



## TERMS OF REFERENCE

### SUPPLY AND DELIVERY OF FIFTEEN (15) UNITS BAROMETRIC PRESSURE SENSOR; FORTY-FOUR (44) UNITS TEMPERATURE/ HUMIDITY SENSOR; AND TWELVE (12) UNITS WIND VANE ANEMOMETER/DIRECTION SENSOR

#### A. BACKGROUND

This procurement aims to provide the much-needed replacement for the defective sensors at different Automatic Weather Stations.

#### B. APPROVED BUDGET FOR THE CONTRACT (ABC)

The Approved Budget for the Contract is **Four Million Eight Hundred Seventy-Three Thousand One Hundred Pesos (Php5,985,458.00)** only inclusive of VAT and all applicable government taxes.

#### C. PLACE AND DATE OF DELIVERY

The winning bidder shall supply and deliver FIFTEEN (15) UNITS BAROMETRIC PRESSURE SENSOR, FORTY-FOUR (44) UNITS TEMPERATURE/HUMIDITY SENSOR AND TWELVE (12) UNITS WIND VANE ANEMOMETER/DIRECTION SENSOR at PAGASA Central Office within Sixty (60) calendar days upon receipt of NTP.

#### D. ADDITIONAL BIDDER REQUIREMENTS

1. All participating bidder/ supplier shall be required to submit the following:
  - Supplier must issue all the following documents and particulars:
    - Partner certification from the product manufacturer
    - End user certificate of approval on the datalogger modification software

#### E. TECHNICAL SPECIFICATIONS

##### 1 . Barometric Pressure Sensor (BaroVUE 10) - Eighteen (15) Units

Pressure Range	500 to 1100hPa
Temperature Range	-40° tp +60°C
Supply Voltage	9 to 28Vdc
Elevation	~609.6 m (2,000 ft) below sea level (as in a mine) to 4,572 m (15,000 ft) above sea level

Current	< 5 mA (active)
Consumption	200 $\mu$ A (sleep mode)
Digital Output	SDI-12, RS-232 serial
Pressure Fitting	Barbed fitting for 0.318 cm (0.125 in.)
Dimensions	2.2 x 9.0 x 10.2 cm (0.87 x 3.54 x 4.02 in.)
Weight	226.8 g (0.5 lb)

### Accuracy

Calibration Uncertainty	$\pm 0.15$ hPa
Uncertainty	$\pm 0.3$ hPa (at 20°C)
Total Uncertainty	$\pm 0.5$ hPa (at -40° to +60°C)
Long-Term Stability	$\pm 0.1$ hPa/yr
Power Supply Rejection	Negligible
Measurement Noise	0.05 hPa (RMS)
Resolution	0.1 hPa

## 2. Temperature/Humidity Sensor (HygoVUE10) - Forty-Four (44) Units

Sensing Element	SHT35 modified by Campbell Scientific
Communication Standard	SDI-12 V1.4 (responds to a subset of commands)
Supply Voltage	7 to 28 Vdc
EMC Compliance	Tested and conforms to IEC61326:2013.
Standard Operating Temperature Range	-40° to +70°C
Main Housing Material	UV stable, white PET-P
Electronics Sealing Classification	IP67
Sensor Protection	Outer glass-filled polypropylene cap fitted with a stainless-steel mesh dust filter with nominal pore size of < 30 $\mu$ m. The sensor element has a PTFE protective film with a filtration efficiency of > 99.99% for particles of 200 nm or larger size.
Sensor Connector	M12, male, 4-pole, A-coded
Cable	Polyurethane sheathed, screened cable, nominal diameter 4.8 mm (0.19 in.)
Field-Replaceable Chip or Recalibrate	Field-replaceable chip
Sensor Cap Diameter	12.5 mm (0.5 in.)
Body Diameter at Connector	18 mm (0.7 in.)
Sensor Body Weight	50 g (1.8 oz)
Weight	250 g (8.8 oz) with 5 m (16.4 ft) cable

