

# PHYCON

***Small interface – big performer!***





The PHYCON interface makes it particularly easy for you to get to grips with computer-aided experiments:

- Its compact size makes it easy to handle
- Is connected to the PC via the USB interface and is automatically identified by the operating system
- Doesn't require a power pack, as it is supplied with electricity from the PC via the USB interface
- Ideal for multi-channel measurements, as up to 8 PHYCON interfaces can be connected to a PC at any one time
- Its low price makes it extremely suitable for student exercises too
- Due to the clearly designed and intuitively used software (→ p. 4/5) you will quickly and easily obtain your measurement results (see below)
- The large number of sensors available, which can be connected to PHYCON (→ p. 6 ff), enables universal use in physics, biology and chemistry lessons

With **PHYCON** you only need **5 steps** for measurement results!





pH value measurement during titration



Force and acceleration during a spring oscillation



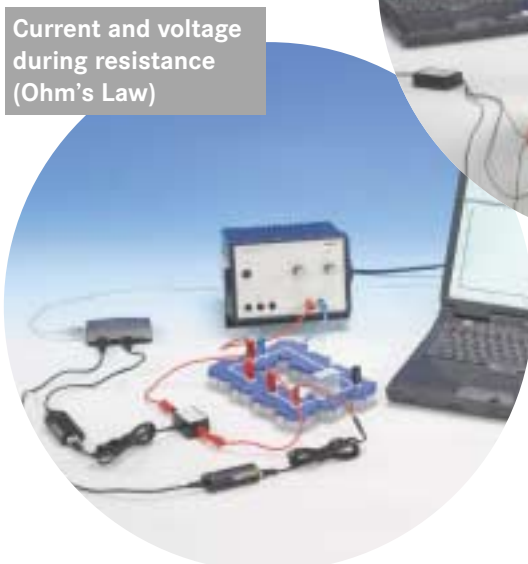
The magnetic field strength of a bar magnet



Measurement of an ECG



Current sensor



Current and voltage during resistance (Ohm's Law)

Choose the sensors suitable for your experiment from the large number available.

Sensors are currently available for the following variables:

- Voltage
- Current
- Temperature
- Pressure
- Force
- Acceleration
- Magnetic flux density
- Illuminance
- UV intensity
- Sound level
- Air humidity
- pH value/potential
- Conductivity
- Absorption/transmission
- Oxygen concentration
- ECG
- Pulse frequency
- Respiration frequency

(a detailed description of the sensors is given on page 6 onwards)

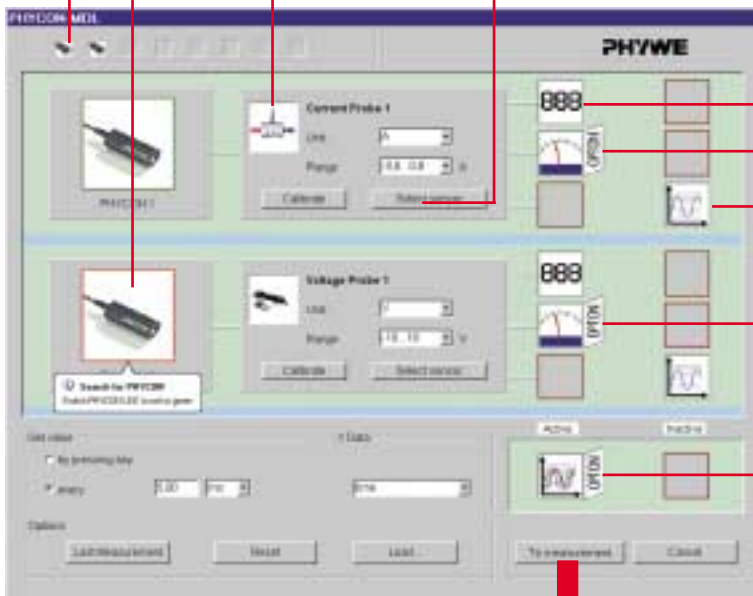
Each PHYCON interface connected to the PC is represented here by an image.

If you click on a PHYCON's image its LED changes from green to red:  
 → Makes identification easier when working with more than one PHYCON.

The sensors connected to the PHYCON are automatically identified and are also graphically represented.



The sensors used need to be calibrated to improve accuracy?  
 → No problem: One click and a calibration function opens, which enables one or two point calibration depending on the sensor.



The display instruments for the measurement are clearly allocated to the individual PHYCON interfaces and can each be activated and deactivated by clicking directly on their symbol.



Use the "Options" field to adjust the scale display ranges for the analog pointer instruments.



The XY recorder can be required:  
 • The X-axis can be used for time, measured value or measuring channel of sensor  
 • For the Y-axis up to 3 values selected at any one time  
 • To optimise the display measurement you can switch between dynamic adjustment and display in the default list

Everything set?  
 → Click here to open the measuring window

**The control centre for the measurement:**

→ One click and the measurement starts, stops or is aborted

You have forgotten to activate a measuring instrument or want to change a setting?  
 → No problem, click here once and you are back in the setting menu for the measurement.



You want to repeat this measurement later with precisely the same settings?  
 → Simply click here and all the settings can be saved in order to precisely reactivate them at any time.



