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MODEL 085A
RELATIVE HUMIDITY / TEMPERATURE SENSOR MANUAL



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Model 085A Relative Humidity / Temperature Sensor Manual.

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Safety Notice

The contents of this manual have been checked against the hardware and software described herein. Since deviations cannot be prevented entirely, we cannot guarantee full agreement. However, the data in this manual is reviewed regularly and any necessary corrections included in subsequent editions.

Faultless and safe operation of the product presupposes proper transportation, storage, and installation as well as careful operation and maintenance. The seller of this equipment cannot foresee all possible modes of operation in which the user may attempt to utilize this instrumentation. The user assumes all liability associated with the use of this instrumentation. The seller further disclaims any responsibility for consequential damages.

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1. GENERAL INFORMATION

1.1. Description

The 085A sensor is an extremely accurate microprocessor controlled relative humidity and temperature sensor. The relative humidity sensor responds to the full range of 0 to 100% humidity. Response is linear with negligible hysteresis or temperature dependence. The temperature sensor is a two-element composite thermistor type with linear response over the range of –30°C to +50°C. The sensor is designed to be mounted in a radiation shield when used outdoors. The exact model number you order will determine the functions of your sensor. The following section describes the model number feature assignments.



Figure 1 Model 085A-35 Sensor



Figure 2 Model 085A-6 Sensor

1.2. 085A Options

The 085A options are defined by dash numbers as follows:

085A-__ (Shield Option)

1.2.1. Radiation Shield Compatibility Option:

6 = Use with Model 076B motor aspirated radiation shield. This sensor comes with 8-inch long pigtail wires for connection to the radiation shield junction box. Refer to the radiation shield manual for sensor and cable connections.

35 = Use with Model 074 naturally aspirated radiation shield. This sensor has a circular connector for use with Met One Instruments cable PN 2348.

2. SENSOR SITING

The EPA recommends sensor mounting in a radiation shield at a 2 meter height, ideally over green mowed grass to minimize related terrestrial radiation errors on the temperature and relative humidity readings. Typical installations may vary significantly from these recommendations due to geographic limitations or specific monitoring requirements.

3. INSTALLATION

If the sensor is to be mounted in a radiation shield, refer to Figure 2 and\or the radiation shield manual section for mounting details. Typical installations are shown below.

Sensors not installed in a radiation shield should be mounted in a representative location having good airflow and shaded from sunlight or other heat radiation sources that would affect measurement of relative humidity or temperature.

