USER MANUAL

A3900 II
Online Monitoring System



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Contents

On-line vibration monitoring system 3
Before the First Start-up 4
Unit description 5
Data outputs 5
Front panel description 5
A3900-II connection 8
Terminals description 8
Module connection 8
Sensor connection 9
Output current loop 4-20mA 9
Output relay 10
Serial interface RS232 10
Data storage 10
A3900-II setting 11
Hyper Terminal setting: 11
Measurement parameters setting: 14
Technical Specification of Adash 3900-II 18
Dimensioned Sketch of Adash 3900-II 18

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Adash 3900-II
On-line vibration monitoring system

Application:
- Predictive maintenance
- Measurement of bearing condition
- Machine protection systems
- Machine control systems
- Machine monitoring systems

Characteristics:
- Measurement of vibration (mm/s, in/s) in freq.band 10-1000Hz
- Measurement of bearing condition (HF parameter, g=9.82m/s^2) in freq.band 5-16kHz
- Wideband measurement of acceleration (g=9.81m/s^2) in freq.band 0.8Hz-16kHz
- Measurement of TRUE RMS and TRUE PEAK values
- A3900-II settings from computer via RS232 interface
- A3900-II is possible to connect to memory module for data storage (standard CompactFlash card)
- Adjustable current loop 4-20mA for actual value output
- Complete checking of failures. Current of the loop drops to 3.5 mA immediately and the control system does not generate any incorrect response
- Indication of exceeding the predefined vibration limits (ALARM, ALERT)
- ALARM limit relay
- The quality acceleration ICP sensor is used
- Continuous check of break of cable or sensor
- Simple connection to control systems (PLC)
- Simple installation to DIN rail

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Before the First Start-up

Failure to respect any of the following recommendations may damage the device !
With a non-professional handling of voltage exceeding 50 V you expose yourself to accident hazard.

1. Never connect any sensor to the ICP input of the unit other than the ICP sensor type! If you are not sure, consult the procedure with your supplier.

2. Never connect the unit directly to the mains voltage !

3. Use only power supply units with a nominal voltage 20 - 28V DC to supply the unit !

4. Use only power supply units with a nominal voltage 10 - 30V DC to supply current loop !

5. Pay attention to the correct polarity of the supplied voltage !

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Unit description

The unit Adash 3900-II is simple tool for vibration measurements, which is intended for process control and reliability systems, machinery protection systems and generally for all the applications concerning the maintenance and monitoring of machinery state. Thus, a large variety of applications are possible for motors, fans, pumps, gearboxes, small turbines, bearing diagnostics etc.

Data outputs

Actual measured value is displayed on three-digits, seven-segments display on the front panel. There are also situated all LEDs for indication of unit state.

A3900-II unit contains two additional outputs:
- adjustable current loop 4-20mA - output of actual value for using in control systems (PLC)
- switch-over relay - for "ALARM" indication

Current loop, "ALARM" and "ALERT" limits and all others parameters are adjustable by software "Hyperterminal" (standard MS-Windows program). Standard serial interface RS232 is used for connection between PC and A3900-II. If "ALARM" limit is exceeded, then relay contacts are switched on/off. Any failure of sensor, or cable (disconnection of cable too) is signalized by message "*ICP*" on display.

Front panel description

On the front panel are situated:



- BNC connector for analogue output of measured signal
- three-digits, seven-segments display for real-time displaying of measured value
- three LEDs ("mm/s", "ips", "g") for indication of measured unit
- LED ("PEAK") for indication of evaluation of signal (TRUE PEAK (LED is on) or TRUE RMS (LED is off))
- three LEDs ("OK", "ALERT", "ALARM") for indication of limit exceeding
- LED ("LOOP") for indication of current loop status

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Three-digits, seven-segments display - the report list

After start or restart

8.8.8. plus all LEDs are ON (user can check, whether all front panel components light)
X.XX firmware version (e.g. 2.20), all LEDs are OFF

