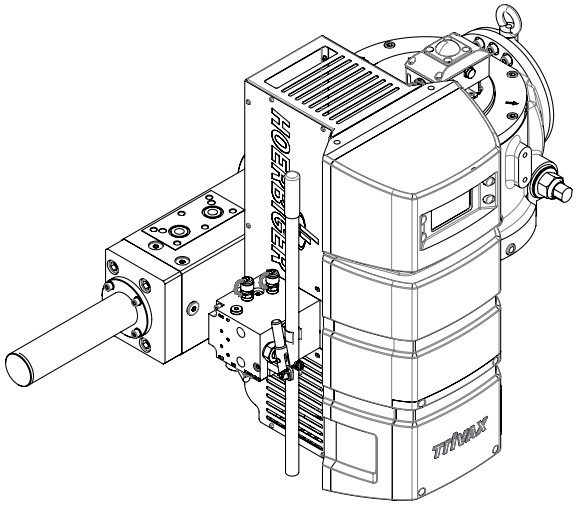
TriVAX® Plus Scotch Yoke

Operating angle 90°

Technical data

HOERBIGER
because performance counts



“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 Scotch Yoke

Smart valve actuator 90°

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 5000 is the actuator for quarter turn valves, i.e. butterfly, ball or plug valves, which are operating in On/Off mode (TriVAX 5100 or TriVAX 5200) or in positioning mode (TriVAX 5300). There are double acting and single acting versions available. The operating torques for double acting actuators are in the range of 11 to 66 kNm, while the single acting actuators are able to apply spring ending torques from 5 to 68 kNm. 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 quarter turn actuator 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 plattform

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 ± 10 % – Frequency: ± 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	± 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 Scotch Yoke 90°

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	

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 5200 AND 5300 ONLY)

ANALOGUE INPUT

AI1 (Ex i) – Set point position AI2 (Ex i) – Set point speed	**Max. values for connectable Ex i equipment** No-load voltage U_i: 30 V Short circuit current I_i: 130 mA Power P_i: 980 nW Capacity C_i: 5,2 nF Inductivity L_i: 0	Current: 4 – 20 mA Voltage: 7…30 V DC Load: 350 Ω

ANALOGUE OUTPUT (TRIVAX 5300 ONLY)

Analogue Output AO1 (Ex i) – Position retransmission	**Max. values for connectable Ex i equipment** 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)

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.

ACTUATOR SIZES

TriVAX® PLUS Scotch Yoke 90°

ACTUATOR SIZE	5XX1	5XX2	5XX3	5XX4
Operating angle	90° +/– 5°	90° +/– 5°	90° +/– 5°	90° +/– 5°
DOUBLE ACTING				
Ending torque	11000 Nm	25400 Nm	39150 Nm	66750 Nm
Running torque	5650 Nm	13100 Nm	20150 Nm	34400 Nm
Operating velocity	6 °/s	2,85 °/s	1,8°/s	1,05 °/s
SINGLE ACTING				
Op. torque (spring ending torque)	5650 Nm	10150 Nm	18450 Nm	35900 Nm
Running torque	3450 Nm	6200 Nm	12300 Nm	24900 Nm
Op. torque (oil starting torque)	7550 Nm	15250 Nm	35050 Nm	74550 Nm
Operating velocity – standard	5,3 °/s	2,85 °/s	1,35°/s	0,68 °/s
Operating velocity – quick acting/FS	180 °/s	80 °/s	50 °/s	40 °/s

