110-WS-25BP

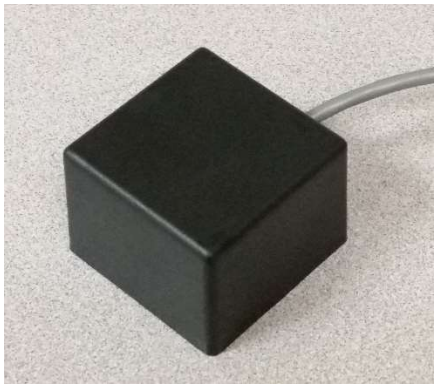
User Manual

Barometric Pressure Sensor

110-WS-25BP

110-WS-25BP-12

(aka 230-WS-32BP)



110-WS-25BP Barometric Pressure Sensor

Phone (530) 823-7185
Email nova@novalynx.com **Website** www.novalynx.com

Receiving and Unpacking

Carefully unpack all components and compare to the packing list. Notify NovaLynx Corporation 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. Damages to equipment sent via Parcel Post or UPS require the consignee to contact NovaLynx Corporation for instructions.

Returns

If equipment is to be returned to the factory for any reason, call NovaLynx 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 or additional damage during the return shipment. Call NovaLynx 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 the packaging. Please write the RA# on the outside of the box.

Warranty

NovaLynx Corporation 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. NovaLynx Corporation's obligations under this warranty are limited to, at NovaLynx's option: (i) replacing; or (ii) repairing; any product determined to be defective. In no case shall NovaLynx Corporation's liability exceed product's original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by NovaLynx Corporation, 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 FORWARD

Thank you for purchasing NovaLynx products. NovaLynx has been designing and manufacturing weather instruments since 1988. NovaLynx represents several well-known brands of quality manufacturers, including Gill Instruments, RM Young, Kipp & Zonen, and Vaisala. It is our hope that our products will meet all your monitoring requirements.

2 INTRODUCTION

The NovaLynx **110-WS-25BP Barometric Pressure Sensor** uses a silicon capacitive sensing element and signal processing circuitry to sense changes in atmospheric pressure. The 0 to 5 volt output signal represents a measurement range of approximately 4.43 to 33.96 inHg (150 to 1150 mb). The sensor must be installed in a vented, rain-tight enclosure, or mounted indoors.

IMPORTANT NOTE: Model **110-WS-25BP** requires a 5.000 VDC regulated power supply. Applying a higher voltage may damage the sensor.

Model **110-WS-25BP-12** operates on a 12VDC unregulated supply

3 SPECIFICATIONS

110-WS-25BP Barometric Pressure Sensor *(aka 230-WS-32BP)*	
Measurement Range	15 to 115 kPa (approximate)
Max. Pressure Exposure	400 kPa (exposure beyond this limit may cause permanent damage to sensor)
Sensitivity	45.9 mV per kPa; 0.459 mV per 0.01 kPa (approximate)
Calibration Factor	0.0218 kPa per mV (generic slope, reciprocal of sensitivity) and 11.4 kPa (generic intercept)
Measurement Uncertainty	± 1.5 % (with generic calibration coefficients)
Measurement Repeatability	Less than 0.1 %
Non-linearity	Less than 1 %
Warm-up Time	20 ms
Response Time	1 ms
Temperature Response	Less than 0.002 % per C for temperatures greater than 0 C; -0,015 % per C for temperatures less than 0 C
Operating Environment	-40 to 80 C; 0 to 100 % relative humidity (non-condensing)
Input Voltage: **110-WS-25BP**	5.000 VDC regulated
Input Voltage: **110-WS-25BP-12**	12 VDC nominal
Output Voltage Range	0 to 5 VDC
Cable	Tinned leads, 24 AWG, 3 conductor shielded. 18" (46 cm)
Current Draw	7 mA DC
Dimensions	2" x 2" x 1.5" (51 x 51 x 38 mm)
Weight / Shipping	0.1 lb (45 g) / 0.4 lb (181 g)

4 INSTALLATION

The sensor must be mounted indoors or, if outdoors, in a rain-tight vented enclosure. In either case, the arrangement must allow air pressure around the sensor to equalize with outdoor barometric pressure. Avoid mounting near AC power sources or power supplies where electrical noise might affect the sensor. Protect the sensor from temperature extremes.

