

T 8484-1 EN

TROVIS 3730-1 Electropneumatic Positioner



Application

Single-acting positioner for attachment to pneumatic globe and rotary valves. Self-calibrating, automatic adaptation to valve and actuator.

Set point	4 to 20 mA
Valve travel	3.5 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

- 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
- LCD easy to read in any mounting position thanks to selectable reading direction
- Simple one-knob, menu-driven operation
- Configurable with a computer over the SSP interface using the TROVIS-VIEW software
- Variable, automatic start-up
- All parameters saved in non-volatile EEPROM
- Two-wire system with a small electrical load of 315 Ω
- Tight-closing function can be activated
- Continuous zero monitoring



Fig. 1: TROVIS 3730-1 Electropneumatic Positioner

Design and principle of operation

The TROVIS 3730-1 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 linear 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 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 (9) for menu navigation on the display (11).

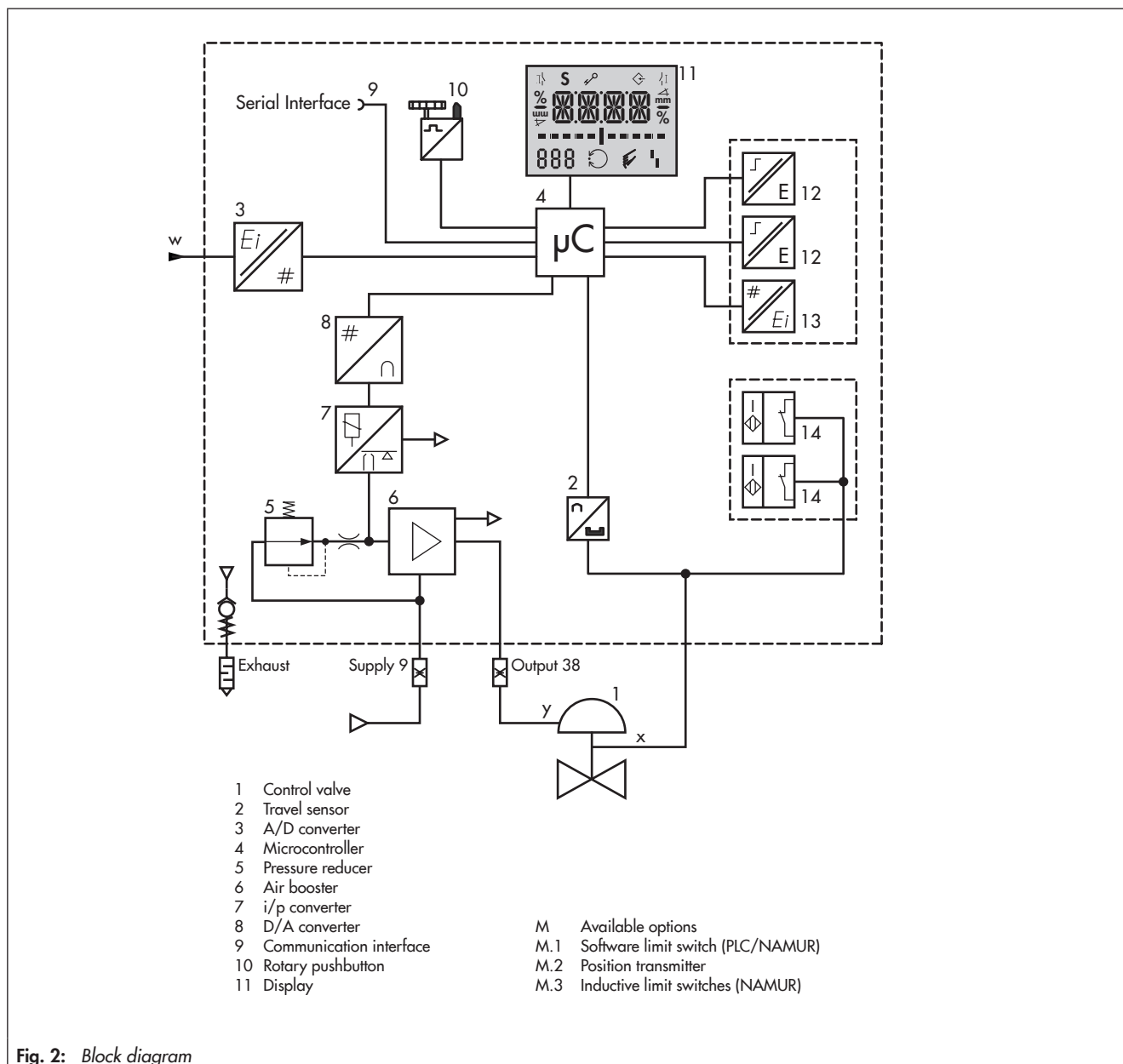


Fig. 2: Block diagram

Technical data · TROVIS 3730-1 Positioner





Travel	
Adjustable travel for	Direct attachment to Type 3277: 3.5 to 30 mm Attachment according to IEC 60534-6 (NAMUR): 3.5 to 300 mm Attachment according to VDI/VDE 3847: 3.5 to 300 mm Attachment to rotary actuators: 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 Split-range operation: 4 to 11.9 mA and 12.1 to 20 mA
Static destruction limit	±33 V
Minimum current	3.6 mA for display · 3.8 mA for operation
Load impedance	Without explosion protection: ≤6.6 V (corresponds to 330 Ω at 20 mA) · Explosion-protected versions: ≤7.3 V (corresponds to 365 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: Class 4 Oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected
Signal pressure (output)	0 bar up to the supply pressure · Can be limited to 2.4 bar ±0.2 bar by software
Hysteresis	≤0.3 %
Sensitivity	≤0.1 %
Characteristic	Linear/equal percentage/reverse equal percentage/SAMSON butterfly valve/VETEC rotary plug valve/segmented ball valve
Direction of action	Reversible
Air consumption, steady state	Independent of supply air, approx. 65 l _n /h
Air output capacity (when Δp = 6 bar)	
Actuator (supply)	8.5 m _n ³ /h · At Δp = 1.4 bar: 3.0 m _n ³ /h · K _{vmax(20 °C)} = 0.09
Actuator (exhaust)	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	4K4 -20 to +85 °C: All versions -40 to +85 °C: With metal cable glands -55 to +85 °C: Low-temperature versions 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, chromate and powder coating · 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
Weight	
	Aluminum housing: approx. 1.0 kg · Stainless steel housing: approx. 2.2 kg

Optional additional functions

Position transmitter		
Version	Two-wire system, galvanic isolation, reverse polarity protection, reversible direction of action	
Power supply	10 to 30 V DC	
Output signal	4 to 20 mA	
Operating range	2.4 to 21.6 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 switches	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 mW
Signal state	≤1.0 mA (non-conducting)	R = 10 kΩ (non-conducting)
	≥2.2 mA (conducting)	R = 348 Ω (conducting)
Static destruction limit	32 V DC/24 V AC	32 V DC/50 mA
Inductive limit switches		
Version	For connection to switching amplifier according to EN 60947-5-6, SJ2-SN proximity switches, reverse polarity protection	
Measuring plate not detected	≥3 mA	
Measuring plate detected	≤1 mA	
Static destruction limit	20 V DC	
Permissible ambient temperature	-50 to +85 °C	

