REINHARDT Weather Stations with Microprocessor

| MWS 8 | MWS 9-5 | MWS 3 | MWS 5MV |

- Precise measurements at the physical limits
- High long-time stability
- Big internal data logger (not MWS 3)
- Evaluation electronics / interface in one housing
- Practice-oriented software
- Picture-documented instruction for installation
- Starting-up in 5 minutes without soldering or clamming
- Stationary and portable
- Use all year long with optional heating
- Low current consumption
- High-quality steel or anodised aluminium
- Tested in in-circuit- and function test
- Cycle end test in a climatic chamber
- Own hard- and software development
- Production and calibration at one site

In both technique and quality our products are High-End products, but at medium prices. The MWS-family is the third generation of professional weather stations that we have developed and produced. They are known for their compactness and digital data transfer (RS232, RS422, RS485, USB, WLAN, GSM, TCP/IP), as the measured values are not falsified by losses such as there are in analog transfer or by coupling ins. Unlike other products in the market, the electronics of our products have a burn-in of at least 1 week in a 4 hours cycle between 0° and 50°Celsius. In this way we avoid early defects. The finished units are calibrated in a climatic chamber between -40°Celsius to +65°Celsius in several cycles. In the climatic chamber parameters are simulated. The reference values gained in this way become part of an interpolation table which is used for calibrating the units. The calibration process takes about 2 to 3 days.

Applications:

Environmental measuring stations – weather services – acoustics – Formula1 Team courses – test courses of renowned tyre and car producers – building instrumentation and control – weather data for satellite navigation – military – cable TV – power plants – airports – yachting clubs – hang glider clubs – insurance companies – road service – dumping sites – petrochemical plants – food industry – market gardens – agriculture – schools and universities – research institutes – health resorts – tourist information – professional private use.

In developing the weather stations we considered most of the prescriptions of Deutscher Wetterdienst. The temperature and humidity sensors of MWS 9-5 are double screened. MWS 9-5 works with an electrical axial fan so that there is a quick reaction to changed measured values. Its measured values are even more exact and more current. MWS 5MV has a white coated bladed housing which protects against solar radiation; an electrical axial fan and the gaps between the blades are for ventilation. The weather stations were developed in modern LSI- and microprocessor technology and are temperature-compensated.

Installation

All our weather stations excel in easy installation of hardware and software so that the weather station can be used after 5 to 10 minutes. Even PC amateurs can work very quickly with its easy-to-use and practical menu-driven software. A comprehensive help-function (F1-key) is available for almost every item of the software.

Expansions

The basic versions of the weather stations can be expanded with additional sensors. All sensors and evaluation electronics are within the housings of the weather stations. If sensors are needed in addition to the basic version, our weather stations already come with high-quality sockets. When they are not needed, the sockets are protected against environmental influences by a protective cover. Even several years later, you can order additional sensors in this way. You just plug them into the respective socket and transmit the new sensor parameters via interface (Plug and Play). You will find details on the additional sensors in the table on the last page or in the diagrams. For expansions or further tasks there are free inputs between 0 and 4.095 Volt and an optional frequency measurement (TTL-level) with MWS 9-5. The weather stations offer a networking connection via an RS232 to TCP/IP converter or via Wireless LAN (in free field up to 100 m), also via internet. A GSM-module is available too. The weather data can thus be inquired on a data mobile phone. This option is also used for transmitting the selected weather data by SMS. A subscription function for periodic data scanning is available too. One example of this use is e. g. the inquiry of the weather data of a vacant heliport.
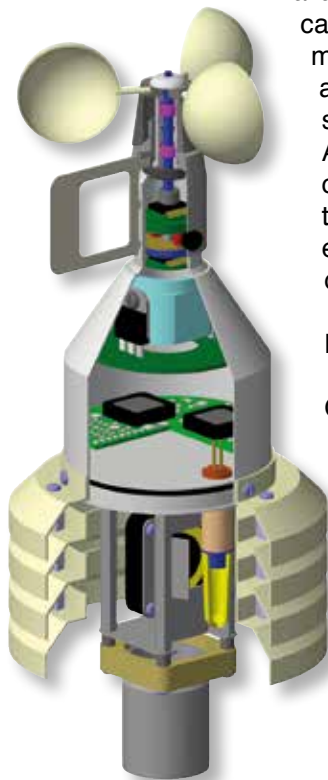
MWS 5MV Sectional Drawing