**The display instruments for the measured values**

- Digital display
- Analog pointer instrument
- Yt- or XY recorder: Use the mouse to change their size as required and move them to anywhere on the screen.

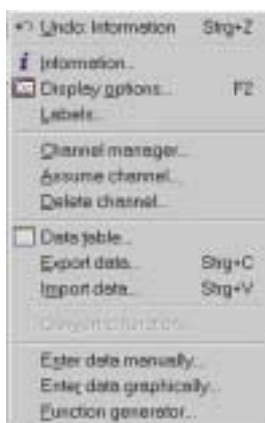
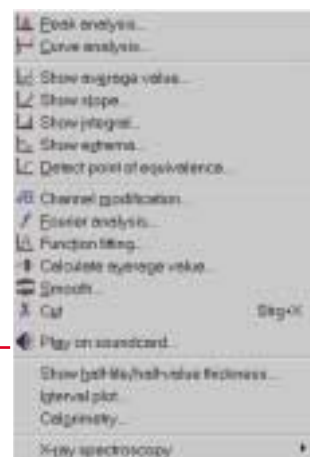
You have changed the measuring parameters and now want e.g. to directly deduct a voltage measurement or a weight during a force measurement from the measured values:  
 → You can do this with one click using the "origin balancing" function.

**Important information**

The main "measure" time as freeware and the program used to This means for example to analyse the values It is installed either u from our homepage

**The PHYCON interface software makes measuring easy:**

- Automatic sensor detection with visualisation of the connected sensors in the software
- Up to 8 sensors can be connected at any one time
- Clearly designed
- All control elements are always visible
- Intuitive to use
- Real-time display of all measured values
- The experiment parameters can be saved and reloaded
- Many and diverse analysis functions in the main “measure” program



**The measured values**

- Can be displayed as straight lines, curves, bars or dots and in many different colours
- Can be exported via the clipboard to any other Windows® program, as a graphic or in tabular form
- And much, much more

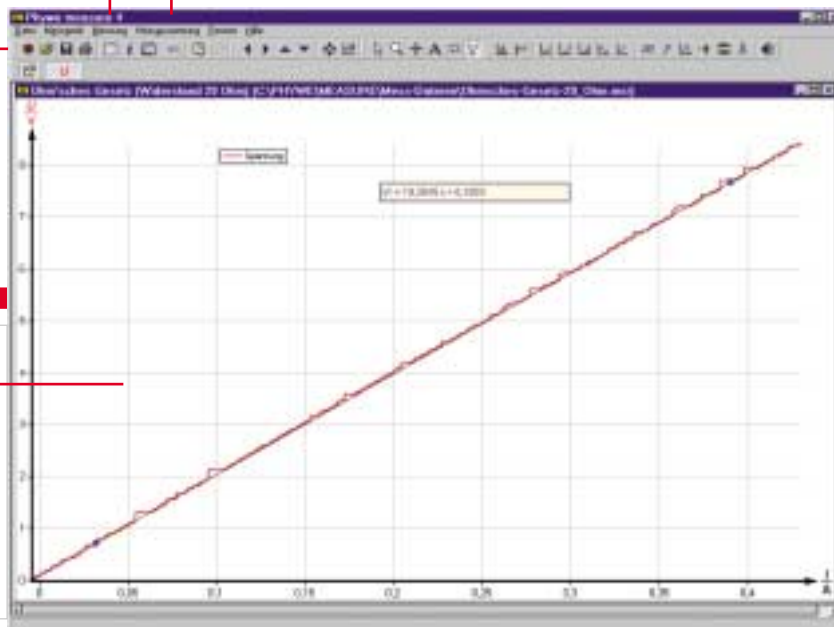
**Available analysis functions:**

- Integral calculation
- Fourier analysis of oscillations
- Mean value calculation
- Smoothing of measurement curves
- Equivalent point calculation of titrations
- Special analysis functions for x-ray spectroscopy
- Curve fitting (A freely selectable mathematical function is fitted to the measured values)
- Channel conversion (the measured values can be linked to each other in any way or with mathematical functions)
- And much, much more.

An integrated function generator can be used to calculate and display values for any mathematical functions you want. Measured values from other sources can be entered manually.

Most analysis functions can be selected via the tool bar.

After the measurement the main “measure” program has numerous tools available for displaying and analysing your measurements.



Up to 16 measuring channels can be displayed at any one time.

**Attention! Use a double “measure”!**

The program can be installed on any number of PCs at any time and can be used without licence fees. Only the part of the program that records measured values requires a licence. Your students can also use the program at home or in the laboratory measured in class. You can purchase a “measure” CD or by downloading the program (www.phywe.com).

