Data Acquisition Systems

MONI-DA
MONI-DA/S

MANUAL

Software: WinControl-3.29
Firmware: MONI-DA V.33

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Data Acquisition Systems MONI-DA & MONI-DA/S

Software: WinControl-3.23
Firmware: MONI-DA V. 24

MANUAL

CONTENT

I MONI-DA, MONI-DA/S: General Description

The MONITORING-PAM fluorometers have been developed for unattended, long-term and multi-site monitoring of photosynthesis. The data acquisition systems MONI-DA and MONI-DA/S permit battery-powered measurements of photosynthesis of terrestrial and aquatic plants, respectively. Common properties of the two data acquisition systems are:

- Waterproof and robust housing.
- Low power consumption.
- Dual data storage on ring buffer chip and memory card.

Major differences between MONI-DA and MONI-DA/S are

- Data transfer via cellular phone or satellite modem, and solar panels are only available for the MONI-DA.
- To avoid water leaks, the MONI-DA/S lacks the memory card port of the MONI-DA and, hence, the card cannot be removed. For the same reason, signal LEDs are omitted on the rear face of the MONI-DA/S.
- All sockets of the MONI-DA are M12 5-pole but in the MONI-DA/S, waterproof 6-pole sockets are employed.

Battery and Power Consumption

Following the rapid development in battery technique, we have equipped data acquisition systems with different batteries as listed below.

Serial number	Date	Battery type	Voltage, Charge
CFMH#### (MONI-DA) CFMK#### (MONI-DA/S)	Before June 2011	Sealed lead-acid (contact Walz to have the lead-acid battery exchanged for a lithium iron-phosphate battery)	12.0 V, 7.0 Ah (Low battery warning at 11.5 V, auto shut down at 7.5 V)
CFMP#### (MONI-DA) CFMS#### (MONI-DA/S)	After June 2011	Lithium manganese oxide	7.2 V, 4.8 Ah (Low battery warning at 6.8 V, auto shut down at 6.5 V)
	After November 2012	Lithium iron-phosphate	12.0 V, 7.5 Ah (Low battery warning at 11.5 V, auto shut down at 11.0 V)

Charging of MONI-DA batteries requires that one of the PC interface boxes of the MONITORING-PAM (MONI-IB1, MONI-IB4/LAN, MONI-IB1/S or MONI-IB4/LANS) is connected to the mains and to the data acquisition system (see Table 1).

A full charge cycle of the lithium iron-phosphate battery requires approximately 6 hours. The readout of the MONI-DA indicates the battery charging state (see Section III).

Power consumption of a MONI-DA system is 5 mW in the standby mode. In the measuring mode, this value is increased depending on the number of the emitter-detector heads connected and on measuring conditions. To give an example, with 7 emitter-detector heads

delivering saturation flashes every 15 minutes the system runs on lithium iron-phosphate batteries for more than 4 weeks.

In most cases, power supply by the two solar panels delivered together with MONI-DA systems (MONI-SET-3-DA or MONI-SET-4-DA) is sufficient for long-term operation of the system without line power.

Handling

Always, care must be taken to keep sockets clean (rear face of MONI-DA, Fig. 1). During field operation, the sockets must be closed either by screw caps or by cable plugs. Plugging and unplugging of lines, as well as handling the microSD card require dry and clean conditions.

II MONI-DA, MONI-DA/S: Rear Face (Fig. 1)

1. Magnetic Finger

The MONI-DA (also MONI-DA/S) is delivered with a "magnetic finger". The magnetic finger is used to operate the MONI-DA via the 7 magnetic proximity switches at the MONI-DA front face (Fig. 3). For transport, the MONI-DA system can be completely switched off by placing the magnetic finger in the transport position at the rear face of the MONI-DA (see Fig. 1). In the off-state, signal LEDs do not flash.

2. MicroSD Card

By default, both, the MONI-DA and the MONI-DA/S are equipped with an industrial grade 0.5 GByte microSD flash card. The microSD flash card of the MONI-DA is removable and, hence, it is used to transfer data to a computer equipped with a standard card reader. Data can then be viewed and processed using WinControl-3 software.

In addition to 0.5 GByte, the MONI-DA also handles 1 and 2 GByte microSD cards. When the microSD card is removed and plugged back, the MONI-DA will resume writing on the last data file. Saturation flash data in the absence of a card can be

retrieved from the MONI-DA internal flash memory (see Section IV). New data files are created with each clock start or by a system reset.

Accessing the microSD card in the MONI-DA/S requires opening of the housing: therefore, this card mainly serves for backup of data.

3. MicroSD Card Handling

- Only high quality *Industrial Grade* microSD cards should be used for data storage. They need to be FAT16 formatted. The FAT32 format as well as SDHC and SDXC are not supported by the MONI-DA.

- Do not remove or insert a memory card while writing or reading data that is shortly before, during, and shortly after saturation pulses. Also, do not remove the memory card during data restoration or formatting.