Datalogger

Our MWS 5MV, MWS 8 and MWS 9-5 weather stations hold a big internal data logger. In this way, the weather stations can be used portably, even without PC, as the data can later be read out at any time. Logging is started by setting a memory interval and the time. If the memory of your data logger is used to full advantage, the oldest record is automatically replaced by a new one. Even when the data
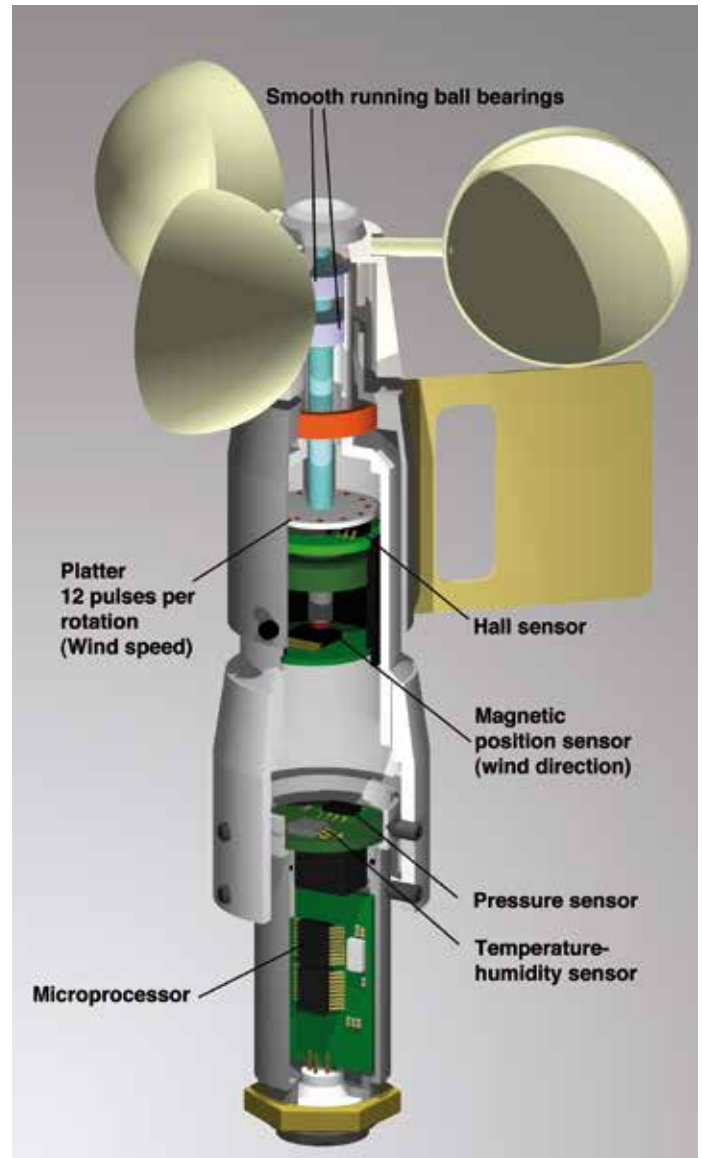
MWS 3, diameter anemometer 120 mm

logger is read out, the data are not deleted and remain in memory. MWS 9-5, MWS 8 and MWS 5MV weather stations are developed in such a way that there is no loss of data, even if the unit is not supplied with power for a longer time (non-volatile EEPROM-storage). In case of power failure, MWS 9-5 even records data non-stop for up to 30 minutes because of its internal accumulator buffer. A "Mini-USV" is available for the other weather stations. The weather stations can e. g. be used portably with a laptop with an RS232- or USB-interface and a RS232-to-USB converter.

