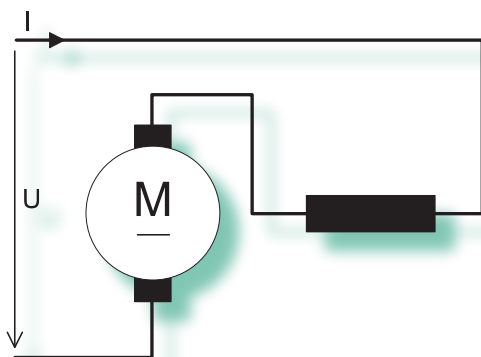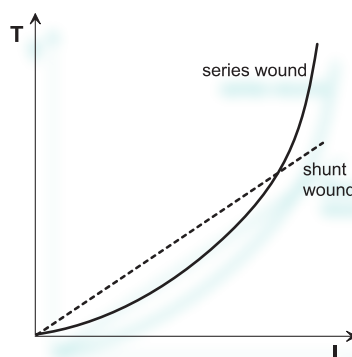# Series wound motor application

Principle drawing of series wound motor


Principle diagram of series wound motor

General

Series wound motors have the armature circuit and field winding connected in series.

Such a configuration has a non linear (squared) characteristic for current and torque relation.

A drive configuration with a series wound motor can only operate in the first quadrant, which is motor operation. Braking is not possible.
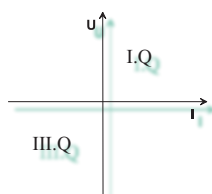
In some cases it is required to change the speed direction. Then a contactor for the field connection is used.
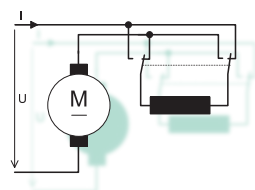
With such a configuration the torque direction can be changed and then the drive will operate in the third quadrant (motor).

Series wound motors are still used in the drilling business. Due to load dependent field current, it is very difficult to calculate the motor speed based on motor voltage compared to shunt field configuration. Drives **without** load and friction can not be controlled by EMF speed feedback at all.

Therefore it is strongly recommended to equip hoist drives with analogue tacho or encoder.

The DCS800 solution

The DCS800 control structure can fit to the demands of series wound motors.
The calculation mode for EMF speed feedback and actual torque can be set up based on the armature current and flux curve.
The flux curve must be taken from a datasheet or measured in different load conditions.

When field contactors for operation in the third quadrant are used, the command signal for the contactor must be sent to the DCS800 in parallel. The connection to the drive control structure must be made by a small adaptive program.
Of course all classic drive functions like speed ramp, speed control, torque control, master follower and shared motion are available.

Product notes

Paralleling Series wound motors

Pump and drilling installations are very often configured by operating more than one motor on the same shaft. The load characteristics of series wound motors (current and voltage) give an improved balancing behavior if the armature load circuit is connected in parallel. With this configuration, current sharing between the two motors is self balanced. An additional control function inside the DCS 800 drive is not necessary.
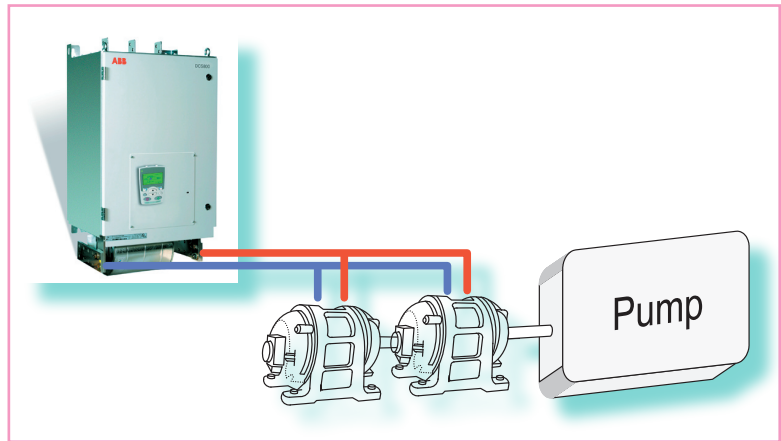
DCS800 EMF calculation for series wound motors

DCS800 drives have a built in feature to calculate EMF speed based on load current and motor voltage. This enables the drive to operate speed control by EMF speed feedback for e.g. mud pumps or cement pumps. An encoder or analogue tacho is not required.
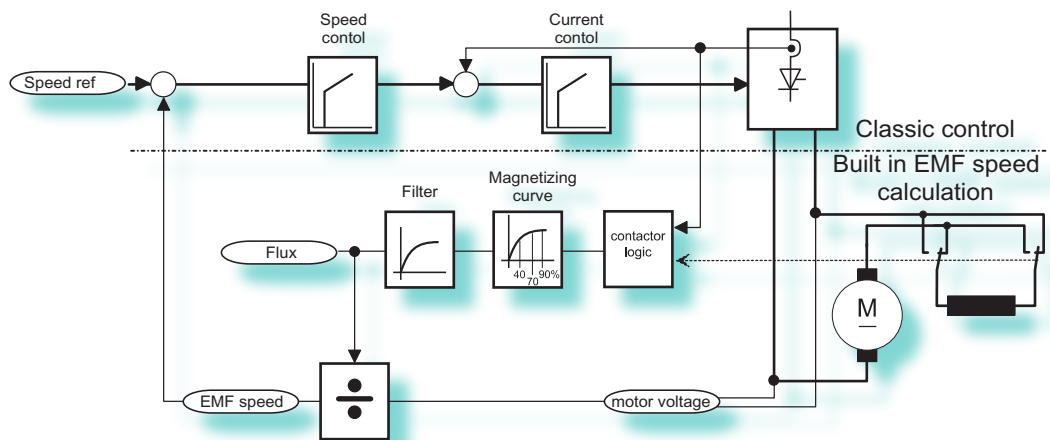

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