

# Isolatoren / Stand-off Insulators

ST 300 / ST 500

These stand-off insulators are made for indoor use.

They are made of plastic material. The flange has three slotted holes permitting to align the insulator's cap screw clamping to the direction of the antenna feed line. The cap screw clamping can take copper tubes up to 8 mm diameter.

Due to their mechanical properties and the plastic material made of, the stand-off insulators type ST are virtually break-proof.

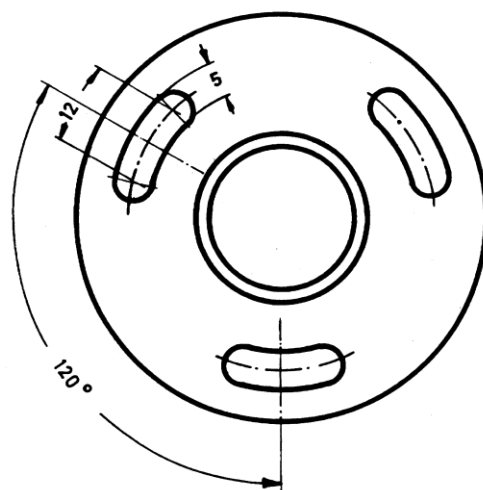
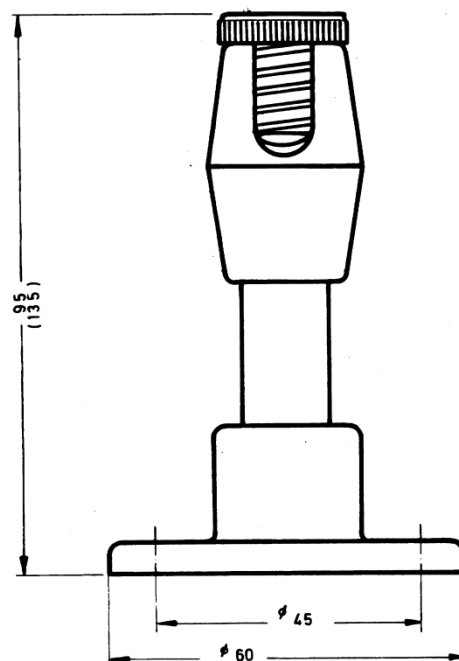
- Easy mounting
- No broken ceramics
- No maintenance

## Specification

Height	ST 300: 95 mm ST 500: 135 mm
Slotted holes	3
Width of cap screw clamping	8 mm
Mounting flange and Cap screw clamping	thermoplastics
Shaft	polyester
Max. RF operating voltage	ST 300: 20 kV ST 500: 50 kV
Tightening torque for fixing screws	max. 1.2 Nm

## Parts List

Designation	Order-Code
ST 300	E 189-015
ST 500	E 189-016



# Abspannisolatoren / Strain Insulators

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## Type RH

RH insulators are made of plastic bars with rectangular cross sections of 40 x 15 mm.

They have 8.5 mm bore holes on both ends in order to take up standard 5/16" shackles.

The permissible stress effect on these insulators is max. 400 daN at 23° C.

RH insulators are resistant to all marine environment, especially to mention the extreme resistance to tension crack.

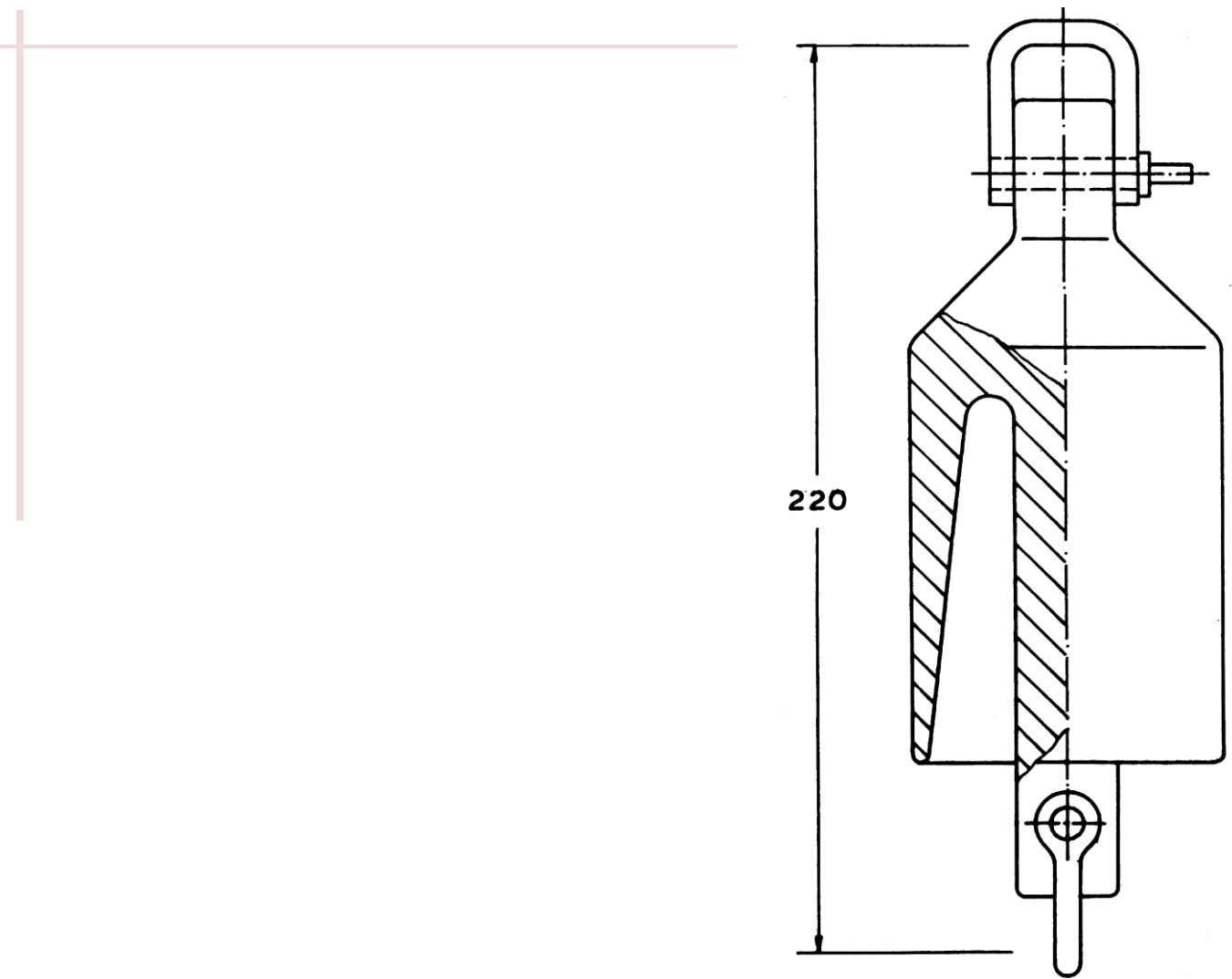
Even under tropical temperatures the resistance against chemicals includes inorganic acids up to a concentration of 20 % alkali, aqueous solutions of inorganic salts, organic acids as well as alcohols, aldehyde, ketone groups, ester, amine, and seawater.

