



## User's guide



# Adash 4700 Vibration Recorder

### Applications:

- ✎ Vibration diagnostics of machines
- ✎ Measurement in inaccessible places
- ✎ Measurements on moving parts
- ✎ Diagnostics of bearings

### Characteristics:

- ✎ Measurements repeated in specified time interval
- ✎ True RMS, True PEAK, Time signals, FFT spectra
- ✎ Recording to analysis for bearing conditions
- ✎ Data storage WAV format (PC format)
- ✎ Envelope analysis to MMC memory card up to 2 GB
- ✎ Internal battery for continuous measurement up to 8 hours
- ✎ Mounting tools for attaching to machinery
- ✎ Standard accelerometer 100 mV/g or other required sensitivity
- ✎ Indication of overload and defects of sensor or cable
- ✎ Indication of instrument condition



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## Unit description

A4700-Vibration Recorder is designed for measurements in inaccessible places during operation or on moving parts. It has been developed as individual unit with its own built-in power supply. The instrument can be mounted directly to a machine by screws or other fixtures. This feature enables A4700 to take measurements from points with difficult or no access (e.g. moving parts of machines, dangerous areas, etc.). This instrument can be used on standard places for continual, long-time measuring too.

A4700 is manually switched on after sensor and memory card installation. The measurement is immediately started according configuration file, which is stored on the memory card. The measurement is stopped manually by the user or when battery is discharged or the memory is full.

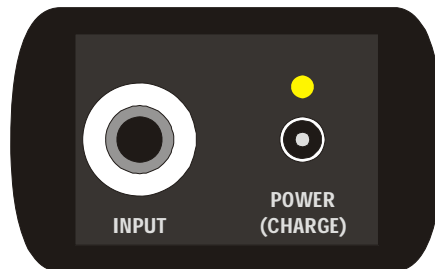
### Front view



### Top view

On the top side of the unit are two connectors:

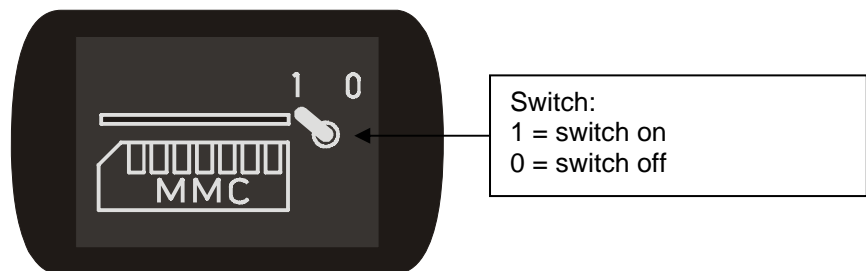
- 7-pin, screw connector for sensor or
- power supply (charger) with LED



### Rear view

Behind small protecting door ( push-up and open ) are:

- slot for memory card (MMC)
- switch on/off



### Power supply

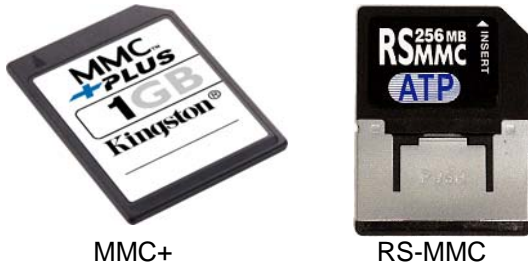
To internal LiPOL accumulator enables 8 hours of measurement. A4700 contain a connector for charger. This slot is also used for external power supply.

For charging switch the instrument OFF and connect the charger. The LED is lighting. During the charging the LED shine goes down. When the LED turns out, the battery is charged.

The charging is not in progress if the instrument is ON and external power supply is connected.

