

Ekorex – Consult, spol. s r.o. IČO: 47451394	OPERATING INSTRUCTIONS Servo-drive	TP2016 /PTN6
Lázně Bohdaneč	Type Series PTN6-XX.XX.XX.XX	

Technical conditions are approved on behalf of the manufacturer by:	Date, stamp, signature
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Table of contents:

1. APPLICATION
2. PRINCIPLE
3. DESCRIPTION
4. OPERATING CONDITIONS
5. PERFORMANCE DATA
6. MEASURING AND CHECKING
7. OTHER DATA
8. STORAGE, DELIVERY AND TRANSPORTATION
9. WORKMANSHIP AND PLACING PURCHASE ORDERS
10. INSTALLATION, PUTTING INTO OPERATION, MAINTENANCE SERVICE AND REPAIRS
11. QUALITY WARRANTY
12. PACKAGING AND DISPATCH
13. RECYCLING

ENCLOSURES:

- 01-TP0899/TP PTN6 – PTN6 Device Setting-up
- 02-TP0899/TP PTN6 – PTN6 Device Running-in
- 03-TP0899/TP PTN6 – PTN6 Workmanship Checking
- 04-TP0899/TP PTN6 – Test Record
- 05-TP0899/TP PTN6 – Instructions for Installation, Operation and Maintenance
- 06-TP0899/TP PTN6 – Devices Wiring
- 07-TP0899/TP PTN6 – PTN6 Assortment Table

1. Application

Actuating mechanisms are intended for operating control devices (eg. valves) for which they are suitable thanks to their mechanical and dynamic characteristics and also thanks to the electronic instrumentation.

2. Principle

The system of mechanic gears powered by an asynchronous motor, actuates a nut of a trapezoidal screw and of a turning-off spring. The force is increased by turning the gears to the pressure against the valve seat until a setting-up moment of the motor motion arrest by a moment microswitch (reaching a rated force of valve turning-off). There are as a matter of course two moment microswitches in the basic instrumentation of the actuating mechanism. Up to three position microswitches (two microswitches function as signalling ones, another microswitch as a position moment switch), a transmitter and a converter of unified signal are fitted in the device according to the type.

The operating rod motion informs only about 80% of the total activity of the whole mechanism from the standpoint of time and the overall service of the actuating mechanism. The operating rod motion in fact informs about activity of the driving mechanism within the beginning and the end of the range of reaching the force null value (In other way – from the moment of the valve releasing from the set-up force and reaching the force null value). For some valves it takes even more than 10 sec., in other way more than 10% of the total activity of the valve from the moment of stopping the driving mechanism operating rod to the moment of a real valve turning-off by the required force. It is not possible to control the driving mechanism activity in the extreme positions, i.e. a real valve turning-off and turning-on by the set-up force, according to the operating rod motion.

For the actuating mechanisms of the PTN type series the position microswitches take off the information of the driving mechanism activity directly from the gear wheels. They linearly control the motor motion from the turning-off nut from the moment of the beginning of the release of the set-up force of the nut tightening in the bottom dead center via the beginning and the end of the valve operating rod motion until the final motor stopping in the top dead center of the reached turning-off force (and the other way round). We can take advantage of this

information during setting-up, regulation in the automatic control systems, and during a substitute mode in a moment of a moment microswitches defect.

3. Description

The actuating mechanisms are linear, with operating rod with a constant control operation velocity. The asynchronous motor and the self-locking gear mechanism are fitted on a steel plate. The whole kit is attached to the aluminium casting and closed by a cover via a rubber seal.

The output operating rod of the actuating mechanism is ended with a nut segment intended for a connection of the actuating mechanism with a valve.

