

Intelligent on/off valve controller

Neles™ SwitchGuard™ SG9000

Neles SwitchGuard SG9000 is a top class intelligent on/off valve controller designed to operate on any valve actuator. Unique embedded diagnostic features are integrated in its design and enable users to guarantee the availability of their switching valves in demanding processes. SwitchGuard can be easily fitted to the actuator and its controlled pneumatic capacity replaces any solenoid valve, providing a simple and reliable interface with the process control system. Diagnostic information is presented in easily understandable way using any FDT frame application, to enable planned maintenance of potentially failing valve assemblies before they have chance to impact on the process.



Key features

- Reliable and robust design
- The rugged cover protects the unit from environmental hazards and external abuse
- Ease of use
- Language selection: English, German and French
- Local / remote operation
- Expandable architecture
- Advanced device diagnostics including
 - Self-diagnostics
 - Online diagnostics
 - Performance diagnostics
- Speed control for switching
- HART communication

Options

- Full stainless steel enclosure (SG9300)
- High pneumatic capacity (SG9200)
- Integrated limit switches
- Position transmitter
- U/I converter to support binary control

Total cost of ownership

- Low energy and air consumption
- Future proof design allows further options at a reduced cost
- Optimised spares program. Reduced number of spares



Designed to switch

- Several pre-selected opening and closing profiles
 - Opening and closing can be configured separately
 - Minimised pressure impacts in piping
- Excellent speed control performance
- Highly reliable pneumatics unit
- Wide pneumatics capacity

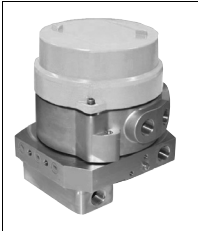
Easy installation and configuration

- Same unit for linear and rotary valves, double and single-acting actuators
- Simple fast calibration and configuration
 - using Local User Interface (LUI)
 - using DTM / EDD in a remote location
 - using Distributed Control System (DCS) asset management tools
- Low power design enables installation to all common control systems

Open solution

- Valmet is committed to delivering products that freely interface with software and hardware from a variety of manufacturers and Neles SwitchGuard is no exception. This open architecture allows the SwitchGuard to be integrated with other field devices and systems.
- FDT and EDD based multi-vendor support configuration
- Support files for SG9000H are available from our internet page, at <http://www.neles.com/SG9000>.

Stainless steel version



Neles SwitchGuard SG9300 Stainless Steel version, a new addition to the SwitchGuard family of safety valve controllers, is manufactured in a stainless steel housing and developed for use in corrosive environments.

Easy to maintain

- Modular design with maintenance components
- Alterable pneumatics module
- Fewer components to maintain than in a traditional instrumentation solution
- Visibility of the whole valve package

Mounting

- Can be mounted on single and double acting pneumatic actuators
- Can be mounted on 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
 - Full stainless steel enclosure (SG9300)
 - Protected against humidity
 - Minimum maintenance requirements
 - Wear resistant and sealed components
 - Contactless position measurement

Predictive maintenance

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

Technical description

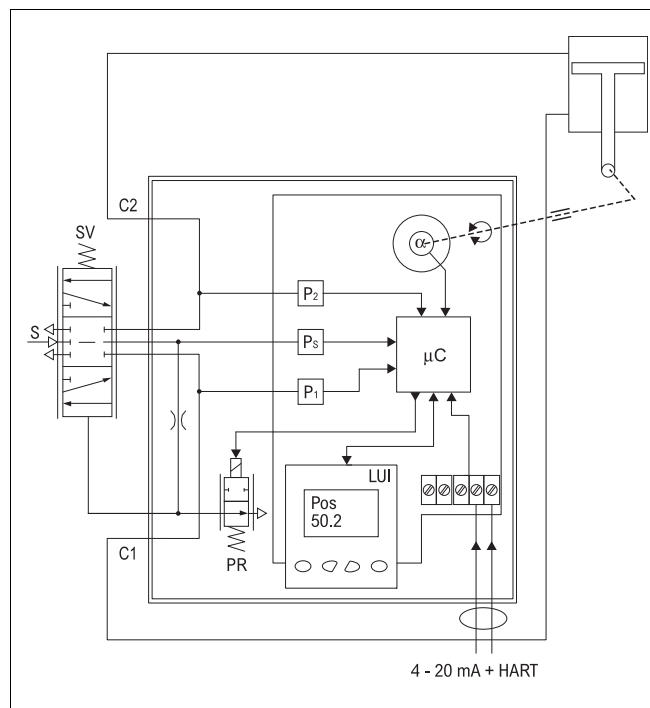
The SwitchGuard is a 4–20 mA loop-powered microcontroller-based intelligent on/off valve controller. The binary 24 VDC signal can be used via optional U/I converter. SwitchGuard operates even with a 3.6 mA input signal and communicates via HART. The device contains a Local User Interface enabling local configuration. A PC with FDT/DTM software can be connected to the SwitchGuard itself or to the control loop.

The powerful 32-bit microcontroller controls the valve position. The measurements include:

- Input signal
- Valve position with contactless sensor
- Actuator pressures, 2 independent measurements
- Supply pressure
- Device temperature

Advanced self-diagnostics guarantees that all measurements operate correctly. Failure of one measurement does not cause the valve to fail if the input signal and position measurements are operating correctly. After connections of electric signal and pneumatic supply, the micro controller (μC) reads the input signal, position sensor (α) and pressure sensors (P_s , P_1 , P_2). A difference between setpoint according to the stroke curve and position sensor (α) measurement is detected by the control algorithm inside the μC . The μC calculates a new value for prestage (PR) coil current based on this information.

The changed current to the PR changes the pilot pressure to the spool valve. Reduced pilot pressure moves the spool and the actuator pressures change accordingly. The spool opens the flow to the driving side of the double diaphragm actuator and opens the flow out from the other side of the actuator. The increasing pressure will move the diaphragm piston. The actuator and feedback shaft rotate clockwise.



