

30 YEARS TURNING INFORMATION  
INTO PROFITS



# Pessl Instruments



## @METOS® Loggers & Sensors

# Pessl Instruments with METOS® started an Industry!

- 1984** Metos® Electronic Disease Predictor for Apple Scab was made
- 1988** New electronics and new design Metos® Classic was born - with built in mini printer and PC Interface.
- 1990** Metos® DAT - DOS Software - Met8 and Met9 was made to have data on DOS PC's linked by cable.
- 1992** Metos® Compact with a PC interface and modem dial in for remote communication was developed.
- 1994** Windows graphic software and new models for disease and irrigation management developed
- 1997** Wireless age started - data transfer via mobile networks using the GSM dial in launched.
- 2000** µMETOS® was developed. This small independent station had its own display and internal disease prediction models.
- 2004** MOST IMPORTANT STEP: METOS® goes online using the Internet only and creates [www.fieldclimate.com](http://www.fieldclimate.com)  
iMetos® was born and GPRS is used to transmit data to the platform automatically and continuously.
- 2006** New software and decision support system for irrigation management are launched. New soil moisture sensors are supported.
- 2009** Pessl Instruments celebrates 25 years and launches the T-monitor for Silo and Grain Storage monitoring.
- 2010** iMETOS® ica, an automatic irrigation controller was developed and irrigation system get automated intelligently via soil moisture readings.
- 2011** iMetos® ECO D2 is launched as low cost powerful logger for soil moisture, frost warning, meter reading and rain.
- 2012** iMetos® goes mobile – APPS for Android and Apple are launched.
- 2013** Pessl Instruments launches the wireless intelligent sensor mesh network - full wireless from the field to the palm in your smart phone. Total control anywhere, anytime in near real time. Pessl launches the CDMA interface for the US market.
- 2014** Pessl buys together with the Pessl Instruments Group company EFOS the majority shares in a US distribution company (Morph20AG). CropVIEW® the high resolution remote crop image monitoring with RECIM technology is launched. Pessl Instruments celebrates 30 years of existence and 10 years [fieldclimate.com](http://fieldclimate.com). Pessl re-launches the legacy brand µMetos® blue with Bluetooth and modern APPS and Internet connectivity.
- 2015** Metos NPK the mobile soil nutrient laboratory is introduced. iMeteoPRO, a complete new concept of localized microclimatic weather forecast, crop and animal management and disease outbreak alerts based on online subscription revolutionizes the market.



**METOS® Compact**



**µMETOS**



**iMETOS®**



**APPS**



## Innovation continues ...

Werksweg 107, 8160 Weiz, Austria | Tel.: ++43(0)3172-5521  
Fax: ++43(0)3172-552123 | e-mail: [sales@metos.at](mailto:sales@metos.at)

**Gottfried J. Pessl**

**Founder and Chief Executive Officer**

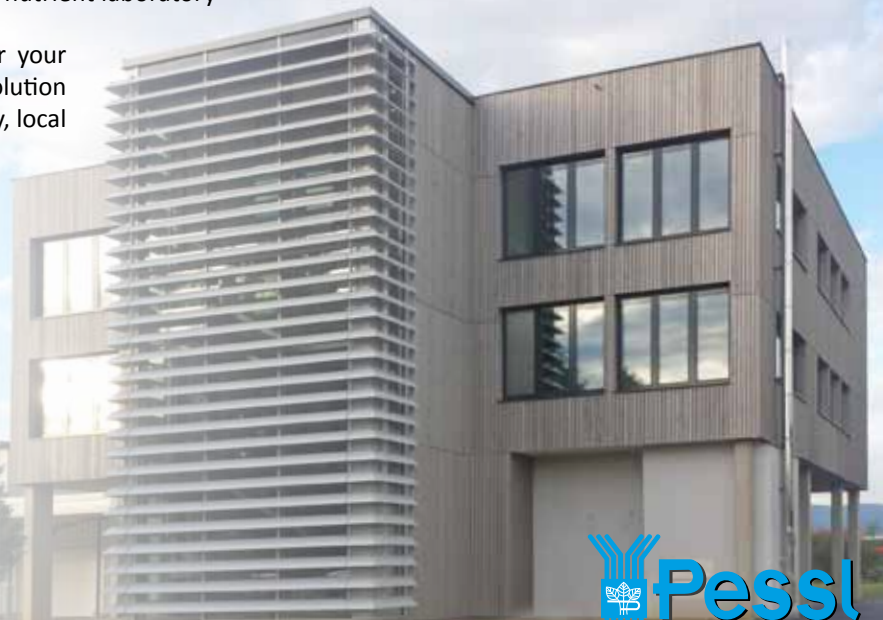
## **Why should you choose Metos®? What makes a Metos® from Pessl Instruments unique?**

The Metos® brand offers the most complete range of wireless solar powered monitoring systems with web based software for informed decision making. This technology is used in various industries and applications since more than 30 years for all climate zones and in almost every corner of the world. Metos® is a global brand which offers most modern technologies for agriculture, research, hydrology, meteorology, flood warning and other industries with local support. The technology is durable, highly precise and supported by our trained global partners worldwide. The Metos® brand lasts longer, performs better, is easier to use and offers you the lowest total cost of ownership.

## **The Metos® brand by Pessl Instruments offers the best solution for your application.**

- AGRICULTURE:** Plant Protection Warning, Irrigation Management, Insect Warning, Frost and Heat Warning, Greenhouse and Irrigation Automation. CropVIEW® High Resolution Remote Crop Image Monitoring (RECIM Technology), iMeteoPRO® – Combined with real microclimatic forecast with infield Rain and Temperature – a subscription based service
- RESEARCH:** Climate Studies, Global Warming, Application Studies, Soil Studies
- METEOROLOGY:** Measurement of all related meteorological parameters for all climate zones.
- HYDROLOGY:** Flood and Drought monitoring, Well and Water Level Monitoring
- WIND AND SOLAR INDUSTRY:** Site Evaluation Studies, Permanent Monitoring
- MOBILE MONITORING ON VEHICLES:** Spray Drift Information, Logistic Information
- STORAGE MONITORING:** Permanent temperature and other related parameters in storage applications.
- AUTOMATION:** iMetos ICA allows full intelligent automation
- SOIL ANALYSES:** iMetos®NPK the mobile soil nutrient laboratory

Look at this catalogue and find the best solution for your monitoring problem. We provide you with a turnkey solution for your complex problem together with highest quality, local support for pre-sale, installation and future expansion.



TURNING INFORMATION INTO PROFITS



# CONTENTS

5 - 15

**DATALOGGERS**

5	Metos AG, SM	10	iMeteoPRO
6	iMetos PRO	11	iMetos NPK
7	iMetos ECO D2	12	iMetos RadioNode
8	iMetos ICA	13	µMetos blue
9	TrapVIEW	14	t-monitor
		15	CropVIEW

16 - 19 ..... **TEMPERATURE SENSORS**

20, 21 ..... **PRECIPITATION**

22 - 29 ..... **LIGHT SENSORS**

30 - 33 ..... **WIND SENSORS**

34 - 35 ..... **PLANT GROWTH SENSORS**

36, 37 ..... **LEAF WETNESS SENSORS**

38 ..... **SNOW DEPTH SENSOR**

39, 40 ..... **SOIL TEMPERATURE SENSORS**

41 - 52 ..... **SOIL MOISTURE SENSORS**

53 - 57 ..... **INTERFACES**

58 ..... **NOISE SENSOR**

59 ..... **BAROMETER**

60, 61 ..... **WATER QUALITY SENSORS**

62 ..... **PRESSURE SWITCH**

63 - 65 ..... **WATER LEVEL SENSORS**

66 ..... **CO<sub>2</sub> SENSOR**

67 ..... **WHERE TO BUY**



**THIS TEAM IS AT  
YOUR SERVICE  
WORLDWIDE!**

iMetos AG, SM

iMETOS

# STATIONS & DATALOGGERS

**IMT50..300**

**SMT50..300**



iMetos AG is our internet based monitoring device for disease prediction and evapotranspiration monitoring. iMetos AG is available in various models. iMetos SM has the same purpose but comes with a soil temperature sensor and supports 6 Watermark sensors.

IMT  
SMT

TNS30

iDEC15

ICA30/60

IM-TR

IMPRO1

OPT12

RFRN09

MMBL020

SMS30S

IMV100

<b>Sensors Layout</b>	3 fixed analog inputs - wind speed, leaf wetness and rain gauge. 5 digital inputs - automatic sensor recognition (no sensor chain support). SMT model supports 6 additional watermark sensors via front panel.
<b>Memory</b>	128KB (approx. 3 days)
<b>Internet Connectivity</b>	GSM - GPRS, EDGE, HSDPA, CDMA
<b>Alarm</b>	SMS, user configurable via website.
<b>Dimensions without sensors</b>	54 cm x 18 cm x 18 cm
<b>Weight without sensors</b>	1.3 kg
<b>Measuring interval</b>	5 minutes
<b>Logging interval</b>	User selectable
<b>Internet contact interval</b>	User selectable
<b>6V, 4.5Ah Battery</b>	Operating range: -35°C to 80°C
<b>Solar panel</b>	Dimensions: 15 x 15 cm, 0.6 watt solar panel

## iMetos PRO

IMT  
SMT

TNS30

iDEC15

ICA30/60

IM-TR

IMPRO1

OPT12

RFRN09

MMBL020

SMS30S

IMV100



### TNS30

iMetos Pro is a very rugged data logger for all climatic conditions and is powered by rechargeable batteries and a solar panel. The data logger has a built-in GPRS modem for direct communication with Pessl Instruments world-renowned fieldclimate technology, and can handle up to 120 sensors, through the intelligent sensor bus system. The system is extremely reliable due to a non-volatile internal memory for more than 1 year of stored data.

<b>Sensors Layout</b>	3 fixed analog inputs - wind speed, leaf wetness and rain gauge. 5 digital inputs - automatic sensor recognition supporting sensor chains (max. 120 sensors).
<b>Memory</b>	4MB, (approx. 180 days)
<b>Internet Connectivity</b>	GSM - GPRS, EDGE, HSDPA, CDMA
<b>Alarm</b>	SMS, user configurable via website
<b>Dimensions without sensors</b>	54 cm x 18 cm x 18 cm
<b>Weight without sensors</b>	1.1 kg
<b>Measuring interval</b>	5 minutes
<b>Logging interval</b>	User selectable
<b>Internet contact interval</b>	User selectable
<b>6V, 4.5Ah Battery</b>	Operating range: -35°C to 80°C
<b>Solar panel</b>	Dimensions: 15 x 15 cm, 0.6 watt solar panel
<b>Part.no. TNS30</b>	iMetos II base unit (no sensors included) Internet based logger, battery 4.5A H, 0.6 watt solar panel, GPRS based, logger, mounting brackets



## iMetos ECO D2

iMETOS

### iDEC15



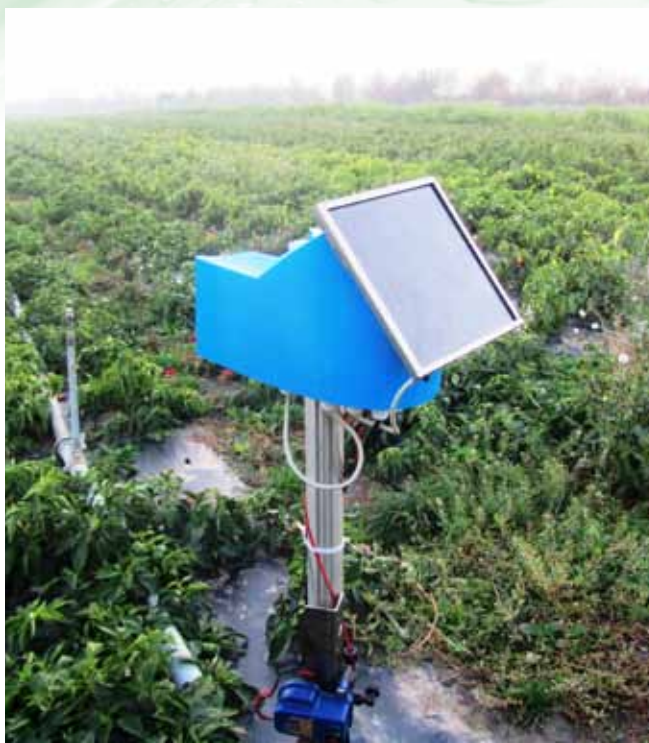
The wireless iMetos ECO D2 is solar and battery powered with rain, water level, temperature, soil moisture, salinity, etc. sensors designed to work in extremely harsh applications and all climate zones. The system has a fully integrated GPRS/EDGE modem for direct communication with Pessl Instruments world-renowned fieldclimate technology, and can handle up to 350 sensors through the intelligent sensor bus system.

- IMT
- SMT
- TNS30
- iDEC15**
- ICA30/60
- IM-TR
- IMPRO1
- OPT12
- RFRN09
- MMBL020
- SMS30S
- IMV100

<b>Sensors Layout</b>	1 rain gauge analog input 1 soil temperature or air temperature analog input 1 RS485 digital input - automatic sensor recognition supporting sensor chains 1 RS485 expansion input – supports 2 optional digital inputs
<b>Memory</b>	2MB flash memory
<b>Internet Connectivity</b>	GSM - GPRS, EDGE, HSDPA, CDMA
<b>Alarm</b>	SMS, user configurable via website
<b>Dimensions without sensors</b>	21 cm L x 16 cm W x 19 cm H
<b>Weight without sensors</b>	2.6 kg
<b>Measuring interval</b>	5 minutes
<b>Logging interval</b>	User selectable
<b>Internet contact interval</b>	User selectable
<b>6V, 4.5Ah Battery</b>	Operating range: -35° C to 80° C
<b>Solar panel</b>	Dimensions: 15 x 15 cm, 0.6 watt solar panel
<b>Part.no. iDEC15</b>	iMetos ECO „D2“ base unit (without sensors), solar charged, with mainboard

## iMetos ICA

IMT  
 SMT  
 TNS30  
 IDEC15  
**ICA30/60**  
 IM-TR  
 IMPRO1  
 OPT12  
 RFRN09  
 MMBL020  
 SMS30S  
 IMV100



### ICA30/60

iMetos® ica 30/60 is a web based controller that uses GSM/GPRS technology to operate remotely the irrigation or automation system of a farm or a residential area. The ICA 30/60 are self contained in an IP65 case, with a rechargeable battery and a solar panel, and can operate three (30) or six (60) DC solenoid valves.

Both systems have the Pessl Instruments chain interface on board, allowing the connection of all sensors supported by this technology (various soil moisture sensors, temperature, dendrometers, waterlevel sensors, water counter, pressure transducers, etc).

ICA has a main switch to interface with most standard time based irrigation controllers (Progres, TORO, Rainbird, Netafim etc.) to start irrigation/fertigation cycles intelligently based on data and plant requirements.