The electric connection is made possible by two bushings P13,5 and by a bushing P9. The driving motor is turned off by means of microswitches at the moment of reaching the rated force in the valve position "MO" and "MZ" – TURNED OFF. It is possible to set up two signalling microswitches "SO" – TURNED ON and "SZ" – TURNED OFF by means of cams by a manual rotation of the mechanical part with a spanner. The third (possibly the fourth) microswitch which is connected in series with "MO" or "MZ" can be in the instrumentation as a special workmanship (it is necessary to state the microswitch identification – "SMO" or "SMZ" - in the purchase order). It is possible to set the cams up independently in the total range. It is also possible to control the driving mechanism activity with a microswitch in case of a falling-out of both moment switches. There is a position indicator on the columns.

Two three-revolution or ten-revolution transmitters (possibly also the third transmitter to control the total running of the actuating mechanism or to regulate in case of signalling need of the operating rod valve locking) of the position with the ohmic signal from 0 to 100 Ohm, can be mounted in the actuating mechanism according to the type. They can be completed with the converters with the unified electric output.

The converter with the current electric signal from 4 to 20 mA is designed for two-wire connection in the loop (it is directly fed from the measured signal). The converter has to have an independent feeding for other possibilities of the electric output, as 0 (4) to 20 mA, 0 to 10 V. As the output signal is picked up from the bar of the actuating mechanism, it controls linearly the motion of the valve operating rod (V1 and V2 transmitters). V3 transmitter linearly controls the motor motion and by that also the total activity course of the driving mechanism (See Enclosure – picking up from the nut).

3.1 Possibility of Microswitches Utilization

As the range of the cams displacement is directly proportional to the range of the displacement of the turning-off nut (it means in the total range from the maximum switching of both springs – both the bottom and top dead center of the actuating mechanism) it is possible to use the "SMZ" or "SMO" position microswitches as a safety element in case of a moment microswitches failure.

The first position microswitch set up in the position behind the turning-off and turning-on moment of the turning-off springs (by means of the extension of the cams one facing another one during its connection in the series in the common motor feed supply) provides the actuating mechanism turning-off in case of a defect of the turning-off springs or of the moment microswitches. That microswitch can provide the technologic process in the emergency state until a moment microswitches repair!! We only recommend to check whether the turning-off springs did not cause the defect (Springs rupture is not very probable). In case you only utilize the microswitch for blocking one moment you can pick up the moment of its switching as a defect and information about the activity of the driving mechanism in a substitute mode. We only make a repair in an opportune moment.

We set up the second position microswitch in the extreme position destined for signalling (possibly in both extreme positions, again by means of extension of cams one facing another one).

The third position microswitch is from the manufacture connected according to the wiring diagram and it is intended for the motor blocking in the series with the moment microswitch (according to the requirement in the purchase order – SMO, SMZ), and precisely up to about 5 % of the range of the lift behind the set-up value of the gears displacement for the given moment microswitch.

In the other cases the signalling microswitches function as in case of common driving mechanisms.

3.2 Defect Evaluation in case of Switching the Set-up Crash Microswitch Signalling -

- a moment microswitch is defective – it is necessary to replace it
- a moment microswitch is in order – the springs are mechanically weary (or a displacement of the valve operating rod into the valve seat occurred) and it is necessary to tighten the springs to the force and to displace the moment microswitch. It is possible to do it at a guess (by judgment) of the level of the output signal in comparison with the original setting-up (it is valid for the transmitter with the picking up from the nut). Increase the turning-off force by displacing the rotation of the turning-off nut in the tension. After setting-up it is necessary to measure the new level of the output signal and then to correct that value in the regulation (also on the label in the device cover). It is possible to make that also during the regulation of the moment by means of the third position microswitch. It is necessary to turn the driving mechanism mechanics closely before the moment of the third microswitch turning-off, and then to set up the moment microswitch turning-off. We can check the setting-up correctness by running repeatedly behind the turning-off moment. Yet but still we recommend to have a professional setting-up made in the manufacturing plant.

