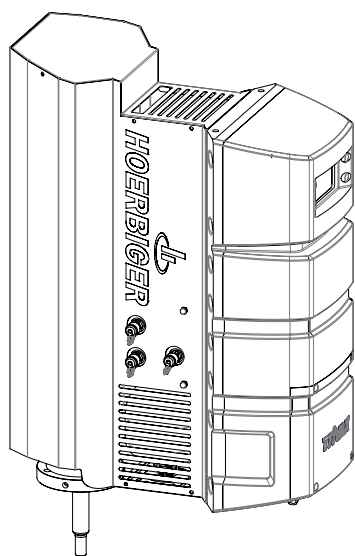


# TriVAX® Plus Linear

Stroke 50 – 220 mm

Technical data



“OUR TRIVAX VALVE ACTUATOR HAS A PIPING-FREE DESIGN WITH A CLOSED AND PRECHARGED HYDRAULIC SYSTEM WHICH MAKES IT UNIQUE. THEREBY WE PROVIDE A COMPACT DESIGN, LOWEST MAINTENANCE COSTS AND A VERY SIMPLE AND QUICK INSTALLATION.”

GOTTHARD GAWENS, GLOBAL PRODUCT MANAGER TRIVAX

## TriVAX® Plus Linear

### Smart valve actuator Stroke 50 – 220 mm

The TriVAX valve actuation concept from HOERBIGER combines the advantages of the existing valve actuation systems. As it is an electric actuator with fluidic gear, it is easy to install, doesn't need any other power infrastructure than the electric, includes an integrated operating and diagnostic tool and has the opportunity to integrate safety functions or quick operation features very easily. Due to tubeless construction potential leakages are avoided.

TriVAX 4000 is the actuator for linear valves, i.e. globe or gate valves, which are operating in On/Off mode (TriVAX 4100 or TriVAX 4200) or in positioning mode (TriVAX 4300). There are double acting and single acting versions for stroke length up to 220 mm available. The operating forces for double acting actuators are in the range of 48 to 360 kN, while the single acting actuators are able to apply spring ending forces from 14 to 117 kN. Extensive diagnostic functionalities enables the analysis of actuator, valve and process.

TriVAX is suitable for hazardous areas with a needed protection level up to ATEX II 2 G/D Ex de IIB T4. The standard weather protection is IP65 and optional IP67.

TriVAX is an integrated actuator unit which incorporates a hydraulic cylinder which is driven by an electro-hydraulic high pressure power unit and controlled by an electronic control unit with intuitive human machine interface.

#### Features:

- Completely closed hydraulic system
- Compact design
- Tubeless architecture
- Easy integrable safety functions (Fail-Safe / ESD)
- Simple installation
- Flexible application possibilities
- Small electric power consumption
- Separate terminal compartment
- Modular construction

#### Customer benefits:

- Install & Perform – simple installation and intuitive handling
- Reliable and efficient operation
- Flexible application possibilities with one product platform

## CHARACTERISTICS

Operating voltage	3 ph / 400 V / 50 Hz or 1 ph / 230 V / 50 Hz	or 3 ph / 480 V / 60 Hz
Tolerances	Voltage $\pm 10\%$ – Frequency: $\pm 5\%$	
Max. current	3 ph / 400 V: 4,8 A	1 ph / 230 V: 7,8 A      3 ph / 480 V: 3,9 A
Nominal current (@ 50% load)	3 ph / 400 V: 2,2 A	1 ph / 230 V: 3,2 A      3 ph / 480 V: 2,2 A
Recommended fuse	3 ph / 400 V: 6 A	1 ph / 230 V: 10 A      3 ph / 480 V: 6 A
Tripping characteristic	B	
Min. breaking capacity	1,5 kA	
Power consumption	1100 W	
Position accuracy	$\pm 2\%$ of full stroke	
Ambient temperature	–25°...70 °C velocity reduction at temp. > 65 °C possible Option: –30°C...+60 °C	
Protection class	IP 65	
Explosion protection	ATEX II2G/D Ex de IIB T4 / IP67 IEC-Ex: Ex de IIB T4 / IP67 cCSAus: Ex d e [ib] ib IIB T4 Gb Class I, Zone 1 AEx d e [ib] ib IIB T4 Gb	
Corrosion protection	DIN EN ISO 12944-2 category C3 (medium), optional: C5M (very high – marine)	
Manual operation	Hand pump (optional)	
Mounting position	Each position possible (at outside mounting: Display NOT on top side)	