<b>Sensors Layout</b>	1 rain gauge analog input 1 RS485 digital input - automatic sensor recognition supporting sensor chains 3 water meter, 1 pressure detector (ICA30) and 2 pressure detectors (ICA60)
<b>Memory</b>	2 MB/16 MB flash memory
<b>Internet Connectivity</b>	GSM - GPRS, EDGE
<b>Alarm</b>	SMS, user configurable via website
<b>Dimensions without sensors</b>	21 cm L x 16 cm W x 19 cm H
<b>Weight without sensors</b>	2.6 kg
<b>Measuring interval</b>	User selectable
<b>Logging interval</b>	User selectable
<b>Internet contact interval</b>	User selectable
<b>6V, 4.5Ah Battery</b>	Operating range: -35° C to 80° C
<b>Solar panel</b>	Dimensions: 15 x 15 cm, 0.6 watt solar panel
<b>Outputs</b>	3 bi-directional Latch valves(DC) switches for 12 Volt solenoids with pulses of up to 2A on ICA30 6 bi-directional Latch valves (DC) switches for 12 Volt solenoids with pulses of up to 2A on ICA60
<b>Part.no. ICA30</b>	Internet Central Control for 3 DC valve with IP 65 box, 6 volt battery and solar panel
<b>Part.no. ICA60</b>	Internet Central Control for 6 DC valve with IP 65 box, 6 volt battery and solar panel



# TrapVIEW



TrapVIEW is a patented combination of hardware and software solutions for remote monitoring of different agricultural and industrial insects. The TrapVIEW, with its integrated electronics and sticky plate, is light enough to be hung where needed. In the field, the device is self-sufficient, being powered by a solar panel and a battery. Multiple cameras take high-resolution pictures of the sticky plate within the TrapVIEW. Images are sent via GPRS to the TrapVIEW web-platform. These pictures are analyzed with automatic detection of pest with the results visible on web or mobile devices. Control is real-time and data collected can be used for further analysis.

**Catchable pests with TrapVIEW:**

- Apple brown tortrix - *Pandemis heparana*
- Codling moth - *Cydia pomonella*
- Cotton bollworm/Corn earworm - *Helicoverpa armigera*
- Diamondback moth - *Plutella xylostella*
- European corn borer (ECB) - *Ostrinia nubilalis*
- European grape berry moth - *Eupoecilia ambiguella*
- European grapevine moth - *Lobesia botrana*
- Fruit tree tortrix moth - *Archips podana*
- Light brown apple moth - *Epiphyas postvittana*
- Navel orangeworm - *Amyelois transitella*
- Peach moth - *Grapholitha molesta*
- Peach twig borer - *Anarsia lineatella*
- Plum fruit moth - *Cydia funebrana*
- Potato tuber moth - *Phthorimaea operculella*
- Silver Y moth - *Autographa gamma*
- Spotted-wing drosophila (SWD) - *Drosophila suzukii*
- Summer fruit tortrix - *Adoxophyes orana*
- Tomato leafminer - *Tuta absoluta*
- Turnip moth - *Agrotis segetum*



<b>Memory</b>	4 MB
<b>Internet Connectivity</b>	GSM - GPRS, EDGE, HDSPA
<b>GPS receiver</b>	Yes
<b>Dimensions of electronics (without trap housing)</b>	180 cm x 130 cm x 35 cm
<b>Weight</b>	0.93 kg
<b>Internet contact interval</b>	Up to four times per day (usually once a day)
<b>Battery type</b>	Lithium battery
<b>Solar panel</b>	Dimensions: 180x130cm, 7.2 Volt, 333 mA
<b>Camera</b>	4 x 2 megapixel cameras
<b>Part.no. IM-TR</b>	TrapVIEW - Internet based monitoring device, solar panel, rechargeable battery, GPRS Logger, Interface for 1 temp. input (no sensors incl.), 1 year webservice incl., GPS sensor

**iMETOS**

- IMT
- SMT
- TNS30
- iDEC15
- ICA30/60
- IM-TR**
- IMPRO1
- OPT12
- RFRN09
- MMBL020
- SMS30S
- IMV100

## iMeteo PRO

High performance weather forecast combined with measured temperature and rain

- IMT
- SMT
- TNS30
- IDEC15
- ICA30/60
- IM-TR
- IMPRO1**
- OPT12
- RFRN09
- MMBL020
- SMS30S
- IMV100



### IMPRO1

iMeteo®PRO is the optimal integration of measured and forecasted weather data. It combines the past temperature and rainfall data on the location and runs a precise 7-day microclimatic forecast on hourly basis that can be accessed anytime you want via computer or smartphone. One part is a robust solar-powered Weather Station which measures and stores temperature and rainfall on your location, and sends this data in real time via GPRS or CDMA to the Internet. The second part of the iMeteo®PRO platform is the combination the historic measured weather data with the highest accurate forecast data which is automatically calibrated with measured data. iMeteo®PRO provides you a unique platform for the most accurate planning of harvest, planting, cultivation (including disease outbreak alerts), spraying and company logistics on subscription basis.

#### Services:

##### Arable Agriculture

- Conditions for Sugar Beet and Potato Harvest
- Hours to Use Combines in Small Cereals
- Fertilizer and Spraying Possibilities
- NoBlight
- TomCast
- Rust Infection
- Mould Infections in Turf and Cereals

##### Wine and Fruit Producers

- Fertilizer and Spraying Possibilities
- Fruit and Grape Harvest
- NoBlight
- Scab Infection
- Rust Infection
- Powdery Mildew Risk Periods
- Flight of Moths

##### Animal Production

- Dairy Stress
- Poultry Stress
- Hay and Silage Preparation

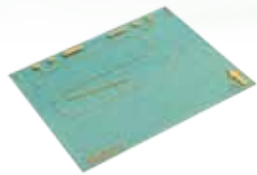
##### Irrigation Farming

- Evapotranspiration corrected with crop factors for next 5 days

<b>Hardware:</b>	Datalogger GPRS/EDGE with 365 days of memory, Solar panel and rechargeable battery, Rain gauge 0,2 mm resolution, Air temperature -30°C to 60°C (precision +/- 0,3°C)
<b>Forecasted data:</b>	Air temperature, Soil temperature, Relative Humidity, Rainfall absolute in 0,2 mm resolution including the probability of the rain, Sunshine duration Cloud cover in three steps (low, middle and high), Wind speed and wind gust, Wind direction, Evapotranspiration in mm (ET Value), Leaf Wetness, Cloud Cover

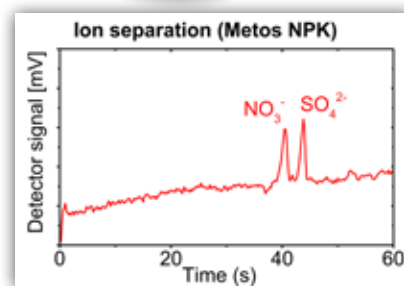
# Metos NPK

## The mobile soil nutrient laboratory



**OPT12**

METOS®NPK is a completely new concept which integrates soil nutrient analyses into a single microchip. After the soil samples are extracted in a traditional way from the field the sample preparation is done right on the field or office. The filtered sample solution is simply injected into a capillary to which a high electric voltage is applied. Many of the solved chemical compounds are electrically charged and therefore start to migrate in the electric field. Every molecule type migrates with an individual speed through the liquid medium, according to its molecule size and charge. The sample ingredients are separating and reach a detector one after another at different migration times as the concentration of each sample compound can be measured individually. This technology also works for on-site measurements in field conditions and can be operated by users without laboratory knowledge. The measurement data is related to GPS coordinates and is sent via telecommunication to our web-cloud ([www.fiedclimate.com](http://www.fiedclimate.com)), where it is saved and can be accessed by several users. The possibility to transfer of the data to machine-readable formats is under development, allowing the automatic site-specific variable rate application with precision farm machinery (e.g. fertilizer spreaders, sprayer etc).



<b>Minimum sample volume:</b>	0,250 ml
<b>Measurement range:</b>	5 – 1000 ppm 0,01 – 0,5 g / kg
<b>Resolution:</b>	0,5 ppm 1 mg / kg
<b>Accuracy:</b>	For measurements of liquid concentrations (ppm): ±10 % For measurements of soil concentrations (mg / kg): ±15 %
<b>Chip life time:</b>	12 hours after braking of the sterile package
<b>Battery capacity:</b>	12 hours measurement time 3 months standby time
<b>Duration of one measurement:</b>	5 minutes

- IMT
- SMT
- TNS30
- iDEC15
- ICA30/60
- IM-TR
- IMPRO1
- OPT12**
- RFRN09
- MMBL020
- SMS30S
- IMV100

**iMETOS**



IMT  
 SMT  
 TNS30  
 IDEC15  
 ICA30/60  
 IM-TR  
 IMPRO1  
 OPT12  
**RFRN09**  
 MMBL020  
 SMS30S  
 IMV100



## RFRN09

iMetos®RadioNode is a small, wireless, battery powered datalogger for in-field measurement of soil moisture, temperatures, rain, flow rate, leaf wetness, relative humidity and other parameters. iMetos®RadioNode sends all sensor readings in real time through an interactive mesh network back to our base station. From the base station the data is uploaded to the web via cellular network (GPRS, Edge, UMTS, CDMA). With your username and password data is made available via Pessl Instruments legendary [www.fieldclimate.com](http://www.fieldclimate.com) platform. Data access is given in an intuitive way via Internet enabled PC or smart phone. The mobile APPS with smart phones (Android, IOS) are completing the product. In case of risk situations (frost, irrigation needs etc.) user can get real time automatic alerts and warnings via SMS. To operate iMetos®RadioNode the iMetos 3.3. hardware with RF Access Point (Art.No. RFAP10) is needed.

<b>HOUSING:</b>	UV resistant housing polycarbonate plastic (Protection class IP67)
<b>DIMENSIONS – HEIGHT - WIDE:</b>	21 cm L X 16 cm W X 19 W WEIGHT: 455 gram (without sensors)
<b>POWER SUPPLY:</b>	One 3.6V Lithium Primary Cell with 19.000mAH (7 years operation)
<b>MODEL/TYPE:</b>	Texas Instruments RF CC1120 module with integrated ultra low power sub-GHz transceiver module; integrated crystal, internal voltage regulator, build in antenna global using free ISM bands 2.4 GHz, 868 MHz (SRD band) USA, Canada, Australia, Israel 915MHz Asia, Europe: 433 MHz
<b>Expected range:</b>	300 to 400 meter (1200 to 1400 ft.) at +10dBm, broad line of sight, when mounted on level ground at least 3 m (10 ft.) high and above crops, grass, brushes or foliage.
<b>Sensors supported:</b>	Pessl Instruments tipping bucket range gauge 0,2mm (0,01 inch) (Art.No. IM523) or read out of flow meters Pessl Instruments pressure switch (Art.No. PS010) or Pessl Instruments leaf wetness sensor (Art.No. IM521CD) 4 soil moisture sensors (Watermarks, Full line of Decagon Sensors) 2 Pessl Instruments Temperature sensors (i.e. Wet and Dry bulb for frost detection Art.No. IM505CD), Air- or Soil temperature (Art.No. IM5042) 1 Hygroclip 2 - Temperature and Relative Humidity (Art.No. A660611)
<b>Part.no. RFRN09</b>	Technical data of sensors can be seen in the catalogue pages

## μMetos blue Datalogger with Bluetooth Interface

### MMBL020



μMetos blue is a battery powered data logger with Bluetooth interface and is powered by lithium primary cells, which will runs the logger for about 7 years. It does not need any infrastructure and mounting in the field is done in minutes. μMetos blue comes with a large memory of about 2 years of data storage and can handle various sensors. Data is permanently measured in 5 minutes interval. Waving a Bluetooth-enabled smartphone (IOS, Android) over the μMetos blue will activate the μMetos blue APP and will pair the unit for download on your mobile device. Data is transmitted to your phone in seconds with device number, GPS position and date of last download. With the μMetos blue APP

an almost unlimited number of μMetos blue stations can be uploaded. You can see the data directly on the mobile phone. Once your smart phone is connected to the internet all the data is synchronized with [www.fieldclimate.com](http://www.fieldclimate.com).

<b>HOUSING:</b>	UV resistant housing polycarbonate plastic (Protection class IP67)
<b>DIMENSIONS – HEIGHT - WIDE:</b>	21 cm L X 16 cm W X 19 W WEIGHT: 455 gram (without sensors)
<b>POWER SUPPLY:</b>	One 3.6V Lithium Primary Cell with 19.000mAH (7 years operation)
<b>MODEL/TYPE:</b>	Processor PIC24 – Bluetooth 3.0
<b>Expected range:</b>	10 - 40 meter
<b>Sensors supported:</b>	Pessl Instruments tipping bucket range gauge 0,2mm (0,01 inch) (Art.No. IM523) or read out of flow meters
	Wind speed (Art.No. IM512CD)
	Solar Radiation (Art.No. IM506D/IM5069D)
	Pessl Instruments pressure switch (Art.No. PS010) or Pessl Instruments leaf wetness sensor (Art.No. IM521CD)
	4 soil moisture sensors (Watermarks, Full line of Decagon Sensors)
	2 Pessl Instruments Temperature sensors (i.e. Wet and Dry bulb for frost detection Art.No. IM505CD), Air- or Soil temperature (Art.No. IM5042)
	1 Hygroclip 2 - Temperature and Relative Humidity (Art.No. A660611)
<b>Part.no. MMBL020</b>	Technical data of sensors can be seen in the catalogue pages

IMT  
SMT

TNS30

iDEC15

ICA30/60

IM-TR

IMPRO1

OPT12

RFRN09

**MMBL020**

SMS30S

IMV100

## t-monitor®

Automatic real time monitoring, process control of storage rooms, silos etc.

IMT  
SMT

TNS30

iDEC15

ICA30/60

IM-TR

IMPRO1

OPT12

RFRN09

MMBL020

**SMS30S**

IMV100



**SMS30S**

The intelligent and innovative approach of the imetos t-monitor allows for installation any time after loading of the store without disruption. Any critical change of temperature or other factors gives a good overview of the whole storage due to flexible and representative mounting of the monitoring system in a cost effective way. Demands on the local infrastructure are minimal and the t-monitor can also work in areas without mains power as the system can function on battery and solar charge. The alarms can be sent to single or multiple store managers by SMS worldwide. This state of the art technical solution allows up to 140 temperature measuring points on different nodes and hubs on one system in combination with early warnings. Apart from the temperature many other parameters can be measured: Inside/Outside temperature and relative humidity, CO<sub>2</sub>, wind speed, rainfall, movement (theft protection) just to name a few.

<b>Sensors Layout</b>	3 fixed analog inputs - wind speed, leaf wetness and rain gauge. 5 digital inputs - automatic sensor recognition supporting sensor chains (max. 120 sensors).
<b>Memory</b>	4MB, (approx. 180 days)
<b>Internet Connectivity</b>	GSM - GPRS, EDGE, HSDPA, CDMA
<b>Alarm</b>	SMS, user configurable via website
<b>Dimensions without sensors</b>	54 cm x 18 cm x 18 cm
<b>Weight without sensors</b>	1.1 kg
<b>Measuring interval</b>	5 minutes
<b>Logging interval</b>	User selectable
<b>Internet contact interval</b>	User selectable
<b>6V, 4.5AH Battery</b>	Operating range: -35°C to 80°C
<b>Solar panel</b>	Dimensions: 15 x 15 cm, 0.6 watt solar panel
<b>Part.no. SMS30S</b>	Silo Monitor "T-monitor" Solar

## CropVIEW®

### Agricultural Field Information System with RECIM® Technology (Remote Crop Image Monitoring) Inside

#### IMV100

CropVIEW® is an agricultural information system, which periodically receives high-resolution photos of farmland, research plots, crop canopies etc. Photos are automatically uploaded, without any further personnel use, on a customized internet platform, thus allowing a steady crop quality and yield control in the agricultural sector. The high resolution picture allows for checking of the germination of seeds or the effect of fertilizers or pesticides or crop development, whether a disease or pest already threatens profitability. An innovative agricultural information system guarantees daily control of the development of your plants and fruits. High-resolution images combined with local weather data like temperature, relative humidity, rainfall, sunshine duration, leaf wetness etc. can be viewed and analysed daily over time without any additional effort. The system operates with rechargeable battery and a solar panel for year round operation in most climatic zones.



