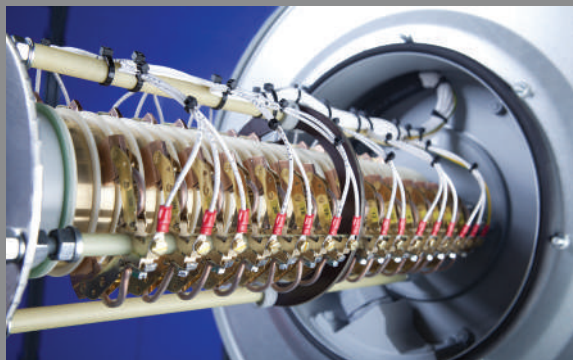




Hartmann & König  
STROMZUFÜHRUNGS AG

## Spring cable reels



**YOUR PARTNER FOR ENERGY AND DATA TRANSMISSION SYSTEMS  
FOR MOBILE CONSUMERS**

CONCEIVE  
CONNECT  
CONDUCT





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## General

### Application

Cable reeling drums with spring drive are used for current supply to mobile consumers that need automatic winding of flexible energy or control lines.

### Application Areas

Portal and slewing cranes of all types, deck cranes, according to ship classifications, DET NORSKE VERITAS, Lloyd's Register of Shipping or German Lloyd. Mobile cranes, construction cranes, loading plants, magnet and grab cranes, E-trains, travelling platforms, lifting platforms, stapler, longitudinal scrapers in sewage treatment plants, charging plants, palletising plants, aisle stackers etc.

Our cable reeling drums conform to VDE or EN and accident prevention regulations (UVV) regulations.

### Special Cases of Use

- Drums for installation onboard sea ships or for applications in the tropics.
- Drums for aggressive operating conditions acid baths, in galvanising trades, sewage treatment plants.
- Drums for measuring current, signal current or high-frequency transmission.
- Drums for the supply of liquid or gaseous media (hose reeling drums).
- Drums for the application with flexible wire rope (rope drums) e.g. for road indicators in connection with copying works and potentiometer or for easing grippers.
- Drums for untaught cable payout (curves or circular tracks with rotary ranges of up to 360° and above).
- Drums with interlock device (ratchet) for height adjustable tools or control switch on lifting gear.
- Drums for coiling flat cables (especially for lifting platforms, palletising apparatus, machine tools).
- Drums for spiral coiling.

For these and application cases not listed above, we are at your disposal with advice and deed and look forward to your enquiry.

### Protection Class

The housing of slip ring body is encapsulated according to protection system IP55 (higher protection systems available on request).

### Drive

The springcable reeling drum is driven by means spiral leaf spring. The durability of drum-drive springs is dependent on the type of operation. The expected number of spring oscillations is approx. **120.000**. For this purpose, we use only special spring steels in order to attain longer service life of the spiral leaf spring.

### Drum's Direction of Rotation

In standard configuration, cable payout occurs on the **left** of the slip ring body or rotary valve, and it is depicted in the dimension drawings. Opposite alignment can also be supplied.

### Limitation of Stop Position

Drum can be supplied with a cam limit switch for extra payment. This serves **only** for limiting the stop position.

### Measures for Accident Prevention

For the drums with chain drive, it is provided with cladding so that the drums can be used in accordance with the accident prevention regulations and the law about technical working means in traffic or working area. Further protection measures, like the possibly required cladding of a revolving storage drum body, must be provided on both sides and adjusted to the respective mounting conditions.

### Surface Protection

The sheet metal parts of the cable reeling drums LT155 – LTAII700 are in galvanised version. All other parts are provided with priming and cover coat in 2 component epoxy resin according to RAL 7031 blue-grey. Other colours are available on request.

### Maintenance Instructions

The operating instructions required for assembly and commissioning are attached to every drum with a delivery note.

### Suitability of Cable reeling Drums

maximum driving and lifting velocity  
 $v = 60 \text{ m/min}$   
maximum driving acceleration  
 $a = 0.2 \text{ m/s}^2$



## General

### Overall Length of Cable

The length of cable is calculated from the operationally required coiling length + mounting height of drum + 2 safety windings + connection length.

### Guarantee

We provide guarantee according to General Terms of Supply by Hartmann & König Stromzuführungs AG (from page 51). The drum drive springs, wear parts are excluded from guarantee.

### Note

Hartmann & König is developed, constructed and produced according to the

- Low Voltage Directive 2006/95/EG
- EMC Directive 2004/108/EG
- Generally valid manufacturing guidelines according to ISO 9001:2000

### Drum reeling Cables

Cables suitable for reeling on drums, which conform to the mechanical requirements, must be used. For the selection of cables, we refer to our catalogue page 48.

### Determining the required cable cross-section by calculation, by considering the permissible voltage drop for three-phase current

$$A = \frac{\sqrt{3} \times L \times IG \times \cos \varphi}{\Delta U \times \chi} \text{ (mm}^2\text{)}$$

### Explanation of Formula Symbols

- A = required cable cross-section (mm<sup>2</sup>)  
 L = overall length of drum-reeled cable (m)  
 IG = total current consumption (A)  
 cos φ = power factor = approx. 0.8  
 χ = conductivity (for coppa= 56)  
 Δ U = permissible voltage drop (V)

### Determining the required cable cross-section with consideration of permissible thermal load capacity

For the cables based on the drum selection table, the loading values "current capacity" page 48 are valid for cable laid freely in air with 4 loaded conductors. The values apply to an ambient temperature of 30°C. For other ambient temperatures, other conversion factors are vailed.

The current loading values mentioned on page 48 are only limitedly applicable to cables in drum operation. The following table "conversion factors" specifies conversion factors for power rating in dependence on the type of drum reeling. They are valid for continuous full-reeled cables.

In practice, however, operating state applies to different devices that do not fully require full consideration of these conversion factors, since the cable is only temporarily fully coiled. In these cases, corresponding mean values should be used for calculation.

As for spirally coiled cables, permissible loading values for single layer coils are applicable.

The loading values according to "current capacity" apply also to 4-wire cables. Likewise, they are also permissible for five-wire arrangements if one of the conductors is used as protective earth.

As for multiple wire cables, we recommend the following conversion factors based on the number of loaded wires (Table conversion factors).

The loading values listed "current capacity" on page 48 apply to continuous load.



## General

### Type Key

	LT	-	220	-	2	-	551H	-	4	-	26
	LTAI	-	530	-	4	-	524	-	5	-	150
	LTAII	-	700	-	6	-	525	-	4	-	220
design											
drum size											
numbers of springs											
spring type serial (H) or parallel											
number of poles of slip ring body including protective earth											
current rating of slip ring body (A)											

In our offer text or confirmation of order, the type keys are written as follows  
 LT220/251H4-26 or LTAI530/424-4-150

### Selection of Drum Types

For the selection of a reeling drum, typical drum arrangement for the respective application (see page 4) and the intended cable coiling drum (type, cross-section, outside diameter and weight per meter of the cable) are decisive.

- |  |  |
|--|--|
| <b>l</b> = operational maximum cable length that can be coiled (m)   | <b>NL</b> = number of layers of cable on the drum (partly decisive for determining cable cross-section)                                      |
| <b>L</b> = maximum cable length that hangs from the drum (m) ("L" can be equal to the cable length "l" that can be operationally coiled)   | <b>n<sub>v</sub></b> = necessary drum pre-tension rotation   |
| <b>h</b> = maximum mounting height (m) = distance from cable fixed point up to drum middle (m). Measurement "h" can be fallen short of partially by considering sufficient floor clearance (e.g. for cable payout in a driving direction). For payout in two driving directions and overrunning the cable's fixed point, deflection and tension relief devices must be provided. | <b>n</b> = operationally necessary and at the same time maximum permissible drum rotation for maximum length of cable that can be coiled "l" |
|  | <b>TF</b> = max. tensile force for pulling the cable (N)   |
|  | <b>f</b> = max. cable dip (f) based on cable fixed point "LF"  |

### Note

At the expense of a small coiling length, a higher starting pull  $n_{vU}$  can be achieved by greater initial stress.

The drum's total rotational speed  $n_{vU} + n_U$  that is permissible for the springs may never be exceeded, since the danger exists that the spring may break.

- $n_{vU}$  = rotational speed, pre-tension  
 $n_U$  = speed of rotation for cable



## Arrangement Examples

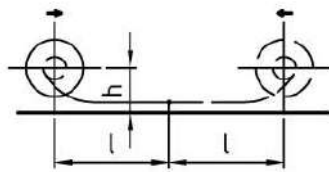


fig. A

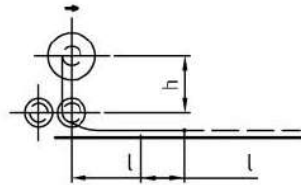


fig. B

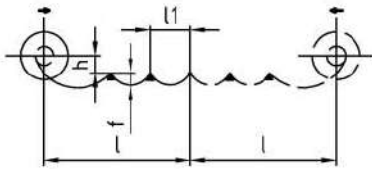


fig. C

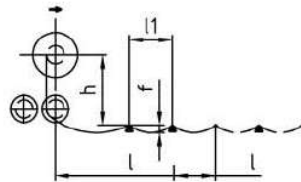


fig. D

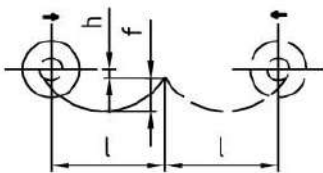


fig. E

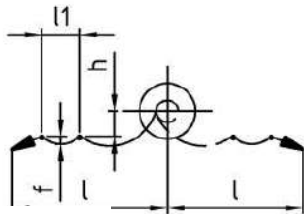


fig. F

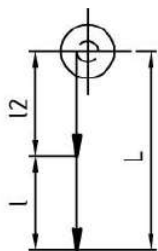


fig. G



fig. H

### Figures A and B

Drum on mobile unit. Cable deposit on the ground or on a continuous surface. Horizontal cable payout is towards one or two sides.

Figure B via a deflector pulley.

### Figures C and D

Drum on mobile unit. Cable deposit on supports for  $l_1$  up to 1 m. For  $l$  above 1 m to max 3 m, the cable is kept on rollers or on smooth supports rounded upwards.

Figure D via a deflector pulley.

### Figure E

Drum on mobile unit or on a fixed point. Horizontal cable payout is towards one or two sides. ( $f$  is dependent on cable cross-section and on tensile force).

### Figure F

Drum is stationary. Horizontal cable payout towards one side or two sides, cable is deposited as above in figures C and D, however on rollers.

### Figure G

Cable payout is vertical or approximately downwards.

$l$  = lifting height or payout length

$L$  = cable length =  $l + l_2 + 2$  safety windings

### Figure H

Cable payout is vertical, otherwise like figure G.





## Spring Cable reeling Drums cylindrical, horizontal, v= 60 m/min Type Series LT, LTAI, LTAII



Type Series LT

4 x 1.5 mm <sup>2</sup> , Ø 11.1 mm, 0.16 kg/m, Tensile Force of Cable max. 1200 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
7	0.5	1.7	LT155/108-4-26	3.1	26	2	13	40	
12	0.5	2.0	LT180/131-4-26	9.0	26	2	19	60	
27	0.5	4.0	LT180/231H4-26	11.0	26	4	38	60	
38	1.0	5.0	LT222/351H4-26	15.5	26	4	36	100	
47	1.0	3.0	LT300/252H4-26	28.0	26	4	45	100	
72	1.0	4.0	LT301/352H4-26	34.2	26	6	69	100	
83	1.5	3.0	LT420/253H4-36	56.0	36	4	58	120	

5 x 1.5 mm <sup>2</sup> , Ø 11.8 mm, 0.18 kg/m, Tensile Force of Cable max. 1500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
7	0.5	1.7	LT155/108-5-26	3.5	26	2	13	40	
12	0.5	2.0	LT180/131-5-26	9.0	26	2	19	60	
20	0.5	4.0	LT180/231H5-26	11.0	26	4	37	60	
26	1.0	3.0	LT220/251H5-26	19.0	26	4	33	100	
39	1.0	4.0	LT222/351H5-26	22.0	26	6	49	100	
47	1.0	3.0	LT300/252H5-26	28.0	26	4	45	100	
73	1.0	4.0	LT301/352H5-26	34.2	26	6	69	100	
83	1.5	2.9	LT420/253H5-36	56.0	36	4	58	120	

7 x 1.5 mm <sup>2</sup> , Ø 13.3 mm, 0.23 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
7	0.5	1.9	LT155/108-7-26	3.5	26	2	13	40	
10	0.5	3.0	LT180/131-7-26	10.5	26	2	16	60	
12	1.0	3.0	LT220/151-7-26	19.5	26	2	16.5	100	
20	1.0	3.0	LT220/251H7-26	21.5	26	4	25	100	
41	1.0	5.0	LT222/351H7-26	23.1	26	6	49	100	
49	1.0	3.5	LT300/252H7-26	28.0	26	4	45	100	
73	1.0	4.0	LT301/352H7-26	34.2	26	6	67	100	
80	1.5	4.0	LT420/253H7-36	57.0	36	4	57	120	

12 x 1.5 mm <sup>2</sup> , Ø 16.9 mm, 0.36 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
7	0.5	2.0	LT180/131-12-26	10.5	26	2	12	60	
9	1.0	2.0	LT220/151-12-26	19.5	26	2	12	100	
22	1.0	4.0	LT220/251H12-26	22.5	26	2	30	100	
32	1.0	3.0	LT300/252H12-36	30.0	36	4	45	100	
48	1.0	3.0	LT301/352H12-36	39.0	36	6	62	100	
56	1.5	4.0	LT301/372H12-36	44.0	36	6	35	170	
71	1.5	4.0	LT420/283H12-36	57.0	36	4	49	120	
79	1.5	4.0	LT420/253H12-36	59.0	36	4	54	120	
85	1.5	5.0	LT421/253H12-36	63.0	36	4	57	120	
106	1.5	3.5	LTAI530/424-12-36	128.0	36	5	57	160	

18 x 1.5 mm <sup>2</sup> , Ø 17.9 mm, 0.47 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
11	1.0	2.5	LT220/251-18-36	22.0	36	2	13	200	
18	1.0	3.0	LT221/251H18-36	25.0	36	4	22	100	
23	1.0	3.0	LT300/252-18-36	31.0	36	4	22.5	210	
29	1.5	3.0	LT300/272H18-36	38.0	36	4	28	180	
33	1.5	3.0	LT420/183-18-36	55.0	36	2	24	120	
40	1.5	4.0	LT420/153-18-36	56.0	36	2	29	120	
73	1.5	4.0	LT420/283H18-36	58.0	36	4	49	120	
87	1.5	5.0	LT421/253H18-36	61.0	36	4	57	120	



## Spring Cable reeling Drums cylindrical, horizontal, v= 60 m/min Type Series LT, LTAI, LTAII

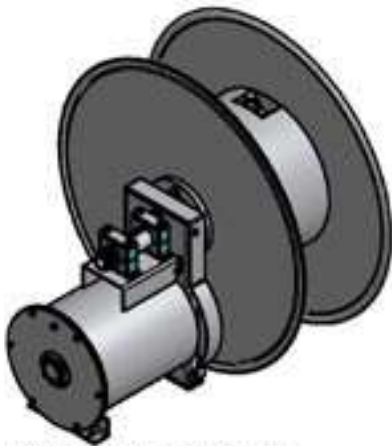


Type Series LT

24 x 1.5 mm <sup>2</sup> , Ø 22.6 mm, 0.59 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
14	1.0	2.0	LT300/152-24-36	29.0	36	2	22	100
24	1.0	3.0	LT300/252-24-36	31.0	36	2	22	210
35	1.5	3.0	LT420/283-24-36	59.0	36	2	24	240
41	1.5	3.0	LT420/253-24-36	61.0	36	2	28	240
45	1.5	3.1	LT421/253-24-36	68.0	36	2	29	240
76	1.5	3.3	LT530/286H24-36	117.0	36	4	40	245
89	1.5	3.8	LTAII530/624-24-36	152.0	36	4	46	305

30 x 1.5 mm <sup>2</sup> , Ø 24.2 mm, 0.71 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
20	1.0	2.0	LT300/252-30-36	31.0	36	2	13	210
36	1.5	3.0	LT420/283-30-36	60.0	36	2	24	240
38	1.5	3.0	LT420/253-30-36	62.0	36	2	25	240
46	1.5	3.4	LT421/253-30-36	68.0	36	2	29	240
78	1.5	3.6	LT530/286H30-36	118.0	36	4	40	245
91	1.5	4.0	LTAII530/624-30-36	152.0	36	4	46	305

4 x 2.5 mm <sup>2</sup> , Ø 12.1 mm, 0.21 kg/m, Tensile Force of Cable max. 1600 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
5	0.5	2.0	LT155/108-4-26	4.0	26	2	11.5	40
10	0.5	2.0	LT180/131-4-26	9.0	26	2	18	60
12	0.5	4.0	LT220/151-4-26	16.0	26	2	16.5	100
29	1.0	4.0	LT220/251H4-26	19.5	26	4	34	100
42	1.0	4.0	LT222/351H4-26	23.0	26	6	50	100
46	1.0	4.0	LT300/252H4-26	25.0	26	4	45	100
68	1.0	4.0	LT301/352H4-26	34.0	26	6	67	100
83	1.5	4.0	LT420/253H4-36	56.0	36	4	58	120
88	1.5	3.0	LT530/285H4-36	110.0	36	4	50	130
102	1.5	2.6	LTAI530/324-4-36	116.0	36	5	58	120



Type Series LTAI and LTAII

5 x 2.5 mm <sup>2</sup> , Ø 12.8 mm, 0.24 kg/m, Tensile Force of Cable max. 1800 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
4	0.5	1.0	LT155/108-5-26	6.0	26	2	8	40
11	0.5	2.0	LT180/131-5-26	10.0	26	2	18	60
12	0.5	2.0	LT220/151-5-26	16.0	26	2	16.5	100
26	1.0	2.9	LT220/251H5-26	16.0	26	4	25	100
40	1.0	3.5	LT222/351H5-26	18.5	26	6	33	100
46	1.0	4.0	LT300/252H5-26	25.5	26	4	45	100
69	1.0	4.0	LT301/352H5-26	28.0	26	6	67.5	100
80	1.5	3.5	LT420/253H5-36	56.0	36	4	57	120
103	1.5	2.6	LTAI530/324-5-36	116.0	36	6	58	120

7 x 2.5 mm <sup>2</sup> , Ø 14.0 mm, 0.31 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
10	0.5	2.0	LT180/131-7-26	9.0	26	2	18	60
12	0.5	3.0	LT220/151-7-26	15.5	26	2	16.5	100
17	1.0	3.0	LT220/251H7-26	19.0	26	4	33	100
26	1.0	4.0	LT221/251H7-26	20.0	26	4	33	100
41	1.0	5.0	LT222/351H7-26	21.0	26	6	49	100
47	1.0	4.0	LT300/252H7-26	29.0	26	4	45	100
71	1.0	4.0	LT301/352H7-26	35.0	26	6	67	100
81	1.5	4.0	LT420/253H7-36	55.0	36	4	57	120
104	1.5	2.9	LTAI530/424-7-36	129.0	36	5	58	160





## Spring Cable reeling Drums cylindrical, horizontal, v= 60 m/min Type Series LT, LTAI, LTAII

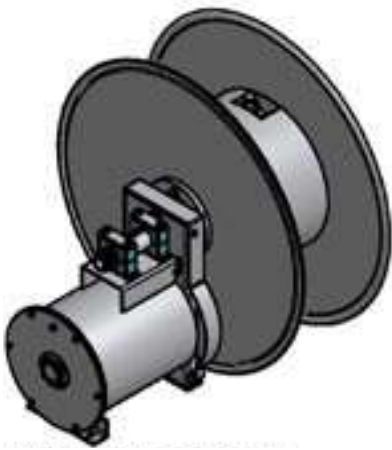


Type Series LT

12 x 2.5 mm <sup>2</sup> , Ø 20.2 mm, 0.48 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
16	1.0	2.0	LT300/152-12-36	28.0	36	2	22	100
25	1.0	2.7	LT300/252-12-36	30.0	36	2	22	210
29	1.0	4.0	LT301/372H12-36	34.0	36	6	52	100
34	1.5	3.0	LT420/183-12-36	53.0	36	2	24	120
41	1.5	2.8	LT420/153-12-36	55.0	36	2	28	120
83	1.5	5.0	LT421/253H12-36	60.0	36	4	57	120
85	1.5	5.0	LT530/285H12-36	66.0	36	4	57	200
107	1.5	4.0	LTAII530/524-12-36	142.0	36	5	56	200

18 x 2.5 mm <sup>2</sup> , Ø 20.6 mm, 0.68 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
15	1.0	2.0	LT300/152-18-36	29.0	36	2	22	100
24	1.0	3.0	LT300/252-18-36	32.0	36	2	22	210
27	1.0	3.0	LT300/272H18-36	36.0	36	4	35	170
34	1.5	3.0	LT420/283-18-36	58.0	36	2	24	240
45	1.5	3.0	LT420/253H18-36	60.0	36	4	57	120
69	1.5	3.0	LT530/286H18-36	65.0	36	4	40	245
87	1.5	3.4	LTAI530/424-18-36	140.0	36	4	46	200
104	1.5	4.0	LTAII530/524-18-36	150.0	36	5	54	200

24 x 2.5 mm <sup>2</sup> , Ø 25.5 mm, 0.82 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
12	1.0	2.0	LT300/172-24-36	35.0	36	2	19	165
22	1.0	3.0	LT300/272-24-36	35.0	36	2	19	330
36	1.5	3.0	LT421/283-24-36	63.0	36	2	24	240
43	1.5	3.6	LT421/253-24-36	70.0	36	2	29	240
79	1.5	3.8	LT530/286H24-36	133.0	36	4	40	245
88	1.5	4.0	LTAII530/525-24-36	144.0	36	5	44	300



Type Series LTAI and LTAII

30 x 2.5 mm <sup>2</sup> , Ø 28.7 mm, 0.97 kg/m, Tensile Force of Cable max. 2500 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
8	1.5	1.0	LT420/183-30-36	68.0	36	2	24	120
20	1.5	2.0	LT420/283-30-36	68.0	36	2	24	240
33	1.5	4.0	LT421/253-30-36	75.0	36	2	28	240
77	1.5	4.0	LT530/286H30-36	135.5	36	4	38	245
98	1.5	3.6	LTAII700/625-30-36	238.0	36	4	39	340

4 x 4 mm <sup>2</sup> , Ø 13.4 mm, 0.28 kg/m, Tensile Force of Cable max. 1800 N								
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
9	0.5	2.0	LT180/131-4-40	8.5	40	2	18	60
12	0.5	3.0	LT220/151-4-40	18.0	40	2	25	100
16	1.0	3.0	LT220/251H4-40	20.0	40	4	33	100
26	1.0	4.0	LT221/251H4-40	22.0	40	4	33	100
41	1.0	5.0	LT222/351H4-40	23.1	40	6	46	100
47	1.0	4.0	LT300/252H4-40	31.0	40	4	45	100
73	1.0	3.5	LT301/352H4-40	37.0	40	6	67	100
81	1.5	4.0	LT420/253H4-42	55.0	42	4	58	120
103	1.5	2.7	LTAI530/424-4-42	156.0	42	5	58	160



