



## **MOTOR POWERED CABLE REELS**

**VAHLE**   
**ELECTRIFICATION SYSTEMS**



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**Container crane  
Port Bremerhaven**

Frequency controlled drive with tensile force regulation incl. control.

Slipping body 10 KV with fiber optic cable and rotating coupler, 12 ports

Ø Reel drum: 7,4 m  
Cable payout: 500 m  
Cable: NTSCGEWÖU  
6KV, 3 x 95 +  
2 x 50/3+18 LWL

Travel speed: 55 m/min.  
Mounting height: 20 m

Operating since 2002



**Container crane  
Port Duisburg**

Frequency controlled drive with tensile force regulation incl. control.

Slipping body 10 KV with fiber optic cable and rotating coupler, 6 ports

Ø Reel drum: 5,3 m  
Cable payout: 500 m  
Cable: NTSCGEWÖU  
10KV, 3 x 95 +  
2 x 25/2+6 LWL

Travel speed: 120 m/min.  
Mounting height: 6 m

Operating since 2004



## REFERENCE INSTALLATIONS



### Container crane Port Hamburg

Frequency controlled drive with tensile force regulation incl. control.

Slipping body 10 KV with fiber optic cable and rotating coupler, 18 ports

Ø Reel body: 7,2 m  
Cable payout: 650 m  
Cable: NTSCGEWÖU  
10KV, 3 x 50 +  
2 x 25/2+18 LWL

Travel speed: 45 m/min.  
Mounting height: 22 m

Operating since 2004



### Container crane Mediterranean Port Ashod/Israel

Frequency controlled drive with tensile force regulation incl. control.

Slipping body 10 KV with fibre optic cable and rotating coupler, 6 ports

Ø Reel body: 6,4 m  
Winding width: adjustable  
Cable payout: 400 m  
Cable: NTSCGEWÖU  
6KV, 3 x 70 +  
2 x 25/+6 LWL

Travel speed: 45 m/min.  
Mounting height: 18,5 m

Operating since 2004

### Introduction:

Our motor driven cable reels serve the industry for reliable electrification of equipment in motion; for automatic winding of flexible power and control cables. They fully meet international safety requirements.

### Applications:

Include Portal-, Gantry- and Container Cranes, Dockside-, Ship- and Construction Cranes, Grab buckets and Magnets, Electric Hoist and other material handling, lifting, stacking and storing equipment.

### Special applications:

- VAHLE Reels on board ships or in the tropics.
- VAHLE Reels in aggressive environments (galvanizing plants, pickling lines, sewage treatment systems).
- VAHLE Reels in explosionproof versions (without sliprings).
- VAHLE Reels for Control, Signal and Highfrequency-Transmission.
- VAHLE Reels for Air, Liquids and Gases (Hose Reels).
- VAHLE Reels for handling steel ropes in travel distance tracking systems and for grab stability on heavy cranes (Tag Line Reels).
- VAHLE Reels for curves and for circular monorails with special swivel base.
- VAHLE Reels for multi level machine tools and for push-button pendants.

Vahle welcomes your inquiry for a particular application.

### Electrical properties of sliprings:

VAHLE sliprings are available as follows:

- Low voltage: nominal voltages from 415 up to 1000 Volt  
nominal current from 16 up to 1200 A
- Medium voltage: nominal voltages from 6 up to 20 KV  
nominal current: 600 A

Higher voltages on request.

Slipring enclosures are designed to IP 54. Higher grade protection available on request.

If required, sliprings can be equipped with thermostatically controlled heaters and cam limit switches.

Special sliprings for data transmissions, e.g. Ethernet up to 100 mbps and Profibus 1,5 mbps are also available.

### Drive system:

The following drive systems are employed:

- Three-phase motor with compact drive unit
- Three-phase motor with frequency inverter
  - with constant torque
  - with variable torque
- Torque motor

All drives always work in travel direction. Uncoiling is realized by paying out the cable from the reel body against the drive unit torque. The drive unit adjusts to all travel speeds until standstill. A brake avoids uncontrolled cable payout, if the drive is disconnected.

The drive unit can be equipped with electrical heating.

### Reel bodies:

Monospiral reel bodies with spokes are manufactured in bolted versions, adjustable to width and can therefore be adapted to various cable diameters. The winding diameter is conform to the minimum bending radius of the cable.

- Cylindrical (random) winding reel bodies are made of galvanized steel.

### Also available:

- Double spiral reel bodies for parallel winding of 2 cables with the same diameter.
- 3-2-3 winding layers
- Cylindrical, one layer winding with spool-device

### Cable payout

Standard cable payout as shown on dimensional drawings. If desired cable payout may be reversed without surcharge. A subsequent change of payout direction can be accommodated without major effort.

### Limit Switch

An optional limit switch may be installed on all cable reels to stop travel or hoist motor when only the final two or one windings remain on the reel body.

### Corrosion protection

- Monospiral reel bodies are hot-dip galvanized. Motor and gearbox are treated with primary paint and final coating.
- Random winding reel bodies are zinc-coat galvanized. Motor and gearbox are treated with primary paint and final coating.

### Operating manual

The operating manual for installation and start up procedure is attached to each delivery.

### Installation

When installing the cable reel make certain that cable reel frame or the gearbox is placed on a level surface.

Also it is absolutely essential to accurately position the cable reel at a precise 90 deg. angle to the direction of travel and that the reel axis is level, otherwise, coiling and uncoiling will be impeded. Make certain that the air flow to drive motor or resistor arrangement is unhindered and generated heat can escape freely. Install the cable free of twists and be certain that the for tension relief required one or two windings are present.

The electrical connections to the sliprings and at the cable feed location must be carried out by qualified and licensed personnel. The reel is ready for operation when the drive motor has been connected. The reel body must be turning in coiling direction when the drive motor is correctly wired. The payout direction is marked with an arrow.

### Measures to prevent accidents

As per EC-regulation 2006/42/EG we point out that rotating parts, such as the reel body have to be secured against risks of accidents.

### Warranty

We provide guarantee as per General Terms and Conditions for Products and Services of the Electrical Industry.



## Calculation of required cable cross section

1. Determination of ampacity and cable cross section.
2. Control of voltage drop.
3. Selection of cable.

### 1. Determination of ampacity and cable cross section.

The nominal currents ( $I_N$ ) of the individual motors are summarized with de-rating factors ( $f_{ED}$ ,  $f_T$ ,  $f_1$ ,  $f_2$ ) to an equivalent continuous current ( $I_D$ ). If necessary, the following calculation has to be carried out several times.

$$I_D = \frac{I_N}{f_{ED} \cdot f_T \cdot f_1 \cdot f_2} \quad [A]$$

#### $I_N$ : Recommendation for nominal current

Estimated example for crane installations:

Sum up the nominal currents of the two motors with the strongest output and base load.

$$I_N = I_{N1} + I_{N2} + I_G \quad [A]$$

If only one power output is known:

$$I_N = \frac{P \cdot 1000}{\sqrt{3} \cdot U \cdot (\cos \varphi \cdot \eta)} \cdot f_G \quad [A]$$

P = Power [kW]

U = Voltage [V]

( $\cos \varphi \cdot \eta$ ) = 0,8 estimated

$f_G$  = 1 individual power rating is known

$f_G$  = 0,9 only total power is known

$f_{ED}$ : **Reduction factors for intermittent duty as per table 1**

$f_T$ : **Reduction factors for elevated temperatures**

Reduction factors for ambient temperatures above 30 °C as per table 2.

$f_1$ : **Reduction factors for multilayer coiling**

Reduction factors for ampacity depending on type of winding as per table 3. They are valid for permanently wound up cables. Derating factors can be used if the cables are only temporarily wound up.

$f_2$ : **Reduction factors for multicore cables**

For multicore cables consider derating factors as per table 4 (only valid for cross-section up to 10 mm<sup>2</sup>)

### 2. Check of voltage-drop

Rough calculation to determine the voltage drop  $\Delta U$

$$\Delta U = \sqrt{3} \cdot L \cdot I_A \left( \frac{Z}{1000} \right) \quad [V]$$

L = total cable length [m]

$I_A$  = starting current [A]

Z = impedance [ $\Omega$ /km]

for  $\cos \varphi = 0,6$  from table 1

$\Delta U$  = recommendation  $\Delta U < 5 \%$

**I<sub>A</sub>: Calculation of start-up current**

The order of the motor sizes does not depend on their power output , it is based on the level of the start-up current, i.e. a squirrel cage motor with small power output, but with high start-up current will be placed in sequence before a slipring motor with higher power output.

Recommendation:  $I_A = I_{A1} + I_{N2} \quad [A]$

I<sub>A1</sub> = 1. Motor with highest start-up current

I<sub>N2</sub> = 2. Motor with highest nominal current

Advice:  $I_A = X \cdot I_N \quad [A]$

Squirrel cage motor:  $X \approx 6$

Slipring motor:  $X \approx 2$

Frequency regulated motor:  $X \approx 1,1$

**3. Selection of cables (larger type face, see page 6)**

Select only suitable reeling cables as per regulation DIN / VDE 0298. Consider the smallest permissible bending radii (table 5).

Due to the required mechanical strength do not select cross sections of control cables lower than 1,5 mm<sup>2</sup>. We recommend to include spare conductors for multicore control cables.





# CABLE SELECTION

**Table 1: Continuous ampacity of cables type NSH . . . and NTS . . . for straight, open air lay down.  
Max. permissible operation temperature of the conductor 90° C.**

Wire size [mm <sup>2</sup> ]	Continuous ampacity 30° C [A] art 30 °C	$f_{ED}$	Multiplier for intermittent service				Z [Ω / km]
			60%	40%	25%	15%	
1,5	23		1,00	1,00	1,00	1,00	8,770
2,5	30		1,00	1,00	1,04	1,07	5,310
4	41		1,00	1,03	1,05	1,19	3,360
6	53		1,00	1,04	1,13	1,27	2,250
10	74		1,03	1,09	1,21	1,44	1,370
16	99		1,07	1,16	1,34	1,62	0,888
25	131		1,10	1,23	1,46	1,79	0,587
35	162		1,13	1,28	1,53	1,90	0,443
50	202		1,16	1,34	1,62	2,03	0,344
70	250		1,18	1,38	1,69	2,13	0,258
95	301		1,20	1,42	1,74	2,21	0,205
120	352		1,21	1,44	1,78	2,26	0,174
150	404		1,22	1,46	1,81	2,30	0,154
185	461		1,23	1,48	1,82	2,32	0,136
240	540		1,23	1,49	1,85	2,36	0,119

**Table 2: Multiplier for ambient temperature**

Ambient temperature [°C]	25	30	35	40	45	50	55	60	65
Correction factor $f_T$	1,05	1,00	0,95	0,89	0,84	0,77	0,71	0,63	0,55

**Table 3: Multiplier for multilayer coiling**

Number of full layers on reel	1 <sup>(1)</sup>	2	3	5
Correction factor $f_i$	0,80	0,61	0,49	0,38

**Table 4: Multiplier for multi-conductor cable, up to 10 mm<sup>2</sup> wire size**

Number of conductors	5	7	10	14	19	24	40	61
Correction factor $f_c$	0,75	0,65	0,55	0,50	0,45	0,40	0,35	0,30

<sup>(1)</sup> also for spiral winding

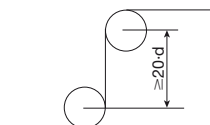
**Table 5: Minimum bending radii**

Type of cable	Nominal voltage up to 0,6 / 1 kV			Nominal voltage above 0,6 / 1 kV	Remarks
Flexible cables	Overall diameter of cable in mm				If cable types can be used for several applications consult the manufacturer. Suitability for this operation must be guaranteed by special design features.
	above 8 - 12	above 12 - 20	above 20		
fixed installation	3 x d	4 x d	4 x d	6 x d	
fully flexible installation	4 x d	5 x d	5 x d	10 x d	
for entry	4 x d	5 x d	5 x d	10 x d	
for positive guidance with reeling operation	5 x d	5 x d	6 x d	12 x d	
for positive guidance with rollers/sheaves	7,5 x d	7,5 x d	7,5 x d	15 x d	

Cables PUR-HF 0,6/1 kV allow under positive guidance like reel operation up to 20 mm Ø a minimum permissible bending radius 6 x d.

The straight section between two bends in an S-shaped cable guide or guidance to another level must be at least 20-times the cable diameter.

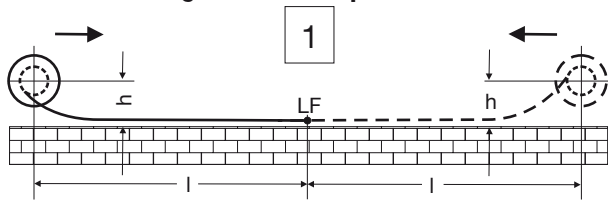
Subject to technical advancement.