- IMT
- SMT
- TNS30
- iDEC15
- ICA30/60
- IM-TR
- IMPRO1
- OPT12
- RFRN09
- MMBL020
- SMS30S
- IMV100**

<b>HOUSING:</b>	Power supply and sensor support box: 60 cm L X 16 cm W X 19 cm H, WEIGHT: 1.455 gram (without sensors)
<b>Camera module:</b>	Stainless steel holder with IP65 box 12 cm L X 5 cm W X 20 cm H, WEIGHT: 430 gram
<b>POWER SUPPLY:</b>	6 Volt lead acid 4.5 AH battery with solar panel
<b>MODEL/TYPE:</b>	Cortex M4 processor module with integrated Communication model for GSM/UMTS/CDMA operation.
<b>CAMERA AND OPTICS:</b>	MT9J003 10 Mega Pixel 2/3" CMOS sensors - Optics DSL377A-650-F2.8 2/3" Lence with 2.5 mm Focal length and DSL901J-650-F3.0 2/3" Lence with 12 mm Focal Length
<b>Optional Weather Sensors supported:</b>	Pessl Instruments tipping bucket range gauge 0,2mm (0,01 inch) (Art.No. IM523) Pessl Instruments Pessl Instruments leaf wetness sensor (Art.No. IM521CD) Pessl Instruments Soil temperature (Art.No. IM5042) 1 Hygroclip 2 - Temperature and Relative Humidity (Art.No. A660611)
	Technical data of sensors can be seen in the catalogue pages

## Relative Humidity and Air Temperature

**A660611**  
**IM5042**  
**IM505CD**  
**IRTEMP**



**A660611**

Relative humidity, temperature measurement and dew point calculation

- Outstanding accuracy and repeatability
- Integrated data acquisition and calibration history

Humidity sensor	ROTRONIC Hygromer® IN-1
Temperature sensor	Pt100 1/3 Class B
Accuracy with Standard adjustment profile	at 23°C and 10, 35, 80 %rh ± 0.8%rh / ± 0.1 K
Accuracy with High Precision adjustment profile	at 23 °C and 10, 20, 30, 40, 50, 60, 70, 80, 90 % rh ± 0.5%rh/ 0.1 K
Resolution, AirChip3000	Typically 0.02 %rh, 0.01 K
Long-term stability	< 1 %rh, 0.1°C / year
Humidity response time t <sub>63</sub>	3...12 seconds (depending on probe type)
Measurement range	0...100 %rh, -100...200 °C (depending on probe type)
Electronics operating range	-50...100°C and 0...100 %rh
Analog output signals (standard, user scalable)	0...1 V = 0...100 %rh 0...1 V = -40...60°C
PC interface UART (standard)	with ROTRONIC interface cable HW4 compliant
Sensor	Yes (programmable, factory default = off)
Alarm function	Yes, analog & digital, programmable
Audit Trail & Electronic Records	FDA 21CFR Part 11 and GAMP compliant
Power supply & consumption	3.2...5 VDC ±0 % / typically 4 mA
Housing/probe material	Polycarbonate or stainless steel(depends on probe type)
Filter	Polyethylene insert, polycarbonate cage
Standards	CE-compliant 2007/108/EG
Part.no. A660611	RH & Temperature Hygroclip S3 with holder and convection cap
Part.no. A660610	RH & Temperature Hygroclip S3 without holder and convection cap
Part.no. A660915	RH & Temperature replacement sensor (sensor head only)
Part.no. A660920	Chain RH & Temperature Hygroclip S3 with holder and convection cap



## Single Air Temperature Dual purpose soil and air temperature sensor

**IM5042**  
**IM5021D**

The dual purpose soil temperature and air temperature sensor is designed to be used for measuring the soil temperature for seeding and later to be used for air temperature inside the convection cap. The sensor is designed to be inserted under all soil conditions and depth without breaking preventing a temperature bridge and offers multiple use as simple, economic and practical solution for arable farmers.



Precise measurement of Air Temperature in naturally ventilated radiation shield. (IM5021D)

<b>Sensor</b>	SMT160-30
<b>Supply voltage</b>	4.57 - 7 V
<b>Supply current</b>	max. 200 $\mu$ A
<b>Short circuit protection</b>	infinite (within supply voltage range)
<b>Short circuit supply current</b>	max. 40 mA
<b>Operating temp. range</b>	-30 to +99 C
<b>Accuracy</b>	min. 0.3 C (-30 to +99 C)
<b>Calibration error</b>	max. 0.25 C (23 C)
<b>Nonlinearity error</b>	max. 0.2 C
<b>Supply voltage sensitivity</b>	max. 0.1 C/V
<b>Repeatability</b>	max. 0.2 C
<b>Long term drift</b>	max. 0.1 C
<b>Output frequency</b>	1 to 4 kHz
<b>Duty cycle</b>	0.320 (0 C), 0.00470/ C
<b>Evaluation</b>	ANALOGIC
<b>Cable length</b>	5 m
<b>Part.no. IM5042</b>	Soil and air temperature in carbon fiber tube with convection cap
<b>Part.no. IM5021D</b>	Single air temperature sensor with convection cap with 5 meter cable

A660611  
IM5042  
IM505CD  
IRTEMP

**TEMPERATURE**

## Wet & Dry Bulb Temperature

A660611

IM5042

**IM505CD**

IRTEMP


**IM505CD**

The highly reliable and experienced SMT 160-30 is built in a waterproof housing, covered by a cotton tissue and wetted by water. This is the most accurate way to directly determine the dew point.

<b>Sensor</b>	SMT160-30
<b>Supply voltage</b>	4.57 - 7 V
<b>Supply current</b>	max. 200 $\mu$ A
<b>Short circuit protection</b>	infinite (within supply voltage range)
<b>Short circuit supply current</b>	max. 40 mA
<b>Operating temp. range</b>	-30° C to +99° C
<b>Accuracy</b>	min. 0.3° C (-30° C to +99° C)
<b>Calibration error</b>	max. 0.25° C (23° C)
<b>Nonlinearity error</b>	max. 0.2° C
<b>Supply voltage sensitivity</b>	max. 0.1° C/V
<b>Repeatability</b>	max. 0.2° C
<b>Long term drift</b>	max. 0.1° C
<b>Output frequency</b>	1 to 4 kHz
<b>Duty cycle</b>	0.320 (0° C), 0.00470°/C
<b>Evaluation</b>	Analog
<b>Cable length</b>	5 m
<b>Part.no. IM505CD</b>	Single wet & dry bulb temperature
<b>Part.no. IM504CD</b>	Single wet bulb temperature



## IR Temperature

**IRTEMP**



A660611  
IM5042  
IM505CD  
IRTEMP

**TEMPERATURE**

The infrared temperature sensor infers the temperature from a portion of the thermal radiation (black-body radiation) emitted by the object being measured. It is a non-contact temperature measurement from a distance. By knowing the amount of infrared energy emitted by the object and its emissivity, the object's temperature can be determined.

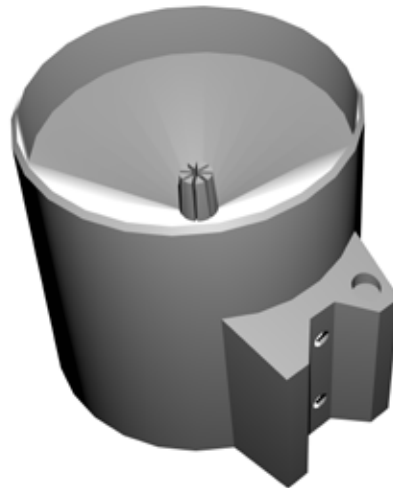
<b>Sensor</b>	Melexis MLX90614-BCC
<b>Resolution</b>	0.1°C
<b>Interface</b>	RS 485 PI Sensor Bus
<b>Size</b>	20 mm (dia) x 24 mm
<b>Sensor housing</b>	Weather resistant PAS
<b>Range</b>	-40°C ... 85°C
<b>Part.no. IRTEMP</b>	Infrared Temperature

## Rain Gauge

IM523

IM5231

LMP02

**IM523**
**IM5231**


The mechanic consists of a small magnet which moves past a metallic switch and open or closes the circuit. The double spoon tips left or right and does not loose any droplet of water due to a very fast switching mechanics. The resolution with a surface of 200 cm<sup>2</sup> is 0,2 mm. The resolution with the 80 cm<sup>2</sup> surface is 0,5 mm.

<b>Sensor Type</b>	Double tipping bucket rain gauge	
<b>Output</b>	Switch signal	
<b>Switch</b>	Reed contact, magnetically operated	
<b>Sensitivity</b>	1 tip per 0.2 mm	1 tip per 0.5 mm
<b>Collector Surface</b>	200 cm <sup>2</sup>	80 cm <sup>2</sup>
<b>Dimensions</b>	185 mm diameter x 250 mm H	
<b>Evaluation</b>	Digital	
<b>Maximum Rain</b>	12 mm/minute	40 mm/minute
<b>Part.no. IM523</b>	Rain gauge for iMetos 0.2 mm resolution	
<b>Part.no. IM523PRO</b>	Rain gauge for iMetos pro with 5 meter cable and holder	
<b>Part.no. HRG01</b>	Heating for rain gauge	

## Lambrecht

### LMP02



Precipitation sensor with Joss-Tognini type weighing tipping bucket.

<b>Meas. principle/ element</b>	weighing tipping bucket system • precision stainless steel bucket acc. to Joss-Tognini
<b>Meas. range/ Resolution</b>	4 cm <sup>3</sup> - (~4 g) volume of tipping bucket - 0.2 mm • 0...16 mm/min
<b>Accuracy</b>	± 2 % with intensity correction
<b>Collecting funnel</b>	200 cm <sup>2</sup> / WMO standard
<b>Ranges of application</b>	unheated varieties: 0...+70 °C metering (frost resistant down to -20 °C)
<b>Pulse output</b>	reed contact · polarity protected · bounce-free signal • supply voltage 4...30 VDC • current consumption max. 100 µA · typical 50 µA • load max. 30 VDC/ 0.5 A
<b>Housing/ Funnel + ring</b>	aluminium · anodized
<b>Dimensions/ Weight</b>	H 292 mm · Ø 190 mm · for mounting pipe Ø 60 mm · approx. 3 kg
<b>Standards</b>	WMO-No. 8 · VDI 3786 lf. 7 · EN 50081/82 · VDE 0100
<b>Part.no. LMP02</b>	Rain gauge Lambrecht - Resolution 0,2mm with 5 meter cable
<b>Part.no. LMP02H</b>	Rain gauge Lambrecht - Resolution 0,2mm with 5 meter cable with heating
<b>Part.no. LMPS24</b>	Power supply for Lambrecht rain gauge heating

IM523  
IM5231  
LMP02

PRECIPITATION

## Pyranometer Sensor

IM506D

IM507D

IM508D

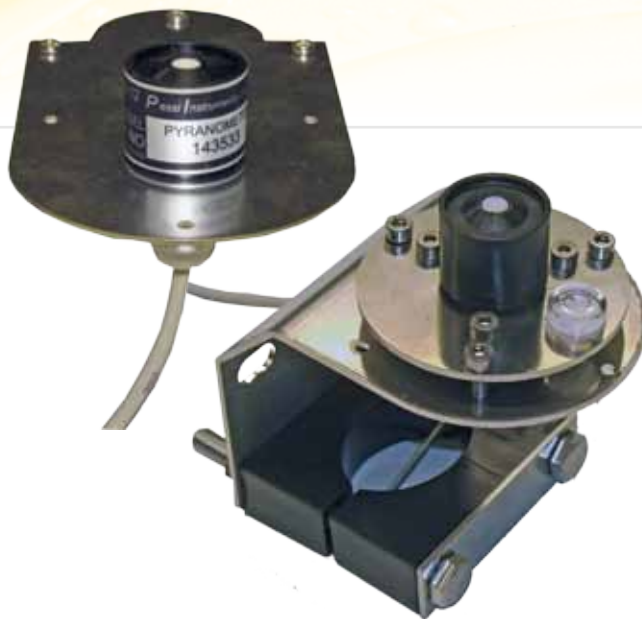
CZ-LITE

CMP3

CMP6

CMA6

LP02


**IM506D**
**IM5069D**

The IM506D Pyranometer is designed for field measurement of global solar radiation in agricultural, meteorological, and solar energy studies. In clear, unobstructed daylight conditions, the Pessl Instruments pyranometer has favourable results compared to the first class thermopile-type pyranometers but is priced at a fraction of the cost.

<b>Sensor</b>	LI-200SZ
<b>Calibration</b>	Calibration against Kipp and Zone CMP3 under daylight. Absolute error max. 5%, typically 3%
<b>Stability</b>	2% drift on 2 years use
<b>Time to measure</b>	10 $\mu$ s
<b>Temperature dependency</b>	0.15% per Centigrade
<b>Cosines correction</b>	Sensor corrects up to 80° degrees
<b>Direction error</b>	1% through 360 degrees at 45°
<b>Working temperature</b>	-20°C to 65°C
<b>Relative Humidity</b>	0 to 100%
<b>Sensor</b>	Photodiode
<b>Housing</b>	Weatherproof PAS case with acrylic diffuser, stainless steel hardware
<b>Size</b>	12.68 cm length x 4.50 cm height
<b>Weight</b>	114g
<b>Evaluation</b>	Pulse Wide Modulation 0-80% = 0-2000 W/m <sup>2</sup>
<b>Spectral range:</b>	300-1100 nm
<b>Part.no. IM506D</b>	Pyranometer (Solarimeter)
<b>Part.no. IM5061D</b>	Pyranometer (Solarimeter) with 5 meter cable
<b>Part.no. IM5069D</b>	Pyranometer (Solarimeter) „HP“ with leveling plate, holder and 5 meter cable

## PAR Quantum SENSOR

IM507D

IM5079D



Photosynthetically Active Radiation (PAR), is typically measured as Photosynthetic Photon Flux Density (PPFD), which has units of quanta (photons) per unit time per unit surface area. The units most commonly used are micromoles of quanta per second per square meter ( $\mu\text{mol s}^{-1} \text{m}^{-2}$ ). Plant scientists, horticulturists, ecologists, and other environmental scientists use MD507D Quantum Sensors to accurately measure this variable.