If kept in water even for longer periods the insulators do not absorb any moisture. Dusty material and ice do adhere very little because of the water-repellent surface.

RH insulators have excellent electrical features: the insulation resistance is extremely high, the surface conductivity minimal, the dielectric dissipation factor is low, the resistance to tracking and arc resistance are good.

## Parts List

Designation	Order-Code
RH 200, 20 cm length	E 189-005
RH 300, 30 cm length	E 189-007
RH 400, 40 cm length	E 189-008
RH 500, 50 cm length	E 189-010
RH 600, 60 cm length	E 189-009



Parts List

Designation	Order-Code
RHG 220	E 107-526

STA = Rod Antenna      K = Tilt      SSB = internal feeding      NDB = Non Directional Radio Beacon  
E = Receiving Rod Antenna      TR = reinforced      SSB/E = external feeding  
EAU = Transformer      SE = Transmit Antenna      PM/M = dark grey (similar to RAL 7000)

# Durchführungsisolator / Lead-Through Insulator

P 75

The lead-through insulator, series P, is especially designed for antenna installations on board of seagoing vessels. Insulation characteristics are at an optimum even under severe environmental conditions.

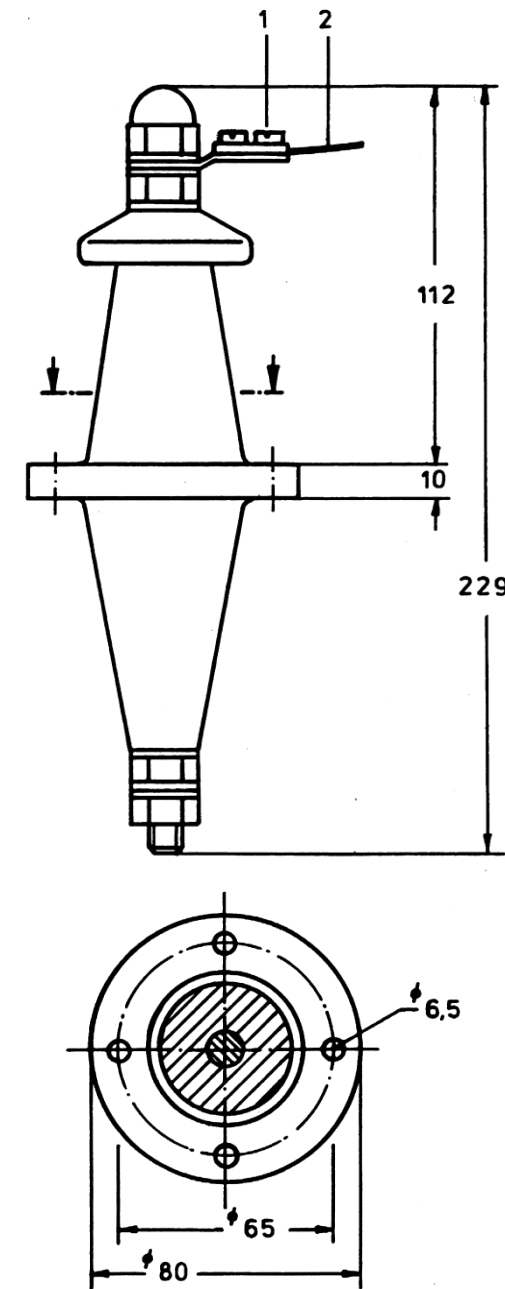
Shipbuilding problems with regard to steel or light metal super-structures will not be encountered as the fastening flange of the insulator is made of thermoplastic material.

## Specification

Insulator	UV-resistant null water absorption
Lead-through axle	brass
Recommended mounting	vertical
Antenna connection	clamp terminal 25 mm <sup>2</sup>
Transmitter connection	clamping cone for Ø 6 mm copper tubing
Maximum RF operating voltage	10 kV
Dielectric constant	2.1 (400 kHz - 30 MHz)
Tangens delta	0.0003 (400 kHz - 30 MHz)
Temperature stability	-60° C ... +100° C
water absorption	0
Surface resistance at 100 % relative humidity	10 <sup>15</sup> Ω/cm

## Parts List

Designation	Order-Code
P 75	E 189-014



Tightening torque for fixing screws (M6):  
max. 1.2 Nm

- 1 Terminal
- 2 Stranded wire Ø 4 - 8 mm

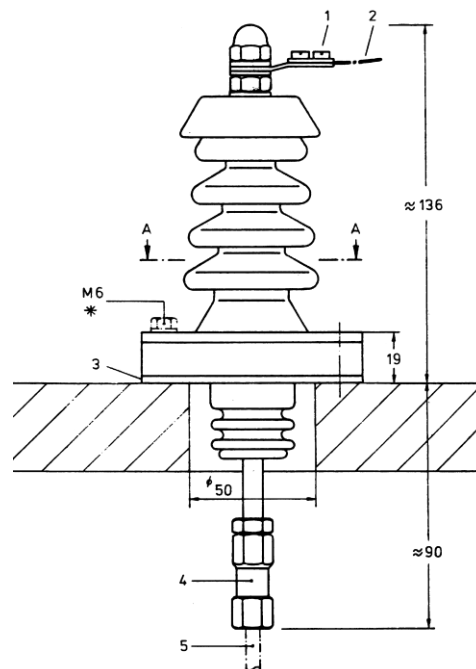
# Durchführungsisolator / Lead-Through Insulator

P 20

This lead-through insulator is especially designed for antenna installations on board of seagoing vessels. Insulation characteristics are at an optimum even under severe environmental conditions.