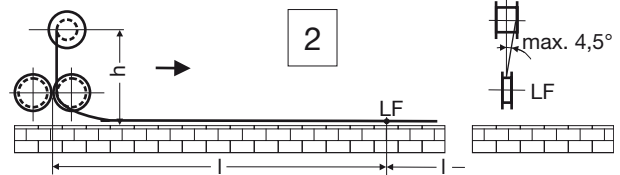


## Cable reel configuration examples

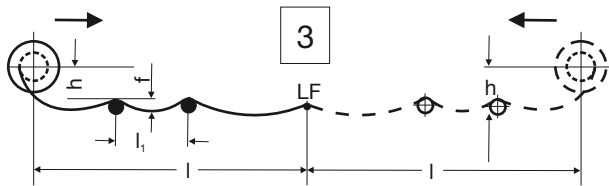


### Retrieve

Reel is mounted on the moving equipment, picks up cable from the floor or other surface. One or two way horizontal payout.

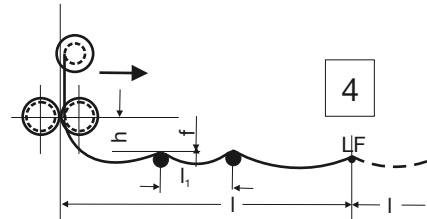


### Retrieve lift

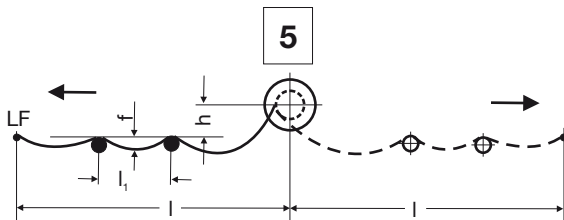


### Retrieve

Much the same as above, however cable recovery from round support brackets or rollers at regular intervals;  $l_i$  for brackets max. 1 m, for rollers 1 up to 3 m.

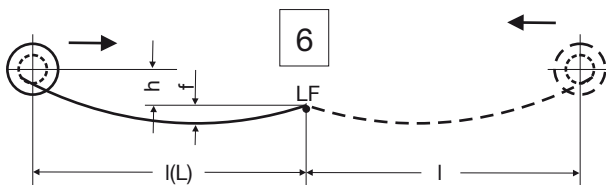


### Retrieve lift



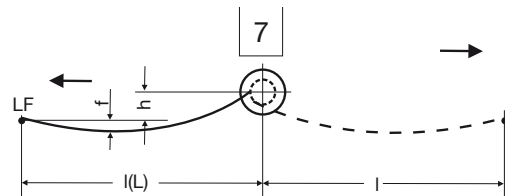
### Drag

In this case the reel is stationary. Cable is dragged over round supports or rollers to and from the reel, in one or two directions ( $l_i \bullet 3$  m).



### Horizontal stretch with reel on moving equipment

Cable is suspended horizontally, supported only at both ends, allowing a sag ( $f$ ) in relation to  $l$  or  $L$  whatever is longer.

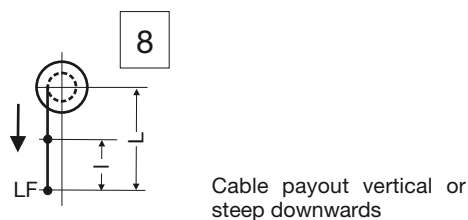


### Horizontal stretch with stationary reel

### Legend to Drawings:

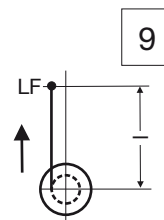
$l$  = operational (active) length of cable  
 $L$  = max. length between reel and end of cable  
 $h$  = height of reel above recovery surface

$LF$  = feed point or cable fixpoint  
 $f$  = cable sag  
 $l_i$  = support intervals



Cable payout vertical or steep downwards

### Lifting operation



Cable payout vertical or steep upwards

### Legend to Drawings (samplel 8 and 9)

$LF$  = Cable fixpoint  
 $l$  = oprational length of cable (lifting height) [m]

$L$  = max. length between reel and end of cable [m]. Additional weight (e.g. control switch) has to be considered.



# QUESTIONNAIRE

1. For what type of moving equipment is the reel? \_\_\_\_\_  
(Dimensional drawings of equipment and application are extremely valuable)

- 1.1 Installation site indoor  outdoor
- 1.2 Temperature conditions - \_\_\_\_ °C + \_\_\_\_ °C
- 1.3 Duty factor (time on) of full operating load \_\_\_\_\_ % DF
- 1.4 Environmental conditions \_\_\_\_\_

2. Type of application (see page 6) example \_\_\_\_\_

- 2.1 Reel type random wrap  monospiral wrap

3. Mounting height from center of reel to cable pickup surface \_\_\_\_\_ m

4. Working travel of equipment in motion \_\_\_\_\_ m

5. Cable Payout one-way  two-way

6. Operational length of active cable I = \_\_\_\_\_ m, L = \_\_\_\_\_ m  
(Midway feed-point cuts the length of cable needed in half)

6.1 For vertical lift (see page 4, example 8) I = \_\_\_\_\_ m, L = \_\_\_\_\_ m

6.2 Operated from a remote point to raise and lower cable at a controlled speed yes  , no

6.2.1 Loads in addition to cable weight (pendant controls or receptacles) \_\_\_\_\_ kg or \_\_\_\_\_ lbs

7. Chosen Cable (Number of copper conductors x wire size) \_\_\_\_\_ x \_\_\_\_\_ mm<sup>2</sup> or \_\_\_\_\_ #AWG

7.1 Weight of cable \_\_\_\_\_ kg/m or \_\_\_\_\_ lbs/ft.

7.2 Diameter of cable \_\_\_\_\_ mm or \_\_\_\_\_ in.

8. Full operating load or maximum horsepower of equipment \_\_\_\_\_ KW or \_\_\_\_\_ HP

8.1 Nom. amperage (nominal current – I<sub>N</sub>) \_\_\_\_\_ A

8.1.1 Start-up amperage (start-up current – I<sub>A</sub>) \_\_\_\_\_ A

8.2 Voltage rating / frequency \_\_\_\_\_ V \_\_\_\_\_ Hz

9. What percentage of the total installed ampacity will work simultaneously \_\_\_\_\_ %

10. Number of phase collector rings required \_\_\_\_\_ pcs.  
(Our cable reel slipping assemblies always include one non-insulated ground)

11. How many cycles of the equipment per hour? \_\_\_\_\_ cycles

12. Operating hours per day \_\_\_\_\_ hours.

13. Speed of travel or lift \_\_\_\_\_ m/min.

14. Shortest starting time \_\_\_\_\_ sec.

15. Acceleration \_\_\_\_\_ sec. \_\_\_\_\_ m/sec.<sup>2</sup>

16. Details for reel drive motor

16.1 Voltage / frequency \_\_\_\_\_ V \_\_\_\_\_ Hz

16.2 Duty cycle \_\_\_\_\_ % DF

16.3 Is it possible to control reel drive motor from the host carrier \_\_\_\_\_ yes \_\_\_\_\_ no

17. Limit switch for travel or lift required \_\_\_\_\_ yes \_\_\_\_\_ no

Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# DETERMINATION OF OPTIMUM DRIVE CONFIGURATION



## Advice for selection of the most suitable drive system

The various characteristics of our different drives guarantee an effective and cost saving solution for each application:

### Intermittent duty

The best solution for intermittent duty is in most cases the compact drive unit.

This system offers a very good price performance ratio for travel speeds up to approx. 60 m/min. and host carrier controlled intermittent duty service. The compact drive unit represents especially for continuous operation of smaller sized equipment with moderate speeds, the optimum solution.

Simple operation and high reliability are its well received attributes.

### Continuous operation

Mainly torque motors and frequency controlled drives are used for continuous operations.

- **Torque motors:** for smaller sized applications and lower travel speeds
- **Frequency controlled drives:** for sizable reels or high travel speeds

All essential parameters must be known to correctly design a motor driven cable reel:

1. Type of application
2. Travel speed
3. Start-up acceleration
4. Total length of cable to be coiled
5. Type of cable (no. of poles + cross section)
6. Mounting height
7. Ambient temperature
8. Motor voltage / frequency

Please refer to our questionnaire on page 10.



Especially the duty cycle must be indicated. The use of a reel that is calculated for intermittent service can decrease the price by 30% and more in comparison to a reel that is continuously operating. So, why waste money?

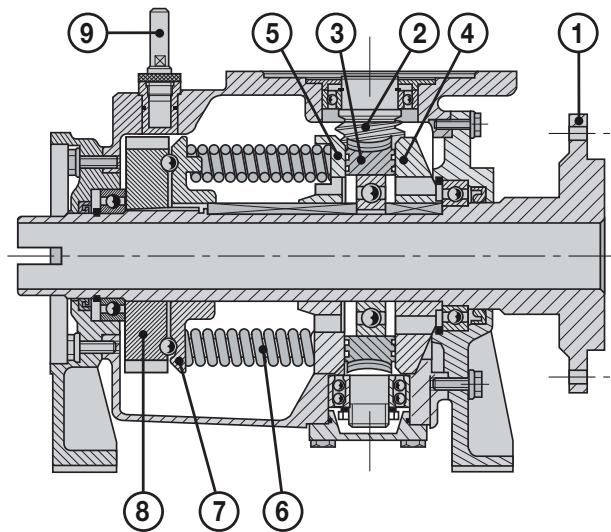
## Motor reels with compact drive units

The compact drive unit is coupled directly to the cable reel axle. This produces a very flat torque curve for coiling and uncoiling which in turn results in a substantially above average life cycle for the cable.

Torque fluctuations caused by coiling speed or slip are limited to 5-10 % depending on the size of the drive unit.

This system offers an economical and easy to implement solution for a great number of applications for cable and hose reels. It consists of a compact unit with integrated gearbox and clutch driven by a squirrel cage motor. Hydraulic motors or compressed air motors can also be utilized.

The torque drive has a substantial advantage in that the torque is easily adjustable. Therefore cable tension can be adjusted if site conditions should require.



In the drive unit, represented in the sectional drawing above, the clutch is the main component which permits the constant torque output.

A bronze crown gear (3), driven by a motor driven worm screw (2), is freely mounted on the reel shaft. Its surfaces are specially machined.

The friction plates (4 and 5) are installed on either side of the crown gear. They are made of steel and are fixed to the reel shaft with a key.

The friction plates are also specially machined so while they are turning an oil film is generated between the crown gear and the friction plates which transmits torque to the reel shaft.

In order to adjust the clutch to obtain the required output, the torque unit has an adjustable spring assembly which consists of the rear friction plate (5), a series of springs (6), the spring holder plate (7) and the torque adjusting nut (8).

The rear friction plate is fixed to the reel shaft with a key, but can slide along the shaft axis. The torque adjusting nut is screwed onto the reel shaft and pushes against the spring holder plate through a series of steel balls.

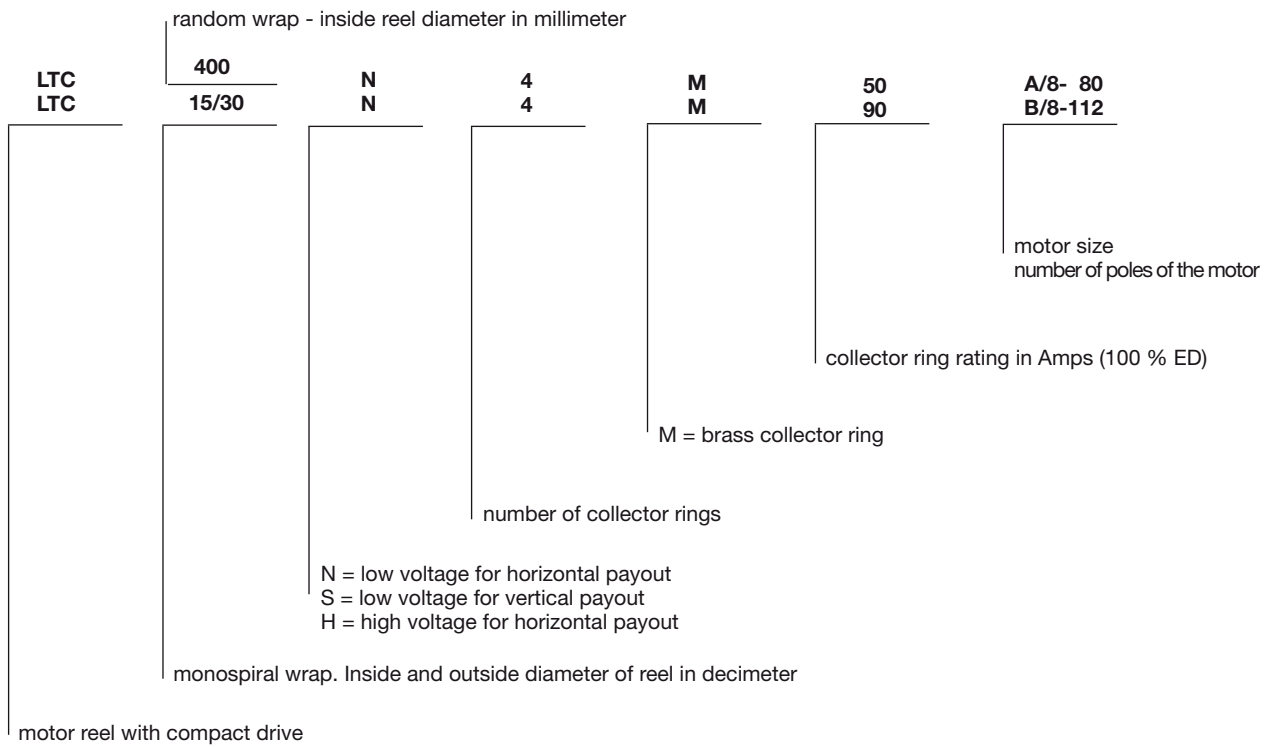
The torque can be adjusted by placing the torque adjusting key (9) upside down into the torque unit. With the torque adjusting nut (8) held in place, the reel axle can be turned manually, thus increasing or decreasing the torque output of the clutch to the desired level.



