LITERATURE

ULTRABOX

DAIRYLAND
ELECTRICAL INDUSTRIES
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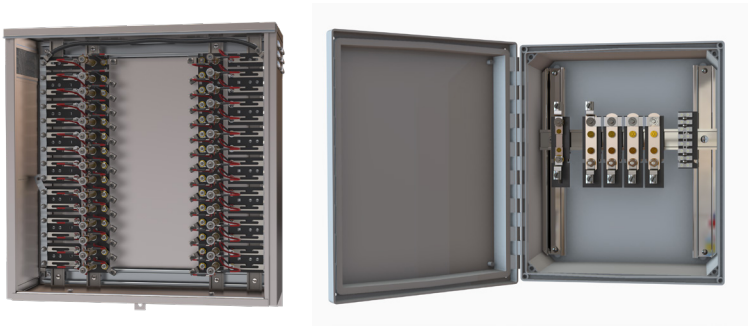
ULTRABOX OFFERS REVOLUTIONARY APPROACH TO CP JUNCTION BOX CREATION



Dairyland UltraBox can be customized to meet your needs

Dairyland now offers a completely new patented approach to cathodic protection junction boxes with the introduction of the UltraBox – a modular design that addresses junction box shortcomings that have frustrated users for decades. CP junction boxes are used throughout the cathodic protection world to connect rectifiers, pipelines, tanks, anodes, and test wires to manage and measure CP current, and facilitate potential readings in some cases. Housing shunts, resistors, and isolated measurement terminals, these boxes are very basic in principle, and the industry design hasn't ever changed – until now.

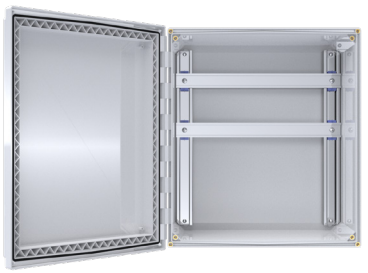
Typical industry junction boxes are customized arrangements that utilize the above components mounted with hardware to an insulated panel in the enclosure, and tie to incoming and outgoing wiring in the field. However, fixing loose connections or later adding components requires field disassembly of the box, and occasionally results in field wiring being reconnected to the wrong terminals. Dairyland's UltraBox solves those problems using rail-mounted, standard modules which can be quickly added or relocated for complete flexibility in junction box design. Using various industry-standard shunts and resistors, these modules feature a secure quick-connect latching system for installation, removal, or repositioning anywhere on a rail, and allow complete access to wiring and hardware. Junction box expansion, adjustment, and maintenance just became easier with the UltraBox.

The UltraBox can be obtained as either a fully assembled product, or as bulk unassembled components for users wishing to configure themselves.

Enclosure Material and Allowed Orientations

Dairyland offers several sizes of enclosure in two material types – either molded polycarbonate or welded, unpainted 304 stainless steel. Polycarbonate enclosures are available in 14"x12"x7", 18"x16"x10", or 24"x24"x10" sizes, non-vented. Stainless steel enclosures of a strong, lightweight custom design include screened vents and are available in 18"x16"x10" and 24"x24"x10" sizes. All feature either hinged or removable doors that are lockable. For dimensions, see the full complement of product drawings. Shunt and isolated terminal modules may be arranged in either type of enclosure, while any arrangement that includes resistors is housed exclusively in the vented stainless steel enclosure line.

24" x 24" x 10" stainless steel enclosure



18" x 16" x 10" poly enclosure

Due to the great flexibility inherent in the UltraBox design, any module may be mounted on either horizontally or vertically oriented DIN rails. Depending on the type of application, certain orientations are more advantageous than others – either to maximize the number of modules per enclosure or to allow best access for cable entry, exit, and termination.

UltraBox use involving resistors was thoroughly tested for temperature rise in normal and elevated ambient conditions. Specifications state the maximum wattage allowed per stainless steel enclosure size at these ambient conditions.

High strength and corrosion resistant materials are used throughout, including stainless hardware, nickel-plated copper buswork, and enclosures of polycarbonate or 304 stainless steel. Stainless hardware is used for secure attachment, but not as a current conduction path. Rather, all current flow is via direct component, terminal, and bus contact.

