TURNING INFORMATION INTO PROFITS

Product Portfolio
Technical Catalogue
APRIL 2023 EDITION

Pessl INSTRUMENTS

METOS®
BY PESSL INSTRUMENTS

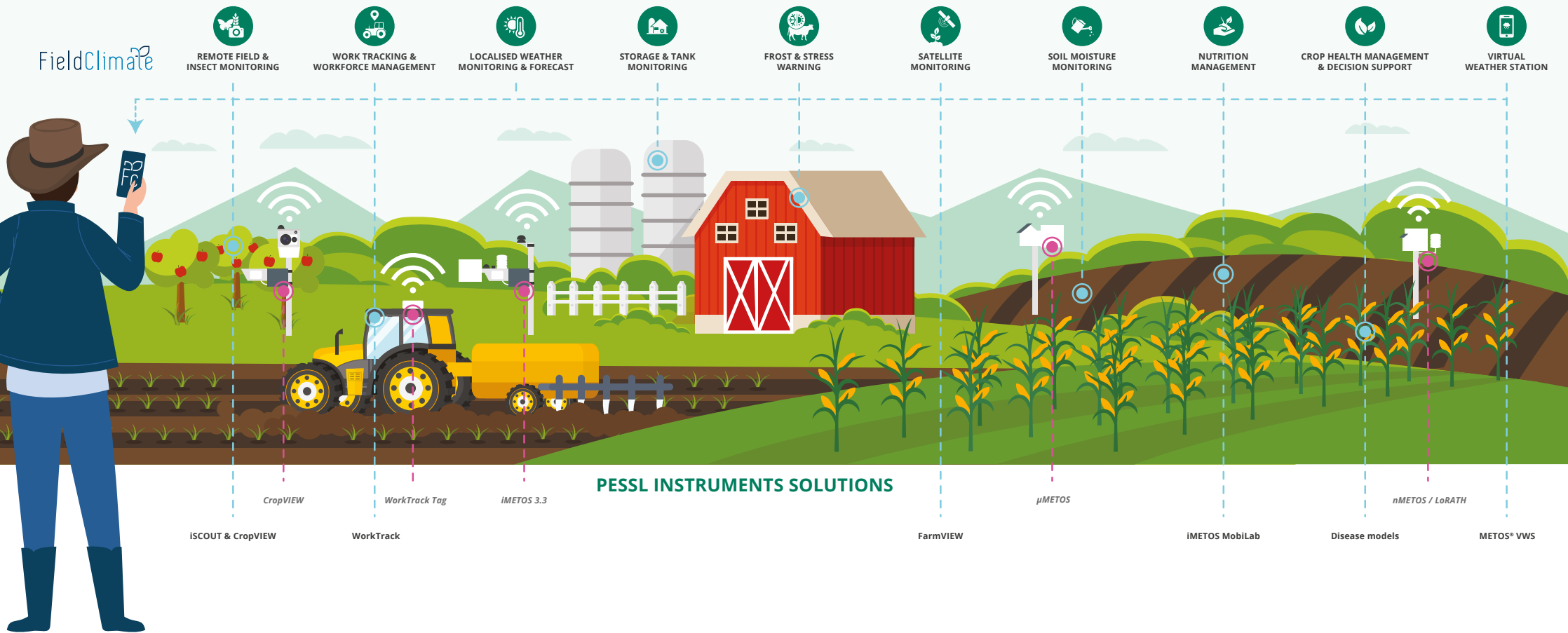## Stations & Dataloggers

Sensors

Nested Approach to IoT Agriculture

Agriculture has changed dramatically in the last two decades and fast developing technologies will continue to have a tremendous influence on the farming practices in the years to come. IoT in agriculture is gaining importance since it helps monitor multiple on-farm assets all at once. But how does it work?

The Nested or Holistic approach means connecting many different devices/solutions that are strategically placed in fields. Pessl Instruments connects all the dots, makes it easier to control your farm and fields, so you don't have to worry

about important management decisions being overlooked. This way you avoid unnecessary trips to the field, know exactly what the conditions at any given time are, make timely decision about irrigation, fertilizing, pesticide application, harvesting, and more 24/7 all year round.

For the nested approach to work, you need multiple devices to monitor multiple issues in your field and around your farm; having just one weather station cannot provide enough data to respond to everything your farm needs.

FieldClimate

REMOTE FIELD & INSECT MONITORING

WORK TRACKING & WORKFORCE MANAGEMENT

LOCALISED WEATHER MONITORING & FORECAST

STORAGE & TANK MONITORING

FROST & STRESS WARNING

SATELLITE MONITORING

SOIL MOISTURE MONITORING

NUTRITION MANAGEMENT

CROP HEALTH MANAGEMENT & DECISION SUPPORT

VIRTUAL WEATHER STATION

PESSL INSTRUMENTS SOLUTIONS

CropVIEW

WorkTrack Tag

iMETOS 3.3

µMETOS

nMETOS / LoRATH

iSCOUT & CropVIEW

WorkTrack

FarmVIEW

iMETOS MobiLab

Disease models

METOS® VWS

METOS® by Pessl Instruments -
The Revolution of Decision Making for Your Farm

No matter which crop, soil, or part of the world is in question, digital IoT agriculture solutions will reduce guess work and enable data driven decisions for:

- **improved quality of your yield**
- **enhanced productivity of your team and**
- **increased profit of your farm.**
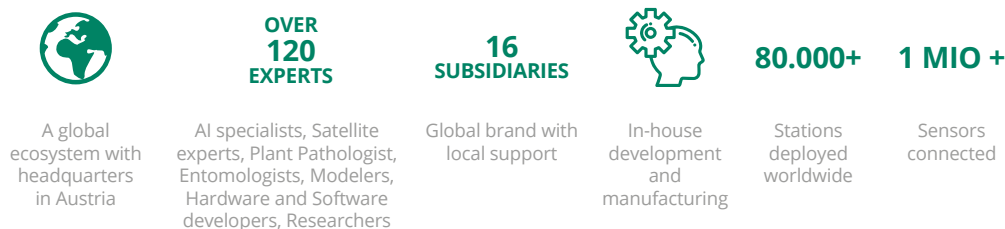
At the same time they will help:

- **optimize input use (water, energy, fertilizers, chemicals, and workforce),**
- **reduce the overall impact on the environment.**

Pessl Instruments has been serving growers, researchers and managers in 85 countries for more than 37 years. Customizable digital IoT agriculture hardware and software solutions cover all needs, pain points and challenges that boots on the ground face in their everyday work and we are proud to make the burden of decision making a bit lighter.

METOS® IS APPLICABLE IN MULTIPLE SECTORS

AGRICULTURE | **HYDROPONICS AND GREENHOUSES** | **LANDSCAPE (GOLF AND TURF)** | **CITY CLIMATE** | **ANIMAL WELFARE** | **RESEARCH** | **HYDROLOGY AND FLOOD WARNING** | **METEOROLOGY**

PESSL INSTRUMENTS IN NUMBERS & FACTS

A global ecosystem with headquarters in Austria	OVER **120** EXPERTS	**16** SUBSIDIARIES		**80.000+**	**1 MIO +**
	AI specialists, Satellite experts, Plant Pathologist, Entomologists, Modelers, Hardware and Software developers, Researchers	Global brand with local support	In-house development and manufacturing	Stations deployed worldwide	Sensors connected

INTERFACE PARTNERS

JOHN DEERE · SAP · aquagri · LACOS Precision in Software · meteoblue weather close to you

BERMAD · GEOSYS Growing agriculture · SGS · HORT@ From research to field · NEX'T Farming One Name.one FarmCare GmbH · 365FarmNet · TALGIL Computing & Control Ltd. · PS Probe Schedule · prospera

HELENA · WiseConn · Solentum · Rivulis Irrigation · manna · DKE DATA · Crop Intelligence · AgriMedic

AXA · intterra · esa · SINERGISE · xarvio Digital Farming Solutions · IBF AGRICULTURA DE PRECISIÓN · CLIMAFIELD A StormGeo Company

Strider · a2a smart city · AGRICOLUS · irriga GLOBAL · CROPIO · hispatec agrosI·igencia · DISAGRO · iXMAP

RWA · ZG Raiffeisen · RAIFFEISEN Big iT-ai GmbH · WINFIELD UNITED · MINFARMTECH · blugrape

agrosmart cultivo inteligente · DataFarm · Koppert · AGRIVI · dropsight · BOREALIS

TELECOMMUNICATION PARTNERS

vodafone · HUAWEI · orange · IPKO · NOKIA · inmarsat · Telefónica

SENSOR PARTNERS

IRROMETER · Sentek · METER · RIS · TOPCON · AquaCheck · spherag

INPUT INDUSTRY PARTNERS

YARA · syngenta · KWS · BASF We create chemistry · HZPC · ADAMA

CORTEVA agriscience · Limagrain from earth to life · MAÏSADOUR OUR CULTURE. YOUR WELL-BEING

JOANNEUM RESEARCH MATERIALS · FarmBeats Powered by Microsoft Azure

Stations & Dataloggers

METOS® VWS - Virtual Weather Station
miniMETOS
METOS® FWT
nMETOS Frost
nMETOS
µMETOS
iMETOS 3.3
LoRATH
LoRAIN
SolAntenna
iSCOUT®
CropVIEW®
WorkTrack
WorkTrack Tag
iMETOS MobiLab
N-Pilot
Dualex
ICA10
DropSight

METOS® VWS

The perfect entry point to precision agriculture. Use simulated data, calculated by highly reliable meteoblue weather models for any point on earth.

BEST USED FOR:
- Flat terrain monitoring
- No sensors = no maintenance
- Offers the same range of solutions as an actual weather station

SECTORS:
Agriculture, landscape, city climate

METOS® VWS - Virtual Weather Station

Order number: 800005

Virtual Stations exist for any point on the earth, for which meteoblue can derive weather data. The data is not the result from an actual METOS® station measurement, but consists of simulated data, calculated by highly reliable meteoblue weather models.

In some terrains, such as flatlands, the calculated data is highly accurate with minimal discrepancies to actual values, such as temperature or precipitation. These are the regions where virtual stations prove to be a great asset.

In cases where terrain is more complex or discrepancies from the actual values, we recommend installing a METOS® station.

DATA QUALITY

Air temperature	👍
Relative humidity	👍
Solar radiation	👍
Wind speed	👍
Precipitation	👎
Leaf wetness	👎
Soil temperature	👎

With actual case studies, METOS® VWS is under continuous improvements.
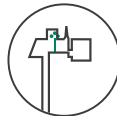
VIEW RESULTS ON OUR WEBSITE:

MAIN FEATURES

Calculated sensor variables equal to iMETOS IMT300 sensor set: wind speed, solar radiation, soil temperature, air temperature, precipitation, relative humidity and leaf wetness, along with calculated values of ET0, vapor-pressure deficit (VPD) and Delta T. All data and decision support services are accessible online through FieldClimate platform.

METOS® VWS vs METOS IoT STATION

	Virtual station	METOS IoT Stations
Variables	Same parameters as iMETOS IMT300 + soil temperature	Based on sensor set
Precision	Limited	High
Availability	Anywhere in the world	Only where the station is installed
Terrain	Not complex terrain	Any terrain
Maintenance	No maintenance	Regular hardware maintenance necessary
Suitability for high value decisions (frost, water management etc.)	Limited	High

THE ADVANTAGES

A perfect entry into precision agriculture with no maintenance cost

Offers the same range of solutions as an actual weather station

Very cost effective, simple to use and activated with just a few clicks on the computer or phone

Works as a complete decision support service - provides weather forecast, offers disease models and helps with work planning

miniMETOS

Compact, cost effective, small, quick to install, and designed for deployment where hardware needs to be hidden for aesthetic or operational reasons.

BEST USED FOR:
- Irrigation management
- Turf health monitoring

SECTORS:
Landscape (golf, turf, gardening), hydroponics and greenhouses, agriculture, city climate

miniMETOS

miniMETOS is a combination of most essential sensors for irrigation and stress management. It permanently measures soil temperature & volumetric water content (VWC) with Pessl Instruments Soil Moisture Sensor PI54-D and Watermark (soil moisture tension) in near real-time wherever you want. The installation of a logger can be completely underground (invisible); therefore, it is a perfect installation for golf courses, parks, home & garden, as well as in agriculture where vandalism and theft could be a problem. The device is battery powered with a lifespan between 6 to 12 months, and provides actionable data, such as the exact amount of soil moisture and the soil temperature in each inch/cm of the measurement area, to help you plan the irrigation event and to warn you about possible stress points in a timely fashion.

With miniMETOS all the potential issues and stress events can be identified before they occur or become visible.

KEY FEATURES:

- Permanent measurement of the soil moisture and soil temperature at any of your locations
- Invisible, so it doesn't affect the workers and the aesthetic of location (golf course, park etc.)
- No solar panel needed as long life battery powered based on the latest power harvesting technology
- 6 to 12 months of battery life and quick installation
- Cost-effective and durable
- Prevents possible vandalism

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP67)
Dimensions	14.8 cm L x 11.8 cm W x 9.3 cm H
Weight	0.25 kg
Connectivity	NB-IoT NB1 / Cat-M1 / GPRS
Power supply	3.6V primary battery cell
Measuring interval	15 minutes
Logging interval	15 minutes
Communication interval	60 minutes
SENSORS	
PI54-D	see page 128
Watermark	see page 134

INSTALLATION ON GOLF COURSE

Laying the cable - inserting the sensors in the main turf root zone.

Preparation of the irrigation box for the data logger.

Re-installing the lawn tiles to cover the sensors. 14 days later - "invisible".

METOS® FWT

Compact, cost effective, & quick to install ultrasonic height level monitoring device. Designed to monitor the water level depth in flooded rice fields and many other applications.

BEST USED FOR:
• Irrigation management in rice fields
• Improving plant growth and health

SECTORS:
Agriculture

METOS® FWT

METOS® FWT is an IoT device designed to monitor the water level depth in flooded rice fields in real time.

The solution supports farmers in the adoption of the Alternate Wetting and Drying (AWD) methodology or similar water-saving techniques.

METOS® FWT can be a very helpful tool supporting decisions to mitigate risks due to periods of water scarcity.

It is a ultrasonic height level monitoring device applicable in many different situations. The device comes with the top part and the tube needs to be sourced by the client or distributor locally to best fit the clients use case.

A COMPACT SOLUTION FOR YOUR RICE FIELD

| Save time | Reduce GHG emissions | Water savings (up to 20%) | Potential for higher yield | Plant health |

Alternate Wetting and Drying (AWD) is a water-saving technique for rice production. With the low-cost METOS® FWT technology, the manual practice is digitalized and rice growers get real-time continuous monitoring that results in:

- Saved time and money,
- More precise water applications,
- Decreased global warming potential thanks to the reduced GHG (methane) emission by healthier roots,
- Data that is automatically stored, sharable and accessible also for extension service field staff for better AWD knowledge transfer and management at the community level.

TECHNICAL SPECIFICATIONS

Dimensions	Length (mm): 170 mm max (diameter) Width (mm): 170 mm max (diameter) Height (mm): 95 mm max
Weight	0.400 kg
Connectivity	NB-IoT NB1 / Cat-M1 / GPRS
Power supply	Solar panel 2V, 0.5 Wp, 40X60 mm + Battery 12 Ah in superCap.
Measuring interval	5 minutes (default, customizable 10, 20, 30, 60 minutes)
Logging interval	15 minutes (default, customizable 10, 20, 30, 60 minutes)
Transfer Interval	15 minutes (default, customizable 30, 60 minutes)
SENSORS	
Ultrasonic distance sensor - Resolution	1 mm
Ultrasonic distance sensor - Working temperature	-15 °C to +60°C

Solar Panel

Ultrasonic Depth Sensor Datalogger & Connectivity Battery & Magnet

Tube

Tubes:
- need to be sourced locally and are not part of the delivered product,
- minimum 150 mm diameter,
- can be plastic, bamboo, ... don't use metal tubes.

nMETOS

Compact, cost effective, small, quick to install, and designed for large-scale deployment everywhere intelligent IoTs are needed.

