MaxiMet®

Application Note

On-board weather data for MAS autonomous ship

GMX500 weather station provides accuracy and reliability with low power demand

Background

The Mayflower Autonomous Ship (MAS) is an ocean going, solar powered, crew-less vessel. It uses Artificial Intelligence (AI) to navigate and solar panels to collect energy, allowing it to travel further and reveal more about the ocean than traditional ships.

Using its ability to remain at sea longer, and its AI navigation to optimize its route, MAS can increase the number and relevance of its scientific and meteorological observations. This will allow a better understanding of critical issues such as climate change, ocean plastic pollution and marine mammal conservation.

The Mayflower Autonomous Ship project is led by marine research organisation ProMare with IBM as lead technology and scientific partner for the project. The project was named to celebrate the 400th anniversary of the Mayflower ship sailing from Plymouth, England to "the New World" in 1620.



Mayflower Autonomous Ship (MAS) operates without crew using AI to guide it using a range of onboard sensors combined with machine learning (photo courtesy Promare/ IBM)

Challenge

With no human crew, MAS needs to plan its own route to optimize data collection, whilst remaining safe and being energy efficient. To achieve this MAS uses AI Captain, an onboard virtual decision making system developed with IBM.

AI Captain relies on data from a number of sources, constantly evaluating the data to maintain optimal efficiency and safety. The information about local weather, a key data source, requires a sensor that is highly reliable and accurate but with minimum space and energy demand.

Solution

MaxiMet® GMX500 compact weather station from Gill Instruments, was selected to provide weather data on the vessel. The MaxiMet® range has a reputation for reliability in a range of land and marine based data collection and control environments, and is used by customers around the world. The MaxiMet® unit is robust, low power, high performance and easy to integrate with the control and AI systems.

MAS400 programme director Brett Phaneuf stated "The MaxiMet provides us essential, real-time, highly resolute data about local conditions. Without it we would be unable to properly assess local conditions and the rate at which they may change so we maintain safe and efficient navigation on our long journeys across the world's oceans".



MaxiMet® GMX500

Compact, integrated weather station used on board the MAS, providing weather data to the AI Captain.

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WIND SPEED	
Range	0-60m/s (134 mph)
Accuracy	0-10m/s +/-0.3m/s RMS 10-40m/s +/-3% RMS 40-60m/s +/- 4% RMS
Resolution	0.01m/s
Units of measurement	m/s, knots, mph, kph, ft/min

WIND DIRECTION	
Range	0-359°
Accuracy	0.5m/s-40m/s +/- 3° 40-60m/s +/- 5°
Resolution	1°
Units of measurement	degrees

AIR TEMPERATURE	
Range	-40°C TO +70°C
Accuracy	0.3°C @ 20°C
Resolution	0.1°C
Units of measurement	°C, °F

RELATIVE HUMIDITY	
Range	0-100%RH
Accuracy	2% RH @ 20°C (10%-90% RH)
Resolution	1% RH
Units of measurement	% RH, g/m^3

BAROMTRIC PRESSURE	
Range	300-1100 hPa
Accuracy	+/- 0.5 hPa @ 25°C
Resolution	0.1 hPa
Units of measurement	hPa, mbar, mmHg, inHg

OUTPUTS	
Digital comms modes	RS232, RS422 RS485, SDI-12, NMEA, MODBUS
Protocols	ASCII, SDI-12 v1.3, MODBUS (RTU and ASCII)
Data output rates	1/s, 1/min, 1/hour, or polled

POWER SUPPLY	
Input Voltage	5-30V DC
Current @ 12V DC	25mA continuous mode 0.7mA eco-power mode (1 hr polled)

MECHANICAL	
Construction	UV stablized thermoplastic
Fittings	Fit to 44.5mm (1.75 inch) pole directly Fit to 30mm to 58mm pole using optional mounting bracket accessory
Weight	0.7 kg

ENVIRONMENTAL & REGULATORY	
Protection class	IP66
EMC	EN61326
Operating temp.	-40°C to +70°C
Storage temp	-40°C to +70°C
CE marking	Yes
RoSH compliant	Yes
Origin	UK (United Kingdom)