UltraBox®

Premium Modular Junction Boxes

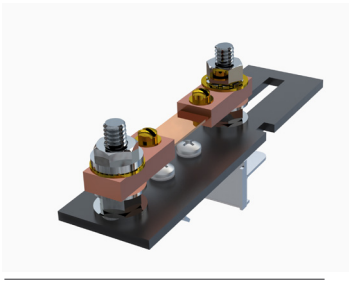
by Dairyland

Shunt Modules

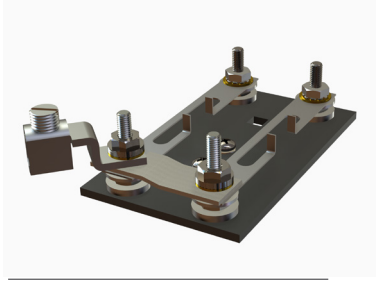
Industry standard shunts are incorporated into UltraBox modules to meet customer requirements. Type SO, SW, SS, RS, and JB shunt families are offered, some with multiple ratings. Modules are offered in versions with one or two shunts on an isolated base, which is then easily snapped and locked on the DIN rail. Offering two shunts on a common base helps to contain cost and make installation efficient.

Each shunt snaps in place on the desired DIN rail alongside the next and are connected together via standard links to form a continuous header bus. Need one more in the future? Just add another shunt module later, along with a link to connect it.

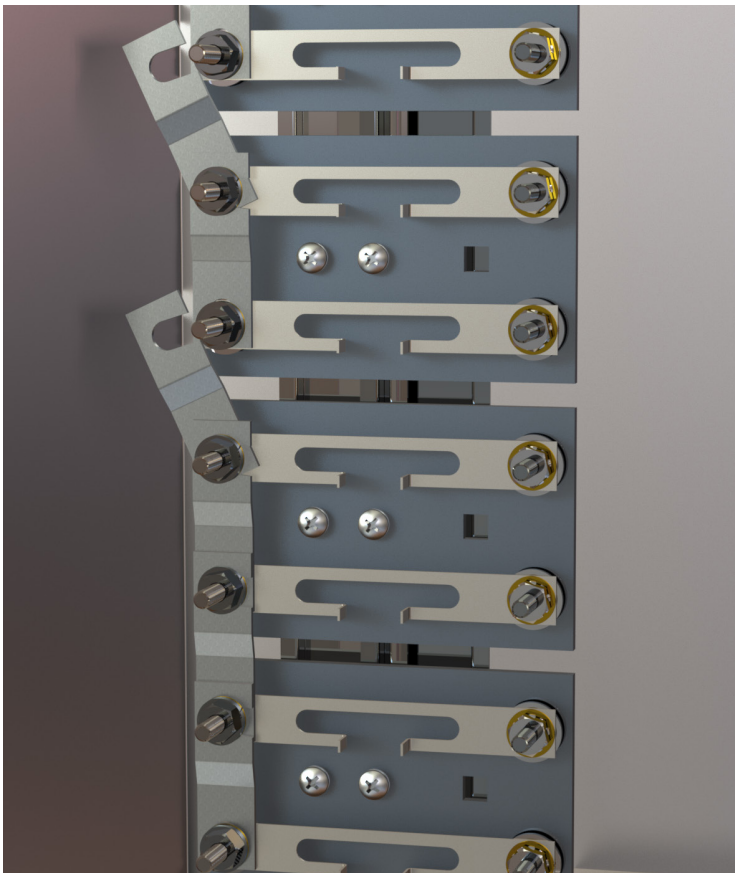
Links are offered with different height adjustment, allowing a thicker SW main shunt to connect alongside a JB model, for example, and still form a continuous header bus. All links are nickel-plated copper, for conductivity along with corrosion resistance.



Single SW Shunt Module



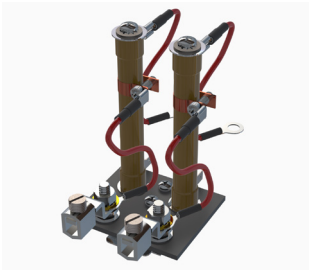
Double JB Shunt Module



Resistor Modules

UltraBox resistor modules are a unique industry offering, with vertically oriented mounting to minimize space requirements and to aid in cooling. This strong, compact module structure provides flexibility in adding resistors at the time of box assembly, or in the future, and is offered in single and double resistor versions. Standard adjustable slide resistors by Dairyland offer improved characteristics over typical product offerings by others, including a heavy rib-wound edge design for assured electrical band contact, and a 90W minimum rating. This provides additional margin and flexibility over the common 50W wire edge-wound designs. Users requesting “provisions for resistors” can have a resistor rail installed in the original box layout, and later purchase resistor modules and snap those onto the spare rail – or purchase the rail assembly later, as long as the enclosure has been initially sized to allow this.

