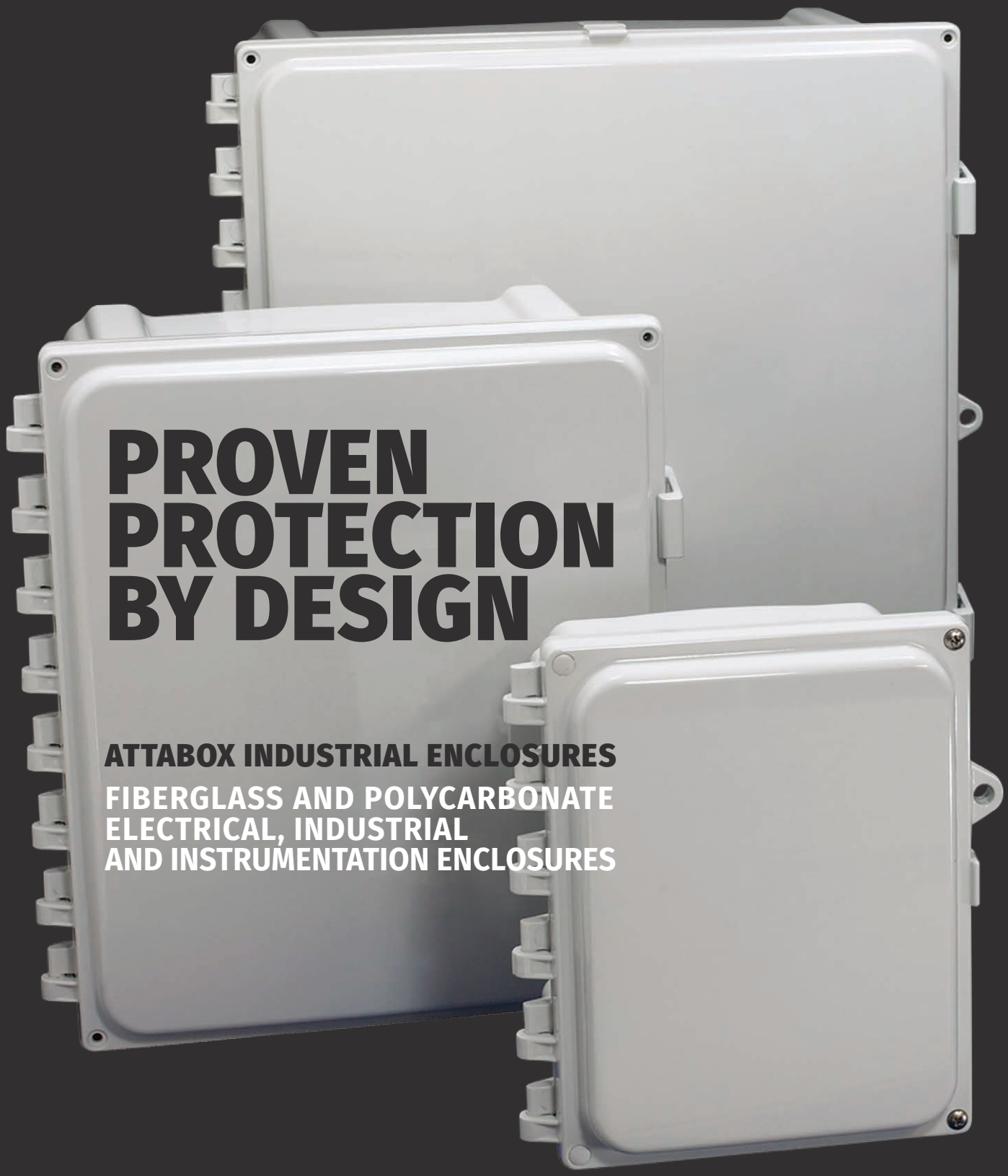

PROVEN PROTECTION BY DESIGN

ATTABOX INDUSTRIAL ENCLOSURES

FIBERGLASS AND POLYCARBONATE ELECTRICAL, INDUSTRIAL AND INSTRUMENTATION ENCLOSURES

AttaBox™

A BRAND OF **ROBROY** ENCLOSURES™

Table of Contents

Introduction	1
General Info	2
ModRight™	10
Heartland™	12
Commander™	18
BantamBox™	32
Viking™	42
DuraShield™	54
Endurance™	60
Freedom™	64
Centurion™	82
MachoBox™	90
Triton™	94
Accessories	102
Technical Info	118
Part No. Index	150

AttaBox™

A BRAND OF **ROBROY** ENCLOSURES™

ATTABOX INDUSTRIAL ENCLOSURES

Proven Protection By Design

The Reason You Buy Enclosures: ***Protection.***
The Reason You Should Buy AttaBox Enclosures: ***Proven Protection.***

Many factors might influence your purchase of an enclosure, but all relate to the ultimate need for an enclosure to reliably protect whatever you put inside.

Whether your enclosure is intended to house an electrical connection, or a control panel, or sensitive measurement systems, the demand for uncompromised protection against diverse forces—including moisture, dust and dirt, ultraviolet radiation, temperature extremes, and impact—is the number one reason to put your trust in ATTABOX.

Get the protection you paid for.

AttaBox Enclosures: Designed to Match the "Right" Enclosure to the Exacting Performance and Protection Needs of Your Specific Job.

Every application is different.

Not every enclosure is best for every use.

AttaBox ***offers you freedom-of-product-choice with a wide-ranging selection of non-metallic enclosures featuring ten full product lines encompassing over 150 different sizes and 4 configurations.***

AttaBox ***produces enclosure families representing the varying benefits of polycarbonate, fiberglass, and polyester, ensuring breadth and depth in your ability to source and achieve protection for every on-the-job need.***

General Information

Standards

Application

The products in this catalog are designed for electrical and electronic enclosure applications in commercial or industrial locations that are classified as non-hazardous. Information on the classification of hazardous and non-hazardous locations appears at the end of this section.

The enclosure products in this publication should be applied, installed and used only by qualified engineers, technicians or electricians knowledgeable of the standards, laws, regulations and ordinances associated with the respective application. The information in this section has been condensed from several references and is provided for guidance in selecting the appropriate enclosure for an application. The original reference must be consulted for detailed information.

Industry Standards

The following information is provided with permission of the respective organizations to assist in the selection of an enclosure:

Enclosure Ratings

What are Ratings?

As a way of standardizing enclosure performance, organizations like NEMA, UL, CSA and IEC use rating systems to identify an enclosure's ability to resist external environmental influences. These influences include falling dirt or liquids, hose directed water to complete submersion and each are broken out by the Type rating. While these ratings are intended to assist you in your enclosure selection there are differences among the organizations.

North American Standards Organizations

In North America, NEMA, UL and CSA are the more common recognized standards organizations. Ratings between these organizations are similar in description and performance. UL and CSA both required enclosure testing that is conducted in certified labs. They also conduct site evaluations or field audits to ensure manufacturer adheres to prescribed manufacturing methods and material specifications within the approved UL/CSA files. NEMA publishes a standard for ratings and testing, but does not test or list enclosures.

International Standards Organizations

IEC does not require independent testing, similar to NEMA, but there are differences in the interpretation between the two organizations. For example, under the IEC standards for each level of ingress protection (IP), a certain amount of water is allowed to enter the enclosure. Unlike UL or CSA, water-tight means simply that. Any amount of water ingress regardless of size or amount is considered a failure to the specification.

IEC 60529 IP ratings do not specify construction or degrees or protection, while NEMA type ratings do specify construction and performance requirements for most conditions. Because of these differences in tests and evaluations, the IEC enclosure ratings cannot be directly translated with NEMA Enclosure Type ratings.

Reference Documents and Sources

National Electrical Manufacturers Association (NEMA)

1300 North 17th ST, Suite 1847
Rosslyn, VA 22209
www.nema.org

NEMA Standards Publication 250, Enclosures for Electrical Equipment (1000 Volts Maximum) and NEMA Standards Publication ICS6, Enclosures for Industrial Controls and Systems.

Canadian Standards Association (CSA)

178 Rexdale Blvd.
Etobicoke, Ontario, Canada M9W 1R3
www.csa.ca

CSA Standard C22.2 No. 14 Industrial Control Equipment for Use in Ordinary (Non-Hazardous) Locations; CSA Standard C22.2 No. 40 Cut-Out, Junction and Pull Boxes; and CSA Standard 22.2 No. 94 Special Purpose Enclosures

Underwriters Laboratories (UL)

333 Pfingsten Road
Northbrook, IL 60062-2096
www.ul.com

Underwriters Laboratories of Canada

7 Crouse Road
Scarborough, Ontario, Canada M1R 3A9
UL 50 Enclosures for Electrical Equipment; UL 94 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; UL 508 Industrial Control Equipment; UL 870 Wireways, Auxiliary Gutters and Associated Fittings; and UL 746C Polymeric Materials - Use in Electrical Equipment Evaluations

International Electrotechnical Commission (IEC)

1 Rue de Varembei
CH-1211
Geneva 20, Switzerland
www.iec.ch
IEC 529 Classification of Degrees of Protection Provided by Enclosures
IEC 204 Electrical Equipment of Industrial Machines

American National Standards Institute (ANSI)

1430 Broadway
New York, NY 10018
www.ansi.org
ANSI Z55.1 Gray Finishes for Industrial Apparatus and Equipment

National Fire Protection Association (NFPA)

Batterymarch Park
Quincy, MA 02269
www.nfpa.org
NFPA 70 National Electric Code
NFPA 79 Electrical Standard for Industrial Machinery

NEMA, UL, and CSA Ratings

NEMA, UL, and CSA are standard writing organizations commonly recognized in North America. Their ratings are based on similar application descriptions and expected performance. UL and CSA both require enclosure testing by qualified evaluators. They also send site inspectors to make sure a manufacturer adheres to prescribed manufacturing methods and material specifications. NEMA, on the other hand, does not require independent testing and leaves compliance completely up to the manufacturer.

Enclosure Types Non-Hazardous Location

ENCLOSURE RATING	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA STANDARD 250) AND ELECTRICAL AND ELECTRONIC MFG. ASSOCIATION OF CANADA (EEMAC)	UNDERWRITERS LABORATORIES INC. (UL 50, UL50E AND UL 508)	CANADIAN STANDARDS ASSOCIATION (STANDARD C22.2 NO. 94)
Type 1	Enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment or locations where unusual service conditions do not exist.	Indoor use primarily to provide protection against contact with the enclosed equipment and against a limited amount of falling dirt.	General purpose enclosure. Protects against accidental contact with live parts.
Type 2	Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.	Indoor use to provide a degree of protection against limited amounts of falling water and dirt.	Indoor use to provide a degree of protection against dripping and light splashing of non-corrosive liquids and falling dirt.
Type 3	Enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, and sleet; undamaged by the formation of ice on the enclosure.	Outdoor use to provide a degree of protection against windblown dust and windblown rain; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against rain, snow, and windblown dust; undamaged by the external formation of ice on the enclosure.
Type 3R	Enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain sleet; undamaged by the formation of ice on the enclosure.	Outdoor use to provide a degree of protection against falling rain; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against rain and snow; undamaged by the external formation of ice on the enclosure.
Type 4	Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	Either indoor or outdoor use to provide a degree of protection against falling rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against rain, snow, windblown dust, splashing and hose-directed water; undamaged by the formation of ice on the enclosure.
Type 4X	Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	Either indoor or outdoor use to provide a degree of protection against falling rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure; resists corrosion.	Indoor or outdoor use; provides a degree of protection against rain, snow, windblown dust, splashing and hose-directed water; undamaged by the external formation of ice on the enclosure; resists corrosion.
Type 6	Enclosures are intended for use indoors or outdoors where occasional submersion is encountered. Limited depth; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use to provide a degree of protection against entry of water during temporary submersion at a at a limited depth; undamaged by the external formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against the entry of water during temporary submersion at a limited depth. Undamaged by the external formation of ice on the enclosure; resists corrosion.
Type 6P	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (hose directed water and the entry of water during prolonged submersion at a limited depth); that provides an additional level of protection against corrosion and that will be undamaged by the external formation of ice on the enclosure.	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formation.	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formation.
Type 12	Enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids.	Indoor use to provide a degree of protection against dust, dirt, fiber flyings, dripping water, and external condensation of noncorrosive liquids.	Indoor use; provides a degree of protection against circulating dust, lint, fibers, and flyings; dripping and light splashing of non-corrosive liquids; not provided with knockouts.
Type 13	Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.	Indoor use to provide a degree of protection against lint, dust seepage, external condensation and spraying of water, oil, and noncorrosive liquids.	Indoor use; provides a degree of protection against circulating dust, lint, fibers, and flyings; seepage and spraying of non-corrosive liquids, including oils and coolants.

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General Information

NA Standards continued and International Standards (IP Code)

Comparison of Enclosure Types for Non-hazardous Locations

Provides a Degree of Protection Against the Following Environmental Conditions	Type of Enclosure								
	1	3	3R	4	4X	6	6P	12	13
Incidental Contact with Enclosed Equipment	●	●	●	●	●	●	●	●	●
Indoor	●	●	●	●	●	●	●	●	●
Outdoor		●	●	●	●	●	●		
Falling Dirt	●	●	●	●	●	●	●	●	●
Dripping and Light Splashing Liquids		●	●	●	●	●	●	●	●
Rain, Sleet*, Snow		●	●	●	●	●	●		
Circulating Dust, Lint, Fibers and Flyings		●		●	●	●	●	●	●
Settling Dust, Lint, Fibers and Flyings		●		●	●	●	●	●	●
External Ice*		●	●	●	●	●	●		
Hosedown and Splashing Water				●	●	●	●		
Oil and Coolant Seepage								●	●
Oil and Coolant Spraying and Splashing									●
Corrosive Agents					●		●		
Occasional Temporary Submersion						●	●		
Occasional Prolonged Submersion							●		

*External operating mechanisms are not required to be operable when the enclosure is ice covered

A Brief Comparison Of NEMA – "Enclosure for Electrical Equipment (1000 Volts Maximum)" and IEC 60529 – "Degrees of Protection Provided By Enclosures (IP Code)"

This publication is intended to provide a brief comparison and explanation of some of the basic differences between NEMA Standard 250, Enclosures for Electrical Equipment (1000 Volts maximum) and IEC Standard 60529, Degrees of Protection provided by Enclosures (IP Code). For a detailed comparison of the differences between the NEMA 250 and IEC 60529 performance specifications, please refer to the respective documents.

What is IEC 60529 and what does it cover?

IEC 60529 is a standard developed through the International Electrotechnical Commission (IEC) that describes a system for classifying the degrees of protection provided by an enclosure. An "enclosure" as used in 60529 is "a part providing protection of equipment against certain external influences and in any direction protection against direct contact".

What is not covered by IEC 60529?

IEC 60529 is NOT a "product standard" and does not cover enclosure requirements other than the "degree of protection" provided. For instance IEC 60529 does not specify the corrosion protection and other environmental operating requirements and tests defined in NEMA 250.

What does "degree of protection" mean in IEC 60529?

"Degree of protection" is a term used in the standard to describe:

1. The protection of persons against access to hazardous parts inside the enclosure.
2. The protection of the equipment inside the enclosure against ingress of solid foreign objects.
3. The protection of the equipment inside the enclosure against harmful effects due to the ingress of water.

What is an "IP Code"?

The IP Code is a designation that indicates the level, or amount, of the protection. The IP Code designation consists of the letters IP (International Protection or Ingress Protection) followed by two numerals. In some instances there may be an optional letter or third digit representing protection against access and mechanical impacts. These two items are beyond the scope of this reference. Please consult additional resources as required.

What does the first numeral of an IP Code indicate?

The first characteristic numeral indicates the degree of protection provided by the enclosure with respect to persons having access to hazardous parts and with respect to solid foreign objects entering the enclosure. See Table 1.

What does the second numeral of an IP Code indicate?

The second numeral indicates the degree of protection provided by the enclosure with respect to the harmful ingress of water. See Table 2.

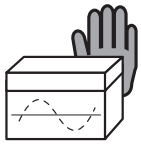
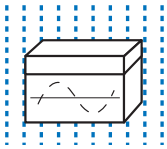
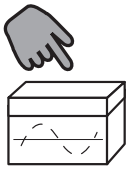
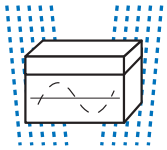
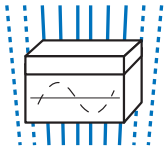
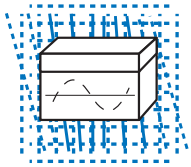
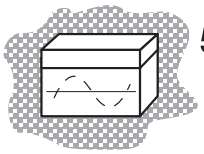
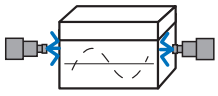
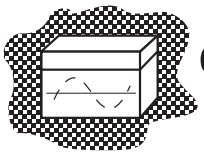
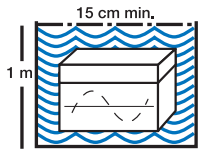
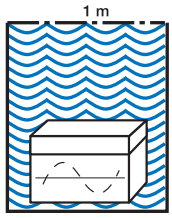
If a requirement for an enclosure Type is specified, can an equivalent IP rated enclosure be substituted?

No! The IP Code only addresses requirements for protection of people, ingress of solid objects, and ingress of water. There are numerous other requirements covered by the Type designations that are not addressed by the IEC 60529/IP Codes. IEC 60529 does not specify:

- Construction requirements
- Door and cover securement
- Corrosion resistance
- Effects of icing
- Gasket aging and oil resistance
- Coolant effects

The Type designation specifies requirements for these additional performance protections. For this reason, the IEC enclosure IP Codes designations CANNOT be converted to enclosure Type numbers. For general cross reference comparison see See Table 2.

Table 1

First Number Protection against solid objects.	***Second Number*** Protection against liquids.
0 No Protection	0 No Protection
 1 Protected against solid objects up to 50 mm e.g. accidental touch by hands.	 1 Protected against vertically falling drops of water.
 2 Protected against solid objects over 12 mm. e.g. fingers.	 2 Protected against direct sprays of water up to 15° from the vertical.
3 Protected against solid objects over 2.5 mm. e.g. fingers. (tools and small wires)	 3 Protected against sprays to 60° from the vertical.
4 Protected against solid objects over 1 mm. e.g. fingers. (tools and small wires)	 4 Protected against water sprayed from all directions – limited ingress permitted.
 5 Protected against dust – limited ingress permitted (no harmful deposits.)	 5 Protected against low pressure jets of water from all directions – limited ingress permitted.
 6 Totally protected against dust.	6 Protected against strong jets of water e.g. for us on ship decks – limited ingress permitted.
	 7 Protected against the effects of immersion between 15 cm and 1 m.
	 8 Protected against long periods of immersion under water.

General Information

IP Code Continued

Table 2

SIZE ID NUMBER	OVERALL H X W X D
1	IP23
2	IP30
3	IP64
3R	IP32
4	IP66
4X	IP66
6	IP67
6P	IP68
12	IP55
13	IP65

The data contained in the table is provided for information and this table must only be used to apply NEMA ratings to IEC designators; it should not be used inversely. The cross-reference is based on engineering judgment and is not approved by the standards organizations.

Enclosure Selection Guidelines

The Enclosure Selection is designed to enhance enclosure selection by making the process easier, more consistent, accurate and complete. The goal is to assure that factors affecting enclosure selection are considered and the enclosure specification is complete and accurate.

1. Examination of the Application

The requirements of your application must be taken into consideration. Often the application will be associated with the market or product. For example, does the application require a disconnect, does it need to be wall mount or free standing? Each application is different and needs a complete review.

2. Environmental Considerations

Regardless of application - solar field, factory floor, chemical plant, the environment is a critical factor for consideration.

In the proposed environment, what is the highest threat? Based on this threat, and the use of NEMA ratings you can determine which enclosure offers the best protection.

3. Material Considerations

Based on the environmental protection that you identify, you will need to define the appropriate material for your application.

Fiberglass
Polycarbonate
PVC
ABS
Carbon Steel
Stainless Steel
Aluminum

4. Size Considerations

Several factors will need to be evaluated when specifying the size of the enclosure, such as:

Internal equipment dimensions
Service connections
External space restrictions
Mounting and access
Climate control requirements
Aesthetics
Economics

5. Standards or Ratings

Select an enclosure that has a rating appropriate for your environment and application. Rating types from NEMA, UL, CSA, and IEC determine an enclosures ability to withstand environmental conditions. Keep in mind that there may be multiple enclosures that meet the ratings which may be reduced by material and size considerations.

6. Thermal Considerations

To maximize the life and efficiency of internal components effective thermal management considerations need to be evaluated. One often thinks in terms of dissipating heat build-up, but one must also consider applications that require addition of heat.

General Information

Hazardous Locations

Classification of Hazardous Atmospheres

The NEC classifies areas according to the nature, likelihood and extent of ignitable flammable hazards that could exist where electrical equipment is installed. The intent of area classification is to prevent fires and explosions that could be caused by electrical equipment serving as an ignition source (arc, spark, high temperature, etc.).

The NEC divides the atmospheric explosion hazards into three classes. Considerable skill and judgment must be applied when deciding to what degree an area contains hazardous concentrations of vapors, combustible dusts or ignitable fibers and flyings. Factors such as temperature, barometric pressure, humidity, ventilation, quantity of release, distance from the source, etc. must all be evaluated.

An abbreviated summary of the NEC classifications appears in the table below. For detailed information on specific atmospheres, refer to the NEC, Articles 501-505 and 511-517. For a more complete list of flammable liquids, gases and solids; refer to NFPA 497A and NFPA 497B, Classification of Gases, Vapors and Dusts for Electrical Equipment in Hazardous (Classified) Locations.

SUMMARY OF HAZARDOUS ATMOSPHERES

CLASS	DIVISION	GROUP	TYPICAL ATMOSPHERE, IGNITION TEMPERATURES
I Flammable Gases, Vapors Flammable and Combustible Liquids	1 Normally hazardous – Always present in atmosphere	A	Acetylene, 305°C (581°F)
		B	Hydrogen, 520°C (968°F)
		C	Ethylene, 450°C (842°F)
		D	Methane, 630°C (999°F)
	2 Not normally hazardous – May be present in atmosphere	A	Same as Division 1
		B	Same as Division 1
		C	Same as Division 1
		D	Same as Division 1
II Combustible Dusts	1 Normally hazardous – Always present in atmosphere	E	Combustible metal dusts, or other combustible dusts of similar hazardous characteristics
		F	Combustible carbonaceous dusts
		G	Combustible dusts not included in Group E or F, includes flour, grain, wood, plastic & chemicals
	2 Not normally hazardous – Always present in atmosphere	F	Same as Division 1
		G	Same as Division 1
III Ignitable fibers and flyings	1 & 2	No Groups	

General Information | IP Code

IEC methodology was added to the 1996 NEC in Article 505. The IEC uses area classifications similar to the NEC, but with different terms, groupings, descriptors and temperature range. Article 505 defines only Class I areas; however, the divisions and groupings are different as shown in the following tables:

IEC Group I is for underground mines and is not covered by the NEC. Group IIC combines NEC Groups A and B making the requirements for acetylene the same as for hydrogen and other highly flammable gases.

COMPARISON OF GROUPS	
NEC Group	IEC Group
A	IIC
B	IIC
C	IIB
D	IIA

The IEC divides NEC Division 1 into Zone 0 and Zone 1. In Zone 0 the hazard is present at all times or for long periods of time. In Zone 1 the hazard is present during normal conditions, including repair and maintenance activities or leakage, or where operations or processes could result in the release of a flammable mixture or cause a simultaneous failure of electrical equipment.

COMPARISON OF DIVISIONS WITH ZONES	
NEC Division	IEC Zone
1	0
1	1
2	2
Non-hazardous	Non-hazardous

CAUTION: These methodologies are mutually exclusive and should not be mixed and matched. Equipment approved for the NEC classifications may be used in the equivalent IEC area, but not vice versa. NEC Article 500-3 requires that the area classification, wiring and equipment selection be under the supervision of a qualified Registered Professional Engineer.

Enclosure ratings for hazardous locations include:

NEMA 7 Enclosures constructed for indoor use in hazardous locations classified as Class I, Division 1, Groups A, B, C or D as defined in NFPA 70.

NEMA 8 Enclosures constructed for either indoor or outdoor use in hazardous locations classified as Class I, Division 1, Groups A, B, C and D as defined in NFPA 70.

NEMA 9 Enclosures constructed for indoor use in hazardous locations classified as Class II, Division 1, Groups E, F or G as defined in NFPA 70.

NEMA 10 Enclosures constructed to meet the requirements of the Mine Safety and Health Administration, 30 C. F. R., Part 18.

ModRight™ Services

AttaBox Enclosures prides itself in its willingness and ability to meet the enclosure modification needs of customers. The combination of technologically advanced equipment and a sound procedure for handling the most detailed modification allows AttaBox Enclosures to process modifications on time, and to the highest quality standards in the industry.

Modifications can be mixed and matched in an endless number of combinations. They can take the form of:

- Custom mold-in colors
- Silk screening
- EMI/RFI shielding
- Custom window sizes
- Custom cutouts/holes
- Custom size enclosures
- Other special requests

This AttaBox catalog is devoted to practical applications and solutions to enclosure problems. A variety of off-the-shelf products are available to solve common industry related problems. AttaBox's ModRight Program is designed to support you in very uncommon or complex applications. When you need to pick up the phone for additional assistance, think AttaBox ModRight!

***Mod**Right*

The ModRight program is multi faceted and designed to meet a range of unique requirements from simple hole drilling to full custom blend of molding materials.

***Design**Right*

The DesignRight Program will take your custom concept, perhaps your embossed logo or a completely custom cover design, and conform it to an existing enclosure. The result is your custom cover on a "standard" base.

***Form**Right*

The FormRight Program is available for custom material formulation to match your unique requirements. AttaBox will work with you to custom formulate the sheet molding compound with the attributes that you require for UV, flame retardation, infestation resistance, you name it.

***Pro**Right*

The ProRight Program offers the capability of prototyping a unique design through the hand layup process or low volume molding. Product can be pre-tested for its effectiveness before large volumes of product are produced.

***Build**Right*

The BuildRight Program offers a complete range of standard and unique modifications that make a useful configuration right out of the carton available.

The BuildRight Program accommodates custom manufacturing and component assembly to deliver exactly the configuration that you desire at time of shipping.

***Cost**Right*

The CostRight Program will help you determine beforehand how cost effective the pre-assembly can be. Prices are agreed to up front at an industry competitive rate.

***Ship**Right*

The ShipRight Program evaluates current shipping requirements and offers "when-needed" and on time deliveries in an agreed upon manner. Bulk shipping and quantity requirements are considered under this program.

This is the total package

From the basic product through all of its custom/modified required changes, to the moment it arrives at your doorstep for installation into your application, AttaBox ModRight Program offers standard and custom assistance for your every need. To receive a quotation or further information, please visit us at AttaBox.com.

MADE IN
MICHIGAN
AttaBox
In-House Modifications

Heartland™ Series

Proven Protection From Reliable Material Performance In Aggressive Environments

The **Heartland** (AH) Series are high performance, polycarbonate enclosures applicable for heavy industrial conditions, but with a refined style suitable for commercial, industrial and OEM design applications.

The polycarbonate resin in the **Heartland** Series attained the best available "F1" rating, having passed critical tests for UV exposure and water immersion.

Heartland Series enclosures are rain-tight and watertight rated for use in both interior and exterior applications. Material ratings, as well as product ratings, assure the user that polycarbonate is designed to perform, without adverse affects, in cold weather applications.

Of significant protective value: corrosion-resistant polycarbonate can be effectively used across a wide range of aggressive environments.