## IN-/OUTPUTS

TriVAX® PLUS Linear 50 – 220 mm

### IN-/OUTPUTS DIGITAL

#### DIGITAL INPUT

DI1 – DI4 (Ex e)	Signal „0“: 0 – 11 VDC Signal „1“: 15 – 30 VDC Nominal current 5 mA – Load: 4,8 kΩ External voltage (24 VDC) with common ground for DI1 – DI4
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#### DIGITAL OUTPUT

DO1 – DO4 (Ex e)	Solid state – high-side switch Signal „0“: 0 V Signal „1“: 24 V Nominal current: 5 mA Short circuit current: 80 mA max. load: 300 Ω External voltage (common for DO1 – DO4): 20 – 30 VDC (typ. 24 V)	Per parameter configuration for the selected event as active „0“ or active „1“ programmable
DO5 – DO7 (Ex e)	Relay contact MAKE Nominal voltage: 24 VDC Max. current: 1 A Min. switching power: 500 mW (10 V / 5 mA)	Per parameter configuration for the selected event as active „0“ or active „1“ programmable

### IN-/OUTPUTS ANALOGUE (TRIVAX 4200 AND 4300 ONLY)

#### ANALOGUE INPUT

A11 (Ex i) – Set point position A12 (Ex i) – Set point speed	<b>Max. values for connectable Ex i equipment</b> No-load voltage $U_i$ : 30 V Short circuit current $I_i$ : 200 mA Power $P_i$ : 1,5 W Capacity $C_i$ : 5,2 nF Inductivity $L_i$ : 0	Current: 4 – 20 mA Voltage: 7...30 V DC Load: 350 Ω
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#### ANALOGUE OUTPUT (TRIVAX 4300 ONLY)

Analogue Output AO1 (Ex i) – Position retransmission	<b>Max. values for connectable Ex i equipment</b> No-load voltage $U_i$ : 30 V Short circuit current $I_i$ : 130 mA Power $P_i$ : 980 mW Capacity $C_i$ : 5,2 nF Inductivity $L_i$ : 0	Current: 4 – 20 mA Voltage: 7...30 V DC Load: 350 Ω (passive output)
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### INPUT ESD

#### DIGITAL INPUT ESD

Digital Input ESD IN (Ex e)  This input can be disabled by HOERBIGER at double acting actuators.	Signal „0“: 0 VDC Signal „1“: 24 VDC (Min. ext. switching voltage 24 VDC) Nominal current: 38 mA	A LOW Signal at ESD IN (Signal „0“) moves the actuator to its safety position (hold position/spring return) and it doesn't react on other control signals.
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## ACTUATOR SIZES

### TriVAX® PLUS Linear 50 – 220 mm

ACTUATOR SIZE	4XX1	4XX2	4XX3	4XX4
Stroke length	50/75/100/150/ 220 mm	75/100/150/ 220 mm	100/150/ 220 mm	150/ 220 mm
<b>DOUBLE ACTING</b>				
Operating force (min.)	10 kN	30 kN	60 kN	160 kN
Operating force (max.)	48 kN	76 kN	177 kN	360 kN
Operating velocity	16 mm/s	10 mm/s	4,3 mm/s	2,4 mm/s
<b>SINGLE ACTING</b>				
Spring ending force	14 kN	24 kN	54 kN	117 kN
Spring starting force	32 kN	32 kN	68-84 kN*	161-182 kN*
Oil starting force	33 kN	50 kN	117 kN	260 kN
Operating velocity – standard	16 mm/s	10 mm/s	4,3 mm/s	2,4 mm/s
Operating velocity – quick acting/FS	250 mm/s	250 mm/s	100 mm/s	50 mm/s