## Data storage

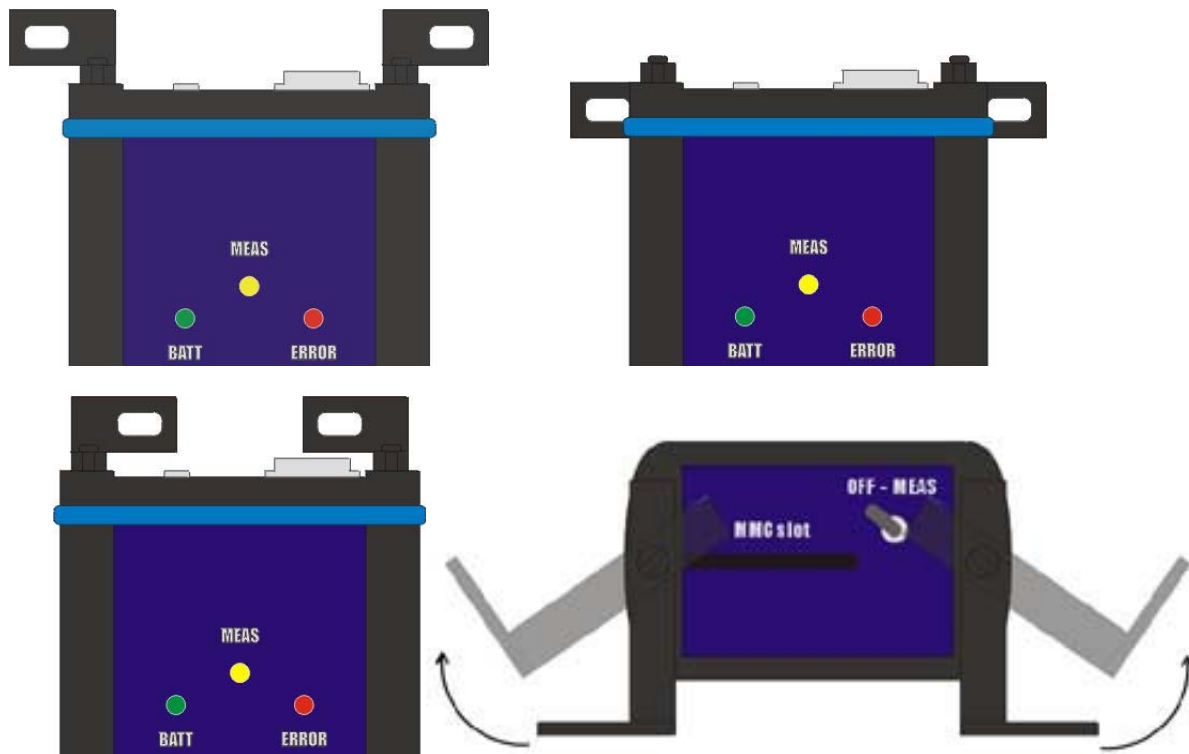
A4700 uses standard **MMC**, **MMC+** or **RS-MMC** memory card max 2GB.



The time volume of memory card depends of required measurements. It can be from minutes (for recording WAV) to hours or days. When MMC-card is inserting into instrument, then chamfer must be on the left-site (gold contacts must be on the top).

## Clamping of instrument

Four clamps are prepared for unit mounting to the machine. They are fixed to instrument in three basic direction.



## A4700 setting

For taking measurements you should follow these steps:

- charge the unit battery
- define the required measurements in 4700CFG.INI, this file has to be in MMC card root
- insert the card in the slot
- mount the unit to the machine
- switch do unit ON.

Now the data is taken. When the process is finished, switch the unit OFF. The unit is also switched OFF when the memory card is full or battery LOW. The saved data is protected.

- remove the card
- use the A3600Download software (see [www.adash.cz](http://www.adash.cz), section Downloads/ Software Adash/ A3600download) for data reading and export to other format.

### Measuring modes

The unit can measure TRUE RMS and TRUE PEAK values, Time signals ( max 16384 samples), FFT spectra (max 3200 lines) and WAV files ( max 50kHz sampling).

Every measurement uses just one electronics path, which is define by user in 4700CFG.INI file.

#### Paths definitions:

Path	Filtering	Default sampling freq. (= minimum freq.) <sup>(2)</sup>	Note
LF	1 or 10Hz <sup>(1)</sup> – 1,000Hz	2 560Hz	integration to velocity
LB	500Hz - 16kHz	40 960Hz	
HB	5kHz – 16kHz	40 960Hz	
LIN	0.5Hz – 16kHz	40 960Hz	
ENV	5kHz – 16kHz	256Hz	with envelope modulator
ENVL	500Hz - 16kHz	256Hz	with envelope modulator
XLF	0.5Hz – 1,000Hz	2 560Hz	without integration

**Note.** Freq parameter is not used for **rms** or **peak**. in this case.

- (1) the filter 1Hz or 10Hz is selected in 4700CFG.INI file by **intflt** parameter  
 (2) for RMS and PEAK measurements the sampling frequency 50kHz is always used

### Configuration

The instrument is configured by 4700CFG.INI and 4700TIME.INI configuration files<sup>(4)</sup>, which have to be stored in the root directory of the memory card.