Technical specifications

Neles SwitchGuard

General

Loop powered, no external power supply required.

Suitable for rotary and linear 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:
-40 to +85 °C / -40° to +185 °F

Enclosure

Material:	Anodised aluminum alloy and glass window (SG92_, not E2)
Protection class:	IP66, NEMA 4X
Pneumatic ports:	SG921_ 1/4 NPT SG9235 1/2 NPT SG9237 1 NPT (1/2 NPT supply)
Conduit entry thread:	M20 x 1.5
Weight:	SG921_ 3.0 kg / 6.6 lbs SG9235 4.6 kg / 10.1 lbs SG9237 5.0 kg / 11 lbs Limit switches +1.0 kg / 2.2 lbs

Mechanical and digital position indicator visible through the main cover (SG92_, not E2).

Pneumatics

Supply pressure:	3–8 bar / 44–116 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:	
SG9212	7 Nm ³ /h / 4.1 scfm (Cv = 0.06)
SG9215	90 Nm ³ /h / 53 scfm (Cv = 0.7)
SG9235	380 Nm ³ /h / 223 scfm (Cv = 3.2)
SG9237	feed 380 Nm ³ /h / 223 scfm (Cv = 3.2) exhaust 700 Nm ³ /h / 412 scfm (Cv = 6.4)

Consumption with 4 bar / 60 psi supply:	
	actuator pressurized 0.22 Nm ³ /h / 0.13 scfm,
	actuator vented 0.25 Nm ³ /h / 0.15 scfm

Electronics

Electrical connection:	max. 2.5 mm ²
HART	
Supply power:	Loop powered, 4-20 mA
Minimum signal:	3.6 mA
Current max :	23 mA
Load voltage:	up to 9.5 V DC / 20 mA (corresponding 475 Ω.)
Voltage:	max. 30 V DC
Polarity protection:	-30 V DC
Over current protection:	active over 35 mA
Max power dissipation:	1.05 W with position transmitter 1.74 W

Position transmitter (optional)

Output signal:	4–20 mA (galvanic isolation; 600 V DC)
Supply voltage:	12 - 30 V DC
Resolution:	16 bit / 0.244 μA
Linearity:	<0.05 % FS
Temperature effect:	<0.35 % FS
External load:	max 0–780 Ω max 0–690 Ω for intrinsically safe

Local User Interface (LUI) functions

- Local control of the valve
- Monitoring of valve position, input signal, temperature, supply and actuator pressure difference
- Guided start-up function
- LUI may be locked remotely to prevent unauthorised access
- Automatic travel calibration
- Tuning
- Parameter selection
- Language selection: English, German and French
- Alarm and warning state indications
- Latest event view