During the Measurement

XXX measured value (0.00 - 999), there are three LEDs, which indicated a measured unit. The "LOOP" LED indicates status of current loop and relation to predefined limits is indicated by "OK", "ALERT" and "ALARM" LEDs.
- - - measurement is stopped, parameters are set via interface RS232 (if these segments are blinking, then time delay for system restart is run)
ICP - cable or sensor is not connected
- failure of cable or sensor (short circuit, disconnection)
- failure of ICP power supply
Err memory failure
CAL system auto-calibration after restart
OVr input amplifier overload - failure state (you should use the lower sensitivity of sensor)

Unit state signalization

Status and settings of unit is signalized by LEDs on the front panel. Description of all adjustable parameters - see *Detailed description of menu.*

Measured unit (mm/s, ips, g) and evaluation (RMS, PEAK)

mm/s, ips, g LED indicates measured unit
PEAK LED indicates evaluation of TRUE PEAK (LED is on) or TRUE RMS (LED is off)

Measurement status (OK, ALERT, ALARM)

all of three LEDs are OFF check function does not run (*Alarm value* = 0)
OK LED is ON check function runs and status is OK (value lower than *Alert* and *Alarm value*), COM-1 contacts are opened and 0-COM contacts are closed
ALERT LED is ON - measured value is lesser than *Alarm value*, but it is greater than *Alert value*, COM-1 contacts are opened and 0-COM contacts are closed
ALARM LED is ON - measured value is greater than ALARM value and relay is switch on: COM-1 contacts are closed and 0-COM contacts are opened

Current Loop status

LOOP LED is OFF - current loop does not run (Loop max value = 0)
LOOP LED is blinking - current loop circuit is opened - power supply for current loop is failed
LOOP LED is ON - current loop works OK

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Output signal from sensor

The BNC connector is the output of measured signal. It is possible to connect an external vibration-analyser or other evaluation device for independent measurement of the signal.

The 3900 II unit is able to accept max. signal from sensor in range +/- 5V. You should use the sensor with suitable sensitivity.

Signal on the BNC connector is separated from the sensor by amplifier with gain 1 and output resistance aprox. 3kΩ.

Signal on BNC does not contain DC component, which is created by ICP power supply.

Input parameters of external devices or short circuit on the BNC have no effect to the 3900 II data processing.

ICP powered input of external device can be connected and used directly to BNC output.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

A3900-II connection

Terminals description

Power supply terminals

+24V positive pole of supply voltage 20–28 V
0V negative pole of supply voltage
They are two pairs and they are intended for power supply of module and current loop (in active mode).

Input terminals

+ICP positive pole of ICP
–ICP negative pole of ICP
SHLD sensor cable shield

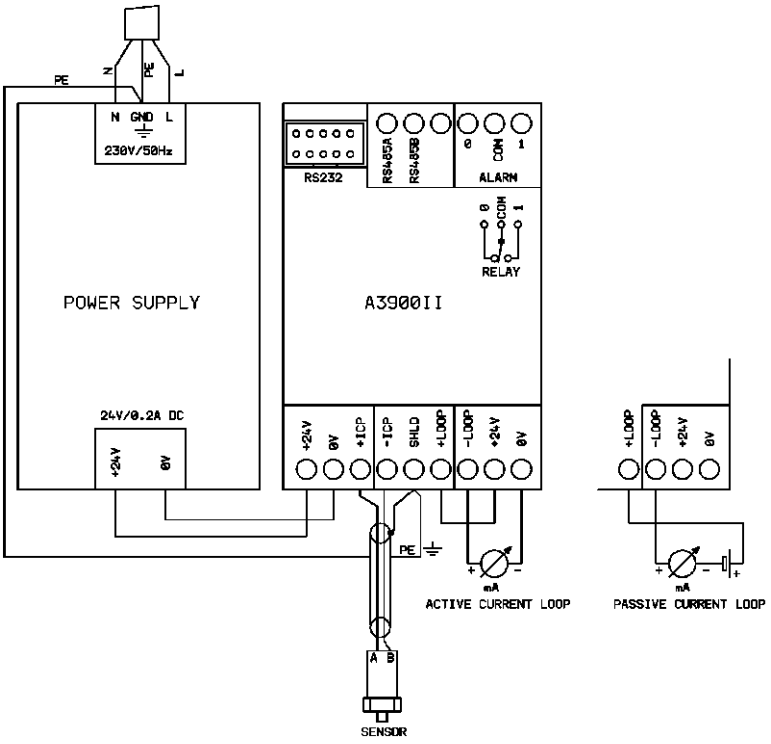
Output terminals of current loop

+ LOOP positive pole of current loop 4-20 mA
- LOOP negative pole of current loop