Table 1: Summary of explosion protection approvals

		Certification		Type of protection	
TROVIS 3730-1	-110	 EU type examination certificate	Number Date	PTB 18 ATEX 2001 2018-10-25	II 2 G Ex ia IIC T4/T6 Gb II 2 D Ex ia IIIC T 85 °C Db
	-510	 EU type examination certificate	Number Date	PTB 18 ATEX 2001 2018-10-25	II 2 D Ex tb IIIC T 85 °C Db
	-810	 EU type examination certificate	Number Date	PTB 18 ATEX 2001 2018-10-25	II 3 G Ex nA IIC T4/T6 Gc II 2 D Ex tb IIIC T 85 °C Db
	-850	 EU type examination certificate	Number Date	PTB 18 ATEX 2001 2018-10-25	II 3 G Ex nA IIC T4/T6 Gc
	-111	IECEX	Number Date	IECEX PTB 19.0010 2019-03-04	Ex ia IIC T4/T6 Gb Ex ia IIIC T85°C Db
	-511	IECEX	Number Date	IECEX PTB 19.0010 2019-03-04	Ex tb IIIC T85°C Db
	-811	IECEX	Number Date	IECEX PTB 19.0010 2019-03-04	Ex nA IIC T4/T6 Gc Ex tb IIIC T85°C Db
	-851	IECEX	Number Date	IECEX PTB 19.0010 2019-03-04	Ex nA IIC T4/T6 Gc
TROVIS 3730-1	-111	CCoE	Number Date Valid until	A/P/HQ/MH/104/6597 2020-11-16 2024-12-31	Ex ia IIC T4T6 Gb
	-112	CCC Ex	Number Date Valid until	2020322307001506 2020-09-18 2025-09-17	Ex ia IIC T4/T6 Gb Ex iaD 21 T85
	-512	CCC Ex	Number Date Valid until	2020322307001506 2020-09-18 2025-09-17	Ex tD A21 IP66 T85°C
	-113	EAC	Number Date Valid until	RU C-DE.HA65.B.00700/20 2020-08-19 2025-08-18	1Ex ia IIC T6...T4 Gb X Ex ia IIIC T85 °C Db X
	-115	INMETRO	No. Date Valid until	IEEx 20.0231 2021-04-30 2024-01-10	Ex ia IIC T4/T6 Gb Ex ia IIC T85°C Db
	-515	INMETRO	No. Date Valid until	IEEx 20.0231 2021-04-30 2024-01-10	Ex tb IIIC T85°C Db
	-855	INMETRO	No. Date Valid until	IEEx 20.0231 2021-04-30 2024-01-10	Ex nA IIC T4/T6 Gc
	-114	KCS Korea	Number Date Valid until	21-KA4BO-0728 2021-09-30 2022-09-30	Ex ia IIC T6/T4
	-116	TR CMU	Number Date Valid until	ZETC/35/2021 2021-07-26 2024-07-25	II 2G Ex ia IIC T4/T6 Gb II 2D Ex ia IIIC T85 °C Db
	-516	TR CMU	Number Date Valid until	ZETC/35/2021 2021-07-26 2024-07-25	II 2D Ex tb IIIC T85 °C Db
	-816	TR CMU	Number Date Valid until	ZETC/35/2021 2021-07-26 2024-07-25	II 3G Ex nA IIC T4/T6 Gc II 2D Ex tb IIIC T85 °C Db
	-856	TR CMU	Number Date Valid until	ZETC/35/2021 2021-07-26 2024-07-25	II 3G Ex nA IIC T4/T6 Gc

Mounting the positioner

The positioner can be attached directly to the Type 3277 Actuator 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.

Communication

The positioner can be configured with SAMSON's TROVIS-VIEW Software (version 4). For this purpose, the positioner has a digital interface (**SSP**) to allow the USB port of a computer to be connected to it using an adapter cable.

The TROVIS-VIEW software enables the user to easily configure the positioner as well as view process parameters online.

i Note

TROVIS-VIEW can be downloaded free of charge from our website at www.samson.de > Service & Support > Downloads > TROVIS-VIEW.

Additional options

- Analog position transmitter
- Software limit switches (NAMUR)
- Software limit switches (PLC)
- Inductive limit switches

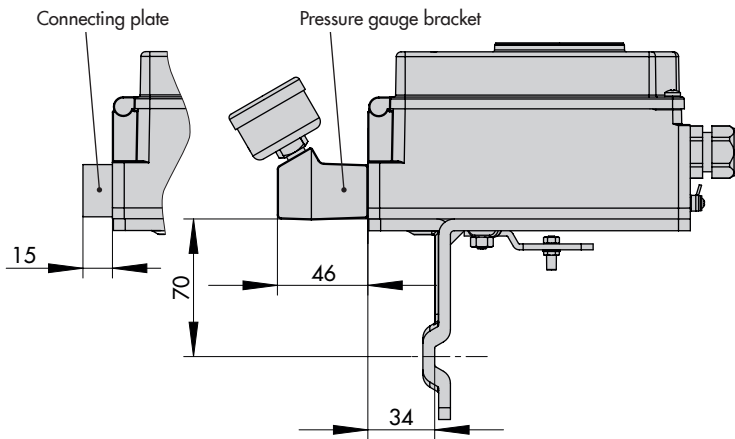
Operation

The positioner is operated with a user-friendly rotary pushbutton. The parameters are selected by turning the knob, pushing it activates the required setting. The menu is structured with all parameters listed one after the other on the same level. This allows users to read and change parameters at the device.