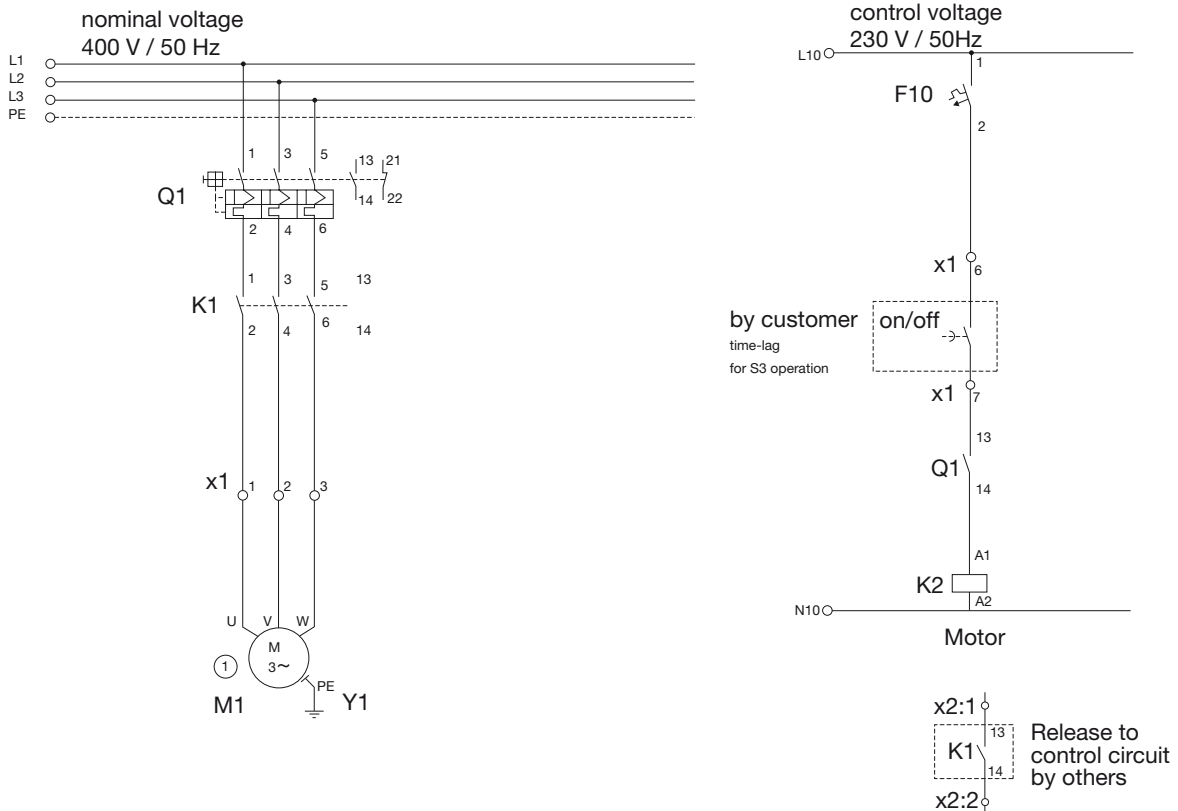
# TYPE DESIGNATION CODE COMPACT DRIVE-UNIT PRINCIPLE CIRCUIT DIAGRAM

## Motor reel with compact drive-unit

### Type code

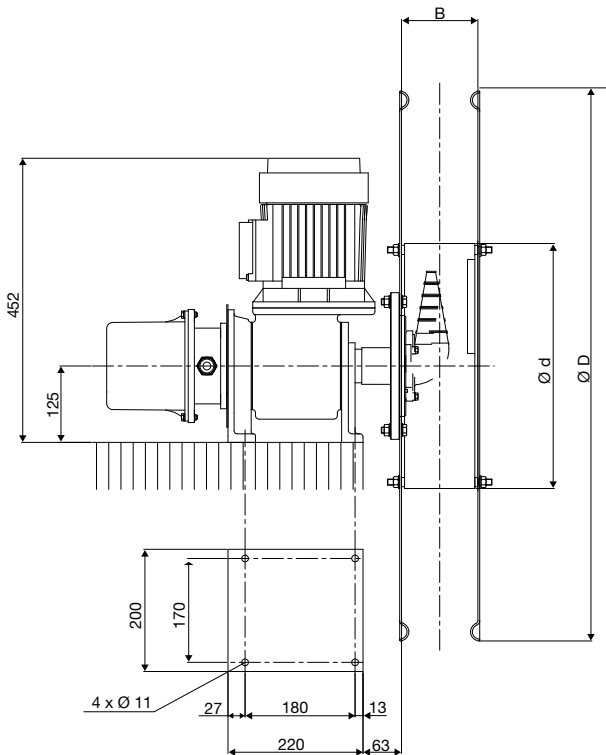


## VAHLE reel control with compact drive

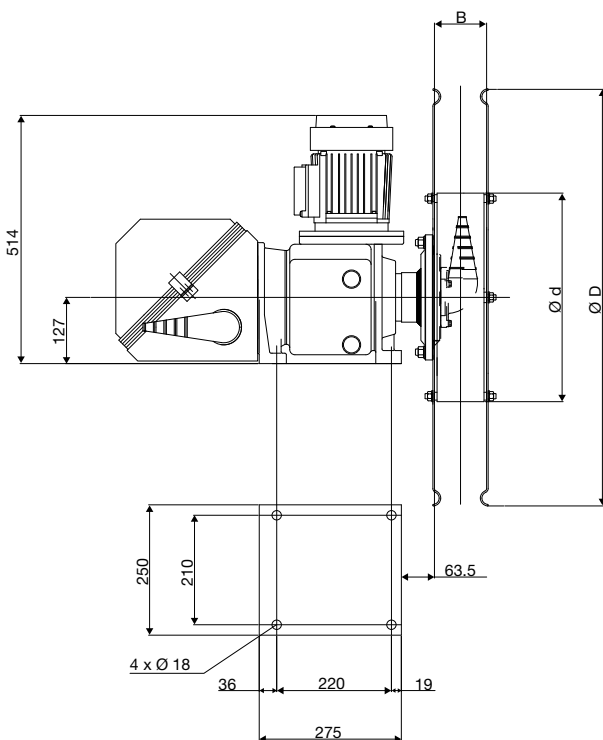




## Low voltage - spiral wrap



Drive unit A						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	B	15 mm	20 mm	25 mm	30 mm
300 mm	600 mm	100 mm	34 m	24 m	18 m	-
300 mm	600 mm	150 mm	50 m	41 m	24 m	-
300 mm	600 mm	200 mm	67 m	53 m	33 m	-
400 mm	800 mm	100 mm	43 m	30 m	23 m	24 m
400 mm	800 mm	150 mm	65 m	52 m	39 m	32 m
400 mm	800 mm	200 mm	86 m	67 m	55 m	49 m



Drive unit B						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	B	15 mm	20 mm	25 mm	30 mm
300 mm	600 mm	100 mm	34 m	24 m	18 m	-
300 mm	600 mm	150 mm	50 m	41 m	24 m	-
300 mm	600 mm	200 mm	67 m	53 m	33 m	-
400 mm	800 mm	100 mm	43 m	30 m	23 m	24 m
400 mm	800 mm	150 mm	65 m	52 m	39 m	32 m
400 mm	800 mm	200 mm	86 m	67 m	55 m	49 m

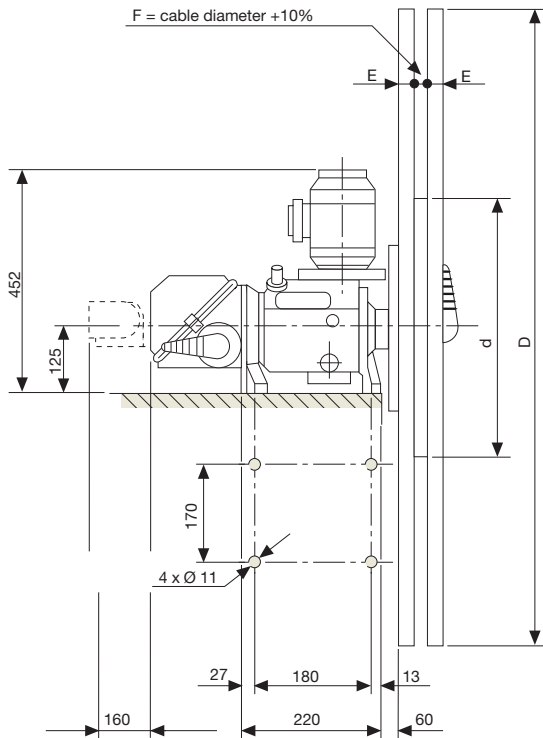
These tables should be used only for approximate calculation of the reel body. Please send your inquiry for your application.



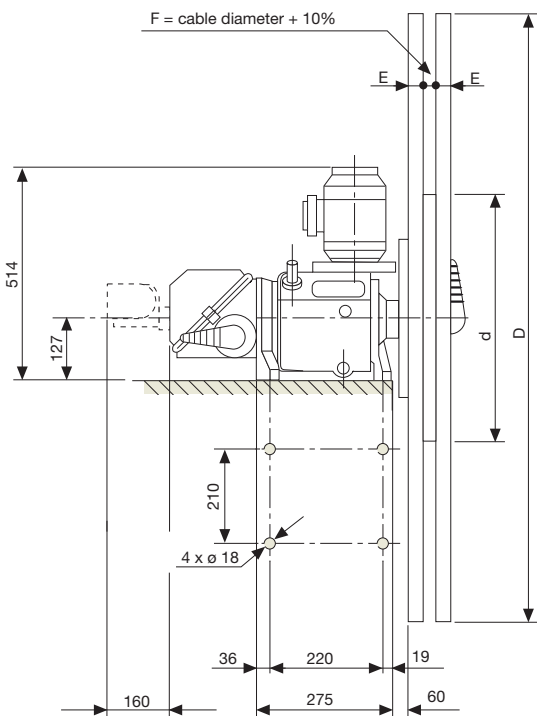
# REEL DIMENSIONAL DRAWINGS

with compact drive

## Low voltage - spiral wrap



Drive unit A						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	13 mm	15 mm	18 mm	20 mm
300 mm	700 mm	20 mm	19 m	16 m	12 m	11 m
300 mm	900 mm	20 mm	38 m	32 m	24 m	23 m
500 mm	1000 mm	40 mm	38 m	30 m	23 m	21 m
500 mm	1200 mm	40 mm	61 m	54 m	43 m	37 m
500 mm	1400 mm	40 mm	93 m	81 m	66 m	57 m
500 mm	1600 mm	40 mm	129 m	109 m	89 m	79 m

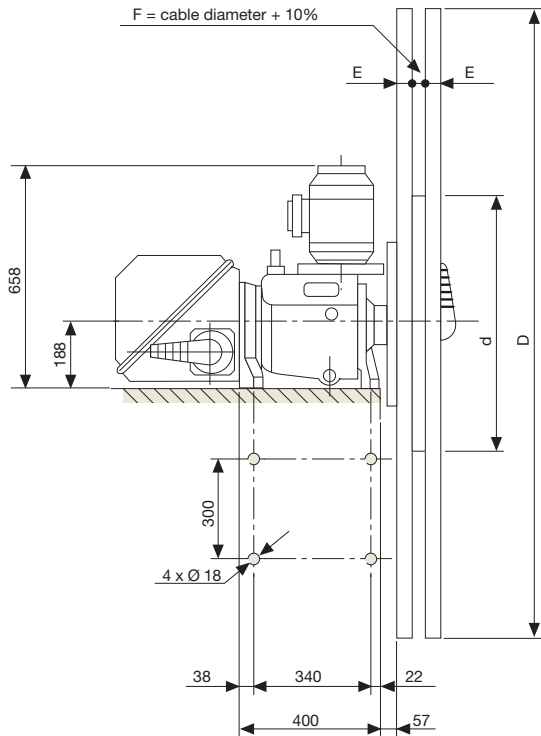


Drive unit B						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	15 mm	20 mm	23 mm	25 mm
500 mm	1000 mm	40 mm	30 m	21 m	16 m	16 m
500 mm	1200 mm	40 mm	54 m	37 m	32 m	30 m
500 mm	1400 mm	40 mm	81 m	57 m	48 m	45 m
800 mm	1600 mm	40 mm	87 m	65 m	53 m	50 m
800 mm	1900 mm	40 mm	140 m	102 m	84 m	82 m
800 mm	2200 mm	40 mm	203 m	152 m	128 m	119 m

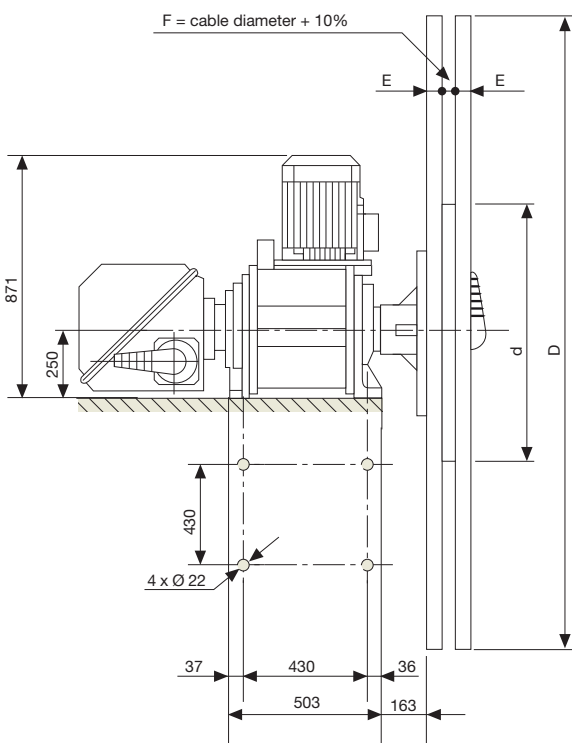
These tables should be used only for approximate calculation of the reel body. Please send your inquiry for your application.