Data Format

One feature why our products are so successful is that the sensor identification is continuously transferred together with the measured value. Other systems provide it in the header only. This is why our weather station can easily be integrated
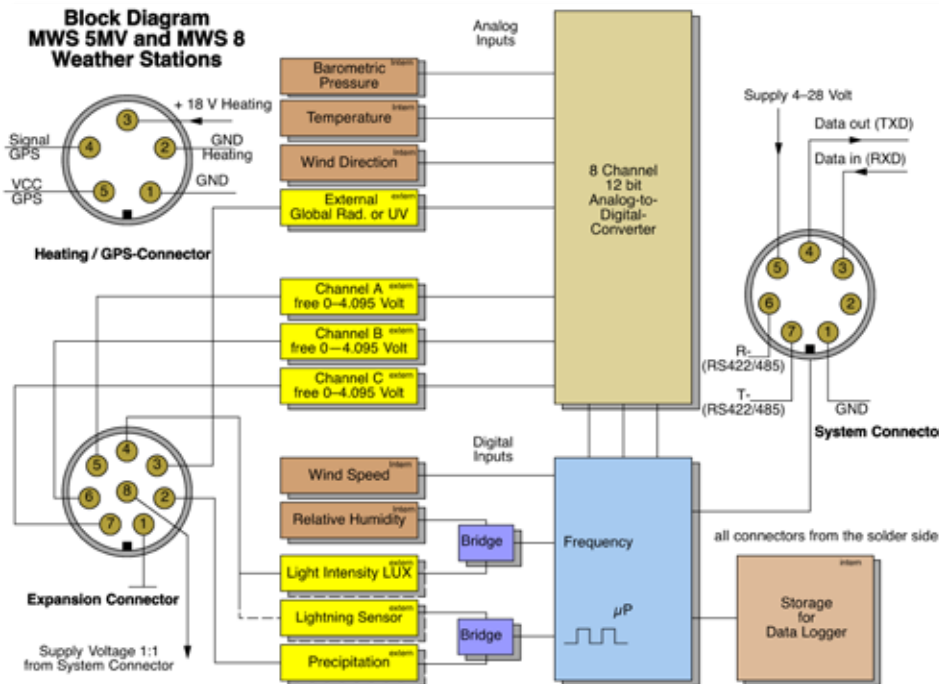
Block Diagram MWS 3 Weather Station
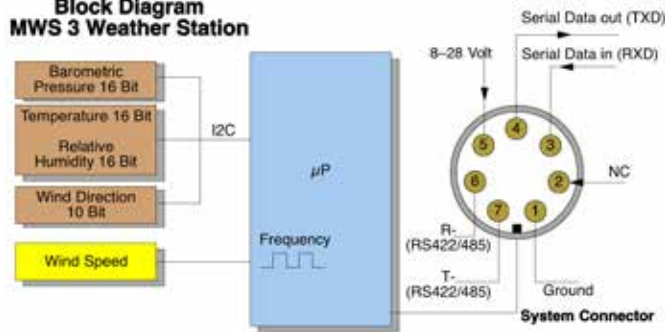
MWS 3
Standard:
- Temperature
- Relative humidity
- Dewpoint
- Barometric pressure
- Wind speed
- Gust speed
- Wind direction WR

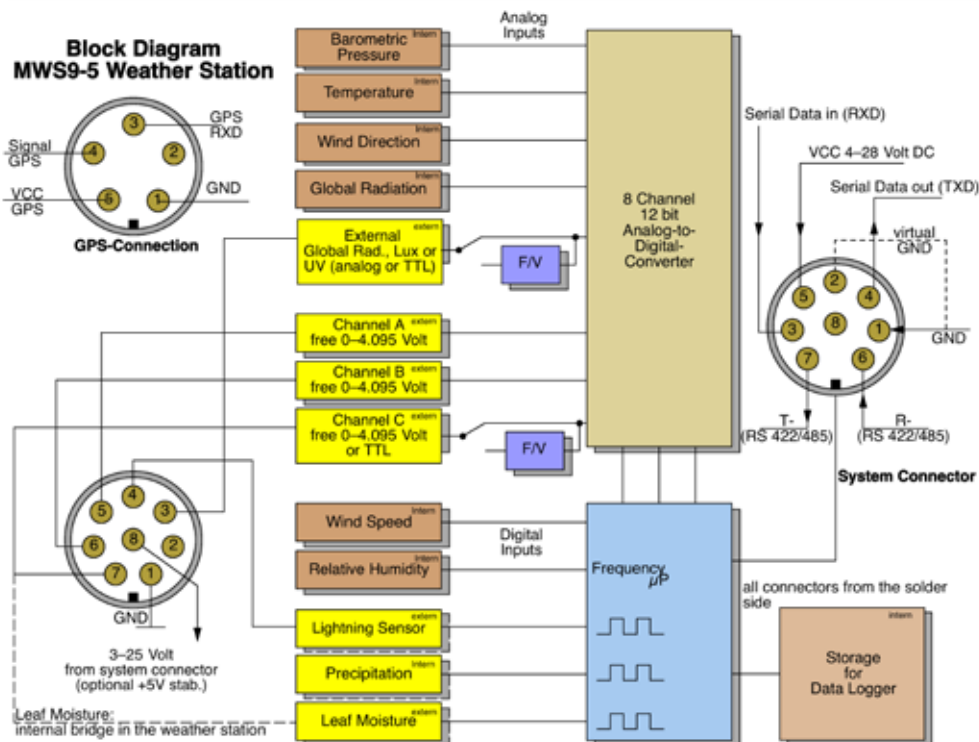**Block Diagram MWS 5MV and MWS 8 Weather Stations**

