Operating manual for admodus[®]USP*pro*

Operating manual (englisch)



Synergetik Gı	nbH	admodus [®] USP <i>pro</i>	Version: 1.4
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Synergetik			
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Translation

Upon delivery to the countries of the EEA, the operating manual must be translated to the language of the destination country. In case of any discrepancies in the language of the destination country, either the original operating manual (German language) must be consulted or the manufacturer must be contacted for clarification.

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admodus[®]USP*pro*

Contents

1	GEN	IERAL SAFETY INSTRUCTIONS AND WARNINGS	6
	1.1	Hazard notes	6
	1.2	Responsibility of the operator	7
2	OVE	RVIEW AND INTENDED USE	8
	2.1	Product description	8
	2.2	Intended use	9
	2.3	Misuse	9
	2.4	Residual hazards	10
3	DEL	IVERY, TRANSPORT AND STORAGE	13
	3.1	Incoming inspection	13
	3.2	Scope of delivery	13
	3.3	Accessories and prerequisites	15
	3.4	Storage	15
	3.5	Transport	15
	3.6	Return delivery	15
4	INST	TALLATION	16
	4.1	Electrical installation	16
	4.2	Installation of the operating and display module	20
5	CON	IMISSIONING AND OPERATION	21
	5.1	Notes to the operator	21
	5.2	Overview	22
	5.3	Carrying out a measurement series	24
6	MAI	NTENANCE AND CLEANING	39
	6.1	Cleaning	39
	6.2	Maintenance	40
7	DISF	POSAL	41
8	TEC	HNICAL DATA	42
9	ANN	IEX	44
	9.1	Configuration settings of the PC operating software	44
	9.2	Recorded measurement data	47
	9.3	Device Identification	50
	9.4	Declaration of conformity	51

Synergetik GmbH	admodus [®] USP <i>pro</i>	Version: 1.4
9.5 EMI	results	52
Document date: 02.05.16	Operating manual	Page 5 of 52

1 General safety instructions and warnings

1.1 Hazard notes



Hazard notes

are marked with a warning triangle.



Notes

are marked with a hand.



Electrical hazards

are arked with the adjacent symbol.



Warnings

are marked with a stop sign.

For safety and warranty reasons, any modifications on the device which exceed installation and connection procedures must only be performed by the manufacturer.

1.2 Responsibility of the operator

For connection, commissioning and operation of the device, the following informations and parent legal regulations of the country (e.g. in German VDE) must be observed. Further, any safety and accident prevention regulations for the respective individual case must be applied.

In regular intervals of three months, all connections and the device housing must be visually inspected for corrosion damage.

If connectors which are attached to the cables show signs of corrosion, they must be replaced.

If there are signs of corrosion on the device housing or on integrated connectors, the device must be sent back to the manufacturer.

At the end of its life cycle, the device must be disposed as electronic waste properly.

The device may only be put into operation if the following conditions are met:.

- The operating personnel became familiar with the operating manual and the therein reported hazards. The operating manual is part of the device and must always be available for the operating personnel. The safety instructions contained therein must be observed.
- The device must be connected mechanically safe to a lifting device. For this purpose the mounting eyelet provided by the device must be used.
- The device must be electrically connected correctly at all ports.

The electrical installations around the device must only be carried out by a competent and electrically qualified person.

2 Overview and intended use

2.1 **Product description**

The admodus[®]USP*pro* allows a quick and precise measurement of various soil physical parameters of silt layers, as can be found in waterways and ports. During the controlled lowering of the probe, a depth profile of the following parameters is created in real-time:

- Density
- Frequency dependent acoustic attenuation
- Sound velocity
- Temperature

Enabled by the combination of a high-precision pressure sensor and an integrated 3D accelerometer, the following parameters are recorded during the entire the lowering operation:

- Depth
- Sink rate
- Inclination angle

The recorded data is transmitted to the display module (standard PC, not included in the scope of supply) and displayed there in real time and stored for later review and archiving.

Connected to an external GPS system, the exact geographical position of the measurement is automatically recorded.

In accordance with its functionality and its performance characteristics, the product can be used as survey instrument ("survey grade").

For the intended use, additional accessories are required.

2.2 Intended use

The admodus[®]USP*pro* is designed for creating depth profiles of silt layers in waterways and ports. The allowed limiting values, as specified in the chapter "Technical data", must be observed. Any case of application outside these limits which is not approved by Synergetik GmbH in written form is omitted from the liability of the manufacturer.

The device may only be operated by trained personnel.

The proper calibration of the probe must be checked immediately prior to each measurement.

The measurement results of the admodus[®]USP*pro* must only be used in conjunction with other independent measuring methods for determining the nautical depth.

