255-200

User Manual

255-200 Evaporation Pan

And Accessories

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.

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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 **255-200 Evaporation Pan** meets Class A National Weather Service specifications. It is constructed of low carbon type 304 stainless steel. The seams are Heliarc welded for long trouble-free service. A ½" NPT drain opening doubles as a connection point for an external NovaLynx 255-100 Analog Output Evaporation Gauge in automated systems.

The evaporation pan is the central element of an evaporation station, which may include other scientific instruments to monitor temperature, humidity, wind and precipitation. These sensors may be tended manually, or the entire station may be automated.

This manual includes instructions for siting and installing the 255-200 Evaporation Pan. Different methods of measuring evaporation are presented: 1) Fixed point measurement and 2) Hook gauge measurement. Equipment for automation is mentioned but is beyond the scope of these instructions. All measurement devices are sold separately.

Fixed Point Measurement

255-200	**Evaporation Pan**
255-210	Still Well with Fixed Point
255-211E	Replacement Graduate, English units
255-211M	Replacement Graduate, Metric

Hook Gauge Measurement

255-200	**Evaporation Pan**
255-205	Still Well
255-214	Hook Gauge, English units
255-215	Hook Gauge, Metric

3 SPECIFICATIONS

Evaporation Pan	
Type	National Weather Service Class A
Materials	Low carbon stainless steel, type 304, 18 gauge (1.270 mm)
Construction	Heliarc welded
Outlet	1/2" NPT stainless steel drain coupler, female. Plastic drain plug.
Volume	77 gallons (291 liter) approx
Fill ratio	1" water = 7.7 gallons
Dimensions	Ø 47.5" x 10" deep (Ø 1206 mm x 254 mm deep)
Weight	50 lbs (23 kg)
Shipping Weight	68 lbs (31 kg)
Shipping Carton	50" x 49" x 11" (127 x 125 x 30 cm)

4 SITE SELECTION

Evaporation from the pan can be influenced by many factors, making it important to choose the location carefully. At a minimum the site must be level with no trees or buildings that could cast a shadow over the evaporation pan. Do not pave the area or import gravel. Ideally, the area should be sodded or covered by natural vegetation mowed below the level of the pan.

Do not select locations near frequently irrigated fields or lawns, or downwind of spillways where mist may be blown into the pan. The pan should be upwind of large bodies of water such as reservoirs, lakes, ponds or swamps (check weather service information for prevailing wind direction).

Enclose the area with a fence to keep animals from drinking from the evaporation pan. A steel link fence, 9 or 11 gauge, a minimum of 4' high, with steel posts set in concrete, is suggested. If the area has problems with small animals or rodents, it may be necessary to bury a barrier and place 18" to 24" of chicken wire (galvanized) along the bottom of the fence. Make sure the fence does not shade the pan. Refer to Appendix B for a Nation Weather Service recommended layout.

5 EVAPORATION PAN SUPPORT PLATFORM

NOTE: Do not attempt to move an evaporation pan if there is any significant amount of water in it, to avoid damage to the pan.

When filled with water, the evaporation pan will weigh 690 pounds (313 kg). The material of the pan is relatively thin, so it will need a smooth, level surface to rest on. The evaporation pan may be supported by a pressure-treated wood or composite decking material platform (Appendix A).

Level the soil, making sure any fill used to support the platform is well-tamped. After emplacing the platform, add fill dirt underneath and tamp in place, leaving a ½" air gap below the top support. The air gap will allow inspection underneath in case of leaks. Center the evaporation pan on the platform, placing the drain hole opening towards the down-hill side (if there is a grade) or facing north (Northern Hemisphere) if using a NovaLynx 255-100 Analog Output Evaporation Gauge.

6 MAINTENANCE

Do not paint the evaporation pan, because the temperature characteristics of all evaporation pans must be identical in order to obtain meaningful data.

At each inspection, check the level of the pan and look for signs of leakage below and around the pan. Clean the pan as frequently as necessary to keep it free from sediment, algae, and oil films. Any of these contaminants will materially affect the rate of evaporation.

The growth of algae can be discouraged by adding a small amount (5-10mg/liter) of copper sulfate to the water (comply with applicable laws). A standard Class A pan filled to 8 inches will require about 1/2 teaspoon of copper sulfate crystals. If algae is already present, it must be removed first by thoroughly cleaning the pan.