Connect the sensor to your logger or other monitoring equipment according to the wire installation table below:

110-WS-25BP, 110-WS-25BP-12 24 AWG, 3-conductor, shielded (PN 330-0324)		
Wire Color	**Function**	**Signal**
Red	+Power input	**Model 110-WS-25BP**: 5.000 Vdc
		Model 110-WS-25BP-12: 12 Vdc
Black	Ground (common)	GND
White	Barometric pressure signal	0 to 5 V

5 LOGGER SETUP

The voltage output of the barometric pressure sensor is usually read by a logger that can be calibrated to display the pressure in engineering units such as inches of mercury (inHg), millibars (mb), or other units which are interchangeable.

The following chart lists the generic slope and offset numbers for calibrating to local pressure readings on a 0 to 5000 mV scale. *(Note: the offset is typically 122mb, but individual units vary.)* To use the chart, select the units desired and program the corresponding slope(m) and offset(b) numbers into the logger.

Units	Calibration Factor (Slope)	Offset (Intercept)
kilopascals [kPa]	0.0218	12.20
hectopascals [hPa]	0.218	122.00
millibars [mb]	0.218	122.00
pounds per square inch [psi]	0.00316	1.77
millimeters of mercury [mm Hg]	0.164	91.51
inches of mercury [in Hg]	0.00643	3.60

Individual sensors may vary slightly in the offset parameter. If a precision reference is available the offset number can be adjusted for an exact match.

The information in the chart can be used to calculate the expected reading from the measured millivolt output of the sensor.

Examples:

- General formula: Calibration Factor * Sensor Output Signal (mV) + Offset = Barometric Pressure
- Sea level (mb): 0.218 * 4089 mV + 122.00 = 1013 mb
- Sea level (inHg) 0.00643 * 4089 mV + 3.60 = 29.9 inHg

Barometric pressure can be expressed as the local "station" pressure or can be referenced to mean sea level (MSLP). If the sensor is located at any elevation besides sea level, the offset parameter can be adjusted to make the output read as if it were at sea level. The chart in **Appendix A** lists the amount of offset to apply to convert the readings to MSLP.

Examples:

- General formula: Total offset = Offset(Intercept) + Deviation from zero
- At 1524 meters Total offset = 122.00 mb + 170.18 mb = 292.18 mb
- At 5000 feet Total offset = 3.60 inHg + 5.03 inHg = 8.63 inHg

Again, individual sensors may vary, so if a precision reference is available the offset can be adjusted for an exact match.

NOTE: when ordered with a logger such as the 110-WS-25DL, offset information for the specific sensor will be included with the logger. Use this offset for reference unless a high-quality reference sensor is available on-site.

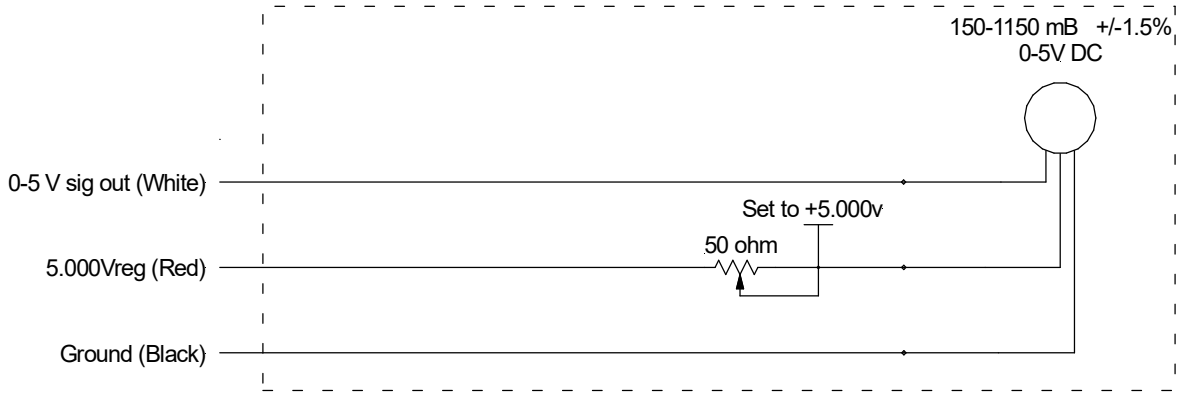
6 MAINTENANCE

Compare the output of the barometric pressure sensor to a reference annually. Be sure the reference is displaying the same relative range, either MSLP or station pressure.