## Low voltage - spiral wrap



Drive unit C						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	20 mm	25 mm	30 mm	35 mm
500 mm	1400 mm	40 mm	57 m	45 m	36 m	27 m
800 mm	1600 mm	40 mm	65 m	50 m	38 m	30 m
800 mm	1900 mm	40 mm	102 m	82 m	64 m	51 m
800 mm	2200 mm	40 mm	152 m	119 m	95 m	81 m
1200 mm	2500 mm	60 mm	169 m	135 m	105 m	87 m
1200 mm	2800 mm	60 mm	234 m	184 m	145 m	119 m



Drive unit D						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	30 mm	35 mm	40 mm	45 mm
800 mm	2200 mm	63 mm	95 m	81 m	66 m	57 m
800 mm	2500 mm	75 mm	131 m	110 m	94 m	77 m
1200 mm	3100 mm	160 mm	189 m	164 m	135 m	123 m
1200 mm	3800 mm	360 mm	316 m	270 m	229 m	196 m
1500 mm	4000 mm	380 mm	329 m	277 m	244 m	208 m
1500 mm	4300 mm	450 mm	393 m	341 m	295 m	258 m

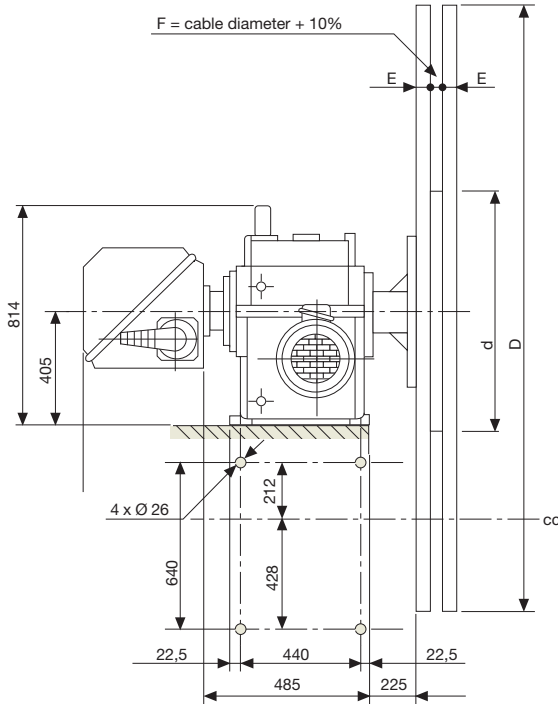
These tables should be used only for approximate calculation of the reel body.  
Please send your inquiry for your application.



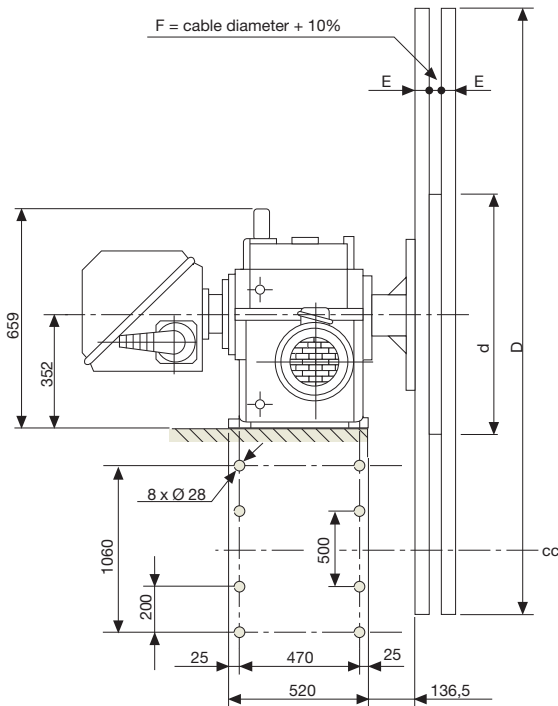
# REEL DIMENSIONAL DRAWINGS

with compact drive

## Low voltage - spiral wrap



Drive unit E						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	40 mm	45 mm	50 mm	55 mm
1200 mm	3500 mm	80 mm	185 m	163 m	150 m	125 m
1200 mm	3800 mm	80 mm	229 m	196 m	184 m	158 m
1500 mm	4300 mm	100 mm	295 m	258 m	231 m	202 m
1500 mm	5000 mm	100 mm	409 m	357 m	331 m	286 m
2000 mm	5500 mm	120 mm	472 m	412 m	382 m	330 m
2000 mm	6000 mm	120 mm	596 m	518 m	470 m	418 m

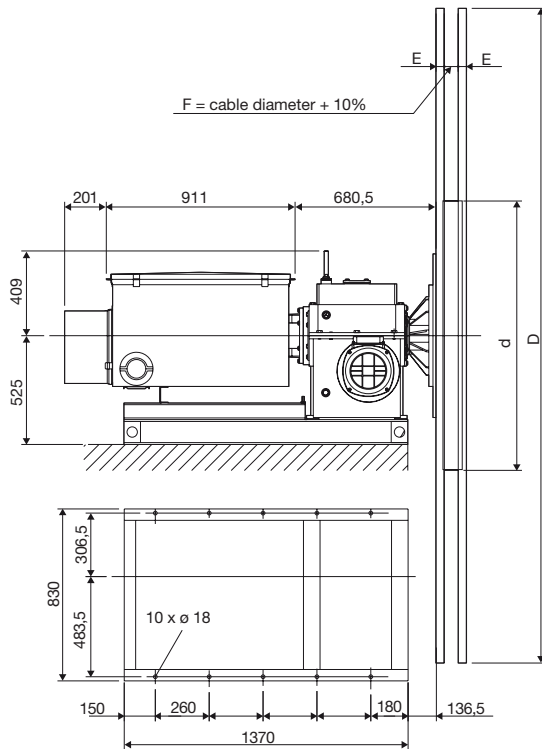


Drive unit F						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	50 mm	55 mm	60 mm	65 mm
2000 mm	6000 mm	100 mm	470 m	418 m	380 m	340 m
2500 mm	6500 mm	120 mm	528 m	470 m	427 m	382 m
2500 mm	7000 mm	120 mm	633 m	552 m	510 m	465 m
2500 mm	7300 mm	150 mm	699 m	618 m	576 m	508 m
3000 mm	7300 mm	150 mm	653 m	588 m	518 m	491 m

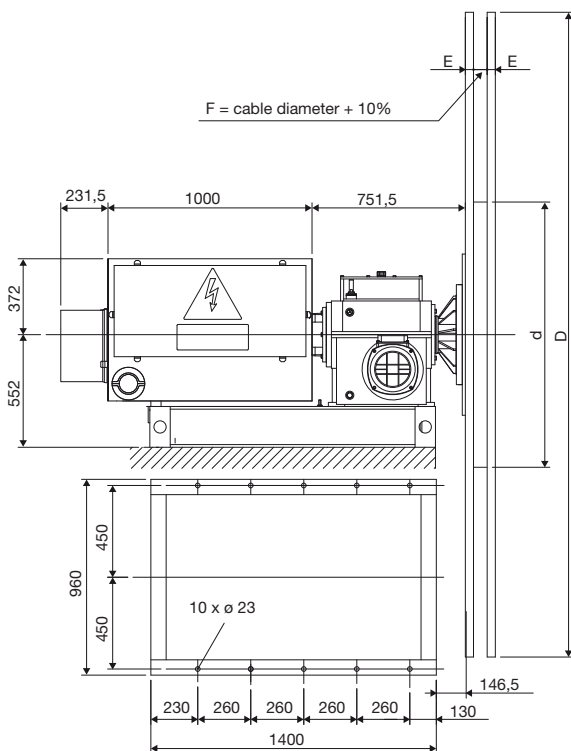
These tables should be used only for approximate calculation of the reel body. Please send your inquiry for your application.



## Medium voltage



Drive unit G						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	41 mm	44 mm	47 mm	53 mm
1200 mm	3500 mm	80 mm	187 m	172 m	156 m	-
1200 mm	3800 mm	80 mm	220 m	205 m	189 m	-
1500 mm	4300 mm	100 mm	285 m	255 m	237 m	211 m
1500 mm	5000 mm	100 mm	399 m	368 m	350 m	311 m
2000 mm	5500 mm	120 mm	461 m	425 m	404 m	358 m
2000 mm	6000 mm	120 mm	566 m	530 m	492 m	428 m



Drive unit H						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	48 mm	50 mm	56 mm	60 mm
2000 mm	6000 mm	100 mm	479 m	470 m	403 m	380 m
2500 mm	6500 mm	120 mm	539 m	528 m	453 m	427 m
2500 mm	7000 mm	120 mm	642 m	633 m	557 m	510 m
2500 mm	7300 mm	150 mm	708 m	699 m	601 m	576 m
3000 mm	7300 mm	150 mm	664 m	653 m	569 m	518 m

These tables should be used only for approximate calculation of the reel body. Please send your inquiry for your application.



# MOTOR REELS

with torque motor

## Motor reels with torque motor

Our torque motors are especially designed for reel operation and have therefore an extremely flat torque curve. Usable rpm is 400 rpm which is considerably higher than for standard commercial torque motors.

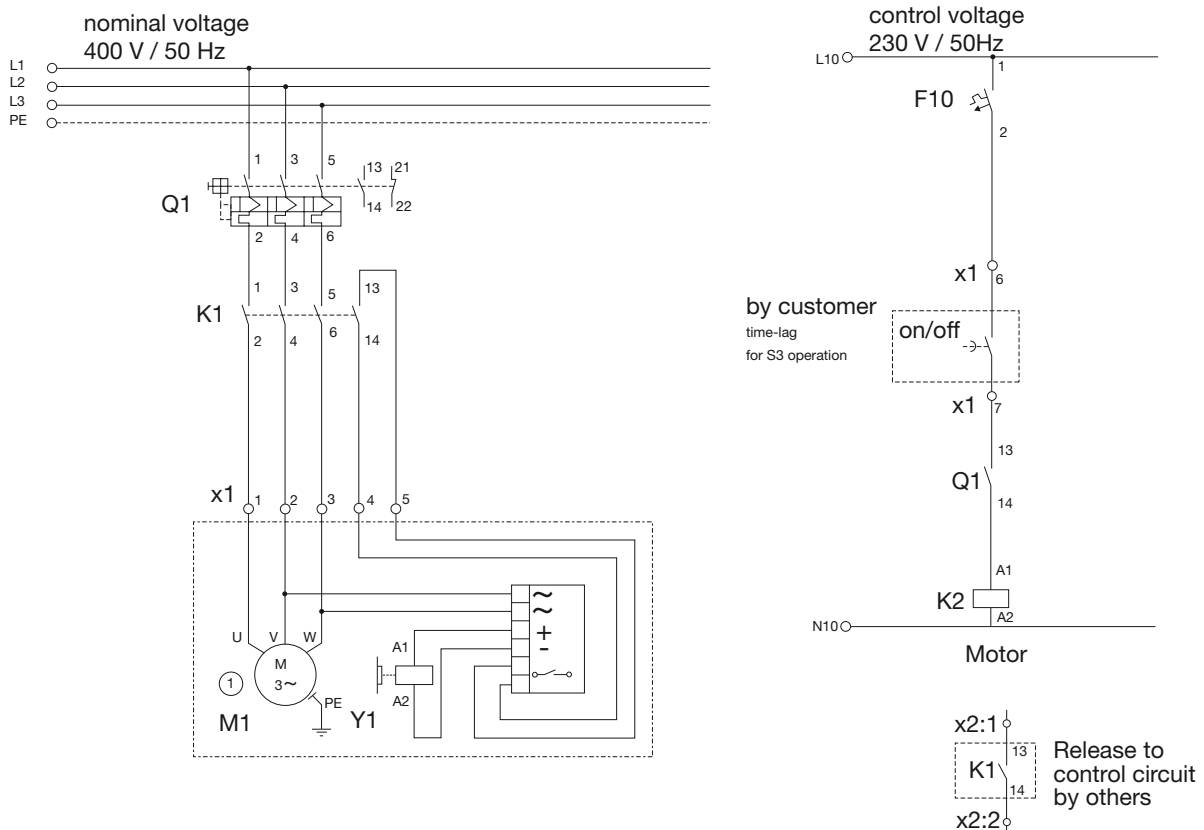
## Version

- Motors with constant torque
- Continuous operation 100% DC
- Electromagnetic brake
- Protection code IP 55
- Ambient temperature up to 40 °C (standard) - Special versions for higher temperatures on request