HEARTLAND SERIES ATTRIBUTES

- Latches and hinges do not penetrate enclosure
- Easy to remove lid
- High performance inserts
- Integrated padlock hasp
- Flush-fit side mount swing panel and DIN rail system
- Molded in bosses
- Multi-directional mounting feet
- Available in standard opaque or clear cover options

HEARTLAND SERIES INDUSTRY STANDARDS

UL/cUL File #	E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4, 4X, 6P, 12
IEC 60529 Ratings	IP66, IP68
Temperature Range	(-20°F to +240°F) (-29°C to +115°C)
Flammability Rating	UL94-5VA, UL94-V0
Self Extinguishing	Non-halogenated, non-flame propagating
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

Heartland | Opaque (AH)

Heartland | Clear (AH_C)

Heartland | Opaque

HINGED, LATCHED, PADLOCKABLE

CONSTRUCTION

Material (Box & Cover)	Polycarbonate with UV inhibitors
Gasket Material	Neoprene rope style, Poured polyurethane seamless gasket on select sizes
Cover Screw Material	304 Stainless Steel
Mounting Bosses	Panel mounting capability for fixed rear panel
Back Panel Screw Size	#10-32x3/8
Metal Inserts	All threaded brass inserts accepting #10-32 screws
Cover Screw Size	#10-32 x 5/8
Cover Screw Torque	20-24 in.-lbs.
Mounting Feet Inserts	1/4-20x1/2
Mounting Feet Torque	14-16in.-lbs
Hinge and Latch Hardware	Polycarbonate with UV inhibitors
Side Mount Solutions	Variable height side mount capability

INDUSTRY STANDARDS

UL/cUL File #	E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4, 4X, 6P, 12
IEC 60529 Ratings	IP66, IP68
Temperature Range	(-20°F to +240°F) (-29°C to +115°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-halogenated, non-flame propagating
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BP__A	pg. 108
Carbon Steel	BP__CS	pg. 108
ABS	BP__ABS	pg. 108

ACCESSORIES

Swing Panel Mounts (4 per kit)	pg. 17
DIN Rail / DIN Rail Kit	pg. 17
Vents	pg. 104
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Cable Glands	pg. 106
Thermal Accessories	pg. 115
Thumb Screw Kit	pg. 17
Pole Mount Kit	pg. 17
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Heartland | Clear

HINGED, LATCHED, PADLOCKABLE

CONSTRUCTION

Material (Box & Cover)	Polycarbonate with UV inhibitors
Gasket Material	Neoprene rope style, Poured polyurethane seamless gasket on select sizes
Cover Screw Material	304 Stainless Steel
Mounting Bosses	Panel mounting capability for fixed rear panel
Back Panel Screw Size	#10-32x3/8
Metal Inserts	All threaded brass inserts accepting #10-32 screws
Cover Screw Size	#10-32 x 5/8
Cover Screw Torque	20-24 in.-lbs.
Mounting Feet Inserts	1/4-20x1/2
Mounting Feet Torque	14-16in.-lbs
Hinge and Latch Hardware	Polycarbonate with UV inhibitors
Side Mount Solutions	Variable height side mount capability

INDUSTRY STANDARDS

UL/cUL File #	E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4, 4X, 6P, 12
IEC 60529 Ratings	IP66, IP68
Temperature Range	(-20°F to +240°F) (-29°C to +115°C)
Flammability Rating	UL94-V0
Self Extinguishing	Non-halogenated, non-flame propagating
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BP__A	pg. 108
Carbon Steel	BP__CS	pg. 108
ABS	BP__ABS	pg. 108

ACCESSORIES

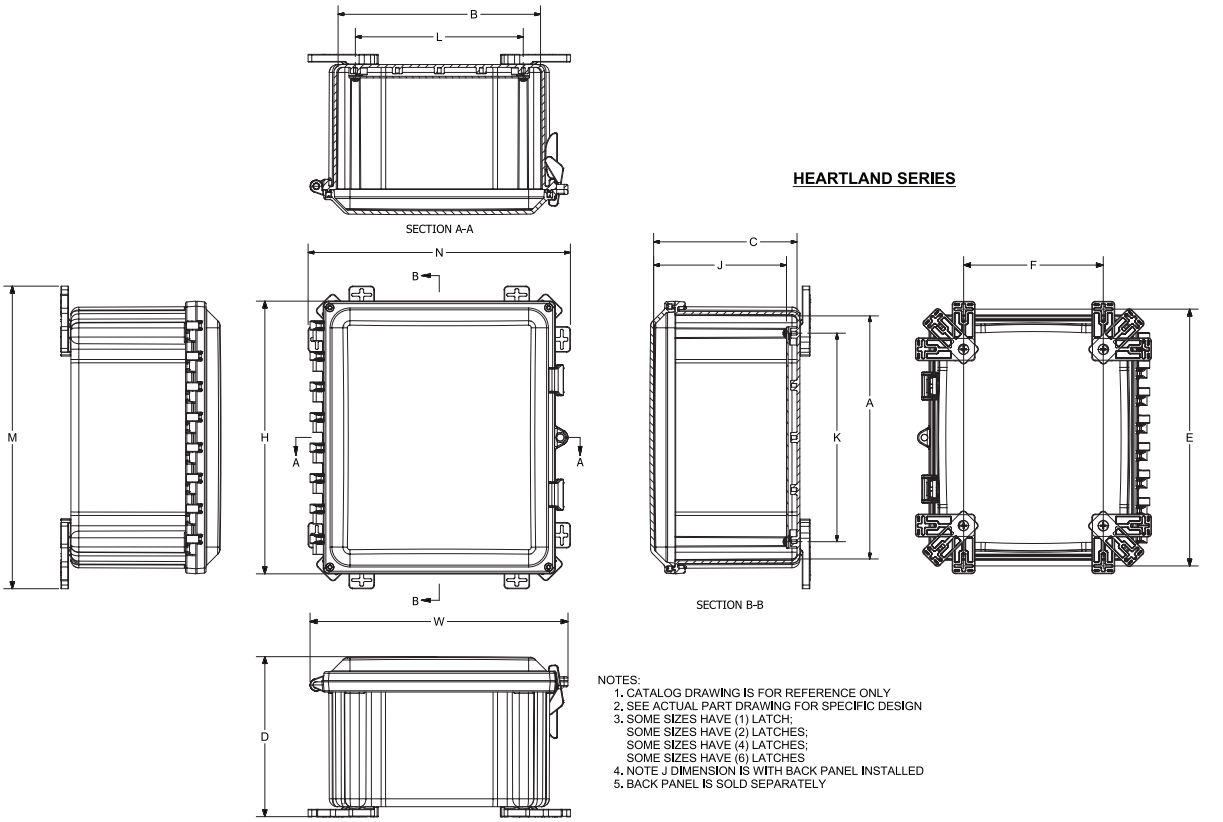
Swing Panel Mounts (4 per kit)	pg. 17
DIN Rail / DIN Rail Kit	pg. 17
Vents	pg. 104
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Cable Glands	pg. 106
Thermal Accessories	pg. 115
Thumb Screw Kit	pg. 17
Pole Mount Kit	pg. 17
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Heartland

TECHNICAL DRAWINGS / DIMENSIONS



NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. SOME SIZES HAVE (1) LATCH;
   SOME SIZES HAVE (2) LATCHES;
   SOME SIZES HAVE (4) LATCHES;
   SOME SIZES HAVE (6) LATCHES
4. NOTE J DIMENSION IS WITH BACK PANEL INSTALLED
5. BACK PANEL IS SOLD SEPARATELY

HEARTLAND SERIES DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING HOR. E X F	MOUNTING VER. E X F	MOUNTING 45 E X F	J	K	L	M	N	SHIPPING WEIGHT	PANEL NUMBER
AH664 **AH664C**	7.41 x 8.68 x 5.84 (188 x 223 x 148)	5.94 x 5.94 x 5.02 (151 x 151 x 127)	3.64 x 8.40 (93 x 213)	8.04 x 3.64 (204 x 93)	6.75 x 6.74 (171 x 171)	4.50 (114)	4.25 (108)	4.25 (108)	8.89 (226)	8.89 (226)	2.50 lbs.	BP66**
AH864 **AH864C**	9.41 x 8.68 x 5.86 (239 x 223 x 149)	7.97 x 5.97 x 5.07 (202 x 152 x 129)	5.64 x 8.04 (143 x 213)	10.04 x 3.64 (255 x 93)	8.76 x 6.75 (223 x 171)	4.56 (116)	6.25 (159)	4.25 (108)	10.89 (277)	8.89 (226)	3.19 lbs.	BP86**
AH884 **AH884C**	9.41 x 10.68 x 5.86 (239 x 271 x 149)	7.97 x 7.97 x 5.03 (202 x 202 x 128)	5.63 x 10.03 (143 x 255)	10.04 x 5.63 (255 x 143)	8.74 x 8.78 (222 x 223)	4.53 (115)	6.25 (159)	6.25 (159)	10.88 (277)	10.88 (277)	CF	BP88**
AH1084 **AH1084C**	11.41 x 10.68 x 6.36 (290 x 271 x 161)	9.96 x 7.96 x 5.57 (253 x 202 x 142)	7.64 x 10.04 (194 x 255)	12.04 x 5.64 (306 x 143)	10.76 x 8.75 (273 x 222)	5.05 (128)	8.25 (210)	6.25 (159)	12.89 (327)	10.89 (277)	4.31 lbs.	BP108**
AH1086 **AH1086C**	11.41 x 10.68 x 7.89 (209 x 271 x 200)	9.95 x 7.95 x 7.06 (253 x 202 x 179)	7.63 x 10.03 (194 x 255)	12.03 x 5.63 (306 x 143)	10.76 x 8.75 (273 x 222)	6.54 (166)	8.25 (210)	6.25 (159)	12.88 (327)	10.88 (277)	CF	BP108**
AH10106 **AH10106C**	11.41 x 12.68 x 6.97 (209 x 322 x 177)	9.95 x 9.95 x 6.15 (253 x 253 x 156)	7.63 x 12.03 (194 x 306)	12.03 x 7.63 (306 x 194)	10.76 x 10.75 (273 x 273)	5.65 (144)	8.25 (210)	8.25 (210)	12.88 (327)	12.88 (327)	CF	BP1010**
AH12106 **AH12106C**	13.40 x 12.68 x 7.86 (340 x 322 x 200)	11.95 x 9.95 x 7.07 (304 x 253 x 180)	9.64 x 12.04 (245 x 306)	14.04 x 7.64 (357 x 194)	12.76 x 10.75 (324 x 273)	6.56 (167)	10.25 (260)	8.25 (210)	14.89 (378)	12.89 (327)	6.19 lbs.	BP1210**
AH14126 **AH14126C**	15.40 x 14.68 x 7.86 (391 x 373 x 200)	13.95 x 11.95 x 7.07 (354 x 304 x 180)	11.64 x 14.04 (296 x 357)	16.04 x 9.64 (407 x 245)	14.76 x 12.75 (375 x 324)	6.56 (167)	12.25 (311)	10.25 (260)	16.89 (429)	14.89 (378)	7.99 lbs.	BP1412**
AH16148 **AH16148C**	17.65 x 16.68 x 9.98 (448 x 424 x 253)	15.93 x 13.93 x 9.20 (405 x 354 x 234)	13.64 x 16.04 (347 x 407)	18.04 x 11.64 (458 x 296)	16.76 x 14.75 (426 x 375)	8.68 (220)	14.25 (362)	12.25 (311)	18.89 (480)	16.89 (429)	10.00 lbs.	BP1614**
AH181610 **AH181610C**	19.41 x 18.68 x 11.90 (493 x 474 x 302)	17.83 x 15.83 x 11.08 (453 x 402 x 281)	15.64 x 18.04 (397 x 458)	20.04 x 13.64 (509 x 347)	18.75 x 16.74 (476 x 425)	10.56 (268)	16.25 (413)	14.25 (362)	20.89 (531)	18.89 (480)	11.25 lbs.	BP1816**
AH18164 **AH181614C**	19.41 x 18.68 x 5.41 (493 x 474 x 137)	18.16 x 16.16 x 5.08 (461 x 410 x 129)	N/A	20.50 x 13.50 (521 x 343)	N/A	4.56 (116)	16.25 (413)	14.25 (362)	21.75 (552)	N/A	CF	BP1816**
AH20168 **AH20168C**	21.41 x 18.68 x 9.97 (544 x 474 x 253)	19.86 x 15.86 x 9.15 (504 x 403 x 232)	18.75 x 19.17 (476 x 487)	23.15 x 14.75 (588 x 375)	21.91 x 17.87 (557 x 454)	8.65 (220)	18.25 (464)	14.25 (362)	24.00 (610)	20.02 (509)	CF	BP2016**
AH242410 **AH242410C**	25.41 x 26.68 x 11.41 (645 x 678 x 290)	23.91 x 23.91 x 11.88 (607 x 607 x 302)	N/A	25.69 x 18.00 (653 x 457)	N/A	10.56 (268)	22.25 (565)	22.25 (565)	26.69 (678)	21.86 (555)	CF	BP2424**

All measures are in inches, items in parentheses are in millimeters.
** AH18164 size does not exhibit same mounting foot design. Mounting feet are molded into the box rather than installed separately.*
*** Panel sold separately*

Heartland

ACCESSORIES

Includes mounts, screws and panel.

ALUMINUM SWING PANEL KITS

CATALOG NUMBER	FITS
AH66SPK	6 x 6
AH86SPK	8 x 6
AH88SPK	8 x 8
AH108SPK	10 x 8
AH1010SPK	10 x 10
AH1210SPK	12 x 10
AH1412SPK	14 x 12
AH1614SPK	16 x 14
AH1816SPK	18 x 16
AH2016SPK	20 x 16
AH2424SPK	24 x 24

ABS SWING PANEL KITS

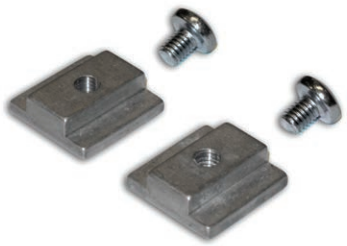
CATALOG NUMBER	FITS
AH66SPABS	6 x 6
AH86SPABS	8 x 6
AH88SPABS	8 x 8
AH108SPABS	10 x 8
AH1010SPABS	10 x 10
AH1210SPABS	12 x 10
AH1412SPABS	14 x 12
AH1614SPABS	16 x 14
AH1816SPABS	18 x 16
AH2016SPABS	20 x 16
AH2424SPABS	24 x 24

DIN RAILS

CATALOG NUMBER	FITS	DESCRIPTION
AH6DRK	6”	Kit Includes a DIN rail that fits size indicated, plus two custom slot nuts, and two thread forming screws used for mounting to back of enclosure.
AH8DRK	8”	
AH10DRK	10”	
AH12DRK	12”	
AH14DRK	14”	
AH16DRK	16”	
AH18DRK	18”	
AH20DRK	20”	
AH24DRK	24”	
AH6DR	6”	Kit Includes a DIN rail that fits size indicated, plus two tribolar screws.
AH8DR	8”	
AH10DR	10”	
AH12DR	12”	
AH14DR	14”	
AH16DR	16”	
AH18DR	18”	
AH20DR	20”	
AH24DR	24”	

ACCESSORIES

CATALOG NUMBER	DESCRIPTION
AHSNK	Slot Nut Kit (includes two nuts & two screws)
AHSPMK	Swing Panel Mounts (4 per kit)
AHLK	Latch Kit (2 latches per kit) - replacement only
AHAK	Accessory Kit (includes all screws, inserts and mounting feet) - replacement only
AHTSKSS	Kit includes two stainless steel thumb screws, and two plastic backers.
AHTSKAL	Kit includes two aluminum thumb screws, and two plastic backers.



AHSNK

AHSPMK

AHLK

AHAK

Commander™ Series

Proven Protection From A Complete Environmental Seal

FIBERGLASS OPTION:
Commander (CO) Series slim-line enclosures are designed from fiberglass-reinforced polyester and feature a continuous polyurethane gasket that provides the critically reliable, long-term protection of a complete environmental seal.

POLYCARBONATE OPTION:
The Commander Series offers an all-polycarbonate product with blank covers and a choice of one-or-two-hole pushbutton openings for both 22mm and 30mm hardware. These enclosures include the external flush wall design, unobstructed sidewalls internally, polymer cover screws, watertight seal and other standard features of the Commander Series.

Commander Series enclosures, in a full range of sizes, are ideal for compact or portable control or simply as a small junction box.

Commander Series Fiberglass Enclosures are available in two cover versions:
The first style is a flush cover for unobstructed enclosure sides and a continuous cover gasket producing a watertight seal. Attributes include soft, rounded edges and virtually no pocket areas to trap dust or debris. These enclosures feature a mounting foot option versus bosses for a mounted back panel.

The second style offers a lift-off overhang cover design with molded-in panel mount inserts.

Both versions of the Commander Series enclosures feature a slim style with flush sidewalls. Both also include captive stainless steel cover screws.

COMMANDER SERIES ATTRIBUTES

- Memory retaining continuous polyurethane gasket
- Captive stainless steel cover screws on fiberglass option
- Captive polymer cover screws on polycarbonate option
- Chemically resistant fiberglass reinforced polyester or polycarbonate
- Submersible, non corrosive, environmental design
- High impact resistance

COMMANDER SERIES INDUSTRY STANDARDS

UL/cUL File #	E64358 / E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
CSA Std. C22.2 File #	LR069014 (Fiberglass only)
IEC 60529 Ratings	IP66, IP67, IP68
UL 1741 File #	E333478 (Fiberglass only)
Temperature Range (Fiberglass)	(-76°F to +274°F) (-60°C to +134°C)
Temperature Range (Polycarbonate)	(-20°F to +240°F) (-29°C to +115°C)
Flammability Rating	UL94-5V
Self extinguishing	Non-halogenated, non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	cULus, CSA, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Plenum Space Rating (UL 2043)	Yes (Fiberglass only)
Chemical Resistance	See chart on page 120

Commander (CO)

BLANK

BLANK

22MM IN-LINE

30MM IN-LINE

30MM MULTI-HOLE

POLYCARBONATE

Commander | Fiberglass | Blank

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Hot compression molded fiberglass reinforced polyester (thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Recessed captive 304 stainless steel
Cover Screw Size	#10-24 x 3/4
Cover Screw Torque	20-24 in.-lbs.
Enclosure mounting	Mounting wells located under the cover/outside the gasket area
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
CSA Std. C22.2 File #	1, 3R, 4X, 6P, 12 per CSA File# LR069014
IEC 60529 Ratings	IP66, IP67, IP68 per UL file# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self extinguishing	Non-halogenated, non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	cULus, CSA, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Plenum Space Rating (UL 2043)	Yes
Chemical Resistance	See chart on page 120

ACCESSORIES

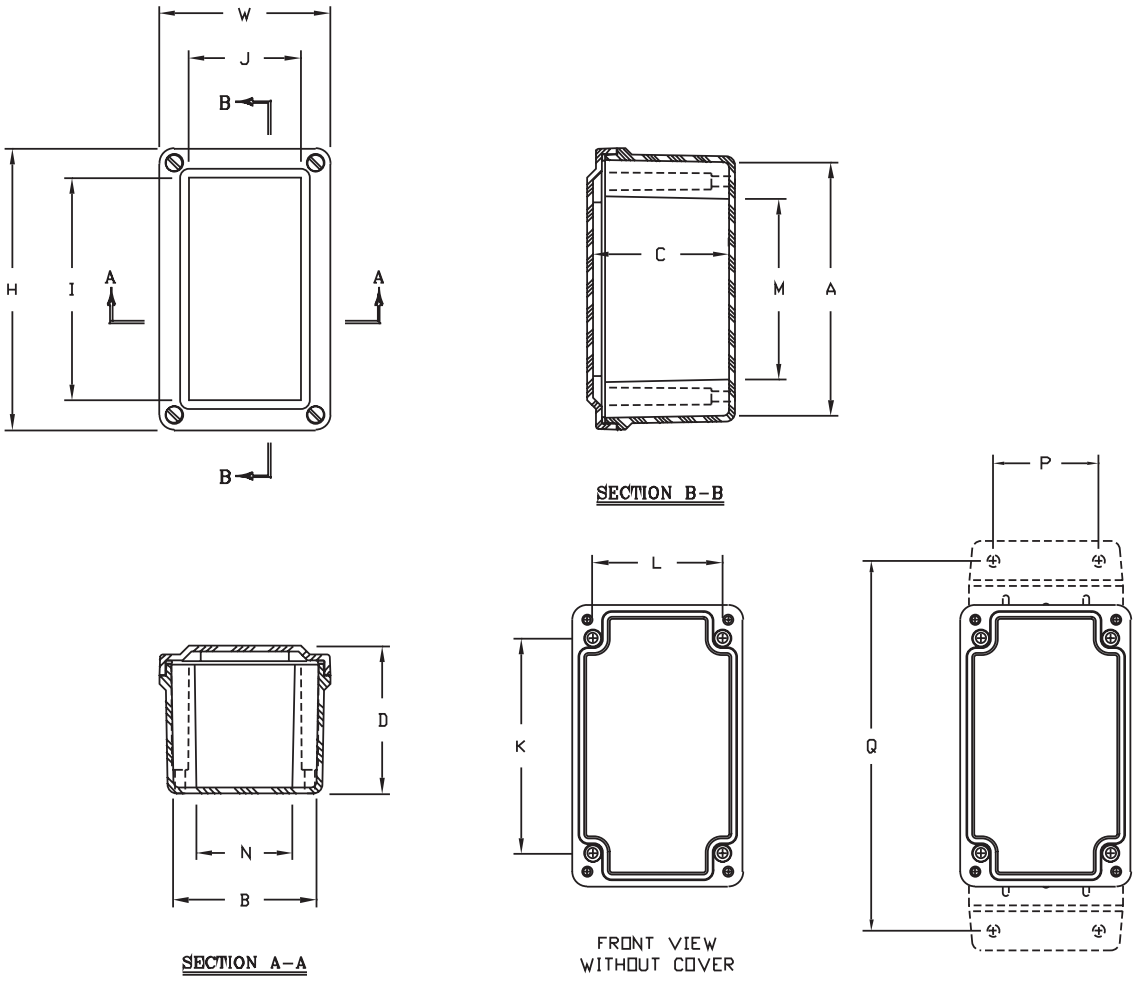
Accessory Kit (Screws)	pg. 104
Mounting Feet	COMTGFTKIT
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Commander | Fiberglass | Blank

TECHNICAL DRAWINGS / DIMENSIONS



COMMANDER SERIES FIBERGLASS BLANK CONFIGURATION DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	I	J	K	L	M	N	P	Q	SHIPPING WEIGHT
***CO332**	3.72 x 3.63 x 2.95 (95 x 92 x 75)	3.13 x 3.03 x 2.70 (79 x 77 x 69)	0 (0)	0 (0)	2.31 (59)	2.75 (70)	1.59 (40)	2.03 (52)	2.2 (56)	4.4 (112)	0.9 lbs.
CO532	5.97 x 3.63 x 3.14 (152 x 92 x 80)	5.38 x 3.03 x 2.87 (137 x 77 x 73)	4.72 (120)	2.38 (61)	4.56 (116)	2.75 (70)	3.84 (98)	2.03 (52)	2.2 (56)	6.7 (169)	1.2 lbs.
CO644	6.63 x 3.81 x 3.89 (168 x 97 x 99)	6.00 x 3.19 x 3.63 (153 x 81 x 92)	5.31 (135)	2.50 (64)	4.88 (124)	2.94 (75)	4.13 (105)	2.19 (56)	2.2 (56)	7.3 (186)	1.5 lbs.
CO832	8.41 x 3.63 x 3.14 (214 x 92 x 80)	7.82 x 3.03 x 2.87 (199 x 77 x 73)	7.16 (182)	2.38 (60)	7.00 (178)	2.75 (70)	6.28 (160)	2.03 (52)	2.2 (56)	9.1 (231)	1.5 lbs.
CO844	8.88 x 3.81 x 3.89 (225 x 97 x 99)	8.26 x 3.19 x 3.63 (210 x 81 x 92)	7.56 (192)	2.50 (64)	7.13 (181)	2.94 (75)	6.38 (162)	2.19 (56)	2.2 (56)	9.6 (243)	1.8 lbs.
CO932	9.35 x 3.63 x 3.14 (237 x 92 x 80)	8.75 x 3.03 x 2.87 (222 x 77 x 73)	8.10 (206)	2.38 (60)	7.94 (202)	2.75 (70)	7.22 (183)	2.03 (52)	2.2 (56)	10.1 (256)	1.6 lbs.
CO1144	11.13 x 3.81 x 3.89 (283 x 97 x 99)	10.51 x 3.19 x 3.63 (267 x 81 x 92)	9.81 (249)	2.50 (64)	9.37 (238)	2.94 (75)	8.63 (219)	2.19 (56)	2.2 (56)	11.8 (300)	2.1 lbs.
CO1432	13.78 x 3.63 x 3.14 (350 x 92 x 80)	13.19 x 3.03 x 2.87 (335 x 77 x 73)	12.53 (318)	2.38 (60)	12.37 (314)	2.75 (70)	11.66 (296)	2.03 (52)	2.2 (56)	14.5 (368)	2.1 lbs.
CO1732	17.35 x 3.63 x 3.14 (441 x 92 x 80)	16.75 x 3.03 x 2.87 (426 x 77 x 73)	16.10 (409)	2.38 (60)	15.94 (405)	2.75 (70)	15.22 (387)	2.03 (52)	2.2 (56)	18 (458)	2.8 lbs.

**Flat Cover*
All measures are in inches, items in parentheses are in millimeters

Commander | Fiberglass | Blank

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Hot compression molded fiberglass reinforced polyester (thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Recessed captive 304 stainless steel
Cover Screw Size	#10-24 x 3/4
Cover Screw Torque	20-24 in.-lbs.
Enclosure mounting	Mounting wells located under the cover/outside the gasket area
Back Panel Screw Size	#10-32x3/8
Panel Mounting	Raised bosses with brass inserts accepting #10-32x3/8 screws for optional panel mounting
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
CSA Std. C22.2 File #	1, 3R, 4X, 6P, 12 per CSA File# LR069014
IEC 60529 Ratings	IP66, IP67, IP68 per UL file# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self extinguishing	Non-halogenated, non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	cULus, CSA, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Plenum Space Rating (UL 2043)	Yes
Chemical Resistance	See chart on page 120

ACCESSORIES

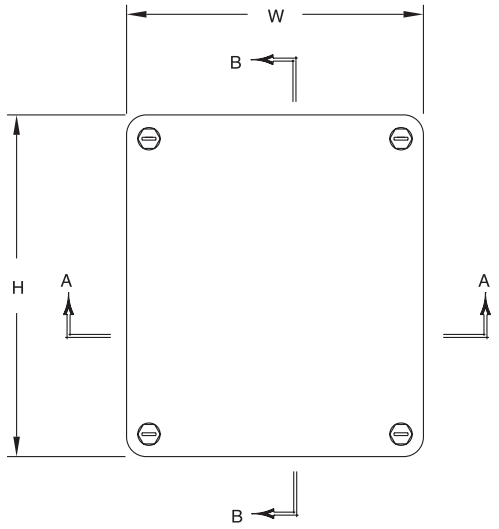
Aluminum Back Panel	BP_A	pg. 108
Carbon Steel Back Panel	BP_CS	pg. 108
All Other Accessories		Pg. 102-117

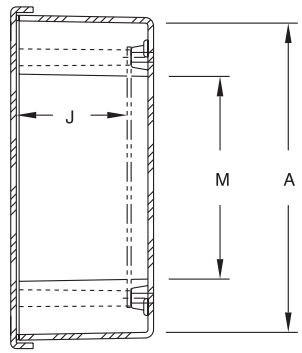
MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

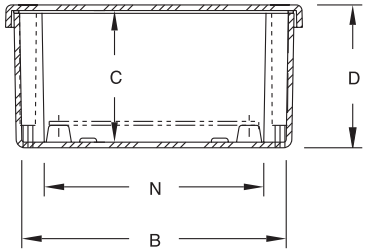
Commander | Fiberglass | Blank

TECHNICAL DRAWINGS / DIMENSIONS

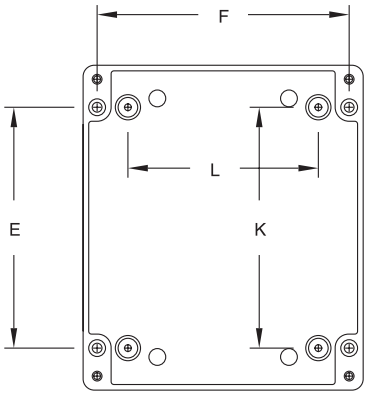




SECTION B-B



SECTION A-A



FRONT VIEW
WITHOUT COVER

COMMANDER SERIES FIBERGLASS BLANK CONFIGURATION DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	M	N	SHIPPING WEIGHT	PANEL NUMBER
CO763	7.63 x 6.63 x 3.19 (194 x 168 x 81)	6.90 x 5.90 x 2.88 (175 x 150 x 73)	5.37 x 5.63 (137 x 143)	2.48 (63)	5.37 (137)	4.25 (108)	4.52 (115)	4.9 (124)	2.5 lbs.	BP76*
CO963	9.87 x 6.63 x 3.19 (251 x 168 x 81)	9.15 x 5.90 x 2.88 (232 x 150 x 73)	7.62 x 5.63 (194 x 143)	2.48 (63)	7.62 (194)	4.25 (108)	6.77 (172)	4.9 (124)	2.6 lbs.	BP96*

**Panel ordered separately*
All measures are in inches, items in parentheses are in millimeters

Commander | Fiberglass | 30mm In-Line Configuration

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Hot compression molded fiberglass reinforced polyester (thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Recessed captive 304 stainless steel
Cover Screw Size	#10-24 x 3/4
Cover Screw Torque	20-24 in.-lbs.
Enclosure mounting	Mounting wells located under the cover/outside the gasket area
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
CSA Std. C22.2 File #	1, 3R, 4X, 6P, 12 per CSA File# LR069014
IEC 60529 Ratings	IP66, IP67, IP68 per UL file# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self extinguishing	Non-halogenated, non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	cULus, CSA, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Plenum Space Rating (UL 2043)	Yes
Chemical Resistance	See chart on page 120

ACCESSORIES

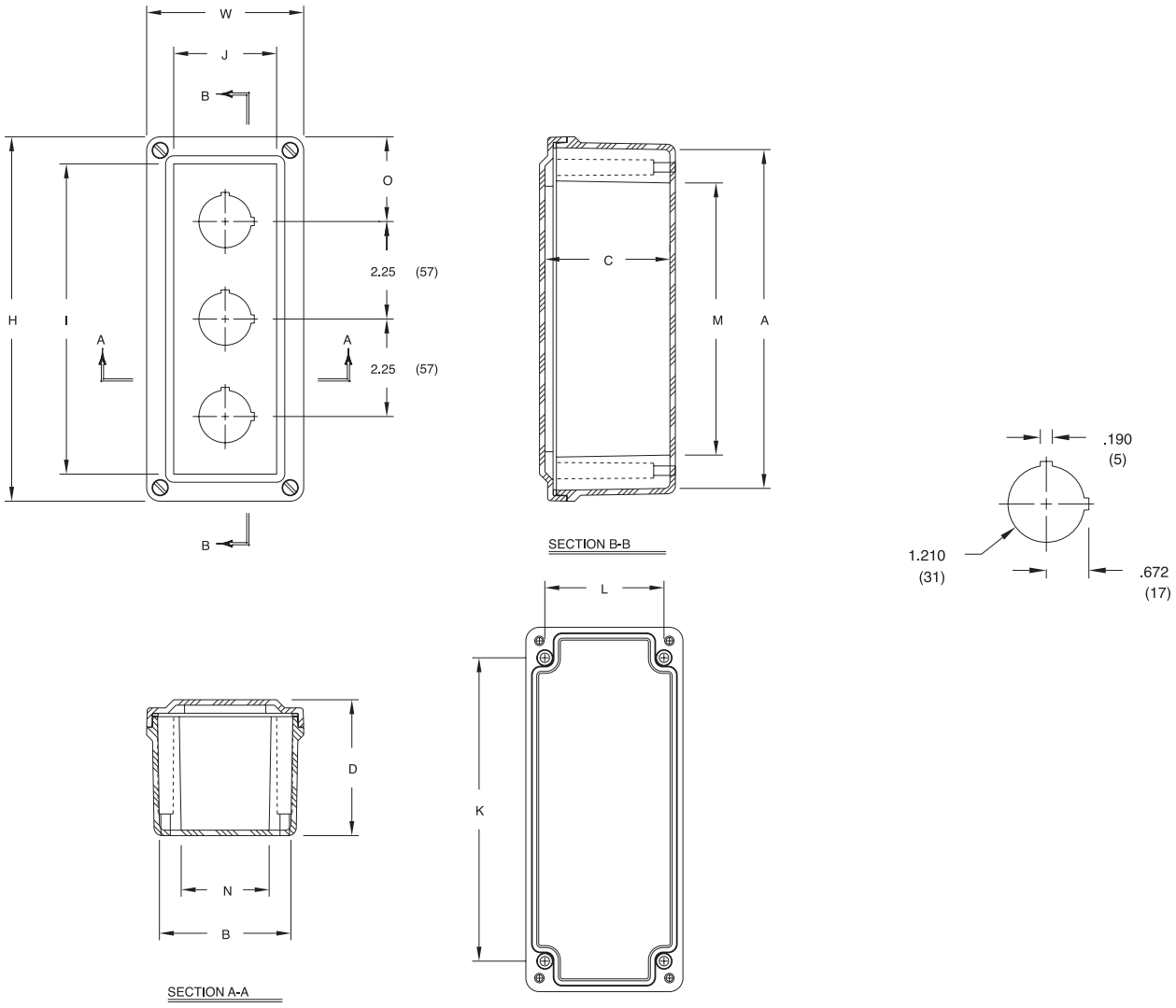
Accessory Kit (Screws)	pg. 104
Mounting Feet	COMTGFTKIT
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Commander | Fiberglass | 30mm In-Line Configuration

TECHNICAL DRAWINGS / DIMENSIONS



COMMANDER SERIES FIBERGLASS 30mm IN-LINE CONFIGURATION DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	I	J	K	L	M	N	O	SHIPPING WEIGHT
CO1PB	6.63 x 3.81 x 3.89 (168 x 97 x 99)	6.00 x 3.19 x 3.63 (153 x 81 x 92)	5.31 (135)	2.5 (64)	4.88 (124)	2.94 (75)	4.13 (105)	2.19 (56)	3.31 (84)	1.5 lbs.
CO2PB	6.63 x 3.81 x 3.89 (168 x 97 x 99)	6.00 x 3.19 x 3.63 (153 x 81 x 92)	5.31 (135)	2.5 (64)	4.88 (124)	2.94 (75)	4.13 (105)	2.19 (56)	2.19 (56)	1.5 lbs.
CO3PB	8.88 x 3.81 x 3.89 (225 x 97 x 99)	8.26 x 3.19 x 3.63 (210 x 81 x 92)	7.56 (192)	2.5 (64)	7.13 (181)	2.94 (75)	6.38 (162)	2.19 (56)	2.19 (56)	1.8 lbs.
CO4PB	11.13 x 3.81 x 3.89 (283 x 97 x 99)	10.51 x 3.19 x 3.63 (267 x 81 x 92)	9.81 (249)	2.5 (64)	9.37 (238)	2.94 (75)	8.63 (219)	2.19 (56)	2.19 (56)	2.0 lbs.
CO5PB	13.78 x 3.63 x 3.14 (350 x 92 x 80)	13.19 x 3.03 x 2.87 (335 x 77 x 73)	12.53 (318)	2.38 (60)	12.37 (314)	2.75 (70)	11.66 (296)	2.03 (52)	2.39 (61)	2.1 lbs.
CO6PB	17.35 x 3.63 x 3.14 (441 x 92 x 80)	16.75 x 3.03 x 2.87 (426 x 77 x 73)	16.1 (409)	2.38 (60)	15.94 (405)	2.75 (70)	15.22 (387)	2.03 (52)	3.05 (77)	3.0 lbs.

All measures are in inches, items in parentheses are in millimeters.
Note: Shown CO3PB for Reference.