## Spring Cable reeling Drums cylindrical, horizontal, v= 60 m/min Type Series LT, LTAI, LTAII

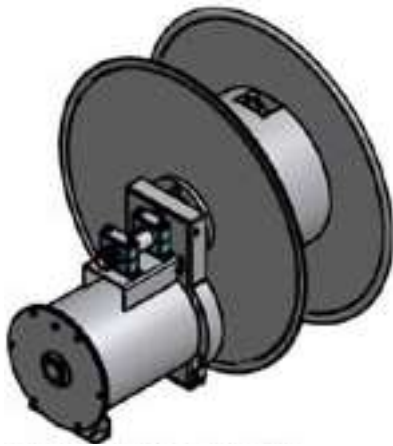


Type Series LT

5 x 4 mm <sup>2</sup> , Ø 14.5 mm, 0.32 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
4	0.5	1.0	LT180/131-5-40	7.8	40	2	18	60	
9	0.5	2.0	LT180/231-5-40	8.5	40	2	18	120	
12	0.5	3.0	LT220/151-5-40	17.5	40	2	16	100	
26	1.0	4.0	LT221/251H5-40	21.0	40	4	33	100	
41	1.0	5.0	LT222/351H5-40	24.0	40	6	49	100	
50	1.0	3.9	LT300/252H5-40	28.0	40	4	45	100	
70	1.0	4.0	LT301/352H5-40	36.5	40	6	67	100	
81	1.5	4.0	LT420/253H5-42	55.5	42	4	57	120	
104	1.5	3.0	LTAI530/424-5-42	156.0	42	5	58	160	

4 x 6 mm <sup>2</sup> , Ø 14.8 mm, 0.37 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
12	1.0	3.0	LT220/151-4-60	16.0	60	2	18	100	
17	1.0	3.0	LT220/251H4-60	18.0	60	4	33	100	
26	1.0	4.0	LT221/251H4-60	20.0	60	4	33	100	
50	1.0	3.9	LT300/252H4-60	31.0	60	4	45	100	
57	1.0	4.0	LT301/352H4-60	37.0	60	6	55	100	
69	1.5	4.0	LT420/283H4-60	54.0	60	4	48	120	
82	1.5	4.0	LT420/253H4-60	56.0	60	4	57	120	
105	1.5	3.1	LTAI530/424-4-60	156.0	60	5	58	180	

5 x 6 mm <sup>2</sup> , Ø 16.1 mm, 0.43 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
9	1.0	2.9	LT220/151-5-60	19.1	60	2	16	100	
12	1.0	3.0	LT221/151-5-60	20.0	60	2	16	100	
27	1.0	4.0	LT221/251H5-60	20.5	60	4	33	100	
32	1.0	4.0	LT222/351H5-60	24.0	60	6	48	100	
37	1.0	4.0	LT300/272H5-60	30.0	60	4	35	170	
55	1.0	4.0	LT301/372H5-60	36.0	60	6	52	170	
71	1.5	4.0	LT420/283H5-60	55.0	60	4	49	120	
84	1.5	5.0	LT420/253H5-60	57.0	60	4	57	120	
106	1.5	3.3	LTAII530/524-5-60	168.0	60	5	58	200	



Type Series LTAI and LTAII

4 x 10 mm <sup>2</sup> , Ø 18.8 mm, 0.61 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
7	1.0	2.0	LT220/151-4-60	19.0	60	2	16	100	
13	1.0	3.0	LT220/251-4-60	21.0	60	2	16	200	
17	1.0	2.0	LT300/172-4-60	26.0	60	2	17	170	
23	1.0	3.0	LT300/252-4-60	28.0	60	2	22	200	
29	1.0	3.0	LT300/272H4-60	30.0	60	4	34	170	
34	1.5	4.0	LT420/283-4-60	55.0	60	2	23	240	
40	1.5	3.0	LT420/253-4-60	57.0	60	2	28	240	
45	1.5	3.0	LT420/284H4-60	59.0	60	4	32	235	
68	1.5	3.0	LT530/286H4-60	131.0	60	4	40	245	
85	1.5	4.0	LTAI530/424-4-60	156.0	60	4	46	200	
110	1.5	3.9	LTAII530/524-4-60	168.0	60	5	58	200	



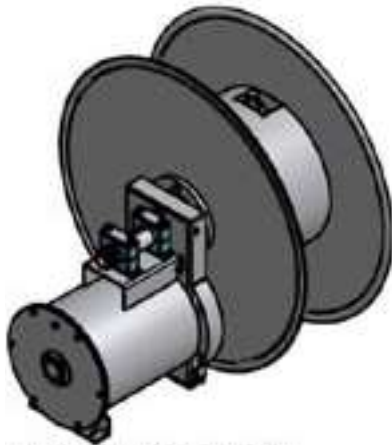
## Spring Cable reeling Drums cylindrical, horizontal, v= 60 m/min Type Series LT, LTAI, LTAII



Type Series LT

4 x 16 mm <sup>2</sup> , Ø 23.4 mm, 0.92 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
14	1.0	3.0	LT300/152-4-125	25.0	125	2	15	100	
18	1.0	3.0	LT300/272-4-125	28.0	125	2	19	330	
25	1.0	2.0	LT420/283-4-150	58.0	150	2	24	240	
35	1.5	2.0	LT421/283-4-150	60.0	150	2	24	240	
42	1.5	4.0	LT421/253-4-150	62.0	150	2	28	240	
71	1.5	4.0	LT530/286H4-150	131.0	150	4	40	245	
90	1.5	3.9	LTAI530/424-4-150	156.0	150	4	46	200	

4 x 25 mm <sup>2</sup> , Ø 27.1 mm, 1.27 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
15	1.5	2.0	LT420/283-4-150	58.0	150	2	14	240	
20	1.5	2.0	LT420/184-4-150	58.0	150	2	16	230	
33	1.5	3.0	LT421/283-4-150	60.0	150	2	25	240	
42	1.5	2.6	LT530/285-4-150	112.0	150	2	25	260	
80	1.5	4.0	LTAI530/424-4-150	138.0	150	4	46	200	
117	1.5	4.0	LTAII700/624-4-150	240.0	150	4	46	230	



Type Series LTAI and LTAII

4 x 35 mm <sup>2</sup> , Ø 29.7 mm, 1.72 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
8	1.5	1.0	LT420/183-4-150	55.0	150	2	8	120	
20	1.5	2.0	LT420/283-4-150	58.0	150	2	15	240	
31	1.5	2.0	LT530/186-4-150	111.0	150	2	19	245	
49	1.5	2.8	LT530/285-4-150	112.0	150	2	25	265	
100	1.5	3.7	LTAI700/425-4-150	188.0	150	4	39	230	

4 x 50 mm <sup>2</sup> , Ø= 35.1 mm, 2.63 kg/m, Tensile Force of Cable max. 3000 N									
l (m)	h (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
42	1.5	2.9	LT530/286-4-220	131.0	220	2	21	490	
75	1.5	3.4	LTAII700/625-4-220	255.0	220	3	29	455	



## Spring Cable reeling Drums, cylindrical, horizontal freely suspended, v= 60 m/min Type Series LT, LTAI, LTAII

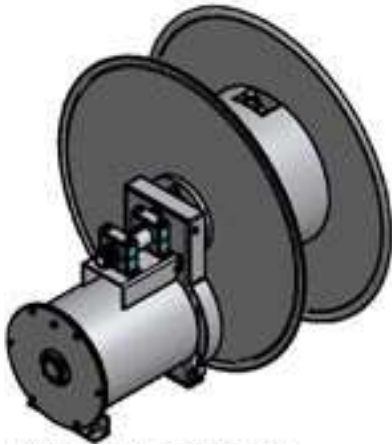


Type Series LT

4 x 1.5 mm <sup>2</sup> , Ø= 11.1 mm, 0.16 kg/m, Tensile Force of Cable max. 1200 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	1.0	0.5	1.7	LT155/108-4-26	3.1	26	2	13	40
9	1.0	0.5	2.0	LT155/208H4-26	3.7	26	14	16	40
12	1.0	0.6	1.9	LT180/231-4-26	9.0	26	2	19	60
22	1.5	1.0	3.0	LT220/251H4-26	19.0	26	4	31	100
30	1.5	1.1	2.0	LT300/272H4-26	52.0	26	12	30	165
35	1.5	1.0	1.4	LT420/283-4-36	56.0	36	2	25	240
40	1.5	1.2	1.0	LT530/285-4-36	110.0	36	3	24	260

5 x 1.5 mm <sup>2</sup> , Ø= 11.8 mm, 0.18 kg/m, Tensile Force of Cable max. 1500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	1.0	0.5	1.7	LT155/108-5-26	3.1	26	2	13	40
8	1.0	0.7	2.0	LT155/208H5-26	3.7	26	10	15	40
12	0.5	0.4	2.1	LT180/231-5-26	11.5	26	2	19	120
16	0.5	0.3	2.4	LT220/251-5-26	19.0	26	2	18	200
28	1.5	1.1	2.0	LT300/272H5-26	52.0	26	11	28	165
34	1.5	1.0	1.4	LT420/283-5-36	56.0	36	2	24	240
37	1.5	1.2	1.0	LT530/285-5-36	110.0	36	3	22	260

7 x 1.5 mm <sup>2</sup> , Ø= 13.3 mm, 0.23 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	0.5	0.2	1.8	LT155/108-7-26	3.1	26	2	13	40
22	1.0	0.7	1.8	LT300/252-7-26	29.0	26	2	22	210
35	2.0	1.5	1.6	LT420/253-7-36	57.0	36	6	25	240
43	2.0	1.5	1.2	LT530/285-7-36	111.0	36	2	25	260



Type Series LTAI and LTAII

12 x 1.5 mm <sup>2</sup> , Ø= 16.9 mm, 0.36 kg/m, Tensile Force of Cable max. 1500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
9	1.0	0.5	2.0	LT220/151-12-26	19.5	26	2	12	100
20	1.5	0.9	2.0	LT300/252-12-26	30.0	26	3	19	210
28	2.0	1.5	1.6	LT420/283-12-36	58.0	36	5	20	240
34	1.5	1.1	1.3	LT530/286-12-36	132.0	36	2	20	490
40	2.0	1.7	1.8	LTAII530/525-12-36	150.0	36	15	23	430

18 x 1.5 mm <sup>2</sup> , Ø= 17.9 mm, 0.47 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
15	1.0	0.7	2.7	LT221/251-18-36	25.0	36	2	18	200
19	1.5	1.0	2.0	LT300/252-18-36	30.0	36	5	18	210
25	2.0	1.5	1.6	LT420/283-18-36	58.0	36	6	18	240
32	2.0	1.3	1.3	LT530/286-18-36	132.0	36	3	19	490
36	2.0	1.5	1.4	LTAII530/525-18-36	150.0	36	12	21	500

24 x 1.5 mm <sup>2</sup> , Ø= 22.6 mm, 0.59 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
17	1.5	1.0	2.1	LT300/252-24-36	31.0	36	7	15	210
22	2.0	1.5	1.7	LT420/283-24-36	63.0	36	10	15	240
32	2.0	1.6	1.5	LT530/286-24-36	133.0	36	2	18	490
40	2.0	1.7	1.8	LTAII530/625-24-36	155.0	36	5	22	720

30 x 1.5 mm <sup>2</sup> , Ø= 24.2 mm, 0.71 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
15	1.5	1.0	2.1	LT300/252-30-36	31.0	36	9	13	210
20	2.0	1.5	1.8	LT420/283-30-36	63.0	36	11	14	240
30	2.0	1.6	1.3	LT530/286-30-36	118.0	36	5	17	490
35	2.5	1.5	1.8	LTAII530/625-30-36	155.0	36	7	20	720



## Spring Cable reeling Drums, cylindrical, horizontal freely suspended, v= 60 m/min Type Series LT, LTAI, LTAII

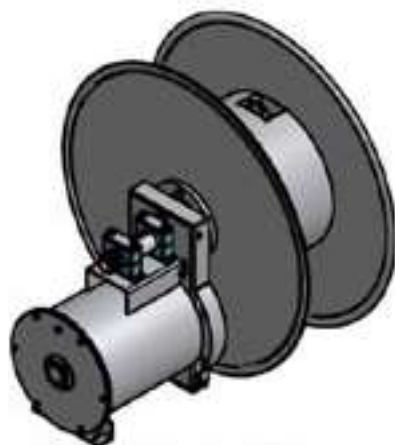


Type Series LT

4 x 2.5 mm <sup>2</sup> , Ø= 12.1 mm, 0.21 kg/m, Tensile Force of Cable max. 1600 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	1.0	0.5	2.0	LT155/108-4-26	3.1	26	2	13	40
14	0.5	0.3	2.2	LT220/251-4-26	19.5	26	2	18	200
25	1.5	1.0	1.9	LT300/272H4-26	52.0	26	17	25	165
33	1.5	1.2	1.4	LT420/283-4-36	56.0	36	3	24	240
37	2.0	1.4	1.0	LT530/285-4-36	110.0	36	5	22	265
46	2.0	1.4	1.2	LTAI530/425-4-36	116.0	36	6	27	400

5 x 2.5 mm <sup>2</sup> , Ø= 12.8 mm, 0.24 kg/m, Tensile Force of Cable max. 1800 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	1.0	0.5	1.9	LT155/108-5-26	3.1	26	2	13	40
14	0.5	0.3	2.2	LT220/251-5-26	19.5	26	2	18	200
22	1.0	0.7	1.7	LT300/252-5-26	31.0	26	2	22	210
25	1.5	1.1	1.9	LT300/272H5-26	52.0	26	17	25	165
30	1.5	1.1	1.4	LT420/283-5-36	56.0	36	5	22	240
37	2.0	1.5	1.1	LT530/285-5-36	110.0	36	5	22	267
46	2.0	1.6	1.2	LTAI530/425-5-36	116.0	36	7	26	400

7 x 2.5 mm <sup>2</sup> , Ø= 14.0 mm, 0.31 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
12	1.0	0.6	2.6	LT181/231-7-26	11.5	26	2	19	120
14	1.0	0.4	2.5	LT220/251-7-26	20.0	26	2	18	200
22	1.5	0.9	1.9	LT300/252-7-26	31.0	26	2	22	210
26	2.0	1.6	2.2	LT300/272H7-26	52.0	26	17	25	165
31	2.0	1.6	1.6	LT420/283-7-36	57.0	36	4	23	240
34	2.0	1.7	1.1	LT530/285-7-36	110.0	36	7	20	267
40	2.0	1.6	1.2	LTAI530/425-7-36	116.0	36	10	23	400
45	2.0	1.6	1.3	LTAII530/525-7-36	130.5	36	7	26	500



Type Series LTAI and LTAII

12 x 2.5 mm <sup>2</sup> , Ø= 20.2 mm, 0.48 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
20	1.5	1.1	2.4	LT300/252-12-36	30.0	36	6	18	210
25	2.0	1.6	1.7	LT300/272-12-36	58.0	36	10	17	240
35	2.0	1.5	1.5	LT530/286-12-36	132.0	36	2	20	490
40	2.0	1.6	1.7	LTAII530/525-12-36	130.5	36	4	23	600
43	2.0	1.6	1.8	LTAII530/625-12-36	145.0	36	3	24	720

18 x 2.5 mm <sup>2</sup> , Ø= 20.6 mm, 0.68 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
18	2.0	1.3	2.2	LT300/252-18-36	31.0	36	7	17	210
21	1.5	1.2	2.5	LT300/272-18-36	52.0	36	2	19	230
30	2.0	1.6	1.4	LT530/286-18-36	132.0	36	5	17	490
35	2.0	1.7	1.5	LTAII530/525-18-36	130.5	36	7	20	600
38	2.5	1.7	1.7	LTAII530/625-18-36	145.0	36	5	22	720

24 x 2.5 mm <sup>2</sup> , Ø= 25.5 mm, 0.82 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
20	2.5	1.7	1.8	LT420/283-24-36	65.0	36	12	14	240
28	2.5	1.6	1.6	LT530/286-24-36	133.0	36	6	16	490
31	2.5	1.7	1.7	LTAII530/525-24-36	131.5	36	9	18	600
34	2.5	1.7	1.8	LTAII530/625-24-36	147.0	36	8	19	720



## Spring Cable reeling Drums, cylindrical, horizontal freely suspended, v= 60 m/min Type Series LT, LTAI, LTAII



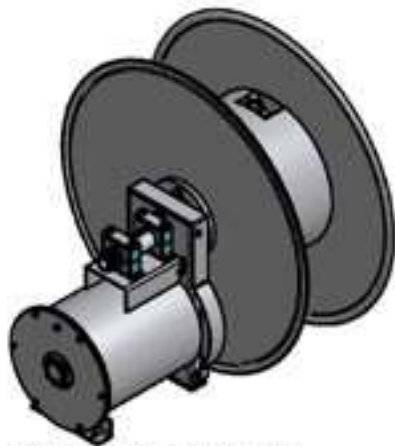
Type Series LT

30 x 2.5 mm <sup>2</sup> , Ø= 28.7 mm, 0.97 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
18	2.5	1.7	1.9	LT420/283-30-36	70.0	36	14	12	240
26	2.5	1.7	1.6	LT530/286-30-36	135.5	36	7	14	490
32	2.5	1.7	2.0	LTAII530/625-30-36	147.0	36	9	18	720

4 x 4 mm <sup>2</sup> , Ø= 13.4 mm, 0.28 kg/m, Tensile Force of Cable max. 1800 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	1.0	0.5	2.0	LT155/108-4-40	3.1	40	2	13	40
8	1.0	0.6	2.0	LT155/208H4-40	3.7	40	10	15	40
17	1.5	1.0	2.7	LT220/251H4-40	20.0	40	14	21	100
22	1.5	0.9	1.8	LT300/252-4-40	31.0	40	2	22	200
29	2.0	1.2	1.4	LT420/283-4-42	57.0	42	7	20	240
33	2.5	1.6	1.0	LT530/286-4-42	90.0	42	2	20	245
40	1.5	0.8	1.2	LTAII530/625-4-42	145.0	42	4	24	720

5 x 4 mm <sup>2</sup> , Ø= 14.5mm, 0.32 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
15	2.0	0.9	2.7	LT220/251-5-40	16.0	40	2	18	100
19	1.5	1.0	1.8	LT300/272-5-40	28.0	40	2	19	165
25	1.5	1.0	1.3	LT420/283-5-42	57.0	42	8	18	240
34	1.5	1.7	1.1	LT530/286-5-42	110.0	42	7	20	267
40	1.5	1.1	1.3	LTAII530/625-5-42	132.0	42	4	23	600

4 x 6 mm <sup>2</sup> , Ø= 14.8 mm, 0.37 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
15	1.5	1.0	2.7	LT220/151-4-60	16.0	60	2	18	100
19	1.5	1.0	1.8	LT300/172-4-60	28.0	60	2	19	165
25	1.5	1.2	1.3	LT420/283-4-60	57.0	60	8	18	240
30	1.5	1.6	1.0	LT530/285-4-60	110.0	60	9	18	267
36	1.5	1.0	1.2	LTAII530/525-4-60	132.0	60	6	21	600
41	1.5	1.4	1.3	LTAII530/625-4-60	145.0	60	3	24	725



Type Series LTAI and LTAII

5 x 6 mm <sup>2</sup> , Ø= 16.1mm, 0.43 kg/m, Tensile Force of Cable max. 2500 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
15	1.5	0.6	2.9	LT220/251-5-60	19.1	60	2	18	200
20	1.5	1.0	1.9	LT300/252-5-60	28.0	60	5	19	210
25	1.5	1.4	1.4	LT420/283-5-60	57.0	60	8	27	240
34	1.5	1.4	1.2	LT530/286-5-60	110.0	60	2	20	490
40	2.0	1.5	1.4	LTAII530/525-5-60	133.0	60	4	23	600

4 x 10 mm <sup>2</sup> , Ø= 18.8 mm, 0.61 kg/m, Tensile Force of Cable max. 2000 N									
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
20	1.5	1.0	2.2	LT300/272-4-60	28.0	60	2	19	330
23	1.5	1.7	1.6	LT420/283-4-60	55.0	60	10	17	240
30	1.5	1.4	1.3	LT530/286-4-60	131.0	60	4	18	490
35	2.0	1.6	1.4	LTAII530/525-4-60	133.0	60	7	20	600
39	2.0	1.6	1.5	LTAII530/625-4-60	145.0	60	5	22	725





## Spring Cable reeling Drums, cylindrical, horizontal freely suspended, v= 60 m/min Type Series LT, LTAI, LTAII



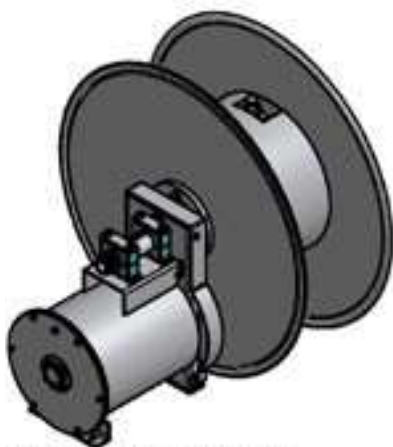
Type Series LT

4 x 16 mm <sup>2</sup> , Ø= 23.4 mm, 0.92 kg/m, Tensile Force of Cable max. 2500 N										
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
20	1.5	1.0	1.1	LT530/286-4-125	131.0	125	10	12	490	
25	1.5	1.2	1.4	LTAII530/525-4-125	133.0	125	12	15	600	
30	2.0	1.5	1.5	LTAII530/625-4-125	145.0	125	10	17	725	

4 x 25 mm <sup>2</sup> , Ø= 27.1mm, 1.27 kg/m, Tensile Force of Cable max. 2500 N										
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
18	1.5	1.0	1.1	LT530/286-4-150	132.0	150	12	10	490	
22	2.0	1.3	1.4	LTAII530/525-4-150	135.0	150	14	13	600	
27	2.0	1.6	1.6	LTAII530/625-4-150	148.0	150	12	15	725	

4 x 35 mm <sup>2</sup> , Ø= 29.7mm, 1.72 kg/m, Tensile Force of Cable max. 2500 N										
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
18	2.0	1.2	1.3	LTAII530/525-4-150	135.0	150	17	10	600	
20	2.0	1.2	1.4	LTAII530/625-4-150	148.0	150	16	11	725	

4 x 50 mm <sup>2</sup> , Ø= 35.1 mm, 2.63 kg/m, Tensile Force of Cable max. 3000 N										
l (m)	h (m)	f1* (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)	
17	2.0	1.4	1.4	LTAII530/625-4-220	148.0	220	18	9	725	



Type Series LTAI and LTAII



## Spring Cable reeling Drums, cylindrical, vertically downwards, v= 60 m/min Type Series LT, LTAI, LTAII

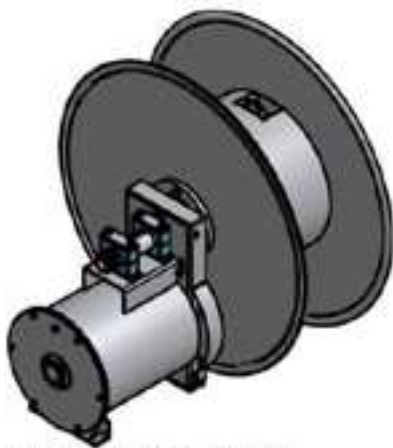


Type Series LT

4 x 1.5 mm <sup>2</sup> , Ø 11.1 mm, 0.16 kg/m, Tensile Force of Cable max. 1200 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT155/108-4-26	3.1	26	2	13	40
9	2.0	LT155/208H4-26	3.7	26	4	16	40
12	2.0	LT180/131-4-26	9.0	26	2	19	60
25	4.0	LT220/251H4-26	19.0	26	6	31	100
35	4.0	LT222/351H4-26	23.0	26	9	43	100
50	2.0	LT301/372H4-26	58.0	26	9	51	165
64	1.0	LT530/286H4-36	115.0	36	4	38	250

