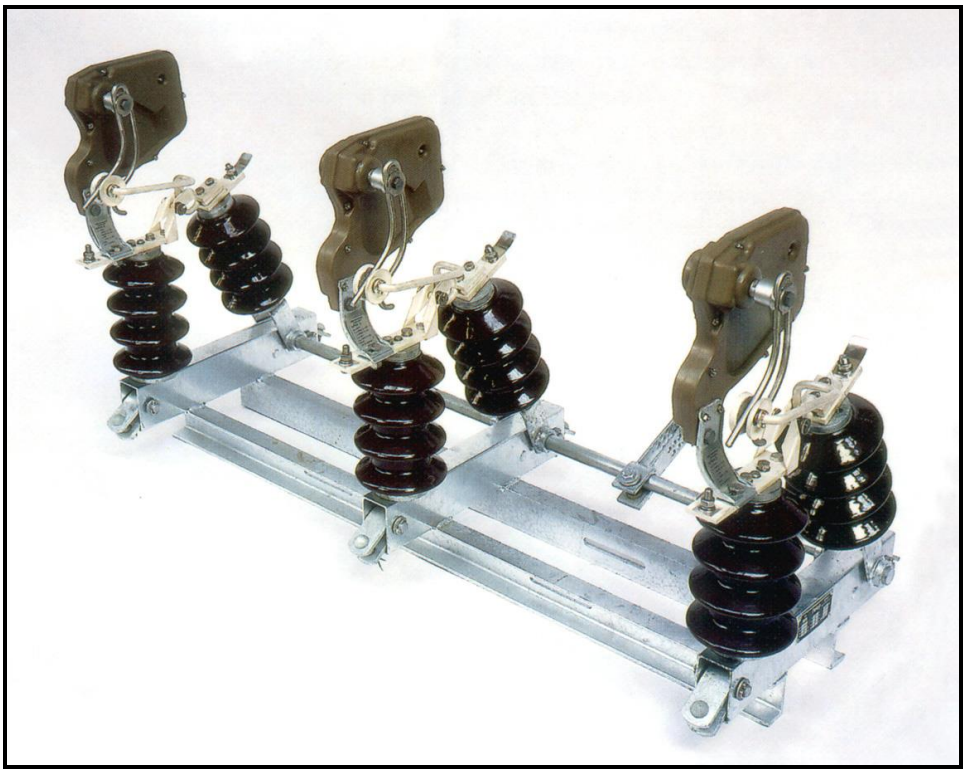
OUTDOOR DISCONNECTING SWITCH type FLE®

25 kV; 400 - 630 A

ACCOMPANYING DOCUMENT

Holder of certificates TÜV CZ according to:

ČSN EN ISO 9001: 2001
ČSN EN ISO 14001: 2005



PD 001/08/2001-A

INŽENÝRSKO - VÝROBNÍ ELEKTROTECHNICKÝ PODNIK, A.S.

ASSEMBLY RULES

The FLE load disconnector with hand its hand drive is delivered in a completely assembled state. The connection of the load disconnector to the line is shown in Fig. 1.

WORKS ON INSTALLATION SITE:

1. **Attachment of the load disconnector** to the pole occurs using 2 fixing H supports. The support is to be fastened to the pole in accordance with the Fig. 3.

   A. Attachment to wooden poles using two M20 x 400 bolts.
   B. Attachment to a concrete pole using two R 120 sleeves. Each sleeve consists of two parts connected each to the other using two M16x90 screws. The fixing supports are secured to the sleeves using the M20 nuts with shims (21). The load disconnector frame is fixed to the supports using four M16x30 screws.

2. Assembly of drive mechanism

The hand operated drive mechanism (position 2, Fig. 2) and the operation pull-rods are usually mounted to the pole at a position which is turned round by 90º with regard to the electrical power line (a position in parallel with the line is also possible). The drive mechanism is then fixed to the pole using two sleeves and two holders (position 9, Fig. 2), at a level of 1200 to 1250 mm above the ground. Attachment of the drive mechanism to the holders occurs via two M16x30 screws.

3. Rocking bearings assembly

The lower and upper rocking bearings (position 2 and 3, Fig. 2) are fixed to the pole using sleeves. The upper rocking bearing is provided with a single-arm clamping end piece with barrel-type sleeve which provides for a side deflection of the upper pull-rod by 10º to each side.