## Application

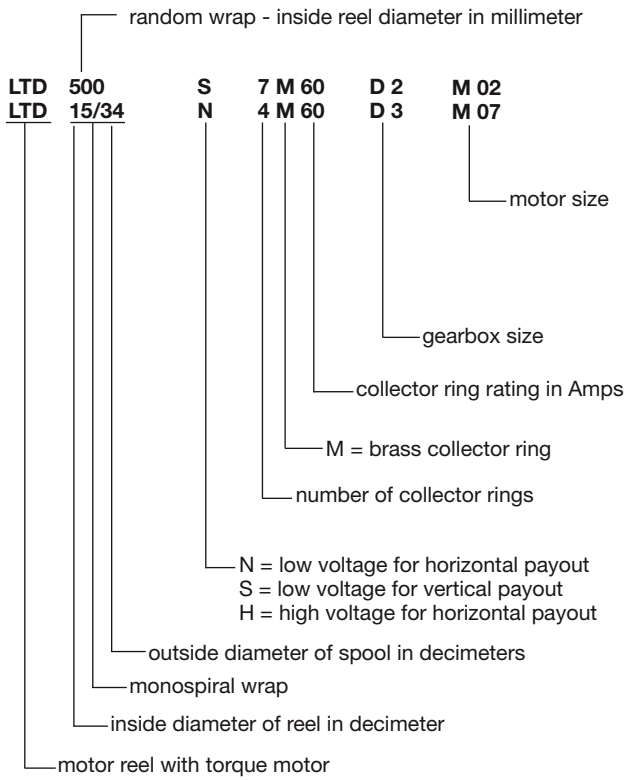
- Continuous operation 100% DC
- random wrap
- monospiral wrap
- Horizontal and vertical payout

## Principle circuit diagram





### Type code

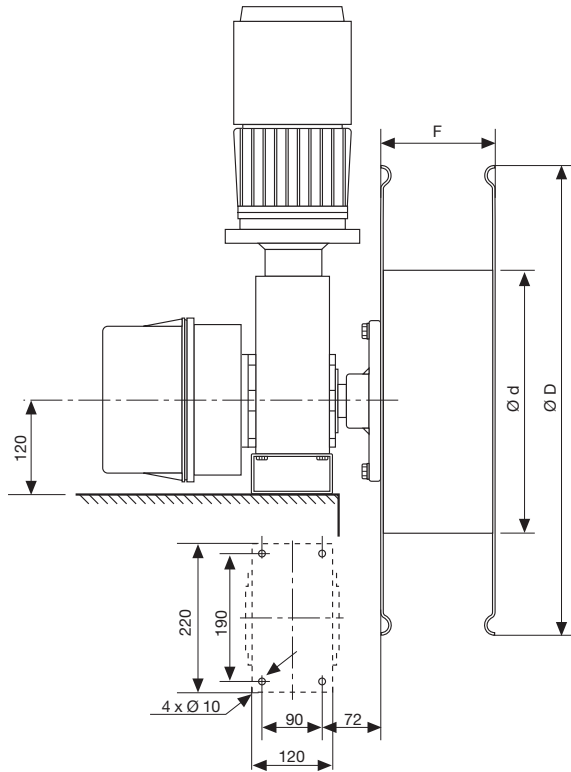




# REEL DIMENSIONAL DRAWINGS

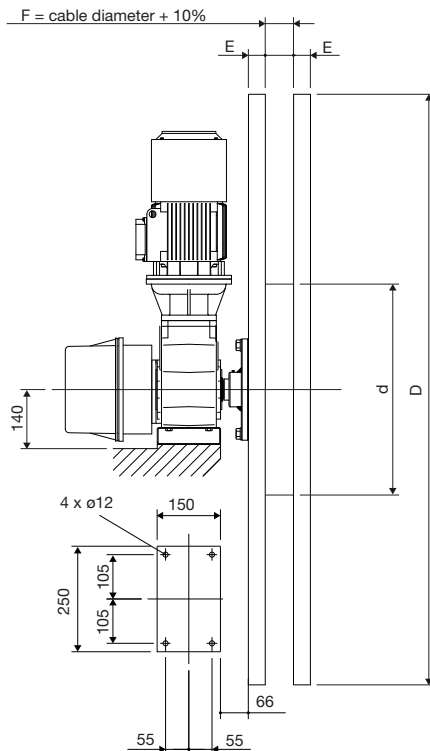
with torque motor

## Low voltage - random wrap



Gearbox D2						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	b	15 mm	20 mm	25 mm	30 mm
300 mm	600 mm	100 mm	34 m	24 m	18 m	-
300 mm	600 mm	150 mm	50 m	41 m	24 m	-
300 mm	600 mm	200 mm	67 m	53 m	33 m	-
400 mm	800 mm	100 mm	43 m	30 m	23 m	24 m
400 mm	800 mm	150 mm	65 m	52 m	39 m	32 m
400 mm	800 mm	200 mm	86 m	67 m	55 m	49 m

## Low voltage - monospiral wrap

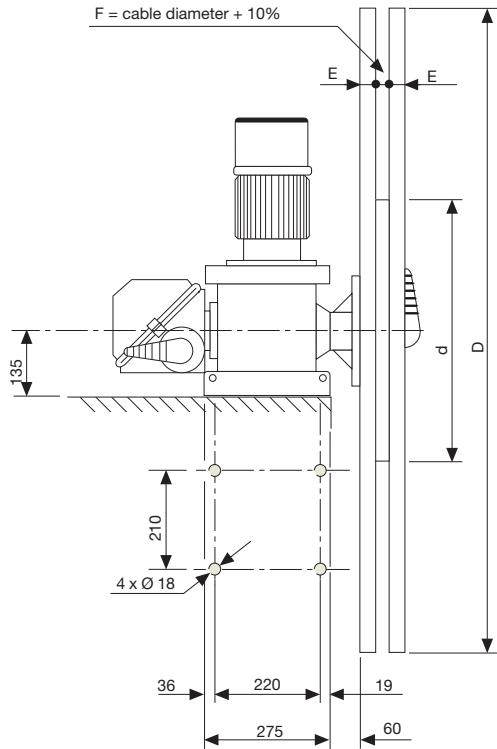


Gearbox D3						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	15 mm	20 mm	25 mm	30 mm
300 mm	700 mm	20 mm	16 m	11 m	8 m	-
300 mm	900 mm	20 mm	32 m	23 m	17 m	-
500 mm	1000 mm	40 mm	30 m	21 m	17 m	12 m
500 mm	1200 mm	40 mm	54 m	37 m	30 m	21 m
500 mm	1400 mm	40 mm	81 m	57 m	46 m	37 m
500 mm	1600 mm	40 mm	109 m	80 m	64 m	50 m

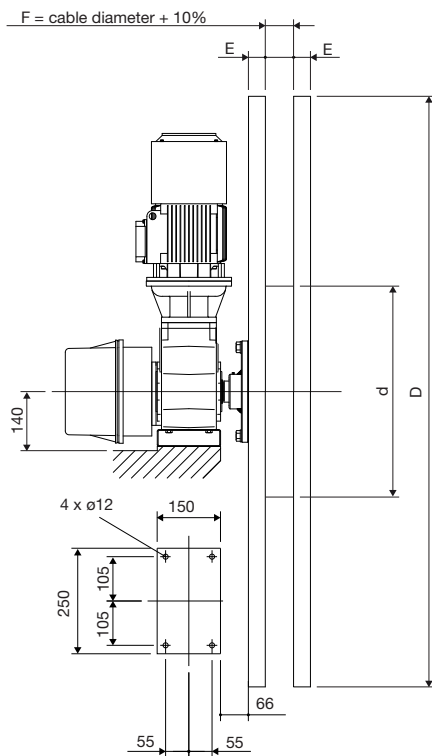
These tables should be used only for approximate calculation of the reel body.  
Please send your inquiry for your application.



## Low voltage - monospiral wrap



Gearbox D4						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	25 mm	30 mm	35 mm	40 mm
500 mm	1000 mm	40 mm	17 m	12 m	10 m	7 m
500 mm	1200 mm	40 mm	30 m	21 m	19 m	13 m
500 mm	1400 mm	40 mm	46 m	37 m	27 m	24 m
800 mm	1600 mm	40 mm	50 m	38 m	30 m	27 m
800 mm	1900 mm	40 mm	82 m	64 m	51 m	42 m
800 mm	2200 mm	40 mm	119 m	95 m	82 m	66 m
800 mm	2500 mm	60 mm	163 m	131 m	110 m	95 m



Gearbox D5						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	35 mm	40 mm	45 mm	50 mm
500 mm	1400 mm	40 mm	27 m	24 m	-	-
800 mm	1600 mm	40 mm	30 m	27 m	18 m	19 m
800 mm	1900 mm	40 mm	51 m	42 m	39 m	35 m
800 mm	2200 mm	40 mm	82 m	66 m	57 m	53 m
1200 mm	2500 mm	60 mm	87 m	76 m	64 m	59 m
1200 mm	2800 mm	60 mm	119 m	108 m	88 m	83 m
1200 mm	3100 mm	60 mm	164 m	135 m	123 m	110 m

These tables should be used only for approximate calculation of the reel body.  
Please send your inquiry for your application.



## MOTOR REELS with FI drive

Motor reels with frequency inverter drive can be supplied with constant and variable torque.

With variable torque the motor will be controlled automatically by a potentiometer, depending on the cable payout length.

Therefore the tensile force on the cable is limited at any position to the required minimum.

- Horizontal cable payout with cable lengths up to 800 m
- Drive by start pinion gear units and torque motors
- Variable torque to protect the cable
- Cable control via limit switches in connection with guide roller assemblies.



**Standard reel control units are available in four versions:**

1. VAHLE compact control in compact housing
2. VAHLE compact control on mounting plate
3. VAHLE control in switch cabinet
4. VAHLE control on mounting plate



**VAHLE compact control**

As an option the control unit is available in a stainless-steel housing or in a switch cabinet resp. on a mounting plate as per customers specification. Examples for customer requests:

- Interface via Bus (e.g Profibus, CANopen, Interbus, ASI)
- operating and / or signal station
- Encoder signals via fiber optic
- Special supply voltages and network configurations
- Integrated with existing switch cabinet systems