5 x 1.5 mm <sup>2</sup> , Ø 11.8 mm, 0.18 kg/m, Tensile Force of Cable max. 1500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	3.0	LT155/108-5-26	3.1	26	2	13	40
8	3.0	LT155/208H5-26	3.7	26	6	16	40
10	2.0	LT180/131-5-26	8.0	26	3	18	60
11	3.0	LT220/151-5-26	17.0	26	3	16	100
25	4.0	LT220/251H5-26	19.0	26	6	32	100
33	2.0	LT300/272H5-26	32.0	26	6	34	165
50	3.0	LT301/372H5-26	38.0	26	9	51	165
64	2.0	LT530/286H5-36	115.0	36	6	38	260

7 x 1.5 mm <sup>2</sup> , Ø 13.3 mm, 0.23 kg/m, Tensile Force of Cable max. 2000 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT155/108-7-26	3.1	26	2	13	40
10	2.0	LT180/131-7-26	10.0	26	3	15	60
11	2.0	LT220/151-7-26	18.0	26	3	16	100
19	4.0	LT220/251H7-26	20.0	26	6	25	100
24	5.0	LT222/351H7-26	25.0	26	9	48	100
34	3.0	LT300/272H7-26	34.0	26	6	34	165
41	3.0	LT301/372H7-26	40.0	26	9	51	165
49	3.0	LT420/284H7-36	59.0	36	4	36	240
63	2.0	LT530/286H7-36	115.0	36	4	38	260



Type Series LTAI and LTAII

12 x 1.5 mm <sup>2</sup> , Ø 16.9 mm, 0.36 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT180/131-12-26	10.0	26	10	12	60
12	3.0	LT220/151-12-26	19.0	26	4	15	100
15	3.0	LT222/351H12-26	25.0	26	28	20	100
22	3.0	LT300/152-12-36	30.0	36	3	22	100
26	3.0	LT300/272H12-36	36.0	36	6	34	165
32	2.0	LT420/283-12-36	58.0	36	3	24	240
40	3.0	LT420/253-12-36	60.0	36	3	29	260
50	1.8	LTAII530/525-12-36	128.0	36	4	29	400

18 x 1.5 mm <sup>2</sup> , Ø 17.9 mm, 0.47 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT220/151-18-36	23.0	36	3	10	100
12	2.7	LT221/251-18-36	25.0	36	3	16	200
22	3.0	LT300/252-18-36	30.0	36	3	22.5	200
28	2.0	LT420/283-18-36	58.0	36	3	24	240
31	3.0	LT420/253-18-36	61.0	36	3	29	255
34	2.0	LT530/285-18-36	126.0	36	3	23	280
48	2.0	LTAII530/525-18-36	150.0	36	6	27	500



## Spring Cable reeling Drums, cylindrical, vertically downwards, v= 60 m/min Type Series LT, LTAI, LTAII

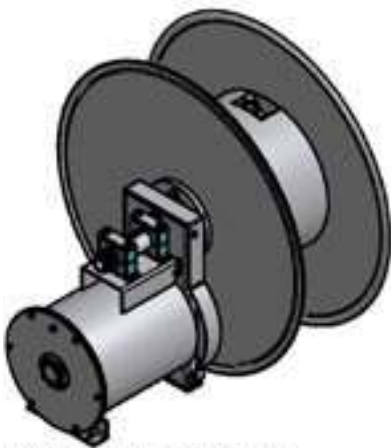


Type Series LT

24 x 1.5 mm <sup>2</sup> , Ø 22.6 mm, 0.59 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
9	2.0	LT300/152-24-36	28.0	36	8	10	100
14	1.9	LT300/172-24-36	39.0	36	5	15	165
23	2.0	LT420/283-24-36	63.0	36	8	18	240
24	2.0	LT420/253-24-36	65.0	36	12	19	260
25	2.0	LT420/284-24-36	67.0	36	3	18	465
32	2.0	LT530/286-24-36	118.0	36	3	19	490
36	1.7	LTAI530/425-24-36	128.0	36	5	20	480
45	2.1	LTAII530/625-24-36	155.0	36	8	25	600

30 x 1.5 mm <sup>2</sup> , Ø 24.2 mm, 0.71 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
8	2.0	LT300/152-30-36	28.0	36	10	10	100
16	2.0	LT300/252-30-36	31.0	36	12	13	210
18	3.0	LT300/272-30-36	33.0	36	3	17	330
19	2.0	LT420/283-30-36	63.0	36	8	15	240
20	2.0	LT420/253-30-36	65.0	36	9	16	260
22	2.0	LT420/284-30-36	66.0	36	3	17	470
25	3.0	LT421/284-30-36	69.0	36	3	18	470
32	1.5	LT530/286-30-36	118.0	36	3	19	500
38	1.9	LTAII530/625-30-36	155.0	36	6	21	600

4 x 2.5 mm <sup>2</sup> , Ø 12.3 mm, 0.21 kg/m, Tensile Force of Cable max. 1300 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT155/108-4-26	3.1	26	2	13	40
10	2.0	LT180/131-4-26	10.5	26	3	18	60
11	2.0	LT220/151-4-26	18.0	25	3	16	100
25	4.0	LT220/251H4-26	19.5	26	6	32	100
27	4.0	LT222/351H4-26	22.0	26	9	48	100
34	4.0	LT300/272H4-26	52.0	26	6	28	165
45	3.0	LT301/372H4-26	55.0	26	9	51	165
48	2.0	LT420/284H4-36	56.0	36	6	36	235
64	2.0	LT530/286H4-36	114.0	36	6	38	250



Type Series LTAI and LTAII

5 x 2.5 mm <sup>2</sup> , Ø 13.0 mm, 0.24 kg/m, Tensile Force of Cable max. 1800 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT155/108-5-26	3.1	26	2	13	40
10	2.0	LT180/131-5-26	11.5	26	3	18	60
11	2.0	LT220/151-5-26	16.0	26	3	16	100
23	3.0	LT220/251H5-26	19.5	26	6	32	100
34	3.0	LT300/272H5-26	52.0	26	6	34	165
39	3.0	LT301/372H5-26	58.0	26	9	51	165
49	3.0	LT420/284H5-36	61.0	36	6	36	240
61	2.0	LT530/286H5-36	112.0	36	6	38	250



## Spring Cable reeling Drums, cylindrical, vertically downwards, v= 60 m/min Type Series LT, LTAI, LTAII

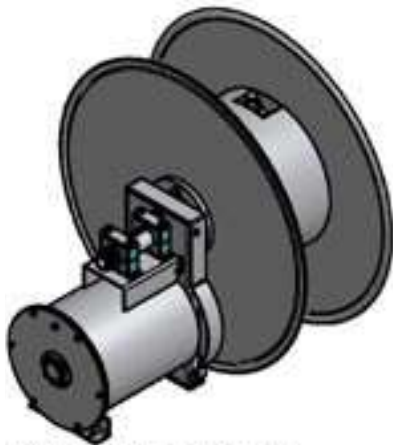


Type Series LT

7 x 2.5 mm <sup>2</sup> , Ø 14.0 mm, 0.31 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
5	2.0	LT155/108-7-26	4.0	26	4	10	40
9	2.0	LT180/131-7-26	10.0	26	4	17	60
12	3.0	LT220/151-7-26	18.0	26	3	16	100
17	5.0	LT220/251H7-26	20.0	26	8	31	100
18	4.0	LT222/351H7-26	25.0	26	9	32	100
21	2.0	LT300/252-7-26	31.0	26	3	22	210
32	2.0	LT420/283-7-36	57.0	36	3	24	240
39	2.0	LT420/253-7-36	59.0	36	3	29	260
43	2.0	LT420/284H7-36	62.0	36	6	36	240
47	2.0	LT530/286H7-36	115.0	36	6	38	250
50	1.3	LTAII530/525-7-36	130.5	36	4	29	400

12 x 2.5 mm <sup>2</sup> , Ø 20.2 mm, 0.48 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
11	2.0	LT300/152-12-36	28.0	36	14	11	100
23	3.0	LT300/252-12-36	30.0	36	3	22	210
28	2.0	LT420/283-12-36	58.0	36	7	20	240
30	3.0	LT420/253-12-36	69.0	36	10	22	260
33	2.0	LT530/285-12-36	110.0	36	7	19	280
40	1.8	LTAI530/425-12-36	128.0	36	4	23	480
50	2.1	LTAII530/625-12-36	145.0	36	5	28	600

18 x 2.5 mm <sup>2</sup> , Ø 20.6 mm, 0.68 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
8	2.0	LT300/152-18-36	29.0	36	15	10	100
16	3.0	LT300/252-18-36	32.0	36	10	15	200
17	3.0	LT300/272-18-36	34.0	36	3	17	330
20	2.0	LT420/283-18-36	60.0	36	13	14	240
21	2.0	LT420/253-18-36	62.0	36	14	16	260
24	2.0	LT420/284-18-36	63.0	36	3	18	470
32	2.0	LT530/286-18-36	110.0	36	3	19	500
35	1.5	LTAII530/525-18-36	143.0	36	7	20	600
43	1.9	LTAII530/625-18-36	145.0	36	3	24	725



Type Series LTAI and LTAII

24 x 2.5 mm <sup>2</sup> , Ø 25.5 mm, 0.82 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
12	2.0	LT300/252-24-36	31.0	36	10	12	200
16	2.0	LT420/283-24-36	57.0	36	16	11	240
17	2.0	LT420/253-24-36	59.0	36	16	17	260
22	2.0	LT420/284-24-36	61.0	36	5	16	470
25	3.0	LT421/284-24-36	64.0	36	3	18	470
33	2.0	LT530/286-24-36	110.0	36	3	19	490
28	1.6	LTAII530/525-24-36	143.0	36	11	16	600
38	2.0	LTAII530/625-24-36	145.0	36	6	21	725



## Spring Cable reeling Drums, cylindrical, vertically downwards, v= 60 m/min Type Series LT, LTAI, LTAII



Type Series LT

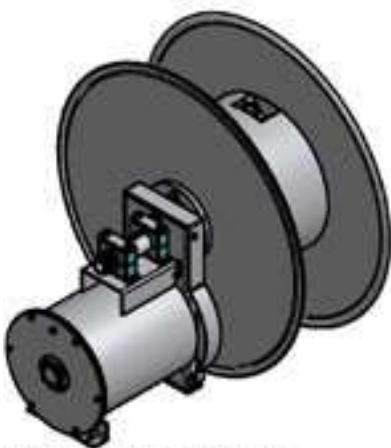
30 x 2.5 mm <sup>2</sup> , Ø 28.7mm, 0.97 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	1.0	LT420/183-30-36	57.0	36	19	6	120
14	2.0	LT420/283-30-36	60.0	36	17	10	240
15	2.0	LT420/253-30-36	62.0	36	20	11	260
20	2.0	LT420/284-30-36	65.0	36	7	14	470
26	3.0	LT421/284-30-36	67.0	36	3	18	470
30	2.0	LT530/286-30-36	110.0	36	5	17	500
32	2.0	LTAII530/625-30-36	145.0	36	9	18	725

4 x 4 mm <sup>2</sup> , Ø 13.4 mm, 0.28 kg/m, Tensile Force of Cable max. 1800 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
5	2.0	LT155/108-4-40	3.5	40	3	11	40
10	3.0	LT180/131-4-40	10.5	40	4	17	60
12	3.0	LT220/151-4-40	18.0	40	3	16	100
17	2.0	LT220/251H4-40	20.0	40	12	22	100
20	3.0	LT222/351H4-40	24.0	40	22	26	100
22	1.9	LT300/252-4-40	31.0	40	2	23	210
34	3.0	LT300/272H4-40	37.0	40	6	34	180
39	2.0	LT420/253-4-42	60.0	42	3	29	260
48	3.0	LT420/284H4-42	64.0	42	6	36	470
52	2.0	LT530/286H4-42	104.0	42	6	38	250

5 x 4 mm <sup>2</sup> , Ø 14.5 mm, 0.32 kg/m, Tensile Force of Cable max. 2000 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
5	2.0	LT155/108-5-40	4.0	40	3	11	40
8	2.0	LT180/131-5-40	11.0	40	7	14	60
12	3.0	LT220/151-5-40	18.0	40	3	16	100
17	3.0	LT220/251H5-40	20.0	40	12	22	100
21	2.0	LT300/252-5-40	28.0	40	3	22	200
29	3.0	LT300/272H5-40	31.0	40	8	29	165
32	2.0	LT420/283-5-42	58.0	42	3	24	240
39	2.0	LT420/253-5-42	60.0	42	3	29	260
42	3.0	LT420/284H5-42	63.0	42	6	36	240
45	2.0	LT530/286H5-42	110.0	42	6	38	250

4 x 6 mm <sup>2</sup> , Ø 14.8 mm, 0.37 kg/m, Tensile Force of Cable max. 2000 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
12	3.0	LT220/151-4-60	19.0	60	3	16	100
15	3.0	LT220/251H4-60	20.0	60	14	18	100
21	2.0	LT300/252-4-60	31.0	60	3	22	200
25	3.0	LT300/272-4-60	59.0	60	12	25	330
32	2.0	LT420/283-4-60	56.0	60	3	24	240
39	2.0	LT420/253-4-60	59.0	60	3	29	260
42	1.6	LTAI530/425-4-60	130.5	60	3	24	400

5 x 6 mm <sup>2</sup> , Ø 16.1 mm, 0.43 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
9	2.0	LT220/151-5-60	18.0	60	7	12	100
13	3.0	LT220/251H5-60	22.0	60	16	18	100
22	3.0	LT300/252-5-60	31.0	60	3	22	200
31	2.0	LT420/283-5-60	57.0	60	3	24	240
34	2.0	LT420/253-5-60	59.0	60	6	26	260
37	2.0	LT530/285-5-60	112.0	60	3	23	280
42	1.4	LTAI530/425-5-60	130.5	60	3	24	480



Type Series LTAI and LTAII



## Spring Cable reeling Drums, cylindrical, vertically downwards, v= 60 m/min Type Series LT, LTAI, LTAII

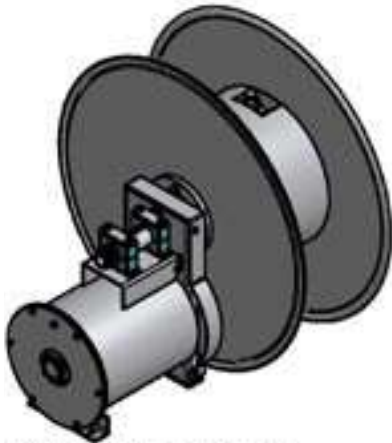


Type Series LT

4 x 10 mm <sup>2</sup> , Ø 18.8 mm, 0.61 kg/m, Tensile Force of Cable max. 2000 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
7	2.0	LT220/151-4-60	19.0	60	9	10	100
12	3.0	LT222/351H4-60	31.0	60	4	15	100
18	2.0	LT300/252-4-60	31.0	60	5	20	200
22	2.0	LT420/283-4-60	56.0	60	11	16	240
24	2.0	LT420/253-4-60	59.0	60	16	16	260
26	2.0	LT530/285-4-60	108.0	60	11	15	280
32	2.0	LT530/286-4-60	110.0	60	3	19	500
42	1.7	LTAII530/525-4-60	135.0	60	3	24	600
44	2.1	LTAII530/625-4-60	148.0	60	8	25	600

4 x 16 mm <sup>2</sup> , Ø 23.4 mm, 0.92 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	(n.U)	TF.(N)
6	1.0	LT300/152-4-125	29.0	125	17	7	100
12	2.0	LT300/252-4-125	32.0	125	13	12	200
18	2.0	LT300/272-4-125	36.0	125	3	17	330
25	2.0	LT420/284-4-150	64.0	150	3	18	470
31	2.0	LT530/286-4-150	115.0	150	4	18	500
35	2.1	LTAII530/625-4-150	150.0	150	3	24	720

4 x 25 mm <sup>2</sup> , Ø 27,1 mm, 1,27 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
10	2.0	LT420/283-4-150	62.0	150	19	8	240
20	2.0	LT420/284-4-150	64.0	150	6	15	470
21	2.0	LT421/284-4-150	67.0	150	4	17	470
23	2.0	LT530/286-4-150	115.0	150	10	12	500
25	1.5	LTAII530/625-4-150	150.0	150	13	14	720



Type Series LTAI and LTAII

4 x 35 mm <sup>2</sup> , Ø 29.7 mm, 1.72 kg/m, Tensile Force of Cable max. 2500 N							
Vertical (m)	NL	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
8	1.0	LT420/253-4-150	66.0	150	24	7	260
15	2.0	LT420/284-4-150	68.0	150	10	11	470
17	2.0	LT530/286-4-150	115.0	150	12	10	500
19	1.3	LTAII530/625-4-150	150.0	150	17	10	720



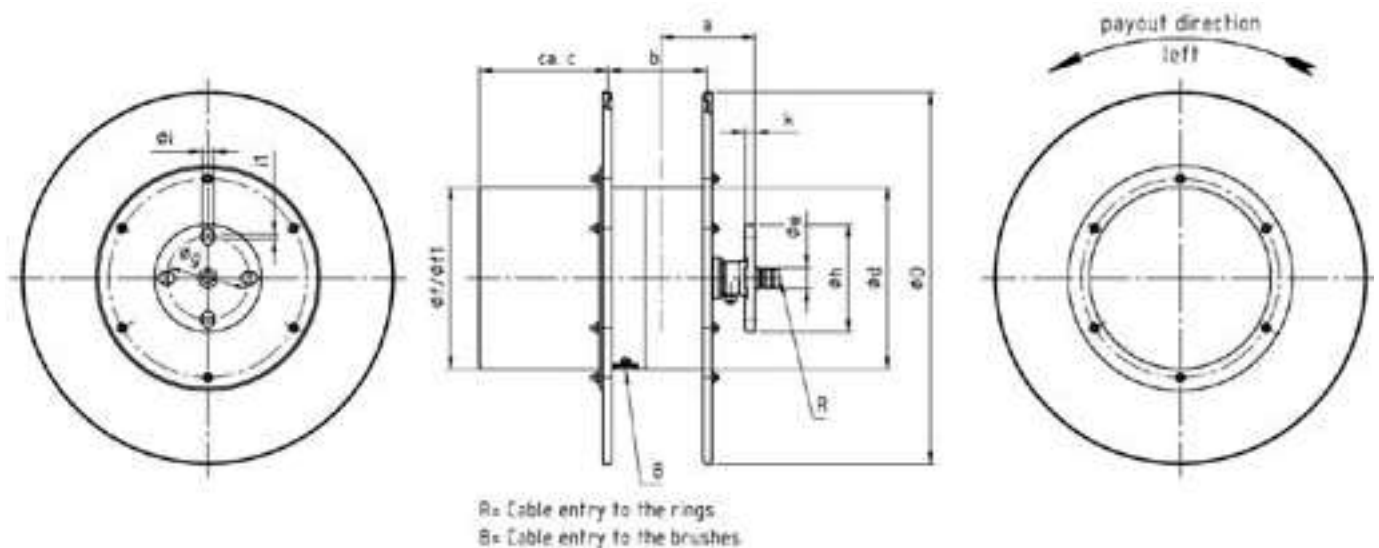


## Dimension Sheets LT

Type Series	Drawing No.	Ø d	Ø D	a	b	Ø e	Ø f	Ø f1	Ø g	Ø h	Ø i	i1	k
LT155	01-95-00-0-3	155	260	101	110	35	155	--	65	85	4 x Ø 9	--	5
LT180	01-95-00-0-3	180	300	109	130	35	180	--	65	85	4 x Ø 9	--	5
LT220	01-95-00-0-3	220	400	114	120	35	220	--	100	130	4 x Ø 13	6	12
LT221	01-95-00-0-3	220	450	129	150	35	220	--	100	130	4 x Ø 13	6	12
LT222	01-95-00-0-3	220	450	139	170	35	220	--	100	130	4 x Ø 13	6	12
LT300	01-95-00-0-3	300	550	165	190	50	300	--	100	135	4 x Ø 13	5	20
LT301	01-95-00-0-3	300	550	213	285	50	300	--	100	135	4 x Ø 13	5	20
LT420	01-95-00-0-3	420	680	200	240	60	420	--	135	178	4 x Ø 17	5	20
LT421	01-95-00-0-3	420	770	200	240	60	420	--	175	215	4 x Ø 17	5	20
LT530	01-95-00-0-3	530	900	260	310	70	420	--	185	250	4 x Ø 18	15	23

Cover dimension c in mm based on the number of poles

Type Series	3+Earth 26A	3+Earth 36A	3+Earth 40A	3+Earth 42A	3+Earth 60A	3+Earth 125A	3+Earth 150A	3+Earth 220A	4+Earth 26A	4+Earth 36A	4+Earth 40A	4+Earth 42A	4+Earth 60A
LT155	60	--	60	--	--	--	--	--	60	--	90	--	--
LT180	90	--	90	--	--	--	--	--	90	--	90	--	--
LT220	50	100	50	100	100	--	--	--	75	75	75	75	100
LT221	50	75	50	75	75	--	--	--	50	75	50	75	100
LT222	50	35	50	35	35	--	--	--	60	60	60	--	85
LT300	80	80	80	80	80	120	--	--	80	80	80	80	80
LT301	80	80	80	80	80	80	--	--	80	80	80	80	80
LT420	--	85	85	--	85	--	85	--	--	85	--	85	85
LT421	--	85	--	85	85	--	85	--	--	85	--	85	85
LT530	--	85	--	85	85	--	85	85	--	85	--	85	85



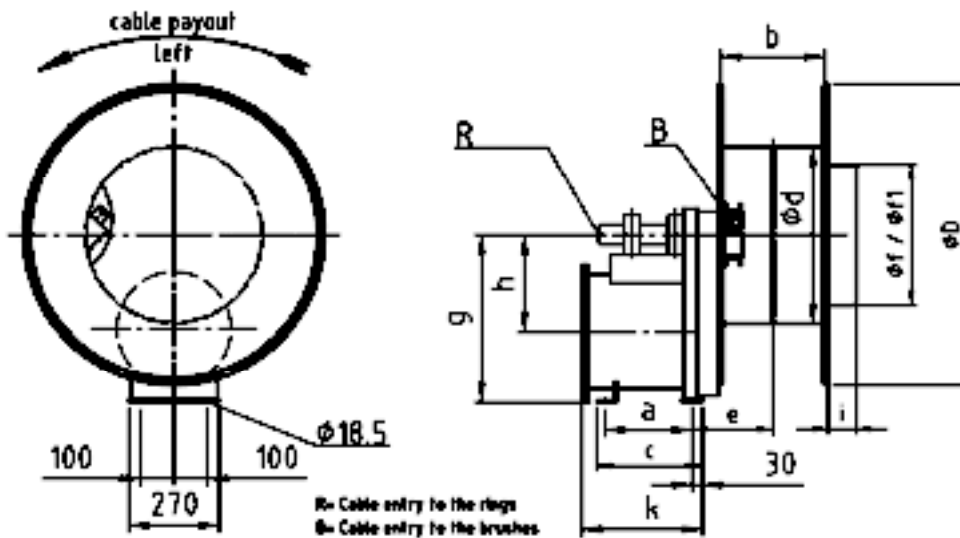


## Dimension Sheets LTA

Type Series	Drawing No.	Ø d	Ø D	a	b	e	Øf	Øf1	g	h	c	k
LTAI 420	02-66-00-0-4	420	680	260	240	206	420	300	500	290	320	358
LTAI 421	02-66-00-0-4	420	770	260	240	206	420	300	500	290	315	358
LTAI 530	02-66-00-0-4	530	900	260	310	241	420	300	500	290	315	358
LTAII 530	02-66-00-0-4	530	900	390	310	241	420	300	500	290	445	488
LTAI 701	02-66-00-0-4	700	1200	260	350	255	300	300	500	290	315	358
LTAII 701	02-66-00-0-4	700	1200	390	350	255	300	300	500	290	445	488

Cover dimension i in mm based on the number of poles.