MWS 5MV and MWS 8
Standard:
- Temperature
- Relative humidity
- Dewpoint
- Barometric pressure
- Wind speed
- Gust speed
- Average wind
- Windchill
- Wind direction WR
- Prevalent wind direction

Optional:
- Global radiation
- Precipitation
- Light intensity (not together with humidity)
- UV-radiation
- Leaf moisture
- GPS
- Heating

Block Diagram MWS9-5 Weather Station

MWS 9-5
Standard:
- Temperature
- Relative humidity
- Dewpoint
- Barometric pressure
- Global radiation
- Precipitation
- Wind speed
- Gust speed
- Windchill calculated
- Wind direction WR
- Prevalent wind direction

Optional:
- Light intensity
- UV-radiation
- Leaf moisture
- GPS
  - Local elevation
  - Local coordinates
  - Greenwich mean time (UTC-time)
- Heating

in complex systems. The measured values are linearised within the weather station and converted into an ASCII-signal which is transmitted via RS232-interface (optionally RS422/485 and USB). A wide variety of options for signal transmission is offered in the market, such as e. g. converters from RS232 to USB, modems or radio transmission with RS232-input. The data transfer rate of the RS232-interface can be set in various baud rates (1200, 2400, 4800, 9600, 19200 and 38400). The signals are processed as standard ASCII-data, separated by comma (E. g.: TE17.7,DR946.9,WR351.6,FE70.8,WG0.0,WS0.0,WD0.0,WC17.7,), to further data processing equipment or PCs.

Information of the optional GPS-mouse are transmitted in NMEA-Standard and integrated in the MWS 5MV, MWS 8 and MWS9-5 data string. Local elevation, local time (UTC), local position and speed above ground are transmitted with the data string. In this way, this information is always stored in the data logger together with the environmental data so that the measured values can always be assigned to a geographical position. This is especially important if the weather station is used portably. The GPS-data are not evaluated by the REINHARDT-software, although it is not possible to integrate them in routing programs via our software.

Special Features of the Weather Stations:

MWS 3

MWS 3 is even smaller, lighter and more compact than MWS 5MV and MWS 9-5. This weather station comes with non-contact sensors and sensors with magnetic sampling for wind speed and wind direction. Power consumption is only 0.18 W.

Mobility Package for MWS 5 and MWS 8

The optional mobility package was developed so that environmental data can be recorded or evaluated on site. The standard package comes with a transport box with a tripod for the weather station and foam cuttings which hold the weather station, the connection cable, the mains supply unit and other accessories.

Graphical Menu

The measured values can be displayed with our standard evaluation and display software under WINDOWS98®, WINDOWS2000®, WINDOWS XP®, WINDOWS VISTA® or WINDOWS 7®. There are three ways of displaying the values: numerically, graphically (XY-curve) and display of wind in a wind rose. The display windows can be sized individually and can be combined as you like. The stored data come in such a way that they can be read in with other software, such as e. g. EXCEL® and can then be worked on

and displayed. A converter is integrated for exporting the stored ASCII-data to the CSV-file (EXCEL®).