- 4700CFG.INI	- mandatory file <sup>(5)</sup>	measurements definition
- 4700TIME.INI	- optional file <sup>(6)</sup>	date and time settings of the unit <sup>(3)</sup>

(3) When the unit is switched ON, the date and time from 4700TIME.INI is set in that moment.

(4) Configuration files can be created on PC such as standard text files (.txt), which must be renamed to ini-files (.ini).

(5) The measurement cannot start without this file.

(6) If 4700TIME.INI is not found, then default factory or last set time and date is used.

**Attention!** Memory card must be formatted in FAT16 (FAT) files system.

**Attention!** On the memory card must be at least 1% of free space.

The usual **Notepad**, which is standard system software is fine for ini files creation.

#### ***The description for beginners, how to write to ini files:***

1. Remove the memory card from the instrument and insert it to the card reader (card reader must be connected to the PC).
2. Close all information windows, which appear. Locate the name of the memory card (e.g. Removable disk F:).
3. Start the program **Notepad** (*Start – Programs – Accessories – Notepad*). The empty window appears. Write the configuration parameters.
4. Save the file (*File - Save as ...*) as 4700CFG.txt to the root directory of the memory card (e.g. Removable disk F:).
5. Close *Notepad*. Use similar procedure also for 4700TIME.INI.

#### ***How to rename extension of configuration files:***

1. Find configuration files (*This computer - Removable disk*).
2. Click on the icon of configuration file by right button of mouse and from menu chooses **Rename**.
3. Rename configuration files to:  
- 4700CFG.INI  
- 4700TIME.INI

Now configuration files are created, but they are empty. Edit of the file 4700TIME.INI (setting of time and date) is very simple. File contains only two rows for date and time.

#### ***A4700TIME.INI Example:***

1. Open the A4700TIME.INI file (from Notepad menu select **Open**).
2. Write these two rows to file (you can copy these rows from WORD by keys **Ctrl+C** (copy) and **Ctrl+V** (paste)):

```
time = hh:mm:ss          - actual time, e.g.13:00:00
date = dd.mm.yyyy       - actual date, e.g. 21.03.2006
```

3. Save file (*File - Save*) and close **Notepad**.

Edit of the file 4700CFG.INI (configuration of measuring) is similar to edit of the 4700TIME.INI:

#### ***A4700CFG.IN Example:***

1. Open the file A4700CFG.INI.
2. Write these rows to file (you can copy these rows from WORD by keys **Ctrl+C** (copy) and **Ctrl+V** (paste)) and create your configuration by parameter modification:

```
[ CONFIG ]
sensor = 100          - sensitivity of sensor - 100mV/g
icp    = on           - ICP power supply – on / off
range  = auto         - range of measuring
```

intflt = 1 - LF filter (1 or 10Hz)

**[MEAS 1]** - configuration of measurement No.1

start = 5 - first measurement is started five second after instrument switch ON

repeat= 10 - measurement is be repeated every ten seconds

type = rms - measuring type is TRUE RMS

path = LIN - path is LIN (0.5Hz - 16kHz)

samples = 0:02 - value of TRUE RMS is computed from 2 seconds of signal

3. Save this file (*File - Save*) and close **Notepad**.

4. Remove the memory card from the card reader and insert it to the A4700.

Now, we must installed sensor on the measuring place and to the instrument and activated the instrument. The instrument will be measure values of TRUE RMS every 10 seconds until discharge of the accumulator, filling of the memory or switch off the instrument. It is only one example of measuring and all parameters are described in next chapters.

### **4700CFG.INI - Parameters Description**

Standard INI-file contains two types of sections:

[CONFIG] – global configuration of instrument (sensor, range, etc.).

