CATALOGUE

MANUAL DRIVE
for indoor MV switching devices

TYP **RPP – XA 40**

Unsere Handelsvertretung in Deutschland

TEC TRA DO

ISO 9001:2009
ISO 14001:2005

ivep®

GENERAL INFORMATION

The RPP... drive mechanism is a device used for the operation of MV indoor switching devices, primarily the disconnectors and switch disconnectors. It is intended for use on switching devices mountend on the rear wall of a switching cell or a switchgear cubicle, and is noted for its simple and reliable design, with only a minimum requirements on maintenance.

The drive mechanism can be equipped with:

- blocking magnet
- auxiliary switch
- incoming terminal board
- cable outlets
- a switch indicating the insertion of control crank

light indicators to signal the ON-OFF end positions

The kinematic string consisting of parts to be found between the moving contacts of the switched device and the handling crank features adequate mechanical strength. The maximum torque on the output shaft of the drive is 300 Nm, which is fully adequate to ensure the control of disconnectors with voltage range of 7.2 to 38.5 kV, and with rated currents of up to 2000 A.

The RPP – XA 40 manual drive exhibits a lot of attributes identical with the MPT – CB 40 electrically powered drive mechanism. The common attributes are:

- the structural design
- dimensions of the drive front operating panel
- the mode of mounting the drive into the switching cell
- the same kinematic string in between the drive and the switching device

These common properties of the both types of drive mechanisms simplify the possibilty of synchronous use of both drives for the control of one single switching device, e.g. electric motor drive for the control of disconnector and the manual drive to control the earthing switch. A dimensional sketch of the RPP manual drive is shown in Fig. 1 (left-hand design) and Fig. 2 (right-hand design). The latter figure shows a supporting structure for fixing the drive to either left-hand or right-hand side of the switching cell.

OPERATING CONDITIONS

The RPP manual drive mechanism is intended for use in indoor operating environments as defined by the ČSN EN 62271-102 and ČSN EN 60439-1 standards.

TECHNICAL PARAMETERS

Mechanical service durability	10 000 C-O switching cycles
Highest working torque:	300 Nm
Drive protection degree	IP 40
Highest displacement angle	120°
Operating displacement angle (of drive shaft):	90°
No. of turns to achieve the ON or OFF position; at 90°	7 otáček
Highest force to develop on the shaft handling crank to achieve 300Nm of torque	60N

DESCRIPTION

The RPP manual drive is controlled by a manual crank equipped with safety clutch. The drive can be fixed from both the left-hand and right-hand side to the switching cell side wall, hence featuring the right-hand and left-hand design. The drive is equipped with a lockable mechanism that secures the switching device in ON or OFF positions. One example of a drive mounting is shown in Fig. 3.

A fully equipped drive mechanism consists of the following parts:

A - drive cabinet equipped with removable plate containing the cable outlets (in combinations and sizes defined by the customer). The cabinet base plate incorporates threaded holes for the installation of a supporting structure for fixing the drive to the switching cell wall. The base plate further encompasses the drive earting clamp – see the dimensional sketch in Fig. 1 and 2.

B - driving assembly, which consists of a screw-type gearbox of XA 40 type (i = 30).

The gearbox is equipped with:
- driving shaft with blocking cam
- auxiliary switch (of VS 10 or VS 16 types)
- leverage linking the driving shaft with the auxiliary switch

C - blocking magnet of HEVS 3721 type

The blocking magnet is incorporated in the manual drive and is used for blocking the drive in both end positions (ON and OFF) of the switching device. The blocking of manual drive is done by axial stud, operated by the magnet, which locks on into a blocking cam located on the drive shaft. Following the connection of operating voltage the axial stup slips out from the blocking cam and deblocks/releases the drive mechanism.

Engineering data:
The electromagnets are provided with a nameplate carrying the necessary operating data (powering DC or AC voltage, relative duty cycle etc.).

Rated voltage	V	DC 24 V	DC 48 V, 60 V, 110 V, 220 V	AC 230 V
Relative duty cycle	%	100	100	100
Rated absorbed power	W	11	14	14
Operating position	---	libovolná	libovolná	libovolná
Ambient temperature	℃	-20℃ - +45℃	-20℃ - +45℃	-20℃ - +45℃
Weight	Kg	0,75	0,75	0,75
Highest/lowest rated voltage	%	± 15	± 15	± 15

The DC and AC powered electromagnets feature a duty cycle of 100% and, consequently, they can permanently remain under voltage.

SA This auxiliary (indication) switch of VS 10 type is controlled through a leverage driven by the disconnector or earthing switch shafts. It can be equipped with up to 7 making, 7 breaking and 2 changeover contacts. The contacting system of the switch is dimensioned as follows:

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 mm^2
- highest number of tiers with one or two contacts 12
- service durability to ČSN 35 4107 50×10^3

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 msecs 1 contact

250 V/1.2 A
110 V/1.33 A τ 1 msecs 2 contacts in series

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

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

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

X1-with a two-tier terminal board (up to 50 terminals, at maximum)

ZP - with adjustable cut-on lever (E - with clamping straight terminal with barrel-shaped bearing). The cut-on lever is installed both on the drive shaft and the shaft of the controlled switching apparatus.

E - straight-type clamping terminal with barrel-shaped bearing

F - slip-over terminal with padlock

G - control lever

The kinematic string of driving components that belong to the accessories of the RPP-XA 40 manual drive and which is located in between the manual drive and the shaft of the controlled apparatus consists of the following:

H - control rods of various lengths (metallic – insulated rods)

J - angular rocking bearing

K - angular clamping terminal

L - supporting bearing of the drive shaft

Auxiliary elements of the drive that can be supplied on customer request:

SG3 - switch indicating the plugged-in position of the manual operating handle (manual crank). The switch is brought out onto the terminal board.