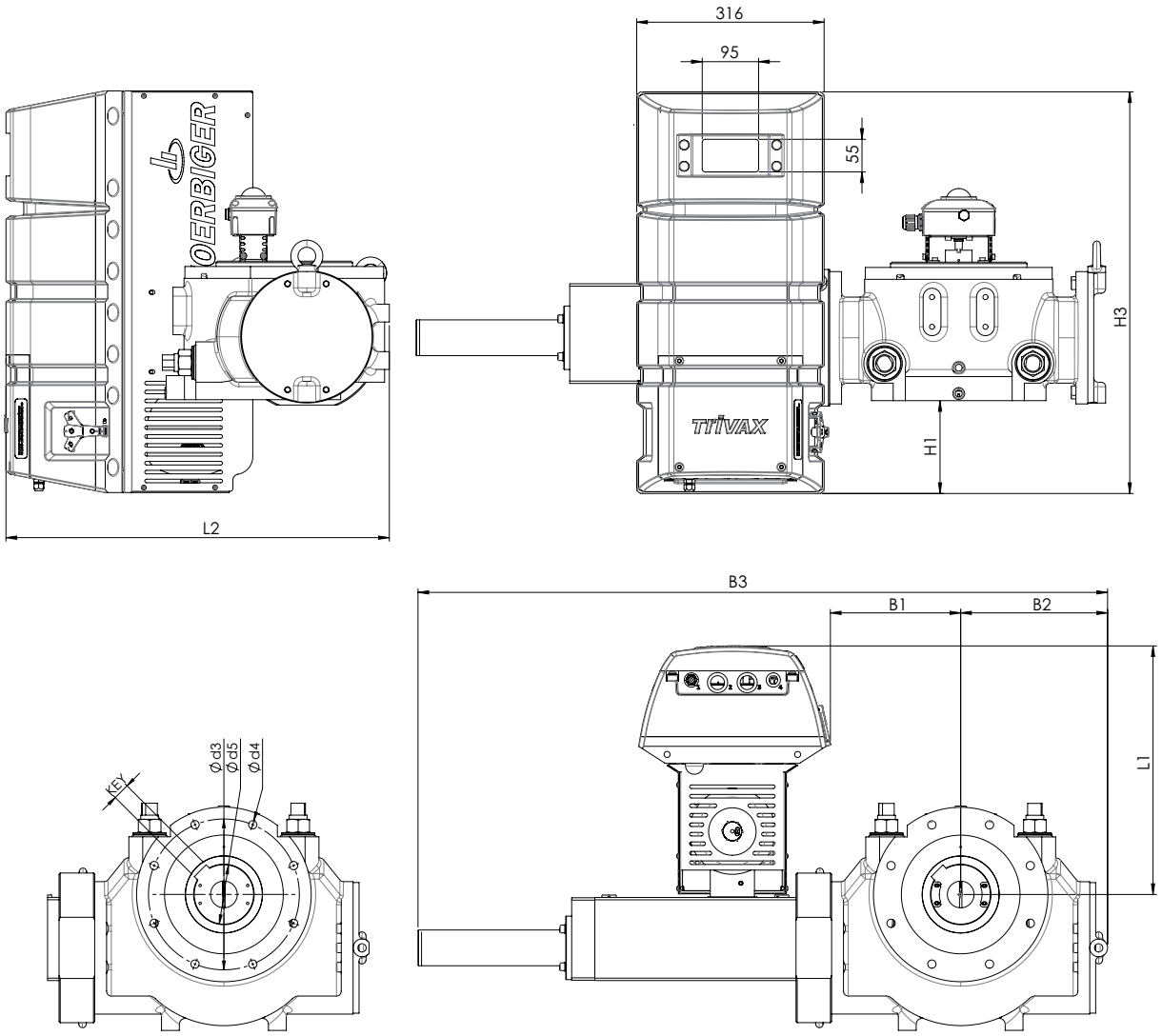
Note: For versions with operating voltage 1 ph / 230 V the operating velocities are reduced to 50 % of the stated values.

On request: Single acting actuators available with spring ending torque of 48,150 and 68,400 Nm