Output terminal of relay (ALARM)

COM common contact of relay
1 contact of relay (in ALARM status it is closed with COM)
0 contact of relay (if not ALARM status it is closed with COM

Module connection



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Sensor connection

A3900-II unit is intended to measure the vibrations by **acceleration sensor**. A real sensibility of used sensor (mV/g) can be set by PC. A3900-II is possible join to PC by standard crossing cable RS232 see *Detailed description of menu.*

For sensor connection is recommended usage of ***shielded twisted pair***, which is resistant to electromagnetic field. The Adash Ltd. supplies the cable with this standard connection:

+ICP	white
–ICP	blue or blue-white
SHLD	cable shield

Output current loop 4-20mA

Current loop is intended for output of measured value. Output current is in range 3.5 - 22mA (4-20mA - value output, 3.5, 3.75 and 22mA to indication of current loop state).It can be processed by external devices or indicated by external ampere-meter.

Current loop is galvanic separated from measuring circuits. It can doing in active or passive mode (see module connection). For power supply of loop in active mode is used input supply voltage **20-28V DC** and for power supply of loop in passive mode must be used external power source **10-30V DC** (see *Module connection*).

Output range of current for measured value

Output range of current loop for measured value is **4 - 20 mA**. Minimum and maximum value of current loop can be assigned to minimum and maximum value of measuring unit.
20 mA - "*loop max value*" (maximum of measured unit)
4 mA - "*loop min. value*" (minimum of measured unit)
Range of current loop for measured data is adjustable from PC (see *Detailed description of menu*).

Output current of loop out of the measuring range

If measured value of vibration exceeds "*Loop max. value*", then the output current is **22mA**.
If measured value of vibration is less than "*Loop min. value*", then the output current is **3.75mA**.
During unit initialization (e.g. after start unit) the output current is **3.5mA**.
If measuring is stopped by command from PC, then the output current is **3.5mA**.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

During unit setup by PC and when measuring is stopped, then the output current is **3.5mA**.
If input of unit is overload by high-level signal, then output current is **3.5mA**.
If any error is detected (e.g. ICP error), then output current is **3.5mA**.
If current loop is switched-off by user (*Loop max. value =0*), then output current is **3.5mA**.
If blackout occurs or if unit is restarted, then output current is aprox. **1.3mA** (even if current loop is in passive mode, see module connection).

Output relay

A3900-II unit contain output switch-over relay with one double throw contact (see *Module connection*). If ALARM value is exceeded, relay is switched on COM-1 contacts and 0-COM contacts are switched off (ALARM value has not to be zero).
User can decide, which pair of contacts to use.

Attention!!!
From relay state cannot be find out the status of unit. If unit is not power supplied, then contacts COM-1 are opened and contacts 0-COM are closed.
If unit input is overloaded by signal from sensor (is signalized OVR on display), then relay remains in the previous state. If the status was not "ALARM" before the OVR, then the OVR does not cause switch of relay to "ALARM".

Using of the relay is recommended, if the RMS value is measured. If the PEAK value is measured, any short-time high amplitude can generate alarm.

Serial interface RS232

A3900-II is possible join to PC by standard crossing cable RS232 with connector CANNON 9 (female, female) and by reduction CANNON 9 / 10pin connector (see *Module connection*). This reduction is in the standard distribution shops.

Data storage

A3900-II is possible to connect to memory module 3600MEM. There are stored measured data to standard compact flash card. Stored data can by analysed in PC. For further information contact the ADASH Ltd.