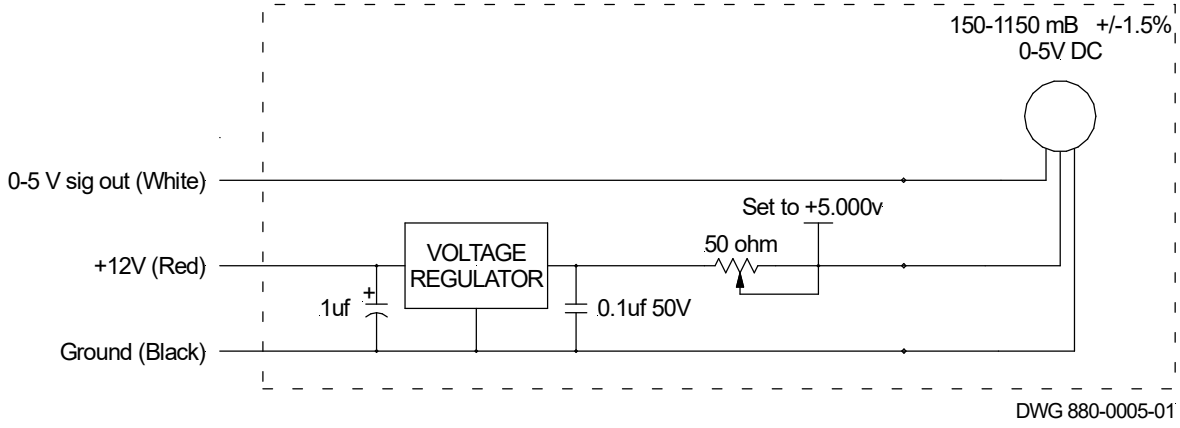
TROUBLESHOOTING MATRIX	
Output is 0 volts	The sensor is not getting power. Apply the correct voltage to the red wire. Model 110-WS-25BP: Regulated 5.000 Vdc Model 110-WS-25BP-12: 12Vdc
The readings do not always match readings from a weather service.	Barometric pressure will vary from location to location. The closer the reference station, all other things being equal, the closer the readings should agree. Ideally, the reference used to calibrate the 230-WS-32BP will be a NIST traceable calibration reference.

7 SCHEMATICS

110-WS-25BP



110-WS-25BP-12



APPENDIX A ELEVATION OFFSET CHART

Feet	Meters	Standard Pressure (inHg)	Deviation from zero (inHg)	Standard Pressure (mb)	Deviation from zero (mb)	Feet	Meters	Standard Pressure (inHg)	Deviation from zero (inHg)	Standard Pressure (mb)	Deviation from zero (mb)
0	0	29.92	0.00	1013.3	0.00	1800	549	28.03	1.90	949.1	64.20
50	15	29.87	0.05	1011.4	1.83	1850	564	27.97	1.95	947.3	65.93
100	30	29.81	0.11	1009.6	3.66	1900	579	27.92	2.00	945.6	67.66
150	46	29.76	0.16	1007.8	5.48	1950	594	27.87	2.05	943.9	69.39
200	61	29.71	0.22	1006.0	7.30	2000	610	27.82	2.10	942.1	71.12
250	76	29.65	0.27	1004.1	9.12	2050	625	27.77	0.00	940.4	0.00
300	91	29.60	0.32	1002.3	10.94	2100	640	27.72	0.00	938.7	0.00
350	107	29.54	0.38	1000.5	12.75	2150	655	27.67	0.05	937.0	1.72
400	122	29.49	0.43	998.7	14.56	2200	671	27.62	0.10	935.2	3.44
450	137	29.44	0.48	996.9	16.37	2250	686	27.57	0.15	933.5	5.15
500	152	29.38	0.54	995.1	18.18	2300	701	27.52	0.20	931.8	6.86
550	168	29.33	0.59	993.3	19.98	2350	716	27.47	0.25	930.1	8.57
600	183	29.28	0.64	991.5	21.78	2400	732	27.42	0.30	928.4	10.28
650	198	29.23	0.70	989.7	23.58	2450	747	27.37	0.35	926.7	11.98
700	213	29.17	0.75	987.9	25.37	2500	762	27.32	0.40	925.0	13.69
750	229	29.12	0.80	986.1	27.16	2550	777	27.26	0.45	923.3	15.39
800	244	29.07	0.86	984.3	28.95	2600	792	27.21	0.50	921.6	17.08
850	259	29.01	0.91	982.5	30.74	2650	808	27.16	0.55	919.9	18.78
900	274	28.96	0.96	980.7	32.52	2700	823	27.11	0.60	918.2	20.47
950	290	28.91	1.01	978.9	34.30	2750	838	27.07	0.65	916.5	22.16
1000	305	28.86	1.07	977.2	36.08	2800	853	27.02	0.70	914.8	23.84
1050	320	28.80	1.12	975.4	37.86	2850	869	26.97	0.75	913.2	25.53
1100	335	28.75	1.17	973.6	39.64	2900	884	26.92	0.80	911.5	27.21
1150	351	28.70	1.22	971.8	41.41	2950	899	26.87	0.85	909.8	28.89
1200	366	28.65	1.28	970.1	43.18	3000	914	26.82	0.90	908.1	30.57
1250	381	28.59	1.33	968.3	44.94	3050	930	26.77	0.95	906.4	32.24
1300	396	28.54	1.38	966.5	46.70	3100	945	26.72	1.00	904.8	33.91
1350	411	28.49	1.43	964.8	48.47	3150	960	26.67	1.05	903.1	35.58
1400	427	28.44	1.48	963.0	50.22	3200	975	26.62	1.10	901.4	37.25
1450	442	28.39	1.54	961.3	51.98	3250	991	26.57	1.15	899.8	38.91
1500	457	28.33	1.59	959.5	53.73	3300	1006	26.52	1.20	898.1	40.57
1550	472	28.28	1.64	957.8	55.48	3350	1021	26.47	1.25	896.5	42.23
1600	488	28.23	1.69	956.0	57.23	3400	1036	26.42	1.30	894.8	43.89
1650	503	28.18	1.74	954.3	58.98	3450	1052	26.37	1.34	893.1	45.54
1700	518	28.13	1.79	952.5	60.72	3500	1067	26.33	1.39	891.5	47.20
1750	533	28.08	1.84	950.8	62.46	3550	1082	26.28	1.44	889.8	48.84

