



Data sheet



Adash 4201 diagnostics analyser

Application:

- ✎ The diagnostic analyser for service measurement, analysis before and after repair etc.
- ✎ Diagnostics of bearings, lubrication and mechanical defects of machines – unbalance, misalignment...
- ✎ Diagnostics of ventilators, pumps, gearboxes, engines, turbines, machine tools...
- ✎ Diagnostics of low-speed machines – paper machines, rolling mills, transport mechanisms...
- ✎ Operating machine balancing
- ✎ Run-up and run-out analysis
- ✎ Check-out of production
- ✎ Eex ib IIB T3 certificate

Characteristics:

- ✎ 1 or 2 (option) channel instrument
- ✎ A possibility to connect acceleration, velocity sensors, optical phase probe or any voltage signal +/- 3V
- ✎ ICP powering of the connected sensor, AC input for general measurement
- ✎ TTL trigger for the synchronization of measurement, machine speed measurement
- ✎ Averaging of static and dynamic data measurement, maximum 20
- ✎ Measurement of TRUE-RMS, TRUE-PEAK values, Crest and Kurtosis in paths:
 - LF velocity in mm/s in band 10 to 1000 Hz
 - LIN acceleration in m/s^2 in band 0.8 Hz to 16 kHz
 - 200Hz acceleration in m/s^2 in band 0.8 to 200 Hz
 - HFE acceleration in g ($9.81 m/s^2$) in band 1.5 to 16 kHz
 - ENV envelope in g ($9.81 m/s^2$) in band 1.5 to 16 kHz
- ✎ FFT analysis 101 to 801 lines, order analysis of 10 harmonics
- ✎ Time signal analysis
- ✎ Operating single or two plane balancing
- ✎ Run-up and coast down measurements, controled by time or machine speed
- ✎ On-line data saving, data memory 512 kB
- ✎ Backlighted graphic LCD display
- ✎ Power supply 4 x AA batteries or alkaline cells
- ✎ RS 232 interface for communication with the user software
- ✎ User software A4000 Download, DDS 2000, MDS 5.00



Introduction:

The Adash 4201 instrument is a portable, fully digital balancing and vibration analyser with the possibility of on-line measurements and data storage. It is intended for identification of bearing condition, lubrication and mechanical defects of machines. It provides diagnostics by the measurement of overall values, FFT analyses and time signals. This equipment enables not only the detection of defects but also

the detailed analysis and precise specification. It can also be used for single and two plane machine balancing and for run-up and run-out measurements. The analyser is particularly easy to use. If used with the DDS 2000 database and expert system, it is suitable for both experienced users and beginners. It can also be used with our simple A4000Download software.

If used with the MDS 5.00 software, it can be used for creating machine deflection shapes.

Diagnostics of Bearings condition and Lubrication:

For this diagnostics, the Adash 4201 instrument offers HFE methods, envelope analysis and Crest and Kurtosis factor measurement. The measurement of **HFE** parameter is the basic method for the analysis of antifriction bearings. It is based on the fact that, in case

of an incipient defect, the emitted energy of vibrations increases in higher frequencies (kHz levels). This parameter is also very sensitive to lubrication failures. The analyser enables to measure TRUE-RMS and TRUE-PEAK values, time and spectra signals in all frequency bands (see the Technical Specification on the last page).

The **ENV** envelope analysis represents a method that not only excellently indicates bearing defects but, followed by the FFT analysis, it also determines which part of the bearing is defective (inner or outer ring, rolling element, cage).

The **Crest** factor is a very sensitive measurement parameter in case of bearing mechanical damages, which are detected already in a very early stage. This method is fully independent of the bearing type and of the shaft speed.

The **Kurtosis** factor represents, compared to other methods of bearing condition analysis, a statistical method.

Diagnosics of Mechanical Defects:

The Adash 4201 analyser is completed with all necessary tools for the diagnostics of mechanical machine defects. It enables a timely detection of unbalance and misalignment, looseness, cavitation and resonance problems. These basic defects along with bearing failures represent the absolute majority of operating problems. The analyser is completed with efficient methods of signal processing so that each type of defect may be verified in several ways, which ensures a high reliability of detection.

The analyser enables to measure TRUE-RMS and TRUE-PEAK values, time signal and the spectrum (see the Technical Specification on the final page).