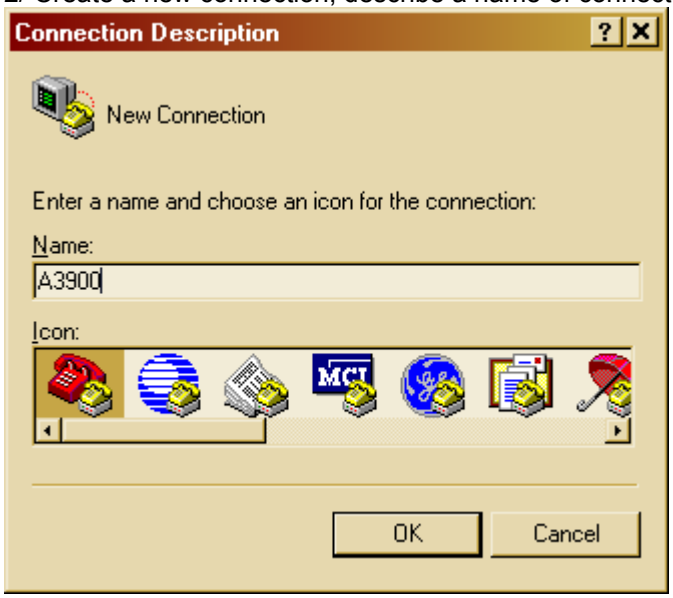
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

A3900-II setting

A3900-II module is set by PC in the Hyper Terminal. Hyper Terminal is standard part of Windows. After connection to PC (by RS-232), Hyper Terminal must be started and setting. Connection RS232 to A3900-II unit - see *Serial interface RS232*.

Hyper Terminal setting:

1/ Run Hyper Terminal (Windows Start / Programs / Accessories / Communication / Hyper Terminal).
2/ Create a new connection, describe a name of connection e.g. A3900 and click on OK button.

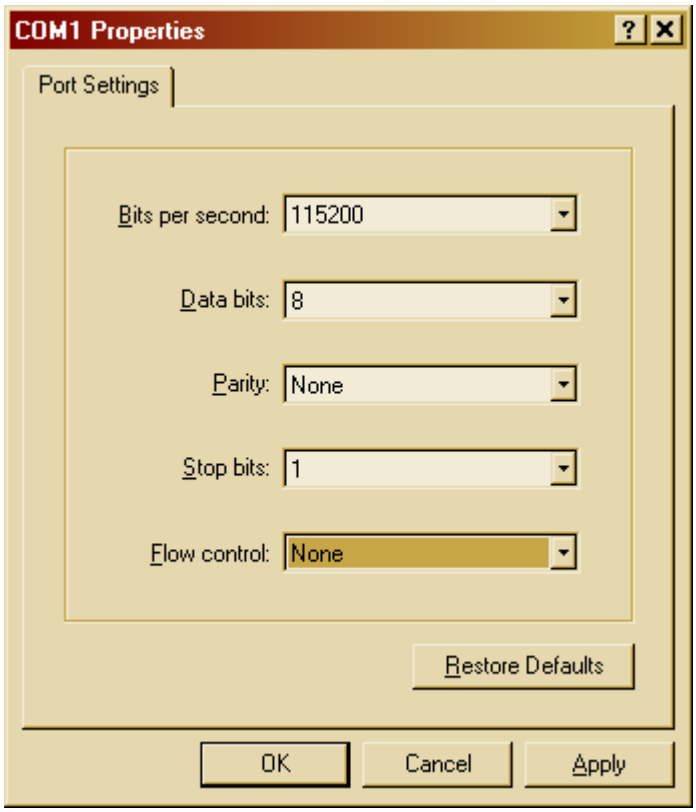


3/ Choose COM-port (used by A3900II) from field "*Connect using*" and click on OK button (other settings are irrelevant).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