The maintenance cycle of the probe is specified to 12 months. Then an inspection in connection with a general overhaul must be performed.

2.3 Misuse

The device is intended solely for the purpose specified in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** Any other use beyond this scope or a modification of the device is considered to be not the intended use. The manufacturer is not liable for any resulting damages. The risk is borne solely by the operator.

2.4 Residual hazards

The following residual hazards emanating from the product admodus[®]USP*pro*:



Lifting, carrying

The total weight of the probe including the transport case is 50 kg. The probe itself weighs 36 kg. Transport and operation must therefore always be done by two persons simultaneously. A careless handling can lead to back injuries.



Contact with biologically substances of concern

After a measurement silt residues can be found on the probe and the supply cable. These are biologically questionable. Direct contact with the skin as well as ingestion should be avoided. Wear gloves and pay attention to hygiene.



Loss of stability

The stability of the upright standing probe is not provided. The probe is as far as possible be stored always horizontally.



Slipping, tripping and falling

The supply cable can be a tripping hazard due to its length.



Pulling in, catching

When lowering the probe, the supply cable is towed by the probe. Persons can be captured and entrained.



Crushing

Due to the heavy weight of the probe, a careless handling can lead to finger or foot crushing.



Contact with sharp edges and corners

On the wing-mounts and wings, sharp corners and sharp edges are present.



Impact

Due to pendulum motions of the probe hanging on the crane, persons can be hit. A sufficient safety distance must be maintained anytime.



Break during operation

The impact of large forces can lead to a break of the suspension of the probe. During operation it must be ensured that the probe is not blocked. A sufficient safety distance must be maintained anytime.



Fall down

Due to a failure of the mechanics, the probe may crash down suddenly. A sufficient safety distance must be maintained anytime.



Short circuit

The power supply voltage for the probe must be carried out with a switching apparatus and a fuse. The voltage may only be switched on, if all cables are connected correctly.



Harsh environments

The probe is used on survey vessels under open sky in conjunction with heavy equipment. The instructions of the ship's crew must be obeyed.



Trouebleshooting

Malfunctions may only be removed by qualified personnel with appropriate training. All operations on the device which exceed installation and connection procedures must only be performed by the manufacturer.



Corrosion

The housing and the electrical contacts must be regularly inspected for corrosion damages.

3 Delivery, transport and storage

3.1 Incoming inspection

Please check the contents of the delivery immediately upon receipt for completeness and intactness. We ask to report promptly any shipping damage to the delivering freight carrier. An immediate written notification must be sent to Synergetik GmbH. Please report any delivery incompleteness in writing within 7 days to your responsible distributor.



Any complaints received later will not be accepted!

3.2 Scope of delivery

The standard delivery of an admodus[®]USP*pro* system includes:

- (1) Transport case
- (2) admodus[®]USP*pro* probe
- (3) Wings (2x small, 1x big)
- (4) Small parts case with
 - Hex key for assembly of the wings
 - Hexagon socket screws (9x) for assembly of the wings
 - Replacement riser tubelets (5x) for the pressure sensor protective cap
- (5) Open-end wrench for assembly of the pressure sensor protective cap
- (6) seawater resistant connection cable
- (7) Dummy plug for connector protection
- (8) Operating manual with declaration of conformity
- (9) Installation CD with operating software



3.3 Accessories and prerequisites

For using the admodus[®]USP*pro,* the following preconditions must be met and the following accessories must be present:

- PC or laptop with Microsoft Windows 7/Vista/XP and Ethernet-interface
- Crane with winch (required lowering speed > 0,5 m/s)
- Supply voltage (15 to 28 V DC)
- Sewing machine oil for filling the pressure sensor chamber

3.4 Storage

The following storage conditions are strictly adhered to:

- max. temperature: +55°C
- min. temperature: -20°C
- max. humidity: 70%, non-condensing

The device must be kept protected from corrosive or organic solvent vapors, radioactive radiation and strong electromagnetic radiation.

3.5 Transport

The device is designed for the harsh marine use. Nevertheless, it should not be exposed to unnecessary heavy shocks or vibrations. The transport must be done in the original transport case. The device must always be dried off before storage.

3.6 Return delivery

The return delivery of the device must be done in its original package exclusively free of postage or carriage to Synergetik GmbH, Illingen. Otherwise the return cannot be accepted!

4 Installation

4.1 Electrical installation



For the electrical installation, the legal regulations of the country must be obeyed (e.g. in Germany VDE 0100).



The electrical installation must only be carried out by a competent and electrically qualified person.

The delivery contents of the admodus[®]USP*pro* include the probe and the seawater-resistant supply cable.

The probe's oriented end of the supply cable is already preassembled with a suitable connector. The probe's distant end of the cable is supplied unassembled and must be fitted with a matching connector during the electrical installation.