**14450.61 PHYCON Interface Software**

CD in jewel case with release code  
 System requirements:  
 At least: Windows® 98 SE, ME, XP, 2000  
 Pentium 3, 500 MHz, 128 MB RAM  
 60 MB free hard disk memory





### PHYCON, USB Interface

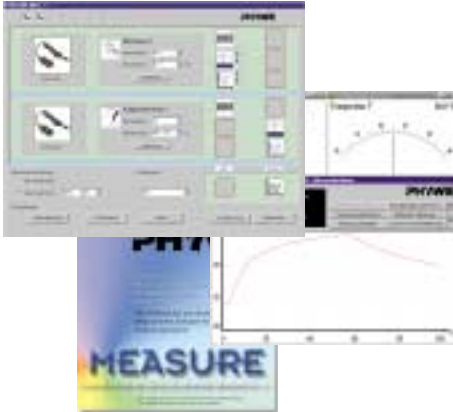
The new PHYWE interface for easy introduction to computer-aided experiments:

- Single channel interface that is directly connected to the USB port of the PC
- Drivers for the USB interface (Human Interface Device) are supplied with the Windows® 98, ME, XP, 2000 operating systems
- A snap-in connector enables the sensors required for the measurement to be easily and securely connected with the interface
- No power pack required as the power is supplied via the PC's USB port
- Intuitively used software enables up to 8 PHYCON interfaces to be connected to a PC at any one time
- A large number of sensors make it suitable for use in physics, chemistry and biology

#### Technical specifications:

- 70 cm long connection cable with Type A USB connector permanently mounted on the housing
- 6-pin socket for connecting the sensors
- Maximum measuring frequency: 200 Hz
- Analog/Digital measuring transformer resolution: 12 Bit
- Housing dimensions (B x D x H): 74 mm x 35 mm x 23 mm

12500.00 PHYCON, USB Interface



### PHYCON Interface Software

PHYWE's "PHYCON Interface" software is part of the PHYWE "measure" software family and is characterised by its easy and intuitively learned usability. With the help of this software you can record and display all the variables recorded by PHYCON Interface's sensors. This makes PHYCON Interface a universal system in your daily physics, chemistry and biology lessons.

The software provides a large number of functions:

- Up to 8 PHYCON Interfaces can be connected via USB ports at any one time (the number of USB ports on the PC can be easily extended using a USB HUB (14612.00))
- The connected sensors are automatically detected by the system and visualised in the settings menu with an image for easy identification
- The measured values can be displayed during measurement by means of digital displays, analog displays (pointer instrument) and in graphics (Yt-, XY diagram)
- If the measured values are displayed as an XY diagram, any measuring channels can be selected from the connected sensors for both the X-axis and the Y-axis
- The main measured program has many and diverse tools for displaying and analysing the measured values after the measurement has been taken
- The measured values can be exported to any other Windows applications in the easiest possible way
- And much, much more.

14450.61 Software PHYCON Interface, CD-ROM in Jewel Case



### Voltage Sensor, -10 .. +10 V

The sensor enables measurement of direct and alternating voltages. In conjunction with the PHYCON USB Interface (12500.00) and the software the sensor can be used just like a classic voltmeter.

Technical specifications:

- Two 4-mm connectors on a 150 cm long connection cable with 6-pin flat connector for connecting to the PHYCON Interface
- Measuring range: -10 .. +10 V
- Resolution: 0.005 V

12576.00 Voltage Sensor, -10 .. +10 V

### Differential Voltage Sensor, -6 .. +6 V

The differential voltage sensor is particularly suitable for measuring smaller direct and alternating voltages. Together with the current sensor (12555.00) it is ideally suited for experimentally deducing Ohm's Law, phase relationships in electric circuits, and much, much more. In contrast to the voltage sensor (12576.00) this sensor is potential-free, i.e. it is not earthed via the interface.

Technical specifications:

- Two 4-mm connectors on a 140 cm long connection cable with 6-pin flat connector for connecting to the PHYCON Interface
- Measuring range: -6 .. +6 V
- Resolution: 0.003 V

12556.00 Differential Voltage Sensor, -6 .. +6 V

### Current Sensor, -0.6 .. +0.6 A

The current sensor enables measurement of current intensities in direct or alternating electric circuits. Together with the voltage sensor (12576.00) or differential voltage sensor (12556.00) it is ideally suited for experimentally deducing Ohm's Law, phase relationships in electric circuits, and much, much more. It can also be used in many and diverse ways in electrochemical experiments.

Technical specifications:

- Two 4-mm sockets arranged at a 180° angle on a 150 cm long connection cable with 6-pin flat connector for connecting to the PHYCON Interface
- Measuring range: -0,6 .. +0.6 A
- Resolution: 0.003 A
- Maximum allowable voltage: 10 V
- Input resistance: 0,1 Ω

12555.00 Current Sensor, -0.6 .. +0.6 A



### Instrument Amplifier

This amplifier is used as a measuring amplifier for small direct and alternating voltages in the range between 20 mV and 1 V. It can be manually switched between 6 different measuring ranges in order to set the respective optimum amplification factor. Typical applications include e.g. amplification of output signals of a device with recorder output, for example a gas chromatograph.