CONTROL CONFIGURATION	5100 SIMPLE ON/OFF	5200 SMART ON/OFF	5300 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

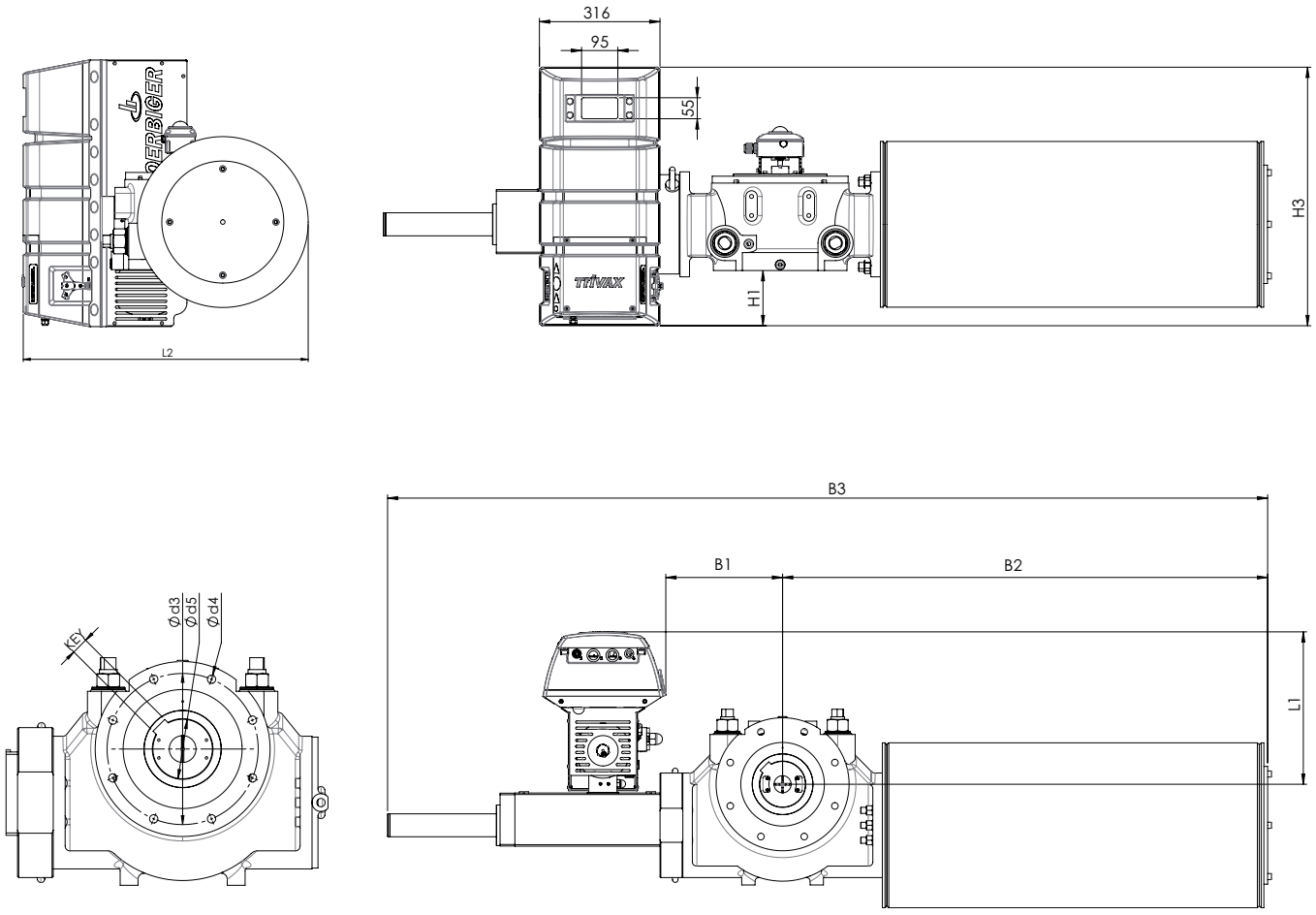
TriVAX® PLUS Scotch Yoke 90°



Size	Max. torque	H1	H3	B1	B2	B3	L1	L2	Ø d3	Ø d4 x depth	Ø d5	KEY	Weight
	[kN]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
5x11	11000	155	677	220	250	1162	421	650	F25 254	M16 x 24	100	28 x 16 x 183	290
5x12	25400	139		317	303	1351	406	671	F30 298	M20 x 30	120	32 x 18 x 212	338
5x13	39150	105		355	330	1510	397	700	F35 356	M30 x 45	160	40 x 22 x 295	450
5x14	66750	85		441	425	1888	384	783	F40 406	M36 x 54	178	45 x 25 x 366	745