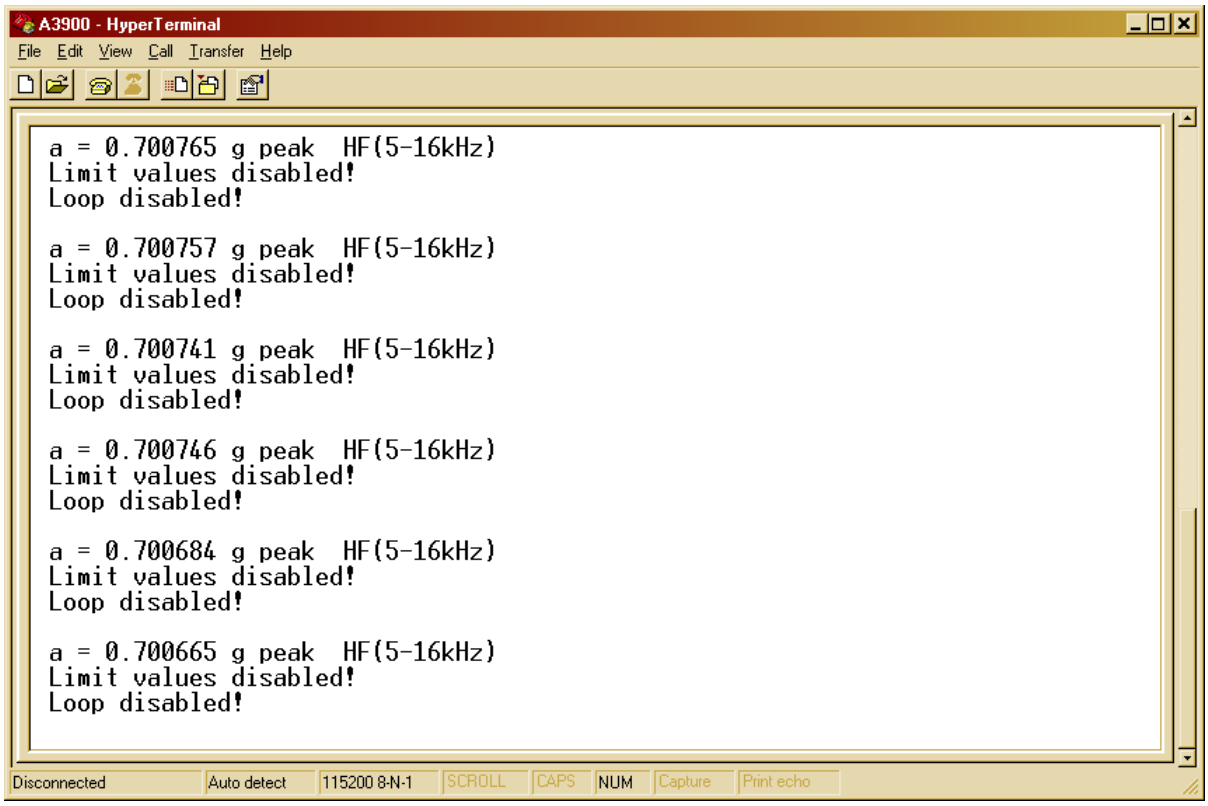


4/ Choose connection parameters like picture below / click on OK.

