HydroLynx Systems, Inc.

Model 2048RH/T
Relative Humidity & Temperature Sensor

Instruction Manual

Document No: WP102713
Document Revision Date: April, 2011

Receiving and Unpacking

Carefully unpack all components and compare to the packing list. Notify HydroLynx Systems immediately concerning any discrepancy. Inspect equipment to detect any damage that may have occurred during shipment. In the event of damage, any claim for loss must be filed immediately with the carrier by the consignee. If the equipment was shipped via Parcel Post or UPS, contact HydroLynx Systems for instructions.

Returns

If equipment is to be returned to the factory for any reason, call HydroLynx between 8:00 a.m. and 4:00 p.m. Pacific Time to request a Return Authorization Number (RA#). Include with the returned equipment a description of the problem and the name, address, and daytime phone number of the sender. Carefully pack the equipment to prevent damage during the return shipment. Call HydroLynx for packing instructions in the case of delicate or sensitive items. If packing facilities are not available, take the equipment to the nearest Post Office, UPS, or other freight service and obtain assistance with packaging. Please write the RA# on the outside of the box.

Warranty

HydroLynx Systems warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment from the factory. HydroLynx Systems' obligations under this warranty are limited to, at HydroLynx's option: (I) replacing; or (ii) repairing; any product determined to be defective. In no case shall HydroLynx Systems' liability exceed product's original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by HydroLynx Systems, or that has been subjected to misuse, negligence, or accident. It is expressly agreed that this warranty will be in lieu of all warranties of fitness and in lieu of the warranty of merchantability.

Address

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1.0 INTRODUCTION

1.1 General Description

The Model 2048RH/T probe is based on HygroClip technology so each probe is 100% interchangeable. The HygroClip includes two main subsystems; an ASCI (Application Specific Integrated Circuit) which measures both sensors, and a Micro controller/EEPROM used to calibrate the sensor data. A MOK connector/signal conditioning package produces the linear 0-5Vdc signals over the measured ranges of 0 to 100% relative humidity and - 40 to +140°F. The 2048RH/T is a standard instrument supplied in the 5081 Packaged Weather Station. The Model 4550 Solar Radiation Shield, with an integrated mounting bracket, is included as part of the 2048RH/T.

1.2 Specifications

Power Supply:	10 to 26 Vdc
Current:	<4mA
Sensor Type:	
Humidity:	HYGROMER®-C94
Temperature:	Pt100 1/3 DIN
Measuring Range:	
Humidity:	0...100%RH
Temperature:	-40...140°F (-40...60°C)
Operating Range:	-40...185°F (-40...85°C)
Accuracy at 23°C:	
Humidity:	±1.5%RH
Temperature:	0.36°F
Output Signal:	0..5Vdc
Excitation Time:	3 seconds
Sensor protection:	Wire mesh filter
Solar Radiation Shield:	
Height:	8.3"
Mounting:	1" Dia U-Bolt
Weight/Shipping:	1.0 lbs/1.5 lbs

2.0 INSTALLATION

As part of the 5081 Packaged Weather Station, the 2048RH/T is shipped partially installed on the 5081 Mast/Crossarm Assembly. Refer to the 5081 Manual for weather station installation.

2.1 Site Selection

When selecting a site be aware of microclimates that may affect the humidity and temperature sensor measurements.

2.1.1 Humidity

Standing water, irrigation, and transpiration of plants will increase the local humidity.

2.1.2 Temperature

Some factors that affect the local ambient temperature are: heat radiators, e.g. parking lot blacktop and building exhaust; and heat sinks, e.g. low pocket areas and cold air drainage.

Also, the site should not be blocked completely from the wind. For the Model 4550 Solar Radiation Shield to be effective, there must be air flow around the sensor.

2.2 Wiring

2.2.1 Wiring Diagram

During the installation of a 5081, it is not necessary to remove the cables from the cable junction box PCB. If other installations requires removing the cables, or during sensor replacement, refer to Wiring Diagram AC108220.

2.2.2 Cable Strain Reliefs

Both cables enter the signal conditioning enclosure through ¼ "Strain Relief" fittings. The strain reliefs reduce the physical strain from the electrical connection as well as providing liquid tight cable entry into the enclosure.

The signal cable is threaded through the 5081 Crossarm and held in place with a cable clamp strain relief.

2.2.3 Connection to the Data Transmitter

The standard input port, a 6-pin rotated MS connector, is labeled Temperature & Humidity. Check alignment key and pin placement before installing connector. To install connectors align keys then press in while turning threaded locking collar. It is important for the connector to be completely seated. Continue turning collar until connector bottoms out. When installed with the 5096N, the signals are usually wired to A1 and A2, refer to Wiring Diagram AC107996.

2.3 Mounting

Refer to Installation Drawing AC107997.

2.3.1 Probe

The probe is installed inside the 4550 Solar Radiation Shield and held in place by a conduit clamp. Do not over tighten conduit clamp onto the probe housing; slide the probe up and down while tightening conduit clamp, stop tightening when unable to easily slide probe.

2.3.2 Cable Junction Box

The cable junction box is attached to a mounting plate that is attached to the solar radiation shield assembly. While it is possible to open the cable junction box while it is attached to the crossarm mast, the field technician will find that removing the mounting plate allows freer access to the cable junction box and the terminal connector inside.

2.3.3 Solar Radiation Shield - Ground Wire

The solar radiation shield is attached to the 5081 crossarm mast with a 1" dia U-bolt 1/4"-20 threads. There is a green ground wire attached under one nut of the U-bolt; this wire connects the cables shield wires to earth ground. The U-bolt mounting plate has teeth which should be allowed to make contact with the bare metal of the mast. If it is suspected that a lack of proper earth grounding is causing anomalous readings a separate ground wire can be attached to the U-bolt and run to customer supplied ground system (grounding rod etc.)

