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**STANDARD ACTUATORS
TYPE XN
OPERATION MANUAL**

Distributors



EMET-IMPEX Co. Ltd., Przemyśl



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1. General information on electric actuators and rules for safe application

1.1 Application

The standard type XN actuators are designed to drive various valves, such as globe valves, gate valves, dampers, butterfly valves, etc., in control systems for industrial automation, power engineering, heat engineering, chemical and food industries, wastewater treatment and water supply systems. The type XN actuators can be operated both indoors (industrial rooms) and outdoors.

The manufacturer explicitly rejects the responsibility for any damage that may arise due to the application of actuators for any purposes different from the intended use. Getting familiar with the details provided in the Operation Manual will make it easier to apply and operate the actuators in the correct manner. Drawings referred to in the Operation Manual and identified with their ordinal numbers (e.g. Dwg. 2) are presented in the final section of the Operation Manual.

1.2 Technical description

The constant speed type XN standard actuators are of modular design. The basic module (driving unit) is a multi-turn unit that incorporates a three-phase electric motor 3x400 V, the main gear, a manual operation, a drive transmission system, a control block and an industrial-type connector. The multi-turn unit represents a self-contained multi-turn actuator but when combined with a linear unit or lever (part-turn) gearbox it makes up a linear or a lever (part-turn) actuator. The control block incorporates travel limit switches, torque limit switches for the overload protection system and a mechanical position indicator. The control block may be equipped with a position transmitter as an option or a pulse generator to provide information that the actuator is in motion. The standard actuators of the XN type are controlled by supplying the power voltage 3x400 V.

For the XN standard actuators the torque limit switches for the overload protection system are **set in a factory**.

Advantages

- ◆ low weight and any working position enable users to install the actuator directly onto the controlled valve,
- ◆ modular design of the units reduces the amount of time necessary for maintenance and repair works,
- ◆ increased IP 67 protection class,
- ◆ easy installation and electric connections at the place of operation with the use of the industrial type plug-in connector,
- ◆ operation reliability and long lifetime,
- ◆ long service intervals,

- ♦ dimensions of mounting flanges F07, F10, F14 according to ISO-5210, DIN-3210 and PN-88/M-42010.

1.3 Ordering code for actuators

The standard actuators of the XN type are manufactured as multi-turn, linear and lever (part-turn) units. For multi-turn actuators it is enough to order only the XN multi-turn module. In case of linear or lever actuators corresponding linear units or lever-type gearboxes should be ordered alongside. The standard actuators of the XN type are classified into three classes:

- ♦ the modulating duty XNR actuators of the multi-turn, linear or lever type,
- ♦ the open-close duty XNS actuators of the multi-turn, linear or lever type,
- ♦ the standard modulating actuators with increased value of torque for overload protection system XNRS of the multi-turn, linear or lever type,

The way of order placing with ordering codes for every type of the actuators is described in Section 9.

1.4 Installation of actuators

The standard actuators can be operated both in closed industrial rooms or outdoors. However, operation in atmospheres with aggressive corrosion effect is not allowed. The permissible operating conditions are specified in technical parameters of the actuators.

Prior to installing the actuator it is necessary to check whether its parameters are suitable for the intended application.

1.5 Maintenance

Adherence to maintenance instructions listed in Section 7 will guarantee long lifetime and fault-free operation of actuators.

1.6 Remarks and warnings on safety issues

Prior to putting the actuators in motion it is mandatory to carefully read and understand this Operation Manual. It is indispensable to install, start up and operate the actuators in correct and safe manner.

As the actuator is supplied with voltage that is hazardous to human life all the works on installation and start up must be carried out exclusively by properly qualified personnel in accordance with the effective regulations on occupational health and safety.

Due to safety reasons all the activities that may affect safety of operators and maintenance personnel and contribute in elimination of damage to actuators or other controlled or collaborated technological systems are purposefully distinguishes as warnings or notes.

Warnings appear whenever the relevant activities affect safety on the staff during installation, start-up or operation.

Notes are placed next to operations that are crucial for defect-free operation of actuators and may lead to damage in case of mishandling or negligence.

2. Technical parameters

2.1 Technical parameters of the XN standard actuators

No	Parameter	Value		
		Multi-turn actuators XN	Linear actuators XN /mod L	Lever actuators XN /mod W
1	Rated value for output torque Mn or output force Fn of the actuators at the power supply voltage 3x400 V AC $\pm 10\%$, f=50Hz (1) For higher values please contact the supplier	XNRa - 30Nm XNRSa - 60Nm XNRb - 60Nm XNRSb - 120Nm XNRc - 120Nm XNRSc-240Nm	XNRa/La - 10 kN XNRS/La - 20 kN XNRb/Lb - 20 kN XNRSb/Lb - 40kN (1)	XNRa/Wa - 250 Nm XNRSa/Wa-500 Nm XNRb/Wb - 500 Nm XNRSb-1000Nm (1)
2	Range for the adjustable overload system (factory setting)	50 – 100% Mn	50 – 100% Fn	50 – 100% Mn
3	Rated voltages for electric power supply of actuators. Rated contact current of microswitches	3x400V AC, $\pm 10\%$, 50 Hz 2.5A / 230V AC 0.3A / 220V DC		
4	Rated values for strokes	4; 5.6; 8; 11; 16; 22; 30; 45; 56; 80; 110 rev.	20; 28; 40; 50; 80; 100; 125;150; 200 mm	90°, 120°, 160°
5	Rated speed of the output driving shaft	4; 5,6; 8; 11; 16; 22; 32; 41 rpm	20; 28; 40; 56; 80; 110 mm/min	0.24; 0.33; 0.47 rpm
6	Operation modes	Mode S4 630 cycles /hour, Mode S2 15 min.		
7	Ambient temperature range	-25 ÷ 70°C		
8	Class of protection	IP 67		
9	Relative humidity	up to 80%		
10	Mounting position	Any position		
11	Lubrication	Semi-liquid grease		
12	Connecting flange	F07, F10, F14	F07 or F10	F10 or F14
13	Dimensions: [mm] BxLxh1 (h) - type a XN (XNM) - type b XN (XNM) - type c XN (XNM) (2) Dimensions depend on the selected linear unit or part-turn gearbox	360x595x230(340) 390x630x230(340) 460x810x300(380)	360x595x505(575) 390x630x545(615) (2)	610x595x595(710) 705x630x655(770) (2)
14	Weight: - type a XN (XNM) - type b XN (XNM) - type c XN (XNM) (3) Weight depends on the selected linear unit or part-turn gearbox	19 (23) kg 25 (29) kg 54 (58) kg	25 (29) kg 31 (35) kg (3)	41 (45) kg 54 (58) kg (3)

2.2 Wiring Diagrams

Electric connections for standard actuators should be carried out in accordance with the technical design based on application diagrams.

The application diagram for closing on travel limit is presented in Dwg. 1. The application diagram for closing on torque (tightened control) is presented in Dwg. 2.

3. Installation of actuators onto valves

Note

Prior to starting the installation process it is necessary to check whether the actuator matches the valve (e.g. a globe valve). The verification procedure depends on the specific valve and, in correlation, the dedicated actuator type. Under all circumstances it is mandatory to inspect the actuator for possible transportation damage.

If any damage is detected please contact your supplier to replace the defective parts with substitutive ones delivered by the manufacturer.

The actuators can be operated at any working position. The actuator should be installed with enough free space to enable undisturbed access to its handwheel.

At least 50 cm of free room must be provided around the actuator for maintenance and repair purposes.

Installation of a multi-turn or a part-turn actuator

When a multi-turn or a part-turn actuator is to be installed directly onto the valve, the coupling method applied between the actuator and the device stem depends on the fact whether the coupling part is used only for torque transmission or is also intended to transfer any longitudinal force.

The B1/B3 coupling

In case when only torque is to be transferred and the B1 coupling is applied, the actuator hollow driving shaft is placed directly onto the valve stem with a key, in accordance with ISO 5210. This coupling method is shown in Dwg. 4. For the B3 coupling the hollow driving shaft of the actuator encapsulates a bushing with a bore and keyway in accordance with ISO 5210. It is the bushing that is used to place the actuator output hollow shaft onto a valve stem with a key. That coupling method is presented in Dwg. 5.

Both methods described above and used to couple the actuator with the valve need the following measures to be taken:

- ◆ Make sure that the mounting flange of the actuator matches the valve design,
- ◆ Make sure that the mounting hole and the keyway

correspond to dimensions of the stem and the key of the valve.