IM506D

IM507D

IM508D

CZ-LITE

CMP3

CMP6

CMA6

LP02

<b>Sensor</b>	EG&G VACTEC VTB1012B
<b>Calibration</b>	Calibration against LI-190SZ under daylight Absolute difference max. 5%, typical 3%
<b>Linearity</b>	Maximum deviation of 1% up to 3000 W/m <sup>2</sup>
<b>Stability</b>	2% change over a 1 year period
<b>Response Time</b>	150 ms
<b>Temperature dependency</b>	0.15% per Centigrade
<b>Cosine correction</b>	Cosine corrected up to 80 degree of incidence
<b>Azimuth</b>	1% error over 360 degree at 45 degree elevation
<b>Operating specs.</b>	-20°C to 65°C, 0 -100 % rel H.
<b>Housing</b>	Weatherproof PAS case with acrylic diffuser, stainless steel hardware
<b>Size and Weight</b>	3.5 Dia.x 3.5 cm, 15g
<b>Evaluation</b>	PWM: 0 - 80% duty cycle. = 0 – 20 kJ/m <sup>2</sup>
<b>Part.no. IM507D</b>	PAR Quantum Sensor
<b>Part.no. IM5071D</b>	PAR Quantum Sensor with 5 meter cable
<b>Part.no. IM5079D</b>	PAR Quantum Sensor with leveling plate, holder and 5 meter cable

## Lux Meter Sensor

IM506D

IM507D

IM508D

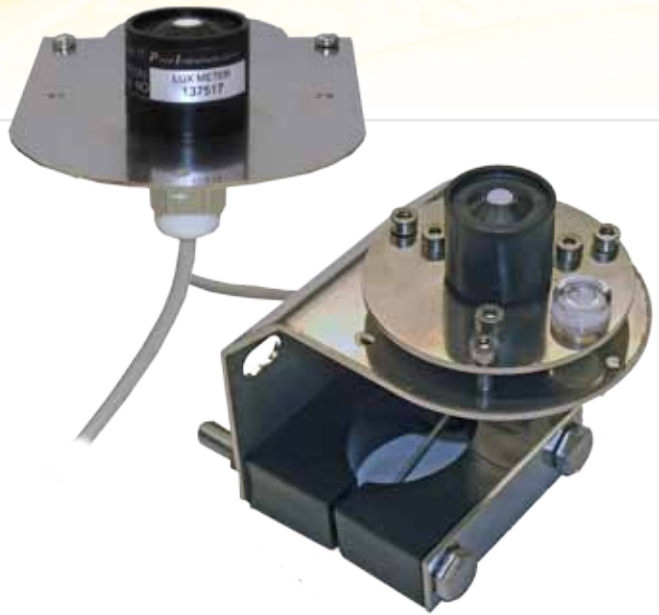
CZ-LITE

CMP3

CMP6

CMA6

LP02


**IM508D**
**IM5089D**

Photometry or Luxmeter IM508D refers to the measurement of visible radiation (light) with a sensor having a spectral responsivity curve equal to the average human eye. The sensor is used to measure lighting conditions where the eye is the primary receiver, such as illumination of work areas, greenhouses, interior lighting etc.

<b>Sensor</b>	VTB 1012 HB
<b>Calibration</b>	Skye SKL 310
<b>Stability</b>	5% drift on 2 years use
<b>Time to measure</b>	250 ms
<b>Temperature dependency</b>	0.15% per Centigrade
<b>Cosines correction</b>	Sensor corrects up 80° degrees
<b>Direction error</b>	1% through 360 degrees at 45°
<b>Working temperature</b>	-20°C to 65°C
<b>Relative Humidity</b>	0 to 100%
<b>Sensor</b>	Photodiode
<b>Housing</b>	Weatherproof PAS case with acrylic diffuser, stainless steel hardware
<b>Size</b>	35 mm diameter, 45 mm height
<b>Weight</b>	114g
<b>Evaluation</b>	Pulse wide modulation Output 8.18% pulse wide at 0 Lux 91.82% pulse wide at 80 000 Lux
<b>Spectral range:</b>	330-730nm, Peak at 580 nm Par Quantum
<b>Part.no. IM508D</b>	LUX or Photopic Sensor
<b>Part.no. IM5081D</b>	LUX or Photopic Sensor with 5 meter cable
<b>Part.no. IM5089D</b>	LUX or Photopic Sensor with leveling plate, holder and 5 meter cable



## Kipp & Zonen SP Lite2 Pyranometer

### CZ-LITE



SP Lite2 is designed for routine measurement of solar radiation. SP Lite2 can be used under all weather conditions. The sensor measures the solar energy received from the entire hemisphere. It is ideal for measuring available energy for use in solar energy applications, plant growth, thermal convection and evapotranspiration.

<b>Response time (95 %)</b>	< 500 ns
<b>Non-stability (change/year)</b>	< 2 %
<b>Non-linearity (0 to 1000 W/m<sup>2</sup>)</b>	< 1 %
<b>Directional error (up to 80 ° with 1000 W/m<sup>2</sup> beam)</b>	< 10 W/m <sup>2</sup>
<b>Temperature dependence (-30°C to +70°C)</b>	- 0.15 %/°C
<b>Sensitivity</b>	60 to 100 μV/W/m <sup>2</sup>
<b>Impedance</b>	50 Ω
<b>Operating temperature</b>	-30°C to +70°C
<b>Spectral range</b>	400 to 1100 nm
<b>Typical signal output for atmospheric applications</b>	0 to 100 mV
<b>Maximum irradiance</b>	2000 W/m <sup>2</sup>
<b>Detector</b>	Silicon photo-diode
<b>Part.no. CZ-LITE</b>	Kipp & Zonen Pyranometer „LITE“ with holder and 5 meter cable

LIGHT

IM506D

IM507D

IM508D

CZ-LITE

CMP3

CMP6

CMA6

LP02

## Kipp & Zonen CMP3 Pyranometer

IM506D  
 IM507D  
 IM508D  
 CZ-LITE  
**CMP3**  
 CMP6  
 CMA6  
 LP02



### CMP3

The CMP 3 pyranometer is an instrument for measuring the solar irradiance. The thermopile sensor construction measures the solar energy that is received from the total solar spectrum and the whole hemisphere (180 degrees field of view). The output is expressed in  $W/m^2$ . The CMP 3 pyranometer is designed for continuous indoor and outdoor use.

<b>ISO 9060:1990 CLASSIFICATION</b>	Second Class
<b>Response time (95 %)</b>	< 18 s
<b>Zero offsets</b>	
<i>(a) thermal radiation (200 <math>W/m^2</math>)</i>	< 15 $W/m^2$
<i>(b) temperature change (5 K/hr)</i>	< 5 $W/m^2$
<b>Non-stability (change/year)</b>	< 1 %
<b>Non-linearity (0 to 1000 <math>W/m^2</math>)</b>	< 1 %
<b>Directional error (up to 80 ° with 1000 <math>W/m^2</math> beam)</b>	< 20 $W/m^2$
<b>Temperature dependence of sensitivity</b>	< 5 % (-10 °C to +40 °C)
<b>Tilt error (at 1000 <math>W/m^2</math>)</b>	< 1 %
<b>Sensitivity</b>	5 to 20 $\mu V/W/m^2$
<b>Impedance</b>	20 to 200 $\Omega$
<b>Level accuracy</b>	1°
<b>Operating temperature</b>	-40°C to +80°C
<b>Spectral range (50 % points)</b>	300 to 2800 nm
<b>Typical signal output for atmospheric applications</b>	0 to 20 mV
<b>Maximum irradiance</b>	2000 $W/m^2$
<b>Part.no. CMP3</b>	Kipp & Zonen Pyranometer with holder and 5 m cable

## Kipp & Zonen CMP6 Pyranometer

### CMP6

The CMP 6 pyranometer is intended for routine global solar radiation measurement research on a plane/level surface. Fully compliant with ISO 9060:1990 specification for a First Class pyranometer, the CMP 6 features a sixty-four thermocouple junction (series connected) sensing element. The sensing element is coated with a highly stable carbon based non organic coating, which delivers excellent spectral absorption and long term stability characteristics. Reliable all weather performance.



IM506D

IM507D

IM508D

CZ-LITE

CMP3

CMP6

CMA6

LP02

LIGHT

<b>ISO 9060:1990 CLASSIFICATION</b>	Second Class
<b>Response time (95 %)</b>	< 18 s
<b>Zero offsets</b> (a) thermal radiation (200 W/m <sup>2</sup> ) (b) temperature change (5 K/hr)	< 15 W/m <sup>2</sup> < 5 W/m <sup>2</sup>
<b>Non-stability (change/year)</b>	< 1 %
<b>Non-linearity (0 to 1000 W/m<sup>2</sup>)</b>	< 1 %
<b>Directional error (up to 80° with 1000 W/m<sup>2</sup> beam)</b>	< 20 W/m <sup>2</sup>
<b>Temperature dependence of sensitivity</b>	< 5 % (-10°C to +40°C)
<b>Tilt error (at 1000 W/m<sup>2</sup>)</b>	< 1 %
<b>Sensitivity</b>	5 to 20 μV/W/m <sup>2</sup>
<b>Impedance</b>	20 to 200 Ω
<b>Level accuracy</b>	1°
<b>Operating temperature</b>	-40°C to +80°C
<b>Spectral range (50 % points)</b>	300 to 2800 nm
<b>Typical signal output for atmospheric applications</b>	0 to 20 mV
<b>Maximum irradiance</b>	2000 W/m <sup>2</sup>
<b>Part.no. CMP6</b>	Kipp & Zonen Pyranometer with holder and 5 m cable

## Kipp & Zonen CMA6 Albedometer

IM506D

IM507D

IM508D

CZ-LITE

CMP3

CMP6

**CMA6**

LP02



### CMA6

The CMA albedometers are double pyranometers that measure both global and reflected solar irradiance in one instrument. CMA albedometers are suitable for measuring global radiation and/or albedo over many differing types of surface. The upper pyranometer measures incoming global solar radiation and the lower sensor measures solar radiation reflected from the surface below. CMA 6 is constructed around two CMP 6 pyranometer sensors.

<b>ISO 9060:1990 CLASSIFICATION</b>	First Class
<b>Response time (95 %)</b>	< 18 s
<b>Zero offsets</b> (a) thermal radiation (200 W/m <sup>2</sup> ) (b) temperature change (5 K/hr)	< 12 W/m <sup>2</sup> < 4 W/m <sup>2</sup>
<b>Non-stability (change/year)</b>	< 1 %
<b>Non-linearity (0 to 1000 W/m<sup>2</sup>)</b>	< 1 %
<b>Directional error (up to 80 ° with 1000 W/m<sup>2</sup> beam)</b>	< 20 W/m <sup>2</sup>
<b>Temperature dependence of sensitivity</b>	< 4 % (-10°C to +40°C)
<b>Tilt error (at 1000 W/m<sup>2</sup>)</b>	< 1 %
<b>Sensitivity</b>	5 to 20 μV/W/m <sup>2</sup>
<b>Impedance</b>	20 to 200 Ω
<b>Level accuracy</b>	0.1°
<b>Operating temperature</b>	-40°C to +80°C
<b>Spectral range (50 % points)</b>	285 to 2800 nm
<b>Typical signal output for atmospheric applications</b>	0 to 20 mV
<b>Maximum irradiance</b>	2000 W/m <sup>2</sup>
<b>Part.no. CMA6</b>	Kipp & Zonen CMA6 Albedometer with holder and 5 m cable



## Hukseflux LP02 Heat Flux Plate/Heat Flux Sensor

LIGHT

LP02



- IM506D
- IM507D
- IM508D
- CZ-LITE
- CMP3
- CMP6
- CMA6
- LP02

LP02 serves to measure the heat that flows through the object on which it is incorporated or in which it is mounted. The actual sensor in HFP01 is a thermopile. This thermopile measures the differential temperature across the ceramics-plastic composite body of LP02. Working completely passively, LP02 generates a small output voltage proportional to the local heat flux.

<b>Sensitivity (nominal):</b>	50 $\mu\text{V}/\text{Wm}^2$
<b>Temperature range:</b>	-30°C to +70°C
<b>Sensor thermal resistance:</b>	< 6.25 $10^{-3} \text{ Km}^2/\text{W}$
<b>Range :</b>	+2000 to -2000 $\text{Wm}^2$
<b>Calibration traceability:</b>	NPL, ISO 8302 / ASTM C177
<b>Expected typical accuracy: (12hr totals)</b>	within +5/- 15% in most common soils, within +5/ -5% on walls
<b>Part.no. LP02</b>	Hukseflux soil heat flux sensor with holder

## Wind Direction

IM511CD

IM512CD

05103L

85106  
DS-2

IM511CD



Vane type wind direction sensor for accurate direction measurement in all weather conditions.

<b>IM511CD Wind Sentry Vane (Wind Direction - Azimuth)</b>	
<b>Range</b>	360° mechanical, 352° electrical (8° open)
<b>Sensor</b>	Balanced vane, 16cm turning radius.
<b>Damping Ratio</b>	0.2
<b>Delay Distance</b>	0.5m (1.6ft)
<b>Threshold</b>	1.3m/s (2.9mph) at 10° displacement 1.9m/s (4.2mph) at 5° displacement
<b>Transducer</b>	Precision conductive plastic potentiometer, 10kOhm ±20% resistance 1.0% linearity, life expectancy 50 million revolutions Rated 1 watt at 40°C, 0 watt at 125°C
<b>Transducer Excitation Requirement</b>	Regulated DC Voltage, 15 VDC max
<b>Output</b>	RS 485
<b>Part.no. IM511CD</b>	Digital wind direction sensor
<b>Part.no. IM513CD</b>	Crossarm for wind speed and wind direction sensor



## Wind Speed

# WIND

### IM512CD



Cup type anemometer for low cost and long lasting accurate wind measurements for all types of application.

- IM511CD
- IM512CD
- 05103L
- 85106
- DS-2

<b>IM512CD Wind Sentry Anemometer (Wind Speed)</b>	
<b>Range</b>	0 to 50m/s (112mph), gust survival 60m/s (134mph)
<b>Sensor</b>	12cm diameter cup wheel assembly, 40mm diameter hemispherical cups
<b>Turning Factor</b>	75cm (2.46ft)
<b>Distance Constant (63% recovery)</b>	2.3m (7.5ft)
<b>Threshold</b>	1.1m/s (2.5mph)
<b>Transducer</b>	Stationary Coil, 1300 Ω nominal resistance
<b>Transducer Output</b>	AC sine wave signal induced by rotating magnet on cup wheel shaft. 100mV p-p at 60rpm. 6V p-p at 3600rpm.
<b>Output Frequency</b>	1 cycle per cup wheel revolution. 0.75m/s per Hz.
<b>Part.no. IM512CD</b>	Wind speed sensor

## Wind Monitor

IM511CD

IM512CD

**05103L**

85106

DS-2


**05103L**

The Wind Monitor combines wind speed and wind direction. It is constructed of a four blade helicoid propeller for highly accurate wind speed measurement with integrated wind direction sensor.

<b>Range</b>	
<i>Wind speed</i>	0-100 m/s (224 mph)
<i>Azimuth</i>	360° mechanical, 355° electrical (5° open)
<b>Accuracy</b>	
<i>Wind speed</i>	±0.3 m/s (0.6 mph) or 1% of reading
<i>Wind direction</i>	±3 degrees
<b>Threshold</b>	
<i>Propeller</i>	1.0 m/s (2.2 mph)
<i>Vane</i>	1.1 m/s (2.4 mph)
<b>Dynamic Response</b>	
<i>Propeller distance constant (63% recovery)</i>	2.7 m (8.9 ft)
<i>Vane delay distance (50% recovery)</i>	1.3 m (4.3 ft)
<i>Damping ratio</i>	0.3
<i>Damped natural wavelength</i>	7.4 m (24.3 ft)
<i>Undamped natural wavelength</i>	7.2 m (23.6 ft)
<b>Output</b>	RS 485
<b>Power Requirement</b>	
<b>Potentiometer excitation</b>	15 VDC maximum
<b>Dimensions</b>	
<i>Overall height</i>	37 cm (14.6 in)
<i>Overall length</i>	55 cm (21.7 in)
<i>Propeller</i>	18 cm (7 in) diameter
<i>Mounting</i>	34 mm (1.34 in) diameter (standard 1 inch pipe)
<b>Weight</b>	
<b>Sensor weight</b>	1.0 kg (2.2 lbs)
<b>Part.no. 05103L</b>	RM Young wind monitor (speed/direction) with gust system and LI battery
<b>Part.no. 05103-45</b>	RM Young wind monitor (speed/direction) with gust system and LI battery (alpine version)



## Ultrasonic Wind Sensors



85106

DS-2



Extremely precise and maintenance-free measurement of wind velocity and wind direction. In contrast to traditional „cups and vanes“ the ultrasonic wind sensor is designed without mechanical parts.

