

Torque Determination without Torque Measuring Shaft



Input of motor specs.

File Device Info

Motor specifications from type plate

Nominal output power	250	W
Nominal speed	1410	1/min
Nominal frequency	50	Hz
Nominal voltage (line to line)	230	V
Nominal current	1.4	A
Nominal powerfactor	0.74	

Additional specifications

Stator copper resistance (line to line)	22	Ohm
Number of poles	4	
Torque adjustment value	-0.064	Nm

Communication

Reconnect LMG

Send to LMG

Start logging

Reset LMG

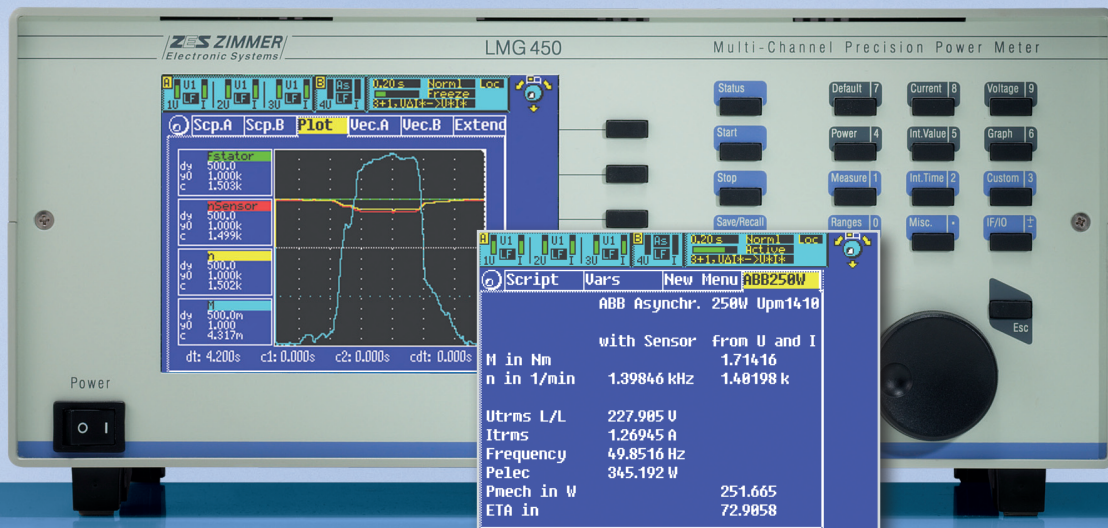
Storing

Load from file

Save to file

Reset form

LMG500 at COM3 with 115200 baud



Torque and speed
from motor current and voltage
with Precision Power Meter LMG450/LMG500

Measuring of torque
in the control cabinet!

Torque determination without torque measuring shaft

1. The knowledge about torque of motors often allows deep insight of the driven process. With mechanically operated stirring and mixing units you can appoint the viscosity of the ready mix by the driving torque. Taking samples for analysing and therewith breaking process will be omitted.

2. Production flow can be controlled more effectively if efficiency degree of the driving motor is known. Especially with pump drives the hydraulic operation point can be set through the fed mechanical power.

3. To avoid down times maintenance should only be done if possible when the admissible limit of deterioration is reached. The exact identification of the deterioration through change of bearing friction is essential for the use of this maintenance concept.

The examples show the huge possible advantages of torque and power measurement at different drives. A classical torque shaft is often not convenient for this application. Fitting of a mechanical measure shaft demands more costs and in most cases you can not retrofit it because of shortage in space. A mobile monitoring set demounting the drive also doesn't serve avoiding downtime.

Therewith the huge application field for priceless and portable torque and power measurement in middle accuracy has been opened: An elegant mathematical operation in the software of precision power meter LMG450 and LMG500 by ZES ZIMMER calculates the torque at the shaft of asynchronous machines and the actual rotation speed regarding slip. For this you don't need any mechanical encroachment and no calibration of the uncoupled motor. The voltage and current measuring for regular power is fully sufficient for the measurement. Current measuring can also be done without detaching connections by use of high precision current clamps.

To determine torque with typical 2% uncertainty you only need to insert nominal motor data from the type plate into a input mask of the LMG. The torque and speed determination is functioning with motors at mains as well as at frequency inverters and therewith it is universally useable.

The mechanical data are calculated continuously in every measuring cycle (beginning at 50ms) and are available over interface and on display. This also enables the analysis of the dynamic performance (vibrations, resonances) in the operating range of asynchronous motors.