Next efficient method is the order analysis, providing an array of amplitude and phase values in speed frequency and its harmonics.

Run-up and Coast down Measurements:

The Adash 4201 analyser enables the recording of run-up and coast-down characteristics. There is possible to record up to 400 measurements. Machine speed, amplitude and phase actual values are measured for each point. The

measurement is controlled by time or machine speed.



Balancing:

The balancing in-situ is the best type of machine balancing. It is not necessary to disassemble the rotor, the whole machine is balanced in such conditions under which it is going to work. The Adash 4201 analyser represent an excellent combination of characteristics which enable the diagnostics of operating failures and after the removal of them the final machine balancing is carried out. The balancing module allows to perform single or two plane machine balancing and then to increase the quality by TRIM software, without having to use a test mass. The module includes software for the calculation of mass division (e.g. on ventilator blades).



Analyser control:

The instrument is controlled by selecting of menu items, which appear on the display. From the analyser main menu is activated the requested function by pressing the button.

```

11:04:42    01.07.2001
START .. On Line Meas.
ENTER .. Machine Balancing
SPACE .. Runup analysis
F2 .. Memory
F3 .. About Instrument
F4 .. Instrument Setup
  
```

In the selection menu is first selected the requested function and validate by pressing the Enter key.

```

BALANCING
Online measurement
Single plane balancing
Two plane balancing
Permitted pos. of vectors
Initialize of vectors
  
```

Signal Path Selection:

The analyser, prior to starting measurement, offers the user to select one of four signal paths (see the Technical Specification on the final page).

```

Time Signal
SIGNAL
LIN
200Hz
HFE
ISO 10-1000Hz, mm/s
  
```

For the diagnostics of bearing condition, mainly HFE and LIN paths are used; for the diagnostics of mechanical failures mainly LF, LIN and 200Hz paths are used.

Signal Static Parameters:

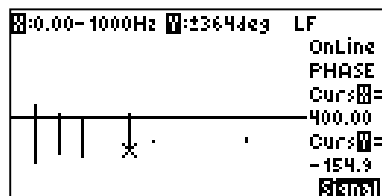
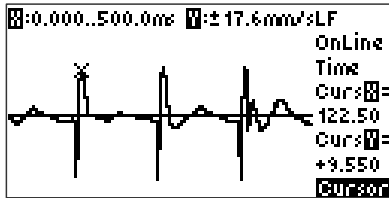
For each signal path four most important static parameters can be evaluated from a single measurement: TRUE-RMS and TRUE-PEAK values and Crest and Kurtosis factors.

```

Static data - LF
ISO 10-1000Hz, mm/s
RMS= 0.42 PEAK=0.63 mm/s
CRST= 1.49 KURT= 1.50
  
```

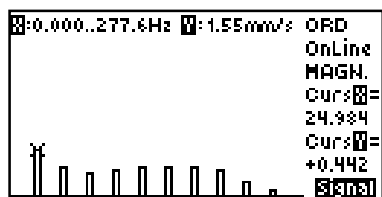
Time Signal and Spectrum:

The displayed time signal and spectrum can be moved on the analyser screen, its appropriate resolution in both the measured coordinates can be zoomed and the cursor can be set to the requested signal point or spectrum line. Coordinates on the cursor position can immediately be read from the screen. If measurement is externally synchronized, for instance by tachoprobe impulses, the final spectrum will be complex.



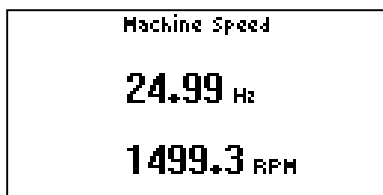
Order Analysis:

The measurement results are, like in case of the complex spectrum, presented to the array of amplitudes and phases, but measured at the speed frequency and its harmonics.



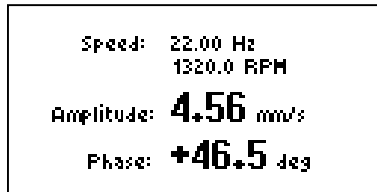
Machine Speed Measurement:

After connecting a tachoprobe, the machine speed in CPS (Hz) and RPM can be measured on-line.