- ◆ Apply a small portion of lubricant to the valve stem and the key.
- ◆ Place the actuator onto the valve stem and carefully align mounting holes of both mounting flanges.
- ◆ Fasten the flanges with bolts with the strength grade no lower than 8.8. Be careful to tighten the bolts in a cross pattern.

The A- coupling

If the actuator is intended to transmit both torque and longitudinal forces the actuator is supplied with the A-type coupling that is shown in Dwg. 6. The A-type coupling can be supplied either with the female thread that correspond to the male thread on the stem of the valve or with a bushing to be tapped by the purchaser himself.

In the latter case, the bushing must be removed from the A-type coupling before assembling and tapped the appropriate thread. While boring the hole and making the female thread inside the bushing one has to pay particular attention to coaxial alignment of the hole with the stem and to perpendicularity of the bushing to the surfaces that mate the thrust bearings.

Prior to assembling the actuator with the valve with use of the A-type coupling the following measures to be taken:

- ◆ Make sure that the mounting flange of the actuator matches the valve design,
- ◆ Make sure that the female thread inside A-type coupling corresponds to the male thread on the valve stem. The special attention should be paid to the thread pitch and the thread direction.
- ◆ Apply a small portion of lubricant to the valve stem.
- ◆ Screw the actuator onto the valve and carefully align mounting holes of both mounting flanges.
- ◆ Fasten the flanges with bolts with the strength grade no lower than 8.8. Be careful to tighten the bolts in a cross pattern.
- ◆ If a protecting tube is delivered along with the actuator, unscrew the metal sheet cover placed opposite the output shaft and screw the protecting tube to the actuator.
- ◆ Top up the grease inside the coupling via a lubrication nipple on the coupling case. Apply solid grease for bearings.

Note

While installation of a lever (part-turn) actuator the particular attention must be paid to loosening components of the end stop for the part-turn gearbox. The relevant procedure is described in the Appendix 1 delivered when a lever (part-turn) actuator is ordered.

Installation of a linear actuator

To assembly a linear actuator with the valve (e.g. a globe valve) the following operations must be carried out:

- ◆ Make sure that the mounting flange of the actuator matches the globe valve flange,
- ◆ Make sure that the thread(s) in the coupling adapter match threads on the linear unit of the actuator and on the valve stem.
- ◆ Check whether a lock-nut is available on the linear unit thread.
- ◆ Apply a small portion of lubricant to threads of the linear unit and the valve stem.
- ◆ Assemble the actuator and the valve (globe valve) and carefully align mounting holes of both mounting flanges.
- ◆ Fasten the flanges with bolts with the strength grade no lower than 8.8. Be careful to tighten the bolts in a cross pattern.

Note

While assembling the coupling stud of the linear unit with the valve stem by using of a coupling adapter, attention must be paid that movement restrictions imposed to the linear stroke of the actuator linear unit must never limit the valve stem stroke as well as to pay attention that the lock nut is tightened accordingly.

4. Electric connections

Warning

Any electric connections must be made exclusively by qualified electricians in accordance with the effective regulations on occupational health and safety.

Actuators are supplied with three-phase voltage 3x400 V AC. The actuator housing must be connected to a protective conductor via the terminal that is incorporated into the male insert of the industrial connector.

All the electric connections of the actuator are carried out with use of industrial connector. The connector hood has two cable glands, one M25 gland on the top for the power supply cable with its diameter 11÷17 mm as well as one M20 gland on the side for a cable with diameter of 8÷13 mm to deliver control and signal cables. The plug (the female part of the connector which is plugged in the actuator) is delivered as a kit that includes a hood, a contact insert and a set of clamped female contacts.

Appropriate wires must be connected to the plug in accordance with the technical design or to the recommended application diagram as shown in Dwg. 1 or 2.

Warning

After completion of the plug assembly verify whether the connections adhere to the application diagram. Check operation and efficiency of protection against electric shock to the standard PN-IEC 60364-4-41 'Low-voltage electrical installations. Part 4-41: Protection for safety - Protection against electric shock'.

Note

Particular attention must be paid to appropriate tightening of glands for electric cables to make sure that the protection class IP67 is guaranteed. If the side gland is not used one has to

check whether it is properly blinded (the blinding plug is delivered along with the gland).

5. Commissioning and start-up

After having the actuator installed on the valve and after completion and testing all the electric connections, the commissioning procedure of the actuator can be commenced. The commissioning is intended to check whether the driven valve is opened and closed in correct and safe manner in accordance with the design.

Note If the commissioning procedure concerns an actuator with a part-turn gearbox it is necessary to make sure that the end stop of the part-turn gearbox has been loosened in the way as described in Appendix 1 delivered when a lever (part-turn) actuator is ordered.

In case of a linear actuator make sure that after installation of an actuator on a globe valve the stroke of the valve stem always falls within the stroke limits of the linear unit.

In general, the commissioning process consists in checking whether torque limit switches operate reliably and the travel limit switches of the actuator are set accordingly so that the electric control for positions OPEN and CLOSED of the actuator always correspond with opening and closing of the valve.

The commissioning procedure is also meant to finally verify all the electric connections, both for control and signalling circuits whether they fully adhere to the design requirements.

Note The actuator setup procedure that is presented below refers to the unit where the valve is being closed when the handwheel is rotated clockwise. In case when the actuator is closed by rotating the handwheel anticlockwise functions of the described switches are mutually swapped.

For setting up the XN actuator it is first necessary to access the adjustable cams by removing the cover of the control block. The cover may have a sight-glass that enables observation of the position indicator located below. The cover is removed by unscrewing four bolts with use of a hex key size 5. View of the control block is shown in Fig. B.

5.1 Switching to the manual operation mode

The both operation modes, i.e. manual and electrically driven are used during the setup process. The manual mode is used to rotate the handwheel to open or close the valve. In the electrically driven mode the actuator is opened and closed by forcing its movements with the actuator motor.

Note The actuator can be switched over to the manual operation mode only when the actuator motor is shut down. Swapping operation modes when the motor is in motion may lead to the actuator damage.

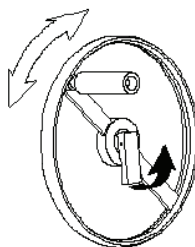
**Fig. A**

Fig. A explains how to switch the actuator over to the manual operation mode.

- ◆ Pull the lever located on the shaft of the handwheel.
- ◆ If a resistance is sensed, rotate slightly the handwheel right and left until the clutch for the manual operation mechanism is reliably engaged.
- ◆ Release the lever that should return to its initial position (as in Fig. A).
- ◆ The handwheel for the manual operation should be rotated with a force that is necessary to overcome inertia and load of the valve stem; in addition movement of the stem must be seen.
- ◆ Switchover to the electrically-driven operation mode is carried out automatically when the electric motor of the actuator is switched on.
- ◆ When movements of the valve are performed with use of the handwheel, please avoid application of excessive forces as it may lead to exceeding the maximum allowed forces or torques as many as several times and will result in damage of both the actuator subassemblies and the valve. For type 'a' actuators the force applied to the handwheel should not exceed 35N (3.5 kG), for 'b' type – 70N (7 kG) and for 'c' type – 90N (9kG) while for 'd' type actuators – 160 N (16 kG).

5.2 Checking operation of torque limit switches

The overload protection system (torque limit switches) is factory set to the rated torque or to the torque specified in the order. The checking procedure consists in functional testing of the switches to make sure that the actuator is switched off when its movements towards opening or closing the valve are mechanically disabled. Prior to checking operation of the torque limit switches, the following operations must be done:

- ◆ Switch the actuator to the manual operation mode.
- ◆ Rotate the handwheel to make sure that the actuator correctly collaborates with the valve.
- ◆ Determine the rotation direction of the handwheel to close the driven valve and check whether the information plate on the handwheel indicates that direction properly. The factory settings assume that clockwise rotation of the handwheel is associated with closing of the valve. If the valve operates in

opposite manner, replace the 'C-O' plate so that the arrow indicates the correct directions for opening and closing of the valve.

- ◆ Rotate the handwheel to move the valve to the middle position.
- ◆ Loose the clamping screws (1) Fig. B on the green and red areas of the cam drum to unlock the cams.
- ◆ Check whether the travel cams (3) and (4) Fig. B are not in contact with travel limit switches (5) or (6). If necessary, move the travel cams (3), (4) away from travel limit switches.
- ◆ Switch on the electric drive of the actuator to move the valve to the closed position (the actuator automatically switches over from the manual operation to electric drive) and stop.
- ◆ If the actuator has moved the valve oppositely to the intended direction **switch the power off** and swap the phase sequence of the power supply voltage.
- ◆ Determine whether switches W5/W7 (12) Fig. B protect the opening or closing direction.

