NELES VALVGUARD VG9000F
INTELLIGENT SAFETY VALVE CONTROLLER

Neles ValvGuard™ VG9000F is a top class intelligent new generation safety valve controller and partial stroke test device for emergency shutdown (ESD) and emergency venting (ESV) valves in FOUNDATION fieldbus network. It's unique and advanced functions and features are specially designed for emergency valve controllers. Together with FOUNDATION fieldbus communication it offers unbeatable value for our customers with increased efficiency, reliability and safety. VG9000F is IEC 61508 compliant up to SIL 3, certified by TÜV. Based on the automatic partial stroke testing (PST) and other diagnostics data, VG9000F increases safety and plant safety targets can be reached more economically than with traditional solutions. Also, unnecessary and expensive manual testing can be avoided. This increases safety and can simultaneously create major cost savings at a plant.

Diagnostics part of the VG9000F safety valve controller is powered by FOUNDATION fieldbus and all communication can be done via the bus. Safety part is isolated from the fieldbus part and is powered with the separate binary 24 V DC signal. VG9000F is also capable to record emergency trips with graph and keyfigures related to it. The availability of the safety valves is maximized through unique diagnostics features, directly integrated into device functionality. Diagnostic information is presented in easily understandable form by using graphical FDT/DTM user interface, such as Neles FieldCare™. This enables the predictive maintenance of potentially failing valve assemblies before they have chance to impact on the process.

KEY FEATURES
- Valve and self tests
- Partial stroke test (automatic or manual)
- Self test for internal electronics and pneumatics
- Emergency trip test
- High pneumatic capacity eliminates the need of additional instrumentation in most cases
- Device is powered during the trip and can collect diagnostics information
- Ease of use local / remote operation
- Advanced device diagnostics including
  - Self-diagnostics
  - Online diagnostics
  - Performance diagnostics
- FOUNDATION fieldbus communication

Open solution
- Metso is committed to delivering products that freely interface with software and hardware from a variety of manufacturers. This open architecture allows the ValvGuard to be integrated with other field devices and systems.
- FDT based multi-vendor support configuration
- The different support files for VG9000F are available in the internet, at http://www.metso.com/automation.

TÜV Certificate
Neles ValvGuard VG9000F is TÜV approved to be used in safety applications up to and including safety integrity level 3 (SIL 3).
Options
- High pneumatic capacity
- Integrated limit switches
- Local Control Panel
- External junction box for wiring
- Language selection: English, German and French

Lower total cost of ownership
- Automised valve testing and testing documentation
- Low energy and air consumption
- Future proof design allows further options at a reduced cost

Easy installation and configuration
- Same unit for linear and rotary valves, double and single-acting actuators
- Simple calibration and configuration
  - Using local user interface
  - Using Neles FieldCare or any FDT compliant software in a remote location

Easy to maintain
- Optimised spares program. Reduced number of spares
- Fewer maintainable components than in a traditional instrumentation solution
- Ability to attach options to mechanics later
- Visibility to the safety valve operation
- Excellent maintainability with firmware download feature

Mounting
- Can be mounted on single and double acting pneumatic actuators
- Both rotary and linear valves
- Extensive selection of mounting kits for 3rd party actuators

Product reliability
- Designed to operate in harsh environmental conditions
  - Rugged modular design
  - Excellent temperature characteristics
  - Vibration and impact tolerant
  - IP66 enclosure
  - Protected against humidity
- Maintenance free operation
  - Resistant to dirty air
  - Wear resistant and sealed components
  - Contactless position measurement

Predictive maintenance
- Easy access to collected data with Neles FieldCare software
  - Logical trend collection
  - Information collected on service conditions
  - Fast notifications with on-line alarms
  - Condition monitoring tool available

VG9000F in FOUNDATION fieldbus networks
- Approved interoperability
- Host interoperability ensured
- FOUNDATION fieldbus ITK version 5 certified
- Unique communication diagnostics
- Digital communication via the FOUNDATION fieldbus includes not only the diagnostics, but also the position feedback signal from the position sensor.