HL1, HL2 – light indication of the switching ON or OFF position

N - blocking push button

Wiring diagrammes of the manual drive are shown in Fig. 4 (fully equipped drive mechanism; control voltage of blocking magnet: 24 V; 48 V; 110 V and 220 V DC), and in Fig. 5 (blocking magnet with 230 V AC operation voltage).

ASSEMBLED RPP – XA 40 MANUALLY OPERATED DRIVE WITH THE 2QAKZ DISCONNECTOR

The kinematic string between the manually operated drive and the controlled electric switching apparatus consists of two cut-in levers, single-arm clamping terminals, control rods and one angular rocking bearing. Forces acting between the drive and the switching device are transferred in one plane. The adjustable arms of the cut-in ZP levers, the latter being mounted on the drive and 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 can be offered in two versions:
- angular kinematic string (necessitates to be equipped with the [J] rocking bearing)
- inclined kinematic string

ANGULAR KINEMATIC STRING

Angular kinematic string of parts mounted between the RPP-XA 40 drive and the 2QAKZ disconnector with rated values of 25 kV and 2000 A is shown in Fig. 6 and 7. By way of example mechanical link between the RPP-XA 40 manually operated drive of left-hand type and the 2QAKZ earthing switch with outlets was chosen.

INCLINED KINEMATIC STRING

Inclined kinematic string of parts mounted between the RPP-XA 40 drive and the QAKZ disconnector 25 kV; 2000 A is shown in Fig. 8 and 9.

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.

ORDERING CODE OF MANUALLY OPERATED DRIVES OF RPP-XA 40 TYPE

Basic design:		RPP – XA 40
- Mounting:		
to the left from disconnector (earthing switch)		L
to the right from disconnector (earthing switch)		P
Contacts of indication changeover switch:		
	7C – 7O – 2P	7
	5C – 5P – 2P	5
	3C – 3O – 2P	3
Blocking magnet:	without blocking magnet	B0
	DC 110 V	B2
	DC 220 V	B3
	AC 230 V	B4
	DC 24 V	B5
	DC 48 V	B6
Light indication of ON or OFF switching state		
	without light indication	S0
	DC 110 V	S2
	DC 220 V	S3
	AC 230 V	S4
	DC 24 V	S5
	DC 48 V	S6
Indication of plugged-in position of the crank:		
	- with indication	A
	- without indication	N

Example of an ordering code:
RPP – XA 40 L.5.B2.S2.A

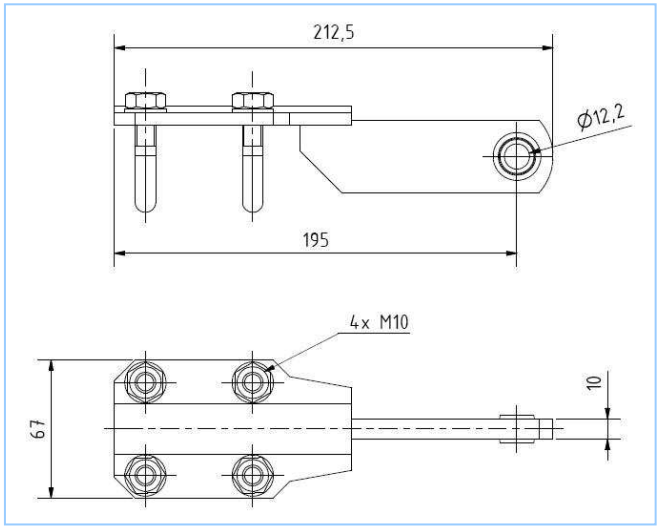
ACCESSORIES TO THE DRIVE

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.

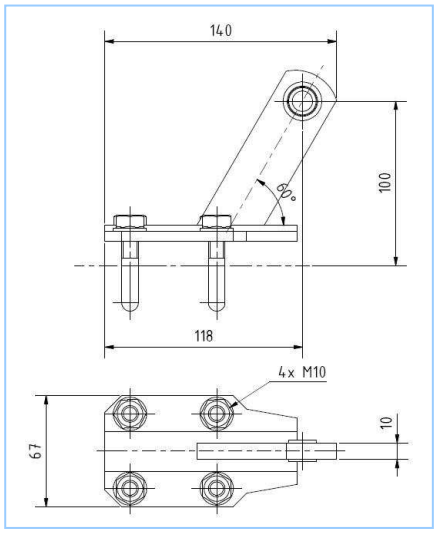
Weight: 0.9 kg



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.