Note

When clockwise rotation of the handwheel results in **closing** of the valve, the shaft of the torque limitation system (11) Fig. B overcomes resistance of the valve and rotates anticlockwise, then the upper cam approaches the switches W5/W7 (12) Fig. B. It means that for such an actuator the W5/W7 switches protect the closing direction while the switches W6/W8 (13) Fig. B protect the direction of opening.

When clockwise rotation of the handwheel results in **opening** of the valve the upper cam also approaches the switches W5/W7 (5) Fig. B. It means that for such an actuator the W5/W7 switches protect the opening direction while the switches W6/W8 (13) Fig. B protect the direction of closing.

It is extremely important to correctly determine these relationships and to make sure that the switches are operated correctly as it is indispensable for reliable and safe operation of both the actuator and the valve.

If clockwise rotation of the handwheel results in closing the valve it is necessary to do the following:

- ◆ Start the actuator from the middle position (about 50% of the opening travel) towards the closing direction and use the test lever of the overload protection system (14) Fig. B to have the switches W5/W7 tripped.
- ◆ Tripping the switches should result in the actuator stop.
- ◆ If the actuator fails to stop, check electric connections of the control circuit for the valve closing.
- ◆ Repeat all the activities for the opening direction and use the test lever for the overload protection system (15) Fig. B to have the switches W6/W8 tripped.
- ◆ Tripping the switches should result in the actuator stop.
- ◆ If the actuator fails to stop, check electric connections of the

control circuit for the valve opening.

5.3 Setting up the travel limit switches

The following setup procedure is recommended for the travel limit switches:

- ◆ Switch the actuator to the manual operation mode.
- ◆ Rotate the handwheel to move the valve to its middle position.
- ◆ After loosening the clamping screws (1) Fig. B on the cam drum switch on the electric drive of the actuator to move the valve towards the closed position (the actuator automatically switches over from the manual operation to electric drive) and stop it nearby the position 'closed'.
- ◆ Switchover the actuator to the manual operation mode. Rotate the handwheel to move the valve to the position 'closed'.
- ◆ As a rule, movement of the valve towards the closed position is associated with clockwise rotation of the handwheel. If so, movement of the drum for travel cams (2) Fig. B is also carried out in the clockwise direction. In this case the red cam (3) Fig. B determines the 'closed' position while the green cam (4) Fig. B determines the 'open' status.

Note

When closing the valve is enforced by anticlockwise rotation of the handwheel, the reverse functions of the cams should be assigned, i.e. the **green** cam will be for closing, while the **red** one for opening.

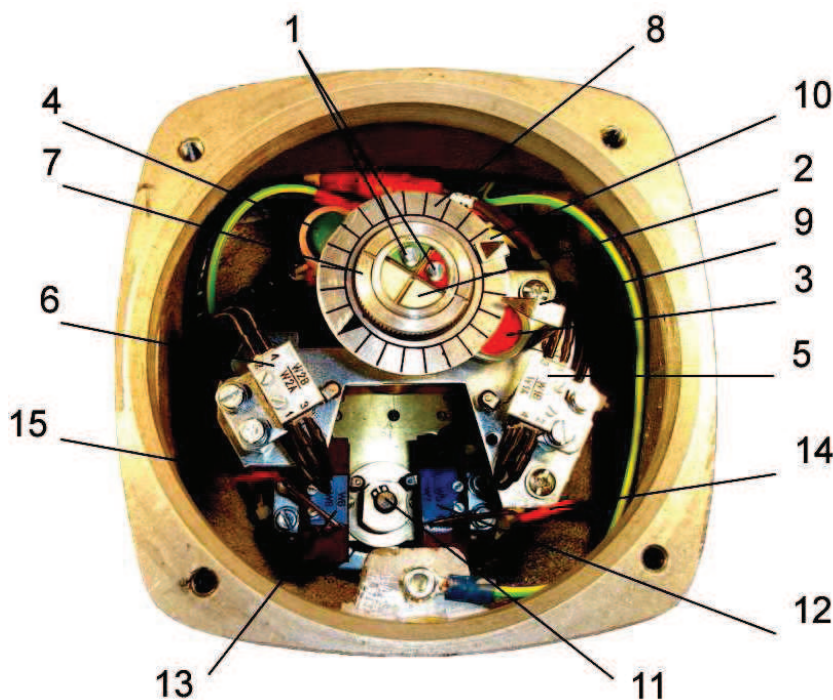


Fig. B

- ◆ After moving the valve to the 'closed' position, maintain the locking screw on the red area still loosened and adjust the red cam that collaborates with limit switches marked as W1B/W1A (5) Fig. B to achieve tripping of the limit switches. Then lock the cam by screwing the locking screw home. Verify correctness of the switches operation by rotating the handwheel towards opening and use reverse rotation to the position 'closed'.
- ◆ If the actuator fails to switch off, readjust position of the cam.
- ◆ Rotate the handwheel to move the valve to its middle position.
- ◆ Move the actuator by means of the electric drive until the 'open' position of the valve is nearly reached.
- ◆ Switch the actuator to the manual operation mode.
- ◆ Rotate the handwheel to set the actuator in its 'open' position.
- ◆ Keep the locking screw on the green area still loosened and adjust the green cam that collaborates with limit switches marked as W2B/W2A (6) Fig. B to achieve tripping of the limit switches. Then lock the cam by screwing the locking screw home. Verify correctness of the switches operation by rotating the handwheel towards closing and use reverse rotation to the position "open".
- ◆ If the actuator fails to switch off, readjust position of the cam.
- ◆ Rotate the handwheel to move the actuator to its middle position.
- ◆ Use the electric drive to move the actuator to the half-open position (50% of the opening travel).
- ◆ Switch the actuator on to move towards the closing direction and depress the lever of the limit switch 'closed' with e.g. a screwdriver to check whether the actuator stops.
- ◆ Repeat the same operation for the opening direction with depressing the lever of the limit switch 'open'.
- ◆ If the actuator fails to stop, switch the power supply off and check whether the application diagram possibly predict the 'tightened control", where the drive is switched off by the torque limit switches. If so, prior to testing operation of the travel limit switches check tripping of the torque limit switches in accordance with the procedure described in par. 5.2.
- ◆ Should the foregoing test procedure prove that the travel limit switches manage to stop the actuator and its behaviour corresponds to the application diagram, the actuator can be electrically controlled towards both the opening and closing directions until the moment when the actuator is stopped at the positions 'open' and 'closed'.

5.4 Adjustment of the position indicator

In order to adjust the position indicator the following operations must be carried out:

- ◆ Move the valve to the 'open' position (until the actuator stops automatically).
- ◆ Loose the nut (7) Fig.B that locks the indicator dial plate (8) and rotate the plate to set it in the initial position so that the plate arrow coincides with the fixed arrow (9) Fig. B.
- ◆ Switch the valve over to the 'closed' position and move the movable arrow (10) Fig. B to coincide with the fixed arrow.
- ◆ Lock both the dial plate and the arrow by tightening the locking nut (7).

5.5 Other settings

If the valve is combined with an actuator with a part-turn gearbox follow the instructions in Appendix 1 to set up end stops and the position indicator on the part-turn gearbox. The Appendix 1 is delivered along with a lever (part-turn) actuator.

5.6 Adjustment of the position transmitter

The XN actuators are usually equipped with position transmitter PPT-02/C. The adjustment procedure for the position transmitter is described in Appendix 2 that is delivered when an actuator with a position transmitter is ordered.

6. External protections for the actuator

The actuator needs application of an external protection for the motor. Settings for the external motor protection should correspond with the values specified in the table in Fig. C.

Speed [rpm]	XNRa		XNRS(S)a		XNRb		XNRS(S)b		XNRc		XNRS(S)c	
	I_N [A]	I_T [A]	I_N [A]	I_T [A]	I_N [A]	I_T [A]	I_N [A]	I_T [A]	I_N [A]	I_T [A]	I_N [A]	I_T [A]
4	0.75	1.1	1.0	1.1	1.6	2.0	1.4	1.55	1.25	1.8	1.7	1.9
5.6	0.43	0.55	0.6	0.7	1.6	2.0	1.4	1.55	1.25	1.8	1.7	1.9
8	0.5	0.8	0.75	0.8	0.85	1.35	1.25	1.35	1.5	2.0	2.0	2.2
11	0.5	0.8	0.75	0.8	0.85	1.35	1.25	1.35	1.5	2.0	2.0	2.2
16	0.85	1.3	1.0	1.1	1.5	1.8	1.8	2.0	2.9	3.2	3.4	3.8
22	0.85	1.3	1.0	1.1	1.5	1.8	1.8	2.0	2.8	3.5	3.2	3.6
32	1.5	2	2	2.2	3.45	3.8	4.3	4.8	4	4.4	5.2	5.8
41	1.9	2.2	2.3	2.6	2.8	3.5	3.2	3.6	4.4	4.8	5.6	6.2

I_N – rated current of the motor,

I_T – recommended tripping current for the motor protection

Fig. C

For the higher speeds of the actuator XN which are used for modulating duty is recommended application of the external controller with electric braking of the motor to lower the coasting of the actuator.