The pan may be emptied by removing the drain plug, then dipping any remaining water out. Wrap Teflon tape on the drain plug before re-installing it. If the drain fitting is not accessible, siphon the water out using a flexible hose. *Under no circumstances should the pan be lifted and emptied if any significant amount of liquid remains in the pan.*

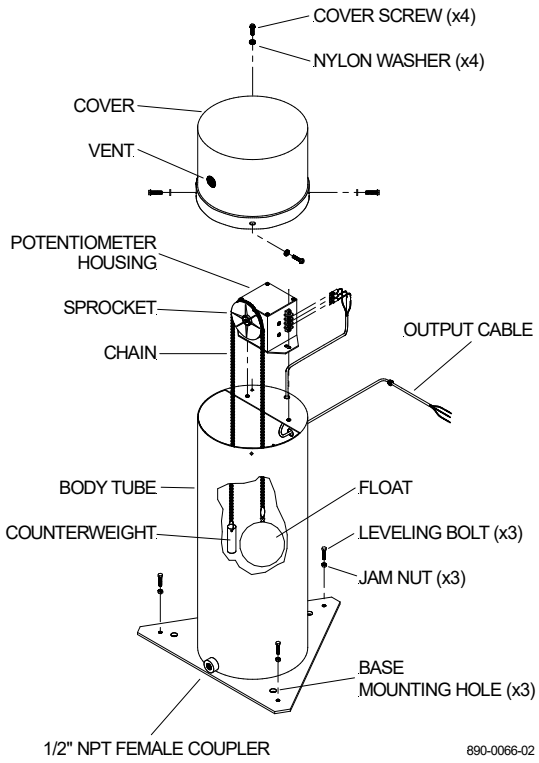
During months when freezing is likely, empty, clean, and store the pan. The pan should be stored indoors if possible. If it is left in the fenced enclosure, it should be turned upside down and secured to the platform.

7 MEASUREMENT TECHNIQUES

The water level in the pan must be measured accurately at regular intervals to determine the total evaporation at the site. The measurements can be done manually using a hook gauge or a fixed point reference and calibrated graduate cylinder. The process can be automated using the NovaLynx 255-100 Analog Output Evaporation Gauge and suitable logger.

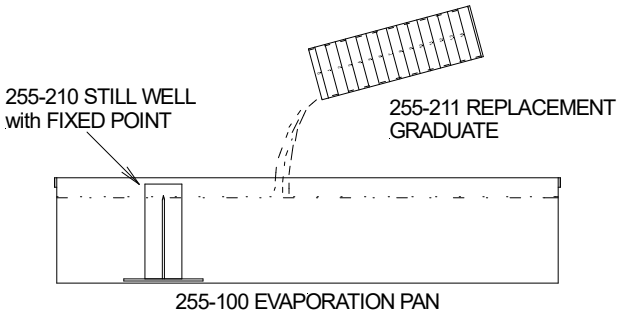
7.1 Automated System

The NovaLynx 255-100 Analog Output Evaporation Gauge consists of a float and counterweight mechanically coupled to a potentiometer. As the float descends due to evaporation of the water in the pan, the change in electrical resistance of the potentiometer is sensed by the logger. Additional information about automated sensing can be obtained at www.novalynx.com.



255-100 Analog Output Evaporation Gauge

7.2 Fixed Point Measurement



- 255-210 Still Well with Fixed Point
- 255-211E Replacement Graduate, English units
- 255-211M Replacement Graduate, Metric

The **255-210 Still Well with Fixed Point** is constructed of stainless steel and is heavy enough to resist being moved by the wind. The base of the still well is triangular with leveling screws at each corner. Place the unit in the evaporation pan approximately one foot from the north edge of the evaporation pan (Northern Hemisphere) and use a carpenter's level on the top of the still well to check and adjust the level. Do not move or disturb the still well between readings for best accuracy.

The cylindrical tube (stilling well) is welded to the base and has three small holes that allow water to flow in and out of the still well. A pointed rod is mounted vertically inside the tube. Add water to the evaporation pan (don't pour the water into the still well). As the level approaches the tip of the rod, add water more slowly to allow the level to equalize. The still well makes readings more precise by eliminating wind-caused surges in the water level and ripples.