4. Operating Conditions

Supply voltage (48 to 62 Hz) 230V + 10 % , -15 %,

Closing force and operation velocity: determined in the table

4.1 Rated Force: 4 kN 6,3 kN 8 kN 10kN 12kN

4 kN for velocities of 16, 20,25 mm/min.
6,3 kN to 12 kN (the velocities are stated in the catalogue)

Actuating mechanism working stroke: max. 50 mm - min. 25 mm
 (The minimum and maximum working stroke is delimited by the valve lift that can be any of the range of the working stroke of the actuating mechanism. The force switches turn off at reaching the set-up force in any position of the working stroke).

5. Performance Data

Columns Pitch 100,132,150 mm
 Time Interval for Reversion: min. 50 ms (without loading)

Load Capacity of the Force Switches

and of Signalling Microswitches 250 V AC/ 5 A

Ohmic Transmitter 0 to 100 Ohm

Current Signal 4 to 20 mA / 24V

(eg. a Z-22.20.24 supply, the converter is fed from the two-wire loop)

Current Signal 0 (4) to 20 mA/24V

Voltage Output 0 to 10 V

(Those converters have to be fed from a galvanically separated supply – eg. a Z-22.52.24 supply)

Nonlinearity of the Electric Output Signal max. 0,3 % (of the range)

Ambient Temperature from - 20 °C to + 60 °C

Climate Resistance T23, according to ČSN 038805 standard

Protection IP 65, according to ČSN EN 60 529 standard

Certificate Nr. E 95.0245 of September 12, 1995

For the PTN6-XX.XX.XX.XX type series is only valid the part that determines the protection of the actuating mechanism. The part that determines the applicability in accordance with the ČSN 33 2320 standard is not valid for the reason of the application of a different motor - FCJ2B52D of the ATAS of Náchod manufacturer.

6. Measuring and Checking

6.1. Checking generally

Input materials checking follows the instructions according to the SM-01 Quality Manual.

The checking between operations and 100% output checking follows the instructions according to the SM-01 Quality Manual.

6.2 100% Checking

6.21 Device Setting-up

We make setting-up and the electric checking of the driving mechanism according to the setting-up direction Nr. 01-TP0899/TP PTN6.

6.22 Device Running-in – See Enclosure Nr. 02-TP0899/TP PTN6

6.23 Workmanship Checking – See Enclosure Nr. 03-TP0899/TP PTN6

The overall checking of the exterior, workmanship and completeness of the product.

The checking of the mechanical workmanship.

6.3 The manufacturer guarantees the manufacture quality by the checking activities according to the routings, the introduced checking system and checking of the observance of technological processes.

7. Other Data

7.1 Dimensioned Sketch it is in the catalogue

7.2 Operation Type: permanent

7.3 Data on the Product:

a) Trade Mark

- b) Device Type
- c) Manufacturing Number
- d) Supply Voltage
- e) Power Input
- f) Protection

8. Storage, Delivery and Transportation

8.1 Storage:

The devices can be stored at the surroundings temperature of 5 to 55 °C with the relative humidity of the surrounding air max. 75 %.

8.2 Delivery:

The actuating mechanism is delivered in a packing that provides a basic mechanical damage protection. The packing is labeled with a transportation position of the device and with a symbol of fragile goods, then the consignee, number of the trade case and manufacturing number is written on it.

8.3 Transportation:

The customer provides and pays the transportation of the actuating mechanisms. If the customer requires providing transportation from the manufacturer, that possibility is admitted.

9. Workmanship and Placing Purchase Orders

9.1 Device workmanship is in the catalogue.

9.2 The device type, feeding, quantity and way of transportation is given in the purchase order.

10. Installation, Putting into Operation, Maintenance Service and Repairs

10.1 At least workers knowledgeable in accordance with § 5 of the order 50/1978 Sb.¹, pertinently in accordance with 51/1987 Sb., are allowed to make works according to technical conditions during the connection of the electrical part. The actuating mechanism is connected in condition of the art. 9.5, by isolated Cu wires with a total insulation resistance min. 10 MOhm.

