Intelligent Valve Controller
ND9000
Rev. 2.4
Safety Manual
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1. **General information**

Neles ND9000 is loop powered SIL 2 certified intelligent valve controller and thus a safety related product. Extra attention is required to make sure it is used in a way it is intended to be used and in a safe manner. The ND9000 Installation, Maintenance and Operating Instructions 7 ND90 71 en (later referred as IMO) shall be used together with this safety manual when installing and operating this product.

2. **Structure of safety valve controller**

2.1 **System components and description of use**

See the IMO for the detailed technical description of the device and the system architecture.

2.2 **Permitted device types**

The information in this manual pertaining to functional safety applies to all ND9000 device variants mentioned in the device type coding in the IMO.

This document is valid with devices which serial number starts from PH 13_ _ _ _ _ . Serial number can be found from device machine plate. The first two numbers are showing manufacturing year and next two numbers are showing manufacturing week on that year. Example: PH1301_ _ _ _ = year 2013, week 1

2.3 **Supplementary device documentation**

1. ND9000 Installation, Maintenance and Operating Instructions
2. DTM User Manual 2; Metso’s DTM User Guide (later referred as DTM manual)

These are available from Metso or for download from www.metso.com/valves.

3. **Description of safety requirements**

3.1 **Safety function**

Spool valve and prestage unit are the only components, which takes part of the safety function. Prestage unit is coil operated flapper valve, which is open when de-energized. De-energized is the safe state of the device prestage unit coil. Prestage unit is controlling the spool valve, which is operated by spring force to fail safe position and by pneumatic force to the normal position. Fail safe is activated when device is de energized. That will cause the emergency shutdown valve to close or open depending on the application type. The closing (or opening) time depends e.g. on the size and type of the pneumatics actuator and the valve.

3.2 **Restrictions for use in safety-related applications**

Please ensure that the valve controller is used correctly for the application in question and that the ambient conditions and air supply quality are taken into account. The instructions for installation conditions, as detailed in the IMO, shall be observed. The specifications in the IMO shall not be exceeded.

3.3 **Checking the safety function**

To check that device is performing safety action:

- The device must not be in the safety position
- De-energize input signal
- Check that valve moves to the intended safety position
3.4 Functional safety indicators

The tables below show the specific indicators for functional safety

![Table]

3.5 Behavior of device

3.5.1 During power-up

It may take up to 8 seconds for device diagnostics to power up and the device to be fully operational in the diagnostics point of view. This does not effect to the safety function of the device. In HART version devise start to follow mA signal when signal is connected.

In Foundation Fieldbus and Proﬁbus PA versions there are some parameters which define valve behavior in case of:

- Loss of cyclic communication
- Recovery of cyclic communication
- Loss of power supply
- Power-up

Those parameters have to be set correctly before use. If support is needed, please contact to local Metso Automation office.

3.5.2 During operation

Once the device is powered, the device energizes the prestage and the supply air will be fed to the pneumatic actuator by spool valve. That will eventually cause the valve to go to its normal operating position.

3.5.3 During emergency trip

See section 3.1.

3.6 Installation

3.6.1 Hardware fault tolerance

The required hardware fault tolerance of the installation is zero. If hardware fault tolerance of 1 is required, then a dual redundant configuration of the valve installation shall be used.
3.6.2 Installation and commissioning
The installation of the device needs to be done according to the IMO. Every parameter related to the device type in question and mentioned in the IMO needs to be checked and compared against the device settings. If any deviations exist the safety of the installation cannot be guaranteed.
The ND9000 shall be configured before commissioning. The parameters configured to the ND9000 shall be read back and verified before commissioning using the Device Description (DD) or Metso's DTM for ND9000

Orientation
Orientation of the device is described in the IMO.

3.6.3 Parameters write protection
The parameters programmed in the ND9000 shall be write protected. If the organizational procedures are established, this can be done using the user access levels in the configuration software. See section 5.8 in the IMO
3.6 Operation
See the IMO for the operation of the device.

3.7 Maintenance
See the IMO for maintenance instructions.
During maintenance work on the device, alternative safety function methods shall be taken to ensure process safety.

4. Proof-tests
To perform proof-test, see chapter 3.3 Checking the safety function

4.1 Repair
Any repair to the device shall be carried out by the manufacturer only. Device failures must be reported to the manufacturer. The user shall provide a detailed report to the manufacturer describing the failure and any possible effects.

5. Lifetime expectation
The useful lifetime of the ND9000 in safety related applications is approximately 12 years. After this period failure rate of ND9000 may decrease.
Certificate
No. V 419 2012 C2

Manufacturer:
Metso Automation Inc.
Vanha Porvoontie 229
01380 Vantaa
Finland

Product / Test item:
Electro pneumatic positioner

Type series:
ND 9000, ND 7000, SD 9000, SD 7000

Application / Safety function:
Return connected actuator to design required position upon demand

Test result:
The devices of the type series stated above are suitable for use in single-channel safety-related systems in accordance with IEC 61508-2:2010 / IEC 61511-1:2003 up to and including SIL 2 and up to and including SIL 3 in multi-channel systems.
Detailed results can be found in the report No. V 419 2012 S1 dated 2012-12-14.
A summary of the test values is given on the reverse side of this certificate.

Suitability for certain applications can only be evaluated through examination of each safety-related overall system with regard to the requirements of IEC 61508-2:2010 / IEC 61511-1:2003.

This certificate is valid until 12 / 2017

Cologne, 2012-12-14
Inspector
Dipl.-Ing. Th. Küppers

Test Centre for Energy Appliances
Head of Test Centre
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