3.1. Mounting Instructions

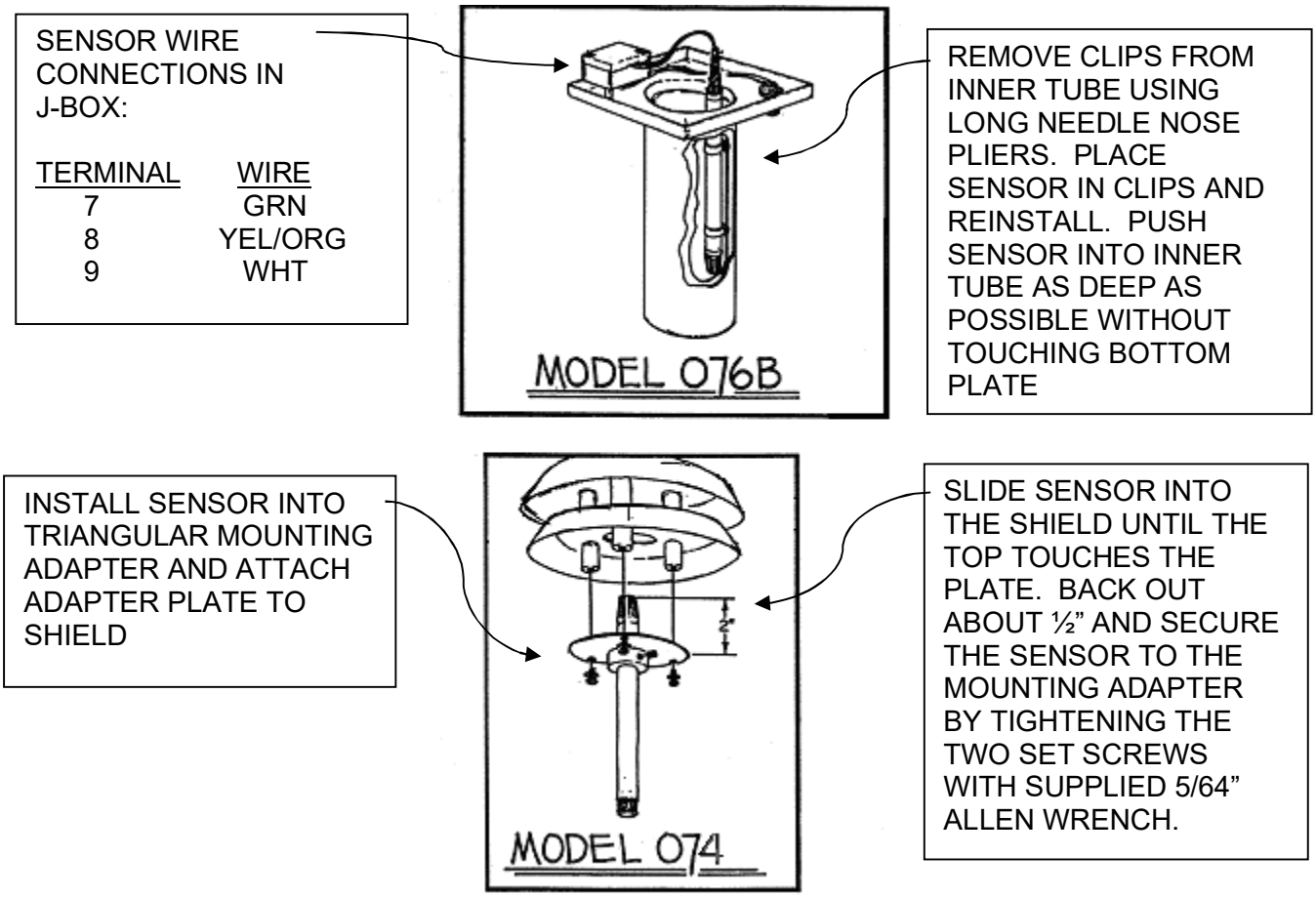


Figure 2 Radiation Shield Installation

3.2. Wiring Instructions

Sensor Connection	Wire Color	Description
Pin A	White	+10 to +18 VDC
Pin B	Green	Signal Ground
Pin C	Yellow or Orange	RH Analog Output
Pin D	Black	Temperature Common
Pin E	Red	Temperature Signal
Pin F	No Connection	No Connection
No Connection	White/Brown	Shield

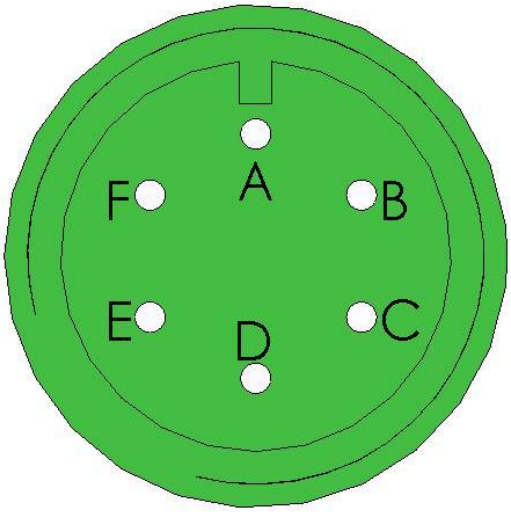


Figure 3 Electrical Connector
View looking at connector pins. (Pins are also identified on connector).

4. OPERATIONAL CHECK-OUT AND CALIBRATION

4.1. Relative Humidity Sensor Check-out

To verify correct wiring and test the basic sensor operation, blow on the sensor. The moisture in your breath should cause the relative humidity reading to rise.

The relative humidity sensor has been calibrated at the factory. To check for proper operation of the sensor it is advised that the output signal be checked against a local weather service facility or a local relative humidity measuring device such as a psychrometer. Due to normal atmospheric and geographical variations, the local weather service data should be used only as a guideline. Ambient air relative humidity can be expected to vary significantly over short distances and in brief periods of time.

4.2. Limitations of RH Measurements at Below Freezing Temperatures

The sensor's relative humidity output is referenced to saturated water vapor pressure above liquid water. When the air temperature is below freezing, the sensor's maximum theoretical measurement range is limited as follows:

Air Temperature (Deg C)	Maximum RH (%)
0	100
-5	96
-10	92
-15	88
-20	84
-25	80
-30	76
-35	72
-40	68
-45	64
-50	60

4.3. Temperature Sensor

Compare readings with a precision NIST-traceable temperature sensor. Calibration verification should be performed using a Met One Instruments Model 5472 Thermal Mass to assure that both instruments are at the same temperature. This is an aluminum mass with drilled recesses for the 085A sensor and a standard temperature sensor (NIST thermometer or RTD). The mass can be used in air or can be partially submerged in ice or an ice bath. The 085A sensor should not be submerged.

