Automatic measuring stations

16.98 Automatic agro-meteostation, 62 channels

The meteostation is designed for simple and reliable retrieval of agro-meteorological data. The parameters measured in the standard design are: wind speed and wind direction, global radiation, air temperature, air humidity, soil temperature and precipitation.

It is easy to set up the station in the field with two people in a short time. The datalogger (21.11.01) with its own power supply, is housed in a steel case which can be locked.

Each station is subjected to customer specific configuration and a functional and life test.

The station is supplied inclusive the software needed for the configuration of the datalogger and reading-out of the stored data.

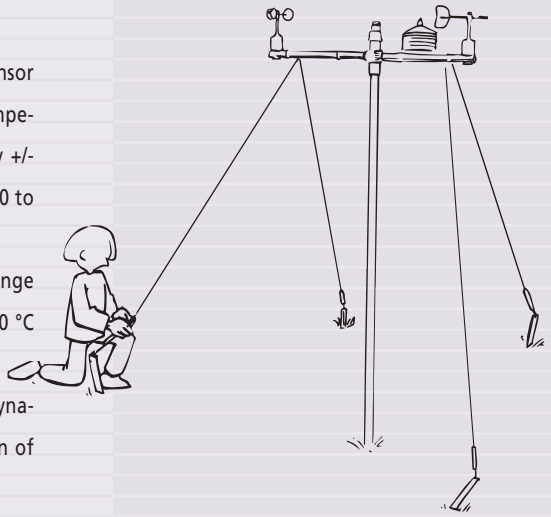
The station is equipped, standard, with the following sensors:

- ❑ Wind speed sensor, measuring range 0,25 - 75 m/sec, accuracy 1%.
- ❑ Wind direction sensor for wind speeds between 0.6 -75 m/sec, accuracy +/- 2° at wind speeds over 5 m/sec.
- ❑ Radiation sensor with a measuring range of 305 - 2800 nm and an accuracy of 2.5%.
- ❑ Air temperature- and relative humidity sensor with radiation shield, measuring range temperature between -40 °C and +60 °C accuracy +/- 0.20 °C; measuring range relative humidity 0 to 100%; accuracy better than 2%.
- ❑ Soil temperature sensor sith a measuring range of -40 °C and +60 °C, accuracy 0.1 °C at 0-50 °C and 0.2 °C at -40 °C till +60 °C.
- ❑ Rain gauge of UV-resistant plastic, aero-dynamic desighn with tipping bucket, resolution of 0.2 mm precipitation, surface 507 cm^2.

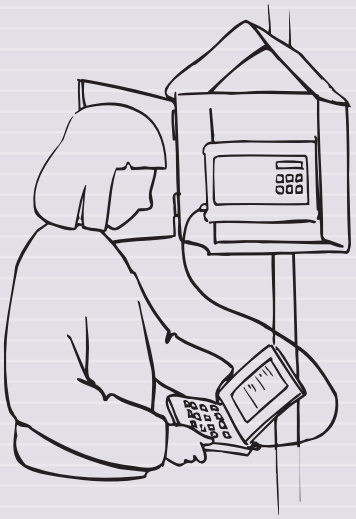
The complete set is supplied with software (incl. software to calculate evapotranspiration), tools and extensive documentation for installation and maintenance. Entering an annual maintenance contract is recommended.

Automatic agro-meteostation, 62 channels

The meteostation is secured with guy ropes.

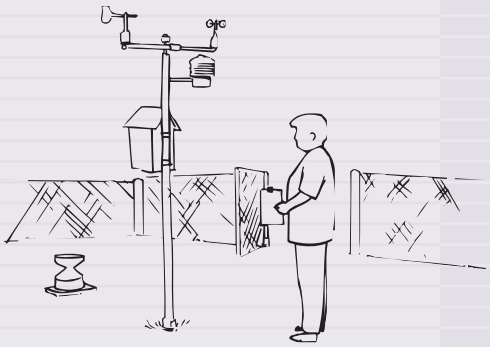


The data are retrieved using a laptop.



METEO DATALOGGERS & SENSORS

Checking the settings of the automatic weather station.



16.99 Automatic agro-meteostation, 8 channels

Eijkelkamp Agrisearch Equipment designed a standard 8 channel meteostation for measuring, recording and processing of the standard parameters: wind speed and wind direction, global radiation, air temperature, air humidity and precipitation.
The station is constructed around a foldable mast which can be taken apart, allowing for mobile applications of the station.

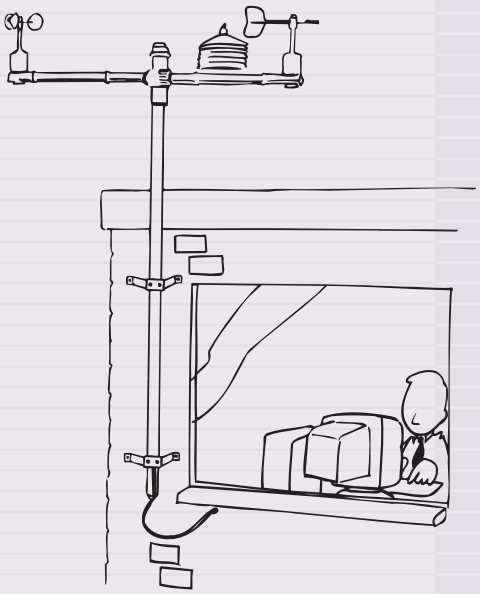
The datalogger (16.99.15) with built-in air temperature and relative air humidity sensor has 8 input channels and a memory in excess of 3100 measurements per channel.
The measuring interval can be set anywhere between 10 seconds and 12 hours. With the menu controlled software every single channel and sensor can be configured. Each station is subjected to customer specific configuration and a functional and life test.
Entering an annual maintenance contract is recommended.

The station is equipped, standard with the following sensors:

- Wind speed sensor, measuring range 0.25 - 75 m/sec, accuracy 1%.
- Wind direction sensor for wind speeds between 0.6 - 75 m/sec, accuracy +/- 2° at wind speeds over 5 m/sec.
- Radiation sensor with a measuring range of 530 - 1080 nm and an accuracy of 5%.
- Built-in air temperature- and relative air humidity sensor, measuring range air temperature between -20 °C and +70 °C; measuring range relative air humidity 0 to 100%; accuracy better than 2%.
- Rain gauge of UV-resistant plastic, aerodynamic design with tipping bucket, resolution of 0.2 mm precipitation, surface 507 cm^2.

The complete set is supplied inclusive software, tools and extensive documentation for installation and maintenance.

In case of a permanent connection the data can be processed immediately.



