



Application

Single-acting or double-acting positioner for attachment to pneumatic control valves.
Self-calibrating, automatic adaptation to valve and actuator.

Set point 4 to 20 mA
Valve travel 3.6 to 300 mm
Opening angle 24 to 100°

The positioner ensures a predetermined assignment of the valve position to the input signal. It compares the input signal received from a control system to the travel or rotational angle of the control valve and issues a corresponding output signal pressure (output variable).

Special features

- High air capacity
- Simple attachment to all common linear and rotary actuators:
 - SAMSON direct attachment
 - NAMUR rib
 - Attachment to rod-type yokes according to IEC 60534-6-1
 - Attachment according to VDI/VDE 3847
 - Rotary actuator attachment according to VDI/VDE 3845
- Non-contact position sensing
- Plain-text display with NAMUR Recommendation NE 107 states and messages on the device
- Integrated diagnostic functions
- Simple one-knob, menu-driven operation
- LCD easy to read in any mounting position thanks to selectable reading direction
- Configurable with a computer over the SSP interface using the TROVIS-VIEW software
- Variable, automatic start-up with four different initialization modes
- Sub (substitution) initialization mode allows the positioner to be started up in case of emergency whilst the plant is running without having to change the valve position.
- All parameters saved in non-volatile EEPROM
- Two-wire system with a small electrical load of 465 Ω
- Adjustable tight-closing function
- Continuous zero monitoring



Fig. 1: TROVIS 3730-3 Electropneumatic Positioner

- Integrated temperature sensor and operating hours counter
- Self-diagnostics, messages as condensed state conforming to NAMUR Recommendation NE 107
- Integrated EXPERTplus diagnostics for control valves (► T 8389-3)
- Optional additional functions: position transmitter, inductive limit contacts, software limit contacts, forced venting function, binary input, binary output ¹⁾

¹⁾ Only in combination with limit contacts

Design and principle of operation

The TROVIS 3730-3 Electropneumatic Positioner is mounted on pneumatic control valves and used to assign the valve position (controlled variable x) to the control signal (set point w). The positioner compares the electric control signal of a control system to the travel or opening angle of the control valve and issues a signal pressure for the pneumatic actuator.

The positioner mainly consists of a non-contact travel sensor system (2), pneumatics and the electronics with the microcontroller (4). The valve position is transmitted either as an angle of rotation or a travel to the pick-up lever, from there to the travel sensor (2) and forwarded to the microcontroller (4). The PID algorithm in the microcontroller compares the valve position measured by the travel sensor (2) to the 4 to 20 mA DC control signal issued by the control system after it has been converted by the A/D converter (3).

In case of a set point deviation, the activation of the i/p module (7) is changed so that the actuator of the control valve (1) is pressurized or vented accordingly over the downstream air capacity booster (6). As a result, the closure member of the valve (e.g. plug) is moved to the position determined by the set point.

The positioner is operated by a rotary pushbutton (10) for menu navigation on the plain-text display (11).

The extended EXPERTplus diagnostics are integrated into the positioner. They provide information on the control valve and positioner and generate diagnostic and status messages, which allow faults to be pinpointed quickly.

Version

- **TROVIS 3730-3** · Electropneumatic positioner for control valves, HART® communication, on-site operation, local communication with SSP interface, EXPERTplus diagnostics

Optional modules

The optional additional functions of the TROVIS 3730-3 Positioner allows it to be adapted to specific requirements. The following additional functions are available:

- Position transmitter
- Inductive limit contacts
- Software limit contacts
- Forced venting
- Binary input
- Binary output (only in combination with limit contacts)

If the positioner is ordered with additional functions, they are ready installed and connected upon delivery.