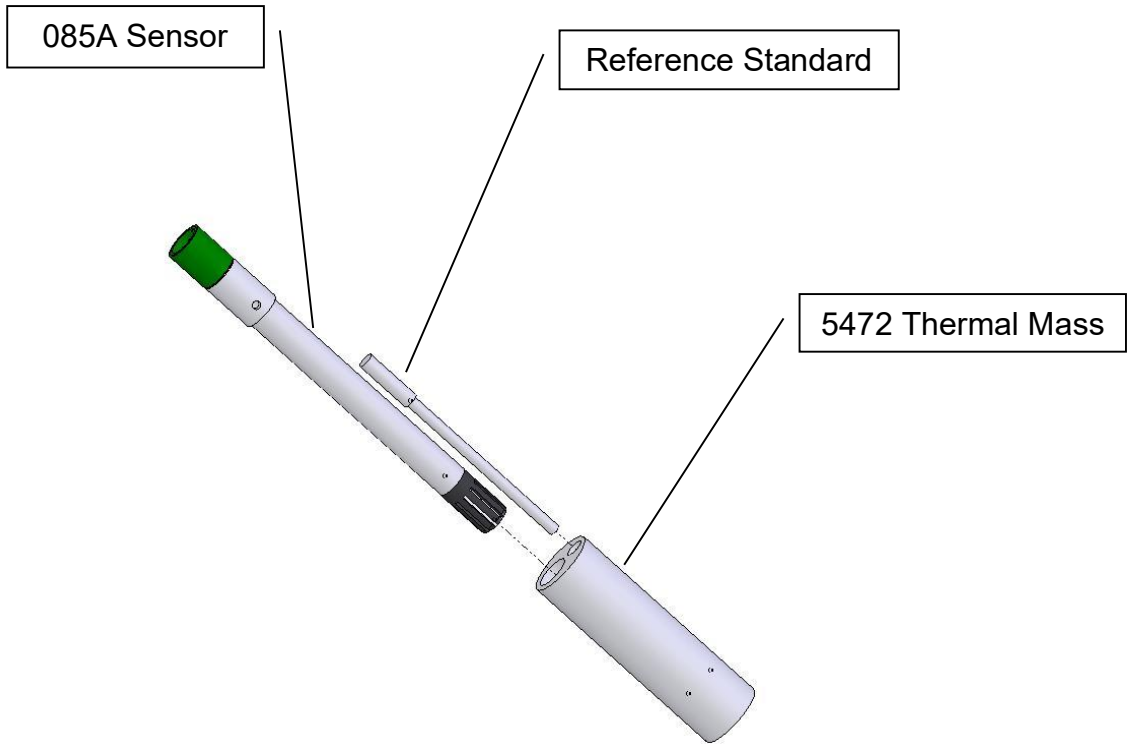


Figure 4 - 5472 Thermal Mass

4.4. Temperature Table

4.4.1. Temperature to Resistance Table (Celsius)

Model 085A-X Temperature vs. Sensor Resistance

TEMP DEG C	RCAL	TEMP DEG C	RCAL
-30	110236	10	26155
-29	104464	11	25436
-28	99187	12	24739
-27	94344	13	24064
-26	89882	14	23409
-25	85760	15	22775
-24	81939	16	22159
-23	78388	17	21561
-22	75079	18	20980
-21	71988	19	20416
-20	69094	20	19868
-19	66379	21	19335
-18	63827	22	18816
-17	61424	23	18311
-16	59157	24	17820
-15	57014	25	17342
-14	54986	26	16876
-13	53064	27	16421
-12	51240	28	15979
-11	49506	29	15547
-10	47856	30	15126
-9	46284	31	14715
-8	44785	32	14314
-7	43353	33	13923
-6	41985	34	13541
-5	40675	35	13167
-4	39421	36	12802
-3	38218	37	12446
-2	37065	38	12097
-1	35957	39	11756
0	34892	40	11423
1	33868	41	11097
2	32883	42	10777
3	31934	43	10465
4	31019	44	10159
5	30136	45	9859
6	29284	46	9566
7	28462	47	9279
8	27667	48	8997
9	26899	50	8450

*VALUE WITH 18.7K RESISTOR IN PARALLEL WITH SENSOR

RANGE -30°C TO +50°C
THERMISTOR BEAD **44203**
Tc= -(R*18700/(18700+R)-12175)/127.096
Rt = -(127.096*Tc-12175)*18700/(127.096*Tc-12175+18700)