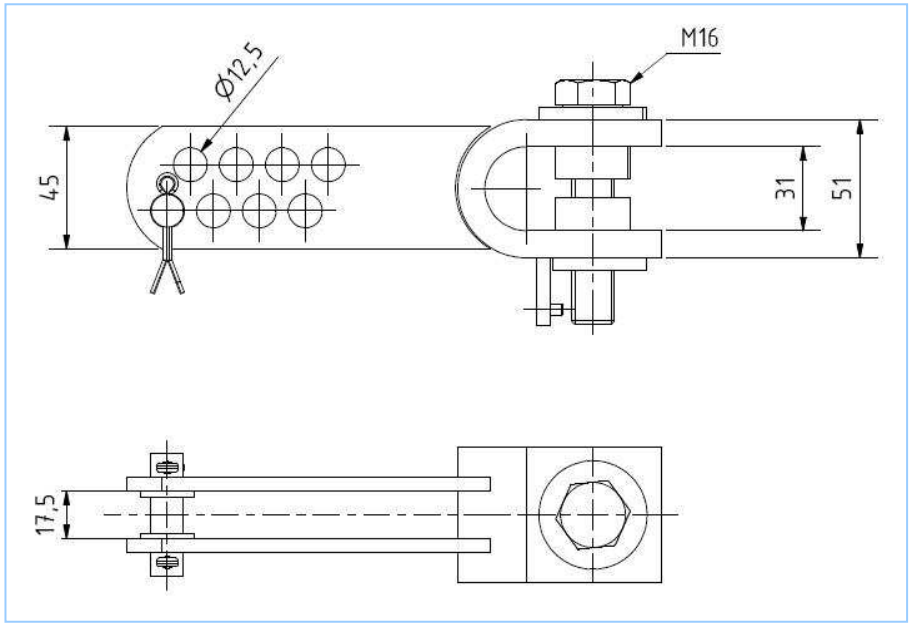
Weight: 0.8 kg



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

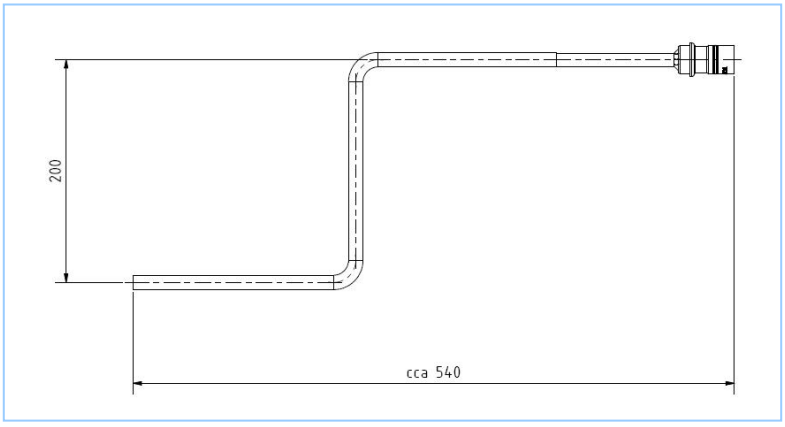
In combination with the clamping terminal this lever provides for the transfer of straight motion of the control rod onto the shaft of the switching device. Retightening of the M16 screw causes the hardened steel bushings to be cut in into the shaft. Retightening torque: 140 Nm.

Weight: 1.4 kg



G – Control crank

Weight: 0.8 kg



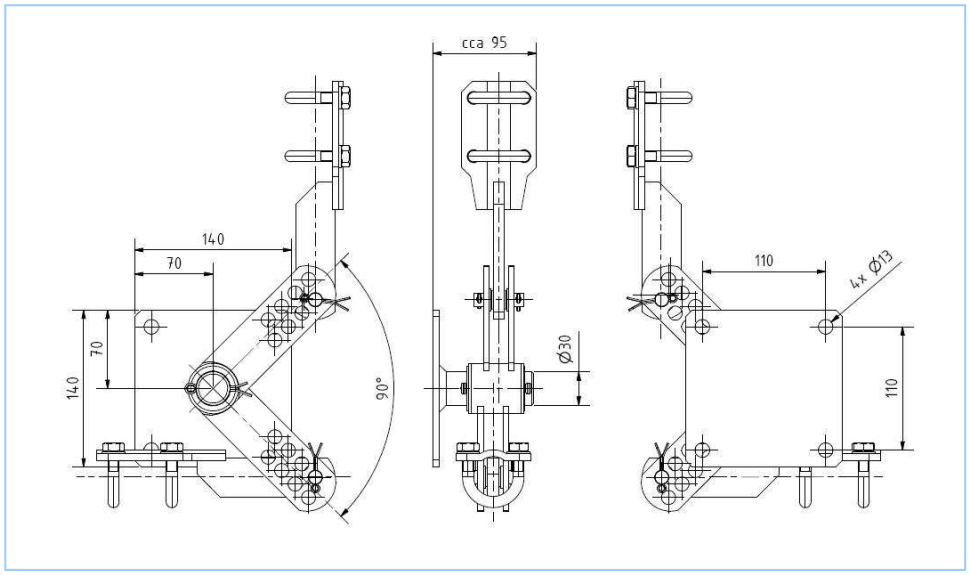
H – Insulated – metallic pull rods

- the metallic pull rods are supplied in ¾“ 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

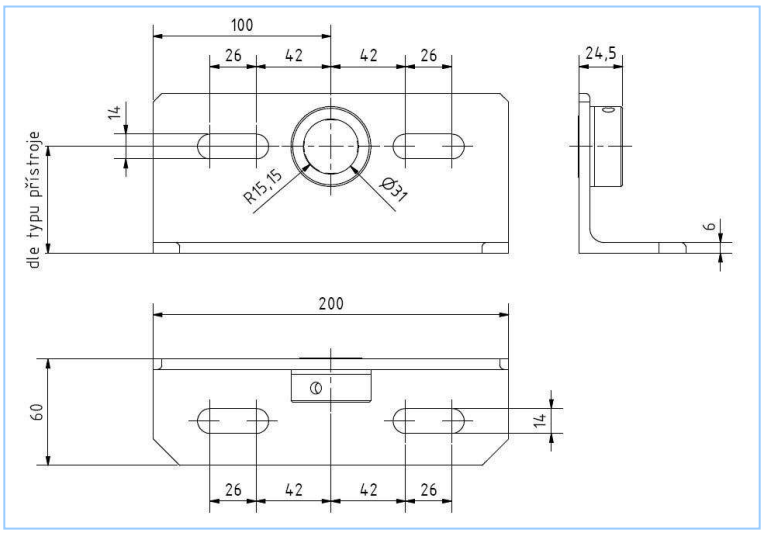


L – supporting bearing of through and terminal design (galvanized)

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 MPT (electric motor powered) or RPP (manually powered) drives into the switching stations and the adjustment steps are identical for both options of the drive. 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 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 always faces 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.