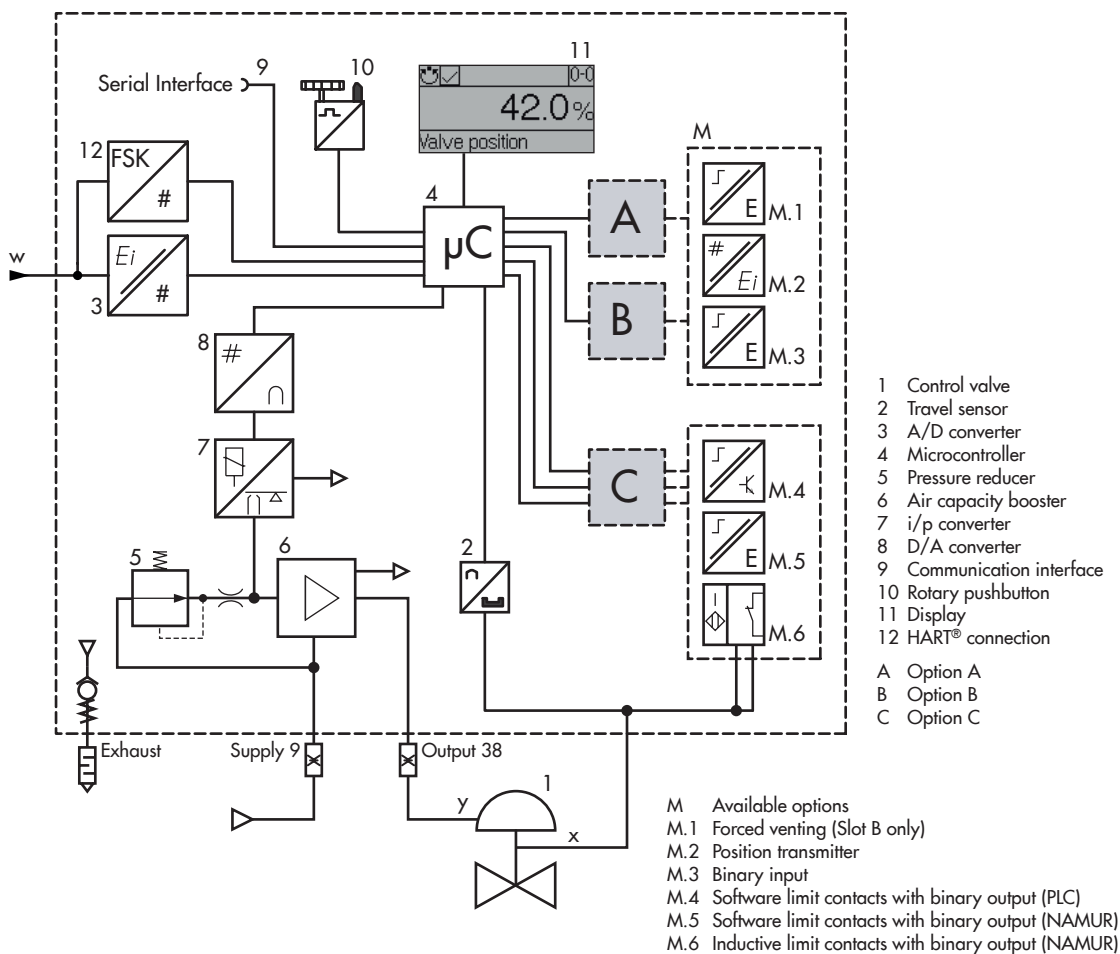






Fig. 2: Block diagram of TROVIS 3730-3 Positioner

Technical data · TROVIS 3730-3 Positioner

Travel		
Adjustable travel for	Direct attachment to Type 3277: Attachment according to IEC 60534-6 (NAMUR): Attachment according to VDI/VDE 3847 Attachment to rotary actuators:	3.6 to 30 mm 3.6 to 300 mm 3.6 to 300 mm 24 to 100°
Travel range	Adjustable within the initialized travel/angle of rotation of the valve; travel can be restricted to 1/5 at the maximum.	
Set point w		
Signal range	4 to 20 mA · Two-wire device, reverse polarity protection · Minimum span 4 mA	
Static destruction limit	40 V, internal current limit approx. 40 mA	
Minimum current	3.75 mA for display/operation (HART® communication and configuration) 3.90 mA for pneumatic functions	
Load impedance	≤ 9.3 V (corresponds to 465 Ω at 20 mA)	
Supply air		
Supply air	1.4 to 7 bar (20 to 105 psi)	
Air quality acc. to ISO 8573-1	Max. particle size and density: Oil content: Pressure dew point:	Class 4 Class 3 Class 3 or at least 10 K below the lowest ambient temperature expected
Hysteresis	≤0.3 %	
Sensitivity	≤0.1 %	
Characteristic	Linear/Equal percentage/Reverse equal percentage/SAMSON butterfly valve	
Transit time	Venting or filling with air adjustable separately up to 240 s by software	
Direction of action	Reversible	
Air consumption, steady state	Independent of supply air approx. 65 l _n /h	
Air output capacity (when Δp = 6 bar)		
To fill actuator with air	8.5 m _n ³ /h · At Δp = 1.4 bar: 3.0 m _n ³ /h · K _{vmax} [20 °C] = 0.09	
To vent actuator	14.0 m _n ³ /h · At Δp = 1.4 bar: 4.5 m _n ³ /h · K _{vmax} [20 °C] = 0.15	
Environmental conditions and permissible temperatures		
Permissible environmental conditions according to EN 60721-3		
Storage	1K6 (relative humidity ≤95 %)	
Transport	2K4	
Operation	-20 to +85 °C: All versions -40 to +85 °C: With metal cable glands -55 to +85 °C: Low-temperature version with metal cable glands Observe the limits in the test certificate for explosion-protected versions.	
Resistance to vibration		
Vibrations (sinusoidal)	According to DIN EN 60068-2-6: 0.15 mm, 10 to 60 Hz; 20 m/s ² , 60 to 500 Hz per axis 0.75 mm, 10 to 60 Hz; 100 m/s ² , 60 to 500 Hz per axis	
Bumps (half sine)	According to DIN EN 60068-2-29: 150 m/s ² , 6 ms; 4000 bumps per axis	
Noise	According to DIN EN 60068-2-64: 10 to 200 Hz: 1 (m/s ²) ² /Hz 200 to 500 Hz: 0.3 (m/s ²) ² /Hz 4 h/axis	
Recommended continuous duty	≤20 m/s ²	
Influences		
Temperature	≤0.15 %/10 K	
Supply air	None	
Requirements		
EMC	Complying with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21	
Degree of protection	IP 66/NEMA 4X	

Electrical connections	
Cable glands	One M20x1.5 cable gland for 6 to 12 mm clamping range Second M20x1.5 threaded connection additionally available
Terminals	Screw terminals for 0.2 to 2.5 mm ² wire cross-section
Explosion protection	
ATEX, IECEx	Refer to Table 1
Materials	
Housing and cover	Die-cast aluminum EN AC-ALSi12(Fe) (EN AC-44300) acc. to DIN EN 1706, chromated and powder paint coated · Special version: stainless steel 1.4408
Window	Makrolon® 2807
Cable glands	Polyamide, nickel-plated brass, stainless steel 1.4305
Other external parts	Stainless steel: 1.4571 and 1.4301
Communication	
	TROVIS-VIEW with SSP/HART® Revision 7
Weight	
	Aluminum housing: approx. 1.0 kg · Stainless steel housing: approx. 2.2 kg