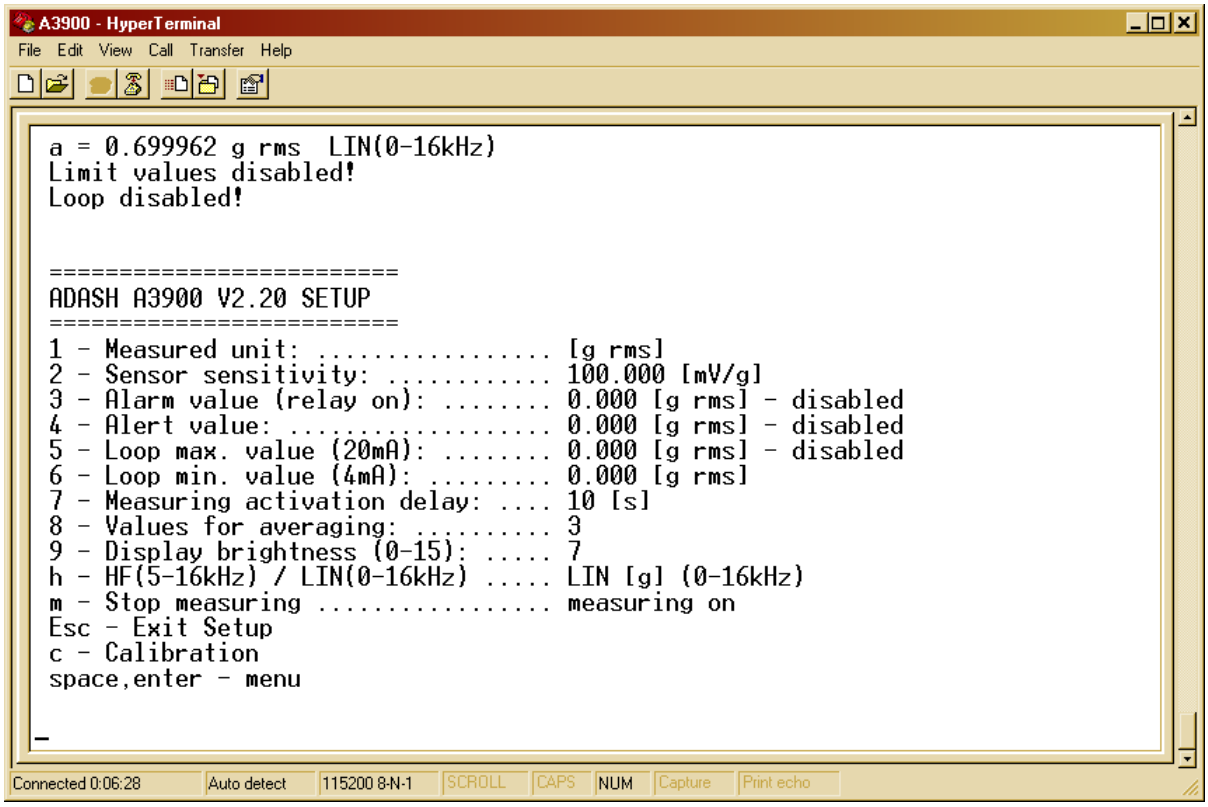


Now connection is created and actual value of measuring is displayed every aprox.1[s] time interval.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com



6/ MENU display - click on the Hyper Terminal window and press ENTER or SPACE.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

Measurement parameters setting:

Enter, Space **-** Open menu (measuring will continue)
Esc **-** Close menu (if measuring isn't stopped)
m - Stop measuring / Start measuring (System is automatically resetting after *Start measuring*).
Most of the parameters setting needs to restart measuring.
s **-** Save new setting

'1' - Measured unit (mm/s, in/s, g)

Measured unit can be changed only if the measuring is stopped (by pressing the key 'm').
Submenu of *measured unit* is opened by pressing the key '1'.

'1'	***g-rms***	measuring of acceleration
'2'	***g-peak***	measuring of acceleration
'3'	***mm/s-rms***	measuring of velocity
'4'	***ips-rms***	measuring of velocity
'5'	***mm/s-peak***	measuring of velocity
'6'	***ips-peak***	measuring of velocity

Measured unit can be chosen from this submenu by pressing the key '1', '2', '3', '4', '5' or '6'.
A new *measured unit* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.
If measuring of acceleration is choosen (g/rms or g/peak), then ***HF(5-16kHz)/LIN(0-16kHz)*** setting is added to menu.

Attention!!! *– if measured unit is changed by user, then Alarm value, Alert value, Loop max. value and Loop min. value are reset to zero!*

h - setting of frequency band of acceleration [g] – LIN [g] (0.5Hz–16kHz), or HF [g] (5kHz–16kHz).
It can be changed only if the measuring is stopped by pressing the key 'm'.
This menu is displayed only for measuring of acceleration. A *setting of frequency band of acceleration* can be changed by pressing the key 'h'. A new *setting of frequency band of acceleration* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

'2' - Sensor sensitivity

Sensor sensitivity can be changed only if the measuring is stopped (by pressing the key 'm').
Sensor sensitivity can be changed by pressing the key '2'. A new *sensor sensitivity* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

Attention!!! *sensor sensitivity has not to be zero*

'3' - Alarm value (relay on)

Alarm value can be changed only if the measuring is stopped (by pressing the key 'm').
A *Alarm value* can be changed by pressing the key '3'. If *Alarm value* is zero, relay is deactivated. A new *Alarm value* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

measured data	ALARM indicator	contacts COM-1	contacts 0-COM
lower than *Alarm value*	is ON	switched on	switched off
more than *Alarm value*	is OFF	switched off	switched off

