



COMPLETE AVIATION



COROBOR
systems
A Campbell Scientific Company



WEATHER SOLUTIONS

What we offer

End-to-End Solutions for Aviation Weather

- Aviation grade meteorological sensors and data acquisition systems.
- Turnkey Automated Weather Observing Systems (AWOS) for airports and aerodromes of all sizes, including Runway Visual Range (RVR) and Automatic Terminal Information Services (ATIS).
- Data management solutions for forecasters, pilots, airport managers, and met agencies.
- Program and project management services for aviation clients around the globe.

Proven Experience

Over several decades, Campbell Scientific has built a reputation for high quality, reliable measurement instrumentation and has been field-proven in many different applications in every corner of the world.

We've installed over 1,200 aviation weather stations around the world. Previous clients include the US Air Force, NAV Canada, BMKG (Indonesia), NIMET (Nigeria), and civil and military aviation authorities worldwide.

COROBOR has a worldwide presence with more than 1,400 MESSIR systems installed in more than 135 countries.

Reliability in the Harshest Environments

Globally, Campbell Scientific AWOS have near 100% operability, even 10-15 years after installation.

A Truly Global Partner

Campbell Scientific's network of companies have direct offices and service centers around the globe. Technical and logistical support can be provided to clients anywhere in the world, often in their own country and language.

Additional Services:

- *System design and consultation*
- *AWOS refurbishment and upgrades*
- *Site surveys*
- *Training*
- *Program management*
- *Software development and integration*

Quality and Value

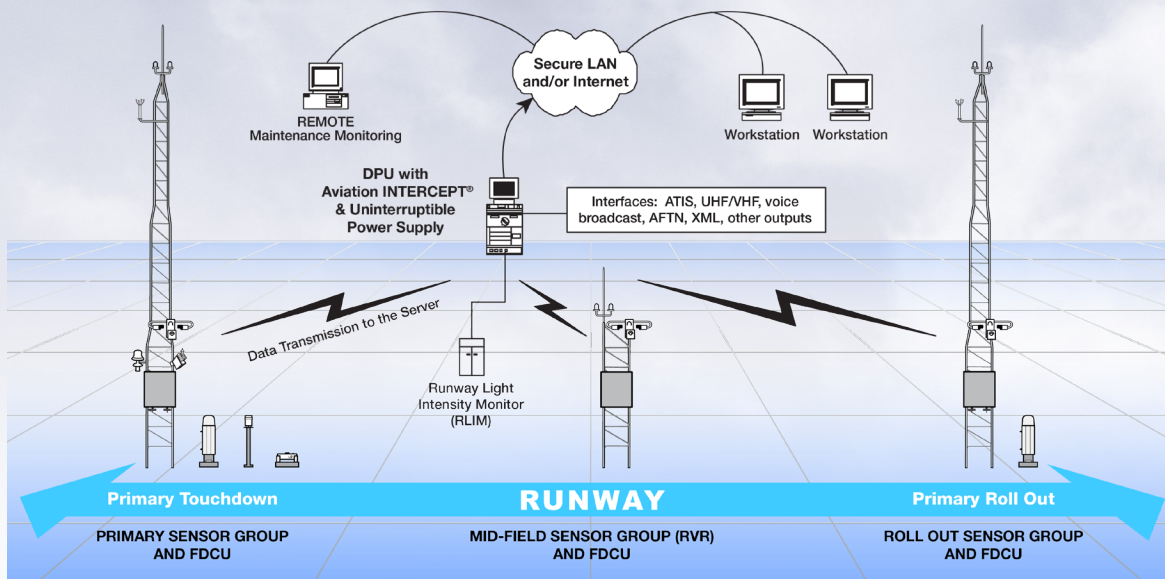
Aviation solutions from Campbell Scientific are supplied according to the client's specifications and budget. These long-life sensors and systems can be maintained, upgraded, and replaced over time.

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Automated Weather Observing Systems (AWOS) for Airports



Campbell Scientific has successfully installed over 1,200 aviation weather stations worldwide at commercial and private airports, military air bases, and heliports. Systems are modular in design and range in size and complexity, from a single weather station to a network of

sensor groups on multiple runways.

Campbell's AWOS solutions are rugged and built to meet our customers' specifications. All of our systems are compliant with ICAO/WMO/FMH-1 reporting standards.

Key components of the AWOS include meteorological sensors, a Field Data Collection Unit (FDCU), AC or solar power systems, telecommunications, Campbell's web-based Aviation INTERCEPT® display software, and user workstations.



From top left:
Campbell's AWOS at
Soekarno-Hatta International
Airport, Jakarta, Indonesia;
Met garden at Lublin, Poland;
South Pole

From bottom left:
AWOS at Andrews AFB;
NAV CANADA Dawson
Creek AWOS;
AWOS installation at
Pangkalan Bun, Indonesia



Aviation INTERCEPT®

Visualization software that displays your airport's runway weather data

Aviation INTERCEPT® presents all weather and Runway Visual Range (RVR) data from the sensors at an airport in an easy-to-read, simple-to-navigate format. It fulfills all acquisition, processing, data display, reporting, archiving, system maintenance, and external data distribution requirements.