Approvals and electrical values

Certificate	Approval	Electrical values
ATEX		
SG_X EESF 19 ATEX 045X EN IEC 60079-0: 2018, EN 60079-11: 2012, EN 60079-31: 2014	II 1 G Ex ia IIC T6...T4 Ga II 1 D Ex ia IIIC T90 °C...T120 °C Da II 1 D Ex ta IIIC T90 °C...T120 °C Da II 2 G Ex ib IIC T6...T4 Gb II 2 D Ex ib IIIC T90 °C...T120 °C Db II 2 D Ex tb IIIC T90 °C...T120 °C Db	Input: $U_i \leq 28 \text{ V}$, $I_i \leq 120 \text{ mA}$, $P_i \leq 1.0 \text{ W}$, $C_i \leq 13.5 \text{ nF}$, $L_i \leq 53 \mu\text{H}$ PT: $U_i \leq 28 \text{ V}$, $I_i \leq 120 \text{ mA}$, $P_i \leq 1.0 \text{ W}$, $L_i \leq 53 \mu\text{H}$, $C_i \leq 13.5 \text{ nF}$
SG_X EESF 19 ATEX 046X EN 60079-0: 2018, EN 60079-11: 2012, EN 60079-31: 2014, EN 60079-15: 2010	II 3 G Ex nA IIC T6...T4 Gc II 3 D Ex ic IIIC T90 °C...T120 °C Dc II 3 D Ex tc IIIC T90 °C...T120 °C Dc II 3 G Ex ic IIC T6...T4 Gc II 3 D Ex ic IIIC T90 °C...T120 °C Dc II 3 D Ex tc IIIC T90 °C...T120 °C Dc	Input: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$ Input: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$, $C_i \leq 13.5 \text{ nF}$, $L_i \leq 53 \mu\text{H}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$, $C_i \leq 13.5 \text{ nF}$, $L_i \leq 53 \mu\text{H}$
SG_E6 SIRA 11ATEX1006X EN 60079-0:2012, EN 60079-1:2007, EN 60079-31:2009	II 2 G Ex d IIC T6...T4 Gb II 2 D Ex tb IIIC T80 °C...T105 °C Db	Input: $U_i \leq 30 \text{ V}$, $P_i \leq 1.0 \text{ W}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 20 \text{ mA}$, $P_i \leq 1.0 \text{ W}$
IECEx		
SG_X IECEx EESF 19.0019X IEC 60079-0 : 2017, IEC 60079-15 : 2010, IEC 60079-31 : 2013	Ex ia IIC T6...T4 Ga Ex ia IIIC T90 °C...T120 °C Da Ex ta IIIC T90 °C...T120 °C Da Ex ib IIC T6...T4 Gb Ex ib IIIC T90 °C...T120 °C Db Ex tb IIIC T90 °C...T120 °C Db	Input: $U_i \leq 28 \text{ V}$, $I_i \leq 120 \text{ mA}$, $P_i \leq 1.0 \text{ W}$, $C_i \leq 13.5 \text{ nF}$, $L_i \leq 53 \mu\text{H}$ PT: $U_i \leq 28 \text{ V}$, $I_i \leq 120 \text{ mA}$, $P_i \leq 1.0 \text{ W}$, $L_i \leq 53 \mu\text{H}$, $C_i \leq 13.5 \text{ nF}$
SG_X IECEx VTT 10.0005X IEC 60079-0 : 2017 IEC 60079-11 : 2011 IEC 60079-15 : 2010 IEC 60079-31 : 2013	Ex nA IIC T6...T4 Gc Ex ic IIIC T90 °C...T120 °C Dc Ex tc IIIC T90 °C...T120 °C Dc Ex ic IIC T6...T4 Gc Ex ic IIIC T90 °C...T120 °C Dc Ex tc IIIC T90 °C...T120 °C Dc	Input: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$ Input: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$, $C_i \leq 13.5 \text{ nF}$, $L_i \leq 53 \mu\text{H}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$, $C_i \leq 13.5 \text{ nF}$, $L_i \leq 53 \mu\text{H}$
SG_E6 IECEx SIR 11.0001X IEC 60079-0:2012, IEC 60079-1:2007-04, IEC 60079-31:2008	Ex d IIC T6...T4 Gb Ex tb IIIC T80 °C...T105 °C Db	Input: $U_i \leq 30 \text{ V}$, $P_i \leq 1.0 \text{ W}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 20 \text{ mA}$, $P_i \leq 1.0 \text{ W}$
INMETRO		
SG_Z NCC 12.0793 X ABNT NBR IEC 60079-0:2013 versao corrigida em 2016 ABNT NBR IEC 60079-11:2013 versao corrigida em 2017 ABNT NBR IEC 60079-31:2014	Ex ia IIC T6...T4 Ga Ex ia IIIC T6...T4 Gb	Input: $U_i \leq 28 \text{ V}$, $I_i \leq 120 \text{ mA}$, $P_i \leq 1.0 \text{ W}$, $C_i \leq 22 \text{ nF}$, $L_i \leq 53 \mu\text{H}$ PT: $U_i \leq 28 \text{ V}$, $I_i \leq 120 \text{ mA}$, $P_i \leq 1.0 \text{ W}$, $L_i \leq 53 \mu\text{H}$, $C_i \leq 22 \text{ nF}$
SG_Z NCC 12.0794X ABNT NBR IEC 60079-0:2013 Versão corrigida em 2016 ABNT NBR IEC 60079-11:2013 Versão corrigida em 2017 ABNT NBR IEC 60079-15:2012 ABNT NBR IEC 60079-31:2014	Ex nA IIC T6...T4 Gc Ex ic III C T90 °C...T120 °C Dc Ex tc IIIC T90 °C...T120 °C Dc Ex ic IIC T6...T4 Gc Ex ic III C T90 °C...T120 °C Dc Ex tc IIIC T90 °C...T120 °C Dc	Input: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$ Input: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$, $C_i \leq 22 \text{ nF}$, $L_i \leq 53 \mu\text{H}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 152 \text{ mA}$, $C_i \leq 22 \text{ nF}$, $L_i \leq 53 \mu\text{H}$
SG_E5 NCC 12.0796 X ABNT NBR IEC 60079-0:2013 ABNT NBR IEC 60079-1:2009 Versão corrigida em 2011 ABNT NBR IEC 60079-31:2014 ABNT NBR IEC 60529:2005 Versão corrigida em 2011	Ex d IIC T6...T4 Gb Ex tb IIIC T80 °C...T105 °C Db	Ex d IIC Gb T5 Gb Input: $U_i \leq 30 \text{ V}$, $P_i \leq 1.0 \text{ W}$ PT: $U_i \leq 30 \text{ V}$, $I_i \leq 20 \text{ mA}$, $P_i \leq 1.0 \text{ W}$
cCSAus		
SG_E2 CSA 1980091 CSA Std C22.2 No.25-1966, CSA Std C22.2 No.30-M1986, CAN/ CSA-C22.2 No.94-M91, C22.2 No. 142-M1987, CAN/CSA C22.2 61010-1-04, CAN/CSA-C22.2 No 60079-0-07, CAN/CSA-C22.2 No 60079-1-07, CAN/ CSA C22.2 No 60079-31-12, CAN/CSA- C22.2 No. 60529-05, FM 3600 (1998), FM 3615 (2006), FM 3810 (2005), ANSI/ NEMA 250-1991, ISA 60079-0-07, ISA 60079-1- 07, ISA 60079-31-2009, ANSI/IEC 60529:2004	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 T6...T4 AEx d IIC T6...T4 Ex tb IIIC T100 °C IP66 AEx tb IIIC T100 °C IP66	Input: $U_i \leq 30 \text{ V}$, $P_i \leq 1.05 \text{ W}$ PT: $U_i \leq 30 \text{ V}$, $P_i \leq 1.05 \text{ W}$
SG_U CSA 1552597 CSA C22.2 No. 0-M91, CSA C22.2 No. 94-M91, CSA C22.2 No. 142-M1987, CSA C22.2 No. 157-92, CSA C22.2 No. 213-M1987, CSA C22.2 No. 60079-0:11, CSA C22.2 No. 60079-11:11, CSA C22.2 No. 60079-15:12, CSA C22.2 No. 60529:05, ANSI/ISA 60079-0: 2009, ANSI/ISA 60079-11: 2012, ANSI/ISA 60079-15: 2012, FM 3600 November 1998, FM 3610 October 1999, FM 3611 October 1999, FM 3810-2005, ANSI/ NEMA 250:1991, ANSI/IEC 60529:2004	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	Input: $U_i (V_{\text{max}}) = 28 \text{ V}$, $I_i (I_{\text{max}}) = 120 \text{ mA}$, $P_i = 1 \text{ W}$, $C_i = 22 \text{ nF}$, $L_i = 53 \mu\text{H}$ Output: $U_i (V_{\text{max}}) = 28 \text{ V}$, $I_i (I_{\text{max}}) = 120 \text{ mA}$, $P_i = 1 \text{ W}$, $C_i = 22 \text{ nF}$, $L_i = 53 \mu\text{H}$