The collective overvoltage protection of the class C or BC in accordance with the effective standards related to overcurrent protection is absolutely indispensable.

If the built-in travel and /or torque limit switches of the actuator are used for collaboration with conventional relay-type circuits the attention must be paid to protection of these circuits against short circuits (a circuit breaker up to 2A is recommended). Solenoids of relays must be equipped with spark-suppression circuits.

7. Maintenance

The XN actuators need no regular maintenance measures during their lifetime.

It is recommended to inspect the actuators once a year, check all the mechanical connections and verify for absence of any leaks, plays, cracks or deformations.

Contact the equipment supplier if any defects of malfunctioning of actuators are detected.

8. Transportation and storage

It is recommended to transport the actuators wrapped in foil sheets and placed on standard palettes. The actuators should be secured against accidental dislocation.

Actuators must be stored indoors in purposefully dedicated rooms. Avoid storage of actuators under corrosive ambient conditions.

9. Ordering codes

Placing orders for XN actuators is described below.

ORDERING CODES FOR STANDARD MULTI-TURN ACTUATORS OF X TYPE

[illegible]

NOTES:

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1. The RS operation mode means the S4 operation up to the maximum torque for modulating duty and the S2 stands for operation up to the maximum torque for open-close duty
 2. The feedback signal 'pulse generator' provides a free voltage contact witch gives pulses during the actuator operation.
 3. Travel above 110 revolutions should be agreeded with supplier
- The maximum number of revolutions - 1250

Standard actuators, type XN

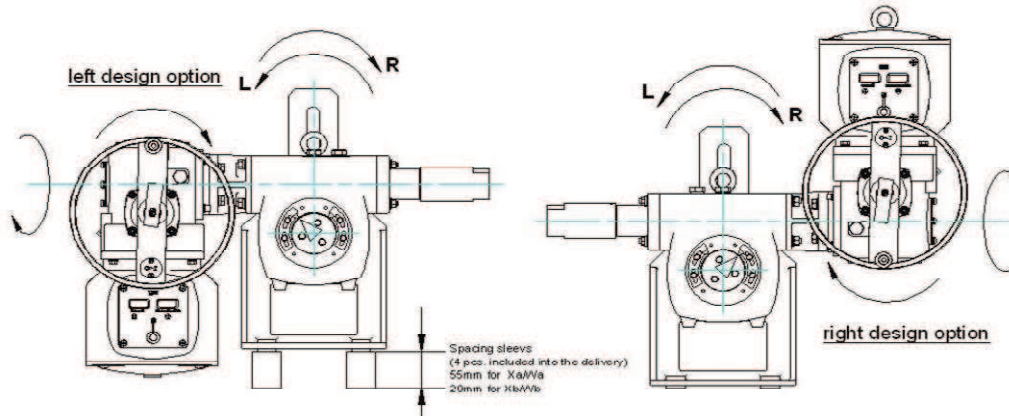
ORDERING CODES FOR PART-TURN GEARBOXES OF X TYPE

[illegible]

NOTES:

August 2009

1. Number of revolutions per 90° of rotation is 4.25
2. From the actuator attachment side the Wa gearbox has the F07 coupling flange, the Wb gearbox – F10.
3. From the side of the valve the Wa gearbox has the F10 coupling flange, the Wb gearbox – F14.
4. The part-turn gearbox is supplied with a connecting bushing for attaching a multi-turn actuator.
5. The left and right design options are explained on the drawings below.



Left L design option

Clockwise rotations of the handwheel result in clockwise rotation of the input shaft for the lever gearbox and anticlockwise rotation of the lever.

Left R design option

Clockwise rotations of the handwheel result in clockwise rotation of the input shaft for the lever gearbox and clockwise rotation of the lever.

Right R design option

Clockwise rotations of the handwheel result in clockwise rotation of the input shaft for the lever gearbox and clockwise rotation of the lever.

Right L design option

Clockwise rotations of the handwheel result in clockwise rotation of the input shaft for the lever gearbox and anticlockwise rotation of the lever.

ORDERING CODES FOR X-TYPE LINEAR UNITS

L			-		-					-	
Rated force											
Modulating duty	10 kN	a									
Open-close duty	20 kN										
Modulating duty	20 kN	b									
Open-close duty	40 kN										
Stroke											
up to 50mm				1							
up to 100 mm				2							
up to 125 mm				3							
up to 150 mm				4							
up to 200 mm				5							
Design options											
Left (anticlockwise rotation - the inner sleeve retracts)				0							
Right (clockwise rotation - the inner sleeve retracts)				1							
Mounting flange											
F07 flange for the La unit						1					
F10 flange for La and Lb units						2					
Stem thread											
Stem thread for the La unit: M12x1.25						1					
Stem thread for the La unit M16x1.5						2					
Stem thread for the Lb unit: M20x1.5						3					
Supplementary equipment											
No coupling										0	
Adapter (specify the valve type)										1	
Coupling (yoke + adapter, specify the valve type)										2	

NOTES:

1. The linear unit is supplied along with a connecting bushing for a multi-turn actuator.
2. For La and Lb units the inner sleeve stroke is 5 mm per a single revolution.

Examples of order placing specifications:

1. The standard multi-turn actuator XN:

XNRa-44-02-11-000-10, which denotes:

The standard multi-turn actuator for modulating duty, the rated torque (tripping of the overload protection, factory setting) 30 Nm, operation mode S4 (modulating duty) up to 30 Nm, rotation speed 11 rpm, travel 11 revolutions, without local control, with a position transmitter 4-20 mA, double limit switches for both travel and torque, with no additional electronic equipment, cross-section of power conductors 1.5 mm² and control conductors 0.5 mm², without a heater, with a coupling bushing B3, without a mechanical position indicator (the cover of the control block without a sight glass).

2. The standard multi-turn actuator XN for open-close duty:

XNSa-32-00-11-000-11, which denotes:

The standard multi-turn actuator for open-close duty, the rated torque (tripping of the overload protection, factory setting) 60 Nm, operation mode S2 up to 60 Nm, rotation speed 8 rpm, travel 5.6 revolutions, without local control, without a position transmitter 4-20 mA, double limit switches for both travel and torque, with no additional electronic equipment, cross-section of power conductors 1.5 mm² and control conductors 0.5 mm², without a heater, with a coupling bushing B3, with a mechanical position indicator (the cover of the control block with a sight glass).

3. The standard lever actuator XN for modulating duty with increased rated torque, overload protection 700Nm:

XNRSb-32-02-11-00-00/Wb-11-342 torque for the overload protection 700 Nm, which denotes:

The standard lever actuator for modulating duty with increased rated torque, the setting torque (tripping of the overload protection, factory setting) 700 Nm, operation mode S4 (modulating duty) up to 500 Nm, output speed 180°/min (the digit '3' in the code of multi-turn actuator stands for 8 rpm of the multi-turn actuator, in case of a part-turn gearbox the number of revolutions per 90° is 4.25, therefore the outputs speed $8/4.25 \times 90^\circ$ amounts ca. 180°/min), travel 120° (the digit '2' in the code of multi-turn actuator stands for the travel of 5.6 revolutions, therefore $5.6/4.25 \times 90^\circ$ results in 120°), without local control, with a position transmitter 4-20 mA, double limit switches for both travel and torque, with no additional electronic equipment, cross-section of power conductors 1.5 mm² and control conductors 0.5 mm², without a heater, without a mechanical position indicator (the cover of the control block without a sight glass), the part-turn gearbox of the right option (side of the multi-turn actuator

where the part-turn gearbox is attached), with a base plate, with a shaft for mounting a lever, ball joints for a linkage, with a bushing with a Morse taper (the member to mount the linkage ball joint to a lever of the valve to be welded).