Commander | Fiberglass | 22mm In-Line Configuration

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Hot compression molded fiberglass reinforced polyester (thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Recessed captive 304 stainless steel
Cover Screw Size	#10-24 x 3/4
Cover Screw Torque	20-24 in.-lbs.
Enclosure mounting	Mounting wells located under the cover/outside the gasket area
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
CSA Std. C22.2 File #	1, 3R, 4X, 6P, 12 per CSA File# LR069014
IEC 60529 Ratings	IP66, IP67, IP68 per UL file# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self extinguishing	Non-halogenated, non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	cULus, CSA, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Plenum Space Rating (UL 2043)	Yes
Chemical Resistance	See chart on page 120

ACCESSORIES

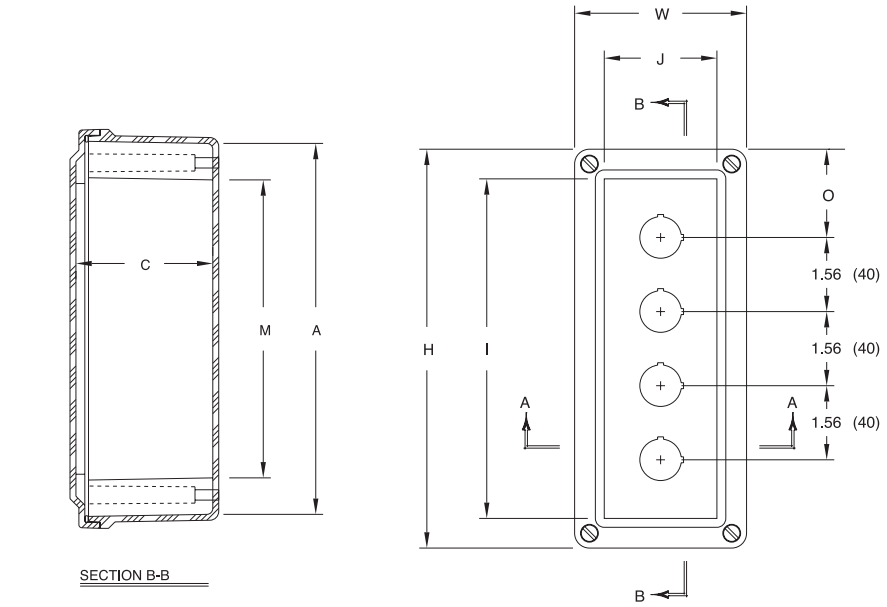
Accessory Kit (Screws)	pg. 104
Mounting Feet	COMTGFTKIT
All Other Accessories	Pg. 102-117

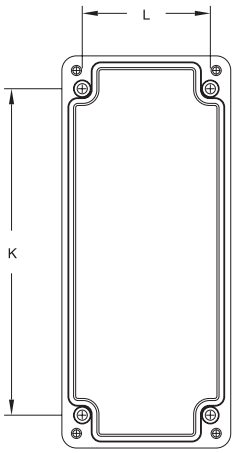
MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

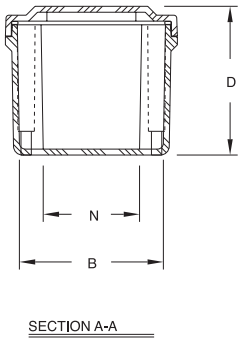
Commander | Fiberglass | 22mm In-Line Configuration

TECHNICAL DRAWINGS / DIMENSIONS

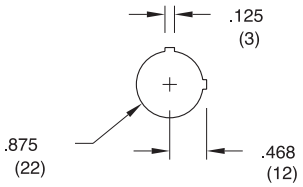




FRONT VIEW
WITHOUT COVER



SECTION A-A



COMMANDER SERIES FIBERGLASS 22mm IN-LINE CONFIGURATION DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	I	J	K	L	M	N	O	SHIPPING WEIGHT
CO1PB22	6.63 x 3.81 x 3.89 (168 x 97 x 99)	6.00 x 3.19 x 3.63 (153 x 81 x 92)	5.31 (135)	2.5 (64)	4.88 (124)	2.94 (75)	4.13 (105)	2.19 (56)	3.31 (84)	1.6 lbs.
CO2PB22	6.63 x 3.81 x 3.89 (168 x 97 x 99)	6.00 x 3.19 x 3.63 (153 x 81 x 92)	5.31 (135)	2.5 (64)	4.88 (124)	2.94 (75)	4.13 (105)	2.19 (56)	2.53 (64)	1.6 lbs.
CO3PB22	6.63 x 3.81 x 3.89 (168 x 97 x 99)	6.00 x 3.19 x 3.63 (153 x 81 x 92)	5.31 (135)	2.5 (64)	4.88 (124)	2.94 (75)	4.13 (105)	2.19 (56)	1.75 (44)	1.6 lbs.
CO4PB22	8.88 x 3.81 x 3.89 (225 x 97 x 99)	8.26 x 3.19 x 3.63 (210 x 81 x 92)	7.56 (192)	2.5 (64)	7.13 (181)	2.94 (75)	6.38 (162)	2.19 (56)	2.09 (53)	1.8 lbs.
CO5PB22	11.13 x 3.81 x 3.89 (283 x 97 x 99)	10.51 x 3.19 x 3.63 (267 x 81 x 92)	9.81 (249)	2.5 (64)	9.37 (238)	2.94 (75)	8.63 (219)	2.19 (56)	2.44 (62)	2.1 lbs.
CO6PB22	11.13 x 3.81 x 3.89 (283 x 97 x 99)	10.51 x 3.19 x 3.63 (267 x 81 x 92)	9.81 (249)	2.5 (64)	9.37 (238)	2.94 (75)	8.63 (219)	2.19 (56)	1.66 (42)	2.1 lbs.

All measures are in inches, items in parentheses are in millimeters.
Note: Shown CO4PB22 for Reference.

Commander | Fiberglass | 30mm Multi-Hole Configuration

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Hot compression molded fiberglass reinforced polyester (thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Recessed captive 304 stainless steel
Cover Screw Size	#10-24 x 3/4
Cover Screw Torque	20-24 in.-lbs.
Stainless Steel Hardware	300 series stainless steel used on all external hardware
Cover Retention	Stainless steel beaded cover retention chain
Back Panel Screw Size	#10-32x3/8
Panel Mounting	Raised bosses with brass inserts accepting #10-32x3/8 screws for optional panel mounting
Mounting Feet	Integral Mounting Flange
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
CSA Std. C22.2 File #	1, 3R, 4X, 6P, 12 per CSA File# LR069014
IEC 60529 Ratings	IP66, IP67, IP68 per UL file# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self extinguishing	Non-halogenated, non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	cULus, CSA, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Plenum Space Rating (UL 2043)	Yes
Chemical Resistance	See chart on page 120

ACCESSORIES

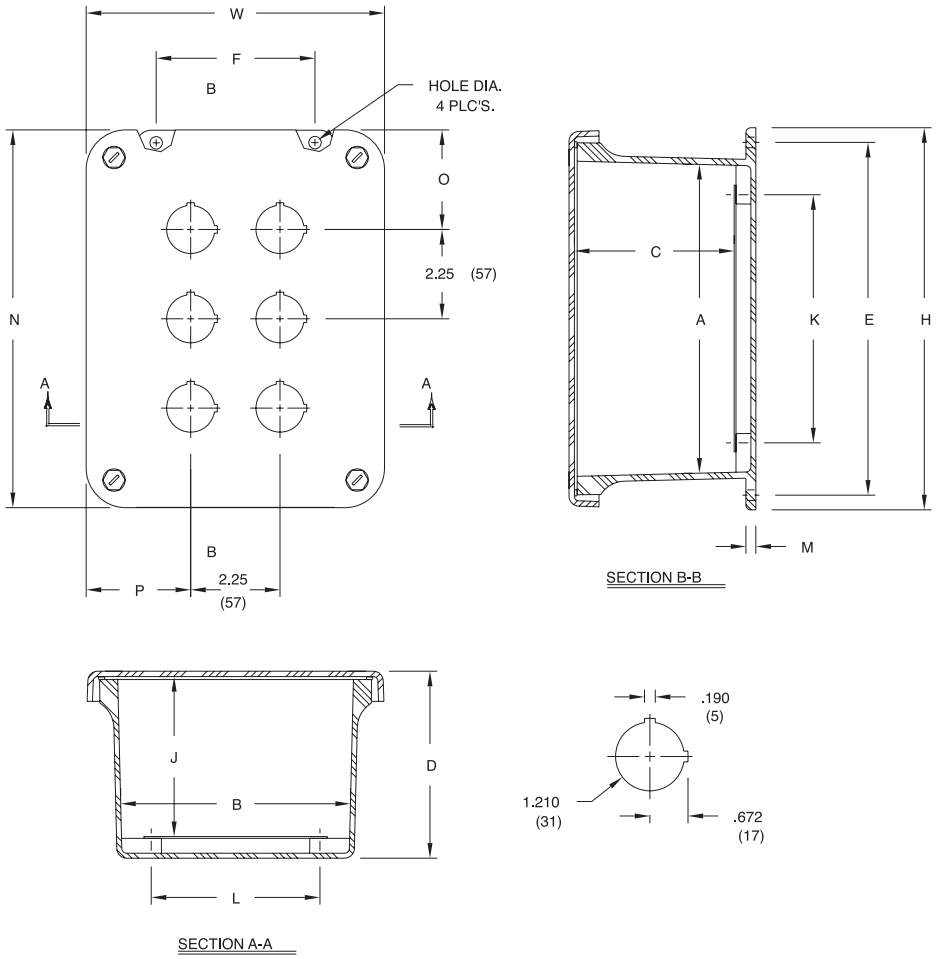
Aluminum Back Panel	BP_A	pg. 108
Carbon Steel Back Panel	BP_CS	pg. 108
Accessory Kit (Screws)		pg. 104
All Other Accessories		Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11
EMI/RFI Shielding	pg. 10-11

Commander | Fiberglass | 30mm Multi-Hole Configuration

TECHNICAL DRAWINGS / DIMENSIONS



COMMANDER SERIES FIBERGLASS 30mm MULTI-HOLE CONFIGURATION DIMENSIONS

CATALOG NUMBER	HOLE CONFIG.	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	M	N	O	P	HOLE DIA.	SHIPPING WT.	PANEL NUMBER
CO4PBW	2 x 2	7.50 x 7.50 x 4.75 (191 x 191 x 121)	5.72 x 5.72 x 4.45 (145 x 145 x 113)	6.75 x 4.00 (171 x 101)	4.00 (101)	4.25 (108)	4.25 (108)	0.25 (6)	7.52 (191)	2.64 (67)	2.64 (67)	0.31 (8)	2.7 lbs.	BP66*
CO6PBW	3 x 2	9.62 x 7.50 x 4.74 (244 x 191 x 121)	7.73 x 5.74 x 4.45 (196 x 146 x 113)	8.88 x 4.00 (225 x 101)	4.00 (101)	6.25 (159)	4.25 (108)	0.25 (6)	9.5 (242)	2.64 (67)	2.51 (64)	0.31 (8)	3.5 lbs.	BP86*
CO9PBW	3 x 3	11.62 x 9.41 x 4.25 (295 x 239 x 108)	9.73 x 7.73 x 3.98 (247 x 196 x 101)	10.75 x 6.00 (273 x 152)	3.50 (89)	8.25 (209)	6.25 (159)	0.25 (6)	11.35 (288)	3.43 (87)	2.45 (62)	0.31 (8)	5.0 lbs.	BP108*

All measures are in inches, items in parentheses are in millimeters.
Note: Shown CO6PBW for Reference.
** Panel ordered separately.*

Commander | Polycarbonate

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Polycarbonate with UV inhibitors
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Custom polycarbonate screw
Cover Screw Size	Custom screw size
Cover Screw Torque	16 in.-lbs
Enclosure Mounting	Mounting wells located under the cover/outside the gasket area
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4X, 6P, 12
IEC 60529 Ratings	IP66, IP67, IP68
Temperature Range	(-20°F to +240°F) (-29°C to +115°C)
Flammability Rating	UL94-5VA
Certifications	cULus, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

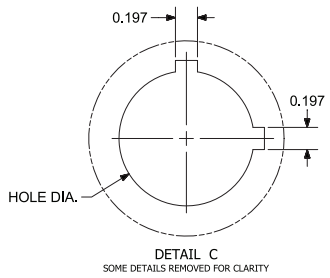
Accessory Kit (Screws)	pg. 104
All Other Accessories	Pg. 102-117

MODIFICATIONS

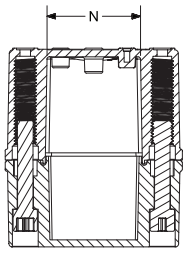
Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11
EMI/RFI Shielding	pg. 10-11

Commander | Polycarbonate

TECHNICAL DRAWINGS / DIMENSIONS

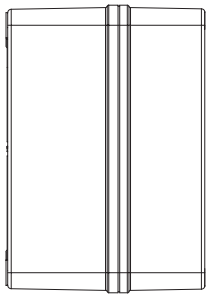


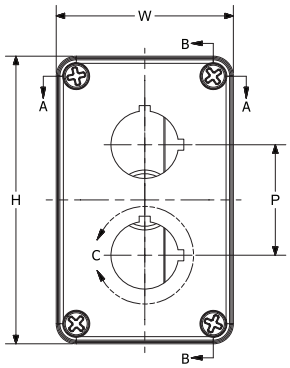
DETAIL C
SOME DETAILS REMOVED FOR CLARITY

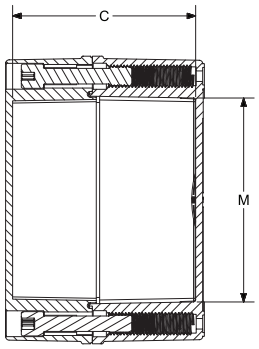


SECTION A-A

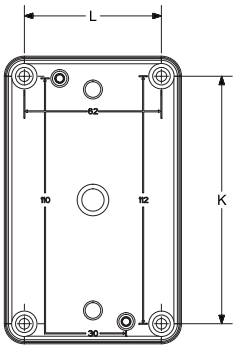
COMMANDER SERIES
POLYCARBONATE

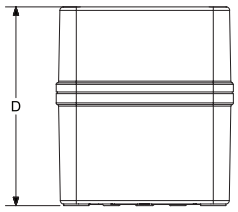


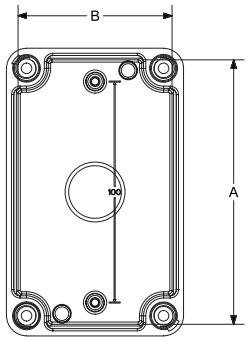




SECTION B-B







BOX DETAIL
FRONT VIEW

NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. COVER OPTIONS:
   -BLANK - NO HOLES
   -1PB - (1) 30 mm DIA. HOLE
   -2PB - (2) 30 mm DIA. HOLES
   -1PB22 - (1) 22 mm DIA. HOLE
   -2PB22 - (2) 22 mm DIA. HOLES

COMMANDER SERIES POLYCARBONATE DIMENSIONS

CATALOG NUMBER	HOLE CONFIG.	OVERALL H X W X D	INSIDE A X B X C	K	L	M	N	P	HOLE DIA.	SHIPPING WT.
COPC432	Blank	4.34 x 3.16 x 2.79 (110 x 80 x 71)	3.92 x 2.74 x 2.51 (100 x 70 x 64)	3.62 (92)	2.44 (62)	2.85 (72)	1.66 (42)	N/A	N/A	CF
COPC533	Blank	5.12 x 3.16 x 3.54 (130 x 80 x 90)	4.71 x 2.74 x 3.26 (120 x 70 x 83)	4.41 (112)	2.44 (62)	3.63 (92)	1.66 (42)	N/A	N/A	CF
COPC1PB	1	4.34 x 3.16 x 2.79 (110 x 80 x 71)	3.92 x 2.74 x 2.51 (100 x 70 x 64)	3.62 (92)	2.44 (62)	2.85 (72)	1.66 (42)	N/A	1.20 (31)	CF
COPC2PB	2	5.12 x 3.16 x 3.54 (130 x 80 x 90)	4.71 x 2.74 x 3.26 (120 x 70 x 83)	4.41 (112)	2.44 (62)	3.63 (92)	1.66 (42)	1.97 (50)	1.20 (31)	CF
COPC1PB22	1	4.34 x 3.16 x 2.79 (110 x 80 x 71)	3.92 x 2.74 x 2.51 (100 x 70 x 64)	3.62 (92)	2.44 (62)	2.85 (72)	1.66 (42)	N/A	0.89 (23)	CF
COPC2PB22	2	5.12 x 3.16 x 3.54 (130 x 80 x 90)	4.71 x 2.74 x 3.26 (120 x 70 x 83)	4.41 (112)	2.44 (62)	3.63 (92)	1.66 (42)	1.97 (50)	0.89 (23)	CF

All measures are in inches, items in parentheses are in millimeters.
Note: Shown CO6PBW for Reference.
** Panel ordered separately.*

BantamBox™ Series

Proven Protection When "Small Is A Big Advantage!"

BantamBox is a polycarbonate enclosure series in either opaque (BB) screw cover or clear (BBCC) screw cover versions.

The flush sides of the enclosure make it a sought-after OEM design product. Raised bosses accommodate back panel mounting and are successfully used for remote sensor mounting and small electronic controls in any environment.

These modular enclosures offer a broad range of 72 sizes and are ideal as project boxes in both their opaque and clear forms.

BANTAMBOX SERIES ATTRIBUTES

- Available in 2 cover options
  1. Opaque Cover
  2. Clear Cover
- Multiple depths available in most sizes
- Resistant to harsh environments
- Flush sides for that perfect fit
- Multiple molded in bosses for a variety of mounting solutions

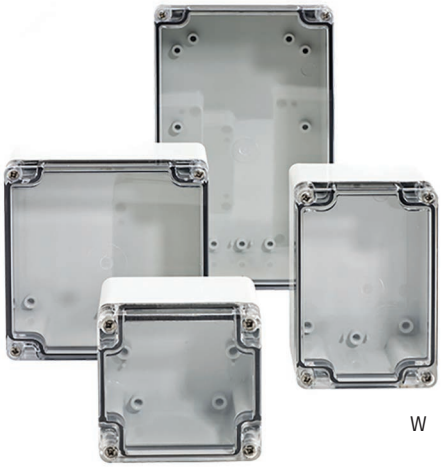
BANTAMBOX SERIES INDUSTRY STANDARDS

UL/cUL File #	E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4, 4X, 12
IEC 60529 Ratings	IP66 Per UL File# E362920
Temperature Range	(-40°F to +212°F) (-40°C to +100°C)
Flammability Rating	UL94-V2
Self Extinguishing	Non-Halogenated
Certifications	cULus, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

BantamBox | Opaque Cover (BB)

W

BantamBox | Clear Cover (BBCC)



W

BantamBox | Opaque Cover | W

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	304 Stainless Steel
Cover Screw Size	Various
Cover Screw Torque	M4: 9 - 17 in.-lbs., M6: 17-22 in.-lbs.

INDUSTRY STANDARDS

UL/cUL File #	E319779 Per UL File# E362920
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-40°F to +212°F) (-40°C to +100°C)
Flammability Rating	UL94-V2
Self Extinguishing	Non-Halogenated
Certifications	cULus, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

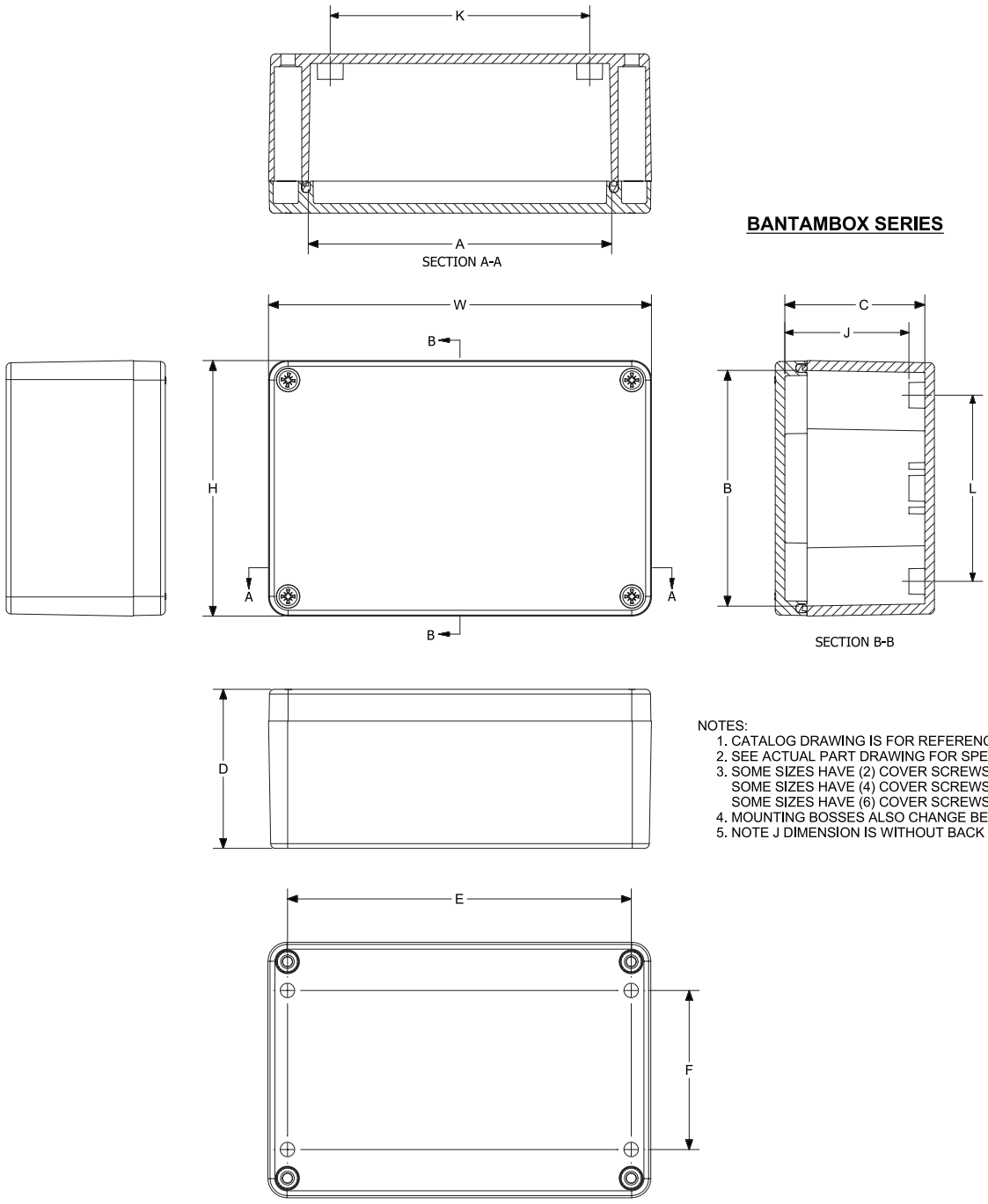
ACCESSORIES

BACK PANELS

Phenolic Resin Hard Paper Back Panel	BPB__P	pg. 110
All Other Accessories		Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11



NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. SOME SIZES HAVE (2) COVER SCREWS;
   SOME SIZES HAVE (4) COVER SCREWS;
   SOME SIZES HAVE (6) COVER SCREWS
4. MOUNTING BOSSES ALSO CHANGE BETWEEN PARTS
5. NOTE J DIMENSION IS WITHOUT BACK PANEL INSTALLED

BantamBox | Opaque Cover | W

DIMENSIONS

PART NUMBER	"OVERALL W X H X D"	"INSIDE A X B X C"	"MOUNTING E X F"	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
BB050504W	2.05 x 1.97 x 1.38 (52 x 50 x 35)	1.85 x 1.77 x 1.22 (47 x 45 x 31)	1.57 x 1.50 (40 x 38)	1.06 (27)	0.67 (17)	N/A	0.11 lbs.	N/A
BB060504W	2.56 x 1.97 x 1.38 (65 x 50 x 35)	2.40 x 1.81 x 1.18 (61 x 46 x 30)	2.07 x 1.50 (53 x 38)	0.98 (25)	1.50 (38)	N/A	0.13 lbs.	BPB0605P
BB060505W	2.56 x 1.97 x 1.77 (65 x 50 x 45)	2.40 x 1.81 x 1.57 (61 x 46 x 40)	2.07 x 1.50 (53 x 38)	1.34 (34)	1.50 (38)	N/A	0.15 lbs.	BPB0605P
BB060545W	2.56 x 1.97 x 1.77 (65 x 50 x 45)	2.36 x 1.77 x 1.57 (60 x 45 x 40)	2.07 x 1.50 (53 x 38)	1.38 (35)	1.50 (38)	N/A	0.15 lbs.	BPB0605P
BB060555W	2.56 x 1.97 x 2.17 (65 x 50 x 55)	2.36 x 1.77 x 1.93 (60 x 45 x 49)	2.07 x 1.50 (53 x 38)	1.73 (44)	1.50 (38)	N/A	0.18 lbs.	BPB0605P
BB060603W	2.52 x 2.28 x 1.46 (64 x 58 x 37)	2.28 x 2.05 x 1.18 (58 x 52 x 30)	2.05 x 1.81 (52 x 46)	0.98 (25)	1.57 (40)	1.42 (36)	0.19 lbs.	N/A
BB090603W	3.86 x 2.52 x 1.46 (98 x 64 x 37)	3.54 x 2.20 x 1.93 (90 x 56 x 49)	3.39 x 2.05 (86 x 52)	1.10 (28)	3.19 (81)	N/A	0.25 lbs.	N/A
BB080805W	3.23 x 3.15 x 2.17 (82 x 80 x 55)	3.03 x 2.95 x 1.93 (77 x 75 x 49)	2.76 x 1.97 (70 x 50)	1.73 (44)	2.28 (58)	2.28 (58)	0.32 lbs.	BPB0808P
BB080807W	3.23 x 3.15 x 2.56 (82 x 80 x 65)	3.03 x 2.95 x 2.32 (77 x 75 x 59)	2.76 x 1.97 (70 x 50)	2.09 (53)	2.28 (58)	2.28 (58)	0.36 lbs.	BPB0808P
BB080809W	3.23 x 3.15 x 3.35 (82 x 80 x 85)	3.03 x 2.95 x 3.11 (77 x 75 x 79)	2.76 x 1.97 (70 x 50)	2.91 (74)	1.73 (44)	2.28 (58)	0.40 lbs.	BPB0808P
BB080810W	3.23 x 3.15 x 3.74 (82 x 80 x 95)	3.03 x 2.95 x 3.50 (77 x 75 x 89)	2.76 x 1.97 (70 x 50)	2.91 (74)	1.73 (44)	2.28 (58)	0.44 lbs.	BPB0808P
BB128035W	4.72 x 3.15 x 1.42 (120 x 80 x 36)	4.49 x 2.91 x 1.18 (114 x 74 x 30)	4.25 x 1.97 (108 x 50)	0.98 (25)	3.23 (82)	2.32 (59)	0.33 lbs.	BPB1280P
BB128040W	4.72 x 3.15 x 1.61 (120 x 80 x 41)	4.49 x 2.91 x 1.38 (114 x 74 x 35)	4.25 x 1.97 (108 x 50)	1.18 (30)	3.23 (82)	2.32 (59)	0.35 lbs.	BPB1280P
BB128045W	4.72 x 3.15 x 1.85 (120 x 80 x 47)	4.49 x 2.91 x 1.57 (114 x 74 x 40)	4.25 x 1.97 (108 x 50)	1.38 (35)	3.23 (82)	2.32 (59)	0.37 lbs.	BPB1280P
BB128050W	4.72 x 3.15 x 1.97 (120 x 80 x 50)	4.49 x 2.91 x 1.73 (114 x 74 x 44)	4.25 x 1.97 (108 x 50)	1.54 (39)	3.78 (96)	2.32 (59)	0.37 lbs.	BPB1280P
BB128055W	4.72 x 3.15 x 2.17 (120 x 80 x 55)	4.49 x 2.91 x 1.93 (114 x 74 x 49)	4.25 x 1.97 (108 x 50)	1.73 (44)	3.78 (96)	2.32 (59)	0.39 lbs.	BPB1280P
BB128060W	4.72 x 3.15 x 2.36 (120 x 80 x 60)	4.49 x 2.91 x 2.13 (114 x 74 x 54)	4.25 x 1.97 (108 x 50)	1.93 (49)	3.23 (82)	2.32 (59)	0.42 lbs.	BPB1280P
BBR128060W	4.72 x 3.15 x 2.36 (120 x 80 x 60)	4.49 x 2.91 x 2.13 (114 x 74 x 54)	4.25 x 1.97 (108 x 50)	1.93 (49)	3.23 (82)	2.28 (58)	0.40 lbs.	BPB1280P
BB128065W	4.72 x 3.15 x 2.56 (120 x 80 x 65)	4.49 x 2.91 x 2.32 (114 x 74 x 59)	4.25 x 1.97 (108 x 50)	2.13 (54)	3.23 (82)	2.28 (58)	0.42 lbs.	BPB1280P
BB128070W	4.72 x 3.15 x 2.79 (120 x 80 x 70)	4.49 x 2.91 x 2.52 (114 x 74 x 64)	4.25 x 1.97 (108 x 50)	2.36 (60)	3.23 (82)	2.32 (59)	0.45 lbs.	BPB1280P
BBR128070W	4.72 x 3.15 x 2.79 (120 x 80 x 70)	4.49 x 2.91 x 2.52 (114 x 74 x 64)	4.25 x 1.97 (108 x 50)	2.32 (59)	3.23 (82)	2.28 (58)	0.45 lbs.	BPB1280P
BB128080W	4.72 x 3.15 x 3.15 (120 x 80 x 80)	4.49 x 2.91 x 2.95 (114 x 74 x 75)	4.25 x 1.97 (108 x 50)	2.76 (70)	3.23 (82)	2.32 (59)	0.44 lbs.	BPB1280P
BBR128080W	4.72 x 3.15 x 3.15 (120 x 80 x 80)	4.49 x 2.91 x 2.95 (114 x 74 x 75)	4.25 x 1.97 (108 x 50)	2.76 (70)	3.23 (82)	2.28 (58)	0.44 lbs.	BPB1280P
BB128085W	4.72 x 3.15 x 3.35 (120 x 80 x 85)	4.49 x 2.91 x 3.15 (114 x 74 x 80)	4.25 x 1.97 (108 x 50)	2.95 (75)	3.23 (82)	2.32 (59)	0.48 lbs.	BPB1280P
BB128090W	4.72 x 3.15 x 3.54 (120 x 80 x 90)	4.49 x 2.91 x 3.35 (114 x 74 x 85)	4.25 x 1.97 (108 x 50)	3.15 (80)	3.23 (82)	2.32 (59)	0.49 lbs.	BPB1280P
BB128010W	4.72 x 3.15 x 3.94 (120 x 80 x 100)	4.49 x 2.91 x 3.74 (114 x 74 x 95)	4.25 x 1.97 (108 x 50)	3.58 (91)	3.23 (82)	2.32 (59)	0.55 lbs.	BPB1280P
BB168035W	6.30 x 3.15 x 1.46 (160 x 80 x 37)	6.10 x 2.95 x 1.22 (155 x 75 x 31)	5.83 x 1.97 (148 x 50)	0.98 (25)	4.80 (122)	2.28 (58)	0.22 lbs.	BPB1680P
BB168055W	6.30 x 3.15 x 2.17 (160 x 80 x 55)	6.10 x 2.91 x 1.93 (155 x 74 x 49)	5.83 x 1.97 (148 x 50)	1.73 (44)	4.80 (122)	2.28 (58)	0.50 lbs.	BPB1680P
BB168060W	6.30 x 3.15 x 2.36 (160 x 80 x 60)	6.10 x 2.91 x 2.09 (155 x 74 x 53)	5.83 x 1.97 (148 x 50)	1.89 (48)	4.80 (122)	2.28 (58)	0.52 lbs.	BPB1680P
BB168085W	6.30 x 3.15 x 3.35 (160 x 80 x 85)	6.10 x 2.91 x 3.11 (155 x 74 x 79)	5.83 x 1.97 (148 x 50)	2.91 (74)	4.84 (123)	2.32 (59)	0.63 lbs.	BPB1680P
BB168090W	6.30 x 3.15 x 3.54 (160 x 80 x 90)	6.10 x 2.91 x 3.31 (155 x 74 x 84)	5.83 x 1.97 (148 x 50)	3.11 (79)	4.80 (122)	2.28 (58)	0.65 lbs.	BPB1680P
BB208055W	7.87 x 3.15 x 2.17 (200 x 80 x 55)	7.64 x 2.91 x 1.93 (194 x 74 x 49)	7.40 x 1.97 (188 x 50)	1.65 (43)	6.38 (162)	2.28 (58)	0.51 lbs.	BPB2080P
BB121255W	4.80 x 4.72 x 2.17 (122 x 120 x 55)	4.57 x 4.49 x 1.97 (116 x 114 x 50)	4.33 x 3.54 (110 x 90)	1.73 (44)	3.31 (84)	3.86 (98)	0.52 lbs.	BPB1212P
BB121275W	4.80 x 4.72 x 2.95 (122 x 120 x 75)	4.57 x 4.49 x 2.72 (116 x 114 x 69)	4.33 x 3.54 (110 x 90)	2.52 (64)	3.31 (84)	3.86 (98)	0.65 lbs.	BPB1212P
BB121285W	4.80 x 4.72 x 3.35 (122 x 120 x 85)	4.57 x 4.49 x 3.15 (116 x 114 x 80)	4.33 x 3.54 (110 x 90)	2.95 (75)	3.31 (84)	3.86 (98)	0.63 lbs.	BPB1212P
BB121211W	4.80 x 4.72 x 4.13 (122 x 120 x 105)	4.57 x 4.49 x 3.94 (116 x 114 x 100)	4.33 x 3.54 (110 x 90)	3.74 (95)	3.31 (84)	3.86 (98)	0.76 lbs.	BPB1212P