4. Assembly of pull rods and the adjustment of section switch stroke

Usual types of poles, i.e. the 9/6; 10.5/6 and 12/6 poles are each provided with three pull-rods of different length, according to the pole type. The control lower pull-rod (position 4, Fig. 2) is provided with G1“ thread from one side, and screwed into a pipe coupling (Fig. 54) from one side and fixed into a carrying yoke of the clamping end piece of the lower rocking bearing from the other side. The medium position control pull-rod (position 5, Fig. 2) consists of a threadless pipe, fixed into the locking bearing yokes. This pull-rod can be mounted after the length adjustment which is a result of adjustment works. The upper control pull-rod (position 6, Fig. 2) is then fixed to the rocking yokes of the clamping end piece (position 7, Fig. 2), which is linked with the bolt via the cut-in lever (position 8, Fig. 2) and inserted in the upper part into the load disconnector shaft opening, and in the lower part into the single-arm rocking clamp (position 7, Fig. 2) of the upper rocking bearing (position 3, Fig. 2).

5. Adjustment of the drive

a) Set up both the load disconnector and the drive into closed position. The load disconnector end stop for ON and OFF switching position has been precisely adjusted at the manufacturing plant.
b) Measure and arrange the length of the medium pipe-type pull-rod (position 5, Fig. 2) and temporarily fix the pull rod in its clamping end pieces (e.g. above the medium fixing yoke in each of the end pieces).

ATTENTION!

Improper assembly of the sleeves to the control pull-rod bearings is followed by the decrease in stroke and the impossibility of achieving the end ON and OFF positions of the load disconnector. Check whether all interbearings have achieved the angle position of 90º (see Fig. 6, control pull-rods) when deflecting the hand drive lever by 90º from the pole axis. Check in the B inspection point whether the arm on the load disconnector revolving shaft bears on the stop blocks when in ON – OFF position (see Fig. 6).

Check in the C inspection point whether the barrel-type sleeve on the cut-in lever is linked via a pull-rod with the barrel-type sleeve of the single-arm clamping end piece of the upper rocking bearing (Fig. 6).

An improper assembly of the pull-rod (caused by the mixing up of rocking bearings with barrel-type of cylinder-type sleeve, or by an improper assembly of the interbearing as such, e.g. by turning it round by 180º) may affect the control forces acting on the manual drive (pulling up the clamping end pieces on the bolts, bending the pull-rods).

The load-disconnector drive mechanism may by considered to be adjusted properly when even for slowly operation of the drive the end stops fo the making and breaking position will be achieved for

both the drive and the load disconnector. The drive pull rod in making position has to display a pre-stressed state (being under the pressure of the drive), in order to ensure the pushing direction of the end piece against the stop.
After having performed a few testing operations and checking the proper functioning of the drive and the load disconnector the M10 nuts of the yokes of clamping end pieces shall be retightened and checked, as well as the M16 nuts that secure both the rocking bearings and the hand drive mechanism.

ATTENTION:
The connection of the pole earthing system is done to the connecting spot marked accordingly on the drive body.
The assembly and connection of the overhead lines, as well as that of the earthing protection system (Engineering conditions, Art. 18 and 19) is not a subject of this assembly rules. All these works have to be carried out in conformity with the regulations of respective assembly organizations or utility companies.

MAINTENANCE INSTRUCTIONS

The outdoor FLE load disconnector is a switching device which is easy to be serviced and revised. For the purpose of achievement of the reliability level required it is recommended to perform regular visual inspections of the device (at least once a year) during which also the defect-free state of the supporting insulators is to be verified.
No-load switching operations should be performed after a longer out-of-action period of the load disconnector in order to clean the contacting points and verify the mechanical operation of the drive mechanism.
It is recommended to make a periodical revision of the switching device in no-load state at least once during 10 years during which the following servicing works are performed:

a) Checking the state of main contacts, cleaning and greasing of contact surfaces with „Barrierta L 55/1“ vaseline, manufactured by Klüber-Lubrication (Germany).
b) Checking the state of bearings, cleaning and greasing using the „Omnigliss Spray“, manufactured by Dow Corning (another brands of greasing agents such as AOO, AVL etc. may also be used, providing these evidence water-resistant properties).
c) Checking the state of supporting and pull-rod insulators, and their cleaning.
d) Testing the mechanical function of the drive and the load disconnector, and the arc quenching chambers.