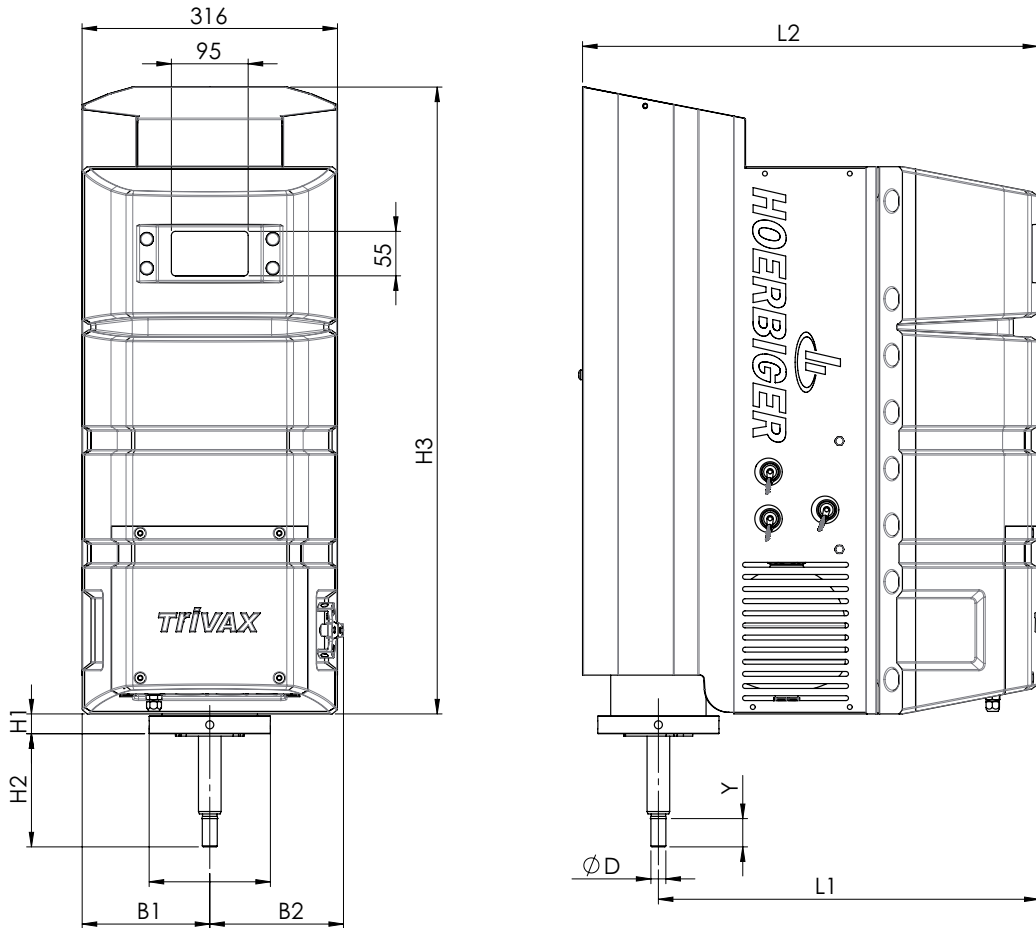
\* depending on stroke length

Note: For versions with operating voltage 1ph/230V the operating velocities are reduced to 50% of the stated values.

CONTROL CONFIGURATION	4100 SIMPLE ON/OFF	4200 SMART ON/OFF	4300 SMART POSITIONING
Functional scope	OPEN / CLOSE	OPEN / CLOSE	Positioning
Duty cycle	S3 – 10 %	S3 – 10 %	S3 – 25 %
Position accuracy			± 2 % of full stroke
Intuitive human machine interface	✓	✓	✓
Digital In-/Outputs	✓	✓	✓
Digital Inputs	4 (24 VDC) configurable for latched operation, push-to-run operation or 2-wire control		
Digital Outputs	4 solid state outputs 24 V DC high side configurable as HIGH or LOW output for status signals		
Digital Outputs – voltfree	3 voltfree relay contacts configurable as MAKE or BREAK contacts for status signals		
Analogue Inputs	–	1 analogue input for threshold control position	2 analogue inputs for set point position and speed
Analogue Output	–	–	1 analogue output for position retransmission
Position detection	✓	✓	✓
Manual operation	Option	Option	Option
Ex proof (ATEX)	Option	Option	Option