PART NUMBER	"OVERALL W X H X D"	"INSIDE A X B X C"	"MOUNTING E X F"	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
BB161255W	6.30 x 4.72 x 2.17 (160 x 120 x 55)	6.06 x 4.69 x 1.93 (154 x 114 x 49)	5.87 x 3.46 (149 x 88)	1.65 (42)	4.76 (121)	3.58 (91)	0.63 lbs.	BPB1612P
BB161270W	6.30 x 4.72 x 2.76 (160 x 120 x 70)	6.06 x 4.69 x 2.52 (154 x 114 x 64)	5.87 x 3.46 (149 x 88)	2.24 (57)	4.76 (121)	3.58 (91)	0.77 lbs.	BPB1612P
BB161275W	6.30 x 4.72 x 2.95 (160 x 120 x 75)	6.06 x 4.69 x 2.72 (154 x 114 x 69)	5.87 x 3.46 (149 x 88)	2.44 (62)	4.76 (121)	3.58 (91)	0.71 lbs.	BPB1612P
BB161290W	6.30 x 4.72 x 3.54 (160 x 120 x 90)	6.06 x 4.69 x 3.31 (154 x 114 x 84)	5.87 x 3.46 (149 x 88)	3.03 (77)	4.76 (121)	3.58 (91)	0.84 lbs.	BPB1612P
BB161212W	6.30 x 4.72 x 4.72 (160 x 120 x 120)	6.06 x 4.69 x 4.45 (154 x 114 x 113)	5.87 x 3.46 (149 x 88)	4.21 (107)	4.76 (121)	3.58 (91)	1.16 lbs.	BPB1612P
BB161214W	6.30 x 4.72 x 5.51 (160 x 120 x 140)	6.06 x 4.69 x 5.24 (154 x 114 x 133)	5.87 x 3.46 (149 x 88)	5.00 (127)	4.76 (121)	3.58 (91)	1.23 lbs.	BPB1612P
BB201255W	7.87 x 4.72 x 2.17 (200 x 120 x 55)	7.64 x 4.49 x 1.93 (194 x 114 x 49)	7.40 x 3.46 (188 x 88)	1.69 (43)	6.30 (160)	3.54 (90)	0.78 lbs.	BPB2012P
BB201270W	7.87 x 4.72 x 2.76 (200 x 120 x 70)	7.64 x 4.69 x 2.52 (194 x 114 x 64)	7.40 x 3.46 (188 x 88)	2.28 (58)	6.30 (160)	3.54 (90)	0.90 lbs.	BPB2012P
BB201275W	7.87 x 4.72 x 2.95 (200 x 120 x 75)	7.64 x 4.69 x 2.68 (194 x 114 x 68)	7.40 x 3.46 (188 x 88)	2.44 (62)	6.30 (160)	3.54 (90)	0.93 lbs.	BPB2012P
BB201290W	7.87 x 4.72 x 3.54 (200 x 120 x 90)	7.64 x 4.69 x 3.27 (194 x 114 x 83)	7.40 x 3.46 (188 x 88)	3.03 (77)	6.30 (160)	3.54 (90)	1.05 lbs.	BPB2012P
BB241270W	9.45 x 4.72 x 2.76 (240 x 120 x 70)	9.21 x 4.49 x 2.48 (234 x 114 x 63)	9.02 x 3.54 (229 x 90)	2.28 (58)	7.99 (203)	3.90 (99)	1.05 lbs.	BPB2412P
BB241210W	9.45 x 4.72 x 3.94 (240 x 120 x 100)	9.21 x 4.49 x 3.66 (234 x 114 x 93)	9.02 x 3.54 (229 x 90)	3.46 (88)	7.95 (202)	3.90 (99)	1.16 lbs.	BPB2412P
BB201555W	7.87 x 5.91 x 2.17 (200 x 150 x 55)	7.64 x 5.67 x 1.93 (194 x 144 x 49)	7.40 x 4.69 (188 x 119)	1.73 (44)	6.30 (160)	4.65 (118)	0.92 lbs.	BPB2015P
BB201575W	7.87 x 5.91 x 2.95 (200 x 150 x 75)	7.64 x 5.67 x 2.72 (194 x 144 x 69)	7.40 x 3.46 (188 x 119)	2.52 (64)	6.30 (160)	4.65 (118)	1.01 lbs.	BPB2015P
BB201580W	7.87 x 5.91 x 3.15 (200 x 150 x 80)	7.64 x 5.67 x 2.91 (194 x 144 x 74)	7.40 x 4.69 (188 x 119)	2.72 (69)	6.30 (160)	4.65 (118)	1.16 lbs.	BPB2015P
BB201510W	7.87 x 5.91 x 3.94 (200 x 150 x 100)	7.64 x 5.67 x 3.70 (194 x 144 x 94)	7.40 x 3.46 (188 x 119)	3.50 (89)	6.30 (160)	4.65 (118)	1.26 lbs.	BPB2015P
BB201511W	7.87 x 5.91 x 4.13 (200 x 150 x 105)	7.64 x 5.67 x 3.90 (194 x 144 x 99)	7.40 x 4.69 (188 x 119)	3.46 (88)	6.30 (160)	4.65 (118)	1.44 lbs.	BPB2015P
BB201513W	7.87 x 5.91 x 4.92 (200 x 150 x 125)	7.64 x 5.67 x 4.69 (194 x 144 x 119)	7.40 x 3.46 (188 x 119)	4.25 (108)	6.30 (160)	4.65 (118)	1.52 lbs.	BPB2015P
BB341555W	13.39 x 5.91 x 2.17 (340 x 150 x 55)	13.07 x 5.59 x 1.89 (332 x 142 x 48)	12.76 x 4.33 (324 x 110)	1.69 (43)	10.47 (266)	5.04 (128)	1.72 lbs.	BPB3415P
BB341580W	13.39 x 5.91 x 2.95 (340 x 150 x 75)	13.07 x 5.59 x 2.68 (332 x 142 x 68)	12.76 x 4.33 (324 x 110)	2.48 (63)	10.47 (266)	5.04 (128)	2.03 lbs.	BPB3415P
BB341510W	13.39 x 5.91 x 3.94 (340 x 150 x 100)	13.07 x 5.59 x 3.66 (332 x 142 x 93)	12.76 x 4.33 (324 x 110)	3.46 (88)	8.66 (220)	4.41 (112)	2.18 lbs.	BPB3415P
BB341512W	13.39 x 5.91 x 4.72 (340 x 150 x 120)	13.07 x 5.59 x 4.45 (332 x 142 x 113)	12.76 x 4.33 (324 x 110)	4.25 (108)	8.66 (220)	4.41 (112)	2.49 lbs.	BPB3415P
BB161665W	6.30 x 6.30 x 2.56 (160 x 160 x 65)	6.06 x 6.06 x 2.28 (154 x 154 x 58)	5.83 x 5.12 (148 x 130)	2.09 (53)	4.80 (122)	5.43 (138)	0.94 lbs.	BPB1616P
BB241670W	9.45 x 6.30 x 2.76 (240 x 160 x 70)	9.21 x 6.06 x 2.52 (234 x 154 x 64)	8.98 x 5.12 (228 x 130)	2.32 (59)	7.95 (202)	5.43 (138)	1.21 lbs.	BPB2416P
BB241690W	9.45 x 6.30 x 3.54 (240 x 160 x 90)	9.21 x 6.06 x 3.31 (234 x 154 x 84)	8.98 x 5.12 (228 x 130)	3.11 (79)	7.95 (202)	5.43 (138)	1.34 lbs.	BPB2416P
BB241612W	9.45 x 6.30 x 4.72 (240 x 160 x 120)	9.21 x 6.06 x 4.49 (234 x 154 x 114)	8.98 x 5.12 (228 x 130)	4.29 (109)	7.95 (202)	5.43 (138)	1.63 lbs.	BPB2416P
BB251655W	9.84 x 6.30 x 2.17 (250 x 160 x 55)	9.61 x 6.06 x 1.93 (244 x 154 x 49)	9.37 x 5.12 (238 x 130)	1.73 (44)	8.39 (213)	5.12 (130)	1.14 lbs.	BPB2516P
BB251685W	9.84 x 6.30 x 3.35 (250 x 160 x 85)	9.61 x 6.06 x 3.11 (244 x 154 x 79)	9.37 x 5.12 (238 x 130)	2.91 (74)	8.39 (213)	5.12 (130)	1.51 lbs.	BPB2516P
BB251690W	9.84 x 6.30 x 3.54 (250 x 160 x 90)	9.61 x 6.06 x 3.31 (244 x 154 x 84)	9.37 x 5.12 (238 x 130)	3.11 (79)	8.35 (212)	5.12 (130)	1.41 lbs.	BPB2516P
BB251611W	9.84 x 6.30 x 4.53 (250 x 160 x 115)	9.61 x 6.06 x 4.29 (244 x 154 x 109)	9.37 x 5.12 (238 x 130)	4.09 (104)	8.39 (213)	5.12 (130)	1.88 lbs.	BPB2516P
BB251612W	9.84 x 6.30 x 4.72 (250 x 160 x 120)	9.61 x 6.06 x 4.49 (244 x 154 x 114)	9.37 x 5.12 (238 x 130)	4.29 (109)	8.35 (212)	5.12 (130)	1.78 lbs.	BPB2516P
BB251615W	9.84 x 6.30 x 5.91 (250 x 160 x 150)	9.61 x 6.06 x 5.67 (244 x 154 x 144)	9.37 x 5.12 (238 x 130)	5.47 (139)	8.35 (212)	5.12 (130)	2.14 lbs.	BPB2516P
BB362015W	14.17 x 7.87 x 5.91 (360 x 200 x 150)	13.94 x 7.56 x 5.63 (353 x 192 x 143)	13.39 x 6.18 (340 x 157)	5.24 (133)	11.89 (302)	6.81 (173)	3.42 lbs.	BPB3620P
BB302365W	11.85 x 9.06 x 2.56 (300 x 230 x 65)	11.54 x 8.78 x 2.32 (293 x 223 x 59)	11.34 x 7.87 (288 x 200)	2.13 (54)	10.04 (255)	7.80 (198)	1.84 lbs.	BPB3023P
BB302385W	11.85 x 9.06 x 3.35 (300 x 230 x 85)	11.57 x 8.82 x 3.07 (294 x 224 x 78)	11.34 x 7.87 (288 x 200)	2.87 (73)	10.04 (255)	7.80 (198)	2.12 lbs.	BPB3023P
BB302311W	11.81 x 9.06 x 4.33 (300 x 230 x 110)	11.57 x 8.82 x 4.09 (294 x 224 x 104)	11.34 x 7.87 (288 x 200)	3.90 (99)	10.04 (255)	7.80 (198)	2.53 lbs.	BPB3023P

BantamBox | Clear Cover | W

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Material (Box & Cover)	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	304 Stainless Steel
Cover Screw Size	Various
Cover Screw Torque	M4: 9 - 17 in.-lbs., M6: 17-22 in.-lbs.

INDUSTRY STANDARDS

UL/cUL File #	E319779
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3R, 4, 4X, 12
IEC 60529 Ratings	IP66 per UL File# E362920
Temperature Range	(-40°F to +212°F) (-40°C to +100°C)
Flammability Rating	UL94-V2
Self Extinguishing	Non-Halogenated
Certifications	cULus, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

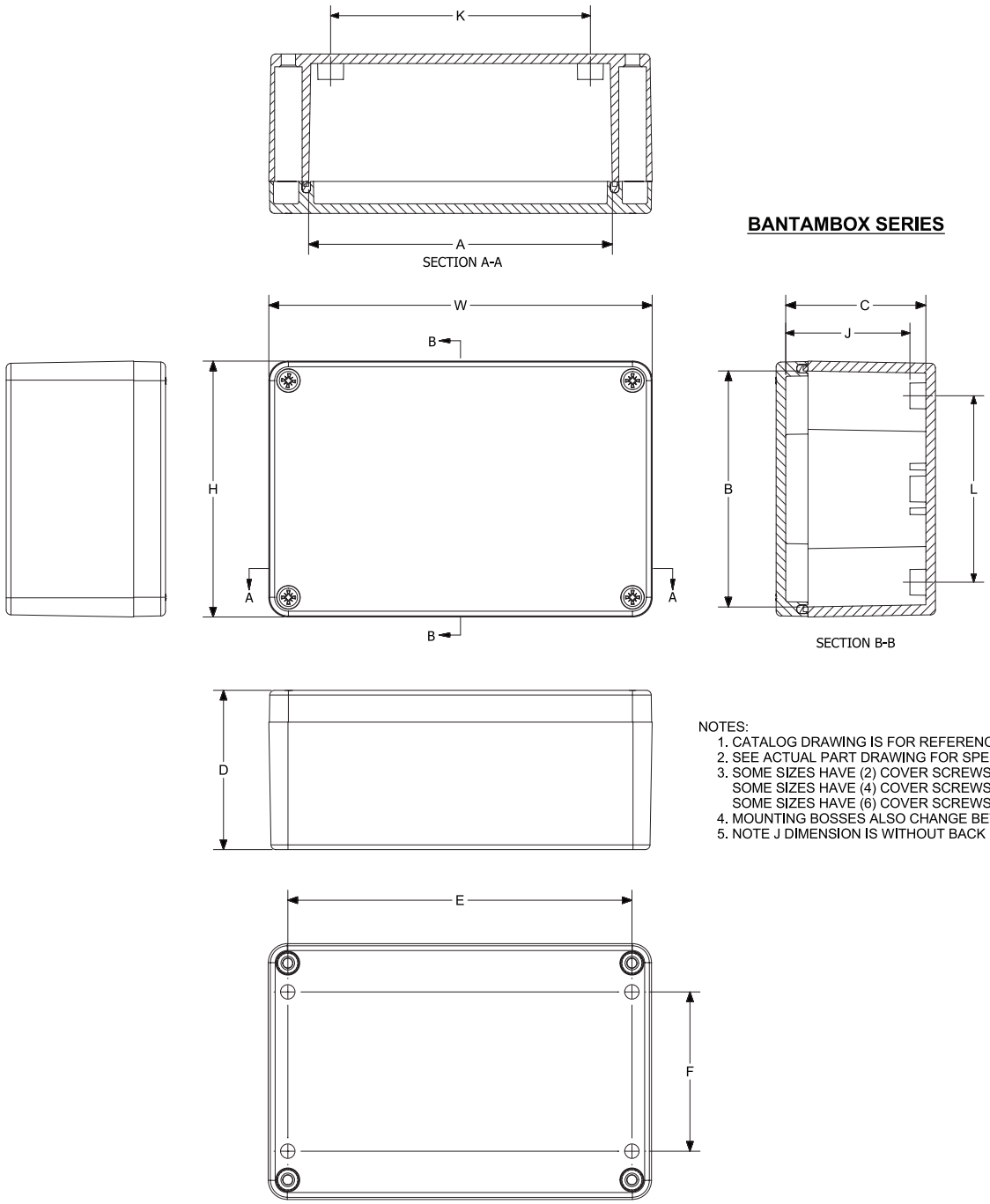
Phenolic Resin Hard Paper Back Panel	BPB__P	pg. 110
All Other Accessories		Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

BantamBox | Clear Cover | W

TECHNICAL DRAWINGS



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   SOME SIZES HAVE (6) COVER SCREWS
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5. NOTE J DIMENSION IS WITHOUT BACK PANEL INSTALLED

BantamBox | Clear Cover | W

DIMENSIONS

PART NUMBER	"OVERALL W X H X D"	"INSIDE A X B X C"	"MOUNTING E X F"	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
BBCC050504W	2.05 x 1.97 x 1.38 (52 x 50 x 35)	1.85 x 1.77 x 1.22 (47 x 45 x 31)	1.57 x 1.50 (40 x 38)	1.06 (27)	0.67 (17)	N/A	0.11 lbs.	N/A
BBCC060504W	2.56 x 1.97 x 1.38 (65 x 50 x 35)	2.40 x 1.81 x 1.18 (61 x 46 x 30)	2.07 x 1.50 (53 x 38)	0.98 (25)	1.50 (38)	N/A	0.13 lbs.	BPB0605P
BBCC060505W	2.56 x 1.97 x 1.77 (65 x 50 x 45)	2.40 x 1.81 x 1.57 (61 x 46 x 40)	2.07 x 1.50 (53 x 38)	1.34 (34)	1.50 (38)	N/A	0.15 lbs.	BPB0605P
BBCC060545W	2.56 x 1.97 x 1.77 (65 x 50 x 45)	2.36 x 1.77 x 1.57 (60 x 45 x 40)	2.07 x 1.50 (53 x 38)	1.38 (35)	1.50 (38)	N/A	0.15 lbs.	BPB0605P
BBCC060555W	2.56 x 1.97 x 2.17 (65 x 50 x 55)	2.36 x 1.77 x 1.93 (60 x 45 x 49)	2.07 x 1.50 (53 x 38)	1.73 (44)	1.50 (38)	N/A	0.18 lbs.	BPB0605P
BBCC090603W	3.86 x 2.52 x 1.46 (98 x 64 x 37)	3.54 x 2.20 x 1.93 (90 x 56 x 49)	3.39 x 2.05 (86 x 52)	1.10 (28)	3.19 (81)	N/A	0.25 lbs.	N/A
BBCC080805W	3.23 x 3.15 x 2.17 (82 x 80 x 55)	3.03 x 2.95 x 1.93 (77 x 75 x 49)	2.76 x 1.97 (70 x 50)	1.73 (44)	2.28 (58)	2.28 (58)	0.32 lbs.	BPB0808P
BBCC080807W	3.23 x 3.15 x 2.56 (82 x 80 x 65)	3.03 x 2.95 x 2.32 (77 x 75 x 59)	2.76 x 1.97 (70 x 50)	2.09 (53)	2.28 (58)	2.28 (58)	0.36 lbs.	BPB0808P
BBCC080809W	3.23 x 3.15 x 3.35 (82 x 80 x 85)	3.03 x 2.95 x 3.11 (77 x 75 x 79)	2.76 x 1.97 (70 x 50)	2.91 (74)	1.73 (44)	2.28 (58)	0.40 lbs.	BPB0808P
BBCC080810W	3.23 x 3.15 x 3.74 (82 x 80 x 95)	3.03 x 2.95 x 3.50 (77 x 75 x 89)	2.76 x 1.97 (70 x 50)	2.91 (74)	1.73 (44)	2.28 (58)	0.44 lbs.	BPB0808P
BBCC128035W	4.72 x 3.15 x 1.42 (120 x 80 x 36)	4.49 x 2.91 x 1.18 (114 x 74 x 30)	4.25 x 1.97 (108 x 50)	0.98 (25)	3.23 (82)	2.32 (59)	0.33 lbs.	BPB1280P
BBCC128040W	4.72 x 3.15 x 1.61 (120 x 80 x 41)	4.49 x 2.91 x 1.38 (114 x 74 x 35)	4.25 x 1.97 (108 x 50)	1.18 (30)	3.23 (82)	2.32 (59)	0.35 lbs.	BPB1280P
BBCC128045W	4.72 x 3.15 x 1.85 (120 x 80 x 47)	4.49 x 2.91 x 1.57 (114 x 74 x 40)	4.25 x 1.97 (108 x 50)	1.38 (35)	3.23 (82)	2.32 (59)	0.37 lbs.	BPB1280P
BBCC128050W	4.72 x 3.15 x 1.97 (120 x 80 x 50)	4.49 x 2.91 x 1.73 (114 x 74 x 44)	4.25 x 1.97 (108 x 50)	1.54 (39)	3.78 (96)	2.32 (59)	0.37 lbs.	BPB1280P
BBCC128055W	4.72 x 3.15 x 2.17 (120 x 80 x 55)	4.49 x 2.91 x 1.93 (114 x 74 x 49)	4.25 x 1.97 (108 x 50)	1.73 (44)	3.78 (96)	2.32 (59)	0.39 lbs.	BPB1280P
BBCC128060W	4.72 x 3.15 x 2.36 (120 x 80 x 60)	4.49 x 2.91 x 2.13 (114 x 74 x 54)	4.25 x 1.97 (108 x 50)	1.93 (49)	3.23 (82)	2.32 (59)	0.42 lbs.	BPB1280P
BBCCR128060W	4.72 x 3.15 x 2.36 (120 x 80 x 60)	4.49 x 2.91 x 2.13 (114 x 74 x 54)	4.25 x 1.97 (108 x 50)	1.93 (49)	3.23 (82)	2.28 (58)	0.40 lbs.	BPB1280P
BBCC128065W	4.72 x 3.15 x 2.56 (120 x 80 x 65)	4.49 x 2.91 x 2.32 (114 x 74 x 59)	4.25 x 1.97 (108 x 50)	2.13 (54)	3.23 (82)	2.28 (58)	0.42 lbs.	BPB1280P
BBCC128070W	4.72 x 3.15 x 2.79 (120 x 80 x 70)	4.49 x 2.91 x 2.52 (114 x 74 x 64)	4.25 x 1.97 (108 x 50)	2.36 (60)	3.23 (82)	2.32 (59)	0.45 lbs.	BPB1280P
BBCCR128070W	4.72 x 3.15 x 2.79 (120 x 80 x 70)	4.49 x 2.91 x 2.52 (114 x 74 x 64)	4.25 x 1.97 (108 x 50)	2.32 (59)	3.23 (82)	2.28 (58)	0.45 lbs.	BPB1280P
BBCC128080W	4.72 x 3.15 x 3.15 (120 x 80 x 80)	4.49 x 2.91 x 2.95 (114 x 74 x 75)	4.25 x 1.97 (108 x 50)	2.76 (70)	3.23 (82)	2.32 (59)	0.44 lbs.	BPB1280P
BBCCR128080W	4.72 x 3.15 x 3.15 (120 x 80 x 80)	4.49 x 2.91 x 2.95 (114 x 74 x 75)	4.25 x 1.97 (108 x 50)	2.76 (70)	3.23 (82)	2.28 (58)	0.44 lbs.	BPB1280P
BBCC128085W	4.72 x 3.15 x 3.35 (120 x 80 x 85)	4.49 x 2.91 x 3.15 (114 x 74 x 80)	4.25 x 1.97 (108 x 50)	2.95 (75)	3.23 (82)	2.32 (59)	0.48 lbs.	BPB1280P
BBCC128090W	4.72 x 3.15 x 3.54 (120 x 80 x 90)	4.49 x 2.91 x 3.35 (114 x 74 x 85)	4.25 x 1.97 (108 x 50)	3.15 (80)	3.23 (82)	2.32 (59)	0.49 lbs.	BPB1280P
BBCC128010W	4.72 x 3.15 x 3.94 (120 x 80 x 100)	4.49 x 2.91 x 3.74 (114 x 74 x 95)	4.25 x 1.97 (108 x 50)	3.58 (91)	3.23 (82)	2.32 (59)	0.55 lbs.	BPB1280P
BBCC168035W	6.30 x 3.15 x 1.46 (160 x 80 x 37)	6.10 x 2.95 x 1.22 (155 x 75 x 31)	5.83 x 1.97 (148 x 50)	0.98 (25)	4.80 (122)	2.28 (58)	0.22 lbs.	BPB1680P
BBCC168055W	6.30 x 3.15 x 2.17 (160 x 80 x 55)	6.10 x 2.91 x 1.93 (155 x 74 x 49)	5.83 x 1.97 (148 x 50)	1.73 (44)	4.80 (122)	2.28 (58)	0.50 lbs.	BPB1680P
BBCC168060W	6.30 x 3.15 x 2.36 (160 x 80 x 60)	6.10 x 2.91 x 2.09 (155 x 74 x 53)	5.83 x 1.97 (148 x 50)	1.89 (48)	4.80 (122)	2.28 (58)	0.52 lbs.	BPB1680P
BBCC168085W	6.30 x 3.15 x 3.35 (160 x 80 x 85)	6.10 x 2.91 x 3.11 (155 x 74 x 79)	5.83 x 1.97 (148 x 50)	2.91 (74)	4.84 (123)	2.32 (59)	0.63 lbs.	BPB1680P
BBCC168090W	6.30 x 3.15 x 3.54 (160 x 80 x 90)	6.10 x 2.91 x 3.31 (155 x 74 x 84)	5.83 x 1.97 (148 x 50)	3.11 (79)	4.80 (122)	2.28 (58)	0.65 lbs.	BPB1680P
BBCC208055W	7.87 x 3.15 x 2.17 (200 x 80 x 55)	7.64 x 2.91 x 1.93 (194 x 74 x 49)	7.40 x 1.97 (188 x 50)	1.65 (43)	6.38 (162)	2.28 (58)	0.51 lbs.	BPB2080P
BBCC121255W	4.80 x 4.72 x 2.17 (122 x 120 x 55)	4.57 x 4.49 x 1.97 (116 x 114 x 50)	4.33 x 3.54 (110 x 90)	1.73 (44)	3.31 (84)	3.86 (98)	0.52 lbs.	BPB1212P
BBCC121275W	4.80 x 4.72 x 2.95 (122 x 120 x 75)	4.57 x 4.49 x 2.72 (116 x 114 x 69)	4.33 x 3.54 (110 x 90)	2.52 (64)	3.31 (84)	3.86 (98)	0.65 lbs.	BPB1212P
BBCC121285W	4.80 x 4.72 x 3.35 (122 x 120 x 85)	4.57 x 4.49 x 3.15 (116 x 114 x 80)	4.33 x 3.54 (110 x 90)	2.95 (75)	3.31 (84)	3.86 (98)	0.63 lbs.	BPB1212P
BBCC121211W	4.80 x 4.72 x 4.13 (122 x 120 x 105)	4.57 x 4.49 x 3.94 (116 x 114 x 100)	4.33 x 3.54 (110 x 90)	3.74 (95)	3.31 (84)	3.86 (98)	0.76 lbs.	BPB1212P
BBCC161255W	6.30 x 4.72 x 2.17 (160 x 120 x 55)	6.06 x 4.69 x 1.93 (154 x 114 x 49)	5.87 x 3.46 (149 x 88)	1.65 (42)	4.76 (121)	3.58 (91)	0.63 lbs.	BPB1612P