Single Resistor Module



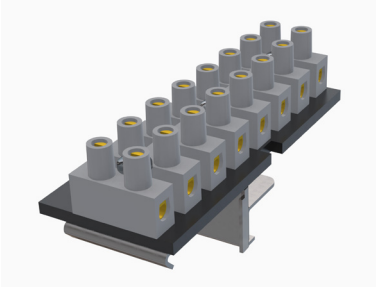
Double Resistor Module

150W, 220W and 300W resistors are also available as single resistor modules. Rheostat modules are available in 25W, range zero to 1 Ohm (up through zero to 25k Ohms) resistance and in 50W, 75W, 100W, and 150W with range zero to 0.5 Ohm (up through zero to 50k Ohms) resistance. In addition, users can custom-wind nichrome wire around a blank single core module for added flexibility in addressing pipeline interference issues.

Isolated Terminal Modules

Often, pipeline potential measurements are taken in junction boxes via field wiring connections, and Dairyland offers modules with multiple isolated terminals for just this purpose. Four and eight position terminal modules allow connections to reference cells, pipelines, wiring for span tests, and more. Multiple modules can be added to any box on available DIN rail space. The optional MDS-1 mounting kit even allows side or corner mounting to DIN rails or the underlying struts for maximum use of space.

4 Position Terminal Module



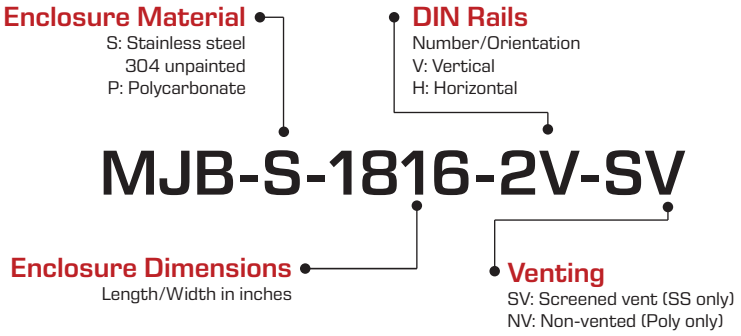
8 Position Terminal Module

PRODUCT SELECTION

The following sections identify enclosure, component (shunt, resistor, etc.), and accessory specifications and details.

Enclosure selection

Enclosure sizes, material, and rail orientation combinations are shown below. Rail quantity and orientation should take the number and size of modules into account, as well as desired cable routing. An additional rail may also be suggested for future expansion. Note that all conduit hole punching is performed in the field by the user. Finally, users may wish to select an enclosure size in excess of the module space requirements for convenience.



Model Number Structure for Enclosure

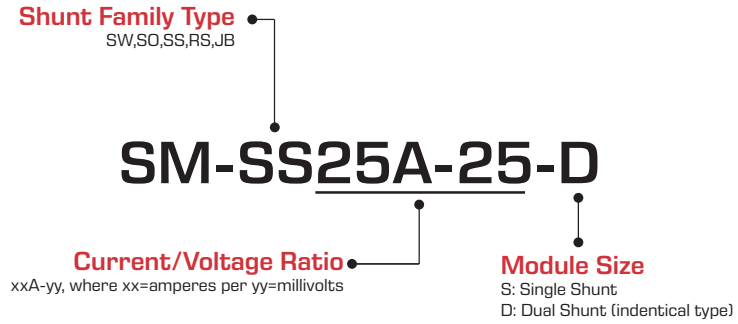
Enclosure Options

Material	Size	Rail Qty and Orientations
Polycarbonate	14x12x7”	1H, 1V
Polycarbonate	18x16x10”	1H, 1V, 2H, 2V
Polycarbonate	24x24x10”	1H, 1V, 2H, 2V
Stainless steel 304	18x16x10”	1H, 1V, 2H, 2V
Stainless steel 304	24x24x10”	1H, 1V, 2H, 2V, 4V

Rail orientation - H: horizontal, V: vertical

Shunt module selection

Shunt types available: SW, SO, SS, JB, RS Modules with one or two identical shunts are available. For efficiency, Dairyland suggests the use of double shunt modules whenever possible. A double shunt module is simply two separate shunts housed on a single snap-in module to save cost and assembly time. Some specialized or high current shunt designs are only available as a single-shunt module, such as the SW 100A/50mV. Shunt modules do not include an output terminal, as they often are connected to resistor modules, which contain that terminal. Likewise, the input terminal is not included, as the size requirements can vary depending on the input cable. See Accessories, below, for terminal information.



