Motatest Dynamic– Technical Specification

Description

We define the "dynamic motor analysis" as the inspection of a running motor under normal working conditions.
For this, the three line voltages (L1, L2, and L3) and the three phase currents are measured and the resultant mechanical parameters are calculated. The aim is, to receive an analysis of the electric motor, its power supply, and its load conditions, exclusively on the basis of these 6 measured values.

It often occurs that motors become too hot during operation. There are many reasons for this. It may be e.g. due to the line power supply, to the motor itself or due to the motor load. The cause is often hard to detect, as the motor is sometimes assembled in parts of a plant where access is difficult.
Usually the motor lead is easier to access. Ideally, the electrical values are measured here. The Motatest Dynamic offers valuable services as it simplifies the motor inspection enormously-without requiring any special knowledge by the operator.

Functional principle

Internally, the Dynamic Motor Analyser consists of two components: the measuring module and the analytical software, which is installed in the PC. The measuring module performs the measurements. For this, it determines millions of measured values on the running motor and transfers these values to the PC. The communication between the measuring module and the PC is performed via a high-speed Gigabit-Ethernet connection.
The measured results are automatically analysed by the analysis software. At the end of the inspection the software shows the results on the screen. The evaluation is displayed clearly and structured in numerical values and for a better understanding, also graphically, similar to an oscilloscope.
The test results are stored in a data base. A detailed test report can be printed upon request.

Connecting the motor

The motor to be tested is connected with the measuring module via test leads. For connecting the test leads, two solid industrial test sockets in the measurement case are available. The three current clamps are intended to be clamped on the three phases of the motor lead and to tap the three voltages. That is all. Now the measurement can be started.
At first, the Dynamic Motor Analyser checks if all measuring leads are properly connected. If this is not the case, it assists via graphic and text, how to connect properly.

Analysis software

The fast, intelligent measurement technology and the user-friendly, intuitive analysis software are matched perfectly to each other. A few clicks in the settings and selections are sufficient to configure the test for the connected motor. The input of the nameplate data and the corresponding setting is done by the operator with the help of a virtual assistant. In this way, wrong settings are prevented.
The extensive evaluations lead to clear, understandable results. Special or detailed knowledge regarding the handling of the analysis software is not required.
Based on the 6 electrical values the software calculates all further electrical and mechanical values.

Detecting and displaying various values

1. 3-phase power consumption of the motor
2. 3-phase voltage supply of the motor
3. Conversion to line to line voltage
4. Analysis of the line voltage-evaluation of the voltage quality • Frequency: min. value, average value, and max. value • Voltage: min. value, average value, and max. value • Voltage unbalance: min. value, average value, and max. value • Voltage unbalance according to NEMA (National Electric Manufacturers Association) • Power de-rating factor according to NEMA • Deviation from the nominal value: min. value, average value, and max. value • FFT (Fast Fourier Transform) Determination up to the 25th/50th harmonic/ Harmonics analysis • THD U (Total Harmonic Distortion) • Crest factor • HFD (High-Frequency Detection)
5. Analysis of the motor current • Frequency

• Current : min. value, average value, and max. value • Current unbalance: min. value, average value, and max. value • Deviation from the nominal value: min. value, average value, and max. value • FFT (Fast Fourier Transform) • Determination of the motor speed Determination up to the 25th/50th harmonic/ Harmonics analysis • THD I (Total Harmonic Distortion) • Crest factor • HFD (High-Frequency Detection) • Peak starting currents – course starting current
6. Motor power • Apparent power: min. value, average value, and max. value • Idle power: min. value, average value, and max. value • Effective power: min. value, average value, and max. value
7. Cos Phi: min. value, average value, and max. value
8. Load factor
9. Speed detection • Speed detection at asynchronous motors from the motor current • Speed detection on the motor shaft |for this, additionally a tachometer with laser scanning has to be ordered • Motor speed is also logged during a long-term measurement
10. Torque calculation
11. Overload factor
12. Efficiency

13. Energy measurement
14. Current-energy measurement according to NEMA
15. Dynamic logging and analysis of the starting procedure
16. Motor run-out speed
17. Peak values during operation
18. Event logging • Online measurement • Event analysis • Event logger function (disturbance recorder) • Automatic triggering for events • Rms value triggering at exceedance / lower deviation of U or I • Rms value trigger at jump by U or I • Increased motor temperature • Manual triggering with key • Peak measurements (transient analysis) during switching operations in the motor • Logging of all measured values over any time periods • Long-term storage of all measured values
19. Squirrel cage bar analysis
20. Test regarding mechanical damages as e.g. unbalanced load
21. Fast oscilloscope display of sine waves
22. Fast oscilloscope display of the rms values

23. Temperature measurement e.g. at motor housing. • For this, the temperature sensor has additionally to be ordered
24. Vibration measurement with X-Y-Z-vibration sensor • For this, the vibration sensor has to be additionally ordered

Technical data:

measuring channels	6 *24bit
measuring frequency	between 100Ks up to 2,5Ms
voltage	3 channels
voltage measuring range	0...700VAC | 0...1000VDC/ line to line voltage
current	3 channels
current measuring range	depending on the connected current clamp
measuring channels	6 *12bit
measuring frequency	between 100Ks up to 2,5Ms
speed	a speed measuring input for speed measuring with laser scanning
temperature	a temperature measuring input e.g. for motor housing measurement
vibration	3 vibration measuring inputs for a X-Y-Z vibration sensor
case dimensions	415 x 325x 170 mm | w*d*h