📖 **Data sheet**

Adash 4101 vibration analysers

Application:

- 📂 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
- 📂 Check-out of products
- 📂 Eex ib IIB T3 certificate

Characteristics:

- 📂 A possibility to connect
    acceleration, velocity sensors
    an optical phase probe, a measuring transformer
- 📂 ICP feeding 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 64
- 📂 Measurement of TRUE-RMS and TRUE-PEAK values, *Crest* and *Kurtosis*

factors 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
    HF acceleration in g (9.81 m/s^2) in band 5 to 16 kHz
    ENV envelope in m/s^2 in band 5 to 16 kHz

- 📂 FFT analysis 101 to 801 lines, order analysis of 10 harmonics
- 📂 Time signal analysis
- 📂 Operating single or two plane balancing
- 📂 Data collector – route mode of measurement, data memory 512 kB
- 📂 Analyser – user setting of parameters between measurements
- 📂 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 4101 instrument is a portable, fully digital data collector and vibration analyser with the possibility of on-line and route measurements. It is intended for identification of bearing condition, lubrication and mechanical defects of the whole machine. It enables to apply diagnostics at the level of measurement overall values, FFT analyses and time signal measurement. Its equipment enables not only detection of occurring defects but also their detailed analysis and precise specification. It can also be used for single and two plane machine balancing. The analyser is characteristic by its very easy operation. If used with the DDS 2000 database and expert system, it is suitable for both experienced users and beginners. Also is possible to use simple A4000Download software. If used with the MDS 5.00 user software, it enables to evaluation the machine deflection shapes.

Diagnostics of Bearings and Lubrication:

For this diagnostics, the Adash 4101 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 signal and signal spectrum in frequency bands HF and LIN (vide the Technical Specification on the final 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, retainer). The analyser enables to measure TRUE-RMS and TRUE-PEAK values, time signal. The envelope spectrum is evaluated in 0-400 Hz range. Remember, that it represents periodicity of bearing failure. The spectrum frequency range is in no relation with ENV 5-16 kHz filter.

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 on the bearing type and on the shaft speed.

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

Diagnostics of Mechanical Defects:

The Adash 4101 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 signal spectrum of velocity in frequency band LF and that of acceleration in frequency band LIN (vide the Technical Specification on the final page).

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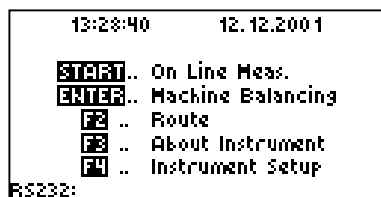
Operating Balancing:

The operating balancing is the best manner of machine balancing. It is not necessary to disassemble the rotor, the whole machine being balanced in such conditions under which it is going to work. The Adash 4101 analysers represent an optimal combination of characteristics since they enable the diagnostics of operating failures after the removal of which the final machine balancing is carried out. The balancing module allows to perform single or two plane machine balancing, without having to use a test mass. A special wizard leads the user through the whole process of balancing. The module includes software for the calculation of mass division (e.g. on ventilator blades).
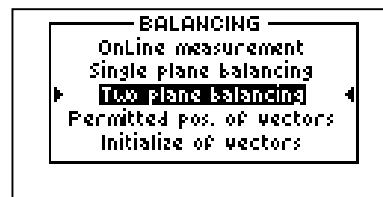
Analyser control:

The instrument is controlled by selecting menus that appear on the display. From the analyser main menu is activated the requested function by pressing the relative button.

```
13:28:40     12.12.2001

START.. On Line Meas.
ENTER.. Machine Balancing
F2 .. Route
F3 .. About Instrument
F4 .. Instrument Setup
RS232:
```

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 (vide the Technical Specification on the final page).

```
Time Signal
- SIGNAL -
LF
HF
LIN
ENV
Freq: 10-1000Hz, unit: mm/s
```
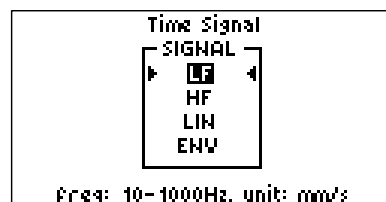
For the diagnostics of bearing condition, mainly HF, ENV and LIN paths are used; for the diagnostics of mechanical failures mainly LF and LIN paths are used.
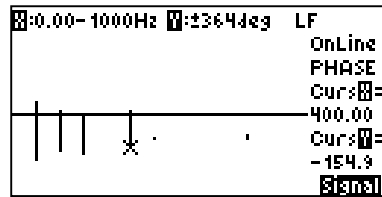
Signal Static Parameters:

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
```
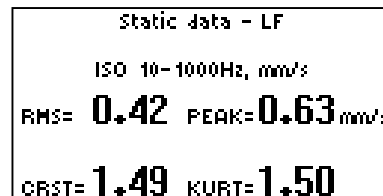
Time Signal and Signal Spectrum:

The displayed time signal and signal spectrum can be moved on the analyser screen, its appropriate resolution in both the measured coordinates can be selected 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.

```
█:0.000..500.0ms █:±17.6mm/sLF
                              OnLine
                              Time
                              Curs█=
                              122.50
                              Curs█=
                              +9.550
                              Cursor
```

```
█:0.00-1000Hz █:5.46mm/s LF
                              OnLine
                              MAGN.
                              Curs█=
                              400.00
                              Curs█=
                              +1.983
                              Cursor
```

```
█:0.00-1000Hz █:±364deg LF
                              OnLine
                              PHASE
                              Curs█=
                              400.00
                              Curs█=
                              -154.9
                              Signal
```

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.

