

Selection Diagrams (Instructions for Use)

The operational characteristics of the HEINZMANN disc armature motors are best illustrated through motor diagrams. They enable the ideal motor variant to be selected to suit a particular application case. The procedure for this is described below.

HEINZMANN offers a wide range of disc armature motor variants. Selection diagrams are therefore available in full scope on our product-CD *Electric Drives* or on our homepage www.heinzmann.com.

How to use the selection diagrams

Each selection diagram consists of 2 subdiagrams.

The upper diagram in each case shows the characteristics:

- Speed - Torque (blue wide)
- Current - Torque (red narrow)

The lower diagram in each case shows the characteristics:

- Output - Torque (green wide)
- Efficiency - Torque (orange narrow)

The characteristics are shown for several voltages.

For overview purposes the characteristics for the current and efficiency only show the lowest and the highest practical voltage (in this example 36 V and 72 V). Characteristic values for voltages in between (in this instance 48 V and 60 V) must be estimated.

The area highlighted in white on the diagram represents the safe operating range for the S1 operation of an uncooled motor mounted to a sufficiently-sized cooling area. The wide red line represents the limit for a power loss that is just on the borderline (in this example 75 W).

The section highlighted in light grey in the diagram represents the range for which additional cooling measures are required to operate motors. Without them this operating range must be avoided.

The diagrams are valid without exception for the operating temperature status, based on:

- armature temperature ~ 125 °C
- solenoid temperature ~ 105 °C
- ambient temperature 25 °C

Application example:

Given: Voltage $U = 48\text{ V}$
Torque $M = 115\text{ Ncm}$

Required: Speed n
Current I
Output P
Efficiency η

Readings in upper diagram:

- Starting from $M = 115\text{ Ncm}$ vertical (1) go to the speed characteristic for $U = 48\text{ V}$. Intersecting point A is on the borderline, i.e. still in the permitted area.
- Go from A horizontally (2) to the left to the speed scale and then read off the relevant speed (here: ~2800 rpm).
- Continue from A vertically into the range between the two current characteristics (between 36 V and 72 V) and estimate point B.
- Go from B horizontally (3) to the right to the current scale and then read off the relevant amperage (here: ~8.7 A).

Readings in lower diagram:

- Starting from $M = 115\text{ Ncm}$ vertical (4) go to the output characteristic for $U = 48\text{ V}$. Intersecting point C is also on the borderline, i.e. still in the permitted area.
- Go from C horizontally (5) to the left to the output scale and then read off the relevant output (here: approx. 340 W).
- Continue from C vertically into the range between the two efficiency characteristics and estimate point D.
- Go from D horizontally (6) to the right to the efficiency scale and then read off the relevant efficiency (here approx. 81%).

Unknown values can be determined for other given variables in the same manner.

Additional example:

Required: Speed $n = 2000\text{ rpm}$
Torque $M = 120\text{ Ncm} = 1.2\text{ Nm}$
(i.e. $P = 0.104 \cdot M \cdot n = 250\text{ W}$)

Required: The relevant required operating voltage

Result: $U \approx 36\text{ V}$

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