DIMENSIONS SINGLE ACTING ACTUATORS

TriVAX® PLUS Scotch Yoke 90°

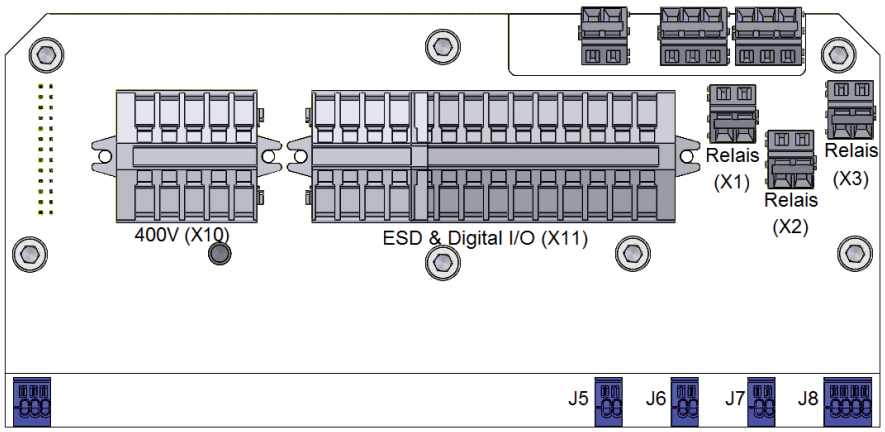


Size	Max. spring ending torque	H1	H3	B1	B2	B3	L1	L2	Ø d3	Ø d4 x depth	Ø d5	KEY	Weight
	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
5xx1	5650	146	677	309	1280	2326	402	715	F30 298	M20 x 30	120	32 x 18 x 212	660
5xx2	10150	139		317	1286	2335	408	721	F30 298	M20 x 30	120	32 x 18 x 212	657
5xx3	18450	106		355	1561	2740	397	750	F35 356	M30 x 45	160	40 x 22 x 295	950
5xx4	35900	84		442	2064	3527	700	820	F40 406	M36 x 54	178	45 x 25 x 366	1395

Note: The depth of shaft hole (d5) is equal the key length (KEY)

TERMINAL BLOCK

TriVAX® PLUS Scotch Yoke 90°



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 Scotch Yoke 90°

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 5200 AND 5300 ONLY)	
Threshold control	
Positioner	For TriVAX 5300 ONLY
PARTIAL STROKE TEST (FOR TRIVAX 5200 AND 5300 ONLY)	
PST Direction	OPEN or CLOSE
PST Angle	3 – 99 %
PST Reference value	Ref.characteristic/max. limit
PST Tolerance	0 – 100 %
PST Activation	Control room/time interval 1 – 999 days

WIRING PROPOSAL

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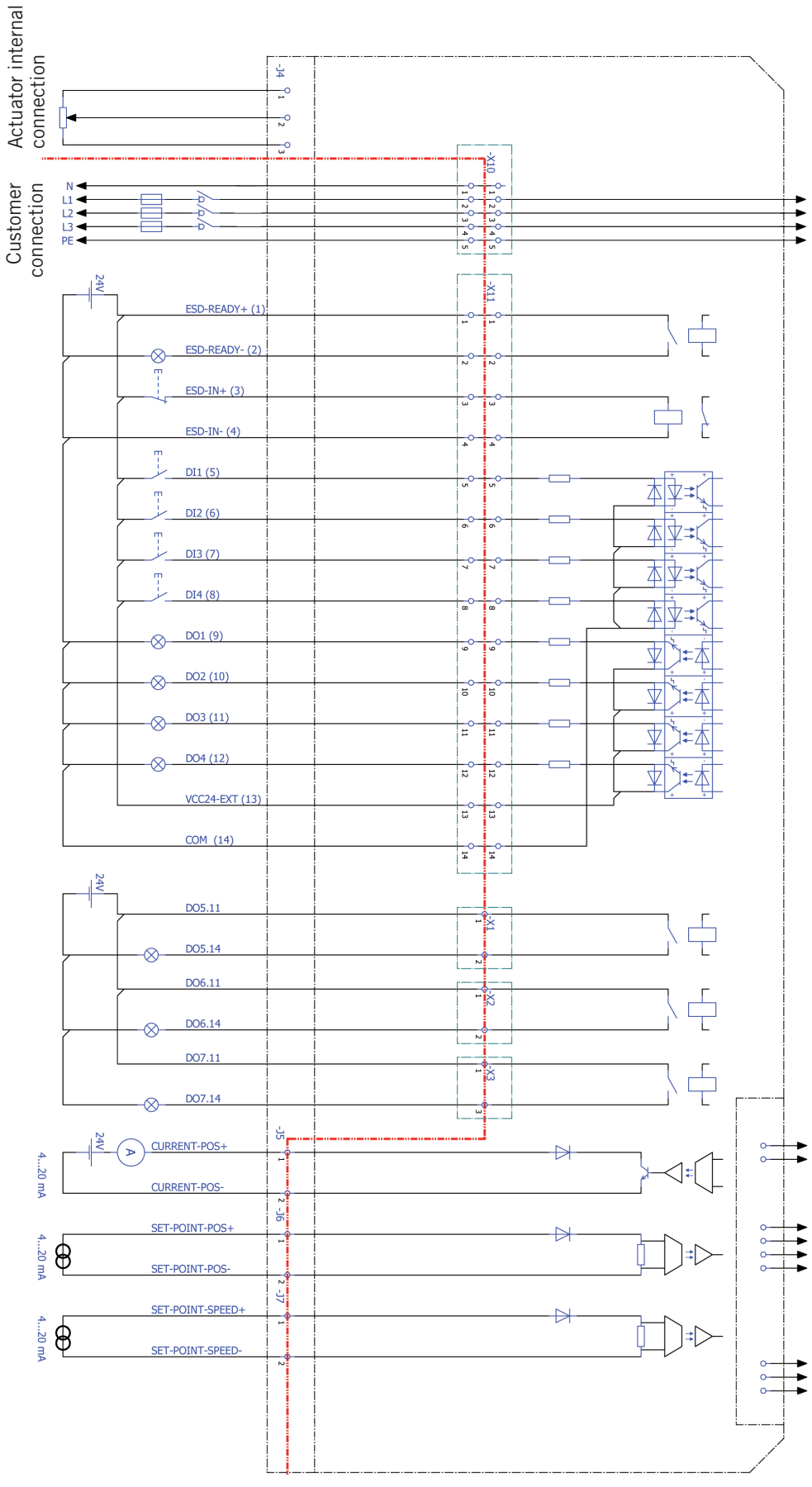

