

IP and NEMA Rated Enclosures for Wireless Nodes

Overview

Many applications require that the remote wireless node be protected from the elements by housing it within an IP rated and/or NEMA rated enclosure. LORD MicroStrain® provides specific IP and NEMA rated enclosures as an option for several of its [wireless nodes](#). These IP and NEMA rated enclosures also allow for additional external battery capacity if needed. This technical note describes these enclosures and their use.

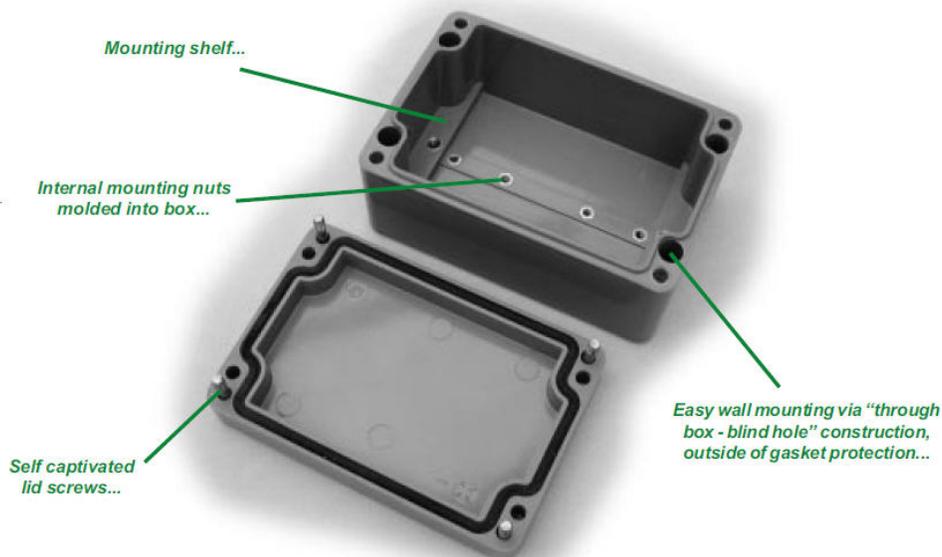


Figure 1: Typical IP-66/NEMA 4X Enclosure

IP Rated

The IP Code (Ingress Protection Rating), as defined by the [IEC](#), classifies the degree of protection provided by an electrical enclosure against the intrusion of solid objects, dust, accidental contact, and water.

The IP rating is formatted as "IP" followed by two digits. The first digit indicates a protection level against solids such as dust, and the second digit indicates a protection level against liquids. Table 1 and Table 2 illustrate the IP formats (in simplified form). Please refer to the IEC specifications directly for more details.

Solid Particle Protection	
Level	Protected Against
0	No protection against contact and ingress of objects.
1	Any large surface of the body, such as the back of a hand, but no protection against deliberate contact with a body part.
2	Fingers or similar objects.
3	Tools, thick wires, etc.
4	Most wires, screws, etc.
5	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact.
6	No ingress of dust; complete protection against contact.

Table 1: Solid Particle Protection

Liquid Ingress Protection	
Level	Protected Against
0	Not protected
1	Dripping water
2	Dripping water when tilted up to 15°
3	Spraying water
4	Splashing water
5	Water jets
6	Powerful water jets
7	Immersion up to 1 meter
8	Immersion beyond 1 meter

Table 2: Liquid Ingress Protection

Using the tables above, an **IP65** rating means:

- Solid Particle Protection = No ingress of dust; complete protection against contact.
- Liquid Ingress Protection = Water jets.

Using the tables above, an **IP66** rating means:

- Solid Particle Protection = No ingress of dust; complete protection against contact.
- Liquid Ingress Protection = Powerful water jets.

NEMA Rated

NEMA defines standards for various grades of electrical enclosures used in industrial applications. A typical NEMA enclosure might be rated to provide protection against environmental hazards such as water, dust, oil, coolant or environments with corrosive agents. Table 3 illustrates the NEMA formats (in simplified form). Please refer to the NEMA specifications directly for more details.