Table 1: Summary of explosion protection approvals

	Certification			Type of protection/comments
		Number	Date	
TROVIS 3730-3-	-110	 EU type examination certificate	BVS 18 ATEX E 044 X 2018-06-07	II 2G Ex ia IIC T6 Gb/ II 2D Ex ia IIIC T85 °C Db IP66
	-510	 EU type examination certificate	BVS 18 ATEX E 044 X 2018-06-07	II 2D Ex tb IIIC T85 °C Db
	-810	 EU type examination certificate	BVS 18 ATEX E 044 X 2018-06-07	II 3G Ex nA IIC T6 Gc/ II 3D Ex tb IIIC T85 °C Gb
	-850	 EU type examination certificate	BVS 18 ATEX E 044 X 2018-06-07	II 3G Ex nA IIC T6 Gc
	-111	IECEx	Number: IECEx BVS 18.0035X Date: 2018-07-27	Ex ia IIC T4/T6 Gb/ Ex ia IIIC T85 °C Db
	-511	IECEx	Number: IECEx BVS 18.0035X Date: 2018-07-27	Ex tb IIIC T85 °C Db
	-811	IECEx	Number: IECEx BVS 18.0035X Date: 2018-07-27	Ex tb IIIC T85 °C Db/ Ex nA IIC T4/T6 Gc
	-851	IECEx	Number: IECEx BVS 18.0035X Date: 2018-07-27	Ex nA IIC T6 Gc
	-113	EAC	Number: RU C-DE.HA65.B.00700/20 Date: 2020-08-19 Valid until: 2025-08-18	1Ex ia IIC T6...T4 Gb X Ex ia IIIC T85 °C Db X
	-115	INMETRO	Number: IEx 20.0090X Date: 2021-01-11 Valid until: 2024-01-11	Ex ia IIC T4/T6 Gb Ex ia IIC T85°C Db
	-515	INMETRO	Number: IEx 20.0090X Date: 2021-01-11 Valid until: 2024-01-11	Ex tb IIIC T85°C Db
	-855	INMETRO	Number: IEx 20.0090X Date: 2021-01-11 Valid until: 2024-01-11	Ex nA IIC T4/T6 Gc

Mounting the positioner

The positioner can be attached directly to the Type 3277 Actuator (175 to 750 cm²) over a connection block. In actuators with "actuator stem extends" fail-safe action, the signal pressure is routed over an internal hole in the actuator yoke to the actuator. In actuators with "actuator stem retracts" fail-safe action, the signal pressure is routed to the actuator over ready-made external piping.

Using the appropriate bracket, the positioner can also be attached according to IEC 60534-6-1 (NAMUR recommendation). The positioner can be mounted on either side of the control valve.

A pair of universal brackets is used for the attachment to Type 3278 Rotary Actuators or other rotary actuators according to VDI/VDE 3845. The rotary motion of the actuator is transferred to the positioner over a coupling wheel with travel indication.

A special version of the positioner allows it to be attached according to VDI/VDE 3847. This type of attachment allows the positioner to be replaced quickly while the process is running by blocking the air in the actuator. The positioner can be attached directly to the Type 3277 Actuator using an adapter bracket or adapter block. Alternatively, it can be attached to the NAMUR rib of a control valve using an additional NAMUR connection block.

Operation

The positioner is operated using one proven, user-friendly rotary pushbutton: the various menu levels, parameters and values are selected by turning the button. By pressing the button, the required setting is activated. All parameters can be checked and changed on site.

All values are displayed on the plain-text display. The reading direction of the display can be rotated by 180°.

The initialization key activates initialization which is started according to the ready adjusted parameters (autotune). After initialization is completed, the positioner immediately starts closed-loop operation.

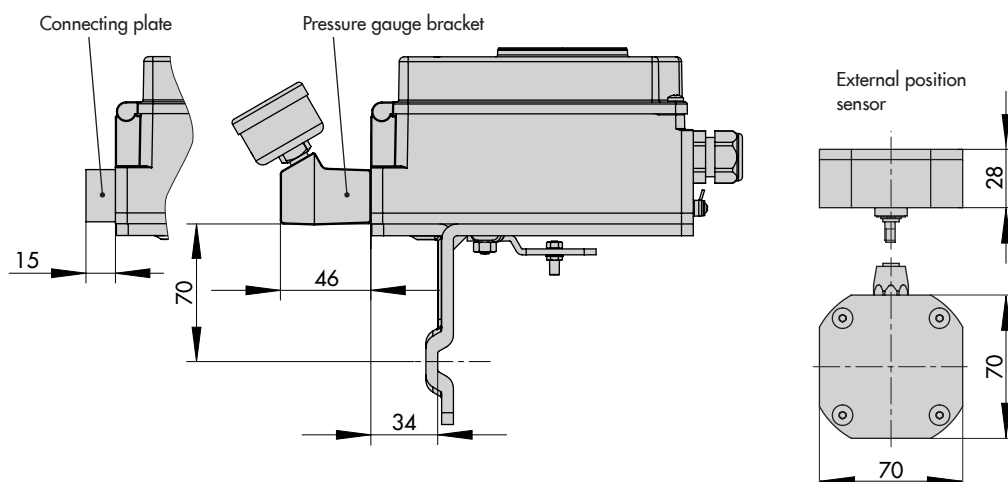
To configure the positioner with SAMSON's TROVIS-VIEW software, the positioner is equipped with an additional digital interface to be connected to the USB interface of a computer using an adapter.

Additionally, all parameters of the TROVIS 3730-3 Positioner can be accessed using HART® communication.