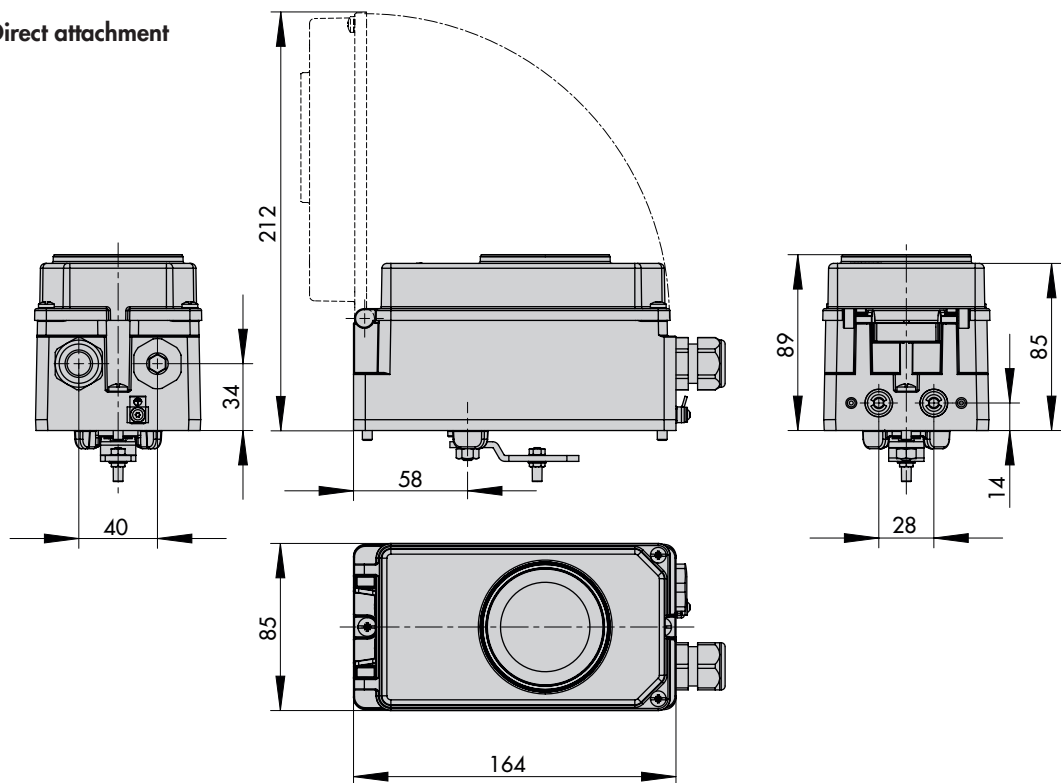
All values are displayed on the LCD. The reading direction of the LCD can be rotated by 180°.

To configure the positioner with SAMSON's TROVIS-VIEW software, the positioner is equipped with an additional digital interface to be connected to the RS-232 or USB interface of a computer.