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.

MAINTENANCE INSTRUCTIONS

The RPP 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 XA 40 gear case is filled with solid lubricant and is maintenance free along its whole service life. Also the blocking magnet and the common VS 10 switch are 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.

A more detailed description is shown in the accompanying documents which include the transport, storing, assembly, operating and maintenance instructions.

WARRANTY PERIOD

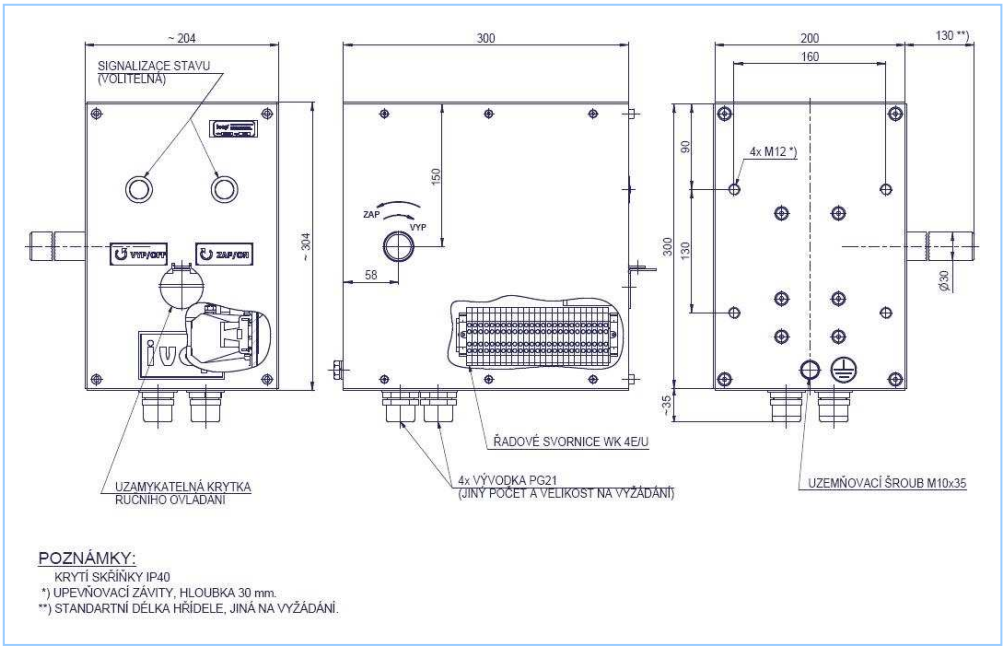
By default the warranty period for the drives is 5 years.

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. The drive mechanism is designed for 40 years of service life.

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.

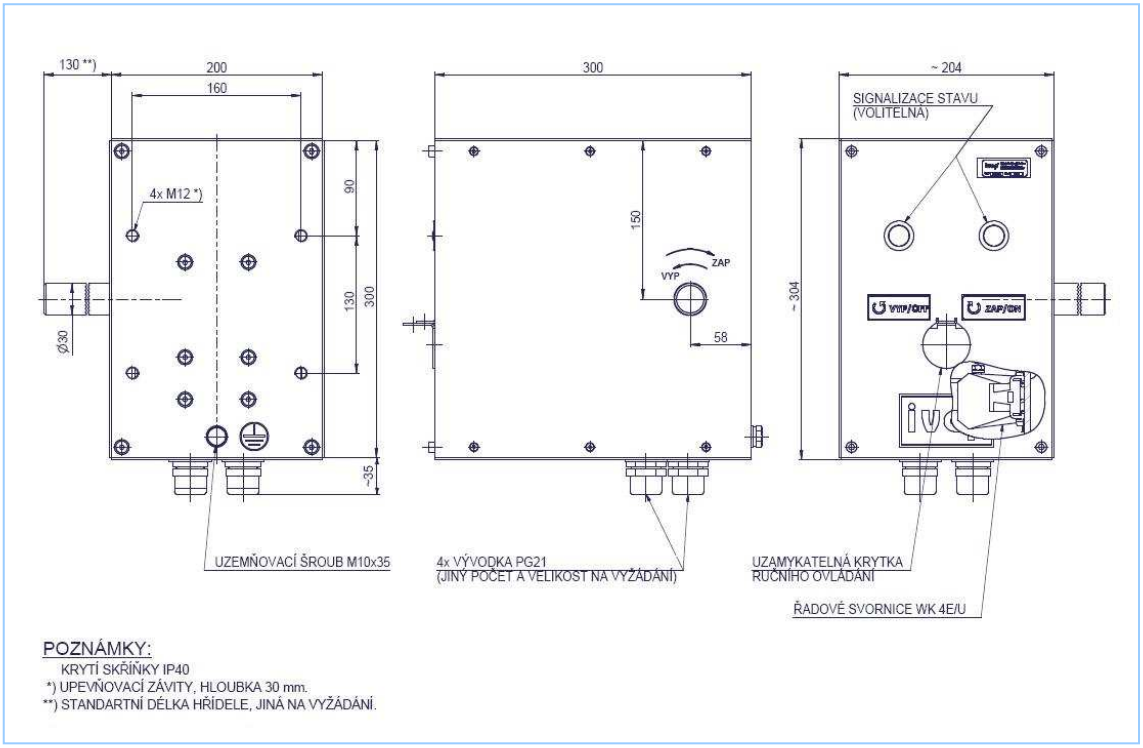
LEFT-HAND TYPE OF RPP MANUAL DRIVE



signalizace stavu (volitelná) = switching state indication (optional)
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