Type Series	3+Earth 36A	3+Earth 40A	3+Earth 60A	3+Earth 150A	3+Earth 220A	4+Earth 36A	4+Earth 42A	4+Earth 60A
LTAI 420	--	--	--	--	90	--	--	--
LTAI 421	--	--	--	--	90	--	--	--
LTAI 530	--	--	--	--	--	--	--	--
LTAII 530	--	--	--	--	--	--	--	--
LTAI 700	--	--	--	--	--	--	--	--
LTAII 700	--	--	--	--	--	--	--	--
LTAI 701	--	--	--	--	--	--	--	--
LTAII 701	--	--	--	--	--	--	--	--





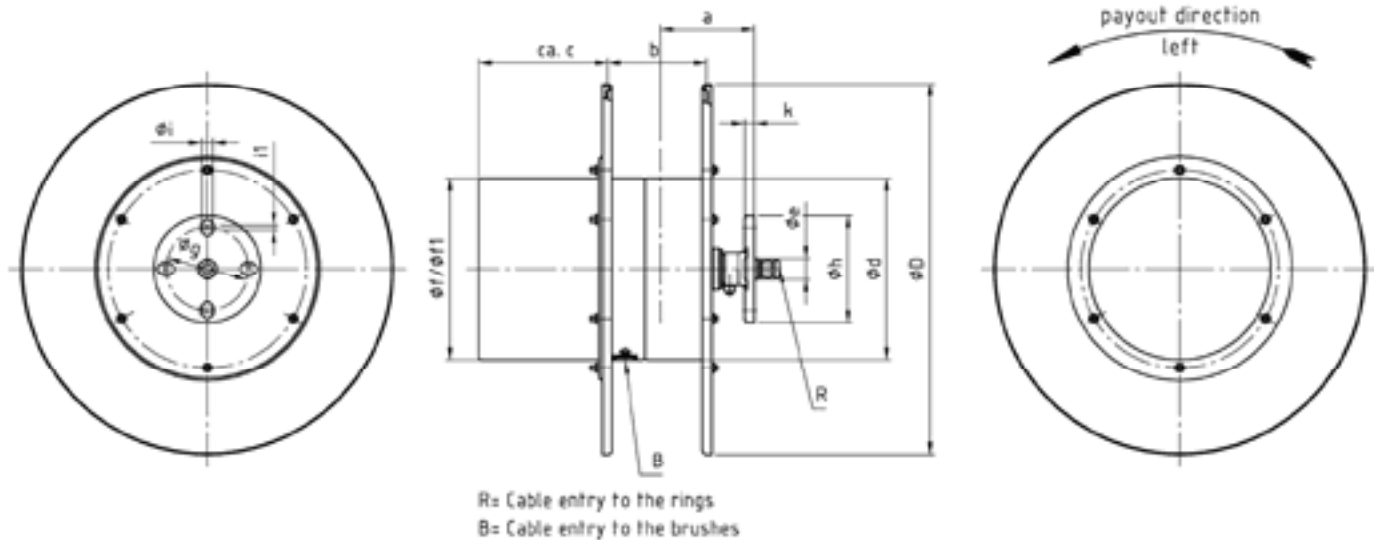
## Dimension Sheets LT

Type Series	Drawing No.	Ø d	Ø D	a	b	Ø e	Ø f	Ø f <sub>1</sub>	Ø g	Ø h	Ø i	k
LT155	01-95-00-0-3	155	260	101	110	35	155	--	65	85	4 x Ø 09	5
LT180	01-95-00-0-3	180	290	109	130	35	180	--	65	85	4 x Ø 09	5
LT220	01-95-00-0-3	220	400	114	120	35	220	--	100	130	4 x Ø 14	12
LT221	01-95-00-0-3	220	450	129	150	35	220	--	100	130	4 x Ø 14	12
LT222	01-95-00-0-3	220	450	139	170	35	220	--	100	130	4 x Ø 14	12
LT300	01-95-00-0-3	300	550	165	190	50	300	--	100	135	4 x Ø 15	20
LT301	01-95-00-0-3	300	550	213	285	50	300	--	100	135	4 x Ø 16	20
LT420	01-95-00-0-3	420	680	200	240	60	420	300	135	178	4 x Ø 18	20
LT421	01-95-00-0-3	420	770	200	240	60	420	300	175	215	4 x Ø 18	20
LT530	01-95-00-0-3	530	900	260	310	75	420	300	185	250	4 x Ø 18	23

Cover dimension c in mm based on the number of poles.

Type Series	Drawing No.	6+Earth 26 A	6+Earth 36A	11+Earth 26A	11+Earth 36A	17+Earth 36 A	23+Earth 36 A	29+Earth 36 A
LT155	01-95-00-0-3	100	--	150	--	--	--	--
LT180	01-95-00-0-3	100	--	150	--	--	--	--
LT220	01-95-00-0-3	100	100	150	200	250	350	--
LT221	01-95-00-0-3	75	75	130	130	200	350	--
LT222	01-95-00-0-3	75	75	130	130	200	350	350
LT300	01-95-00-0-3	80	80	150	150	200	320	400
LT301	01-95-00-0-3	80	80	120	120	200	320	400
LT420	01-95-00-0-3	--	85	--	155	235 <sup>1</sup>	355 <sup>1</sup>	435 <sup>1</sup>
LT421	01-95-00-0-3	--	85	--	155	235 <sup>1</sup>	355 <sup>1</sup>	435 <sup>1</sup>
LT530	01-95-00-0-3	--	85	--	85	155	355 <sup>1</sup>	355 <sup>1</sup>

<sup>1</sup> = 1 = see Ø f<sub>1</sub> of cover





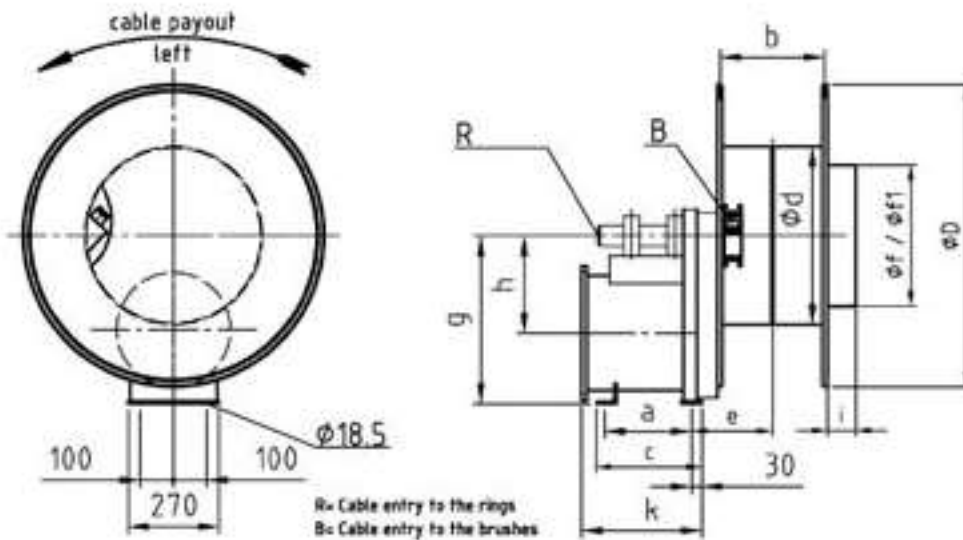
## Dimension Sheets LTA

Type Series	Drawing No.	Ø d	Ø D	a	b	~ e	Ø f	Ø f <sub>1</sub>	Ø g	Ø h	Ø i	k
LTAI 421	02-66-00-0-4	420	770	260	240	206	420	300	500	290	315	358
LTAI 530	02-66-00-0-5	530	900	260	310	241	420	300	500	290	315	358
LTAII 530	02-66-00-0-6	530	900	390	310	241	420	300	500	290	445	488
LTAII 700	02-66-00-0-9	700	1200	390	350	255	420	300	500	290	445	488

Cover dimension c in mm based on the number of poles.

Type Series	Drawing No.	6+Earth 36A	11+Earth 36A	17+Earth 36 A	23+Earth 36 A	29+Earth 36 A
LTAI 421	02-66-00-0-4	--	90	155	250 <sup>1</sup>	320 <sup>1</sup>
LTAI 530	02-66-00-0-5	--	--	90	160	260 <sup>1</sup>
LTAII 530	02-66-00-0-6	--	--	90	160	260 <sup>1</sup>
LTAII 700	02-66-00-0-9	--	--	25 <sup>1</sup>	155 <sup>1</sup>	255 <sup>1</sup>

<sup>1</sup> = 1 = see Ø f<sub>1</sub> of cover





## Spring Cable reeling Drums, spiral, horizontal, v= 60 m/min Type Series LTSP, LTAISP, LTAISP



Type Series LTSP

4 x 6 mm <sup>2</sup> , Ø= 14.8 mm, 0.37 kg/m, Tensile Force of Cable max. 2000 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
10	1.0	LTSP2/6/251-4-60	73.0	60	10	7	157
25	1.5	LTSP3/9/252-4-60	100.0	60	9	14	180
33	1.5	LTSP4/10/283-4-60	120.0	60	11	16	240
50	1.5	LTAISP6/12/325-4-60	150.0	60	7	20	320
90	1.5	LTAISP6/15/325-4-60	160.0	60	6	27	320
115	1.5	LTAISP6/18/525-4-60	300.0	60	6	32	380
135	1.5	LTAISP8/20/625-4-60	400.0	60	6	32	340

5 x 6 mm <sup>2</sup> , Ø= 16.1 mm, 0.43 kg/m, Tensile Force of Cable max. 2500 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
25	1.5	LTSP3/9/252-5-60	100.0	60	9	13	180
30	1.5	LTSP4/10/283-5-60	120.0	60	13	14	240
45	1.5	LTAISP6/12/325-5-60	150.0	60	11	16	210
90	1.5	LTAISP6/15/525-5-60	160.0	60	4	29	265
120	1.5	LTAISP6/18/525-5-60	300.0	60	5	33	380
130	1.5	LTAISP8/20/625-5-60	400.0	60	7	31	340

4 x 10 mm <sup>2</sup> , Ø= 18.8 mm, 0.61 kg/m, Tensile Force of Cable max. 2000 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
23	1.0	LTSP3/9/272-4-60	100.0	60	9	12	285
30	1.5	LTSP4/10/283-4-60	120.0	60	13	13	240
37	1.5	LTAISP6/12/325-4-60	150.0	60	14	13	320
70	1.5	LTAISP6/15/425-4-60	160.0	60	12	21	355
100	1.5	LTAISP6/18/525-4-60	300.0	60	6	27	445
120	1.5	LTAISP8/20/625-4-60	400.0	60	5	28	400



Type Series LTAISP and LTAISP

4 x 16 mm <sup>2</sup> , Ø= 23.4 mm, 0.92 kg/m, Tensile Force of Cable max. 2500 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
20	1.5	LTSP4/10/283-4-125	125.0	125	15	10	240
28	1.5	LTAISP6/12/325-4-125	155.0	125	17	10	320
45	1.5	LTAISP6/15/325-4-125	165.0	125	13	14	320
70	1.5	LTAISP6/18/425-4-125	305.0	125	7	20	425
90	1.5	LTAISP8/20/525-4-125	405.0	125	6	21	400
100	1.5	LTAISP10/22/625-4-125	550.0	125	6	21	380

4 x 25 mm <sup>2</sup> , Ø= 27.1 mm, 1.27 kg/m, Tensile Force of Cable max. 2500 N, with reinforced Drum Body							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
22	1.5	LTAISP6/12/325-4-150	155.0	150	19	8	320
40	1.5	LTAISP6/15/325-4-150	165.0	150	14	13	320
65	1.5	LTAISP6/18/425-4-150	305.0	150	9	18	420
85	1.5	LTAISP8/20/525-4-150	405.0	150	8	19	400
95	1.5	LTAISP10/22/625-4-150	550.0	150	8	19	380



## Spring Cable reeling Drums, spiral, horizontal, v= 60 m/min

Type Series LTSP, LTAISP, LTAISP



Type Series LTAISP and LTAISP

4 x 35 mm<sup>2</sup>, Ø= 29.7 mm, 1.72 kg/m, Tensile Force of Cable max. 2500 N,  
with reinforced Drum Body

l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
30	1.5	LTAISP6/15/525-4-150	165.0	150	17	10	530
45	1.5	LTAISP8/18/525-4-150	380.0	150	15	12	400
55	1.5	LTAISP8/20/525-4-150	405.0	150	13	14	400
80	1.5	LTAISP10/22/625-4-150	550.0	150	11	16	380

4 x 50 mm<sup>2</sup>, Ø= 35.1 mm, 2.63 kg/m, Tensile Force of Cable max. 3000 N,  
with reinforced Drum Body

l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
25	1.5	LTAISP8/15/625-4-220	165.0	220	20	7	480
40	1.5	LTAISP8/18/625-4-220	380.0	220	20	10	480
50	1.5	LTAISP8/20/625-4-220	405.0	220	15	12	480
65	1.5	LTAISP10/22/625-4-220	550.0	220	14	13	480

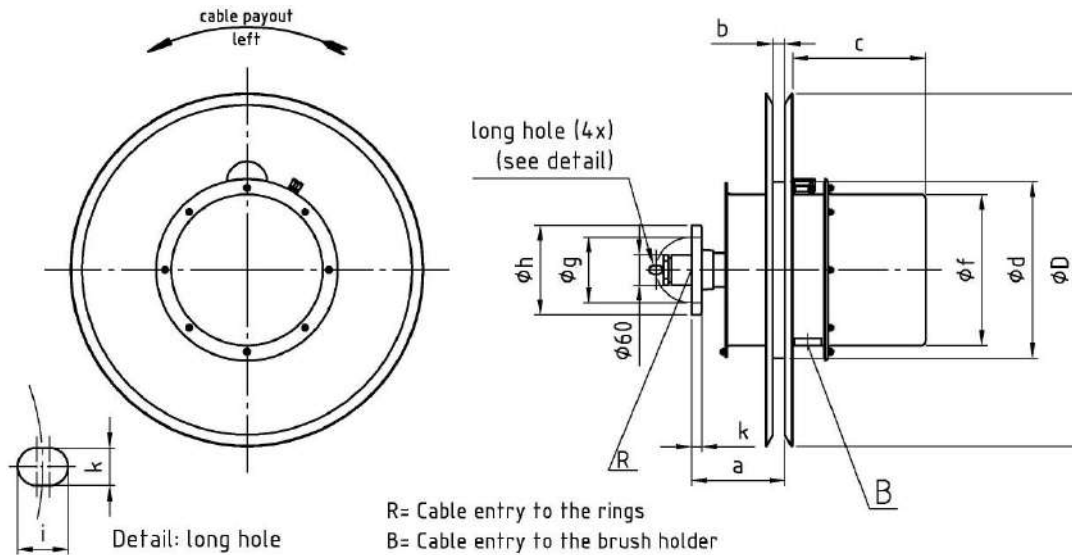




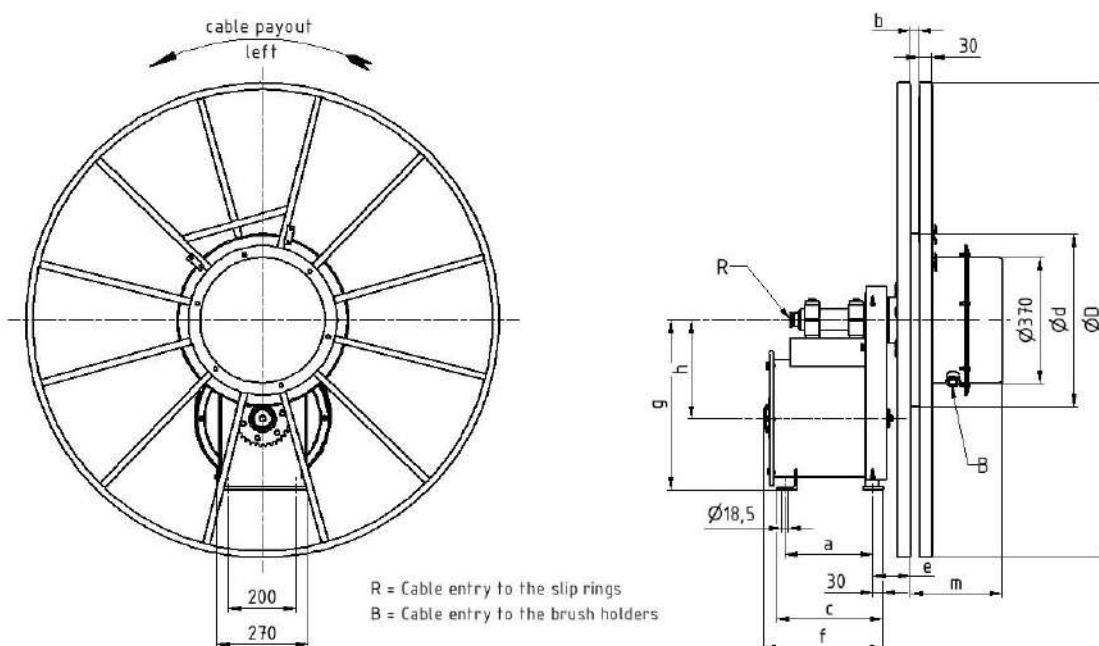
## Dimension Sheets LTSP, LTAISP, LTAIISP

Type Series	Drawing No.	Ø D	Ø d	Ø f	b	k	~a	c	Ø g	Ø h	k	i
LTSP 2	01-103-00-4	600	285	220	Cable Ø + (3 - 5%)	9	130	80	100	130	14	20
LTSP 3	01-103-00-4	900	350	300		15	184	125	100	135	15	20
LTSP 4	01-103-00-4	1000	420	420		20	237	165	130	178	18	23

Dimension c in mm = 3 + earth



Type Series	Drawing No.	Ø D	Ø d	a	b	c	e	f	m
LTAISP 6/12	02-69-00-000	1200	600	260	Cable Ø + (3 - 5%)	446	112	385	260
LTAISP 6/15	02-69-00-000	1500	600	260		446	112	488	260
LTAIISP 6/12	02-69-00-000	1200	600	390		446	112	488	260
LTAIISP 8/20	02-69-00-000	2000	800	390		446	112	488	260
LTAIISP 10/22	02-69-00-000	2200	1000	390		446	112	488	260





## Spring Cable reeling Drums, cylindrical, horizontal, v= 60 m/min Type Series LTB, LTB....SP



Type Series LTB

4 x 10 mm <sup>2</sup> , Ø= 23.6 mm, 0.9 kg/m, Tensile Force of Cable max. 800 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/424-4-60	180.0	60	10	34	190
75	1.0	LTB50/524-4-60	190.0	60	5	41	240
100	1.0	LTB50/624-4-60	200.0	60	6	55	210

4 x 16 mm <sup>2</sup> , Ø= 26.7 mm, 1.24 kg/m, Tensile Force of Cable max. 1280 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/424-4-125	180.0	125	11	33	180
75	1.0	LTB50/524-4-125	190.0	125	5	40	230
100	1.0	LTB50/624-4-125	200.0	125	9	52	210

4 x 25 mm <sup>2</sup> , Ø= 31.5 mm, 1.85 kg/m, Tensile Force of Cable max. 2000 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/524-4-150	190.0	150	12	32	230
75	1.0	LTB50/624-4-150	220.0	150	6	39	280

4 x 35 mm <sup>2</sup> , Ø= 42.5 mm, 2.57 kg/m, Tensile Force of Cable max. 2800 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/524-4-150	190.0	150	13	31	230
75	1.0	LTB50/624-4-150	220.0	150	7	37	230

4 x 50 mm <sup>2</sup> , Ø= 49.0 mm, 3.6 kg/m, Tensile Force of Cable max. 2800 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/524-4-220	190.0	150	13	31	230
75	1.0	LTB50/624-4-220	220.0	150	7	37	230



Type Series LTB....SP

4 x 10 mm <sup>2</sup> , Ø= 23.6 mm, 0.9 kg/m, Tensile Force of Cable max. 800 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/424SP4-60	230.0	60	10	34	190
75	1.0	LTB50/524SP4-60	240.0	60	5	41	240
100	1.0	LTB50/624SP4-60	250.0	60	6	55	210

4 x 16 mm <sup>2</sup> , Ø= 26.7 mm, 1.24 kg/m, Tensile Force of Cable max. 1280 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
50	1.0	LTB50/524SP4-125	230.0	125	11	33	180
75	1.0	LTB50/524SP4-125	240.0	125	5	40	230
100	1.0	LTB50/624SP4-125	250.0	125	9	52	210

4 x 25 mm <sup>2</sup> , Ø= 31.5 mm, 2.57 kg/m, Tensile Force of Cable max. 2000 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/624SP4-150	240.0	150	12	32	230
75	1.0	LTB50/625SP4-150	250.0	150	6	39	280

4 x 35 mm <sup>2</sup> , Ø=42.5 mm, 2.57 kg/m, Tensile Force of Cable max. 2800 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/624SP4-150	240.0	150	13	31	230
75	1.0	LTB50/625SP4-150	250.0	150	7	37	280

4 x 50 mm <sup>2</sup> , Ø= 49.0 mm, 3.6 kg/m, Tensile Force of Cable max. 2800 N							
l (m)	h (m)	Type Series	Weight (kg)	A	nv.(U)	n.(U)	TF.(N)
60	1.0	LTB50/624SP4-220	240.0	150	13	31	230
75	1.0	LTB50/625SP4-220	250.0	150	7	37	280



## Spring Cable reeling Drums, cylindrical, horizontal, v= 60 m/min Type Series LTSCH, LTAISCH, LTAISCH

Spring-loaded hose reeling drums are of the same version as the cable reeling drums of type series LT and LTAI - II from page 5 - 18, however, with the difference that instead of a current consumer, a corresponding rotary valve (rotor) for air, water, gas, oil, etc., is installed.

The rotary valves that we install as standard are suitable for air and water of max. 10 bar. Higher pressures, negative pressures (vacuum), other liquids, such as hydraulic – oils, acids, alkaline solutions, etc. gases and oils must be requested separately. With a drum-reeled hose, attention must be paid to stiffness due to coiling. For manual operation, the hose can be blocked in the desired length by using a hand crank and an additional retainer.

An attachment of a roller deflector yoke allows one to smoothly coil - and uncoil the hose. Hand crank, retainer and roller yoke are available for extra payment. When selecting the appropriate hose, please pay attention to the smallest possible bending diameter as well as the tensile force specified for a spring-loaded hose reeling drum. On request, we supply also installed spiral leaf springs with particularly quiet running characteristic (noise level insulation).