Automatic agro-meteostation, 8 channels

Dataloggers

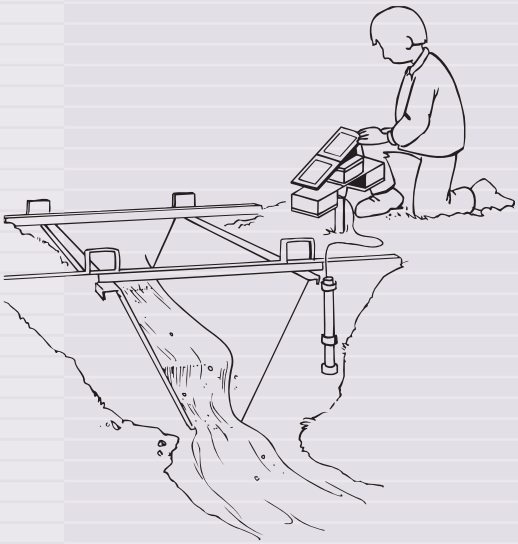
16.99.15 Datalogger, model Datahog 2 with 8 input channels

The complete, compact datalogger with built-in air temperature/humidity sensor is easy to use and housed in weather resistant (IP65) housing. The logger is fitted with 6 free input channels allowing various applications. The datalogger has an extensive memory for storage of up to 3100 measurements (channel, date and time). The measuring intervals can be adjusted from 10 seconds to up to 12 hours. The long life of the batteries allows the datalogger to be deployed in long term projects in remote areas of short term research where data are registered in short intervals. A multitude of sensors can be linked to the datalogger. The datalogger is fitted standard with battery supply, but electricity supply via the mains or a solar panel is possible too. With built-in air temperature/humidity sensor the datalogger can be supplied with 2 or 6 free input channels. For special applications the compact datalogger can be supplied without built-in air temperature/humidity sensor, with 1, 2, 4 or 8 input channels (for instance for use with rain gauge or flume). Special software is available to configure the datalogger and to download data.

Advantages

- ❑ Connecting facilities for different sensors.
- ❑ Selection from analog/digital input channels.
- ❑ Compact and weather resistant.
- ❑ Easy programming and configuring with provided menu controlled software.
- ❑ Extensive series of measuring and recording intervals.
- ❑ Every channel can be individually programmed.
- ❑ Adjustable start/stop function.
- ❑ Data/time recording.
- ❑ Accurate 15 bit resolution, extensive memory capacity.
- ❑ RS 232 output, due to ASCII-data compatible to all PC's.
- ❑ Reading-in of files in spreadsheets is easy.

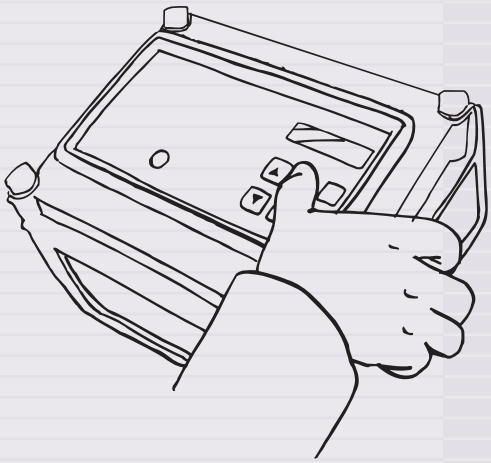
A flume is connected to the datalogger.



Datalogger (8 channels) with and without built-in air humidity sensor

METEO DATALOGGERS & SENSORS

Checking the settings of the datalogger.



21.11.01 Datalogger DL2e, standard hardware system

Datalogger with a memory for 32.000 measurements (extendable to 128.000) housed in a weather resistant (IP65), synthetic housing. The datalogger is fitted with function keys and an LCD-read-out screen. Various sensors and additional components make this datalogger a many sided instrument suitable also for future applications.

In its standard design the datalogger has 30 analog (15 differential), 2 digital/pulse and 2 relays output channels. The datalogger is programmed using software that can be used on any IBM-compatible PC. Each channel can be configurated for an individual sensor. Measuring intervals can be set from 1 second to up to 24 hours.

The datalogger can be started directly via the datalogger itself (function keys) or via an external signal or automatic (date and time). A great number of conversion tables have been stored in the datalogger allowing measured signals to be transformed into workable values such as °C, Watt per m2 , etc. Additionally the datalogger offers the facility to bring-in customer specific conversions. Internal electricity supply with batteries or via mains or solar panel.

Advantages

- ❑ Connecting facilities for different sensors.
- ❑ Weather resistant (IP65), rugged, portable datalogger.
- ❑ Many sided because of the application of plug-in-cards.
- ❑ Extendible to 62 channels.
- ❑ Extensive memory capacity.
- ❑ Every channel can be individually programmed.
- ❑ Extensive series of measuring and recording intervals.
- ❑ Compatible with all IBM compatible PC's.
- ❑ Menu controlled software.
- ❑ On-site checking by using the keys and the display on the front panel.

Configuration of the datalogger using a laptop.

Datalogger extendable to 62 input channels

Sensors

The various sensors, together with a datalogger, can be used to construct a customer specific measuring system.

Precipitation

16.98.47 Aerodynamic synthetic rain gauge

The design of the synthetic rain gauge is such that the disturbing influence of air-currents is reduced to a minimum. The funnel has a surface of 507 cm^2. The output signal, in the form of a switch contact, is recorded by the logger or recorder. Accuracy +/- 1%. Also supplied with integrated datalogger (e+ RAIN set 11.41.21.SA or 11.41.22.SA).

Wind

16.98.31 Wind speed sensor

The wind speed sensor has a measuring range of 0.25 - 75 m/sec and an accuracy of 1% +/- 0.1 m/sec. For every 1.25 m wind passage a signal is given to the datalogger.

16.98.50 Wind speed sensor MM067-IH

This wind speed sensor is specially designed for the wind turbine industry with the aim to obtain a robust and accurate wind measuring system. The sensors measure optically. Measuring range 0.75 - 40 m/sec, resolution 0.04 m, inaccuracy <0.8 m/s (@ 0-30 m/s) <0.5 m/s (@ 3-30 m/s). Heater inside, operating temperature -75 till +80 °C.

16.98.34 Wind direction sensor

Sensor for the registration of the wind direction. The wind vane will respond to wind speeds as low as 0.6 m/sec. The sensor has an accuracy of +/- 0.2° at wind speeds over 5 m/sec.

16.98.51 Wind vane type MM660-IH

Very robust and accurate wind vane with reinforced stainless steel vane shaft. Special design ensures a free movement during frost periods. Measuring range 0-360°, resolution 5.6°, inaccuracy <3.8°, heater inside, operating temperature -75 till +80 °C..

The rain gauge must be positioned horizontal and unobstructed.