## Specification

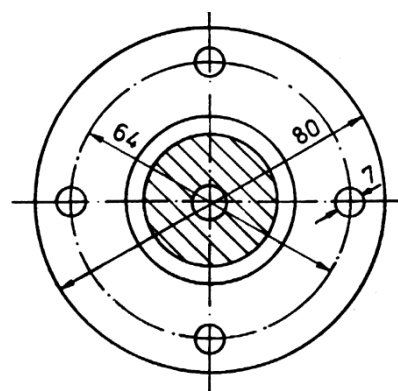
<b>Insulator</b>	UV-resistant null water absorption
<b>Lead-through axle</b>	brass
<b>Recommended mounting</b>	preferably vertical
<b>Antenna connection</b>	clamp terminal 25 mm
<b>Transmitter connection</b>	clamping cone for Ø 6 mm copper tubing
<b>Maximum RF operating voltage</b>	12 kV
<b>Dielectric constant</b>	2.1 (400 kHz - 30 MHz)
<b>Tangens delta</b>	0.0003 (400 kHz - 30 MHz)
<b>Temperature stability</b>	-60° C ... +100° C
<b>water absorption</b>	0
<b>Surface resistance at 100 % relative humidity</b>	$10^{15} \Omega/\text{cm}$
<b>Weight</b>	0.51 kp



- 1 Screw terminal
- 2 Stranded wire Ø 4 - 8 mm
- 3 Flat gasket
- 4 Clamping cone for Ø 6 mm
- 5 Copper tube Ø 6 mm

\* Tightening torque: max. 4 Nm

Section A-A



## Parts List

Designation	Order-Code
P 20	E 189-013

STA = Rod Antenna  
E = Receiving Rod Antenna  
EAU = Transformer

K = Tilt  
TR = reinforced  
SE = Transmit Antenna

SSB = internal feeding  
SSB/E = external feeding  
PM/M = dark grey (similar to RAL 7000)

NDB = Non Directional Radio Beacon



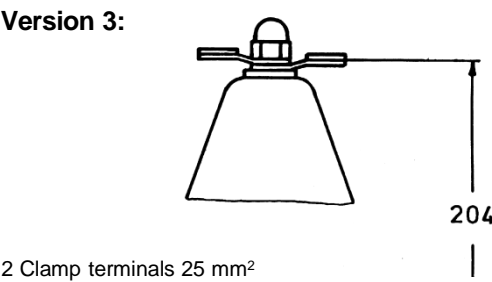
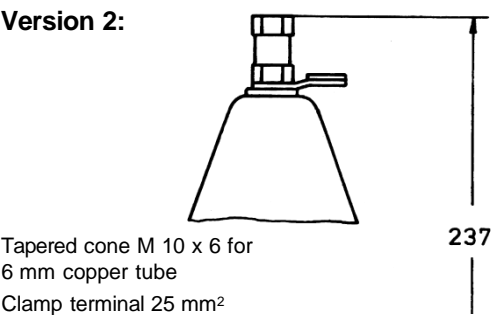
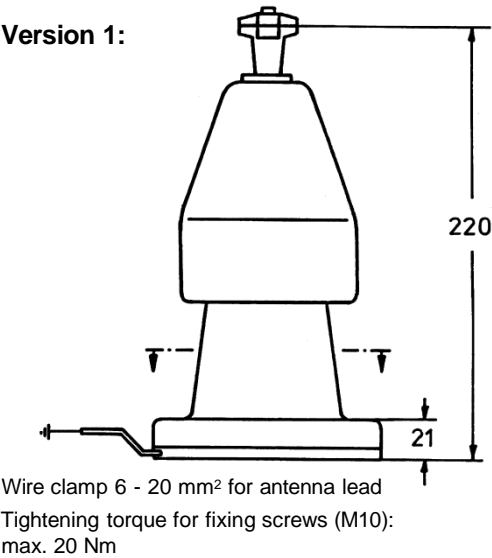
# Blitzschutzisolator / Lightning Protection Insulator

PB 500

The delivery scope of the insulator PB 500 involves all parts for the three different versions.

## Specification

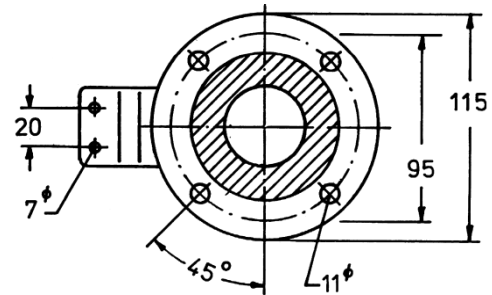
Antenna potential	PTFE-insulated
Max. RF-voltage	30 kV
Dielectric constant	2.1 (400 kHz - 30 MHz)
Tangens delta	0.0003 (400 kHz - 30 MHz)
Water absorption	none
Surface resistance at 100 % relative humidity	$10^{15} \Omega/\text{cm}$
Icing	none
Max. RF-load	LF/MF 200 Watt
Discharging gap	10 ± 3 mm - adjustable (supplied at 10 mm)



## Parts List

Designation	Order-Code
PB 500	E 107-852

Subject to changes of the technical data due to technological improvement.



# Durchführungsisolator / Lead-In Insulator

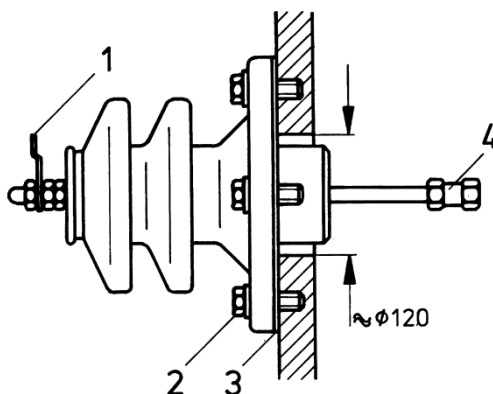
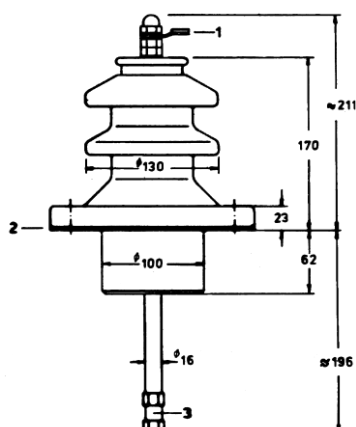
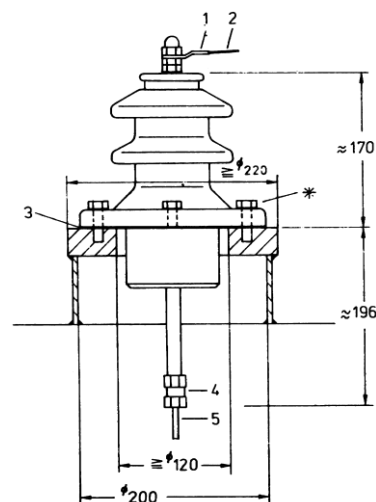
P 502

This lead-in insulator has been carefully designed to meet severe environmental conditions as one will find on board of seagoing vessels.

The P 502 is made of high quality plastic material with outstanding electrical data over a wide frequency range (ceramics change their electrical data due to the applied frequency).