We recommend a robust, waterproof connection system which can be fixed to the exterior side of the wall and to continue the further cabling in the protected interior room.



It is recommended to install a suitable distribution box on the inner side of the wall. The box should include the following components:

- LAN jack (RJ45) for either a direct connection of the operator PC or an ethernet switch.
- All-pole on/off switch, accessible to the operator, for switching the supply voltage on the device.
- Connection of the DC power supply via a fuse (1A, slow-blow). The supply voltage may range between 15 volts and 28 volts DC. The maximum current consumption of the device is 250 mA at 24 volts DC. This corresponds to a maximum power consumption of 6 watts.
- Grounding point (PE). The shielding line of the device and the metal housing of the installed LAN jack must be connected here.



Supply voltage protection through switch and fuse

In order to prevent short circuits which can cause a malfunction or fire, the voltage supply must be protected by using a switch as well as a fuse (1A, slow-blow)



LAN installation with twisted-pair cable only

To ensure a proper transmission of the ethernet signals between the device and the operator PC, the connection cables between the outside terminal system and the distribution box in the interior must be kept as short as possible and designed as a twisted pair.

When selecting the assembly site of the fixed installed components and for the cable routing, the following situations must be avoided in any case:

- Close proximity to objects, which emit intense heat (max. +40 °C)
- Mechanical shocks
- Vibrations
- Corrosive chemicals or gases
- The proximity to objects with high electromagnetic fields (frequency converters, etc.)
- Close proximity to appliances or equipment on a vessel, which
 - o evaluate the earth's magnetic field (magnetic compass, etc.)
 - o are used for radio communication

4.1.1 Assembly of connection cable

The cable is protected by a seawater- and acid-resistant outer jacket. Underneath, the four supply-lines (red, white, black, green) can be found beside some rubber-lines. Furthermore there are four twisted-pair cable pairs (orange/orange-white, green/green-white, blue/blue-white, brown/brown-white), shielded with copper foil and copper braid.



The connection cable must be carefully stripped as shown above and connected to the distributon box either directly or via an appropriate plug-in system. Synergetik GmbH

Lead	Function	Remarks
Shield	protective earth (PE), LAN shield	Connect to protective earth
red	Supply, plus	Power supply.
white	(1528 V DC)	Connect both cables together.
black	Supply, minus	Power supply reference potential (GND). Connect both cables together.
green		
orange / orange-white	Ethernet-Pair 2	Ethernet-Pair 2
green / green-white	Ethernet-Pair 3	Ethernet-Pair 3
blue / blue-white		not used, cut off
brown / brown-white		not used, cut off

4.1.2 Pin assignment of the LAN jack

Pair 2 (orange / orange-white) and pair 3 (green / green-white) of the connection cable must be connected to a RJ45 socket with the following assignment in the junction box:



Furthermore, the metallic housing of the RJ45 jack must be connected to protective earth (PE).

4.2 Installation of the operating and display module

4.2.1 Installation of the operating program

The admodus[®]USP*pro* is operated via a standard PC or laptop with Windows 7 / Vista / XP operating system. The necessary admodus[®]USP*pro* control software is included in the delivered CD. The installation is started by executing the file "setup.exe".

🦉 admodus@USP pro Installer	
Destination Directory Select the primary installation directory.	
All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory.	
C:\Programme\admodusUSP\ Brows	se
Directory for National Instruments products C:\Programme\National Instruments\ Brown	se
<pre></pre>	<u>C</u> ancel

The default settings can be accepted unchanged except for the confirmation of the license agreements. By accepting the license agreements from National Instruments there are no costs or further obligations.

After successful installation, the admodus[®]USP*pro* control software can be started via the desktop icon or via the Windows start menu.

4.2.2 Integration of an existing GPS system

The admodus[®]USP*pro* control software can receive data from a connected GPS system through a serial port. If the data from the GPS receiver needs to be used by multiple programs at the same time, the open source software "com0com", "com2tcp" and "hub4com" can be used to distribute a physical serial port on multiple virtual interfaces. The software is available for free at <u>http://com0com.sourceforge.net/</u>.

admodus[®]USP*pro*

5 Commissioning and Operation

5.1 Notes to the operator

This manual contains important informations which are required to operate the device and is addressed to technically qualified personnel with appropriate knowledge in the field of measurement technology and hydrography. To ensure the proper functioning of the device, this manual must be read carefully before the device is connected and put in operation.



Prior to commissioning all steps which are required to install the admodus[®]USP*pro* must be performed.



To prevent short circuits by open cable ends (e.g. unconnected probe) lying in the water, the supply voltage is only allowed be switched on if all connections are properly connected.