Curve of the switching service life (maintenance free curve) of an arc quenching chamber

The NPAK 5 arc quenching chamber manufactured by ABB Tfransmit Oy is a maintenance-free product, providing none of the load related values in terms of the number of switching cycles or the total mechanical service life become exceeded (see the main engineering data and the curve describing the number of switching operations on active load currents – see catalogue).
In 1998 test have been performed by the company ABB Transmit OY, in which the NPAK 5 arc quenching chamber has passed 2000 C-O switching operations with satisfactory result.
When getting beyond the maintenance free curve limits it is not necessary to replace the NPAK 5 chamber against a new one.
In case the maintenance free curve limits have been exceeded due to a too high number of operating currents, only 2 pcs of plastic plates (CXBY 67036.2) need to be replaced. If the limits of maintenance free curve have been exceeded due to the closing of too high short-circuit currents (above 8000 A), it is necessary to replace, in addition to the above mentioned plastic plates, also the fixed NPAZ 151 contact and the NPAZ 159 sparking knife.
According to the information released by ABB Transmit Oy, the replacement of the above mentioned spare parts in the arc quenching chamber may be performed easily by the user himself.

RULES FOR PACKING AND TRANSPORT

a) The packing of the switching device is done by the manufacturer by placing the device on special platforms. The load disconnector is being transported in switched ON state.
b) The load disconnectors can be transported by any transport means.
c) During the transport it is not necessary to protect the device against weather conditions. When handling the product and when unloading it cannot be lifted by gripping them at arc quenching horns and the contacting parts.

d) The assembly procedures to be used when mounting the load disconnector onto a pole are described in section „Assembly rules“.

APPENDICES

Fig. 1 Mode of connection of the FLE load disconnector to the line
Fig. 2 Arrangement of the FLE load disconnector with a drive mechanism
Fig. 3 Fixing the FLE load disconnector to a pole
Fig. 4 Hand operated drive mechanism
Fig. 5 Types of supporting bearings used
Fig. 6 Proper assembly steps
Fig. 7 Table of cross sections of concrete poles

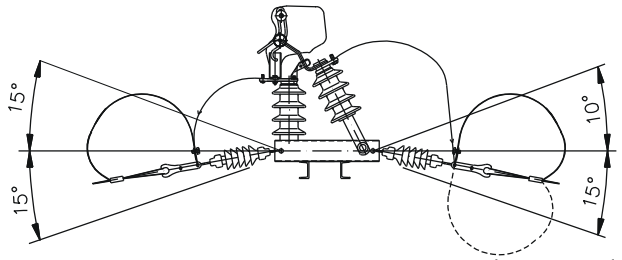
CONNECTION OF THE LOAD DISCONNECTOR TO THE LINE

Fig. 1

Current infeed using Cu bands from one side

lead-in using cable (rope)

using Cu band

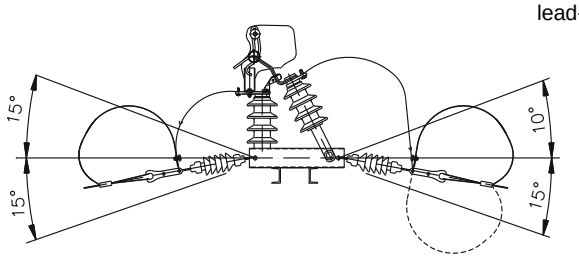


interconnection from bottom

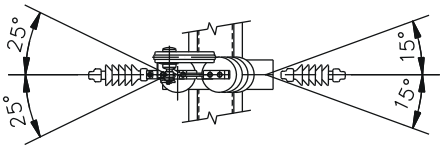
Current infeed using Cu bands from both sides