NEMA Type	Definition
1	General-purpose. Protects against dust, light, and indirect splashing but is not dust-tight; primarily prevents contact with live parts; used indoors and under normal atmospheric conditions.
2	Drip-tight. Similar to Type 1 but with addition of drip shields; used where condensation may be severe (as in cooling and laundry rooms).
3 and 3S	Weather-resistant. Protects against weather hazards such as rain and sleet; used outdoors on ship docks, in construction work, and in tunnels and subways.
4 and 4X	Watertight (weatherproof). Must exclude at least 65 GPM of water from 1-in. nozzle delivered from a distance not less than 10 ft for 5 min. Used outdoors on ship docks, in dairies, and in breweries. The 4X model has corrosion resistance.
5	Dust-tight. Provided with gaskets or equivalent to exclude dust; used in steel mills and cement plants.
6 and 6P	Submersible. Design depends on specified conditions of pressure and time; submersible in water or oil; used in quarries, mines, and manholes.
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Table 3: NEMA Type and Definition

Using the NEMA table above, a NEMA 4X rating means:

- Watertight (weatherproof). Must exclude at least 65 GPM of water from 1-in. nozzle delivered from a distance not less than 10 ft for 5 min. Used outdoors on ship docks, in dairies, and in breweries. The 4X model has corrosion resistance.

Optional IP and NEMA Rated Enclosures in General

LORD MicroStrain[®] offers enclosures carrying both IP and NEMA ratings that have these general features (slight differences in features exist from model to model):

- Two piece molded fiberglass reinforced polyester construction
- Captive cover screws are provided with a standard slot head
- Cover screws fasten into pre-threaded holes
- Recessed neoprene gasket with tongue and groove construction is oil and petroleum resistant
- Easy wall mounting via "through box - blind hole" construction, outside of the gasket protection

G-Link[®]-LXRS[®]

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6306-0100	2g or 10g G-Link [®] -LXRS [®]	inches	4.32	2.94	2.17
	IP66 NEMA 4X 1590ZGRP082.pdf				
	No battery holder	mm	110	75	55
	No See-Thru cover				

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6306-0200	2g or 10g G-Link [®] -LXRS [®]	inches	6.30	2.94	2.17
	IP66 NEMA 4X 1590ZGRP083.pdf				
	Battery holder for 1 D-Cell	mm	160	75	55
	No See-Thru cover				

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6306-0300	2g or 10g G-Link [®] -LXRS [®]	inches	6.73	4.76	2.17
	IP65 NEMA 4X hb1324.pdf				
	Battery holder for 3 D-Cells	mm	170	120	55
	Has See-Thru cover				

SG-Link[®]-LXRS[®]

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6309-3000	SG-Link [®] -LXRS [®]	inches	4.32	2.94	2.17
	IP66 NEMA 4X 1590ZGRP082.pdf				
	No battery holder	mm	110	75	55
	No See-Thru cover				

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6309-4000	SG-Link [®] -LXRS [®]	inches	6.30	2.94	2.17
	IP66 NEMA 4X 1590ZGRP083.pdf				
	Battery holder for 1 D-Cell	mm	160	75	55
	No See-Thru cover				

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6309-5000	SG-Link®-LXRS®	inches	6.73	4.76	2.17
	IP65 NEMA 4X hb1324.pdf				
	Battery holder for 3 D-Cells	mm	170	120	55
	Has See-Thru cover				

V-Link®-LXRS®

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
6313-3100	V-Link®-LXRS®	inches	6.30	6.30	3.65
	IP66 NEMA 4X 1590ZGRP161.pdf				
	Battery holder for 2 D-Cells	mm	160	160	90
	No See-Thru cover				

TC-Link®-LXRS®

Part Number	Use IP Rating and NEMA Rating Detailed Dimensional Drawing Battery Holder See-Thru Cover	Units	Length	Width	Height
3023-0010	TC-Link®-6CH-LXRS®	inches	5.6	4.8	4
	IP66 NEMA 4X R130-120-000.pdf				
	Battery holder for 2 D-Cells	mm	140	120	100
	No See-Thru cover				

Support

LORD MicroStrain® support engineers are always available to expand on this subject and support you in any way we can.

LORD Corporation

MicroStrain® Sensing Systems

459 Hurricane Lane, Unit 102 ph: 800-449-3878

Williston, VT 05495 USA fax: 802-863-4093

www.microstrain.com

support@microstrain.com

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