BEST USED FOR:
- Field operations planning (workforce allocation, spray and irrigation planning)
- Improving plant protection with disease models
- Reducing the risk for animal health problems

SECTORS:
Agriculture, animal welfare, landscape (golf, turf, gardening), hydroponics and greenhouses, city climate, hydrology (county-wide rainfall networks)

nMETOS Frost

Spring frost can be a devastating experience for any farmer – not only can it damage the plants and/or crops in the field, it can completely destroy them. This way, a great deal of hard work, time and effort the farmer puts into planting and nurturing the fields are lost; in the worst case scenarios, it can mean an extreme financial loss as well.

nMETOS FROST is a product that helps you fight against frost damage in your field. It is a simple product made for one specific use case: detecting dry and wet bulb temperature and informing clients about the risks in real time based on the integrated logic inside the product. Simple to use, next to zero user settings required, easy battery exchange.

	nMETOS FROST
Precipitation	✖
Wet & Dry Bulb Temperature	✔
Air Temperature & Relative Humidity	✖
Volumetric Water Content	✖
Soil Temperature	✖
Soil Water Tension	✖
Leaf Wetness	✖
Dew Point	✖
VPD	✖
Delta T	✖

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP65)				
Dimensions	30 x 26 x 8 cm				
Weight	0,6 kg				
Connectivity	NBIoT NB1 / Cat-M1 / GPRS				
Power supply	2x standard D-type batteries				
Work modes*					
Measuring interval	5 min	1 min	1 min	1 min	5 min
Logging interval	10 min	5 min	1 min	5 min	10 min
Communication interval	60 min	15 min	5 min	15 min	60 min
Wet bulb temperature value	>= 8° C	=4° C < 8° C	< 4° C > -6° C	<= -6 C > -8° C	<= -8° C
SENSORS					
Wet bulb temperature, dry bulb temperature	**Temperature sensor:** DS18B20 **Operating temperature range:-**55 °C to +125 °C **Thermometer error:** -10 °C to +85 °C: ±0.3 °C **Drift:** ±0.2 °C				

*Measurement, logging and communication interval are fixed. They cannot be changed by the user from the FieldClimate Cloud platform.

Additional recommendations and notes:
- we recommend using extra 3 month weather forecast subscription
- batteries are easily exchangeable (2x D type batteries), the product comes without the batteries
- the 2x D batteries provide power for 100 days of usage

nMETOS FROST

Order number:
700252 (HL7800)
700253 (HL7802)

nMETOS 100, 180, 180SM, 200

nMETOS is the latest generations of weather stations that operates on NB-IoT network and can be connected to any existing NB-IOT/CAT-M/GPRS network. nMETOS can measure rainfall, air and soil temperature, relative humidity, leaf wetness, and soil moisture. All the data is synchronized within FieldClimate.

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP65)	
Dimensions	22.5 cm L x 17 cm W x 18 cm H	
Weight	1,10 kg	
Connectivity	NB-IoT NB1 / Cat-M1 / GPRS	
Power supply	3.6V primary battery cell	
	DEFAULT	**FROST MODE**
Measuring interval	5 minutes	5 minutes
Logging interval	15 minutes	5 minutes
Communication interval	15 minutes	5 minutes
SENSORS		
Rain Gauge	**Sensitivity:** 1 tip per 0.2 mm	
Air Temperature	**Operating temperature range:** -40 °C to +125 °C **Thermometer error -10 °C to +85 °C:** +/- 0.3 °C	
Relative humidity	**Precision 0 - 80 %:** +/- 2 %; **Precision 80 - 100 %:** +/- 3 %	

nMETOS 100
Order number:
700220 (HL7800)
700221 (HL7802)

nMETOS 180
Order number:
700222 (HL7800)
700223 (HL7802)

nMETOS 180SM
Order number:
700224 (HL7800)
700225 (HL7802)

nMETOS 200
Order number:
700228 (HL7800)
700229 (HL7802)

	nMETOS 100	nMETOS 180	nMETOS 180SM	nMETOS 200
Precipitation	✔	✔	✔	✔
Wet & Dry Bulb Temperature	✘	✘	✘	✘
Air Temperature & Relative Humidity	✘	✔	✔	✔
Volumetric Water Content	✘	✘	✔	✘
Soil Temperature	✘	✘	✔	✘
Soil Water Tension	✘	✘	✔	✘
Leaf Wetness	✘	calculated	calculated	✔
Dew Point	✘	calculated	calculated	calculated
VPD	✘	calculated	calculated	calculated
Delta T	✘	calculated	calculated	calculated

By using proprietary intelligent sensor handling, nMETOS provides additional calculated sensor of:

• Leaf wetness for disease forecast,
• VPD and Delta T for defining crop health and best weather for spraying window,
• Dew point for frost prediction.
• "Frost mode" is enabled from the FieldClimate app.

nMETOS 80, 80SM

nMETOS is a new generation of a battery powered IoT data logger that operates on NB-IOT/CAT-M/GPRS networks. It can be connected to any existing NB-IoT network. nMETOS measures air temperature, relative humidity and soil moisture. All the data is synchronized within FieldClimate. The nMETOS 80 and nMETOS 80SM product variants are designed for monitorig indoor conditions where the precipitation monitoring is not needed.

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP65)
Dimensions	14.8 cm L x 11.8 cm W x 9.3 cm H
Weight	0.25 kg
Connectivity	NB-IoT NB1 / Cat-M1 / GPRS
Power supply	3.6V primary battery cell
Measuring interval	5 minutes
Logging interval	15 minutes
Communication interval	15 minutes
SENSORS	
Air Temperature	**Operating temperature range:** -40 °C to +125 °C **Thermometer error -10 °C to +85 °C:** +/- 0.3 °C
Relative humidity	**Precision 0 - 80 %:** +/- 2 %; **Precision 80 - 100 %:** +/- 3 %

nMETOS 80, 80SM

nMETOS 80
Order number:
700216 (HL7800)
700217 (HL7802)

nMETOS 80SM
Order number:
700218 (HL7800)
700219 (HL7802)

	nMETOS 80	nMETOS 80SM
Precipitation	✖	✖
Air Temperature	✔	✔
Relative Humidity	✔	✔
Volumetric Water Content	✖	✔
Soil Temperature	✖	✔
Soil Water Tension	✖	✔
Dew Point	calculated	calculated
VPD	calculated	calculated
Delta T	calculated	calculated

By using proprietary intelligent sensor handling, nMETOS provides additional calculated sensors of:
- VPD and Delta T for defining crop health and best weather for spraying window,
- Dew point for frost prediction.

nMETOS
Use

THIS IS WHAT YOU CAN DO:

- Plan the work week based on a localized weather forecast for your operations
- Plan your work day based on the actual rain, temperature data and the daily weather forecast for your field
- Plan your spray program based on disease models and check the quality of spray work online
- Plan your irrigation based on ET-crop and predicted plant water use
- Pass data directly into your management software and Operations Center via automatic interface

Precipitation shown in FieldClimate

24-hour rain map

7-day rain map

nMETOS
Motherboards

nMETOS NB-IoT gen 3 (29-0404)

front

back
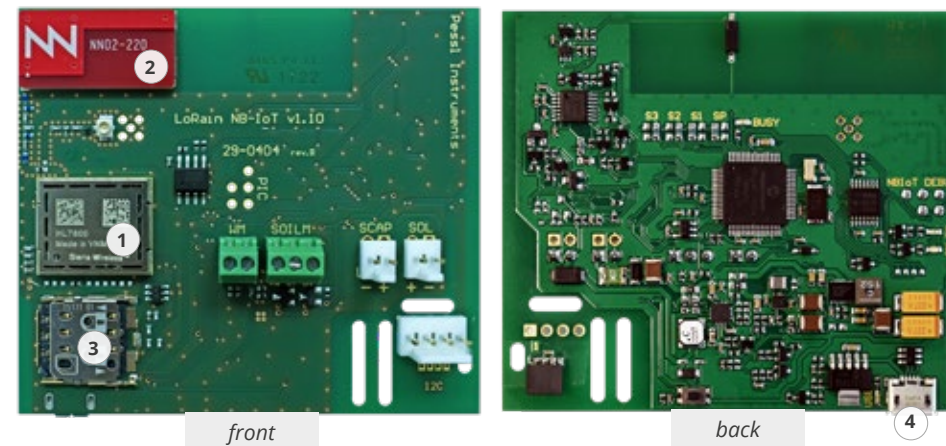
1 NB-IoT module   **2** Antenna   **3** SIM card holder   **4** USB micro B

µMETOS

Monitor environmental parameters (rainfall, air temperature and humidity, frost, leaf wetness, solar radiation and wind speed), soil variables (soil moisture and soil temperature), as well as water level, water EC and pH.

BEST USED FOR:
- Soil moisture monitoring and irrigation management
- Improving plant protection with disease models
- Frost monitoring & alarms

SECTORS:
Agriculture, landscape (golf, turf, gardening), city climate

FAMILY MEMBERS: µMETOS variations

μMETOS

μMETOS is a mainstream weather station product fulfilling 99% of its users needs. It uses the LPWAN connectivity (NB-IoT NB1/Cat-M1/GPRS), enabling low power consumption and long-distance connectivity. It supports monitoring of all climate parameters (rain, temperature), soil characteristics (soil moisture, soil temperature, electrical conductivity), water pressure, multisensor SDI12 probes etc. Data is consistently measured in 15-minute intervals and sent to the server every 60 minutes (this can be changed to fit the specific needs). For mitigating mobile network connectivity issues, the station stores data of the last few days internally and resends the measured values to the cloud when the mobile network is back online. All the data is synchronized and stored on FieldClimate platform, integrated with all additional services from Pessl Instruments and available for further integrations via API. It supports an external antenna option and has a built-in GPS sensor. For any other non-listed sensor support or special connectivity needs, check with your local sales contact.

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP65)
Dimensions	30 cm L x 16 cm W x 19 cm H
Weight	1.6 kg
Connectivity	NB-IoT NB1 / Cat-M1 / GPRS
Battery	6V charging battery with solar panel
Solar panel	Dimensions: 13.5 x 13.5 cm, 2 Watt solar panel

	DEFAULT	FROST MODE
Measuring interval	5 minutes	5 minutes
Logging interval	15 minutes	5 minutes
Communication interval	15 minutes	5 minutes

Product Variations

μMETOS BASE
Order number: 700035

μMETOS FROST
Order number: 700036

μMETOS 200
Order number: 700037

μMETOS 280-MWS
Order number: 700038

μMETOS 300-MWS
Order number: 700040

μMETOS 280-USW
Order number: 700039

μMETOS 300-USW
Order number: 700041

	μMETOS BASE	μMETOS FROST	μMETOS 200	μMETOS 280-MWS	μMETOS 300-MWS	μMETOS 280-USW	μMETOS 300-USW
Precipitation	✗	✗	✓	✓	✓	✓	✓
Wet & Dry Bulb Temperature	✗	✓	✗	✗	✗	✗	✗
Air Temperature & Relative Humidity	✗	✗	✓	✓	✓	✓	✓
Leaf Wetness	✗	✗	✓	✗	✓	✗	✓
Global Radiation	✗	✗	✗	✓	✓	✓	✓
Wind Speed	✗	✗	✗	✓	✓	✓	✓
Wind Direction	✗	✗	✗	✗	✗	✓	✓
Dew Point	✗	✗	calculated	calculated	calculated	calculated	calculated
VPD	✗	✗	calculated	calculated	calculated	calculated	calculated
Delta T	✗	✗	calculated	calculated	calculated	calculated	calculated

Optional: you can add soil temperature sensors (Aquacheck, Sentek, Watermark, PI54-D). Note that there are limitations how many sensors can be connected. For more details contact your local METOS® branch or your dealer.

µMETOS Motherboard
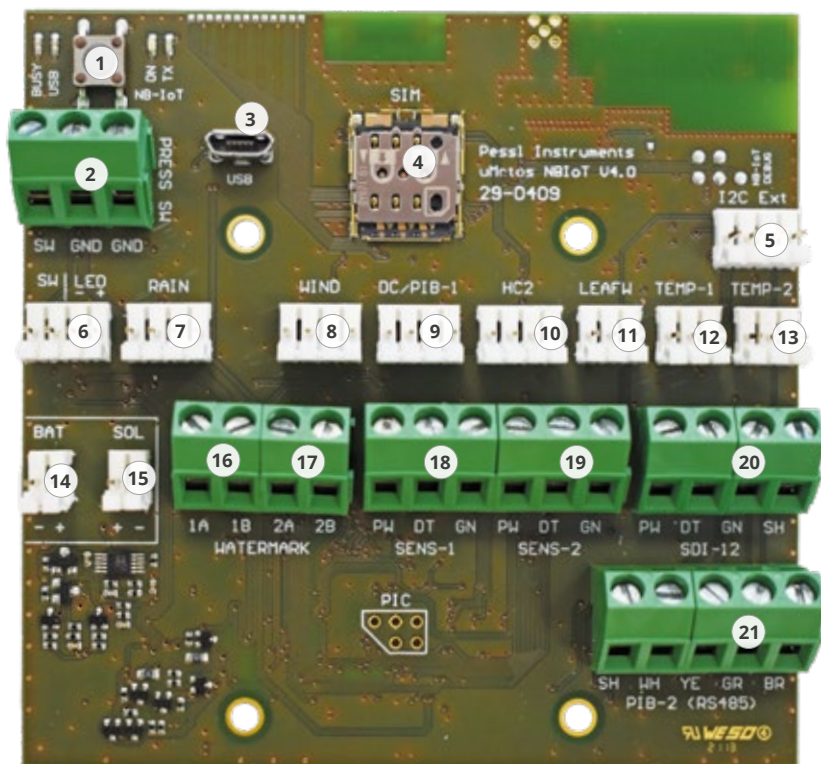
Gen. 4

1. Internal connectivity test button
2. Pressure switch input
3. USB port
4. SIM card slot
5. I2C input
6. External button with status LED
7. Rain gauge or Water meter input
8. Anemometer or Counter input
9. DC (Duty cycle) for Pyranometer or PI-Bus input
10. HC2 sensor input
11. Leaf Wetness input
12. Temp-1 (DS18B20) - dedicated air temperature input
13. Temp-2 (DS18B20) - dedicated soil temperature input
14. 6V Battery connector
15. Solar panel connector
16. Watermark input
17. Watermark input
18. PI-Bus input
19. PI-Bus input
20. SDI12 input
21. General PI-Bus input

iMETOS 3.3

iMETOS 3.3 is a special weather station product that supports many (> 600) different sensors. It is a powerful, durable and flexible data logger for all climatic and meteorological conditions or any other type of application users can think of.

BEST USED FOR:
- specific research projects,
- having multiple different sensors on one location,
- common agricultural needs:
- Improving plant protection with disease models,
- Soil moisture monitoring and irrigation management,
- Frost monitoring, alarms etc.

SECTORS:
Agriculture, animal welfare, research, meteorology, hydrology, landscape (golf, turf, gardening), city climate

iMETOS 3.3

A powerful, durable and flexible data logger for all climatic and meteorological conditions. They offer a complete solution for environmental monitoring, disease models, water management and more. Versatile, with the possibility to configure and connect many different sensors – over 600 sensors to choose from.