lead-in using Cu band

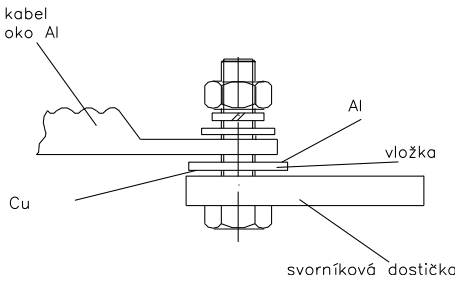
lead-in using Cu band



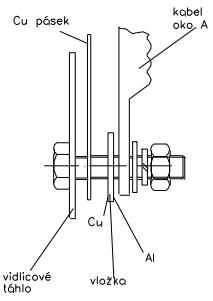
interconnection from the bottom



A

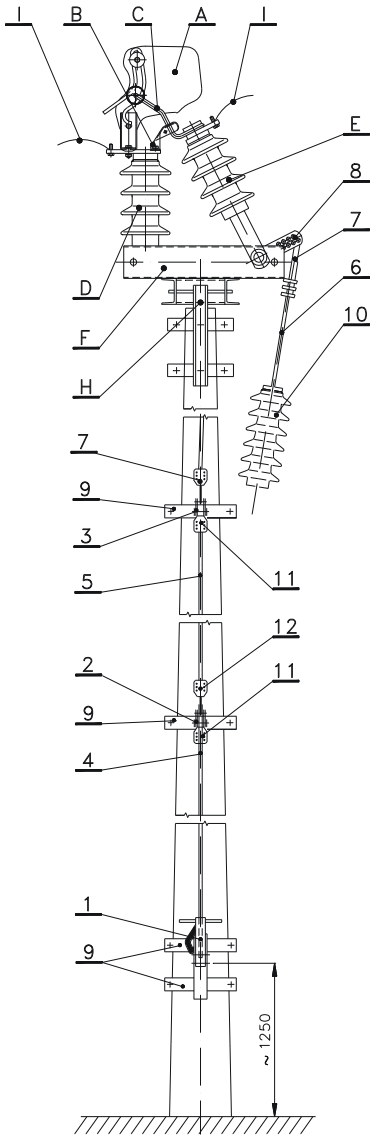


B



ARRANGEMENT OF THE FLE LOAD DISCONNECTOR WITH DRIVE MECHANISM

obr. 2

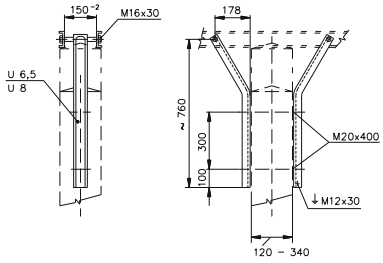


A – breaking chamber
B – main current carrying path
C – additional current carrying path
(arc quenching contact system)
D – fixed supporting insulator
E – rocking supporting insulator
F – supporting frame
H – fixing supports
I – flexible band-type lead-ins
1 – hand operated drive mechanism
2 – rocking bearing
3 – upper rocking bearing
4 – lower rocking bearing
5 – control middle position pull rod
6 – control upper position pull rod
7 – single-arm clamping end piece
with barrel
8 – cut-in lever
9 – fixing sleeves
(R 130; R 155; R 178)
10 – insulator installed in a pull rod
(for wooden poles only)
11 – two-arm clamping end piece
12 – single-arm clamping end piece without barrel

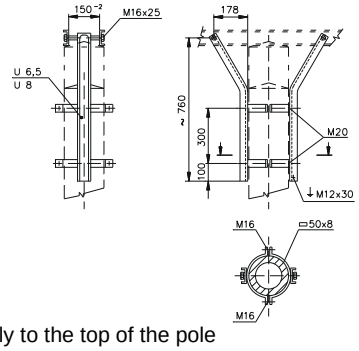
FIXING THE FLE LOAD DISCONNECTOR TO A POLE

Fig. 3

Wooden pole .