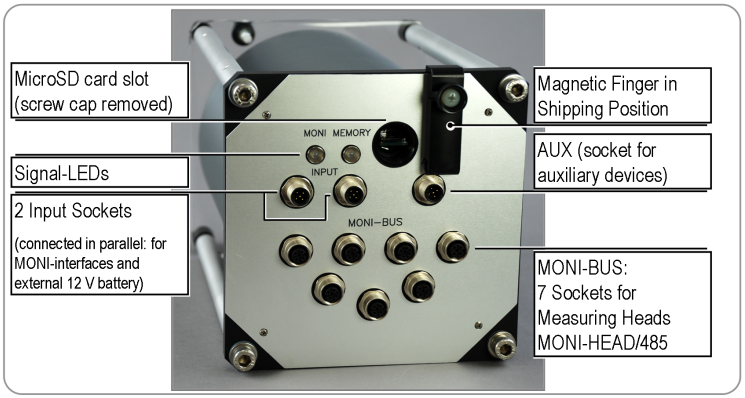


Fig. 1: Data Acquisition System MONI-DA: Rear View

- To remove a microSD card from the microSD card connector, gently push and release the SD card. Do not attempt to pull out the microSD card without prior unlocking it by a "push-to-release" action. Also, installing the microSD card requires push and release.

- Memory cards have limited life time and should be replaced regularly. The life time depends on the number of the storage processes.

- Do not touch the contact area of the microSD card. When fingerprints or stains are found on the contact area, wipe the area with a soft dry cloth.

4. Input and AUX Socket

- Two parallel-connected input sockets and one AUX (auxiliary) socket are provided. All three are male M12 5-pole sockets in case of the MONI-DA but the MONI-DA/S uses special waterproof 6-pole sockets. Table 1 summarizes the options for connecting various devices to the MONI-DA.

- After a computer connection has been established using any of the three interface types listed in Table 1, the standby mode of the MONI-DA is disabled, and the device is operated by the WinControl-3 software which also acquires all currently measuring data. In parallel, writing on the microSD card and in internal flash memory continues.

- Note that the option to select different measuring light intensities for different MONI-HEAD/485 is available only when the MONI-DA is operated in the stand-alone mode. Operation by WinControl-3 will set measuring light intensities of all MONI-HEAD/485 to the intensity level of the first detected MONI-HEAD/485.

- Data transfer from memory card to computer requires removal of the microSD memory card and readout using the card reader of a computer. Alternatively, data can be read from an internal flash memory chip as described later (Section IV).

- The MONI-DA battery is charged via a RS 485 communication cable. For charging, the cable is plugged into one of the input sockets of the MONI-DA.
- For powering the MONI-DA by an external 12 V battery, the relevant pins are marked in Fig. 2.

Table 1 - Assignment of Input and AUX Sockets of MONI-DA

Socket / Device	Input 1 and 2	AUX
PC Interface USB-0	yes	no
PC Interface Box MONI-IB1	yes	no
PC Interface Box MONI-IB4/LAN	yes	no
Telephone/Satellite Modem	no	yes
Solar Panel SP	yes	yes
12 V External Battery	yes	no

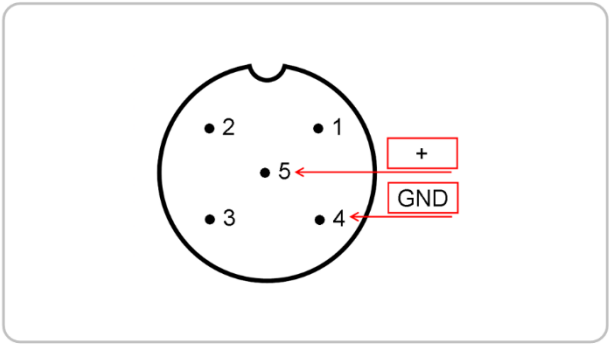


Fig. 2: Pin Assignment for Connection of External 12 V Battery. View of M12 5-pole Input Socket on MONI-DA rear face.

5. MONI-Bus

The MONI-Bus consists of 7 female M12 5-pole sockets for communication with measuring heads MONI-HEAD/485 (MONI-DA/S: 7 special waterproof 6-pole sockets for connection of MONI-HEAD/S).

6. Signal LEDs Flash Code (MONI-DA, front and rear face. MONI-DA/S, front face only):

Status	Event	MONI (Monitoring-LED)	MEM (Memory-LED)
Start	Searching devices	Fast green flashes	Fast green flashes
	Detecting devices	Lights up red	Fast green flashes
Measure mode	Batch or clock running, and device detected	Double green flashes every 2 seconds	
	Batch or clock not running, and device detected	Single green flash every 2 seconds	
	No device detected = Searching devices	Fast green flashes	Fast green flashes
	Memory flash card ok		Double green flashes every 2 seconds
	Memory flash card error		Double red flashes every 2 seconds
	Writing to memory flash card		Fast green flashes
	Saturation pulse execution	Light constantly green	
Hibernation	Batch or clock running, and device detected	Double green flashes every 10 seconds	

Status	Event	MONI (Monitoring-LED)	MEM (Memory-LED)
	Batch or clock not running, and device detected	Single green flash every 10 seconds	
	No device detected	Double red flashes every 10 seconds	
	Memory flash card damaged		Double red flashes every 10 seconds
	Memory flash card ok		Double green flashes every 10 seconds

III MONI-DA, MONI-DA/S: Front Face (Fig. 3)

1. Magnetic Finger

   During measurements, the magnetic finger is kept in the home position (see Fig. 3).

