



CATALOGUE

ELECTRIC DRIVE
for indoor MV switching devices

TYP **SPT – CB 40**

Unser Handelspartner in Deutschland



ISO 9001:2009
ISO 14001:2005

ivep[®]

GENERAL INFORMATION

The SPT... electrically powered motor drive is intended for the actuation of MV indoor switching devices. The highest torque the drive is capable of developing is 310 Nm. The drive mechanism is installed in a cabinet and it can be placed to either the left or right hand side of a MV switching equipment (switching cell or switchgear).

The drive is of general-purpose construction and can be used for the control of switching devices of various manufacturers. The operating panel of the drive is primarily installed in the switching cell front doors or at other locations, as required by the operator. Its location in the front part of the switching cell provides for easy access to all the parts of the drive, including the electrical or manual emergency operation, without the necessity of entering in the inside of the switching cell. The dimensional sketch of the SPT-CB 40 electric motor drive is shown in Fig. 1 (left-hand version) and 2 (right-hand version). The Fig. 3 shows the supporting structure of a drive for mounting on the side wall of the switching cell. The kinematic transmission of torque of the drive output shaft, acting on the shaft of disconnector, is designed as a system of adjustable cut-in levers, connecting rods and rocking bearings.

As to its design the SPT – CB 40 drive is a follow-on of the SPT – CB 40 type series of drives. Its module size, supporting structure for fixing the drive into the switching cell, as well as its kinematic string (torque transmission elements between the drive and the driven switching device) is identical with the RPP – XA 40 manual drive.

APPLICATION

The SPT – CB 40 electric motor drive can be used for remote or local control of disconnectors on busbars or outlets, in overhead or cable lines, installed in cell-type switching stations of A and B type, as defined by ČSN 381753 standard.

STANDARDS AND REGULATIONS

The SPT electric motor drive meets the requirements of ČSN EN 62271-102 and ČSN EN 60439-1 standards.

OPERATING CONDITIONS

The SPT electric motor drive is intended for mounting in indoor operating environments, under normal operating conditions as defined by ČSN EN 60694 standard, part. 2.

MAIN TECHNICAL DATA

Table 1

Typ	El. motor typ	Jmenovité ovládací napětí motoru U_a [V]	Jmenovité napětí motoru U_r [V]	Výkon motoru P [W]	Jmenovitý proud I_a [A]	Poměr I_a/I_z	Max. záběrový moment [Nm]	Typ jističe
SPT-CB 40-S2	ss motor s permanentními magnety	110 V DC	110 V DC	200	2,3	5	320	²⁾ S282UC-K1
SPT-CB 40-S2	ss motor s permanentními magnety	110 V DC	110 V DC	300	3,4	5	512	²⁾ S282UC-K2
SPT-CB 40-S3	ss motor s permanentními magnety	220 V DC	220 V DC	200	1,1	5	320	²⁾ S282UC-K0,75
SPT-CB 40-S3	ss motor s permanentními magnety	220 V DC	220 V DC	300	2	4	512	²⁾ S282UC-K1
SPT-CB 40-S4	ss motor s permanentními magnety	* 230 V AC	¹⁾ 220 V DC	200	1,1	5	310	³⁾ LSN-1,2C/1
SPT-CB 40-S5	ss motor s permanentními magnety	24 V DC	24 V DC	200	10,1	6	330	³⁾ LSN-10C/2
SPT-CB 40-S6	ss motor s permanentními magnety	48 V DC	48 V DC	200	5	6	330	³⁾ LSN-6C/2

Type	Type of electric motor	Rated control voltage of motor U_a [V]	Rated powering voltage of motor U_r [V]	Power output of motor P [W]	Rated current I_a [A]	Ratio I_a/I_z	Highest torque [Nm]	Circuit breaker type
SPT-CB 40-S2	DC motor with permanent magnets	110 V DC	110 V DC	200	2.3	5	320	²⁾ S282UC-K1
SPT-CB 40-S2	DC motor with permanent magnets	110 V DC	110 V DC	300	3,4	5	512	²⁾ S282UC-K2
SPT-CB 40-S3	DC motor with permanent magnets	220 V DC	220 V DC	200	1.1	5	320	²⁾ S282UC-K0,75
SPT-CB 40-S3	DC motor with permanent magnets	220 V DC	220 V DC	300	2	4	512	²⁾ S282UC-K1
SPT-CB 40-S4	DC motor with permanent magnets	* 230 V AC	¹⁾ 220 V DC	200	1.1	5	310	³⁾ LSN-1,2C/1
SPT-CB 40-S5	DC motor with permanent magnets	24 V DC	24 V DC	200	10.1	6	330	³⁾ LSN-10C/2
SPT-CB 40-S6	DC motor with permanent magnets	48 V DC	48 V DC	200	5	6	330	³⁾ LSN-6C/2

*Note:

- 1) the control voltage of 230 V AC is rectified and used to power a DC operated motor 220 V DC
- 2) circuit breakers made by ABB
- 3) circuit breakers made by OEZ

The mechanical durability of the drive is 10 000 C-O switching cycles. The time period necessary to attain the ON or OFF switching position is 2 to 3 seconds, and depends on the speed of electric motor ($n = 1500\text{min}^{-1}$), the type of transmission (CB 40 type; $i = 126$) and the type of driven switching device.

DESCRIPTION

The SPT electric motor drive is intended for mounting in the front area of a switching cell, outside of the frame of the driven switching device. Its dimensional drawings are shown in Fig. 1 and 2.

The drive cabinet, made from galvanized steel sheets and profiles, consists of two compartments separated from each other. The power compartment includes the two-stage CB 40 type gear unit ($i = 126$) with driving shaft. The gear unit is filled up with solid lubricant.

The drive's output shaft is used to control:

- the VS 10 (16) auxiliary (indicating) switch, via a lever type adjustable gearing
- the cam mechanism.

The gear unit is fixed to the baseplate of the cabinet. The baseplate bears the drive supporting structure used for mounting the drive into the electric power distribution equipment (switching cell or switchgear; for mounting on the right or left-hand side), and is equipped with earthing clamp.

The adjustable cut-in lever, fixed to the drive's output shaft, is the first component unit of kinematic string elements installed between the drive and the controlled switching device.

The accessories of the kinematic power transmission string does include:

H – bars of various lengths (metallic - insulated)
2 pcs

E – single-arm clamping terminal 4 pcs

J – angular rocking bearing 1 pc

K – angular clamping terminal 1 pc

L – bearing to support the disconnecter and earthing switch shaft (only for special assemblies).

The electrical part of the drive is located mostly in the second part of the cabinet and incorporates:

- electric motors of various types, with powering voltages and output powers as shown in Table 1
- control and protective elements. The full-range equipment includes: time relay [KT1], light indicators of switching position [HL1, HL2], contactors (auxiliary contacts of contactor) [KM1, KM2], breaking (OFF) button [SA1], making (ON) button [SA2], blocking switch of emergency manual control [SQ3], braker [FA1].
- cable terminal PG21 (PG29)
- X1 input terminal board with up to 50 terminals

The SQ1 and SQ2 limit switches are used to control the electric motor via contactors – electric drive reversing.