```
█:0.000..277.6Hz █:1.55mm/s ORD
                              OnLine
                              MAGN.
                              Curs█=
                              24.984
                              Curs█=
                              +0.442
                              Signal
```

```
█:0.000..277.6Hz █:±182deg ORD
                              OnLine
                              PHASE
                              Curs█=
                              24.984
                              Curs█=
                              -85.21
                              Signal
```

Machine Speed Measurement:

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

```
      Machine Speed

        24.99 Hz

       1499.3 RPM
```

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.

```
Speed:   22.00 Hz
         1320.0 RPM

Amplitude:  4.56 mm/s

Phase:  +46.5 deg
```

The process of balancing can be suspended 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 |
```

Storing of Results:

If the measurement result appears on the analyser screen, measured data may be stored in 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 4000 DL.

```
Machine List & Out of route place
15 .. On Line Meter          ✓
20 .. Time Signal            ✓
25 .. Signal spectrum        █
30 .. Order analysis         ✓
35 .. Default Meas.          ✓
40 .. Machine Speed          ✓
```

Route Measurements:

Using the DDS 2000 database system, a list of route measurements can be created and transferred, any time via the RS 232 serial interface, to the analyser memory, including the referential values of individual measurements. The list of route measurements has three levels.

The highest level of route measurements is the *machine* item.

```
Machine List & Out of route place

> RS-600,700,800/Vent.600
  RS-600,700,800/Pneu.600
```

Each machine item consists of a list of *measuring points.*
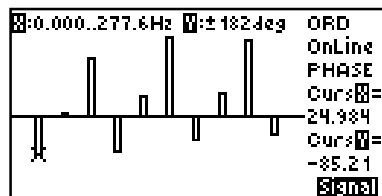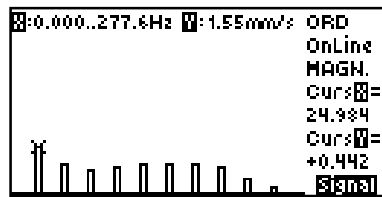
```
   RS-600,700,800/Vent.600

> motor/M1A
  motor/M1H
  motor/M1V
  motor/M2A
```

Each measuring point item consists of a list of measurements, required in the measuring point of the selected machine.

```
        motor/M1A

> Static data - LF        ██

  LF-spec

                          R H
```

Within the route measurement, individual measurements or the whole set of measurements within the selected measuring point can be started. The measured data are immediately stored in the analyser memory and later exported, via the serial interface, to the DDS 2000 system database.

Models of Adash 4101:

The Adash 4101 is producet in several types with different configurations. The construction of the Adash 4101 allows a change of configuration only by change of internal software (upgrade). The basic Adash 4101 types are: BASE, TREND and PRO.

Adash 4101 BASE Model:

It enables to perform basic vibro-diagnostic measurements, based on velocity measurement, with the aim of detecting machine defects, such as unbalance, misalignment, looseness, resonance. To detect bearing and gear condition, the instrument is completed with the HFE parameter measurement. Also this basic version is a fully professional version with an external sensor and its magnetic clamp for the elimination of subjective manual thrust, which ensures a serious repeatability of all the

measurements unlike manual probes (so-called vibration pens).

The instrument enables to measure TRUE-RMS and TRUE-PEAK values, Crest factor and time signal in bands LF, LIN and HF (see below to the Technical Specification). The instrument works in the analyser mode and does not enable to store the measured data for further processing by the user software.

This instrument is suitable for beginers and for maintanance staff.

Adash 4101 TREND Model:

It has all the characteristics of the 4101 BASE model, being further completed with a memory for route and on-line measurements. Only static data (RMS, PEAK, Crest, speed) can be stored, time signal cannot be stored. In addition, this instrument includes the envelope analysis module. It works in the analyser and data collector modes and, if used with the DDS 2000 TREND user software, it enables to process measurement trends, to create route measurements and to process certificates and reports. If the processing of on-line measured data is sufficient in a text format, the simple A4000 DL user software can be used.

The instrument can also be completed with machine speed measurement, order analysis and the module of single and two plane balancing. Signal spectrum cannot be measured, with the exception of balancing spectrum. The instrument enables to trigger measurement by an external signal or tachoprobe impulses.

Adash 4101 Trend represents the base instrument for standard route vitration diagnostic.

Adash 4101 PRO Model:

It is the most efficient model among the Adash 4101 vibration analysers. Besides the possibilities of the 4101 TREND model, including all expansions, it also enables to measure the Kurtosis factor and signal spectrum via all four LF, HF, LIN and ENV signal paths. All types of dynamic data (time signal, signal spectrum, order analysis) can be stored in the analyser memory.

📂 **Technical Specification:**

Inputs:	INPUT for vibration sensor (ICP power supply) or for AC input $\pm$ 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 – 3,000 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
	HF acceleration in g (g = 9.81 m/s^2) in band 5 to 16 kHz
	ENV acceleration in m/s^2 in band 5 to 16 kHz, signal envelope modulated
Balancing:	velocity in mm/s in band 10 to 200 Hz (600 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
	operating single and two plane machine balancing
Averaging:	maximum 64
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

📂 **Order Information:**

The fully equipped measuring set Adash 4101 PRO includes:

- Adash 4101 vibration analyser
- analyser user's manual
- vibration sensor
- coiled cable for connection of the vibration sensor
- magnetic clamp for the vibration sensor
- optical or laser tachoprobe
- digital scales (for balancing)
- CD-ROM with the user SW (A4000 DL, DDS 2000, MDS 5.00 – as per order)
- RS 232 serial connection cable with Canon 9 terminals for communication with the user SW
- user SW manual
- 4 x accumulators AA 1.2 V
- battery charger with user's manual
- leather protective cover for the analyser
- transport bag with a strap