Technical specifications:

Housing with two 4-mm sockets arranged in parallel, a rotating knob for adjusting the measuring ranges and a 100 cm long connection cable with 6-pin flat connector for connecting to the PHYCON Interface

- Measuring ranges: 0 .. 20 mV/0 .. 200 mV/0 .. 1 V  
-20 .. +20 mV/-200 .. +200 mV/-1 .. +1 V
- Linearity: 1%
- Frequency range: 0 .. 250 Hz
- Input resistance: 1 MΩ
- Housing dimensions (B x D x H): 96 mm x 53 mm x 45 mm

12563.00 Instrument Amplifier



**Temperature Sensor, -40 .. +130°C**

This robust temperature sensor with a protective tube made from stainless steel is directly connected to the PHYCON Interface. The liquid-tight handle cast-on to the stainless steel tube makes it easy to handle at any time and it can be safely used for measurements in all kinds of different liquids.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the handle, for connection to the PHYCON Interface
- Measuring range: -40 .. +130°C
- Resolution: 0.1°C

**12570.00 Temperature Sensor, -40 .. +130°C**



**Surface Temperature Sensor, -40 .. +130°C**

This temperature sensor, with an extremely low thermal capacity due to its small size, at the end of a highly flexible connection lead reacts virtually without delay to temperature changes. This makes it outstandingly suitable for measurements in which low geometric dimensions or fast reacting sensors are required, e.g. for the measurement of surface temperatures, skin temperature and much, much more. Due to its design, it is only suitable for taking measurements in air and not for taking measurements in liquids.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the sensor, for connection to the PHYCON Interface
- Measuring range: -40 .. +130°C
- Resolution: 0.1°C

**12572.00 Surface Temperature Sensor, -40 .. +130°C**



**Temperature Sensor, long, -50 .. +150°C**

This temperature sensor has been designed for measuring temperatures outdoors and in bodies of water. It can also be used to measure temperatures at different depths in rivers and lakes.

**Technical specifications:**

- Amplifier in a housing with a 3.5-mm jack for connecting the temperature sensor and a 150 cm long connection cable with 6-pin flat connector for connection to the PHYCON Interface
- Liquid-tight cast-in temperature sensor with a 30 m long cable and a 3.5-mm jack for connecting to the amplifier
- Measuring range: -50 .. +150°C
- Resolution: 0.1°C
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12571.00 Temperature Sensor, long, -50 .. +150°C**



**Thermocouple Box, NiCr-Ni, -200 .. +1400°C**

With this connection box for Type K NiCr-Ni thermocouples and a corresponding temperature sensor (see below), temperatures can be measured over a range of approx. 1600 degrees. This span stretches from the temperature of liquid nitrogen to the temperatures in the heart of flames. The connection box contains a compensation system, therefore a reference thermocouple in iced water is not required. You can choose the thermocouples that best suit your measuring purposes from the five different types available (thermocouple is not included with the box).

**Technical specifications:**

- Connection box with a Type K thermocouple socket for connecting Type K thermocouples and a 150 cm long connection cable with 6-pin flat connector for connection to the PHYCON Interface
- Measuring range (depending on the sensor): max. -200 .. +1,400°C
- Resolution: 0.1°C
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12573.00 Thermocouple Box, NiCr-Ni, -200 .. +1,400°C**



**NiCr-Ni (Type K) Thermocouples as Accessories to the Thermocouple Box 12573.00**

Various versions of NiCr-Ni thermocouples with thermal voltage free 2-pin standard flat connector, Type K.

NiCr-Ni thermocouple	13615.02	13615.01	13615.03	13615.05	13615.04
Temperature ranges [°C]	-50 .. +500	-50 .. +1100	-50 .. +1000	-50 .. +1000	-50 .. +300
Response time [s]	approx. 2	< 1	approx. 5	approx. 3	approx. 10
Sensor dimensions					
Diameter [mm]	1.0 .. 2.0	0.5	3.0	4.0 (small plate)	7.0
Length [mm]	-	100	120	120	250
Length of connection lead [m]	1.5	2.0	1.0	1.0	1.5

Product No.	Product name	Version
13615.02	NiCr-Ni thermocouple, single, -40 .. 500°C	Glass filament insulation, spot-welded tip
13615.01	NiCr-Ni thermocouple, Micro-sheath	Magnesium oxide powder insulation, stainless steel sheath, flexible: bending radius approx. 1 mm
13615.03	NiCr-Ni submersible sensor, Stainless steel, -50 .. 1000°C	For liquids and gases, thermocouple in protective tube,
13615.05	NiCr-Ni submersible sensor, Teflon, up to 300°C	For liquids and gases, thermocouple in protective tube, Teflon (PTFE)
13615.04	NiCr-Ni surface sensor, up to 1000°C	For measuring surface temperatures, thermocouple on small copper plate



**Pressure Sensor (Barometer), 810 .. 1060 hPa, absolute**

This pressure sensor can be used to measure the air pressure (weather observation) and for experiments where a pressure close to the normal air pressure is to be measured.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the sensor, for connecting to the PHYCON Interface
- Connection for hoses: Luer lock fitting
- Measuring range: 800 .. 1050 hPa (abs)
- Resolution: 0.1 hPa
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12552.00 Pressure Sensor (Barometer), 810 .. 1060 hPa, absolute**