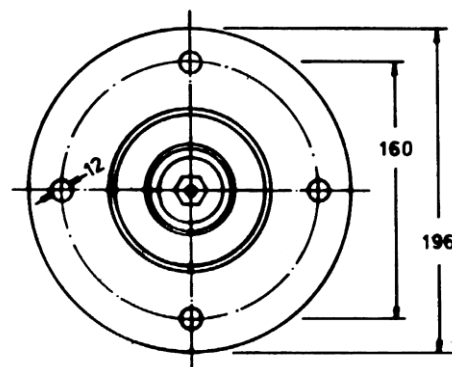
The insulating material is UV-resistant, it has null water absorption, and its surface may be damaged (e. g. scratches) without any reduction of the very high insulation value.

Special features have been integrated into the design to prevent arcing to ground potential and to eliminate corona discharge.



- 1 Clamping cone for 25 mm<sup>2</sup>
- 2 Mounting screws M 10 and washer 10,5\*
- 3 Flat gasket
- 4 Clamping cone Ø 6 mm

\* not scope of delivery



## Parts List

Designation	Order-Code
P 502	E 107-780

STA = Rod Antenna

E = Receiving Rod Antenna

EAU = Transformer

K = Tilt

TR = reinforced

SE = Transmit Antenna

SSB = internal feeding

SSB/E = external feeding

PM/M = dark grey (similar to RAL 7000)

NDB = Non Directional Radio Beacon

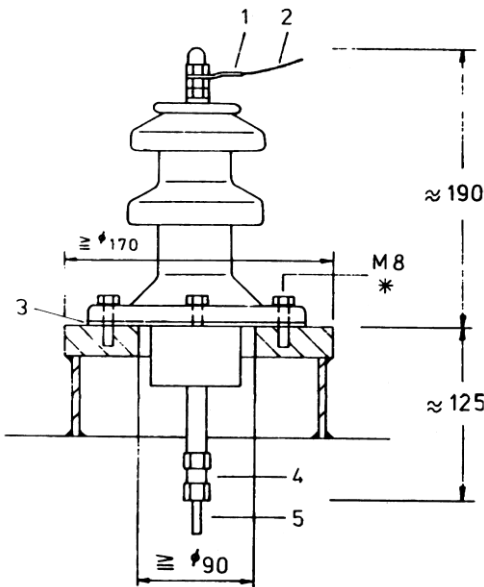
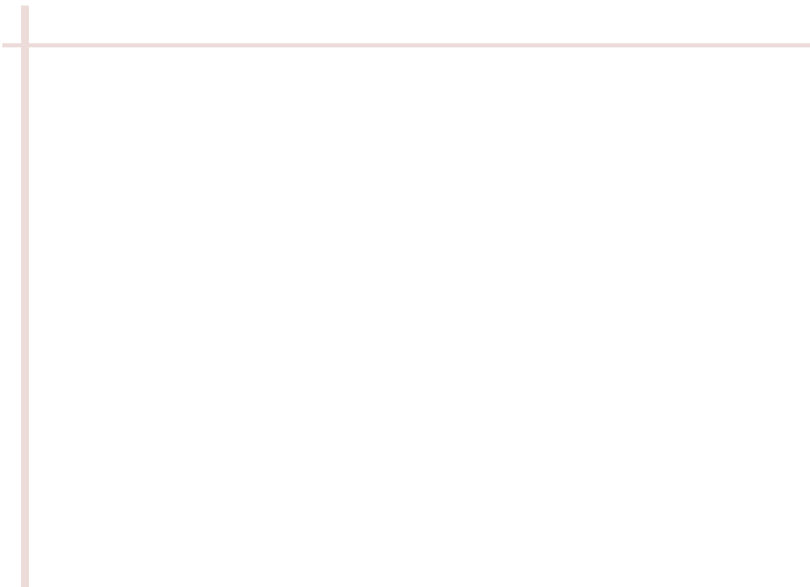


# Durchführungsisolator / Lead-Through Insulator

P 202

This lead-through insulator is especially designed for antenna installations on board of seagoing vessels. Insulation characteristics are at an optimum even under severe environmental conditions.

Shipbuilding problems with regard to steel or light metal super-structures will not be encountered as the complete insulator body is made of high quality plastic material.



## Parts List

Designation	Order-Code
P 202	E 189-012

- Subject to technical alterations -



## Supporting Pipes and Tilting Mechanism for Self-Supporting Mast Antennas

- Robust construction
- Space saving installation
- Different heights
- Screwed or welded anchorage
- Withstanding sea environment
- Easy and fast tilting
- Watertight base injection
- Condensation protection
- Detachable spindle assembly
- Self-locking trapezoidal spindle worm

In view of so many applications our manufacturing program covers a number of standard supports and tilts.

This precis contains units for the following equipment:

ELNA mast antennas with 5 m lower section (e.g. STA 115 C/MF/HF/E, STA 70 - 100 PM)

ELNA mast antennas with 8 m lower section (e.g. STA 105 ... 140 PM, STA 105/120 PM/M, STA 150 C..., STA 150 NDB...)

Please contact us in case your application requires special tailored systems. We are quite prepared to modify and design in accordance with all practicable cases of need.

### Generals

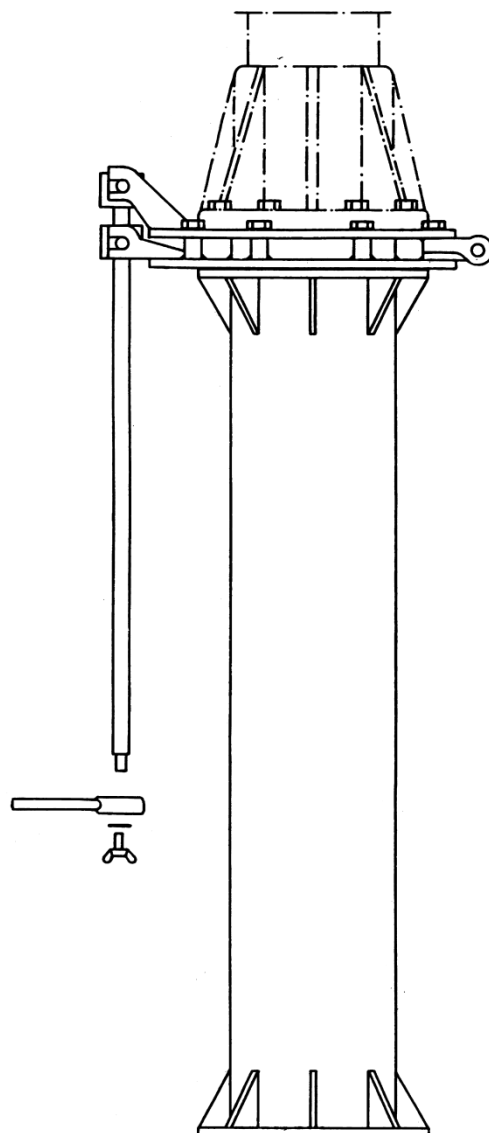
The type designations of our different versions provide the projecting engineer with useful information about the equipment in question.