[MEAS x] – configuration of every measurement (x = 1 to max. 32)

**Note:** When the **semicolon (;)** is in the beginning of the row, then this row is not used.

#### **[CONFIG]**

sensor = 100 sensor sensitivity in mV/g

icp = on ICP power supply setting ( on or off)

range = auto input range (auto or user in g), the user value is rounded to the one of unit  
= 50 defined value, which is near

intflt = 1 low frequency of LF path (1Hz or 10Hz), if not set, then **intflt = 10**.

#### **[MEAS 1]**

measurement number (max. 32)

start = 0 optional (default value = 0)

= 5 measurement will begin 5 second after unit switch ON

= 10:05 measurement will begin at 10:05 of unit time  
format : **hh:mm**, **hh:mm:ss**, or **ss**

repeat= 0 optional (default value = 0)

= 5 measurement is repeated every 5 seconds

= 03:30 measurement is repeated every 3 hours and 30 seconds  
format : **hh:mm**, **hh:mm:ss**, or **ss**

= -1 only one measurement will be taken

type = mandatory, the measurement type name

= rms TRUE RMS

= peak TRUE PEAK

= time time signal

= spec spectrum

= wav recording of a time signal to the WAV file

path = mandatory, the measurement path name, see the **Path definitions** table in

previous chapter

`freq = 4096` optional, it defines the sampling frequency in Hz for **time** and **wav**. Default sampling frequencies for **time** and **wav** are specified in **Path definitions** table. The default frequencies are the minimum values, which the unit can use. When you define lower value, then the minimum value from table will be used. The 50000 is maximum limit).

The **freq** value no effect:

- for **rms** or **peak** measurement (the sampling frequency 50kHz is used always),
- for **spec** ( frequency range are equal the high frequency of filtering, see **Path definitions** table).

`samples = 2048`  
`length = 1:35` the mandatory definition of number of samples or time length of the signal. For **rms**, **peak**, **time**, **wav** must be defined one of these two parameters ! When both values are defined, then the samples number is used. **Length** format: **mm:ss**, or **ss** (**ss** format can be a real number, e.g.0,5). The minimum of **length** is 0,1sec, the maximum is 10 minutes. The **samples** number must be in ( 200, 16384). When user defines the **freq** and **length**, the required samples number cannot exceed the 16384 for **time** type. No such restriction for **rms**, **peak** or **wav**.

`lines = 800` mandatory for **spec**, number of lines (min. 100, max. 3200).

## Important Notes

Wrong or unusable settings are ignored.

If two or more measurements should start at the same time, then the instrument shifts these measurements.

The real time (from 4700TIME.INI) is saved to the instrument for next use. The internal battery keeps it.

The order sequence of the parameters in every section [MEAS x] is free.

Maximum number of measurements ([MEAS x]) is 32. The first 32 measurements are loaded, the next are ignored.

## Examples of configuration file 4700CFG.ini

[CONFIG]	- global configuration of instrument
<code>sensor = 100</code>	- sensor sensitivity is 100mV/g
<code>icp = on</code>	- ICP is ON
<code>range = auto</code>	- auto-range is ON
<code>intflt = 1</code>	- lower cutoff frequency of LF filter is 1Hz
[MEAS 1]	- setting of the measurement No.1
<code>start = 7</code>	- measurement starts 7 second after instrument ON
<code>repeat= 5</code>	- the data are taken every 5 sec

type = rms	- measurement type is TRUE RMS
path = LF	- measurement path is LF (1-1000Hz)
length = 1	- length is 1 second (using of the <b>length</b> is better)
[MEAS 2]	
repeat= 25	- data taken every 25 seconds
type = peak	- measurement type is TRUE PEAK
path = XLF	- measurement path is XLF (0.5Hz – 1.000Hz, without integration)
samples = 200000	- the number of samples is 200,000, i.e. 4 seconds of record
[MEAS 3]	
start = 13:00	- measurement will start on 13:00
repeat= 2:00	- data taken every 2 minutes
type = spec	- measurement type is spectrum
path = LB	- measurement path is LB (500Hz – 16kHz), spec range 16kHz
lines = 800	- the number of lines in spectra is 800

### **4700TIME.INI**

This configuration file contains settings of the instrument time and date. The file 4700TIME.INI contains two parameters:

```
time = 10:30:00
date = 12.3.2005
```

The **time** parameter defines instrument time in format: **hh:mm:ss**, or **hh:mm**

The **date** parameter defines actual-date in format **dd:mm:yy**, or **dd:mm:yyyy**.