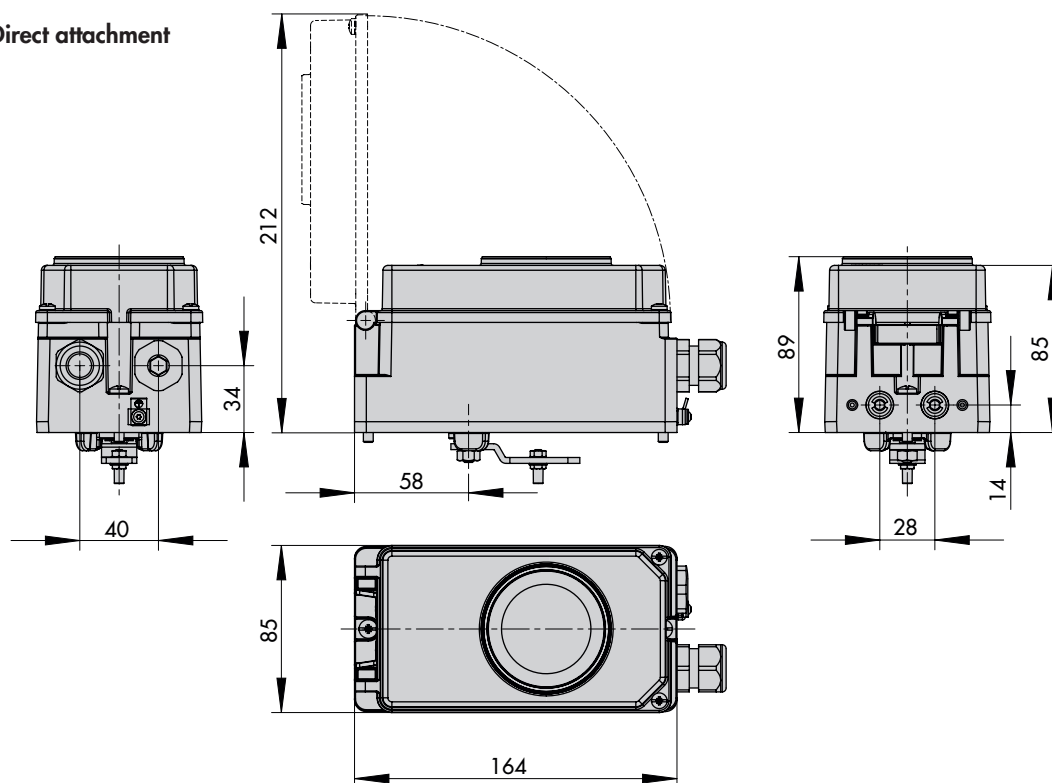
Technical data · Optional additional functions

Position transmitter		
Version	Two-wire system, galvanic isolation, reverse polarity protection, reversible direction of action	
Auxiliary power	10 to 30 V DC	
Output signal	4 to 20 mA	
Error indication	2.4 or 21.6 mA	
No-load current	1.4 mA	
Static destruction limit	38 V DC · 30 V AC	
Software limit contacts	NAMUR	PLC
Version	Galvanic isolation, reverse polarity protection, switching output acc. to EN 60947-5-6	Galvanic isolation, reverse polarity protection, binary input of a PLC acc. to EN 61131-2, $P_{\max} = 400 \text{ mW}$
Signal state	$\leq 1.0 \text{ mA}$ (non-conducting)	$R = 10 \text{ k}\Omega$ (non-conducting)
	$\geq 2.2 \text{ mA}$ (conducting)	$R = 348 \Omega$ (conducting)
Static destruction limit	32 V DC/24 V AC	32 V DC/50 mA
Binary output	NAMUR	PLC
Version	Galvanic isolation, reverse polarity protection, switching output acc. to EN 60947-5-6	Galvanic isolation, reverse polarity protection, binary input of a PLC acc. to EN 61131-2, $P_{\max} = 400 \text{ mW}$
Signal state	$\leq 1.0 \text{ mA}$ (non-conducting)	$R = 10 \text{ k}\Omega$ (non-conducting)
	$\geq 2.2 \text{ mA}$ (conducting)	$R = 348 \Omega$ (conducting)
Static destruction limit	32 V DC/24 V AC	32 V DC/50 mA
Inductive limit contacts		
Version	For connection to switching amplifier according to EN 60947-5-6, SJ2-SN proximity switches, reverse polarity protection	
Measuring plate not detected	$\geq 3 \text{ mA}$	
Measuring plate detected	$\leq 1 \text{ mA}$	
Static destruction limit	20 V DC	
Permissible ambient temperature	-50 to +85 °C	
Binary input (switching behavior configured in TROVIS-VIEW software)		
Active switching behavior (default setting)		
Connection	For external switch (floating contact) or relay contact	
Open-circuit voltage	Max. 10 V (when contact is open)	
Current draw	Max. 100 mA (pulsed when contact is closed)	
Contact	Closed: $R < 20 \Omega$; open: $R > 400 \Omega$	
Passive switching behavior		
Connection	For externally applied DC voltage, reverse polarity protection	
Voltage input	0 to 30 V	
Static destruction limit	40 V DC	
Current draw	3.7 V at 24 mA	
Switching voltage	Closed: $< 1 \text{ V}$; open: $> 6 \text{ V}$	
Forced venting		
Version	Galvanic isolation, reverse polarity protection	
Voltage input	0 to 24 V DC	
Input resistance	$\geq 7 \text{ k}\Omega$	
Signal state	Active	$U_e < 11 \text{ V}$
	Not active	$U_e > 15 \text{ V}$
Static destruction limit	38 V DC/30 V AC	