3.0 THEORY OF OPERATION

The 2048RH/T is designed for use in meteorological monitoring stations.

3.1 Definitions

3.1.1 Relative Humidity

Relative Humidity is defined as the ratio of water existing as vapor in the air at a given temperature to the maximum amount of water that could exist as vapor in the air at that temperature. It is most often expressed in percent: e.g. 45% RH. Note: RH is meaningless without a temperature measurement.

3.1.2 Temperature

Temperature is defined in many ways, to paraphrase the Zeroth Law of Thermodynamics: "There exists a useful quantity called temperature". Temperature is the measure, on a definite temperature scale, of the hotness or coldness of a system.

3.2 Sensors

The section 3.2.1 Relative Humidity Sensors is taken from Accuracy of Relative Humidity Instruments; by J-Patrick Lafarie, Rotronic Instrument Corporation.

3.2.1 Relative Humidity Sensor

The humidity sensor is a small capacitor consisting of a hygroscopic dielectric material placed between a pair of electrodes. Most capacitive sensors use a plastic or polymer as the dielectric material, with a typical dielectric constant ranging from 2 to 15. When no moisture is present in the sensor, both this constant and the sensor geometry determine the value of the capacitance.
At normal room temperature, the dielectric constant of water vapor has a value of about 80, a value much larger than the constant than the constant of the sensor dielectric material. Therefore, absorption of the moisture by the sensor results in an increase in sensor capacitance. At equilibrium conditions, the amount of moisture present in a hygroscopic material depends on both ambient temperature and ambient water vapor pressure. This is also true for the hygroscopic dielectric material used in the sensor.

By definition, relative humidity is also a function of both the ambient temperature and water vapor pressure. Thus, there is a relationship between relative humidity , the amount of moisture present in the sensor, and sensor capacitance. This relationship is the base of the operation of a capacitive humidity instrument.

3.2.2 Hygromer® C94 Sensor

Developed by Rotronic, the Hygromer C94 sensor is the result of many years of experience in humidity measurement. Special formulation of the dielectric polymer, careful selection of all other materials used in the sensor and tight manufacturing standards contribute to make the C94 a superior sensor:

- Average life time well in excess of 10 years.
- Very stable; operates practically maintenance free, with long intervals between calibrations,
- Accurate to ±1%RH or better from 0...100%RH (at 64 to 82°F).
- Recovers quickly from exposure to high humidity over long periods.
- Survives long term exposure to extremely high temperatures up to 392°F. There is no known limit for temperatures below freezing.

3.2.3 Temperature - RTD

Resistive Temperature Detectors (RTD) operate on the principle that the electrical resistance of a metal conductor changes as a function of temperature. Materials for RTDs can be gold, silver, copper or platinum. Platinum has become the most used metal for RTDs as it has a nearly linear temperature versus resistance relationship. RTD’s provide an accurate, stable and repeatable means of temperature measurement.

3.2.4 Protective Shield

A plastic shield with a wire mesh filter enclose the RH and temperature sensors providing mechanical and chemical protection. The plastic shield prevents objects from physically coming into contact with the sensors; the filter allows moist air to pass through its walls while excluding particles.

3.3 Signal Conditioning

The HygroClip technology takes advantage of Digital Signal Processing (DSP) to provide 100% interchangeability between probes. The DSP includes two main subsystems: a custom designed ASCI chip and a micro controller with EEPROM memory. The HygroClip is conditioned to the ALERT standard 0...5 Vdc output by the MOK connector and signal converter.

3.3.1 Application Specific Integrated Circuit (ASCI)

The ASCI measures both the humidity and temperature sensors and converts the measurement into digital counts. The digital data is sent to the micro controller for calibration. The ASCI also includes two Digital to Analog converters(DAC) which are used in the final stage to convert the calibrated digital data from the micro controller into an analog signal.

3.3.2 Micro Controller with EEPROM

The micro controller uses the digital counts from the ASCI to compute a calibrated value for the sensor output DAC’s. The EEPROM stores the sensor data for temperature compensation, linearization and other sensor parameters used to calibrate sensor output data.

3.3.3 MOK Connector and Signal Converter

The MOK connector incorporates a small circuit board which converts the standard HygroClip output signals into those required by the data telemetry equipment; the ALERT standard is 0...5Vdc.

3.4 Model 4550 Solar Radiation Shield

- The solar radiation shield serves three functions:
- protects the probe from direct sunlight
- provides aspiration
- provides mounting arm for secure installation to the 5081 mast.

3.4.1 Protection

Direct exposure to sunlight will cause temperature measurements to read higher than actual. To minimize this effect the shield is constructed of a flat deflection plate and three wedge shaped aluminum plates. All plates are powder coated with a white high gloss finish to increase the shield's reflectivity.

3.4.2 Aspiration

The shield is shaped to allow air flow, aspiration, around the probe so that the temperature of the air being measured is representative of the ambient air. On calm days, winds speeds less than 1.5 mph (0.5 m/s), the shield aspiration will not be effective and measurement errors of 7°F have been recorded with a solar angle of 70 degrees above the horizon. Conditions mentioned are not typically of concern in a flood warning system; however, error correction methods can be employed relating data such a the sun's angle and wind speed.

3.4.3 Mounting

The mounting arm is designed for mounting onto a 1" diameter mast or tower leg using the U-bolt and clamp assembly.