- Web-based viewing platform, accessible to authorized users through a web browser on any computer connected to the local network.
- No user licenses are required

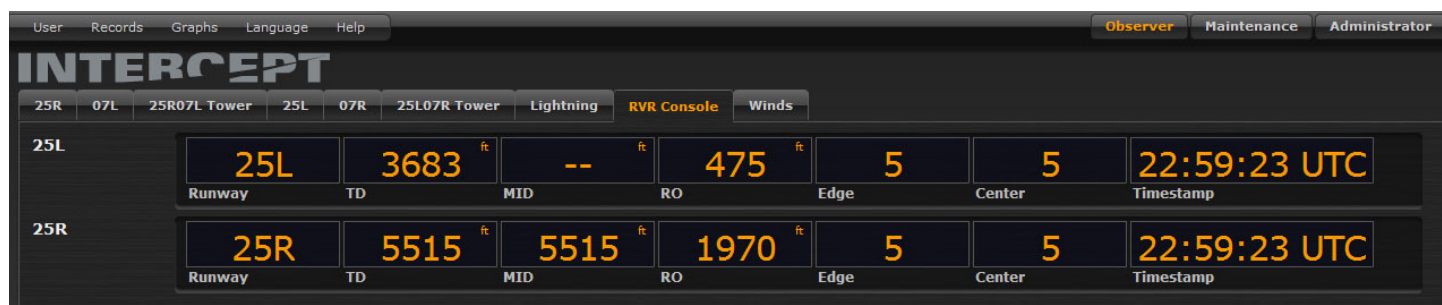
- Automatic METAR/SPECI reports (other report formats available: SYNOP, CLIMAT, TAF, etc.)
- ICAO/FAA/WMO/FMH-1 approved algorithms
- Remote maintenance monitoring
- Automatic Terminal Information Service (ATIS) broadcasts aviation weather reports generated by a Campbell AWOS
- Display screens are currently available in English, Spanish, Chinese, and Russian



Graphical User Interface (GUI) showing Controller Data Display (above) and Weather Observer (Data Collection Unit) Display (right). Users may select screens optimized for day or night viewing.



RVR Field Measurement



An RVR Data Display in Aviation INTERCEPT® for a complex airport with three runways, and with instrumentation at three places along each runway.

Portable/Tactical Aviation Weather Stations



Portable/Tactical Aviation Weather Stations

Campbell's portable/tactical weather stations are designed specifically to meet the demands of tactical or rapid deployment use, and are particularly suited for remote locations with harsh environmental conditions. Solar-powered systems are the solution for airfields with limited infrastructure.

Features:

- A complete AWOS solution that is ICAO/FMH-1/WMO compliant
- Rugged, weatherproof construction (passed MIL-STD-461E for EMI and MIL-STD-810F for severe environmental conditions)

- Professional grade meteorological sensors
- Very low power consumption
- Aviation INTERCEPT® installed on a rugged laptop computer
- Easy to pack, carry, and ship
- Survives rough handling while providing accurate aviation readings

Portable/tactical systems include professional grade meteorological sensors to measure wind speed and direction, dew point, pressure, temperature, visibility, cloud height, freezing rain, precipitation identification, precipitation amounts, and lightning detection.

Campbell's web-based Aviation INTERCEPT® software is simple and easy to use on a laptop. Data can also be sent remotely by cable (RS232/RS485), spread spectrum radio, GSM/GPRS modem, or satellite radio.

Systems are packed in durable, waterproof cases and can be assembled in minutes—no tools are required.

Previous Customers Include:

US Air Force, US Army, US Navy, US Marines, Taiwan Navy, Swedish Military Forces, Colombian Army, Indonesian Air Force, US Africa Command, Israeli Ministry of Defense, NATO, Polish Air Force, Army of Saudi Arabia, Afghanistan Army, Spanish Army, Kazakhstan Air Force, Singapore Civil Defense, and Chilean Air Force.



Offshore Aviation Systems for Platforms, Heliports, Buoys



Solar-powered WEATHERPAK® on offshore buoy in Colombia

Campbell's AWOS for offshore installations are built to meet the unique challenges of providing site-specific aviation weather reporting at locations that are often remote, unmanned, and face harsh conditions.

Our modular approach to building aviation weather stations allows for flexibility in sensor selection, power, telecommunications, and installation and mounting of the AWOS.

Offshore AWOS, based on Campbell's rugged WEATHERPAK technology, includes the following features:

- Power over Ethernet (PoE)—data and power over a single cable
- Rugged, weatherproof construction (passed MIL-STD-461E and MIL-STD-810F)
- Ability to add additional external sensors
- ICAO/FMH-1/WMO compliant
- Automatically generated weather reports
- Optional voice broadcast directly to pilots



Single point WEATHERPAK® system on a research vessel

INTERCEPT® Lite

AWOS for General Aviation

Campbell's AWOS for General Aviation measures and reports weather conditions at general aviation airports. The complete system includes aviation grade meteorological sensors, data transmission, and INTERCEPT® Lite display software. The system reports weather data in compliance with ICAO/WMO standards and is available in multiple configurations:

- Simplified, single screen display of aviation weather data
- Web-based platform, accessible to authorized users via web browser
- ICAO/WMO/FMH-1 approved algorithms
- Automatic METAR/SPECI reports
- Built-in tests and data quality checks
- ATIS output capability
- Data logs available for download or export
- Display screens in English and Chinese



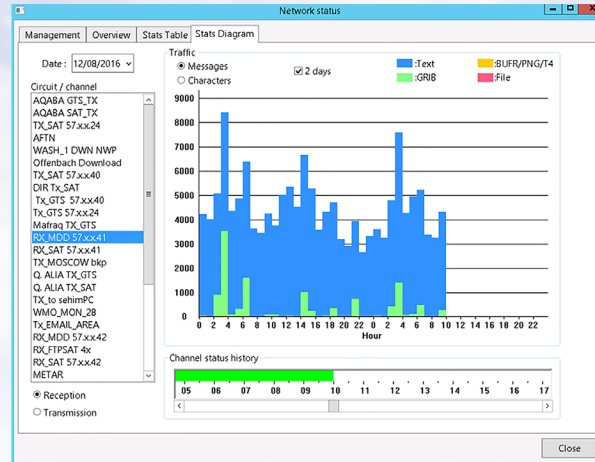
Users may select screens optimized for day or night viewing

AFTN/AMHS

Meteorological Data Ingestion, Storage, and Dispatch

MESSIR-COMM:

- Collect data from all over your country (e.g., observations)
- Ingest data from various sources (remote sensing, legacy systems)
- Collect data from web sites
- Distribute data and products to internal and external users in your country (Aviation, Army, Regional Centres, Professionals)
- Perform GTS Meteorological Message Switching in coordination with other countries
- Migrate to the new WIS environment specified by WMO



MESSIR-COMM Stats Diagram

What Is MESSIR-COMM?

MESSIR-COMM is a system (hardware and software) initially developed as a GTS Meteorological Message Switching System. MESSIR-COMM can also fulfil the specific requirements of your meteorological center in terms of data collection, ingestion, and distribution. MESSIR-COMM can interface with legacy meteorological systems, provided that such systems conform to WMO standards and can export in well-documented formats.

MESSIR-COMM can also be used as a "brick" of the complete MESSIR-WIS solution, allowing your meteorological center to migrate to WIS in full compliance with WMO specifications.

MESSIR-COMM can be coupled/combined with the MESSIR-XBASE real-time central database.

MESSIR-COMM at a Glance

- Proven stability: MESSIR-COMM remains operational for years, around the clock
- Hot stand-by architecture with automatic immediate change-over and no down-time
- Facilitates data storage and usage for Met services
- User friendly: Administrators/operators become familiar with MESSIR-COMM after only one hour of practice
- MESSIR-COMM is AvXML-compliant and can generate and switch XML OPMET data
- Compliant with latest WMO and ICAO requirements

Switch All Types of Data to the Right End User

- Traditional Alphanumeric Codes (TAC) including SYNOP, TEMP, METAR, TAF, etc.
- Table-Driven Code Forms (TDCF)
- Files in WMO format; satellite and radar images
- Binary products such as GRIB, BUFR, PNG, T4-DFAX
- Export data into various formats: text, image, XML, etc.
- WMO monitoring

Compliance with WMO/ICAO Standards, WIS, TDCF – BUFR and AvXML

MESSIR-COMM is compliant with the WMO Manual 386 on the GTS and the WMO Manual 306 (Manual on Codes), WMO Manual on Global Data Processing System 485, WMO Manual 1060 on WIS, WIS Tech Specs, as well as with the latest ICAO Annex 3 Amendments.

AvXML Compliant

MESSIR-COMM can handle OPMET data as XML according to ICAO and WMO regulations

- METAR/TAF/SPECI and SIGMET conversion to AvXML
- Compatibility with Abbreviated Heading Lines (AHL) used for exchanging XML OPMET messages

Other Related Products from COROBOR Systems

- MESSIR-VISION – a forecaster workstation
- MESSIR-CLIM – an airport climate database
- MESSIR-SAT – reception and processing of satellite imagery
- MESSIR-NET – meteorological web portal for remote access of pilot briefing
- MESSIR-WIS – solution for your GISC, DCPC and NC

Solutions Can Be Connected With:

- National Meteorological Center
- Aeronautical Fixed Telecommunication Network (AFTN) or Air Traffic Message Handling System (AMHS)
- World Area Forecast Centers (WAFC) of London and/or Washington through FTP server
- Local AWOS
- Global Telecommunication System of the WMO (GTS)

Forecasting and Decision Aid System

MESSIR-NEO:

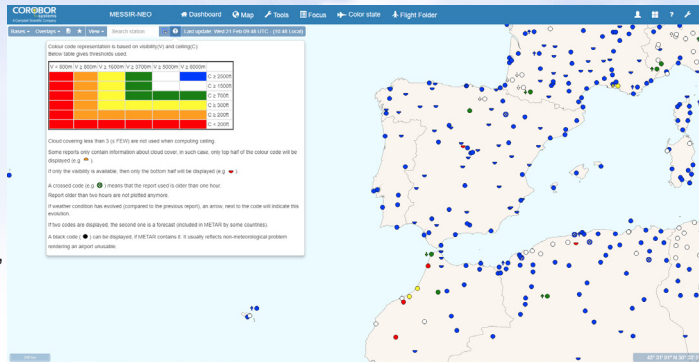
Manage your met, hydro, agro, and aviation data within the same app. Access all your data anywhere, anytime, from your PC, smartphone, or tablet with an online web application. Build your own dashboard where you can define your views, products, and animations.