2. Programming the MONI-DA, MONI-DA/S

   The MONI-DA can be configured using WinControl-3 software via all MONITORING-PAM interfaces (see section V). A large number of commands and data, however, are directly accessible by the 7 magnetic proximity switches of the front plate. The option to adjust certain settings for different MONI-HEAD/485 individually is only available in the stand-alone mode of the MONI-DA, that is, in the absence of computer control.

   To operate the proximity switches, hold the magnetic finger horizontally and move the rounded end of the finger over the switch area.

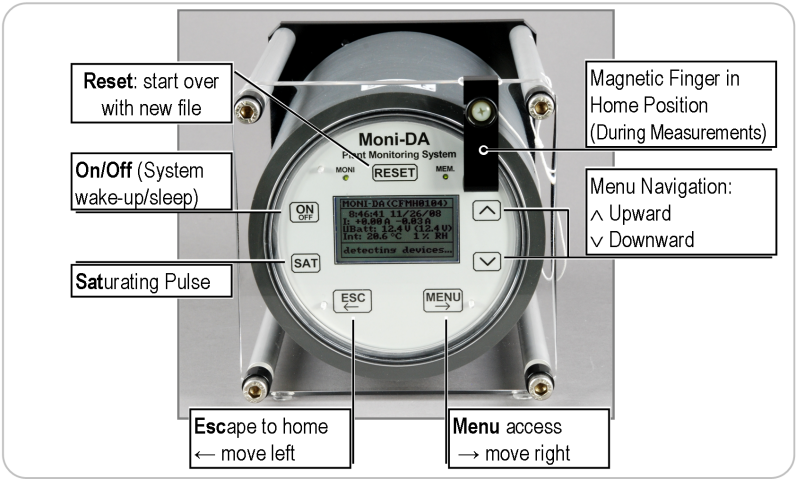
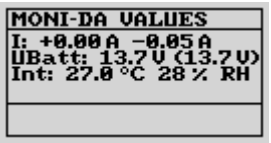
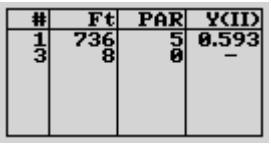


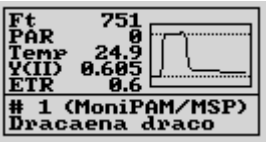
Fig. 3: Data Acquisition System MONI-DA: Front View

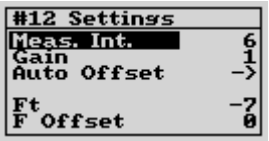
3. Function of Proximity Switches

	KEY	SCREEN	DETAILS
a	**RESET**	**Home Screen**	
	Detects connected devices and starts a new data file on microSD card	MONI-DA(CFMH0025) 12:53:11 13/01/10 Clock: 3:56 (10) M25-0153.PAM(3.0k)	
b	**On/Off**	**Home Screen**	
	ON switches the home screen on. OFF puts the MONI-DA into the standby mode	MONI-DA(CFMH0025) 12:53:11 13/01/10 Clock: 3:56 (10) M25-0153.PAM(3.0k)	

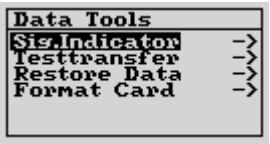
	KEY	SCREEN	DETAILS
c	⮝/⮟ Starting from the home screen, the keys scroll through data pages		Pages accessible: Home Screen (see **d**) MONI-DA values (see **e**) MONI-HEAD values (see **f**) Fast Kinetics Screens (see **h**)
d		**Home Screen**  	**1st line.** Serial number of MONI-DA (in brackets) **2nd line.** Time & date **3rd line.** Information on clock status (mm:ss); In clock mode: time till next flash & clock interval. In batch mode: time till next flash **4th line.** File name, file size **5th line.** Message row

KEY	SCREEN	DETAILS
e	**MONI-DA Values** 	**1st line.** Screen title **2nd line.** Charging & consumption current **3rd line.** Battery voltage during measurement and saturation pulse (bracketed) **4th line.** Temperature & relative humidity inside MONI-DA
f	**MONI-HEAD Values** 	**Column** **Content** **#** MONI-HEAD ID **Ft** Fluorescence level **PAR** Photosynthetically active radiation, µmol/(m²·s) **Y(II)** Effective photochemical quantum yield of photosystem II