4.0 TESTING, CALIBRATION, AND MAINTENANCE

Each HygroClip probe is 100% interchangeable because calibration and other data are stored in the non-volatile EEPROM. HygroClip probes can be swapped without any loss of accuracy and without calibration. If the probe requires calibration return it to the factory.

4.1 Field Test

The field test is a one point calibration check which confirms the probe’s functionality and accuracy at the current ambient conditions.

4.1.1 Test Setup

The test setup may vary but three things must be supplied:

- power
- measurement of the output
- measurement of the ambient %RH and Temperature.

Power may be supplied through the data transmitter or a custom test harness. The output is read with a volt meter or the 5096 "read-an" command. Use a portable psychrometer and thermometer or other hand held meter to measure the ambient conditions. We will assume for this test that the 2048RH/T is connected to a 5096 Data Transmitter installed at a 5081

Weather Station and that the field technician is familiar with using a laptop terminal program and the 5096.

4.1.2 Test Procedure

- Use the portable psychrometer and thermometer to measure the ambient conditions.
- Record these values as the "Measured" value (Maintenance Report # WP104973).
- Using the 5096 "Read-an..." command measure the sensor output.
- Record these values as the "Reading" values.
- Compare "Measured" values to "Reading" values (Curves # AC100893 & AC100894).
- Limits: The accuracy of the field test equipment must be taken into account to determine the limits of these tests; however, as a "rule-of thumb" the maximum error for %RH should be ≤ ±4%RH and temperature should be ≤ ±2°F.

4.2 Field Calibration Check

While a field calibration check is possible it is not a HydroLynx recommended procedure; as it requires more equipment, more time to perform the testing and should have a temperature stable test environment.

During a calibration check the probe is placed into test conditions other than ambient; a chamber with a salt solution is most often used for relative humidity and an ice bath is used for temperature. These test conditions along with the ambient conditions allow for a two-point calibration check.

The bench calibration check procedure can be used in the field; contact the factory for further information about filed test equipment if field calibration checks are required.

4.3 Bench Calibration Check

To bench check the calibration a test setup using a 5096 Data Transmitter is assumed in this procedure as in section 4.1 Field Test.

4.3.1 Bench Calibration Check Setup - Relative Humidity

HydroLynx recommends using Model 2061 Calibration Chamber to calibrate the %RH sensor. The 2061 design is based on the known relative humidity of saturated salt solutions.

- Setup calibration chamber. Note: Salt solutions must be allowed to stabilize before being used. Refer to the 2061 Manual.
- Connect probe to 5096 Data Transmitter which has computer terminal program running.
- Fill out the test results sheet for expected outputs based on salt solutions used.
- Remove protective cover from probe.

4.3.2 Bench Calibration Check - Relative Humidity

- Place probe in Low Calibration Chamber (LCC), allow sensor to stabilize.
- Measure sensor output with 5096 read command "read-an".
- Record output on test results sheet.
- Place probe into High Calibration Chamber (HCC) and allow sensor to stabilize.
- Measure sensor output with 5096 read command "read-an".
- Record output on test results sheet.
- Compare measured results with expected outputs.
- Return probe to HydroLynx if calibration is required.

4.3.3 Bench Calibration Check Setup - Temperature

The temperature of water does not change as water is changing states, e.g. from solid to liquid or liquid to gas and vice versa. Thus an ice bath provides a stable reference temperature to check the probe's temperature calibration. To prepare an ice bath select a container that is stable and sized to allow the probe to be emersed with enough water and ice to cover the probe end. Note that the ice bath should be stirred while measurements are made to maintain constant temperature.

- Prepare Ice Bath
- Wrap water-proof cover around probe end with plastic shield removed. Plastic wrap and a rubber band work well as a water-proof cover.
- Connect probe to 5096 Data Transmitter which has computer terminal program running.

4.3.4 Bench Calibration Check - Temperature

- Place probe and thermometer on bench and allow temperature to stabilize.
- Read thermometer and fill out test sheet for expected output.
- Measure sensor output with 5096 read command "read-an".
- Record output on test results sheet.
- Place probe and thermometer in Ice Bath, stir while both stabilizes.
- Read thermometer and fill out test sheet for expected output.
- Measure sensor output with 5096 read command "read-an".
- Record output on test results sheet.
- Compare measured results with expected outputs.
- Return probe to HydroLynx if calibration is required

4.4 Central Site Calibration

Central site calibration includes the conversion of raw data into engineering units with the **Divisor** and base setting the data to the local standard with the **Base Value**.

4.4.1 Divisor = 1 / Increment Size

The Increment Size for a sensor is found by dividing the measured range by the RAW Increments (inc) used by the data transmitter to report that range:

e.g.: 100 %RH / 255 inc = 0.392 %RH/inc
180 °F / 255 inc = 0.706 °F/inc.

(RAW increments equal 255 for an 8-bit ADC and 1023 for 10-bit ADC.)

The Divisor is the inverse of the Increment Size:

e.g.: 255 inc / 100 %RH = 2.55 inc/%RH
255 inc / 180°F = 1.417 inc/°F.

To convert the Engineering Units multiply the Divisor by the correct conversion factor:

e.g.: 1.417 inc/°F x 1.8 °F/°C = 2.55 inc/°C

(1.8 is conversion factor to report the temperature in °C.)

4.4.2 Base Value - Zero Offset

The Base Value is the engineering unit value that corresponds to the Zero Datum Point (ZDP) of the sensor. For the 2048 the Relative Humidity ZDP is 0%RH and the Temperature ZDP is -40°F.