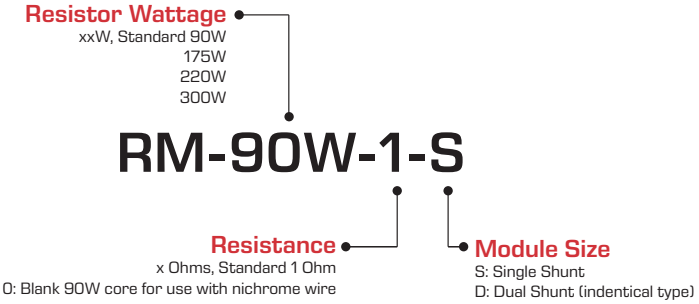
Model Number Structure for Shunt Modules

Typical shunts stocked (other ratings upon request):

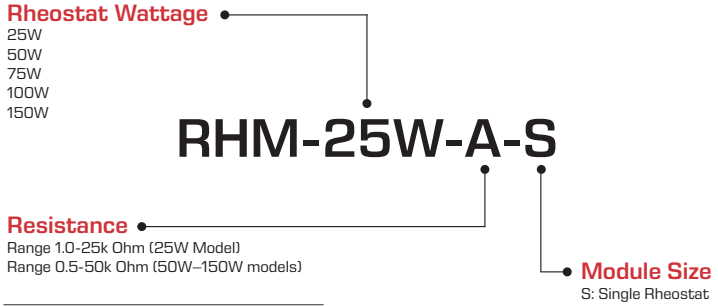
- SW 50A 50mV
- SW 100A 50mV
- SO 50A 50mV
- JB 5A 50mV
- SS 25A 25mV
- RS 5A 50mV

Resistor and Rheostat module selection

Similar to shunt modules, 90W adjustable resistor modules are available in single and double versions and are matched and aligned with the corresponding shunt. Standard ratings are 90W, 1 Ohm, with orientation vertical to the module base for efficiency. Options include 2 Ohms through 5 Ohms, in the same design, as well as a version with a blank ceramic core for users to custom wind using nichrome wire. The 90W rating is intended to cover 50W application requests with margin, and to cover most applications where a 100W resistor is requested. 175W and 220W resistor modules are available in a vertical



Model Number Structure for Resistor Modules



Model Number Structure for Rheostat Modules

orientation relative to the DIN rail. A 300W resistor is available with a horizontal orientation. Resistor modules include an output terminal for wire size range #2AWG through #14AWG. Insulated #14AWG wire leads are finished and included to allow connection to the shunt, and from the adjustable resistance band to the output terminal.

Rheostat modules are available in 25W with 1.0-25k Ohm resistance and in 50W, 75W, 100W and 150W with 0.5-50k Ohm resistance. Similar to the resistor modules, rheostat modules include an output terminal for wire size range #2AWG through #14AWG. Insulated #14AWG wire leads are finished and included to allow connection to the shunt.

Important note: all industry resistors and rheostats are rated for a specified wattage only when the full adjustable length is being used. When a fraction of the length is used to achieve a needed resistance, the power rating (wattage) allowed is limited to that same fraction of the total.

Resistors larger than 90W and those with a blank ceramic core for use with nichrome wire are only offered as single resistor modules (not dual).

Isolated terminal module selection

Multiple isolated terminals are available on two different module designs. For a 4 position module using conventional terminals accepting #2AWG through #14AWG, specify model ITM4-2-14. For an 8 position compact molded terminal block that accepts #10AWG through #20AWG, specify ITM8-10-20.

ACCESSORIES AND ULTRABOX EXPANSION

Terminals

Terminals are automatically included with resistor modules but are accessories for shunt modules – both the input for the common header (usually only one) and the output for each shunt. Dairyland suggests all needed terminals with each proposed UltraBox layout, using our automated design tools. Terminal options that will appear in proposed box designs are the following, and may be ordered separately. All terminals are tin plated, with a floating pad set-screw design to maintain compression on the wire. The common terminals listed below are sold in packs of 10.