All connectors must be plugged together, as protection class IP68 is only achieved in the connected state.



The housing of the admodus[®]USP*pro* must not be opened. For this reason the device is equipped with an electronic seal. The warranty gets void if this seal is broken.





5.3 Carrying out a measurement series

The specified measurement accuracy can only be achieved if all parameters dependent on the specific use and conditions on-site are correctly configured and the measurement procedure is followed as described below:

- Setup and commissioning
- Calibration
- Carrying out a the measurement series
 - $\circ~$ Verification of the calibration directly before measurement
 - o Carrying out the measurement
- Disassembling



All parameters, depending on the specific use and conditions on-site, must be specified by the user. These parameters have a direct impact on the measurement results. The maximum allowable limits, as specified in chapter "Technical data" must be maintained.



It is the user's responsibility to verify the measurement results with respect to their plausibility.



The user must ensure that measurements are taken only with a correctly calibrated probe.

5.3.1 Setup and commissioning

• Wing assembly

The three wings must be fixed to the probe housing, each one by using three of the included hexagon socket screws and the hex key.

Attaching the probe to the crane

The probe must be connected to a suitable lifting device (crane) via to the mounting eyelet. Care must be taken to a safe mechanical connection. The connection cable should be fixed with strain relief (e.g. with a cable tie) in the near of the probe suspension and should be guided over a deflection pulley on the crane.



• Filling and checking the pressure sensor oil reservoir

The probe can now be placed in an upright position. An unforeseeable topple over of the probe can be avoided by tightening the crane cable.

The depth gauge oil reservoir, which protects the sensitive pressure sensor against aggressive salt water and mud, must now be opened with the included wrench.

The oil reservoir cap and the plugged riser tubelet must be clean. If necessary, the riser tubelet must be replaced. The oil reservoir must also be clean. If necessary, the reservoir must be carefully rinsed with fresh water and cleaned with a cotton swab.

After cleaning, the oil reservoir must be completely filled up with sewing machine oil. The oil reservoir cap is then reattached and tightened gently with the wrench. This causes excess oil to be pressed out of the oil reservoir through the riser tubelet. Once complete, the riser tubelet must be free of bubbles and completely filled up with oil.



The pressure sensor is very sensitive and can be damaged easily. Be careful during the cleaning procedure.



The length of the riser tubelet must be exactly 40 mm. Differences will have a direct impact on the depth measurement.

• Connecting the supply cable and activating the supply voltage

The dummy plug, which protects the electrical contacts of the probe against corrosion or mechanical damage, must be removed. The seawater-resistant supply cable must then be connected to the probe on one side and to the terminal system installed on board on the other side.

The supply voltage can now be activated via the permanently installed on/off switch.



On deck the cable must be placed in a way that it does not get suddenly blocked or that it can capture persons during the execution of the measurements.

• Cleaning the sensors

The four ultrasonic transducers as well as the temperature sensor must be cleaned carefully.





The surface of the ultrasonic transducers must not be damaged. For this reason, neither aggressive cleaning agents, nor sharp or spike objects should be used for cleaning.

• Tempering of the probe

Since of the integrated sensors are sensitive to temperature gradients, it is necessary to temper the entire probe before calibration or performing a measurement. This can be done by the aid of the crane by submerging the device underwater up to the attachment eye for a period of at least 5 minutes.



Before starting the first calibration, the probe must be tempered for at least 5 minutes in the waters, where the measurements will be done later.

5.3.2 Calibration

For compensating aging effects and minor damages of the ultrasonic transducers, a calibration of the probe must be performed before carrying out a measurement series.



The calibration of the ultrasonic transducers is independent of the depth calibration.

The calibration wizard guides the user through the calibration process step by step:



The salinity of water is directly related to its density. For a correct calibration of the density sensor and the sound velocity measurement it is mandatory to specify the salt concentration (salinity) of the calibration medium. The salinity is specified in the unit PSU.

The salinity specified at this point is used <u>exclusively</u> for the calibration described here, but its value has to be entered **absolute exactly**!

Note: After a successful calibration, the admodus.USP pro can be used in water of **any** salinity – the salinity of the measuring medium can be different from this value here. If the salinity of the measurement area is not equal to the one used here, you should enter its value in the "Probe status" settings menu (used for plausibility checks).



The surfaces of the four ultrasound sensors must be cleaned for the calibration process. Dirt and sedimentary depositions distort the calibration.



The surface of the ultrasonic transducers must not be damaged. For this reason, neither aggressive cleaning agents, nor sharp or spike objects should be used for cleaning.