4.4.2. Temperature to Resistance Table (Fahrenheit)

Model 085A-X Temperature vs. Sensor Resistance

TEMP DEG F	RCAL	TEMP DEG F	RCAL
-22	110236	33	34319
-21	106964	34	33757
-20	103855	35	33207
-19	100895	36	32669
-18	98075	37	32141
-17	95385	38	31625
-16	92816	39	31119
-15	90361	40	30622
-14	88011	41	30136
-13	85760	42	29659
-12	83602	43	29192
-11	81532	44	28733
-10	79543	45	28283
-9	77632	46	27841
-8	75794	47	27408
-7	74025	48	26983
-6	72321	49	26565
-5	70678	50	26155
-4	69094	51	25753
-3	67565	52	25357
-2	66088	53	24969
-1	64661	54	24587
0	63281	55	24212
1	61946	56	23843
2	60654	57	23481
3	59402	58	23125
4	58190	59	22775
5	57014	60	22430
6	55874	61	22091
7	54768	62	21758
8	53694	63	21430
9	52651	64	21108
10	51637	65	20790
11	50652	66	20478
12	49695	67	20170
13	48763	68	19868
14	47856	69	19570
15	46974	70	19276
16	46114	71	18987
17	45277	72	18703
18	44461	73	18422
19	43666	74	18146
20	42890	75	17874
21	42134	76	17606
22	41395	77	17342
23	40675	78	17081
24	39972	79	16825
25	39285	80	16572
26	38614	81	16322
27	37958	82	16076
28	37317	83	15834
29	36691	84	15595
30	36078	85	15359
31	35479	86	15126
32	34892	87	14897

Model 085A-X Temperature vs. Sensor Resistance

TEMP DEG F	RCAL	TEMP DEG F	RCAL
88	14670	106	11061
89	14447	107	10883
90	14227	108	10707
91	14009	109	10534
92	13794	110	10362
93	13583	111	10193
94	13374	112	10025
95	13167	113	9859
96	12963	114	9696
97	12762	115	9534
98	12564	116	9374
99	21368	117	9215
100	12174	118	9059
101	11983	119	8904
102	11794	120	8751
103	11607	121	8600
104	11423	122	8450
105	11241		

*VALUE WITH 18.7K RESISTOR IN PARALLEL WITH SENSOR

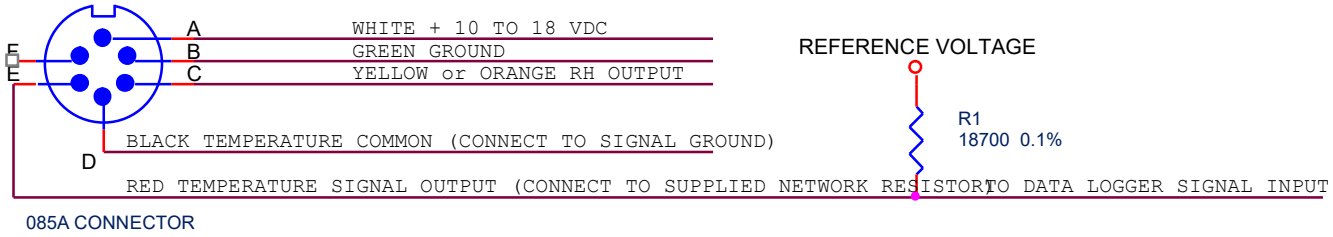
RANGE -22˚F TO +122˚F
THERMISTOR BEAD 44203
Tc= -(R*18700/(18700+R)-12175)/127.096
Rt = -(127.096*Tc-12175)*18700/(127.096*Tc-12175+18700)

4.5. Temperature Sensor Data Logger Connection

The voltage across the sensor has a linear correlation to temperature when a precision 18700Ω ±0.1% resistor (Met One Instruments part number 80685) is connected in series with the excitation voltage. This resistor is built into Met One Instruments data loggers configured for this sensor and supplied with the 085A sensor for use with other equipment. Contact Met One Instruments to obtain a replacement resistor. Maximum recommended excitation is 3.2V. Higher excitation voltage will cause self-heating of the thermistors, and result in temperature measurement errors.

Reference Voltage	-30.0 °C	+50.0 °C
1.000	0.855 VDC	0.311 VDC
2.000	1.710 VDC	0.622 VDC
2.500	2.137 VDC	0.778 VDC
5.000 (DO NOT USE)		

Signal Voltage vs. Temperature for Various Excitation Voltages



Data Logger Connection

4.6. General Maintenance Schedule

6 – 12 Month Intervals:

- Inspect the sensor for proper operation per Section 4.0.