## Relative Humidity

Measurement Range

0 to 100% RH

Accuracy

*-NOTE- The accuracy figures quoted are the 95% confidence limits relative to factory standards.*

±1.5% (at 25°C, over the range 0 to 80% RH)

±2% (at 25°C, over the range 80 to 100% RH)

Short-Term Hysteresis

< ±1% RH

Additional Errors at

Other Temperatures

< ±1% RH (over -40° to +60°C)

Long-Term Stability

±0.5% per year (maximum drift in clean air conditions)

Reported Resolution

0.001% RH

Repeatability

0.05% RH (3σ noise level)

Response Time with Filter

< 20 s (63% response time in still air)

## Air Temperature

Measurement Range

-40°C to +70°C

*-NOTE-*

*The accuracy figures quoted are the 95% confidence limits relative to factory standards.*

Accuracy

±0.2°C (over the range -40 to +70°C)

±0.1°C (over the range 20 to 60°C)

Long-Term Drift

< 0.03°C per year

Reported Resolution

0.001°C

Repeatability

0.04°C (3σ noise level)

Response Time with Filter

< 130 s (63% response time in air moving at 1 m/s)

Calibration Traceability

NIST and NPL standards

## Maximum Current Drain

Quiescent

50 μA

During Measurement

0.6 mA (takes 0.5 s)

### 3. Wind Vane Anemometer /Direction Sensor (RM Young 05103-L) – Twelve (12) Units

Sensor

Helicoid-shaped, 4-blade propeller and fuselage-shaped sensor body

Measurement Description

Wind speed and direction

Operating Temperature Range

-50° to +50°C (assuming non-riming conditions)

Mounting Pipe Description

34 mm (1.34 in.) OD

Standard 1.0-in. IPS schedule 40

Compliance with Standards

2011/65/EU RoHS Directive

2015/863/EU RoHS Phthalates Amendment

Housing Diameter

5 cm (2.0 in.)

Propeller Diameter

18 cm (7.1 in.)

Height

37 cm (14.6 in.)

Length 55 cm (21.7 in.)  
Weight 1.5 kg (3.2 lb)

### Wind Speed

Range 0 to 100 m/s (0 to 224 mph)  
Accuracy  $\pm 0.3$  m/s ( $\pm 0.6$  mph) or 1% of reading  
Starting Threshold 1.0 m/s (2.2 mph)  
Distance Constant 2.7 m (8.9 ft) 63% recovery

Output ac voltage (three pulses per revolution)  
90 Hz (1800 rpm) = 8.8 m/s (19.7 mph)  
Resolution  $(0.0980 \text{ m s}^{-1}) / (\text{scan rate in seconds})$  or  $(0.2192 \text{ mph}) / (\text{scan rate in seconds})$

### Wind Direction

Mechanical Range 0 to 360°  
Electrical Range 355° (5° open)  
Accuracy  $\pm 3^\circ$   
Starting Threshold 1.1 m/s (2.4 mph) at 10° displacement  
Distance Constant 1.3 m (4.3 ft) 50% recovery  
Damping Ratio 0.3  
Damped Natural Wavelength 7.4 m (24.3 ft)  
Undamped Natural Wavelength 7.2 m (23.6 ft)  
Output Analog dc voltage from potentiometer (resistance 10 kohm) Linearity is 0.25%.  
Life expectancy is 50 million revolutions.  
Power switched excitation voltage supplied by data logger

Voltage

## F. TERMS OF ACCEPTANCE

- The winning bidder must be able to provide the necessary software modification to the existing Campbell Scientific data logger for the delivered sensors and must be able to prove that the supplied sensor (one sampling for each sensor) is working to the existing data logger.
- The winning bidder shall provide documentary proof of calibration from the PAGASA Instrument Calibration Laboratory on the delivered sensors.

## G. WARRANTY

New Sensor replacement as soon as possible under standard warranty conditions.