<u>Step 3</u> – Submerging the probe in the calibration medium

Synergetik GmbH	admodus [®] USP <i>pro</i>	Version: 1.4
	Calibration Wizard	
	Probe calibration Synerget	k
	Prepare sensor calibration. Please make sure that the probe is completely covered by water.	
	Click 'Next' to start the calibration process	
	<< Back Next >> Cancel	
be clear and clean. Sus	pended particles and air bubbles distort the	ne calibration.
be clear and clean. Sus	pended particles and air bubbles distort t	ne calibration.
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be clear and clean. Sus	bended particles and air bubbles distort t	he calibration.

<u>Step 4</u> – Waiting for sensor stabilization and manual triggering the calibration

Probe calibration	\geq		Synerge
System is now waiting for t	he measurement resul	ts to stabilize. Please wait	
Start calibration by clicking	'Next' after successful	stabilization.	
Temperature stable	Density stable	Attenuation stable	Probe under water
۲	۲	۲	۲
۲	۲	۲	9
•	۲	0	۲

To ensure a correct calibration, the software checks the actual sensor values and only activates the "Next" button, if all sensor values are stable. The calibration will be executed when the user clicks on the "Next" button.

<u>Step 5</u> – Verification of the calibration



The status of the performed calibration is displayed in a final window. If the calibration fails, the last valid calibration is restored automatically.



The calibration process is now completed.

If the salinity of the measurement area is identical to the value used for calibration, you can apply the calibration salinity to be used for the plausibility checking in the automatic mode by checking "Apply calibration salinity to measurement area salinity".

If the salinity of the measurement area is not equal to the one used while calibrating, you should enter its value in the "Probe status" settings menu (used for plausibility checks).

5.3.3 Verification of the calibration directly before the measurement

• Cleaning the sensors

After a performed measurement it may often be the case that mud residuals stick on the sensors. These must be removed. This can be done e.g. by leaving the probe partially submersed in the water while riding to the next measuring point.



Visual sensor check

The four ultrasonic transducers, the temperature sensor and the depth sensor must be checked visually. Sedimentary depositions are not allowed to stick on the sensors. The pressure sensor riser tubelet must be free of dirt particles.



Inacceptable dirt inclusion

• Verification of the depth calibration and execution if necessary

As the depth calibration is referred to the current ambient air pressure, the probe must not be under water during the verification and calibration of the pressure sensor. Because of the permanently changing air pressure, the depth calibration must be checked frequently and executed if necessary.

The verification is performed by observing the actual pressure value (see picture). It should be in a range of ± 0.001 bar (equivalent to ± 1 cm).



The calibration is performed by hovering the mouse over the display "sensor depth" on the left top of the window. The display then changes to a red-colored "Calib" button with which the calibration can be initiated.



The depth of the ultrasonic transducers in relation to the water surface is determined by the pressure sensor in combination with the integrated inclination sensor. Because the pressure sensor is located exactly 71.2cm (incl. riser-tubelet) above the transducers, this difference is displayed after a successful depth calibration if the probe is aligned exactly vertical.

• Submerge the probe to the mounting eyelet

To check the calibration of ultrasonic transducers, the probe must be entirely under water. It is important to ensure that the sensor data is not affected by suspended particles or other debris.

Wait for tempering and check calibration

The operating program displays the current status of the sensors at the lower right. Once the probe is completely submerged, the actual sensor values are automatically compared with the expected values. The tempering of the sensors is monitored too. As soon as the probe is ready for measurement, the green light will turn on.





The expected values depend on the salinity of the measurement area which must be set in the configuration menu. An incorrect entered value may cause the probe to stay disabled for measurement, because the expected sound velocity and density does not coincide with the measured values.

5.3.4 Performing a measurement

Start recording

Measurements can be started and stopped by hand in manual mode. In the "hands-free" automatic mode, starting and stopping of the measurements is performed automatically by the operating program. For this purpose, appropriate threshold values can be set in the configuration menu.

• Controlled lowering of the probe (lowering speed 0.5 m/s)

The probe can now be lowered with the aid of the crane with a defined speed. With a lowering speed of 0.5m/s, a depth resolution of about 1 cm is achieved. At slower speeds, the probe may not penetrate the complete silt layer. At faster speeds, the probe could be damaged.

• Wait for reaching a solid sediment layer and stop measurement

The measurement must be stopped after reaching the solid sediment layer. In the "handsfree" automatic mode, sinking speed and inclination angle of the probe are used for automatic stopping the measurement.

• Pull the probe entirely out of the water

After stopping the measurement, the probe must be completely pulled out of the water.



Please clean the probe's sensors after each measurement if they are covered with silt.

5.3.5 Disassemby

• Switch off power supply

To avoid short circuits due to open cable ends, the supply voltage should be switched off using the fixed installed on/off switch.