# DIMENSIONS DOUBLE ACTING ACTUATORS

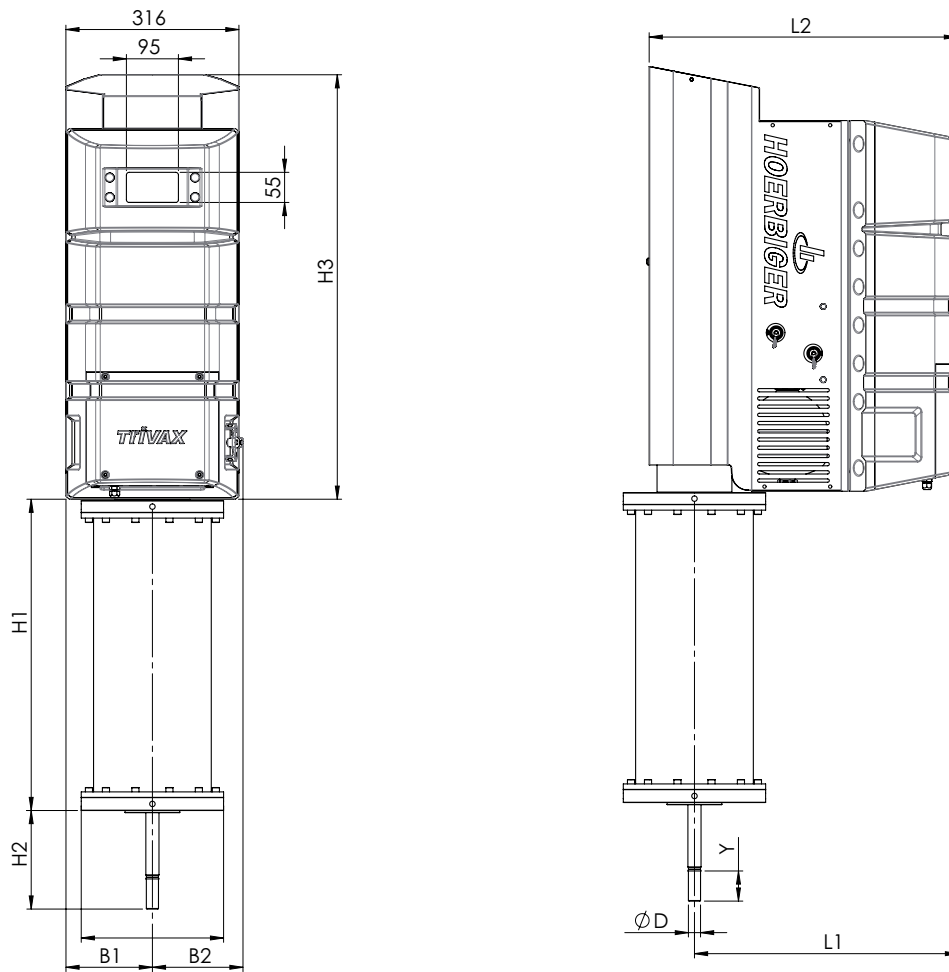
TriVAX® PLUS Linear 50 – 220 mm



Size	(Max) hydraulic power [kN]	Stroke [mm]	H1 [mm]	H2 retracted [mm]	H2 extended [mm]	H3 [mm]	B1 [mm]	B2 [mm]	L1 [mm]	L2 [mm]	ØD [mm]	Y [mm]	Weight [kg]
4x11	48	50	24,5	65	115	776	158	166	467	560	M20 x 1,5	35	121
		75			140								
		100			165								
		150			215								
		220			285								
4x12	76	75	26,5	80	155	776	158	166	478	560	M24 x 1,5	55	134
		100			180								
		150			230								
		220			300								
4x13	177	100	26,5	97	197	844	158	166	499	604	M42 x 3	75	169
		150			247								
		220			317								
4x14	360	150	47,5	163	313	855	158	166	526	661	M48 x 3	120	226
		220			383								