- IM511CD
- IM512CD
- 05103L
- 85106**
- DS-2**

Sensor	RM Young 85106 Ultrasonic Anemometer	Ultrasonic Wind Sensor DS-2
<b>Wind speed</b>		
Range:	0-70 m/s (156 mph)	0 to 30 m/s
Resolution:	0.1 m/s	0.01 m/s
Accuracy:		0.30 m/s or < 3%, whichever is larger
0 to 30 m/s	±2% or 0.1m/s	
30 to 70 m/s	±3%	
<b>Wind Direction</b>		
Azimuth Range:	0-360°	0 to 359 degrees
Resolution:	1°	1 degree
Accuracy:	± 2°	±3 degrees
<b>Serial output</b>		
Type	RS-232, RS-485, SDI-12	
Formats	ASCII Text (polled and continuous), RMYT (Wind Tracker), NMEA, SDI-12 (v1.3)	
Baud Rates	1200, 4800, 9600, and 38400 baud	
<b>General</b>		
Output rate:	1 Hz typical (selectable)	average speed, gust speed, direction, or vector, 1 Hz
Power Supply:	9 to 16 VDC, 150 mA max	<b>Excitation Voltage:</b> 3.6 to 15 VDC
Dimensions:	34 cm high x 17 cm wide	<b>Current:</b> 0.03 mA quiescent, 0.5 mA sampling, < 0.05 mA average
Weight:	0.7 kg (1.5 lb)	100 mm x 75 mm
<b>Operating Temperature Range:</b>	-40 to 50 C	-40 to 50 C

## Dendrometer

## Sap Flow Sensor

### DN501

### SF-L

DN501  
SF-L



Dendrometers are sensors for continuous measurement of plant growth (changes of the plant diameter).

The dendrometer allows us to record the plant parameters using the same time interval, as environmental parameters. The data, therefore, allows the direct assignment of plant responses and stress to environmental influences. Dendrometers are a cost-effective and useful tool for ecophysiological studies.

The well-known Granier sap flow sensor, i.e. thermal dissipation probe (Granier, 1985) uses heat as a tracer of sap flow. Due to its simplicity, reliability and affordability the Granier technique is used all over the world. The SF-L Sap Flow Sensor therefore considerably enhances accuracy and reliability in sap flow measurements through continuous correction of natural temperature gradients of the sapwood. In contrast to the original Granier technique, SF-L sensor provides a very stable and more accurate value between the heated needle and the sapwood ambient temperature.

<b>Suitable for plant size</b>	Diameter 3-30 cm
<b>Range of the sensor</b>	11 mm
<b>Accuracy</b>	$\pm 2 \mu\text{m} \pm 0.12\%$
<b>Resolution</b>	Infinite
<b>Linearity</b>	1%
<b>Thermal expansion coefficient of the sensor</b>	$< 0,1 \mu\text{m}/\text{K}$
<b>Operating conditions</b>	Air temperature: -30 to +40°C, air humidity: 0-100%
<b>Part.no. DN501</b>	Dendromter Interfacebox with IP65 box (in addition you have to order the sensor, there are several types – please ask)

<b>Power consumption:</b>	0.2W +/-5% when using the UP power-supply,
<b>Constant current output:</b>	82mA stabilized (ccs2)
<b>Heating resistance:</b>	34.5 Ohm +/-0.4 Ohm
<b>Heating wire:</b>	special material, ultra-thin, completely covered with isolating varnish for smooth surface
<b>Needle-length:</b>	33mm standard, other lengths 10..63mm available on request
<b>Heating-zone:</b>	20mm from top of the needle, needle marked with yellow-band
<b>Sample-size:</b>	the sensors may be used for trees from 70mm diameter on, special sensor-configurations for smaller plants are available
<b>Signal-output:</b>	40 $\mu\text{V}/\text{K}$ between 0..40deg C, copper-constantan thermocouple (Type T) (see Appendix B for details).
<b>Needle-distance:</b>	up to 15cm, vary distance dependend on type of plant/tree, check with calibration if standard calculation is suitable for your measurements
<b>Powersupply CCS2:</b>	Uv = 12V-18Vdc, < 90mA total, robust IP68 alu-housing sup plies 82mA for sensor line, 2.9 V Voltage drop over each sensors, thus maximum 3 sensors when supplied with 12V batteries

## Leaf Temperature

### IM522CD



IM522CD is a highly accurate temperature sensor. It measures the radiated temperature around the surface of a leaf or a canopy.

IM522CD

IM521CD

LWN530

<b>Sensor</b>	SMT160-30
<b>Supply voltage</b>	4.57 - 7 V
<b>Supply current</b>	max. 200 $\mu$ A
<b>Short circuit protection</b>	infinite (within supply voltage range)
<b>Short circuit supply current</b>	max. 40 mA
<b>Operating temp. range</b>	-30°C to +99°C
<b>Accuracy</b>	min. 0.3°C (-30°C to +99°C)
<b>Calibration error</b>	max. 0.25°C (23°C)
<b>Nonlinearity error</b>	max. 0.2°C
<b>Supply voltage sensitivity</b>	max. 0.1°C/V
<b>Repeatability</b>	max. 0.2°C
<b>Long term drift</b>	max. 0.1°C
<b>Output frequency</b>	1 to 4 kHz
<b>Duty cycle</b>	0.320 (0° C), 0.00470°/ C
<b>Evaluation</b>	Analog
<b>Cable length</b>	5 m
<b>Part.no. IM522CD</b>	Single leaf temperature sensor

## Leaf Wetness Sensor

IM522CD

IM521CD

LWN530

**IM521CD**

Leaf Wetness works by measuring the conductivity in a filter paper. The filter paper is held between two stainless steel electrodes in a transparent holder. The use of transparent Lucite plastic as a holder reduces warming of the sensor when it is exposed to direct sunlight.

<b>Supply voltage</b>	4.75 - 5.25 V
<b>Supply current</b>	max. 1500 $\mu$ A
<b>Short circuit protection</b>	infinite (within supply voltage range)
<b>Dry / Wet threshold</b>	220 - 390 kohm
<b>Output</b>	dry: max. 0.4 VDC wet: min. VCC-0.4VDC
<b>Dimensions</b>	127 mm x 254 mm x 508 mm
<b>Electronic</b>	Totally plastic encapsulated - SMD
<b>Evaluation</b>	Digital - Threshold detection
<b>Cable length</b>	5 m
<b>Part.no. IM521CD</b>	Leaf wetness sensor with 5 m cable

## Decagon LWS Leaf Wetness Sensor

**LWN530**



IM522CD

IM521CD

LWN530

LEAF

Decagon LWS is designed to detect wetness (presence and duration) and ice formation.

<b>Measurement Time</b>	10 ms (milliseconds)
<b>Sensor Type</b>	Frequency domain
<b>Output</b>	320 - 1000 mV @ 3 V excitation
<b>Operating Environment</b>	-40°C to 50°C
<b>Power</b>	2.5 VDC @ 2 mA, to 5 VDC @ 7 mA
<b>Cable Length</b>	5 m standard; custom cable lengths available
<b>Sensor Dimensions:</b>	11.2 cm x 5.8 cm x .075 cm
<b>EXPECTED LIFETIME:</b>	2 + years of continuous use
<b>Part.no. LWN530</b>	Decagon leaf wetness sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos ECH870EXT / ECH871EXT

## Ultrasonic snow depth sensor


**USH8**

Non-contact measurement of snow-depth in extreme conditions by ultrasonic sensors. The sensor is characterized by its high level of operating reliability, low energy consumption and ease of use in the field.

<b>Measurement range – Snow depth</b>	Measurement range: 0 to 8 m; resolution: 1 mm; accuracy: 0.1 % (FS) Measurement principle / sensor: ultrasonic (frequency 50 kHz; beamwidth 12°)
<b>Measurement range – Temperature</b>	Measurement range: -35 °C to +60 °C; resolution: 0.1 °C; non-linearity: ≤0.15 % Measurement principle / sensor: semiconductor (external sensor in air-cooled radiation shield)
<b>Interface – Analog</b>	Distance / snow level Signal: 0/4 to 20 mA (configurable); resolution: 12 bit; max. load 100 Ω
<b>Interface – Digital</b>	Distance / snow level and air temperature Interface: RS 232; data transmission rate: 1.2 to 19.2 kBd Protocol: various ASCII protocols
<b>Power supply</b>	Supply voltage: 10.5 ... 15 VDC Current consumption: max. 200 mA (Measuring phase about 3 sec); <1 mA (Standby) Power consumption: 0.5 Ah / day (with measuring interval of 1min)
<b>Range of application</b>	Operating temperature: -35°C to +60°C
<b>Protection rating</b>	IP66
<b>Installation</b>	Mast-mounting device for 61 mm (2 ") pipe
<b>Part.no. USH8</b>	Ultrasonic snow depth sensor

## Soil Temperature

### IM5041D



The Soil Temperature Sensor is a SMT 160-30 in a waterproof stainless steel housing. The sensor output is a duty-cycle signal.

<b>Sensor</b>	SMT160-30
<b>Supply voltage</b>	4.57 - 7 V
<b>Supply current</b>	max. 200 $\mu$ A
<b>Short circuit protection</b>	infinite (within supply voltage range)
<b>Short circuit supply current</b>	max. 40 mA
<b>Operating temp. range</b>	-30°C to +99°C
<b>Accuracy</b>	min. 0.3°C (-30°C to +99°C)
<b>Calibration error</b>	max. 0.25°C (23°C)
<b>Nonlinearity error</b>	max. 0.2°C
<b>Supply voltage sensitivity</b>	max. 0.1°C/V
<b>Repeatability</b>	max. 0.2°C
<b>Long term drift</b>	max. 0.1°C
<b>Output frequency</b>	1 to 4 kHz
<b>Duty cycle</b>	0.320 (0°C), 0.00470°/C
<b>Evaluation</b>	Analog
<b>Cable length</b>	5 m
<b>Part.no. IM5041D</b>	Single soil & water temperature with 5 m cable

SOIL

IM5041D

SAR19

ECH500

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

GS3

TNS103..7

AQ600

100SMT

SEN12512

SEN13512

ECH870EXT

ECH871EXT

ECH874EXT

WM-BUS

TNS100

## Multiple Soil Temperature

IM5041D

**SAR19**

ECH-GS1

ECH500

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

GS3

TNS103..7

AQ600

100SMT

SEN12512

SEN13512

ECH870EXT

ECH871EXT

ECH874EXT

WM-BUS

TNS100

**SAR19**
**SAR19M**


SAR19/SAR19M provide soil temperature measurement from several centimeters to 15 meter depth by using the Pessl Instruments sensor BUS. The distance between the sensors can be chosen according to the application. Up to 10 sensors can be attached on one sensor chain.

<b>Temperature Sensor</b>	DS18B20
<b>Operating Temperature Range</b>	-55°C to +125°C
<b>Supply DC Voltage (range)</b>	3 - 5.5 V
<b>Thermometer Error -10°C to +85°C</b>	±0.3°C
<b>Drift</b>	±0.2°C
<b>Data transmission</b>	Rs 485 Digital signal (temperature data sent on demand of iMetos main board) iMetos checks all sensors every 5 minutes
<b>Part.no. SAR19</b>	Single chain soil temperature (1 soil temperature + interface)
<b>Part.no. SAR19M</b>	Additional soil temperature to connect on SAR19 (max. 10 sensors, min. distance in between)





# GS1 Ruggedized Low Cost Volumetric Water Content Sensor

SOIL

**ECH-GS1**



The GS1 is a ruggedized version of our basic, no-frills soil moisture only sensor. It accurately measures volumetric water content in soil or soilless media.

<b>Measurement Time</b>	10 ms (milliseconds)
<b>Accuracy</b>	±0.03 m <sup>3</sup> /m <sup>3</sup> in typical soils, up to 8 dS/m With soil-specific calibration: ±0.01 to 0.02 m <sup>3</sup> /m <sup>3</sup> Resolution: 0.001 m <sup>3</sup> /m <sup>3</sup> VWC in mineral soils
<b>Power Requirements</b>	3.0 VDC to 15 VDC (absolute maximum) @ 15 mA. Output: 1,000 to 2,500 mV
<b>Operating Environment</b>	-40 to 50° C
<b>Range of Measurement</b>	0 to 100% VWC
<b>Sensor Dimensions</b>	8.9 cm x 1.8 cm x 0.7 cm
<b>Cable Length</b>	5 m standard, custom cable lengths available upon request
<b>Part.no. ECH-GS1</b>	GS1Volumetric Water Content Sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos: ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT / ECH874INT

- IM5041D
- SAR19
- ECH-GS1**
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100

## Decagon EC-5 Soil Moisture Sensor



### ECH500

The EC-5 is a basic, reliable and low cost Soil Moisture Sensor. The EC-5 determines volumetric water content (VWC) by measuring the dielectric constant of the media using capacitance/frequency domain technology. Its 70 MHz frequency minimizes salinity and textural effects, making this sensor accurate in almost any soil or soilless media. It is just 5 cm long, and has a 0.3 L measurement volume.

<b>Accuracy</b>	
<i>Mineral Soil</i>	±3% VWC, most mineral soils, up to 8 dS/m ±1-2% VWC with soil specific calibration
<i>Rockwool Potting Soil</i>	±3% VWC, 0.5 to 8 dS/m ±3% VWC, 3 to 14 dS/m
<b>Resolution</b>	0.1% VWC (mineral soil) 0.25% VWC (rockwool)
<b>Range</b>	calibration dependant; up to 0-100% VWC with polynomial equation
<b>Dimensions</b>	8.9 x 1.8 x 0.7 cm
<b>Cable Length</b>	5 m, custom cable lengths available upon request
<b>Measurement Time</b>	10 ms
<b>Power</b>	2.5 - 3.6 V DC @ 10 mA. Output proportional to input voltage. 2.5 V and 3 V excitations supported with calibration equations
<b>Output</b>	Voltage, correlated linearly (soil) or polynomially (growing media) with VWC
<b>Temperature</b>	-40°C to +50°C
<b>Part.no. ECH500</b>	Decagon Echo5 probe sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT/ ECH874INT

IM5041D

SAR19

ECH-GS1

**ECH500**

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

GS3

TNS103..7

AQ600

100SMT

SEN12512

SEN13512

ECH870EXT

ECH871EXT

ECH874EXT

WM-BUS

TNS100

# Decagon 10HS Soil Moisture Sensor

SOIL

## ECH510



The 10HS soil moisture sensor has a larger volume of influence. Being 10 cm long, the 10HS measures 1 liter of soil. The 10HS determines volumetric water content (VWC) by measuring the dielectric constant of the soil using capacitance/frequency domain technology. Using a 70 MHz frequency minimizes salinity and textural effects, making the 10HS accurate in most soils. Factory calibrations can be used in most typical soils with a saturation extract EC of 10 dS/m.