4.5 Maintenance

Recommended maintenance for the 2048RH/T includes a yearly visual inspection and field test. A bench calibration check is recommended every three to five years, depending upon local conditions.

4.5.1 Visual Inspection

Visual Inspection of equipment includes checking:

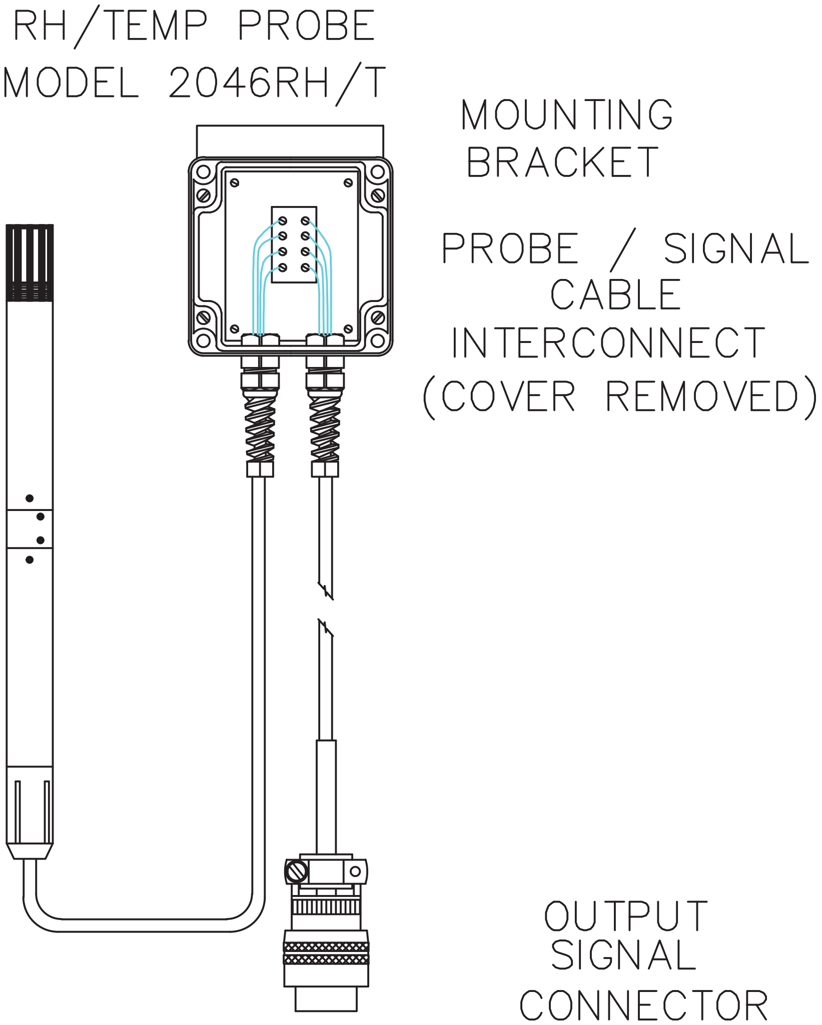
- All surfaces for accumulation of dust, dirt and corrosive pollutants
- Cables for cuts, fraying and other physical damage
- Connectors for corrosion
- Connectors for a secure fit
- All mounting hardware for secure fittings

4.5.2 Field Test

Perform field test as outlined in section 4.1 Field Test.

5.0 DRAWINGS

AC108226	Outline - Probe, Cable Junction Box & MS Connector
AC108227	Outline - Probe
AC108228	Outline - Shield
AC107997	Installation
AC108220	Wiring Diagram - Chassis
AC107996	Wiring Diagram - 5096N
AC100894	Calibration Curve - %RH vs Vdc (Increments)
AC100893	Calibration Curve - °F vs Vdc (Increments)
WP100892	2048 Test Results
WP104973	Maintenance Report



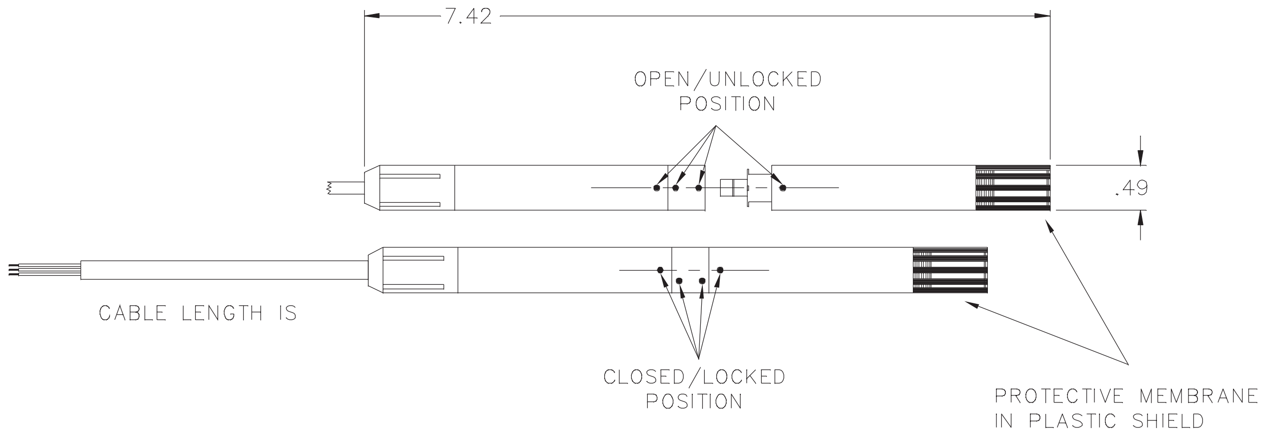
MODEL 2048RH/T

REV C	REDRAWN ON NEW BOARDER	5/27/99
970702	MANUAL UPDATE	7/17/97
ECN#	DESCRIPTION	DATE

MODEL USAGE

HydroLynx

MODEL NO.	2048RH/T
TITLE	CHASSIS
DWG TYPE	ASSEMBLY
DRAWN BY	P.DECKER
DATE	1/16/03
CHECKED BY	
DATE	
SIZE	A
DWG NO.	AC108226
REV	