## DIMENSIONS SINGLE ACTING ACTUATORS

TriVAX® PLUS Linear 50 – 220 mm

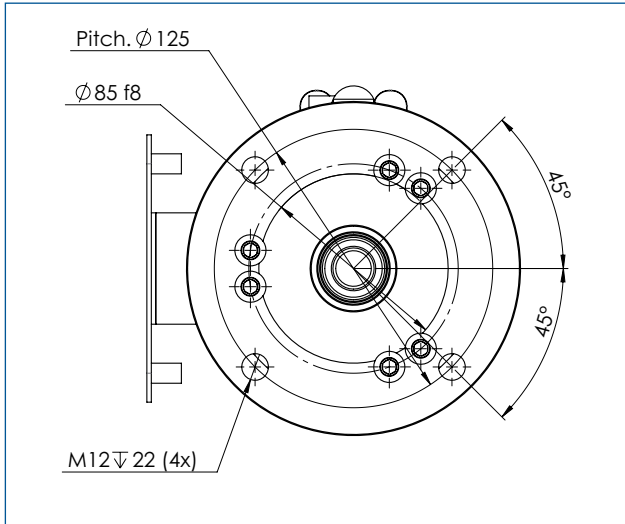


Size	Max. spring ending force	Stroke	H1	H2 retracted	H2 extended	H3	B1	B2	L1	L2	ØD	Y	Weight
	[kN]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
4xx1	14	50	306	65	115	776	158	166	467	560	M20 x 1,5	35	149
		75	381	68	143								155
		100	471	65	165								187
		150	646	65	215								233
		220	862	60	280								233
4xx2	24	75	518	65	140	776	158	166	478	560	M24 x 1,5	55	189
		100	638	80	180								195
		150	830	65	215								223
		220	1224	80	300								250
4xx3	54	100			200	844	158	166	499	604	M42 x 3	75	696
		150	1302	100	250								696
		220			320								695
4xx4	117	150			250	855	158	166	526	661	M48 x 3	75	1255
		220	1383	100	320								1255