Meet Your Technological Needs

- A modern and user-friendly interface where you can enjoy your daily work
- Access to a wide range of meteorological data and services
- Connection to a secure, reliable, and highly available platform
- Access to your dashboard anywhere and at any time
- Personalized trigger alerts and warnings to protect your operations

Modular and Adaptable Platform

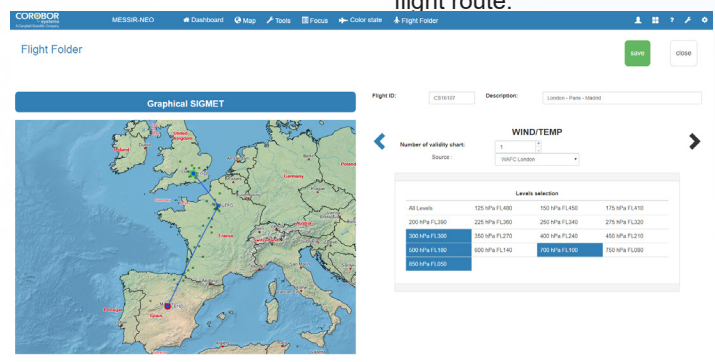
- NEO was built with a modular architecture that adapts to your needs and infrastructure.
- You have the option to subscribe to our MaaS solution and get access to all NEO features.
- You can also choose to deploy NEO on your own infrastructure and access it from your network.
- NEO is adaptable to your infrastructure and is fully compatible with the latest hardware technologies (SAN, Fiber Channels, Open Stack, Virtualization)
- Define your own, customized NEO platform with the modules that you choose.



MESSIR-NEO METAR/SYNOP color codes for easy live overview of regional conditions

Download Your Flight Folder in Only Three Mouse Clicks

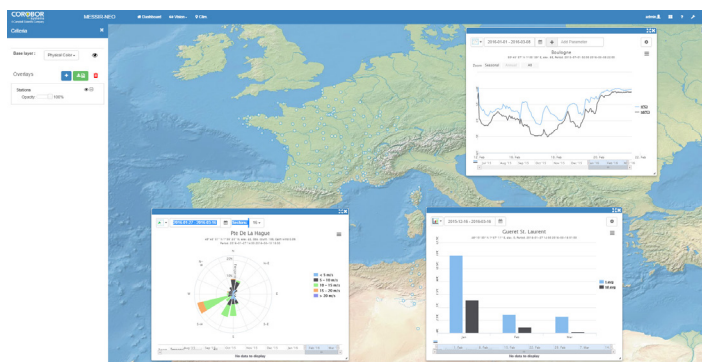
- Set up your routine flights only once.
- Automatically generate charts focusing on your flight route:
 - Wind-Temperature charts (from GRIBs) and SIGWX charts (from BUFRs)
- Automatically retrieve OPMET text data related to airports and FIRs along the flight route.



MESSIR-NEO Flight Folder

New Innovative Technologies for the Best User Experience

- NEO is built with the latest web technologies: HTML 5, JavaScript, Web Caching, NoSQL, Bootstrap, RESTful API
- Our technical architecture is using clustering, load balancing, high availability, and health check technologies.
- The MaaS version is deployed on multiple data centers to ensure redundancy and the highest possible service up-time.
- Access your data quickly thanks to caching mechanisms and NoSQL cluster.



MESSIR-NEO Weather Analysis



Meteorological Forecasting and Pilot Briefing Software

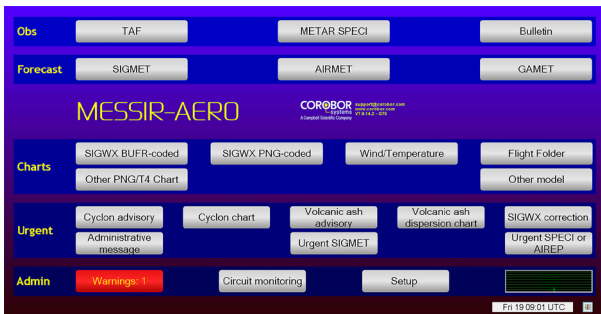
MESSIR-AERO: Meteorology Briefing for Pilots

COROBOR's pilot meteorological briefing solution, MESSIR-AERO, provides a complete set of meteorological information for airport operations and en-route flight planning. This includes airport forecasts for take-off and landing, forecasts of weather conditions at higher altitudes, and special and significant weather reports throughout the entire flight route.