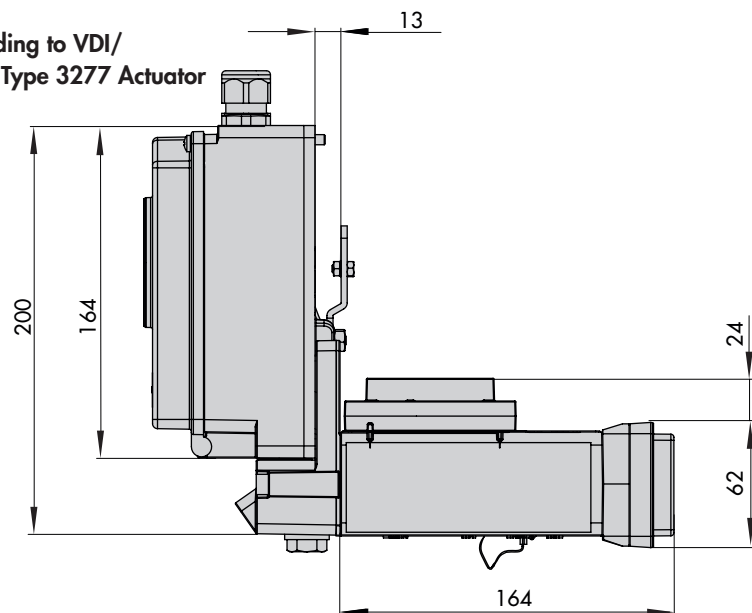
Attachment according to IEC 60534-6



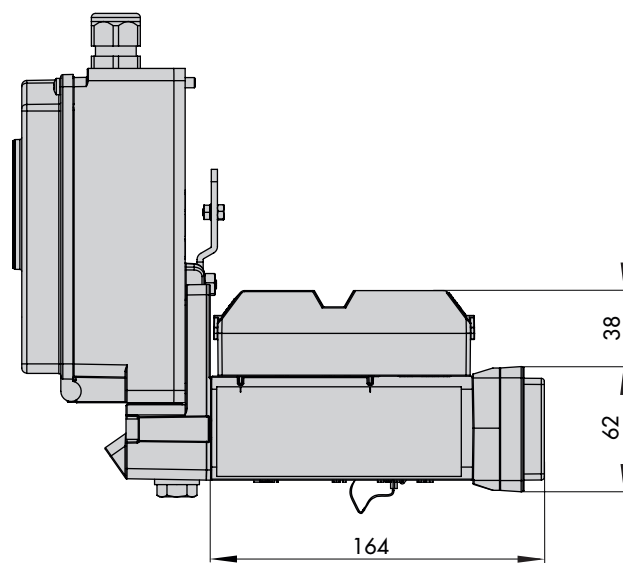
Direct attachment



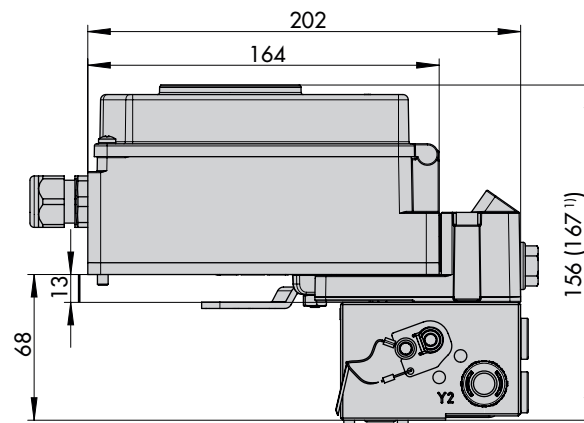
Attachment according to VDI/
VDE 3847-1 onto Type 3277 Actuator



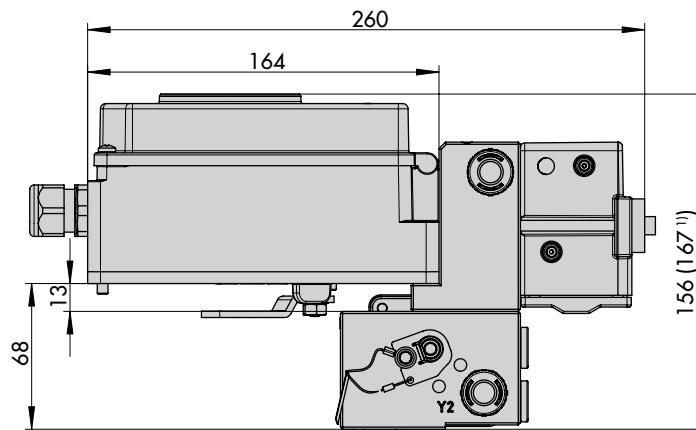
Attachment according to VDI/
VDE 3847-1 to a NAMUR rib