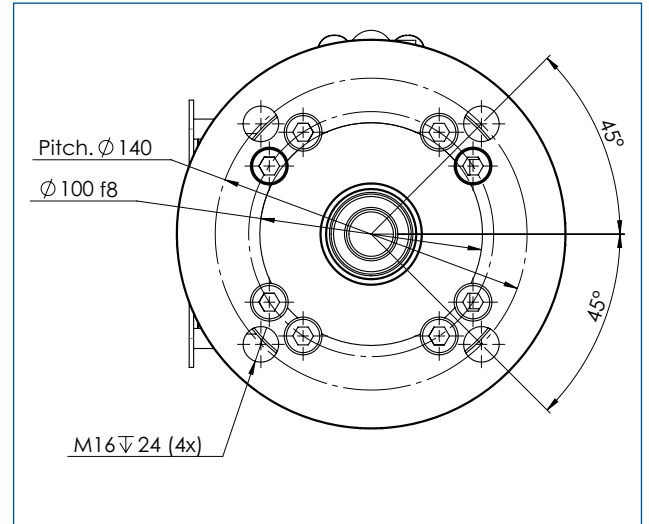
# DIMENSIONS CONNECTING FLANGES

TriVAX® PLUS Linear 50 – 220 mm

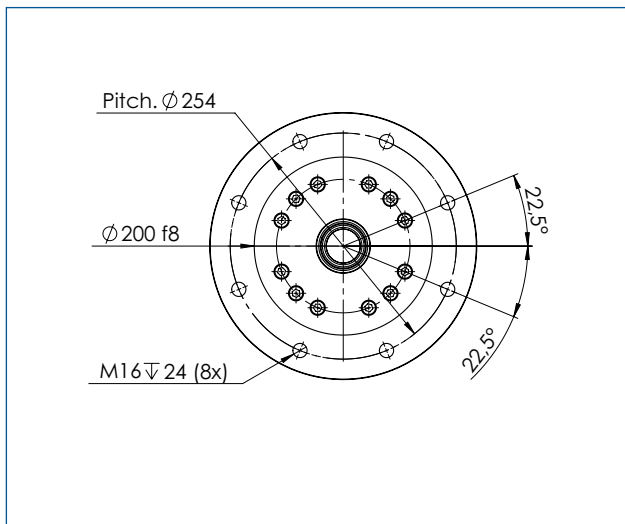
4X11/4XX1



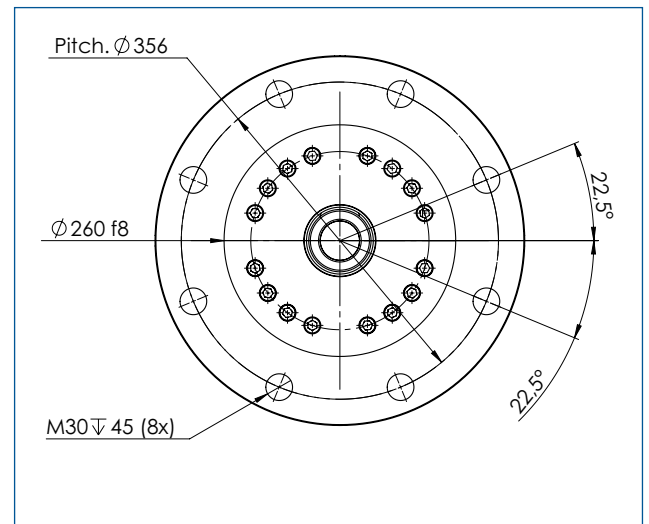
4X12/4XX2



4X13/4XX3



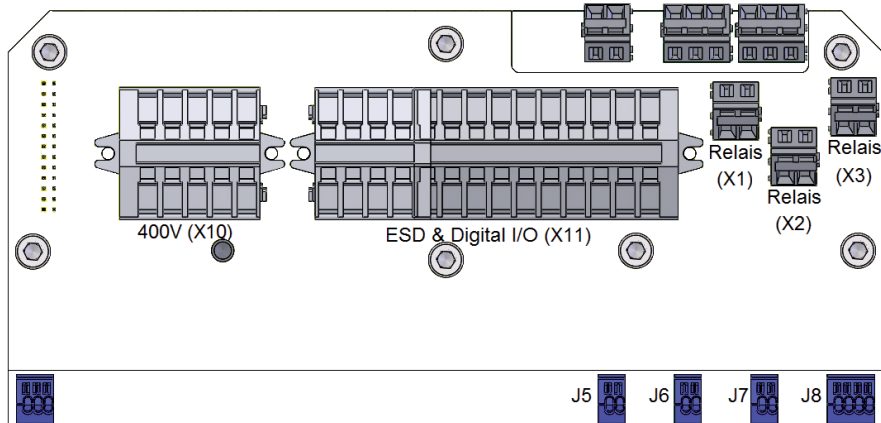
4X14/4XX4





# TERMINAL BLOCK

TriVAX® PLUS Linear 50 – 220 mm



## TERMINAL BLOCK

### OPERATING VOLTAGE – TERMINAL BLOCK X10

L1-L2-L3 + ground wire + N

### ESD AND DIGITAL IN- / OUTPUTS – TERMINAL BLOCK X11

ESD IN – Input 24 V DC

At low-signal ESD will be released

Digital Inputs 1 – 4  
Assignment depends on configuration

**Latched operation**

DI1: OPEN  
DI2: CLOSE  
DI3: STOP  
DI4: Configurable

**Push-to-run operation**

DI1: OPEN  
DI2: CLOSE  
DI3: Configurable  
DI4: Configurable

**2-wire control**

DI1: Control Input OPEN/CLOSE  
DI2: Configurable  
DI3: Configurable  
DI4: Configurable

Digital Outputs 1– 4  
Assignment depends on configuration

**Default values**

DO1: Actuator moves  
DO2: Selector switch LOCAL  
DO3: Inactive  
DO4: Inactive

### VOLTFREE CONTACTS (OUTPUTS) TERMINAL BLOCKS X1 – X2 – X3

Digital Outputs 5-7  
Assignment depends on configuration

**Default values**

DO5: End position OP  
DO6: End position CL  
DO7: Monitor

### ANALOGUE IN- / OUTPUTS – TERMINAL BLOCKS J5 – J6 – J7

Analogue Inputs 1 – 2

AI1: Set point of actuator position (J6)

AI2: Set point of actuator speed (J7)

Analogue Output 1

AO1: Retransmission of actual actuator position (J5)

### CABLE ENTRIES

2x M25x1,5

1x M16x1,5

## POSSIBLE CONFIGURATIONS TRIVAX INTERFACES AND DIAGNOSTICS

TriVAX® PLUS Linear 50 – 220 mm

### CONFIGURATIONS

#### DIGITAL INPUTS 1 – 4

Block LOCAL operation	Configurable as active HIGH or as active LOW input
Start partial stroke test	
Error ack	
Interlock REMOTE	