The VS 10 auxiliary (indication) switch is actuated

using a lever type gearing, driven by the main shaft of the disconnecter or earthing switch. The VS 10 can contain up to 7 making, 7 breaking and 2 changeover contacts. The system of contacts is designed to meet the following parameters:

AC circuits

- rated voltage 400 V
- rated current of resistors 10 A
- rated current of motors 6 A
- cross section of connecting Cu conductors 1 to 2.5 mm²
- highest number of tiers with one or two contacts 12
- service durability to ČSN 35 4107 50 x 10³

DC circuits

250 V/ 0.1 A				
110 V/ 0.15 A	τ	30	msecs	
				1 contact
250 V/ 0.15 A				
110 V/ 0.17 A	τ	30 msecs		2 contacts in series
250 V/ 0.46 A				
110 V/ 1.00 A	τ	1 msec		1 contact
250 V/ 1.2 A				
110 V/ 1.33 A	τ	1 msec		2 contacts in series

The auxiliary indication switch can be supplied with the following combination of making, breaking and changeover:

- 12C-12O-2P (highest number of contacts)
- 7C-7O-2P
- 5C-5O-2P
- 3C-3O-2P

By agreement VS 16 switches of identical dimensions but with higher switching parameters at the AC and DC level can also be installed.

The SQ3 manual blocking switch of emergency control disconnects an electric safety circuit in case the manual crank is plugged in (emergency control). This circuit prevents the activation of local and remote controls.

The manual crank is equipped with adjustable clutch, set to 6 Nm. This torque is adequate to achieve the highest breakaway torque of the drive, i.e. 310 Nm, for which the drive mechanism is dimensioned.

All electrical, control and protection elements, including the X terminal board, are accessible after the removal of drive side cover.

The motor drive is fully hardwired and connected with all electrical elements, which makes the drive to a compact control and protective unit.

An example of electrical wiring of the drive is shown in Fig. 4. The electrical diagrams are the result of manufacturer offers or the customer requirements.

The drive connection is done by LV cables. The lower part of the drive harbours a replaceable cover with cable bushings, for pulling through the LV cables to the X terminal board. The necessary number of cable bushings can be specified by the customer himself (usually 4xPG 21).

ASSEMBLED SPT– CB 40 ELECTRIC MOTOR DRIVE WITH THE 2QAKZ DISCONNECTOR

The mechanical connection between the electric drive and the actuated MV switching device is established by a kinematic string, consisting of cut-in levers, single-arm clamping terminals, control rods and one angular rocking bearing. The adjustable arms of the cut-in levers of the drive and that of the controlled switching device provide for easy adjustment of the ON and OFF switching end positions and indication of the same.

The kinematic string between the drive and the controlled switching device operates in one plane and can be offered in two versions:

- angular kinematic string (necessitates to be equipped with angular rocking bearing)
- inclined kinematic string (necessitates to be equipped with angular rocking bearing)

Angular kinematic string

Angular kinematic string of parts mounted between the SPT-CB 40 electric motor drive and the 2QAKZ disconnecter with rated values of 25 kV and 2000 A is shown in Fig. 5; 6; 7 and 10. Mechanical links between the 2QAKZ and the drives are shown on some examples and displayed in a way to show mutual position between both of the devices in a switching cell.

Inclined kinematic string

Inclined kinematic string of parts mounted between the SPT – CB 40 electric motor drive and the 2QAKZ disconnecter is shown in Fig. 8 and 9. The pictures display also combinations of the SPT motor drive with the RPP manual drive.

The comparison of both sets of kinematic strings shows clearly that both versions represent a mechanical link between the drive and the switching device for single-system distribution substations. In double-system distribution substations the angular kinematic string is to be used. Example of such an arrangement is shown in Fig. 10.

ORDERING CODE OF ELECTRICALLY OPERATED DRIVES OF SPT-CB TYPE

Basic design:	SPT – CB 40			
Rated voltage of electric motor drive:				
- 3 PEN 50 Hz 400 V	S1			
- DC 110 V	S2			
- DC 220 V	S3			
- AC 230 V (DC 220 V + (rectifier)	S4			
- Installation:				
to the left from the disconnecter (earthing switch)	L			
to the right from the disconnecter (earthing switch)	P			
Contacts of indication changeover switch:				
12C – 12O	12			
7C – 7O – 2P	7			
5C – 5P – 2P	5			
3C – 3O – 2P	3			

Example of an ordering code:

SPT – CB 40 S4.P.5

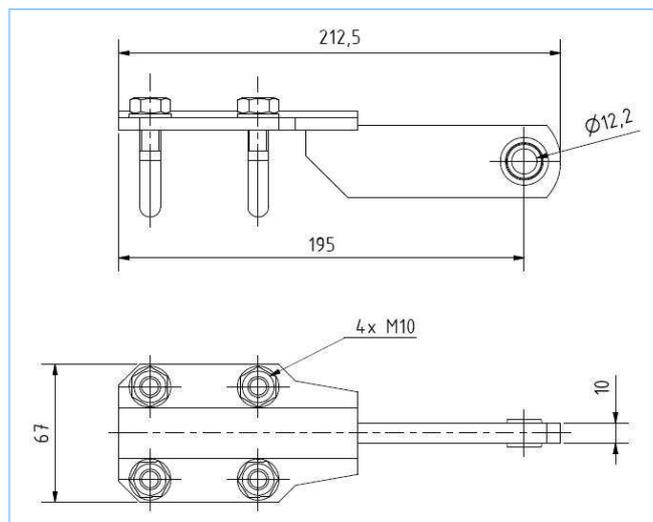
ACCESSORIES TO THE DRIVE

E – Single-type clamping terminal with barrel-shaped bearing

Serves for the connection of control rods. One terminal features a part of the cut-in drive lever, while the other terminal with the cut-in lever is fixed to the shaft of the switching device.

The barrel-shaped bearing provides for angular deflection of the pull rod by 15° which facilitates the assembly and adjustments.

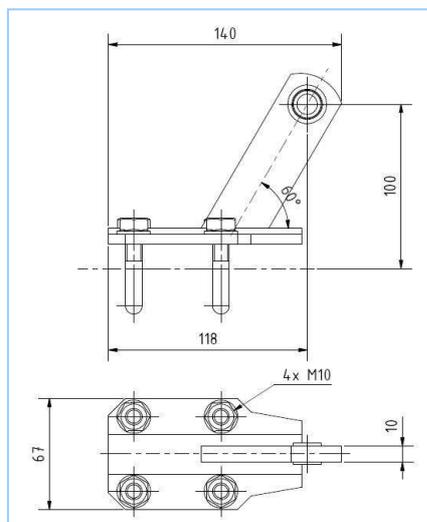
Weight: 0.9 kg



K – Angular clamping terminal

Features the same function as the single-type clamping terminal, i.e. serves for connection purposes. It is used in case the control angle of the pull rod, when using the straight terminal, would be inappropriate for the switch arrangement.