The letter „K“ stands for tilting mechanism, whereas the then following figures „5“ or „8“ indicate that this tilting flange is destined for antennas/masts with a 5 resp. 8 m long lower section;

The letters „SP“ stand for spindle assembly, whereas the galvanised spindle is named „SP/G“, the stainless steel spindle „SP/S“, and the complete spindle assembly in stainless steel „SP/SS“.

The spindle assembly SP/... is made detachable. It can be fixed to both tilting flanges, K 5 and K 8, whereby the spindle device can also be installed upside down (see page 6). It shall be removed and stored away, whenever the tilt is expected to stand still for a longer time. The spindle worm shall be greased well.

Supporting pipes are indicated by the letters „TR“, their heights is given in decimeters. For the list of standard types see last page, please. Supporting pipes of other heights than standard versions may be ordered against extra charge. Please, indicate the length in the type designation e.g. as follows: TR 15... for a supporting pipe 1.50 m (= 15 decimeters) high. The base flange of the supporting



# Standrohre, Kippvorrichtungen / Supporting Pipes, Tilting Mechanism

TR + K/E

may be fitted with through bores when necessary „TR ... / ... /B“ (please, refer to following pages, Alternative), e.g. with installations on concrete foundations or on board of ships with aluminum decks. The supports and the tilts are painted with rust preventing primer. All units can be treated with sandblasting and galvanization, or they can be made completely of stainless steel. The standard equipment is always provided for internal feeding (base injection), while the equipment for external feeding is indicated by the additional letter “E”.

## Description

### Supporting Pipes

Supporting pipes are made of high-grade steel pipes fitted with a round top flange with through bores and a round bottom flange. The bore holes and the bolt hole circles meet the dimensions of our mast antennas, masts, and the base plates of the corresponding tilting devices. The standard supports have no bore holes in the bottom flange, they are for welded anchorage only. If bore holes are required, please, explain your wishes when ordering.

The supports can be delivered for antennas with external feeding or base injection. The version with the internal feeder for base-injected antennas is a watertight construction with protective measures against condensation. Top and bottom flanges are sealed with gaskets.

There are two different supporting pipe sizes available for either the 8 m base section antennas or for the 5 m base section antennas (see table on last page, please).

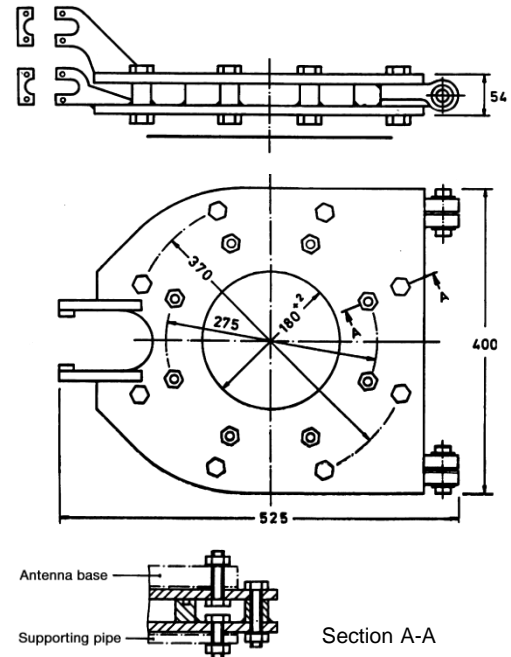
The supports are delivered descaled and painted with a rust preventing primer. Sandblasted and (hot) galvanized surfaces upon request.

### Tilting Mechanism

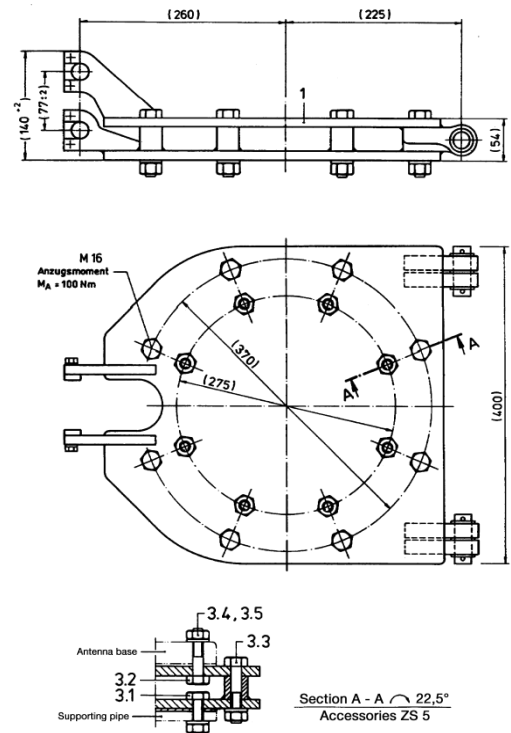
The tilting devices ease not only the first installation of antennas or masts as the erection can be effected without cranes, but they also save costs later when the assembly must be laid down for maintenance.

The tilts are made of high-grade steel and can be used with or without crank drives. Manually operated trapezoidal spindles, hydraulic cylinders, and remotely controlled automatic drives are available. The tilting device consists of the base plate and the tilting plate. The closed tilting device (antenna resp. mast in upright position) can be fixed additionally by stainless steel through bolts whenever the self-locking capability of the trapezoidal spindle seems to be insufficient. The closed device is sealed against water by means of a sealing cord between base and tilting plates. The cord lays in a groove welded to the base plate.

