DC MOTORS
WOUND FIELD MOTORS
PERMANENT MAGNET MOTORS
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DC Motors
Electro-Hydraulic Pumps

GENERAL INFORMATION

INTRODUCTION

- This catalogue is published by
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  I - 41100 MODENA Italy

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Replace all previous edition

We design and manufacture :
- D.C. motors with winding :
  - series wound
  - compound wound
  - shunt wound
  - separately excited
- D.C. Permanent Magnet Motors
- Electro-hydraulic pumps for lifting
- Electro-hydraulic pumps for steering
- A.C. and D.C. geared motors
- A.C. and D.C. drive wheels

Our motors are manufactured with :
- High efficiency
- Protection from IP 20 up to IP 65
- Class H and F materials
- IEC and European Standards compliance
- Special models on request
- High efficiency armature core lamination
- they are available :
  - ventilated
  - not ventilated
  - with forced ventilation

All products are manufactured in compliance with IEC and European standards.

Permanent Magnet Motors
Simplicity in construction, high performances with optimum efficiency and long stable life are the most important features of our permanent magnet motors.

Wound Field Motors
During the wound field motor design and development we have taken into consideration all the technical and commercial aspects, which are required to meet every kind of applications.
For this reason all of the important components used on our motors have been specifically selected, are of a very high quality and they are used on every models.
This philosophy enable us to provide reliable motors even when they are used in the heaviest conditions.

Electro-hydraulic pumps for steering
The hydrostatic steering system is used in vehicles where the driver has to control large loads with minimum effort and where confort and safety are essential.
We have designed and developed a range of electro-hydraulic pumps which are suitable for this kind of application. When the steering wheel is turned the steering unit measures an oil volume, which is proportional to the steering-wheel rotation. The oil is supplied by the electro-hydraulic pump to the steering unit and from steering unit into the chamber of the steering cylinder.

Electro-hydraulic pumps for lifting and traction applications
The electro-hydraulic pumps consist of a permanent magnet motor or wound field motor of an integrated gear pump. Sometime different kinds of pumps or multiple-stage pumps are utilised to meet specific inquiries.
The type of winding determines the electro-hydraulic performance, in particular the idling and full load speed variations.
We are able to supply compound, series and shunt wound motors and consequently can provide customers with the best combination to meet their specific requirement.
**GENERAL INFORMATION (continued)**

**DESIGN FEATURES**

**Type of winding**
- The motor range includes:
  - Wound field motors
  - Series wound
  - Compound wound
  - Shunt wound
  - Permanent Magnet motor

**Enclosure**
- Enclosure from IP 20 up to IP 56 can be supplied.

**Insulation**
- Class F achieved by class H insulated wire, in conjunction by epoxy paints and resins. This guarantees high strength and reliability at up to 155°C winding temperature.

**Bearings**
- Selected quality ball bearings with double shield and internal lubrication. On request high temperature grease or C3 tolerance bearings can be supplied.

**Brushes**
- Made of carbon or graphite-metal depending on the motor characteristic. Easy to reach and maintain or, if necessary replace.

**Accessories**
- Available on request: electromagnetic brakes, start contactors, thermal protection and detectable wear system, worm and planetary gearboxes, tachogenerator or encoder, forced ventilation, foot mounting adapter.

**Motor Characteristics**
- Speed and torque of a D.C. motor, and therefore also volumetric flow and pressure of the driven pumps, are interrelated as shown in the graphs. The type of winding determines the curve shape.

Series wound motors are characterized by excellent starting torque. One should also note the high idle speed.

Shunt wound motors have the benefit of maintaining a practically constant speed irrespective of load variation; they have low starting torque and high starting current.

Permanent Magnet motors perform like shunt wound motors but in permanent magnet motors generally the variation in speed is greater as load changes.

As one see from the diagram, compound wound motors have intermediate features in comparison with series and shunt wound motors.
DUTY TYPES

The dimensioning of D.C. motors and electro-hydraulic pumps is based on the duty types. In particular the output power \( P_r \) depends on the temperature \( T \) reached by the motor.