SENSING ELEMENTS

SENSOR CABLE

CABLE COLORS	CABLE FUNCTION
GREY	GND
GREEN	+VDC
BLUE	GND
BROWN	TEMPERATURE
WHITE	RELATIVE HUMIDITY
SHIELD	GND

ECN#	DESCRIPTION	DATE
N/A	REDRAWN ON NEW BORDER	6/1/99
970702	MANUAL/MODEL & UPDATE	7/17/97

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES

FRACTIONS = € N/A
.XX = € .01
.XXX = € .005

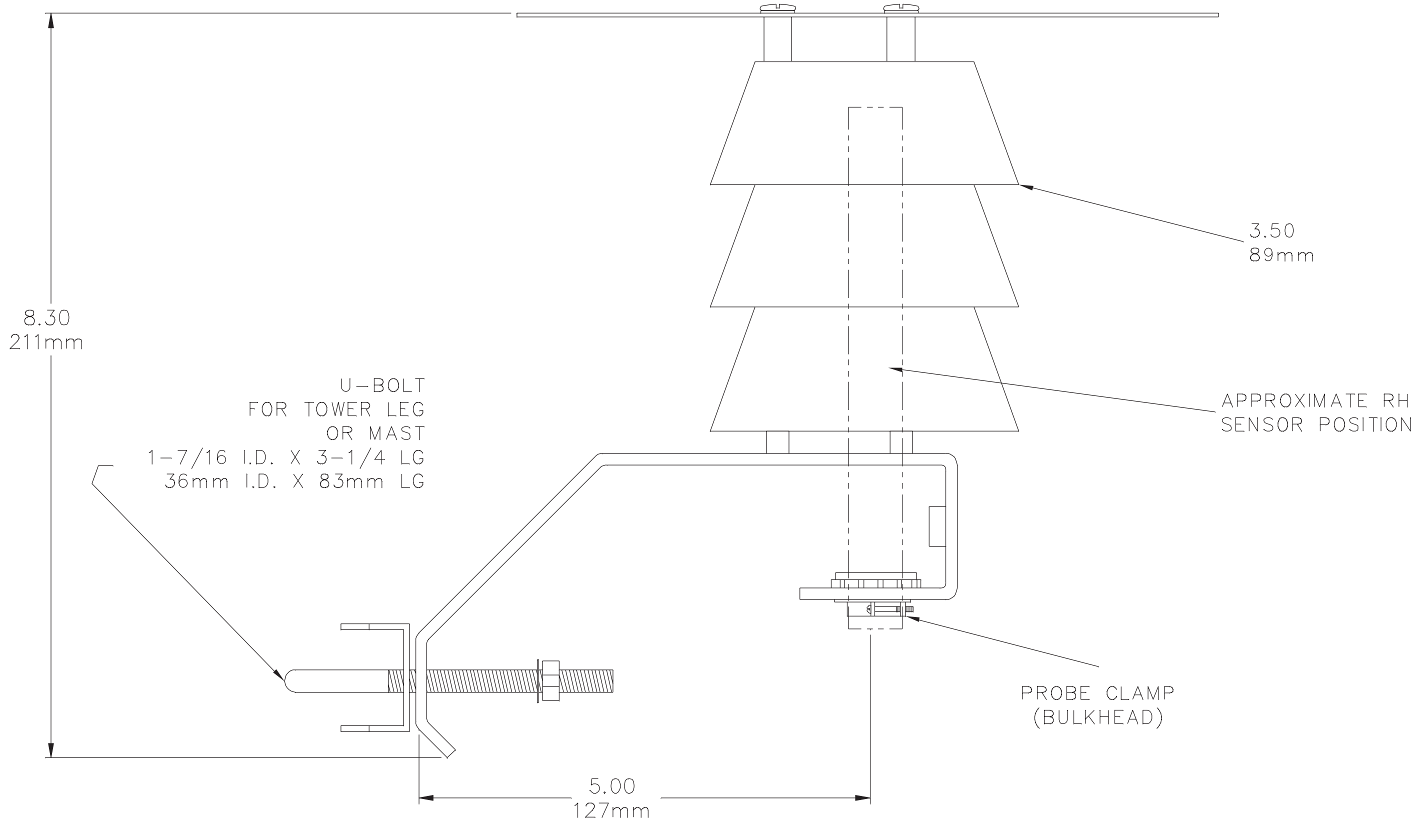
MAT'L
FINISH
TREATMENT

MODEL USAGE

DRAWN BY P.DECKER
DATE 1/16/03
CHECKED BY
DATE

HydroLynx

MODEL NO. 2048 RH/T
TITLE PROBE
RELITIVE HUMIDITY & TEMPERATURE
DWG TYPE OUTLINE
SIZE A
DWG NO. AC108227
REV



N/A	REDRAWN ON NEW BORDER	10/5/98
970702	MANUAL / MODEL UPDATE	7/17/97
ECN#	DESCRIPTION	DATE

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES

FRACTIONS = € N/A
.XX = € .01
.XXX = € .005

MAT'L N/A
FINISH N/A
TREATMENT N/A

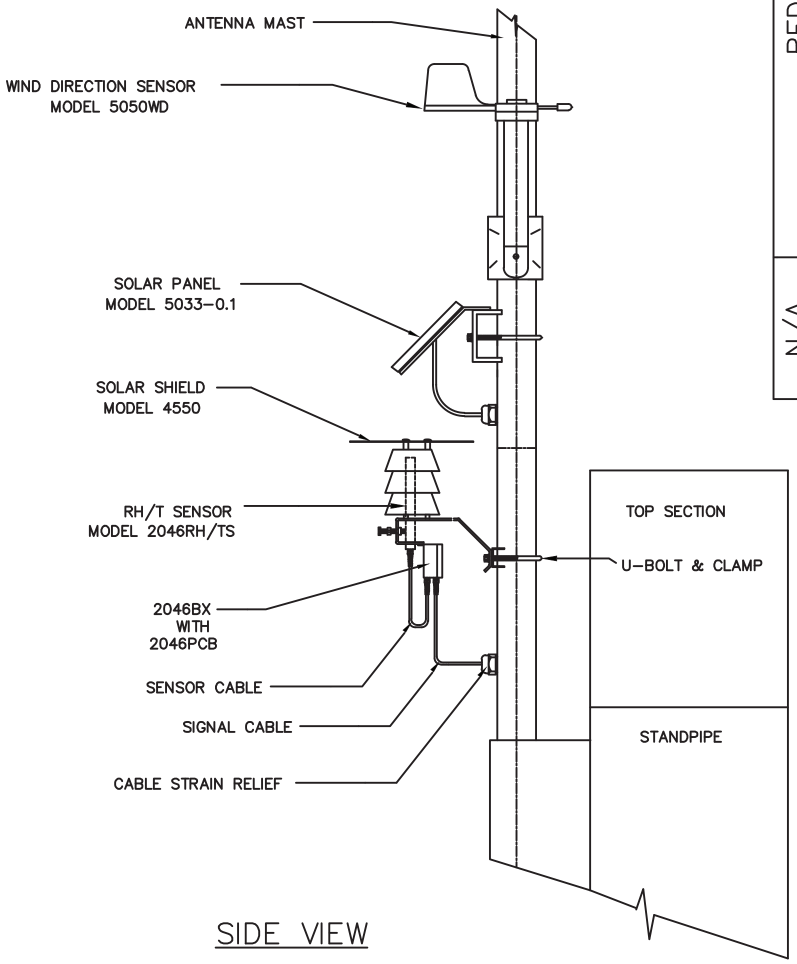
MODEL USAGE
2048 RH/T

HydroLynx

MODEL NO. 4550,2048RHT
TITLE SOLAR RADIATION SHIELD

DRAWN BY P.DECKER	DATE 1/16/03	DWG TYPE OUTLINE, DIMENSION	
CHECKED BY	DATE	SIZE A	DWG NO. AC108228
			REV

ALERT STANDPIPE MODEL 5081
WITH 2046RH/T INSTALLED



SIDE VIEW

ECN#	DESCRIPTION	DATE
970702	ACAD REDRAW	5/27/99
N/A	REDRAWN ON NEW BORDER	5/27/99

HydroLynx

MODEL USAGE

MODEL NO. 5081MX

TITLE 2046RH/T MOUNTING

DWG TYPE INSTALLATION

DRAWN BY B. WORRELL

DATE 5/26/99

CHECKED BY

DATE

SIZE A

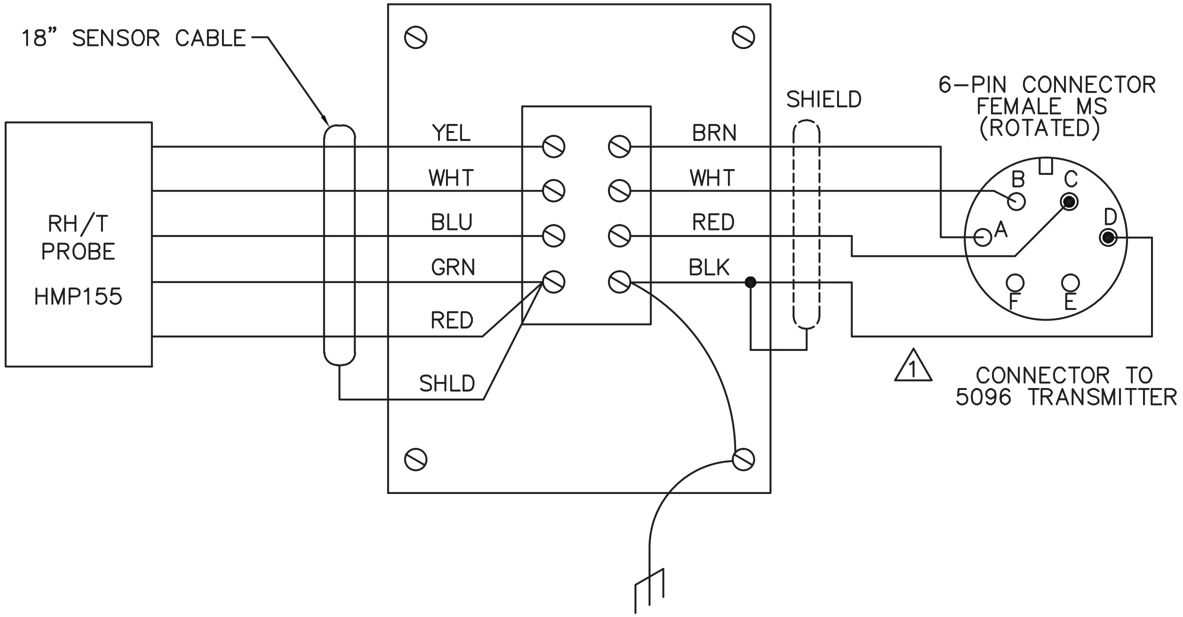
DWG NO. AC107997

REV B

NOTES:

⚠1 CABLE LENGTH = 25FT

2 CABLE TYPE IS BELDON #9535,
5 CONDUCTOR WITH SHIELD.



1	NEW VAISALA SENSOR	10/09
ECN#	DESCRIPTION	DATE

MODEL USAGE
HMP155

HydroLynx

MODEL NO. 2048RH/T–VAISALA

TITLE CHASSIS

DRAWN BY M.MALONEY

DATE 05/20/04

CHECKED BY

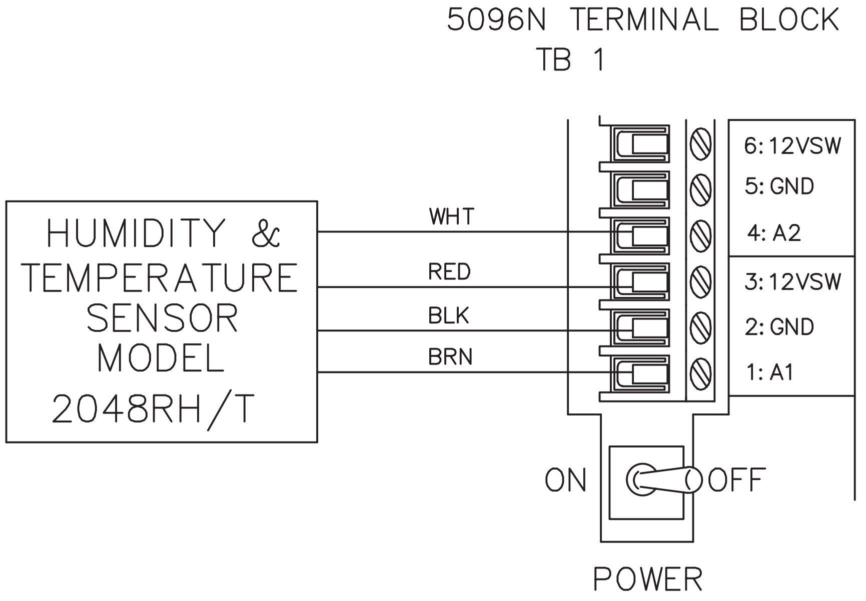
DATE

DWG TYPE WIRING DIAGRAM

SIZE A

DWG NO. AC108220

REV 1



3	NEW MODEL NUMBER	11/25/08
ECN#	DESCRIPTION	DATE

MODEL USAGE	HydroLynx
5096N	
	MODEL NO. 2048RH/T
	TITLE OUTPUT
DRAWN BY DDD	DATE 5/26/99
CHECKED BY	DATE

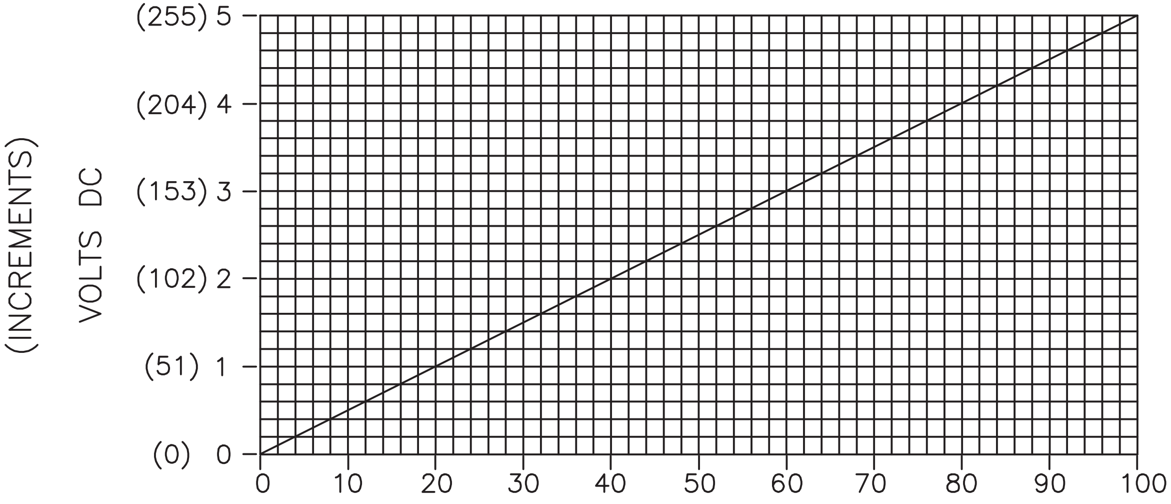
DWG TYPE WIRING DIAGRAM

SIZE A

DWG NO. AC107996

REV 3

MODEL 2048RH/T SIGNAL CONDITIONING
OUTPUT CURVE
VOLTS VS. HUMIDITY



RELATIVE HUMIDITY % R.H.