Other hazardous area approval

CCOE / PESO Ex d, Ex ia
 GOST R Ex d, Ex ia
 KOSHA Ex ia, Ex nA
 NEPSI Ex d, Ex ia

Electromagnetic protection

Electromagnetic compatibility
 Emission acc. to EN 61000-6-4 (2007)
 and FCC 47 CFR PART 15,
 SUBPART B, CLASS B (2002)
 Immunity acc. to EN 61000-6-2 (2005)

CE marking

EMC 2004/108/EC
 ATEX 2014/34/EU



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

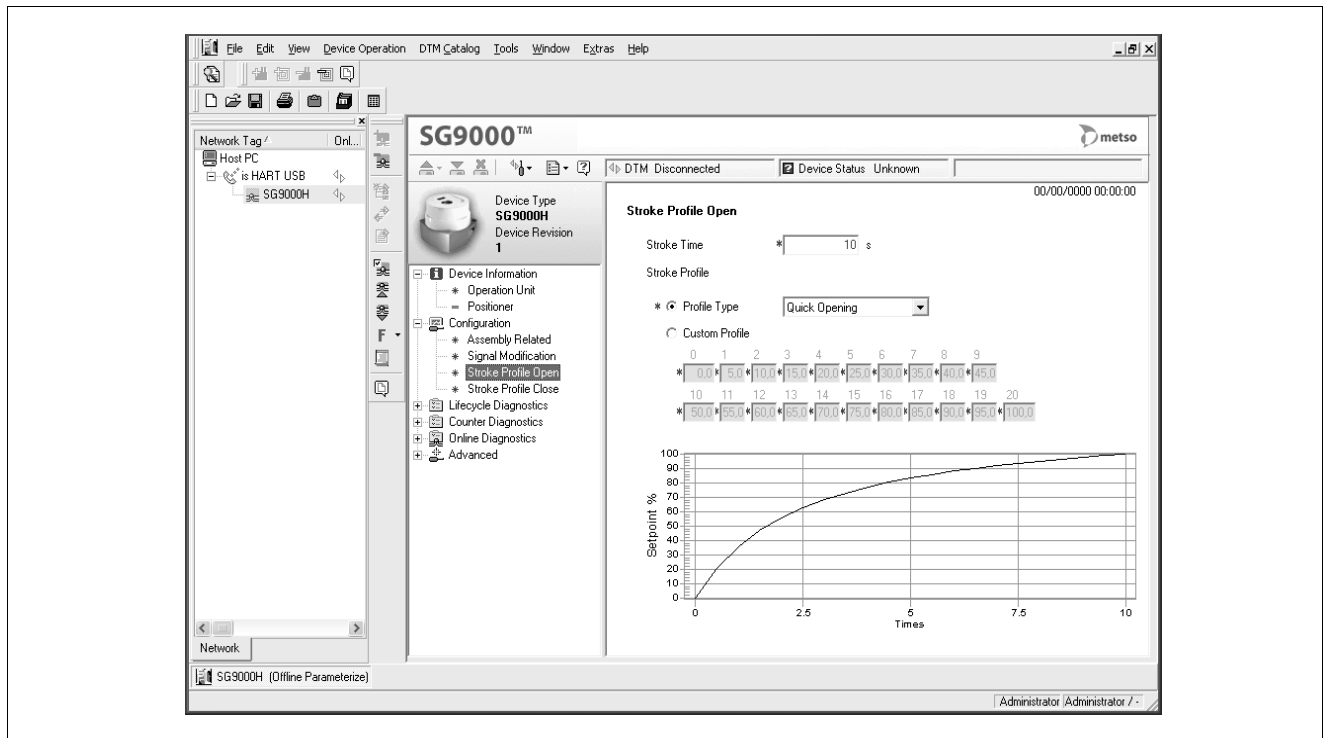
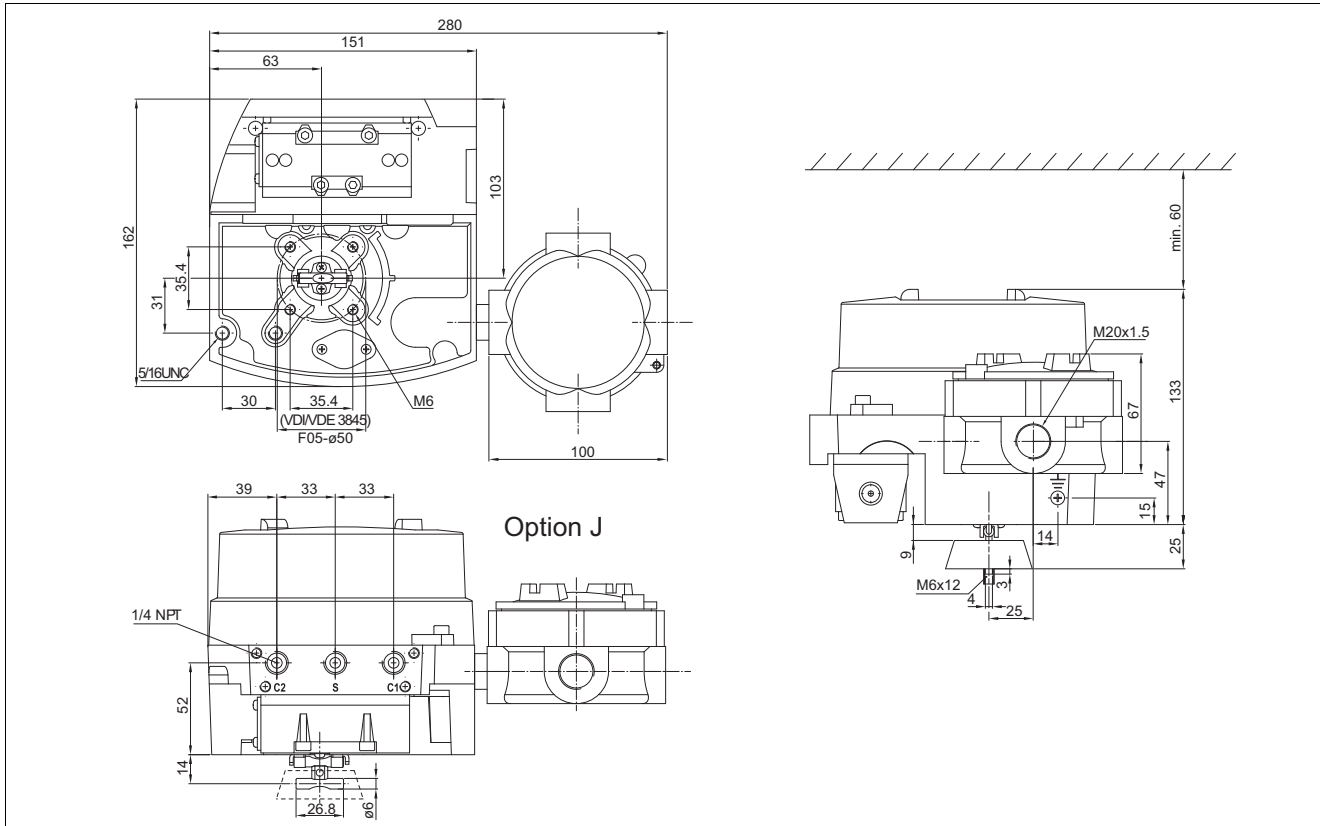