Machine Balancing:

The single or two plane operating balancing of machines is possible. Prior to any balancing, on-line measurement can be carried out to machine stability condition check.

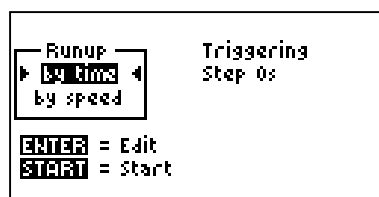


The process of balancing can be interrupted in any time. The performed measurements and calculations remain stored in the analyser memory also after it is switched off. After switching the analyser on again, the process of balancing will continue from the place where it was suspended for the last time.

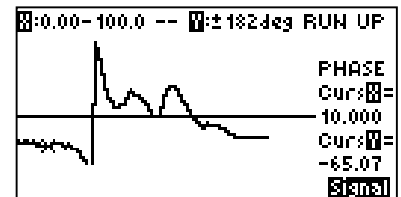
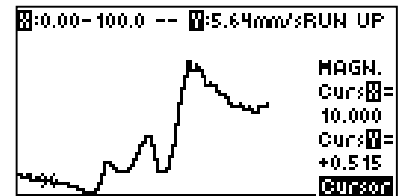
Plane 1	Plane 2
Result Values	
Mass: 0.42 gram	Mass: 0.92 gram
Ang.: +102 deg	Ang.: +52 deg

Run-up, Coast-down Analysis:

Run-up and coast-down characteristics define the measured machine behaviour during the change of the machine speed. Before running of the recording, there is necessary to select, whether the individual measurements will be controlled by time or machine speed.



The measurement results are the RPM, amplitude and phase behaviour in individual machine states.

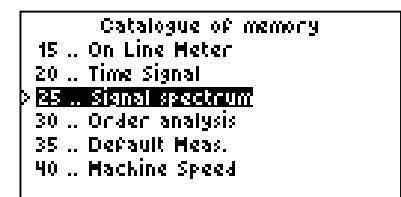


Frequency resolution:

The sufficient frequency resolution of measurement is necessary for balancing, order or run-up analysis of machinery, where some parts rotate by different but near speeds. The Adash 4201 instrument enables set the correct frequency resolution.

Storing of Results:

If the measurement result appears on the analyser screen, measured data may be stored into the instrument memory. Measurement results thus stored can be exported via the RS 232 serial interface from the instrument memory to the database of the Adash DDS 2000 expert system, where they are archived and available for comfort analyses. If the processing of measurement results is sufficient in a text format, data can be exported from the instrument memory using a simpler program Adash 4000DL and next apply e.g. MS Excel.



 **Technical Specification:**

Inputs:	1x (optional 2x) INPUT for vibration sensor (ICP power supply) or for AC input ± 3 V TRIG for trigger impulses, machine speed (3 - 5 V) RS 232 for optical tachoprobe, connector of communication interface with the user software
Interface:	RS 232 for communication with the user software
Sensor:	accelerometer with ICP power supply, nominal sensitivity 10, 50, 100, 500 mV/g or user setting
Signal ranges:	0.01 – 300 m/s ² (sensor 100 mV/g) 0.1 – 3000 m/s ² (sensor 10 mV/g)
Signal paths:	LF velocity in mm/s in band 10 to 1,000 Hz, signal integrated LIN acceleration in m/s ² in band 0.8 Hz to 16 kHz HFE acceleration in g ($g = 9.81$ m/s ²) in band 1.5 to 16 kHz 200Hz acceleration in m/s ² in band 0.8 to 200 Hz ENV envelope in g (9.81 m/s ²) in band 1.5 to 16 kHz
Balancing:	velocity in mm/s in band 3 to 200 Hz (180 to 12,000 RPM), signal integrated
Measured data:	values TRUE-RMS, TRUE-PEAK, Crest and Kurtosis factors, machine speed measurement of time signal, signal spectrum and order analysis one and two planes machine balancing, run-up and coast-down analysis
Averaging:	maximum 20
Trigger:	auto (internal), manually (key), external signal
Display:	backlighted graphic LCD
Data memory:	512 kB
Power supply:	4 x alkaline cells 1.5 V or accumulators 1.2 V (AA size)
Size:	223 x 105 x 40 mm
Weight:	approx. 500 g
Protection:	IP 55