Type Series LTSCH

rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 3.2 mm, G1/8", Ø= 9.5 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
6	0.5	10bar	LTSCH155/108-1/8"	3.1	3	12	40
12	0.5	10bar	LTSCH155/208H1/8"	3.7	4	22	40
22	0.5	10bar	LTSCH180/231H1/8"	11.5	4	34	60
24	0.5	10bar	LTSCH220/251H1/8"	19.0	6	30	60
36	0.5	10bar	LTSCH300/252H1/8"	28.0	3	36	100
52	1.5	10bar	LTSCH420/283H1/8"	56.0	6	38	140
60	1.5	10bar	LTSCH420/253H1/8"	57.0	8	43	110
75	1.5	10bar	LTSCH530/285H1/8"	110.0	6	44	120
82	1.5	10bar	LTAISCH530/324-1/8"	135.0	14	48	120
95	1.5	10bar	LTAISCH531/324-1/8"	154.0	5	57	120



Type Series LTAISCH and LTAIISCH

rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 6.4 mm, G1/4", Ø= 15.0 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
10	0.5	10bar	LTSCH180/231-1/4"	11.5	2	16	105
14	0.5	10bar	LTSCH220/151-1/4"	17.0	2	18	100
22	0.5	10bar	LTSCH221/251H1/4"	21.0	7	27	100
32	0.5	10bar	LTSCH300/252H1/4"	28.0	10	29	100
33	1.5	10bar	LTSCH420/153-1/4"	48.0	3	23	110
52	1.5	10bar	LTSCH420/283H1/4"	56.0	9	35	140
58	1.5	10bar	LTSCH420/253H1/4"	57.0	12	39	110
75	1.5	10bar	LTSCH530/285H1/4"	110.0	8	42	120
82	1.5	10bar	LTAISCH530/324-1/4"	134.0	4	46	120
95	1.5	10bar	LTAISCH531/324-1/4"	153.0	9	53	120



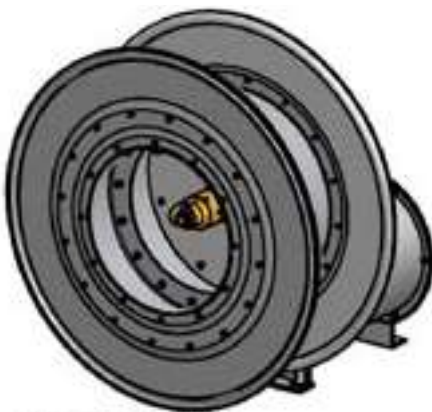
## Spring Cable reeling Drums, cylindrical, horizontal, v= 60 m/min Type Series LTSCH, LTAISCH, LTAISCH



Type Series LTSCH

rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 9.5 mm, G3/8", Ø= 20.0 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
12	0.5	10bar	LTSCH220/251-3/8"	16.0	6	13	60
17	0.5	10bar	LTSCH221/251H3/8"	17.0	6	21	80
19	0.5	10bar	LTSCH300/152-3/8"	25.0	2	18	100
32	0.5	10bar	LTSCH300/252H3/8"	28.0	4	30	100
35	1.5	10bar	LTSCH420/153-3/8"	48.0	2	24	110
58	1.5	10bar	LTSCH420/283H3/8"	56.0	6	38	140
68	1.5	10bar	LTSCH421/253H3/8"	57.0	7	44	110
72	1.5	10bar	LTAISCH420/324-3/8"	130.0	9	48	110
84	1.5	10bar	LTAISCH530/324-3/8"	140.0	5	45	160
95	1.5	10bar	LTAISCH530/424-3/8"	144.0	12	50	140
115	1.5	10bar	LTAISCH700/424-3/8"	184.0	14	48	120
125	1.5	10bar	LTAISCH700/624-3/8"	216.0	10	52	180

rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 12.7 mm, G1/2", Ø= 25.0 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
18	0.5	10bar	LTSCH300/252-1/2"	28.0	4	16	200
30	1.5	10bar	LTSCH420/283-1/2"	55.0	3	19	250
35	1.5	10bar	LTSCH420/253-1/2"	57.0	4	22	200
45	1.5	10bar	LTSCH421/283H1/2"	61.0	15	28	140
50	1.5	10bar	LTSCH421/253H1/2"	62.0	18	33	110
66	1.5	10bar	LTSCH530/286H1/2"	131.0	6	34	245
80	1.5	10bar	LTAISCH530/424-1/2"	150.0	8	41	200
110	1.5	10bar	LTAISCH700/624-1/2"	216.0	18	44	180



Type Series LTAISCH and LTAISCH

rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 19.0 mm, G3/4", Ø= 31.0 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
30	1.5	10bar	LTSCH420/283-3/4"	56.0	3	19	250
36	1.5	10bar	LTSCH421/253-3/4"	62.0	4	22	200
43	1.5	10bar	LTSCH530/285-3/4"	112.0	2	22	240
65	1.5	10bar	LTAISCH530/424-3/4"	150.0	11	32	230
80	1.5	10bar	LTAISCH700/425-3/4"	188.0	6	32	260
100	1.5	10bar	LTAISCH700/625-3/4"	234.0	5	39	340

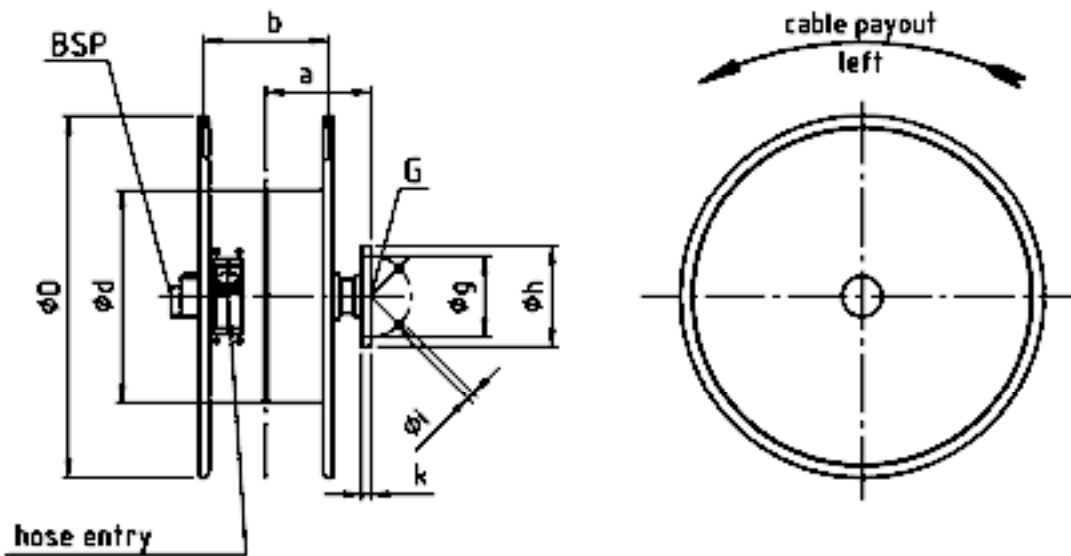
rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 25.4 mm, G1", Ø= 39.0 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
35	1.5	10bar	LTSCH530/286-1"	132.0	3	17	490
42	1.5	10bar	LTAISCH530/424-1"	150.0	10	22	220
60	1.5	10bar	LTAISCH530/624-1"	173.0	13	30	290
79	1.5	10bar	LTAISCH700/625-1"	240.0	8	30	390

rigid, tough, drum-reeled, mechanically reinforced Hose, NS= 31.5 mm, G1 1/4", Ø= 47.0 mm							
l (m)	h (m)	Pressure	Type Series	Weight (kg)	nv.(U)	n.(U)	TF.(N)
36	1.5	10bar	LTAISCH530/425-1 1/4"	165.0	10	17	280
53	1.5	10bar	LTAISCH700/625-1 1/4"	240.0	7	20	540

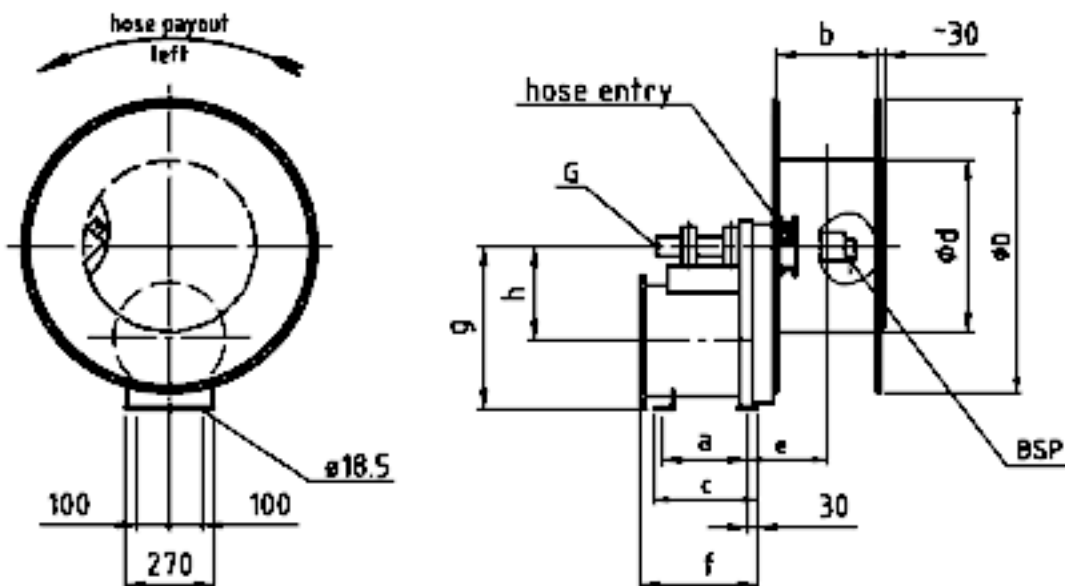


## Dimension Sheets LTSCH, LTAISCH, LTAIISCH

Type Series	Drawing No.	Ø d	Ø D	b	a	Ø g	Ø h	Ø i	k
LTSCH 155	02-68-00-0-4	155	260	110	101.5	65	85	4 x Ø 09	10
LTSCH 180	02-68-00-0-4	180	300	130	113	65	85	4 x Ø 09	10
LTSCH 220	02-68-00-0-4	220	400	120	114	100	130	4 x Ø 13	9
LTSCH 221	02-68-00-0-4	220	450	150	129	100	130	4 x Ø 13	9
LTSCH 300	02-68-00-0-4	300	550	190	165	100	135	4 x Ø 15	15
LTSCH 420	02-68-00-0-4	420	680	240	200	130	178	4 x Ø 17	20
LTSCH 421	02-68-00-0-4	420	770	240	200	170	215	4 x Ø 17	20
LTSCH 530	02-68-00-0-4	530	900	310	260	200	250	4 x Ø 18	23



Type Series	Drawing No.	Ø d	Ø D	b	a	c	e	f	g	h
LTAISCH 420	02-67-00-0-4	420	680	240	200	320	206	358	500	290
LTAISCH 530	02-67-00-0-4	530	900	310	260	315	241	358	500	290
LTAISCH 700	02-67-00-0-4	700	1200	350	260	315	255	358	500	290
LTAIISCH 530	02-67-00-0-4	530	900	310	260	445	241	488	50	290
LTAIISCH 700	02-67-00-0-4	700	1200	350	260	445	255	488	500	290







## Spring Cable reeling Drums slipringless, horizontal, $v= 60$ m/min Type Series LTS

For slip-ring-free cable reeling drums, the special cable to be coiled is without movable contacts (slip ring body) between the two cable ends. Drums of this kind are hence particularly suitable for coiling measuring lines, multiple-wire lines (control lines) and sheathed cables. Since no movable slip ring contacts are located between the two cable ends when coiling, no special attest is required for the application of this drum in rooms with explosion protection. The drum consists of the drum body, the two auxiliary drums, the revolving roller arm with deflector pulleys, the counterweight and the drive unit as well. The drive takes place through spiral leaf springs. For cable payout from the main drum, coiling occurs by means of the revolving roller arm via the deflector pulley, the auxiliary cable, from the one to the other auxiliary drum (and vice versa, when coiling). Due to this double coiling process, the cable cannot be twisted. Attention should be paid so that non-rotating cables are used. The revolving roller arm is firmly connected with the drive axis, whereas the main drum and the auxiliary drum are mounted on the drive axle by means of bearings. A rotation on the main drum corresponds to a half rotation on the roller arm. Due to the necessary auxiliary windings, the total cable length is +75 % of the payout length. Cable diameter and cable weight are decisive for the length that can be coiled. The suitable drum type can be selected according to the above data. When placing an order, data such as type, diameter, weight and length of drum-reeled cable, must be specified since the have to be provided on the type plate.



Type Series LTS

drum-reeled special Cable $\varnothing= 12.0$ mm, 0.25 kg/m								
Type Series	Cable Payout		Cable Length		Weight (kg)	nv.(U)	n.(U)	TF.(N)
	Hori.	Verti.	Hori.	Verti.				
LTS25/351	24	22	38	35	52.0	4	26	90
LTS35/224	40	35	64	56	110.0	8	32	130
LTS45/324	60	40	96	64	150.0	4	36	150

drum-reeled special Cable $\varnothing= 16.0$ mm, 0.45 kg/m								
Type Series	Cable Payout		Cable Length		Weight (kg)	nv.(U)	n.(U)	TF.(N)
	Hori.	Verti.	Hori.	Verti.				
LTS35/224	35	20	56	32	110.0	15	25	130
LTS45/324	45	25	72	40	150.0	13	27	150
LTS45/424	55	33	88	52	160.0	8	32	190

drum-reeled special Cable $\varnothing= 20.0$ mm, 0.65 kg/m								
Type Series	Cable Payout		Cable Length		Weight (kg)	nv.(U)	n.(U)	TF.(N)
	Hori.	Verti.	Hori.	Verti.				
LTS35/224	34	15	55	24	110.0	17	23	130
LTS45/324	40	20	64	32	150.0	17	23	150
LTS45/424	45	25	72	40	160.0	14	26	190

drum-reeled special Cable $\varnothing= 21.5$ mm, 1.2 kg/m								
Type Series	Cable Payout		Cable Length		Weight (kg)	nv.(U)	n.(U)	TF.(N)
	Hori.	Verti.	Hori.	Verti.				
LTS45/424	40	12	64	20	160.0	18	22	190



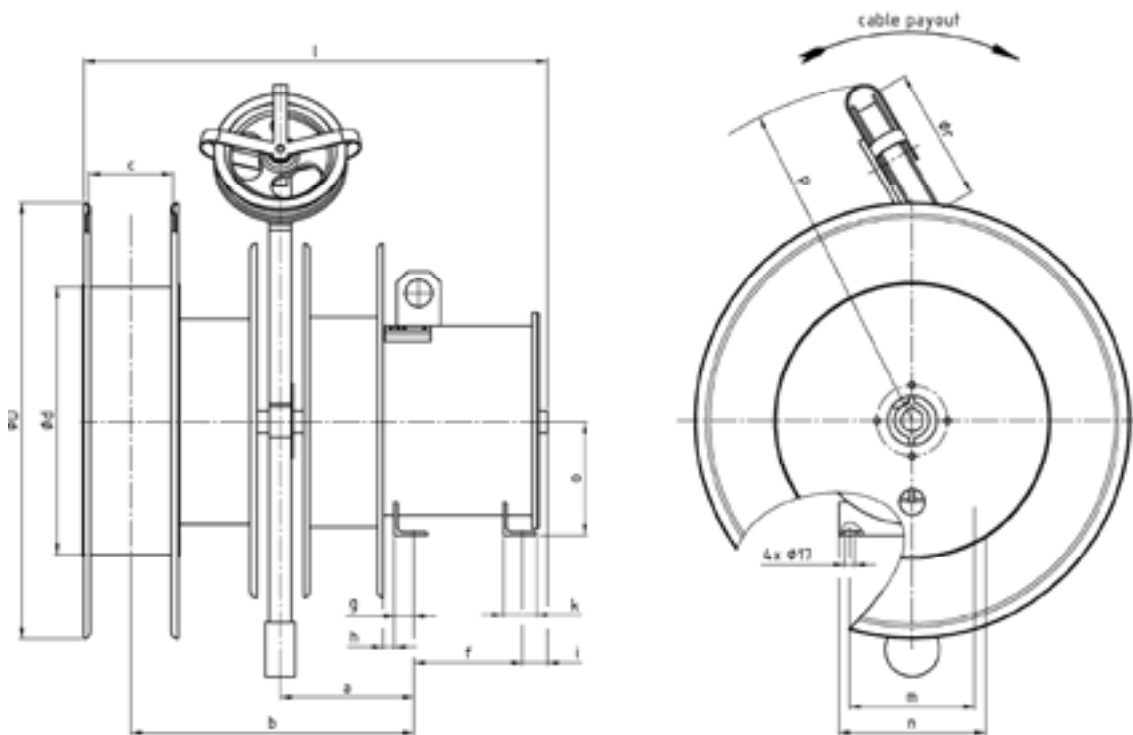


## Dimension Sheet LTS

Type Series	Drawing No.	$\varnothing d$	$\varnothing D$	a	c	b	f	g	h
LTS 25	05-10-00-000	300	500	193	80	387	85	40	7.5
LTS 35	05-01-01-000	380	650	218	110	440	200	35	7.5
LTS 45	05-02-01-000	500	800	245	160	515	200	35	7.5

Type Series	Drawing No.	i	k	~l	m	n	o	p	$\varnothing r$
LTS 25	05-10-00-000	--	145	560	220	300	160	430	214
LTS 35	05-01-01-000	55	60	755	200	270	210	480	244
LTS 45	05-02-01-000	55	60	855	200	270	210	595	244

Payout direction - right - viewed from drum body.





## Cable reeling Drums for Counter-Weight Drive, horizontal, spiral Type Series KTGI, KTGII, KTGIII

Type series KTG is driven with a counterweight. The cable reeling drum can be used economically everywhere, where the space needed for the counterweight and the counterweight suspension is available. The counterweight distance may be shortened by suspending the counterweight in block and tackle principle, but the counterweight must be enlarged accordingly. Also for these cable reeling drums, it is possible to pay out the cable in two sides. Counterweight drums are characterised by great operational safety, since they possess few abrasive parts in the drive unit. The counterweights and flexible steel ropes must be provided by the customer. The counterweight distance travelled (rope distance in m) according to our calculation is without inward movement. To determine the counterweight and counterweight distance travelled, we request for your enquiry. Cladding and safety measures are according to accident prevention regulations.

**1. KTG I** cable reeling drum with flange fastening is made with an outside diameter of 1.800 mm. The rope groove body is cylindrically designed.

**2. KTG II** cable reeling drum is stable and equipped with a strongly conically held rope groove body. This has the advantage that with an increase in coiling diameter of the drum body also the coiling diameter of the rope body increases. This provides a nearly constant tension in the cable.

**3. KTG III** cable reeling drum can be made for great cable cross-sections and up to an outside diameter of the drum body of approx. 5.000 mm. The rope groove body is cylindrically designed. Drum body is equipped with several, reinforced spokes.



Type Series KTGIII

4 x 4 mm <sup>2</sup> , Ø= 18.0 mm, 0.46 kg/m, Tensile Force of Cable for KTG max. 480 N v= 60 m/min, Mounting Height 1.5 m									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
40	KTGI6/12-4-60	60	6	7.5	125.0	2.0	14.0	240	87.8
60	KTGI6/15-4-60	60	6	10.0	130.0	2.0	19.0	275	100.6

4 x 6 mm <sup>2</sup> , Ø= 19.4 mm, 0.58 kg/m, Tensile Force of Cable for KTG max. 720 N v= 60 m/min, Mounting Height 1.5 m									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
34	KTGI6/12-4-60	60	6	6.5	125.0	2.0	12.0	260	95.1
64	KTGI6/15-4-60	60	6	10.5	130.0	2.0	19.0	285	104.2
80	KTGI8/18-4-60	60	6	10.5	225.0	2.0	20.0	320	156.1

4 x 10 mm <sup>2</sup> , Ø= 23.6 mm, 0.91 kg/m, Tensile Force of Cable for KTG max. 1200 N v= 60 m/min, Mounting Height 1.5 m									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
28	KTGI6/12-4-60	60	6	5.5	125.0	2.0	9.6	420	153.7
55	KTGI6/15-4-60	60	6	9.0	130.0	2.0	16.3	440	161.0
75	KTGI8/18-4-60	60	6	10.0	225.0	2.0	18.0	460	224.4

4 x 16 mm <sup>2</sup> , Ø= 26.7 mm, 1.24 kg/m, Tensile Force of Cable for KTG max. 1920 N v= 60 m/min, Mounting Height 1.5 m									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
23	KTGI6/12-4-125	125	6	4.5	125.0	2.0	7.9	640	234.1
47	KTGI6/15-4-125	125	6	7.5	130.0	2.0	14.0	660	241.5
65	KTGI8/18-4-125	125	6	8.5	225.0	2.0	16.0	680	331.7
80	KTGI8/20-4-125	125	8	13.0	265.0	2.0	18.2	700	265.0



## Cable reeling Drums for Counter-Weight Drive, horizontal, spiral Type Series KTGI, KTGII, KTGIII



Type Series KTGIII

4 x 25 mm <sup>2</sup> , Ø=27.1 mm, 1.27 kg/m, Tensile Force of Cable for KTG max. 3000 N v= 60 m/min, Mounting Height 1.5 m									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
20	KTGI6/12-4-150	150	6	4.0	130.0	2.0	6.8	800	293.0
40	KTGI6/15-4-150	150	6	6.5	135.0	2.0	12.2	820	300.0
54	KTGII8/18-4-150	150	6	9.0	225.0	2.0	12.9	840	314.1
75	KTGII8/20-4-150	150	8	11.5	265.0	2.0	16.6	860	321.5
98	KTGII10/25-4-150	150	8	13.0	375.0	2.0	18.3	880	411.2

4 x 35 mm <sup>2</sup> , Ø= 29.7 mm, 1.72 kg/m, Tensile Force of Cable for KTG max. 3150 N v= 60 m/min, Mounting Height 1.5 m									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
35	KTGI6/15-4-150	150	6	6.0	135.0	2.0	10.7	850	311.1
50	KTGII8/18-4-150	150	6	9.0	225.0	2.0	12.4	870	325.3
63	KTGII8/20-4-150	150	8	10.0	265.0	2.0	14.8	890	332.7
100	KTGII10/25-4-150	150	8	13.0	375.0	2.0	18.9	1010	467.3

4 x 50 mm <sup>2</sup> , Ø= 37.4 mm, 2.85 kg/m, Tensile Force of Cable for KTG max. 4500 N v= 60 m/min, Mounting Height 2.0 m, with reinforced Drum Body									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
30	KTGI6/15-4-220	220	6	5.0	135.0	2.0	8.9	1020	373.2
43	KTGII8/18-4-220	220	8	7.5	225.0	2.0	10.2	1040	388.8
59	KTGII8/20-4-220	220	8	9.0	265.0	2.0	13.1	1060	396.3
95	KTGII10/25-4-220	220	8	11.5	375.0	2.0	17.0	1080	504.7

3 x 70 + 3 x 35/3 mm <sup>2</sup> , Ø= 42.7 mm, 3.92 kg/m, Tensile Force of Cable for KTG max. 6300 N v= 60 m/min, Mounting Height 2.0 m, with reinforced Drum Body									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
36	KTGII8/18-4-220	220	6	6.0	225.0	2.0	8.6	1200	448.6
50	KTGII8/20-4-220	220	8	7.5	265.0	2.0	11.0	1220	456.0
80	KTGII10/25-4-220	220	8	10.0	375.0	2.0	14.3	1240	579.4
115	KTGIII12/30-4-220	220	12	16.5	900.0	2.0	17.3	1260	521.4