• Cleaning the probe

The device must be cleaned and the oil reservoir of the depth meter must be emptied. For detailed instructions refer to the chapter "cleaning".

• Drying probe and wings and storing in the transport box

The wings can now be dismantled. Before storing in the transport case, make sure that the device has been dried well, otherwise mold can be formed.

6 Maintenance and cleaning

6.1 Cleaning

After usage the device must be rinsed and cleaned with fresh water. Any mud residuals and other debris must be removed.

The oil reservoir of the depth sensor must be opened with the enclosed wench and to be emptied. Thereafter the oil reservoir as well as the oil reservoir cap and the riser tubelet should be rinsed with fresh water and gently cleaned and dried with a cotton swab.

Following this the entire device, including the wings, must be dried with a towel. To prevent mold formation, the device should be stored in a dry condition in the transport case.



The device must only be cleaned with liquids if it is ensured that the probe connector is protected either by the supply cable or by the dummy plug.



The surface of the ultrasonic transducers must not be damaged. For this reason, any aggressive cleaning agents as well as sharp or spike objects should not be used for cleaning.

6.2 Maintenance

The function as well as the calibration of the whole measurement system must be checked and documented regularly by the operator. Furthermore, the entire measurement system including the connection cable must be checked for damage. The inspection intervals are determined by the operator.

However, the manufacturer recommends urgently carrying out an annual general inspection. If the general inspections are not carried out, the specified accuracy cannot be guaranteed.



The housing of the admodus[®]USP*pro* must not be opened. For this reason the device is equipped with an electronic seal. The warranty gets void if this seal is broken.



You have the possibility to perform an annual maintenance based on a maintenance contract.

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7 Disposal

The admodus[®]USP*pro* must be disposed according to the applicable local environmental regulations for electronic products.

The correct disposal of your old product helps to prevent negative consequences on the environment and health.



Note the applicable local regulations and do not dispose the device with normal household waste.



On the end of the lifecycle, the device can be left at your local recycling center for free. The device is then recycled professionally.

8 Technical data

Mechanical data			
Housing	Stainless steel		
	V4A "1.4571", seawater and acid resist	tant	
Dimensions	93 cm x 55 cm (with wings)	93 cm x 55 cm (with wings)	
	93 cm x 18 cm (without wings)		
Weight	Probe body (with wings):	35,8 kg	
	Probe body (without wings):	28,4 kg	
	Transportation case:	13,9 kg	
Cable length	30 m (others on request)		
Maximum operating depth	40 m (others on request)		
Operating temperature	-20°C bis 40°C		
Storage temperature	-20°C bis 55°C		
Features	Wings easy to install, no moving/external parts, all sensors integrated and protected against mechanical stress		

Electrical data		
Supply voltage (U _B)	15 to 28 V DC	
Power consumption	6 W	
Network interface	LAN – 100Base-TX (standard RJ45 connector)	

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Sensor technology			
Analog-to-digital converter	Ultrasound:	12 Bit, 40 MHz	
	other sensors	24 Bit, 4 kHz	
Internal / External sampling rate	4 kHz / 50 Hz (others on request)		
Density resolution / accuracy	0,001 g/cm ³ / ±0,005 g/cm ³		
Vertical resolution	< 1cm (for vertical velocity < 0,5 m/s)		
Pressure range	0 to 5 bar (others on request)		
Pressure resolution / accuracy	0,001 bar / ±0,0015 bar		
Temperature resolution / accuracy 0,1°C / ±0,15°C			

Application software		
Hardware requirements	Notebook or PC with LAN – 10/100Base-TX	
Operating system	Windows XP / Vista / 7	
Language	German, English (others on demand)	
Display	realtime data	
Logging interval	Adjustable from realtime to 1 value per minute	
Operation	Manual and "Hands-free" automatic mode	
Determination of the location of the survey vessel	Synchronized feeding of position data in the evalu- ation software via a PC possible.	
Customization	possible on request	