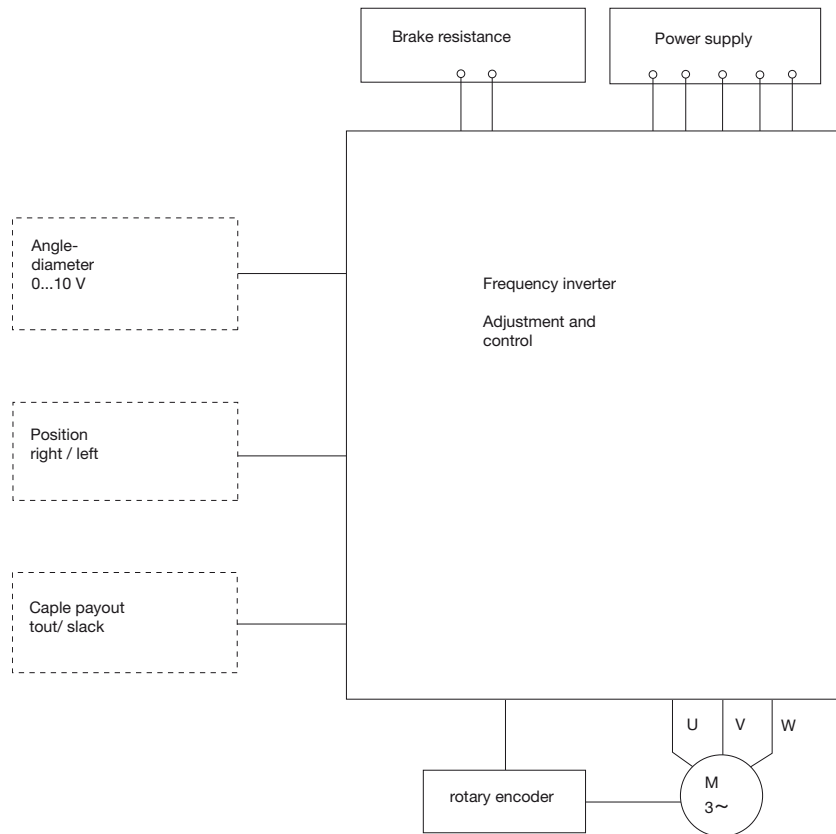


**VAHLE control in switch panel**

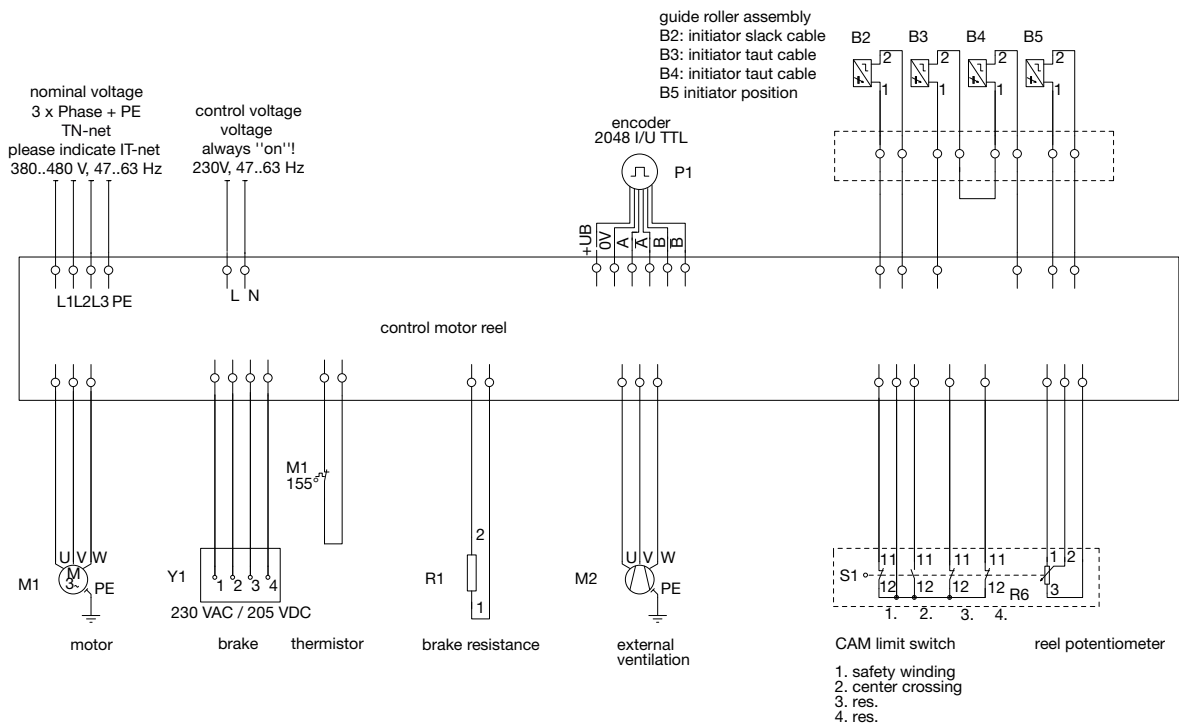


# PRINCIPLE CIRCUIT DIAGRAM

## for motor reels with frequency inverter drive



### Example: VAHLE compact control unit



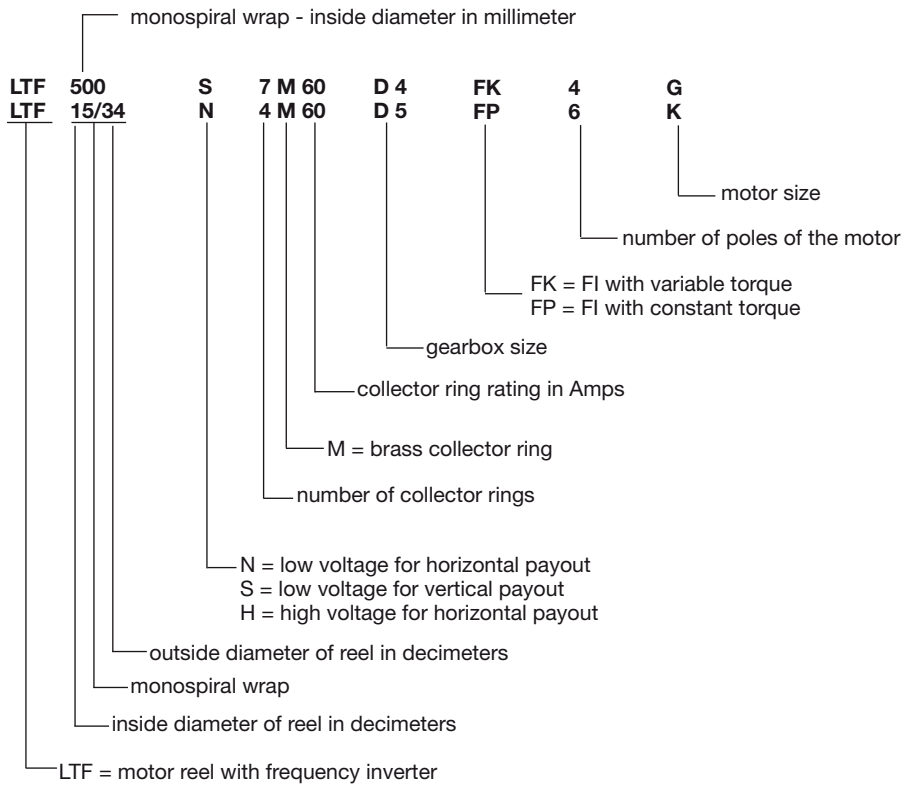


# TYPE DESIGNATION CODE

## Motor reels with frequency inverter drive



### Type code

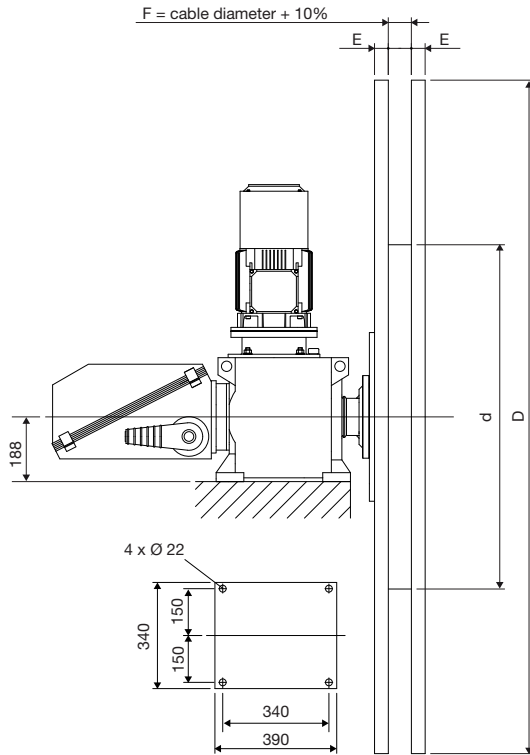




# REEL DIMENSIONAL DRAWINGS

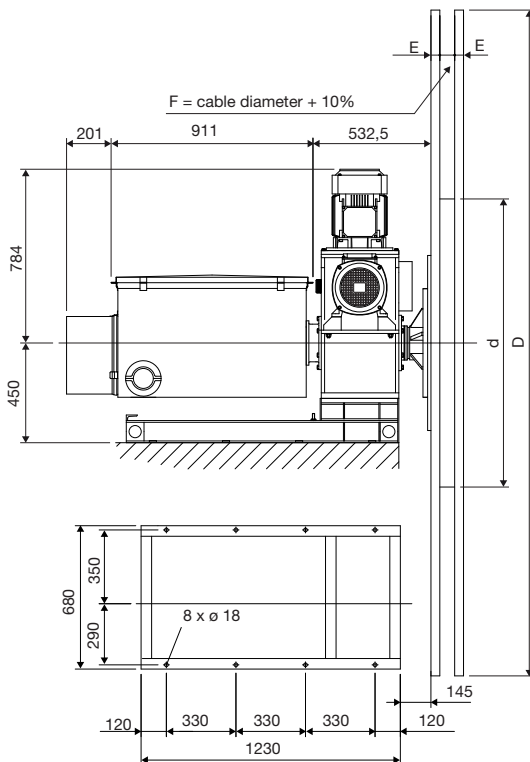
with frequency inverter drive

## Low voltage



Gearbox D5						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	25 mm	30 mm	35 mm	40 mm
500 mm	1400 mm	40 mm	27 m	24 m	-	-
800 mm	1600 mm	40 mm	30 m	27 m	18 m	19 m
800 mm	1900 mm	40 mm	51 m	42 m	39 m	35 m
800 mm	2200 mm	40 mm	82 m	66 m	57 m	53 m
1200 mm	2500 mm	60 mm	87 m	76 m	64 m	59 m
1200 mm	2800 mm	60 mm	119 m	108 m	88 m	83 m
1200 mm	3100 mm	60 mm	164 m	135 m	123 m	110 m

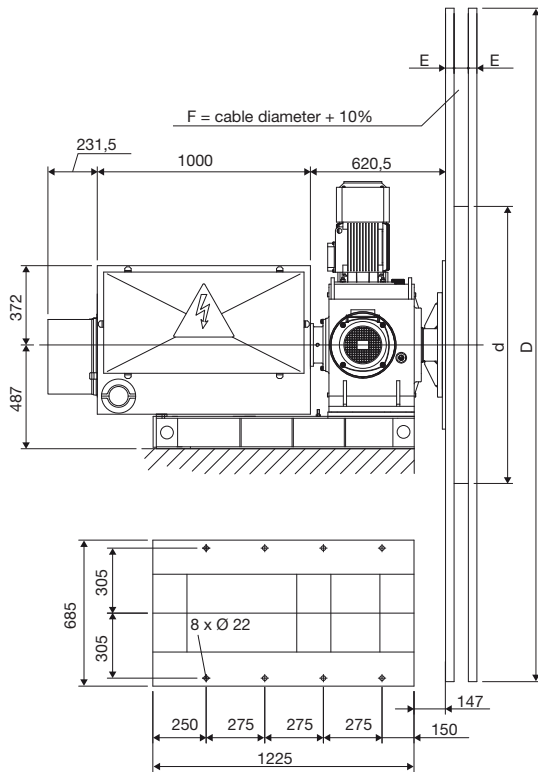
## Medium voltage 6 kV



Gearbox D6						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	40 mm	45 mm	50 mm	55 mm
1500 mm	4600 mm	100 mm	336 m	299 m	272 m	243 m
1500 mm	5000 mm	120 mm	409 m	357 m	331 m	286 m
2000 mm	4600 mm	100 mm	302 m	259 m	242 m	208 m
2000 mm	5000 mm	120 mm	375 m	332 m	301 m	266 m
2000 mm	5500 mm	120 mm	472 m	412 m	382 m	330 m
2000 mm	6000 mm	120 mm	578 m	518 m	470 m	418 m
2500 mm	6000 mm	120 mm	535 m	467 m	432 m	374 m

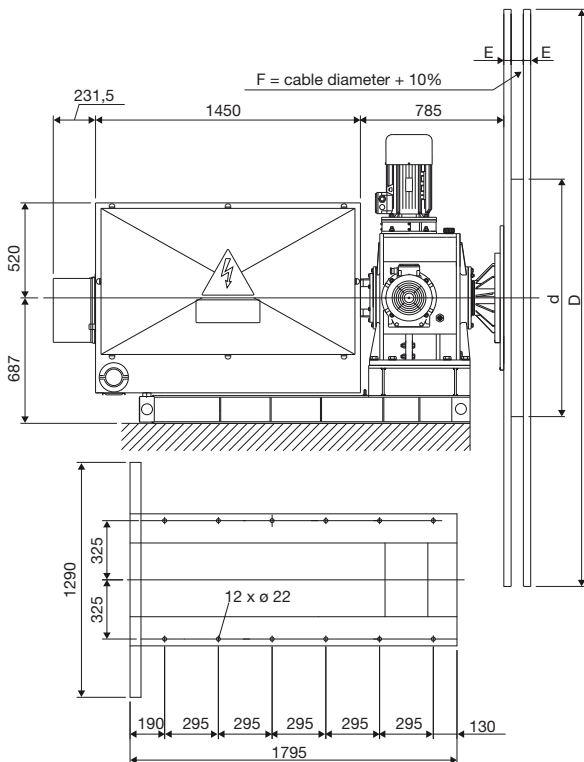
These tables should be used only for approximate calculation of the reel body. Please send your inquiry for your application.