## Cable reeling Drums for Counter-Weight Drive, horizontal, spiral Type Series KTGI, KTGII, KTGIII



Type Series KTGIII

3 x 95 + 3 x 50/3 mm <sup>2</sup> , Ø= 47.3 mm, 5.02 kg/m, Tensile Force of Cable for KTG max. 8550 N v= 60 m/min, Mounting Height 2.0 m, with reinforced Drum Body									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
30	KTGII8/18-4-265	265	8	5.5	225.0	2.0	7.2	1300	486.0
45	KTGII8/20-4-265	265	8	7.0	265.0	2.0	9.8	1320	493.5
72	KTGII10/25-4-265	265	8	9.0	375.0	2.0	12.8	1340	626.2
105	KTGIII12/30-4-265	265	12	15.0	900.0	2.0	15.7	1360	562.8

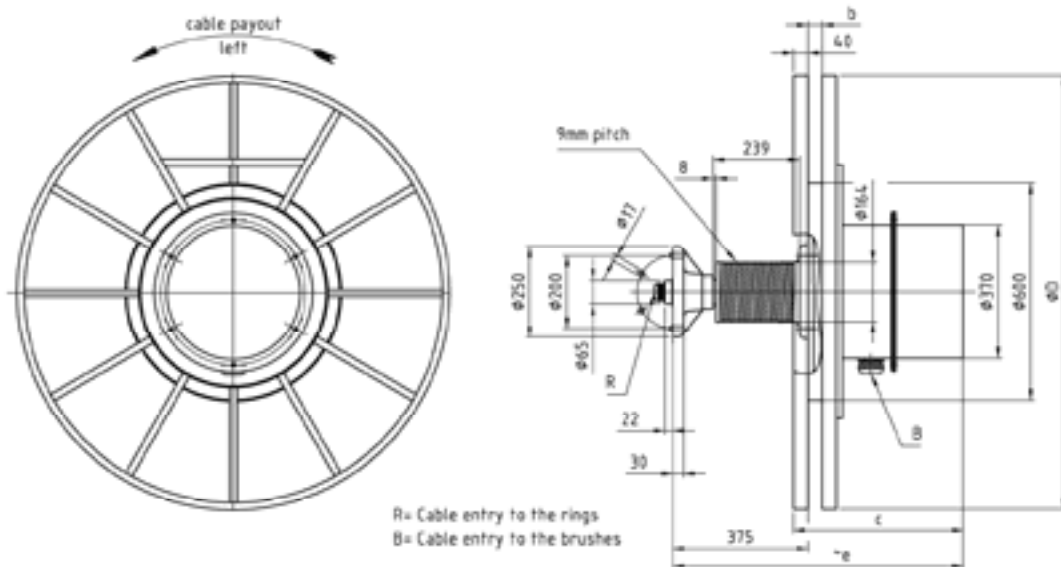
3 x 120 + 3 x 70/3 mm <sup>2</sup> , Ø= 55.0 mm, 6.63 kg/m, Tensile Force of Cable for KTG max. 10000 N v= 60 m/min, Mounting Height 2.0 m, with reinforced Drum Body									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
33	KTGIII10/20-4-500	500	12	6.5	750.0	2.0	6.6	1400	482.8
60	KTGIII10/25-4-500	500	12	10.0	800.0	2.0	10.6	1420	489.7
95	KTGIII12/30-4-500	500	12	13.0	950.0	2.0	13.9	1440	595.9

3 x 150 + 3 x 70/3 mm <sup>2</sup> , Ø= 57.9 mm, 7.6 kg/m, Tensile Force of Cable for KTG max. 13000 N v= 60 m/min, Mounting Height 2.0 m, with reinforced Drum Body									
Length (m)	Type Series	A	Rope Ø (mm)	Rope Length* (m)	Weight (kg)	nv.(U)	n.(U)	TF.(N)	Counter Weight (kg)
30	KTGIII10/20-4-1000	1000	12	6.5	750.0	2.0	6.0	1500	517.2
55	KTGIII10/25-4-1000	1000	12	9.5	800.0	2.0	9.7	1520	524.2
90	KTGIII12/30-4-1000	1000	12	12.0	950.0	2.0	13.1	1540	637.2



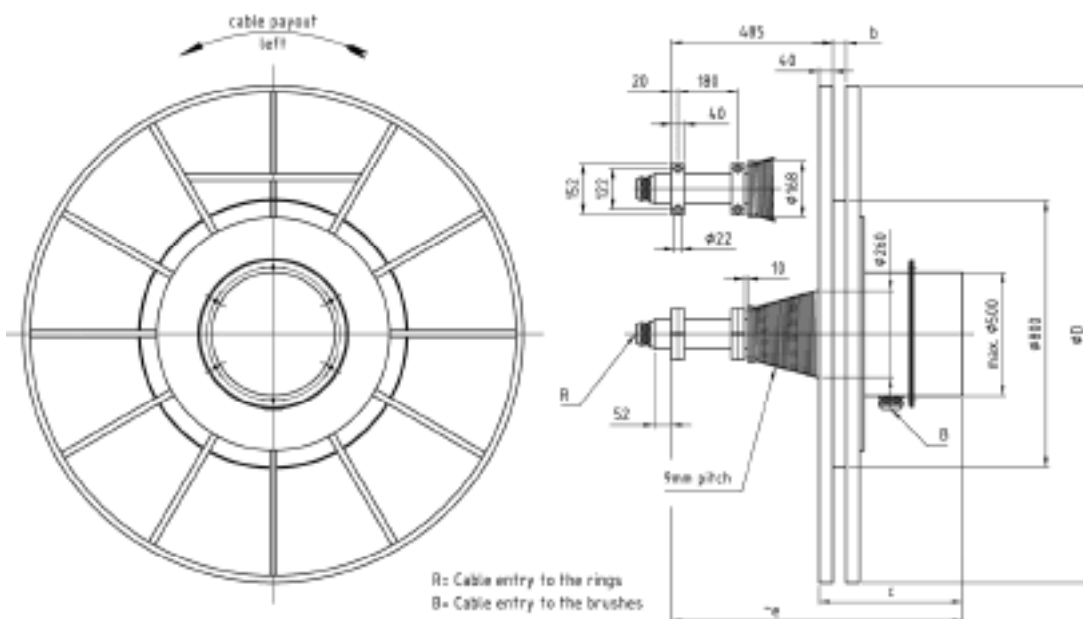
## Dimension Sheets KTGI, KTGII, KTGIII

Type Series	Drawing No.	Ø D	b	3+Earth 60 A	3+Earth 150 A	3+Earth 220 A	3+Earth 265 A	3+Earth 500 A	~ e
KTG I 6/12	04-53-00-0-3	1200	Cable Ø + (3 - 5%)	280	280	280	--	--	645
KTG I 6/15	04-53-00-0-3	1500		280	280	280	--	--	645
KTG I 8/18	04-53-00-0-3	1800		280	280	280	--	--	645
KTG I 8/20	04-53-00-0-3	2000		280	280	280	--	--	645



Dimension c = 3 + earth

Type Series	Drawing No.	Ø D	b	3+Earth 60 A	3+Earth 150 A	3+Earth 220 A	3+Earth 265 A	3+Earth 500 A	~ e
KTG II 8/18	04-54-00-0-3	1800	Cable Ø + (3 - 5%)	280	385	385	380	380	820
KTG II 8/20	04-54-00-0-3	2000		280	385	385	380	380	820
KTG II 8/25	04-54-00-0-3	2500		280	385	385	380	380	820

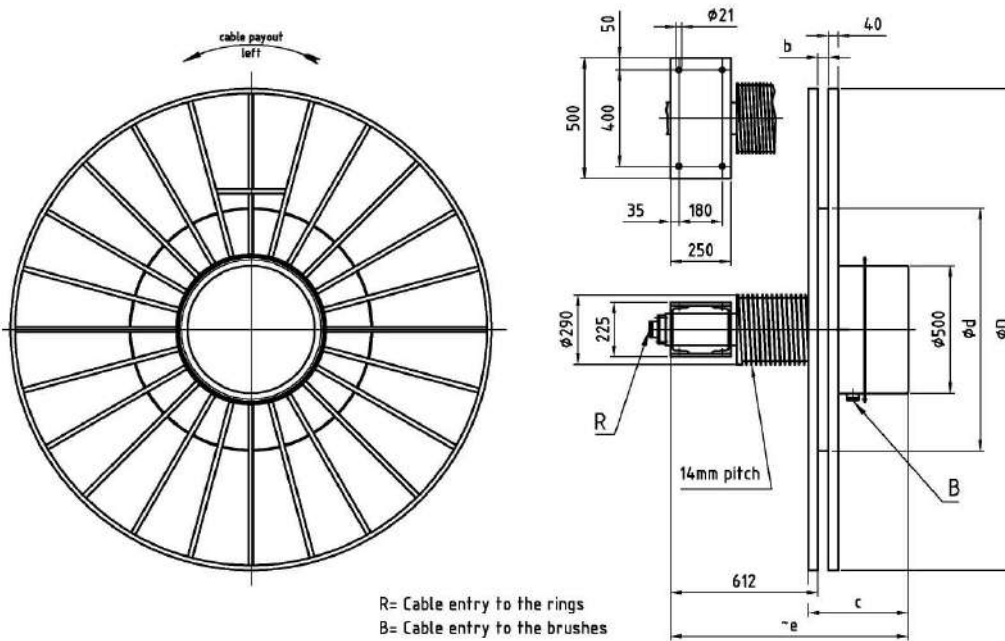


Dimension c = 3 + earth



## Dimension Sheets KTGIII

Type Series	Drawing No.	Ø d	Ø D	b	3+Earth 60 A	3+Earth 150 A	3+Earth 220 A	3+Earth 265 A	3+Earth 500 A	~ e
KTG III 10/20	04-55-00-0-3	1000	2000	Cable Ø + (3 - 5%)	--	325	325	375	375	1000
KTG III 10/25	04-55-00-0-3	1000	2500		--	325	325	375	375	1000
KTG III 12/30	04-55-00-0-3	1000	3000		--	325	325	375	375	1000



Dimension c = 3 + earth





## Accessories

### Ratchet (retention 1x per revolution)

With the ratchet a certain length of the cable can be secured as standard feature, with one retention position per revolution. If desired also several retention positions can be provided. Moreover, tensile relief finds application through this tension relief. The attached ratchet is on the flange, the segment piece is attached to the drum body housing. In case of later attachment of the ratchet on its cable reeling drum, you will be given the required parts with attachment instruction.



Type Serie  
Ratchet (RA)

Ratchet Type	suitable Type Series	Drawing No.
RA 155	LT 155	01-96-00-000
RA 180	LT 180	01-96-00-000
RA 220	LT 220	01-96-00-000
RA 221	LT 221	01-96-00-000
RA 222	LT 222	01-96-00-000
RA 300	LT 300	01-96-00-000
RA 301	LT 301	01-96-00-000
RA 420	LT 420	01-96-00-000
RA 421	LT 421	01-96-00-000
RA 530	LT 530	01-96-00-000

### Roller Yoke

The swivelling roller yoke is installed at the flange. By the supporting of the roller yoke, uniform uncoiling and coiling of the cable is ensured and this prevents the cable from “jumping” over the outer shield of the drum. The roller yoke is equipped with plastic rollers. This makes it possible to pay out the cable smoothly and laterally. The roller yoke can be swivelled upwards and downwards.



Type Serie  
Roller Yoke (R)

Roller Yoke Type	suitable Type Series	Drawing No.
R 155	LT 155	01-97-00-000
R 180	LT 180	01-97-00-000
R 220	LT 220	01-97-00-000
R 221	LT 221	01-97-00-000
R 222	LT 222	01-97-00-000
R 300	LT 300	01-97-00-000
R 301	LT 301	01-97-00-000
R 420	LT 420	01-97-00-000
R 421	LT 421	01-97-00-000
R 530	LT 530	01-97-00-000

### Eye Yoke

The swivelling eye yoke is installed at the flange. By the supporting of the eye yoke, uniform coiling and uncoiling of cable is ensured, and this prevents the cable from “jumping” over the outer shield of the drum. In contrast, application areas for this are in environments or plants where a high concentration of dirt-particles prevails, or where it must be capable of being decontaminated. The eye yoke is made of a round steel rod and it can therefore not damage the cable.



Type Serie  
Eye Yoke (O)

Eye Yoke Type	suitable Type Series	Drawing No.
O 155	LT 155	01-98-00-000
O 180	LT 180	01-98-00-000
O 220	LT 220	01-98-00-000
O 221	LT 221	01-98-00-000
O 222	LT 222	01-98-00-000
O 300	LT 300	01-98-00-000
O 301	LT 301	01-98-00-000
O 420	LT 420	01-98-00-000
O 421	LT 421	01-98-00-000
O 530	LT 530	01-98-00-000



## Accessories

### Rotating Ceiling Mounting Bracket

The rotating ceiling mounting bracket has a swivelling range 300° with an stopper. It is suitable for mounting under the ceiling in, e.g. workshops or automation, in order to cover a working area of max. 300°.

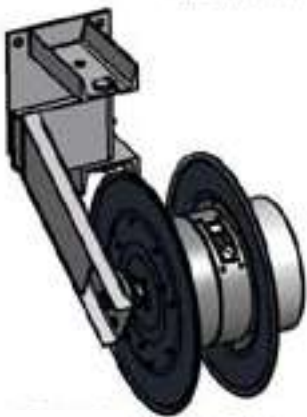


Type Serie  
rotable Ceiling Mounting Bracket (DrD)

rotable Ceiling Mounting Bracket Type	suitable Type Series	Drawing No.
DrD 155	LT 155	01-99-00-000
DrD 180	LT 180	01-99-00-000
DrD 220	LT 220	01-99-00-000
DrD 221	LT 221	01-99-00-000
DrD 222	LT 222	01-99-00-000
DrD 300	LT 300	01-99-00-000
DrD 301	LT 301	01-99-00-000
DrD 420	LT 420	01-99-00-000
DrD 421	LT 421	01-99-00-000
DrD 530	LT 530	01-99-00-000

### Rotating Wall Mounting Bracket

The rotating wall mounting bracket has a swivelling range 150° with an stopper. It is suitable for wall mounting, e.g. workshops, in order to cover a working area of max. 150°.



Type Serie  
rotable Wall Mounting Bracket (WA)

rotable Wall Mounting Bracket Type	suitable Type Series	Drawing No.
WA 155	LT 155	01-62-03-000
WA 180	LT 180	01-53-03-000
WA 220	LT 220	01-46-03-000
WA 221	LT 221	01-52-03-000
WA 222	LT 222	01-46-03-000
WA 300	LT 300	01-47-03-000
WA 301	LT 301	01-119-00-000
WA 420	LT 420	01-48-03-000
WA 421	LT 421	01-49-03-000
WA 530	LT 530	01-59-03-000

### Fixed Mounting Bracket

The fixed mounting bracket for ceiling resp. ground erection is suitable for e.g. workshops or automation.



Type Serie  
fixed Mounting Bracket (STB)

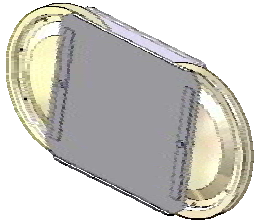
fixed Mounting Bracket Type	suitable Type Series	Drawing No.
STB 155-180	LT 155-180	2381-0003
STB 220-301	LT 220-301	2382-0006
STB 420	LT 420	2384-0004
STB 421	LT 421	2384-0004a
STB 530	LT 530	2385-0003



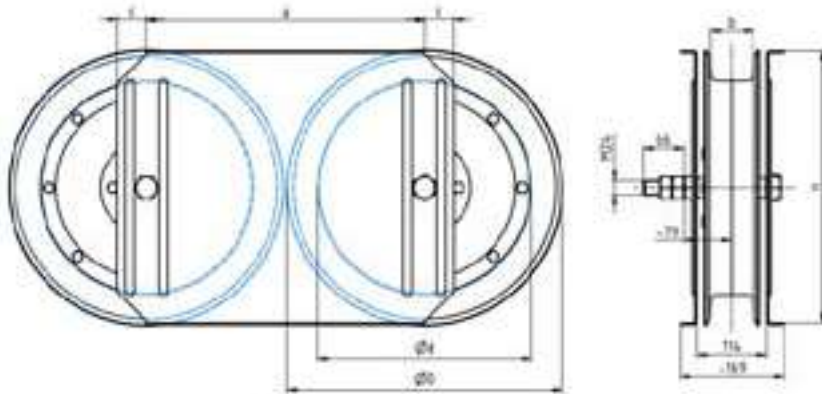
## Accessories

### Double Cable Deflector Sheave Type Series UD

Double cable deflector sheave for a spiral coil. Serves for deflecting reeled cable from a higher positioned cable drum and for moving over the centre feed funnel.



Typ Serie UD

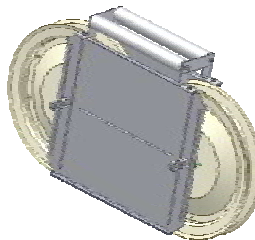


Type Series	Drawing No.	max. Cable $\varnothing$
UD I	13-70-00-000	20 mm
UD II	13-71-00-000	30 mm
UD III	13-72-00-000	40 mm
UD IV	13-73-00-000	52 mm

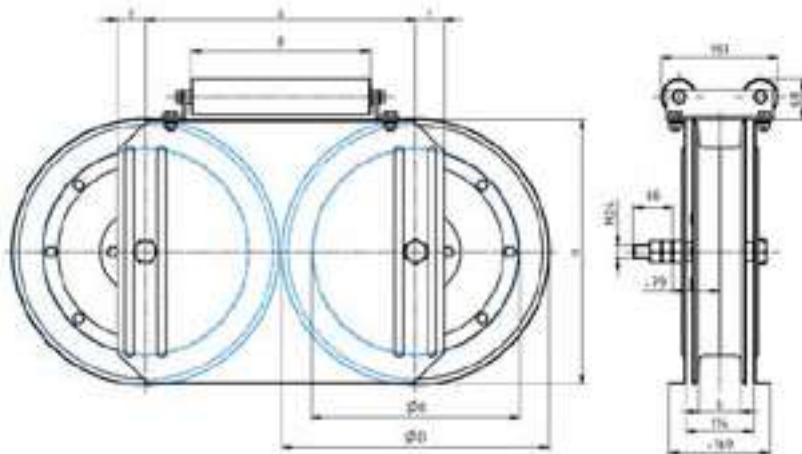
Type Series	a	b	c	$\varnothing d$	$\varnothing D$	n
UD I	455	70	47.5	350	450	444
UD II	655	70	50	530	650	640
UD III	785	70	70	660	780	770
UD IV	925	70	70	780	900	910

### Double Cable Deflector Pulley with Cross Rollers, Type Series UDQ

Double cable deflector pulley for cylindrical coil (multi-layered) with cross rollers. It serves for deflecting drum-reeled cable from a higher positioned cable drum (similar to normal double cable reeling drum) and for passing over the centre feed funnel.



Typ Serie UDQ



Type Series	Drawing No.	max. Cable $\varnothing$
UDQ I	13-70-01-000	22 mm
UDQ II	13-71-01-000	30 mm
UDQ III	13-72-01-000	40 mm
UDQ IV	13-73-01-000	52 mm

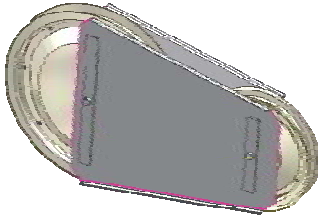
Type Series	a	b	c	$\varnothing d$	$\varnothing D$	n	p
UDQ I	455	70	47.5	350	450	447	301
UDQ II	655	70	50	530	650	640	386
UDQ III	785	70	70	660	780	770	486
UDQ IV	925	70	70	780	900	910	600



## Accessories

### Double Cable Deflector Pulley, Type Series L

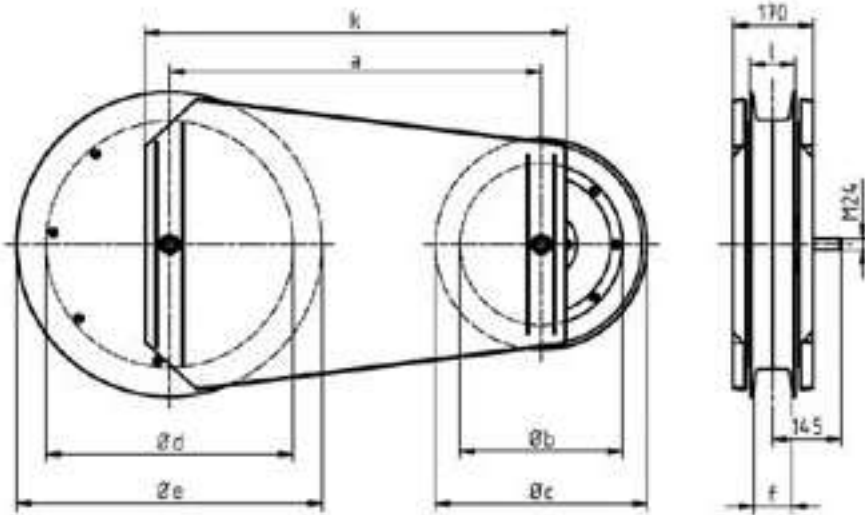
Double cable deflector pulley for channel with unequal deflector pulleys. The installed guide or deflector pulley serves for keeping the drum-reeled cable in a cable channel. The application must always occur laterally with the large pulley in the direction of cable reeling drum. The distance of the drum from the deflector pulley should be chosen such that only an inclination of max. 4° occurs from the drum width. We are at your disposal for more accurate information.



Type Serie L

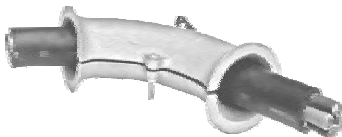
Type Series	Drawing No.	max. Cable Ø
L I	13-67-00-000	30 mm
L II	13-68-00-000	40 mm

Type Series	a	Ø b	Ø c	Ø d	Ø e	f	k	l
L I	790	350	450	530	650	~70	893	96
L II	860	350	450	660	770	~70	943	97



### Deflector Horn

Longitudinally divided deflector horn with chain and screw fastening. The deflector horn prevents kinking of cable when running over cable fixed points. The arrangement is horizontal and as far as possible from the middle, such that it can transform without hindrance. The arrangement must occur in the middle of cable reeling drum. The deflector horn can only be installed when neither the spooling device nor the chain find application.



Type Serie Deflector Horn

Type Series	Drawing No.	max. Cable Ø
Deflector Horn - I	13-14-00-000	19-22 mm
Deflector Horn - II	13-15-00-000	23-32 mm
Deflector Horn - III	13-16-00-000	33-40 mm
Deflector Horn - IV	13-43-00-000	42-55 mm



## Accessories

### Spooling Device, Type Series SP

Spooling device with cross spindle and guiding finger with roller chain for connection to the cable reeling drum. The attachment of the spooling device to the cable reeling drum serves for uniform coiling of the cable on a cylindrical drum body. The uniformly coiled drum body prevents the cable layers from climbing over one another, and thus from overflow of cable layers over the drum shield and subsequent damage or malfunction of cable. At the same time it preserves the cable. The version driven by chain can be retrofitted on existing systems.