Additionally, you can connect Pessl Instruments proprietary radio network (*for technical information see page 92*) and up to 16 wireless sensor nodes within a farm, research block, golf course, park, …

TECHNICAL SPECIFICATIONS

Sensors layout	1 wind speed, 1 leaf wetness, 1 rain gauge, 1 water-meter (reed), 2 hygroclips (air temperature and relative humidity)
	5 digital inputs: automatic sensor recognition, supporting sensor chains (max. 600 sensors)
Extension connector	Radio access point or Sentek Drill & Drop or ultrasonic wind sensor or two extra chain connectors – Pessl Instruments bus cable nodes
Memory	8 MB flash memory
Internet connectivity	2G, 3G, 4G (LTE class 1, LTE class M)
Alert	SMS, user configurable via website
Dimensions without sensors	41 cm L x 13 cm W x 7 cm H
Weight without sensors	2.2 kg
Battery	6V, 4.5AH, Operating range: -35 °C to 80 °C
Solar panel	Dimensions: 13.5 x 13.5 cm, 2 Watt solar panel

	DEFAULT	FROST MODE
Measuring interval	5 minutes	5 minutes
Logging interval	15 minutes	10 minutes
Transmission interval	60 minutes	10 minutes
	iMETOS 3.3 base unit (no sensors included), internet based logger, battery 4.5Ah, solar panel, UMTS based, logger, mounting brackets	

Product Variations

	iMETOS IMT BASE	iMETOS IMT200	iMETOS IMT280-MWS	iMETOS IMT300-MWS	iMETOS IMT280-USW	iMETOS IMT300-USW
Precipitation	✖	✔	✔	✔	✔	✔
Air Temperature	✖	✔	✔	✔	✔	✔
Relative Humidity	✖	✔	✔	✔	✔	✔
Leaf Wetness	✖	✔	✖	✔	✖	✔
Global Radiation	✖	✖	✔	✔	✔	✔
Wind Speed	✖	✖	✔	✔	✔	✔
Wind Direction	✖	✖	✖	✖	✔	✔
Dew Point	✖	calculated	calculated	calculated	calculated	calculated
VPD	✖	calculated	calculated	calculated	calculated	calculated
Delta T	✖	calculated	calculated	calculated	calculated	calculated

iMETOS IMT BASE

Order number:
700120 (LTE RC7620)
700121 (CA LTE HL7688)
700122 (US LTE HL7618RD)
700124 (HL7802)

iMETOS IMT200

Order number:
700135 (LTE RC7620)
700136 (CA LTE HL7688)
700137 (US LTE HL7618RD)
700139 (HL7802)

iMETOS IMT280-MWS / iMETOS IMT280-USW

Order number
iMETOS IMT280-MWS:
700140 (LTE RC7620)
700141 (CA LTE HL7688)
700142 (US LTE HL7618RD)
700144 (HL7802)

Order number
iMETOS IMT280-USW:
700145 (LTE RC7620)
700146 (CA LTE HL7688)
700147 (US LTE HL7618RD)
700149 (HL7802)

iMETOS IMT300-MWS / iMETOS IMT300-USW

Order number
iMETOS IMT300-MWS:
700150 (LTE RC7620)
700151 (CA LTE HL7688)
700152 (US LTE HL7618RD)
700153 (HL7802)

Order number
iMETOS IMT300-USW:
700155 (LTE RC7620)
700156 (CA LTE HL7688)
700157 (US LTE HL7618RD)
700159 (HL7802)

iMETOS 3.3
Motherboard
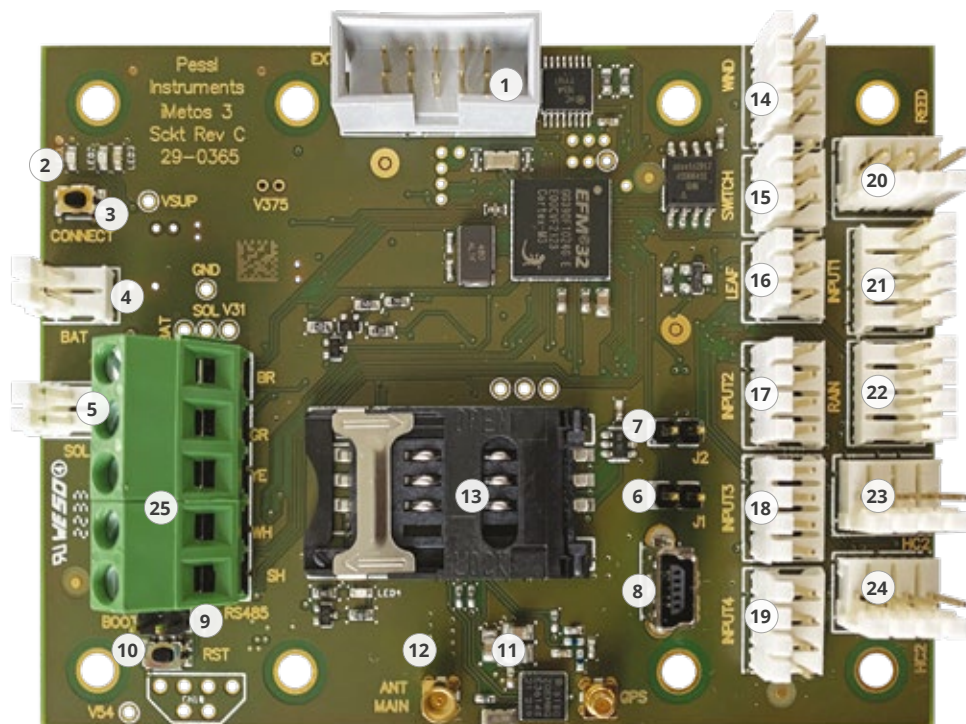
1. Extension board (Radio node)
2. LED indicators
3. Connect button
4. Battery
5. Solar panel
6. Jumper J1
7. Jumper J2
8. USB
9. Boot jumper
10. Reset button
11. GSM antenna
12. GPS antenna
13. SIM card holder
14. Wind speed
15. Switch
16. Leaf wetness
17. Input 2
18. Input 3
19. Input 4
20. Reed
21. Input 1
22. Rain gauge
23. Temperature & relative humidity (Hygroclip)
24. Temperature & relative humidity (Hygroclip)
25. Dedicated chain input

Turning Information Into Profits. www.metos.at

LoRATH

LoRATH is a new generation of a battery powered IoT data logger that operates on LoRAWAN network. It can be connected to any existing LoRaWAN® network. LoRATH measures air temperature, relative humidity, leaf wetness and soil moisture. All the data is synchronized within FieldClimate. The unit is prepared to be mounted mainly inside (tunnels, greenhouses, indoor applications).

LoRATH 80

Order number:
700021 (EU 863-870)
700022 (US 902-928)
700023 (AU 915-928)
700024 (RU 864-870)
700025 (AS 920-925))

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP65)
Dimensions	14.8 cm L x 11.8 cm W x 9.3 cm H
Weight	0.25 kg
Connectivity	LoRaWAN® Frequency plans: EU863-870, RU864-870, US902-928, AU915-928 and AS920-925
Power supply	Super capacitor charged with the solar pane
Measuring interval	5 minutes
Logging interval	15 minutes
Communication interval	15 minutes
SENSORS	
Air Temperature	**Operating temperature range:** -40 °C to +125 °C **Thermometer error -10 °C to +85 °C:** +/- 0.3 °C
Relative humidity	**Precision 0 - 80 %:** +/- 2 %; **Precision 80 - 100 %:** +/- 3 %

	LoRATH 80
Air Temperature	✔
Relative Humidity	✔
Dew Point	calculated
VPD	calculated
Delta T	calculated

LoRATH product uses LoRaWAN® communictation technology and is by default using the TTN LoRaWAN® network. For any specific LoRaWAN network (other than TTN) the client needs to fill out the order document available at https://metos.at/wp-content/uploads/2021/08/LPWAN-LoRaWAN-order-details-V1.4.pdf

LoRAIN

LoRAIN is a new generations of weather stations that operate on LoRaWAN® network. LoRAIN devices measures rainfall, air and soil temperature, relative humidity, leaf wetness, and soil moisture. All the data is synchronized within FieldClimate.

⚠ SPECIAL ORDERS ONLY

This product is available on special demand only. Contact your local METOS® distributor or contact **orders@metos.at** for more information.

LoRAIN Rain only

Order number:
700000 (EU 863-870)
700001 (US 902-928)
700002 (AU 915-928)
700003 (RU 864-870)
700004 (AS 920-925)

	LoRAIN Rain only
Precipitation	✔

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP65)
Dimensions	22.5 cm L x 17 cm W x 18 cm H
Weight	1,10 kg
Connectivity	LoRaWAN® Frequency plans: EU863-870, RU864-870, US902-928, AU915-928 and AS920-925
Power supply	Super capacitor charged with the solar panel
Measuring interval	5 minutes
Logging interval	15 minutes
Communication interval	15 minutes
SENSORS	
Rain Gauge	**Sensitivity:** 1 tip per 0.2 mm

LoRAIN product uses LoRaWAN® communictation technology and is by default using the TTN LoRaWAN® network. For any specific LoRaWAN network (other than TTN) the client needs to fill out the order document available at https://metos.at/wp-content/uploads/2021/08/LPWAN-LoRaWAN-order-details-V1.4.pdf

SolAntenna

SolAntenna is a wireless multipurpose electronic device providing automated real-time information. It was designed to collect, analyze and help with understanding storage conditions. It measures the most critical parameters: with CO_2, temperature and relative humidity in real time and where it is needed the most – in the middle of the storage.

Thanks to Solantenna, you'll always know the conditions in the storage which will help prevent damage/rotting before it occurs. Solantenna gives you 24/7 information about your storage conditions which leads to fine tuning the environmental conditions inside the storage units. Hot spots are easily detected so you won't have to use as many chemicals to mitigate the issue.

KEY FEATURES:

• Preventing crop and money losses
• Suitable for any type of storage (bulk or box)
• Precise and specific measurements for quick actions
• Completely wireless
• Easy to use and setup – start tomorrow
• Flexible solution for every grower, especially potato

TECHNICAL SPECIFICATIONS

VERSION 3.0 EC

Connectivity	LoRaWAN® Frequency plans: EU863-870, RU864-870, US902-928, AU915-928 and AS920-925
Measuring range (MR)	CO_2: 0 – 40.000 ppm
Temperature (MR)	-5°C – +60°C
Humidity (MR)	0% – 99% RH
Measuring accuracy (MA)	CO_2 ± 40 ppm +5% of the measured value
Temperature (MA)	± 0,5°C
Humidity (MA)	0% – 90%, ±1.8% RH, 90% – 95%, ± 2.3% RH 95% – 100%, accuracy ± 3% RH
Sensors Types	SCD41 0-40000ppm HYT-221 – temperature sensor TWLM1001 – humidity sensor
Measuring interval	5 minutes
Logging interval	15 minutes
Communication interval	15 minutes

*Important Note: SolAntenna needs to be connected to LoRaWAN® network to deliver the data.

LoRaWAN gateway

⚠ SPECIAL ORDERS ONLY

This product is available on special demand only. Contact your local METOS® distributor or contact orders@metos.at for more information.

Any LoRaWAN® product needs to be connected/provisioned on a LoRaWAN® network to work. You can either connect it to any existing LoRaWAN® network (that is in range) or you can order LoRaWAN® gateway at Pessl Instruments. By default, we use TTN network, integrations of downlinks and uplinks for other LoRaWAN network providers are charged separately on project basis. The preconfigured TTN indoor gateway can be ordered from us.

Camera products

A remote monitoring system that provides time-lap images that monitors insect pressure (iSCOUT®) and growth of your crops for stage of development, germination, disease issues and size of fruit (CropVIEW®).

BEST USED FOR:
- Preventing damage on crops and fields
- Reducing the use of pesticides or insecticides
- Early detection of diseases & insect pressure
- Yield forecast of fruit crops through AI on following crop growth

SECTORS:
Agriculture, animal welfare, research, landscape (golf, turf, gardening)

FAMILY MEMBERS: iSCOUT® variations & CropVIEW® variations

iSCOUT® - AI-Based Insect Scouting

iSCOUT® is a combination of hardware and software solutions for remote monitoring of different pest insects. It is an insect trap with integrated electronics and a sticky plate. Due to its low weight, it can be hung anyhwere in the field. The device is self-sufficient, as it is powered by a solar panel and a battery. 10 MP camera takes high-resolution pictures of the sticky plate within the iSCOUT® trap. Images are sent via LTE communications to an online platform where they are analyzed and counted by automatic pest detection framework, using AI and self-learning algorithms. All data from camera system and AI software is displayed online, within the FieldClimate. Camera devices (iSCOUT® or CropVIEW®) can be connected to control unit. Every power unit can also connect the following environmental sensors: rain, temperature and relative humidity (Hygroclip) and leaf wetness.
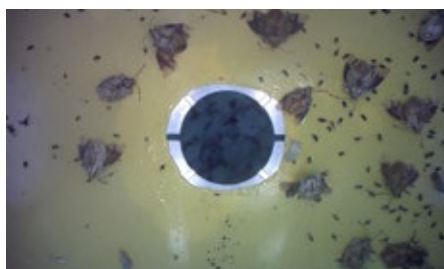
iSCOUT® Bug
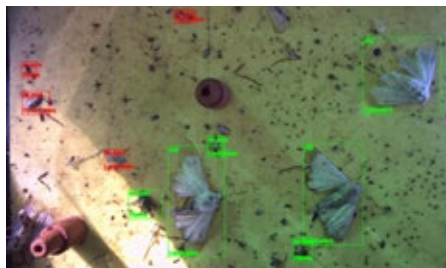
iSCOUT® uses automatic recognition algorithm for recognizing pests.
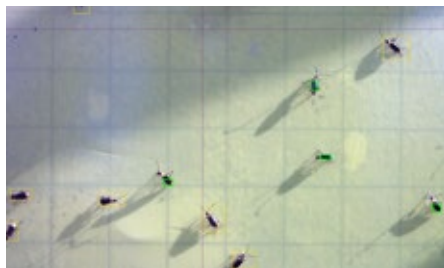
iSCOUT® Color Trap

TECHNICAL SPECIFICATIONS

Memory	1 GB	
Internet connectivity	LTE class 1	
GPS receiver	Yes	
Dimensions of trap housing without control unit	20 cm L x 15.5 cm W x 17 cm H	
Weight without control unit	0.93 kg	
Battery type	Rechargeable Lead acid battery 6V, 12 Ah	
Solar panel dimensions	17.5 x 17.5 cm, 7.2 Volt, 333 mA	
Camera	10 megapixel camera	
	CONTROL UNIT - SENSORS	**CAMERA - PHOTOS**
Measuring interval	5 min	taking photos: selected by the user (1 to max 3 times per day*)
Logging interval	15 min	
Transmission interval	60 min	after photo is taken
	Internet based monitoring device, solar panel, rechargeable battery, GPRS Logger, GPS sensor	

*Photo taking and transmission: depending on mobile network type: max 1 photo per day when using the GPRS connectivity and max 3 photos per day when using LTE connectivity. On closed traps it should be set at night (between 23:00 - 3:00).

Camera Control unit base with interface to camera devices and opportunity to connect environmental sensors (not included). Following sensors can be connected: Rain gauge, temperature, relative humidity and leaf wetness.

Control Unit Board

iSCOUT® Variations

iSCOUT® PHEROMONE

Designed and developed to catch insects with insect specific pheromone lure (**codling moth, european grape berry moth, tomato leafminer and many other species**). It includes a metal plate on which sticky paper and a pheromone lure can be applied.

Order number:
700160 (EU LTE HL7692)
700161 (CA LTE HL7688)
700162 (US LTE HL7618RD)
700163 (HL8548)

iSCOUT® BUG

Designed and developed to catch bugs (**marmorated stink bug and others**). It includes a metal bottom plate with black pyramid wings and has closed side entries. Once the bug enters the trap from the bottom, it is fixed on the plate.

Order number:
700164 (EU LTE HL7692)
700165 (CA LTE HL7688)
700166 (US LTE HL7618RD)
700167 (HL8548)

iSCOUT® FRUIT FLY

Designed and developed to catch fruit flies (**spotted wing drosophila, olive fruit fly, mediterranean fruit fly and many other species**). It includes 3 mm nettings on entries, so that bigger flies (house flies) cannot enter the trap. Tank system for lure and metal plate on which sticky paper is applied are included. To catch and monitor bigger flies, nettings can be removed.

Order number:
700172 (EU LTE HL7692)
700173 (CA LTE HL7688)
700174 (US LTE HL7618RD)
700175 (HL8548)

iSCOUT® COLOR TRAP

Designed and developed to monitor sticky traps of different colors. The device comes with high resolution camera and a holder for a sticky plate.
Catching various insects depends on the color of the plate used:
- blue: *frankliniella occidentalis, thrips tabaci, ...*
- yellow: **white flies, leafminers, sciarid flies, ...**
- white: **apple sawfly, plum sawfly, plum fruit sawfly, raspberry beetle, ...**

Order number:
700168 (EU LTE HL7692)
700169 (CA LTE HL7688)
700170 (US LTE HL7618RD)
700171 (HL8548)

CropVIEW® - AI-Based Crop & Growth Monitoring Solution

CropVIEW® is an agricultural information system, which periodically takes high-res photos of farmland, research plots, crop canopies, orchards etc. Photos are automatically uploaded to FieldClimate, thus allowing a constant crop quality and yield control. The high-res pictures enable checking seeds for germination, monitoring the effect of fertilizers and pesticides on crop development, and help decide whether a disease or pest already threatens profitability. Images can be viewed and analyzed daily over time without any additional effort. The system operates with rechargeable battery and a solar panel all year round in most climatic zones. Camera devices (iSCOUT® or CropVIEW®) can be connected to control unit. Every power unit can also host the following environmental sensors: rain, temperature and relative humidity (Hygroclip) and leaf wetness.

TECHNICAL SPECIFICATIONS

Housing	Power supply and sensor support box: 41 cm L x 13 cm W x 7 cm H
Weight without sensors	2.2 kg
Camera module	Stainless steel base with IP65 box 27 cm L x 17 cm W x 9 cm H, weight: 1.5 kg
Power supply	6 V lead acid 12Ah battery with solar panel
Model/Type	Cortex M4 processor module with integrated Communication model for UMTS/LTE operation
Camera and optics	MT9J003 10 Mega Pixel 2/3" CMOS sensors - Optics DSL377A-650-F2.8 2/3" Lens with 2.5 mm Focal length and DSL901J-650-F3.0 2/3" Lens with12 mm Focal Length
Control Unit	Camera Control unit base with interface to camera devices and opportunity to connect environmental sensors (not included). Following sensors can be connected: Rain gauge, temperature, relative humidity and leaf wetness.