Model Number	Wire Range
TB-2-14-10PKG	#2-14AWG
TB-0-8-10PKG	#1/0-8AWG
TB-250-6	250MCM-#6AWG

Links

Shunt links made of nickel-plated copper connect the end of one shunt to the next, forming an expandable header bus. See link drawings for more detail. The pivoting links allow connection and disconnection for the addition of modules as needed and are designed to adapt from compact shunt spacing to slightly wider spacing needed to align shunts that have accompanying resistor modules. Different link designs provide height adjustment to adapt from a thicker shunt to an adjacent thinner shunt, which typically occurs when a series header shunt is included to measure the total current through the remaining shunts. The links listed below are sold in packs of 10.

Model Number	Connection Between Shunt Types
LNK-116-10PKG	Standard link for connecting between identical shunt types, or if no height change between different shunt types
LNK-316-10PKG	Connects: SW-5 thru SW-80, SO-50 To: adjacent SS, JB, RS
LNK-516-10PKG	Connects: SW-100 thru SW-150 To: Adjacent SS, JB, RS
LNK-0	Used in final shunt position in header and for connecting SW-100 to SW-50

Rail Assemblies

Dairyland attempts to identify future needs in originally sizing the UltraBox enclosure for a client. For example, where “provisions for resistors” have been requested, the UltraBox is sized for this requirement and the additional resistor rail is included. For later additions, space permitting, select a rail based on length. For enclosures with a “1V” or “2V” in the model number, the rail length is the vertical/height measurement of the enclosure, while enclosures with an “H” designation require a rail length equal to the horizontal/width measurement of the enclosure. For example, enclosure MJB-S-1816-1V-SV with vertically oriented rails requires the 18” rail found in kit DIN-18-K. Each rail assembly includes the required hardware to attach to the enclosure struts.

Model Number	Rail length
DIN-12-K	12”
DIN-14-K	14”
DIN-16-K	16”
DIN-18-K	18”
DIN-24-K	24”

Strut Mounting Kit

Isolated terminal modules that accept field measurement wiring are often located on the main UltraBox rails, shifted to one side. An option is to utilize the MDS-1 strut mounting kit, which allows the isolated terminal module to be mounted directly to the underlying strut, efficiently located tight to enclosure side wall, bottom, or corner, separate from the main rail locations.

See MJB Isolation Terminal Modules drawing 100123 in this document for more information on the MDS-1 kit (page 22 of 27).

Cable Assemblies

When shunt headers on multiple rails need to be connected, Dairyland offers assembled cable kits to span the headers. Standard construction includes #1/0AWG extra flexible conductor. This cable assembly is automatically included, where needed, when Dairyland determines the UltraBox layout from stated customer requirements. Specify model MTL-0-24-C.

Round Pole Mounting Kit

For applications where mounting the enclosure to a round pole is desirable, Dairyland offers a kit to secure the enclosure to any diameter pole from 2” to 10”. This kit works for any size enclosure and comes complete with all needed mounting hardware. Specify model MEPK-2-10.

SPECIFICATIONS

Enclosures

See drawings for dimensions

Polycarbonate

- Material UL94-5VA(f1)
- Ingress protection IP66/NEMA 4X
- Max long term operating temp -40°C…+80°C
- Hinged cover, lockable

Stainless Steel

- Material 304 stainless, unpainted
- Ingress protection NEMA 3R
- Max long term operating temp -40°C…+120°C (+140°C without 8-position terminal module)
- Screened, vented – bottom and sides
- Removable cover, lockable

RECOMMENDED MAXIMUM INTERNAL POWER DISSIPATION

18x16x10” Stainless Enclosure

With resistor only:

425W (120°F/49°C)
600W (72°F/22°C)

With 8-position Isolated Terminals installed:

350W (120°F/49°C)
500W (72°F/22°C)

24x24x10” Stainless Enclosure

With resistor only:

600W (120°F/49°C)
850W (72°F/22°C)

With 8-position Isolated Terminals installed:

500W (120°F/49°C)
700W (72°F/22°C)

Note that maximum power dissipation limits above relate to actual values based on current flow, not the sum of the total resistor wattage ratings.