Type Serie SP

Type Series	Drawing No.	Coiling Width	max. Cable Ø
SP 590	X03-12-00-000	590 mm	50 mm

\*\*\* Special dimensions can be worked out for you at any time, in cooperation with the customer by specifying the coiling width and the cable diameter. \*\*\*

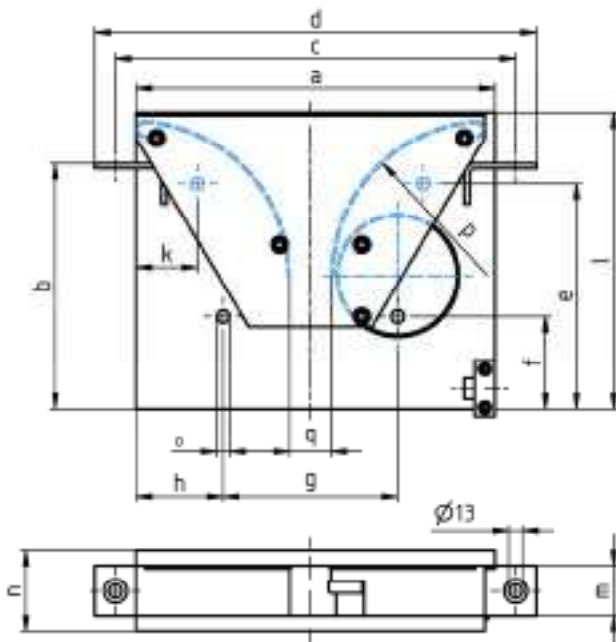
### Cable Deflector Centre Feed Funnel, Type Series ULTV

Cable deflector centre feed funnel with vertical position is suitable for cable channel shaft. The commercial deflector funnel type ULTV is generally accommodated perpendicularly in a concrete shaft for connection to the cable. It should be positioned below the cable deposit. Fastening holes are provided.



Type Serie ULTV

Type Series	Drawing No.	max. Cable Ø
ULTV - I	13-52-00-000	19 mm
ULTV - II	13-47-00-000	21 mm
ULTV - III	13-41-00-000	29 mm
ULTV - IV	13-42-00-000	38 mm



Type Series	a	b	c	d	e	f	g	h
ULTV - I	350	240	390	430	220	90	170	85
ULTV - II	425	270	465	505	220	78	202	98
ULTV - III	540	495	670	720	405	310	300	360
ULTV - IV	820	650	920	970	550	200	400	210

Type Series	i	k	l	m	n	o	p	q
ULTV - I	220	60	290	50	80	13	150	40
ULTV - II	360	20	300	70	110	13	175	40
ULTV - III	400	70	530	100	140	13	270	55
ULTV - IV	740	40	700	140	180	17	400	80





## Accessories

### Deflector and Guide Pulleys, Type Series URN, LRN

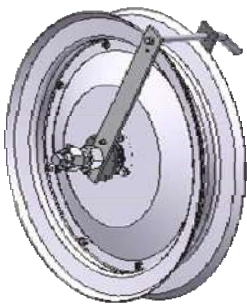
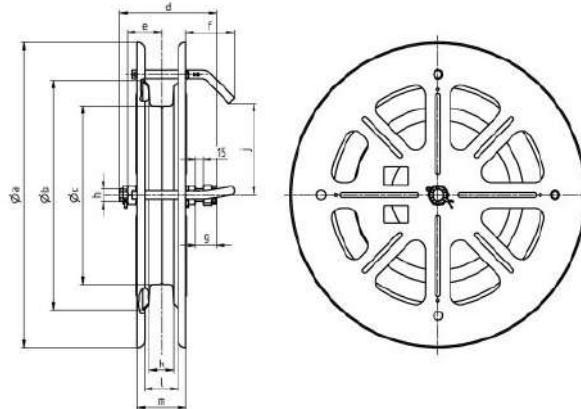
Deflector and guide pulleys for cable guidance for onboard operation in marine design, according to ship classification DNV, GL, and LRS, as well as for harbour cranes. Cable deflector pulleys and guide pulleys for onboard and normal versions. They are used when the drum-reeled cable is not paid out directly from the cable reeling drum, but through cable deflections. Roller core diameters min. 15 x cable diameter.



Type Serie URN

Type Series	Drawing No.	Drawing No. Marine Design	Weight (kg)	Ø a	Ø b	Ø c	d	e	f
URN 350	13-30-01-001	13-30-01-000	23	600	450	350	195	60	99
URN 500	13-32-00-001	13-32-00-000	42	800	650	530	240	84	85
URN 660	13-33-00-001	13-33-00-000	52	900	780	660	240	86	75

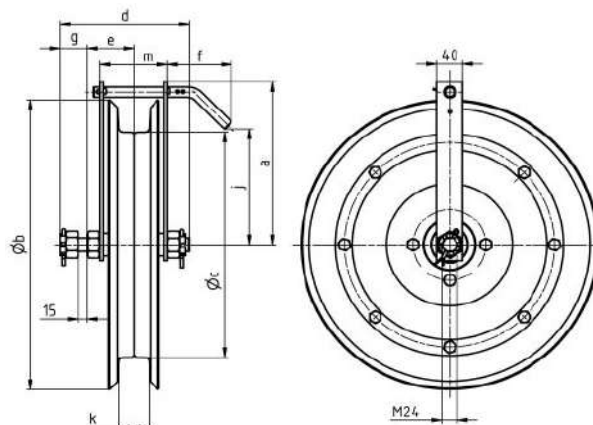
Type Series	Drawing No.	Drawing No. Marine Design	Weight (kg)	g	h	j	k	l	m
URN 350	13-30-01-001	13-30-01-000	23	42	M 20	180	50	58	98
URN 500	13-32-00-001	13-32-00-000	42	57	M 30	280	50	82	112
URN 660	13-33-00-001	13-33-00-000	52	55	M 30	344	70	90	120



Type Serie LRN

Type Series	Drawing No.	Drawing No. Marine Design	Weight (kg)	Ø a	Ø b	Ø c	d	e	f
LRN 350	13-30-00-001	13-30-00-000	16	253	450	350	183	70	97
LRN 500	13-32-01-001	13-32-01-000	24	360	650	530	240	82	88

Type Series	Drawing No.	Drawing No. Marine Design	Weight (kg)	g	h	j	k	l	m
LRN 350	13-30-00-001	13-30-00-000	16	45	M 24	180	45	--	105
LRN 500	13-32-01-001	13-32-01-000	24	59	M 30	280	50	--	116



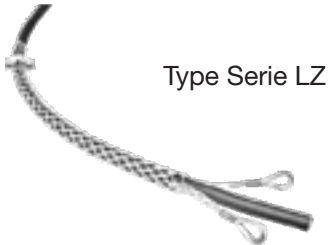




## Accessories

### Cable Grip, Type Series LZ

Cable grip 800 mm long and galvanised, with 2 thimbles and stainless steel clips. Cable grip is matched with the cable diameter. By the supporting of a cable grip, strain relief occurs in the cable at the feed-in point. Through the grip, surface clamping occurs on the cable and no pointed loading. The cable grip are dimensioned with 3-fold safety factor of the max. tensile force.



Type Serie LZ

Type Series	Drawing No.	max. Cable Ø
LZ 1	SK-5034-00	10 - 15 mm
LZ 2	SK-5034-00	15 - 20 mm
LZ 3	SK-5034-00	20 - 25 mm
LZ 4	SK-5034-00	25 - 30 mm
LZ 5	SK-5034-00	30 - 40 mm

### Cable Deposit Roller, Type Series KL

By the supporting of cable deposit roller, permanent contact of the cable with the ground is minimised. Through this, also dirt or damage to the cable is prevented.



Type Serie KL

Type Series	Drawing No.	Width
KL 1	13-51-00-000	200 mm
KL 2	13-51-01-000	300 mm
KL 3	13-51-02-000	400 mm
KL 4	N-030-00A	800 mm

### Rotary Valve

Rotary valve for air and water at max. 10 bar working pressure of the medium = standard. Nominal width (passage) of the rotary valve is how it is specified in the type series. (Hollow axle of the cable reeling drum is equal or greater than the rotary valve). A torque holder is fitted. If desired, for extra charge, it is provided with additional hood over the rotary valve. Other media such as hydraulic oil, gas, vacuum, special liquids, acids, leaches and similar available on request.



Model Example

Type Series	max. Pressure	Pressure Medium
1/8"	10 bar	air
1/8"	10 bar	water
1/4"	10 bar	air
1/4"	10 bar	water
3/8 "	10 bar	air
3/8"	10 bar	water
1/2"	10 bar	air
1/2"	10 bar	water
3/4"	10 bar	air
3/4"	10 bar	water
1"	10 bar	air
1"	10 bar	water
1 1/4"	10 bar	air
1 1/4"	10 bar	water
1 1/2"	10 bar	air
1 1/2"	10 bar	water



## Accessories

### Cam Limit Switch

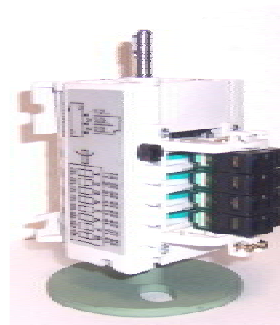
Cam limit switch with switching cams 5 A, 250 V, cam width 40°. Opening under force, for monitoring the position, "Drum full or drum empty".

- I. Cam limit switch with modul housing (IP65) outside the slip ring space, with additional stainless steel (NIROSTA) chain and sprocket wheel.
- II. Cam limit switch without housing (IP20) in the slip ring space.

An additional cam limit switch is possible for all drum types. The pole number must be determined by the customer. In series production we use 2 - 4 - 6 - 8 or 10 contacts. Other contact variants are possible upon request, e.g. with a potentiometer or proximity switch. These limit switches do not serve as safety switches. For further information, we are always at your disposal.



Type I: IP66 with modul housing

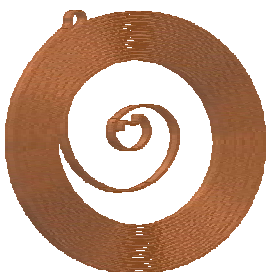


Type II: IP20 without modul housing

### Spiral Spring

Spiral leaf springs for spring-loaded cable reeling drums of the specified type series are spirally coiled, rounded and made of compacted special spring steel. These spiral leaf springs are subject to natural wear due to continuous flexural fatigue. The best suitable material is used for manufacture. After the anticipated spring play approx. 120.000, fatigue features become apparent and can lead to fracture of the spiral leaf springs. Under flexural play, also called spring play, one does not understand the entire spring windings, but rather a play occurs even then, when the spring is moved in only a part of the winding. The spiral leaf spring is hung with an eyelet in the cable drum. Axial hanging takes place via a groove on the axle. Using a special hook design of the spring, it is possible to change the coiling direction of the cable reeling drum.

Drum springs are excluded from guarantee.



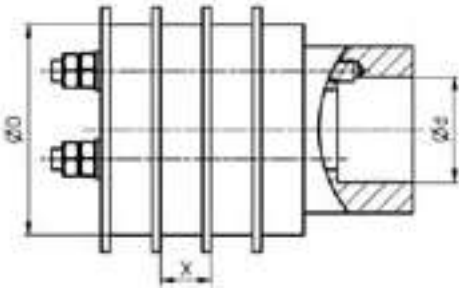
Model Example

Type Series	Outer Ø (mm)	Inner Ø (mm)
508	140	36
531	170	36
551	205	36
524	315	50
525	315	50
552	280	45
553	400	60
572	280	45
583	400	60
585	505	85
586	505	85



## Accessories

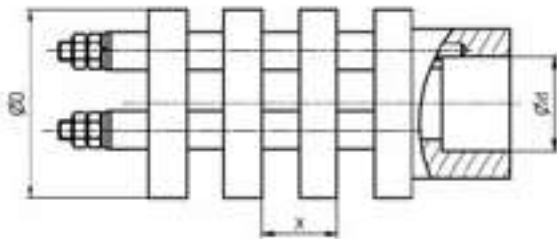
### Slip Ring Body, blocked YB 3 + Earth



Current Rating A	26	32	36	40	42
Outer Ø D	50	80	80	50	80
Bore Hole Ø D	30	55	55	25	55
Distance X	12	8	12	12	12

Current Rating A	60	125	150	220	265	500
Outer Ø D	80	98	130	130	200	200
Bore Hole Ø D	55	55	80	80	100	100
Distance X	14	25	17	22	58	58

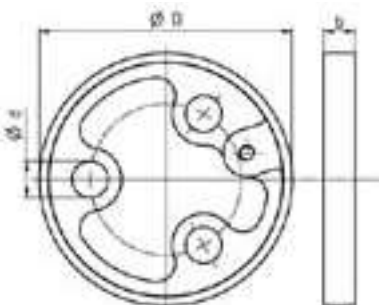
### Slip Ring Body, air gap YL 3 + Earth



Current Rating A	26	32	36	40	42
Outer Ø D	50	80	80	50	80
Bore Hole Ø D	30	55	55	25	55
Distance X	12	8	12	12	12

Current Rating A	60	125	150	220	265	500
Outer Ø D	80	98	130	130	200	200
Bore Hole Ø D	55	55	80	80	100	100
Distance X	14	25	17	22	58	58

### Slip Ring

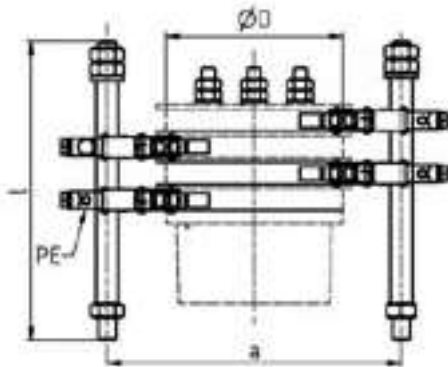


\*\*\* Slip rings – earth are not exchangeable with phase slip rings. \*\*\*

Current Rating A	26	32	36	40	42	60
Outer Ø D	50	80	80	50	80	80
Width b	10	6	10	10	10	12
Phasen - Ø d	8.5	11.5	11.5	8.5	11.5	11.5
Earth - Ø d	5.5	11.5	11.5	5.5	6.5	6.5

Current Rating A	125	150	220	265	500	1000
Outer Ø D	98	130	130	200	200	340
Width b	15	15	20	28	28	30
Phasen - Ø d	12.5	12.5	12.5	16.5	16.5	16.6
Earth - Ø d	8.5	8.5	8.5	12.5	12.5	12.5

### Brush Holder Unit complete 3 + Earth



Current Rating A	26	32	36	40	42	60
Ø D	50	80	80	50	80	80
a	104	133	133	104	133	150

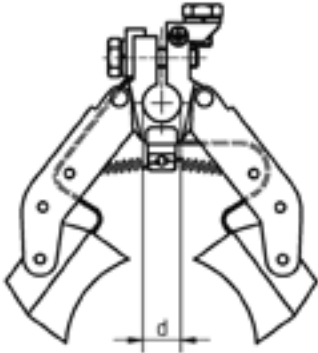
Current Rating A	125	150	220	265	500	1000
Ø D	98	130	130	200	200	340
a	146	224	224	300	300	460

Dimension l is variable based on design on the spring cable reeling drum.



## Accessories

### Brush Holder - Earth

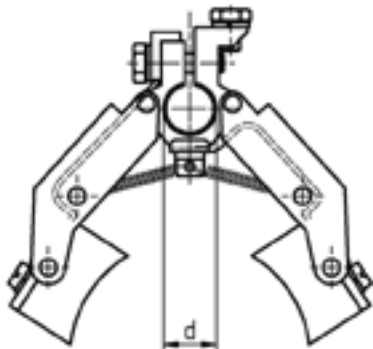


Current Rating A	26	32	36	40	42	60
Dimension Ø d	10	10	10	10	10	13

Current Rating A	125	150	220	265	500	1000
Dimension Ø d	16	16	17	17	17	17

\*\*\* Brush holders - earth are not exchangeable with phase brush holders. \*\*\*

### Brush Holder - Phase



Current Rating A	26	32	36	40	42	60
Dimension Ø d	8	8	8	8	8	12

Current Rating A	125	150	220	265	500	1000
Dimension Ø d	15	16	16	16	16	16



# Questionnaire

1. Track length of consumer

L = \_\_\_\_\_ m

2. Which cable length should be wound on the drum?  
wound on the drum?

l = \_\_\_\_\_ m

( for cable fixed point in the middle of track, cable length is half track length)

3. Coiling type

- spiral
- cylindrical
- 3.2.3 coiling

4. For use of intended cable type

\_\_\_\_\_ mm<sup>2</sup>  
cable Ø \_\_\_\_\_ mm<sup>2</sup>  
cable weight \_\_\_\_\_ kg/m

5. Power to be transmitted and current rating

\_\_\_\_\_ kW  
\_\_\_\_\_ A

6. What % of installed power comes into application?

\_\_\_\_\_

7. How many insulated slip rings are needed?

\_\_\_\_\_

(our drums are always provided with non-insulated earth ring )

8. For which device is the drum used?

\_\_\_\_\_

( e.g. construction crane, crane bridge, ravelling platform, etc.)

9. Should the drum be fixed or attached to a movable equipment ?

fixed  movable

10. Cable payout

- horizontal (plane)
- vertical (perpendicular)
- suspended version
- (see arrangement examples)

11. Mounting height

\_\_\_\_\_ m

(from drum middle to the cable deposit)

12. Drum drive by means of springs

- Counterweight
- electric motor

13. Operating voltage and type of current for drum motor

\_\_\_\_\_ V

14. How many times per hour does the equipment move ?

\_\_\_\_\_ /h

15. Working time in hours per day ?

\_\_\_\_\_ /h

16. Travelling and stroke speed

\_\_\_\_\_ m/min

17. Starting time

\_\_\_\_\_ s

18. Cable deposit

- between the tracks
- outside the tracks

19. Payout direction

- right
- left
- ( always viewed from slip ring )

20. Arrangement of drums

(for figures, see page 4)

- |   |                          |   |                          |
|---|--------------------------|---|--------------------------|
| A | <input type="checkbox"/> | E | <input type="checkbox"/> |
| B | <input type="checkbox"/> | F | <input type="checkbox"/> |
| C | <input type="checkbox"/> | G | <input type="checkbox"/> |
| D | <input type="checkbox"/> | H | <input type="checkbox"/> |

21. Extraordinary ambient conditions:

Mounting height for more than 1000 m above

sea level \_\_\_\_\_  
or underground \_\_\_\_\_  
humidity \_\_\_\_\_ %

strong vibrations yes   
explanation \_\_\_\_\_

no

Noise level in db according to DIN 45633

sheet.1 \_\_\_\_\_

ambient temperature in C°

from \_\_\_\_\_  
to \_\_\_\_\_

Ambient air

- sand dust
- coal dust
- salty water

Other media or application areas

\_\_\_\_\_

22. Painting

priming and cover coat according to RAL 7031 (normal version)

- Hot-dip galvanised
- sand blasting
- other surface treatments

\_\_\_\_\_

For larger drums please send us a drawing or sketch of the installation or attachment conditions.



# Technical Explanatory Notes

## Cable Data, Current Rating, Conversion Factor, Calculating Formula

### Cable Data

4 core		
mm <sup>2</sup>	Ø mm	Weight kg/m
1.5	11.1	0.155
2.5	12.1	0.208
4.0	13.4	0.281
6.0	14.8	0.372
10.0	18.8	0.611
16.0	23.4	0.924
25.0	27.1	1.270
35.0	29.7	1.720
50.0	35.1	2.630
70.0	41.8	3.326
95.0	49.2	4.695
120.0	54.3	5.565
150.0	58.9	6.933

5 core		
mm <sup>2</sup>	Ø mm	Weight kg/m
1.5	11.8	0.178
2.5	12.8	0.241
4.0	14.5	0.318
6.0	16.1	0.426
10.0	20.5	0.704
16.0	23.0	1.067
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

7 core		
mm <sup>2</sup>	Ø mm	Weight kg/m
1.5	13.3	0.231
2.5	14.0	0.308

12 core		
mm <sup>2</sup>	Ø mm	Weight kg/m
1.5	16.9	0.359
2.5	20.2	0.480

Normal cross section		
wire mm <sup>2</sup>	Ø mm	Weight kg/m
18 x 1.5	17.9	0.474
18 x 2.5	20.5	0.679
24 x 1.5	22.6	0.590
24 x 2.5	25.5	0.820
30 x 1.5	24.2	0.710
30 x 2.5	28.7	0.970
42 x 1.5	28.5	0.980

### Calculating Formula

Ohm's Law	$U = I \times R$
Current heat	$W = I^2 \times R \times t$
Resistance of a conductor (supply and return)	$R = \frac{2 \times l}{\chi \times A}$
Direct current power	$P = U \times I$
Alternating current – real power	$P = U \times I \times \cos \varphi$
Three-phase current - real power	$P = \sqrt{3} \times U \times I \times \cos \varphi$
Efficiency	$\eta = \frac{P_{ab}}{P_{zu}}$

<b>U</b>	Operating voltage in V (Volt) in two-wire plants between the two conductors, in direct current three-wire plants between two main conductors.
<b>u</b>	Voltage drop in V from the beginning to the end of the conductor
<b>I</b>	Current in a conductor in A (Amper)
<b>R</b>	Resistance in Ω (Ohm)
<b>W</b>	Work in Ws (Watt second)
<b>P</b>	Power in W (Watt)
<b>P<sub>ab</sub></b>	Dissipated power in W (Watt)
<b>P<sub>zu</sub></b>	Supplied power in W (Watt)

<b>η</b>	(Eta) Efficiency
<b>χ</b>	(Kappa) Conductivity in $\frac{S \times m}{mm^2}$ e.g. for copper approx. 56
<b>cos φ</b>	(Phi) Power factor
<b>A</b>	Cross-section of the conductor in mm <sup>2</sup>
<b>l</b>	One-way length of the conductor section to be considered in m
<b>t</b>	Time in s (second)
<b>V max</b>	Traveller speed (horizontal) Stroke speed (vertical) in m/min

### Current Rating (without consideration of the voltage drop)

Nominal cross section mm <sup>2</sup>	Rating in ...% DC			
	100%	60%	40%	20%
1.5	23	23	23	23
2.5	30	30	30	30
4.0	41	41	42	45
6.0	53	54	55	62
10.0	74	76	80	97
16.0	99	106	115	143
25.0	131	144	161	208
35.0	162	183	208	274
50.0	202	234	270	361
70.0	250	294	409	467
95.0	301	361	427	581
120.0	352	425	506	693
150.0	404	493	589	811
185.0	461	567	681	940

The specified values apply to single-layer coiling. The values for 100% rating are found in table 2 from DIN 57100, Part 523/VDE 0100 and EN60204-0298. They specify the rating of insulated cables according to Group 2 for ambient temperatures of 30 °C as well as a permissible conductor temperature of 60 °C.

### Conversion Factor

For the dependence of current rating on the number of layers on the drum at +30 °C						
Number of layer on the drum	1	2	3	4	5	
Conversion factor	0.8	0.61	0.49	0.42	0.34	
For the dependence of rating on ambient temperature Factor						
°C	Factor	°C	Factor			
above 25 to 30	1	above 40 to 45	0.71			
above 30 to 35	0.91	above 45 to 50	0.58			
above 35 to 40	0.82	above 50 to 55	0.41			
for four-wire conductors						
Numbers of loaded wires	5	7	10	14	19	24
Conversion factor	0.75	0.65	0.55	0.5	0.45	0.4
						0.35

The conversion factors for deviating ambient temperatures are based on table 3 from DIN 57100/VDE0100, Part 523 and EN 60204-0298. The converted values for the intermittent operation are based on experience. Please observe the reduction of current rating of the conductor in the case of multi-layer coiling.