	CONTROL UNIT - SENSORS	CAMERA - PHOTOS
Measuring interval	5 min	taking photos: selected by the user (1 to max 3 times per day*)
Logging interval	15 min	
Transmission interval	60 min	after photo is taken

CropVIEW VARIATIONS:

CropVIEW® Panorama
One 10 MP Wide Angle Lens
Order number:
700176 (EU LTE HL7692)
700177 (CA LTE HL7688)
700178 (US LTE HL7618RD)
700179 (HL8548)

CropVIEW® Tele
One 10 MP Tele Lens
Order number:
700180 (EU LTE HL7692)
700181 (CA LTE HL7688)
700182 (US LTE HL7618RD)
700183 (HL8548)

CropVIEW® Dual
Two 10 MP Lenses - Wide Angle and Tele
Order number:
700184 (EU LTE HL7692)
700185 (CA LTE HL7688)
700186 (US LTE HL7618RD)
700187 (HL8548)

Images, taken by CropVIEW®.

A tool in FieldClimate enables you to select specific fruits on pictures taken in your orchard or field by a zoom lense in CropVIEW®. If you know the precise distance between the camera and crop, you will get a reliable measurement of fruit diameter in mm.
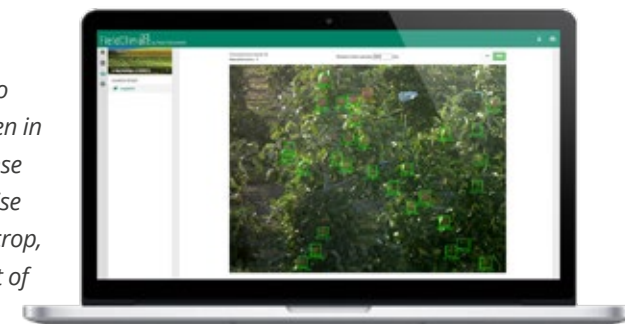
APPLE ORCHARD USE CASE

Tele lens focusing on a tree and detecting the apples automatically (CropVIEW automatic detection).

Marking apples by hand and following their growth during the season.
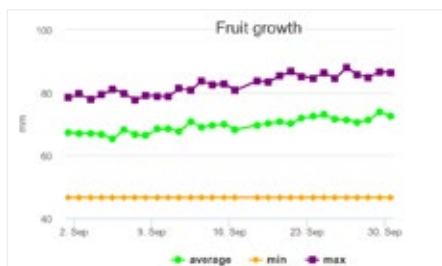
The minimum, maximum and average diameter (in mm) of all selected fruits is shown on a graph, and the exact values in a table.

VITICULTURE USE CASE

Following the growth of shoots and developing leaves.

Inflorescence of grapes is clearly seen on the photos.

SERIES OF PICTURES IN MAIZE/WHEAT USE CASE

Germination and emergence of wheat.

Different BBCH stages of wheat, for example tillering stages.

Following the uniform emergence and growth of maize daily.

With CropVIEW® you receive a time lapse of your crop growth. Check the time lapse of maize growth here:

https://youtu.be/V_ZXBSD_7XQ

WorkTrack

A battery-powered versatile tracking device that is easily mounted on any asset (sprayer, mower, utility vehicles, tractors, carts, …).

BEST USED FOR:
- Detailed activity report about where, when, and how much an asset has been operational
- Optimisation and enhancement of work and workforce planning
- Knowing current position of all active machines

SECTORS:
Agriculture, landscape (golf courses, parks), city climate

FAMILY MEMBERS: WorkTrack, WorkTrack Tag

WorkTrack

With WorkTrack you have your fleet always under full control - you know exactly when your drivers are coming and going.

The WorkTrack agriculture GPS tracking unit combined with the WorkTrack Tags feature allows you the capability of both fleet tracking and asset tracking, to manage your entire farm from equipment to employees.

On our FieldClimate platform, you see your vehicles and implements and have all data stored about where and which operations you have running. Together with your connected METOS® weather station, you can see the application of wet or dry fertilizer or chemical as well as any farm delivery, grain transport, over-the-road trucking, seed delivery, and equipment rental on the mobile phone/iPad or desktop. WorkTrack connects all farming equipment automatically and swiftly. Companies that have implemented the WorkTrack have improved their efficiency by 25-30% while decreasing fuel consumption by 15%. Most companies have seen these benefits within their first 30 days of activation.

TECHNICAL SPECIFICATIONS

Connectivity	LTE & 2G module for multi-regional use; Cat M1/NB1 deployed bands: 2, 3, 4, 5, 8, 12, 13, 20, 26*, 28*; EGPRS quad-band, 850/900/1800/1900 MHz (* roaming bands) with internal high gain antenna
GNSS	GPS, GLONASS, GALILEO, BEIDOU, accuracy < 3m, internal high gain GNSS antenna
Housing	UV resistant polycarbonate plastic (Protection class IP67)
Power	(+6...+30) V DC via car power plug or with internal capacitor with solar panel
Communication	It uses UDP protocol for data delivery to FieldClimate platform
Dimensions	72,5 x 73 x 27 mm

WorkTrack:

- Records a GPS position and speed every 5 seconds and transfers the data every 30 seconds to FieldClimate.
- It is activated with vibration and movement and records the first position when the super capacitor is sufficiently charged.
- The super capacitor can hold charge when connected to a permanent power source (tractor battery).
- In sleep mode the current uptake is below 100µAmp. It can empty a fully charged 75Ah battery within 750 000 hours. When it is connected to a switched-on power source the super capacitor will discharge within 24 hours after being disconnected from power.

This is what you get with WorkTrack:

- A detailed activity report about where, when, and how much the machine has been running
- Current positions of all active machines
- Enhanced work planning

Service fee is free of charge in the first year.

WorkTrack used on a golf cart.

WorkTrack Tag

Order number: 100423

The new WorkTrack Tag is a low-cost yet fast and easy to use device that connects your machines - to save time, resources, improve productivity and profitability. With WorkTrack Tag together with WorkTrack all your machines will be connected to the FieldClimate. You can track all your tractors, support vehicles and machines all in one place.

WorkTrack Tag comes with real-time views that include:
• GPS Location
• Hours & Mileage
• Location History
• Heading, Speed and more

Together with FieldClimate, we made it easy to monitor all your machines (tractors, support vehicles, fuel trucks, sprayers, and others). By attaching an WorkTrack Tag to whichever machine you like you'll be able to track:
• Maintenance of the device
• Work scheduling
• Fuel Logs and Automated Reporting
• Dispatching
• Movement and prevent theft

HOW DO WORKTRACK AND WORKTRACK TAG WORK TOGETHER?

The connection between the two is fast and they work together
• to maximise the efficiency of the workforce
• completely transparent fleet tracking

WorkTrack tags are automatically recognised by WorkTrack tracker and are transmitted to the FieldClimate.

You mount the WorkTrack on your tractor and each WorkTrack Tag to the device, vehicle or any other machine you want tracking.

1 WorkTrack = up to 20 WorkTrack Tags

iMETOS MobiLab

Indispensable tool for sap and soil-analysis.

BEST USED FOR:
- Precise NO_3 and NH_4 soil analysis
- Precise NO_3, NH_4, Na, Cl, SO_4, K, Ca and Mg analysis from plant sap
- Defining usage of fertilizers and pesticides
- Lowering the impact on the environment (water, biodiversity, soil, ...)

SECTORS:
Agriculture, hydroponics and greenhouses, landscape, city climate, research

iMETOS MobiLab – Soil, Water and Plant Sap Analytics

Successful crop growing needs an optimized use of fertilizers. At Pessl Instruments we have developed a product line to support horticulture and agriculture in this field.

REMOTE PLANT SENSING

The new FarmView services integrate Sentinel-2 Earth observations. This helps to determine homogeneous and inhomogeneous zones inside the fields. From this data, we can retrieve a useful soil sampling pattern.

SAMPLING AND MEASUREMENT

The **iMETOS Soil Sampler app** records the position of the sample and the sampling time. It assigns a unique identifier (UI) to each soil and plant sap sample. After saving the UI, sampling time and position are stored and can be synced with the LOAC Software (Windows 7 or newer). The MobiLab LabOnAChip® measures soil samples via capillary electrophoresis (CE) on small microfluidic chip in an automated manner. An internal standard (ISTD) needs to be added to the sample before measuring.

PLANT SAP AND WATER

The **iMETOS MobiLab Lab-on-a-Chip SAP** contains everything needed for measuring plant sap. With a simple garlic press and some plastic gear one can easily take samples from leaves. The iMETOS MobiLab Lab-on-a-Chip WATER can be used to monitor irrigation water.

SOIL

The **MobiLab Soil Extraction** set contains the hardware to take a soil sample and prepare an extract for further measurement. The set contains a sieve and a bowl to homogenize the solid soil sample. A tube inside a tailor-made balance takes the sieved sample up. Distilled water is then added. The balance records the actual share of the sample and the water; thus error tolerant working becomes possible. Afterwards, the tube is placed on a shaker and left there for 30 minutes to extract the nitrogen compounds. Balance and shaker communicate with the MobiLab software via a USB-hub.

The **iMETOS Mobilab Lab-on-a-Chip SOIL** supplies the Lab-on-a-Chip and the necessary plastic ware to undertake the subsequent soil measurements.

iMETOS MobiLab Lab-on-a-Chip® (soil, water or plant sap)

Sample volume	50 -100 µl
Measurment range	3-1000 ppm; 0.01-0.5 g/kg
Resolution	0.5 ppm; 1 mg/kg
Accuracy	For measurements of liquid concentrations (ppm): ±3 % For measurements of soil concentrations (mg/kg): ±15 %
Chip lifetime	Approximately 300-500 tests
Battery life	2 hours of measuring time

CONSUMABLES

Chemical solutions, plastic ware, filters and microfluidic chips will need to be replaced after every 300 measurements. **iMETOS MobiLab SOIL Consumables, iMETOS MobiLab WATER Consumables** and **iMETOS MobiLab SAP Consumables** deliver everything needed for the next 300 measurements. If one wants to change from soil measurement to plant sap and vice versa it will be enough to equip your system with the necessary tools and consumables.

iMETOS MobiLab SOIL EXTRACTION®

Power supply	12 V adaptor for wall outlet
Battery	2 h working time

SINGLE NUTRIENT MEASUREMENT

The **iMETOS NO$_3$ Electrode** is an ion selective electrode (ISE) capable of measuring nitrate. After a two point calibration the Electrode is immersed in the soil extract and returns the concentration of nitrate immediately. This value can be entered into the iMETOS MobiLab Software.

Waterproof	IP67
Concentration range	7×10^{-6} to 1 M (0.1 - 14,000 ppm as N)
pH range	2.5 to 11 pH
Temperature range	0 to 50°C
Electrode resistance	1 to 4 megohms
Reproducibility	+/- 4%
Minimum sample size	3 ml in a 50 ml beaker
Size	Electrode length: 155 mm
	Body diameter: 12 mm
	Cap diameter: 16 mm
	Cable length: 100 cm
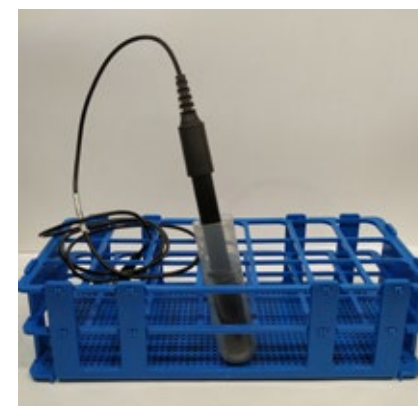
N-Pilot

A handheld, portable sensor that detects the nitrogen nutritional status of plants.

BEST USED FOR:
- measuring the nitrogen nutritional status of crops
- determining fertilization application

SECTORS:
Agriculture
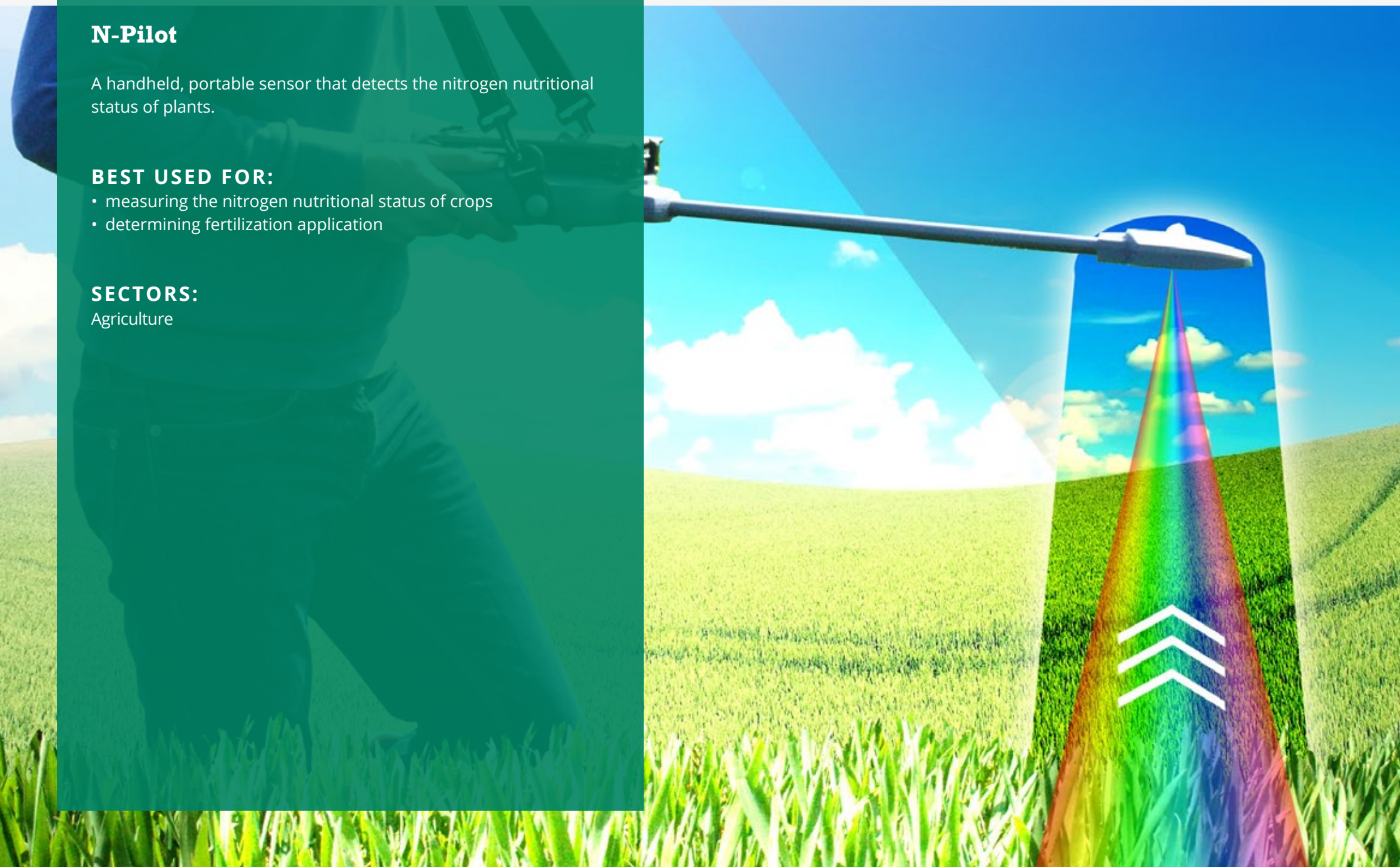
N-Pilot

N-Pilot® is a portable reflectometer, measuring the nitrogen nutritional status of crops by assessing the plants chlorophyll content and the amount of biomass.

N-Pilot® provides a nitrogen fertilization recommendation that includes all top-dressings for cereals and the total N-requirement for rape seed after winter.

THE FERTILIZATION ADVICE CONSIDERS THE FOLLOWING PARAMETERS:
- Crop variety
- Expected yield
- Growth stage of the crop
- Protein target (grain protein content)

KEY FACTS
- The diagnosis is fast, reliable and cost effective.
- It provides direct nitrogen fertilization advice in the field.
- Controls and optimizes both yield and protein content.
- There are no subscription fees or any extra costs.
- A robust and autonomous device adapted to the regional specifics.
- It can be used by multiple users.
- Crop varieties are updated regularly by Borealis L.A.T

EASY MEASUREMENTS FOR IMMEDIATE RESULTS

Measurements with N-Pilot® are carried out in 20 seconds while moving through the field.