The most important are:

**Continuous running duty type S1**
Operation at constant load, the duration of which is sufficient to achieve thermal equilibrium. This is the continuous duty condition equivalent to maximum performance of the motor.

**Short time - duty type S2**
Operation at constant load, of short duration, without thermal equilibrium being reached. A no load period follows, sufficient for the motor to return to ambient temperature.

Example: S2 – 60 min.
The motor runs continuously for 60 minutes, and stops a time sufficient to return to ambient temperature.

**Intermittent periodic-duty type S3**
Operations which consist of a sequence of uniform cycles (duty-cycle 10 min.) consisting of a period at constant load \( t_s \) and a no load period \( t_r \)

Example: S3 – 30%
The motor runs 3 minutes and stops 7 minutes.

\[
S_3 (\%) = \frac{t_s}{t_s + t_r} \times 100
\]
GENERAL INFORMATION (continued)

TIPICAL MOTOR CONNECTION

- Series wound motors

RA
2 TERMINALS

RB
2 + 1 TERMINALS

RC
3 TERMINALS

RD
3 + 1 TERMINALS FOR PLUG BRAKING

RE
4 TERMINALS

RF
5 TERMINALS

RH
4 TERMINAL WITH FIELD WEAKENING

- Compound wound motors

NA
2 TERMINALS

NB
3 TERMINALS

ND
6 TERMINALS

- Shunt wound motors

Shunt Wound
PA
2 TERMINALS

Separately excited
Shunt Wound motor
PB
4 TERMINALS

- Permanent magnet motors

MP
2 TERMINALS
The degree of protection of electric motor cover is expressed by the two letter IP followed by two numbers. The first number (see table I) is the degree of protection against solid bodies as indicated. The second number (see table II) is the degree of protection against harmful penetration of water.

Example: Protection IP 44 = Protected against 1mm. solid parts and water spray.

**USEFUL FORMULAS**

\[ \text{Pa} = \text{Input Power} \quad (\text{kW}) \]
\[ \text{Pr} = \text{Output power} \quad (\text{kW}) \]
\[ \text{U} = \text{Voltage} \quad (\text{Volt}) \]
\[ \text{I} = \text{Current} \quad (\text{Ampere}) \]
\[ \text{Q} = \text{Pump delivery} \quad (\text{lt/min.}) \]
\[ \text{p} = \text{Pressure} \quad (\text{bar}) \]
\[ \text{M} = \text{Torque} \quad (\text{Nm}) \]
\[ \text{n} = \text{Speed} \quad (\text{n/min.}) \]
\[ \text{\%} = \text{Efficiency} \quad (\%) \]

\[ \text{Power} \]
\[ \text{Pa} = U \times I \]
\[ \text{Pr} = 0.105 \times M \times n \]
\[ \text{Pr} = \frac{Q \times p}{600} \]

\[ \text{Torque} \]
\[ M = 9.55 \times \frac{Pr}{n} \]

\[ \text{Efficiency} \]
\[ \% = \frac{Pr}{Pa} \]
### ELECTRIC D.C. MOTORS ORDER CODE

<table>
<thead>
<tr>
<th>CA 2000</th>
<th>24</th>
<th>2009</th>
<th>151</th>
<th>RA</th>
<th>VA</th>
<th>Q</th>
</tr>
</thead>
</table>

- **TYPE**
  - CA: Wound Field Motor
  - MP: Permanent Magnet Motor

- **MOTOR DIAMETER**
  We build electric D.C. motors with following diameters:
  102, 113, 125, 151, 191, 244 (mm.)

- **TYPE OF WINDING**
  We can supply: series wound RA or RB, compound wound NA, shunt wound PA and permanent magnet MP.