### Voltage drop in Volt

for	for direct current single-phase alternating current (free of induction cos φ = 1)	for three-phase current
given current	$u = \frac{2 \times l \times I}{\chi \times A} (V)$	$u = \frac{\sqrt{3} \times l \times I \times \cos \varphi}{\chi \times A} (V)$
given power	$u = \frac{2 \times l \times P}{\chi \times A} (V)$	$u = \frac{l \times P}{\chi \times A} (V)$

### Cross Section of Cores in mm<sup>2</sup>

for	for direct current single-phase alternating current (free of induction cos φ = 1)	for three-phase current
given current	$A = \frac{2 \times l \times I}{\chi \times u} (mm^2)$	$A = \frac{\sqrt{3} \times l \times I \times \cos \varphi}{\chi \times u} (mm^2)$
given power	$A = \frac{2 \times l \times P}{\chi \times u \times U} (mm^2)$	$A = \frac{l \times P}{\chi \times u \times U} (mm^2)$





## Technical Explanations

### Spring Cable reeling Drum

#### Notes for Cable reeling Drums

Cable reeling drums are suitable for horizontal application with payout towards 1 or 2 sides, as well as for vertical application downwards and upwards. In this regard, we request you to pay attention to our Questionnaire (page 47) as well as to the arrangement examples (page 4). The cable reeling drums that we manufacture conform to appropriate regulations.

#### Application Purpose and Selection of Cable reeling Drums

Our manufacture comprises cable reeling drums with the following drive types:

1. Drive via spiral springs, type series LT, LTSCH, LTA, LTB, LTS (slippingless), KTG etc.
2. Drive via counterweight, type series KTG.

Which of these drum drives is suitable for your application purpose depends on different factors. Since all types of drive starting from the well-known spring-loaded drive, via counterweight drive, are at our disposal. We are in a position to select the best drive for your application purpose.

We have attached a Questionnaire (page 47) to this catalogue; if it is properly filled out, we can consider all these factors when preparing an offer, which are necessary for perfect operation of a drum or of a slip ring body. On page 4, there are arrangement examples about how to mount the drum on the equipment. It is recommendable to attach accurate details and possibly a drawing so that we can provide you with correspondingly optimum, installation proposals.

#### Drum Arrangement

The cable reeling drum has to be located such that the cable at any time, even after running over the middle point, can be freely coiled and uncoiled without hindrance. The cable deposit should, according to the table, occur from maximum 0.5 to 2.5 m underneath the drum axis, outside or inside the tracks. Greater installation heights are possible, but must be drawn to our attention.

#### Cable Selection or Cable Fixed Point

All cable reeling drums can be paid out towards 1 or 2 sides, based on the feed-in. If fed-in on one side, then the cable length equals to the entire track length. If fed-in, in the middle of the track, then the cable length is equal to only half of the track length. In both cases, for strain relief, 2 safety windings must remain on the drum.

The required cable lengths are calculated as follows:

$L_{\text{required}} = \text{coiled cable length } l + 2 \text{ safety windings for strain relief} + \text{distance from fixed point to terminal box} + \text{from the drum to the slip rings} + \text{the mounting height } h.$

The payout length specified in the lists l (m) may not be exceeded, since this can lead to damage to the spiral leaf spring.

#### Choosing the Cable

When purchasing the drum-reeled cable, the supplier must be informed that:

- a) The cable must be suitable for forced guidance with constantly intermittent, uniform movements.
- b) Only non-spinning cables with the VDE or EN compliant bending diameters and tensile loads may be used.

The data we have quoted such as diameters, weight, cross-section as well as drum core diameter, bending radius at deflectors and curves conform to VDE or EN regulations or lie above them for safety reasons. For all values, regulations according to VDE0100 or VDE0165 were used. Due to the frequent high level of wear at the place of use, it has been apparent that special cables manufactured by several companies, even though expensive, exhibit long service life and are best suitable for drum-reeling. Experiments and the data determined by us were carried out with a drum-reeled cable. When selecting the cable cross-section, attention should be paid also to static permanent tensile load, based on the overall copper cross-section of the conductor. For concentric cables, the tensile stress reduces. The tensile forces calculated in our catalogue are based on  $-15^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ . For low temperatures, a higher tensile force is required due to the bending stiffness of the cable.

#### Winding the Cable

The reeling cable has to be laid on the drum body fully and free from twist.

**Please observe our notes in the treatment regulations.**

#### Attention!

Only lay as much cable on the drum, as is specified on the type plate. Two additional windings for strain relief must remain on the drum after paying out the entire cable. These windings have been included in the capacity of the drum body. Appropriate notes are found in our Operating and Maintenance Regulations, which are attached to every cable reeling drum.



## Technical Explanations

### Spring Cable reeling Drum

#### Control Cable

All our cables can be equipped with multi-pole slip ring bodies for four pole lines. The number of wires and the cross-section of cables determine the design of the slip ring body.

#### Operating Voltage

As standard, the drums and slip-rings are rated for up to 500 V three-phase current (3~) or 600V direct current (=). For higher operating voltage, we request for enquiry.

#### Current Rating

As standard, the drums are designed for current ratings for a duty cycle of S1 (100% duty cycle).

#### Protective Earth

All our slip ring bodies and drums are provided with non-insulated protective earth. Number of poles is the number of insulated poles, e.g. 3 pole + earth or 11 poles + earth. The protective earth is identifiable and cannot be mistaken for phase.

#### Drum Body

The drum bodies can be provided both for cylindrical as well as for spiral coiling. To ensure perfect ventilation of cable, large drum bodies are provided with perforated sheet metal jacket and the board sides are in corresponding spoke design.

#### Cam Limit Switch

Additional attachment of a limit switch is possible for all types. This switch serves for limit switching via the control line of the under carriage. (Not to be used as safety switch for track end).

Limit switches can be operated with alternating current 15 - 250 VAC, or direct current 15 - 30 VDC.

#### Protection Class

Our standard cable reeling drums can be erected in open air (IP55).

IP55 means: Full protection exists against touching parts under voltage or inner moving parts.

Protection exists against dangerous dust deposits. Entry of dust as such is not fully prevented, but the dust may not enter in such great amounts that operation is impaired.

Other protections systems are available upon request.

#### Colour Coating

Cable reeling drums are galvanised designed. Other parts are provided with priming or coating in 2 components epoxy resin according to RAL 7031 – blue grey.

Upon request the following surface treatments can be performed:

Other colours, sand blasting and rust primer, hot-dip galvanizing, plastic coating, special coating for maritime environment, etc.

#### Maintenance

Due to simple design the drums require only minor maintenance. Bearings are provided with lubricant. For roller bearings with higher ambient temperature, our operating and maintenance regulations must be observed. The carbon brushes fitted in the slip ring bodies are subject to natural wear. These must be cleaned accordingly and after approx. 2 /3 of wear replaced.

#### Ambient Influences

The environment often brings difficult operating conditions and must be accounted for when placing an order for the drum.

Observe the following items:

Extremely high or low outside temperatures, strong temperature fluctuations, erection in great heights, high humidity, strong vibrations, contaminated air, application at sea or in salty air, underground application just to mention several cases of use.

#### Liability for Faults

If any alterations or repairs to the cable reeling drum are done by anyone else within the time of warranty, we do not take any further liability for faults.

#### Note

Hartmann & König is developed, constructed and produced according to the

- Low Voltage Directive 2006/95/EG
- EMC Directive 2004/108/EG
- Generally valid manufacturing guidelines according to ISO 9001:2000



# General Conditions

## of Hartmann & König Stromzuführungs AG (last update: 2005-12)

### I. GENERAL

1. The scope of deliveries and/or services (hereinafter referred to as „Supplies“) shall be determined by the written declarations of both Parties. General terms and conditions of the Purchaser shall apply only if and when expressly accepted by the supplier or the provider of services (hereinafter referred to as „Supplier“) in writing.
2. The Supplier herewith reserves any industrial property rights and/or copyrights pertaining to its cost estimates, drawings and other documents (hereinafter referred to as „Documents“). The Documents shall not be made accessible to third parties without the Supplier's prior consent and shall, upon request, be returned without undue delay to the Supplier if the contract is not awarded to the Supplier. Sentences 1 and 2 shall apply mutatis mutandis to documents of the Purchaser; these may, however, be made accessible to third parties to whom the Supplier may rightfully transfer Supplies.
3. The Purchaser shall have the non-exclusive right to use standard software, provided that it remains unchanged, is used within the agreed performance parameters, and on the agreed equipment. The Purchaser may make one back-up copy without express agreement.
4. Partial Supplies shall be allowed, unless they are unreasonable to accept for the Purchaser.

### II. PRICES AND TERMS OF PAYMENT

1. Prices shall be ex works and exclude packaging, value added tax shall be added at the then applicable rate.
2. If the Supplier is also responsible for assembly or erection and unless otherwise agreed, the Purchaser shall pay the agreed remuneration and any incidental costs required, e. g. travel costs, costs for the transport of tools and equipment, and personal luggage as well as allowances.
3. Payments shall be made free Supplier's paying office.
4. The Purchaser may set off only those claims that are undisputed or against which no legal recourse is possible.
5. On delay of payment we charge interest payable on arrears.

### III. RETENTION OF TITLE

1. Items pertaining to the Supplies („Retained Goods“) shall remain the property of the Supplier until each and every claim the Supplier has against the Purchaser on account of the business connection has been fulfilled. If the combined value of the security interests of the Supplier exceeds the value of all secured claims by more than 20 %, the Supplier shall release a corresponding part of the security interest if so requested by the Purchaser.
2. For the duration of the retention of title, the Purchaser may not pledge the Retained Goods or use them as security, and resale shall be possible only for resellers in the ordinary course of their business and only on condition that the reseller receives payment from its customer or makes the transfer of property to the customer dependent upon the customer fulfilling its obligation to effect payment.
3. The Purchaser shall inform the Supplier forthwith of any seizure or other act of intervention by third parties.
4. Where the Purchaser fails to fulfil its duties, including failure to make payments due, the Supplier shall be entitled to cancel the contract and take back the Retained Goods in the case of continued failure following expiry of a reasonable time set by the Supplier; the statutory provisions that a time limit is not needed remain unaffected. The Purchaser shall be obliged to surrender the Retained Goods.

### IV. TIME FOR SUPPLIES; DELAY

1. Times set for Supplies can only be observed if all Documents to be supplied by the Purchaser, necessary permits and releases, especially concerning plans, are received in time and if agreed terms of payment and other obligations of the Purchaser are fulfilled. Unless these conditions are fulfilled in time, times set shall be extended appropriately, this shall not apply where the Supplier is responsible for the delay.
2. If non-observance of the times set is due to force majeure such as mobilization, war, rebellion or similar events, e. g. strike or lockout, such time shall be extended accordingly.
3. If the Supplier is responsible for the Delay (hereinafter referred to as „Delay“) and the Purchaser demonstrably suffered a loss therefrom, the Purchaser may claim a compensation as liquidated damages of 0.5 % for every completed month of Delay, but in no case more than a total of 3 % of the price of that part of the Supplies which because of the delay could not be put to the intended use.

4. Purchaser's claims for damages due to delayed Supplies as well as claims for damages in lieu of performance exceeding the limits specified in No. 3 above shall be excluded in all cases of delayed Supplies even upon expiry of a time set to the Supplier to effect the Supplies. This shall not apply in cases of mandatory liability based on intent, gross negligence, or due to injury of life, body or health. Cancellation of the contract by the Purchaser based on statute shall be limited to cases where the Supplier is responsible for the delay. The above provisions do not imply a change in the burden of proof to the detriment of the Purchaser.
5. At the Supplier's request the Purchaser shall declare within a reasonable period of time whether the Purchaser cancels the contract due to the delayed Supplies or insists on the Supplies to be carried out.
6. If dispatch or shipment is delayed at the Purchaser's request by more than one month after notice of the readiness for dispatch was given, the Purchaser may be charged, for every month commenced, storage costs of 0.5 % of the price of the items of the Supplies, but in no case more than a total of 5 %. The parties to the contract may prove that higher or, as the case may be, lower storage costs have been incurred.

### V. TRANSFER OF RISK

1. Even where delivery has been agreed freight free, the risk shall pass to the Purchaser as follows:
  - a) if the Supplies do not include assembly or erection, at the time when the Supplies are shipped or picked up by the carrier. Upon request of the Purchaser, the Supplier shall insure the Supplies against the usual risks of transport at the expense of the Purchaser;
  - b) if the Supplies include assembly or erection, at the day of taking over in the own works or, if so agreed, after a fault-free trial run.
2. The risk shall pass to the Purchaser if dispatch, shipping, the start or performance of assembly or erection, the taking over in the own works or the trial run is delayed for reasons for which the Purchaser is responsible or if the Purchaser has otherwise failed to accept the Supplies.

### VI. ASSEMBLY AND ERECTION

Unless otherwise agreed in writing, assembly/erection shall be subject to the following provisions:

1. The Purchaser shall provide at its own expense and in good time:
  - a) all earth and construction work and other ancillary work outside the scope of the Supplier, including the necessary skilled and unskilled labour, construction materials and tools,
  - b) the equipment and materials necessary for assembly and commissioning such as scaffolds, lifting equipment and other devices as well as fuels and lubricants,
  - c) energy and water at the point of use including connections, heating and lighting,
  - d) suitable dry and lockable rooms of sufficient size adjacent to the site for the storage of machine parts, apparatus, materials, tools, etc. and adequate working and recreation rooms for the erection personnel, including sanitary facilities as are appropriate in the specific circumstances. Furthermore, the Purchaser shall take all measures it would take for the protection of its own possessions to protect the possessions of the Supplier and of the erection personnel at the site,
  - e) protective clothing and protective devices needed due to particular conditions prevailing on the specific site.
2. Before the erection work starts, the Purchaser shall make available of its own accord any information required concerning the location of concealed electric power, gas and water lines or of similar installations as well as the necessary structural data.
3. Prior to assembly or erection, the materials and equipment necessary for the work to start must be available on the site of assembly/erection and any preparatory work must have advanced to such a degree that assembly/erection can be started as agreed and carried out without interruption. Access roads and the assembly/erection site itself must be level and clear.
4. If assembly, erection or commissioning is delayed due to circumstances for which the Supplier is not responsible, the Purchaser shall bear the reasonable costs incurred for idle times and any additional travelling of the Supplier or the erection personnel.
5. The Purchaser shall attest to the hours worked by the erection personnel towards the Supplier at weekly intervals and the Purchaser shall immediately confirm in writing if assembly, erection or commissioning has been completed.



# General Conditions of Hartmann & König Stromzuführungs AG (last update: 2005-12)

6. If, after completion, the Supplier demands acceptance of the Supplies, the Purchaser shall comply therewith within a period of two weeks. In default thereof, acceptance is deemed to have taken place. Acceptance is also deemed to have been effected if the Supplies are put to use, after completion of an agreed test phase, if any.

## VII. RECEIVING OF SUPPLIES

The Purchaser shall not refuse to receive Supplies due to minor defects.

## VIII. DEFECTS AS TO QUALITY

The Supplier shall be liable for defects as to quality („*Sachmängel*“, hereinafter referred to as „*Defects*“,) as follows:

1. All parts or services where a Defect becomes apparent within the limitation period shall, at the discretion of the Supplier, be repaired, replaced or provided again free of charge irrespective of the hours of operation elapsed, provided that the reason for the Defect had already existed at the time when the risk passed.
2. Claims based on Defects are subject to a limitation period of 12 months. This provision shall not apply where longer periods are prescribed by law according to Sec. 438 para. 1 No. 2 (buildings and things used for a building), Sec. 479 para. 1 (right of recourse), and Sec. 634a para. 1 No. 2 (defects of a building) German Civil Code („*BGB*“), as well as in cases of injury of life, body or health, or where the Supplier intentionally or grossly negligently fails to fulfil its obligation or fraudulently conceals a Defect. The legal provisions regarding suspension of expiration („*Ablaufhemmung*“), suspension („*Hemmung*“) and commencement of limitation periods remain unaffected.
3. The Purchaser shall notify Defects to the Supplier in writing and without undue delay.
4. In the case of notification of a Defect, the Purchaser may withhold payments to a reasonable extent taking into account the Defect occurred. The Purchaser, however, may withhold payments only if the subject-matter of the notification of the Defect occurred is justified beyond doubt. Unjustified notifications of Defect shall entitle the Supplier to have its expenses reimbursed by the Purchaser.
5. The Supplier shall first be given the opportunity to supplement its performance („*Nacherfüllung*“) within a reasonable period of time.
6. If supplementary performance is unsuccessful, the Purchaser shall be entitled to cancel the contract or reduce the remuneration, irrespective of any claims for damages it may have according to Art. XI.
7. There shall be no claims based on Defect in cases of insignificant deviations from the agreed quality, of only minor impairment of usefulness, of natural wear and tear or damage arising after the transfer of risk from faulty or negligent handling, excessive strain, unsuitable equipment, defective workmanship, inappropriate foundation soil or from particular external influences not assumed under the contract, or from non-reproducible software errors. Claims based on defects attributable to improper modifications or repair work carried out by the Purchaser or third parties and the consequences thereof shall be likewise excluded.
8. The Purchaser shall have no claim with respect to expenses incurred in the course of supplementary performance, including costs of travel and transport, labour, and material, to the extent that expenses are increased because the subject-matter of the Supplies was subsequently brought to another location than the Purchaser's branch office, unless doing so complies with the intended use of the Supplies.
9. The Purchaser's right of recourse against the Supplier pursuant to Sec. 478 BGB is limited to cases where the Purchaser has not concluded an agreement with its customers exceeding the scope of the statutory provisions governing claims based on Defects. Moreover, No. 8 above shall apply *mutatis mutandis* to the scope of the right of recourse the Purchaser has against the Supplier pursuant to Sec. 478 para. 2 BGB.
10. Furthermore, the provisions of Art. XI (Other Claims for Damages) shall apply in respect of claims of damages. Any other claims of the Purchaser against the Supplier or its agents or any such claims exceeding the claims provided for in this Art. VIII, based on a Defect, shall be excluded.

## IX. INDUSTRIAL PROPERTY RIGHTS AND COPYRIGHT; DEFECTS IN TITLE

1. Unless otherwise agreed, the Supplier shall provide the Supplies free from third parties' industrial property rights and copyrights (hereinafter referred to as „*IPR*“) with respect to the country of the place of destination. If a third party asserts a justified claim against the Purchaser based on an infringement of an IPR with respect to the Supplies made by the Supplier and then used in conformity with the contract, the Supplier shall be liable to the Purchaser within the time period stipulated in Art. VIII No. 2 as follows:
  - a) The Supplier shall choose whether to acquire, at its own expense, the right to use the IPR with respect to the Supplies concerned or whether to modify the Supplies such that they no longer infringe the IPR or replace them. If this would be unreasonable to demand from the Supplier, the Purchaser may cancel the contract or reduce the remuneration pursuant to the applicable statutory provisions.
  - b) The Supplier's liability to pay damages shall be governed by Art. XI.
  - c) The above obligations of the Supplier shall only apply if the Purchaser (i) immediately notifies the Supplier of any such claim asserted by the third party in writing, (ii) does not concede the existence of an infringement and (iii) leaves any protective measures and settlement negotiations to the discretion of the Supplier. If the Purchaser stops using the Supplies in order to reduce the damage or for other good reason, it shall be obliged to point out to the third party that no acknowledgement of the alleged infringement may be inferred from the fact that the use has been discontinued.

2. Claims of the Purchaser shall be excluded if it is itself responsible for the infringement of an IPR.
3. Claims of the Purchaser shall also be excluded if the infringement of the IPR is caused by specifications made by the Purchaser, to a type of use not foreseeable by the Supplier or to the Supplies being modified by the Purchaser or being used together with products not provided by the Supplier.
4. In addition, with respect to claims by the Purchaser pursuant to No. 1 a) above, Art. VIII Nos. 4, 5, and 9 shall apply *mutatis mutandis* in the event of an infringement of an IPR.
5. Where other defects in title occur, Art. VIII shall apply *mutatis mutandis*.
6. Any other claims of the Purchaser against the Supplier or its agents or any such claims exceeding the claims provided for in this Art. IX, based on a defect in title, shall be excluded.

## X. IMPOSSIBILITY OF PERFORMANCE; ADAPTATION OF CONTRACT

1. To the extent that Supplies are impossible to be carried out, the Purchaser shall be entitled to claim damages, unless the Supplier is not responsible for the impossibility. The Purchaser's claim for damages shall, however, be limited to an amount of 10 % of the value of the part of the Supplies which, owing to the impossibility, cannot be put to the intended use. This limitation shall not apply in the case of mandatory liability based on intent, gross negligence or injury of life, body or health; this does not imply a change in the burden of proof to the detriment of the Purchaser. The right of the Purchaser to cancel the contract shall remain unaffected.
2. Where unforeseeable events within the meaning of Art. IV No. 2 substantially change the economic importance or the contents of the Supplies or considerably affect the Supplier's business, the contract shall be adapted taking into account the principles of reasonableness and good faith. Where doing so is economically unreasonable, the Supplier shall have the right to cancel the contract. If the Supplier intends to exercise its right to cancel the contract, it shall notify the Purchaser thereof without undue delay after having realised the repercussions of the event; this shall also apply even where an extension of the delivery period had previously been agreed with the Purchaser.

## XI. OTHER CLAIMS FOR DAMAGES

1. Any claims for damages and reimbursement of expenses the Purchaser may have (hereinafter referred to as „*Claims for Damages*“), based on whatever legal reason, including infringement of duties arising in connection with the contract or tort, shall be excluded.
2. The above shall not apply in the case of mandatory liability, e. g. under the German Product Liability Act („*Produkthaftungsgesetz*“), in the case of intent, gross negligence, injury of life, body or health, or breach of a condition which goes to the root of the contract („*wesentliche Vertragspflichten*“). However, Claims for Damages arising from a breach of a condition which goes to the root of the contract shall be limited to the foreseeable damage which is intrinsic to the contract, unless caused by intent or gross negligence or based on liability for injury of life, body or health. The above provision does not imply a change in the burden of proof to the detriment of the Purchaser.
3. To the extent that the Purchaser has a valid Claim for Damages according to this Art. XI, it shall be time-barred upon expiration of the limitation period applicable to Defects pursuant to Art. VIII No. 2. In the case of claims for damages under the German Product Liability Act, the statutory provisions governing limitation periods shall apply.

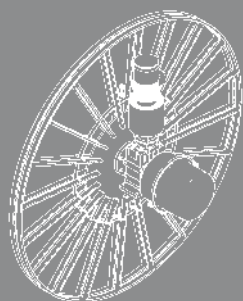
## XII. VENUE AND APPLICABLE LAW

1. If the Purchaser is a businessperson, sole venue for all disputes arising directly or indirectly out of the contract shall be the Supplier's place of business. However, the Supplier may also bring an action at the Purchaser's place of business.
2. Legal relations existing in connection with this contract shall be governed by German substantive law, to the exclusion of the United Nations Convention on Contracts for the International Sale of Goods (CISG).
3. Place of Execution is 76676 Graben – Neudorf (Germany).

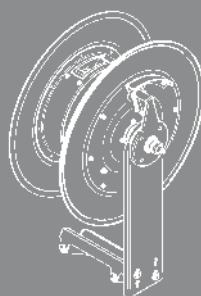
## XIII. SEVERABILITY CLAUSE

The legal invalidity of one or more provisions of this contract shall in no way affect the validity of the remaining provisions. This shall not apply if it would be unreasonable for one of the parties to continue the contract.

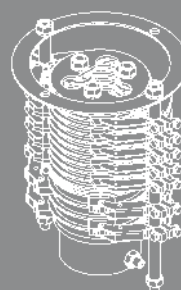
Hartmann & König  
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**Motorized cable reels**



**Spring cable reels**



**Slip ring bodies**

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