The ease of use facilitates the assessment of varying nitrogen demand across the field, calculating fertilization requirements accordingly.

A field diagnosis can include multiple N-Pilot® measurements.

Dualex

Indispensable tool for nitrate and clorophyl measurement.

BEST USED FOR:
- indicating plant nitrogen status
- fertilizer application & spray planning

SECTORS:
Agriculture, hydroponics and greenhouses, landscape, research

Dualex - Instant non-destructive Nitrate and Clorophyl Measurement

Dualex is a leafclip sensor which measures chlorophyll and polyphenols content of plant leaves. Thanks to a patented technology, this optical sensor allows simple, fast, and non-destructive measurement of chlorophyll, flavanols and anthocyanins in leaves.

ACCURATE MEASUREMENT OF CHLOROPHYLL

Chlorophyll plays a vital role in photosynthesis and plant development. Dualex measures the chlorophyll by analyzing the light transmitted through the leaf. Thanks to a chemical calibration made by FORCE-A, the chlorophyll is given in µg/cm² in the range of 5-80 µg/cm².

UNIQUE LEAFCLIP SENSOR TO MEASURE FLAVONOLS AND ANTHOCYANINS CONTENT IN LEAVES

Flavanols are mainly synthetized after light exposure. As a consequence, they are a good indicator of plant-light interaction history. Dualex measures flavonols and anthocyanins by analyzing the screening effect of flavonols and anthocyanins on chlorophyll fluorescence. Flavonols and anthocyanins content are given in relative absorbance units from 0 to 3 for flavonols and 0 to 1.5 for anthocyanins.

NBI®: NITROGEN BALANCED INDEX

Chlorophyll is often used as an indicator of plant nitrogen status. Several years of research and experimentation showed that polyphenols, specifically flavonols, are also good indicators of nitrogen status of plants.
NBI® (Nitrogen Balance Index) combines chlorophyll and flavonols (related to nitrogen/Carbon allocation). It's a nitrogen plant status indicator directly correlated with massic nitrogen content. The NBI® is less sensitive to the variations of environmental conditions than the chlorophyll (leaf age, leaf thickness...).

TECHNICAL SPECIFICATIONS

Measuring material	Plant leaves
Measuring system	Transmittance and screening effect on chlorophyll fluorescence
Index measured	Chlorophyll (CHL), Flavonols (FLAV), anthocyanins (ANTH), NBI
Accuracy	5%
Reproducibility	4,5% for CHL, 3,5% for FLAV and ANTH
Repeatability	1,3% for CHL, 2% for FLAV and ANTH
Area measured	19,6 mm²
Leaf thickness	1.5 mm maximum
Measurement time	< 1 s
User interface	LCD screen, Sound warning
Positioning	Internal GPS
Relative accuracy	< 2,5 m (CEP, 50%, 24 h static)
Storage capacity	10 000 multiparametric data
Data output	.csv file
Data transfer	USB
Operating temperature	From 5 to 45 °C
Battery	Li-ion rechargeable
Autonomy	6 hours
Total weight	220 g
Size	205 x 65 x55 mm

ICA10

A smart system which uses the data from a pressure switch to monitor and to operate irrigation systems.

BEST USED FOR:
• Optimisation of irrigation cycles
• Optimisation of fertigation cycles
• Monitoring and operating the irrigation system

SECTORS:
Agriculture

ICA10

Order number: 100424

ICA10 is a smart system which uses the data from a flow sensor switch to monitor and operate irrigation system. With the help of partner platform Spherag, sensors for soil moisture, temperature, relative humidity, wind, rain, water counter, pressure transducers etc. can be used to automatically switch on and off the solenoids. ICA10 works with most common solenoids from Baccara, TORO, Rainbird, Netafim etc. to make irrigation/fertigation cycles more intelligent, based on real-time data and real plant requirements.

ICA10 applications

TECHNICAL SPECIFICATIONS

Sensors Layout	Automatic ON/OFF switch, Pressure detector
Memory	Microprocessor
Internet connectivity	NB-IoT
Alert	Notification, user configurable via website Remotely operated
Weight without sensors	246.5 g
Measuring interval	Real time
Logging interval	Real time
Internet contact	Real time
Battery	3,7V, 3AH, Operating range: -15° C to 60° C
Solar panel	Dimensions: 45 x 70 cm, 0,4 Watt solar panel
Outputs	1 bi-directional Latch valves (DC) . Outcome 14V

Data in Spherag platform

DropSight

Easy-to-use tool for measuring spray deposition efficiency of the formulation on natural plant surfaces.

BEST USED FOR:
- Measuring spray deposition efficiency of the formulation on natural plant surfaces

SECTORS:
Agriculture

DropSight - Sprayer calibration and deposition management

Order number: 500167

DropSight is an easy-to-use, scientifically developed tool for measuring spray deposition efficiency of the formulation on natural plant surfaces. Through the specially designed photographic laboratory (LeafLab), UV fluid (UView) and the DropSight® app for a smartphone, one can stop guessing and make informed decisions based on quantitative measurements of spray deposition.

The DropSight app, combined with LEAFLAB and UVIEW, offer the complete solution to a quantitative analyses of UV tracer deposition levels on leaf surfaces.

LeafLab is a portable, on-site laboratory, purposely developed for plant leaf UV photography with DropSight® to quantify the deposition efficiency onto a crop within minutes of application. UV led lightning with wavelength, intensity and uniformity to optimise fluorescence for smartphone photography when using UView tracer, completes the technical specification. The UView fluorescent fluid is recognised by DropSight software and the deposition efficiency is measured and calculated.

Typical DROPSIGHT results

VALUE PROPOSITION

- Reduce the risk of poor biological control outcomes due to poor sprayer set up and spray deposition.
- Reduce the risk of unacceptable residue levels due to accumulation and run off resulting from too high volume and/or too large droplet spectrum used.
- Reduce the chemical losses due to run off resulting from excessive spray volumes.
- Reduce the risk of soil and ground water contamination due to excessive spray volumes.
- Evaluate and quantify the risk of drift on neighbouring crops.
- Optimize the use of chemical formulations preventing over- and under application, minimizing crop loss and potential resistance development.
- Optimize the selection and use of adjuvants and additives to improve deposition efficiency.
- Optimize the design of sprayer performance.
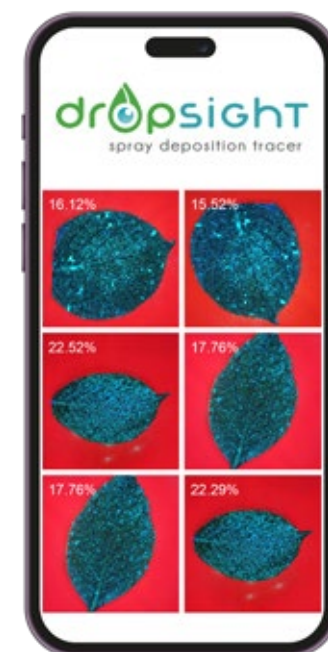
Sensors

iMETOS RadioNode
Interfaces
Wind
Temperature
Soil Temperature
Leaf
Precipitation
Soil Moisture
Water
Snow
Light
Barometer
Plant
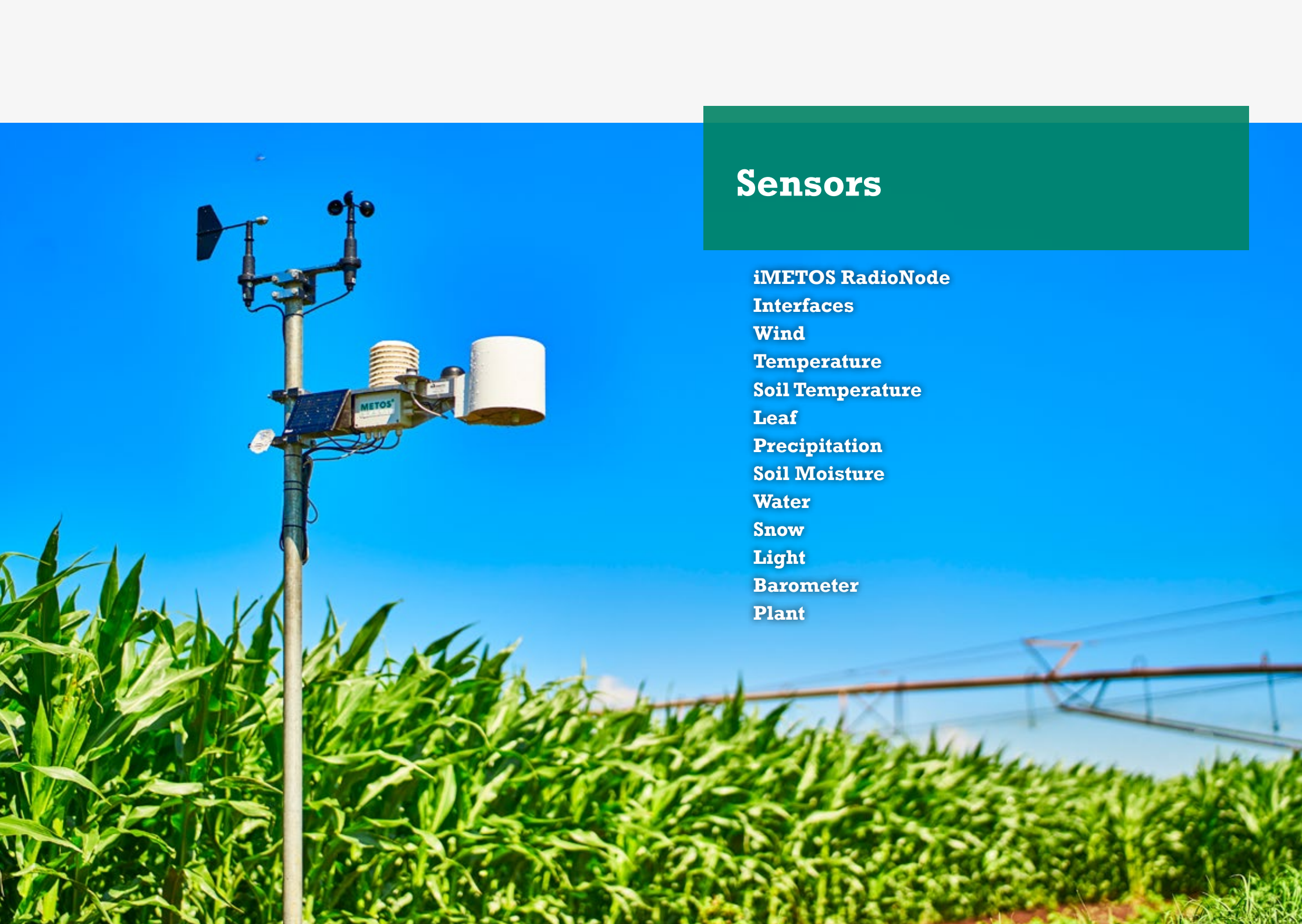
iMETOS RadioNode Interface

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 star topology network back to our base station. From the base station, the data is uploaded to the web via cellular network (GPRS, UMTS). All data is available within the FieldClimate platform. To connect iMETOS RadioNode to the iMETOS 3.3, RF Access Point is needed.

TECHNICAL SPECIFICATIONS

Housing	UV resistant polycarbonate plastic (Protection class IP67)
Dimensions without sensors	30 cm L x 16 cm W x 19 cm H
Weight without sensors	1.6 kg
Model/Type	Texas Instruments RF CC1120 module with integrated ultra low power sub-GHz; transceiver module; integrated crystal, internal voltage regulator, built in antenna global; using free ISM bands, ISM Band 915 MHz: USA, Canada, Australia, Israel etc.; ISM Band 868 MHz: Europe; ISM Band 433 MHz: Asia
Expected range	300 to 400 meter (1200 to 1400 ft.) at +10 dBm, broad line of sight, when mounted on level ground at least 3 m (10 ft.) high and above crops, grass, bushes or foliage

CONNECTION TO MOTHERBOARDS
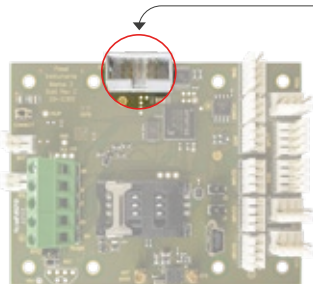
iMETOS 3.3

Internal wireless access point allows you to connect up to 16 RadioNodes to the main station.

Remote Sensor Node Variations
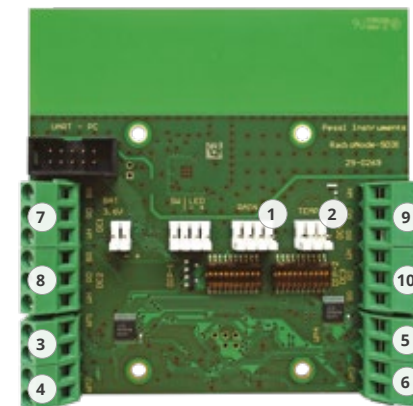
SD31 iMETOS RadioNode Watermark/ METER with inputs for:
1. Rain gauge 0.2 mm (0.01 inch) / Water meter
2. Temperature sensor (WMTEMP)
3.-6. Watermark sensor
7.-10. PI54-D
Power Supply: One 3.6V Li-Ion primary cell with 19.000mAh (7 years operation)

SD51 iMETOS RadioNode Drill & Drop with inputs for:
1. Rain gauge 0.2 mm (0.01 inch) / Water meter
2. Sentek Drill & Drop probe
3.-4. Watermark sensor
5.-6. PI54-D
7. Solar panel
8. 6V, 4.5Ah battery connector
9. External antenna
Power Supply: Solar panel and 6V Pb 4.5Ah battery
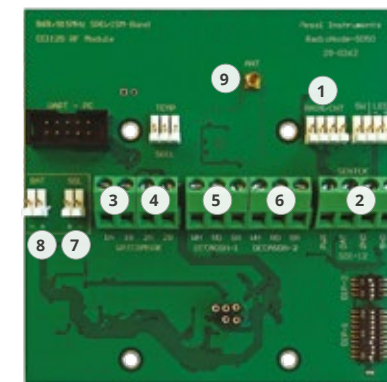
⚠ **SPECIAL ORDERS ONLY**

This product is available on special demand only. Contact your local METOS® distributor or contact **orders@metos.at** for more information.

Chain Node Interface for 3 Pessl Instruments Sensors

Order number: 600069 / 900052 / 900173

This Interface enables the connection of up to 3 PI54-D sensors to a METOS® weather station. The Interface can be an External box for iMETOS 3.3 (ECH870EXT).

YOU CAN CONNECT:

The following Pessl Instruments sensors:
• Vacuum Tensiometer
• Water Level Sensor
• Pipe Water Pressure Sensor
• PI54-D

CONNECTION TO MOTHERBOARDS
iMETOS 3.3
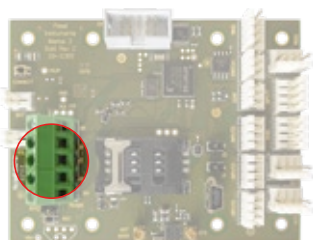
Chain Node Interface for 2 Pessl Instruments Sensors & 2 Watermark Sensors & 1 Soil Temperature Sensor

Order number: 600068 / 900051 / 900174

This Interface enables the connection of up to 5 soil sensors to a METOS® weather station. It is possible to connect 2 PI54-D sensors, 2 Watermark sensors and 1 soil temperature sensor.
The Interface can be an External box for iMETOS 3.3 (ECH871EXT).

YOU CAN CONNECT:

Two pieces of the following sensor:
• Watermark sensor

One piece of the following sensor:
• Soil Temperature (WMTEMP)

Two pieces of the following Pessl Instruments sensors:
• Vacuum Tensiometer
• Water Level Sensor
• Pipe Water Pressure Sensor
• PI54-D

CONNECTION TO MOTHERBOARDS
iMETOS 3.3
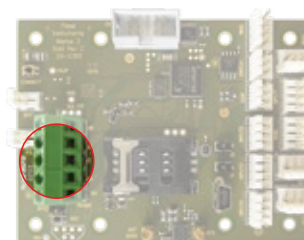
Chain Node Interface for 1 Pessl Instruments Sensor & 4 Watermark Sensors & 1 Soil Temperature Sensor

Order number: 600167 / 900057 / 900175

This Interface enables the connection of up to 6 soil sensors to a METOS® weather station. It is possible to connect 1 PI54-D sensor, 4 Watermark sensors and 1 soil temperature sensor.
The Interface can be an External box for iMETOS 3.3 (ECH874EXT).