With the software, humidity can also be displayed as dew-point. Wind speed is given in the three measured values wind activity, gust speed and average value. All three curves can be shown on one screen. There is also statistical evaluation via software. For all sensors, statistical data such as minimum, maximum, average, tendency) can be faded in. Precipitation, wind speed and global radiation are displayed with activity reports with adjustable threshold values. Global radiation can also be displayed with the total power in W/h, kW/h or MW/h. All parameters can also be displayed in English or American measuring units.
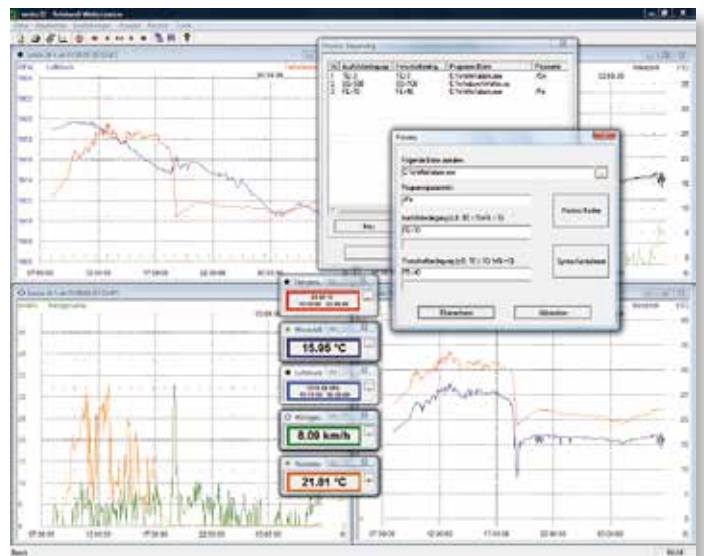
MWS 9-5, MWS 8 and MWS 5MV have their own time and date clock, provided either by the PC or optionally by a GPS-receiver. All measured values (UTC-time) come with a correct time axis and date.
We would recommend to use the weather station with heating (not MWS 3), because then no snow remains on the upper part of the weather station, as it melts at once and no ice forms on the precipitation or the wind sensors.

Control Menu

There is a special software menu where you can set minimum or maximum limit values for every parameter you have measured so that you can control facilities. In case these limit values are exceeded or if they do not come up to the estimate, certain procedures are executed which e. g. address an optional external control board. This control board can e. g. control greenhouses or the venetian blinds of large buildings or petrochemical sites. Depending on the resp. parameter, an e-mail can be sent too.

Software for Calculating the Wind Run

This optional software calculates the wind run and is used for finding the endangered regions in an ecological disaster. With your map in the background, people can be alarmed very fast e. g in case of a poison gas disaster. You can use any maps in JPEG- or Bitmap-format (do not come with the unit!).

Displays

DMMK shows up to 12 parameters simultaneously. Its size is 20 x 30 x 2.8 cm and it is loaded with 7 mm red LEDs so that the display is easily legible even in bright daylight. It is delivered either with foot or for wall mounting.

With the optional **UWDS11-software** you can present the current weather and environmental data on a large-size monitor and enter

DMMK
20 x 30 x 2,8 cm

text or scanned or loaded pictures between the inserts for sales promotion. The analog meteographs with a diameter of 23 cm or 1 m display the weather data with 7 clocks.

HTTP-Server Link

With the latest version of the weather station software you can display the weather data of the weather stations on your homepage

Meteograph 23

Via a PHP-HTTP-interface you can send the data to a MYSQL-database and display them in defined intervals on your homepage. All the available sensors can be selected and visualised in a graph or a table. All the data stored in the MYSQL-database can be processed individually for your own applications. For comprehensive visualisations Web-programming knowledge is required.

Solar Supply

In order to use the weather station independent from mains supply, we offer an optional solar supply with high-quality solar cells, fixture profiles made of anodised aluminium, and a box which is protected against spray water and which holds the Gel battery charger and the control electronics for the solar cell. In order to connect solar panel, battery and electronics box and the connector socket of the weather station, the prepared cables only must be plugged in (Plug and Play). The solar panel is mounted to a 1"-water pipe (This is not part of the unit we deliver).

The optional heating for use all over the year cannot be supplied by our solar supply option.

DFT 485 Temperature-Humidity-Barometric Pressure Sensor

measures ambient temperature from -40 to +60 °C, relative atmospheric humidity from 10 % to 100 %, dewpoint and barometric pressure from 300 to 1,100 hPa. 55 mm high, diameter 35 mm.

DFT 485 Combined Sensor

WGS 485 Micro-Wind Speed Sensor (Anemometer)

The WGS 485 wind speed sensor measures wind speed from 0–150 km/h and gathers average wind and wind peak. It is made of high-quality steel and is based on an anemometer with smooth running ball bearings. No resistance develops in magnetic scanning

WGS 485 Wind Speed Sensor

and therefore no wear. It is 105 mm high, the diameter of the anemometer is 120 mm.