MESSIR-AERO receives data from a variety of sources:

- METAR, SPECI, and TAF from AWOS at the departure, en-route, and destination airports
- Satellite and radar imagery
- Wind shear alerts
- Global data services such as SADIS and WIFS

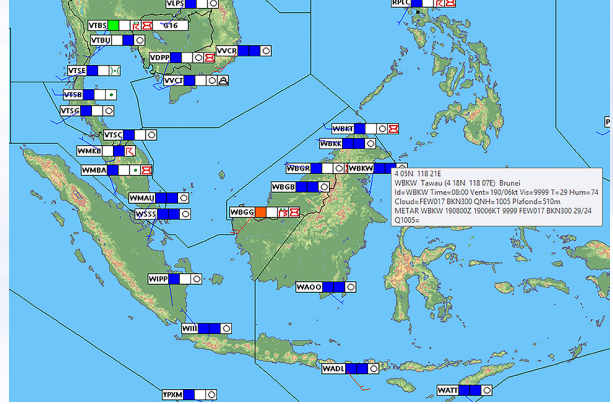
These data are delivered to clients as meteorological flight folders in full compliance with ICAO Annex 3. MESSIR-AERO can send data to other applications and systems as requested by the client.



MESSIR-AERO Menu

Main Features

- Automatic generation of standard charts from GRIBs and BUFRs on ICAO standard chart formats on projections and on user-defined specific geographical areas
- Vertical/temporal cross section
- Create charts automatically using our Image Maker module
- Feed your AIS Flight Planning System with GRIB data
- Data ingestion from WAFS, SADIS, WIFS, GTS, SFTP, HTTPS, FTP, EUMETCast, GEONETCast, Himawari
- Rework directly on screen SIGWX charts prepared from BUFR
- Visual/sound alerts upon reception of advisories such as volcanic ash, cyclone advisories, etc.
- Easy set-up only with user-friendly menus
- Map generator allowing for standard re-projections and

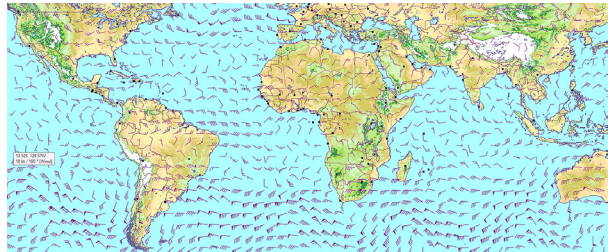


MESSIR-AERO METAR

including various layers: airports locations, digital elevation model, FIRs, waypoints, NAVAIDS, etc.

- Auto-archiving of flight folders according to ICAO regulations
- SIGMET watch/plotting on user-defined areas
- Remote sensing imagery (satellite, radar, lightning impacts) integration
- TAF verification, including automatic comparison with METAR
- METAR/TAF color codes for easy overview of regional conditions

Display and Print Aeronautic Data and Products

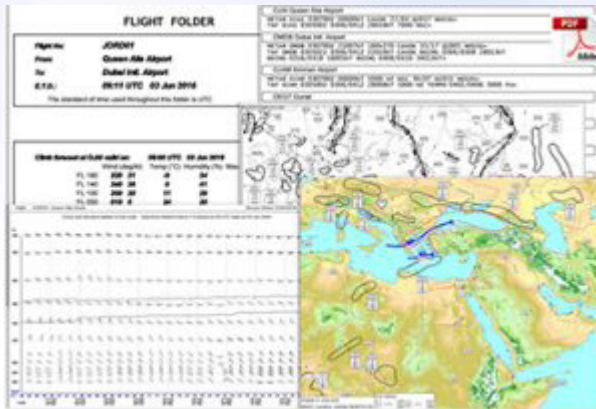


MESSIR-AERO Chart

- OPMET text data: METAR, TAF, SPECI, SIGMET, AIRMET
- Wind, temperature, humidity, pressure, tropopause height charts prepared from GRIBs
- GRIB2 thinned products including icing, turbulence, CAT, and CB forecasts
- High-level SIGWX significant weather charts (SWH) from BUFRs
- Medium-level SIGWX significant weather charts (SWM) from BUFRs
- PNG-coded SIGWX charts

Create Flight Folder in Three Mouse Clicks

- Set up your routine flights only once



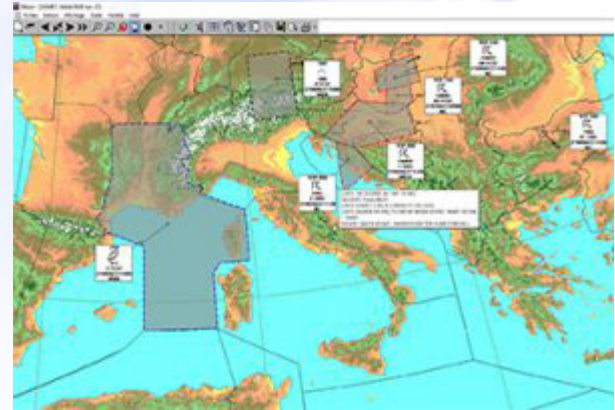
MESSIR-AERO Pilot Flight Folder

- Automatically generate charts focusing on your flight route:
 - Wind temperature charts (from GRIBs)
 - SIGWX charts (from BUFRs)
- Retrieve OPMET text data related to airports and FIRs along the flight route
- Prepare flight folders using FPL messages received via AFTN or AMHS
- Access flight folders on mobile devices (IOS/Android/Windows phone/Blackberry)

AvXML Compliant

MESSIR-COMM can handle OPMET data as XML according to ICAO and WMO regulations

- METAR/TAF/SPECI and SIGMET conversion to AvXML
- Compatibility with AHLs used for exchanging XML OPMET messages



MESSIR-AERO Graphical SIGMET Function

Graphical SIGMET: Easiest Access to SIGMET Data

SIGMET reports to users the meteorological phenomena observed and/or planned that are dangerous for aircrafts. With Graphical SIGMET, users will have a compiling of all valid data SIGMET on the zone of interest at a glance. This is an intuitive and easy-to-use feature and will help operators save time.