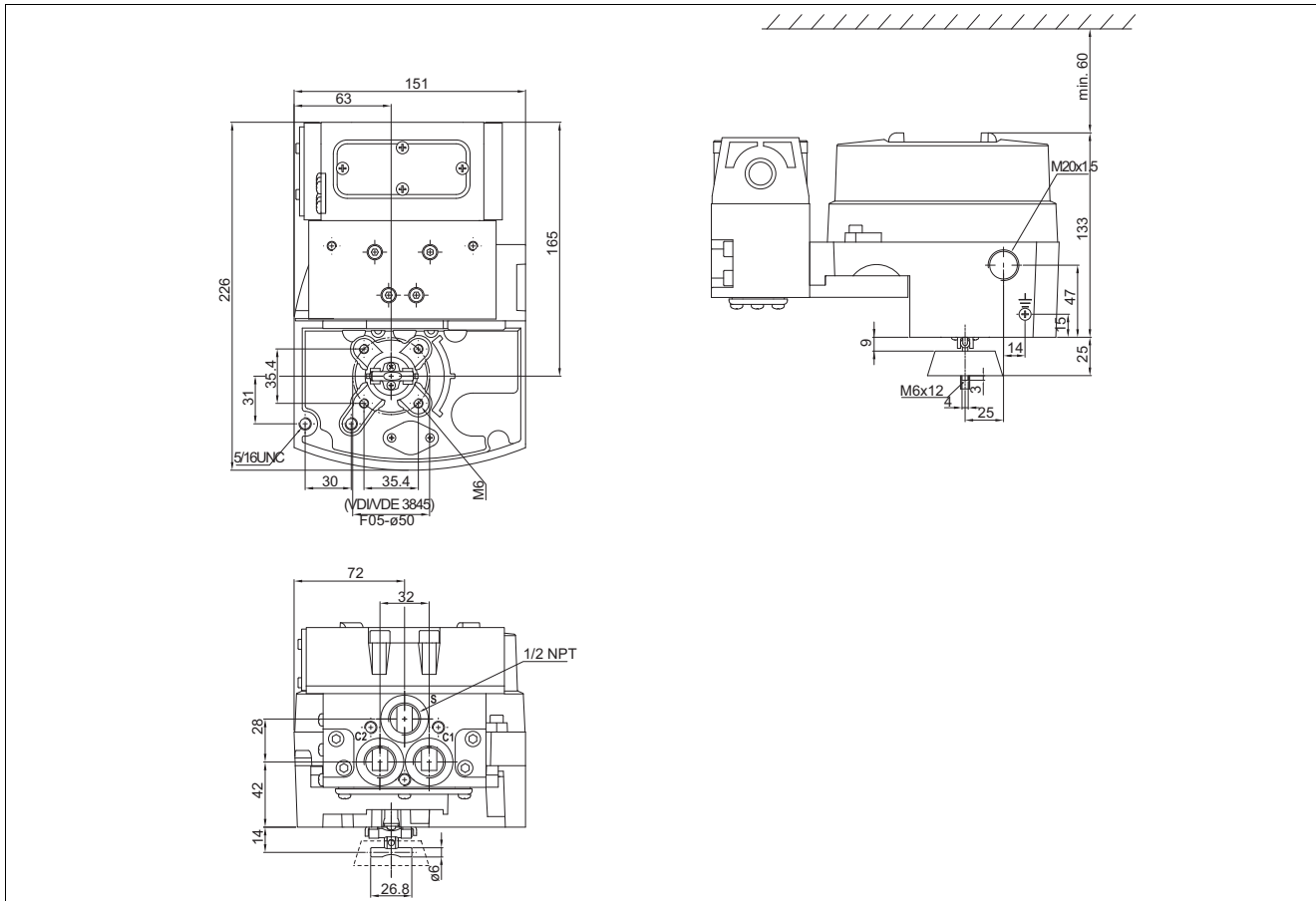
Fig. 2 Configuration is easy to do with DTM, graphical user interface. E.g. pre-selected profiles for opening and closing enable fast and easy stroke setup.