After file processing, is this file renamed to 4700TIME.IN~. At a next start of the instrument the file 4700TIME.IN~ will not used.

## **Measurement and data processing**

**Note:** Before instrument switch ON connect the sensor, insert a memory card and clamp the unit.

After instrument switch ON is ran:

1. verification of memory card and files,
2. reading of 4700TIME.INI (if exists) and setting the instrument clock,
3. reading of 4700CFG.INI.

Instrument automatically performs continual measurements, which are defined in configuration file 4700CFG.INI.

Measured data are saved to files:

4700\_xxx.MEM - data file for measurement of TRUE RMS, TRUE PEAK, FFT, TIME,

4700\_xxx.WAV - standard acoustic PC file for measurement WAV,

where xxx are ordinal numbers of files, e.g. 000, ....., 999.

After end of measurement, remove the memory card from instrument and insert it to card reader (card reader must be connected to PC). **WAV** files can be played as standard acoustic files by any acoustic-player (e.g. Windows media player, etc.), or can be edited by any acoustic editor (e.g. GoldWave, etc.). For **MEM** files processing is possible use the program A3600Download for export to txt files or DDS.

**Note:** If MMC LED is OFF, then is possible to remove the memory card from instrument during measurement (measurement will automatically stopped). If MMC LED is ON and you remove the memory card from instrument, then measurement data corruption is possible!

**Note:** If any **MEAS [x]** measurement contain parameters mismatch, then this measurement will be skipped.

### **LEDs signalization**

#### **Normal state**

MEAS - measurement is in progress  
 MMC - communication with memory card  
 PWR - slower blink, battery OK  
       - faster blink, battery LOW

#### **Errors**

If any error occurs, which prevent data saving, it will be indicated by LED.

All errors are indicated by blinking of ERR LED. ERR led blinking in cycle: one long and few short blinks. Number of short blinks specified a type of error.

If occurs any memory error, then MMC LED and ERR LED light.

If occurs any measure error, then MEAS LED and ERR LED light.

#### **MMC Error**

ERR LED blinking	definition
- . . . .	instrument can't find the memory card, or storage access error
- . . .	wrong file system on the memory card (must be FAT16)
- . .	instrument can't find file 4700CFG.INI (measure setup don't exist)
- .	memory card is full

#### **MEAS Error**

ERR LED blinking	definition
------------------	------------

- . . . . sensor power supply error
- . . . . over-excitation of input amplifier (auto-range error, or low fix-range)

**Technical specification:**

- Input channels:** - 1x **ICP** supplied accelerometer with a sensitivity of 100 mV/g for vibration measurements / recording
- Measurement method:**
- LF-ISO standard velocity measurement (mm/s, ips, 10Hz – 1kHz band)
  - LF velocity measurement (mm/s, ips, 1Hz – 1kHz band)
  - LB low speed (large bearings condition) measurement (acceleration in g, 0.5kHz–16kHz band)
  - HB general bearings condition measurement (acceleration in g, 5–16kHz band)
  - LIN wide band acceleration in g, 0.5Hz – 16kHz band
  - ENV envelope analysis in HB band
  - ENVL envelope analysis in LB band
  - XLF acceleration in g, 0.5Hz – 1kHz band
- Data processing:**
- measuring of TRUE RMS value
  - measuring of TRUE PEAK value
  - analysis of TIME signal
  - FFT analysis
  - recording vibrations to WAV format (PC acoustic format)
- Measurement ranges:** - approx. 100dB, max. 80g peak for sensor 100mV/g
- Memory:** - MMC card from 128MB to 2GB
- Power Supply:**
- internal LiPOL rechargeable battery 3.7V
  - external: charger + power supply 5V/1A
- Measurement time:** - up to 8 hour continuous measuring (for fully charged battery)
- Size:** - 120 x 60 x 35 mm
- Weight:** - approx. 250 g
- Accessories:**
- vibration sensor, magnetic base, cable
  - battery charger, transportation case
  - mounting tools