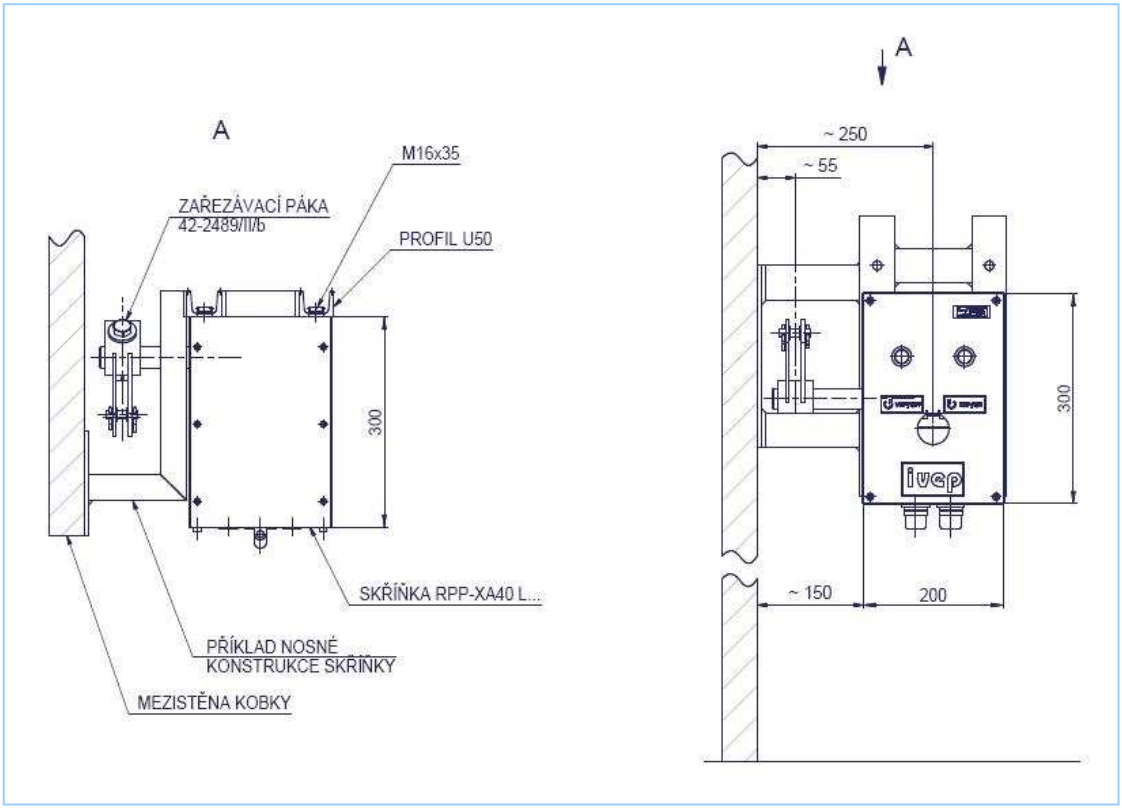
RIGHT-HAND TYPE OF RPP MANUAL DRIVE



signalizace stavu (volitelná) = switching state indication (optional)
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 number and sizes available on request)
uzemňovací šroub M10x35 = M10x35 earthing screw

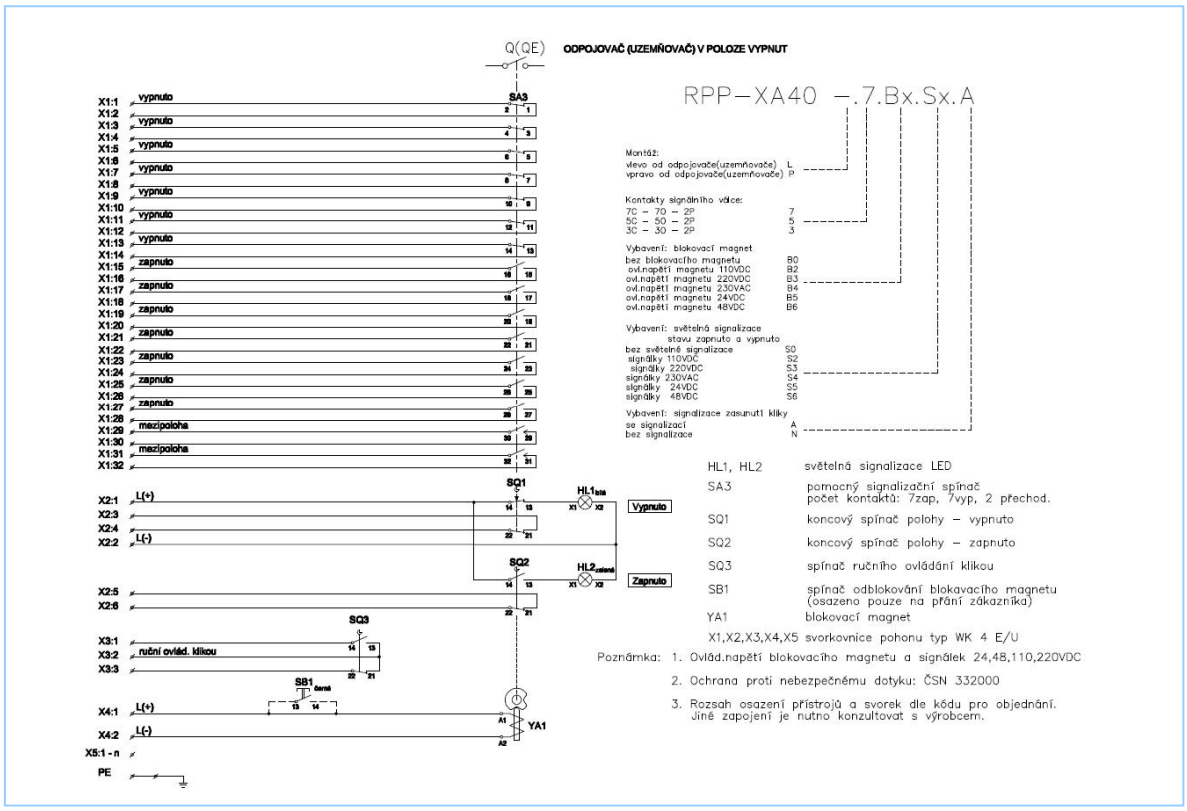
NOTES:
Protection degree IP40
*) fixing threads, depth 30 mm
**) default length of shaft; other sizes available on request