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

***Attention!!!** - if measured unit is changed by user, then Alarm value is reset to zero!*
***Attention!!!** -from relay state cannot be find out state of unit. If unit haven't power supply, then contacts COM-1 are switched off and contacts 0-COM are switched on.*
***Attention!!!** - if unit input is overloaded by great signal from sensor (is signalized OVR by display), then relay stay in the previous state. If unit don't measure Alarm value before the input is overloaded, then OVR value don't cause switch of relay.*
***Attention!!!** - Alarm value and Alert value are recommended to use only if RMS value is measured.*

'4' - Alert value

Alert value can be changed only if the measuring is stopped (by pressing the key 'm').
A *Alert value* can be changed by pressing the key '4'. A new *Alert value* is confirmed by pressing the key 's'. The *Alert value* must be lesser than *Alarm value*. New measuring is started by pressing the key 'm'.

measured data	ALERT indicator
lower than *Alert value*	is ON
more than *Alert value*	is OFF

***Attention!!!** - if measured unit is changed by user, then Alert value is reset to zero!*
***Attention!!!** - if Alert value = 0, then this function is deactivated*
***Attention!!!** - Alarm value and Alert value are recommended to use only if RMS value is measured.*

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

'5' - Loop max. value (value of measured unit which matches to 20mA)

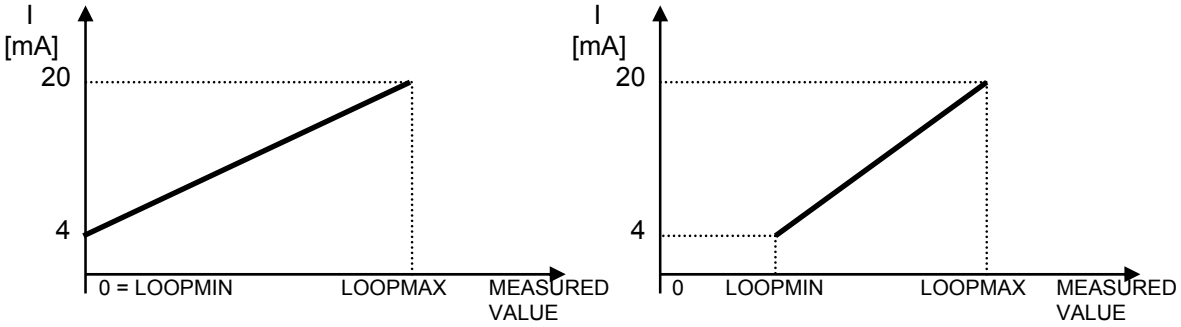
Loop max. value can be changed only if the measuring is stopped (by pressing the key 'm').
A *Loop max value* can be changed by pressing the key '5'. If *Loop max value* is zero, current loop is deactivated (LED is OFF, current of loop is 3,5mA). A new *Loop max value* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

Attention!!! *- if measured unit is changed by user, then loop max value is reset to zero! If value of measured unit exceeded maximum value, then current of loop is 22mA.*

'6' - Loop min. value (value of measured unit which matches to 4mA)

Loop min. value can be changed only if the measuring is stopped (by pressing the key 'm').
A *Loop min value* can be changed by pressing the key '6'. *Loop min value* must be lesser than *Loop max value.* A new *Loop min value* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

Picture: Two typical characteristic of current loop:



Attention!!! *- if measured unit is changed by user, then Loop min value is reset to zero! If value of measured unit is lesser than minimum value, then current of loop is 3,75mA.*

'7' - Measuring activation delay

Measuring activation delay can be changed only if the measuring is stopped (by pressing the key 'm').
A *measuring activation delay* value can be change by pressing the key '7'. It is necessary to sensor activating. A default value of the *Measuring activation delay* is 10s, maximum value of the *Measuring activation delay* is 60s. A new *Measuring activation delay* value is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

'8' - Values for averaging

Values for averaging is recommended to use for measuring of unstable vibration signals.
Values for averaging can be changed only if the measuring is stopped (by pressing the key 'm').
There is possible setting new *Values for averaging* (by pressing the key '8'). A default *Values for averaging* is 3. A new *Values for averaging* is confirmed by pressing the key 's'. New measuring is started by pressing the key 'm'.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

'9' - Display brightness

Display brightness can be changed anytime.
There is possible changed a *Display brightness.* First, press the key '9' and second change *Display brightness* by pressing keys '+,-' (at interval 0-15). A new *Display brightness* is confirmed by pressing the key 's'.