Back up LAS functionality available
- Multipurpose functionality
- Open and close information directly available via the FOUNDATION fieldbus
- Open and close detection is based on either position measurement (soft limit switch) or optional internal limit switch information

TECHNICAL DESCRIPTION
Neles ValvGuard VG9000F is a microcontroller-based safety valve controller and partial stroke test device with FOUNDATION fieldbus communication. Addition to FOUNDATION fieldbus there is also a separate binary 24 V DC signal needed. It is isolated from the fieldbus and powers the safety part. The device contains a Local User Interface (LUI) enabling local configuration. A PC with Neles FieldCare software can be used for advanced configuration and diagnostics. The powerful 32-bit microcontroller controls the valve position during partial stroke and other special testing. The measurements include:
- Safety signal
- Valve position with contactless sensor
- Actuator pressures, two independent measurements
- Supply pressure
- Device temperature
- Housing pressure

Advanced self-diagnostics ensures that all measurements operate correctly. Failure of any measurement does not cause the valve to go to fail-safe position as long as the binary signal is powering the safety part of the device. Operating principle of VG9000F is based on pneumatic solenoid valve (SV) and prestage (PR) which is controlled by microcontroller (μC). Information from the various sensors is used for the operation.

![Fig. 1 The principle of operation](image-url)
NELES VALVGUARD VG9000F INTELLIGENT SAFETY VALVE CONTROLLER

TECHNICAL SPECIFICATIONS

Neles ValvGuard VG9000F

General
FOUNDATION fieldbus powered diagnostics, 24 V DC power from safety system for the safety part.
Suitable for rotary and sliding-stem valves.
Actuator connections in accordance with VDI/VDE 3845 and IEC 60534-6 standards.
Action: Double or single acting
Travel range:
  Linear: 10–120 mm
  Rotary: 45–95°
Measurement range 110° with freely rotating feedback shaft

Environmental influence
Standard temperature range:
  -20° to +85 °C / -4° to +185 °F (-40° C pending)
Influence of vibration on valve position:
  under 2g 5–150 Hz, 1g 150–300 Hz, 0.5g 300–2000 Hz
Open and closed position: no effect

Enclosure
Material: Anodised aluminium alloy and glass window
Protection class: IP66, NEMA 4X
Pneumatic ports:
  VG9215 1/4 NPT
  VG9235 1/2 NPT
  VG9237 1 NPT (1/2 NPT supply) (single acting only)
Conduit entry thread: 3 pcs M20 x 1.5
Weight:
  VG9215 3.0 kg / 6.6 lb
  VG9235 4.6 kg / 10.1 lb
  VG9237 5.0 kg / 11 lb
limit switch options plus 1.0 kg / 2.2 lb
Mechanical and digital position indicator visible through the main cover

Pneumatics
Supply pressure: 3.0–7.5 bar / 44–109 psi
Air quality:
  According to ISO 8573-1:2001
  Solid particles: Class 7
  Humidity: Class 1
  (dew point 10 °C / 50 °F below minimum temperature is recommended)
  Oil class: 3 (or <1 ppm)
Capacity with 4 bar / 60 psi supply:
  VG9215 90 Nm³/h / 53 scfm (Cv = 0.7)
  VG9235 380 Nm³/h / 223 scfm (Cv = 3.2)
  VG9237 feed 380 Nm³/h / 223 scfm (Cv = 3.2)
  exhaust 700 Nm³/h / 412 scfm (Cv = 6.4)
Consumption with 4 bar/60 psi supply:
  actuator pressurized 0.22 Nm³/h / 0.13 scfm
  actuator vented 0.25 Nm³/h / 0.15 scfm