PART NUMBER	"OVERALL W X H X D"	"INSIDE A X B X C"	"MOUNTING E X F"	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
BBCC161270W	6.30 x 4.72 x 2.76 (160 x 120 x 70)	6.06 x 4.69 x 2.52 (154 x 114 x 64)	5.87 x 3.46 (149 x 88)	2.24 (57)	4.76 (121)	3.58 (91)	0.77 lbs.	BPB1612P
BBCC161275W	6.30 x 4.72 x 2.95 (160 x 120 x 75)	6.06 x 4.69 x 2.72 (154 x 114 x 69)	5.87 x 3.46 (149 x 88)	2.44 (62)	4.76 (121)	3.58 (91)	0.71 lbs.	BPB1612P
BBCC161290W	6.30 x 4.72 x 3.54 (160 x 120 x 90)	6.06 x 4.69 x 3.31 (154 x 114 x 84)	5.87 x 3.46 (149 x 88)	3.03 (77)	4.76 (121)	3.58 (91)	0.84 lbs.	BPB1612P
BBCC161212W	6.30 x 4.72 x 4.72 (160 x 120 x 120)	6.06 x 4.69 x 4.45 (154 x 114 x 113)	5.87 x 3.46 (149 x 88)	4.21 (107)	4.76 (121)	3.58 (91)	1.16 lbs.	BPB1612P
BBCC161214W	6.30 x 4.72 x 5.51 (160 x 120 x 140)	6.06 x 4.69 x 5.24 (154 x 114 x 133)	5.87 x 3.46 (149 x 88)	5.00 (127)	4.76 (121)	3.58 (91)	1.23 lbs.	BPB1612P
BBCC201255W	7.87 x 4.72 x 2.17 (200 x 120 x 55)	7.64 x 4.49 x 1.93 (194 x 114 x 49)	7.40 x 3.46 (188 x 88)	1.69 (43)	6.30 (160)	3.54 (90)	0.78 lbs.	BPB2012P
BBCC201270W	7.87 x 4.72 x 2.76 (200 x 120 x 70)	7.64 x 4.69 x 2.52 (194 x 114 x 64)	7.40 x 3.46 (188 x 88)	2.28 (58)	6.30 (160)	3.54 (90)	0.90 lbs.	BPB2012P
BBCC201275W	7.87 x 4.72 x 2.95 (200 x 120 x 75)	7.64 x 4.69 x 2.68 (194 x 114 x 68)	7.40 x 3.46 (188 x 88)	2.44 (62)	6.30 (160)	3.54 (90)	0.93 lbs.	BPB2012P
BBCC201290W	7.87 x 4.72 x 3.54 (200 x 120 x 90)	7.64 x 4.69 x 3.27 (194 x 114 x 83)	7.40 x 3.46 (188 x 88)	3.03 (77)	6.30 (160)	3.54 (90)	1.05 lbs.	BPB2012P
BBCC241270W	9.45 x 4.72 x 2.76 (240 x 120 x 70)	9.21 x 4.49 x 2.48 (234 x 114 x 63)	9.02 x 3.54 (229 x 90)	2.28 (58)	7.99 (203)	3.90 (99)	1.05 lbs.	BPB2412P
BBCC241210W	9.45 x 4.72 x 3.94 (240 x 120 x 100)	9.21 x 4.49 x 3.66 (234 x 114 x 93)	9.02 x 3.54 (229 x 90)	3.46 (88)	7.95 (202)	3.90 (99)	1.16 lbs.	BPB2412P
BBCC201555W	7.87 x 5.91 x 2.17 (200 x 150 x 55)	7.64 x 5.67 x 1.93 (194 x 144 x 49)	7.40 x 4.69 (188 x 119)	1.73 (44)	6.30 (160)	4.65 (118)	0.92 lbs.	BPB2015P
BBCC201575W	7.87 x 5.91 x 2.95 (200 x 150 x 75)	7.64 x 5.67 x 2.72 (194 x 144 x 69)	7.40 x 3.46 (188 x 119)	2.52 (64)	6.30 (160)	4.65 (118)	1.01 lbs.	BPB2015P
BBCC201580W	7.87 x 5.91 x 3.15 (200 x 150 x 80)	7.64 x 5.67 x 2.91 (194 x 144 x 74)	7.40 x 4.69 (188 x 119)	2.72 (69)	6.30 (160)	4.65 (118)	1.16 lbs.	BPB2015P
BBCC201510W	7.87 x 5.91 x 3.94 (200 x 150 x 100)	7.64 x 5.67 x 3.70 (194 x 144 x 94)	7.40 x 3.46 (188 x 119)	3.50 (89)	6.30 (160)	4.65 (118)	1.26 lbs.	BPB2015P
BBCC201511W	7.87 x 5.91 x 4.13 (200 x 150 x 105)	7.64 x 5.67 x 3.90 (194 x 144 x 99)	7.40 x 4.69 (188 x 119)	3.46 (88)	6.30 (160)	4.65 (118)	1.44 lbs.	BPB2015P
BBCC201513W	7.87 x 5.91 x 4.92 (200 x 150 x 125)	7.64 x 5.67 x 4.69 (194 x 144 x 119)	7.40 x 3.46 (188 x 119)	4.25 (108)	6.30 (160)	4.65 (118)	1.52 lbs.	BPB2015P
BBCC341555W	13.39 x 5.91 x 2.17 (340 x 150 x 55)	13.07 x 5.59 x 1.89 (332 x 142 x 48)	12.76 x 4.33 (324 x 110)	1.69 (43)	10.47 (266)	5.04 (128)	1.72 lbs.	BPB3415P
BBCC341580W	13.39 x 5.91 x 2.95 (340 x 150 x 75)	13.07 x 5.59 x 2.68 (332 x 142 x 68)	12.76 x 4.33 (324 x 110)	2.48 (63)	10.47 (266)	5.04 (128)	2.03 lbs.	BPB3415P
BBCC341510W	13.39 x 5.91 x 3.94 (340 x 150 x 100)	13.07 x 5.59 x 3.66 (332 x 142 x 93)	12.76 x 4.33 (324 x 110)	3.46 (88)	8.66 (220)	4.41 (112)	2.18 lbs.	BPB3451P
BBCC341512W	13.39 x 5.91 x 4.72 (340 x 150 x 120)	13.07 x 5.59 x 4.45 (332 x 142 x 113)	12.76 x 4.33 (324 x 110)	4.25 (108)	8.66 (220)	4.41 (112)	2.49 lbs.	BPB3415P
BBCC161665W	6.30 x 6.30 x 2.56 (160 x 160 x 65)	6.06 x 6.06 x 2.28 (154 x 154 x 58)	5.83 x 5.12 (148 x 130)	2.09 (53)	4.80 (122)	5.43 (138)	0.94 lbs.	BPB1616P
BBCC241670W	9.45 x 6.30 x 2.76 (240 x 160 x 70)	9.21 x 6.06 x 2.52 (234 x 154 x 64)	8.98 x 5.12 (228 x 130)	2.32 (59)	7.95 (202)	5.43 (138)	1.21 lbs.	BPB2416P
BBCC241690W	9.45 x 6.30 x 3.54 (240 x 160 x 90)	9.21 x 6.06 x 3.31 (234 x 154 x 84)	8.98 x 5.12 (228 x 130)	3.11 (79)	7.95 (202)	5.43 (138)	1.34 lbs.	BPB2416P
BBCC241612W	9.45 x 6.30 x 4.72 (240 x 160 x 120)	9.21 x 6.06 x 4.49 (234 x 154 x 114)	8.98 x 5.12 (228 x 130)	4.29 (109)	7.95 (202)	5.43 (138)	1.63 lbs.	BPB2416P
BBCC251655W	9.84 x 6.30 x 2.17 (250 x 160 x 55)	9.61 x 6.06 x 1.93 (244 x 154 x 49)	9.37 x 5.12 (238 x 130)	1.73 (44)	8.39 (213)	5.12 (130)	1.14 lbs.	BPB2516P
BBCC251685W	9.84 x 6.30 x 3.35 (250 x 160 x 85)	9.61 x 6.06 x 3.11 (244 x 154 x 79)	9.37 x 5.12 (238 x 130)	2.91 (74)	8.39 (213)	5.12 (130)	1.51 lbs.	BPB2516P
BBCC251690W	9.84 x 6.30 x 3.54 (250 x 160 x 90)	9.61 x 6.06 x 3.31 (244 x 154 x 84)	9.37 x 5.12 (238 x 130)	3.11 (79)	8.35 (212)	5.12 (130)	1.41 lbs.	BPB2516P
BBCC251611W	9.84 x 6.30 x 4.53 (250 x 160 x 115)	9.61 x 6.06 x 4.29 (244 x 154 x 109)	9.37 x 5.12 (238 x 130)	4.09 (104)	8.39 (213)	5.12 (130)	1.88 lbs.	BPB2516P
BBCC251612W	9.84 x 6.30 x 4.72 (250 x 160 x 120)	9.61 x 6.06 x 4.49 (244 x 154 x 114)	9.37 x 5.12 (238 x 130)	4.29 (109)	8.35 (212)	5.12 (130)	1.78 lbs.	BPB2516P
BBCC251615W	9.84 x 6.30 x 5.91 (250 x 160 x 150)	9.61 x 6.06 x 5.67 (244 x 154 x 144)	9.37 x 5.12 (238 x 130)	5.47 (139)	8.35 (212)	5.12 (130)	2.14 lbs.	BPB2516P
BBCC362015W	14.17 x 7.87 x 5.91 (360 x 200 x 150)	13.94 x 7.56 x 5.63 (353 x 192 x 143)	13.39 x 6.18 (340 x 157)	5.24 (133)	11.89 (302)	6.81 (173)	3.42 lbs.	BPB3620P
BBCC302365W	11.85 x 9.06 x 2.56 (300 x 230 x 65)	11.54 x 8.78 x 2.32 (293 x 223 x 59)	11.34 x 7.87 (288 x 200)	2.13 (54)	10.04 (255)	7.80 (198)	1.84 lbs.	BPB3023P
BBCC302385W	11.85 x 9.06 x 3.35 (300 x 230 x 85)	11.57 x 8.82 x 3.07 (294 x 224 x 78)	11.34 x 7.87 (288 x 200)	2.87 (73)	10.04 (255)	7.80 (198)	2.12 lbs.	BPB3023P
BBCC302311W	11.81 x 9.06 x 4.33 (300 x 230 x 110)	11.57 x 8.82 x 4.09 (294 x 224 x 104)	11.34 x 7.87 (288 x 200)	3.90 (99)	10.04 (255)	7.80 (198)	2.53 lbs.	BPB3023P

Viking™ Series

Proven Protection Featuring Mounting Versatility And An Environmentally-Friendly Formula

The **Viking** (V/VCC) Series is a fiberglass-reinforced polyester enclosure family with opaque or clear polycarbonate screw covers. There are 18 sizes available to meet a wide range of applications.

These enclosures feature a watertight rating, high impact resistance and a broad temperature range. Originally designed for low-voltage switchgear and control panels, the versatility of **Viking** Series is enhanced for mounting outdoor electrical and electronic control by a double insulated body that can be mounted directly to the wall or rail with no external feet or flange. The mounting bolts are completely isolated from the interior of the enclosure, maintaining complete environmental integrity inside with maximum electrical safety.

The clear cover version of the **Viking** Series enclosure (VCC) is particularly suitable for all outdoor applications where polyester offers the best quality and a prolonged life span even in the most adverse weather or chemical conditions. The clear cover is ideal for mounting surveillance cameras and security systems.

Of significant environmental importance, **Viking** Series enclosures are completely free of toxic components and heavy metals, complying with industry directives and RoHS policies.

VIKING SERIES ATTRIBUTES

- Available in 2 polycarbonate cover options
  1. Opaque Cover
  2. Clear Cover
- Fiberglass Reinforced Polyester box
- 18 sizes with 3 configurations available
- Resistant to harsh environments
- Lightweight yet durable for easy installation

VIKING SERIES INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

Viking | Opaque Cover (V)

W

HW

HPL

Viking | Clear Cover (VCC)

W

HW

HPL

Viking | Opaque Cover | W

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Box Material	Fiberglass reinforced polyester
Cover Material	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Polycarbonate
Cover Screw Size	Custom
Cover Screw Torque	16 in.-lbs.

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum Back Panel	BPV_A	pg. 111

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Viking | Opaque Cover | HW

HINGED, 2 COVER SCREWS

CONSTRUCTION

Box Material	Fiberglass reinforced polyester
Cover Material	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Polycarbonate
Cover Screw Size	Custom
Cover Screw Torque	16 in.-lbs.
Hinge Material	Polyamide

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum Back Panel	BPV_A	pg. 111

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Viking | Opaque Cover | HPL

HINGED, PADLOCK LATCH

CONSTRUCTION

Box Material	Fiberglass reinforced polyester
Cover Material	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Polycarbonate
Cover Screw Size	Custom
Latch Hardware	304 Stainless Steel
Hinge Material	Polyamide

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

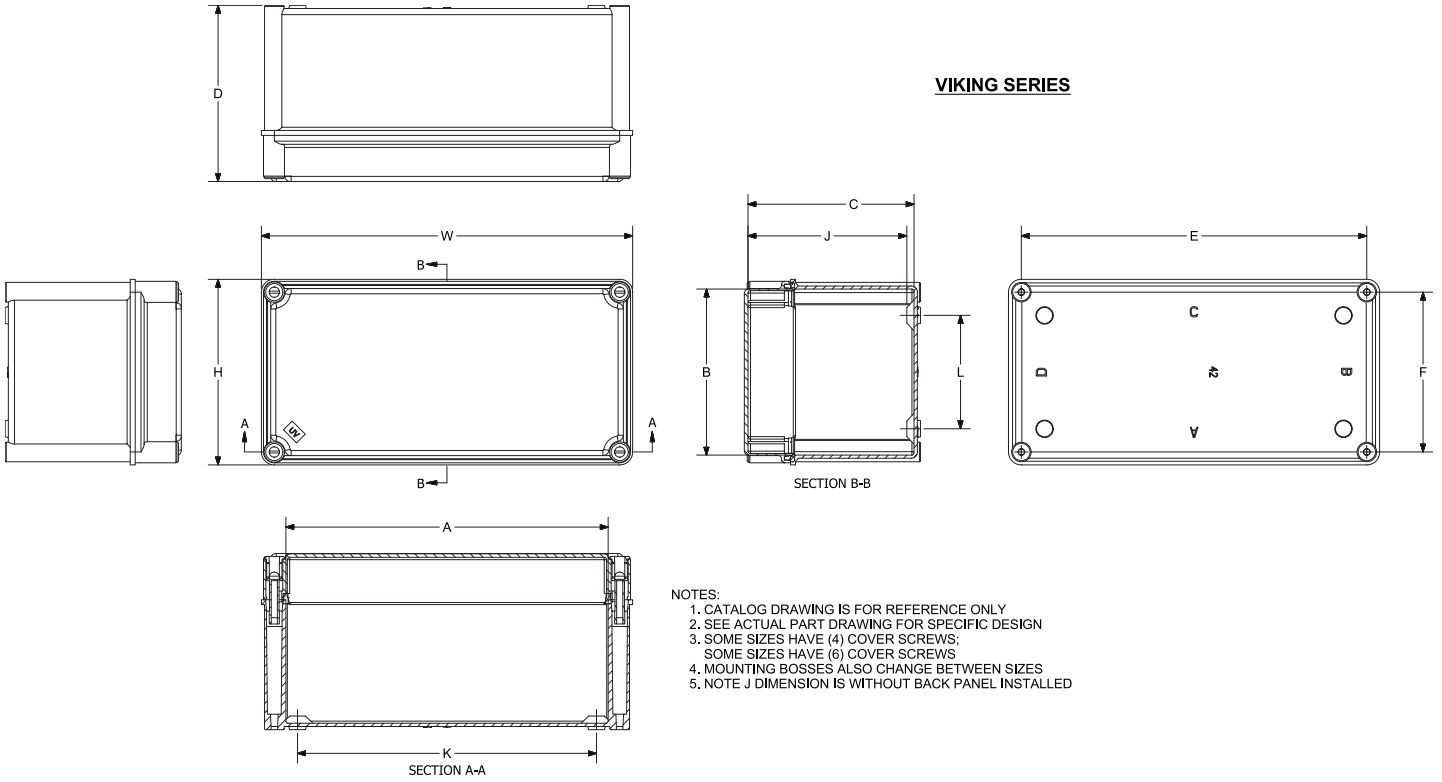
Aluminum Back Panel	BPV_A	pg. 111

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11



NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. SOME SIZES HAVE (4) COVER SCREWS;
   SOME SIZES HAVE (6) COVER SCREWS
4. MOUNTING BOSSES ALSO CHANGE BETWEEN SIZES
5. NOTE J DIMENSION IS WITHOUT BACK PANEL INSTALLED

Viking | Opaque Cover | W, HW & HPL

DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
V1076W V1076HW V1076HPL	10.62 x 7.08 x 6.69 (270 x 180 x 170)	10.00 x 6.46 x 6.34 (254 x 164 x 161)	9.65 x 6.10 (245 x 155)	5.99 (152)	7.87 (200)	4.33 (110)	2.7 lbs.	BPV107A
V10106W V10106HW V10106HPL	10.62 x 10.62 x 6.69 (270 x 270 x 170)	9.92 x 9.92 x 6.34 (252 x 252 x 161)	9.65 x 9.65 (245 x 245)	5.99 (152)	7.87 (200)	7.87 (200)	3.4 lbs.	BPV1010A
V1476W V1476HW V1476HPL	14.17 x 7.08 x 6.69 (360 x 180 x 170)	13.54 x 6.46 x 6.34 (344 x 164 x 161)	13.19 x 6.10 (335 x 155)	5.99 (152)	11.42 (290)	4.33 (110)	2.9 lbs.	BPV147A
V14106W V14106HW V14106HPL	14.17 x 10.62 x 6.69 (360 x 270 x 170)	13.54 x 10.00 x 6.34 (344 x 254 x 161)	13.19 x 9.65 (335 x 245)	5.99 (152)	11.42 (290)	7.87 (200)	3.9 lbs.	BPV1410A
V14108W V14108HW V14108HPL	14.17 x 10.62 x 8.27 (360 x 270 x 210)	13.54 x 10.00 x 7.56 (344 x 254 x 192)	13.19 x 9.65 (335 x 245)	7.20 (183)	11.42 (290)	7.87 (200)	4.2 lbs.	BPV1410A
V14146W V14146HW V14146HPL	14.17 x 14.17 x 6.69 (360 x 360 x 170)	13.46 x 13.46 x 6.34 (342 x 342 x 161)	13.19 x 13.19 (335 x 335)	5.99 (152)	11.42 (290)	11.42 (290)	5.1 lbs.	BPV1414A
V14148W V14148HW V14148HPL	14.17 x 14.17 x 8.27 (360 x 360 x 210)	13.46 x 13.46 x 7.56 (342 x 342 x 192)	13.19 x 13.19 (335 x 335)	7.20 (183)	11.42 (290)	11.42 (290)	5.3 lbs.	BPV1414A
V21106W V21106HW V21106HPL	21.25 x 10.62 x 6.69 (540 x 270 x 170)	20.63 x 10.00 x 6.34 (524 x 254 x 161)	20.28 x 9.65 (515 x 245)	5.99 (152)	18.50 (470)	7.87 (200)	6.1 lbs.	BPV2110A
V21108W V21108HW V21108HPL	21.25 x 10.62 x 8.27 (540 x 270 x 210)	20.63 x 10.00 x 7.56 (524 x 254 x 192)	20.28 x 9.65 (515 x 245)	7.20 (183)	18.50 (470)	7.87 (200)	6.5 lbs.	BPV2110A
V21146W V21146HW V21146HPL	21.25 x 14.17 x 6.69 (540 x 360 x 170)	20.63 x 13.54 x 6.34 (524 x 344 x 161)	20.28 x 13.19 (515 x 335)	5.99 (152)	18.50 (470)	11.42 (290)	9.6 lbs.	BPV2114A
V21148W V21148HW V21148HPL	21.25 x 14.17 x 8.27 (540 x 360 x 210)	20.63 x 13.54 x 7.56 (524 x 344 x 192)	20.28 x 13.19 (515 x 335)	7.20 (183)	18.50 (470)	11.42 (290)	9.0 lbs.	BPV2114A
V21216W V21216HW V21216HPL	21.25 x 21.25 x 6.69 (540 x 540 x 170)	20.55 x 20.55 x 6.34 (522 x 522 x 161)	20.28 x 20.28 (515 x 515)	5.99 (152)	18.50 (470)	18.50 (470)	12.3 lbs.	BPV2121A
V28148W V28148HW V28148HPL	28.35 x 14.17 x 8.27 (720 x 360 x 210)	27.64 x 13.46 x 7.56 (702 x 342 x 192)	27.36 x 13.19 (695 x 335)	7.20 (183)	25.59 (650)	11.42 (290)	12.1 lbs.	BPV2814A
V28218W V28218HW V28218HPL	28.35 x 21.25 x 8.27 (720 x 540 x 210)	27.72 x 20.63 x 7.56 (704 x 524 x 192)	27.36 x 20.28 (695 x 515)	7.20 (183)	25.59 (650)	18.50 (470)	16.7 lbs.	BPV2821A
V755W V755HW V755HPL	7.08 x 5.31 x 5.12 (180 x 135 x 130)	6.46 x 4.69 x 4.84 (164 x 119 x 123)	6.30 x 4.53 (160 x 115)	4.35 (111)	5.14 (131)	3.37 (86)	3.4 lbs.	BPV75A
V775W V775HW V775HPL	7.08 x 7.08 x 5.12 (180 x 180 x 130)	6.46 x 6.46 x 4.84 (164 x 164 x 123)	6.30 x 6.30 (160 x 160)	4.35 (111)	5.14 (131)	5.14 (131)	2.9 lbs.	BPV77A
V1055W V1055HW V1055HPL	10.62 x 5.31 x 5.12 (270 x 135 x 130)	10.08 x 4.69 x 4.84 (256 x 119 x 123)	9.96 x 4.53 (253 x 115)	4.35 (111)	8.70 (221)	3.37 (86)	3.9 lbs.	BPV105A
V555W V555HW V555HPL	5.31 x 5.31 x 5.12 (135 x 135 x 130)	4.69 x 4.69 x 4.84 (119 x 119 x 123)	4.53 x 4.53 (115 x 115)	4.35 (111)	3.37 (86)	3.37 (86)	2.7 lbs.	BPV55A

Viking | Clear Cover | W

4 COVER SCREWS, LIFT OFF COVER

CONSTRUCTION

Box Material	Fiberglass reinforced polyester
Cover Material	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Polycarbonate
Cover Screw Size	Custom
Cover Screw Torque	16 in.-lbs.

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum Back Panel	BPV_A	pg. 111

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Viking | Clear Cover | HW

HINGED, 2 COVER SCREWS

CONSTRUCTION

Box Material	Fiberglass reinforced polyester
Cover Material	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Polycarbonate
Cover Screw Size	Custom
Cover Screw Torque	16 in.-lbs.
Hinge Material	Polyamide

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum Back Panel	BPV_A	pg. 111

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Viking | Clear Cover | HPL

HINGED, PADLOCK LATCH

CONSTRUCTION

Box Material	Fiberglass reinforced polyester
Cover Material	Polycarbonate
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	Polycarbonate
Cover Screw Size	Custom
Latch Hardware	304 Stainless Steel
Hinge Material	Polyamide

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum Back Panel	BPV_A	pg. 111

ACCESSORIES

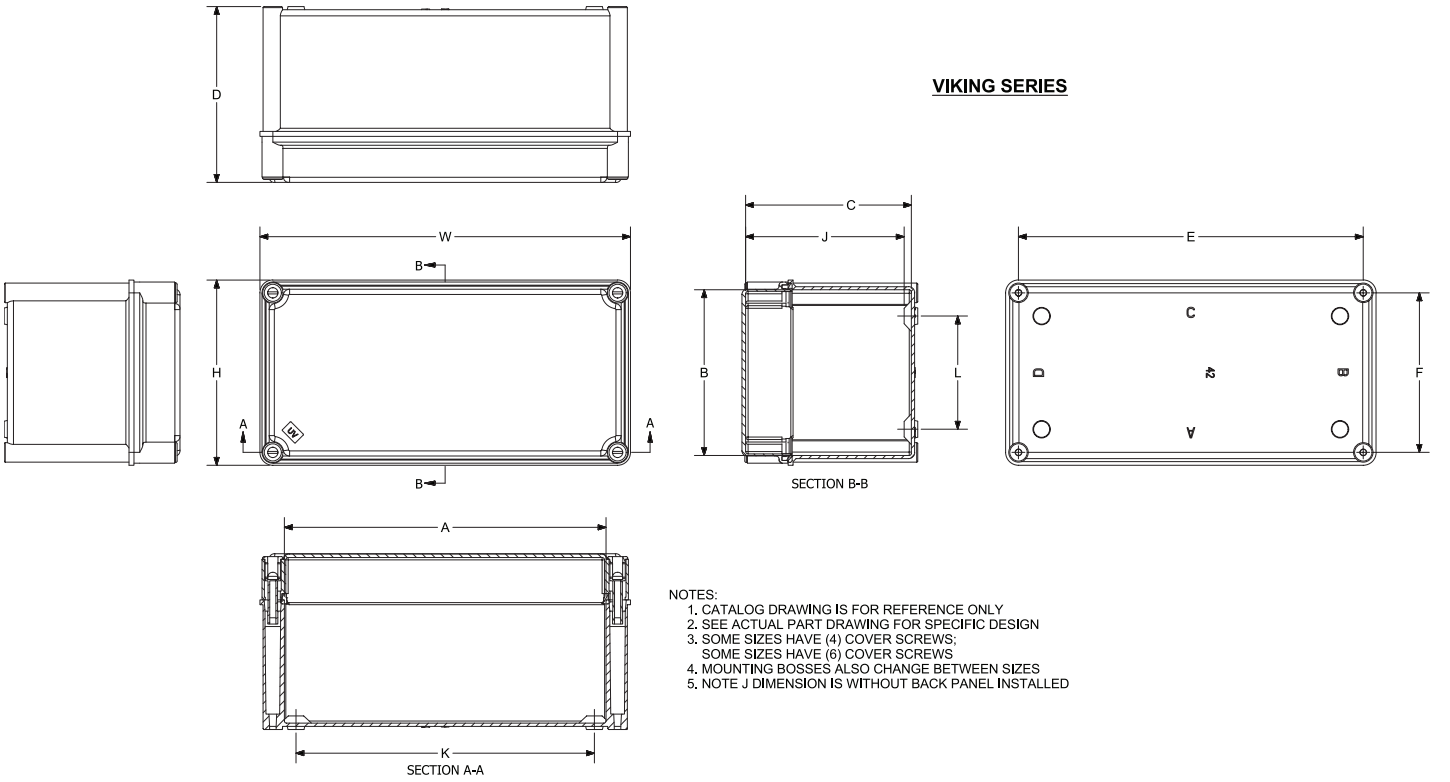
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Viking | Clear Cover | W, HW & HPL

TECHNICAL DRAWINGS



NOTES:
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3. SOME SIZES HAVE (4) COVER SCREWS;
   SOME SIZES HAVE (6) COVER SCREWS
4. MOUNTING BOSSES ALSO CHANGE BETWEEN SIZES
5. NOTE J DIMENSION IS WITHOUT BACK PANEL INSTALLED

Viking | Clear Cover | W, HW & HPL

DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
VCC1076W VCC1076HW VCC1076HPL	10.62 x 7.08 x 6.69 (270 x 180 x 170)	10.00 x 6.46 x 6.34 (254 x 164 x 161)	9.65 x 6.10 (245 x 155)	5.99 (152)	7.87 (200)	4.33 (110)	2.7 lbs.	BPV107A
VCC10106W VCC10106HW VCC10106HPL	10.62 x 10.62 x 6.69 (270 x 270 x 170)	9.92 x 9.92 x 6.34 (252 x 252 x 161)	9.65 x 9.65 (245 x 245)	5.99 (152)	7.87 (200)	7.87 (200)	3.4 lbs.	BPV1010A
VCC1476W VCC1476HW VCC1476HPL	14.17 x 7.08 x 6.69 (360 x 180 x 170)	13.54 x 6.46 x 6.34 (344 x 164 x 161)	13.19 x 6.10 (335 x 155)	5.99 (152)	11.42 (290)	4.33 (110)	2.9 lbs.	BPV147A
VCC14106W VCC14106HW VCC14106HPL	14.17 x 10.62 x 6.69 (360 x 270 x 170)	13.54 x 10.00 x 6.34 (344 x 254 x 161)	13.19 x 9.65 (335 x 245)	5.99 (152)	11.42 (290)	7.87 (200)	3.9 lbs.	BPV1410A
VCC14108W VCC14108HW VCC14108HPL	14.17 x 10.62 x 8.27 (360 x 270 x 210)	13.54 x 10.00 x 7.56 (344 x 254 x 192)	13.19 x 9.65 (335 x 245)	7.20 (183)	11.42 (290)	7.87 (200)	4.2 lbs.	BPV1410A
VCC14146W VCC14146HW VCC14146HPL	14.17 x 14.17 x 6.69 (360 x 360 x 170)	13.46 x 13.46 x 6.34 (342 x 342 x 161)	13.19 x 13.19 (335 x 335)	5.99 (152)	11.42 (290)	11.42 (290)	5.1 lbs.	BPV1414A
VCC14148W VCC14148HW VCC14148HPL	14.17 x 14.17 x 8.27 (360 x 360 x 210)	13.46 x 13.46 x 7.56 (342 x 342 x 192)	13.19 x 13.19 (335 x 335)	7.20 (183)	11.42 (290)	11.42 (290)	5.3 lbs.	BPV1414A
VCC21106W VCC21106HW VCC21106HPL	21.25 x 10.62 x 6.69 (540 x 270 x 170)	20.63 x 10.00 x 6.34 (524 x 254 x 161)	20.28 x 9.65 (515 x 245)	5.99 (152)	18.50 (470)	7.87 (200)	6.1 lbs.	BPV2110A
VCC21108W VCC21108HW VCC21108HPL	21.25 x 10.62 x 8.27 (540 x 270 x 210)	20.63 x 10.00 x 7.56 (524 x 254 x 192)	20.28 x 9.65 (515 x 245)	7.20 (183)	18.50 (470)	7.87 (200)	6.5 lbs.	BPV2110A
VCC21146W VCC21146HW VCC21146HPL	21.25 x 14.17 x 6.69 (540 x 360 x 170)	20.63 x 13.54 x 6.34 (524 x 344 x 161)	20.28 x 13.19 (515 x 335)	5.99 (152)	18.50 (470)	11.42 (290)	9.6 lbs.	BPV2114A
VCC21148W VCC21148HW VCC21148HPL	21.25 x 14.17 x 8.27 (540 x 360 x 210)	20.63 x 13.54 x 7.56 (524 x 344 x 192)	20.28 x 13.19 (515 x 335)	7.20 (183)	18.50 (470)	11.42 (290)	9.0 lbs.	BPV2114A
VCC21216W VCC21216HW VCC21216HPL	21.25 x 21.25 x 6.69 (540 x 540 x 170)	20.55 x 20.55 x 6.34 (522 x 522 x 161)	20.28 x 20.28 (515 x 515)	5.99 (152)	18.50 (470)	18.50 (470)	12.3 lbs.	BPV2121A
VCC28148W VCC28148HW VCC28148HPL	28.35 x 14.17 x 8.27 (720 x 360 x 210)	27.64 x 13.46 x 7.56 (702 x 342 x 192)	27.36 x 13.19 (695 x 335)	7.20 (183)	25.59 (650)	11.42 (290)	12.1 lbs.	BPV2814A
VCC28218W VCC28218HW VCC28218HPL	28.35 x 21.25 x 8.27 (720 x 540 x 210)	27.72 x 20.63 x 7.56 (704 x 524 x 192)	27.36 x 20.28 (695 x 515)	7.20 (183)	25.59 (650)	18.50 (470)	16.7 lbs.	BPV2821A
VCC755W VCC755HW VCC755HPL	7.08 x 5.31 x 5.12 (180 x 135 x 130)	6.46 x 4.69 x 4.84 (164 x 119 x 123)	6.30 x 4.53 (160 x 115)	4.35 (111)	5.14 (131)	3.37 (86)	3.4 lbs.	BPV75A
VCC775W VCC775HW VCC775HPL	7.08 x 7.08 x 5.12 (180 x 180 x 130)	6.46 x 6.46 x 4.84 (164 x 164 x 123)	6.30 x 6.30 (160 x 160)	4.35 (111)	5.14 (131)	5.14 (131)	2.9 lbs.	BPV77A
VCC1055W VCC1055HW VCC1055HPL	10.62 x 5.31 x 5.12 (270 x 135 x 130)	10.08 x 4.69 x 4.84 (256 x 119 x 123)	9.96 x 4.53 (253 x 115)	4.35 (111)	8.70 (221)	3.37 (86)	3.9 lbs.	BPV105A
VCC555W VCC555HW VCC555HPL	5.31 x 5.31 x 5.12 (135 x 135 x 130)	4.69 x 4.69 x 4.84 (119 x 119 x 123)	4.53 x 4.53 (115 x 115)	4.35 (111)	3.37 (86)	3.37 (86)	2.7 lbs.	BPV55A

DuraShield™ Series

Proven Protection Because Of Simplicity In An Extremely Rugged Design

DuraShield (DU) Series enclosures are designed for rugged, durable performance in both commercial and industrial indoor and outdoor environments such as mining, oil, gas, wastewater treatment, and petro-chem.

This fiberglass-reinforced polyester product was developed with a low profile design and shallow depth. A simplified mounting system accommodates a direct-to-wall mounting, leaving unobstructed top, bottom and sides for dense mounting requirements.

Because of their pleasing aesthetics and flush cover design, **DuraShield** Series enclosures are highly valued in high-end electronic applications such as wireless communications and operator interfaces. A poured-in-place polyurethane gasket ensures a rain-tight, water-tight and submersible rating.

DuraShield Enclosures are an exceptional blending of stylistic beauty and rugged endurance.