YOU CAN CONNECT:

Four pieces of the following sensor:
• Watermark sensor

One piece of the following sensor:
• Single Soil Temperature

One piece of the following Pessl Instruments sensors:
• Vacuum Tensiometer
• Water Level Sensor
• Pipe Water Pressure Sensor
• PI54-D

CONNECTION TO MOTHERBOARDS
iMETOS 3.3
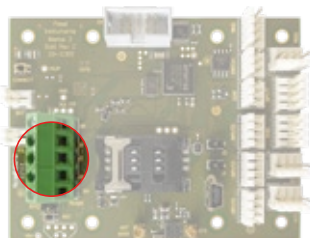
SDI12 Chain Node Interfaces with 2 iMETOS AC/Sentek Connectors

Order number: 600150 / 900105

These Interfaces enable the connection of up to 2 iMETOS AC or 2 Drill & Drop probes. The Interface can be an External box for iMETOS 3.3 (SDI12_Chain).

YOU CAN CONNECT:

Two pieces of the following probe:
• iMETOS AC different types
• Sentek Drill & Drop different types

SDI12_Chain
External Chain Interface

SDI12 V2 Internal Interface
for 2 Soil Moisture Probes

CONNECTION TO MOTHERBOARDS
iMETOS 3.3
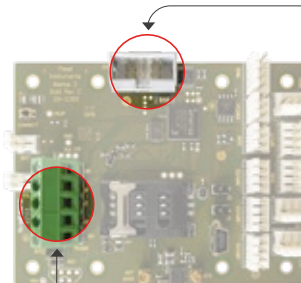
SDI12_X2
SDI12_Chain

Pessl Instruments Ultrasonic Wind Sensor

Order number: "600023 / 900028 (µMetos), 600064 / 900047 (IMT)"

Pessl Instruments ultrasonic wind speed sensor is a two-dimensional sonic wind sensor, built specifically for agricultural, forestry, and environmental research applications. It calculates average and maximum (gust) wind speed and direction over 5 minutes interval.

TECHNICAL SPECIFICATIONS

Output data format	PI-bus
Information transmitted	Vectorial average wind speed, gust and direction
Output rate	1-10 min
Wind module sensitivity	0.12 m/s
Wind module resolution	0.05 m/s
Wind module dynamic	0.5 to 40 m/s
Direction sensitivity	+/-1.5°
Direction resolution	1°
Power supply	3.7V to 6V with supercap
Electrical consumption	0.5 mA Avg. 12 V
Operating temperature without icing	-15° C to +55° C
Cable	2.5 m / LIYCY
Connection	4 wires
Weight of the head	N/A
Weight of unit assembly	200 g with mounting part
Mounting	Pessl Instruments clamp

*weather station measurement interval needs to be set to 5 minute value

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Wind Speed

Order number: 600034 / 900040

IM512CD is a cup type anemometer for low cost and long term, accurate wind measurements for all kinds of use. It calculates average wind speed in the specific time period.
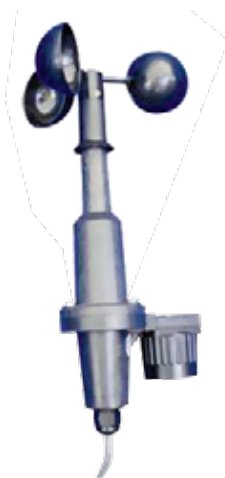
TECHNICAL SPECIFICATIONS

Range	0 to 50 m/s, gust survival 60 m/s
Sensor	12 cm diameter cup wheel assembly, 40 mm diameter hemispherical cups
Turning factor	75 cm
Distance constant (63 % recovery)	2.3 m
Threshold	1.1 m/s
Transducer	Stationary Coil
Transducer output	AC sine wave signal induced by rotating magnet on cup wheel shaft. 100 mVpp at 60 rpm. 6 Vpp at 3600 rpm
Output frequency	1 cycle per cup wheel revolution. 0.75 m/s per Hz

CONNECTION TO MOTHERBOARDS

iMETOS 3.3
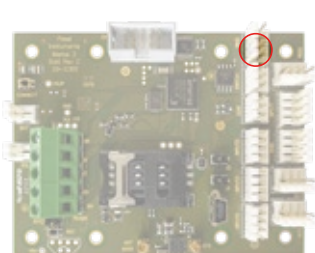
µMETOS

RM Young Wind Monitor

Order number: 600129 / 900064
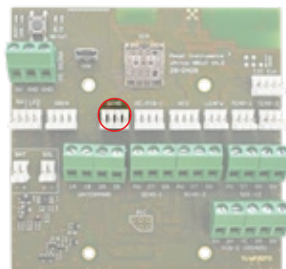
The wind monitor combines wind speed and wind direction. It is constructed of a four-blade helicoid propeller for highly accurate wind speed measurement with integrated wind direction sensor. It measures peak values.

TECHNICAL SPECIFICATIONS

Range	0-100 m/s (224 mph), 0- 360°
Accuracy	**Wind Speed:** ±0.3 m/s (0.6 mph) or 1% of reading
	Wind Direction: ±3 °
Operating temperature range	-50 to 50 °C
Threshold	**Propeller:** 1.0 m/s (2.2 mph)
	Vane: 1.1 m/s (2.4 mph)
Signal output	**Wind speed:** magnetically induced AC voltage, 3 pulses per revolution. 1800 rpm (90 Hz) = 8.8 m/s (19.7 mph)
	Wind direction: DC voltage from conductive plastic potentiometer − resistance 10K Ω, linearity 0.25%, life expectancy − 50 million revolutions
Power Requirement	Potentiometer excitation: 15 VDC maximum
Dimensions	37 cm (14.6 in) H x 55 cm (21.7 in) L, Propeller: 18 cm (7 in) dia. Mounting: 34 mm (1.34 in) dia. (standard 1 inch pipe)
Weight	1.0 kg

CONNECTION TO MOTHERBOARDS

iMETOS 3.3

Hygroclip (Air temperature & Relative Humidity)

Order number: 600149 / 900074 (IMT), 600148 / 900073 (µMetos; EcoD3)

Measures relative humidity and temperature with outstanding accuracy and repeatability. It has an integrated data acquisition and calibration history. Dew point , VPD and delta T calculations available.

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

TECHNICAL SPECIFICATIONS

Temperature sensor	PT1000 1/3 Class B
Humidity sensor	ROTRONIC Hygromer® IN-1
Accuracy with standard adjustment profile	at 23 °C and 10, 35, 80 % rh ±0.8 % rh / ±0.1 °C
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 °C
Resolution, AirChip3000	Typically 0.02 % rh, 0.01 °C
Long-term stability	< 1 % rh, 0.1 °C / year
Humidity response time t 63	3 seconds
Measurement range	0...100 % rh, -100...200 °C
Electronics operating range	-50-100 °C and 0-100 % rh
Output signals	Serial port RS485
Audit trail & electronic records	FDA 21CFR Part 11 and GAMP compliant
Power supply & consumption	3.2 V / 4 mA
Housing/probe material	Polycarbonate
Filter	Polyethylene insert, polycarbonate cage
Standards	CE-compliant 2007/108/EG

Pessl Instrument Air Temperature & Relative Humidity Sensor

Order number: 600019 / 900026 (µMetos), 600009 / 900021 (LoRain)

Measures air temperature and relative humidity and is used for low power consuming applications on µMETOS CLIMA (LoRaWAN®, NB-IoT).

I2C Bus Considerations: I2C Bus is sensitive to the electromagnetic waves and can be distorted under certain conditions. On the contrary, Hygroclip is less sensitive. Recommended cable length: no longer than 1 m.

TECHNICAL SPECIFICATIONS

Sensor	HYT221
Operating temperature range	-40°C to +125°C
Humidity range	0% to 100% RH
Accuracy	±0.2°C (0°C to +60°C) ±2 % RH at +23 °C (0% to 90% RH)
Operating voltage	2.7V to 5.5V
Digital interface	I²C, address 0x28 or alternative address
Operating voltage (limit data)	0.3 V to +6 V
Storage conditions	-20 °C to +50 °C

CONNECTION TO MOTHERBOARDS

µMETOS   nMETOS/LoRAIN
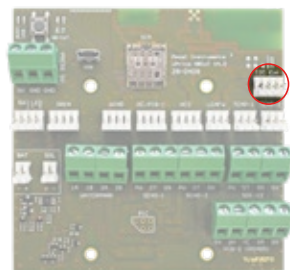
Pessl Instrument Air Temperature & Relative Humidity Sensor with a longer (5 m) cable

Order number: 600019 / 900026 (µMetos), 600009 / 900021 (LoRAIN)

Measures air temperature and relative humidity with additional calculation of virtual sensors like dew point, VPD and delta T. The sensor is used for low power consuming applications on µMETOS CLIMA (LoRaWAN®, NB-IoT).

Application: when long distances up to 15 m from the main station are required i.e. in greenhouses in/out, when two or more sensors are needed.
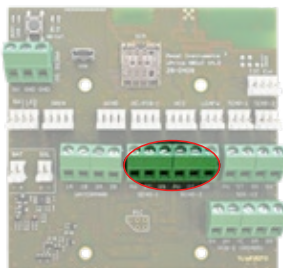
TECHNICAL SPECIFICATIONS

Sensor	HYT221
Cable lenght	5 m
Operating temperature range	-40°C to +60°C
Humidity range	0% to 100% RH
Accuracy	±0.2°C (0°C to +60°C) ±2 % RH at +23 °C (0% to 90% RH)
Operating voltage	2.7V to 5.5V
Digital interface	RS485 with PI-Bus, insertable in a chain
Operating voltage (limit data)	0.3 V to +6 V
Storage conditions	-20 °C to +50 °C

CONNECTION TO MOTHERBOARDS

µMETOS

Pessl Instruments Wet and Dry Bulb Temperature

Two highly reliable and tested PT1000 are built in a waterproof housing. One of them is covered with cotton tissue and wetted with water.

TECHNICAL SPECIFICATIONS

Sensor	PT1000
Supply voltage	4.57-7 V for chain version
Supply current	max. 200 µA
Short circuit protection	Infinite (within supply voltage range)
Short circuit supply current	max. 40 mA
Operating temperature range	-30 °C to +60 °C
Accuracy	0.1 °C
Cable length	5 m

CONNECTION TO MOTHERBOARDS

Order number: 600165 / 900134   *Order number: 600164 / 900132*

iMETOS 3.3   µMETOS   nMETOS
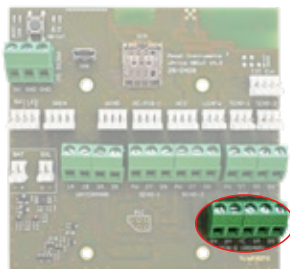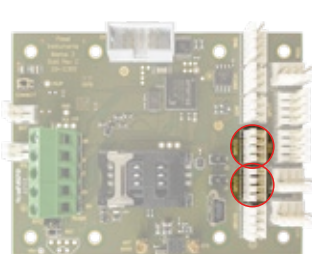
Pessl Instruments
Soil Temperature

The Soil Temperature Sensor is a PT1000 in a waterproof stainless-steel housing. The sensor output is a duty-cycle signal.
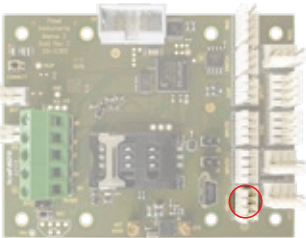
TECHNICAL SPECIFICATIONS

Sensor SMT172	**Operating temperature range:** -30 °C to +75 °C
	Accuracy: ±0.5 °C (-30 °C to +75 °C)
Sensor PT1000	**Operating temperature range:** -30 °C to +75 °C
	Accuracy: ±0.1 °C (-30 °C to +75 °C)
Supply voltage	4.57-7 V
Supply current	max. 200 µA
Short circuit protection	infinite (within supply voltage range)
Short circuit supply current	max. 40 mA
Calibration error	max. 0.25 °C (23 °C)
Nonlinearity error	max. 0.2 °C
Supply voltage sensitivity	max. 0. 1 °C/V
Repeatability	max. 0.2 °C
Long term drift	max. 0.1 °C
Output frequency	1 to 4 kHz
Evaluation	Duty cycle
Cable length	5 m

CONNECTION TO MOTHERBOARDS

iMETOS 3.3

Pessl Instruments Multiple Soil Temperature

Order number: 60079/900058 (Sensor chain with box, holder and 3 sensors) / 900227 (Sensor chain with box, holder and 1 sensor) / 900226 (Additional sensor)

SAR19/SAR19M provides soil temperature measurement from several centimeters to 15-meter deep by using the Pessl Instruments sensor BUS. The distance between the sensors can be chosen according to the application, but only up to 10 sensors can be attached to one sensor chain.

TECHNICAL SPECIFICATIONS

Temperature sensor	DS18B20
Operating temperature range	-55 °C to +125 °C
Supply DC voltage (range)	3-5.5 V
Thermometer error -10 °C to +85 °C	±0.3 °C
Drift	±0.2 °C
Data transmission	Rs 485 Digital signal (temperature data sent on demand of METOS® main board)

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Single Soil Temperature

Order number: 600020 / 900027

WMTEMP is a soil temperature sensor.

TECHNICAL SPECIFICATIONS

Temperature sensor	DS18B20
Operating temperature range	-55 °C to +125 °C
Supply DC voltage (range)	3-5.5 V
Thermometer error -10 °C to +85 °C	±0.3 °C
Drift	±0.2 °C
Data transmission	Rs 485 Digital signal (temperature data sent on demand of METOS® main board)

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

INTERFACE

Necessary Interface to connect this sensor with METOS®:
ECH871EXT, ECH874EXT or ECH871INT, ECH874INT or RFRN09, RFRN12 or WM-BUS

Pessl Instruments Heavy Duty Multiple-temperature Probe

Multiple-temperature probe is a thermometer, designed to make measurements in extremely harsh conditions like temperature of waste on disposal sites, and chipped wood in storage rooms.

TECHNICAL SPECIFICATIONS

Operating temperature range	-55 °C to +125 °C
Supply DC Voltage (range)	3-5.5 V
Thermometer error -10 °C to +85 °C	±0.3 °C
Drift	±0.2 °C
Data transmission	Rs 485 Digital signal (temperature data sent on demand of METOS® main board) METOS® checks all sensors every 5 minutes

CONNECTION TO MOTHERBOARDS
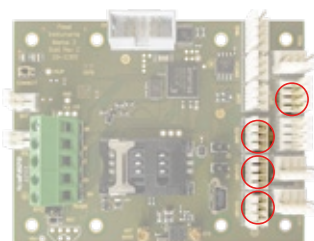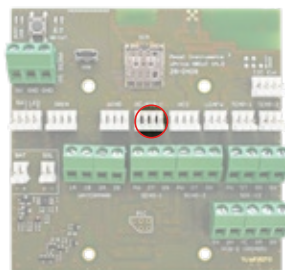
iMETOS 3.3   µMETOS

Pessl Instruments Leaf Temperature

Order number: 600127 / 900169 (IMT), 600126 / 900171 (µMetos)

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

TECHNICAL SPECIFICATIONS

Sensor	PT1000
Accuracy	min. 0.1 °C (-30 °C to +99 °C)
Supply current	max. 200 µA
Short circuit protection	Infinite (within supply voltage range)
Short circuit supply current	max. 40 mA
Operating temperature range	-30 °C to +99 °C
Nonlinearity error	max. 0.2 °C
Supply voltage sensitivity	max. 0.1 °C/V
Repeatability	max. 0.2 °C
Long term drift	max. 0.1 °C
Output frequency	1 to 4 kHz
Duty cycle	0.320 (0 °C), 0.00470 °C
Evaluation	Analog
Cable length	5 m

CONNECTION TO MOTHERBOARDS

iMETOS 3.3

Turning Information Into Profits. www.metos.at   Turning Information Into Profits. www.metos.at

Pessl Instruments
IR Temperature

Order number: 600131 / 900066

The infrared temperature sensor infers the temperature from a portion of thermal radiation (blackbody radiation) emitted by the object being measured. It is a non-contact temperature sensor. By measuring the amount of infrared energy emitted by the object and its emissivity, the object 's temperature can be determined. Main use: canopy or leaf temperature measurements.