Aerodynamic rain gauge (16.98.47)

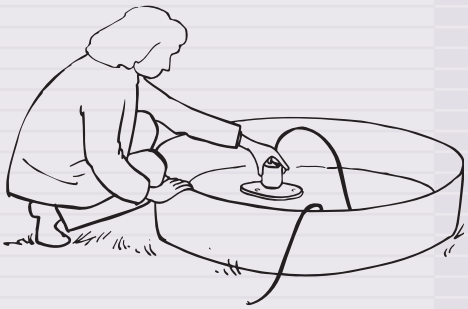
Wind speed sensor (16.98.50)

Wind speed sensor (16.98.31)

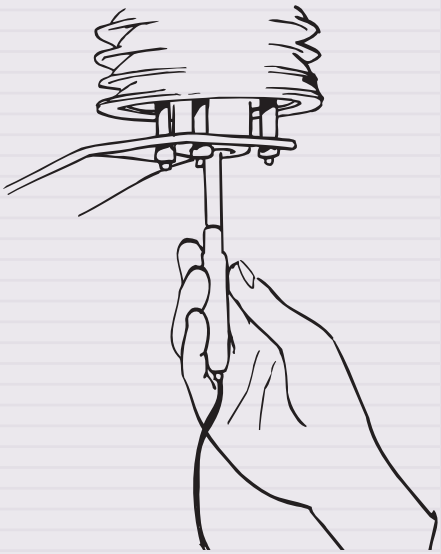
Wind direction sensors (16.98.34 (below) & 16.98.51)

METEO DATALOGGERS & SENSORS

The level sensor is placed in the evaporation pan.



Removing the sensor for periodic calibration.



Air pressure

16.98.29 Air pressure sensor

Air pressure sensor for connection on DL2e datalogger. Measuring range 900 - 1150 hPA, accuracy 1 hPA, power supply 12 Vdc, output signal 0-1 Vdc. Operating temperature -20 till +70 °C.

16.99.29 Air pressure sensor

Air pressure sensor for connection on Datahog 2 datalogger. Measuring range 0 - 1100 hPA, accuracy 1 hPA, power supply 5 Vdc, output signal 0-50 mVdc. Operating temperature -20 till +70 °C.

Evaporation

16.89.08 Level sensor for class A evaporation pan

The level sensor is used for measuring the evaporation using a class A evaporation pan (see also P4.01).The waterproof (IP68) sensor is placed in a stainless steel housing. The level sensor is based on a sensitive pressure transducer and can measure water levels in the range of 55 - 255 mm with an accuracy of 0.03%. The sensor is corrected for ambient atmospheric pressure.

Air temperature and humidity

16.98.41 Air temperature and -humidity sensor

The measuring element consists of a thin polymer film, suitable for high humidity environments. Measuring range 0-100%, accuracy 2%. Measuring range temperature between -40 °C and +60 °C, accuracy +\- 0.2 °C.

16.98.43 Radiation screen

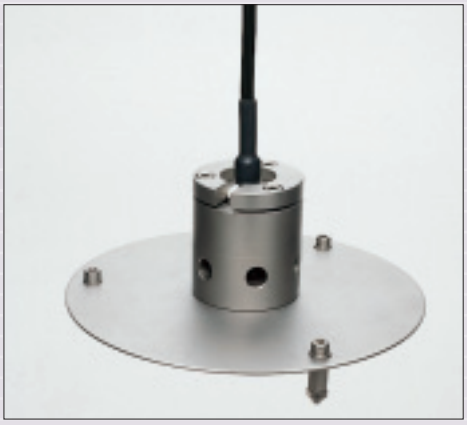
Radiation screen (Young) for air temperature and humidity sensor.

Radiation

16.98.36 and 16.98.37

Sensors for measurement of the global radiation

- Radiation sensor with measuring range 305 - 2800 nm, linearity 2.5%. Output signal in mV.



Level sensor (16.98.08)

Radiation sensor (16.98.36)

Screen with air temperature/humidity sensor (16.98.41 & 16.98.43)

Radiation sensor with mounting foot (16.99.39)

- ❑ Radiation sensor with measuring range 305 - 2800 nm, linearity 1.5%. Output signal in mV.

With two of above mentioned sensors the global and the reflected radiation can be measured.

16.99.35 Radiation sensor, type PAR quantum

Sensor in IP 68 synthetic housing. Measuring range 400 - 700 nm, accuracy better than 5%. Output signal in mV. Maximum response within the PAR measuring band.

16.99.36 Radiation sensor, type PAR 'special'

Sensor in IP 68 synthetic housing. Measuring range 380 - 720 nm, accuracy better than 5%. Output signal in mV. Response very close to the interception by plants.

16.99.39 Radiation sensor

Sensor in IP 65 synthetic housing. Measuring range 530 - 1080 nm, accuracy 5%. Output signal in mV. A mounting foot is available for the 16.99 radiation sensors in synthetic housing.

19.05.01 Tube solarimeter

The tube solarimeter is used for measuring the average global radiation when the surface distribution of the radiation energy is irregular because of shade from leaves. Spectral resonse 0.4 -2.5 µm, sensitivity 15 mV per kW/m^2.

Soil temperature

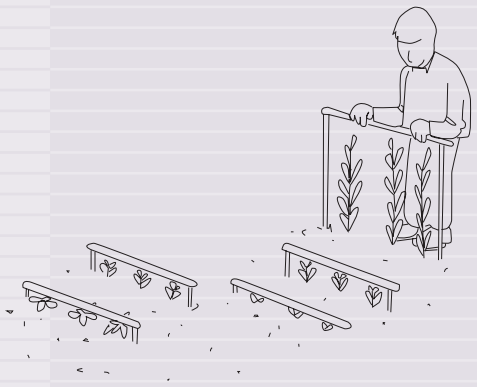
16.98.45 Soil temperature sensor

The waterproof (IP68) soil temperature sensor fitted with a Fenwall thermistor (2250 Ohm at 25 °C) has a measuring range of -40°C till +60 °C. Accuracy 0.2 °C in case of 0-50 °C and 0.2 °C in case of -40 °C till +60 °C.

16.99.20 Soil temperature sensor

The sensor is fitted at the end of a cable (IP67) and is fitted with a Fenwall thermistor (10.000 Ohm at 25 °C) has a measuring range of -20 till 100 °C, accuracy 0.2 °C.

The tube solarimeter is placed at various heights in the crop.



The soil temperature sensors are placed in pre-drilled holes at different depth (after which the borehole is filled in).

Tube solarimeter (19.05.01)

Soil temperature sensor (16.99.20)

Soil moisture sensor (14.26.06)

METEO DATALOGGERS & SENSORS

The saltiphone is positioned at the right height.