admodus[®]USP*pro*

9 Annex

9.1 Configuration settings of the PC operating software

Settings admodus@USP Settings		Language Host-name	Display language of the text of IP-Adress or host name of the	elements
General Image: Constraint of the status View Data logging Measurement Language Probe status External GPS General device setting General device setting GPS tansform Hostname	synergetik settings inglish (US) is 0103234			, , , , , , , , , , , , , , , , , , , ,
Apply	OK Cancel			
Settings admodus@USP Settings	Synergetik	Clear graphs automatically	Clears the measurement data a new measurement starts	a shown in the graphs when
General Graph scale settings Data logging Messurement Probe status External GPS GPS tansform Depth import Yaxis	tomatically when measurement starts arker at 1,05 [g/ml] Min Max	Show density marker at	Displays a marker (horizontal density value exceeds the giv back or recording.	red line) as soon as the en threshold during play-
Depth [m] <u>X axes</u> Attenuation (dB/c Density [g/m] Temperature [deg	0 15 Min Max m] 0 20 0.95 1.3 C] 0 20	Depth Attenuation	Y-display range of the depth- X- value range of the damping	dependent plots g plot
Soundspeed [m/s]	1400 1500	Density	X- value range of the density	plot
Apply	OK Cancel		X- value range of the tempera	ature plot
13 Settions		Save path	Save path for the measureme	peed plot
admodus@USP Settings General View Log file settings	Synergetik	Storage in CSV format	If enabled, the data will be sto CSV file in addition to the inte	ored in an Excel readable rnal storage format,.
Messurement Probe status External GPS GPS tansform	C:\USPData	Decimal comma	When enabled, a comma is u	sed as decimal separator,
Additional data Use decimal con Data logging settings Logging rate	og in CSV format ma in CSV data 10 Hz 💌	Log-rate	Log-rate, display- and save s	peed of the data
Apply	OK Cancel			
Document date: 02.05.16		Operating man	ual	Page 44 of 52

admodus[®]USP*pro* Synergetik GmbH Version: 1.4 Setting Selection between manual start / stop of the measure-Measurement mode ment and "hands-free" automatic mode Arming depth Arming the measurement if this line is passed during eneral General measurement settings Data logging Automatic 💌 lowering the device and the sensors are OK Measurement Probe status External GPS GPS tansform Automatic measurement settings Recording depth Start of the measurement if this line is passed when 1,00 Arming depth [m] lowering device and arming was successful. 2,00 Logging depth [m] Stop-speed Measurement is stopped as soon as the specified rate of 0,10 Stopping speed [m/s] Stopping angle [deg] 45,0 descent falls below this limit for longer than the duration Stopping timeout [s] 2,0 of the stop timeout. OK Cancel Apply Ś S

admodus@USP Setting Status evaluation settings View Data logging Measuremen Salinity of measurement area [PSU] 12,0 External GPS GPS tansform Status threshold settings Density deviation [%] 3.0 0,3 Medium soundspeed deviation [%] 1,5 Senor soundspeed deviation [m/s] Medium attenuation deviation [dB/cm] 1,0 Under water detection depth [m] 1,00 Restore defaults Apply ОК Cancel

Settings



Stop-angle	Measurement is stopped if the inclination has been exceeded for the specified duration of the stop timeout.
Stop-timeout	Minimum duration for which the sink speed must fall below stop-speed or the probe deviation must exceed the stop-angle
Salinity of the measurement area	Salt concentration of the measurement area. Used for plausibility test. Will be overwritten during calibration by the value entered there.
Density toler- ance	Maximum deviation for plausibility check
Medium-sound velocity deviation	Maximum deviation for plausibility check
Sensor- sound velocity deviation	Maximum deviation for plausibility check
Attenuation deviation	Maximum deviation for plausibility check
Under water detection depth	Minimum depth at which the probe state is detected as 'completely under water'
Activate external GPS-module	When enabled, the below selected COM port is opened for GPS input data
COM port for GPS-module	COM port for GPS-data
Baud rate, etc.	Communication parameters of the GPS COM port
Activate external GPS-module	When enabled, the below selected COM port is opened for GPS input data

Synergetik GmbH	admodus [®] USP <i>pro</i>	Version: 1.4
Settings admodus@USP Settings General View Data logging Messurement Probe status External CPS CPS tansform Destination datum PD/83 (Potsdam datum) Apply OK Cancel	Zieldatum Sets the	e output format for GPS positions: PD/83 (Potsdam-Datum) Transformation to Bessel 1841 ellipsoid and position output in Gauss Krueger GK_3 for- mat. Adjustments to the Helmert transform pa- rameters are possibly necessary ETR89 (UTM) Position output in UTM format.
Settings Concell Helmert transform Use legging Use legging Use legging Use legging Use legging	Scale Helmer Translation Transla Rotation Rotation	t transform scale factor in PPM. tion components DX, DY, und DZ in meters. n components EX, EY, und EZ in arcseconds

9.2 Recorded measurement data

The data recorded while measuring with the **admodus**[®]**USP***pro* density probe is saved to the directory defined in the "Settings" menu (see chapter 9.1). File names correspond to the format "YYYY-MM-DD_HH-MM-SS_USPpro_Log", where "YYYY-MM-DD" is the recording date in ISO format and "HH-MM-SS" is the recording's start time in hours, minutes and seconds.

Depending on the logging settings (see chapter 9.1) a text based ".CSV" file is exported besides the standard ".USP" binary log file. CSV files can be easily viewed or edited using Microsoft Excel or most other spreadsheet software.