TECHNICAL SPECIFICATIONS

Sensor	Melexis MLX90614-BCC
Resolution	0.1 °C
Interface	RS 485 PI Sensor Bus
Size	20 mm (dia) x 24 mm
Sensor housing	Weather resistant PAS
Range	-40 °C to +85 °C

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS
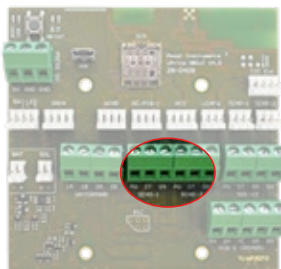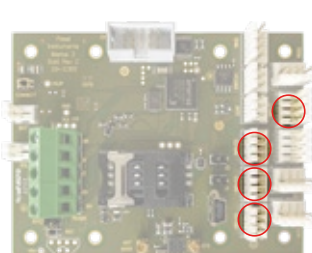
Pessl Instruments
Leaf Wetness

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

TECHNICAL SPECIFICATIONS

Supply voltage	4.75-5.25 V
Supply current	max. 1500 µA
Short circuit protection	Infinite (within supply voltage range)
Dry / Wet threshold	220-390 kOhm
Output	Dry: max. 0.4 VDC Wet: min. VCC-0.4 VDC
Electronic	Totally plastic encapsulated – SMD
Dimensions	42 mm x 78 mm x 15 mm
Cable length	5 m

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS
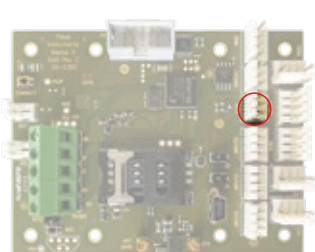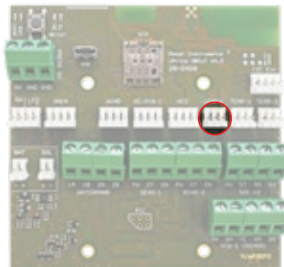
Pessl Instruments Rain Gauge

Order number: 600169 / 900208

The mechanic consists of a magnet, which moves past a reed switch and opens or closes the circuit. The double spoon tips left or right and does not lose any water due to a very fast switching mechanics. The resolution with a surface of 200 cm^2 is 0.2 mm, while the resolution with the 80 cm^2 is 0.5 mm. Heating for rain gauge can also be included.

TECHNICAL SPECIFICATIONS

Sensor type	Double tipping bucket rain gauge
Output	Switch signal
Switch	Reed contact, solid state
Sensitivity	1 tip per 0.2 mm or 1 tip per 0.5 mm
Collector surface	200 cm^2
Evaluation	Digital
Maximum rain	12 mm/minute
Dimensions	185 mm diameter x 250 mm H
Accuracy	±5 %

Protect your rain gauge from birds - add bird protection crown. Very easy to install and dismantle.

Order number: 900191

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Soil Moisture & Soil Temperature Sensor PI54-D

Order number: 600118 / 900012

The PI54-D soil moisture and soil temperature sensor has a larger volume of influence. It determines volumetric water content (VWC) by measuring the dielectric constant of the soil using capacitance technology and soil temperature. It is 10 cm long and thus measures 1 Liter of soil, while high frequency minimizes salinity and textural effects which makes PI54-D accurate in most soils.

TECHNICAL SPECIFICATIONS

Volumetric water content (VWC)	**Range:** 0−0.57 m³/m³ (0%−57% VWC)
	Resolution: 0.0008 m³/m³ (0.08% VWC) in mineral soils from 0−0.50 m³/m³ (0%−50% VWC)
	Accuracy: With standard calibration equation, 0.03 m³/m³ (3% VWC) typical in mineral soils that have solution electrical conductivity <10 dS/m NOTE: With soil-specific calibration, ±0.02 m³/m³ (±2% VWC) is typical in any soil.
Dimensions	16.0 cm (6.3 in) length; 3.3 cm (1.3 in) width; 0.8 cm (0.3 in) height
Prong length	10 cm (3.94 in)
Operating temperature range	-40 to 50 °C
Cable length	5 m
Supply voltage (VIN to GND)	Minimum: 3.6 VDC at 12 mA Maximum: 15 VDC at 20 mA
Measurement duration	Maximum 10 ms
Temperature accuracy - PI54-D	±0.3
Output	Digital
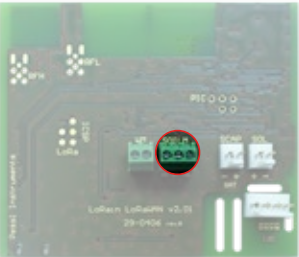
CONNECTION TO MOTHERBOARDS

iMETOS 3.3

µMETOS

nMETOS

miniMETOS, LoRATH soil, LoRAIN soil

INTERFACE

Necessary Interface to connect this sensor with METOS®:
600069 / 900052, 600068 / 900051, 600167 / 900057 or 900173, 900174, 900175
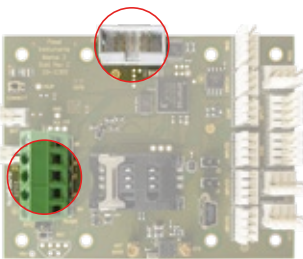
Sentek Drill & Drop and TriSCAN Probe

Sentek Drill & Drop probe provides the user with great flexibility for precision monitoring of temperature, water, and salinity (Triscan) at multiple depths in a soil profile. Available in five lengths: 10 cm, 30 cm, 60 cm, 90 cm and 120 cm with sensors fixed at every 10 cm increment.
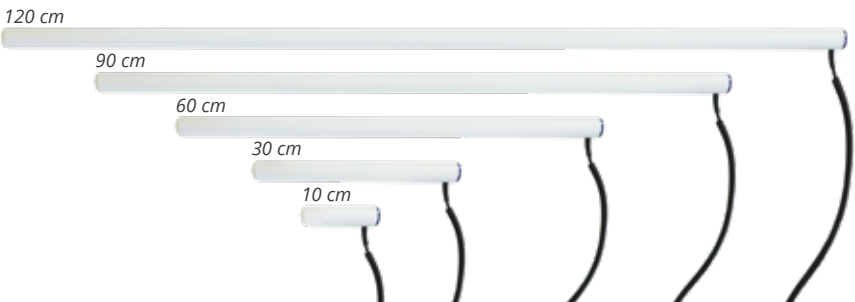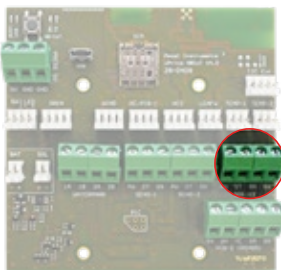

TECHNICAL SPECIFICATIONS

Probe lengths	10 cm (4") / 30 cm (12") / 60 cm (24") / 90 cm (36") / 120 cm (48")
Number of sensors	1 / 3 / 6 / 9 / 12
Outer probe diameter (top-bottom)	24-24.5 mm / 28-29.5 mm / 27-29.5 mm / 26-30 mm / 24.5-29.5 mm
Moisture (VWC) range	Oven dry to saturation
Method	Capacitance based technology
Resolution	**Moisture (VWC):** 1:10000 **Salinity (Triscan) (VIC, Volumetric Ion Content):** 1:6000 **Temperature:** 0.3 °C
Moisture precision	±0.03 % vol.
Temperature accuracy	±2 °C at 25 °C
Operating temperature range	-20 °C to 60 °C

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

INTERFACE

Necessary Interface to connect this sensor with METOS®: 600150/900105

iMETOS AC Probe
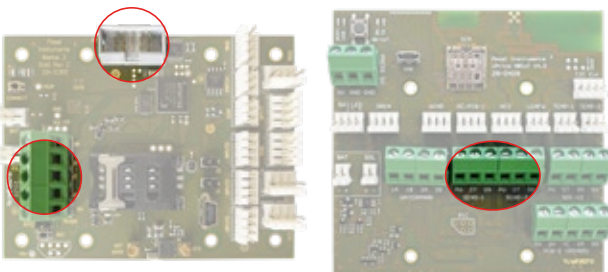## Aquacheck Sub-Surface Probe

The Aquacheck sub-surface soil moisture probe offers capacitance-based soil moisture and temperature measurements along the vertical soil profile. Different configurations are available with 6, 8 or 12 sensors for a probe length variable from 60 to 120 cm.
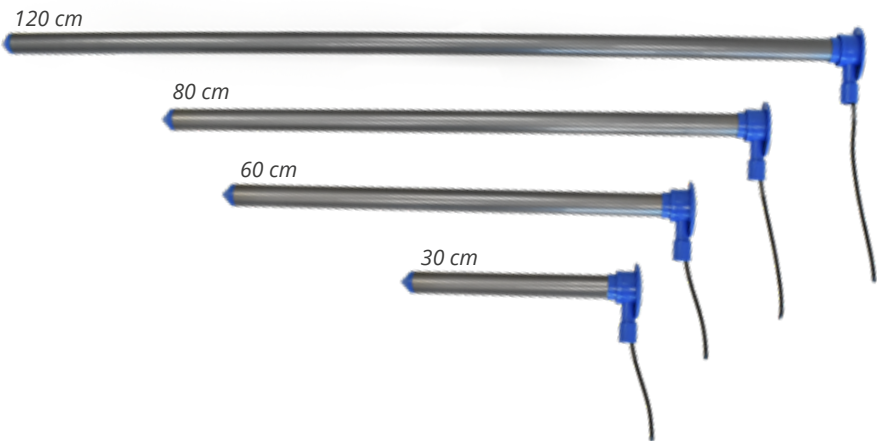
TECHNICAL SPECIFICATIONS

Probe lengths	from 60 to 120 cm
Number of sensors	6 / 8 / 12 sensors depending on the configuration
Shaft Diameter	32 mm
Moisture (VWC) range	Oven dry to saturation
Method	Capacitance based technology
Temperature range	0 °C to 51 °C
Temperature resolution	0.2 °C
Cable length	5 m

120 cm
80 cm
60 cm
30 cm

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

INTERFACE

Necessary Interface to connect this sensor with METOS®:
600150/900105

Irrometer Watermark Soil Moisture Sensor

Order number: 600120 / 900010

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 crop production, 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 electrode's changes. This resistance is read and logged by the weather station.

The sensor is manufactured from non-corrosive materials and lasts up to three years.

TECHNICAL SPECIFICATIONS

Size	2.2 cm diameter x 5 cm length
Measuring principle	Soil water tension correlated with electrical resistance in granular matrix
Working range	0 to 200 kPa
Precision	5 %
Evaluation	Analog
Cable length	3.5 m / 10 m

INTERFACE

Necessary Interface to connect this sensor with METOS®:
600068 / 900051, 600167 / 900057, 900174, 900175

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS   nMETOS

miniMETOS, LoRATH soil, LoRAIN soil
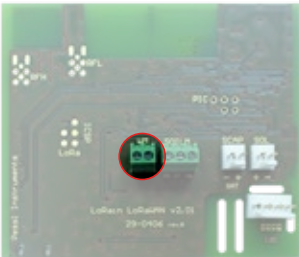
# Irrometer Tensiometer

Order number: TNS101

The instrument measures soil water tension (or suction). This value represents the energy a plant's root system uses to draw water from the soil. Understanding soil moisture dynamics helps the user make informed irrigation scheduling decisions, resulting in improved yield quantity and quality while reducing water, fertilizer, labor, and energy costs. Available in different lengths: 15 cm, 30 cm, 45 cm, 60 cm and 90 cm.
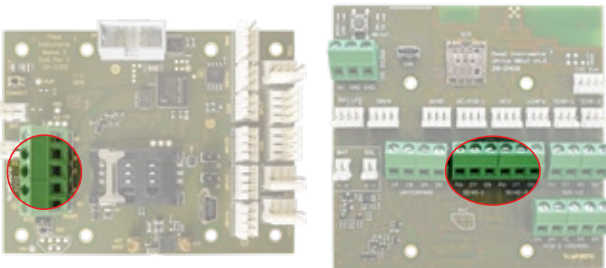
TECHNICAL SPECIFICATIONS

Instrument body materials	Butyrate body, ceramic tip, neoprene stopper
Weight	30 cm weights 0.439 kg. It increases 0.114 kg per 30 cm
Ceramic tip	White tip – used for most soil types
Operating suction	0-90 kPa
Operating temperature range	0 °C to 50 °C
Reservoir dimensions	Height: 120-130 mm including cap; Diameter: 51-55 mm including cap
Body tube dimensions	Length: ranges from 15 to 90 cm; Diameter: 22 mm

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

INTERFACE

Necessary Interface to connect this sensor with METOS®:
600069 / 900052, 600068 / 900051, 600167 / 900057 or 900173, 900174, 900175

EC & pH Interface Box
with Display in IP65 Box

Order number: 600025 / 900029

The EC500PH EC & pH Interface box is a measuring device with display in IP65 Box to be integrated into any METOS® sensor chain interface for continuous EC & pH measurements in water. It is compatible with most industry standard EC & pH sensors. The actual reading can be seen on the display. With the built-in calibration mode, all sensor readings can be calibrated and checked from time to time.
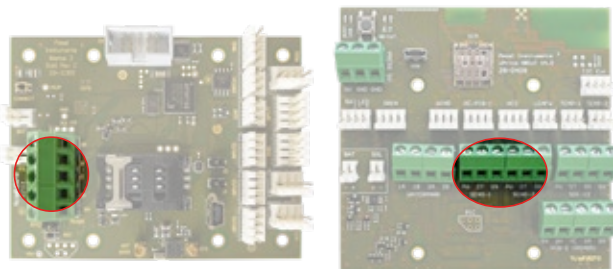
TECHNICAL SPECIFICATIONS

General information	Display shows actual data by pressing the button. It works with iMETOS 3.3.
Cable length	5 m standard, custom cable lengths available upon request

Connection Possibilities
- 1 EC Sensor (Part.no. EC501)
- 1 pH Sensor (Part.no. PH501)
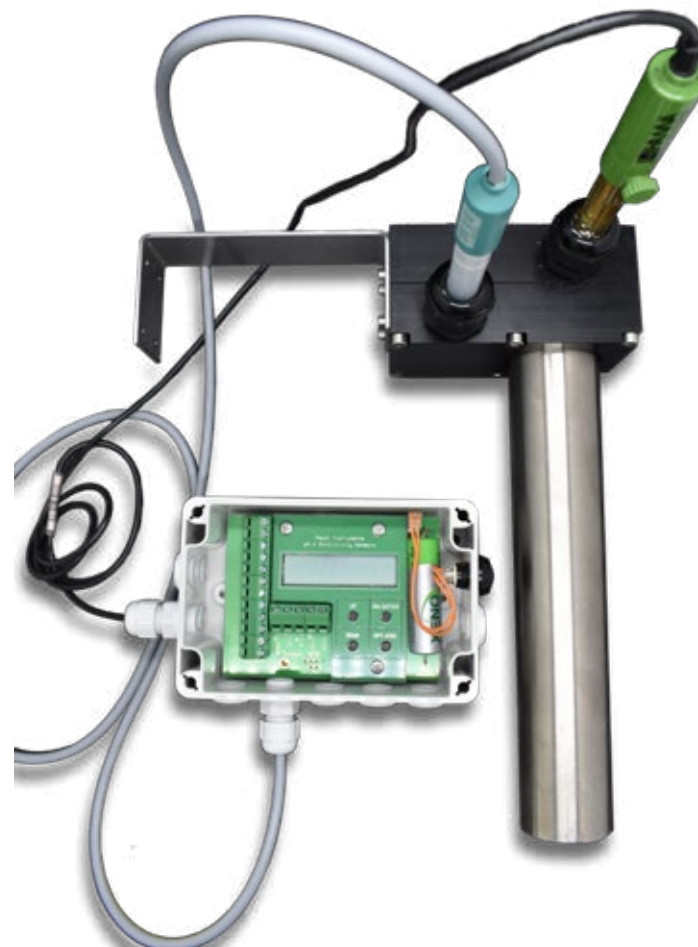

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Electrical Conductivity

Order number: 600145 / 900032

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 hydrographical and environmental water monitoring, in agriculture and industrial applications. The durable design ensures suitability for the harshest environment applications.

TECHNICAL SPECIFICATIONS

Range	0.1 µS/m - 1000 mS/cm
Resolution	0.1 µS/cm
Temperature compensation	Automatic
Probe material	PP
Probe diameter	12 mm
Min. immersion	40 mm

INTERFACE

Necessary Interface to connect this sensor with METOS®:
600025 / 900029 Interface box with display

Pessl Instruments pH Sensor

Order number: 600144 / 900030

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 between 0 and 6; caustic solutions have pH values between 8 and 14. Value 7 is neutral.