10.2 Fastening of the Actuating Mechanism to the Valve:

Fasten the actuating mechanism to the valve by means of a flange. A common workmanship is determined in the dimensioned sketch, and precisely with the pitch of 100, 132, 150 mm. It is possible to agree the other types with the manufacturer. The actuating mechanism is set up in the required range. After loosening two nuts take the cover of the actuating mechanism down. After taking the cover down the terminal board is accessible for connecting supply voltage, signalling switches, a position transmitter and manual switching for position displacement.

Put the flange on the valve body and lock it in a suitable position. Set up the valve operating rod about 1 mm before the level of reaching the turning-off stop columns in the bottom dead center by a stop gauge. Push the valve operating rod down in the bottom dead center. The actuating mechanism operating rod is displaced by manual turning-off with a cover taken down. During that it is necessary to push the toothed wheel out and to throw it in that way out of gear. Turning-off has to be pushed down during the operating rod displacement. After setting the actuating mechanism in motion the toothed wheel slides in the original position. Screw the valve spindle in the coupling and lock it with a nut. After the gauge elimination run in the valve seat by a manual control, and try repeatedly whether the moment microswitch turns off into the valve seat and not on the stop columns. Do the same in case when the valve closes in the top dead center. In that case set up the position of the upper edge of the coupling of the operating rod about 1 mm from the position of the stop ring placed below the range on the operating rod. The actuating mechanism is connected to the supply voltage only after valve fastening and its adjustment. The wiring diagram and the terminal board drawing is given in the device cover.

As the extreme positions of the valve are blocked by columns and the ring within the lift range, the device gauging cannot be damaged.

10.3 Signalling Microswitches Setting-up:

The actuating mechanism is manually set up progressively into positions which have to be signalled. The microswitches switching in that position is set up by a slight rotation of cams after two screws loosening in

¹ Czech collection of laws

packing pieces of the cams. The lower edge of the cam is considered as a position of rest. The leading edge serves for switching the microswitch. It is possible to use one microswitch for two pieces of information by extending the cams with the leading edges one facing the other. In that way it is also possible to block the driving mechanism in case of a defect of the moment microswitches. After setting-up tighten both screws in packing pieces of the cams and test it.

10.4 Transmitter Setting-up

Affixed the actuating mechanism on the valve check the data in extreme positions by means of the ohmmeter. The same is valid for unified output signals. A mechanic can also make a note of the signal value at the moment of switching of the position microswitches and use that information for example during a driving mechanism repair.

For the electric output signal it is necessary to set up the device in the extreme positions and to check over, pertinently to change setting of the range of the output signal by means of setting potentiometers according to the device type. We check the output signal by the multimeter.

10.5 Repairs and Maintenance

We recommend to grease the seating of the gear set and to check over the output signal setting-up after one to three years of the operation according to the surroundings and the actuating mechanism stress.

Entrust the installation, maintenance and also repairs to the professional companies that have the authorization to make maintenance service from the actuating mechanism manufacturer.

Spare parts: O-rings, microswitches, cover nuts, transmitter, terminal board, motor – all according to the device type and after an agreement with the manufacturer.

11. Quality Warranty

11.1. The manufacturer warrants the device for 12 months in accordance with the Commercial Code (§ 429 and subsequent ones). The defects arisen in the warranty period provably thanks to a defective material or defective workmanship, will be repaired for free. The device has to be sent to be repaired in the original or equivalent packing.

11.2. The warranty is not applied to the defects caused by a non authorized intervention in the device, by non-observance of technical and operating conditions specified by the manufacturer, and to the defects caused by a mechanical damage.

12. Packaging and Dispatch

A staff member of the dispatch department puts the actuating mechanism in a determined packing and fills the loose space with a lining material. After that he secures the packing cover and labels the packing in accordance with the Chapter Nr. 8.2.

13. Recycling

It is possible to separate every actuating mechanism to single types of the applied materials and to provide their stocking and a subsequent liquidation according to the principles of the Security of the Waste System SM-15 directions.