**Attachment according to VDI/VDE 3847-2
with single-acting actuator**

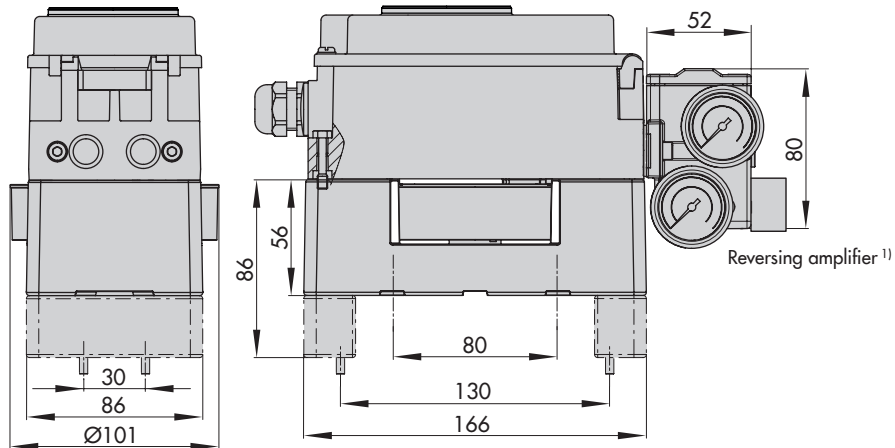


**Attachment according to VDI/VDE 3847-2
with double-acting actuator**

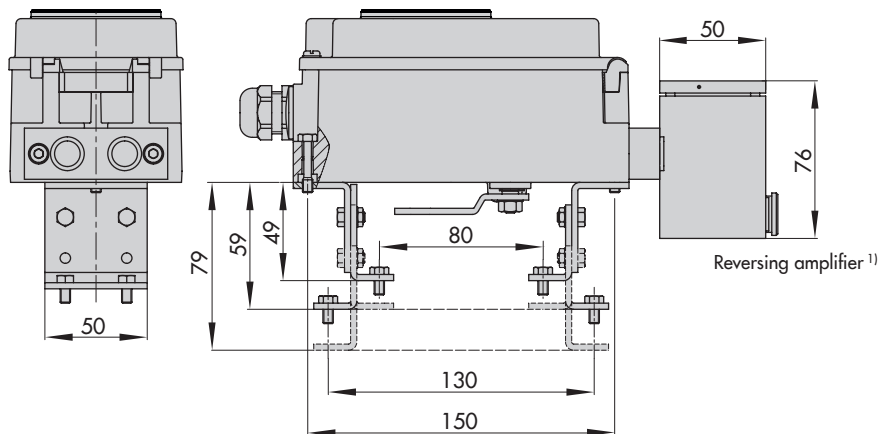


Attachment to rotary actuators according to VDI/VDE 3845

Heavy-duty version

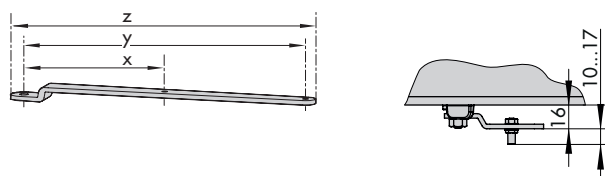


Light version



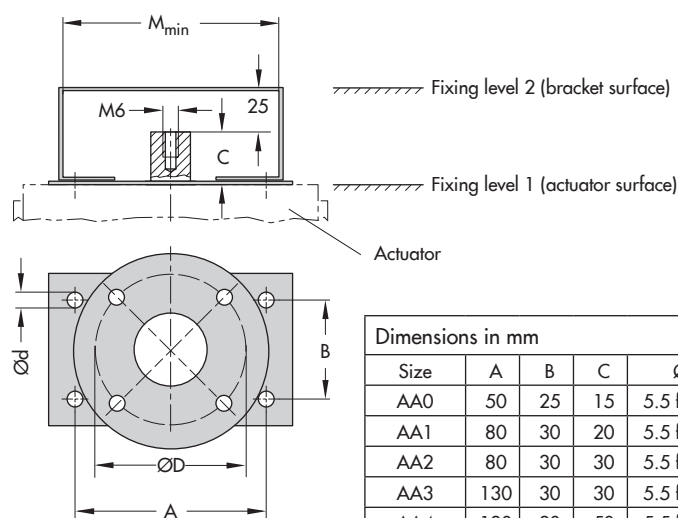
- ¹⁾ Reversing amplifiers
- Type 3710 (see drawing of heavy-duty version for dimensions)
 - 1079-1118/1079-1119, no longer available (see drawing of light version for dimensions)