**Pressure Sensor, 0 .. 2100 hPa, absolute**

Due to its large pressure range and high resolution this absolute pressure sensor is for universal use. It can be used for numerous measurements e.g. for experimental deduction of the gas laws, determination of the vapour pressure of liquids or for measuring the transpiration rate of plants.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the sensor, for connection to the PHYCON Interface
- Measuring range: 0 .. 2100 hPa (abs)
- Resolution: 0.5 hPa
- Connection for hoses: Luer lock fitting
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm
- Supplied with the pressure sensor: 1 plastic syringe 20 ml; 1 hose with 2 Luer lock adapters; 1 tap with Luer lock connections; 2 Luer lock/hose connection adapters 3-8 mm

**12562.00 Pressure Sensor, 0 .. 2100 hPa, absolute**



**Force Sensor, -50 .. +50 N**

This force sensor can be switched between 2 measuring ranges ( $\pm 10$  N/ $\pm 50$  N) and is therefore ideally suited for virtually all experiments in which a force is to be measured. Its range of uses is extended still further as it can be either hand-held or easily fixed to a round rod using the drill hole in its housing. In addition a threaded rod, supplied with the sensor, can be screwed into the end face of the housing.

**Technical specifications:**

- 200 cm long connection cable with 6-pin flat connector, permanently attached to the sensor, for connecting to the PHYCON Interface
- Measuring ranges: -10 .. +10 N and -50 .. +50 N
- Resolution: 0.01 N and 0.05 N
- Housing dimensions (B x D x H): 53 mm x 32 mm x 76 mm

**12558.00 Force Sensor, -50 .. +50 N**



**Magnetic Field Sensor**

Fixed to the housing of the magnetic field sensor is a Hall probe with a sufficiently high resolution to measure the earth's magnetic field. A changeover switch enables you to choose between 2 measuring ranges, which makes it suitable for universal use, e.g. to measure the field strength of permanent magnets, coils, etc.

**Technical specifications:**

- 150 cm long connection cable, permanently attached to the housing, with 6-pin flat connector for connection to the PHYCON Interface; sensor securely attached to the housing by an 80 cm long cable
- Measuring ranges: -0,32 .. +0.32 mT and -6.4 .. +6.4 mT
- Resolution: 0.0002 mT and 0.004 mT
- Sensor dimensions ( $\varnothing$  x L): 19 mm x 140 mm
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12565.00 Magnetic Field Sensor**



**Acceleration Sensor 25-g, -250 .. +250 m/s<sup>2</sup>**

Sensor for measuring one-dimensional accelerations, such as those that occur during impacts or other movements. The large measuring range makes it suitable for a large number of experiments.

**Technical specifications:**

- 240 cm long connection cable with 6-pin flat connector, permanently attached to the sensor, for connecting to the PHYCON Interface
- Measuring range: -250 .. +250 m/s<sup>2</sup> (-25 .. +25 g)
- Resolution: 1 m/s<sup>2</sup>
- Housing dimensions (B x D x H): 45 mm x 27 mm x 20 mm

**12550.00 Acceleration Sensor 25-g, -250 .. +250 m/s<sup>2</sup>**



**Acceleration Sensor 5-g, -50 .. +50 m/s<sup>2</sup>**

Sensor for measuring one-dimensional accelerations. Due to its measuring range and its resolution it is ideally suited for road trials, measurements on pendulum weights or to determine the acceleration of a lift.

**Technical specifications:**

- 240 cm long connection cable with 6-pin flat connector, permanently attached to the sensor, for connecting to the PHYCON Interface
- Measuring range: -50 .. +50 m/s<sup>2</sup> (-5 .. +5 g)
- Resolution: 0.1 m/s<sup>2</sup>
- Housing dimensions (B x D x H): 45 mm x 27 mm x 20 mm

**12551.00 Acceleration Sensor 5-g, -50 .. +50 m/s<sup>2</sup>**



**Light Sensor**

This light sensor has a similar spectral sensitivity to that of the human eye. Its versatility is increased still further by a changeover switch enabling 3 different measuring ranges to be selected. It can be used to experimentally check the inverse square law, for reflection experiments or for weather observation.

**Technical specifications:**

- 150 cm long connection cable, permanently attached to the housing, with 6-pin flat connector for connection to the PHYCON Interface; sensor securely attached to the housing by an 80 cm long cable
- Measuring ranges: 0 .. 600 Lux/0 .. 6000 Lux/0 .. 150,000 lux
- Resolution: 0.2 lux, 2 lux and 50 lux
- Sensor dimensions ( $\varnothing$  x L): 19 mm x 140 mm
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12564.00 Light Sensor**

**UVA Sensor, ~320 .. ~390 nm**

**UVB Sensor, ~290 .. ~320 nm**

These two UV sensors are used to measure the intensity of ultraviolet light. One measures in the waveband from approx. 320 nm to approx. 390 nm (UVA) and the other from approx. 290 nm to 320 nm (UVB). The choice of sensor depends on the experiment to be carried out. You can use both sensors to e.g. measure the transmissivity of different plastics for UV light or to compare UV intensity on sunny days with the intensity on cloudy days.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the handle, for connecting to the PHYCON Interface
- Measuring ranges:
  - 0 .. 20,000 mW/m<sup>2</sup> (UVA sensor)
  - 0 .. 1000 mW/m<sup>2</sup> (UVB sensor)
- Resolution:
  - 5 mW/m<sup>2</sup> (UVA sensor)
  - 0.3 mW/m<sup>2</sup> (UVB sensor)
- Sensor dimensions (Ø x L): 13 mm x 180 mm