#### DIGITAL OUTPUTS 1 – 7

Calibration complete	Configurable as active HIGH or as active LOW output
LOCAL blocking active	
Position OPEN	
Position CLOSED	
Actuator moves	
Failure	
Selector LOCAL	
Selector REMOTE	
Selector NULL	
Maintenance required	
Out of specification	
Functional check	
Collective failure (monitor)	
Partial stroke test not OK	
Partial stroke test active	
Partial stroke test OK	
Actuator ready	

#### ANALOGUE INPUT (FOR TRIVAX 4200 AND 4300 ONLY)

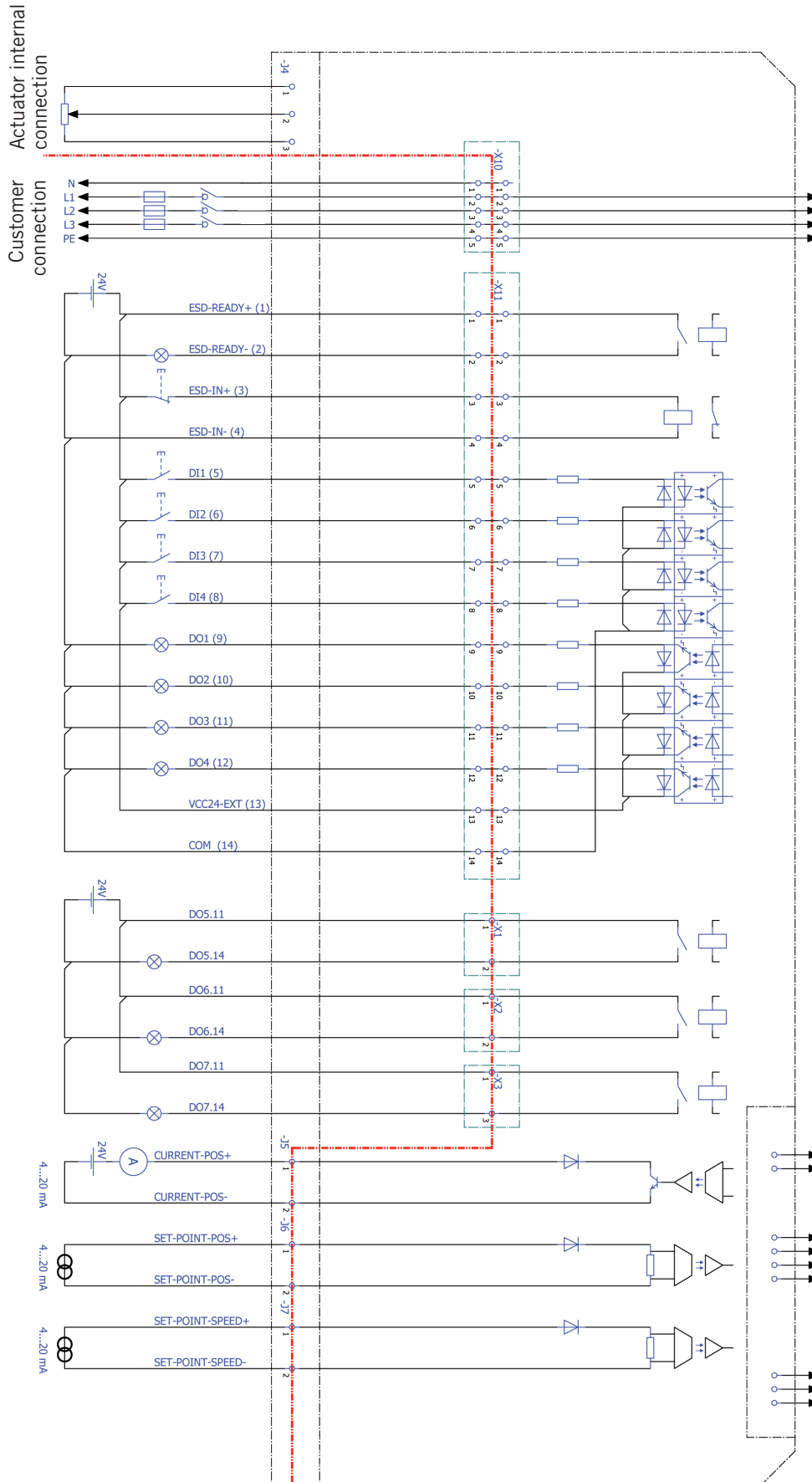
Threshold control	
Positioner	For TriVAX 4300 ONLY