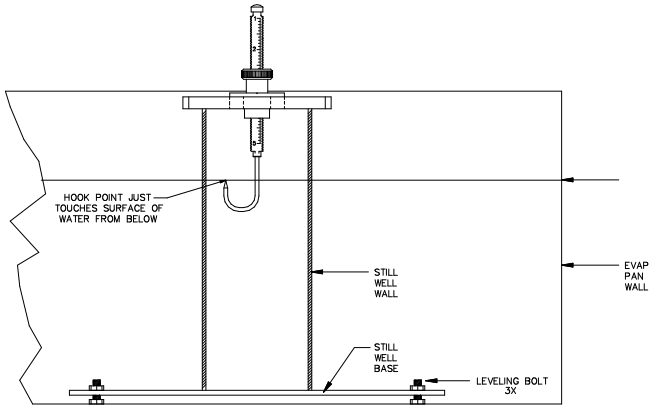
Evaporated water must be replaced. This is done by using the **255-211E** or **255-211M Replacement Graduate**. Evaporation is measured by determining the amount of water required to bring the water level in the stilling well exactly to the tip of the pointed rod.

Each graduate has a cross sectional area $1/100^{th}$ of the evaporation pan. The **255-211E** is 15 inches deep and is graduated in one-inch intervals, with the zero mark at the top. One inch of water in the measuring tube is equivalent to 0.01 inches in the evaporation pan. The **255-211M** is 32 cm deep and is graduated in 2 cm intervals, with the zero mark at the top. Each interval is equivalent to 0.2 mm in the evaporation pan.

When water must be added, fill the measuring tube to the zero mark (the top mark of the tube), then pour (slowly) enough water into the evaporation pan (not in the stilling well) to bring the water level exactly to the tip of the fixed point. Next, read the level of water remaining in the measuring tube. If this reading is closest to the 12 mark, for example, 0.12 inches of water has evaporated (or else evaporation has exceeded precipitation by 0.12 inches). Water added to the pan is recorded as a positive number.

If precipitation has occurred since the previous observation, the water level may be above the tip of the fixed point. In this case, remove water by filling the measuring tube up to the zero level with water from the evaporation pan as many times as necessary to bring the water level below the fixed point. Add up the total amount of water removed. Now fill the graduate with water from your source and add back the amount needed to bring the level exactly to the tip of the fixed point. Read the graduate and subtract the amount from the previous total. Water removed from the pan is recorded as a negative number.

7.3 Hook Gauge Measurement



- 255-205 Still Well
- 255-214 Hook Gauge, English units
- 255-215 Hook Gauge, Metric

Experiments have shown that the height of the rim of the pan above the water surface affects the rate of evaporation. In order that the records from all stations using hook gauges will be comparable, the pan should be filled to a level 2 inches below the rim, and refilled (at a regular observation) when the water has receded 1 inch (3 inches below the rim). Where a micrometer hook gauge is used for measuring water levels, two short lines painted on the inside of the pan, 2 inches and 3 inches, respectively, below the rim, will assist in maintaining the proper water level. Read the gauge immediately before and after making any change in the water level, and record the readings.

The **255-205 Still Well** is constructed of stainless steel and is heavy enough to resist being moved by the wind. The still well makes readings more precise by eliminating wind-caused surges in the water level and ripples.

The base of the still well is triangular with leveling screws at each corner. Place the unit in the evaporation pan approximately one foot from the north edge of the evaporation pan (Northern Hemisphere) and use a carpenter's level on the top of the still well to check and adjust the level. Do not move or disturb the still well between readings for best accuracy.

The cylindrical tube (stilling well) is welded to the base and has three small holes that allow water to flow in and out of the still well. When adding water, pour the water into the pan (don't pour the water into the still well). Allow sufficient time for the water to equalize before taking readings.

The top of the still well supports the **255-214** or **255-215 Hook Gauge**. At the time of each observation, place the gauge on the stilling well and adjust the hook in the well until the point is below the surface of the water. Slowly turn the adjusting nut clockwise until the point just pierces the water surface. Reflection of the sky in the water will assist in determining when the point first breaks through the surface.

After setting the gauge, remove the gauge from the still well and read the scales. Begin with the markings on the stem, and then read the dial, noting the value of