### Tilting Flange K8



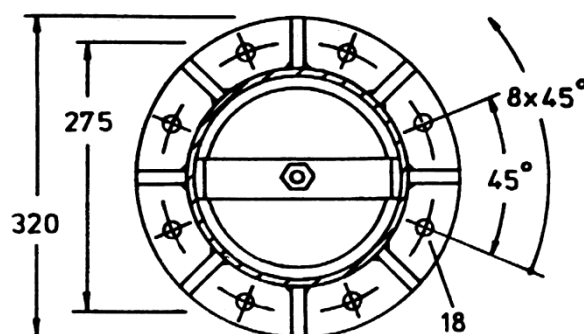
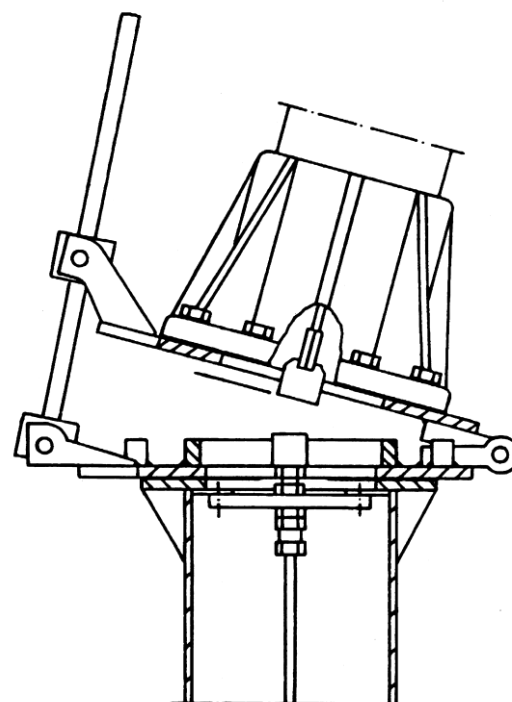
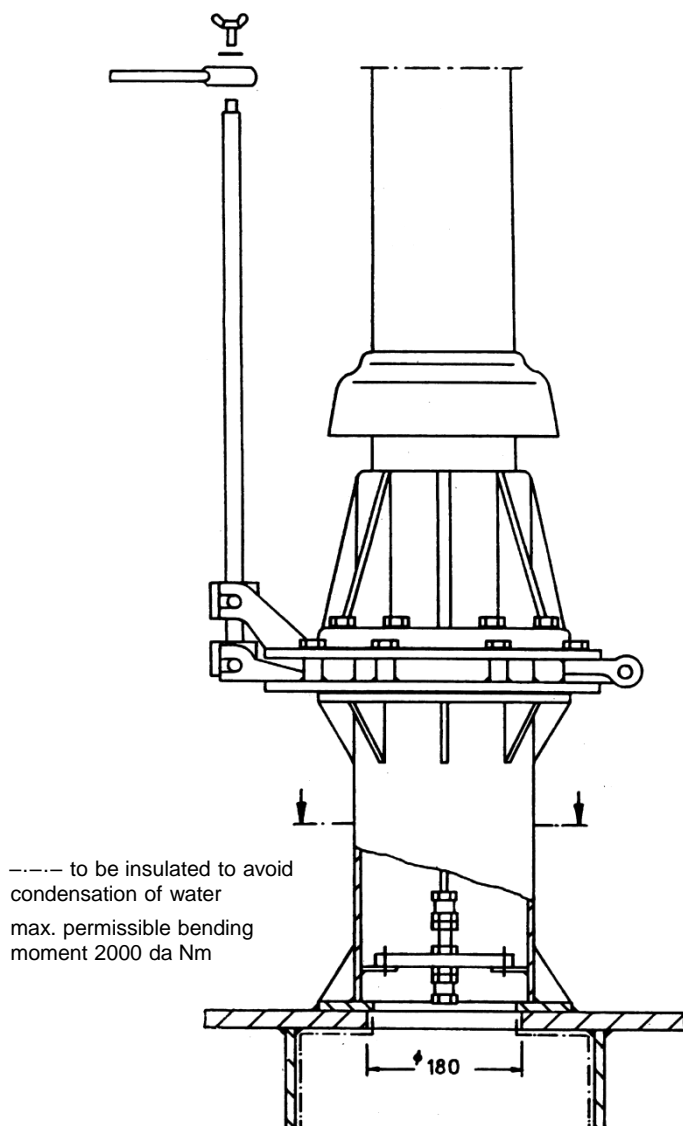
### Tilting Flange K8/E



The internal feeder for base-injected antennas leads through round openings on both, the base and the tilting plates. The internal feed line is interrupted at this point and reconnected by a knife contact assembly. The knife contact assembly disconnects, when the tilting plate opens. The male contact (pos. 9) is fitted on the antenna injection and the female (pos. 10) is installed on the insulator bridge (pos. 11) in the supporting pipe.

## Support and Tilting Assembly TR 4/k with K 8 and SP/G

### Base Injection (Internal Feeding)



Alternative TR 4/K/B  
with through bores

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SE = Transmit Antenna

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PM/M = dark grey (similar to RAL 7000)

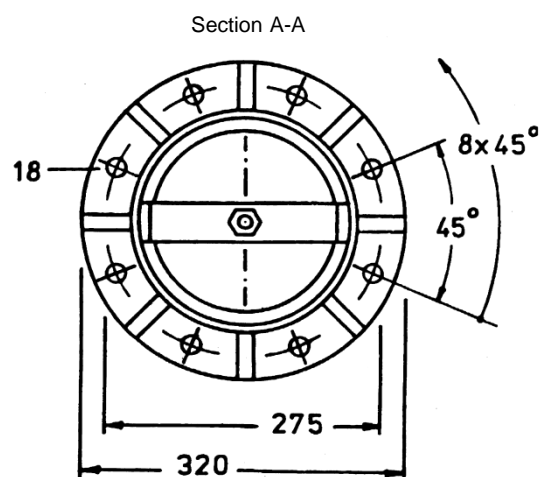
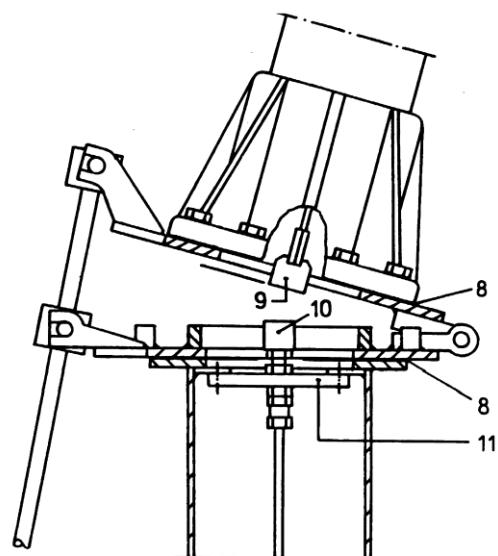
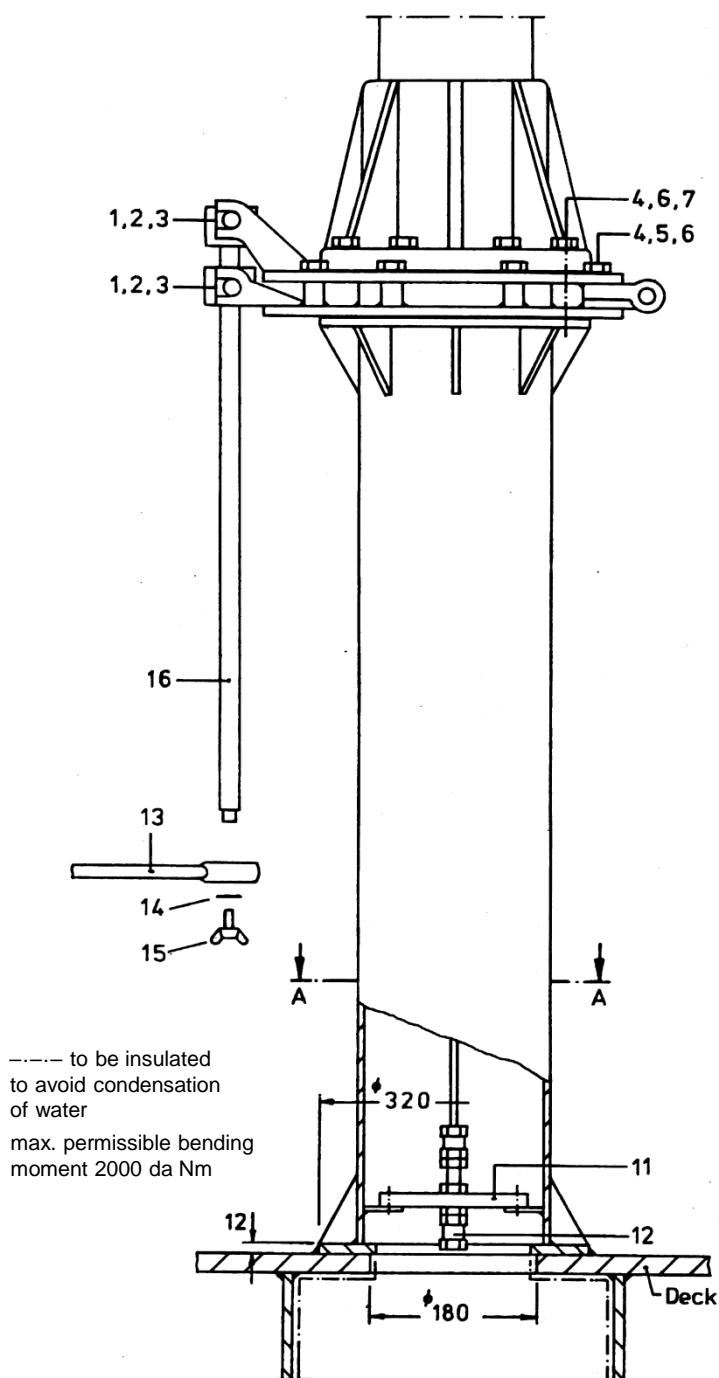
NDB = Non Directional Radio Beacon