4. The standard linear actuator XN for modulating duty with increased rated torque, overload protection 30 kN:

XNRSb-54-02-11-000-00/Lb-2-023-0, torque for the overload protection 30 kN, which denotes:

The standard actuator for modulating duty with increased rated torque, linear operation, the setting force (tripping of the overload protection, factory setting) 30 kN, operation mode S4 (modulating duty up to 20 kN), travelling speed 80 mm/min (the digit '5' in the code of multi-turn actuator stands for 16 rpm of the multi-turn actuator, in case of linear units La and Lb the inner sleeve stroke per 1 revolution is 5 mm, therefore the speed 16×5 amounts to 80 mm/min), travel distance 55 mm (the digit '4' in the code of multi-turn actuator stands for the travel of 11 revolutions of the multi-turn actuator, in case of linear units La and Lb the inner sleeve stroke per 1 revolution is 5 mm, therefore the travel distance is $11 \times 5 = 55$ mm), without local control, with a position transmitter 4-20 mA, double limit switches for both travel and torque, with no additional electronic equipment, cross-section of power conductors 1.5 mm^2 and control conductors 0.5 mm^2 , without a heater, without a mechanical position indicator (the cover of the control block without a sight glass), the linear unit with the stroke up to 100 mm, left design option, with the mounting flange F10, thread on the stem in the Lb unit M20x1.5, without the yoke or adapter.

10. Spare parts

Spare parts of the actuator are shown in exploded-view drawings No 7 and 8. Drawing 7 shows spare parts for the main transmission gear of a multi-turn actuator, whilst Drawing 8 presents spare parts for the control block of XN type.

To order spare parts please specify the actuator type, e.g. XNRa, XNRSb. For some subassemblies marked with the reference note (2) specify also the actuator code, e.g. XNRa-32, XNRSc-44 to make sure that your order is handled correctly.

11. Disposal

Disposal of packing materials

Packing materials are fully recycled. Dispose them in accordance with local regulations and rules related to waste management.

Disposal of the appliance

Actuators or parts of them cannot be disposed along with common wastes! When repairing of worn or damaged actuators proves to be cost-ineffective, they should be scrapped. The scrapping procedure includes the following steps:

- access the chambers and closed spaces that are filled with semi-liquid grease, remove it and hand over to a company that deals with utilization of used oils and lubricants.
- dismount electric and electronic appliances, sort them in accordance with relevant local rules and regulations in force and dispose them to a relevant waste-handling company,
- segregate all metal parts (aluminium alloys, steel, non-ferrous metals), plastic parts and rubber components and dispose them to companies that deal with recycling and management of industrial wastes and equipment.

12. Contact

Manufacturer

ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o.
(ENTERPRISE FOR MANUFACTURING OF AUTOMATION
EQUIPMENT Co. Ltd.),

ul. Tęczowa 57, 50-950 Wrocław, Poland

Fax (+48 71) 342 89 20, e-mail: zpua@zpua.pop.pl

www.zpua.pop.pl

Marketing and Sales: tel. (+48 71) 342 34 00

or (+48 71) 342 33 58

Technical information tel. (+48 71) 342 88 30 ext. 36

Resellers /Distributors:

EMET-IMPEX Co. Ltd.

Ul. Zyblikiewicza 9,

37-700 Przemyśl, Poland

(+48 16) 676 92 30

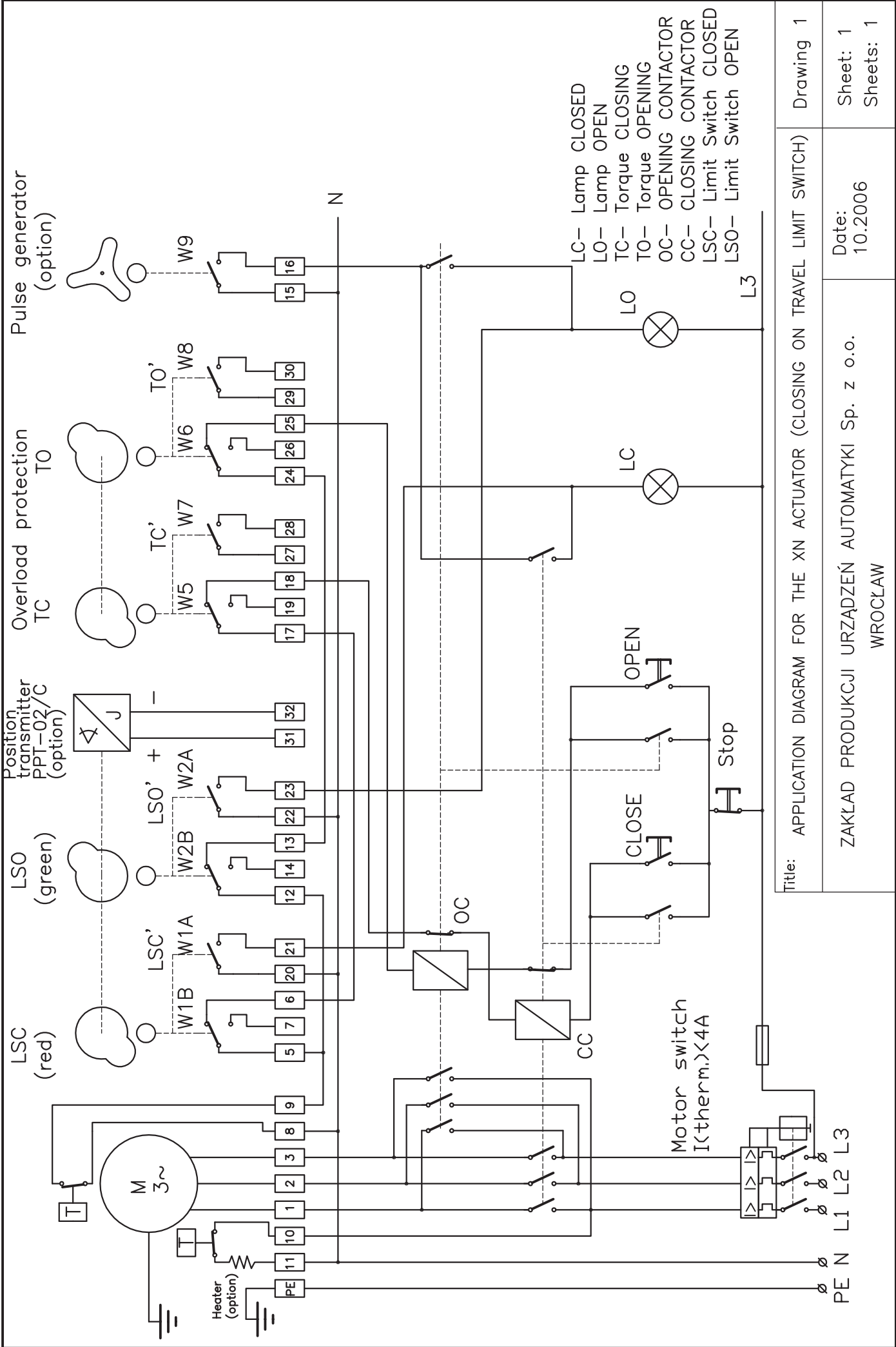
Zakład Automatyki Przemysłowej INTEC Sp. z o.o.

(Enterprise for Industrial Automatics INTEC Co. Ltd.)