Dimensions (mm)

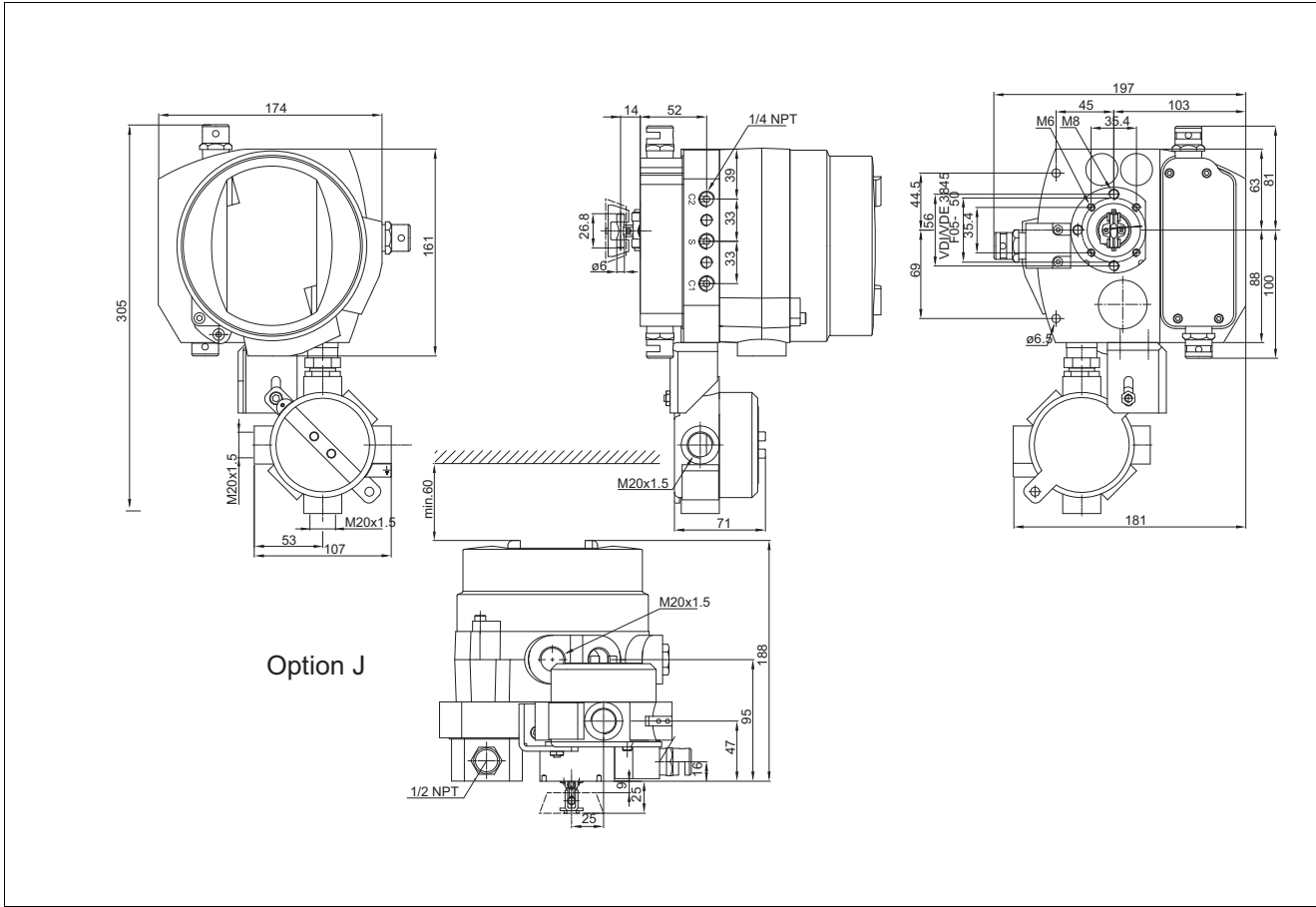
SG921_J



SG923_



SG931_J with limit switches



How to order SwitchGuard SG9000H

1.	2.	3.	4.	5.	6.	7.	8.
SG	9	2	15	H	E6	/	D33

1.	PRODUCT GROUP	
SG	Neles SwitchGuard SG9000H, intelligent on/off valve controller.	
2.	SERIES CODE	
9	Series 9000 Intelligent on/off 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	
	Standard temperature range -40 to +85 °C / -40 to +85 °F. M20 x 1.5 conduit entry.	
2	Standard anodized aluminium enclosure, IP66 / NEMA 4X.	
3	Stainless steel enclosure, IP66 / NEMA 4X, no glass window.	
4.	SPOOL VALVE	CONNECTIONS
12	Restricted capacity. Stroke volume of actuator 0.3 - 6.7 dm ³ .	S, C1, C2 = 1/4 NPT
15	Standard capacity. Stroke volume of actuator > 0.6 dm ³ .	S, C1, C2 = 1/4 NPT
35	High capacity. Stroke volume of actuator > 3.5 dm ³ . Not applicable to 3. sign "3".	S, C1, C2 = 1/2 NPT
37	Extended capacity. For single acting actuators. Stroke volume of actuator > 6.5 dm ³ . Not applicable to 3. sign "3".	S = 1/2 NPT, C2 = 1 NPT
5.	COMMUNICATION / INPUT SIGNAL RANGE	
H	4-20 mA, HART communication.	
6.	APPROVALS FOR HAZARDOUS AREAS	
N	No approvals for hazardous areas.	
N7	No approvals for hazardous areas. Like N, but this is with Russian language machine plate.	
	ATEX and IECEx certifications: II 1 G Ex ia IIC T6...T4 Ga II 1 D Ex ia IIIC T90 °C...T120 °C Da II 1 D Ex ta IIIC T90 °C...T120 °C Da II 2 G Ex ib IIC T6...T4 Gb II 2 D Ex ib IIIC T90 °C...T120 °C Db II 2 D Ex tb IIIC T90 °C...T120 °C Db T4: -40 to +80 °C; T5: < +65 °C; T6: < +50 °C.	
X	II 3 G Ex nA IIC T6...T4 Gc II 3 D Ex ic IIIC T90 °C...T120 °C Dc II 3 D Ex tc IIIC T90 °C...T120 °C Dc II 3 G Ex ic IIC T6...T4 Gc II 3 D Ex ic IIIC T90 °C...T120 °C Dc II 3 D Ex tc IIIC T90 °C...T120 °C Dc T4: -40 to +85 °C; T5: < +75 °C; T6: < +60 °C. Available without limit switches or with ATEX or IECEx certified inductive limit switches.	
X7	TR CU (Russian) certification: 0Ex ia IIC T6...T4 Ga X / Ex ia IIIC T95 °C...T125 °C Da X 0Ex ia IIC T6...T4 Ga X / Ex ta IIIC T95 °C...T125 °C Da X 1Ex ib IIC T6...T4 Gb X / Ex ib IIIC T95 °C...T125 °C Db X 1Ex ib IIC T6...T4 Gb X / Ex tb IIIC T95 °C...T125 °C Db X 2Ex nA IIC T6...T4 Gc X / Ex ic IIIC T95 °C...T125 °C Dc X 2Ex nA IIC T6...T4 Gc X / Ex tc IIIC T95 °C...T125 °C Dc X 2Ex ic IIC T6...T4 Gc X / Ex ic IIIC T95 °C...T125 °C Dc X 2Ex ic IIC T6...T4 Gc X / Ex tc IIIC T95 °C...T125 °C Dc X Temperature range: Ta according to separate table (see certificate). Available without limit switches or with certified inductive limit switches.	
X8	CCC (Chinese) certification: Pending for approval	
Z	INMETRO certifications: Ex ia IIC T6...T4 Ga Ex ia IIC T6...T4 Gb Temperature range: T4: -40 to +80 °C; T5: < +65 °C; T6: < +50 °C. Ex nA IIC T6...T4 Gc Ex ic IIC T6...T4 Gc Temperature range: T4: -40 to +80 °C; T5: < +65 °C; T6: < +50 °C. Available without limit switches or with certified inductive limit switches.	
U	cCSAus certifications: IS Class I, Division 1, Groups A, B, C, D, T4/T5/T6 IS Class I, Zone 0, AEx ia, IIC T4/T5/T6 T4: -40 to +80 °C, T5: < +65 °C, T6: < +50 °C. NI Class I, Division 2, Groups A, B, C, D, T4/T5/T6 NI Class I, Zone 2, Ex nA IIC, T4/T5/T6 T4: -40 to +85 °C, T5: < +70 °C, T6: < +55 °C. Not applicable with 7. sign "J". Not available with limit switches.	