# Standrohre, Kippvorrichtungen / Supporting Pipes, Tilting Mechanism

TR + K/E

## Support and Tilting Assembly TR 12/k with K 8 and SP/G

### Base Injection (Internal Feeding)



Alternative TR 12/K/B  
with through bores

## Installation

The supporting pipes can be fixed to the base ground by either welding or bolting on.

The standard versions are made for welding.

If the installation takes place on non-weldable material, e.g. aluminum or concrete masonry, through bores on the base plate of the supporting pipe may be ordered extra. Being installed on aluminum structures stainless steel bolts, nuts, and washers must be used in order to avoid corrosion. An extra flat gasket (D1/27) must be additionally put between the two different metals.

A careful grounding of the assembly and other nearby conductive structures is a must, if transmitting antennas are being mounted on these supports.

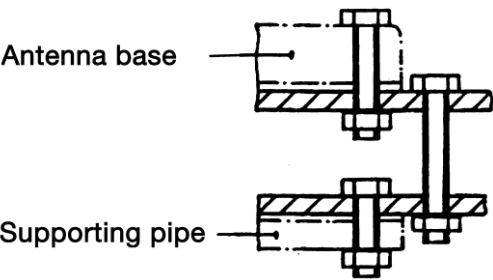
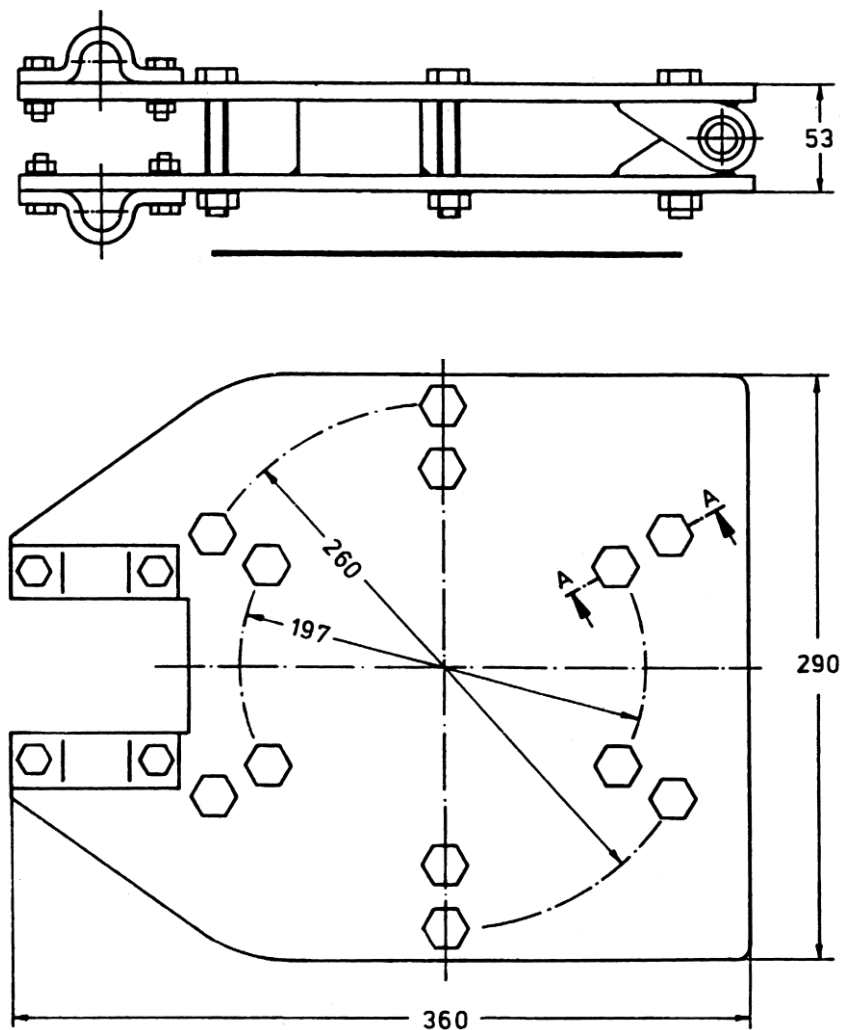
Supporting pipes with internal feeders are being used for base-injected antennas. These pipes are being supplied readily assembled. In order to inject the system from the bottom round or quadratic through holes are made into the ceiling or the plane the supports stand on. The wall extensions and/or connected lead through trunks, ducts, etc. shall be lagged inside with thermal non-conductive material isolating temperature changes and condensed water.