If a text SIGMET cannot be rendered graphically, it will be displayed in text format on the graphic.

Graphical SIGMET makes editing SIGMET messages easier.

MESSIR-AERO at a Glance

- MESSIR-AERO is 100% compliant with:
 - ICAO Annex 3 latest edition and amendments (Meteorological Assistance to International Air Navigation)
 - SADISOPSG evaluation criteria
- Provide the necessary meteorological information worldwide to ensure aeronautical security and warning
- Process data from various sources: SADIS, WIFS, AFTN/AMHS, OPMET
- Only three mouse clicks are required on MESSIR-AERO to display or print a complete flight folder
- Field experience of more than 20 years in more than 100 countries

For a defined FIR, the forecaster can draw the hazard zone directly on the interface after receiving a warning message from a pilot during flight, for example. This will automatically create a SIGMET message with the coordinates.

Everything is done from a user-friendly and simple interface.

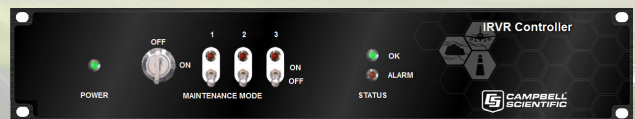
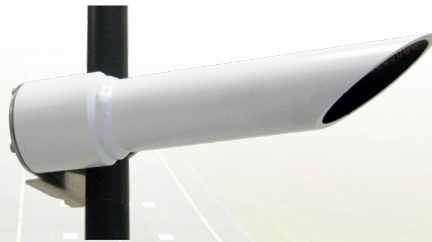
Campbell Scientific Aviation Sensors



The safety and efficiency of your flight operations are the most important aspects to manage, regardless of the size of your airport. Weather phenomena can have a significant impact on your ability to safely and efficiently maintain flight operations. Campbell Scientific's range of highly reliable and accurate optical sensors will help you to ensure that you meet the most stringent requirements and cope with these weather-related challenges.

Some of the most important aspects to be monitored are visibility, background luminance, present weather, and cloud height.

Campbell Scientific's CS120A and CS125 sensors provide accurate visibility measurements. The CS125 will additionally provide present weather as METAR or NWS codes. The CS140 provides background luminance, crucial for RVR calculations. The SkyVUE™ PRO gives cloud information such as cloud base (cloud height) and sky condition (cloud coverage). We also offer the AVM200, which combines RVR, visibility, and present weather detection in a single system. All sensors comply with CAA and ICAO guidance and meet or exceed all recommendations and specifications (this includes CAP437, CAP670, and CAP746).



Optical Range Overview

Visibility and Present Weather – CS120A and CS125

The CS120A and CS125 both measure visibility up to 75 km with the CS125 additionally reporting present weather. Both sensors use the proven forward scatter system for visibility measurement, utilizing downward facing hoods to protect against contamination of the lenses as recommended by ICAO. The CS125 provides unprecedented functionality, reporting extensive METAR, SYNOP, and NWS present weather codes.

SkyVUE™ PRO Ceilometer

Our SkyVUE™ PRO ceilometer provides reporting of up to five layers of cloud cover tracking according to ICAO and WMO rules. For instances when detailed data is shared with environmental agencies, there are options for providing boundary layer data.

The SkyVUE™ PRO is designed around a novel single biaxial lens system. This optical design gives superior performance compared

to traditional dual lens designs especially over the lower altitudes relevant to aviation. Sophisticated data processing is combined with its tilt feature to avoid direct reflections from precipitation overhead.

Background Luminance – CS140

Combining the visibility output of either the CS120A or the CS125 with background luminance from a CS140 background luminance sensor provides all the sensor data needed for an Integrated Runway Visual Range (IRVR) system.

IRVR – the Campbell Scientific IRVR controller

The IRVR controller unit brings together the Campbell visibility and luminance sensors to create an IRVR system of unequalled simplicity and performance. This can be used stand-alone for airports looking to move from human to instrument RVR in the most efficient manner or to upgrade their level of operations.

CS120A/CS125 Visibility and Present Weather Sensors

The CS120A and CS125 are forward scatter visibility and present weather sensors for stand-alone use or with automatic weather stations. They use the well established forward scatter system for visibility measurement, utilizing a 42 degree scatter angle, which gives accurate estimates of Meteorological Observable Range (MOR) for fog and snow. The CS125 identifies precipitation particles from their scattering properties and fall speeds, and combines this with a temperature measurement to identify the weather type.