DURASHIELD SERIES ATTRIBUTES

- 14 sizes available
- Size range from 3” x 3” to 24” x 16”
- Flat cover with captive cover screws
- DIN rail mounting capabilities
- No sidewall obstructions, flush cover
- Aluminum back panels available for all sizes

DURASHIELD SERIES INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 6, 6P, 12
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66, IP67, IP68
Temperature Range	(-26°F to +257°F) (-32°C to +125°C)
Flammability Rating	UL94-V0
Self Extinguishing	Non-halogenated, Non-flame propagating
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

DuraShield (DU)

W

DuraShield (DUL)

W

DuraShield | Opaque Cover | W

FLUSH FITTING COVER FASTENED BY CAPTIVE LID SCREWS

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	304 Stainless Steel
Cover Screw Size	M6 x 35 mm
Cover Screw Torque	17-22 in.-lbs.
Mounting Bosses	Panel mounting capability for fixed rear panel
Metal Inserts	All bosses utilize threaded brass inserts accepting M6 screws
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 6, 6P, 12
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66, IP67, IP68
Temperature Range	(-26°F to +257°F) (-32°C to +125°C)
Flammability Rating	UL94-V0
Self Extinguishing	Non-halogenated, Non-flame propagating
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BPDU__A	pg. 109

ACCESSORIES

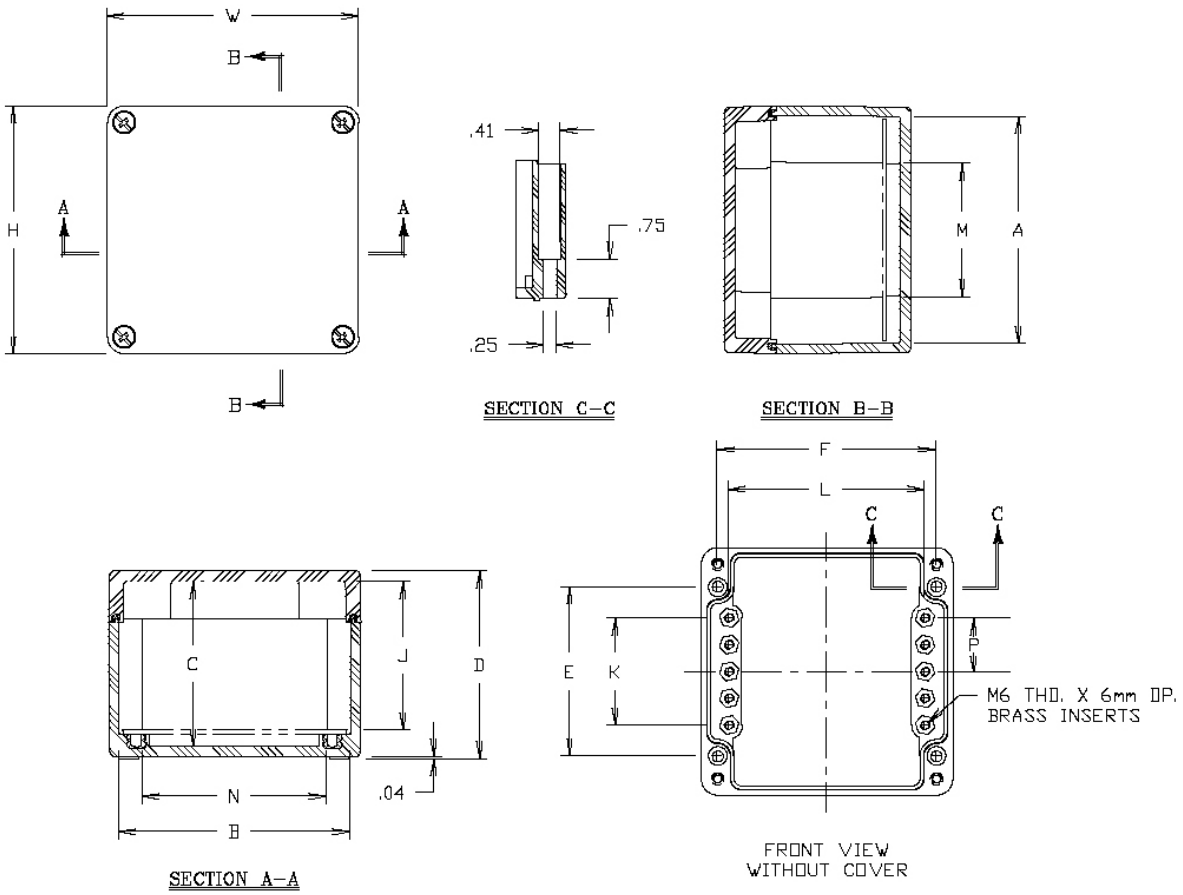
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Mounting Feet	pg. 113
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

DuraShield | Opaque Cover | W

TECHNICAL DRAWINGS / DIMENSIONS



DURASHIELD W DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	M	N	P	SHIPPING WEIGHT	PANEL NUMBER
DU333W	2.95 x 3.15 x 2.78 (75 x 80 x 76)	2.56 x 2.76 x 2.56 (65 x 70 x 65)	1.57 x 2.48 (40 x 63)	2.26 (57)	N/A	2.28 (58)	1.06 (27)	1.93 (49)	N/A	0.81 LB	BPDU33A*
DU342W	2.95 x 4.33 x 2.22 (75 x 110 x 56)	2.56 x 3.93 x 1.81 (65 x 100 x 46)	1.77 x 3.86 (45 x 98)	1.53 (39)	N/A	3.50 (89)	1.29 (33)	3.37 (86)	N/A	.88 LB	BPDU34A*
DU554W	4.72 x 4.80 x 3.58 (120 x 122 x 91)	4.33 x 4.41 x 3.15 (110 x 112 x 80)	3.23 x 4.17 (82 x 106)	2.93 (74)	2.05 (52)	3.74 (95)	2.56 (65)	3.50 (89)	1.02 (26)	1.7 LB	BPDU55A*
DU593W	4.72 x 8.66 x 3.19 (120 x 220 x 81)	4.34 x 8.28 x 2.83 (110 x 210 x 72)	3.23 x 8.03 (82 x 204)	2.62 (67)	2.05 (52)	7.60 (193)	2.57 (65)	7.37 (187)	1.02 (26)	2.4 LB	BPDU59A*
DU594W	4.72 x 8.66 x 3.58 (120 x 220 x 91)	4.33 x 8.27 x 3.15 (110 x 210 x 80)	3.23 x 8.03 (82 x 204)	2.93 (74)	2.05 (52)	7.60 (193)	2.57 (65)	7.37 (187)	1.02 (26)	2.5 LB	BPDU59A*
DU774W	6.30 x 6.30 x 3.58 (160 x 160 x 91)	5.79 x 5.79 x 3.11 (147 x 147 x 79)	4.33 x 5.51 (110 x 140)	2.93 (74)	2.99 (76)	5.20 (132)	3.50 (89)	4.68 (119)	1.50 (38)	2.8 LB	BPDU77A*
DU7114W	6.30 x 10.24 x 3.58 (160 x 260 x 91)	5.79 x 9.72 x 3.11 (147 x 247 x 79)	4.33 x 9.45 (110 x 240)	2.93 (74)	2.99 (76)	9.13 (232)	3.50 (89)	8.62 (219)	1.50 (38)	3.8 LB	BPDU711A*
DU10105W	9.84 x 10.04 x 4.76 (250 x 255 x 121)	9.31 x 9.51 x 4.29 (236 x 242 x 109)	7.87 x 9.25 (200 x 235)	4.11 (104)	3.94 (100)	8.94 (227)	7.03 (179)	8.41 (214)	1.97 (50)	6.4 LB	BPDU1010A*
DU10165W	9.84 x 15.75 x 4.76 (250 x 400 x 121)	9.31 x 15.22 x 4.29 (236 x 387 x 109)	7.87 x 14.96 (200 x 380)	4.09 (104)	3.94 (100)	14.65 (327)	7.03 (179)	14.12 (359)	1.97 (50)	8.8 LB	BPDU1016A*
DU14144W	14.17 x 14.17 x 3.58 (360 x 360 x 91)	13.66 x 13.66 x 3.11 (347 x 347 x 79)	12.20 x 13.39 (310 x 340)	2.91 (74)	5.35 (136)	13.07 (332)	11.38 (289)	12.56 (319)	2.68 (68)	8.0 LB	BPDU1414A*
DU16165W	15.94 x 15.75 x 4.76 (405 x 400 x 121)	15.42 x 15.22 x 4.29 (392 x 387 x 109)	13.98 x 14.96 (355 x 380)	4.09 (104)	9.84 (250)	14.65 (372)	13.14 (334)	14.12 (359)	4.92 (125)	11.0 LB	BPDU1616A*

** Panel ordered separately*

DuraShield | Opaque Cover | W

FLUSH FITTING COVER FASTENED BY CAPTIVE LID SCREWS

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured polyurethane seamless gasket
Cover Screw Material	304 Stainless Steel
Cover Screw Size	M6 x 35 mm
Cover Screw Torque	17-22 in.-lbs.
Mounting Bosses	Panel mounting capability for fixed rear panel
Metal Inserts	All bosses utilize threaded brass inserts accepting M6 screws
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 6, 6P, 12
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66, IP67, IP68
Temperature Range	(-26°F to +257°F) (-32°C to +125°C)
Flammability Rating	UL94-V0
Self Extinguishing	Non-halogenated, Non-flame propagating
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

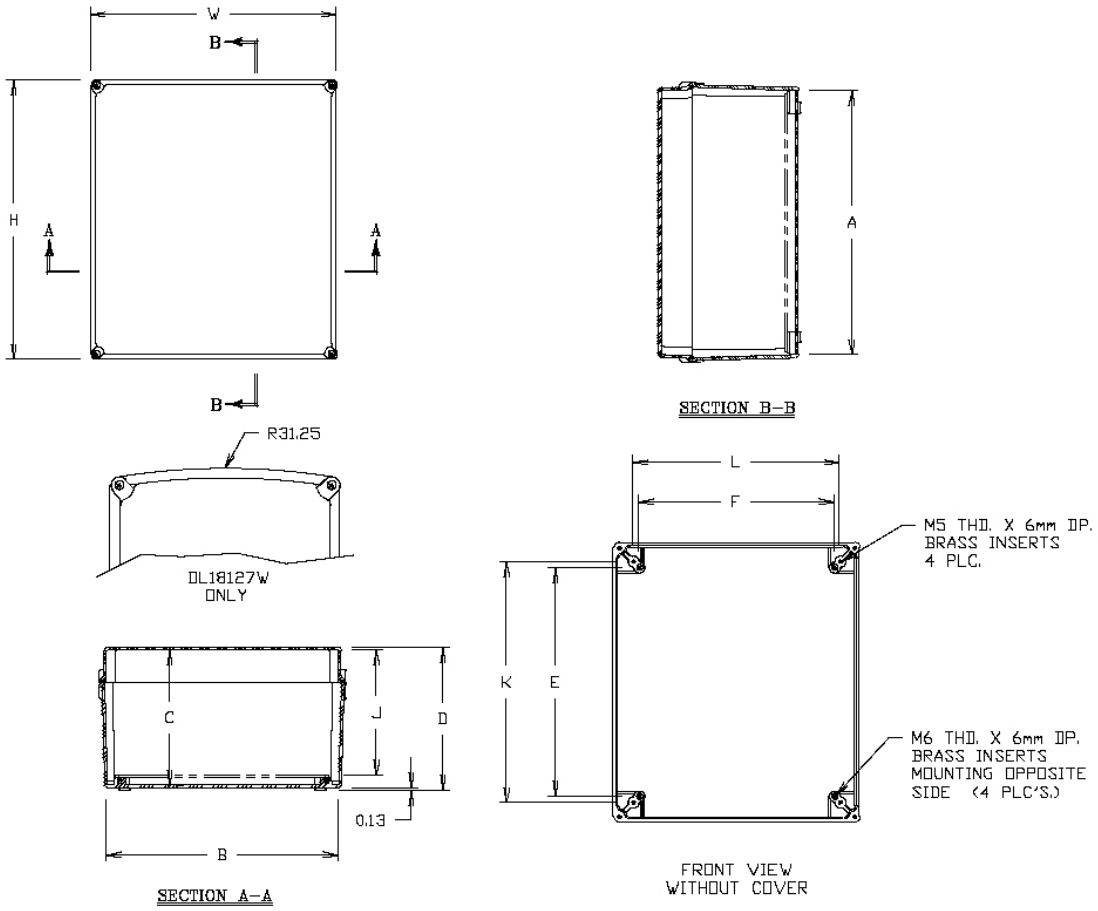
Aluminum	BPDU__A	pg. 109

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Mounting Feet	pg. 113
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11



DURASHIELD W DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
DUL18127W	16.54 x 10.63 x 7.22 (420 x 270 x 183)	15.02 x 9.12 x 6.85 (382 x 232 x 174)	12.68 x 7.17 (322 x 182)	6.26 (159)	13.46 (342)	7.95 (202)	5.5 LBS	BPDU1812A*
DUL18168W	16.54 x 14.57 x 8.44 (420 x 370 x 214)	15.56 x 13.59 x 7.99 (395 x 345 x 207)	13.54 x 11.57 (344 x 294)	7.44 (189)	14.25 (362)	12.24 (311)	9.9 LBS	BPDU1816A*
DUL24168W	23.63 x 16.54 x 8.44 (600 x 420 x 214)	22.67 x 15.55 x 7.99 (576 x 395 x 207)	20.63 x 13.54 (524 x 344)	7.44 (189)	21.34 (542)	14.21 (361)	15.4 LBS	BPDU2416A*

Caution: Metric units are for reference; do not convert
** Panel ordered separately*

Endurance™ Series

Proven Protection From A "Next Generation" Of Design Innovation

Endurance (E) Series enclosures represent a next generation in enclosure evolution: a double insulated body that can be mounted directly to the wall or rail with no external feet or flange. In this design, mounting bolts are completely isolated from the interior of the enclosure, maintaining complete environmental integrity inside with maximum electrical safety. These fiberglass-reinforced polyester enclosures feature a flush, removable, hinged door with 180º opening.

There are 8 sizes of **Endurance** Series enclosures to meet the broadest industrial needs. The enclosures are rated watertight, self-extinguishing, with a broad temperature range.

Raised bosses internally provide for an extensive range of panel mounting options or DIN rail. They are easy to machine as well as customize to the user's demanding specification. **Endurance** Series enclosures were designed with an end user hinge pin system that makes replacing doors very easy. This provides full access to the interior of the enclosure in addition to cutting, drilling or machining custom facings on the door itself.

ENDURANCE SERIES ATTRIBUTES

- Fiberglass Reinforced Polyester Construction
- Poured polyurethane seamless gasket
- Polycarbonate Hinge and Latch Hardware

ENDURANCE SERIES INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

Endurance | Opaque Cover (E)

HQT

Endurance | Opaque Cover | HQT

HINGED, QUARTER TURN LATCH

CONSTRUCTION

Material (Box & Cover)	Fiberglass Reinforced Polyester
Gasket Material	Poured polyurethane seamless gasket
Hinge and Latch Hardware	Polycarbonate

INDUSTRY STANDARDS

UL/cUL File #	E342926
NEMA Ratings (UL508A, UL50 & UL50e)	1, 4, 4X, 12
IEC 60529 Ratings	IP66
Temperature Range	(-58°F to +185°F) (-50°C to +85°C)
Flammability Rating	UL94-5VA
Self Extinguishing	Non-Halogenated
Impact Rating	IK10
Certifications	cULus, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BPE__A	pg. 110

ACCESSORIES

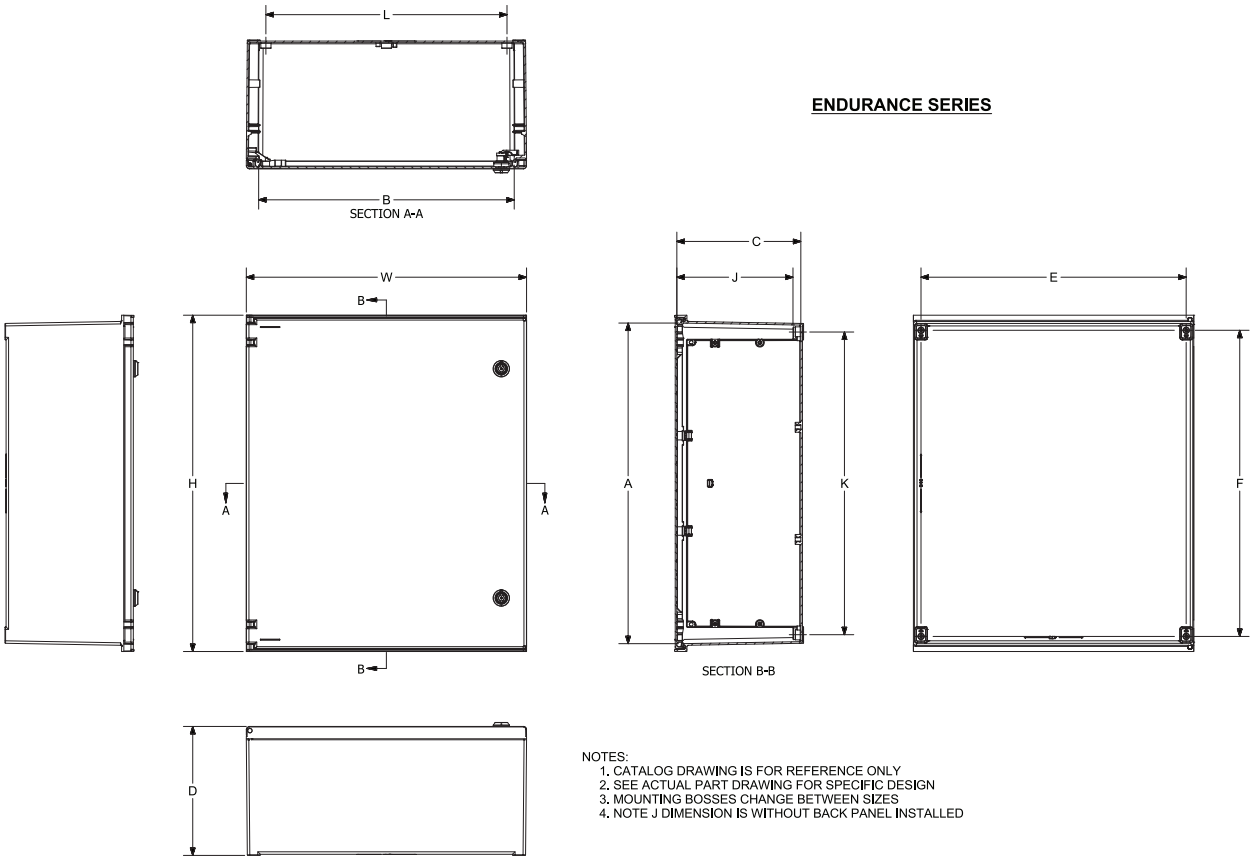
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Silk Screening	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Endurance | Opaque Cover | HQT

TECHNICAL DRAWINGS / DIMENSIONS



ENDURANCE HQT DIMENSIONS

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	SHIPPING WEIGHT	PANEL NUMBER
E12106HQT	11.81 x 9.84 x 5.51 (300 x 250 x 140)	10.71 x 8.11 x 5.17 (272 x 206 x 131)	9.84 x 8.78 (250 x 223)	4.70 (119)	9.61 (244)	7.09 (180)	4.25 lbs.	BPE1210A
E16128HQT	15.75 x 11.81 x 7.87 (400 x 300 x 200)	14.64 x 10.08 x 7.50 (372 x 256 x 191)	13.70 x 10.75 (348 x 273)	7.03 (179)	13.46 (342)	9.06 (230)	7.94 lbs.	BPE1620A
E16168HQT	15.75 x 15.75 x 7.87 (400 x 400 x 200)	14.64 x 14.04 x 7.54 (372 x 357 x 192)	13.70 x 14.69 (348 x 373)	6.92 (176)	13.46 (342)	12.99 (330)	9.59 lbs.	BPE1616A
E20168HQT	19.69 x 15.75 x 7.87 (500 x 400 x 200)	18.58 x 14.04 x 7.54 (472 x 357 x 192)	17.64 x 14.69 (448 x 373)	6.91 (176)	17.40 (442)	12.99 (330)	11.57 lbs.	BPE2016A
E241610HQT	23.62 x 15.75 x 9.60 (600 x 400 x 230)	22.52 x 14.03 x 8.70 (572 x 356 x 221)	21.50 x 14.69 (546 x 373)	8.07 (205)	21.26 (540)	12.99 (330)	15.72 lbs.	BPE2416A
E242010HQT	23.62 x 19.69 x 9.06 (600 x 500 x 230)	22.52 x 17.95 x 8.70 (572 x 456 x 221)	21.50 x 18.62 (546 x 473)	8.07 (205)	21.26 (540)	16.93 (430)	17.48 lbs.	BPE2420A
E301210HQT	31.50 x 11.81 x 9.06 (800 x 300 x 230)	30.39 x 10.08 x 8.70 (772 x 256 x 221)	29.37 x 10.75 (746 x 273)	8.07 (205)	29.06 (738)	9.06 (230)	14.11 lbs.	BPE3012A
E302412HQT	31.50 x 23.62 x 11.81 (800 x 600 x 300)	30.39 x 21.93 x 11.45 (772 x 557 x 291)	29.29 x 22.56 (744 x 573)	10.82 (275)	29.06 (738)	20.87 (530)	27.89 lbs.	BPE3024A

Freedom™ Series

Proven Protection Made Possible By The Freedom To Design For Your Individual Application Needs

Freedom (FR) Series enclosures are developed for maximum design flexibility and pleasing aesthetics. These attractive yet highly durable enclosures fiberglass-reinforced polyester enclosures are ideal for diverse applications including: high-end electronics, OEM housings and conspicuous industrial applications, both indoors and out. They can be relied on for protection in corrosive environments where a full seal against the outside environment is critical and a watertight seal is a must.

A unique benefit of feature-laden **Freedom** Series enclosures is the internal panel management system empowering the end user to select and use only the features required for their specific application --- and to use every cubic inch of valuable internal enclosure space!

The **Freedom** Series offers an additional feature of panel mounting in the cover for use as an operator interface in industrial equipment control stations.

FREEDOM SERIES ATTRIBUTES

- Available in 2 cover options:
  1. Opaque cover
  2. Flush bonded window
- Maximum visibility to raised panels and control devices
- High temperature, flame retardant, non corrosive, environmental designs
- Stands up to an exceptionally broad range of chemical exposures
- Results in an environmentally sealed, environmentally sound space
- High impact resistance
- Double insulated material No incidental electrical contact
- Solid construction in a lightweight design
- UV Resistant

FREEDOM SERIES INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 12, 13
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Window Temperature Range	(-26°F to +170°F) (-32°C to +76°C)
Flammability Rating	UL94-5V
Window Flammability Rating	UL94-HB
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

Freedom (FR)

HW

HPL

Freedom | Flush Bonded Window (FRW)

HPL

Freedom | HW

HINGED, 2 COVER SCREWS

CONSTRUCTION

Material	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket	Poured Seamless Polyurethane Gasket
Cover Screw Material	304 Stainless Steel
Cover Screw Size	#10-32 x 1-1/4
Cover Screw Torque	20-24 in.-lbs.
Hinge Hardware	304 Stainless Steel

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 12, 13
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

PANELS

Aluminum Back Panel	BP__A	pg. 108
Carbon Steel Back Panel	BP__CS	pg. 108

ACCESSORIES

Mounting Feet	pg. 81
Drain & Breather Vents	pg. 102
PluggIt	pg. 103
Panel Management System	pg. 76-81
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Freedom | HPL

HINGED, 2 LOCKABLE PULL LATCHES

CONSTRUCTION

Material	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket	Poured Seamless Polyurethane Gasket
Cover Screw Size	#10-32 x 1-1/4
Cover Screw Torque	20-24 in.-lbs.
Hinge and Latch Hardware	304 Stainless Steel

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 12, 13
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

PANELS

Aluminum Back Panel	BP__A	pg. 108
Carbon Steel Back Panel	BP__CS	pg. 108

ACCESSORIES

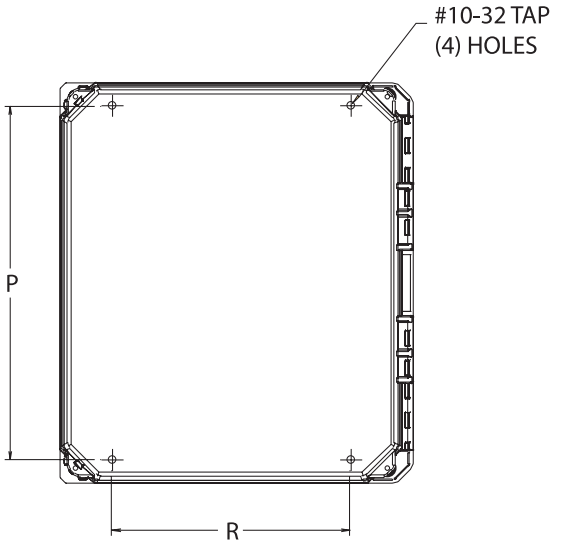
Mounting Feet	pg. 81
Drain & Breather Vents	pg. 102
PluggIt	pg. 103
Panel Management System	pg. 76-81
All Other Accessories	Pg. 102-117

MODIFICATIONS

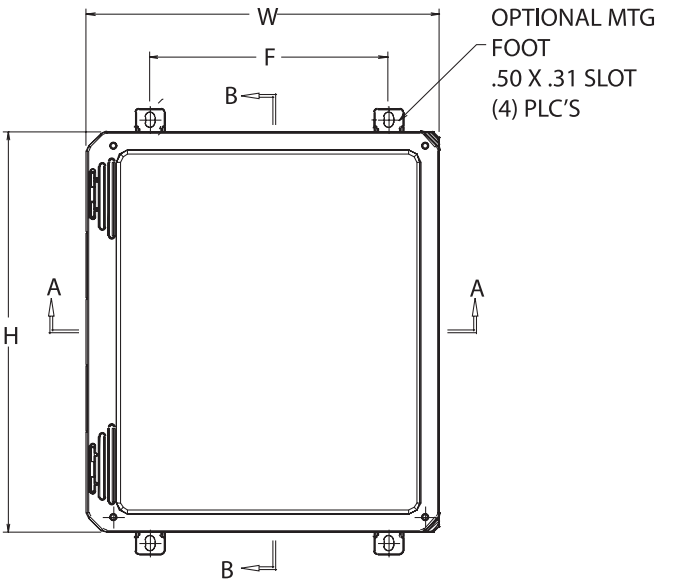
Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

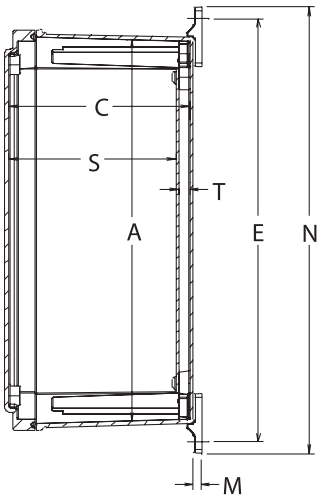
Freedom | HW & HPL

TECHNICAL DRAWINGS / DIMENSIONS

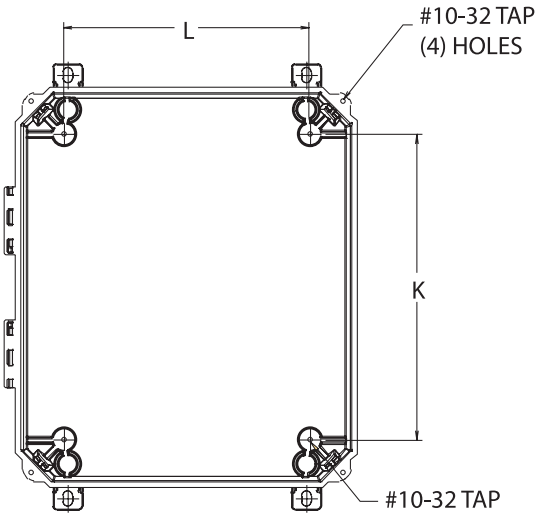


REAR VIEW





SECTION B-B



COVER
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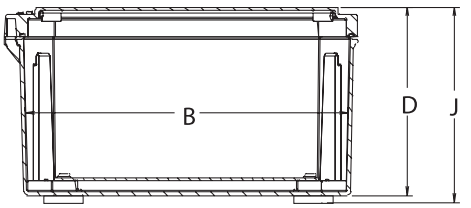


SECTION A-A

FREEDOM OPAQUE COVER SERIES ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING P X R	K	L	S	T	OPT. MOUNT. FEET E X F	N	J	M	SHIPPING WEIGHT	PANEL NUMBER
FR60604HW **FR60604HPL**	7.41 x 7.79 x 4.31 (188 x 198 x 110)	6.77 x 6.77 x 4.06 (172 x 172 x 103)	5.93 x 4.00 (151 x 102)	4.25 (108)	4.25 (108)	3.60 (92)	.38 (10)	8.24 x 4.00 (209 x 102)	9.02 (229)	4.56 (116)	.25 (6)	3.8 lbs	BP66*
FR80604HW **FR80604HPL**	9.41 x 7.79 x 4.31 (239 x 198 x 110)	8.77 x 6.77 x 4.06 (223 x 172 x 103)	7.91 x 4.00 (201 x 102)	6.25 (159)	4.25 (108)	3.60 (92)	.38 (10)	10.21 x 4.00 (259 x 102)	10.98 (279)	4.56 (116)	.25 (6)	4.1 lbs	BP86*
FR80804HW **FR80804HPL**	9.39 x 9.76 x 4.31 (239 x 248 x 109)	8.74 x 8.74 x 4.06 (222 x 222 x 103)	7.91 x 6.00 (201 x 152)	6.25 (159)	6.25 (159)	3.60 (92)	.38 (10)	10.21 x 6.00 (259 x 152)	10.98 (279)	4.56 (116)	.25 (6)	4.9 lbs	BP88*
FR100806HW **FR100806HPL**	11.42 x 9.79 x 6.31 (290 x 249 x 160)	10.73 x 8.73 x 6.06 (273 x 222 x 154)	9.89 x 6.00 (251 x 152)	8.25 (210)	6.25 (159)	5.60 (142)	.38 (10)	12.19 x 6.00 (310 x 152)	12.96 (329)	6.56 (167)	.25 (6)	6.2 lbs	BP108*
FR121006HW **FR121006HPL**	13.45 x 11.83 x 6.31 (342 x 301 x 160)	12.69 x 10.69 x 6.06 (322 x 272 x 154)	11.88 x 8.00 (302 x 203)	10.25 (260)	8.25 (210)	5.60 (142)	.38 (10)	14.18 x 8.00 (360 x 203)	14.95 (380)	6.56 (167)	.25 (6)	8.0 lbs	BP1210*
FR141206HW **FR141206HPL**	15.44 x 13.86 x 6.34 (392 x 352 x 161)	14.72 x 12.72 x 6.06 (374 x 323 x 154)	13.91 x 10.00 (353 x 254)	12.25 (311)	10.25 (260)	5.60 (142)	.38 (10)	16.21 x 10.00 (412 x 254)	16.98 (431)	6.59 (167)	.25 (6)	10.0 lbs	BP1412*
FR141208HW **FR141208HPL**	15.44 x 13.86 x 8.34 (392 x 352 x 212)	14.66 x 12.66 x 8.06 (372 x 322 x 205)	13.91 x 10.00 (353 x 254)	12.25 (311)	10.25 (260)	7.60 (193)	.38 (10)	16.19 x 10.00 (411 x 254)	16.96 (431)	8.59 (218)	.25 (6)	12.5 lbs	BP1412*
FR161408HW **FR161408HPL**	17.58 x 15.96 x 8.34 (447 x 405 x 212)	16.69 x 14.69 x 8.06 (424 x 373 x 205)	15.96 x 12.00 (405 x 305)	14.25 (362)	12.25 (311)	7.60 (193)	.38 (10)	18.26 x 12.00 (464 x 305)	19.04 (484)	8.59 (218)	.25 (6)	13.3 lbs	BP1614*
FR181610HW **FR181610HPL**	19.77 x 18.15 x 10.34 (502 x 461 x 263)	18.63 x 16.63 x 10.06 (473 x 422 x 256)	17.94 x 14.00 (456 x 356)	16.25 (413)	14.25 (362)	9.60 (244)	.38 (10)	20.24 x 14.00 (514 x 356)	21.02 (534)	10.59 (269)	.25 (6)	20.2 lbs	BP1816*
FR201610HW **FR201610HPL**	21.79 x 18.16 x 10.34 (554 x 461 x 263)	20.63 x 16.63 x 10.06 (524 x 422 x 256)	19.96 x 14.00 (507 x 356)	18.25 (463)	14.25 (362)	9.59 (244)	.38 (10)	22.26 x 14.00 (566 x 356)	23.04 (585)	10.59 (269)	.25 (6)	21.7 lbs	BP2016*

All measures are in inches, items in parentheses are in millimeters.
**Panel sold separately.*
*** Clear cover option available. Consult factory.*
**** Screw down cover option available. Consult factory.*
***** HLL cover option available. Consult factory.*

Freedom | Flush Bonded Window | HPL

HINGED, 2 LOCKABLE PULL LATCHES

CONSTRUCTION

Material	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket	Poured Seamless Polyurethane Gasket
Window	Acrylic - Super Abrasion Resistant (SAR)
Hinge and Latch Hardware	304 Stainless Steel

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 12, 13
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Window Temperature Range	(-26°F to +170°F) (-32°C to +76°C)
Flammability Rating	UL94-5V
Window Flammability Rating	UL94-HB
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

PANELS

Aluminum Back Panel	BP__A	pg. 108
Carbon Steel Back Panel	BP__CS	pg. 108

ACCESSORIES

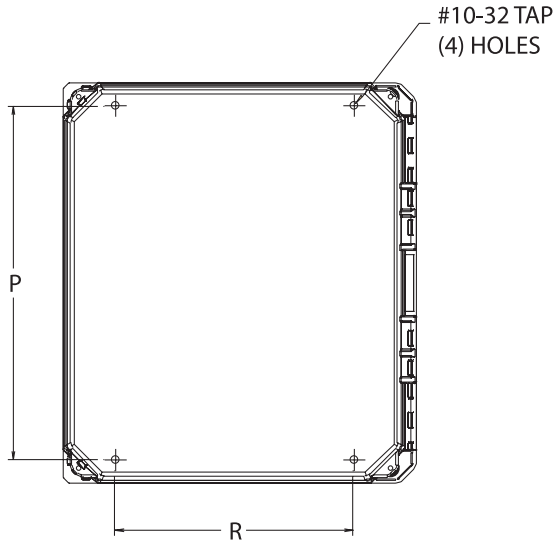
Mounting Feet	pg. 81
Drain & Breather Vents	pg. 102
PluggIt	pg. 103
Panel Management System	pg. 76-81
All Other Accessories	Pg. 102-117