Lever



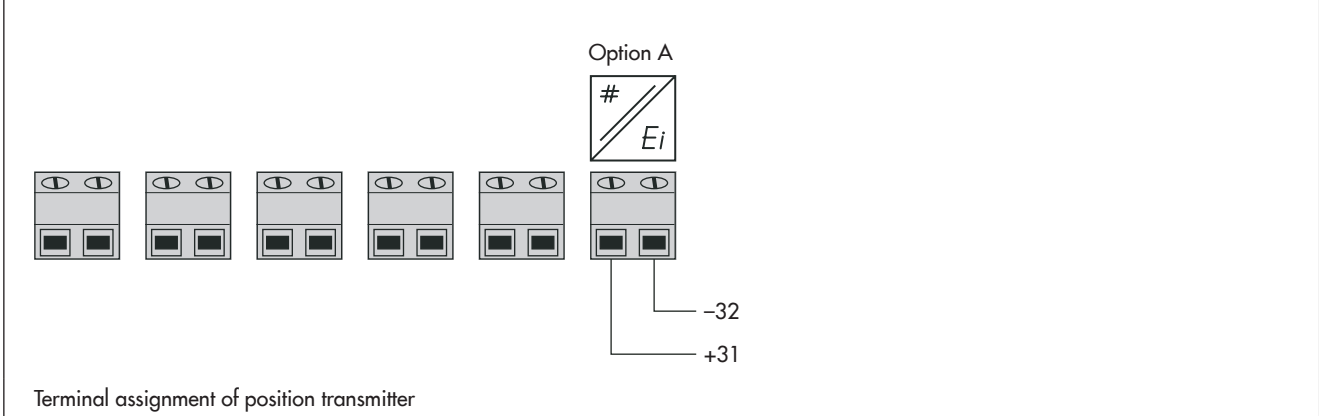
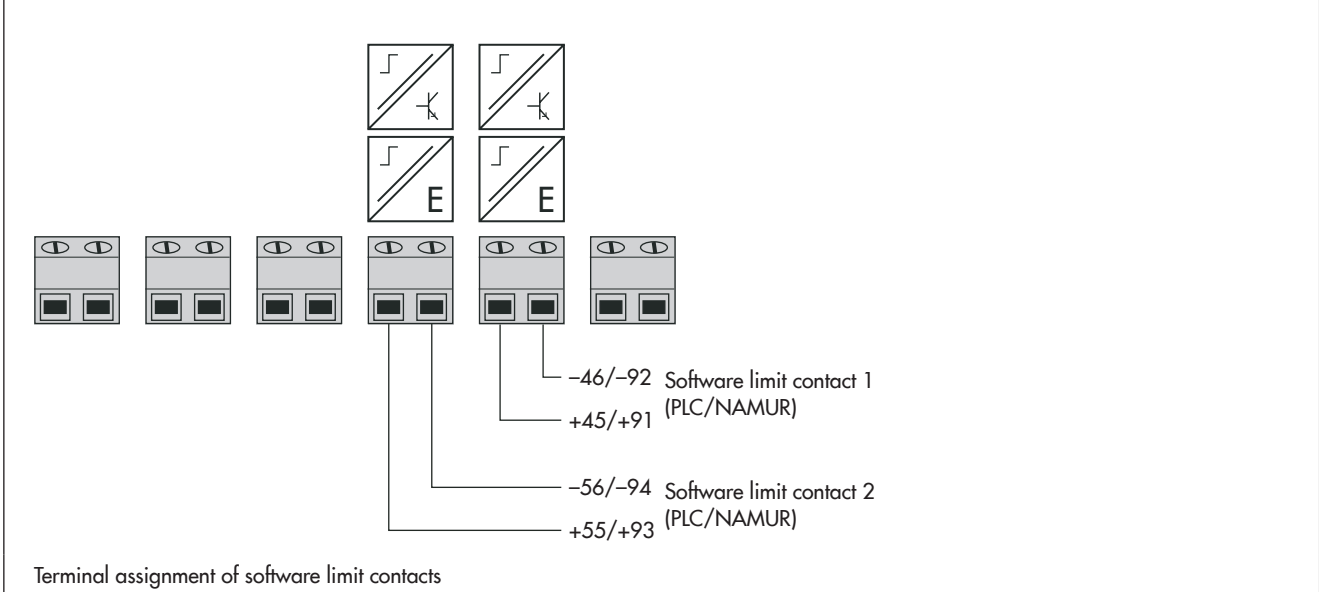
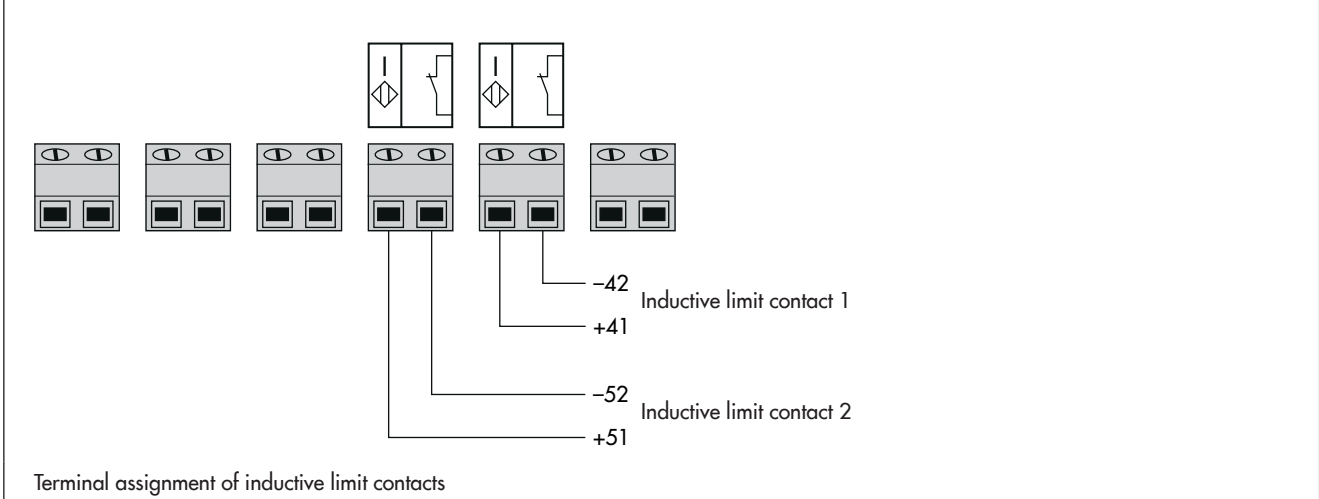
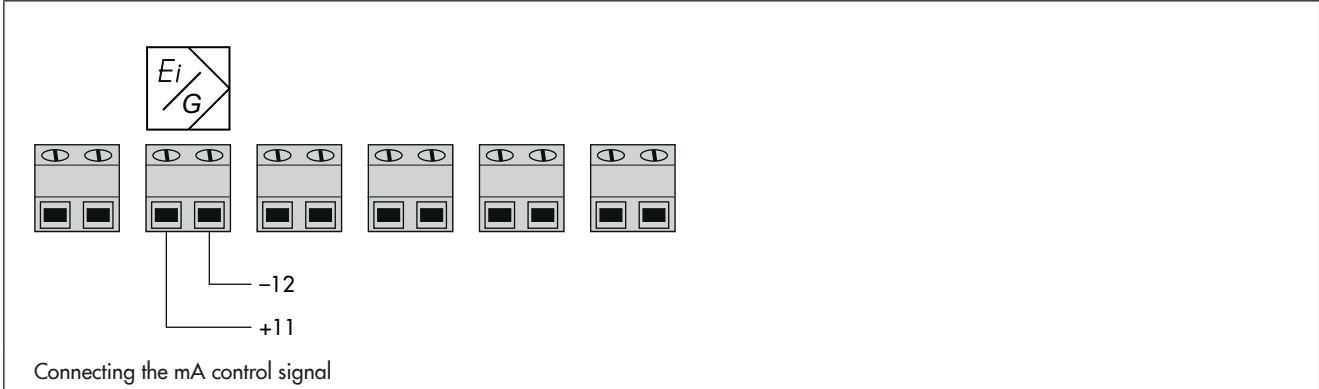
Lever	x	y	z
M	25 mm	50 mm	66 mm
L	70 mm	100 mm	116 mm
XL	100 mm	200 mm	216 mm
XXL	200 mm	300 mm	316 mm

Fixing levels according to VDI/VDE 3845 (September 2010)