SUPPORTING STRUCTURE OF THE MANUAL DRIVE, INTENTED FOR MOUNTING ON THE SWITCHING CELL SIDE WALL



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 CONNECTION OF FULLY EQUIPPED MANUAL DRIVE CONTROL VOLTAGE OF BLOCKING MAGNET: 24 V, 48 V, 110 V, 220 V DC



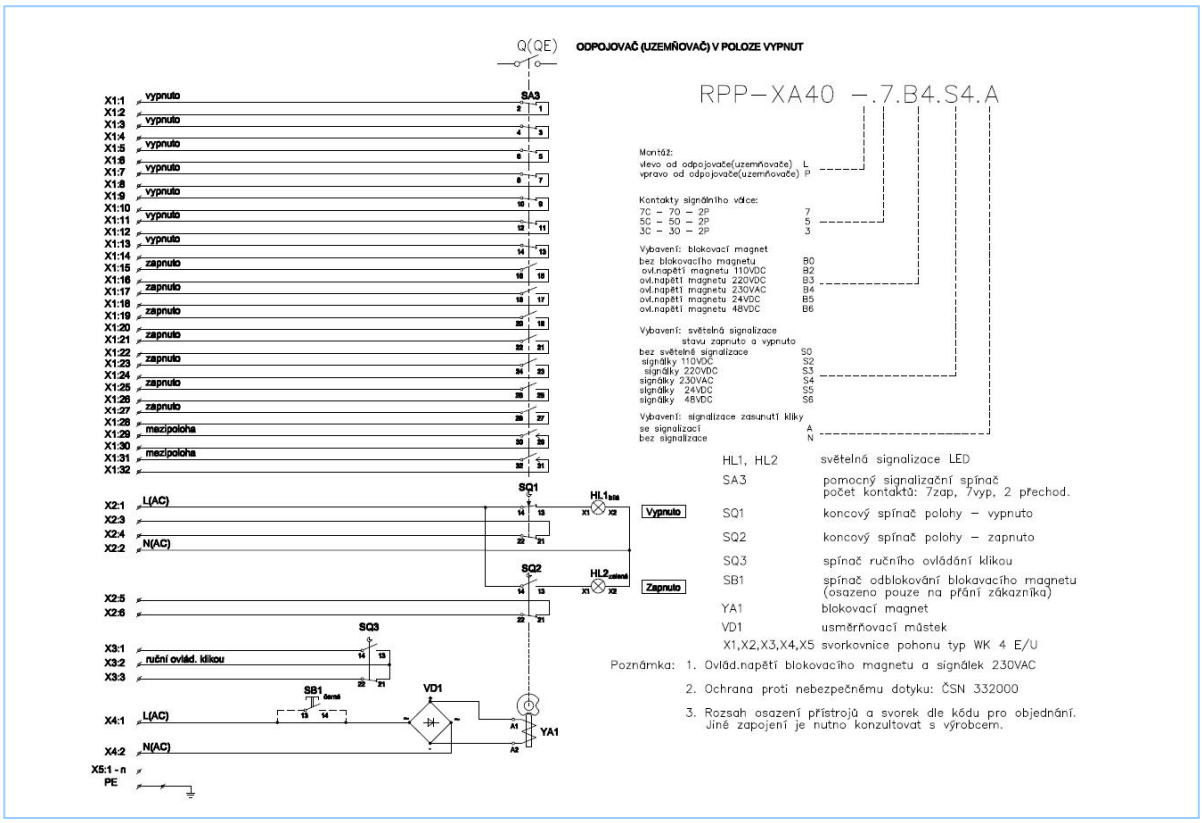
zapnuto = ON; vypnuto = OFF; mezipoloha = intermediate position