6.	APPROVALS FOR HAZARDOUS AREAS	
E2	Flameproof enclosure, 1/2" NPT conduit entry. cCSAus certification: Class I, Div 1, Groups B, C, D; Class II, Div 1, Groups E, F, G; Class III; T6...T4, Enclosure type 4X Ex d IIC T6...T4 AEx d IIC T6...T4 Ex tb IIIC T100 °C IP66 AEx tb IIIC T100 °C IP66 T6: -40 °C to +60 °C; T5: < +75 °C; T4: < +85 °C. No glass window. Available with or without limit switches.	
E5	INMETRO certifications: Ex d IIC T6...T4 Gb Ex tb IIIC T80 °C...T105 °C Db Available with or without limit switches	
E6	ATEX and IECEx certifications: II 2 GD Ex d IIC T6...T4 Gb Ex tb IIIC T80 °C...T105 °C Db Available with or without limit switches.	
E7	TR CU (Russian) certification: IEx d IIC T6...T4 Gb X / Ex tb IIIC T80 °C...T105 °C Db X Temperature range: Ta according to separate table (see certificate). Available with or without limit switches.	
E8	CCC (Chinese) certification: Pending for approval	
7.	OPTIONS OF VALVE CONTROLLER	
T	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.	
J	External junction box, 2 pcs M20x1.5 conduit entry. NOT applicable to 6. sign "E2". Junction box for all 4-20 mA wirings, including position transmitter, if applicable. Junction box is attached to the standard enclosure. Not available with 6. sign "U".	
Y	Special construction.	
8.	LIMIT SWITCH TYPE	
	IP 66 / NEMA 4X enclosure. Extension housing with additional conduit entries, max 4 pcs. M20 x 1.5.	
	Inductive proximity switches	
D33	Neles; SST Sensor Dual Module, NO, 8-125 V DC / 24-125 V AC Temperature range: -40 to +80 °C / -40 to +176 °F. Usable up to SIL3 acc. to IEC61508 Not applicable to 8. sign "X", "Z", or "U"	
D44	Neles; Namur Sensor Dual Module, 6 - 29 VDC, > 3 mA; < 1 mA, NAMUR NC. Usable up to SIL3 acc. to IEC61508 Temperature range -40 to +80 °C / -40 to +176 °F.	
102	P+F; NJ2-12GK-SN, 2-wire type, DC; > 3 mA; < 1 mA, NAMUR NC. Intrinsically safe according to ATEX II 1 G Ex ia IIC T6. Temperature range -40 to +85 °C / -40 to +185 °F. Usable up to SIL3 acc. to IEC61508	
109	NOTE: In safety-related applications the sensor must be operated with a qualified fail safe interface, such as P+F KFD2-SH-EX1. P+F; NCB2-12GM35-N0, 2-wire type, DC; > 3 mA; < 1 mA, NAMUR NC. Intrinsically safe according to ATEX II 2 G Ex ia IIC T6. Temperature range -25 to +85 °C / -13 to +185 °F. Usable up to SIL2 acc. to IEC61508.	
132	Omron; E2E-X2Y1; 2-wire type; AC; <100mA; 24-240VAC. Temperature range: -40 to +85 °C / -40 to +185 °F Not applicable to 8. sign "X", "Z" or "U".	
145	P+F; NJ3-18GK-S1N, 3-wire type, DC; > 3 mA; < 1 mA, NAMUR NO. Intrinsically safe according to ATEX II 1 G Ex ia IIC T6. Temperature range -25 to +85 °C / -13 to +185 °F. Usable up to SIL3 acc. to IEC61508.	
156	NOTE: In safety-related applications the sensor must be operated with a qualified fail safe interface, such as P+F KFD2-SH-EX1. ifm; IFC2002-ARKG/UP, 2-wire type, DC; 150 mA, 10 - 36 V DC, leakage current < 0.6 mA. Temperature range -25 to +80 °C / -13 to +176 °F. Not applicable to 8. sign "X", "Z" or "U".	
157	P+F; NJ2-V3-N, 2-wire type, DC; > 3 mA; < 1 mA. NAMUR NC. Temperature range: -25° to +85 °C / -13° to +185 °F. Intrinsically safe according to ATEX and IECEx. Usable up to SIL2 acc. to IEC61508. Applicable to 6. sign "X", "U"	