Electronics
Electrical connection: max. 2.5 mm²

Safety Signal (Binary input)
Connections: 24 VDC: ‘+’ and ‘-’
Min voltage: 11 V DC
Max output resistance: Ro = 285 Ω
Ex d IIC T5/T6 Gb: Uİ ≤ 28 V
  Pi ≤ 1.0 W

FOUNDATION fieldbus
Connections: H1: ‘+’ and ‘-’
Power supply: taken from bus
Bus voltage: 9 to 32 V DC, reverse polarity protection
Max basic current: 14.2 mA
Operating current: 20.7 mA
Fault current (FDE): 6.3 mA
Ex d IIC T5/T6 Gb: Uİ ≤ 32 V
  li ≤ 380 mA
  Pi ≤ 5.32 W

FOUNDATION fieldbus function block execution times
  MDO 15 ms
  MDI 15 ms
  AI 20 ms

Local user interface functions
  □ Monitoring of valve position, temperature, supply, actuator pressure difference, device usage option and binary signal (on or off)
  □ Guided start-up function
  □ Local User Interface (LUI) may be locked remotely to prevent unauthorised access
  □ Automatic travel calibration
  □ Spool type
  □ Actuator size
  □ Positioner fail action, open/close
  □ Actuator type: double/single acting
  □ Valve type: rotary/linear
  □ Testing: Partial Stroke Test (automatic test enabled or disabled), Pneumatics test
  □ Language selection: English, German and French
APPROVALS

TÜV
IEC 61508 compliant up to SIL 3

Flameproof and explosion proof
ATEX & IECEx
II 2 G Ex d IIC T5/T6 Gb

Electromagnetic protection
Electromagnetic compatibility
Immunity acc. to EN 61000-6-2 (2001)

CE marking
89/336/EEC
Electromagnetic compatibility
94/9/EC
ATEX

FDT/DTM
VG9000F DTM certified by FDT group

FF
DD registered by FOUNDATION fieldbus

Fig. 1. Local User Interface (LUI) enables real time awareness of device parameters.

Fig. 2. Configuration and diagnostics are easy to do with DTM, graphical user interface.
VG921_

DIMENSIONS (mm)