$\text{VOLTS}=\left(\frac{\text{MEASURED}}{1000}\right) \text{X5}$

$\text{INCREMENTS}=\left(\frac{\text{MEASURED}}{100}\right) \text{X255}$

$\text{\%RH}=\left(\frac{\text{READING}}{255}\right) \text{X100}$

ECN#	DESCRIPTION	DATE
N/A	REDRAWN ON NEW BORDER	07/21/00

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES

FRACTIONS = ±

.XX = ±

.XXX = ±

MAT'L

FINISH

TREATMENT

MODEL USAGE

DRAWN BY RABARATA

DATE 01/00/03

CHECKED BY

DATE

HydroLynx

MODEL NO. 2048RH/T

TITLE VOLTAGE VS. HUMIDITY CURVE

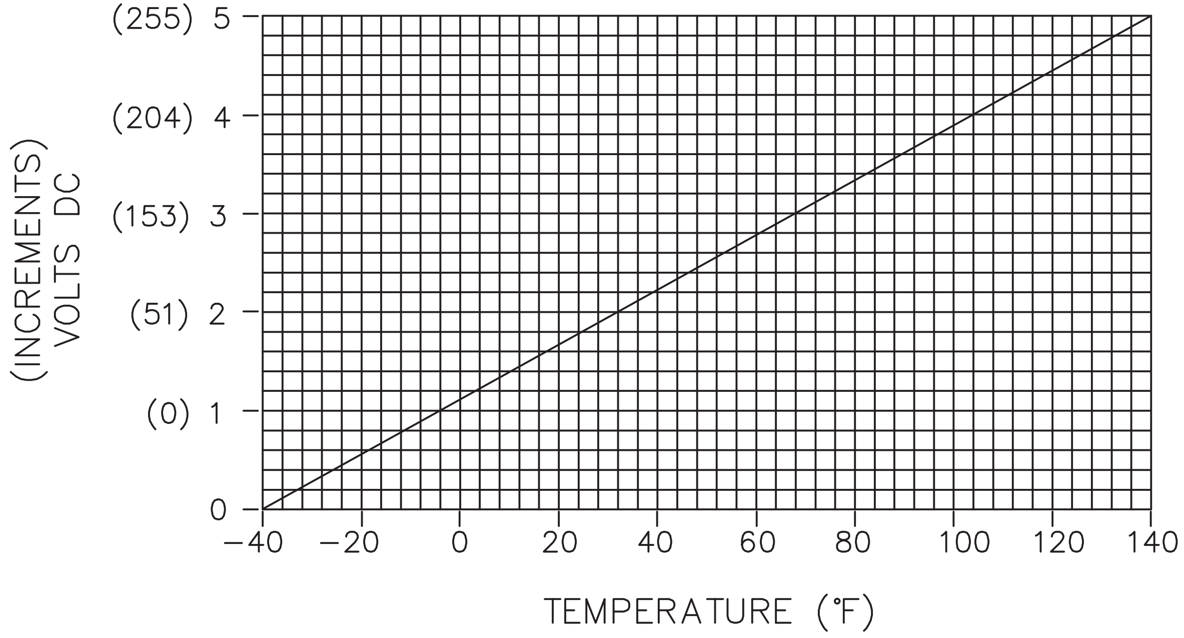
DWG TYPE

SIZE A

DWG NO. AC100894

REV

MODEL 2048RH/T SIGNAL CONDITIONING
OUTPUT CURVE
VOLT Vs. TEMPERATURE



$$\text{VOLTS} = \left(\frac{\text{MEASURED} +40}{180}\right) \text{X5}$$

$$\text{INCREMENTS} = \left(\frac{\text{MEASURED} +40}{180}\right) \text{X255}$$

$$\text{TEMP} = \left(\frac{\text{READING}}{255} \text{X180}\right) -40$$

ECN#	DESCRIPTION	DATE
N/A	REDRAWN ON NEW BORDER	5-27-99
970702	MANUAL / MODEL # UPDATE	7-17-97

MODEL USAGE

HydroLynx

MODEL NO. 2048RH/T

TITLE TEMP VS VOLTS

DRAWN BY R.A. BARATA	DATE 01/00/03	DWG TYPE CURVE	
CHECKED BY	DATE	SIZE A	DWG NO. AC100893	REV

2048RH/T TEST RESULTS

Document Number WP100892

Date:	Serial number:
Inspector:	Temperature range: -40...140 °F (-40...60 °C)
Job number:	Humidity range: 0...100 %RH
Customer:	

TEMPERATURE CALIBRATION

BY: DATE:

	Temperature	Expected Output	Actual Output ± 0.5% (± 25 mV)
Low			V
Mid			V
High			V

HUMIDITY CALIBRATION

BY: DATE:

	RH	Expected Output	Actual Output ± 0.5% (± 25 mV)
Low			
Mid			V
High			V

QC INSPECTION

BY: DATE:

Parameter	Output	Ambient Value	Notes:
Temperature			
Humidity			

Temperature Formulas:

µA = [(°F - 32) ÷ 1.8] + 273.2

µA = °C + 273.2

For -80 to +175 °F range: Vout = (T + 80) ÷ 51

For 0 to +128 °F range: Vout = (T x 5) ÷ 128

HydroLynx

Maintenance Report

Document Number WP104973

SITE INFORMATION		
Location:	Gauge type:	ID#:
Purpose/Comments:		
Weather conditions:		

EQUIPMENT INFORMATION

Equipment	Model #	Asset #	Comments
Data transmitter			
Antenna			
Battery			
Solar panel			
Sensors			

TEST DATA

POWER

Battery voltage	w/o load: Vdc	w/ load: Vdc	Difference: Vdc
Current	Standby: μA	w/ load: A	
Solar panel	w/o load: Vdc	w/ load: A	Reverse: mA

SIGNAL OUT - TX

Power out: W	Reverse power: W	Freq error: Hz	Dev: ± kHz

SIGNAL IN - SENSOR

Sensor	Measured	Reading	Comments

COMMENTS