Cable Reeling Drum
Cable Reeling Drums are used for automatic reeling and unreeling of flexible trailing cables for current consuming mobile machines, whose travel is mostly track bound.

There are mainly three modes of drive for the drums:

a) **Cable Reeling Drum with spring drive**

The spring acts as the drive force. The spring drum is used for small sizes and lengths of cable. Due to the limited torque available from the spring, the size and length of cable that can be wound is limited. The efficiency of the drive mainly depends upon the spring life, and the life of the spring depends upon the number of operations i.e. the working cycle.

The application of spring drum is limited to electro-magnets, machine tools, etc. Since the efficiency and reliability of the drum depends on the quality of the spring, great care should be taken in the selection and manufacture of the spring.

b) **Cable Reeling Drum with counter weight drive**

The counter weight acts as the drive force and is suitable for cable sizes upto 4 x 95 mm sq. and travel length upto a maximum of 100 metres. The length of cable is limited by the height the counter weight has to traverse.

c) **Cable Reeling Drum with stall torque motor drive**

The drum is driven by a specially designed "Stall Torque Motor". The motor provides the necessary torque for the rotation of the drum and has proven to be the most reliable drive for the cable reeling drum. Motorised cable reeling drums can handle almost all sizes and lengths of cable.

The stall torque motor is a brake motor capable of producing a strong torque while remaining close to or exactly at zero speed i.e. rotor in locked condition, without overheating. While the reel is unwinding the rotor is moved against its natural direction of rotation, without being electrically reversed. This is the unique feature of the stall torque motor which makes it
extremely suitable for reeling and unreeling application. This motor has a conical rotor and a built-in-brake. The stall torque

motor is available in squirrel cage as well as slipring construction. The two types used are:

i) Squirrel cage motor — 12 poles operating range
- 500 to + 500 rpm.
ii) Slipring motor — 4 poles operating range
- 600 to + 1500 rpm.

The output torque can be reduced in the slipring motor by increasing the rotor resistance.

There are three types of Cable Reeling Drums, namely:
(a) Semi-parallel
(b) Monospiral
(c) Parallel

Semi-parallel
The semi-parallel drum is used for a small length of cable, say; upto 250 metres, and for voltage upto 415 V. The winding of the cable is not guided by a winding device. The width of the drum ranges between 300 and 500 mm.

Normally the winding on these drums is not entirely uniform. In cases where uniform winding is a major consideration the width of the drum may be reduced to accommodate only 2/3 turns of cable in each layer.
**Monospiral**
The monospiral drum is used for all sizes and lengths of cable, and voltage upto 11 KV. The cable drum is fully ventilated and the derating factor is not high. The number of layers is unlimited but the overall diameter of the drum is limited by the clearance available. The width of the drum is equal to cable diameter plus 5 mm.

**Parallel**
The parallel drum is used for all sizes and lengths of cable and for voltage upto 35 KV. The width of a parallel drum varies between 0.8 M and 5 M. This drum is also popularly known as barrel type drum. The winding of cable is uniformly guided by a winding device.

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**The Cable Reeling Drum consists of the following main components:**

1. Drum body
2. Slipring assembly
3. Drive motor
4. Cable layering mechanism/guide arrangement
5. Cable length limiting switch
6. Over tension/under tension limit switch
7. Cable feeding devices
8. Control and power supply accessories

**Drum Body**
The drum body accommodates the required length of the flexible cable to be wound and unwound. The size of the drum depends upon the diameter of cable and the length of the cable. The I.D. of the drum is 16 times the O.D. of cable for L.T., and 25 times the O.D. of cable for H.T.
**Length of cable and number of layers**:

<table>
<thead>
<tr>
<th>Type of drum</th>
<th>No. of layers</th>
<th>Length of cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-parallel</td>
<td>3 to 5</td>
<td>250 M</td>
</tr>
<tr>
<td>Monospiral</td>
<td>15 to 60</td>
<td>400 M</td>
</tr>
<tr>
<td>Parallel</td>
<td>2 to 3</td>
<td>3000 M</td>
</tr>
</tbody>
</table>

The parallel drum body is provided with a perforated sheet, primarily for better heat dissipation.

**Slipring assembly**

The power, control and communication signal is transmitted by the slipring assembly to the machine. The slipring assembly has to be suitably designed to withstand the short circuit level of the system and the current carrying capacity. The number of sliprings and the ratings will depend upon the requirement of the machine. The brush gear is designed to carry the required current.

**Cable layering mechanism/guide arrangement**

This mechanism is very vital in the case of a parallel drum. It provides a proper layering of the cable side by side, and one over the other after the completion of one layer across the width of the drum. If the chain and the gear box are not properly selected, there will be frequent problems of chain snapping and non-uniform winding. The cable guide assists in the formation of proper catenary and deposit of the cable on the ground at a pre-determined place. The over tension/under tension protection switch is also mounted on the guide arrangement.

**Cable length limiting switch**

This is a gear cam switch with associated electrical switches and is driven by a sprocket and chain mechanism from the drum. This cam switch can be set for a particular length of cable, and if the set values are exceeded the control circuit provides for automatic stoppage of the machine. This is a very important protection and should not be ignored. This switch is also used for regulating tension in the case of Monospiral drum.
**Flexible cable:**

Flexible trailing cables are tailor made and specially designed for reeling and unreeling duty. To select the cable size, the following formula can be used:

\[
A.C. \quad A = \frac{KW \times 1000}{1.73xVxCos \, \phi \times n \times d1 \times d2}
\]

\[
D.C. \quad A = \frac{KW \times 1000}{V \times n \times d1 \times d2}
\]

\(V = \text{Voltage in Volts}\)

\(Cos \, \phi = \text{Power factor}\)

\(n = \text{Efficiency}\)

\(A = \text{Current in Amps}\)

\(d1 = \text{Derating factor for Ambient temperature}\)

\(d2 = \text{Derating factor for flexible cable wound on drum}\)

**d1 for Butyl or EP Rubber Cables**

<table>
<thead>
<tr>
<th>Ambient temp.</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating factor</td>
<td>1.00</td>
<td>0.93</td>
<td>0.86</td>
<td>0.80</td>
<td>0.72</td>
<td>0.63</td>
<td>0.54</td>
<td>0.44</td>
</tr>
</tbody>
</table>

**d2 for Cable wound on drum**

<table>
<thead>
<tr>
<th>Layers</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Monospiral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating factor</td>
<td>0.76</td>
<td>0.58</td>
<td>0.47</td>
<td>0.40</td>
<td>0.85</td>
</tr>
</tbody>
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