ORDERING CODE

TriVAX® PLUS Scotch Yoke 90°

CODE	DESCRIPTION	COMMENT
TRIVAX		
TX		
ACTUATOR		
4	TriVAX Linear	
5	TriVAX Quarter turn	Scotch Yoke
6	TriVAX Quarter turn	Helical
FUNCTION		
1	Simple On/Off	
2	Smart On/Off	
3	Smart Positioning	
SAFETY FUNCTION		
1	FS Hold (DA)	Linear: CL = Piston extended Quarter turn: Clockwise to close
4	FS Mechanic OP	
5	FS Mechanic CL	
6	FS Hold (DA) invers	Linear: CL = Piston retracted Quarter turn: Counter-clockwise to close
9	FS Mechanic OP invers	
0	FS Mechanic CL invers	
A	Without (DA)	ESD disabled – closing direction see above
B	Without (DA) invers	
OPERATING TORQUE / SIZE		
1	DA: 11 kNm / FS Mech: 5,6 kNm	
2	DA: 25,4 kNm / FS Mech: 10,1 kNm	
3	DA: 39,1 kNm / FS Mech: 18,4 kNm	
4	DA: 66,7 kNm / FS Mech: 35,9 kNm	
5	FS Mech: 48,1 kNm	
6	FS Mech: 68,4 kNm	
STROKE		
–	Quarter turn actuator 90°	
A	50 mm	
B	75 mm	
C	100 mm	
D	150 mm	
E	220 mm	
VOLTAGE		
1	3 ph / 400 V / 50 Hz	
2	1 ph / 230 V / 50 Hz	
3	3 ph / 480 V / 60 Hz	

ORDERING CODE

TriVAX® PLUS Scotch Yoke 90°

CODE	DESCRIPTION	COMMENT
PROTECTION CLASS / APPROVAL		
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	
TEMPERATURE RANGE		
1	Standard	– 25°...+70 °C
3	Low temperature	– 30°...+60 °C
FIELDBUS		
0	Without	
3	HART	
MOUNTING ORIENTATION		
0	Standard	Vertical – display above
1	Upside down	Vertical – display below
2	righthand 0°	Choose everytime „0“ for actuators which does’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°	
OPTIONAL FEATURES		
0	Without	
1	Hand pump small	4 cm³/stroke
2	Hand pump large	12 cm³/stroke – actuator size 3 and larger
ELECTRIC / MECHANIC CONNECTION		
1	Cable entry metric / mech. connection standard (see dimensional drawing)	
5	Cable entry NPT (with adaptors) / mech. connection standard (see dimensional drawing)	
CORROSION PROTECTION		
1	Standard	Acc. ISO 12944-2 C3
2	Off-shore	Acc. ISO 12944-2 C5M
3	Primer only	

NOTES

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