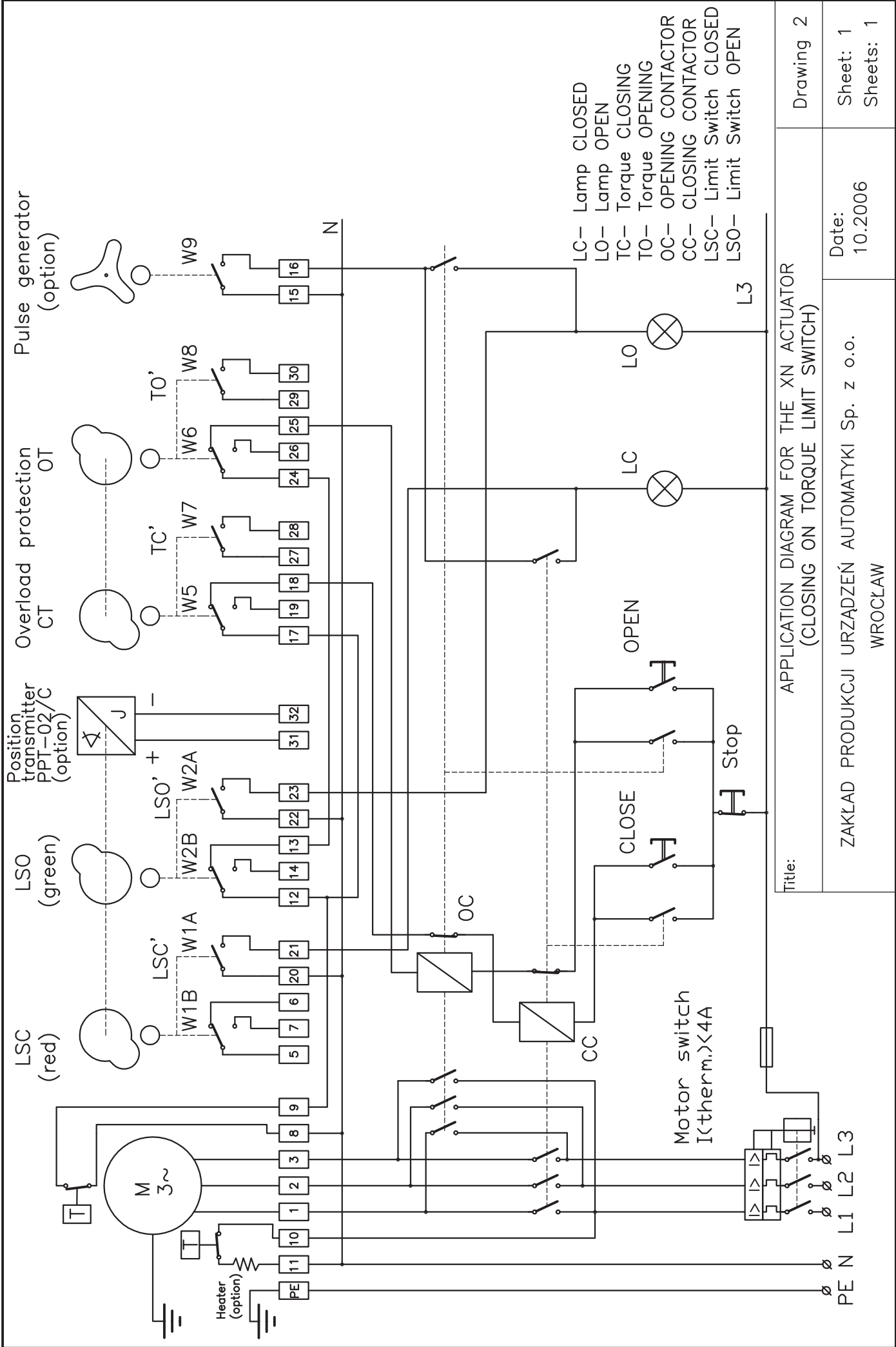
ul. Bacciarellego 54,

51-649 Wrocław, Poland

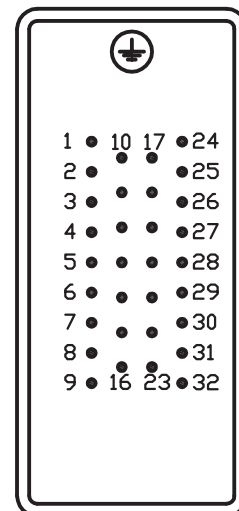
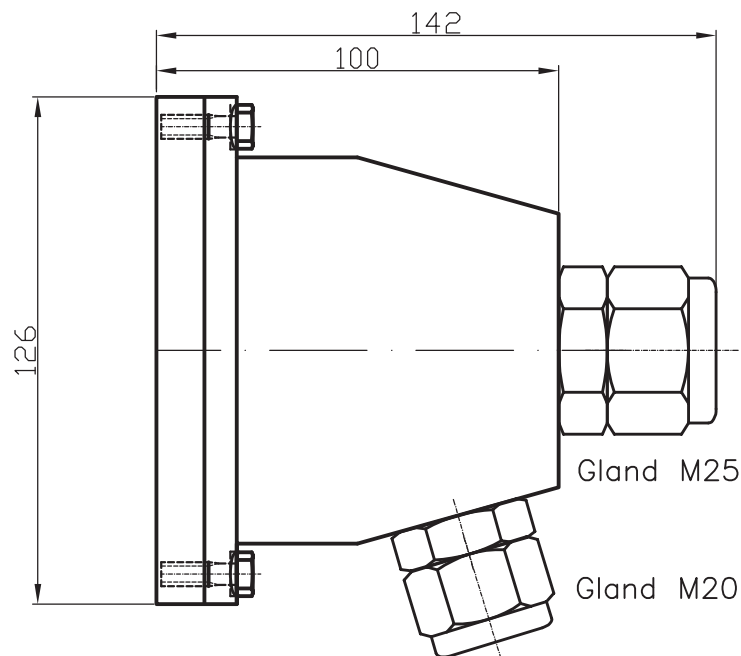
tel. (+48 71) 348 18 18



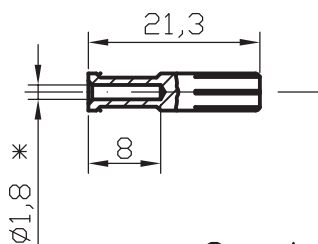
Title: APPLICATION DIAGRAM FOR THE XN ACTUATOR (CLOSING ON TRAVEL LIMIT SWITCH)		Drawing 1
ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCLAW		Date: 10.2006 Sheet: 1 Sheets: 1



Title: APPLICATION DIAGRAM FOR THE XN ACTUATOR (CLOSING ON TORQUE LIMIT SWITCH)		Drawing 2
ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCLAW		Date: 10.2006
		Sheet: 1 Sheets: 1



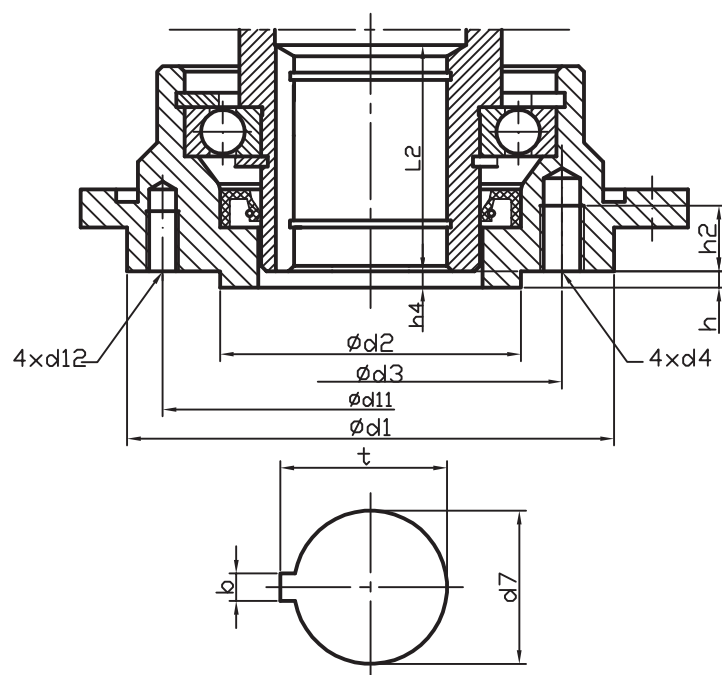
Housing of the connector
for the Actuator XN (STANDARD)



* Cross-sections of wires:
1.5mm² or 2.5mm² – power supply contacts
from 0.5mm² to 1.5mm² – contacts of
control signal
rated current for contacts 16A
rated voltage 500V

Contacts of the multi-contact connector

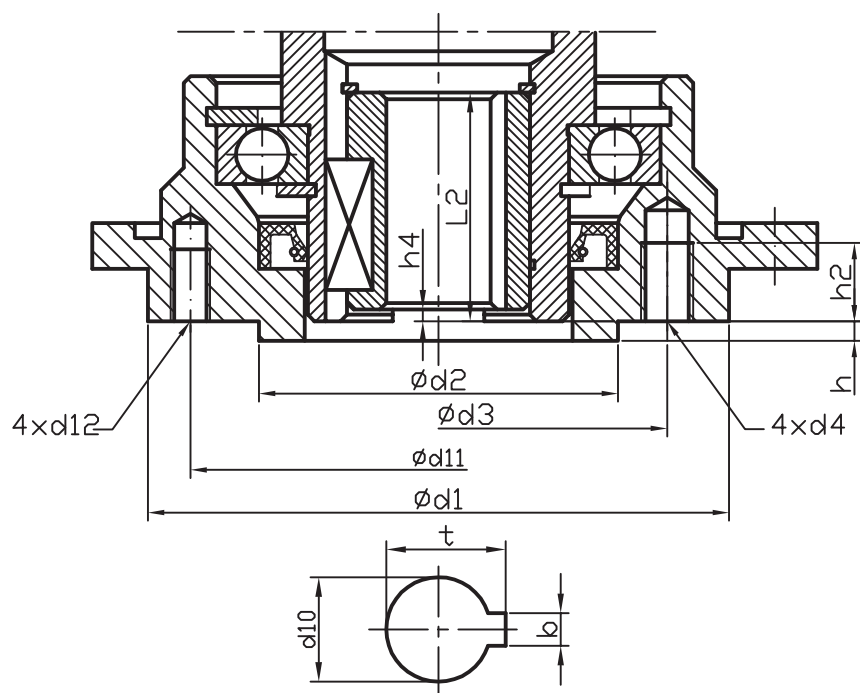
Title: Multi-contact connector for XN actuators	Drawing: 3
ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCŁAW	Date: 10.2006 Sheet: 1 Sheets: 1