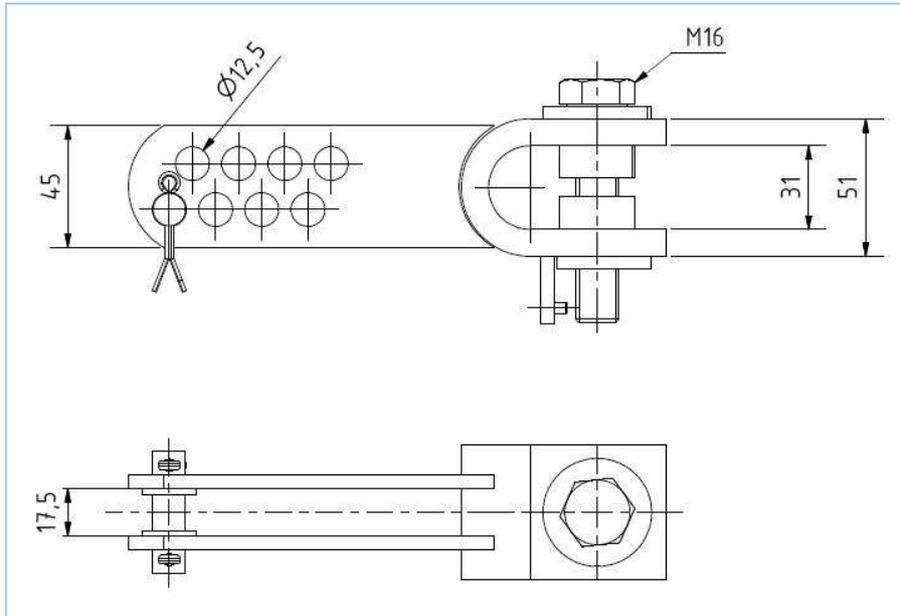
Weight: 0.8 kg



F – Cut-in lever for drive shaft and the switching device shaft of Ø 30 mm dia

In combination with the clamping terminal this lever provides for the transfer of straight motion of the control rod onto the shaft of the switching device. Retightening of the M16 screw causes the hardened steel bushings to be cut in into the shaft. Retightening torque: 140 Nm.

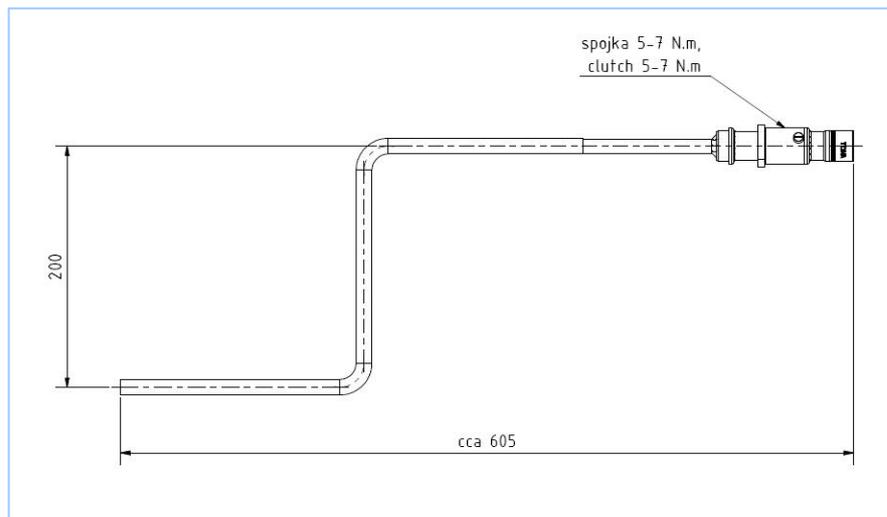
Weight: 1.4 kg



G – Control crank with adjustable safety clutch

The safety clutch is adjustable and is set to $M_s = 6$ Nm, in which case the highest breakthrough torque of 310 Nm is achieved.

Weight: 1.2 kg



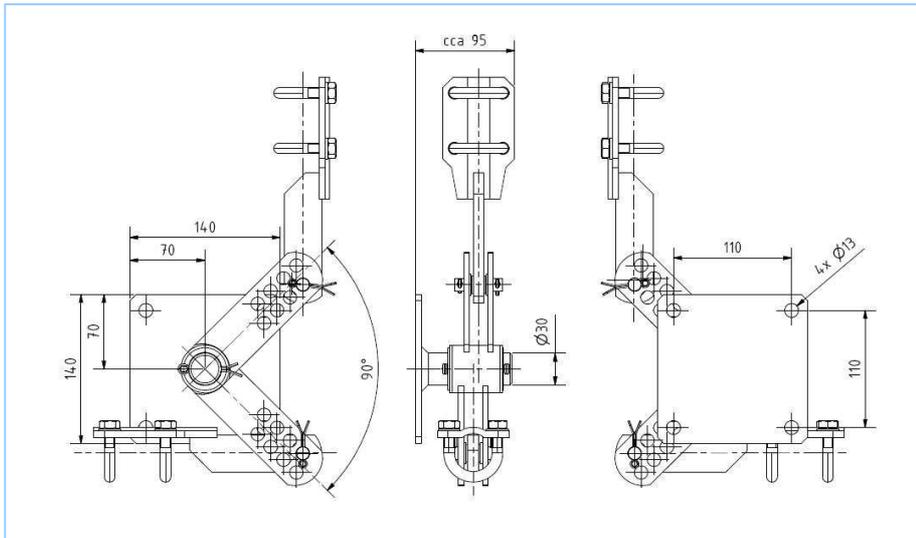
H – Insulated – metallic pull rods

- the metallic pull rods are supplied in $\frac{3}{4}$ " or 1" diameter
- insulated pull rods are supplied in 30 mm dia

J – Angular rocking bearing

The angular rocking bearing is one of the components of the kinematic string and provides for the transfer of forces from horizontal into vertical direction – see figure.

Weight: 4.2 kg

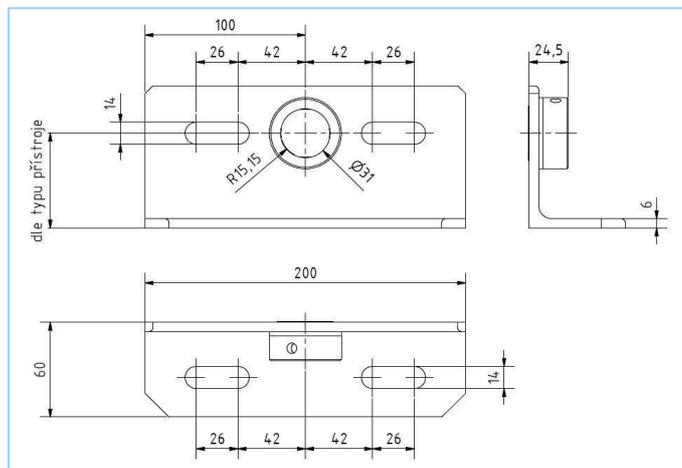


L – supporting bearing of through and terminal design (galvanized)

This bearing, which is used on shafts with a length of more than 200 mm, supports the middle or end part of the shaft. It consists of shaft base, brass bushing and safety ring.

The bearing can be fixed to the rear or side wall of the switching cell.