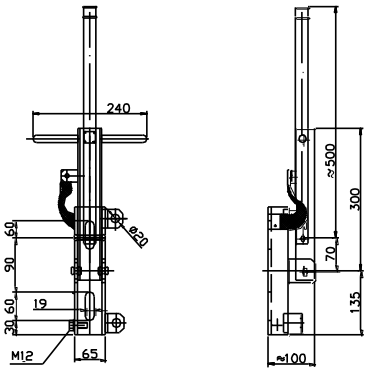
Concrete pole



The load disconnector may be secured directly to the top of the pole

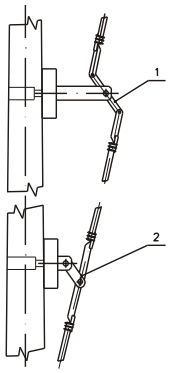
HAND OPERATED DRIVE

Fig. 4



TYPES OF SUPPORTING BEARINGS USED

Fig. 5

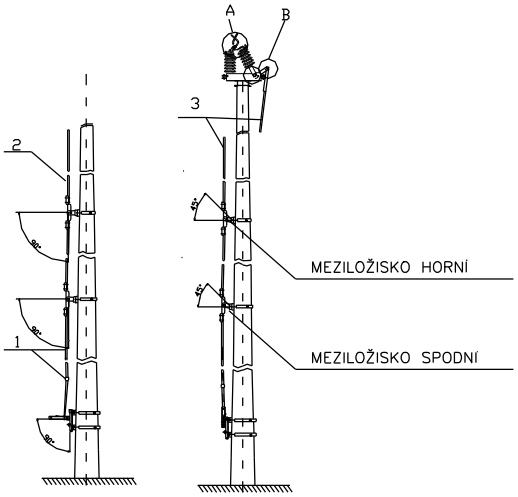


1 – Reversing bearing
2 – Rocking bearing

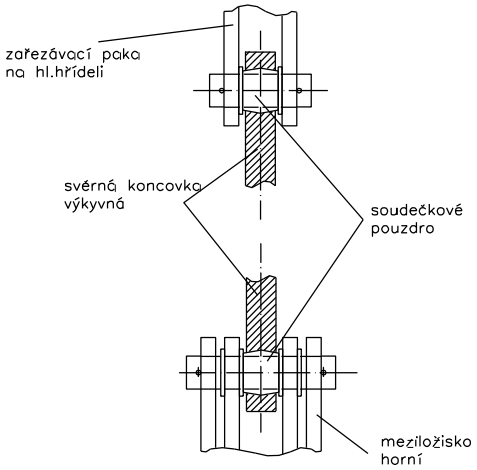
PROPER ASSEMBLY STEPS

Fig. 6

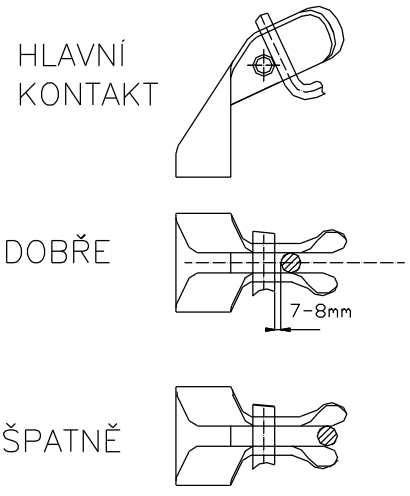
CONTROL PULL RODS - ADJUSTMENT



ASSEMBLY STEPS FOR PULL ROD NO. 3 – INSPECTION POINT C



MAIN CONTACT – INSPECTION POINT A



END POSITION STOP – INSPECTION POINT B

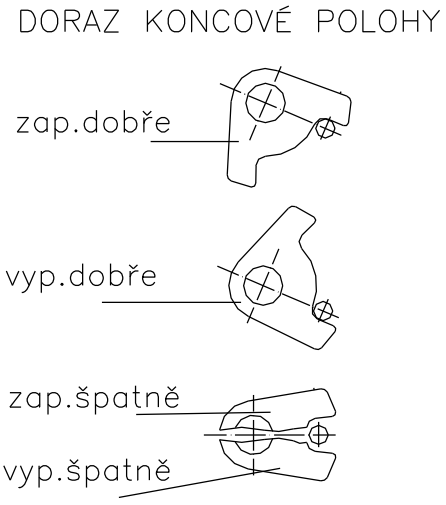
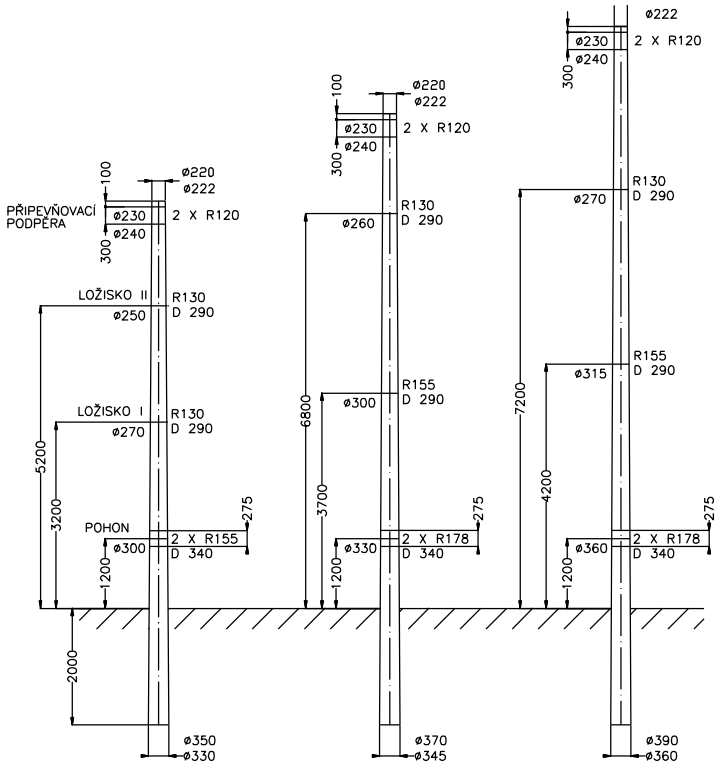


TABLE SHOWING THE CROSS-SECTIONS OF JČE AND ELEKTROVOD SENEC CONCRETE POLES WITH SLEEVES AND HOLDERS

Fig. 7

TYPE 9/6 10.5/6 12/6



SLEEVE CODE MARKING	FOR DIAMETER	DRAWING NUMBER
R 120	230; 240	62 – 2433
R 130	250; 260; 270	42 – 4251
R 155	300; 315	42 – 4252
R 178	330; 360	42 – 4253
D 290	holder of inter-bearing	32 - 1147
D 340	holder of drive mechanism	32 - 1143

CU – FLEXIBLE LEAD-INS

KIND OF POLE	ANCHORAGE	RATED VOLTAGE KV	LENGTH OF LEAD-IN		NUMBER OF 400A BANDS ON ONE UNIT
			FIXED SUPPORT	FLEXIBLE SUPPORT	
wooden and	single-type	25	1100 prod. No. 62-2150	1340 prod. No. 62-2150	3 + 3
concrete		38.5	1340 prod. No. 62-2151	1540 prod. No. 62-2152	3 + 3