<b>Accuracy</b> <i>Apparent Dielectric Permittivity (<math>\epsilon_a</math>)</i>	$\pm 0.5$ from $\epsilon_a$ of 2 to 10, $\pm 2.5$ from $\epsilon_a$ of 10 to 50
<i>Soil Volumetric Water Content (VWC)</i>	Using standard calibration equation: $\pm 0.03 \text{ m}^3/\text{m}^3$ ( $\pm 3\%$ VWC) typical in mineral soils that have solution electrical conductivity $< 10 \text{ dS/m}$ Using soil specific calibration, $\pm 0.02 \text{ m}^3/\text{m}^3$ ( $\pm 2\%$ VWC) in any soil
<b>Resolution</b> $\epsilon_a$ VWC	1.1 from $\epsilon_a$ of 1 to 30, 0.2 from $\epsilon_a$ of 30 to 50 1.2 $0.0008 \text{ m}^3/\text{m}^3$ (0.08% VWC) in mineral soils from 0 to $0.50 \text{ m}^3/\text{m}^3$ (0-50% VWC)
<b>Range</b> $\epsilon_a$ VWC	1 (air) to 50 Calibration dependant; up to 0 - 57% VWC with polynomial equation
<b>Measurement Time</b>	10 ms (milliseconds)
<b>Sensor Type</b>	Capacitance (frequency domain)
<b>Output</b>	300 - 1250 mV, independent of excitation voltage
<b>Operating Environment</b> <i>Survival Temperature</i> <i>Operating Temperature</i>	-40 to +50°C 0 - 50°C
<b>Power requirements</b>	3 VDC @ 12 mA to 15 VDC @ 15 mA
<b>Cable Length</b>	5 m standard; custom cable lengths available
<b>Part.no. ECH510</b>	Decagon 10HS Echo probe sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT/ ECH874INT

- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100

## Decagon 5TM Soil Moisture Sensor



### ECH5TM

Temperature integrated with soil moisture: The 5TM delivers temperature, measured by an onboard thermistor, along with accurate volumetric water content. The 5TM's small size makes it easy to install. Perfect for in field installations.

IM5041D  
 SAR19  
 ECH-GS1  
 ECH500  
 ECH510  
**ECH5TM**  
 ECH5TE  
 ECH511  
 ECH512  
 MD510SM  
 GS3  
 TNS103..7  
 AQ600  
 100SMT  
 SEN12512  
 SEN13512  
 ECH870EXT  
 ECH871EXT  
 ECH874EXT  
 WM-BUS  
 TNS100

<b>Accuracy</b>	
<i>Apparent Dielectric Permittivity (<math>\epsilon_a</math>):</i>	$\pm 1 \epsilon_a$ from 1 - 40 (soil range); $\pm 15\%$ from 40 – 80 Using Topp equation: $\pm 0.03 \text{ m}^3/\text{m}^3$ ( $\pm 3\%$ VWC) typical in mineral soils that have solution electrical conductivity $< 10 \text{ dS/m}$
<i>Soil Volumetric Water Content (VWC):</i>	Using medium specific calibration: $\pm 0.02 \text{ m}^3/\text{m}^3$ ( $\pm 2\%$ VWC) in any porous medium
<i>Temperature:</i>	$\pm 1^\circ\text{C}$
<b>Resolution</b>	
$\epsilon_a$ :	$0.1 \epsilon_a$ from 1-20, $< 0.75 \epsilon_a$ from 20-80
VWC:	$0.0008 \text{ m}^3/\text{m}^3$ (0.08% VWC) from 0 to 50% VWC
Temperature	$0.1^\circ\text{C}$
<b>Range</b>	
$\epsilon_a$ :	1 (air) to 80 (water)
Temperature	$-40$ to $+50^\circ\text{C}$
<b>Dimensions</b>	10 cm x 3.2 cm x 0.7cm
<b>Cable Length</b>	5 m standard, custom cable lengths available upon request
<b>Measurement Time</b>	150 ms (milliseconds)
<b>Power</b>	3.6 - 15 VDC, 0.3 mA quiescent, 10 mA during 150 ms measurement
<b>Output</b>	RS232 or SDI-12
<b>Part.no. ECH5TM</b>	Decagon 5TM sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT/ ECH874INT

# Decagon 5TE Soil Moisture Sensor

## ECH5TE

Soil moisture, temperature, and electrical conductivity: The 5TE lets you monitor bulk electrical conductivity (EC), in addition to volumetric water content (VWC) and soil temperature. Monitoring salt levels can be as important as monitoring soil moisture in water-limited areas. The 5TE allows you to measure salt levels through bulk electrical conductivity.



<b>Accuracy</b>	
<i>Apparent Dielectric Permittivity (<math>\epsilon_p</math>):</i>	$\pm 1 \epsilon_p$ (unitless) from 1 - 40 (soil range), $\pm 15\%$ from 40 - 80 Using Topp equation: $\pm 0.03 \text{ m}^3/\text{m}^3$ ( $\pm 3\%$ VWC) typical in mineral soils that have solution electrical conductivity $< 10 \text{ dS/m}$
<i>Soil Volumetric Water Content (VWC):</i>	Using medium specific calibration, $\pm 0.01 - 0.02 \text{ m}^3/\text{m}^3$ ( $\pm 1 - 2\%$ VWC) in any porous medium
<i>Electrical Conductivity (EC):</i>	$\pm 10\%$ from 0 to 7 dS/m, user calibration required above 7 dS/m
<i>Temperature:</i>	$\pm 1^\circ\text{C}$
<b>Resolution</b>	
$\epsilon_p$ :	$0.1 \epsilon_p$ (unitless) from 1 - 20, $< 0.75 \epsilon_p$ (unitless) from 20 - 80
VWC:	$0.0008 \text{ m}^3/\text{m}^3$ (0.08% VWC) from 0 to 50% VWC
EC:	0.01 dS/m from 0 to 7 dS/m, 0.05 dS/m from 7 to 23.1 dS/m
Temperature	$0.1^\circ\text{C}$
<b>Range</b>	
$\epsilon_p$ :	1 (air) to 80 (water)
EC:	0 - 23 dS/m (bulk)
Temperature:	-40 - 50°C Calibration dependant; up to 0 - 57% VWC with polynomial equation
<b>Measurement Time</b>	150 ms (milliseconds)
<b>Sensor Type</b>	
VWC:	Frequency domain
EC:	Two probe design
Temperature:	Thermistor
<b>Output</b>	RS232 (TTL), or SDI-12
<b>Operating Environment</b>	-40 to +50°C
<b>Power</b>	3.6 - 15 VDC, 0.3 mA quiescent, 10 mA during 150 ms measurement
<b>Cable Length</b>	5 m standard, custom cable lengths available upon request
<b>Sensor Dimensions</b>	10 cm x 3.2 cm x 0.7 cm
<b>Part.no. ECH5TE</b>	Decagon Combi-Echo 5TE
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT/ ECH874INT

- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE**
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100

# Decagon MPS-2 Dielectric Water Potential MPS-6 Calibrated Water Potential Sensor

IM5041D  
 SAR19  
 ECH-GS1  
 ECH500  
 ECH510  
 ECH5TM  
 ECH5TE  
**ECH511**  
**ECH512**  
 MD510SM  
 GS3  
 TNS103..7  
 AQ600  
 100SMT  
 SEN12512  
 SEN13512  
 ECH870EXT  
 ECH871EXT  
 ECH874EXT  
 WM-BUS  
 TNS100



## ECH511 ECH512

The **MPS-2** is a maintenance-free water potential and temperature sensor. The MPS-2 measures a wide range of soil water potentials (-10 to -500 kPa (pF 1.71 to pF 3.71)) without user maintenance.

The **MPS-6** is a matrix water potential sensor that provides long term, maintenance-free soil water potential and temperature readings at any depth without sensitivity to salts. The range of the MPS-6 goes from field capacity to air dry. Lab and field tests indicate that it can make accurate measurements at water potentials at least as dry as permanent wilting point.

<b>Accuracy</b> Soil Water Potential Soil Temperature	<b>MPS-2</b> ± 25% of reading from -10 kPa to -100 kPa ± 1°C	<b>MPS-6</b> ±(10% + 2 kPa) from -9 to -100 kPa
<b>Resolution</b> Soil Water Potential Soil Temperature	0.1 kPa 0.1°C	
<b>Range</b> Soil Water Potential Soil Temperature	<b>MPS-2</b> -10 to -500 kPa (pF 1.71 to pF 3.71) -40° to 60°C	<b>MPS-6</b> -9 to -100,000 kPa -40° to 60°C
<b>Measurement Speed</b>	150 ms (milliseconds)	
<b>Equilibration time</b>	10 min to 1 hr depending on soil water potential	
<b>Sensor Type</b>	Frequency domain with calibrated ceramic discs, thermistor	
<b>Output</b>	RS232 (TTL) with 3.6 volt levels or SDI-12 communication protocol	
<b>Operating Environment</b>	-40° to 60°C	
<b>Power</b>	3.6 - 15 VDC, 0.03 mA quiescent, 10 mA max during 150 ms measurement	
<b>Cable Length</b>	5 m, custom cable lengths available	
<b>Sensor Dimensions</b>	9.6 cm (l) x 3.5 cm (w) x 1.5 cm (d)	
<b>Part.no. ECH511</b> <b>Part.no. ECH512</b>	Decagon MPS2 water tension probe Decagon MPS6 water potential sensor	
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT / ECH874INT	

## Soil Moisture Sensor - Watermark

SOIL

**MD510SM**



The Watermark Sensor consists of two concentric electrodes buried in a special reference matrix material that is held in place by a synthetic membrane. The matrix material has been selected to reflect the maximum change of electrical resistance over the growth range of production crops as well as to neutralize the effect of soil salinity. In operation, soil moisture is constantly being absorbed or released and the electrical resistance between the electrodes changes. This resistance is read by the weather station. The sensor is manufactured from non-corrosive parts and lasts up to three years.

<b>Size</b>	2.2 cm diameter x 5 cm length
<b>Measuring Principle</b>	Resistance with Gypsum Block (Tensiometer Type)
<b>Working Range</b>	10 to 200 kPa
<b>Precision</b>	5%
<b>Evaluation</b>	Analog
<b>Cable</b>	5 meters
<b>Part.no. MD510SM</b>	Soil moisture sensor type Watermark with 5 meter cable
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos:WM-BUS or WM-BUSINT

- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM**
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100

## SOIL MOISTURE SENSOR


**GS3**

The Decagon GS3 sensor measure soil moisture, soil temperature and EC. The sensor has been optimized for use in soilless substrates, giving it a wider range of EC measurement and an increased temperature range. The steel needles not only slice through the substrates for perfect contact, but they also improve the sensor's ability to measure EC in porous substrates such as peat or perlite. The sensor also works well in mineral soils. The GS3 measures water content, temperature, and EC independently. Its 70 MHz frequency minimizes salinity and textural effects, making it accurate

in most soil or soilless media. Stainless steel needles have an extended surface area to optimize EC measurements, while minimizing substrate disturbance during insertion.

<b>ACCURACY</b>	
<b>Apparent Dielectric Permittivity (εa):</b>	± 1 εa (unitless) from 1 - 40 (soil range), ± 15% from 40 - 80
<b>Soil Volumetric Water Content (VWC):</b>	Using a generic calibration: ± 0.03 m <sup>3</sup> /m <sup>3</sup> (± 3% VWC) typical in mineral soils that have solution electrical conductivity < 10 dS/m Using medium specific calibration, ± 0.01 - 0.02 m <sup>3</sup> /m <sup>3</sup> (± 1 - 2% VWC) in any porous medium
<b>Electrical Conductivity (EC):</b>	± 10% from 0 to 10 dS/m, user calibration required above 10 dS/m
<b>Temperature:</b>	± 1°C
<b>RESOLUTION</b>	
<b>εa:</b>	0.1 εa (unitless) from 1 - 20, < 0.75 εa (unitless) from 20 - 80
<b>VWC:</b>	0.002 m <sup>3</sup> /m <sup>3</sup> (0.2% VWC) from 0 to 40% VWC, 0.001 m <sup>3</sup> /m <sup>3</sup> (0.1% VWC) > 40% VWC
<b>EC:</b>	0.001 dS/m from 0 to 23 dS/m
<b>Temperature:</b>	0.1°C
<b>RANGE</b>	
<b>εa:</b>	1 (air) to 80 (water)
<b>EC:</b>	0 - 23 dS/m (bulk)
<b>Temperature:</b>	-40 to 80°C
<b>MEASUREMENT SPEED</b>	150 ms (milliseconds)
<b>SENSOR TYPE</b>	
<b>VWC:</b>	Frequency domain
<b>EC:</b>	Two probe design
<b>Temperature:</b>	Thermistor
<b>OUTPUT</b>	Serial TTL, 3.6 Volt Levels or SDI-12
<b>OPERATING ENVIRONMENT</b>	-40°C to 80°C
<b>POWER</b>	3.6 - 15 VDC, 0.3 mA quiescent, 25 mA during 150 ms measurement
<b>CABLE LENGTH</b>	5 m standard, custom cable lengths available upon request
<b>SENSOR DIMENSIONS</b>	9.3 cm x 2.4 cm x 6.5 cm
<b>Part.no. ECH-GS3</b>	Decagon GS3 – Volumetric Soil Moisture, Electrical Conductivity and Soil Temperature
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos: ECH870EXT / ECH871EXT / ECH874EXT or ECH870INT / ECH871INT/ ECH874INT

IM5041D

SAR19

ECH-GS1

ECH500

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

**GS3**

TNS103..7

AQ600

100SMT

SEN12512

SEN13512

ECH870EXT

ECH871EXT

ECH874EXT

WM-BUS

TNS100



# Tensiometer

SOIL

## TNS103..7

The instrument measures soil water tension, in centibars (cb) or kilopascals (kPa). This value represents the energy a plant's root system uses to draw water from the soil. Understanding soil moisture activity helps the user make informed irrigation scheduling decisions resulting in improved yield and quality while reducing water, fertilizer, labor and energy costs.



- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7**
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100

<b>INSTRUMENT BODY MATERIALS</b>	Butyrate body, ceramic tip, neoprene stopper
<b>RESERVOIR SECTION DIMENSIONS</b>	
HEIGHT	120 mm – 130 mm including cap
DIAMETER	51 mm – 55 mm including cap
<b>BODY TUBE SECTION DIMENSIONS</b>	
LENGTH	Ranges from 15 cm to 150 cm
DIAMETER	22 mm
<b>INSTRUMENT WEIGHT</b>	30 cm is 0.439 kg with increases of 0.114 kg per 30 cm
<b>CERAMIC TIP</b>	White tip – used for most soil types
<b>Operating Suction</b>	0-90 cb (kPa)
<b>Operating Temperature</b>	0°C to +50°C
<b>Part.no. TNS103</b>	Irrrometer Tensiometer 15 cm without Manometer
<b>Part.no. TNS104</b>	Irrrometer Tensiometer 30 cm without Manometer
<b>Part.no. TNS105</b>	Irrrometer Tensiometer 45 cm without Manometer
<b>Part.no. TNS106</b>	Irrrometer Tensiometer 60 cm without Manometer
<b>Part.no. TNS107</b>	Irrrometer Tensiometer 90 cm without Manometer
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos: TNS100

## AquaCheck Sub-Surface Probe

### AQ600



The AquaCheck sub-surface soil moisture probe offers capacitance based soil moisture measurement offering up to six depths or sensors per probe.

