SIEMENS

Drive technology MICROMASTER 4

Tips & Tricks **No: 0004**

Subject Measuring the magnetizing current

Description

The motor should be commissioned according the procedure described in Section 3.5, Commissioning of the operating instruction. This guarantees that the required equivalent circuit diagram data of the motor match those specified on the motor rating plate. The following steps should always be carried-out:

1. **Quick commissioning P0010=1**
   If the quick commissioning P0010=1 is exited using P3900>0, then the motor parameter P0340=1 is automatically calculated. In this case, equivalent circuit diagram data is calculated from the rating plate data which was entered. In addition, the closed-loop control parameters are pre-set.
2. **Motor identification, Part 1 - P1910=1**
   The motor/feeder cable resistances, drive converter voltage losses and the leakage reactance are measured at standstill, and the main (magnetizing) reactance and the rotor resistance calculated, the closed-loop current control set.
3. **Motor identification, Part 2 - P1910=3**
   In this case, the saturation characteristic of the magnetized reactance is measured.

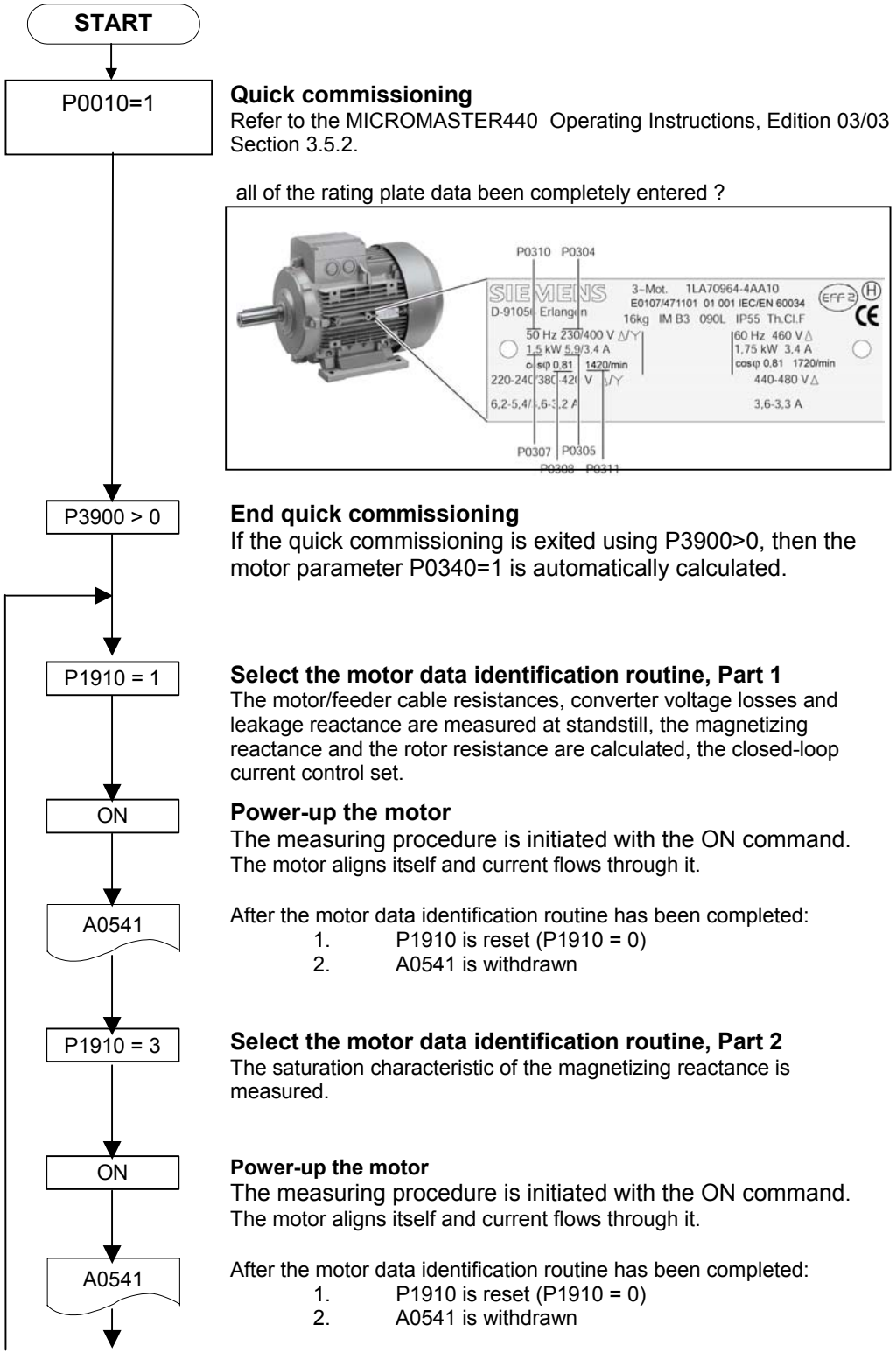
Generally, after these steps have been successfully completed, it is possible to accelerate the drive up to its rated speed. Depending on the motor being used and the mechanical configuration, it may be necessary to further optimize individual controllers.