Multi-turn actuator	XNa	XNb	XNc
ISO 5210	F07	F10	F14
$\phi d1$	91	125	175
$\phi d2$ f8	55	70	100
$\phi d3$	70	102	140
d4	M8	M10	M16
$\phi d7$ H7	28	42	60
$\phi d11$	80	110	155
$\phi d12$	M6	M6	M10
t	31.3	45.3	64.4
bJS9	8	12	18
L2	42	52	90.15
$h4=h$	3	3	4
$h2_{min.}$	16	13	25

Note: Basic dimensions of the coupling are bolded

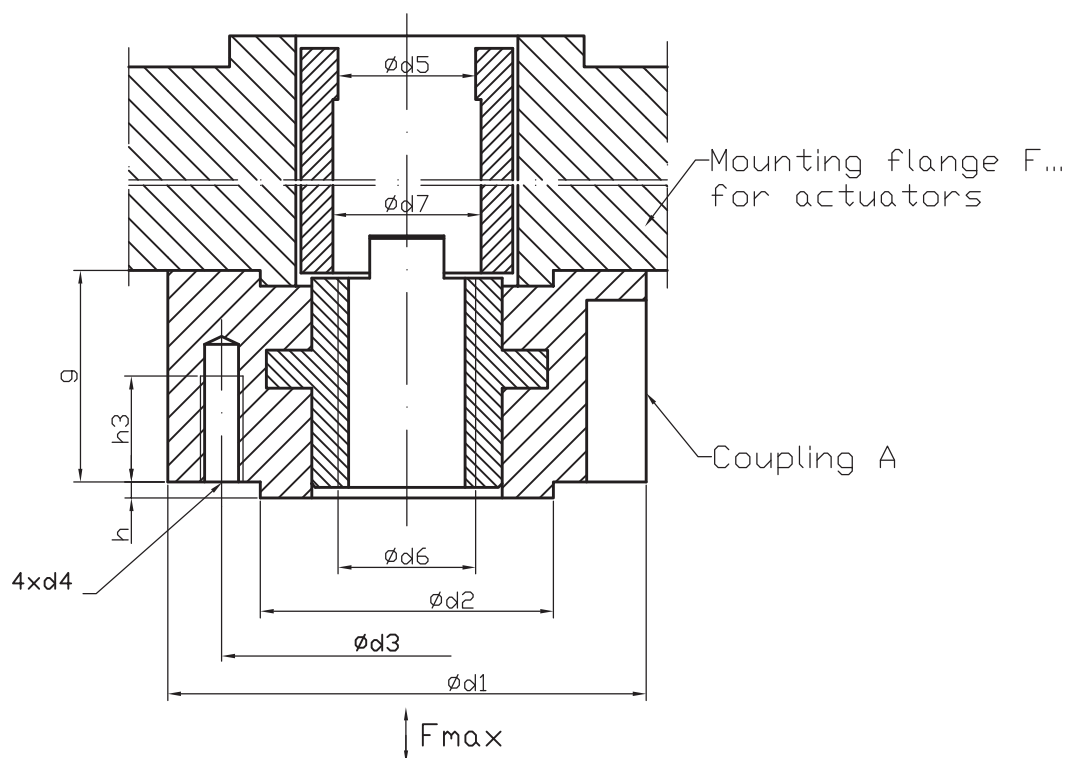
Title: Coupling B1 ISO 5210		Drawing 4
ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCLAW	Date: 10.2006	Sheet: 1 Sheets: 1



Multi-turn actuator	XNa	XNb	XNc
ISO 5210	F07	F10	F14
ød1	90	125	175
Ød2 f8	55	70	100
Ød3	70	102	140
d4	M8	M10	M16
Ød10H9	16	20	30
ød11	80	110	155
ød12	M6	M6	M10
t	18.3	22.7	33.3
bJS9	5	6	8
L2	33.2	40.6	72
h4=h	3	3	4
h2min.	16	13	25

Note: Basic dimensions of the coupling are bolded

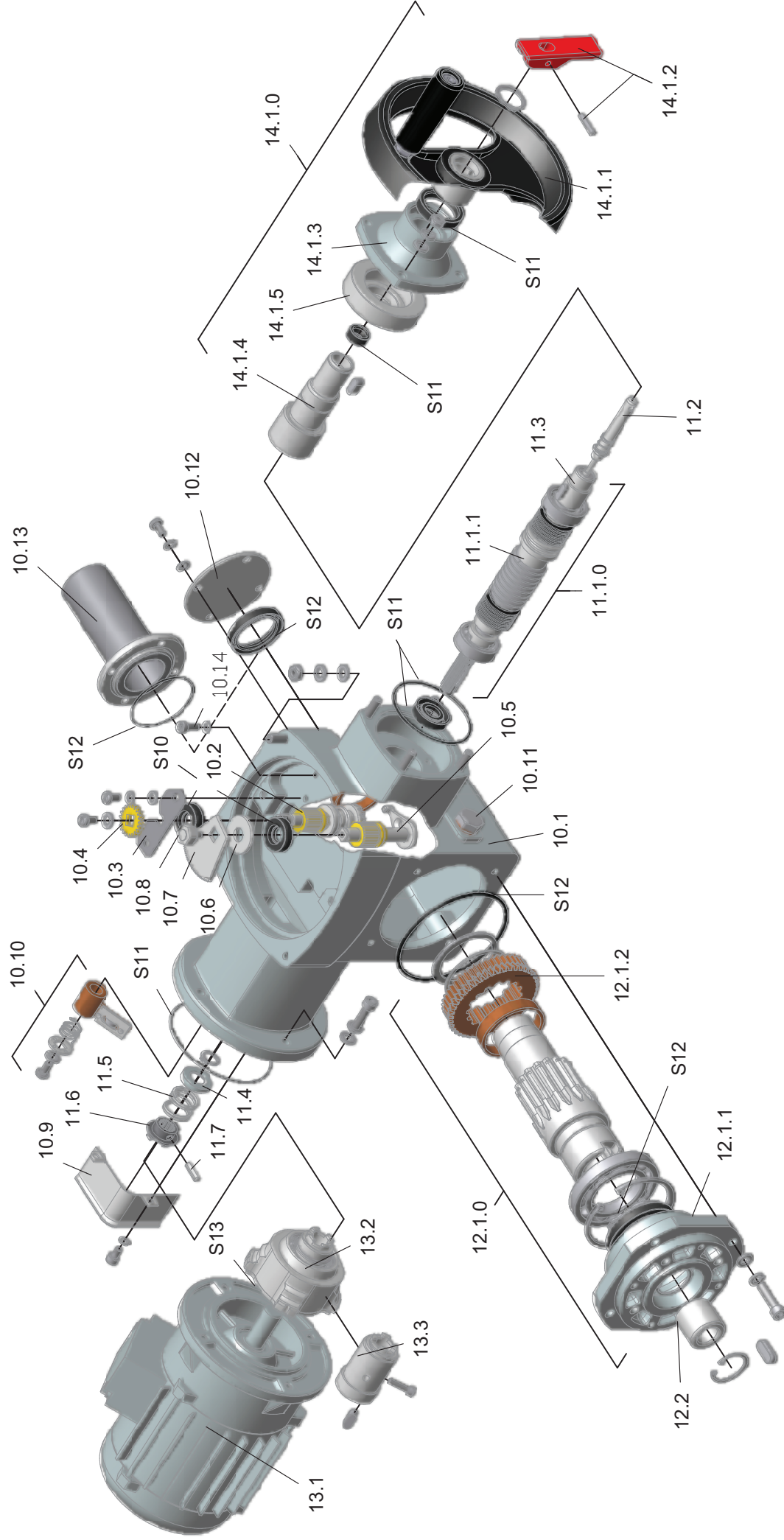
Title: Coupling B3 ISO 5210		Drawing 5
ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCŁAW	Date: 10.2006	Sheet: 1 Sheets: 1