TECHNICAL SPECIFICATIONS

Range	pH 0.00 to 14.00
Resolution	0.001 pH
Accuracy	±2 % F.S.
Temperature deviation	3 % (range 5 °C to 30 °C)
pH probe	Standard up to 0.1 bar (other types on request), 3 m cable, 2-ring-flow-through (please specify type of application)
pH calibration	2-point with automatic buffer (recognition pH 4.0 and pH 7.0)
Probe material	Glass
Probe diameter	12 mm
Min. immersion	35 mm
Operating temperature range	15 °C to 60 °C
Response time	≤ 90 s

INTERFACE

Necessary Interface to connect this sensor with METOS®:
600025 / 900029 Interface box with display

Pessl Instruments Pressure Switch

Simple and robust design makes pressure switch suitable for use with compressed air, hydraulic oil, oil emulsions and water. Detection threshold is 0.5 bar (7.25 psi) and switch off is at 0.25 bar (3.62 psi) (other values on demand). The main purpose of this sensor is to control/check the performance of the irrigation system in different types of applications (resistance to high pressure makes it usable also for frost protection system).
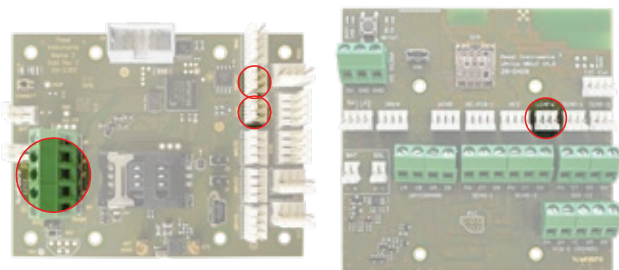
TECHNICAL SPECIFICATIONS

Material	Zinc-plated steel (G 1/4")
Switching function	Open contact, closed contact, changeover
Media	Water, compressed air, hydraulic oil, oil emulsion
Maximum medium temperature	+85 °C
Adjustment ranges	1 to 10 bar (1.4-14 psi), 0-1 bar
Switching frequency	max. 200 /min
Switching pressure difference	10 to 15 %
Switching voltage	Open contact/closed contact 42V max. 2A; Changeover 250 V max. 2A

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

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Pessl Instruments
# Water Counter Interfaces

Order number: 600155

These interfaces support most of the water meters used in irrigation with a pulse output.

SECTORS: Irrigation management, irrigation consulting, smart irrigation, irrigation tractability and bookkeeping, alarms, and supervision. Used widely in open field crops, hydroponics, and green house.
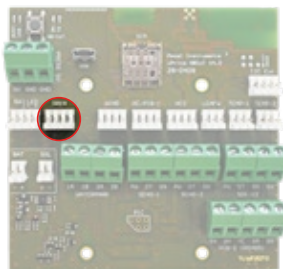
SW1000 pulse counter (Reed/Rain input)

iMETOS 3.3

µMETOS

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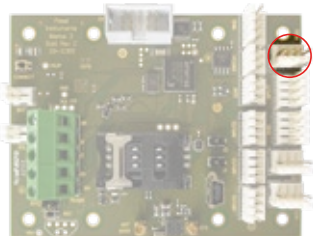
Pessl Instruments
Pipe Pressure (WPS)

Order number: 600154 / 900204

This sensor enables continuous monitoring of the pressure in irrigation pipes (main pipe or sector pipes) and it measures up to 50 bar, so it can be used in all types of irrigation systems (drip irrigation, sprinkler, hydroponics ...).
Technical specification of the full scale and resolution can be changed in the benefit of the user.

SECTORS: Irrigation monitoring and supervision, identification of pressure loss in the installation.


TECHNICAL SPECIFICATIONS

Range	0 to 500 m of water column
Resolution	10 mbar
Accuracy	0.3 %
Operating temperature range	0 °C to 50 °C
Storage temperature range	-20 °C to 80 °C
Weight	300 g (including cable)
Housing	POM
Diaphragm	Ceramic
Cable sheath	Shielded PVC
Output signal	Serial (RS485)
Support	PI-bus only at the end of the chain
Dimensions gauge shaft	90 x 20 mm (height x diameter)

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   μMETOS
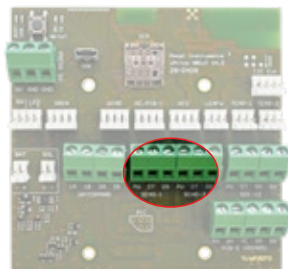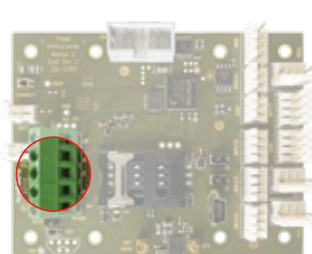
Pessl Instruments Water Level Sensor

Order number: 600026 / 900201, 600153

The Water level sensor is an accurate and cost effective submersible water level sensor that can be connected to METOS® stations with the precision of 3 mm within the measurement ranges. Sensor has an integrated barometric sensor module to increase precision. Pressure (Measuring) ranges: 0 mWC up to 5 mWC (other distances on request). Special cable is also available.
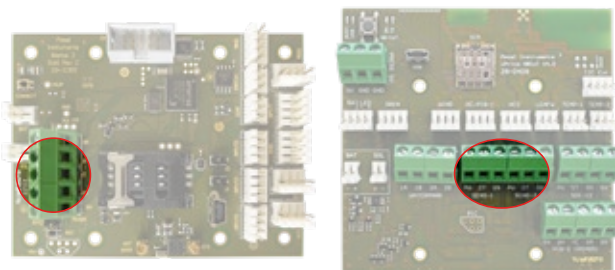
SECTORS: Depth or level measurement in wells and open waters (rivers and lakes) and ground water level measurement.

TECHNICAL SPECIFICATIONS

Accuracy according to IEC 60770	Limit point adjustment (nonlinearity, hysteresis and repeatability) within ±3 % within the measurement ranges
Response time	~ 5 ms
Range	0 to 20 m of water column (other on request)
Resolution	1 mm
Accuracy	0.5 % of maximum water level
Operating temperature range	0 °C to 50 °C
Storage temperature range	-20 °C to 80 °C
Weight	1.1 kg (including cable)
Housing	Stainless steel 1.4301
Diaphragm	Ceramic
Seals	FKM
Cable sheath	Shielded PVC
Output signal	Serial (RS485)
Support	PI-bus only at the end of the chain
Dimensions gauge shaft	90 x 20 mm (height x diameter)

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Ultrasonic Snow Height or Water Depth Sensor

Order number: 600173 / 900209

Ultrasonic snow depth sensor is used for non-contact measurements of snow depth and river levels in extreme weather conditions. The sensor is characterized by its high level of operating reliability, low energy consumption, fast installation and ease of use in the field.


TECHNICAL SPECIFICATIONS

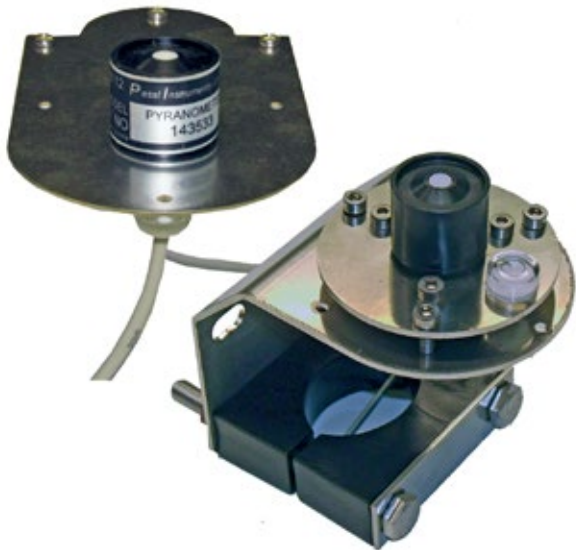|	
Range	0 to 10 m
Resolution	10 mm
Accuracy	0.5 % (FS)
Measurement principle	Ultrasonic
Temperature measurement range	-40 °C to +60 °C
Digital RS-232 interface	Serial port protocol, distance or snow depth
Power supply	From the input of the METOS®, in areas with limited sun extended battery is needed (ord. no. USH8-BATT-EXT).
Ingress protection	IP 66

CONNECTION TO MOTHERBOARDS

iMETOS 3.3
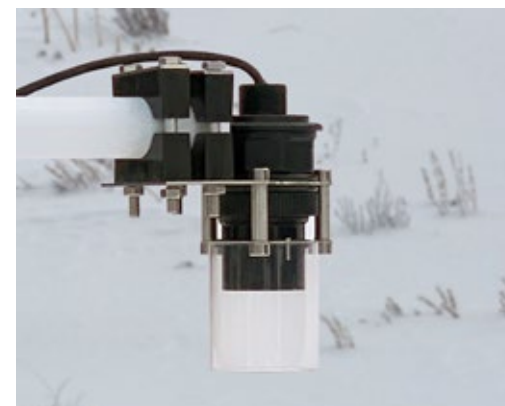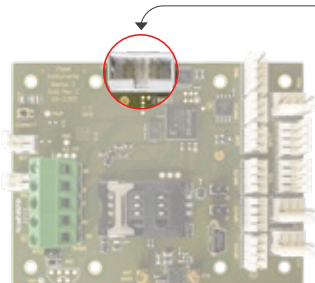
To connect Snow Depth Sensor to the motherboard, you will need **MOD BUS** interface.

Pessl Instruments Pyranometer

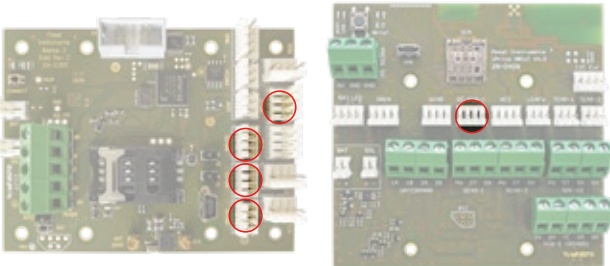*Order number: 600021 / 900002 (µMetos), 600035 / 900000 (IMT)*

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

TECHNICAL SPECIFICATIONS

Sensor	LI-200SZ
Calibration	Calibration against Kipp & Zonen CMP3 under daylight. Absolute error max. 5 %, typically 3 %
Stability	2 % drift on 2-year use
Time to measure	10 µs
Temperature dependency	0.15 % per °C
Cosines correction	Sensor corrects up to 80° degrees
Azimuth	1 % error over 360 degree at 45 degree elevation
Operating temperature range	-20 °C to 65 °C
Operating relative humidity range	0 to 100 %
Sensor	Photodiode
Housing	Weatherproof PAS case with acrylic diffuser, stainless steel hardware
Size	35 mm diameter, 45 mm height
Weight	114 g
Evaluation	Pulse Wide Modulation 0-80 % = 0-2000 W/m²
Spectral range	300-1100 nm

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments PAR Quantum
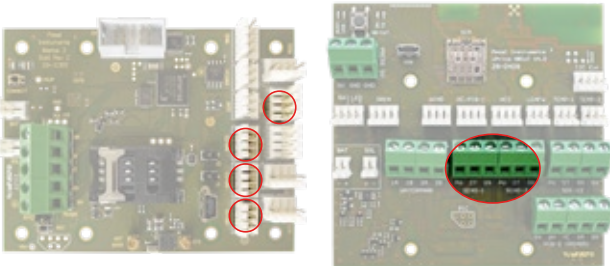
Order number: 600078 / 900005

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

TECHNICAL SPECIFICATIONS

Sensor	EG&G VACTEC VTB1012B
Calibration	Calibration against LI-190SZ under daylight. Absolute difference max. 5 %, typical 3 %
Linearity	Maximum deviation of 1 % up to 3000 W/m²
Stability	2 % change over a 1-year period
Response time	150 ms
Temperature dependency	0.15 % per °C
Cosines correction	Sensor corrects up to 80° degrees
Azimuth	1 % error over 360 degrees at 45 degree elevation
Operating temperature range	-20 °C to 65 °C
Operating relative humidity range	0 to 100 %
Sensor	Photodiode
Housing	Weatherproof PAS case with acrylic diffuser, stainless steel hardware
Size	35 mm diameter, 45 mm height
Weight	114 g
Evaluation	PWM: 0-80 % duty cycle = 0-20 kJ/m²

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Barometer

The Pessl Instruments barometric sensor measures the "absolute air pressure" of the atmosphere on site. It is designed for application of environmental protection, where high accuracy, quick response, long term stability and reliability are required. The instrument is suitable for indoor and outdoor use. A tempered piezoceramic sensor for absolute pressure is used, characterized by its thermal and mechanical stability.
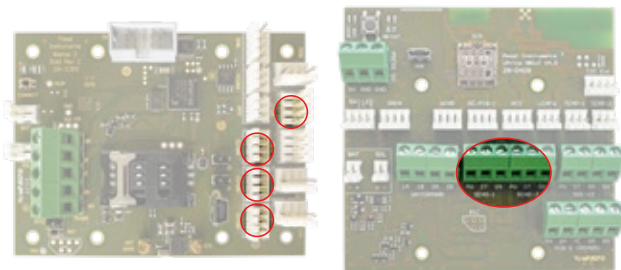

TECHNICAL SPECIFICATIONS

Working range	0-1150 mbar
Weight	ca. 50 g
Power supply	5.0 VDC (6 VDC maximum)
Zero offset	0.50 ±0.09 VDC
Power uptake	max. 20 mA
Precision	0.1 % max. Thrift
Temperature range	-40 °C to 125 °C
Measuring type	Serial (RS 485)

CONNECTION TO MOTHERBOARDS

iMETOS 3.3   µMETOS

Pessl Instruments Dendrometer

Order number: 100358, 100359, 100361, 100360
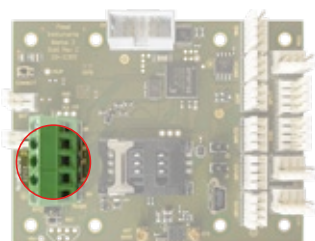
Dendrometers are sensors for continuous measurement of plant growth (changes of the plant diameter). The dendrometer allows us to record the plant parameters using the same time interval as environmental parameters. The data allows the direct assignment of plant responses and stress to environmental influences. Dendrometers are a cost-effective and useful tool for Eco physiological studies.

TECHNICAL SPECIFICATIONS

To specify plant size range	Diameter 3-30 cm
Range of the sensor	11 mm
Accuracy	±1.5 µm ±0.12 % (CR1000 Logger)
Resolution	0.2-2.6 µm (dependent on used data logger)
Linearity	1 %
Thermal expansion coefficient of the sensor	<0.1 µm/K
Operating temperature range	-25 to 70 °C
Operating relative humidity range	0 to 100 %

CONNECTION TO MOTHERBOARDS

iMETOS 3.3

INTERFACE

Necessary Interface to connect this sensor with METOS®:
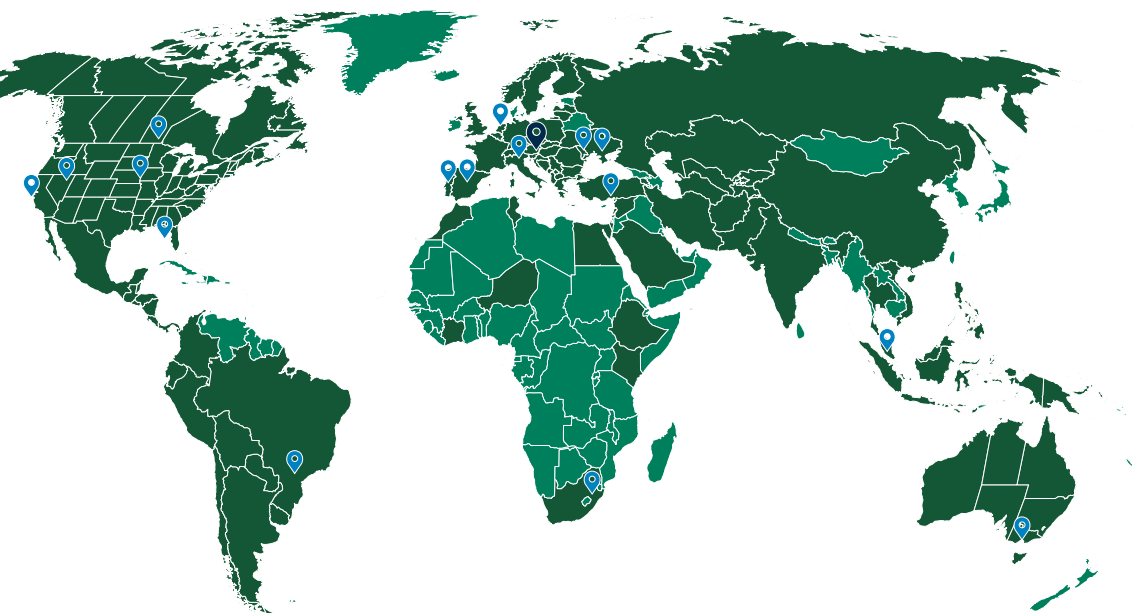600170 / 900205

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