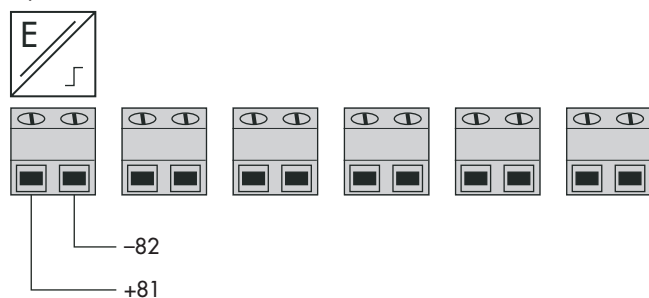


Dimensions in mm						
Size	A	B	C	Ød	M _{min}	D ¹⁾
AA0	50	25	15	5.5 for M5	66	50
AA1	80	30	20	5.5 for M5	96	50
AA2	80	30	30	5.5 for M5	96	50
AA3	130	30	30	5.5 for M5	146	50
AA4	130	30	50	5.5 for M5	146	50
AA5	200	50	80	6.5 for M6	220	50

¹⁾ Flange type F05 acc. to DIN EN ISO 5211

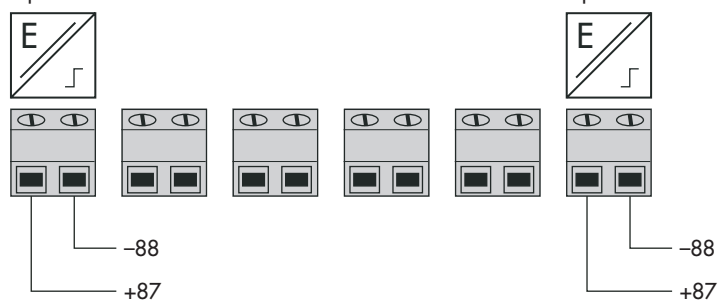


Option B

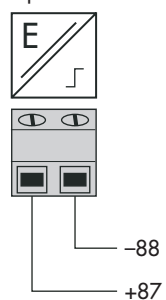


Terminal assignment of forced venting

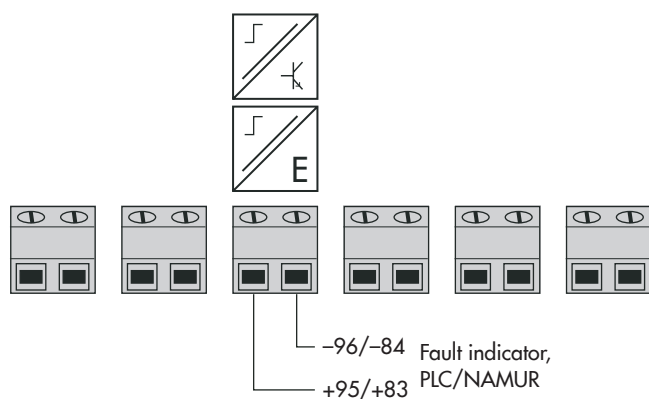
Option B



Option A



Terminal assignment of binary input



Terminal assignment of binary output (fault alarm output)

Article code

Positioner	TROVIS 3730-3- x x x 0 x x x x x 0 x x 0 x x x x 0 0 x x x x x																							
With LCD, autotune, HART® communication																								
Explosion protection																								
Without	0	0	0																					
II 2G Ex ia IIC T6 Gb/ II 2D Ex ia IIIC T85 °C Db IP66	1	1	0																					
Ex db [ia] (with field barrier)	3	9	0																					
ATEX II 2D Ex tb IIIC T85 °C Db	5	1	0																					
II 3G Ex nA IIC T6 Gc/ II 3D Ex tb IIIC T85 °C Gb	8	1	0																					
II 3G Ex nA IIC T6 Gc	8	5	0																					
Ex ia IIC T4/T6 Gb/ Ex ia IIIC T85 °C Db	1	1	1																					
Ex tb IIIC T85 °C Db	5	1	1																					
Ex tb IIIC T85 °C Db/ Ex nA IIC T4/T6 Gc	8	1	1																					
Ex nA IIC T6 Gc	8	5	1																					
EAC 1Ex ia IIC T6...T4 Gb X Ex ia IIIC T85 °C Db X	1	1	3																					
Option A																								
Without	0																							
Position transmitter 4 to 20 mA	1																							
Binary input 24 V DC	2																							
Option B																								
Without	0																							
Binary input 24 V DC	2																							
Forced venting	3																							
Option C																								
Without	0																							
2x software limit contacts + binary output (PLC)	1																							
2x software limit contacts + binary output (NAMUR)	2																							
2x inductive limit contacts + binary output (NAMUR); -50 to +85 °C	4																							
Option D																								
Without	0																							
External travel sensor with M12x1 connector; with 10 m connecting cable	1																							
Prepared for external travel sensor with M12x1 connector	2																							
Field barrier																								
Without	0																							
Prepared for Type 3770 Field Barrier	3																							
Emergency shutdown																								
3.8 mA	0																							
Electrical connection																								
Two M20x1.5 (one cable gland, one blanking plug)	1																							
Housing material																								
Aluminum EN AC-44300DF (standard)	0																							
Stainless steel 1.4408	1																							
Cover																								
With round window	1																							
Closed (without window)	2																							
Housing version																								
Standard	0	0																						
With additional vent hole and VDI/VDE 3847 adapter, without travel pick-off parts	2	0																						
With additional vent hole	2	1																						
Permissible ambient temperature																								
Standard: -20 to +85 °C	0																							
-40 to +85 °C metal cable gland	1																							
-55 to +85 °C, low-temperature version with metal cable gland	2																							
Hardware version																								
1.00.00																					9	9		
Firmware version																								
2.00.13																							9	8