For detailed information on our 485-sensors, additional sensors, please see our brochure "485-Sensors", Sensors" or "Displays".

Technical Data of the Weather Stations	MWS9-5	MWS8	MWS5MV	MWS3
Temperature -40 to +60 °C resolution 0.025 °C tolerance 0.3 °C, MWS 3 0.5 °C	●	●	●	●
Additional temperature sensor in a low radiation housing -40 to +60 °C	○	○	○	–
Ground temperature sensor -35 to +75 °C	○	○	○	–
Humidity 10 % to 100 % rel. humidity resolution 0.025 % (MWS 3 0.01 %) tolerance 2 % RF (MWS 3 2.5 %)	●	●	●	●
Barometric/Absolute pressure 600 to 1,100 hPa tolerance ±0.8 hPa; **MWS 3**: 300 to 1,100 hPa resolution 0.03 hPa, accuracy 1 hPa at 0–50 °C	●	●	●	●
Wind speed Measuring range 0 to response from 0.5 m/s with MWS 5MV, accuracy ±2 km/h, resolution: 0.1 km/h	150 km/h	150 km/h	150 km/h	150 km/h
Windchill Measuring range +50 to -50 °C, MWS 3 calculated	●	●	●	●
Wind direction Response <0.5 m/s or. 1.0 m/s, accuracy ±5.0 °, resolution: 0.1 ° measuring range 0–360 °	●	●	●	●
Global radiation Measuring range 0 to 1,500 W/m² resolution 0.3 W accuracy ±40 W spectral range 0.3 to 2.8 µm	●	○	○	–
Rain / Precipitation resolution 0.1 mm accuracy 0.2 mm collecting area 200 cm² max. intensity: 10 mm/min	●	○	○	–
Heating for use all over the year, 18 VDC, max. 1.3 A	○	○	○	–
Dewpoint calculated -40 °C to +50 °C resolution 0.1 °C tolerance 2.0 °C	●	●	●	●
Light intensity (Lux-Sensor) 0 to 150,000 Lux resolution 50 Lux tolerance 6 %	○	○	○	–
Ultraviolet radiation 0 mW to 15,000 mW resolution 3.6 mW tolerance 10 %, spectral range 320 nm…395 nm	○	○	○	–
Leaf moisture	○	○	○	–
Free analog measuring inputs 0 to 4.095 V, resolution 12 bit	3	3	3	–
Free TTL measuring input 0 to 40,000 Hz resolution 10 Hz tolerance 20 Hz (optional 0….4 kHz)	○	–	–	–
Secure linearised transmission of the measured values via RS232 up to 100 m (RS422 optional up to 1 km), baud rates 1,200, 2,400, 4,800, 9,600 (ASCII) and 19,200, 38,400 (MWS5 MV, MWS 8)	●	●	●	●
RS422-Module for PC (RS422 → RS232)	○	○	○	○
USB-Module	○	○	○	○
Internal clock and data logger: at 10 minutes-interval (Minimum step: 10 seconds)	52 days	41 days	41 days	–
External data logger with clock	–	–	–	–
GPS (Universal time, local coordinates)	○	○	○	–
802.11b/g Wireless LAN Module	○	○	○	○
TCP/IP Module Indoor	○	○	○	○
GSM-Module (Dualband)	○	○	○	○
Comfortable PC-software (Windows® or DOS®)	●	●	●	●
Low current consumption at 18 VDC	120 mA	100 mA	100 mA	10 mA
Solar supply	○	○	○	○
Various displays, digital (LED) and analog (clocks)	○	○	○	○
Power supply and 10 m cabling	●	●	●	○
Mounted on a 1" pipe without thread, optional with external thread (for external diameter about 33.5 mm) or 1"-thread; **MWS 3 thread M18**	●	●	●	–
Weight incl. power pack	2.6 kg	2.8 kg	1.85 kg	0.36 kg
Height	230 mm	283 mm	275 mm	163 mm
Diameter	240 mm	130 mm	125 mm	120 mm

Legend: ● = Series, ○ = Option, – = Not available

*1 Lux-sensor cannot be used with sensors for global radiation and humidity, UV-sensor not with global radiation – For more than one external additional sensor you need the optional collector for connecting additional sensors.

IE & OE Specifications subject to change without prior notice 10/2013