Both devices follow ICAO guidance in having downward-pointing optics that reduce the risk of contamination of the optics and blockage with snow. This also means that direct sunlight will never shine straight into the optics. Interference with the sample volume from the sensor by flow distortion or heat is minimized by keeping it clear of the hood and electronics box.

The sensors incorporate low-power dew-prevention heaters and higher power anti-icing heaters for the hoods as standard. These are automatically controlled to ensure operation in all weathers or can be disabled to save power.

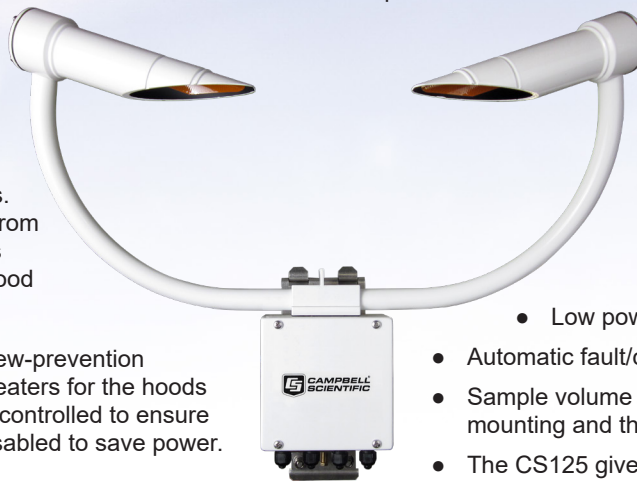
The HygroVUE™5 temperature and relative humidity sensor can be fitted to the CS125. This gives better performance in differentiating between liquid and solid precipitation and also allows relative humidity information to be transmitted.

The CS120A and CS125 comply with ICAO, UK, FAA, and CAA guidance and meet or exceed all recommendations and specifications, which includes ICAO 9837, ICAO Annex 3, CAP437, CAP670, and CAP746.

Integrated low-power heaters prevent the build-up of dew and higher powered anti-icing heaters are also included. All heaters are automatically controlled for simple operation in all weather.

Benefits & Features

- High performance visibility and present weather sensors at an economical price
- Uses established 42-degree scatter angle for good MOR readings in all precipitation types
- Incorporates both dew and hood heaters for all-weather operation
- The CS125 gives present weather and precipitation accumulation
- RS232/RS485 and logic level alarm outputs
- Simple field calibration with optional calibration disk, including dirty window zero-offset correction
- Low power – suitable for remote applications
- Automatic fault/contamination detection
- Sample volume clear of disturbance from the mounting and the electronics enclosure
- The CS125 gives present weather to ICAO standards



Applications

- Road weather
- Airport visibility and RVR
- Marine weather stations
- Automatic weather stations
- Wind farms

Specifications at a Glance

CS120A and CS125

- Maximum reported visibility: 75 km (approx. 47 miles)
- Accuracy: <600 m $\pm 8\%$
600-10,000 m $\pm 10\%$
10,000-15,000 m $\pm 15\%$
15,000-75,000 m $\pm 20\%$
- Resolution: 1 m
- Alarm outputs: 2 x 0-5V outputs, 32 mA (max)
- Serial interface: RS-232 or RS-485
- Operating temperature: -25 to 60°C

- Extended operating temperature: -40 to +70°C option
- Operating humidity: 0-100%
- Wind speed: up to 60 m/s
- Sensor sealing: rated to IP66
- Power: (7-28V DC)
- Hood heater supply: 24V DC or AC
- Hood heater power: 2 x 30W
- Total unit power: <3W while sampling continuously (including dew heaters)

CS125 only

- Present and past weather: identifies as standard mist, fog, drizzle, freezing drizzle, drizzle and snow, rain, freezing rain, rain and drizzle, rain and snow, and snow
- Outputs 56 SYNOP present weather codes according to WMO code table 4680, associated METAR codes at WMO code table 4678, and NWS codes
- Accumulation reported range: 0-999.9 mm
- Accumulation resolution: 0.1 mm

SkyVUE™ PRO Ceilometer

The Campbell Scientific SkyVUE™ PRO Ceilometer measures cloud height and vertical visibility for meteorological and aviation applications. Utilizing Light Detection and Ranging (LIDAR) technology, the instrument transmits fast, low-power laser pulses into the atmosphere and detects back-scattered returns from clouds and aerosols above the instrument.

The SkyVUE™ PRO employs a single lens design to increase optical signal-to-noise ratio over other instruments. The Transmit and Receive sections are optically isolated. This allows the device to have exceptional performance with low altitude overlap between the transmitter and receiver while integrating larger optics into a compact package. The optics are also immune to damage from direct sunlight.

The SkyVUE™ PRO provides information on cloud height, sky condition (up to five layers), and raw backscatter profiles.

As an option, mixing layer height can be calculated within the SkyVUE™ PRO and inserted in data messages.

The SkyVUE™ PRO can be tilted up to 24 degrees. Cloud heights are automatically

corrected. A small tilt is an important feature as it allows the SkyVUE™ PRO to resist high levels of reflection from large raindrops and frozen particles that can impair a vertical sensor.

The SkyVUE™ PRO complies with ICAO and CAA guidance and meets or exceeds all recommendations and specifications, including ICAO 9837, ICAO Annex 3, CAP437, and CAP746.