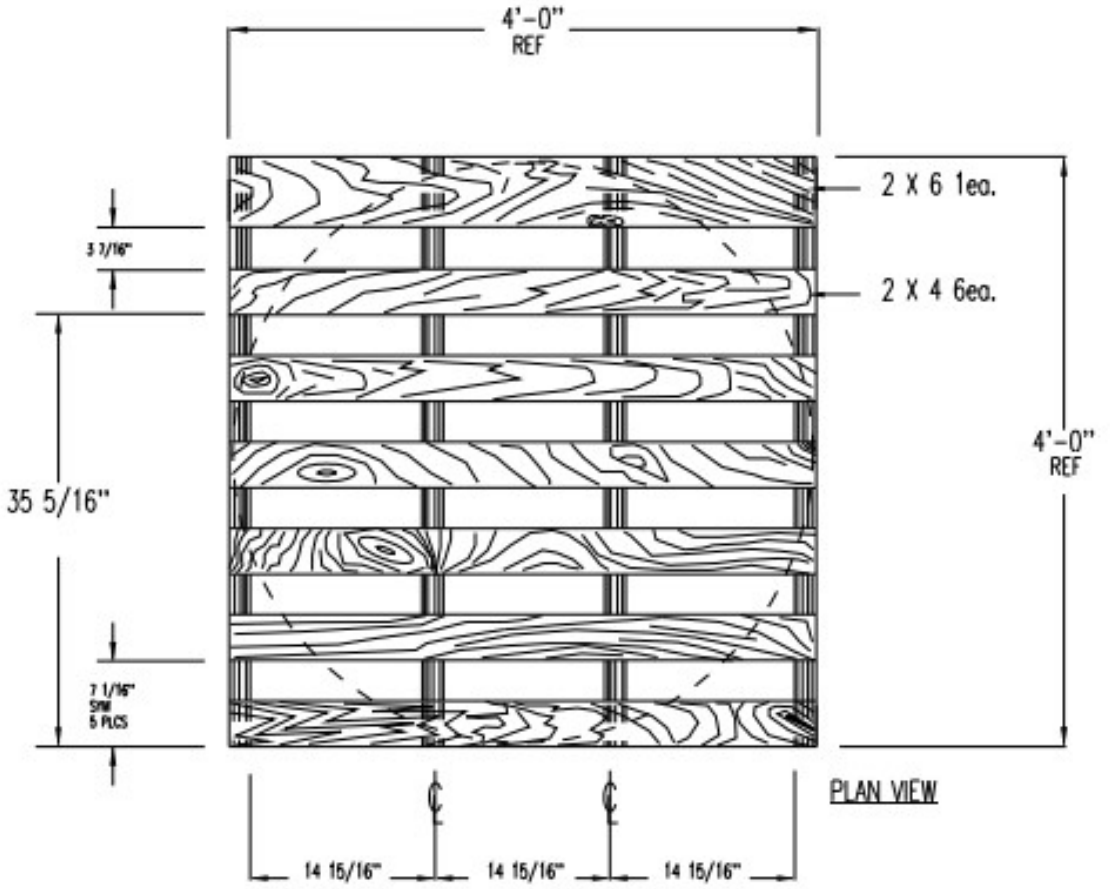
255-214 Hook Gauge

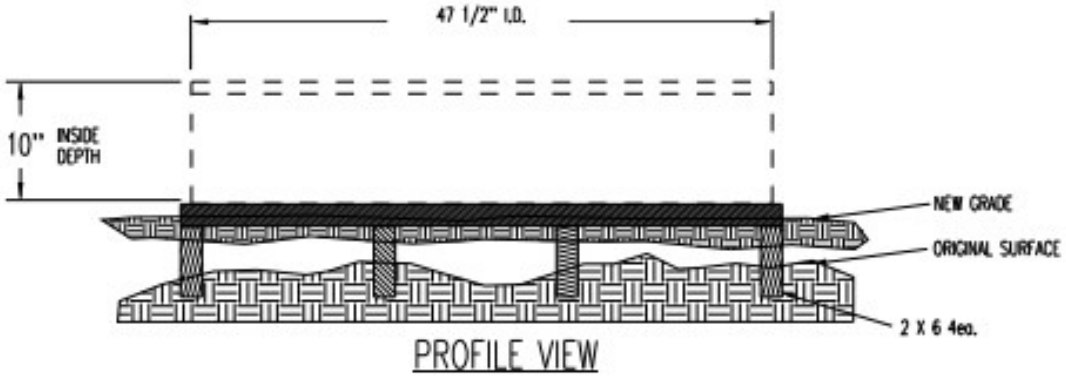
each gradation in the chart below. Add the readings together. Record the measurement, along with the time and date.

Hook Gauge	255-214 (inches)	255-215 (mm)
Stem major gradations	1.000	10.00
Stem minor gradations	0.100	1.00
Dial major gradations	0.010	0.10
Dial minor gradations	0.002	0.02

Evaporation rate can vary significantly by location and season. At a minimum, the level must be read before the water level drops below the range of the hook gauge. If this is not done, data will be lost and the record across the season will not be continuous. In areas of relatively high evaporation rates the level is read every 24 hours. The gauge readings should be taken at the same time each day. Extreme cases may require more frequent reading, or even a different method of measurement.

APPENDIX A PLATFORM REFERENCE DESIGN





APPENDIX B EVAPORATION STATION REFERENCE DESIGN