	KEY	SCREEN	DETAILS
g	➢ and "MONI-HEAD Values" screen (see f) displayed	**PAM Settings** 	**1st line.** Screen title **2nd line.** Key ➢ followed by ➢ and ➢ keys adjust saturation pulse length. Key ➢ escapes. **3rd line.** Keys ➢ and ➢, selection of "Yes" by ➢ followed by ➢ restores factory settings in all MONI-HEADS
h	Use ➢ and ➢ key to select MONI-HEAD **SAT** and "Fast Kinetics" displayed triggers a saturation pulse only in the measuring head selected **SAT** triggers a saturation pulse in all MONI-HEADS when "Fast Kinetics" is displayed	**Fast Kinetics** 	**Ft, PAR, and Y(II):** see f **Temp:** MONI-head temperature **ETR:** Electron transport rate **Last two lines:** Device number and micro processor typ. Comment written in WinControl-3 **Graph:** Fluorescence trace during saturation pulse

	KEY	SCREEN	DETAILS
i	➢ and "Fast Kinetics" screen (h) displayed	**MONI-HEAD Settings** 	**1st line.** MONI-HEAD ID **2nd line.** Intensity setting of PAM excitation light. To adjust, use key ➢ followed by ➢ and ➢ keys. Key ➢ escapes **3rd line.** Amplification factor. To change use keys ➢ and ➢ and subsequently the ➢ and ➢ keys **4th line.** Automatic determination of background signal. To determine background signal, direct optical window away from objects and light sources, select Auto Offset by ➢ and ➢, and choose Yes (➢ and ➢) **Ft** and **Offset** are the currently measured fluorescence level and the currently used background signal, respectively

	KEY	SCREEN	DETAILS
j	➢ and home screen (a) or MONI-DA values (e) displayed To navigate, use up/down (⮝⮟) and left/right (⮜ ➢) buttons	**Main Menu**  *In the batch mode, the MONI-DA is controlled by the series of commands included in the currently loaded batch file, for example, adjustment of saturation pulse frequency to ambient PAR conditions.	**1st line.** Screen title **2nd line.** Access to MONI-DA firmware and flash memory information: Revision number and date, flash memory size in data sets, and operating hours. **3rd line.** Adjustment of intervals between saturation pulses **4th line.** Setting of saturation pulse control: either clock or batch mode* **5th line.** Opens menu Data Tools (see k) **6th line.** Setting date and time **7th line.** Time offset.

KEY		SCREEN	DETAILS	
k	To navigate, use up/down (⮝⮟) and left/right (⮜ ⮞) buttons	**Data Tools** 	**1st line.**	Screen title
			2nd line.	Displays signal strength detected by modem
			3rd line.	Tests data transfer by modem
			4th line.	Writes data from internal memory to microSD card. Capacity: 10 days with 4 MONI-HEADS and clock interval of 5 min.
			5th line.	To FAT16 format a microSD card

IV Mounting of MONI-HEAD/485

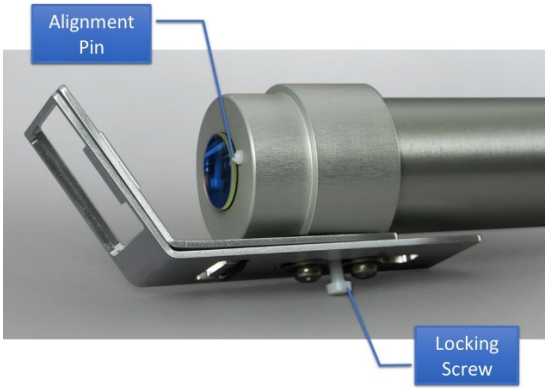


Fig. 4: MONI-HEAD/485

To mount the leaf clip on the measuring head, first position clip so that that alignment pin on front of the MONI-HEAD/485 protrudes from the 3 mm diameter hole of the push on cylinder of the leaf clip, then fasten locking screw (see Fig. 4).

V Data Download from Flash Memory

1. Flash Memory Properties

   Parallel to saving data on microSD, data are stored on an internal 2, 4, or 8 Mbyte flash memory chip, depending on the version of MONI-DA (MONI-DA/S). The flash memory acts as ring buffer which means that, once filled, the latest data overwrite the oldest ones.

2. Management of Flash Memory

   The "Info" page of the MONI-DA menu indicates the size of the flash memory chip as maximum number of "data sets" that can be stored. Per saturation flash analysis, one data set is created by the MONI-DA and also one data set per each of the measuring heads connected to the MONI-DA. The rela-

tionship between flash memory sizes in Mbyte and data sets is given below:

Size of flash memory chip, Mbyte	Maximum data sets
2	12000
4	28000
8	60000

The maximum available experimental time can be assed according to:

$$\text{Time}_{max}[\text{days}] = \frac{\text{Memory Size [data sets]} \cdot \text{Clock Interval [min]}}{1440 \cdot (\text{Number of Measuring Heads} + 1)}$$

The same equation can be used to assess the capacity of microSD cards which usually can hold data of many years but will stop storing data when full.

3. Download of Data from Flash Memory Chip

Data transfer from the MONI-DA or MONI-DA/S internal memory chip to the computer requires:

- Connection between an input socket of data acquisition unit and an RS 485 socket of a PC interface (MONI-DA: USB-0, MONI-IB1, MONI-IB4/LAN. MONI-DA/S: MONI-IB1/S or MONI-IB4/LANS).
- USB connection between the PC interface box (cf. Fig. 6, Fig. 7) and computer using an AB-type USB cable. (The USB-0 does not require an extra USB cable.)
- Previous installation of WinControl-3 to have the interface drivers installed.
- The executable program **bustool.exe**.