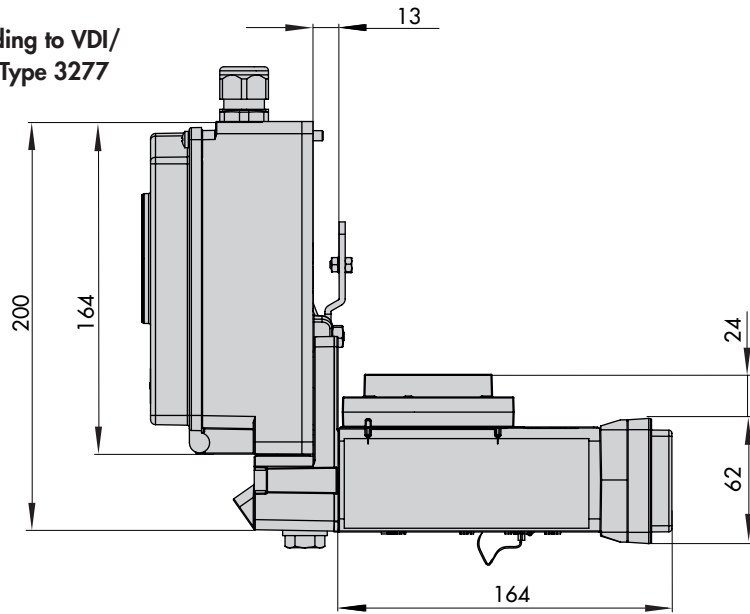
Attachment according to IEC 60534-6



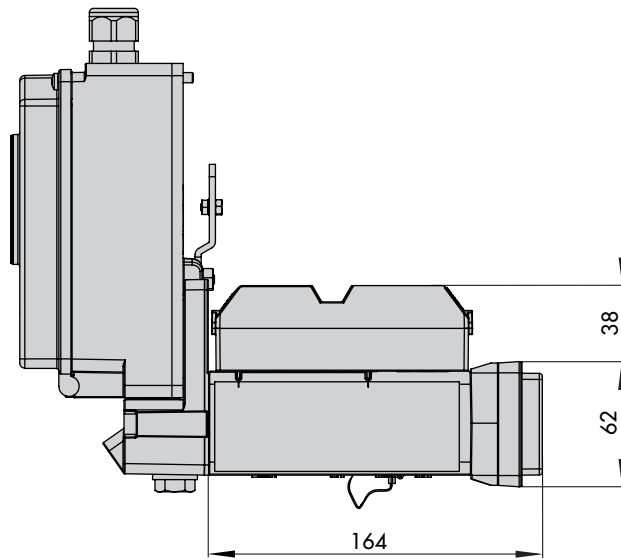
Direct attachment



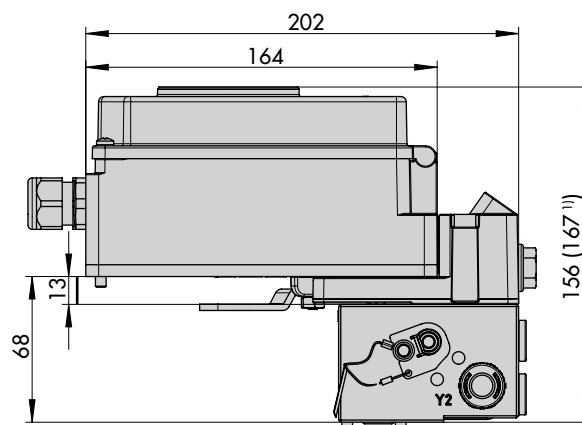
Attachment according to VDI/
VDE 3847-1 onto Type 3277
Actuator



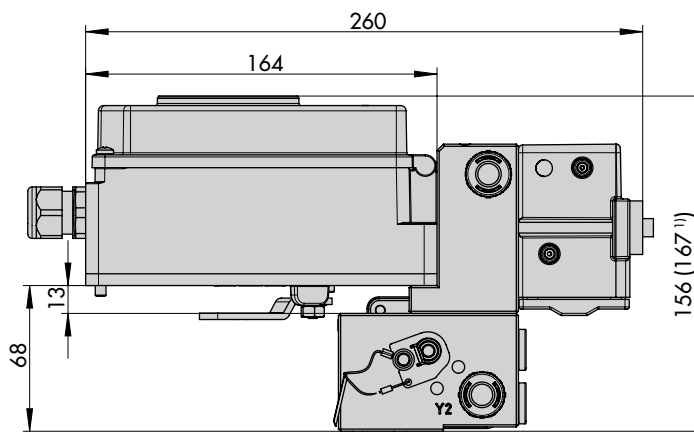
Attachment according to VDI/
VDE 3847-1 to a NAMUR rib