Soil moisture

14.26.06 Soil moisture sensor

Sensor for measuring the volume percentage of moisture in the soil. The sensor operates according the Frequency Domain principle. Measuring range 5-55% volume percentage moisture, accuracy approximately 5% with standard calibration and 2% with a soil specific calibration.

14.04.08 Tensior 3 tensiometer

The Tensior 3 has a measuring range of -100 till +700 hPa and an output signal of -10 till +70 mV (+/- 3 mV). Power supply is 10.6 Vdc and the current consumption is 1.3 mA.

14.04.09 Tensior 4 tensiometer

The Tensior 4 has a measuring range of -1000 till + 850 hPa and an output signal of -100 till +85 mV (+/- 3 mV). Power supply is 10.6 Vdc and current consumption 1.3 mA.

14.04.11 Tensior 8 tensiometer

The Tensior 8 has a measuring range of -1000 till +850 hPa, temperature range -30 till +70 °C, power supply 6 Vdc, current consumption 7 mA, external refilling, filling status indicator, temperature sensor and amplifier.

14.22.05 and 14.27.05 Soil moisture blocks

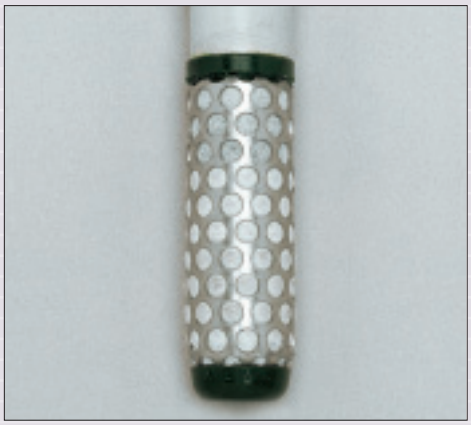
Respectively gypsum and granular matrix blocks (Watermark) can be used to measure the soil moisture tension.

Erosion

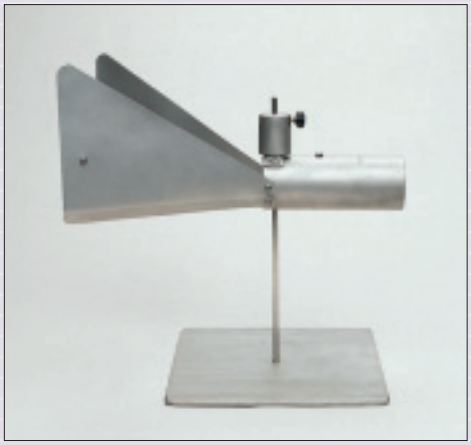
16.98.55 Saltiphone

Sensor for measuring the wind erosion according to the acoustic measuring principle. Dusted grains are counted and the digital output signal is registered by a datalogger. Digital output 0 - 1000 counts/sec. (0-5 V pulse), analogue output 0-1 Vdc, accuracy 5%. Supply 4.8 - 35 Vdc. Current consumption 6 mA. The height of the sensor can be adjusted. Ref. literature: Aeolian environments, sediments and landforms: A.S. Goudie 1999.

Tensiometers Tensior 3 and Tensior 4 (14.04.08 + 14.04.04)



Soilmoisture sensor Watermark (14.27.05)



Saltiphone (16.98.55)

METEO DATALOGGERS & SENSORS

Water level

16.98.25 and 16.98.26 Water level sensors

Water level sensors with ventilated cable. Measuring range 0-500 mbar, 0-5 m water height. Output voltage resp. in 0-1 Vdc and 4-20 mA.

16.99.25 Water level sensor

Water level sensor with ventilated cable. Measuring range 0-500 mbar, 0-5 m water height. Output voltage in 0-17.5 mV (at 5 V power supply).

Solar systems

16.99.50 Solar energy system, 1 W

This unit is supplied for use with the automatic agro-meteostation (art. no 16.99). It incorporates a high grade polycrystalline solar cell array (1W), which is capable of powering an meteostation continuously in almost all parts of the globe, except areas towards the poles in winter.

The unit gives an output of 12 Volts and plugs into the automatic Agro-Meteostation via its RS232 socket which is used for configuring and reading out the automatic agro-meteostation when the solar energy system is connected.

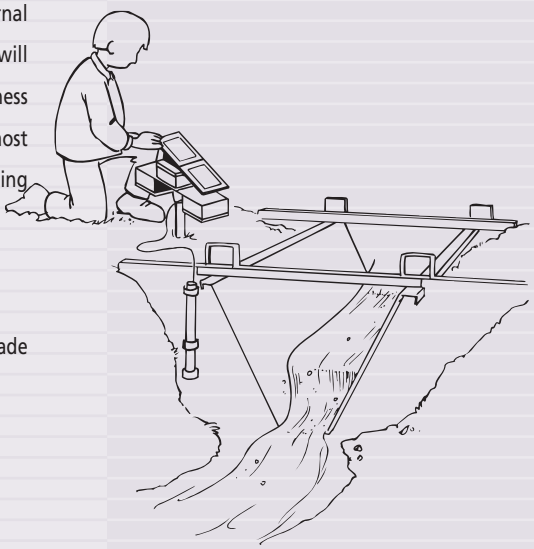
The solar energy system works by charging the batteries that are built into itself when the sun shines, and then using the power stored to supply the automatic agro-meteostation in the dark or on clouded days.

It will charge its batteries when the solar energy level is approximately 80 watts/m^2 or above. The internal rechargeable batteries of the solar energy system will run an automatic agro-meteostation in total darkness for typically 7 weeks (5 weeks at -20 °C) with most types of automatic agro-meteostations and logging times.

16.99.51 Solar energy system, 2 W

Same system as described before with two high grade polycrystalline solar cell arrays (2 W).

The solar energy system can be used e.g. in remote areas to supply the datalogger.