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 CONNECTION OF FULLY EQUIPPED MANUAL DRIVE CONTROL VOLTAGE OF BLOCKING MAGNET: 230 V AC



zapnuto = ON; vypnuto = OFF; mezipoloha = intermediate position

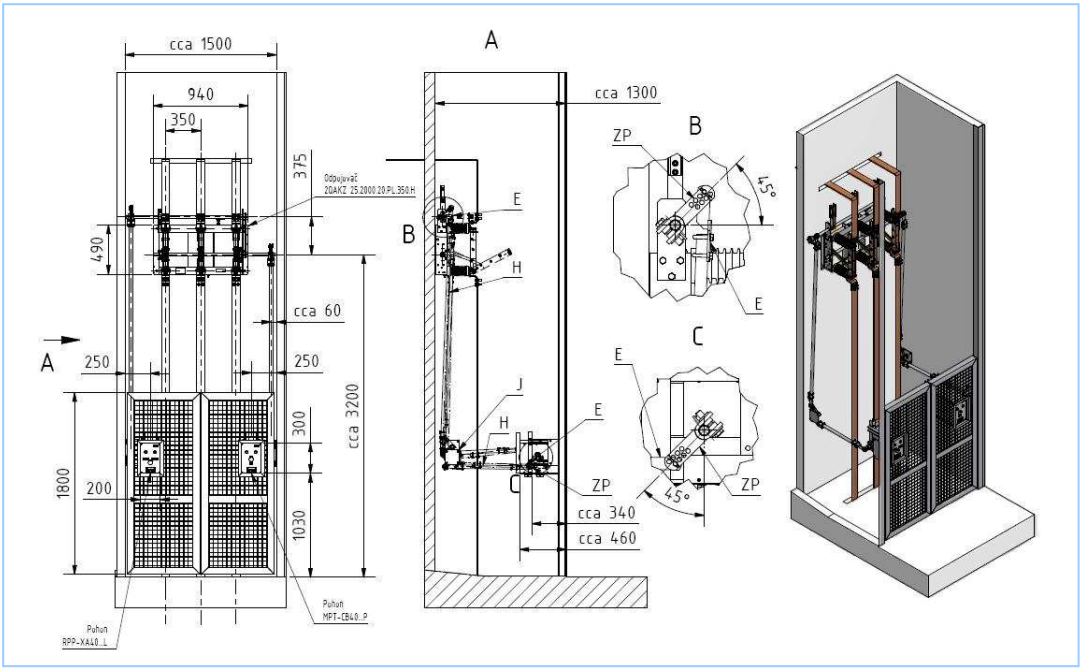
Note:

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.

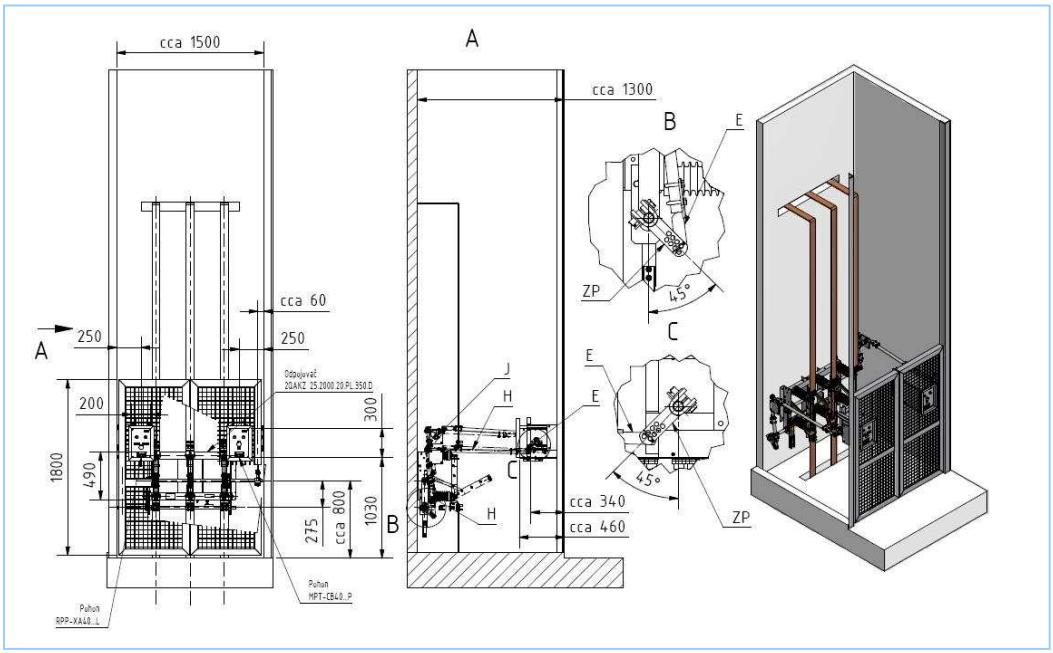
ANGULAR SHAPED KINEMATIC STRING OF THE FOLLOWING DRIVES 2QAKZ 25.2000.20.PL.350.H + MPT-CB 40...P + RPP-XA 40...L

