PRODUCT GROUP APPROVALS FOR HAZARDOUS AREAS Intelligent Valve Controller: cCSAus certifications: IS Class I, Division 1, Groups A, B, C, and D; T4/T5/T6 Ex ia IIC T4/T5/T6 Ga SERIES CODE IS Class I, Zone 0 AEx ia IIC T4/T5/T6 Ga... Page 63 II 2 D Ex tb IIIC T90 °C Db Ui ≤ 28 V, li ≤ 120 mA, Pi ≤ 1 W, Ci ≤ 22 nF, li ≤ 53 uH, Metso, Namur Sensor Dual Module, 6-29 V DC, > 3 mA, < 1 mA, external load resistance 0-690 Ω. Page 64 7 ND90 71 en INTELLIGENT VALVE CONTROLLER ND7000 PRODUCT GROUP APPROVALS FOR HAZARDOUS AREAS Digital Valve Controller: INMETRO certifications (pending): Ex d IIC T4/T5/T6 Gb SERIES CODE Ex tb IIIC T100 °C Db IP66 Temperature range: T4- 40° to +85 °C; T5: < +75 °C; T6: < +60 °C. Series 7000 digital valve controller with universal shaft and Not applicable to 3. Page 65 7 ND90 71 en ADDITIONAL ACCESSORIES FILTER REGULATOR CONNECTION PLUGS Filter regulator for supply air. Not to be used together with conduit entry nipples (CE) or Filter size 5 µm, cableglands (CG). Pressure gauge, scale bar/psi/kPa and kg/cm^2, basic material ND9000H (HART): brass, nickel plated, housing stainless steel, glycerine filled. Page 66 7 ND90 71 en ND9100H- Dev v3, DD v3: Assembly Related: Main Menu: Configuration: 1 Main Menu 1 Configuration 1 Assembly Related 1 Valve Type Rotary, Linear, NelesCvGlobe, Linear No Comp 2 Input Signal 17.5 mA 2 Calibrations 2 Signal Modification 2 Actuator Type Double Acting, Single Acting 3 mA-Setpoint... Page 67 7 ND90 71 en ND9100H- Dev v4, DD v2: Device Information: Operation Unit 1 Device Information 1 Operation Unit 1 Tag ND9000 2 Configuration 2 Positioner 2 Description ND9000 3 Calibration 3 Date 27.8.2001 4 Manually Stroke Valve 4 Message ND9000 5 Monitoring 5 Long tag... Page 68 Fig 2 ND9000H 0402 Menu Tree 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, M A 01545, USA.

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