Multi-turn actuator	XNa	XNb	XNc
ISO 5210	F07	F10	F14
Fmax kN	40	70	160
$\phi d1$	90	125	175
$\phi d2$ f8	55	70	100
$\phi d3$	70	102	140
d4	M8	M10	M16
$\phi d5$	26	40	58
$\phi d6$ max	26	40	57
$\phi d7$	28	42	60
g	40	50	65
h	3	3	4
h3	20	22	25
weight kg	1.1	2.8	6.8

Note: Basic dimensions of the coupling are bolded

Title:	Coupling A ISO 5210	Drawing: 6
ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCLAW	Date: 10.2006	Sheet: 1 Sheets: 1



Title:

List of spare parts for the XN actuator (exploded view)

Dwg.7



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WROCLAW

Operation Manual for XN actuators

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No	Specification	Part type	Pos. in the dwg.
1	Housing of the multi-turn actuator	A	10.1
2	Driving shaft III for the control block gear	A	10.2
3	Lock for the rotating shaft III	C	10.3
4	Gear wheel	C	10.4
5	Driving shaft for the torque limit switch, assembly	A	10.5
6	Washer	C	10.6
7	Gear wheel for torque (transmission)	C	10.7
8	Bolt of gear wheel for torque (2)	C	10.8
9	Protection plate of cables (2)	C	10.9
10	Tightening pawl (spring plate)	A	10.10
11	Lubrication port plug	C	11.11
12	Cover	C	10.12
13	Protection tube (2)	C	10.13
14	Bolt M5 for PE wire	C	10.14
15	Shaft I, assembly (2)	A	11.1.0
16	Worm (2)	C	11.1.1
17	Pull rod, assembly	A	11.2
18	Coupling for the manual operation mechanism, assembly	C	11.3
19	Retaining washer	C	11.4
20	Spring	C	11.5
21	Motor coupling	C	11.6
22	Pin	C	11.7
23	Shaft II, assembly	A	12.1.0
24	Cover	C	12.1.1
25	Wormwheel (2)	C	12.1.2
26	Coupling bushing (2)	C	12.2
27	Motor (2)	C	13.1
28	Reduction gear (2)	A	13.2
29	Reduction gear bushing	C	13.3
30	Manual drive for the X actuator	A	14.1.0
31	Handwheel, assembly	C	14.1.1
32	Pull rod lever	C	14.1.2
33	Cover	C	14.1.3
34	Sleeve I	C	14.1.4
35	Tightening bushing	C	14.1.5
36	Sealing kit for the multi-turn actuator housing	S	S10
37	Sealing kit for the shaft I	S	S11
38	Sealing kit for the shaft II	S	S12
39	Sealing kit for the motor	S	S13

Notes:

1. To place orders for spare parts please specify the actuator type, e.g. XSb1, XSma0, XNRa, XIRsb.
2. To place orders for a motor please specify the actuator code, e.g. XSc1-53..., XSMb1-64..., XNRSb-32..., XIRa-55...
3. Part types:
A - subassembly,
C - componential part
S - sealing part

Title:

List of spare parts for the XN actuators (specification)

Dwg. 7



ZAKŁAD PRODUKCJI URZĄDZEŃ
AUTOMATYKI Sp. z o.o.
WROCŁAW

Operation Manual XN actuators

Rev:

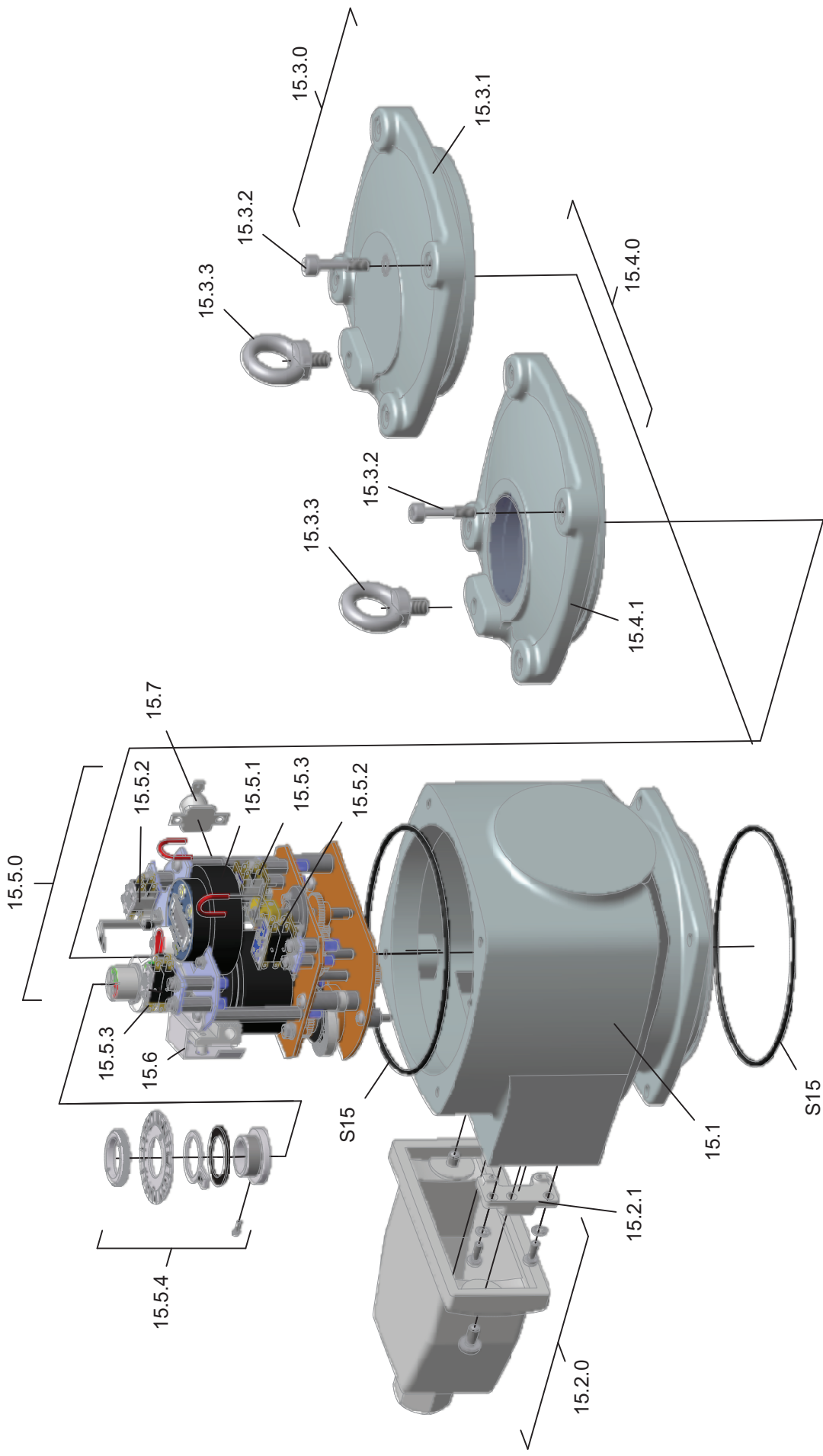
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Date:

2009-07-01

Sheet:

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Title: List of spare parts for the control block XN (exploded view)		Dwg. 8	
	ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCLAW	Operation Manual for XN actuators	
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No	Specification	Part type	Pos. in the dwg.
1	BESTER housing	A	15.1
2	Industrial connector, assembly	A	15.2.0
3	Mounting flange	C	15.2.1
4	Cover XS, assembly	A	15.3.0
5	Cover XS	C	15.3.1
6	Special bolt	C	15.3.2
7	Lug bolt	C	15.3.3
8	Cover with a sight glass, XS, assembly	A	15.4.0
9	Cover XS with a sight glass	C	15.4.1
10	Control block gear	A	15.5.0
11	Position transmitter PPT	A	15.5.1
12	Set of microswitches W1, W6/W8	A	15.5.2
13	Set of microswitches W2, W5/W7	A	15.5.3
14	Mechanical indicator	A	15.5.4
15	Heater	C	15.6
16	Thermostat	C	15.7
17	Sealing kit	S	S15

Notes:

1. To place orders for spare parts please specify the actuator type, e.g. XSb1, XSMa0, XNRa, XIRSb.
2. To place orders for a motor please specify the actuator code, e.g. XSc1-53..., XSMb1-64..., XNRSb-32..., XIRa-55...
3. Part types:
 - A - subassembly,
 - C - componential part
 - S - sealing part

Title: List of spare parts for block control XN (specification)			Dwg. 8	
	ZAKŁAD PRODUKCJI URZĄDZEŃ AUTOMATYKI Sp. z o.o. WROCŁAW	Operation Manual for XN actuators		Sheet: 2 / 2
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