<b>Sensor Type</b>	Profile type integrated sensor without access tube
<b>Probe lengths</b>	from 400 mm to 1200 mm
<b>Number of sensors</b>	Up to 6 soil moisture and 6 soil temperature sensors depending on the probe length. (Up to 6 sensors or depths per probe.)
<b>Shaft diameter</b>	32mm.
<b>Use</b>	Can be used for pastures, arable crops, viticulture or other sub-surface measurement applications
<b>Communication Interface options:</b>	SDI-12 (serial data interface, 1200bd) / MODBUS, 2400bd
<b>Compliance</b>	CE certified
<b>Cable length</b>	Supplied with a 5m 3-core cable
<b>Voltage input</b>	4-12V for standard models; 9-16V option available on BASIC II (on request)
<b>Power Requirement</b>	10uA (0.01mA) during idle; 20mA for 2 seconds during measurement
<b>Sensor Spacing</b>	10cm or 20cm (fixed)
<b>Sensor Reading Count</b>	approximately 32000 for air and 1000 in water
<b>Sensor Resolution</b>	Approximately 13 bits
<b>Temperature Sensor</b>	0-51°C, steps of 0.2°C
<b>Part.no. AQ600</b>	AquaCheck sub-surface MOD (600 mm) 6 soil moisture and temperature sensors
	This sensor works only with ECO D2.

IM5041D

SAR19

ECH-GS1

ECH500

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

GS3

TNS103..7

**AQ600**

100SMT

SEN12512

SEN13512

ECH870EXT

ECH871EXT

ECH874EXT

WM-BUS

TNS100

## Soil Moisture

# SOIL

### 100SMT



The 100SMT is an accurate soil moisture probe for monitoring water content and soil temperature. The oscillation frequency is related to the dielectric permittivity of the surrounding medium. The relation between the permittivity and the soil moisture depends on the soil type and the soil temperature. Therefore all dielectric measurement techniques require a material and temperature dependent calibration for highest precision.

<b>Multilayer printed circuit board</b>	Butyrate body, ceramic tip, neoprene stopper
<b>Overall dimensions</b>	220 x 32 x 10 mm
<b>Connector cable length</b>	1-10 m
<b>Volumetric water content accuracy</b>	~ 1.5 % (depending on soil specific calibration)
<b>Volumetric water content resolution</b>	~ 0.5 %
<b>Temperature range for temperature</b>	-55°C to +125°C
<b>Temperature range for permittivity</b>	-10°C to +70°C
<b>Temperature accuracy</b>	± 0.5°C
<b>Weight</b>	approx. 250 g
<b>Power consumption</b>	65 mA for less than 1s during measurement
<b>Voltage supply</b>	4-12 VDC, up to 28V on request Reverse polarity protection and overvoltage protection
<b>Digital interface</b>	RS485
<b>Other interfaces</b>	SDI-12, USB, analog on request
<b>Identification</b>	unique 24bit identifier for each sensor (digital readout)

- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT**
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100

## Sentek EasyAG Soil Moisture

IM5041D

SAR19

ECH-GS1

ECH500

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

GS3

TNS103..7

AQ600

100SMT

**SEN12512**
**SEN13512**

ECH870EXT

ECH871EXT

ECH874EXT

WM-BUS

TNS100

**SEN12512**
**SEN13512**


SEN12512	
Measuring range	0-100% Vol
Method	HF Capacitance
Accuracy	+/- 0,06% Vol
Installation method	PVC access tube
Power supply	7 to 12 Volts
Interface	SDI-12
Lengths	50cm
Number of Sensors	5

Sentek sensors utilize capacitance-based technology to provide near continuous measurements within the soil profile. By creating a high frequency electrical field around the sensor, extending through the access tube into the surrounding soil, the sensor detects the changes in dielectric constant, or permittivity, of the soil over time. At high frequency the measurement is affected predominantly by water molecules. The greater is the amount of water, the smaller is the frequency measured between the two brass rings of the sensor.

SEN13512	
Measuring Range	0 - 100% Vol
Method	HF Capacitance
Salinity	0-17 dS/m (Bulk EC)
Accuracy	+/- 5% (Salinity)
Installation method	PVC access tube
Power supply	7 to 12 Volts
Lengths	50cm
Interface	SDI-12
Number of Sensors	5
Sensor Depths in cm	10/20/30/40/50
Operating Temperature	-20°C - +75°C

The TriSCAN sensor provides measurements of both soil water and salinity. By employing a patented measurement technique the TriSCAN sensor is able to distinguish between soil water content and salt content. This information is then processed using a Sentek derived model to calculate soil volumetric ion content (VIC) separately from the Volumetric Water Content. The TriSCAN sensor is designed for fertilizer and salinity management in research, agriculture and environmental applications.

The TriSCAN sensor is optimized for one of agriculture's most common soil textures of sands and sandy loams, and is currently not suitable for clays.

## Echo Chain Interface for 3 Decagon Sensors

**ECH870EXT**  
**ECH870INT**



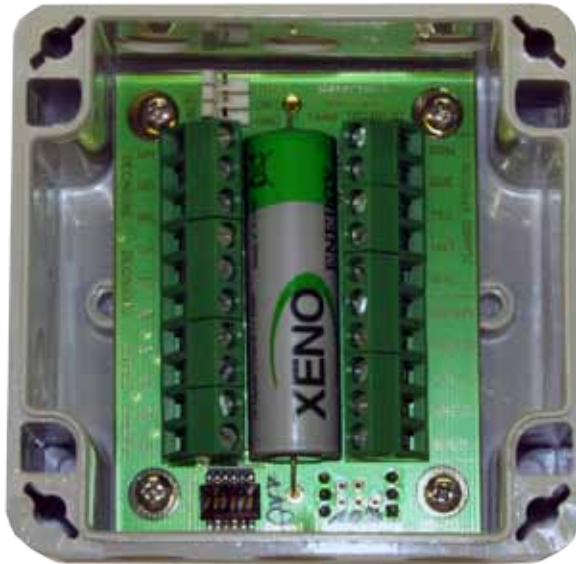
- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT**
- ECH871EXT**
- ECH874EXT**
- WM-BUS**
- TNS100**

<b>Connection Possibilities</b>	3 pc. of following Decagon Sensors: GS1 Soil Moisture Sensor (ECHGS1) GS3 Soil Moisture Sensor (GS3) EC-5 Soil Moisture Sensor (ECH500) 10HS Soil Moisture Sensor (ECH510) 5TM Soil Moisture Sensor (ECH-5TM) 5TE Soil Moisture Sensor (ECH-5TE) MPS-2 Dielectric Water Potential (ECH511), MPS-6 (ECH512) Decagon Leaf Wetness Sensor (LWN530)
<b>Dimension</b>	80 x 55 mm
<b>General Information</b>	Part.no. ECH870EXT Echo Chain Interface with Box Part.no. ECH870INT Echo Chain Interface internal mounted, only for ECO D2 (only one pc. possible per station)
<b>Cable length (Part.no. ECH870EXT)</b>	5 m standard, custom cable lengths available upon request

## Echo Chain Interface for 2 Decagon Sensors & 2 Watermark Sensors & 1 Soil Temperature Sensor

IM5041D  
 SAR19  
 ECH-GS1  
 ECH500  
 ECH510  
 ECH5TM  
 ECH5TE  
 ECH511  
 ECH512  
 MD510SM  
 GS3  
 TNS103..7  
 AQ600  
 100SMT  
 SEN12512  
 SEN13512  
 ECH870EXT  
 ECH871EXT  
 ECH874EXT  
 WM-BUS  
 TNS100

**ECH871EXT**  
**ECH871INT**



<b>Connection Possibilities</b>	2 pc. of following Decagon Sensors: GS1 Soil Moisture Sensor (ECHGS1) GS3 Soil Moisture Sensor (GS3) EC-5 Soil Moisture Sensor (ECH500) 10HS Soil Moisture Sensor (ECH510) 5TM Soil Moisture Sensor (ECH-5TM) 5TE Soil Moisture Sensor (ECH-5TE) MPS-2 Dielectric Water Potential (ECH511), MPS-6 (ECH512) Decagon Leaf Wetness Sensor (LWN530) 2 pc. of following Sensor: Soil Moisture Sensor Type Watermark (MD510SM) 1 pc. of following Sensor: Soil Temperature for WM-BUS (WMTEMP)
<b>Dimension</b>	80 x 55 mm
<b>General Information</b>	Part.no. ECH871EXT Echo Chain Interface with Box Part.no. ECH871INT Echo Chain Interface internal mounted, only for ECO D2 (only one pc. possible per station)
<b>Cable length (Part.no. ECH871EXT)</b>	5 m standard, custom cable lengths available upon request



## Echo Chain Interface for 1 Decagon Sensor & 4 Watermark Sensors & 1 Soil Temperature Sensor

**ECH874EXT**  
**ECH874INT**



- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT**
- WM-BUS
- TNS100

<b>Connection Possibilities</b>	1 pc. of following Decagon Sensors: GS1 Soil Moisture Sensor (ECHGS1) GS3 Soil Moisture Sensor (GS3) EC-5 Soil Moisture Sensor (ECH500) 10HS Soil Moisture Sensor (ECH510) 5TM Soil Moisture Sensor (ECH-5TM) 5TE Soil Moisture Sensor (ECH-5TE) MPS-2 Dielectric Water Potential (ECH511) Decagon Leaf Wetness Sensor (LWN530) 4 pc. of following Sensor: Soil Moisture Sensor Type Watermark (MD510SM),MPS-6 (ECH512) 1 pc. of following Sensor: Soil Temperature for WM-BUS (WMTEMP)
<b>Dimension</b>	80 x 55 mm
<b>General Information</b>	Part.no. ECH874EXT Echo Chain Interface with Box Part.no. ECH874INT Echo Chain Interface internal mounted, only for ECO D2 (only one pc. possible per station)
<b>Cable length (Part.no. ECH874EXT)</b>	5 m standard, custom cable lengths available upon request

## Watermark BUS for 3 Watermark Sensors and 1 Soil Temperature Sensor

IM5041D

SAR19

ECH-GS1

ECH500

ECH510

ECH5TM

ECH5TE

ECH511

ECH512

MD510SM

GS3

TNS103..7

AQ600

100SMT

SEN12512

SEN13512

ECH870EXT

ECH871EXT

ECH874EXT

**WM-BUS**
**TNS100**
**WM-BUS**
**WM-BUSINT**

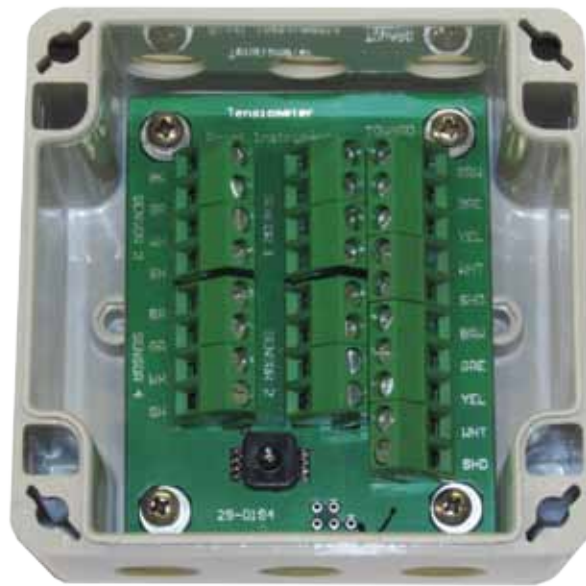

<b>Connection Possibilities</b>	3 pc. of following Sensor: Soil Moisture Sensor Type Watermark (MD510SM) 1 pc. of following Sensor: Soil Temperature for WM-BUS (WMTEMP)
<b>Dimension</b>	80 x 55 mm
<b>General Information</b>	Part.no. WM-BUS Watermark BUS with Box Part.no. WM-BUSINT Watermark internal mounted, only for ECO D2 (only one pc. possible per station)
<b>Cable length (Part.no. WM-BUS)</b>	5 m standard, custom cable lengths available upon request



## Tensiometer Interface with 4 tensiometer connectors

SOIL

**TNS100**



- IM5041D
- SAR19
- ECH-GS1
- ECH500
- ECH510
- ECH5TM
- ECH5TE
- ECH511
- ECH512
- MD510SM
- GS3
- TNS103..7
- AQ600
- 100SMT
- SEN12512
- SEN13512
- ECH870EXT
- ECH871EXT
- ECH874EXT
- WM-BUS
- TNS100**

<b>Connection Possibilities</b>	4 pc. of following Sensor: Tensiometer sensor head with pressure transducer with 5 m cable and 3/8 inch male screw (TNS101)
<b>Dimension</b>	80 x 55 mm
<b>General Information</b>	For each Tensiometer you can choose following: Irrrometer Tensiometer 15 cm without Manometer (TNS103) Irrrometer Tensiometer 30 cm without Manometer (TNS104) Irrrometer Tensiometer 45 cm without Manometer (TNS105) Irrrometer Tensiometer 60 cm without Manometer (TNS106) Irrrometer Tensiometer 90 cm without Manometer (TNS107)
<b>Cable length (Part.no. TNS100)</b>	5 m standard, custom cable lengths available upon request

## Noise Sensor

NS100


**NS100**

The Pessl Instruments sound level noise sentry is a high-performance sound level meter integrated in the iMetos data logger. It includes a precision MEMS microphone, and accurately records date/time of sound levels. Its very small size allows it to be mounted wherever needed or embedded within monitored equipment. It is used in the building industry and in animal behavior monitoring.

<b>Bandwidth</b>	20Hz to 20 kHz
<b>Dimensions</b>	80 x 80 x 55 mm
<b>Weight</b>	250 g
<b>Measurements</b>	Max Acoustic Level (linear-Pa or dB-SPL) / Min Acoustic Level (linear-Pa or dB-SPL) / Average Acoustic Level (LEQ) (linear-Pa or dB-SPL)
<b>Weighting Functions</b>	A / C
<b>Alarms</b>	Max Instantaneous Level / Max Integrated Level (Dose)
<b>Battery type</b>	CR2032 lithium battery
<b>Operating temperature range</b>	-20°C to 70°C
<b>Storage temperature range</b>	-30°C to 80°C
<b>Noise Floor</b>	39 dB (typical)
<b>Saturation Level</b>	110 dB (typical)
<b>Resolution</b>	0.1dB
<b>Recorded Resolution</b>	1 dB
<b>Precision</b>	+2 dB (50 Hz – 8 kHz) (typical) / +5 dB (20 Hz – 20 kHz) (typical)
<b>Sensor Type</b>	MEMS Microphone
<b>Recording interval</b>	Adjustable 1s to 12H, with 10 minutes resolution
<b>Logging interval</b>	User Selectable
<b>Internet contact interval</b>	User selectable
<b>Sensitivity</b>	Adjustable
<b>Part.no. NS100</b>	Noise Sensor

## Barometer

### MD514D



### MD514D

# BAROMETER

The Pessl Instruments barometric sensor measures the “absolute air pressure” of the atmosphere at the site. It is designed for application in the field of environmental protection, where high accuracy, quick responding behaviour, long term stability and reliability are required. The instrument is suited for indoor and field application.

A tempered piezoceramic sensor for absolute pressure is used, characterized by its thermal and mechanical stability.