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

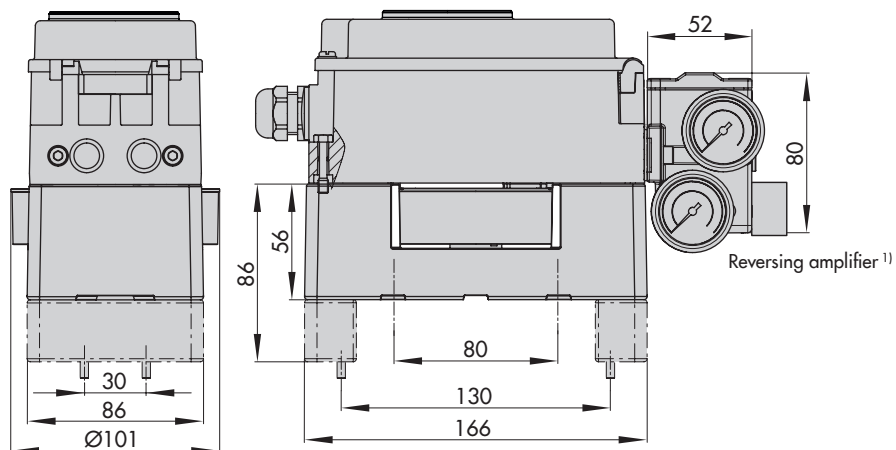


**Attachment according to VDI/VDE 3847-2 with
double-acting actuator**

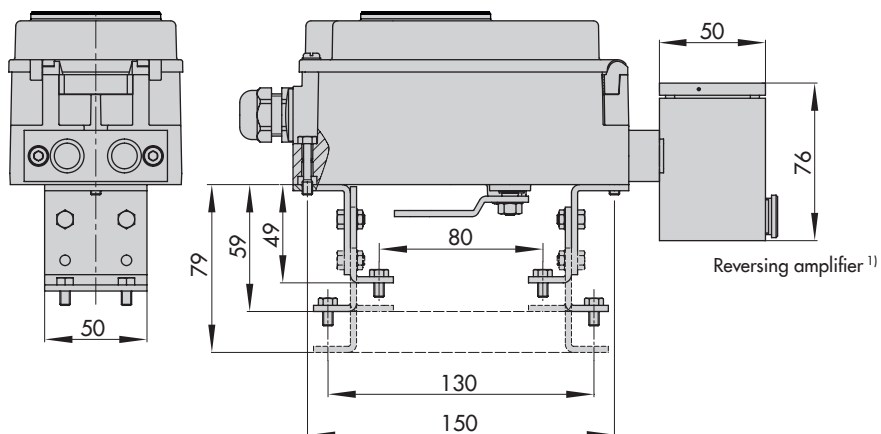


Attachment to rotary actuators according to VDI/VDE 3845

Heavy-duty version

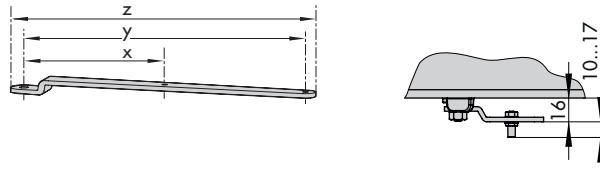


Light version



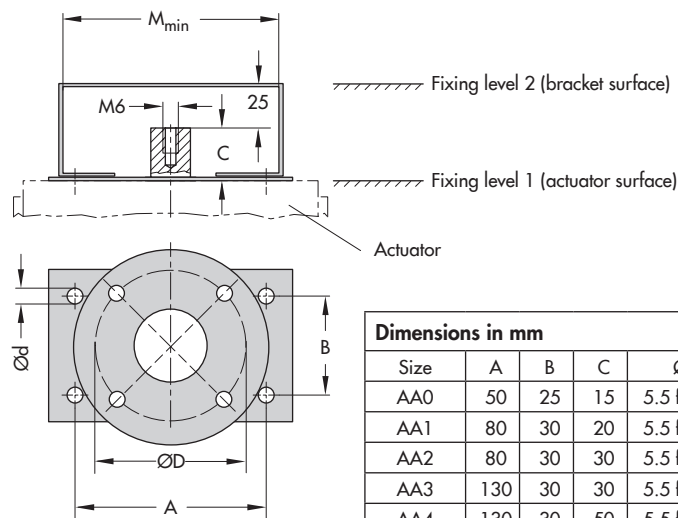
- ¹⁾ Reversing amplifier
- Type 3710 (see drawing of heavy-duty version for dimensions)
 - 1079-1118/1079-1119, no longer available (see drawing of light version for dimensions)