Weight: 1.4 kg



INSTALLATION OF THE DRIVE

The process of installation of SPT (electric motor powered) or RPP (manually powered) drives into the switching stations and the adjustment steps are identical for both the drive options. The reason consists in the same:

- drive design
- dimensions of the drive cabinet, fixing points and earthing terminals
- dimensions and design of the supporting structure of the drive
- kinematic string linking the shafts of both the drive and the controlled switching device
- LV cable inlets

The supporting structure of the drive can be fixed to the side wall of the switching cell by choosing one of the mounting options:

- welding the drive supporting structure to the iron frame of the switching cell;
- screwing the side plates to the switching cell wall using M10 bolts that pass through the mounting holes drilled into the switching cell wall. The other side of the wall is provided with bearing plate;
- by combining the above fixture modes, i.e. by welding and screwing.

The drive can be fixed to the right or left side of the switching cell wall. The corresponding left or right-hand version is to be specified by the ordering code. The output shaft of the drive with the adjustable cut-in lever faces always the wall of the switching cell. The drive is fixed to the cell wall by supporting structure - see dimensional sketch in Fig. 3. The design of the supporting structure can be matched to the specific arrangement of the distribution equipment. The end positions of the controlled switching device are adjusted and aligned by changing the arms on the cut-in lever of the drive output shafts and by changing the arm of the angular rocking bearing of the switched device.

MAINTENANCE INSTRUCTIONS

The SPT – CB 40 drives are nearly maintenance free. In order to achieve the required level of reliability it is recommended to check visually the state of the drive every 2 years and, at the same time, to lubricate the joints and pivots. The CB 40 gear case is filled with solid lubricant and is maintenance free along its whole service life. Also the auxiliary VS 10 switch is maintenance free. In the course of technical inspection, which is to be done once in 2 years, you just have to check and retighten the electrical connections.

WARRANTY PERIOD

By default the warranty period for the drives is 5 years.

From the warranty excluded are occurrences of intentional mechanical damage (vandalism, natural hazards), the use of incorrect assembly procedures and operation of the device out of the guaranteed parameter range.

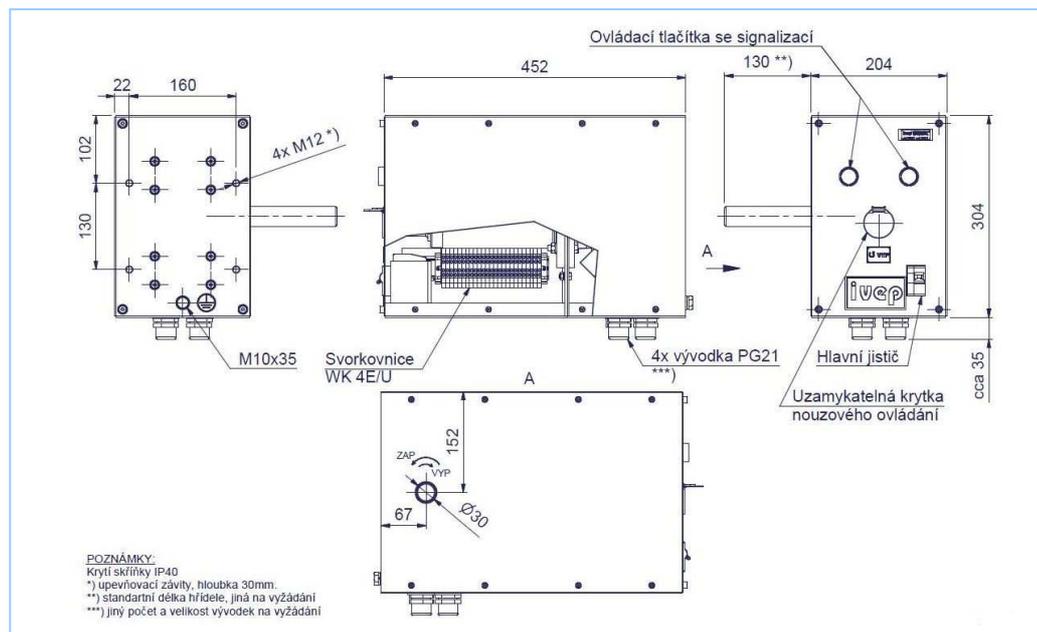
During the warranty period some changes in the surface finish may appear on the drive which, however, do not affect its functionality.

PACKAGING, TRANSPORT, STORAGE

As a rule the drives are supplied on wooden pallets. It is not allowed to expose the drives to excessive shocks during the transport and handling. All packaging material is fully recyclable and can be used also as an energy source.

ELECTRIC MOTOR DRIVE OF SPT TYPE – LEFT-HAND VERSION

Fig. 1



ovládací skříňka se signalizací = control cabinet with indications

uzamykatelná krytka ručního ovládání = lockable cover of manual control element

řadové svornice = terminal block

4x vývodka PG21 (jiný počet a velikost na vyžádání) = 4 pcs of PG21 outlet (other numbers and sizes available on request)

uzemňovací šroub M10x35 = M10x35 earthing screw

NOTES:

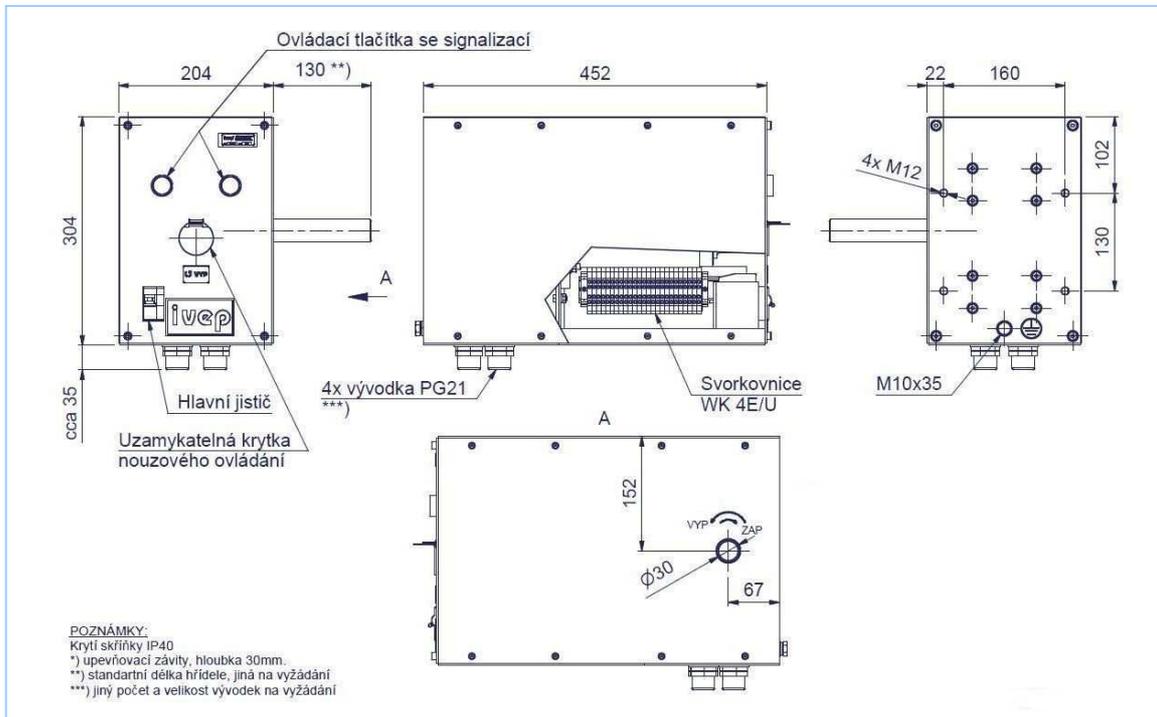
Protection degree IP40

*) fixing threads, depth 30 mm

***) default length of shaft; other sizes available on request

ELECTRIC MOTOR DRIVE OF SPT TYPE – RIGHT-HAND VERSION

Fig. 2



ovládací skříňka se signalizací = control cabinet with indications

uzamykatelná krytka ručního ovládání = lockable cover of manual control element

řadové svornice = terminal block

4x vývodka PG21 (jiný počet a velikost na vyžádání) = 4 pcs of PG21 outlet (other numbers and sizes available on request)

uzemňovací šroub M10x35 = M10x35 earthing screw

NOTES:

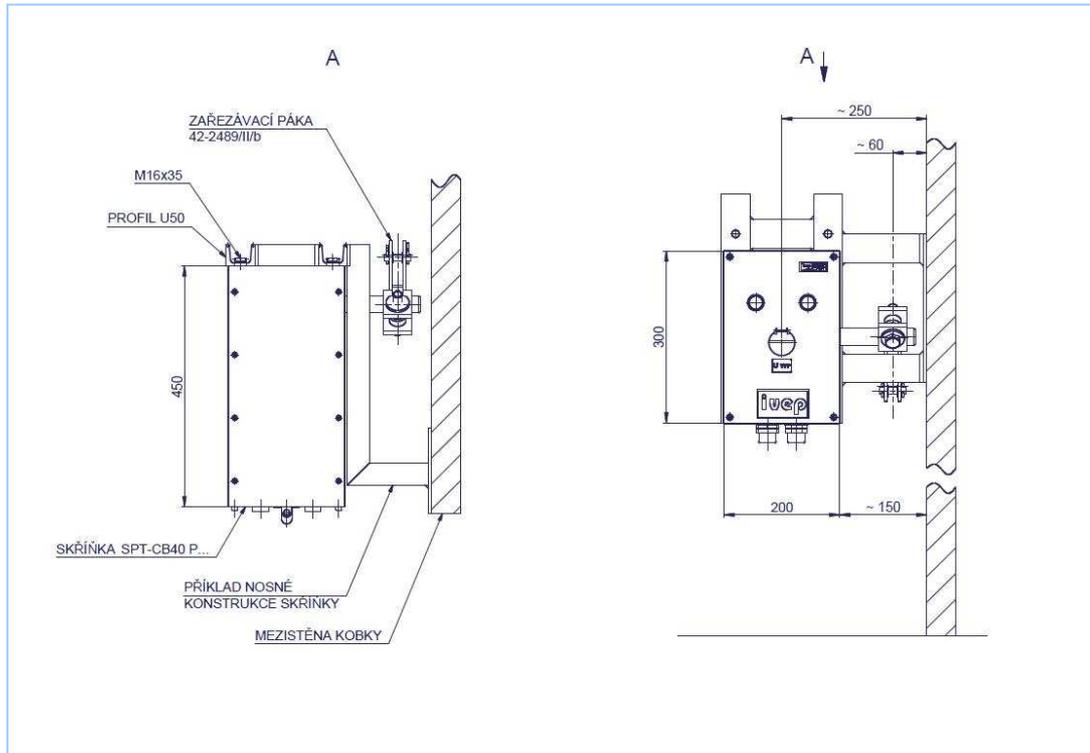
Protection degree IP40

*) fixing threads, depth 30 mm

***) default length of shaft; other sizes available on request

SUPPORTING STRUCTURE OF THE MOTOR DRIVE, INTENDED FOR MOUNTING ON THE SWITCHING CELL SIDE WALL

Fig. 3



zařezávací páka = cut-in lever

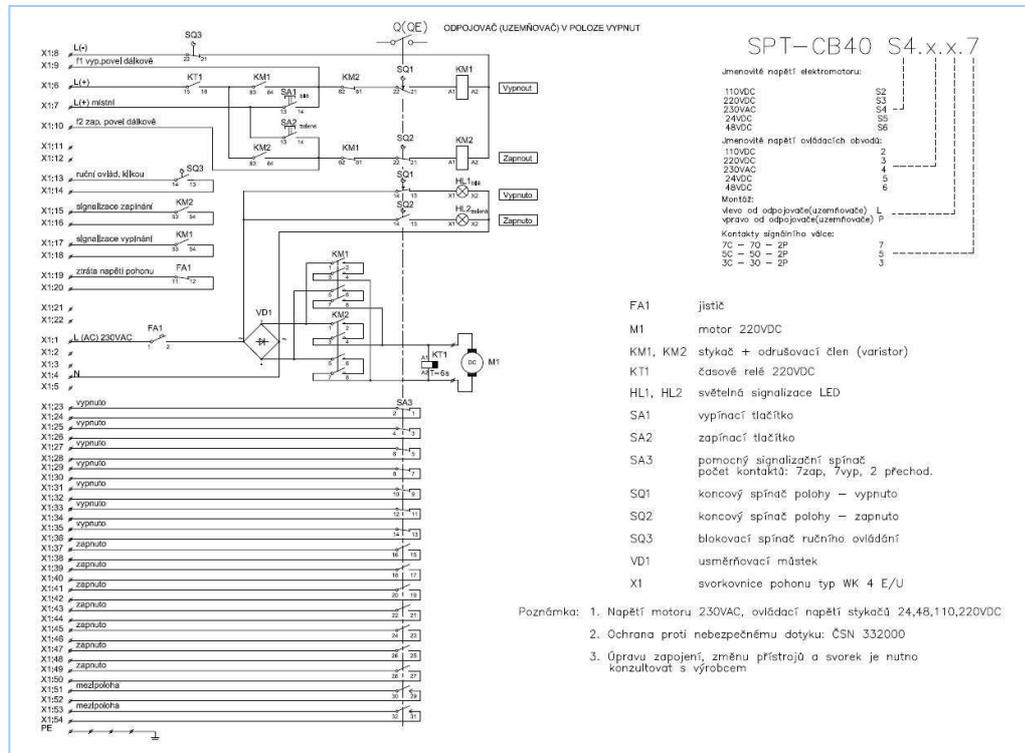
skříňka = cabinet

příklad nosné konstrukce skříňky = example of arrangement of a supporting structure

mezistěna kobky = partitioning wall of a switching cell

EXAMPLE OF ELECTRICAL WIRING OF THE DRIVE

Fig. 4



M1 – motor; KM1, KM2 – contactor + suppression component; FA1 – breaker; KT1 – time relay; HL1, HL2 – LED indicators; SA1 – breaking button; SA2 – making button; SA3 – auxiliary indication switch with 7 making, 7 breaking and 2 changeover contacts; SQ1 – limit switch to indicate the OFF position; SQ2 – limit switch to indicate the ON position; SQ3 – manual control blocking switch; VD1 – rectifier block; X1 – WK 4 E/U terminal board