8.	LIMIT SWITCH TYPE
158	4 pcs of P+F; NJ2-V3-N, 2-wire type, DC; > 3 mA; < 1 mA. NAMUR NC. Temperature range: -25 to +85 °C / -13 to +185 °F Intrinsically safe according to ATEX and IECEx. Usable up to SIL2 acc. to IEC61508. Applicable to 6. sign "X", "U"
160	P+F; NCB2-12GM40-E2-3G-3D, 3-wire type, PNP NO, 0...200 mA, 10...30 V DC Intrinsically safe according to ATEX II 2 G Ex ia IIC T6. Temperature range -25 to +70 °C / -13 to +158 °F Applicable to 6. sign "X" (nA approval only, suitable for Zone 2) or "U"
R01	Reed Type Proximity Switches, 2 pcs. Temperature range -40 to +80 °C / -40 to +176 °F Neles; Maxx-Guard G, SPDT, 300 mA, 24 VDC; 200 mA, 125 VAC Usable up to SIL3 acc. to IEC61508 Not applicable to 8. sign "X", "Z" or "U".
R02	Neles; Maxx-Guard M, Reed, SPDT, passive, intrinsically safe, 300 mA, 24 VDC Temperature range -40 to +80 °C / -40 to +176 °F Usable up to SIL3 acc. to IEC61508 Applicable to 6. sign "X".
R04	Neles; Maxx-Guard H, Reed, SPDT, Vmax 240 v, Imax 3A, Vmax 100W. Temperature range -40 to +80 °C / -40 to +176 °F Usable up to SIL 3 acc. to IEC61508 Applicable to 6. sign "E6" or "E7".

8.	LIMIT SWITCH TYPE
	Mechanical micro switches Temperature range -40 to +85 °C / -40 to +185 °F
K25	2 pcs. Omron D2VW-5L2A-1MS; 3 A – 250 VAC, 0.4 A – 125 VDC, 5 A – 30 V DC. Not applicable to 8. sign "X", "Z" or "U".
K26	2 pcs. Omron D2VW-01L2A-1MS; gold plated contacts, 100 mA – 30 V DC / 125 VAC.
K45	4 pcs. Omron D2VW-5L2A-1MS; 3 A – 250 VAC, 0.4 A – 125 VDC, 5 A – 30 V DC. Not applicable to 8. sign "X", "Z" or "U".
K46	4 pcs. Omron D2VW-01L2A-1MS; gold plated contacts, 100 mA – 30 VDC / 125 VAC. Not applicable to 8. sign "X", "Z" or "U".
U24	U/I Converter, Seneca K109UI. DC Input. Input voltage 0–30 V DC. Power/Supply: 19.2–30 V DC. Power consumption: 500 mW.

Additional accessories

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K	SG9215 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 SG9200 & SG9300 option A3 (1/4NPT AIR CONNECTION) A large capacity filter regulator (not K) must be used for actuator bigger than BC 40 and Bj 32. Installation with mounting bracket. Use large capacity filter regulator also with SG923_. A large capacity filter regulator (not K) must be used for actuator bigger than BC 40 and Bj 32. Installation with mounting bracket.

-- □	CONDUIT ENTRY NIPPLES
CE07	1/2 NPT conduit entry nipples M20x1,5 / 1/2 NPT Code: H037029
CE09	1/2 NPT conduit entry nipples Brass M20x1,5 / 1/2 NPT, E xd approved Code: K0148
CE19	1/2 NPT conduit entry nipples stainless steel M20x1.5 / 1/2 NPT, E xd approved Code: H7599

-- □	CABLE GLANDS
CG5	M20 x 1,5 for Neles limit switches, SG92_N_ (code H6870 grey/ plastic, IP66)
CG6	M20 x 1,5 blue/plastic, IP66, Ex e

-- □	PRESSURE GAUGES AND CONNECTION BLOCKS
	Pressure gauge A3: scale bar/psi/kPa (bar/psi/ kg/cm ²), basic material brass, nickel plated, housing stainless steel AISI 304, glycerine filled. Temperature range -40...+85 °C / -40...+185 °F Pneumatic connection block, material AISiMg, anodized grey.
A3	Pressure gauges with connections 1/4 NPT (S, C1, C2) for VG921_._ AISI 304
A7	Pressure gauges with connections 1/4 NPT for VG93_._ AISI 316
A8	Pressure gauges with connections 1/2" NPT (S, C1, C2) for VG9235_._ AISI 304
A9	Pressure gauges with connections 1/2" NPT (S) and 1" NPT (C2) for VG9237_._ AISI 304
A10	Pressure gauges with connections 1/4 NPT for SG93_._ AISI 316, pressure gauges for severe off-shore use, safety glass window.

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