To transfer data from MONI-DA to the computer proceed as described next:

- Open DOS input window by clicking on the Windows start button and then on the run icon.

- Type cmd. This opens the command prompt window.

- Start program bustool.exe by entering location of the program and program name.
  For example C:\Directory1\Directory2\bustool.exe commands

- To list all data files in flash memory, type: **bustool -a 0 -l** (bustool, space, minus letter a, space, number zero, space, minus letter l) and hit the enter key. The **-a** followed by **0** specifies the device address which is always zero in the case of the MONI-DA, and the **-l** is the list command.

  The file list appearing in the command prompt window contains the following information:

id	measurement start	measurement start	file size	filename	comment
MONI-DA file number	date	time	number of data sets	file name	incomplete file note
`integer`	`yyyy-mm-dd`	`hh:mm:ss`	`integer`	`Mss-iiii.PAM` where `ss` = MONI-DA device number and `iiii` = consecutive file counter	`(partial)`

Note: the number of data sets per saturation pulse analysis is 1 + the number of measuring heads connected to the MONI-DA. The comment "(partial)" indicates that the file is incompletely present because it was been partially overwritten by newer data.

- To download the file with the MONI-DA id number **X**, type **bustool -a 0 -d X** and press the enter key. The command downloads file **X** into the directory of the program bustool.exe. Communication has been optimized to work properly even for long data lines: therefore, a Baud rate of 19200 was selected which corresponds to about 5 data sets per seconds.
- Delete: files on the flash memory cannot be deleted. Oldest data will be automatically overwritten by the newest ones.
- Help: **bustool -h** and enter key

VI Interfaces

1. PC Interface USB-0 (Fig. 5)

The simple interface connects the USB port of a computer to an input socket of the data acquisition system MONI-DA (version for MONI-DA/S not available). The MONI-Interface USB/0 permits adjustment of MONI-DA settings by the user interface of WinControl-3 but does not allow charging of the battery.

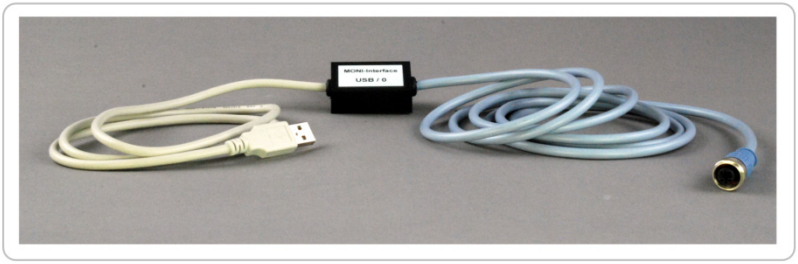


Fig. 5: PC Interface USB-0

2. PC Interface Box MONI-IB1 (Fig. 6) (MONI-DA/S: MONI-IB1/S)

The PC Interface Box MONI-IB1 is designed for communication between computer and MONI-DA as well as for charging of the MONI-DA. Below, hardware and software properties of the MONI-IB1 are reviewed.

RS 485 socket

For PC control and battery charging the MONI-DA needs to be connected to the RS 485 socket using appropriate cables.

Charge socket

During online operation, the PC Interface Box MONI-IB1 needs to be continuously powered by the power supply Model MINI-PAM/L or the

power supply Model MINI-PAM/L24: the latter is used when the MONI-DA is charged using a 50 or 100 m RS 485 line.

USB socket

The sockets permit data transfer between computer and interface MONI-IB1 using a type A-B USB-cable.