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

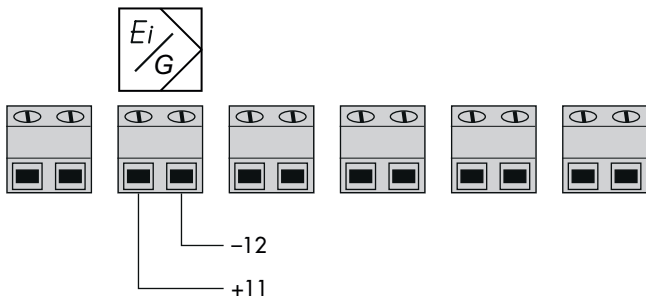
Fixing levels according to VDI/VDE 3845 (September 2010)



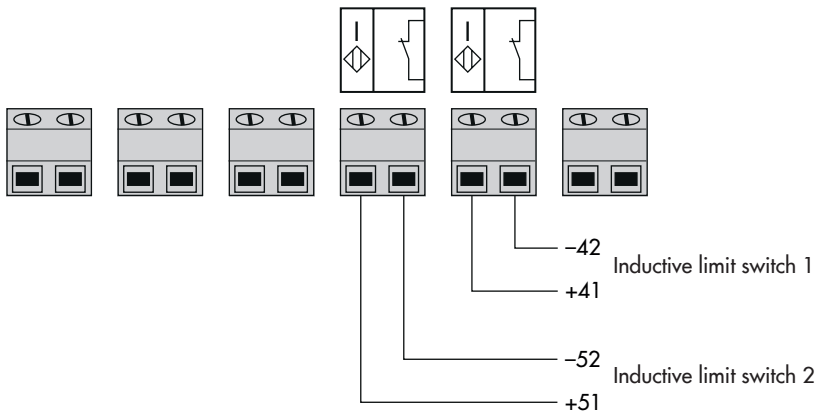
Dimensions in mm						
Size	A	B	C	$\varnothing d$	M_{min}	$D^{1)}$
AA0	50	25	15	5.5 for M5	66	50
AA1	80	30	20	5.5 for M5	96	50
AA2	80	30	30	5.5 for M5	96	50
AA3	130	30	30	5.5 for M5	146	50
AA4	130	30	50	5.5 for M5	146	50
AA5	200	50	80	6.5 for M6	220	50