**12574.00 UVA Sensor, ~320 .. ~390 nm**

**12575.00 UVB Sensor, ~290 .. ~320 nm**

**Sound Level Meter**

You can use the sound level meter to measure sound level in decibels (dB). The device can be used as a hand-held meter or be connected to the PHYCON Interface via a 3.5-mm jack integrated in the device, in order to then record the measured values online. A selector switch on the device enables the measured values to be weighted by dBA or dBC.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector for connecting to the PHYCON Interface and 3.5-mm jack for connecting to the sound level device
- Measuring range: 0 .. 130 dB
- Resolution: 0.1 dB
- Frequency range: 31,5 .. 8,000 Hz
- Time resolution: 125 ms or 1 s (selectable)
- Power supply: 9-V monobloc battery (supplied with the sound level meter)
- Housing dimensions (B x D x H): 255 mm x 83 mm x 32 mm

**12569.00 Sound Level Meter**

**Air Humidity Sensor**

The sensor is integrated in the housing and enables the relative air humidity measurement over a range from 0 to 95% RL. It can be used e.g. for weather studies or for monitoring greenhouses.

**Technical specifications:**

- 110 cm long connection cable with 6-pin flat connector, permanently attached to the housing, for connecting to the PHYCON Interface
- Measuring ranges: 0 .. 95%
- Resolution: 0,04%
- Accuracy: ±5%
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12567.00 Air Humidity Sensor**

**Electrode Amplifier**

All pH and redox electrodes equipped with a BNC connector can be connected to this amplifier. You can choose between units of pH value and mV to display the measured values. The sensors can be calibrated using single point or two point calibration.

**Technical specifications:**

- Amplifier in a housing with a BNC connector for connecting pH and redox electrodes and a 150 cm long connection cable with 6-pin flat connector for connection to the PHYCON Interface
- Measuring range (input): -450 .. +1100 mV
- Housing dimensions (B x D x H): 74 mm x 35 mm x 23 mm

**12560.00 Electrode Amplifier**

**Electrodes with BNC connector as accessories for the electrode amplifier 12560.00**

**46265.15 pH electrode, plastic, gel-filled, BNC**

**46266.15 pH electrode, plastic, refillable, BNC**

**46268.10 pH electrode, glass, refillable, BNC**

**46267.10 Platinum redox electrode, plastic, gel-filled, BNC**

**Conductivity Sensor**

This sensor can be used to determine the conductivities or total ion concentration of aqueous samples. It is equipped with 2 graphite electrodes for conductivity measurement and a temperature sensor for temperature compensation.

**Technical specifications:**

- 150 cm long connection cable, permanently attached to the housing, with 6-pin flat connector for connection to the PHYCON Interface; sensor securely attached to the housing by an 80 cm long cable
- Measuring ranges: 0 .. 200 µS/cm/0 .. 2,000 µS/cm/0 .. 20,000 µS/cm
- Resolution: 0.1 µS/cm, 1 µS/cm and 10 µS/cm
- Temperature compensation: Automatic in the range between +5 .. +35°C
- Temperature range in which the probe can be used: 0 .. +80°C
- Sensor dimensions (Ø x L): 12 mm x 154 mm
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12554.00 Conductivity Sensor**

**Colorimeter**

This compact LED photometer with 4 wavelengths is very suitable for experiments on the Lambert-Beer Law, for the determination of concentrations in solutions or for the measurement of changes in concentrations over time. The photometer holds standard square 1 cm cuvettes (outer dimensions: 12 mm x 12 mm). 15 plastic cuvettes are supplied with the colorimeter.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the housing, for connecting to the PHYCON Interface
- Wavelengths: 430 nm/470 nm/565 nm/635 nm
- Measuring range: 0,05 .. 1.0 abs (10% .. 90% T)
- Resolution: 0.04% T
- Housing dimensions (B x D x H): 138 mm x 70 mm x 68 mm

**12553.00 Colorimeter**





### Oxygen Sensor for O<sub>2</sub> in Solution

This sensor can be used to determine the concentration of dissolved oxygen in aqueous solutions. The probe is equipped with a temperature sensor for automatic temperature compensation. A replacement diaphragm is supplied with the sensor.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the handle, for connecting to the PHYCON Interface
- Measuring range: 0 .. 5 mg/l O<sub>2</sub>
- Resolution: 0.007 mg/l O<sub>2</sub>
- Temperature compensation: Automatic in the range between +5 .. +35 °C
- Sensor dimensions (Ø x L): 13 mm x 180 mm

**12557.00 Oxygen Sensor for O<sub>2</sub> in Solution**



### Oxygen Sensor for Gaseous O<sub>2</sub>

This sensor is ready for immediate use, without any further preparations, for measuring the oxygen concentration in air or in gases. For example it can be used to measure oxygen content during respiration or the oxygen consumed during the corrosion of iron. A 250-ml plastic flask is supplied, which is tightly sealed by the attached sensor and can be used as a measuring vessel (respiratory chamber).