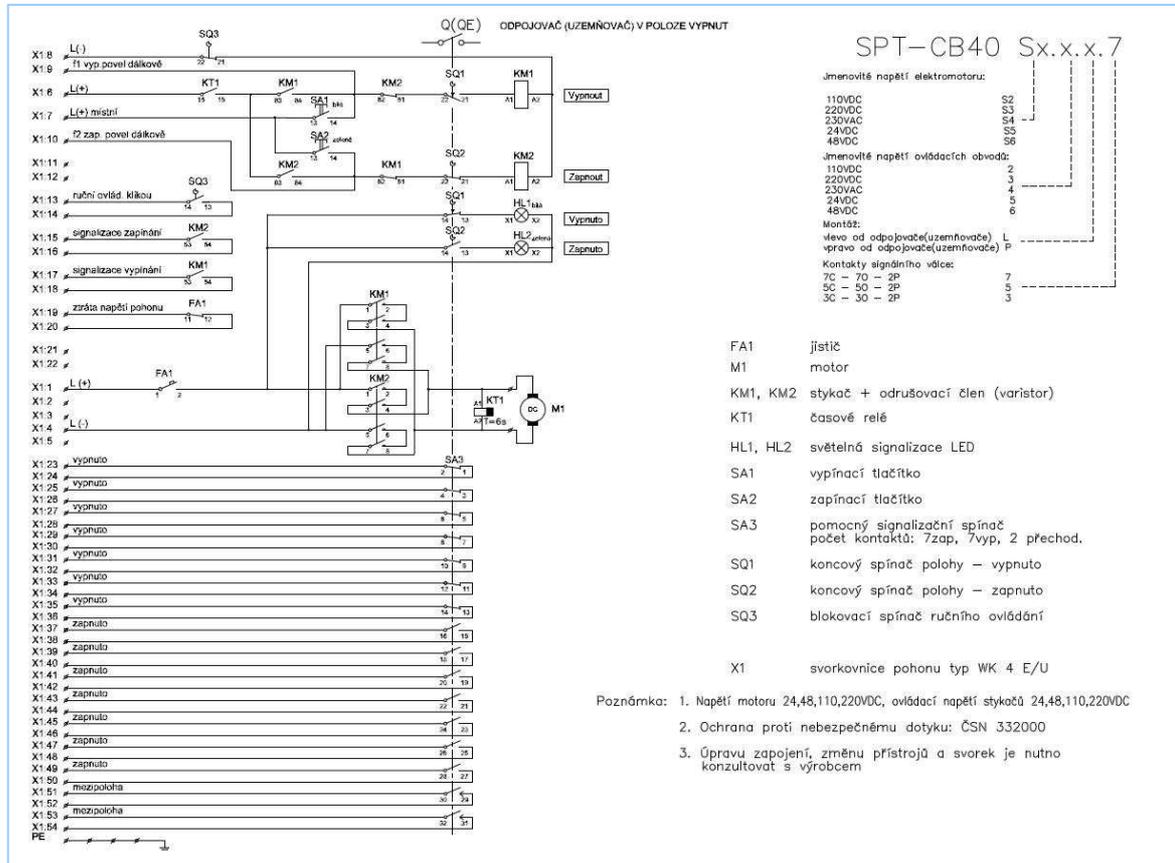
Note:

2. Shock protection: in accordance with ČSN 332000

3. The scope of equipment and the arrangement of terminals in accordance with the ordering code. Other versions of connection are to be agreed with the manufacturer in advance.

EXAMPLE OF ELECTRICAL WIRING OF THE DRIVE

Fig. 5



M1 – motor; KM1, KM2 – contactor + suppression component; FA1 – breaker; KT1 – time relay; HL1, HL2 – LED indicators; SA1 – breaking button; SA2 – making button; SA3 – auxiliary indication switch with 7 making, 7 breaking and 2 changeover contacts; SQ1 – limit switch to indicate the OFF position; SQ2 – limit switch to indicate the ON position; SQ3 – manual control blocking switch; VD1 – rectifier block; X1 – WK 4 E/U terminal board

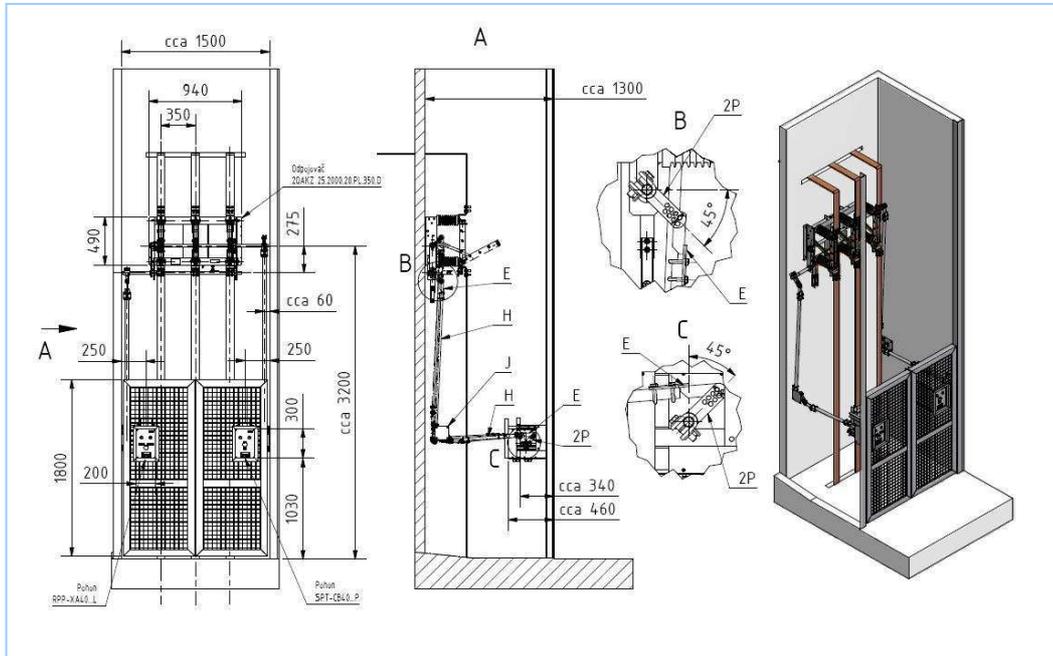
Note:

2. Shock protection: in accordance with ČSN 332000

3. The scope of equipment and the arrangement of terminals in accordance with the ordering code. Other versions of connection are to be agreed with the manufacturer in advance.