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

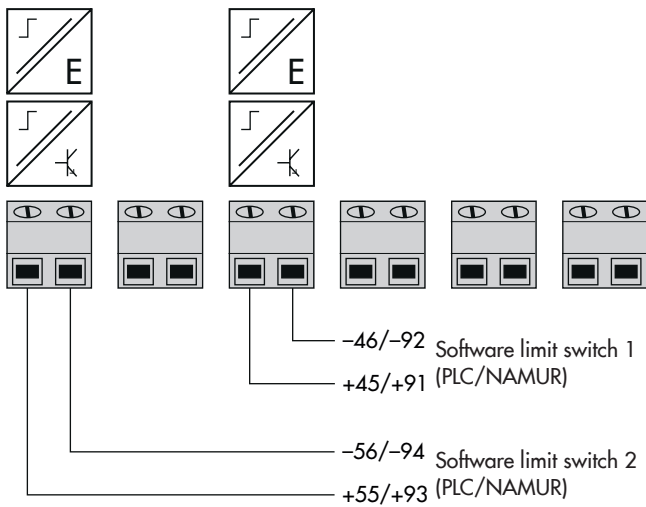
Electrical connection



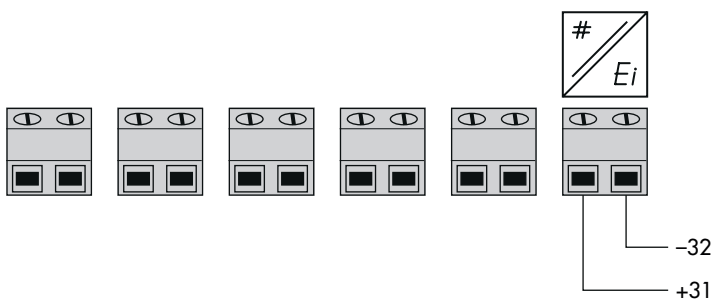
Connecting the mA control signal



Terminal assignment of inductive limit switches



Terminal assignment of software limit switches



Terminal assignment of position transmitter

Article code

Positioner	TROVIS 3730-1- x x x 0 x x 0 x x x x x 1 0 x 9 9 9 8												
With LCD and autotune													
Explosion protection													
Without	0	0	0										
ATEX	II 2 G Ex ia IIC T4/T6 Gb	1	1	0									
	II 2 D Ex ia IIIC T 85 °C Db												
ATEX	II 2 D Ex tb IIIC T 85 °C Db	5	1	0									
ATEX	II 3 G Ex nA IIC T4/T6 Gc	8	1	0									
	II 2 D Ex tb IIIC T 85 °C Db												
ATEX	II 3 G Ex nA IIC T4/T6 Gc	8	5	0									
IECEX	Ex ia IIC T4/T6 Gb	1	1	1									
	Ex ia IIIC T85°C Db												
IECEX	Ex tb IIIC T85°C Db	5	1	1									
IECEX	Ex nA IIC T4/T6 Gc	8	1	1									
	Ex tb IIIC T85°C Db												
IECEX	Ex nA IIC T4/T6 Gc	8	5	1									
CCC Ex	Ex ia IIC T4/T6 Gb	1	1	2									
	Ex iaD 21 T 85												
CCC Ex	Ex tD A21 IP66 T85°C	5	1	2									
CCoE	Ex ia IIC T4T6 Gb	1	1	1									
EAC	1Ex ia IIC T6...T4 Gb X	1	1	3									
	Ex ia IIIC T85 °C Db X												
INMETRO	Ex ia IIC T4/T6 Gb	1	1	5									
	Ex ia IIC T85°C Db												
INMETRO	Ex tb IIIC T85°C Db	5	1	5									
INMETRO	Ex nA IIC T4/T6 Gc	8	1	5									
	Ex tb IIIC T85°C Db												
INMETRO	Ex nA IIC T6 Gc	8	5	5									
KCS Korea	Ex ia IIC T6/T4	1	1	4									
TR CMU 1055	II 2G Ex ia IIC T4/T6 Gb	1	1	6									
	II 2D Ex ia IIIC T85 °C Db												
TR CMU 1055	II 2D Ex tb IIIC T85 °C Db	5	1	6									
TR CMU 1055	II 3G Ex nA IIC T4/T6 Gc	8	1	6									
	II 2D Ex tb IIIC T85 °C Db												
TR CMU 1055	II 3G Ex nA IIC T4/T6 Gc	8	5	6									
Option 1													
Without				0									
Position transmitter 4 to 20 mA				1									
Option 2													
Without				0									
2x software limit switches (PLC)	0	0	0	1									
2x software limit switches (NAMUR) ¹⁾	x	x	x	2									
2x inductive limit switches (NAMUR)				4									
Electrical connection													
2x M20x1.5 (1x cable gland, 1x blanking plug)								1					
Housing material													
Aluminum EN AC-44300DF (standard)								0					
Stainless steel 1.4408								1					
Cover													
With round window									1				
Without window									2				
Housing version													
Standard										0	0		
With additional vent hole and VDI/VDE 3847 adapter; without travel pick-off parts										2	0		

Positioner	TROVIS 3730-1- x x x 0 x x 0 x x x x x 1 0 x 9 9 9 8									
With additional vent hole	2	1								
Additional certification										
SIL		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										
3.00.04										9 8

¹⁾ Only for versions with explosion protection