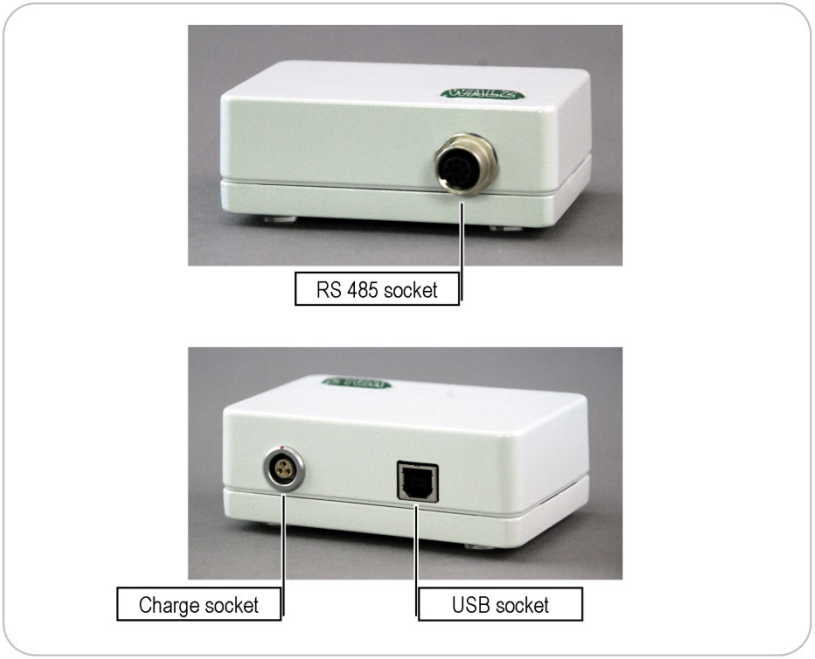


Fig. 6: PC Interface Box MONI-IB1

3. Interface Box MONI-IB4/LAN (Fig. 7) (MONI-DA/S: MONI-IB4/LANS)

The MONI-IB4/LAN box is a multifunctional interface box for communication with the MONITORING-PAM system. The various line connections to MONI-IB4/LAN are:

Charge socket

As described above for the PC Interface Box MONI-IB1.

RS 485 sockets

Up to 4 MONI-HEADs or 1 MONI-DA can be connected to the RS 485 sockets side.

RS 232, USB and Ethernet sockets

The sockets permit data transfer between computer and MONI-IB4/LAN using either RS 232 or USB communication. The Ethernet connector provides network connection to the MONITORING-PAM.

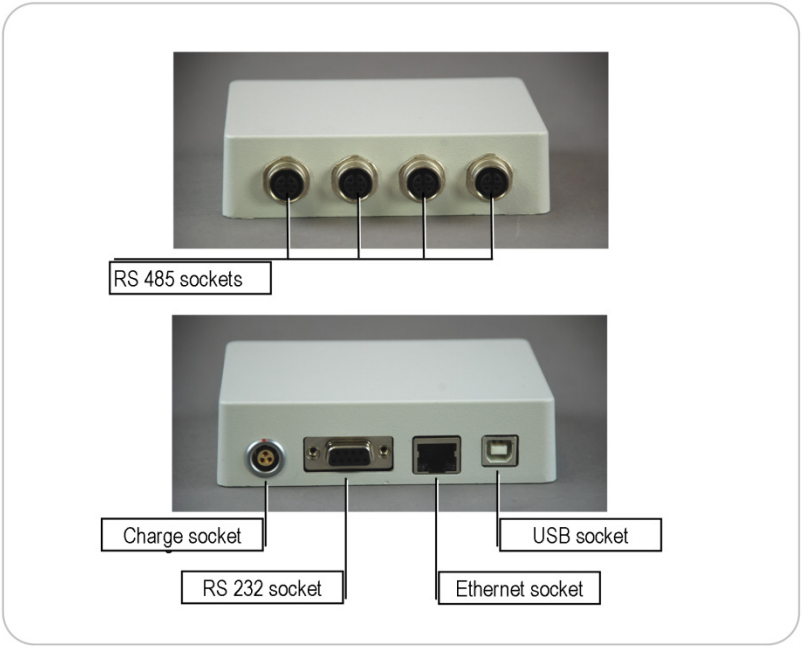


Fig. 7: PC Interface Box MONI-IB4/LAN

4. Network connection via Ethernet

- First connect MONI-IB4/LAN to a network, thereafter connect line power.

- Find IP address/DHCP host name.

  The DHCP hostname and Hardware Address are printed on the MONI-IB4/LAN. The DHCP hostname is identical to the serial number (S/N) and has the format CFMIXXXX (the X stands for Arabic numerals. MONI-IB4/LANS: CFMMXXXX).

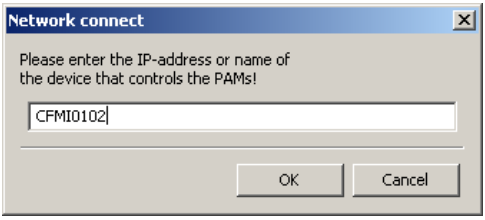
- Start network mode of WinControl-3

  Click on Windows Start button.

  Select Programs and WinControl-3.

  Select WinControl-3 Network Mode.

  Now the Network connect window appears. Enter the DHCP host name and click OK. The connection to the MONITORING-PAM will be established.



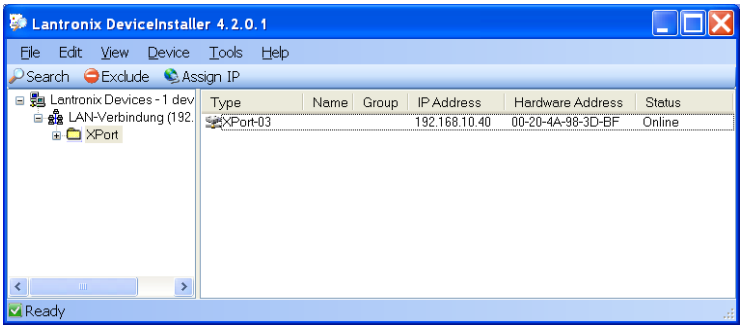
  Generally, also the IP address can be entered in the Network connect window but only the DHCP host name provides a permanent address when different IP addresses are assigned to the MONI-IB4/LAN by the DHCP server.