Solar energy system

PARTS LIST

Art.no.	Description	Qty. in set
Meteo data loggers and sensors (P4.30)		
	Automatic measuring stations (agro-meteo-stations) are available in two standard designs: - a meteo station equipped with a 62 channel data logger. - a meteo station equipped with a 8 channel data logger.	
16.98	**Automatic agro-meteo station, 62 channels, for measurement, registration and processing of standard parameters: wind-speed/direction, global radiation, air temperature/ humidity, precipitation and soil temperature. Data logger with internal memory and own power supply**	
**16.98.01	Mast for measuring station. Extendable pole with 2 foldable sensor arms and base plate for radiation sensor. Height 1.90 m, length of arms 0.96 m (each). Complete with foundation pole and guy ropes	1
**16.98.01.01	Sensor arm, foldable type, length 0.96 m. For connection of radiation screen (16.98.43) and relative air humidity and temperature sensor (16.98.41) to the mast	
**16.98.11	Logger housing with radiation shield (lacquered steel housing with white painted aluminium radiation shield). Dimensions (inside) 495x395x175 mm. Complete with mounting brackets and locking keys	1
**21.11.01	Data logger (Delta-T DL2e), standard hardware system, with 30 analogue (15 differential), 2 digital/counter channels 2 relais channels, memory for 64 K measurements, RS 232 connector, incl. batteries and operating instructions (excl. software)	1
**21.11.06	Software for datalogger type Delta-T DL2e, to configure the data logger and to process and display measuring data. Suitable for PC's with Windows 95, 98, ME, NT 4.0 (SP4 or higher) and 2000.	1
**21.11.13	Cable for data logger, no. 21.11.01, RS232/IBM PC, type 9 pins plug, length 2 m	1
**16.98.31	Wind speed sensor A100R (Vector) with calibration certificate, measuring range 0.25 - 75 m/s, accuracy 1% = 0.1 m/s, resolution 1 pulse per 1.25 m wind path, operating temperature range -30 to +55°C, cable length 5 m	1
**16.98.34	Wind vane W200P (Vector), measuring range 0-360° Accuracy +/- 3° at wind speeds higher than 5 m/s, resolution 0.2°, supply voltage 1-20 Vdc, operating temperature range -50 till +70°C. Cable length 3 m.	1
**16.98.36	Radiation sensor (Kipp & Zonen), measuring range 310-2800 nm, linearity 2.5 %, accuracy 5-15 µV/W, m^2, output signal 1 in mV, incl. fixture, possibility of levelling, cable length 5 m	1
**16.98.41	Air temperature and relative humidity sensor, measuring ranges: T = -40 to +60ºC. RH = 0 till 100%, output signal 0-1 VDC, accuracy 2%, cable length 2.5 m	1
**16.98.43	Radiation screen (Young) for air temperature and air humidity sensor	1
**16.98.45	Soil and water temperature sensor, Fenwall thermistor, 2250 Ohm at 25°C. Measuring range -40 till +60°C., accuracy 0.2°C., total range at 10°C. 0.1°C. Dimensions 80x6 mm, cable length 10 m	1
**16.98.47	Rain gauge made from UV resistant plastic, aero-dynamic design, with tipping bucket, 1 pulse per 0.2 mm precipitation, accuracy 1%, surface 507 cm^2, height 34 cm, cable length 5 m without connector, incl. calibration certificate	1
**16.98.94	Connector and chassis part combination (5-poles splash-proof IP65). On 16.98 meteo-station for all sensors that ust be disconnected for transport reasons and/or ease of use	2
**16.98.88	Software to calculate evapotranspiration according to the Makkink/Penman formula. The method is based on the processing of measuring data produced with meteostations (e.g. 16.98 and 16.99)	1
**16.98.61	Toolbag with tools and maintenance material for meteostation	1
**16.98.90.01	Basic set-up of measuring station with Delta-T data-logger with meteo mast: logger configuration, functional and life test,1 composition of logbook. Excl. connection of sensors	1
**16.98.90.02	Connection of various types of sensors to the Delta-T data-logger. Incl. testing and coding, over-voltage protection by sensor cable cover and potential compensation. Per type of sensor	7
16.99	**Automatic Agro-meteostation, 8 channels, for measurement, registration and processing of standard parameters: wind speed/direction, global radiation, air temperature/humidity and precipitation. Data logger with**	

Art.no.	Description	Qty. in set
	internal memory and own power supply	
**16.98.01	Mast for measuring station. Extendable pole with 2 foldable sensor arms and base plate for radiation sensor. Height 1.90 m, 1 length of arms 0.96 m (each). Complete with foundation pole and guy ropes	1
**16.99.15	Datalogger model Datahog 2, with air temperature/relative humidity sensor and 6 input channels. Measurement interval between 10 sec. and 12 hours. Memory 3103 measurements/ channel + date/time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software)	1
**16.99.93	CD-rom with software for data-logger model Datahog 2. To configure the datalogger and to down-load data. Dutch, English and German. Software to be used with Windows 95/98/NT/ME/2000 and XP.	1
**16.99.16	Arm with radiation screen for data logger 16.99.15, adjustable in height, distance from pole to centre of screen 150 mm	1
**16.99.39	Radiation sensor type SKS 1110, measuring range 530-1080 nm, linearity better than 0.2%, accuracy better than 5%, output signal in mV, incl. binder plug, cable length 3 m	1
**16.99.40	Fixture for levelling of a radiation sensor	1
**16.98.31	Wind speed sensor A100R (Vector) with calibration certificate, measuring range 0.25 - 75 m/s, accuracy 1% = 0.1 m/s, resolution 1 pulse per 1.25 m wind path, operating temperature range -30 to +55 °C, cable length 5 m	1
**16.98.34	Wind vane W200P (Vector), measuring range 0-360° Accuracy +/- 3° at wind speeds higher than 5 m/s, resolution 0.2 degr., supply voltage 1-20 Vdc, operating temperature range -50 till +70°C. Cable length 3 m	1
**16.98.47	Rain gauge made from UV resistant plastic, aero-dynamic design, with tipping bucket, 1 pulse per 0.2 mm precipitation, accuracy 1%, surface 507 cm^2, height 34 cm, cable length 5 m without connector, incl. calibration certificate	1
**16.98.88	Software to calculate evapotranspiration according to the Makkink/Penman formula. The method is based on the processing of measuring data produced with meteostations (e.g. 16.98 and 16.99)	1
**16.98.61	Toolbag with tools and maintenance material for meteostation	1
**16.99.90.01	Basic set-up of measuring station with Datahog 2 data-logger with meteo mast: logger configuration, functional and life test, composition of logbook. Excl. connection of sensors	1
**16.99.90.02	Connection of various types of sensors to the Datahog data-logger. Incl. testing and coding. Per type of sensor	4

CUSTOM MADE MEASURING SYSTEMS

In many cases measuring stations are customer specific configured. Based on a checklist for customer specific measuring stations, special stations can be configured by using the following parts:
A) Dataloggers with accessories and software
B) Mast and accessories
C) Sensors and accessories
D) Data communication
E) Solar systems and other power supply units.

A)DATALOGGERS WITH ACCESSORIES

Two types of dataloggers are supplied for the composition of different custom made measuring stations.
- Model Datahog 2 (in different designs with up to max. 8 input channels.
- Model DL2e in basic standard design, but extendable to 62 channels.

Datalogger model Datahog 2 (without built- in air/humidity sensor).