Benefits & Features

- Single lens design for high signal-to-noise ratio, maximized detector sensitivity, and extended range
- State-of-the-art signal processing
- Integrated heater, blower, and radiation shield as standard
- Built-in calibration capability
- Tilt angles to 24 degrees
- Two-axis inclinometer for automatic correction of cloud height
- Continuous comparison between two internal clocks for confidence in reliable operation

Specifications at a Glance

- Range: 0-10 km/32,800 ft
- Minimum reporting resolution: 5 m/15 ft
- Accuracy: +/- 0.05% +/- 4.6 m
- Cloud layers reported: Up to five layers with cover in oktas
- Data output: RS-232/RS-422/RS-485/Ethernet
- Power: 110/115/230 VAC $\pm$ 10%, 50-60 Hz, 15W to 470W when operating full heaters
- Battery: Internal 12V 2Ah battery
- Maintenance port: USB 2.0 (USB 1.1 compatible)
- Temperature range excluding battery: -40°C to 60°C, -40°F to 140°F
- Humidity: 0-100% RH
- Wind speed: 55 m/s (wind tunnel tested)
- IP rating: IP55 (NEMA 4X)
- Vertical: 6°, 12°, 18° and 24° tilt positions (for improved performance in rainfall)
- Integrated heater, blower, and radiation shield as standard
- Sky condition calculation as standard
- Exceptional laser life in excess of 10 years
- Eye safety: Class 1 M
- Laser safety compliance: EN60825-1:2001
- Electrical safety compliance: EN61010-1
- EMC compliance: BS EN 61326:2006

CS140 Background Luminance Sensor

IRVR Forward Scatter Runway Visual Range

The CS140 is a high quality background luminance sensor. It provides the luminance data required to assess the visibility range for lights such as runway lights or warning lights.

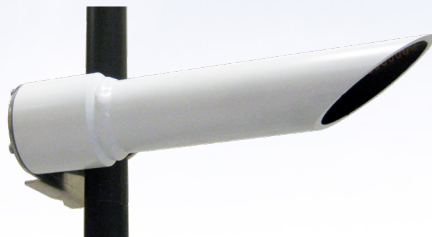
The field of view and elevation angle follow aviation practice and the spectral response follows the CIE curve that matches the typical response of the human eye. The optics are designed so that with the sensor horizontal to the field of view is elevated by 6 degrees. This allows maximum protection from precipitation for the window.

The CS140 meets the standards of ICAO, FAA, and UK CAA.

It is a robust instrument and is immune to damage from sunlight shining directly into the window.

Benefits & Features

- High performance sensor at an economical price
- Elevated field of view with hood horizontal to give high resistance to contamination on the window
- Incorporates both dew and hood heaters for all-weather operation
- RS232/RS485 outputs to operate independently of a host visibility sensor for flexible, reliable operation
- Low power - suitable for remote applications
- Automatic window contamination detection
- Configurable window contamination correction
- Monitoring of internal supply voltages and temperatures



The Campbell Scientific IRVR controller provides the core of a system for automated assessment of IRVR. The IRVR controller can poll sensors at between one and three sensor locations to cover operations from CATI to CATIII in accordance with ICAO standards.

Campbell Scientific can provide IRVR systems to meet all needs from simple self-contained systems to interfacing with a larger AWOS system.

Benefits & Features

- It can operate as a stand-alone IRVR system utilizing the internal web pages or provide IRVR data to a larger AWOS system
- Datalogger based unit for high MTBF
- 2U 19" rack mountable for flexible installation
- Ethernet connection for displays and data messages
- USB service port for easy maintenance
- Data is recorded for traceability and incident recording and can be downloaded for external review

Specifications at a Glance

CS140

- Measuring range: 0-45,000 cd/m²
- Accuracy: $\pm 0.2 \text{ cd/m}^2 < 2 \text{ cd/m}^2 \pm 10\%$
 $> 5 \text{ cd/m}^2$
- Resolution: 0.1 cd/m²
- Field of view 6° wide with sharp cut-off
- Elevation angle 6° with hood horizontal
- Spectral response closely follows CIE curve to match response of human eye
- Operating temperature: -25 to +60 °C
- Extended operating temperature: -40 to +70 °C option
- Operating humidity: 0-100%
- Wind speed: up to 60 m/s
- Sensor sealing: rated to IP66
- Response time: 1 s
- Serial interface: RS-232 or RS-485 half duplex
- Electronics supply voltage: 9-30V DC
- Hood heater supply: 24V DC or AC
- Hood heater power: 48 W
- Dew heater power: 0.6 W
- Total unit power: <1.5W while sampling continuously (including dew heater)
- Low voltage shutdown level can be set to prevent back-up batteries being damaged

IRVR

- Calculates IRVR to ICAO requirements for up to three sites (up to six sensors)
- Three RS-485 inputs for sensor data
- Ethernet connection for displays and data messages
- RS-485 serial output for data messages
- USB service port
- RS-232 input for Wharton or other external clock
- Power requirements: 100-240V AC, 15W 50-60 Hz
- Sensor sealing: rated to IP66



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