Supporting pipes being equipped with tilting devices may be fitted with spindles made of galvanized or of stainless steel. The spindles are detachable. They may be installed on the tilt either hanging or standing upside down.

The spindle swivels out during the tilting operation. It requires approx. 600 cm room for this operation. Some additional action room for the operating man should be taken into consideration.

Tilting devices for internal feeding mounted on corresponding supporting pipes are also readily assembled except the male part of the knife contact assembly. The same shall be installed to the base injection of the antenna in such a way that the knife plunges easily and smoothly into the female contact spring. It shall be adjusted such that it fits the bottom of the female contact with 5 mm space. This will be the case when the knife, being fixed to the internal feeder of the antenna, is adjusted to stand 23 mm out of the antenna's base flange. After the first adjustment the antenna shall be tilted two or three times in order to make sure the proper position of all components. When the contact assembly sits accurately, please, fix all counter screws.

Tilting Flange K 5/E



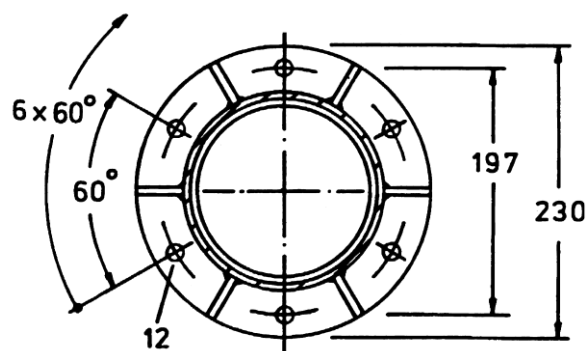
Section A-A

$$TR + K/E$$

Technical drawing of a vertical test rig for a composite column. The rig includes a base plate (12) with a diameter of 230 mm, a central column (13), and a top assembly with a load plate (14) and a central rod (11). The column is supported by two sets of rollers (10) at the base. The top assembly is connected to a horizontal beam (1) and a vertical rod (2,3,4). The column is subjected to a vertical load (B) and a horizontal load (A). The maximum permissible bending moment is 1320 da Nm.

Section A-A

Section B-B



# Standrohre, Kippvorrichtungen / Supporting Pipes, Tilting Mechanism

TR + K/E

## Maintenance

### Supporting Pipes

No maintenance required except painting routine.

### Tilting Devices

Beside the painting routine all moving parts shall be kept well greased. During each tilting operation the sealing cord shall be checked, whether the material is still in a good condition. Please, change the sealing cord, if it looks aged, abraded, or if it sticks to the opened tilting plate instead of remaining in the groove on the ground plate.

The flat gasket rings shall be renewed generally whenever the tilting device was removed. The spindle assembly shall be removed from the tilt, if it is expected that the assembly stands still for a longer time.

## Spare Parts Lists

### Tilting Flanges K8 an K8/E with Spindle Assembly SP/...

Pos.	Item	Designation		Order-Code	Remarks
1	4	Washer	S1/53	E 107-570	
2	7	Thread bolt M16	S1/139	E 107-570	
3	6	Nut M16	S2/158	E 107-571	
4	5	Thread bolt M16	S1/179	E 107-571	
5	8	Flat gasket	DI/27	E 107-416	
6	1	Crescent bush	00-02-78-00-14	E 107-732	4 pieces
7	2	Spring washer	S1/57	E 107-818	
8	3	Thread bolt M6	S2/9	E 107-733	
9	16	Spindle assembly SP/...	-	ref. last page	
10	13	Ratchet	AL/60	E 107-749	
11	14	Disk	S2/189	E 107-286	optional
12	15	Wing bolt	SI/65	E 107-748	optional

### Supporting Pipes TR 4 and TR 12 (Internal/Base Injections Only)

Pos.	Item	Designation		Order-Code	Remarks
1	9	Contact knife	00-02-88-01-07	E 107-452	male
2	10	Contact spring	AL/42	E 107-720	female
3	11	Bridge insulator	00-07-32-10-13	E 107-826	
4	12	Clamping cone	AL/44	E 107-353	



# Standrohre, Kippvorrichtungen / Supporting Pipes, Tilting Mechanism

TR + K/E

## Spare Parts List

### Tilting Flange K5/E with Spindle Assembly SP/...

Pos.	Item	Designation		Order-Code	Remarks
1	1	Bracket	D/125	E 107-703	4 pieces
2	14	Flat gasket	DI/28	E 107-439	
3	2	Thread bolt M8	S2/20	E 107-704	stainless
4	3	Washer	S1/58	E 107-525	stainless
5	4	Nut M8	S2/55	E 107-562	stainless
6	8	Thread bolt M10	S1/135	E 107-535	stainless
7	6	Washer	S1/59	E 107-536	stainless
8	7	Nut M8	S2/57	E 107-537	stainless
9	9	Thread bolt M10	S2/33	E 107-533	stainless
10	5	Thread bolt M10	S2/34	E 107-534	stainless
11	13	Spindle assembly SP/...	-		
12	12	Ratchet	AL/60	E 107-517	
13	11	Disk	S2/189	E 107-286	optional
14	10	Wing bolt	S1/65	E 107-748	optional

## Spare Parts List

### Table of Standard Types

Pos.	Designation	Feeder	Order-Code	Remarks
<b>Tilting Flanges</b>				
1	K 5	internal	E 107-640	for 5 m lower section, knife contact assy
2	K 5/E	external	E 107-641	for 5 m lower section
3	K 8	internal	E 107-642	for 8 m lower section, knife contact assy
4	K 8/E	external	E 107-643	for 8 m lower section
<b>Spindle Assemblies (incl. ratchet):</b>				
5	SP/G		E 107-746	spindle: galvanized
6	SP/SS		E 107-765	complete spindle assembly: stainless steel
<b>Supporting Pipes:</b>				
7	TR 2 R/E	external	E 107-775	0.20 m high, for 3 m + 5 m lower sections
8	TR 15 R/E	external	E 107-847	1.50 m high, for 3 m + 5 m lower sections
9	TR 4	internal	E 107-814	0.40 m high, for 8 m lower section
10	TR 4/E	external	E 107-815	0.40 m high, for 8 m lower section
11	TR 4/K	internal	E 107-831	0.40 m high, for 8 m lower section
		external		for K 8-mounting
12	TR 12	internal	E 107-837	1.20 m high, for 8 m lower section
13	TR 12/E	external	E 107-838	1.20 m high, for 8 m lower section
14	TR 12/E	internal/	E 107-843	1.20 m high, for 8 m lower section
		external		for K 8-mounting

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