Art.no.	Description
16.99.01	Datalogger model Datahog 2, with 1 input channel. Measuring interval between 10 s and 12 hours. Memory 11001 measurements/channel + date and time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software)
16.99.02	Datalogger model Datahog 2, with 2 input channels. Measuring interval between 10 s and 12 hours. Memory 8068 measurements/channel + date and time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software)
16.99.04	Datalogger model Datahog 2,

Art.no.	Description	Qty. in set
	with 4 input channels. Measuring interval between 10 s and 12 hours. Memory 5261 measurements/channel + date and time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software)	
16.99.08	Datalogger model Datahog 2, with 8 input channels. Measuring interval between 10 s and 12 hours. Memory 3103 measurements/channel + date and time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software) Datalogger model Datahog 2 (with built- in air/humidity sensor).	
16.99.09	Datalogger model Datahog 2, with air temperature/relative humidity sensor. Measuring interval between 10 s and 12 hours. Memory 8068 measurements/channel + date and time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software)	
16.99.11	Datalogger model Datahog 2, with air temperature/relative humidity sensor and 2 input channels. Measuring interval 10 s - 12 hours. Memory 5261 measurements/channel + date and time. Incl. RS232 cable. Power supply: alkaline batteries (without software)	
16.99.15	**Datalogger model Datahog 2, with air temperature/relative humidity sensor and 6 input channels. Measurement interval between 10 sec. and 12 hours. Memory 3103 measurements/ channel + date/time. Incl. RS232 cable. Power supply: alkaline batteries (excl. software).**	
	Accessories for Datahog 2:	
16.99.00.01	Option for Datahog, for power supply of sensors that need more power than acceptable for the standard channels (max. 5 mA/ channel, max. 15 mA/logger). Option to be ordered together with the logger	
16.99.00.02	Datahog2 battery holder and plate for 6 batteries art.no. 99.80.01	
16.99.16	Arm with radiation screen for data logger 16.99.15, adjustable in height, distance from pole to centre of screen 150 mm	
16.99.18.01	Bracket for mounting data-logger (Datahog), solar panel, etc. to mast or wall	
16.99.18.02	Mounting block for bracket	
16.99.93	CD-rom with software for data-logger model Datahog 2. To configure the data logger and to down-load data. Dutch, English and German. Software to be used with Windows 95/98/NT/ME/2000 and XP.	
16.99.94	Connector 5-poles male, splash-proof IP65, to connect a sensor to a datalogger Datahog 2	
16.99.60	Calibration set for air humidity sensor on datalogger type Datahog 2	
	Datalogger model DL2e (basic hardware system)	
21.11.01	**Data logger (Delta-T DL2e), standard hardware system, with 30 analogue (15 differential), 2 digital/ counter channels and 2 relais channels, memory for 64 K measurements, RS 232 connector, incl. batteries and operating instructions (excl. software)**	
21.11.06	Software for datalogger type Delta-T DL2e, to configure the datalogger and to process and display measuring data. Suitable for PC's with Windows 95, 98, ME, NT 4.0 (SP4 or higher) and 2000.	
21.11.13	Cable for data logger, no. 21.11.01, RS232/IBM PC, type 9 pins plug, length 2 m	
	Accessories for DL2e:	
21.11.03	Filling ring terminal compartment. Set consisting of: filling ring terminal compart-ment, sealing, cover without cable inlet an 4xM6x60 knurled screws.	
21.11.15	Power supply cable for connection of an external power supply on the data-logger DL2e	
21.11.21	Delta logger expansion card, for 30 analogue channels (15 differential)	
21.11.22	Delta logger expansion card, for 15 counter channels	
21.11.23	Delta logger expansion card, for 12 channels for 4-wire connections	
21.11.24	Delta logger expansion card for 15 channels alternating current/direct current. Analogue input card for use of Delta logger with soil moisture blocks (14.22.05) and soil moisture sensor Watermark (14.27.05)	
21.11.30	Data logger memory chip, 64 K readings extension (only for DL2e)	
21.11.33	Alternating current power supply for Delta logger for	

Art.no.	Description	Qty. in set
	use with soil moisture blocks (14.22.05) and soil moisture sensor Watermark (14.27.05) (for 60 sensors maximum)	
	B) MAST AND ACCESSORIES (THREE TYPES OF BASIC MASTS):	
16.98.01	Mast for measuring station. Extendable pole with 2 foldable sensor arms and base plate for radiation sensor. Height 1.90 m, length of arms 0.96 m (each). Complete with foundation pole and guy ropes	
16.98.03	Mast for measuring station. Pole with H-frame. For fixed installation of datalogger in the field. Height 1.5 m. Complete with soil anchors set and accessories	
16.98.09	Mast for measuring station. Pole with 2 fixed sensor arms. Height 3.0 m, length of arms 0.5 m (each). Complete with	
16.98.01.01	Sensor arm, foldable type, length 0.96 m. For connection of radiation screen (16.98.43) and relative air humidity and temperature sensor (16.98.41) to the mast	
16.98.01.05	Sensor arm, fixed type, length 0.5 m. For connection of wind speed sensor (16.98.31) or wind direction sensor (16.98.34) to the mast	
	Logger housing (for protection of the data-logger (DL2e in the field).	
16.98.11	Logger housing with radiation shield (lacquered steel housing with white painted aluminium radiation shield). Dimensions (inside) 495x395x175 mm. Complete with mounting brackets and locking keys	
	C) SENSORS AND ACCESSORIES	
	Our delivery program includes a range of standard sensors for measuring various para-meters. Special sensors are available on request.	
	Precipitation	
16.98.47	**Rain gauge made from UV resistant plastic, aero-dynamic design, with tipping bucket, 1 pulse per 0.2 mm precipitation, accuracy 1%, surface 507 cm², height 34 cm, cable length 5 m without connector, incl. calibration certificate**	
16.98.47.01	Mast plate for installation of synthetic rain gauge, bi-partite, leveling possibility, total length 75 cm, pole Ø 33.7 mm, incl. adjustment screws	
16.98.47.11	Service kit for rain gauge 16.98.47, consisting of: sieve, cup and screws for the cap	
16.98.48	Rain gauge OMC 212, for heavy conditions, with tipping bucket, 1 pulse per 0.2 mm precipitation, accuracy 2%, surface 400 cm², height 420 mm, incl. heating element 24 Vdc / 250 mA, temperature range -10 till +60°C, without cable	
16.98.48.01	Power supply for heater of rain gauge OMC-212 (16.98.48). Output voltage 24 Vdc, 250 mA (excl. cable)	
	Wind	
16.98.31	**Wind speed sensor A100R (Vector) with calibration certificate, measuring range 0.25 - 75 m/s, accuracy 1% = 0.1 m/s, resolution 1 pulse per 1.25 m wind path, operating temperature range -30 to +55°C, cable length 5m**	
16.98.34	**Wind vane W200P (Vector), measuring range 0-360° Accuracy +/- 3° at wind speeds higher than 5 m/s,. resolution 0.2°, supply voltage 1-20 Vdc, operating temperature range -50 till +70°C. Cable length 3 m**	
16.98.50	**Wind speed sensor type MM067-IH. Optical measuring principle, measuring range 0.75 - 40 m/s, resolution 0.04 m, inaccuracy <0.8 m/s (@ 0-30 m/s) <0.5 m/s (@ 3-30 m/s). Signal transmission 4 - 20 mA. Heater inside, operating temperature -75 till +80°C. Cable length 5 m.**	
16.98.51	**Wind vane type MM660-IH, measuring range 0-360°, resolution 5.6°, inaccuracy <3.8°, signal transmission 4 - 20 mA. Heater inside, operating temperature -75 till +80°C. Cable length 5 m.**	
	Air pressure	
16.98.29	**Air pressure sensor for connection on Delta logger 16.98. Measuring range 900-1150hPa, accuracy 1hPa, power supply 12 VDC, output signal 0-1 VDC, operating temperature -20 to +70°C. Excl. cable**	