Label	Description	Unit
Date	Recording date of the measurement point	YYYY-MM-DD
Time	Recording time of the measurement point	HH:MM:SS
Depth [m]	Depth at the density-measurement point	m
SinkSpeed [m/s]	Sink speed of the probe	m/s
Pressure [bar]	Pressure at the level of the pressure sensor	bar
Temp [degC]	Medium temperature at the level of the sensor head	°C
TempGrad [degC/s]	Medium temperature gradient at the level of the sensor head	°C/s
SurfDensity [g/ml]	Additional Info: Density measured at the surface of the impedance sensor	g/ml
IntDensity [g/ml]	Mean density of the medium in between the sen- sor head (displayed density value)	g/ml
MediumSoundspeed [m/s]	Mean speed of sound in the medium in between the sensor head	m/s
Attenuation [dB/cm]	Mean acoustic attenuation in the medium in be- tween the sensor head	dB/cm

The columns contained in a CSV file are desribed as follows:

Document date: 02.05.16

Synergetik GmbH

Freq0 [kHz]	Frequency at the first node of the frequency- dependent attentuation	kHz
Att0 [dB/cm]	Attenuation at the first node of the frequency- dependent attentuation	dB/cm
Freq1 [kHz]	Frequency at the second node of the frequency- dependent attentuation	kHz
Att1 [dB/cm]	Attenuation at the second node of the frequency- dependent attentuation	dB/cm
Freq2 [kHz]	Frequency at the third node of the frequency- dependent attentuation	kHz
Att2 [dB/cm]	Attenuation at the third node of the frequency- dependent attentuation	dB/cm
Freq3 [kHz]	Frequency at the fourth node of the frequency- dependent attentuation	kHz
Att3 [dB/cm]	Attenuation at the fourth node of the frequency- dependent attentuation	dB/cm
Freq4 [kHz]	Frequency at the fifth node of the frequency- dependent attentuation	kHz
Att4 [dB/cm]	Attenuation at the fifth node of the frequency- dependent attentuation	dB/cm
Freq5 [kHz]	Frequency at the sixth node of the frequency- dependent attentuation	kHz
Att5 [dB/cm]	Attenuation at the sixth node of the frequency- dependent attentuation	dB/cm
Deviation [deg]	Imbalance/pitch of the probe	0
RelHum [RH]	Relative humidity inside the probe (leakage de- tection)	RH (%)
DepthCalibDate	Date of the latest pressure sensor calibration	YYYY-MM-DD
DepthCalibTime	Time the latest pressure sensor calibration	HH:MM:SS
UltrasoundCalibDate	Date of the latest ultrasound sensor calibration	YYYY-MM-DD
UltrasoundCalibTime	Time of the latest ultrasound sensor calibration	HH:MM:SS
Zone	Zone of the GPS position (relevant for UTM da- tum)	-
Easting	East coordinate of the GPS position	m
Northing	North coordinate of the GPS position	m
GPSString	Raw data string of the GPS receiver (NMEA GPGGA)	-
QualityE1	Echosounder signal quality of the first echo of the imported depth data	-

DepthE1 [m]	Echosounder depth of the first echo of the imported depth data	m
QualityE2	Echosounder signal quality of the second echo of the imported depth data	-
DepthE2 [m]	Echosounder depth of the first second of the imported depth data	m
DepthString	Raw data string of the imported Echosounder da- ta (Echotrac DBT)	-

9.3 Device Identification

The serial number is stored in the device and is read out and displayed by the operating software. The nameplate is attached to the transport case and contains the following information:



- Product name
- Name and address of the manufacturer
- CE-identification
- Serial number
- Year built (date of manufacture: month/year)
- Weight

The correct serial number is required for all queries. Only then a proper and quick processing is possible.

9.4 Declaration of conformity

In accordance to the following European Directives the CE mark was affixed:

	Declaration of conformity
with applicable regula	tions
	EMC-Directive 2004/108/EC
We hereby declare the	at the product
	admodus [®] USP <i>pro</i> , year of construction 2011
complies with the regu	ulations listed above.
Harmonized standar	ds applied:
DIN EN 62079	Preparation of instructions – Structuring, content and presentation
Harmonized nationa	I / international standards and technical specifications applied:
DIN EN 61000-6-4	Electromagnetic compatibility (EMC)
DIN EN 61000-6-2	Electromagnetic compatibility (EMC) Immunity standard for industrial environments
Any unauthorized cha	nges to the device will invalidate this declaration.
Illingen, 16.12.2011	Markus Uhle
Manufacturer:	
Synergetik Synergetik	etik Gesellschaft für Industriesensorik mbH straße 5 Illingen 49 (0)6825-94291-0



9.5 EMI results