MODIFICATIONS

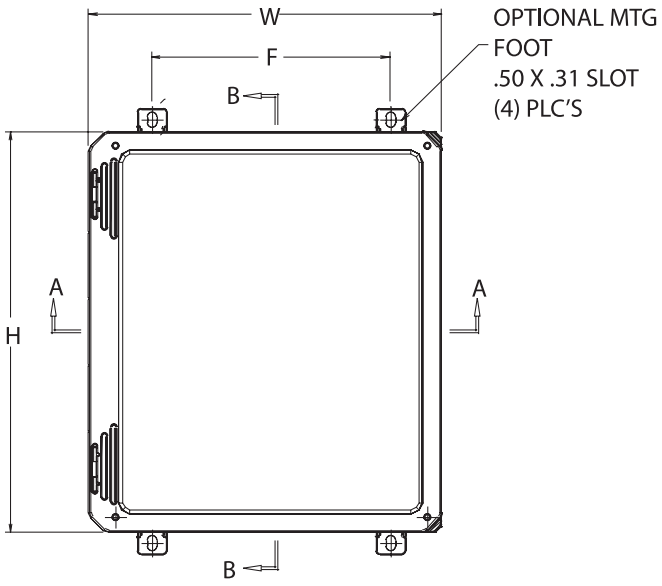
Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

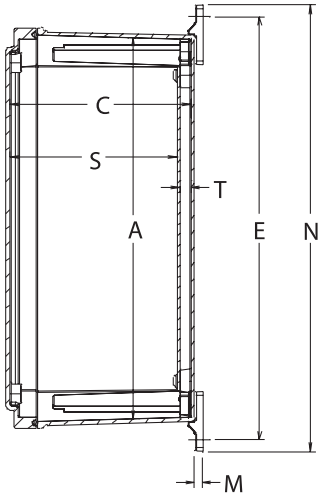
Freedom | Flush Bonded Window | HPL

TECHNICAL DRAWINGS

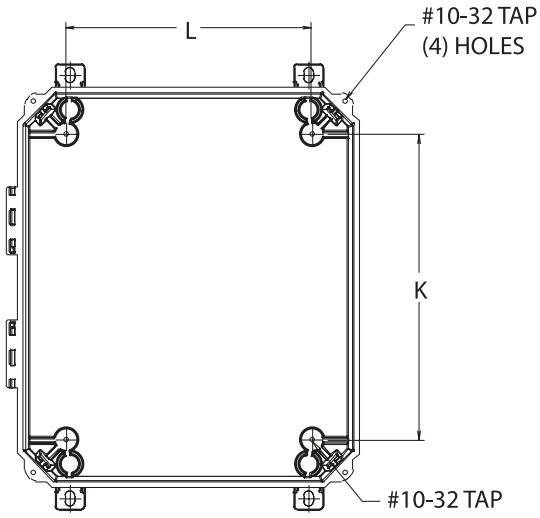


REAR VIEW





SECTION B-B



COVER
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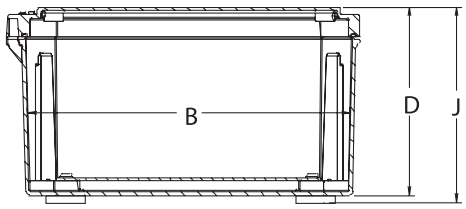


SECTION A-A

Freedom | Flush Bonded Window | HPL

DIMENSIONS

FREEDOM WINDOW SERIES ENCLOSURES

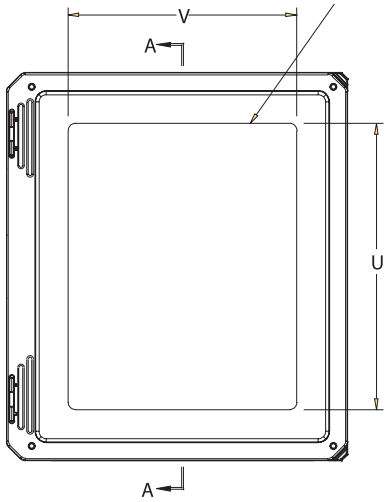
SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING P X R	K	L	S	T	OPT. MOUNT. FEET E X F	N	J	M	SHIPPING WEIGHT	PANEL NUMBER
FRW60604HPL	7.41 x 7.79 x 4.31 (188 x 198 x 110)	6.77 x 6.77 x 4.06 (172 x 172 x 103)	5.93 x 4.00 (151 x 102)	4.25 (108)	4.25 (108)	3.60 (92)	.38 (10)	8.24 x 4.00 (209 x 102)	9.02 (229)	4.56 (116)	.25 (6)	3.8 lbs	BP66*
FRW80604HPL	9.41 x 7.79 x 4.31 (239 x 198 x 110)	8.77 x 6.77 x 4.06 (223 x 172 x 103)	7.91 x 4.00 (201 x 102)	6.25 (159)	4.25 (108)	3.60 (92)	.38 (10)	10.21 x 4.00 (259 x 102)	10.98 (279)	4.56 (116)	.25 (6)	4.1 lbs	BP86*
FRW80804HPL	9.39 x 9.76 x 4.31 (239 x 248 x 110)	8.74 x 8.74 x 4.06 (222 x 222 x 103)	7.91 x 6.00 (201 x 152)	6.25 (159)	6.25 (159)	3.60 (92)	.38 (10)	10.21 x 6.00 (259 x 152)	10.98 (279)	4.56 (116)	.25 (6)	4.9 lbs	BP88*
FRW100806HPL	11.42 x 9.79 x 6.31 (290 x 249 x 160)	10.73 x 8.73 x 6.06 (273 x 222 x 154)	9.89 x 6.00 (251 x 152)	8.25 (210)	6.25 (159)	5.60 (142)	.38 (10)	12.19 x 6.00 (310 x 152)	12.96 (329)	6.56 (167)	.25 (6)	6.2 lbs	BP108*
FRW121006HPL	13.45 x 11.83 x 6.31 (342 x 301 x 160)	12.69 x 10.69 x 6.06 (322 x 272 x 154)	11.88 x 8.00 (302 x 203)	10.25 (260)	8.25 (210)	5.60 (142)	.38 (10)	14.18 x 8.00 (360 x 203)	14.95 (380)	6.56 (167)	.25 (6)	8.0 lbs	BP1210*
FRW141206HPL	15.49 x 13.86 x 6.34 (393 x 352 x 161)	14.72 x 12.72 x 6.06 (374 x 323 x 154)	13.91 x 10.00 (353 x 254)	12.25 (311)	10.25 (260)	5.60 (142)	.38 (10)	16.21 x 10.00 (412 x 254)	16.98 (431)	6.59 (167)	.25 (6)	10.0 lbs	BP1412*
FRW141208HPL	15.49 x 13.86 x 8.34 (393 x 352 x 212)	14.66 x 12.66 x 8.06 (372 x 322 x 205)	13.88 x 10.00 (353 x 254)	12.25 (311)	10.25 (260)	7.60 (193)	.38 (10)	16.19 x 10.00 (411 x 254)	16.96 (431)	8.59 (218)	.25 (6)	12.5 lbs	BP1412*
FRW161408HPL	17.58 x 15.96 x 8.34 (447 x 405 x 212)	16.69 x 14.69 x 8.06 (424 x 373 x 205)	15.96 x 12.00 (405 x 305)	14.25 (362)	12.25 (311)	7.60 (193)	.38 (10)	18.26 x 12.00 (464 x 305)	19.04 (484)	8.59 (218)	.25 (6)	13.3 lbs	BP1614*
FRW181610HPL	19.77 x 18.15 x 10.34 (502 x 461 x 263)	18.63 x 16.63 x 10.06 (473 x 422 x 256)	17.94 x 14.00 (456 x 356)	16.25 (413)	14.25 (362)	9.60 (244)	.38 (10)	20.24 x 14.00 (514 x 356)	21.02 (534)	10.59 (269)	.25 (6)	20.2 lbs	BP1816*
FRW201610HPL	21.79 x 18.16 x 10.34 (554 x 461 x 263)	20.63 x 16.63 x 10.06 (524 x 422 x 256)	19.96 x 14.00 (507 x 356)	18.25 (463)	14.25 (362)	9.59 (244)	.38 (10)	22.26 x 14.00 (566 x 356)	23.04 (585)	10.59 (269)	.25 (6)	21.7 lbs	BP2016*

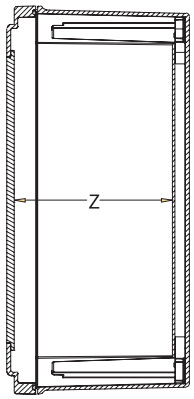
All measures are in inches, items in parentheses are in millimeters.
**Panel sold separately.*

VIEWING WINDOW COVER (FRW)

SIZE ID NUMBER	U	V	Z
FRW60604	4.25 (107.95)	4.25 (107.95)	3.48 (88.26)
FRW80604	6.25 (158.75)	4.25 (107.95)	3.48 (88.26)
FRW80804	6.25 (158.75)	6.25 (158.75)	3.48 (88.26)
FRW100806	8.25 (209.55)	6.25 (158.75)	5.48 (139.19)
FRW121006	10.25 (260.35)	8.25 (209.55)	5.48 (139.19)
FRW141206	12.25 (311.15)	10.25 (260.35)	5.48 (139.19)
FRW141208	12.25 (311.15)	10.25 (260.35)	7.48 (189.99)
FRW161408	14.25 (361.95)	12.25 (311.15)	7.48 (189.99)
FRW181610	16.25 (412.75)	14.25 (361.95)	9.48 (240.79)
FRW201610	18.25 (463.55)	14.25 (361.95)	9.46 (240.28)

All measures are in inches, items in parentheses are in millimeters.





SECTION
A-A

The Design Difference...
Unsurpassed Panel Management System®

AttaBox's innovative "Freedom" Panel Management System® enables Freedom users to take maximum advantage of ALL enclosure space...including the inside of the cover!

- Back Panel
- Variable Height Stationary Panel
- Variable Height Swing Panel
- Dead Front Swing Panel
- Cover Panel

The Freedom Panel Management System®
Offers Many Benefits:

- Full utilization of both space and design. All space within the enclosure can be accessed and utilized with minimal requirements for additional mounting hardware.
- Panel maneuverability at both the time of assembly and in actual field use.
- Optimized use and function of all usable space within the enclosure while assisting in the mounting of cover mounted devices, such as touchpads and printed circuit boards.
- Maximized visibility of panels that offer critical feedback, such as instrumentation, while preserving the integrity of the enclosure.
- Ability to meet unique visual requirements usually associated with a dead front panel.
- Ability to meet the needs for mounting surface at rear of enclosure.
- Ability to meet end users' design capabilities and field changes that would otherwise require major modification or costly disassembly.
- Ability to externally assemble, then "drop in" to the enclosure DIN rail mounted components, thereby minimizing assembly, modification and field servicing.
- Maximum surface area for pushbutton or touchpad layout. Maximizes end users' design possibilities.
- Ability to meet end users' requirements for the installation of isolated visibility or custom visual requirements.
- Offers restricted access to areas of adjustment and calibration.

Go from This!...

...To This!

Freedom | Panel Management System

BACK PANEL

- Traditional sized back panel
- Common industry mounting footprint
- Wide choice of material

DEAD FRONT SWING PANEL

- Mounts at the front of the enclosure
- Larger surface area when compared to the variable height swing panel
- Hinged on one side, secured to the other
- Used in conjunction with corner mounting posts

VARIABLE HEIGHT STATIONARY PANEL

- Mounts at any height in the enclosure base including as back panel or use as a top stationary dead front panel
- Larger panel area than traditional back panels maximizes surface mounting area
- Used in conjunction with corner mounting posts

VARIABLE HEIGHT SWING PANEL

- Mounts at any height in the enclosure base
- Hinged on one side, secured to the other
- Used in conjunction with corner mounting posts

COVER PANEL

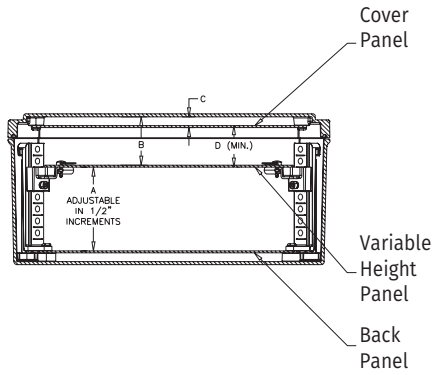
- Stationary panel that mounts to the inside of the enclosure cover.

USE MULTIPLE PANELS

Unique. Reliable. Flexible. Revolutionary. It's What You Want It To Be!

Just imagine ... an enclosure system that truly can be what you want...and need...it to be!
Today, that enclosure system is a reality...with **Freedom**, from AttaBox.

The revolutionary design of **Freedom** provides a one-of-a-kind enclosure architecture that can range from "bare bones" basic yet durable simplicity to a highly customized, sophisticated protective structure.



FREEDOM SERIES ENCLOSURES PANEL MANAGEMENT SYSTEM®

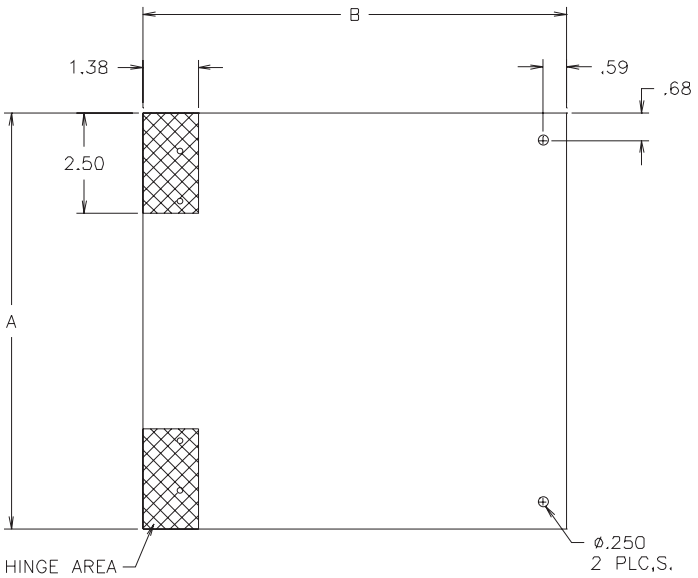
SIZE ID	FIXED PANEL (MIN) A	SWING PANEL (MIN) A	(MAX) A	OPAQUE/BONDED WINDOW CVR B	CLEAR CVR B	C	D (MIN)
60604	1.50 (38.1)	2.00 (50.08)	2.50 (63.50)	1.025 (26.03)	1.025 (26.03)	.375 (9.52)	.57 (14.48)
80604	1.50 (38.1)	2.00 (50.08)	2.50 (63.50)	1.025 (26.03)	1.025 (26.03)	.375 (9.52)	.57 (14.48)
80804	1.50 (38.1)	2.00 (50.08)	2.50 (63.50)	1.025 (26.03)	1.025 (26.03)	.375 (9.52)	.57 (14.48)
100806	1.50 (38.1)	2.00 (50.08)	4.50 (114.30)	1.025 (26.03)	1.025 (26.03)	.375 (9.52)	.57 (14.48)
121006	1.50 (38.1)	2.00 (50.08)	4.50 (114.30)	1.025 (26.03)	0.994 (25.24)	.375 (9.52)	.57 (14.48)
141206	1.50 (38.1)	2.00 (50.08)	4.50 (114.30)	1.025 (26.03)	0.963 (24.44)	.375 (9.52)	.57 (14.48)
141208	1.50 (38.1)	2.00 (50.08)	6.50 (165.1)	1.025 (26.03)	0.963 (24.44)	.375 (9.52)	.57 (14.48)
161408	1.50 (38.1)	2.00 (50.08)	6.50 (165.1)	1.025 (26.03)	0.963 (24.44)	.375 (9.52)	.57 (14.48)
181610	1.50 (38.1)	2.00 (50.08)	8.50 (215.90)	1.025 (26.03)	N/A	.375 (9.52)	.57 (14.48)
201610	1.50 (38.1)	2.00 (50.08)	8.50 (215.90)	1.025 (26.03)	N/A	.375 (9.52)	.57 (14.48)

Note: Swing and stationary panels adjust in 1/2" increments
"C" not applicable for clear cover
Cover panel kit not available for clear cover options

VARIABLE HEIGHT SWING PANEL

PART NUMBER	A	B	PANEL THK.	PANEL TYPE
P806ASA	6.38 (162)	6.56 (1167)	.080 (2)	Flat
P808ASA	6.38 (162)	8.56 (217)	.080 (2)	Flat
P1008ASA	8.38 (213)	8.56 (217)	.080 (2)	Flat
P1210ASA	10.38 (264)	10.56 (268)	.080 (2)	Flat
P1412ASA	12.38 (314)	12.56 (319)	.080 (2)	Flat
P1614ASA	14.38 (365)	14.56 (370)	.080 (2)	Flat
P1816ASA	16.38 (416)	16.56 (421)	.080 (2)	Flat
P2016ASA	18.38 (467)	16.56 (421)	.080 (2)	Flat

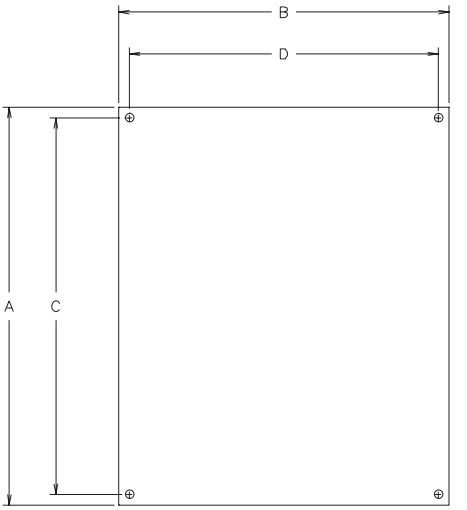
Caution: Metric units are for reference; do not convert.

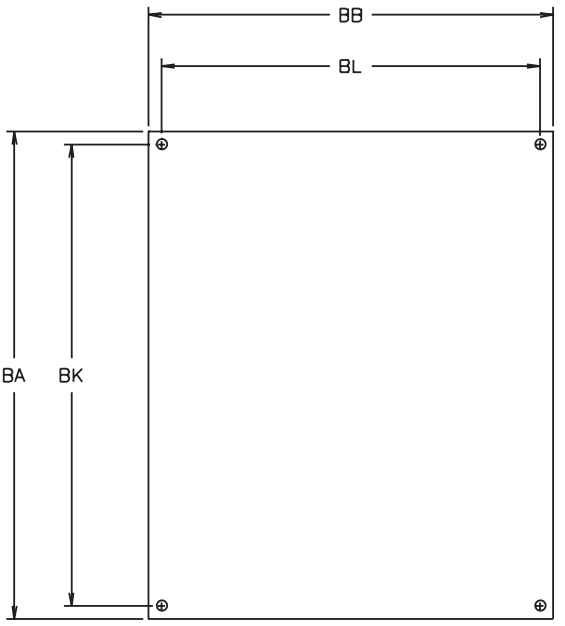


COVER PANEL DIMENSIONS

PART NUMBER	A	B	C	D	PANEL THK.	PANEL TYPE	HOLE DIA	#OF HOLES
CP606AL	5.64 (143)	5.64 (143)	5.02 (127)	5.02 (127)	.080 (2)	Flat	.25 (6)	4
CP806AL	7.68 (195)	5.64 (143)	7.05 (179)	5.02 (127)	.080 (2)	Flat	.25 (6)	4
CP808AL	7.68 (195)	7.68 (195)	7.05 (179)	7.05 (179)	.080 (2)	Flat	.25 (6)	4
CP1008AL	9.71 (247)	7.71 (196)	9.08 (231)	7.08 (180)	.080 (2)	Flat	.25 (6)	4
CP1210AL	11.74 (298)	9.74 (247)	11.12 (282)	9.12 (232)	.080 (2)	Flat	.25 (6)	4
CP1412AL	13.78 (350)	11.78 (299)	13.15 (334)	11.15 (283)	.080 (2)	Flat	.25 (6)	4
CP1614AL	15.81 (402)	13.81 (351)	15.18 (386)	13.18 (334)	.080 (2)	Flat	.25 (6)	4
CP1816AL	17.94 (456)	15.94 (405)	17.31 (440)	15.31 (389)	.080 (2)	Flat	.25 (6)	4
CP2016AL	19.76 (502)	15.76 (400)	19.13 (486)	15.13 (384)	.080 (2)	Flat	.25 (6)	4

Caution: Metric units are for reference; do not convert.





BACK PANEL DIMENSIONS

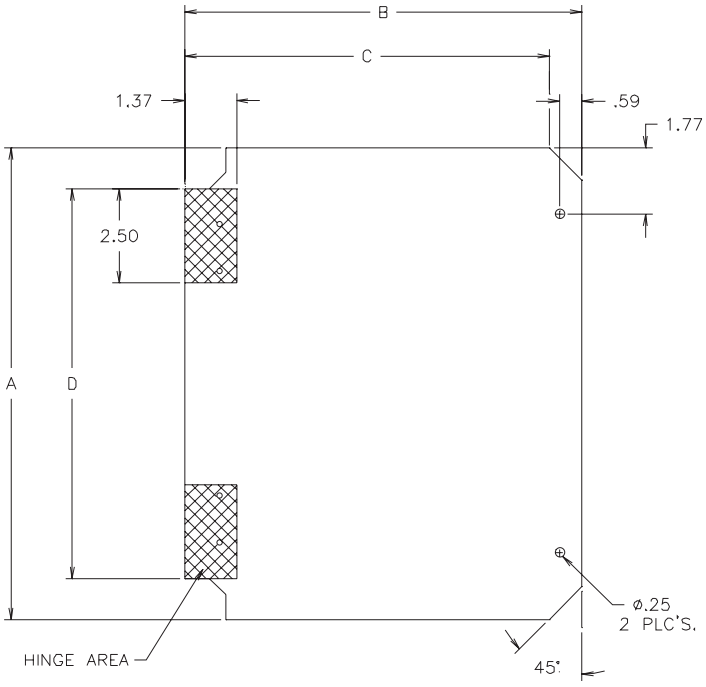
PART NUMBER	BA	BB	BK	BL	PANEL THK.	PANEL TYPE	HOLE DIA.	#OF HOLES
BP66	4.88 (124)	4.88 (124)	4.25 (108)	4.25 (108)	.080 (2)	Flat	.25 (6)	4
BP86	6.88 (175)	4.88 (124)	6.25 (159)	4.25 (108)	.080 (2)	Flat	.25 (6)	4
BP88	6.88 (175)	6.88 (175)	6.25 (159)	6.25 (159)	.080 (2)	Flat	.25 (6)	4
BP108	8.88 (225)	6.88 (175)	8.25 (210)	6.25 (159)	.080 (2)	Flat	.25 (6)	4
BP1210	10.88 (276)	8.88 (225)	10.25 (260)	8.25 (210)	.080 (2)	Flat	.25 (6)	4
BP1412	12.88 (327)	10.88 (276)	12.25 (311)	10.25 (260)	.080 (2)	Flat	.25 (6)	4
BP1614	14.88 (378)	12.88 (327)	14.25 (362)	12.25 (311)	.080 (2)	Flat	.25 (6)	4
BP1816	16.88 (429)	14.88 (378)	16.25 (413)	14.25 (362)	.080 (2)	Flat	.25 (6)	4
BP2016	18.88 (480)	14.88 (378)	18.25 (464)	14.25 (362)	.090 (2)	Flat	.25 (6)	4

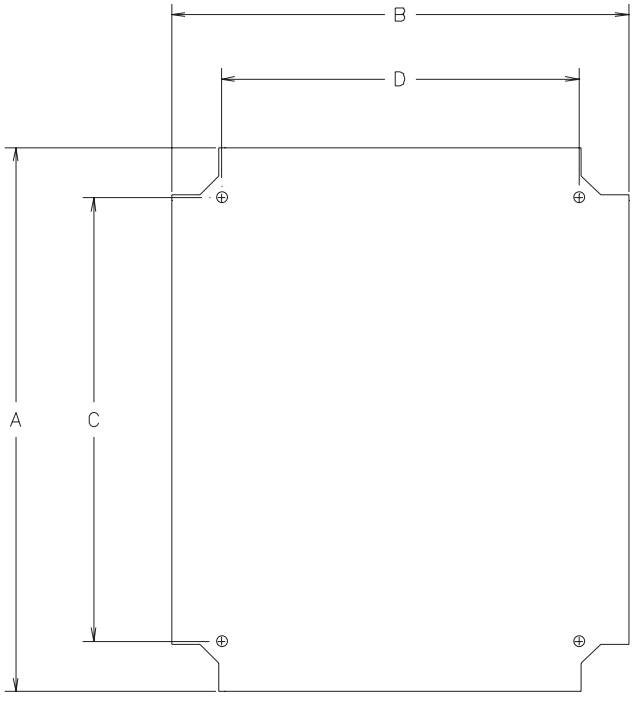
Caution: Metric units are for reference; do not convert.
Suffix - Available materials
AL - Aluminum
CS - Painted Carbon Steel
Example: BP1210A

DEAD FRONT SWING PANEL DIMENSIONS

PART NUMBER	A	B	C	D	PANEL THK.	PANEL TYPE
P806SWA	8.56 (217)	6.56 (167)	5.70 (145)	6.37 (162)	.080 (2)	Flat
P808SWA	8.56 (217)	8.56 (217)	7.70 (196)	6.37 (162)	.080 (2)	Flat
P1008SWA	10.56 (268)	8.56 (217)	7.70 (196)	8.37 (213)	.080 (2)	Flat
P1210SWA	12.56 (319)	10.56 (268)	10.37 (246)	9.70 (263)	.080 (2)	Flat
P1412SWA	14.56 (370)	12.56 (319)	11.70 (297)	12.37 (314)	.080 (2)	Flat
P1614SWA	16.56 (421)	14.56 (370)	15.57 (399)	14.37 (365)	.080 (2)	Flat
P1816SWA	18.56 (471)	16.56 (421)	15.70 (399)	16.37 (467)	.080 (2)	Flat
P2016SWA	20.56 (522)	16.56 (421)	15.70 (399)	18.37 (467)	.080 (2)	Flat

Caution: Metric units are for reference; do not convert.





VARIABLE HEIGHT STATIONARY PANEL DIMENSIONS

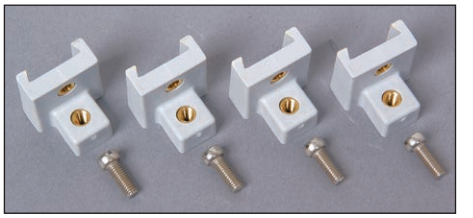
PART NUMBER	A	B	C	D	PANEL THK.	PANEL TYPE	HOLE DIA.	#OF HOLES
P606STA	6.56 (167)	6.56 (167)	4.25 (108)	4.25 (108)	.080 (2)	Flat	.25 (6)	4
P806STA	8.56 (217)	6.56 (167)	6.25 (159)	4.25 (108)	.080 (2)	Flat	.25 (6)	4
P808STA	8.56 (217)	8.56 (217)	6.25 (159)	6.25 (159)	.080 (2)	Flat	.25 (6)	4
P1008STA	10.56 (268)	8.56 (217)	8.25 (210)	6.25 (159)	.080 (2)	Flat	.25 (6)	4
P1210STA	12.56 (319)	10.56 (268)	10.25 (210)	8.25 (260)	.080 (2)	Flat	.25 (6)	4
P1412STA	14.56 (370)	12.56 (319)	12.25 (311)	10.25 (260)	.080 (2)	Flat	.25 (6)	4
P1614STA	16.56 (421)	14.56 (370)	14.25 (362)	12.25 (311)	.080 (2)	Flat	.25 (6)	4
P1816STA	18.56 (471)	16.56 (421)	16.25 (413)	14.25 (362)	.080 (2)	Flat	.25 (6)	4
P2016STA	20.56 (522)	16.56 (421)	18.25 (464)	14.25 (362)	.080 (2)	Flat	.25 (6)	4

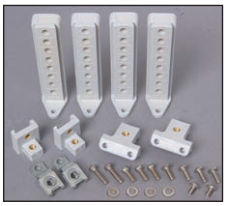
Caution: Metric units are for reference; do not convert.

Freedom | Panel Management System

PANEL KITS - ACCESSORIES ONLY, PANELS NOT INCLUDED

SIZE ID	STATIONARY PANEL ACCESSORY KIT	STATIONARY PANEL BRACKET KIT	SWING PANEL ACCESSORY KIT	SWING PANEL BRACKET KIT	CORNER POST KIT
60604	FR4PKA	FRAPBKT	N/A	N/A	FR4POST
80604	FR4PKA	FRAPBKT	FR4SPKA	FRSPBKT	FR4POST
80804	FR4PKA	FRAPBKT	FR4SPKA	FRSPBKT	FR4POST
100806	FR6PKA	FRAPBKT	FR6SPKA	FRSPBKT	FR6POST
121006	FR6PKA	FRAPBKT	FR6SPKA	FRSPBKT	FR6POST
141206	FR6PKA	FRAPBKT	FR6SPKA	FRSPBKT	FR6POST
141208	FR8PKA	FRAPBKT	FR8SPKA	FRSPBKT	FR8POST
161408	FR8PKA	FRAPBKT	FR8SPKA	FRSPBKT	FR8POST
181610	FR10PKA	FRAPBKT	FR10SPKA	FRSPBKT	FR10POST
201610	FR10PKA	FRAPBKT	FR10SPKA	FRSPBKT	FR10POST


Stationary Panel Bracket Kit


Swing Panel Accessory Kit

Swing Panel Bracket Kit

Corner Post Kit

Stationary Panel Accessory Kit

Dead Front Swing Panel & Swing Panel Accessory Kit

PANEL & ACCESSORY COMBINATION KITS, INCLUDES PANEL

SIZE ID	DEAD FRONT SWING PANEL & ACCESS. KIT	VARIABLE HEIGHT SWING PANEL & ACCESS. KIT	VARIABLE HEIGHT STATIONARY PNL & ACCESS. KIT	VARIABLE HEIGHT BACK PNL & ACCESS. KIT
60604	N/A	N/A	FR60604PKA	FR60604BPKA
80604	FR80604SPK	FR80604SPKA	FR80604PKA	FR80604BPKA
80804	FR80804SPK	FR80804SPKA	FR80804PKA	FR80804BPKA
100806	FR100806SPK	FR100806SPKA	FR100806PKA	FR100806BPKA
121006	FR121006SPK	FR121006SPKA	FR121006PKA	FR121006BPKA
141206	FR141206SPK	FR141206SPKA	FR141206PKA	FR141206BPKA
141208	FR141208SPK	FR141208SPKA	FR141208PKA	FR141208BPKA
161408	FR161408SPK	FR161408SPKA	FR161408PKA	FR161408BPKA
181610	FR181610SPK	FR181610SPKA	FR181610PKA	FR181610BPKA
201610	FR201610SPK	FR201610SPKA	FR201610PKA	FR201610BPKA

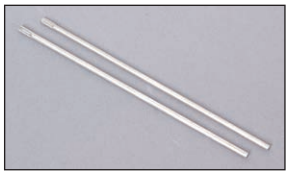
Variable Height Swing Panel & Swing Panel Accessory Kit

Variable Height Back Panel & Stationary Panel Accessory Kit

Variable Height Stationary Panel & Stationary Panel Accessory Kit

Mounting Feet

Cover Screw Kit



Hinge Kit

OTHER ACCESSORY KITS

SIZE ID	MTG. FOOT KIT	OPAQUE COVER SCREW KIT	PULL LATCH KIT	HINGE KIT
60604	FRMGFTKIT	FRWKIT	FRHPLKIT	FR3HINGEKIT
80604	FRMGFTKIT	FRWKIT	FRHPLKIT	FR4HINGEKIT
80804	FRMGFTKIT	FRWKIT	FRHPLKIT	FR4HINGEKIT
100806	FRMGFTKIT	FRWKIT	FRHPLKIT	FR5HINGEKIT
121006	FRMGFTKIT	FRWKIT	FRHPLKIT	FR5HINGEKIT
141206	FRMGFTKIT	FRWKIT	FRHPLKIT	FR6HINGEKIT
141208	FRMGFTKIT	FRWKIT	FRHPLKIT	FR6HINGEKIT
161408	FRMGFTKIT	FRWKIT	FRHPLKIT	FR6HINGEKIT
181610	FRMGFTKIT	FRWKIT	FRHPLKIT	FR6HINGEKIT
201610	FRMGFTKIT	FRWKIT	FRHPLKIT	FR6HINGEKIT

Lockable Pull Latch Kit

Freedom | Covers Only

OPAQUE COVERS	VIEWING WINDOW COVERS
PART NUMBER	PART NUMBER
FR606CVR	**FRW606CVR**
FR806CVR	**FRW806CVR**
FR808CVR	**FRW808CVR**
FR1008CVR	**FRW1008CVR**
FR1210CVR	**FRW1210CVR**
FR1412CVR	**FRW1412CVR**
FR1614CVR	**FRW1614CVR**
FR1816CVR	**FRW1816CVR**
FR2016CVR	**FRW2016CVR**

Centurion™ Series

Proven Protection That Balances Aesthetics With Physical Performance

Centurion (CE) Series fiberglass-reinforced polyester enclosures have been designed for general electrical and electronic applications, as well as industrial and OEM applications requiring broader protection from environmental forces. They offer a unique feature provided by a hidden hinge design and flush fitting cover, making **Centurion** Series enclosures ideal for applications such as control stations and operator interface units in both MRO and OEM environments.