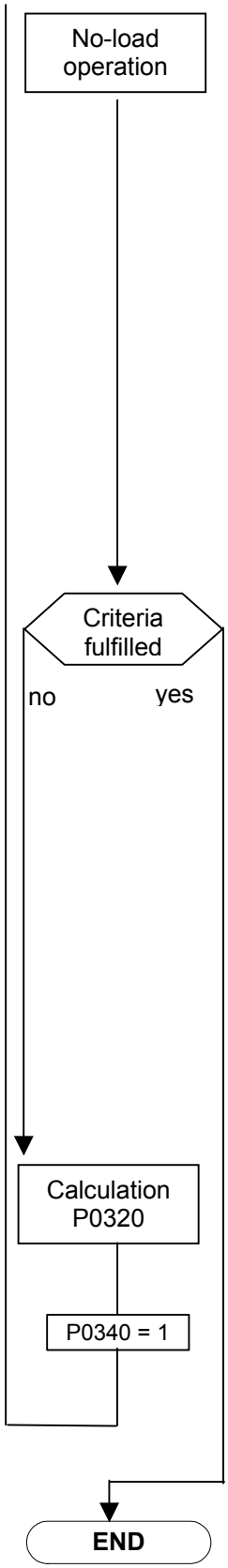
The feedback signals for the internal controller are dependent on calculated quantities – e.g. flux and speed actual value – from the motor model. This is true especially for sensorless vector control (P1300=20/22). However, the model only provides precise quantities if the equivalent circuit diagram data of the motor have been precisely determined. The internal adaptation routines are significantly relieved if precise equivalent circuit diagram data is available. This means that the model parameters can already be determined the first time the drive runs-up. This is the reason that for the SLVC, it only makes sense to further optimize the drive after the equivalent circuit diagram data has been correctly determined.

The magnetizing current value **r0331/P0320** has a special influence. The reason for this is that it cannot be measured at standstill. Using the automatic parameterization - P340=1 – this is estimated using a typical value for **SIEMENS standard motors** (P0320=0; result in r0331). Due to the deviation of the magnetizing current, the values for the magnetizing reactance and the rotor resistance can also not be precisely determined.

The magnetizing current which has been determined should be checked, and where required, corrected, especially for **third-party motors**. The following description provides you with a procedure to manually determine the magnetizing current and to re-calculate the equivalent circuit diagram data for operation of the drive in vector control (P1300=20/21).

Manually determining the magnetizing current





In order to determine the magnetizing current (P0320/r0331), the motor should **be accelerated up to approx. 80%** of its rated speed under no-load conditions.

In so doing, the following conditions must be maintained:

- no field weakening (r0056.8=0)
- flux setpoint r1598=100%
- no efficiency optimization P1580=0%

Under steady-state conditions, a current r0027 is obtained which approximately corresponds to the rated magnetizing current r0331. (The current is always less than the no-load current for a pure V/f control)

Important:
No-load means that the motor is operated without a coupled load.

Measuring and entering the magnetizing current and the associated re-calculation of the equivalent circuit diagram data of the motor is an interactive procedure. It should be repeated at least 2-3 times until the following criteria have been fulfilled:

- The more accurate that the magnetizing current was entered, then the better that the **flux setpoint (r1598=100%)** matches the **flux actual value (r0084=96..104%)** of the visualization model.
- The output of **Xm adaption (r1787)** of the visualization model should be as low as possible. Good values lie between **1-5%.** The lower that the Xh adaptation of the visualizer must operate, then the sensitivity of the motor parameters is that much less after power failures

Note:

For the advertisement of r0084 at the BOP/AOP must be released the level-4 parameter with the help of the service parameter P3950 = 46.

The new value which was determined from the flux-generating current component **r0029** can now be entered into **P0320**.

P0320=r0029*100/P0305

Calculate the motor parameters
The motor equivalent circuit diagram values are calculated from the rating plate data which was entered. In addition, the closed-loop control parameters are pre-set.

Plausibility check

The equivalent circuit diagram data can be classified using the following formulas.

EMF

Rated motor current	P0305=	[A]
Rated magnetizing current	r0331=	[A]
Magnetizing reactance	r0382=	%
Normalized magnetizing current	I_0=r0331*100/P0305=	%
Normalized EMF	***EMF***=r0382***I_0**/100=	%

For small motors up to 120 kW, the normalized EMF should be about 75…80%. For motors with power ratings > 120 kW, this value tends towards 95%.

Rotor resistance

Rotor resistance	r0374=	%
Nominal rotor resistance	r0376=	%
Comparison value	A=r0374*100/r0376=	%

For motors in the cold-condition, this value A should be typically lie between 60…80% and for motors in the warm condition, between 90…110%.

Total leakage reactance

Normalized total leakage reactance	r0377=	%

For induction motors, typical values lie between 20…27%.