- Find MONI-IB4/LAN addresses

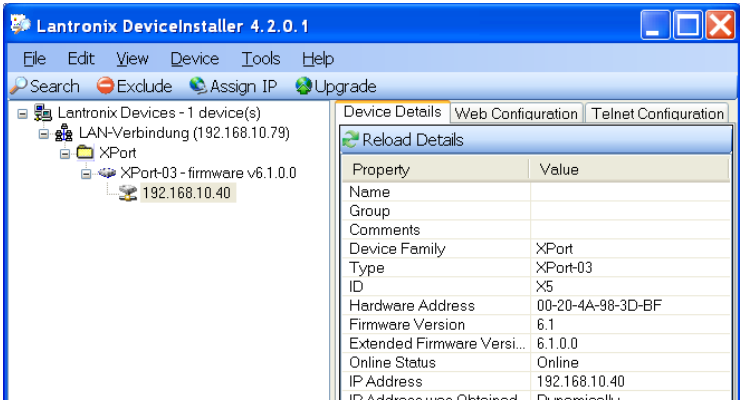
  In case the procedure described above was not successful, you might check the address of the MONI-IB4/LAN as described next:

Download from DeviceInstaller program from Lantronix webpage: http://www.lantronix.com/device-networking/utilities-tools/device-installer.html (Note that the DeviceInstaller requires the Microsoft .NET framework which is present on up-to-date computers but is also available via the Lantronix webpage.

Install and launch DeviceInstaller. The MONI-IB4/LAN should now appear as XPort with IP and hardware address.



Click on XPort until the right window displays the <Device Details>, <Web Configuration> and <Telnet Configuration> tabs (see below).



Select <Web Configuration> and navigate to XPort by clicking the white arrow (→) on green background.

Hit <Enter> key to ignore the User/Password window.

Click <Network> on the XPort window (upper left corner).

The next window shows the DHCP host name of MONI-IB4/LAN.

- If network connection with new address information still cannot be established, contact your network administrator to assign an IP address manually using the <Assign IP> function of the DeviceInstaller software.

VII Comments on WinControl-3

The MONI-DA can be operated under WinControl-3 using a PC interface. When controlled by WinControl-3, the magnetic proximity switches of the MONI-DA are unresponsive except the RESET button.

In WinControl-3, information on MONI-DA and connected devices are displayed in the MONI-Bus window of WinControl-3. Data on the MONI-DA can be viewed under settings when MONI-DA is selected in the device drop-down list (upper left corner of settings window). Similarly, physical information on devices connected to the MONI-DA can be retrieved by selecting the device in the device drop down list.

VIII Data Transfer Using a Wireless Modem

Wireless transfer of MONI-DA data can be carried out via GPRS (General Packet Radio Service) modem or Iridium satellite phones. Here, GPRS communication will be explained.

1. Provider

The following considerations might help to select a provider for GPRS service. Firstly, at each saturation flash analysis, the GPRS modem sends data of the previous saturation flash analysis. The data files sent are rather small. Typically, one set of saturation pulse data of a MONI system comprising six measuring heads corresponds to about 1 Kbyte; the amount of data varies roughly proportionally with the number of measuring heads of the MONI system.

GPRS providers offer flat rates or they charge according to the amount of data transferred. In the latter case, the total amount of data is calculated as the sum of packages of definite size, that is, always the complete package size will added even if the actual size of data transferred is smaller than the package size.

Let us consider that a GPRS provider uses a rather small package size of 10 Kbyte. This package size is clearly greater than the saturation pulse data of even complex MONI systems. If saturation pulse analyses are carried out every 10 minutes, the data size per month is

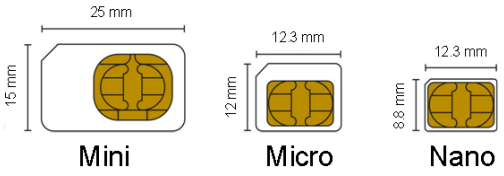
10 Kbyte · (6·24 packages/day) · 30 days = 43 Mbyte

Hence, a contract for 50 Mbyte per month would be sufficient to cover the data transfer of 43 Mbyte calculated above. Often, the minimum total transfer volume of GPRS providers is 100 Mbyte. Still, these 100 Mbyte might be cheaper than GPRS flat rates.

2. GPRS Modem (MONI-MOD1)

The Walz GPRS modem uses serial data transfer to communicate with the MONI-DA. For insertion or replacement of the SIM card, the weather proof case of the modem has to be disassembled as described overleaf.

Standard SIM cards ("Mini-SIM") can be used in the modem. Also, Micro- and Nano-SIM-cards can be employed using appropriate adapters.