## Medium voltage 10 kV



Gearbox D7						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	45 mm	50 mm	55 mm	60 mm
1500 mm	4600 mm	100 mm	299 m	272 m	243 m	211 m
1500 mm	5000 mm	120 mm	357 m	331 m	286 m	269 m
2000 mm	4600 mm	100 mm	259 m	242 m	208 m	187 m
2000 mm	5000 mm	120 mm	332 m	301 m	266 m	246 m
2000 mm	5500 mm	120 mm	412 m	382 m	330 m	310 m
2000 mm	6000 mm	120 mm	518 m	470 m	418 m	380 m
2500 mm	6000 mm	120 mm	467 m	432 m	374 m	351 m

## Medium voltage 20 kV

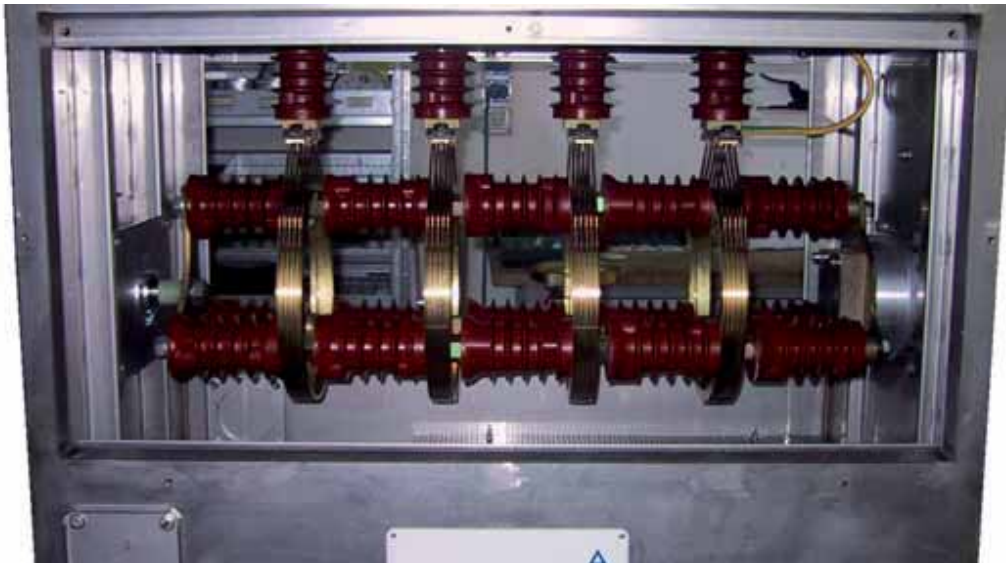


Gearbox D8						
Reel body dimensions			Max. cable payout with cable Ø			
d	D	E	45 mm	50 mm	55 mm	65 mm
1500 mm	5000 mm	120 mm	357 m	331 m	286 m	235 m
2000 mm	4600 mm	100 mm	259 m	242 m	208 m	179 m
2000 mm	5000 mm	120 mm	332 m	301 m	266 m	223 m
2000 mm	5500 mm	120 mm	412 m	382 m	330 m	271 m
2000 mm	6000 mm	120 mm	518 m	470 m	418 m	340 m
2500 mm	6000 mm	120 mm	467 m	432 m	374 m	307 m
2500 mm	7300 mm	150 mm	774 m	699 m	618 m	508 m
3000 mm	7300 mm	150 mm	713 m	653 m	588 m	491 m

These tables should be used only for approximate calculation of the reel body.  
Please send your inquiry for your application.



## CABLE TYPES AND SLIPRING BODIES



### Slipring bodies for:

- Low voltage up to 1 kV
- Medium voltage 1 kV - 25 kV

### Cable types:

- Low voltage cables: Type NSHTÖU-J up to 1 kV
- Low voltage cables: Type Trommelflex PUR-HF up to 1kV
- Medium voltage cables from 1 - 25 kV with and without fiber optic
- Special designs

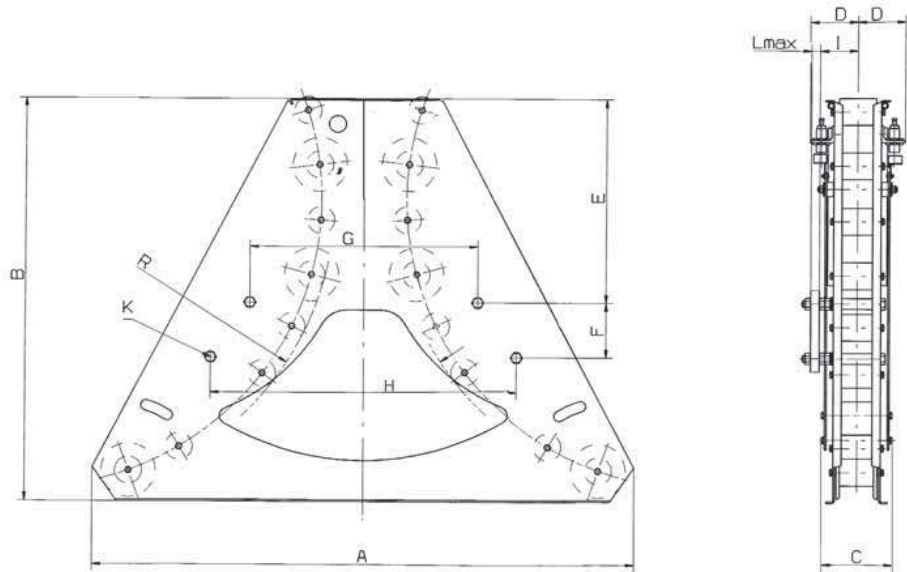
### Applications:

- Container crane applications
- Stacker/Reclaimer
- Discharging stations
- Transfer carriers



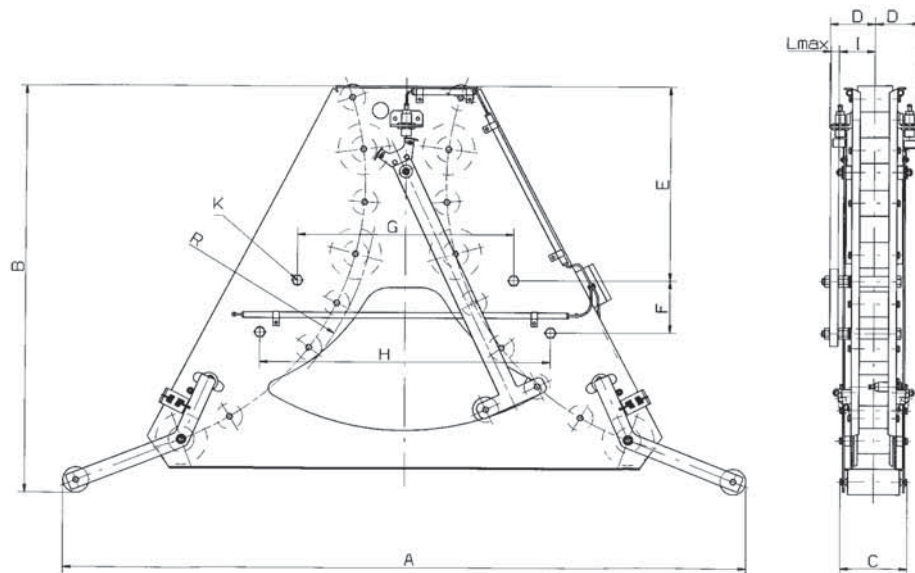
**Guide roller assembly**

monospiral wrap  
two-way payout  
for up to 1000 Volt and  
cable payout to 2 sides.  
More than 1000 Volt rating require  
r min. = 15 times cable OD



**Guide roller without pendulum**

Type	max.cable Ø	A	B	C	D	E	F	G	H	I	K	R	≈kg	Order-No.
<b>R 6</b>	55	1140	860	145	-	360	125	430	598	92,5	M 16	600	85	924 994
<b>R 9</b>	75	1595	1200	180	-	606	164	670	900	111	M 20	900	150	924 995
<b>R 12</b>	83	2100	1660	210	-	560	500	740	1200	111	M 20	1200	250	924 996



**Guide roller with tension control**

Type	max.cable Ø	A	B	C	D	E	F	G	H	I	K	R	≈kg	Order-No. c/w pos.-switch	Order-No. c/w pos. switch
<b>RZ 6</b>	55	1700	930	185	123	360	125	430	598	92,5	M 16	600	95	926 576	924 742
<b>RZ 9</b>	75	2175	1240	220	140	606	164	670	900	111	M 20	900	160	925 073	925 002
<b>RZ 12</b>	83	2600	1710	220	140	560	500	740	1200	111	M 20	1200	260	926 573	925 003



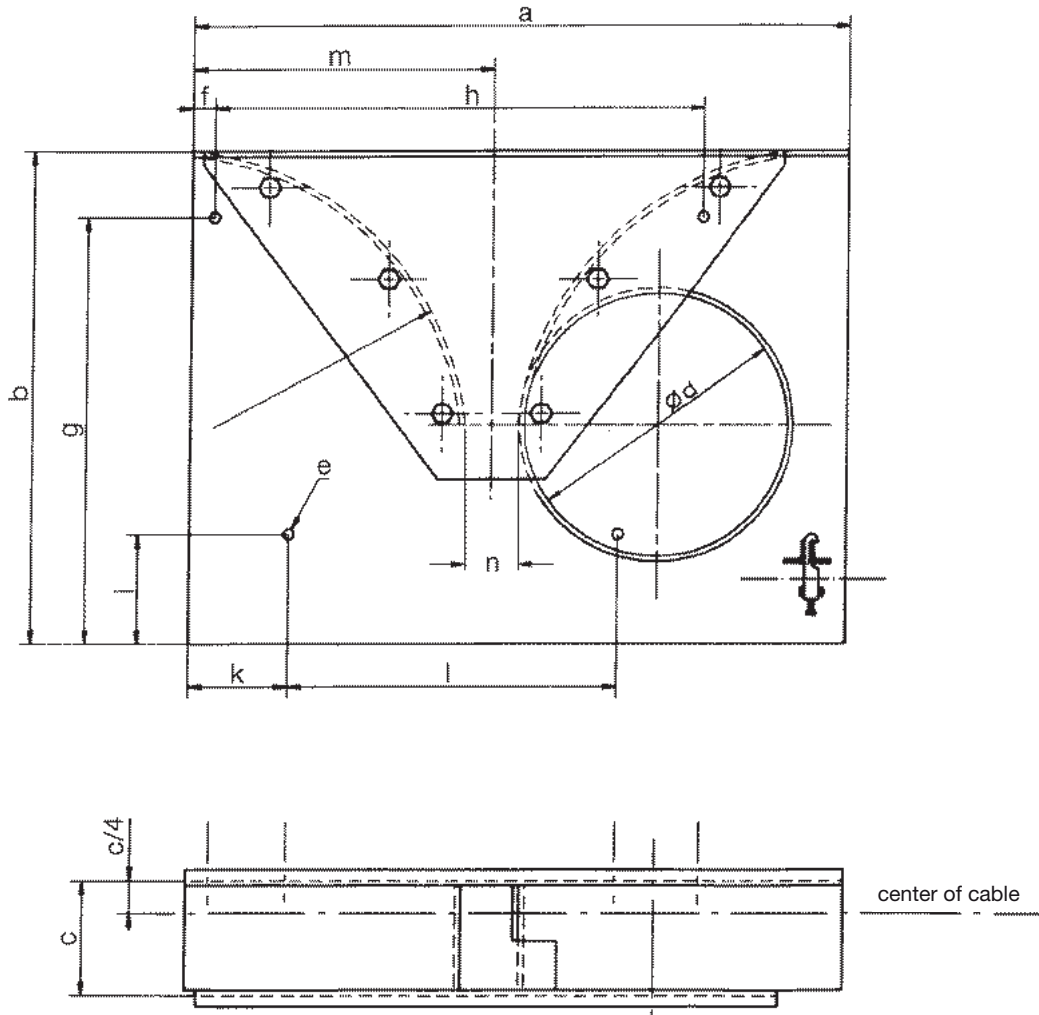
# ACCESSORIES

## Feedpoint funnels

### Feedpoint funnels

for applications up to 1000 Volt, two-way payout.

For medium travel speed and frequent traversing of midpoint.

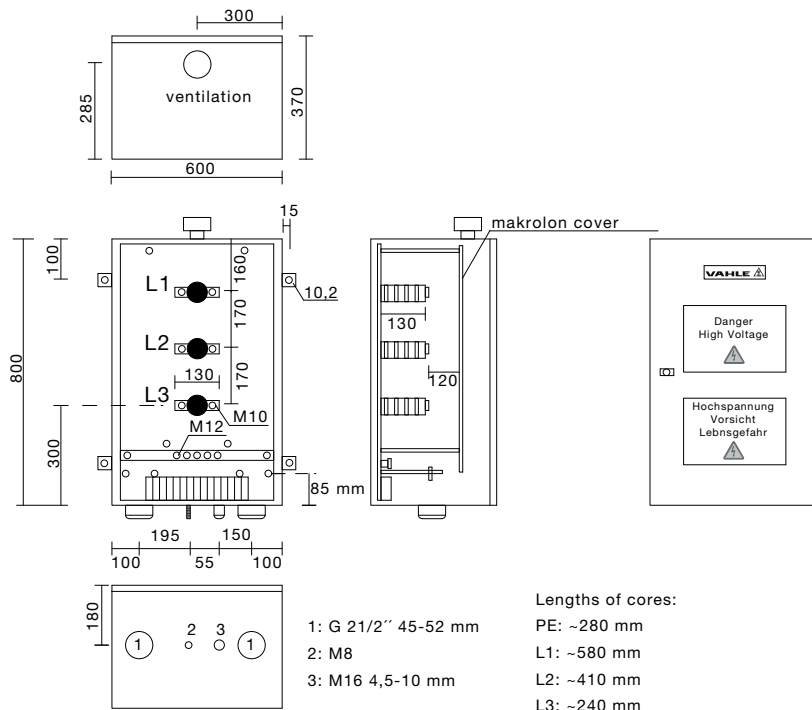


Type	ETZ 3	ETZ 4	ETZ 5	ETZ 7	ETZ 9	ETZ 12
Order-No.	921 380	921 390	921 400	921 410	921 720	926 651
max. cable Ø	34	50	62	80 ~60 <sup>(1)</sup>	90 ~60 <sup>(1)</sup>	~90 <sup>(1)</sup>
a	650	900	1220	1760	2070	2660
b	530	700	900	1200	1475	1930
c	106	146	208	208	216	60
d/r	275	400	500	700	900	1200
e	14		18		22	22
f		40		200	125	150
g	405	550	780	1080	1325	1780
h	400	740	900	1100	1820	2220
i		220			275	330
k	120	210	180	350	1250	1660
l	300	400	600	800	695	920
m	270	410	480	750	960	1260
n	60	80		100	120	120
~kg	15	28	52	100	130	200