pole	double-type	25	1340 prod. No. 62-2151	1540 prod. No. 62-2152	3 + 3
		38.5	1540 prod. No. 62-2152	1740 prod. No. 62-1934	3 + 3

Note:
The Cu inlet bands may be replaced on the fixed support side by extending the overhead line and connecting it using a cable lug to the connecting flag of the support. Aluminium lugs are provided with shims of „Cupal“ brand.

LIST OF ACCESSORIES

Seriál number	Title	pcs
1.	Hand operated drive	1
2.	Rocking bearing	1
3.	Upper rocking bearing (with rocking, clamping type end piece)	1
4.	Lower position control pull rod (with G1“ thread)	1
5.	Medium position control pull rod	1
6.	Upper position control pull rod	1
7.	Single-arm clamping end piece with barrel	1
8.	Cut-in lever	1
9.	Fixing sleeve	4
10.	Insulator installed in a pull rod (for wooden poles, only)	1
11.	Holder of drive mechanism	2
12.	H type fixing support	2
13.	Fork-type pull rod with guide rail	6 (3)*
14.	R 120 sleeve	2 pairs
15.	Cu lead-in, a bunch of 3 pcs	6 (3)*

***)** see „Note“ under the Table with Cu- flexible lead-ins

LIST OF TOOLS FOR MOUNTING THE FLE LOAD DISCONNECTOR TO A POLE

1.	nut wrench No.	24
2.	side spanner No.	24
3.	socket wrench No.	17
4.	socket wrench No.	30

Manufactured and supplied by:

Inženýrsko-výrobní elektrotechnický podnik,a. s.
Vídeňská 117a, 619 00 Brno, Czech Republic

Tel.: 00420 5 47136 654 e-mail:ivep@ivep.cz
Fax: 00420 5 47136 402 http:// www.ivep.cz