Feet	Meters	Standard Pressure (inHg)	Deviation from zero (inHg)	Standard Pressure (mb)	Deviation from zero (mb)
3600	1097	26.23	1.49	888.2	50.49
3650	1113	26.18	1.54	886.5	52.14
3700	1128	26.13	1.59	884.9	53.78
3750	1143	26.08	1.64	883.3	55.42
3800	1158	26.03	1.68	881.6	57.05
3850	1173	25.99	1.73	880.0	58.69
3900	1189	25.94	1.78	878.4	60.32
3950	1204	25.89	1.83	876.7	61.95
4000	1219	25.84	1.88	875.1	63.58
4050	1234	25.79	1.93	873.5	65.20
4100	1250	25.75	4.18	871.9	141.39
4150	1265	25.70	4.22	870.2	143.01
4200	1280	25.65	4.27	868.6	144.63
4250	1295	25.60	4.32	867.0	146.24
4300	1311	25.56	4.37	865.4	147.86
4350	1326	25.51	4.41	863.8	149.47
4400	1341	25.46	4.46	862.2	151.07
4450	1356	25.41	4.51	860.6	152.68
4500	1372	25.37	4.56	859.0	154.28
4550	1387	25.32	4.60	857.4	155.88
4600	1402	25.27	4.65	855.8	157.48
4650	1417	25.22	4.70	854.2	159.08
4700	1433	25.18	4.74	852.6	160.67
4750	1448	25.13	4.79	851.0	162.26
4800	1463	25.08	4.84	849.4	163.85
4850	1478	25.04	4.89	847.8	165.43
4900	1494	24.99	4.93	846.2	167.02
4950	1509	24.94	4.98	844.7	168.60
5000	1524	24.90	5.03	843.1	170.18
5050	1539	24.85	5.07	841.5	171.75
5100	1554	24.80	5.12	839.9	173.33
5150	1570	24.76	5.16	838.4	174.90
5200	1585	24.71	5.21	836.8	176.47
5250	1600	24.66	5.26	835.2	178.04
5300	1615	24.62	5.30	833.7	179.60
5350	1631	24.57	5.35	832.1	181.16
5400	1646	24.53	5.40	830.5	182.72
5450	1661	24.48	5.44	829.0	184.28
5500	1676	24.43	5.49	827.4	185.83
5550	1692	24.39	5.53	825.9	187.39
5600	1707	24.34	5.58	824.3	188.94
5650	1722	24.30	5.63	822.8	190.48
5700	1737	24.25	5.67	821.2	192.03
5750	1753	24.21	5.72	819.7	193.57
5800	1768	24.16	5.76	818.1	195.11
5850	1783	24.11	5.81	816.6	196.65
5900	1798	24.07	5.85	815.1	198.19
5950	1814	24.02	5.90	813.5	199.72
6000	1829	23.98	5.94	812.0	201.25
6050	1844	23.93	5.99	810.5	202.78
6100	1859	23.89	6.03	808.9	204.31
6150	1875	23.84	6.08	807.4	205.83
6200	1890	23.80	6.12	805.9	207.36
6250	1905	23.75	6.17	804.4	208.88
6300	1920	23.71	6.21	802.9	210.39
6350	1935	23.66	6.26	801.3	211.91
6400	1951	23.62	6.30	799.8	213.42
6450	1966	23.57	6.35	798.3	214.93
6500	1981	23.53	6.39	796.8	216.44
6550	1996	23.49	6.44	795.3	217.95
6600	2012	23.44	6.48	793.8	219.45
6650	2027	23.40	6.52	792.3	220.95
6700	2042	23.35	6.57	790.8	222.45
6750	2057	23.31	6.61	789.3	223.95
6800	2073	23.26	6.66	787.8	225.44
6850	2088	23.22	6.70	786.3	226.93
6900	2103	23.18	6.75	784.8	228.42
6950	2118	23.13	6.79	783.3	229.91
7000	2134	23.09	6.83	781.9	231.40
7050	2149	23.04	6.88	780.4	232.88
7100	2164	23.00	6.92	778.9	234.36
7150	2179	22.96	6.96	777.4	235.84
7200	2195	22.91	7.01	775.9	237.32
7250	2210	22.87	7.05	774.5	238.79