### Terminal cabinet 10 kV- Order-No. 970 579

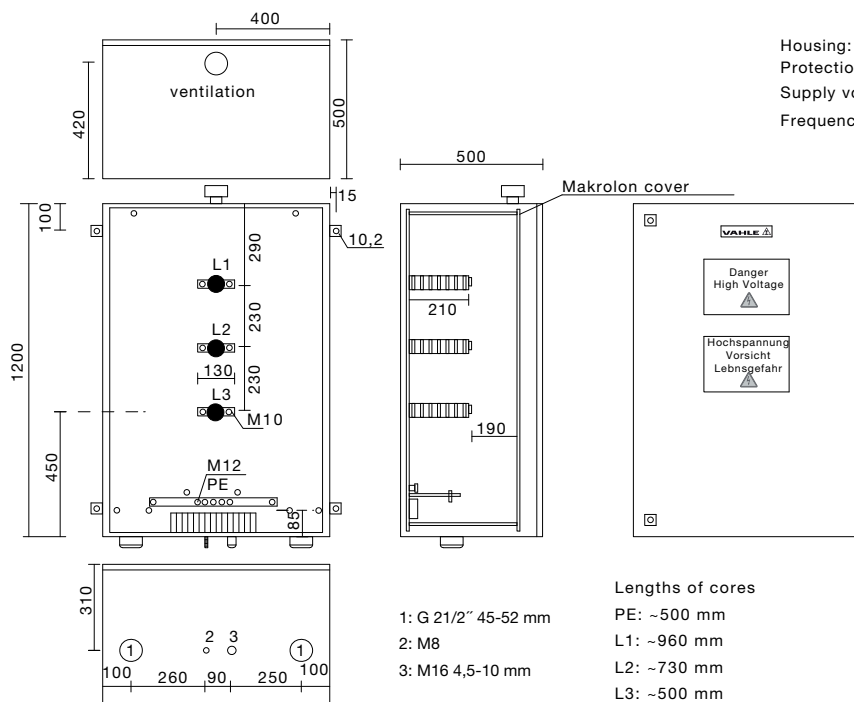
Protection code IP 55  
Stainless steel housing



Housing: Stainless steel  
Protection code: IP55  
Supply voltage: 10kV  
Frequency: 50/60 Hz

### Terminal cabinet 20 kV- Order-No. 970 580

Protection code IP 55  
Stainless steel housing



Housing: Stainless steel  
Protection code: IP55  
Supply voltage: 20 kV  
Frequency: 50/60 Hz



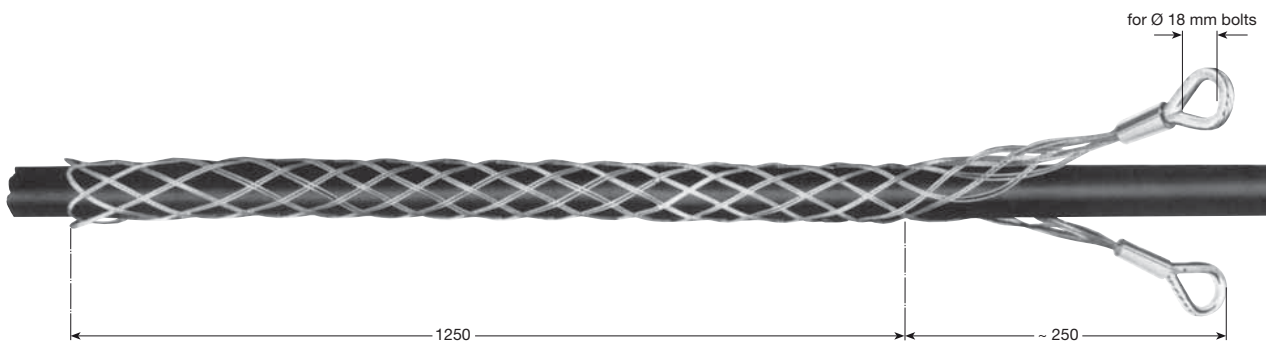
# ACCESSORIES

## Cable grips

### Cable grips, 1250 m long

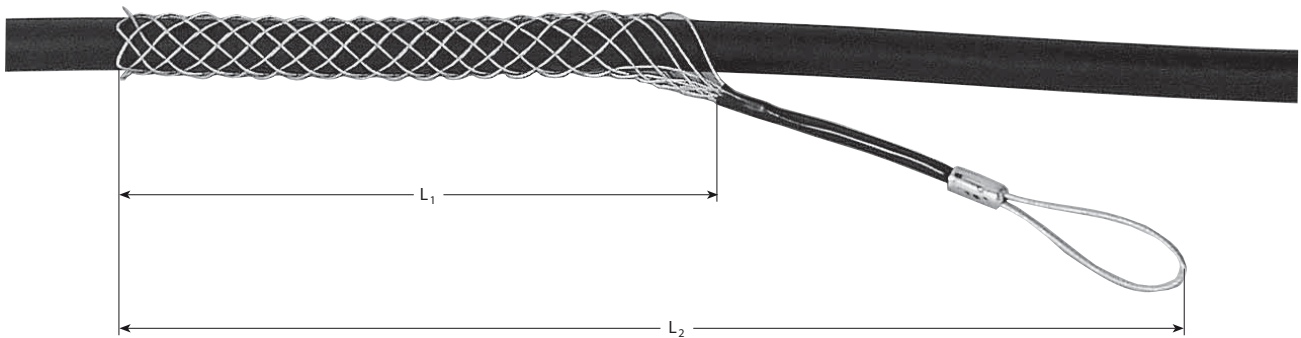
Type	Order-No.	for cable-Ø	Permissible tension <sup>(1)</sup> kg
<b>VLZ 1</b>	901 620	15-20	930
<b>VLZ 2</b>	901 621	20-30	1165
<b>VLZ 3</b>	901 622	30-40	1400
<b>VLZ 4</b>	901 623	40-50	1630

<sup>(1)</sup> 3-times safety factor considered



Pressed with 2 grommets, also open at eye side grip ends without soldering point.

### Cable grips

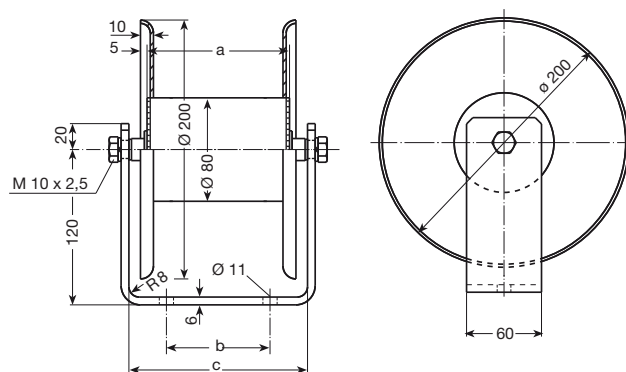


Type	for cable-Ø	Permissible tension <sup>(1)</sup> kg	length of wire mesh measure L <sub>2</sub>	length of wire mesh measure L <sub>1</sub>	Order-No.
<b>VLZK 6</b>	4 bis 7	60	100	275	900 391
<b>VLZK 9</b>	7 bis 9	110	120	290	900 392
<b>VLZK 12</b>	9 bis 12	130	135	340	900 393
<b>VLZK 15</b>	12 bis 15	210	180	390	900 394
<b>VLZK 20</b>	15 bis 20	260	220	450	900 395
<b>VLZK 25</b>	20 bis 25	260	275	510	900 396
<b>VLZK 30</b>	25 bis 30	400	350	610	900 397
<b>VLZK 40</b>	30 bis 40	580	370	660	900 398





## Cable support rollers



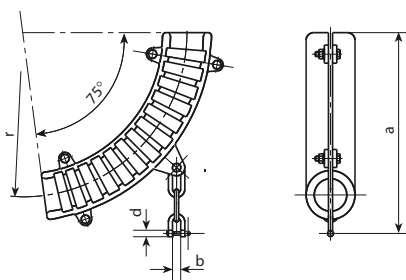
Type	Order-No.				Weight ~ kg	
		a	b	c		
TR 80/110 B 200	924 450	110	–	130	2,25	w/o bracket
TR 80/300 B 200	924 460	300	–	320	3,25	
TR 80/500 B 200	924 470	500	–	520	4,50	
TR 80/110 B 200 H	924 480	110	80	130	3,50	c/w bracket
TR 80/300 B 200 H	924 490	300	250	320	5,15	
TR 80/500 B 200 H	924 500	500	400	520	6,90	

Rollers include bolts and washers

## Anchor shackles

for up to 1000 Volt, for one or two-way payout  
and low travelling speeds

**Application:** mainly used in connection with plug & socket service  
or when a vertical feeding connection from underneath the cable tray is impossible.



Type	Order-No..	for cable-Ø	r	a	d	b	Weight ~ kg
LS 1	921 420	–21,5	100	205	10	14	1,6
LS 2	921 430	>21,5–28	130	225	10	14	2,5
LS 3	921 440	>28 –36,5	170	265	12	17	3,5
LS 4	921 450	>36,5–48	220	300	12	17	5,5



## NOTES

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Products and Service	Catalog No.
<b>1 Open conductor systems</b>	
Open conductor systems	1a
<b>2 Insulated conductor systems</b>	
U 10	2a
FABA 100	2b
U 15 - U 25 - U 35	2c
U 20 - U 30 - U 40	2d
<b>3 Compact conductor systems</b>	
VKS 10	3a
VKS - VKL	3b
<b>4 Enclosed conductor systems</b>	
KBSL - KSL	4a
KBH	4b
MKLD - MKLF - MKLS	4c
LSV - LSVG	4d
<b>5 Contactless power system</b>	
Contactless power system (CPS®)	5a
<b>6 Data transmission</b>	
VAHLE Powercom®	6a
Slotted Microwave Guide (SMG)	6b
<b>7 Positioning systems</b>	
VAHLE APOS®	7a
<b>8 Festoon systems and cables</b>	
Festoon systems for □- tracks	8a
Festoon systems for flat cables on I- tracks	8b
Festoon systems for round flat cables on I- tracks	8c
Festoon systems for ◇- tracks	8d
Cables	8e
<b>9 Reels</b>	
Spring operated cable reels	9a
Motor powered cable reels	9b
<b>10 Others</b>	
Battery charging systems	10a
Heavy enclosed conductor systems	10b
Tender	10c
Contact wire	10d

### Assemblies/Commissioning

### Spare parts/Maintenance service



## Products and Service

Catalog No.

### 1 Copperhead conductor systems

Powerails 1a

### 2 Uni - pole insulated conductor systems

U 10 2a

FABA 100 2b

U 15 - U 25 - U 35 2c

U 20 - U 30 - U 40 2d

### 3 Compact conductor systems

VKS 10 3a

VKS - VKL 3b

### 4 Enclosed conductor systems

KBSL - KSL - KSLT 4a

KBH 4b

MKLD - MKLF - MKLS 4c

LSV - LSVG 4d

### 5 Contactless Power System CPS®

CPS® Contactless Power System 5a

### 6 Communication systems

VAHLE Powercom® 6a

Slotted Microwave Guide (SMG) 6b

### 7 Position encoding systems

VAHLE APOS 7a

### 8 Festoon systems

Cable carriers for □ - tracks 8a

Cable carriers for flatform cables on I - beams 8b

Cable carriers for round cables on I - beams 8c

Cable carriers and accessories for ◇ - tracks 8d

Cables 8e

### 9 Reels

Spring operated cable reels 9a

Motor powered cable reels 9b

### 10 Others

Battery charging systems 10a

Heavy enclosed conductor systems 10b

Cable tenders 10c

Trolley wire and accessories 10d

### Installations/Commissioning

### Spare Parts/Maintenance Service



## Products and Service

Catalog No.

### 1 Open conductor systems

Open conductor systems 1a

### 2 Insulated conductor systems

U 10 2a

FABA 100 2b

U 15 - U 25 - U 35 2c

U 20 - U 30 - U 40 2d

### 3 Compact conductor systems

VKS 10 3a

VKS - VKL 3b

### 4 Enclosed conductor systems

KBSL - KSL 4a

KBH 4b

MKLD - MKLF - MKLS 4c

LSV - LSVG 4d

### 5 Contactless power system

Contactless power system (CPS®) 5a

### 6 Data transmission

VAHLE Powercom® 6a

Slotted Microwave Guide (SMG) 6b

### 7 Positioning systems

VAHLE APOS® 7a

### 8 Festoon systems and cables

Festoon systems for □- tracks 8a

Festoon systems for flat cables on I- tracks 8b

Festoon systems for round flat cables on I- tracks 8c

Festoon systems for ◇- tracks 8d

Cables 8e

### 9 Reels

Spring operated cable reels 9a

Motor powered cable reels 9b

### 10 Others

Battery charging systems 10a

Heavy enclosed conductor systems 10b

Tender 10c

Contact wire 10d

### Assemblies/Commissioning

### Spare parts/Maintenance service

MANAGEMENTSYSTEM



DQS - zertifiziert nach DIN EN ISO 9001:2000  
OHSAS 18001 (Reg.-Nr. 003140 QM OH)



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