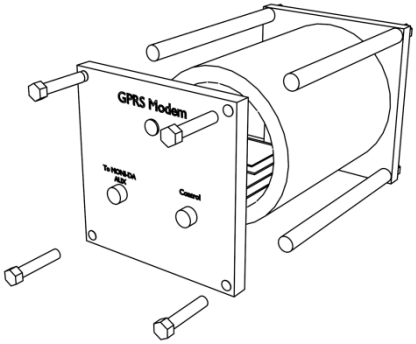


Any PIN code protection of the SIM card needs to be inactivated before the SIM card is installed in the GPRS modem. To

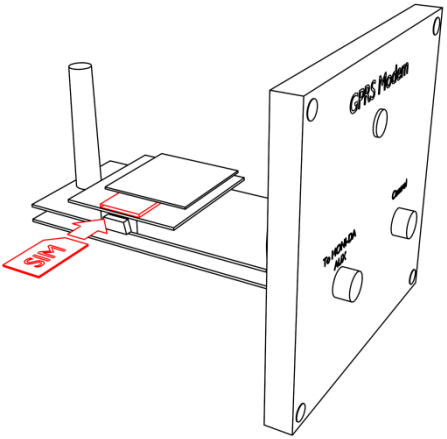
inactivate the PIN code, insert SIM card in a suitable mobile phone and proceed as described in the phone's manual.

3. SIM Card Mounting

Unscrew the four hex head screws at the front panel which holds the connectors and the status LED (cf. drawing). Carefully draw out electronics. Pay attention to keep the two gaskets of the front plate in place.

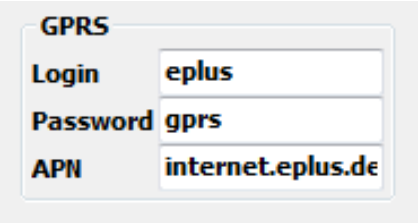


The main circuit board holds a smaller board which contains the modem as well as the SIM card slot (drawn in red, see drawing in right side). To install a SIM card, simply push the card into the slot and release. To remove SIM card card, gently push and release card. Do not attempt to pull out the SIM card without prior unlocking by a "push-to-release" action.



4. Establishing Data Transfer

To establish a GPRS connection to your provider, connect the MONI-DA device to a PC, start WinControl-3, and select "MONI-DA" on device dropdown list (top left corner of Settings window). The Settings window will then display a GPRS box, in which Login, Password and APN (access point name) have to be entered. These data are delivered with the GRPS service of your provider.



GPRS box with exemplary login data

Walz operates a server which receives MONI-DA data. This server provides a user interface to display data. Also, data can be downloaded in WinControl-3 format for further processing. The server's URL is http://www.pam-monitoring.com/. User name and password are provided by Walz. Please get in contact with Walz for requests and further information.

Login box of Walz PAM-Monitor server

IX Guarantee

1. Manufacturer's Guarantee

Under this Manufacturer's Guarantee ("Guarantee"), subject to the Conditions and Instructions below, Heinz Walz GmbH, Germany ("Manufacturer"), guarantees (§443 BGB) to the end customer and user ("Customer") that all products supplied by it shall substantially conform in material respects to the Specifications for 24 months from the delivery date (date on invoice). In this Guarantee, "Specifications" means the product's features (as may be amended by Manufacturer from time to time), which are set out under the headings "specifications" and/or "technical specifications" within the product's respective brochure, data sheet, or respective tab on the Manufacturer's website for such product, and which may be included with the documents for the product when delivered. In case of an eligible guarantee claim, this Guarantee entitles the Customer to repair or replacement, at the Manufacturer's option, and this Guarantee does not include any other rights or remedies.

2. Conditions

This Guarantee shall not apply to:

- Any defects or damage directly or indirectly caused by or resulting from the use of unauthorized replacement parts and/or service performed by unauthorized personnel.

- Any product supplied by the Heinz Walz GmbH, Germany which has been subjected to misuse, abuse, abnormal use, negligence, alteration or accident.

- Damage caused from improper packaging during shipment or any acts of God.

- Batteries, cables, calibrations, fiberoptics, fuses, gas filters, lamps, thermocouples, and underwater cables.

- Defects that could reasonably have been detected upon inspection of the product when received by the Customer and not promptly noticed within ten (10) days to Heinz Walz GmbH.

- Submersible parts of the DIVING-PAM or the underwater version of the MONITORING-PAM have been tested to be watertight down to the maximum operating depth indicated in the respective manual. Guarantee shall not apply for diving depths exceeding the maximum operating depth. Further, guarantee shall not apply for damage resulting from improper operation of devices, in particular, the failure to properly seal ports or sockets.

3. Instructions

- To obtain guarantee service, please follow the instructions below:

- The Walz Service Information Form available at http://www.walz.com/support/repair_service.html must be completed and returned to Heinz Walz GmbH, Germany.

- The product must be returned to Heinz Walz GmbH, Germany, within 30 days after Heinz Walz GmbH, Germany has received written notice of the defect. Postage, insurance, and/or shipping costs incurred in returning equipment for guarantee service are at customer expense. Duty and taxes are covered by Walz.

- All products being returned for guarantee service must be carefully packed and sent freight prepaid.

- Heinz Walz GmbH, Germany is not responsible or liable for missing components or damage to the unit caused by handling during shipping. All claims or damage should be directed to the shipping carrier.

4. Applicable law

- This Guarantee is governed by German law. Place of jurisdiction is Bamberg, Germany.

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