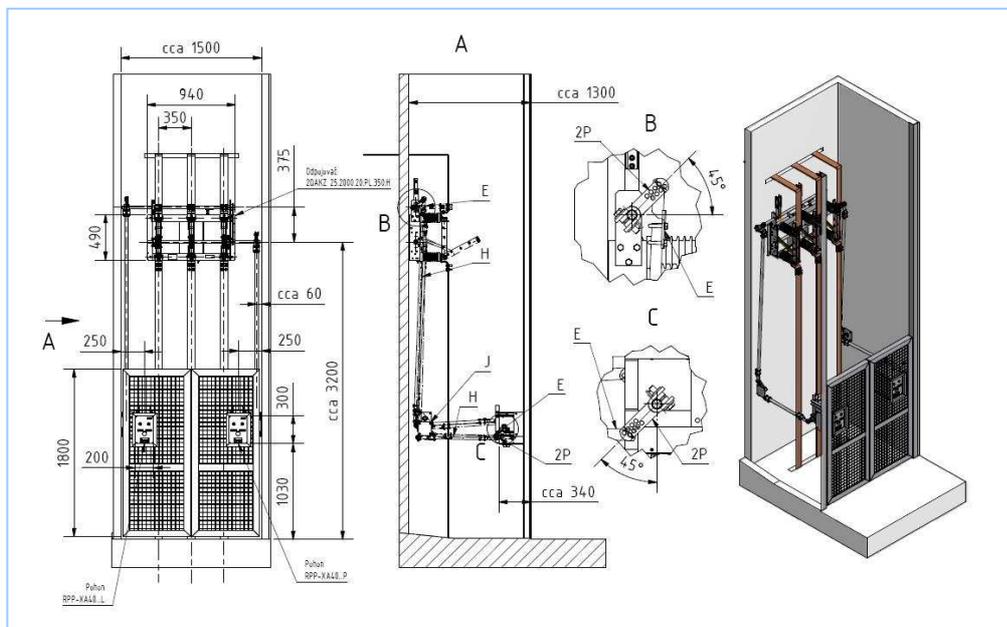
**ANGULAR SHAPED KINEMATIC STRING OF THE FOLLOWING DRIVES
2QAKZ 25.2000.20.PL.350.D + SPT-CB 40...P + RPP-XA 40...L**

Fig. 6



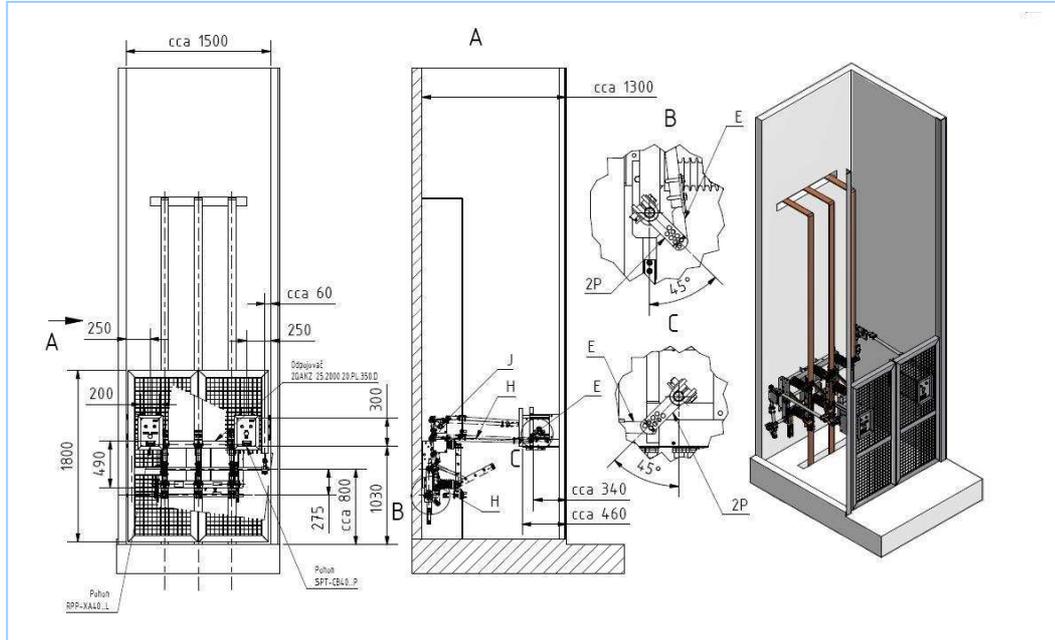
**ANGULAR SHAPED KINEMATIC STRING OF THE FOLLOWING DRIVES
2QAKZ 25.2000.20.PL.350.H + RPP-CB 40...P + RPP-CB 40...L**

Fig. 7



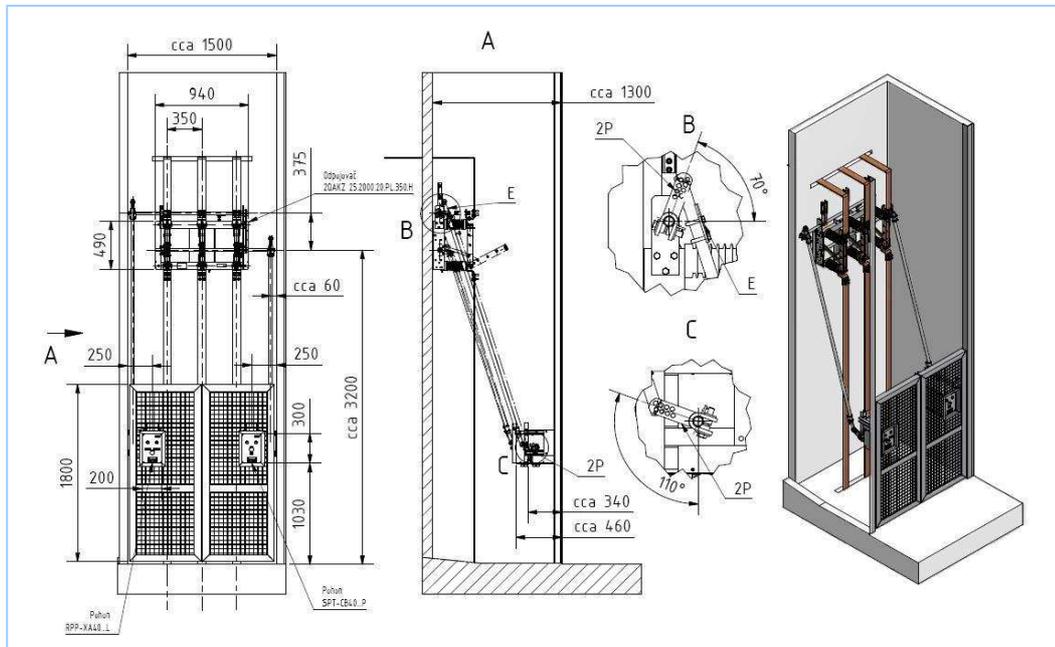
**ANGULAR SHAPED KINEMATIC STRING OF THE FOLLOWING DRIVES
2QAKZ 25.2000.20.PL.350.D + SPT-CB 40...P + RPP-XA 40...L**