Art.no.	Description	Qty. in set
16.99.29	**Air pressure sensor for connection on Datahog 16.99. Measuring range 0-1100 hPa, accuracy 1 hPa, output signal 0-50 mVdc at 5.0 Vdc supply voltage, operating temperature -20 till +70°C. Incl. binder plug, cable length 1 m**	
16.98.27	Air pressure reference box for compensation of air pressure when connecting water level sensors 16.98.25/26 and 16.99.25, level sensor for evaporation pan (16.89.08) and level sensor RBC-flume 13.17.10/11. Incl. 1 m cable.	
	Evaporation	
16.89.08	**Level sensor to measure the water level in an evaporation pan. Pressure range 0-20 mbar, accuracy 0.25%, output signal 0-20 mA, power supply voltage 8-28 V, cable length 5 m**	
16.98.27	Air pressure reference box for compensation of air pressure when connecting water level sensors 16.98.25/26 and 16.99.25, level sensor for evaporation pan (16.89.08) and level sensor RBC-flume 13.17.10/11. Incl. 1 m cable	
16.89.01	Stainless steel evaporation pan, Ø 1206 mm, height 254 mm (inside)	
16.89.05	Wooden support for evaporation pan	
16.98.88	Software to calculate evapo-transpiration according to the Makkink/Penman formula. The method is based on the processing of measuring data produced with meteo stations (e.g. 16.98 and 16.99)	
	Air temperature and humidity	
16.98.41	**Air temperature and relative humidity sensor, measuring ranges: T = -40 to +60°C. RH = 0 till 100%, output signal 0-1 VDC, accuracy 2%, cable length 2.5 m**	
16.98.43	**Radiation screen (Young) for air temperature and air humidity sensor**	
	Radiation	
16.98.36	**Radiation sensor (Kipp & Zonen), measuring range 310-2800 nm, linearity 2.5 %, accuracy 5-15 µV/W,mÇ, output signal in mV, incl. fixture, possibility of levelling, cable length 5 m. E**	
16.98.37	**Radiation sensor (Kipp & Zonen), measuring range 305-2800 nm, linearity better than 1.5 %, output signal in mV, possibility of levelling, with sun screen, cable length 10 m**	
16.99.35	**Radiation sensor, PAR quantum type, measuring range 400-700 nm, linearity better than 0.2%, accuracy better than 5%, output signal in mV, incl. binder plug, cable length 3 m. The quantum sensor has a maximum response within the PAR waveband**	
16.99.36	**Radiation sensor, PAR special type, measuring range 380-720 nm, linearity better than 0.2%, accuracy better than 5%, output signal in mV, incl. binder plug, cable length 3 m. Response of sensor approaches very well the interception by plants**	
16.99.39	**Radiation sensor type SKS 1110, measuring range 530-1080 nm, linearity better than 0.2%, accuracy better than 5%, output signal in mV, incl. binder plug, cable length 3 m**	
16.99.40	Fixture for levelling of a radiation sensor	
19.05.01	**Tube solarimeter, spectral response 0.4-2.5 micro m, sensitivity 15 mV per kW/m2, compl. with 5 m cable and mounting clips, length 90 cm**	
	Soil temperature	
16.98.45	**Soil and water temperature sensor, Fenwall thermistor, 2250 Ohm at 25°C. Measuring range -40 till +60°C., accuracy 0.2°C., total range at 10°C. 0.1°C. Dimensions 80x6 mm, cable length 10 m.**	
16.99.20	**Soil- and water temperature sensor SKTS200/IE, measuring range -20 till 100°C. Accuracy 0.2°C. Cable length 3 m, incl. binder plug**	

Art.no.	Description	Qty. in set
14.26.06	**Soil moisture (volume percentage)**	
14.26.06.02	Soil moisture sensor Theta-probe without connector. Measuring range 5-55% vol. Accuracy: +/- 5% with standard calibration, +/- 2% with soil specific calibration. With 4 pins, length 60 mm, Ø 3.2 mm. Output signal 0-1 Vdc. Cable length 5 m	
14.04.08/09/11	**Soil moisture (soil suction via tensiometers).**	
14.04.08.02	Tensior 3 for measuring soil moisture tension with electr. pressure transducer, range -100 - +700 hPa, output signal -10 - +70 mV +/- 3 mV, power supply 10.6 Vdc, current consumption 1.3 mA, length 30 cm, M12-connector, calibration cert., silicaflour+rubber disc	
14.04.08.03	Tensior 3 for measuring soil moisture tension with electr. pressure transducer, range -100 - +700 hPa, output signal -10 - +70 mV +/- 3 mV, power supply 10.6 Vdc, current consumption 1.3 mA, length 60 cm, M12-connector, calibration cert., silicaflour+rubber disc	
14.04.09.02	Tensior 4 with built-in pressure transducer for measuring soil moisture tension, range -1000 - +850 hPa, signal –100 - +85 mV, +/- 3 mV, power supply 10.6 Vdc, current co-sumption 1.3 mA, length 30 cm, M12-connector, calibration cert., silicaflour + rubber disc	
14.04.09.03	Tensior 4 with built-in pressure transducer for measuring soil moisture tension, range -1000 - +850 hPa, signal -100 - +85 mV, +/- 3 mV, power supply 10.6 Vdc, current consumption 1.3 mA, length 60 cm, M12 connector, calibration	
14.04.10.02	Tensior 5 minitensiometer with elec. pressure transducer, range -1000 - +850 hPa, output signal -100 - +85 mV +/- 3mV, power supply 10.6 Vdc, current consumption 1.3mA, Ø cup 5 mm, length 70 mm, Ø press. transducer 20 mm, cable 1.5 m (M12-connec.), silica + cert.	
14.04.11.02	Tensior T8 for measuring soil moisture tension, range –1000 till +850 hPa, temperature range -30 till +70 °C, power supply 6 Vdc, current consumption7 mA, external refilling, filling status indicator, temperature sensor and amplifier, length 30 cm, M12/IP67 connector.	
14.04.11.03	Tensior T8 for measuring soil moisture tension, range –1000 - +850 hPa, temperature range -30 till +70 °C, power supply 6 Vdc, current consumption 7 mA, external refilling, filling status indicator, temperature sensor and amplifier, length 60 cm, M12/IP67 connector **Note:** **For the connection of the Tensior tensiometers on a datalogger a special power supply is needed.**	
14.04.08.95	Power supply unit for max. 15 tensiors, battery type, stabilized voltage 10.6 Vdc Soil moisture (by measuring the resistance with soil moisture blocks).	
14.22.05	**Soil moisture block, gypsum, cable length 3.5 m, set of 5 pieces**	
14.27.05	**Soil moisture sensor, granular matrix (Watermark), to measure soil moisture tension. Measuring range 0-200 kPa (=0-200 cbar). Length sensor 80 mm, Ø 22.4 mm. Cable length 1.5 m** **Note:** **For the connection of "resistance blocks" on the DL2e datalogger is a special card and power supply needed.**	
21.11.24	Delta logger expansion card for 15 channels alternating current/ direct current. Analogue input card for use of Delta logger with soil moisture blocks (14.22.05) and soil moisture sensor Watermark (14.27.05)	
21.11.33	Alternating current power supply for Delta logger for use with soil moisture blocks (14.22.05) and soil moisture sensor Watermark (14.27.05) (for 60 sensors maximum)	
	Water level measurement	
16.98.25	**Water level sensor for connection to dataloggers, with ventilated cable, mesuring range 0-500 mbar, 0-5 m water height. Accuracy 0.25% of full scale, output voltage 0-1 Vdc, operating temperature range 0-70°C. Cable length 10 m**	