12 Month Interval:

- Return the sensor to Met One Instruments for calibration.
- Replace the two 720050 O-Rings.
- Replace the 860014 Filter Membrane.

4.7. 085A Relative Humidity Sensor Maintenance and Calibration

WARNING: The sensor can be incorrectly calibrated or permanently damaged through improper acts. Do not attempt a repair or calibration if you are unsure of the procedure. Do not touch the sensor element if you do not know the correct procedure.

The instrument should operate for an extended period of time with a minimum of care or maintenance.

The sensor should be re-calibrated every 12 months.

If parts or maintenance assistance are required, contact Met One Instruments. Obtain shipping instructions and a return authorization (RA) before returning any unit.

4.8. Sensor Maintenance

4.8.1. Sensor Element

The RH sensor element is not user-replaceable (replacement requires sensor recalibration). If the element becomes damaged, please send the 085A sensor to Met One Instruments for repair. Please obtain shipping instructions and a return authorization (RA) number before returning any unit.

Met One Instruments manufactures an RH Calibration Kit part number 10233 which can be purchased to perform a calibration after the sensor element is replaced. Please contact the Met One Service Department to purchase the calibration kit.

4.8.2. Spare Parts

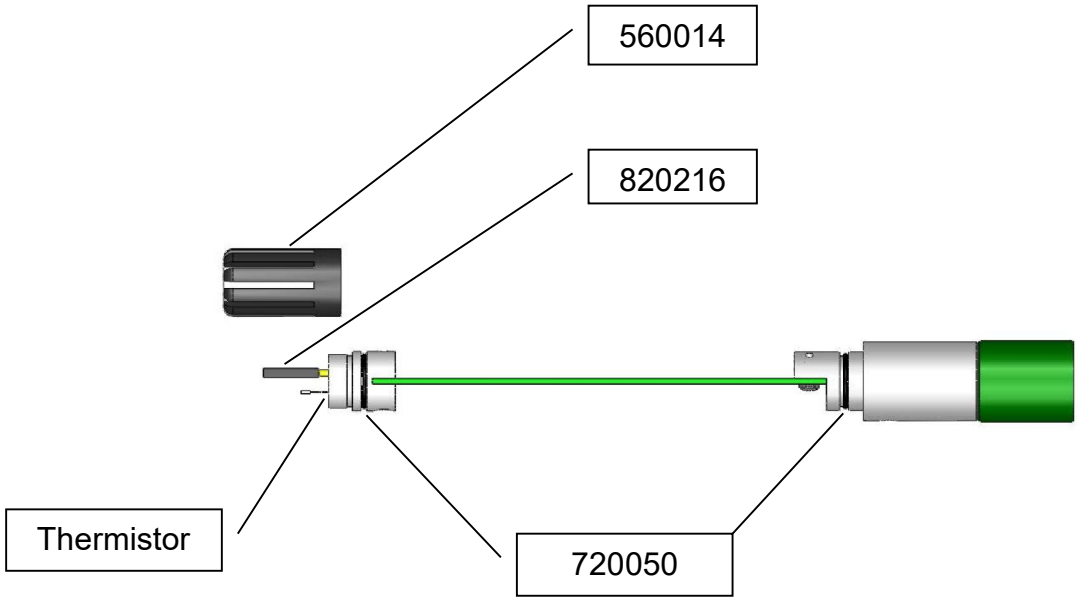


Figure 5 Spare Parts

820216	RH SENSOR ELEMENT (Requires factory calibration)
560014	FILTER, MEMBRANE
720050	O-RING (Two required)

5. Operational Specifications

Model Number:	085A
Relative Humidity	
RH Sensing Element:	Thin film polymer capacitor
Range:	0 to 100% RH
Accuracy:	± 2.0% from 0 to100% RH
Response Time:	10 sec. with 2 m/s aspiration
Temperature:	
Temperature Sensor:	Thermistor
Temperature Operation Range:	-30° C to +50° C (-22° F to 122° F)
Temperature Coefficient:	Compensated internally
Accuracy	±0.15° C (0.27° F)
Output:	Resistive
Analog Output:	0 to 1 VDC Standard 0 to 5.0 VDC Optional
AutoMet Auto ID:	No
General:	
Input Power	10 to 18 VDC @ < 5 mA
Dimensions	Length: 8.5 inches (21.59 cm) Diameter: 0.75 inches (1.91 cm)

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