- **TYPE OF FAN**
  Identifiable from external appearance

- **NUMBER OF BRUSHES**
  - Z: 2 brushes
  - Q: 4 brushes
  - TB: 8 brushes
  - TC: 12 brushes

### ACCESSORIES AVAILABLE ON REQUEST
- Start contactors
- Foot mounting
- Thermal protections and detectable wear systems
ELECTRIC - HYDRAULIC PUMP ORDER CODE

- TYPE
- POWER (W)
- VOLTAGE (V) 12, 24, 36, 40, 48, 60, 72, 90
- MOTOR SPEED (n/min.)
- MOTOR DIAMETER (mm.)
- TYPE OF WINDING
- TYPE OF FAN
- NUMBER OF BRUSHES
- TYPE OF PUMP

ELECTRIC - HYDRAULIC PUMP ORDER CODE

- TYPE
  EP  Electric-hydraulic pump for lifting application
  SE  Electric-hydraulic pump for steering system
  E   Electro-hydraulic pump special type

MOTOR DIAMETER
We built electro-hydraulic pumps with following diameters:
102, 113, 125, 151, 191, 244. (mm.)

TYPE OF WINDING
We can supply: series wound RA or RB, compound
wound NA, shunt wound PA and permanent magnet MP.

TYPE OF FAN
Identifiable from external appearance

fan cooled motors

motor without fan

NUMBER OF BRUSHES
- Z 2 brushes
- Q 4 brushes
- TB 8 brushes
- TC 12 brushes

TYPE OF PUMP DISPLACEMENT, GROUP ROTATION.

Displacements (brakes)

<table>
<thead>
<tr>
<th>Group</th>
<th>Rotation</th>
<th>Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Clockwise</td>
<td>23.4</td>
</tr>
<tr>
<td>S</td>
<td>Anticlockwise</td>
<td>21.7</td>
</tr>
<tr>
<td>DS</td>
<td>Reversible</td>
<td>20.6</td>
</tr>
<tr>
<td>V</td>
<td>Gear pump with relief valve</td>
<td></td>
</tr>
</tbody>
</table>

ACCESSORIES AVAILABLE ON REQUEST
- Start contactors
- Foot mounting
- Thermal protection and detectable wear systems
- Multiple gear pumps
ELECTRO HYDRAULIC PUMPS ENQUIRY FORM

Dimensions of existing pumps:

A = mm
B = mm
C = mm
L = mm
Diameter = mm

Electric Hydraulic Pump data:

FOR STEERING    FOR LIFTING

POWER: WATT
VOLTAGE: VOLT
SPEED: r.p.m.

Pump displacement: cm³/rev. with relief valve
Max Working Pressure: bar
Max Oil Delivery: L/min

Type of winding: series wound
Number of terminals: 2 (1 speed)
compound wound
3 (2 speed)
shunt wound
permanent magnet

Duty Cycle:
continuous S1
Short time S2 min.
intermittent periodic S3 %

Enclosure: IP 20
IP

ACCESSORIES:

Thermal protection 90°C 110°C 130°C
Brush detectable wear system

NOTES:

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D.C.- MOTOR ENQUIRY FORM

Many years of experience have indicated that for optimum cost, performance and reliability, a great many details are very important. Therefore before offering equipment we would ask you to complete the following details, and return the complete questionary to our Technical Dpt. at your earliest convenience.

- **POWER:** WATT
- **VOLTAGE:** VOLT
- **SPEED:** r.p.m.

**Type of winding:**
- series wound
- compound wound
- shunt wound
- permanent magnet

**Number of terminals:**
- 2 (1 speed)
- 3 (2 speed)

**Duty Cycle:**
- continuous S1
- short time S2 [ ] min.
- intermittent periodic S3 [ ]%

**Enclosure:**
- IP 20
- IP [ ]

**ACCESSORIES:**
- Thermal protection
- 90°C
- 110°C
- 130°C
- Brush detectable wear system

**NOTES:**

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CA d = 151 - Wound Field Motors 1.000 - 2.600 W pag. 14

CA d = 191 - Wound Field Motors 3.000 - 8.000 W pag. 15

CA d = 244 - Wound Field Motors 6.000 - 15.000 W pag. 16
CA 113 - Wound Field Motors 113 mm. diam.

100 - 700 W 12 - 80 V

These shown below are only some example of diam. 113 Wound Field Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

**350 W**

- 12V: 3000 n / min.
- 24V: 2850 n / min.
- 36V: 2800 n / min.
- 48V: 2600 n / min.
- 72V: 2700 n / min.
- 80V: 2900 n / min.