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the handle, for connecting to the PHYCON Interface
- Measuring range: 0 .. 27% O<sub>2</sub>
- Resolution: 0.01% O<sub>2</sub>
- Sensor dimensions (Ø x L): 28 mm x 76 mm

**12566.00 Oxygen Sensor for Gaseous O<sub>2</sub>**



### ECG Sensor

With the help of this ECG sensor you can measure and display the progression of bioelectric potential differences with time, which occur during the spread of stimulus and repolarisation during contraction of the heart. This is deduced from the arms using three disposable electrodes. The measuring electronics is isolated from the interface by an optocoupler. 100 self-adhesive disposable electrodes are supplied with the sensor.

**Technical specifications:**

- 150 cm long connection cable, permanently attached to the housing, with 6-pin flat connector for connection to the PHYCON Interface; 3 90 cm long measuring cables are connected to the housing and fitted with crocodile clips
- Housing dimensions (B x D x H): 74 mm x 53 mm x 25 mm

**12559.00 ECG Sensor**



### Heart Rate Sensor

You can use this sensor for wireless measurement of a test person's heart rate during all kinds of different activities. The transmitter with the measuring electrodes, which measure the heart beat in a similar way to an ECG, is placed around the test person's chest using an elastic strap. The signals are picked up by a receiver and passed to the interface at the PC.

**Technical specifications:**

- 150 cm long connection cable with 6-pin flat connector, permanently attached to the receiver, for connection to the PHYCON Interface
- Frequency range: approx. 80 .. 100 cm

**12561.00 Heart Rate Sensor**



### Respiratory Frequency Sensor

This inflatable cuff, which is stretched around the test person's chest, can be used in conjunction with the pressure sensor 0 .. 2100 hPa (12562.00), which is also required to measure the respiratory frequency, by recording the pressure fluctuations that result within the cuff by inhaling and exhaling.

**Technical specifications:**

- Cuff dimensions: Length 120 cm/Width: 15 cm
- Length of the connection hose: 50 cm

**12568.00 Respiratory Frequency Sensor**



### PHYCON Starter Set

This starter set gives you an attractively priced opportunity to introduce computer-aided measurements. You save expenses compared to the purchase of the individual devices. Furthermore the devices are supplied in a practical storage box.

**The PHYCON Starter Set Includes:**

- 1 PHYCON, USB Interface 12500.00
- 1 PHYCON Interface Software 14450.61
- 1 Voltage Sensor, -10 .. +10 V 12576.00
- 1 Current Sensor, -0.6 .. +0.6 A 12555.00
- 1 Temperature Sensor, -40 .. +130 °C 12570.00
- 1 Storage Box

**12510.00 PHYCON Starter Set**



### USB 2.0 4-Port HUB, with Power Pack

If your computer does not have sufficient USB ports for connecting several PHYCON Interfaces, you can connect a USB HUB to one of your USB ports. This then provides you with 4 USB ports (Fig. similar).

**Technical specifications:**

- USB HUB with 4 USB ports 2.0 Type A
- Including external power pack
- Including USB A-B cable, 1.8 m long
- Including CD with drivers

**14612.00 USB 2.0 4-Port HUB, with Power Pack**

**System Overview of the PHYCON USB Interface**

Interface	Software	Sensors	Detecting element	Measured variable
PHYCON, USB Interface (12500.00)	PHYCON Interface Software (14450.61)	Voltage Sensor, -10 .. +10 V (12576.00)	Integrated in the sensor	Voltage
		Differential Voltage Sensor, -6 .. +6 V (12556.00)	Integrated in the sensor	Voltage
		Instrument Amplifier, 0 .. 20 mV / 0 .. 200 mV / 0 .. 1 V, -20 .. +20 mV / -200 .. +200 mV / -1 .. +1 V (12563.00)	Integrated in the sensor	Voltage
		Current sensor, -0.6 .. +0.6 V (12555.00)	Integrated in the sensor	Current
		Temperature sensor, -40 .. +130 °C (12570.00)	Integrated in the sensor	Temperature
		Surface temperature sensor -40 .. +130 °C (12572.00)	Integrated in the sensor	Temperature
		Temperature sensor, long, -50 .. +150 °C (12571.00)	Integrated in the sensor	Temperature
		Thermocouple box, NiCr-Ni, -200 .. +1400 °C (12573.00)	Thermocouple, micro-sheath (13615.01) Thermocouple, single (13615.02) Thermocouple, submersible sensor (13615.03) Thermocouple, surface (13615.04) Thermocouple, Teflon (13615.05)	Temperature
		Pressure sensor (barometer), 810 .. 1060 hPa, absolute (12552.00)	Integrated in the sensor	Pressure
		Pressure Sensor, 0 .. 2100 hPa, absolute (12562.00)	Integrated in the sensor	Pressure
		Force Sensor, -50 .. +50 N (12558.00)	Integrated in the sensor	Force
		Magnetic Field Sensor, -0,32 .. + 0,32 mt, -6,4 .. + 6,4 mt (12565.00) flux density	Integrated in the sensor	Magnetic flux density
		Acceleration Sensor 25-g, -250 .. +250 m/s <sup>2</sup> (12550.00)	Integrated in the sensor	Acceleration
		Acceleration Sensor 5-g, -50 .. +50 m/s <sup>2</sup> (12551.00)	Integrated in the sensor	Acceleration
		Light Sensor, 0 .. 600 Lux, 0 .. 6000 Lux, 0 .. 150000 Lux (12564.00)	Integrated in the sensor	Illuminance
		UVA sensor, ~320 .. ~390 nm (12574.00)	Integrated in the sensor	UV intensity
		UVB sensor, ~290 .. ~320 nm (12575.00)	Integrated in the sensor	UV intensity
		Sound level meter, 0 .. 130 dB (12569.00)	Integrated in the sensor	Sound level
		Air Humidity sensor, 0 .. 95% (12567.00)	Integrated in the sensor	Air humidity
		Electrode amplifier, -450 .. +1100 mV (12560.00)	pH electrode, plastic, gel-filled, BNC (46265.15) pH electrode, plastic, refillable, BNC (46266.15) pH electrode, glass, refillable, BNC (46268.10) Platinum redox electrode, plastic, gel-filled, BNC (46267.10)	pH-Value electrochemical Potential
		Conductivity sensor, 0 .. 200 µS, 0 .. 2000 µS, 0 .. 20000 µS (12554.00)	Integrated in the sensor	Conductivity
		Colorimeter, 430/470/565/635 nm (12553.00)	Integrated in the sensor	Absorption Transmission
		Oxygen sensor for O <sub>2</sub> , 0 .. 5 mg/l in solution (12557.00)	Integrated in the sensor	Oxygen content
		Oxygen sensor for, 0 .. 27% O <sub>2</sub> gaseous O <sub>2</sub> (12566.00)	Integrated in the sensor	Oxygen content
		ECG Sensor (12559.00)	Integrated in the sensor	ECG
		Heart rate sensor (12561.00)	Integrated in the sensor	Pulse
		Pressure sensor, 0 .. 2100 hPa, absolute (12562.00)	Respiratory frequency cuff (12568.00)	Respiration frequency