Feet	Meters	Standard Pressure (inHg)	Deviation from zero (inHg)	Standard Pressure (mb)	Deviation from zero (mb)
7300	2225	22.83	7.09	773.0	240.26
7350	2240	22.78	7.14	771.5	241.73
7400	2256	22.74	7.18	770.1	243.20
7450	2271	22.70	7.22	768.6	244.66
7500	2286	22.65	7.27	767.1	246.12
7550	2301	22.61	7.31	765.7	247.58
7600	2316	22.57	7.35	764.2	249.04
7650	2332	22.52	7.40	762.8	250.50
7700	2347	22.48	7.44	761.3	251.95
7750	2362	22.44	7.48	759.8	253.40
7800	2377	22.40	7.53	758.4	254.85
7850	2393	22.35	7.57	757.0	256.30
7900	2408	22.31	7.61	755.5	257.74
7950	2423	22.27	7.65	754.1	259.19
8000	2438	22.23	7.70	752.6	260.63
8050	2454	22.18	7.74	751.2	262.06
8100	2469	22.14	7.78	749.8	263.50
8150	2484	22.10	7.82	748.3	264.93
8200	2499	22.06	7.87	746.9	266.37
8250	2515	22.01	7.91	745.5	267.79
8300	2530	21.97	7.95	744.0	269.22
8350	2545	21.93	7.99	742.6	270.65
8400	2560	21.89	8.03	741.2	272.07
8450	2576	21.85	8.08	739.8	273.49
8500	2591	21.80	8.12	738.3	274.91
8550	2606	21.76	8.16	736.9	276.32
8600	2621	21.72	8.20	735.5	277.74
8650	2637	21.68	8.24	734.1	279.15
8700	2652	21.64	8.28	732.7	280.56
8750	2667	21.59	8.33	731.3	281.96
8800	2682	21.55	8.37	729.9	283.37
8850	2697	21.51	8.41	728.5	284.77
8900	2713	21.47	8.45	727.1	286.17
8950	2728	21.43	8.49	725.7	287.57
9000	2743	21.39	8.53	724.3	288.97
9050	2758	21.35	8.57	722.9	290.36
9100	2774	21.31	8.62	721.5	291.75
9150	2789	21.26	6.51	720.1	220.29
9200	2804	21.22	6.55	718.7	221.68
9250	2819	21.18	6.59	717.3	223.07
9300	2835	21.14	6.63	716.0	224.45
9350	2850	21.10	6.67	714.6	225.83
9400	2865	21.06	6.71	713.2	227.21
9450	2880	21.02	6.75	711.8	228.59
9500	2896	20.98	6.79	710.4	229.96
9550	2911	20.94	6.83	709.1	231.33
9600	2926	20.90	6.87	707.7	232.70
9650	2941	20.86	6.91	706.3	234.07
9700	2957	20.82	6.95	705.0	235.44
9750	2972	20.78	6.99	703.6	236.80
9800	2987	20.74	7.03	702.2	238.16
9850	3002	20.70	7.07	700.9	239.52
9900	3018	20.66	7.11	699.5	240.88
9950	3033	20.62	7.15	698.2	242.23
10000	3048	20.58	7.19	696.8	243.59