**500 W**

- 12V: 3000 n / min.
- 24V: 2850 n / min.
- 36V: 2820 n / min.
- 48V: 2600 n / min.
- 72V: 2700 n / min.
- 80V: 2900 n / min.

**700 W**

- 12V: 2300 n / min.
- 24V: 2200 n / min.
- 36V: 2520 n / min.
- 48V: 2600 n / min.
- 72V: 2200 n / min.
- 80V: 2330 n / min.
CA 125 - Wound Field Motors 125 mm. diam.

500 - 1.000 W  12 - 80 V

These shown below are only some example of diam. 125 Wound Field Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

**600 W**
- 12V 3000 n / min.
- 24V 2950 n / min.
- 36V 3100 n / min.
- 48V 2850 n / min.
- 72V 2750 n / min.
- 80V 3300 n / min.

**800 W**
- 12V 1700 n / min.
- 24V 1950 n / min.
- 36V 2100 n / min.
- 48V 2230 n / min.
- 72V 2130 n / min.
- 80V 2200 n / min.

**1000 W**
- 12V 2300 n / min.
- 24V 2900 n / min.
- 36V 2620 n / min.
- 48V 2600 n / min.
- 72V 2200 n / min.
- 80V 2330 n / min.
These shown below are only some example of diam. 151 Wound Field Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

**1000 W**
- 12V: 2600 n/min.
- 24V: 2850 n/min.
- 36V: 2800 n/min.
- 48V: 2630 n/min.
- 72V: 2900 n/min.
- 80V: 2710 n/min.

**1500 W**
- 12V: 1800 n/min.
- 24V: 2100 n/min.
- 36V: 2520 n/min.
- 48V: 2600 n/min.
- 72V: 2250 n/min.
- 80V: 2000 n/min.

**2000 W**
- 12V: 1700 n/min.
- 24V: 2000 n/min.
- 36V: 2440 n/min.
- 48V: 2600 n/min.
- 72V: 2200 n/min.
- 80V: 2330 n/min.

**4000 W**
- 24V: 2250 n/min.
- 36V: 2520 n/min.
- 48V: 2600 n/min.
- 72V: 2280 n/min.
- 80V: 2170 n/min.
CA 191 - Wound Field Motors 191 mm. diam.

3.000 - 8.000 W                      24 - 80 V

These shown below are only some example of diam. 191 Wound Field Motors that we manufacture. Under request are available different lengths, flanges, speed and power

3000 W

24V  1500 n / min.
36V  1630 n / min.
48V  1800 n / min.
72V  2000 n / min.
80V  2200 n / min.

4000 W

24V  2150 n / min.
36V  2820 n / min.
48V  2600 n / min.
72V  2100 n / min.
80V  2300 n / min.

5000 W

48V  2800 n / min.
48V  2320 n / min.
48V  2600 n / min.
72V  2200 n / min.
80V  2330 n / min.

6000 W

48V  2200 n / min.
48V  1720 n / min.
48V  1800 n / min.
72V  2550 n / min.
80V  2650 n / min.
CA 244 - Wound Field Motors 244 mm. diam.

These shown below are only some example of diam. 244 Wound Field Motors that we manufacture.
Under request are available different lengths, flanges, speed and power

**6000 W**

- 24V 2160 n/min.
- 36V 1600 n/min.
- 48V 1920 n/min.
- 72V 1500 n/min.
- 80V 1650 n/min.

**8000 W**

- 36V 1620 n/min.
- 48V 1400 n/min.
- 72V 1950 n/min.
- 80V 1840 n/min.

**10000 W**

- 48V 1400 n/min.
- 72V 1800 n/min.
- 80V 2100 n/min.

**14000 W**

- 48V 2250 n/min.
- 72V 2280 n/min.
- 80V 2350 n/min.
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MP d = 125 - Permanent Magnet Motor  400 - 800 W  pag. 21

MP d = 151 - Permanent Magnet Motor  1.000 - 2.000 W  pag. 22
MP 102 - Permanent Magnet Motors 102 mm. diam.