**Yes, I am interested in your PHYCON Interface and would like:**

- a free quotation for the following products without any obligation to make a purchase!  
 to directly order the following products!



Product No.	Name	Unit price	Quantity	Total price
12500.00	PHYCON, USB Interface			
14450.61	Software PHYCON Interface, CD-ROM in jewel case			
12576.00	Voltage sensor, -10 .. +10 V			
12556.00	Differential voltage sensor, -6 .. +6 V			
12555.00	Current sensor, -0.6 .. +0.6 A			
12563.00	Instrument amplifier			
12570.00	Temperature sensor, -40 .. +130°C			
12572.00	Surface temperature sensor, -40 .. +130°C			
12571.00	Temperature sensor, long, -50 .. +150°C			
12573.00	Thermocouple box, NiCr-Ni, -200 .. +1,400°C			
13615.01	NiCr-Ni thermocouple, micro-sheath			
13615.02	NiCr-Ni thermocouple, single, -40 .. +500°C			
13615.03	Submers. NiCr-Ni sensor, stainless steel, -50 .. +1000°C			
13615.04	Surface sensor, NiCr-Ni, up to 1000°C			
13615.05	Submers. NiCr-Ni sensor, up to 300°C, Teflon (PTFE)			
12552.00	Pressure sensor (barometer), 810 .. 1060 hPa, absolute			
12562.00	Pressure sensor, 0 .. 2100 hPa, absolute			
12558.00	Force sensor, -50 .. +50 N			
12565.00	Magnetic field sensor			
12550.00	Acceleration sensor 25-g, -250 .. +250 m/s <sup>2</sup>			
12551.00	Acceleration sensor 5-g, -50 .. +50 m/s <sup>2</sup>			
12564.00	Light sensor			
12574.00	UVA sensor, ~320 .. ~390 nm			
12575.00	UVB sensor, ~290 .. ~320 nm			
12569.00	Sound level meter			
12567.00	Air humidity sensor			
12560.00	Electrode amplifier			
46265.15	pH electrode, plastic, gel-filled, BNC			
46266.15	pH electrode, plastic, refillable, BNC			
46268.10	pH electrode, glass, refillable, BNC			
46267.10	Platinum redox electrode, plastic, gel-filled, BNC			
12554.00	Conductivity sensor			
12553.00	Colorimeter			
12557.00	Oxygen sensor for O <sub>2</sub> in solution			
12566.00	Oxygen sensor for gaseous O <sub>2</sub>			
12559.00	ECG sensor			
12561.00	Heart rate sensor			
12568.00	Respiratory frequency sensor			
12510.00	PHYCON starter set			
14612.00	USB 2.0 4-Port HUB, with power pack			



**PHYWE SYSTEME GmbH & Co. KG**  
 Robert-Bosch-Breite 10  
 37079 Göttingen  
 Germany

**Phone**

+49/5 51/ 604-0

**Fax**

+49/5 51/ 604-107

**eMail**

PHYCON@phywe.de

*www.phywe.com*

Name \_\_\_\_\_

School \_\_\_\_\_

Customer No. (if known) \_\_\_\_\_

Street \_\_\_\_\_

Post Code, Town, Country \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

eMail \_\_\_\_\_

Date \_\_\_\_\_ Signature \_\_\_\_\_

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