STANDARD EQUIPMENT (supplied with product)
MaxiMet product
Mating connector
MetSet software,* to set-up and configure MaxiMet (comms mode, measurement units, reporting intervals, derived parameters, etc)
MetView software*, to view reported parameters
MaxiMet User Manual*
* downloadable from Gill Instruments website

WARRANTY	
Warranty	24 months

OPTIONS	
GPS	Available as an option. Enables reporting of location, height, real time clock, true wind

PART NUMBERS	
1957-0500-60-000	GMX500 without GPS
1957-0500-60-100	GMX500 with GPS

For more information about MaxiMet® please contact Gill Instruments.

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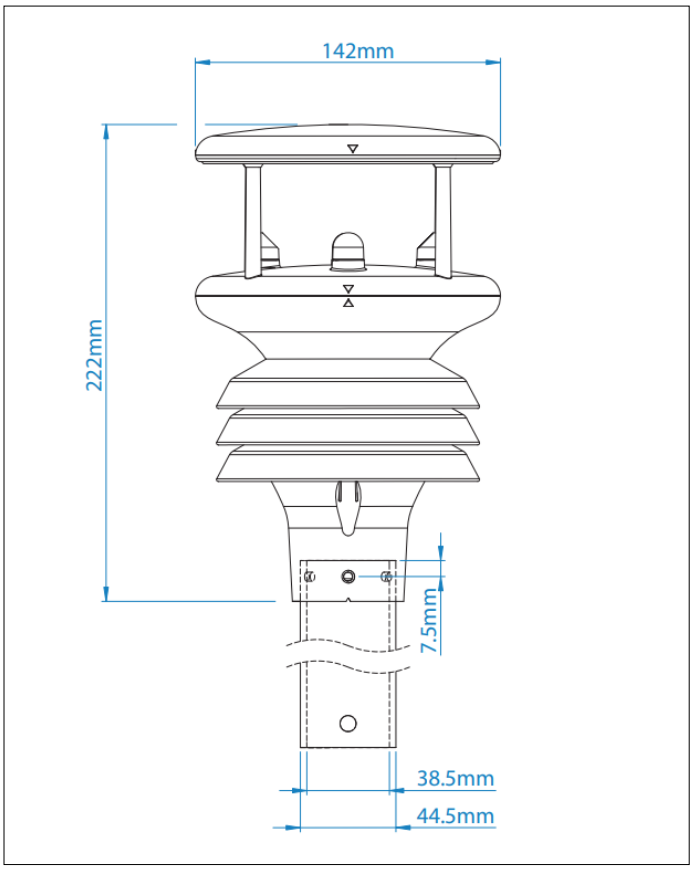
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EXAMPLE DERIVED PARAMETERS (A full list of derived parameters is available in the User Manual which can be downloaded from the Gill Instruments web site)	
Average wind speed	Sunrise
Average wind direction	Solar noon
Corrected wind speed	Twilight
Corrected wind direction	Sunset
Gust wind speed	Position of sun
Gust wind direction	Angle of tilt
Wind chill	Pressure at sea level
Absolute humidity	Heat index

ACCESSORIES
Replacement mating connector
Power & communications cable (15m pre-prepared)
Cable (by the metre, for customer to prepare)
Configuration cable (MaxiMet to USB)
Mounting bracket (for mounting to pole or vertical surface)
Mounting tube (0.5m high)

OTHER MAXIMET® MODELS

	Rain	Solar	Wind	Temperature, Humidity, Pressure	GPS
GMX100	Integrated optical rain gauge				
GMX101		Y			
GMX200			Y		Y, as option
GMX300				Y	
GMX400	Y, Optical			Y	
GMX500			Y	Y	Y, as option
GMX501		Y	Y	Y	Y, as option
GMX550	Tipping bucket connector		Y	Y	Y, as option
GMX551	Tipping bucket connector	Y	Y	Y	Y, as option
GMX600	Integrated optical rain gauge		Y	Y	Y, as option

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