PARTS LIST

Art.no.	Description	Qty. in set
16.98.26	**Water level sensor for connection to dataloggers, with ventilated cable, measuring range 0-500 mbar, 0-5 m water height. Accuracy 0.25% of full scale, output signal 4-20 mA, operating temperature range 0-70°C. Cable length 10 m.**	
16.99.25	**Water level sensor for connection to data loggers, with ventilated cable, measuring range 0-500 mbar, 0-5 m water height. Accuracy 0.25% of full scale, output voltage 0-17.5 mV (at 5V power supply), operating temperature range 0-70° Cable 10 m**	
16.98.27	Air pressure reference box for compensation of air pressure when connecting water level sensors 16.98.25/26 and 16.99.25, level sensor for evaporation pan (16.89.08) and level sensor RBC-	
	flume 13.17.10/11. Incl. 1 m cable	
	Wind erosion	
16.98.55	**Saltiphone to measure wind erosion, acoustic measuring principle, digital output 0-1000 counts/s (0-5V pulse), analogue output 0-1 Vdc, accuracy 5%, supply 4.8 - 35 Vdc, current consumption 6 mA, height adjustable, with binder lug + mounting base, 7.5m cable**	
	Extension cable + connector for sensors	
16.98.92.10	Extension cable to connect sensors, PUR environmental safe, deficient adhesive out-side cover, tin plated copper wire braiding, 4 cores x 0.25 mm², length 10 m	
16.98.92.25	Extension cable to connect sensors, PUR environmental safe, deficient adhesive out-side cover, tin plated copper wire braiding, 4 cores x 0.25 mm², length 25 m	
16.98.92.50	Extension cable to connect sensors, PUR environmental safe, deficient adhesive out-side cover, tin plated copper wire braiding, 4 cores x 0.25 mm², length 50 m.	
16.98.94	Connector and chassis part combination (5-poles splash-proof IP65). On 16.98 meteo-	

Art.no.	Description	Qty. in set
	station for all sensors that must be disconnected for transport reasons and/or ease of use	
16.99.94	Connector 5-poles male, splash-proof IP65, to connect a sensor to a data logger Datahog 2	
	D) DATA COMMUNICATION	
16.98.75	GSM modem for Delta-T data logger (21.11.01). Incl. connection cable and antenna. Excl. GSM subscription. Customer organizes GSM subscription with order. SIM card and PUC code are mailed to Eijkelkamp for configuration and testing of the modem	
	E) SOLAR SYSTEMS AND OTHER POWER SUPPLY UNITS	
16.99.50	**Solar energy system for meteo stations with a Data-hog, consisting of a solar panel, control unit with batteries. Capacity 12V/1Ah/10W. Batteries are charged when solar radiation >80 W/m2. Totally charged battery gives a power supply for the logger of approx.7 wk.**	
16.99.51	**Solar energy system for meteo station, 2 W**	
16.98.80	External power supply for data-logger 230 V (maximal distance 25 meter)	
16.98.83	External power supply for data-logger 230 V (max. distance 100 m).	
16.98.95	Mains power supply, output voltage 12 Vdc 1.0 A, input 90 Vac to 264 Vac, cable length 1.8 m	
16.98.81	Shielded cable for communication and power supply (12 Volt) between Mainshog and Datahog 2. Price per meter	
16.98.84	Shielded cable for communication and power supply (25 Volt) between Mainshog and signalbooster. Price per meter	
16.98.86	Line drivers for use with Mains Hog power supply. For connection between logger and PC. Maximum distance 5 km. Excl. cable. Set of 2 pcs.	
	Configuration and testing of measuring stations (with and without mast)	
16.98.90.01	Basic set-up of measuring station with Delta-T data-logger with meteo mast: logger configuration, functional and life test,	

Art.no.	Description	Qty. in set
	composition of logbook. Excl. connection of sensors	
16.98.90.02	Connection of various types of sensors to the Delta-T data-logger. Incl. testing and coding, over-voltage protection by sensor cable cover and potential compensation. Per type of sensor	
16.98.90.03	Connection of more sensors (of the same type) to the Delta-T datalogger. Incl. testing and coding, over-voltage protection by sensor cable cover and potential compensation. A piece	
16.98.98	Basic set-up of measuring station with Delta-T data -logger, without meteo mast. Incl. logger configuration, functional- and life test, composition of logbook. Excl. connection of sensors.	
16.99.90.01	Basic set-up of measuring station with Datahog 2 data-logger with meteo mast: logger configuration, functional and life test, composition of logbook. Excl. connection of sensors	
16.99.90.02	Connection of various types of sensors to the Datahog data-logger. Incl. testing and coding. Per type of sensor	
16.99.90.03	Connection of more sensors (of the same type) to the Datahog datalogger. Incl. testing and coding. A piece	
16.99.98	Basic set-up of measuring station with Datahog 2 data-logger without meteo mast. Incl. logger configuration, functional and life test, composition of log book. Excl. connection of sensors.	

Art.no.	Description	Qty. in set