VG923_
VG921_/I00

VG923_/I00
**HOW TO ORDER**

ValvGuard VG9000

<table>
<thead>
<tr>
<th>1. sign</th>
<th>PRODUCT GROUP</th>
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<tbody>
<tr>
<td>VG</td>
<td>Neles ValvGuard VG9000F, Intelligent Safety Valve Controller</td>
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<tr>
<th>2. sign</th>
<th>SERIES CODE</th>
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<tbody>
<tr>
<td>9</td>
<td>Series 9000 Intelligent safety valve controller with universal shaft and attachment face according to standard VDI/VDE 3845. Relevant shaft adapter included in mounting kits. *) When safety valve controllers are separate deliveries, shaft adapter kit is supplied.</td>
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<tr>
<th>3. sign</th>
<th>ENCLOSURE</th>
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<tbody>
<tr>
<td>2</td>
<td>Standard IP66 / NEMA 4X enclosure. Temperature range -20 to +85 °C / -4 to +185 °F. 4 pcs M20x1.5 conduit entry when limit switches (8. sign) are not included.</td>
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<tr>
<th>4. sign</th>
<th>SPOOL VALVE CONNECTIONS</th>
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<tbody>
<tr>
<td>15</td>
<td>Standard capacity Stroke volume of actuator &lt; 13 dm³ S, C1, C2 = 1/4 NPT</td>
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<tr>
<td>35</td>
<td>High capacity Stroke volume of actuator &gt; 13 dm³ S, C1, C2 = 1/2 NPT</td>
</tr>
<tr>
<td>37</td>
<td>Extended capacity For single acting actuators S = 1/2 NPT, C2 = 1 NPT</td>
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<tr>
<th>5. sign</th>
<th>COMMUNICATION / INPUT SIGNAL RANGE</th>
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<tbody>
<tr>
<td>F</td>
<td>FOUNDATION fieldbus, physical layer according to IEC 61158-2</td>
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<tr>
<th>6. sign</th>
<th>APPROVALS FOR HAZARDOUS AREAS</th>
</tr>
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<tbody>
<tr>
<td>N</td>
<td>No approvals for hazardous areas.</td>
</tr>
<tr>
<td>E6</td>
<td>ATEX &amp; IECEx certifications: VG9_FEB: II 2 G Ex d IIC T5/T6 Gb U1 = 30 V Temperature range: T5: -20° to +80 °C / -4° to +176 °F T6: -20° to +70 °C / -4° to +157 °F Available with or without limit switches.</td>
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<tr>
<th>7. sign</th>
<th>OPTIONS OF SAFETY VALVE CONTROLLER</th>
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<tbody>
<tr>
<td>J</td>
<td>External junction box for FF and 24 VDC wiring. 2 pcs M20x1.5 conduit entry. Units without limit switches (8. sign) are without extension housing.</td>
</tr>
<tr>
<td>Y</td>
<td>Special construction</td>
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<tr>
<th>8. sign</th>
<th>LIMIT SWITCH TYPE</th>
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<tbody>
<tr>
<td>I02</td>
<td>Inductive proximity switches, 2 pcs. IP 66/ NEMA 4X enclosure.</td>
</tr>
<tr>
<td>I09</td>
<td>P+F; NCB2-12GM35-N0, 2-wire type, DC; &gt; 3 mA; &lt; 1 mA. Intrinsically safe according to ATEX II 2 G Ex ia IIC T6. Temperature range -20 ... +85 °C / -4 ... +185 °F. Not applicable to 6. sign &quot;N&quot;.</td>
</tr>
<tr>
<td>I45</td>
<td>P+F; NJ3-18GK-SN, 2-wire type, DC; &gt; 3 mA; &lt; 1 mA. Intrinsically safe according to ATEX II 2 G Ex ia IIC T6. Temperature range -20 ... +85 °C / -4 ... +185 °F. Not applicable to 6. sign &quot;N&quot;.</td>
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<tr>
<td>I56</td>
<td>P+F; NJ3-18GK-SN, 2-wire type, DC; &gt; 3 mA; &lt; 1 mA. Intrinsically safe according to ATEX II 2 G Ex ia IIC T6. Temperature range -20 ... +85 °C / -4 ... +185 °F. Not applicable to 6. sign &quot;N&quot;.</td>
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<tr>
<td>D33</td>
<td>SST Sensor Dual Module, NO; 8-125 VDC / 24 - 125 VAC Temperature range -20 ... +80 °C / -4 ... +176 °F.</td>
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<tr>
<td>D44</td>
<td>Namur Sensor Dual Module, 6 - 29 VDC, &gt; 3 mA; &lt; 1 mA. Temperature range -20 ... +80 °C / -4 ... +176 °F.</td>
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<tr>
<td>K25</td>
<td>2 pcs, OMRON D2VW-5; 3 A – 250 V AC, 0.4 A – 125 V DC, 5 A – 30 V DC.</td>
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<tr>
<td>K26</td>
<td>2 pcs, OMRON D2VW-01; gold plated contacts, 100 mA - 30 V DC / 125 V AC.</td>
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<tr>
<td>K45</td>
<td>4 pcs, OMRON D2VW-5; 3 A – 250 V AC, 0.4 A – 125 V DC, 5 A – 30 V DC.</td>
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<tr>
<td>K46</td>
<td>4 pcs, OMRON D2VW-01; gold plated contacts, 100 mA - 30 V DC / 125 V AC.</td>
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<tr>
<td>B06</td>
<td>OMRON D2VW-01, gold plated contacts; Bus powered, no external power needed.</td>
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<tr>
<th>9. sign</th>
<th>OPTIONS OF LIMIT SWITCHES</th>
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<tbody>
<tr>
<td>Y</td>
<td>Special construction, to be specified.</td>
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