Fig. 8



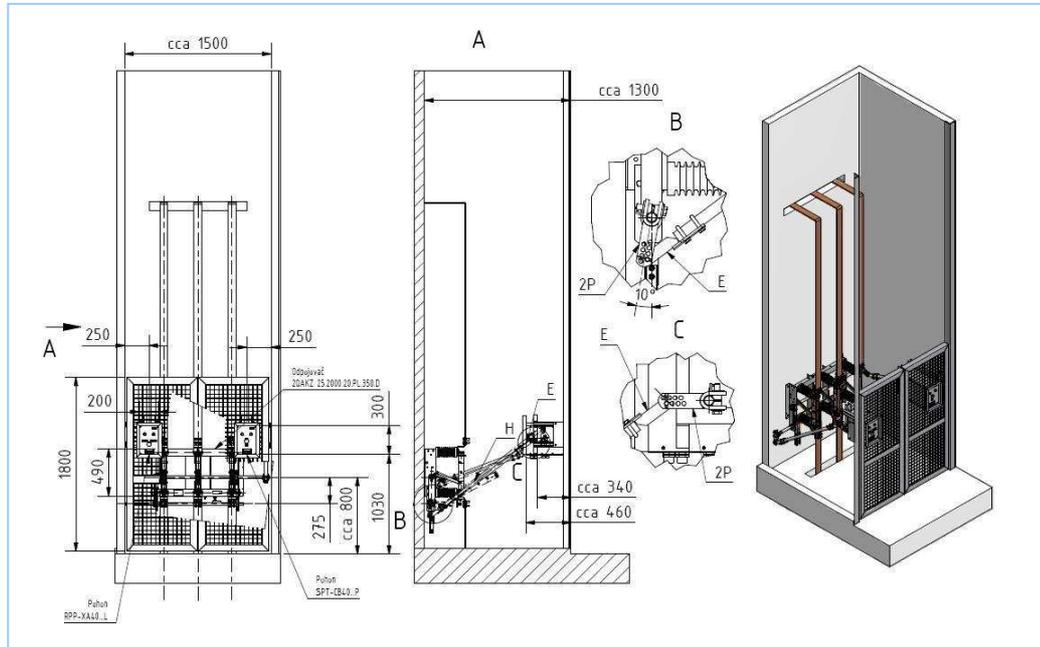
**INCLINED KINEMATIC STRING OF THE FOLLOWING DRIVES
2QAKZ 25.2000.20.PL.350.H + SPT-CB 40...P + RPP-XA 40...L**

Fig. 9



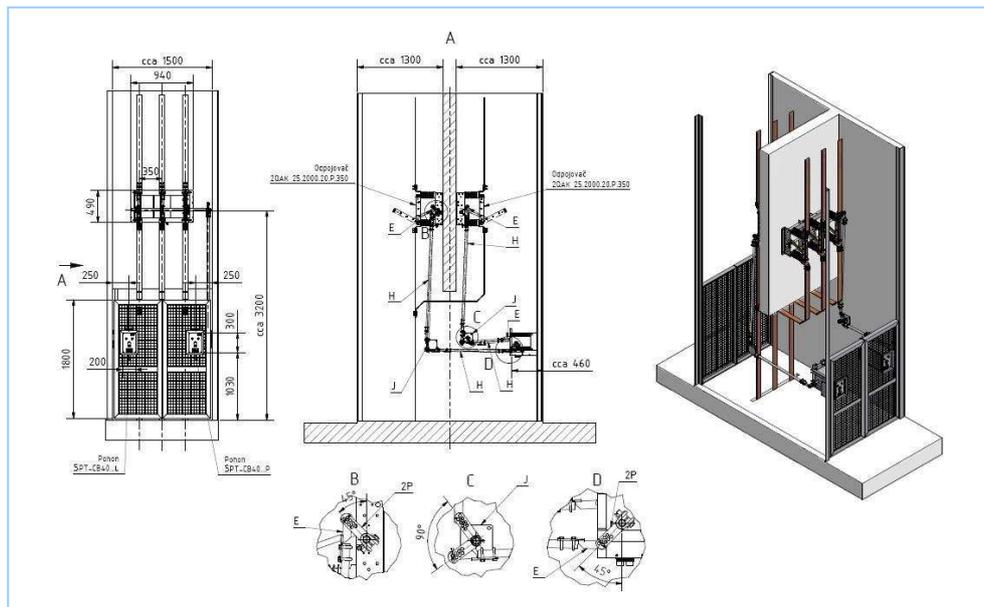
**INCLINED KINEMATIC STRING OF THE FOLLOWING DRIVES
2QAKZ 25.2000.20.PL.350.H + SPT-CB 40...P + RPP-XA 40...L**

Fig. 10

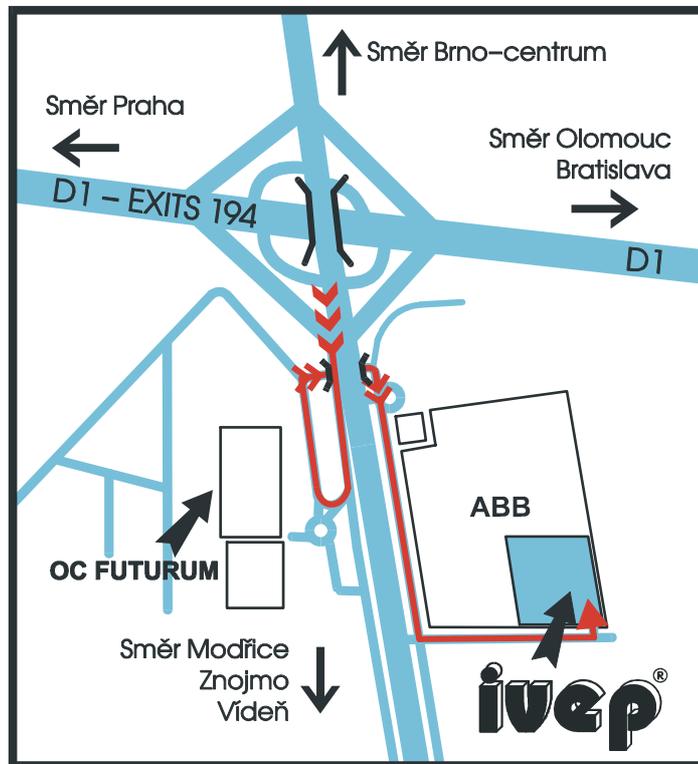


**INCLINED KINEMATIC STRING OF THE FOLLOWING DRIVES
2QAKZ 25.2000.20.PL.350.H + SPT-CB 40...P + RPP-XA 40...L**

Fig. 11



Due to continuous development of the products some dimensions, weights, drawings and descriptions may differ from that shown in this data sheet. In order to satisfy the ever increasing needs of the customers the manufacturer reserves the right to provide modifications to the product described, without previous notice.



Domänenstr. 38
44225 Dortmund

Telefon: +49 (0) 231 - 72 73 865
Mobil: +49 (0) 174 - 59 55 755

E-mail: sales@tctrado.de
Web: www.tctrado.de

Manufactured and supplied by:

IVEP, a.s.
Vídeňská 117a, 619 00 Brno, Czech Republic

Tel.: +420 547136 654 e-mail: marketing@ivep.cz
Fax: +420 547136 402 [http:// www.ivep.cz](http://www.ivep.cz)