#### PARTIAL STROKE TEST (FOR TRIVAX 4200 AND 4300 ONLY)

PST Direction	OPEN or CLOSE
PST Stroke	3 – 99 %
PST Reference value	Ref.characteristic/max. limit
PST Tolerance	0 – 100 %
PST Activation	Control room/time interval 1 – 999 days

# WIRING PROPOSAL

TriVAX® PLUS Linear 50 – 220 mm



## ORDERING CODE

TriVAX® PLUS Linear 50 – 220 mm

CODE	DESCRIPTION	COMMENT
<b>TRIVAX</b>		
TX		
<b>ACTUATOR</b>		
4	TriVAX Linear	
5	TriVAX Quarter turn	Scotch Yoke
6	TriVAX Quarter turn	Helical
<b>FUNCTION</b>		
1	Simple On/Off	
2	Smart On/Off	
3	Smart Positioning	
<b>SAFETY FUNCTION</b>		
1	FS Hold (DA)	Linear: CL = Piston extended Quarter turn: Clockwise to close
4	FS Mechanic OP	
5	FS Mechanic CL	Linear: CL = Piston retracted Quarter turn: Counter-clockwise to close
6	FS Hold (DA) invers	
9	FS Mechanic OP invers	
0	FS Mechanic CL invers	ESD disabled – closing direction see above
A	Without (DA)	
B	Without (DA) invers	
<b>OPERATING TORQUE / SIZE</b>		
1	DA: 48 kN / FS Mech: 14 kN	
2	DA: 76 kN / FS Mech: 24 kN	
3	DA: 177 kN / FS Mech: 54 kN	
4	DA: 360 kN / FS Mech: 117 kN	
<b>STROKE</b>		
–	Quarter turn actuator 90°	
A	50 mm	
B	75 mm	
C	100 mm	
D	150 mm	
E	220 mm	
<b>VOLTAGE</b>		
1	3 ph / 400V / 50 Hz	
2	1 ph / 230 V / 50 Hz	
3	3 ph / 480 V / 60 Hz	

## ORDERING CODE

TriVAX® PLUS Linear 50 – 220 mm

CODE	DESCRIPTION	COMMENT
<b>PROTECTION CLASS / APPROVAL</b>		
A	SIL / IP65	
B	SIL / ATEX	
M	IP65	
N	ATEX	
E	SIL / cCSAus – Ordinary Location	
F	SIL / cCSAus – Hazardous Location	
G	SIL / IECEx	
Q	cCSAus – Ordinary Location	
R	cCSAus – Hazardous Location	
S	IECEX	
<b>TEMPERATURE RANGE</b>		
1	Standard	-25°...+70 °C
3	Low temperature	-30°...+60 °C
<b>FIELDBUS</b>		
0	Without	
3	HART	
<b>MOUNTING ORIENTATION</b>		
0	Standard	Vertical – display above
1	Upside down	Vertical – display below
2	righthand 0°	Choose everytime „0“ for actuators which doesn't need a fixed mounting position FS Hold (DA) / FS Mech
3	righthand 90°	
4	righthand 180°	
5	righthand 270°	
6	lefthand 0°	
7	lefthand 90°	
8	lefthand 180°	
9	lefthand 270°	
<b>OPTIONAL FEATURES</b>		
0	Without	
1	Hand pump small	4 cm <sup>3</sup> /stroke
2	Hand pump large	12 cm <sup>3</sup> /stroke – actuator size 3 and larger
<b>ELECTRIC / MECHANIC CONNECTION</b>		
1	Cable entry metric / mech. connection standard (see dimensional drawing)	
5	Cable entry NPT (with adaptors) / mech. connection standard (see dimensional drawing)	
<b>CORROSION PROTECTION</b>		
1	Standard	Acc. ISO 12944-2 C3
2	Off-shore	Acc. ISO 12944-2 C5M
3	Primer only	

## NOTES

TriVAX® PLUS Linear 50 – 220 mm

## NOTES

TriVAX® PLUS Linear 50 – 220 mm

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