Determination of torque and rotation speed of motors acc. IEC 38, fed by frequency inverters or directly by 3-phase net. Calculation by means of electrical measurements of LMG and catalogue data of motor without any use of mechanical torque and speed sensors. Measurement inaccuracy between no-load operation and 1.5 fold nominal torque typical below 2% of nominal torque resp. of rotation speed.

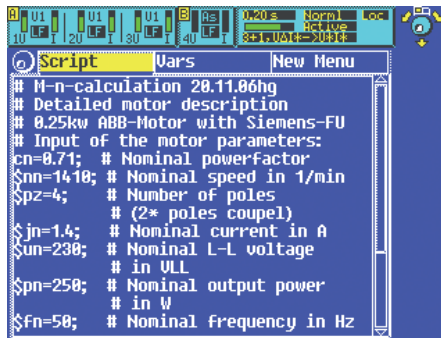


Fig. 1 Input values of 250W-Motor
To be filled into the input mask of the LMG internal script editor: ratings (nominal datas) of the type label of the motor, the ohmic stator resistance (copper resistance including leads) measured between its terminals.

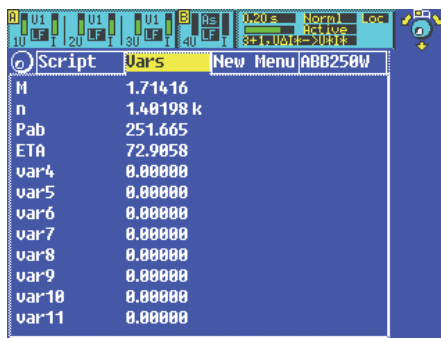


Fig. 2 Overview display
This display shows the overview to control all input values and also it calculates the mechanical and all other quantities of the running measurement.

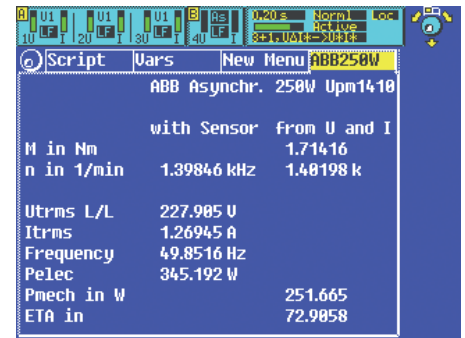


Fig. 3 Customer-specific range
User defined menus have access to all calculated and measured quantities. Here an example with the importance values for a user.

Datum	Zeit	Torque	Speed	Pmech	ETA
03.09.2007	12:19:21	0.10	1487.19	15.33	21.17
03.09.2007	12:19:21	0.14	1485.57	22.13	26.57
03.09.2007	12:19:22	0.21	1482.02	32.82	31.78
03.09.2007	12:19:22	0.34	1475.12	52.36	41.08
03.09.2007	12:19:23	0.49	1466.97	75.44	46.37
03.09.2007	12:19:23	0.71	1455.43	107.63	55.11
03.09.2007	12:19:24	0.90	1445.21	136.26	62.18
03.09.2007	12:19:24	1.04	1436.34	156.44	65.17
03.09.2007	12:19:25	1.16	1431.95	173.55	67.98
03.09.2007	12:19:25	1.24	1426.86	186.82	69.51
03.09.2007	12:19:26	1.31	1423.41	195.21	70.42
03.09.2007	12:19:26	1.36	1420.95	202.91	69.86
03.09.2007	12:19:27	1.43	1417.39	212.96	69.89
03.09.2007	12:19:27	1.51	1413.17	223.72	70.84
03.09.2007	12:19:28	1.57	1409.64	231.84	73.54
03.09.2007	12:19:28	1.57	1410.34	231.36	76.52
03.09.2007	12:19:29	1.49	1414.23	220.69	64.97
03.09.2007	12:19:29	1.69	1403.62	248.99	68.51
03.09.2007	12:19:30	1.62	1396.09	265.49	70.21
03.09.2007	12:19:30	1.89	1393.46	275.41	69.84
03.09.2007	12:19:31	1.97	1389.29	286.08	71.66
03.09.2007	12:19:31	1.99	1387.73	288.52	75.58
03.09.2007	12:19:32	1.91	1391.10	277.91	84.40
03.09.2007	12:19:32	1.64	1406.32	241.37	87.48

Fig. 4 Logged values at load-dependent work of the motor. The logging of the values will be performed with the software "ZES motor spec". This values can be exported to MS Excel™ for further representation and evaluation.

Subject to technical changes, especially to improve the product, at any time without prior notification.