100 - 200 W    12 - 80 V

These shown below are only some example of diam. 102 Permanent Magnet Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

100 W
- 12V: 3000 n / min.
- 24V: 2600 n / min.
- 36V: 2800 n / min.
- 48V: 1800 n / min.
- 80V: 2100 n / min.

200 W
- 12V: 1950 n / min.
- 24V: 2000 n / min.
- 36V: 2200 n / min.
- 48V: 2800 n / min.
- 80V: 3000 n / min.
MP 113 - Permanent Magnet Motors 113 mm. diam.  
200 - 700 W  
12 - 80 V

These shown below are only some example of diam. 113 Permanent Magnet Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

**350 W**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>1450 n / min.</td>
</tr>
<tr>
<td>24V</td>
<td>1500 n / min.</td>
</tr>
<tr>
<td>36V</td>
<td>1600 n / min.</td>
</tr>
<tr>
<td>48V</td>
<td>1850 n / min.</td>
</tr>
<tr>
<td>72V</td>
<td>1620 n / min.</td>
</tr>
<tr>
<td>80V</td>
<td>1710 n / min.</td>
</tr>
</tbody>
</table>

**500 W**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>2700 n / min.</td>
</tr>
<tr>
<td>24V</td>
<td>2850 n / min.</td>
</tr>
<tr>
<td>36V</td>
<td>2520 n / min.</td>
</tr>
<tr>
<td>48V</td>
<td>2600 n / min.</td>
</tr>
<tr>
<td>72V</td>
<td>2250 n / min.</td>
</tr>
<tr>
<td>80V</td>
<td>2500 n / min.</td>
</tr>
</tbody>
</table>

**700 W**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>1700 n / min.</td>
</tr>
<tr>
<td>24V</td>
<td>1400 n / min.</td>
</tr>
<tr>
<td>36V</td>
<td>2220 n / min.</td>
</tr>
<tr>
<td>48V</td>
<td>1680 n / min.</td>
</tr>
<tr>
<td>72V</td>
<td>1550 n / min.</td>
</tr>
<tr>
<td>80V</td>
<td>1630 n / min.</td>
</tr>
</tbody>
</table>
These shown below are only some example of diam. 125 Permanent Magnet Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

### 600 W

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Speed (n/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>2770</td>
</tr>
<tr>
<td>24V</td>
<td>3000</td>
</tr>
<tr>
<td>36V</td>
<td>2580</td>
</tr>
<tr>
<td>48V</td>
<td>2860</td>
</tr>
<tr>
<td>72V</td>
<td>2350</td>
</tr>
<tr>
<td>80V</td>
<td>2500</td>
</tr>
</tbody>
</table>

### 800 W

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Speed (n/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>1950</td>
</tr>
<tr>
<td>24V</td>
<td>2290</td>
</tr>
<tr>
<td>36V</td>
<td>2200</td>
</tr>
<tr>
<td>48V</td>
<td>2780</td>
</tr>
<tr>
<td>72V</td>
<td>2550</td>
</tr>
<tr>
<td>80V</td>
<td>2800</td>
</tr>
</tbody>
</table>
These shown below are only some example of diam. 151 Permanent Magnet Motors that we manufacture. Under request are available different lengths, flanges, speed and power.

**1000 W**

- 12V 2600 n / min.
- 24V 1850 n / min.
- 36V 2300 n / min.
- 48V 2440 n / min.
- 72V 2830 n / min.
- 80V 3000 n / min.

**1500 W**

- 12V 1800 n / min.
- 24V 2500 n / min.
- 36V 2520 n / min.
- 48V 2600 n / min.
- 72V 2250 n / min.
- 80V 1400 n / min.

**2000 W**

- 12V 1700 n / min.
- 24V 2000 n / min.
- 36V 1710 n / min.
- 48V 2600 n / min.
- 72V 2200 n / min.
- 80V 2330 n / min.
As HANSA-TMP has a very extensive range of products and some products have a variety of applications, the information supplied may often only apply to specific situations.

If the catalogue does not supply all the information required, please contact HANSA-TMP. In order to provide a comprehensive reply to queries we may require specific data regarding the proposed application.

Whilst every reasonable endeavour has been made to ensure accuracy, this publication cannot be considered to represent part of any contract, whether expressed or implied.

HANSA-TMP reserves the right to amend specifications at their discretion.