Other parameters

d - Data storage Data storage settings (see part *Data storage*)

c - Calibration unapproachable for user, needs password

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com

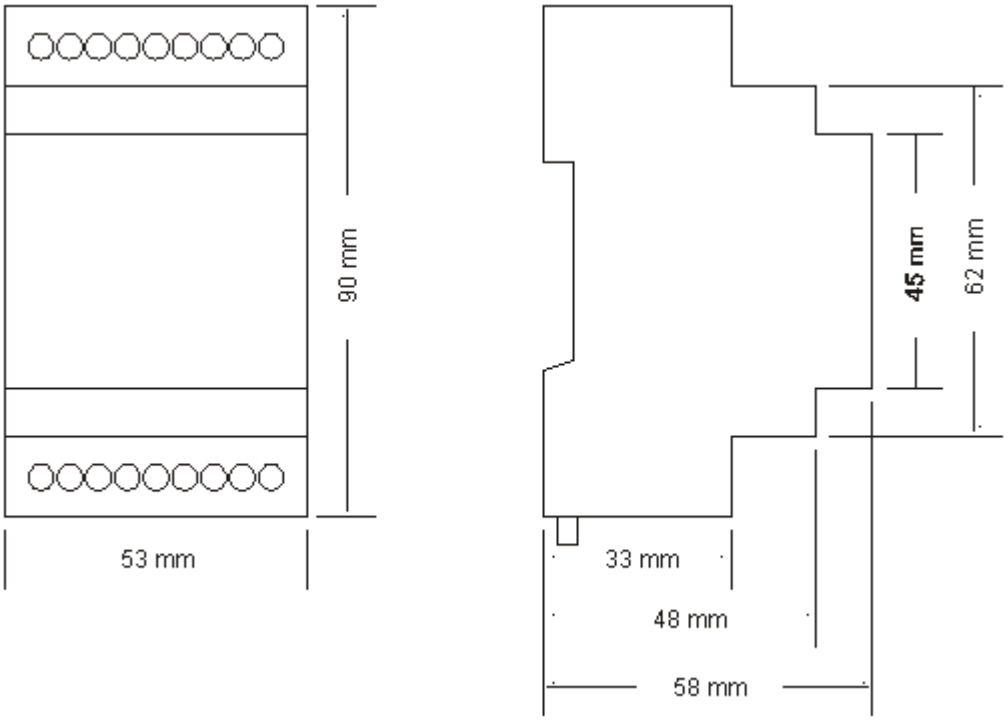
Technical Specification of Adash 3900-II

Technical Specification:

Inputs:	- ICP® for vibration measurement (accelerometer with ICP® supply). Input is able to process signal with maximum voltage ±5 V
Outputs:	- Galvanic separated current loop 4- 20 mA (selectable active/passive) with setting of range of measured unit
	- relay terminal 250V/2A (50Hz)
	- input signal monitor (BNC connector)
Measuring Ranges:	- 0 – 20 g, 0 – 999 mm/s (by sensor sensitivity, input signal: max. ±5 V)
Frequency Bands:	- [g] 0,8 Hz – 16 kHz - [g] 5 kHz – 16 kHz - [mm/s], [ips] 10 Hz – 1 kHz *Freq. ranges are possible to manufacture according to any user option.*
Sensor:	- accelerometer, ICP®powered
LEDs:	- PWR check of power supply
	- ICP® Err wrong sensor or cable
Supply:	- 20 - 28 V DC (70mA/24V DC), external current loop supply (10-30V DC)
Dimensions:	- 90 x 53 x 58 mm
Weight:	- 130 g
Protection:	- IP 20

ICP® is registered trademark of PCB Piezotronics, Inc

Dimensioned Sketch of Adash 3900-II



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more information visit www.adash.com