<b>Sensor</b>	XT0-15PSIA
<b>Working range</b>	0 - 1150 mbar
<b>Weight</b>	ca. 50g
<b>Power Supply</b>	5.0 VDC (6VDC maximum)
<b>Zerro Offset</b>	0.50+/-0.09 VDC
<b>Power uptake</b>	max. 20mA
<b>Precision</b>	0.1% max. Thrift
<b>Temperature range</b>	-40°C to 125°C
<b>Measuring type</b>	Serial (RS 485)
<b>Part.no. MD514D</b>	Barometric Pressure

## EC500PH EC & PH Interfacebox with display in IP65 box

### EC500PH

EC501  
PH501

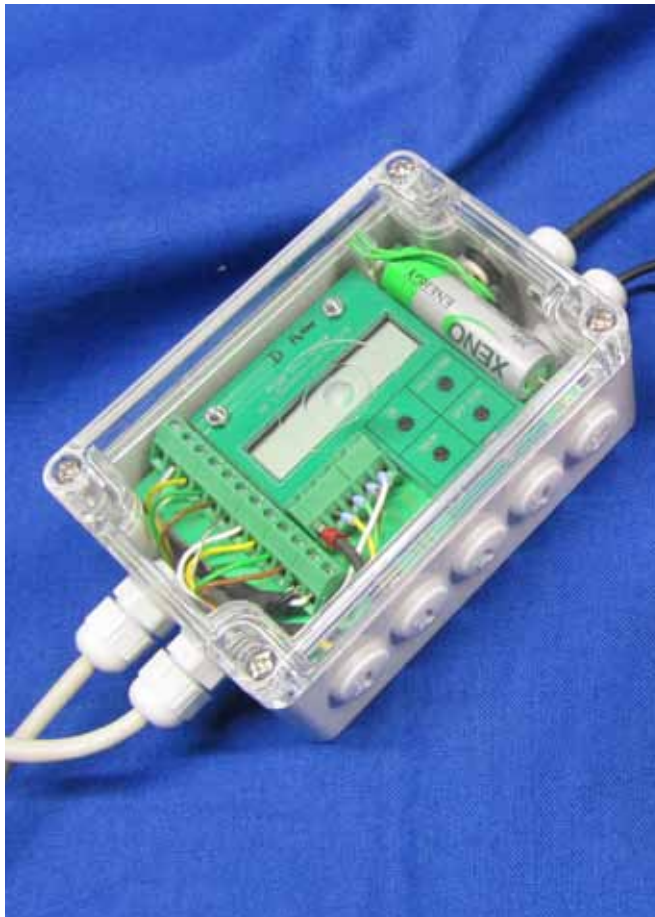
PS010

LMP305

LMP306

ET-250

### EC500PH



The EC500PH EC & PH Interfacebox is a measuring device with Display in IP65 Box to be integrated into any iMetos sensor chain interface for continuous EC & PH measurement in water. The outstanding design allows the use of most industry standard EC & PH sensors available in the world market. On the display the actual reading can be seen. With the built in calibration mode all sensors readings can be calibrated and checked from time to time.

<b>Connection Possibilities</b>	1 pc. EC Sensor (Part.no. EC501) 1 pc. PH Sensor (Part.no. PH501)
<b>General Information</b>	Display shows actual data by pressing the button Works with iMetos II and ECO D2
<b>Cable length</b>	5 m standard, custom cable lengths available upon request
<b>Part.no. EC500PH</b>	EC&PH Interfacebox with display in IP65 box

## EC SENSOR PH SENSOR

### EC501 PH501



**PH:** The pH sensor is a reliable and cost-effective sensor for measuring the pH value of various aqueous solutions. The pH scale covers values between 0 and 14. Acids have pH values towards 0; caustic solutions have pH values towards 14.

**EC:** The Conductivity Sensor provides a complete self-contained measurement. The sensor utilizes a reliable and robust sensor for conductivity measurement and a thermistor for temperature measurement. The sensor is ideal for use in hydrographical and environmental water monitoring in agriculture and industrial applications. The durable design ensures suitability for the harshest environment applications.

<b>EC Sensor</b>	
<b>Range</b>	0.001-100 mS
<b>Resolution</b>	0.01 mS/cm
<b>Accuracy</b>	±0.01pH
<b>Temperature compensation</b>	Automatic
<b>Probe Material</b>	PP
<b>Probe Diameter</b>	12mm
<b>Min. Immersion</b>	40mm
<b>Part.no. EC501</b>	EC Sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos: EC500PH Interface box with Display

<b>PH Sensor</b>	
<b>Range</b>	pH 0.00 to 14.00
<b>Resolution</b>	0.01 pH
<b>Accuracy</b>	±2% F.S.
<b>Temperature compensation</b>	Automatic
<b>pH probe</b>	Up to 7 bar, 3 m cable, 2-ring-flow-through
<b>pH-calibration</b>	2-point with automatic buffer (recognition pH 4.0 and pH 7.0)
<b>Probe Material</b>	Glass
<b>Probe Diameter</b>	12 mm
<b>Min. Immersion</b>	35 mm
<b>Temp. Operating Range</b>	15°C to 60°C
<b>Response time</b>	<= 90s
<b>Part.no. PH501</b>	PH Sensor
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos: EC500PH Interface box with Display

EC500PH

EC501  
PH501

PS010

LMP305

LMP306

ET-250

## Pressure Switch

EC500PH

 EC501  
PH501

**PS010**

LMP305

LMP306

ET-250

**PS010**


Simple and robust construction  
Adjustable switching point through headless screw  
Suitable for compressed air, hydraulic oil, oil emulsions, water. The main purpose of this sensor is to control/check the correct performance of the irrigation system.

<b>Material:</b>	brass (G1/8 „) or zinc-plated steel (G1/4 „)
<b>Switching function:</b>	Open contact, closed contact, changeover
<b>Media:</b>	Compressed air, hydraulic oil, oil emulsion, water
<b>Max. Medium temp.:</b>	+85°C
<b>Adjustment ranges:</b>	1 to 10 bar (14,5-145 psi)
<b>Switching frequency:</b>	max. 200 / min
<b>Switching pressure difference:</b>	10 to 15 %
<b>Mech. service life:</b>	106
<b>switching voltage</b>	Open contact/closed contact 42 V max. 2 A Changeover 250 V max. 2 A
<b>Part.no. PS010</b>	Pressure Switch adjustable form 1-10 BAR
<b>Interface</b>	Necessary Interface to connect this sensor with iMetos: PS100 Pressure Switch electronic with 5 m cable, box and stainless steel holder

## Water Level Sensor

### LMP305



The LMP305 is an accurate but cost effective stainless steel submersible water level sensor that can be connected to iMetos stations with the precision of  $\pm 3\%$  within the measurement ranges. Sensor has an integrated Barometric sensor module to increase the precision. Pressure (Measuring) ranges: 0 mWC up to 5 mWC (other distances on request – please define at order).

Applications: Depth or level measurement in wells and open waters (Rivers and Lakes) and ground water level measurement.

EC500PH

EC501  
PH501

PS010

LMP305

LMP306

ET-250

<b>Accuracy according to IEC 60770</b>	Limit Point Adjustment (Nonlinearity, Hysteresis and Repeatability) within $\pm 3\%$ within the measurement ranges
<b>Response time</b>	~ 5 ms
<b>Range</b>	0 to 5 m water gauge
<b>Resolution</b>	1cm
<b>Accuracy</b>	3 cm of water depth
<b>Operating temperature range</b>	0 to 50°C
<b>Storage temperature range:</b>	-20 to +80°C
<b>Dimensions</b>	
<b>Gauge shaft</b>	90 x 20 mm (height x diameter)
<b>Weight</b>	1.1 kg (including cable)
<b>Housing</b>	Stainless steel 1.4571
<b>Diaphragm</b>	Stainless steel 1.4404
<b>Seals</b>	FKM
<b>Cable Sheath</b>	Shielded PVC
<b>Measuring ranges</b>	0 mWC up to 5 mWC (more on request)
<b>Output signal</b>	0 – 5 Volts
<b>Support</b>	Pessl Instruments BUS only at the end of the chain
<b>Part.no. LMP305</b>	Water level sensor ( $\pm 3\%$ accuracy) please let us know measuring depth and necessary cable lengths (no sensor cable is included please add requested length on CAB11)
<b>Part.no. CAB11</b>	Water level special cable – Li2YCYv black cable (price per meter)

## Water Level Sensor

EC500PH

 EC501  
PH501

PS010

LMP305

**LMP306**

ET-250



### LMP306

The LMP306 is a highly accurate stainless steel submersible water level sensor that can be connected to iMetos stations with the precision of +/-0,5% within the measurement ranges. The sensor has an integrated barometric sensor module to increase the precision. Pressure (Measuring) ranges: 0 mWC up to 5 mWC (other distances are available on request – please, define in the order).

Applications: Depth or level measurement in wells and open waters (rivers and lakes) and ground water level measurement.

<b>Accuracy according to IEC 60770</b>	Limit Point Adjustment (Nonlinearity, Hysteresis, Repeatability) within +/-0,5% within the measurement ranges
<b>Response time:</b>	~ 5 ms
<b>Range:</b>	0.1 to 5 m water gauge
<b>Resolution</b>	1 mm
<b>Accuracy</b>	3 mm of water depth
<b>Operating temperature range</b>	0 to 50°C
<b>Storage temperature range:</b>	-20 to +80°C
<b>Dimensions</b>	
<b>Gauge shaft</b>	90 x 20 mm (height x diameter)
<b>Weight</b>	1.1 kg (including cable)
<b>Housing</b>	Stainless steel 1.4571
<b>Diaphragm</b>	Stainless steel 1.4404
<b>Seals</b>	FKM
<b>Cable Sheath</b>	Shielded PVC
<b>Measuring ranges</b>	0 mWC up to 50 mWC (more on request)
<b>Output signal</b>	0 – 5 Volts
<b>Support:</b>	Pessl Instruments BUS
<b>Part.no. LMP306</b>	Water level sensor (+/- 0.5% accuracy) please let us know measuring depth and necessary cable lengths (no sensor cable is included please add requested length on CAB11)
<b>Part.no. CAB11</b>	Water level special cable – Li2YCYv black cable (price per meter)



## Water level Keller sensor submersible pressure transducer Evaporation Gauge

### ET-250



ET-250 is an highly accurate stainless steel submersible water level sensor used for Class A Evaporation pans to be connected to iMetos stations. Highest precision is reached with Keller sensor technology, water temperature compensation and integrated barometric sensor module. Due to its innovative design, most mechanical Class A pans can be retrofitted with automatic ET measurements.

- EC500PH
- EC501
- PH501
- PS010
- LMP305
- LMP306
- ET-250**

<b>Accuracy according to EC 60770</b>	Limit Point Adjustment (Nonlinearity, Hysteresis and Repeatability) within +/-0.3mm within the measurement range of 0 to 350 mm
<b>Response time</b>	~ 5 ms
<b>Range</b>	5 to 350 mm water gauge
<b>Resolution</b>	0.1 mm
<b>Accuracy</b>	0.3 mm of water depth
<b>Operating temperature range</b>	0 to 50°C
<b>Storage temperature range</b>	-20 to +80°C
<b>Dimensions</b>	
<b>Gauge body</b>	60 mm (diameter) stainless steel
<b>Gauge shaft</b>	90 x 20 mm (height x diameter)
<b>Weight:</b>	1.1 kg (including cable)
<b>Housing:</b>	Stainless steel 1.4571 with holder in water
<b>Diaphragm</b>	Stainless steel 1.4404
<b>Seals</b>	FKM
<b>Cable Sheath</b>	Shielded PVC 5 meter
<b>Measuring ranges</b>	0 mmWC up to 350 mmWC
<b>Output signal</b>	0 – 5 Volts
<b>Support</b>	Pessl Instruments BUS only at the end of the chain
<b>Part.no. ET-250</b>	Keller – submersible pressure transducer evaporation gauge (0.2% accuracy) with 5 m cable

CO<sub>2</sub>

## CO<sub>2</sub> SENSOR

 CO<sub>2</sub>


CO<sub>2</sub> sensors, with patented auto-calibration for climate technology and building management are based on a 2-source, 2-beam process. This technology offers long-term stability ensured by the tested and trusted NDIR CO<sub>2</sub> measurement cell. The miniature design of CO<sub>2</sub> sensor is ideally suited for applications in the environmental fields indoors as well as outdoors.

<b>Measuring principle</b>	non-dispersive infrared technology (NDIR)
<b>Measurement range</b>	0...2000 / 5000 / 10000ppm
<b>Accuracy at 25°C and 1013mbar</b>	0...2000ppm: < ± (50ppm +2% from the measured value)
<b>0...5000ppm:</b>	< ± (50ppm +3% from the measured value)
<b>0...10000ppm</b>	< ± (100ppm +5% from the measured value)
<b>Response time t90</b>	< 195s
<b>Temperature dependency</b>	type 2ppm CO <sub>2</sub> /°C (0...50°C)
<b>Long-term stability</b>	type 20ppm / a
<b>Housing / Protection class</b>	Plastic PC / Housing IP65 4.75 - 7.5V DC
<b>Operating temperature and conditions</b>	-40 to 60°C, 0...100% rF (non-condensing) 85...110kPa
<b>Storage temperature and condition</b>	-40 to +75°C, 0...100% rF (non-condensing) 70...110kPa
<b>Dimensions</b>	96 x Ø18.5mm
<b>Part.no. CO<sub>2</sub></b>	CO <sub>2</sub> Sensor

## Where to get more information and where to buy:

**HEADQUARTER: AUSTRIA**  
PESSL Instruments GmbH  
Werksweg 107  
8160 Weiz  
Tel.: +43 (0) 3172 5521  
Fax: +43 (0) 3172 5521 23  
email: sales@metos.at

## Subsidiaries - Affiliated Companies - Sales Offices

### BELGIUM AND FRANCE

Eric Stöcklin  
Metos Instruments Sarl  
Tel.: +32 495 314 998  
email: eric.stoecklin@metos.at

### BRAZIL

Luciano Loman  
Metos Brasil Importação e Exportação Ltda.  
+55 (11) 3380-1022 or +55 (11) 98350-0003  
email: brasil@metos.at

### ITALY

Dr. Federico Fantin  
Pessl Instruments ITALY  
Tel.: +39 327 6738804  
email: federico.fantin@metos.at

### MEXICO

Enrique Audiffred  
Agrotecnologia de America, S.A. de C.V.  
+52 452.523.40.68  
email: ventas@agrotamerica.com

### MOLDOVA / ROMANIA

Petru Stratan  
iMetos SRL  
+37322292533 +40720201515  
email: petru.stratan@metos.at

### RUSSIA

Yulia Fomina  
Pessl Instruments RUSSIA  
Tel.: +4331725521  
email: yulia.fomina@metos.at

### SOUTH AFRICA

Colin Nish  
Metos Weather Monitoring Solutions cc.  
Tel.: +27 (0) 364681469  
email: colin@metos.co.za

### SPAIN

Manuel Mtz. de Arano  
Pessl Instruments SPAIN  
Tel.: +34 655 704226  
email: manu.arano@metos.at

### UKRAINE

Vitaliy Shumishyn  
UNIMETOS LLC  
+380 55 36 27 131  
email: support@unimetos.com

### USA

Phil Berger  
MorpH2O AG, LLC  
Cell: 801-675-0596  
email: philwberger@gmail.com

If you look for local dealers of countries not listed please refer to our webpage [www.metos.at](http://www.metos.at) or contact our headquarter.





PESSL Instruments GmbH  
Werksweg 107  
8160 Weiz  
Tel.: +43 (0) 3172 5521  
Fax: +43 (0) 3172 5521 23  
email: sales@metos.at  
[www.metos.at](http://www.metos.at)