Fig. 6



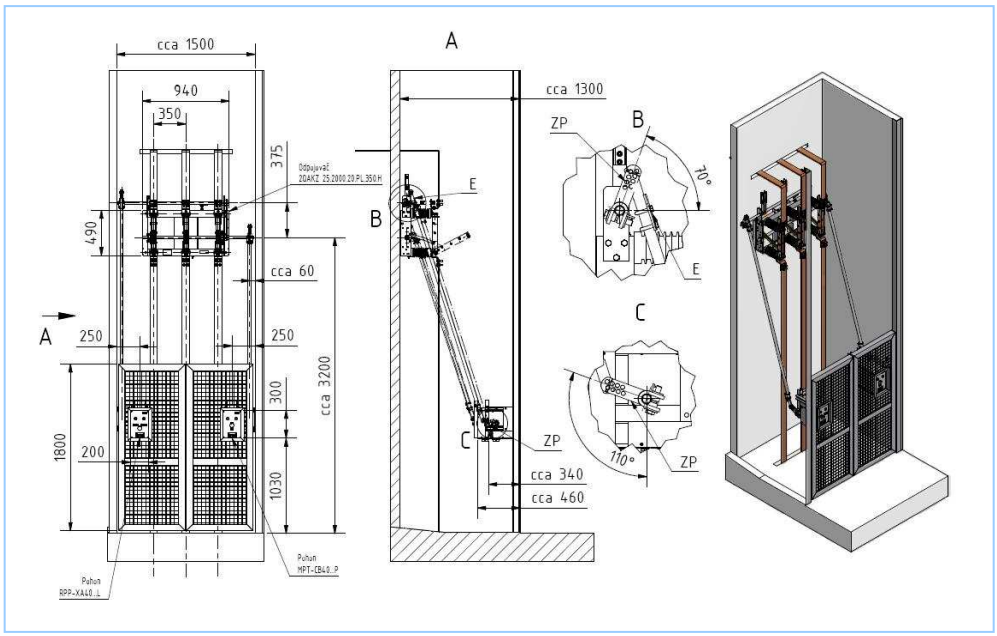
ANGULAR SHAPED KINEMATIC STRING OF THE FOLLOWING DRIVES 2QAKZ 25.2000.20.PL.350.D + MPT-CB 40...P + RPP-XA 40...L

Fig. 7



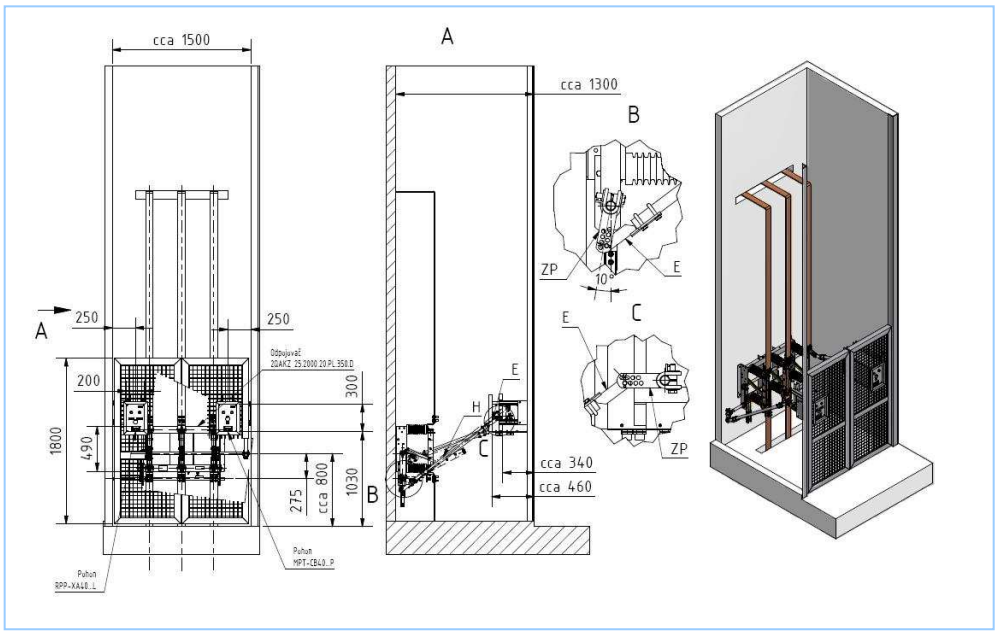
INCLINED KINEMATIC STRING OF THE FOLLOWING DRIVE 2QAKZ 25.2000.20.PL.350.H + MPT-CB 40...P + RPP-XA 40...L

Fig. 8

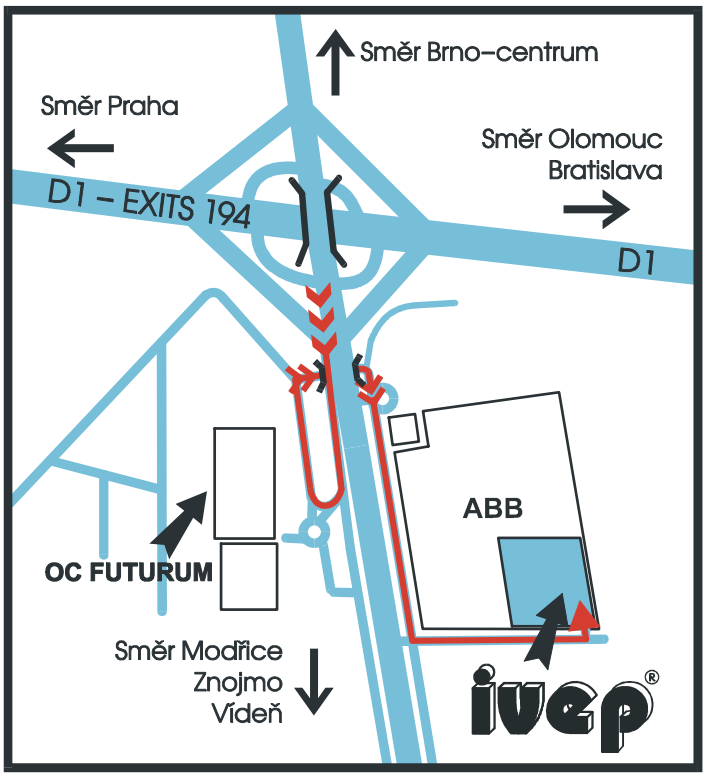


INCLINED KINEMATIC STRING OF THE FOLLOWING DRIVE 2QAKZ 25.2000.20.PL.350.D + MPT-CB 40...P + RPP-XA 40...L

Fig. 9



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.



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