These enclosures, with their smooth, rounded edges and contemporary aesthetics, enhance the appearance of any instrument installation. They are especially well suited for applications with prominent visibility in both industrial and commercial applications.

Of equal importance, **Centurion** Series enclosures are truly tough and durable in the most demanding uses. Both chemical resistance and watertight capabilities make them ideal across a broad spectrum of environmental installations.

CENTURION SERIES ATTRIBUTES

- Available in 2 cover options:
  1. Opaque cover
  2. Flush bonded window
- Stands up to an exceptionally broad range of chemical exposures
- High impact resistance
- Double insulated material. No incidental electrical contact
- Hidden hinge design
- UV Resistant
- Soft edge design, smooth lines, flush cover
- Super abrasion-resistant acrylic window
- High temperature, flame retardant, non-corrosive, environmental designs

CENTURION SERIES INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 4X, 12
CSA Std. C22.2 File #	LR069014
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

Centurion (CE)

HW

HPL

Centurion | Flush Bonded Window (CEW)

HW

HPL

Centurion | HW

HINGED, 2 COVER SCREWS

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured polyurethane seamless gasket
Back Panel Screw Size	#10-32 x 3/8
Cover Screw Material	304 Stainless Steel
Cover Screw Size	#10-24 x 1
Cover Screw Torque	20-24 in.-lbs.
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BP__A	pg. 108
Carbon Steel	BP__CS	pg. 108

MOUNTING FEET

Mounting Feet	pg. 113

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Centurion | HPL

HINGED, PADLOCK LATCH

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured polyurethane seamless gasket
Back Panel Screw Size	#10-32 x 3/8
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BP__A	pg. 108
Carbon Steel	BP__CS	pg. 108

MOUNTING FEET

Mounting Feet	pg. 113

ACCESSORIES

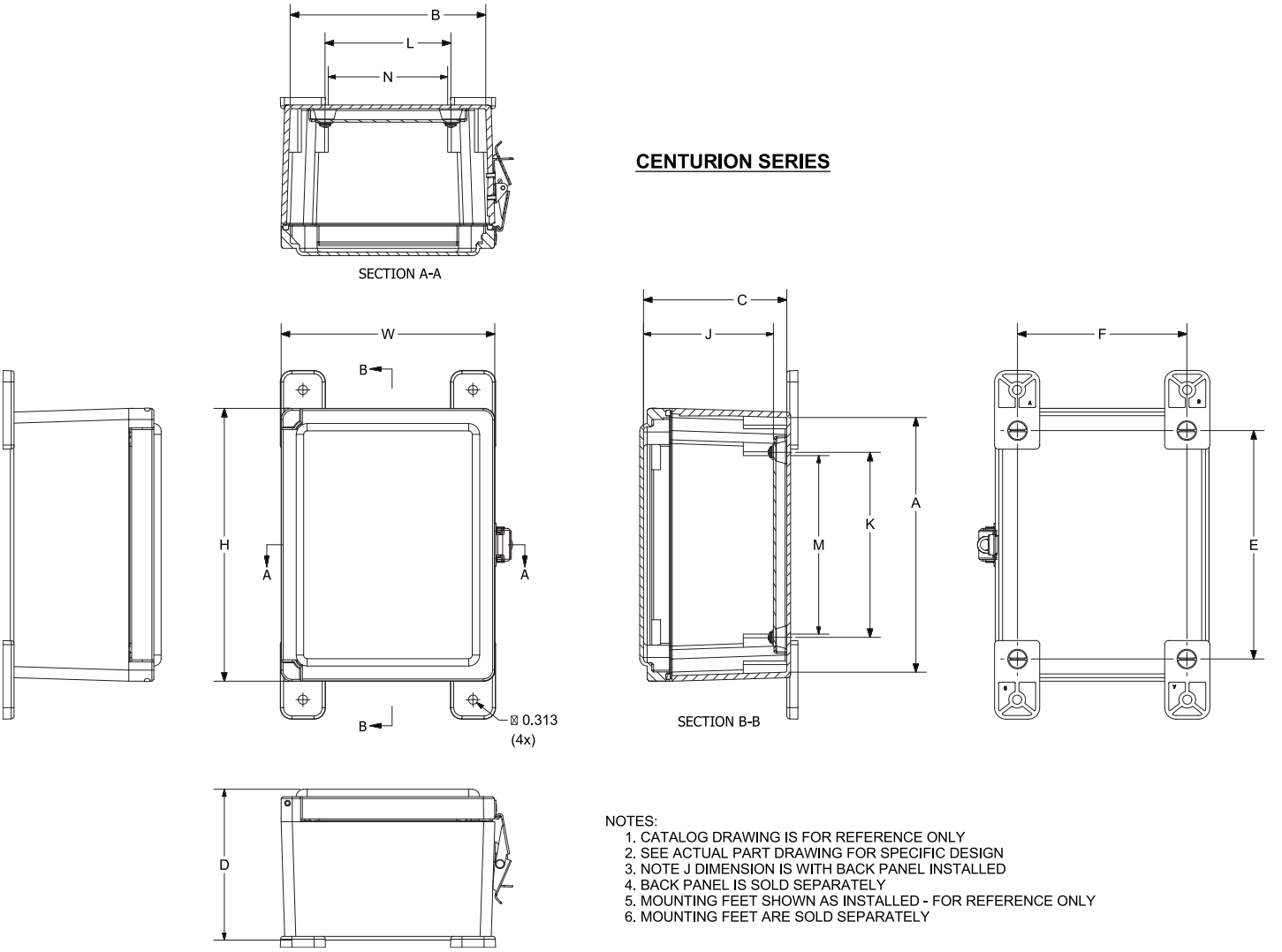
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Centurion | HW & HPL

TECHNICAL DRAWINGS / DIMENSIONS



NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. NOTE J DIMENSION IS WITH BACK PANEL INSTALLED
4. BACK PANEL IS SOLD SEPARATELY
5. MOUNTING FEET SHOWN AS INSTALLED - FOR REFERENCE ONLY
6. MOUNTING FEET ARE SOLD SEPARATELY

CENTURION SERIES ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	M	N	SHIPPING WEIGHT	PANEL NUMBER
CE707HW CE707HPL	7.21 x 7.21 x 5.09 (183 x 183 x 129)	6.65 x 6.65 x 4.84 (169 x 169 x 123)	5.71 x 5.71 (145 x 145)	4.39 (111)	4.25 (108)	4.25 (108)	4.04 (103)	4.04 (103)	4 lbs.	BP66*
CE907HW CE907HPL	9.21 x 7.21 x 5.09 (234 x 183 x 129)	8.59 x 6.59 x 4.84 (218 x 167 x 123)	7.71 x 5.71 (196 x 145)	4.39 (111)	6.25 (159)	4.25 (108)	6.04 (154)	4.04 (103)	4.3 lbs.	BP86*
CE1109HW CE1109HPL	11.21 x 9.21 x 6.09 (285 x 234 x 155)	10.59 x 8.59 x 5.84 (269 x 218 x 148)	9.71 x 7.71 (247 x 196)	5.39 (137)	8.25 (210)	6.25 (159)	8.04 (204)	6.04 (154)	6 lbs.	BP108*
CE1311HW CE1311HPL	13.21 x 11.21 x 6.59 (336 x 285 x 167)	12.59 x 10.59 x 6.34 (320 x 269 x 161)	11.71 x 9.71 (298 x 247)	5.89 (150)	10.25 (260)	8.25 (210)	10.04 (255)	8.04 (204)	7.8 lbs.	BP1210*
CE1513HW CE1513HPL	15.21 x 13.21 x 7.09 (386 x 336 x 180)	14.55 x 12.55 x 6.84 (370 x 319 x 174)	13.71 x 11.71 (348 x 298)	6.39 (162)	12.25 (311)	10.25 (260)	12.04 (306)	10.04 (255)	11.6 lbs.	BP1412*

Centurion | Flush Bonded Window | HW

HINGED, 2 COVER SCREWS

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured polyurethane seamless gasket
Window	Acrylic - Super Abrasion Resistant (SAR)
Back Panel Screw Size	#10-32 x 3/8
Cover Screw Material	304 Stainless Steel
Cover Screw Size	#10-24 x 1
Cover Screw Torque	20-24 in.-lbs.
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Window Temperature Range	(-26°F to +170°F) (-32°C to +76°C)
Window Flammability Rating	UL94-HB
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BP__A	pg. 108
Carbon Steel	BP__CS	pg. 108

MOUNTING FEET

Mounting Feet		pg. 113

ACCESSORIES

4X Breather Vent		pg. 102
4X Drain Vent		pg. 102
PluggIt		pg. 103
Thermal Accessories		pg. 115
All Other Accessories		Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Centurion | Flush Bonded Window | HPL

HINGED, PADLOCK LATCH

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured polyurethane seamless gasket
Window	Acrylic - Super Abrasion Resistant (SAR)
Back Panel Screw Size	#10-32 x 3/8
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3S, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Window Temperature Range	(-26°F to +170°F) (-32°C to +76°C)
Window Flammability Rating	UL94-HB
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BP__A	pg. 108
Carbon Steel	BP__CS	pg. 108

MOUNTING FEET

Mounting Feet	pg. 113

ACCESSORIES

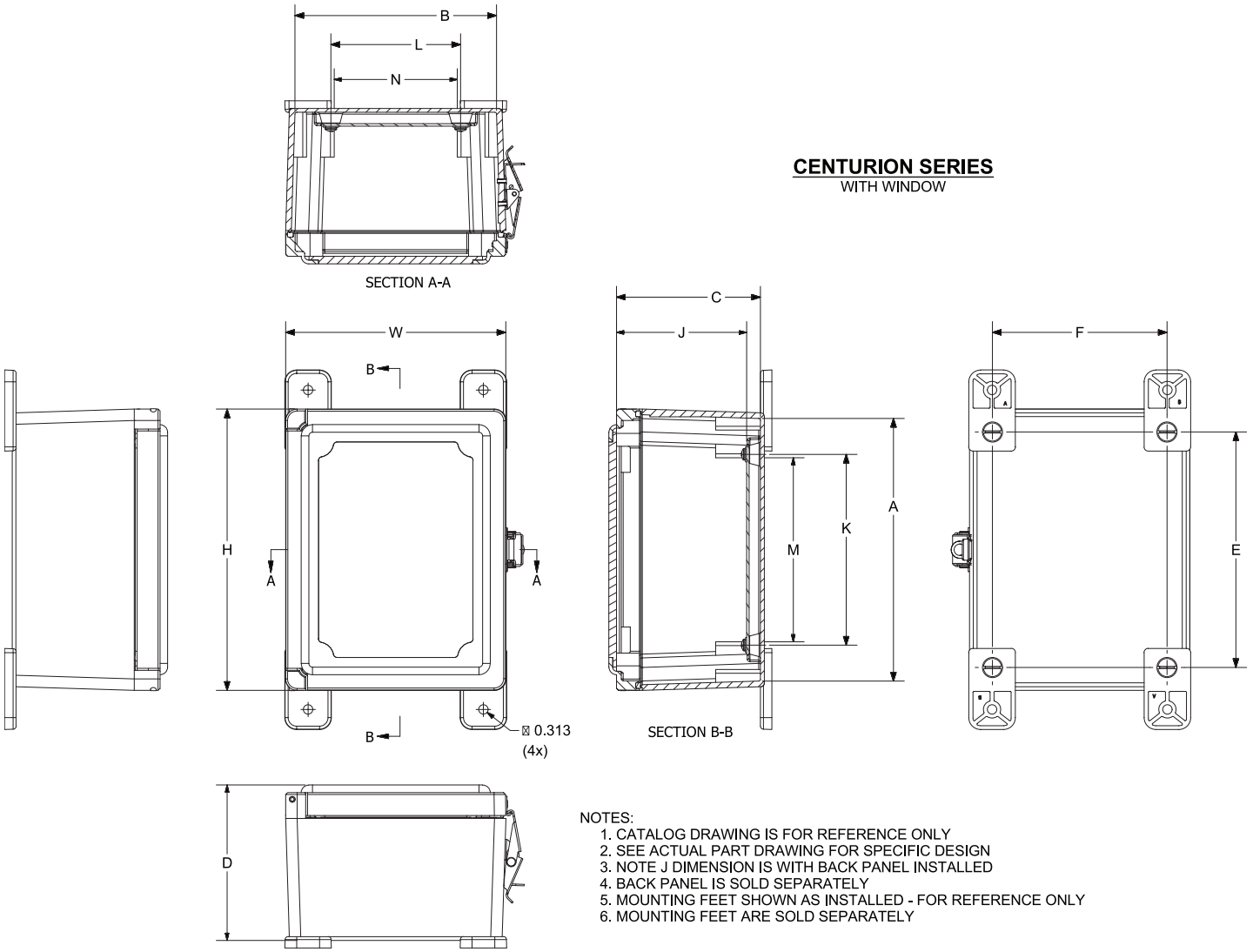
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Centurion | Flush Bonded Window | HW & HPL

TECHNICAL DRAWINGS / DIMENSIONS



NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. NOTE J DIMENSION IS WITH BACK PANEL INSTALLED
4. BACK PANEL IS SOLD SEPARATELY
5. MOUNTING FEET SHOWN AS INSTALLED - FOR REFERENCE ONLY
6. MOUNTING FEET ARE SOLD SEPARATELY

CENTURION WINDOW SERIES ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	WINDOW AREA MAXIMUM	MOUNTING E X F	J	K	L	M	N	SHIPPING WEIGHT	PANEL NUMBER
CEW707HW **CEW707HPL**	7.21 x 7.21 x 5.09 (183 x 183 x 129)	6.65 x 6.65 x 4.84 (169 x 169 x 123)	5.06 x 5.06 (129 x 129)	5.71 x 5.71 (145 x 145)	4.39 (111)	4.25 (108)	4.25 (108)	4.04 (103)	4.04 (103)	4 lbs.	BP66*
CEW907HW **CEW907HPL**	9.21 x 7.21 x 5.09 (234 x 183 x 129)	8.59 x 6.59 x 4.84 (218 x 167 x 123)	7.06 x 5.06 (179 x 129)	7.71 x 5.71 (196 x 145)	4.39 (111)	6.25 (159)	4.25 (108)	6.04 (154)	4.04 (103)	4.3 lbs.	BP86*
CEW1109HW **CEW1109HPL**	11.21 x 9.21 x 6.09 (285 x 234 x 155)	10.59 x 8.59 x 5.84 (269 x 218 x 148)	9.06 x 7.06 (230 x 179)	9.71 x 7.71 (247 x 196)	5.39 (137)	8.25 (210)	6.25 (159)	8.04 (204)	6.04 (154)	6 lbs.	BP108*
CEW1311HW **CEW1311HPL**	13.21 x 11.21 x 6.59 (336 x 285 x 167)	12.59 x 10.59 x 6.34 (320 x 269 x 161)	11.06 x 9.06 (281 x 230)	11.71 x 9.71 (298 x 247)	5.89 (150)	10.25 (260)	8.25 (210)	10.04 (255)	8.04 (204)	7.8 lbs.	BP1210*
CEW1513HW **CEW1513HPL**	15.21 x 13.21 x 7.09 (386 x 336 x 180)	14.55 x 12.55 x 6.84 (370 x 319 x 174)	13.06 x 11.06 (332 x 281)	13.71 x 11.71 (348 x 298)	6.39 (162)	12.25 (311)	10.25 (260)	12.04 (306)	10.04 (255)	11.6 lbs.	BP1412*

MachoBox™ Series

Proven Protection From Designed-In Strength

MachoBox (M) Series enclosures are expanded-size junction boxes made of fiberglass-reinforced polyester, featuring integral mounting flanges and designed to be tough, tough, tough!

MachoBox enclosures are ideal for rugged outdoor environments but also very suitable for indoor mountings where chemical wash-down, dust and aggressive atmospheres are natural threats to all enclosures.

A standard overhang cover design is available in a hinged with padlock configuration. All sizes are 20" or greater in length and width. Threaded brass inserts for fixed rear panel mounting are standard as is a continuously poured polyurethane gasket to ensure a full, reliable environmental seal.

MACHOBOX SERIES ATTRIBUTES

- Overhang cover on smooth sided base
- High temperature, flame retardant, non-corrosive
- All stainless hardware latches and screws
- Full length stainless steel hinge
- Chemically resistant fiberglass reinforced polyester
- Submersible, non corrosive, environmental designs
- Continuous polyurethane gasket

MACHOBOX SERIES INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3R, 4, 4X, 12, 13
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66 per UL File# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	cULus, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

MachoBox (M)

HPL

MachoBox | HPL

HINGED, PADLOCK LATCH

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket Material	Poured Seamless Polyurethane Gasket
Back Panel Screw Size	#1/2-20x5/16
Metal Inserts	All threaded brass inserts accepting #1/4-20 screws
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded edges, minimal protrusions or exposed pocket areas for assembly of dust and debris

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3R, 4, 4X, 12, 13
IEC 60529 Ratings	IP66 per UL File# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	cULus, IEC, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

PANELS

Aluminum Back Panel	BP__A	pg. 111
Carbon Steel Back Panel	BP__CS	pg. 111

ACCESSORIES

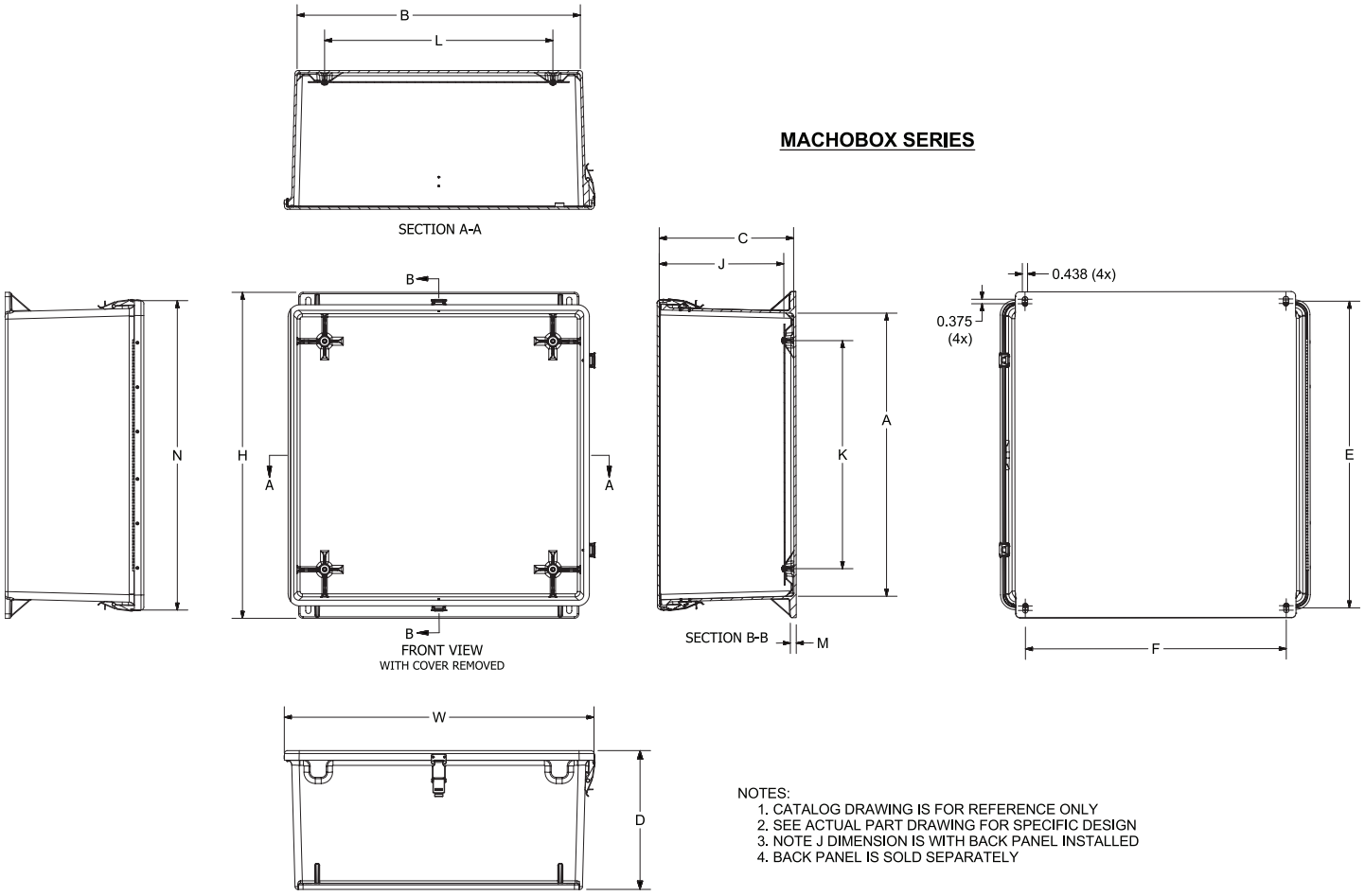
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

MachoBox | HPL

TECHNICAL DRAWINGS / DIMENSIONS



NOTES:
1. CATALOG DRAWING IS FOR REFERENCE ONLY
2. SEE ACTUAL PART DRAWING FOR SPECIFIC DESIGN
3. NOTE J DIMENSION IS WITH BACK PANEL INSTALLED
4. BACK PANEL IS SOLD SEPARATELY

MACHOBOX OPAQUE COVER SERIES ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	M	N	HOLE DIA.	SHIPPING WEIGHT	PANEL NUMBER
M2020HPL	23.50 x 22.12 x 11.70 (597 x 562 x 297)	19.88 x 19.88 x 11.33 (505 x 505 x 288)	21.88 x 18.30 (556 x 465)	10.49 (266)	15.25 (387)	15.25 (387)	0.50 (13)	22.1 (561)	0.44 x 0.38 (11 x 10)	30 lbs.	BPM2020**
M2420HPL	27.50 x 22.12 x 11.70 (699 x 562 x 297)	23.88 x 19.88 x 11.33 (607 x 505 x 288)	25.88 x 18.30 (657 x 465)	10.49 (266)	19.25 (489)	15.25 (387)	0.50 (13)	26.1 (663)	0.44 x 0.38 (11 x 10)	36 lbs.	BPM2420**
M2424HPL	27.50 x 26.12 x 11.70 (699 x 663 x 297)	23.88 x 23.88 x 11.33 (607 x 607 x 288)	25.88 x 22.00 (657 x 559)	10.49 (266)	19.25 (489)	19.25 (489)	0.50 (13)	26.1 (663)	0.44 x 0.38 (11 x 10)	42 lbs.	BPM2424**

All measures are in inches, items in parentheses are in millimeters.
** 3PT handle configuration available; consult factory*
***Panel ordered separately*

Triton™ Series

Proven Protection When "Big Is Better!"

Triton (T) Series enclosures are used where heavy industrial equipment needs protection. These fiberglass-reinforced polyester enclosures are ideal for the mounting of high voltage electrical systems where wiring needs sufficient bend radius to enter the cabinet. They are perfect for applications involving diverse environmental conditions. **Triton's** rating is built to meet rugged construction requirements and offer protection against falling rain and sleet and remain undamaged by external ice formation. Integral mounting feet enable easy installation.

In addition to wall mounted control enclosures, the **Triton** Series offers large and freestanding enclosures. These are dimensionally large enclosures (48 x 36 to 90 x 72). The **Triton** Series has been designed for use in larger industrial control systems and machine tool control panels. They provide a rugged cabinet for use in both indoor and outdoor applications and across a range of difficult environments. These larger size wall mount or freestanding enclosures are designed for the maximum available space for electrical, hydraulic, or mechanical control circuits.

The **Triton** series is used in a daunting range of environmental conditions. A high level of protection is required in conditions involving water, chemical wash-down, wind-blown dust, rain, sleet and external ice formation. An aggressive sealing system is used to meet these rigorous demands. **Triton's** stainless steel hinged, latched down cover series is a natural choice for process control where moisture or chemical environments require unique protection.

TRITON SERIES ATTRIBUTES

- Available in 2 cover options:
  1. Opaque cover
  2. Flush bonded window
- Fiberglass reinforced polyester material
- Memory retaining polyurethane gasket
- 304 series stainless steel hardware
- Integral mounting feet
- Molded in panel mounting inserts or studs
- High temperature, flame-retardant, non corrosive, environmental designs
- Wall mount or free standing configurations

TRITON SERIES INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66 per UL File# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, IEC, CSA, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

Triton (T)

HWT

Triton | Flush Bonded Window (TW)

HWT

Triton | Series Free-Standing (T_FS)

HWT

Triton | HWT

STAINLESS STEEL HINGED, LATCHED DOWN COVER

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket	Poured polyurethane seamless gasket
Back Panel Screw Size	#3/8-16 x 1/2 Hex Bolt
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66
UL 1741 File #	E333478 per UL File# E362920
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, IEC, CSA, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BPT__A	pg. 108
Carbon Steel	BPT__CS	pg. 108

ACCESSORIES

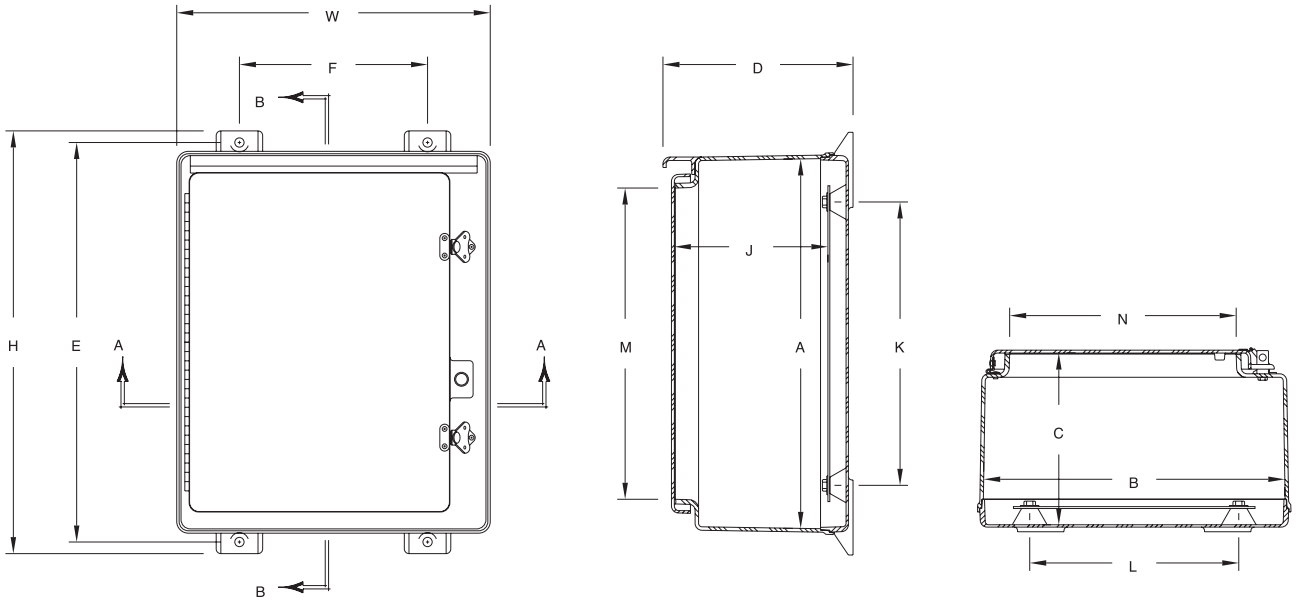
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

Triton | HWT

TECHNICAL DRAWINGS / DIMENSIONS



TRITON SERIES OPAQUE COVER ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	MOUNTING E X F	J	K	L	ENCLOSURE OPENING M X N	NO. OF LATCHES	SHIPPING WEIGHT	PANEL NUMBER
T24208HWT	27.00 x 21.24 x 9.90 (686 x 539 x 252)	24.05 x 20.39 x 9.25 (611 x 518 x 235)	25.75 x 14.00 (654 x 356)	8.25 (209)	19.25 (489)	15.25 (387)	21.25 x 16.00 (540 x 406)	2	32 lbs.	BPT2420**
T242010HWT*	27.00 x 21.24 x 11.90 (686 x 539 x 302)	24.05 x 20.39 x 11.25 (611 x 518 x 286)	25.75 x 14.00 (654 x 356)	8.25 (209)	19.25 (489)	15.25 (387)	21.25 x 16.00 (540 x 406)	2	37 lbs.	BPT2420**
T242410HWT	27.00 x 25.24 x 11.90 (686 x 641 x 302)	24.05 x 24.39 x 11.25 (611 x 619 x 286)	25.75 x 17.87 (654 x 454)	10.25 (260)	19.25 (489)	19.25 (489)	21.25 x 20.00 (540 x 508)	2	38.5 lbs.	BPT2424**
T242412HWT*	27.00 x 25.24 x 13.90 (686 x 641 x 353)	24.05 x 24.39 x 13.25 (611 x 619 x 336)	25.75 x 17.87 (654 x 454)	12.25 (311)	19.25 (489)	19.25 (489)	21.25 x 20.00 (540 x 508)	2	42.1 lbs.	BPT2424**
T30208HWT	32.86 x 20.99 x 9.89 (835 x 533 x 251)	29.90 x 20.14 x 9.23 (760 x 511 x 234)	31.75 x 14.25 (806 x 362)	8.23 (209)	25.25 (641)	15.25 (387)	27.00 x 16.50 (686 x 419)	2	37 lbs.	BPT3020**
T302410HWT	33.41 x 26.32 x 11.95 (849 x 668 x 304)	30.46 x 25.47 x 11.27 (774 x 647 x 286)	32.25 x 18.50 (819 x 470)	10.27 (261)	25.25 (641)	19.25 (489)	27.38 x 21.25 (695 x 540)	2	52.2 lbs.	BPT3024**
T363010HWT	39.31 x 32.50 x 12.05 (999 x 826 x 306)	36.31 x 31.69 x 11.36 (922 x 805 x 289)	38.13 x 23.88 (968 x 606)	10.36 (263)	31.25 (794)	25.25 (641)	33.25 x 27.25 (845 x 692)	3	69 lbs.	BPT3630**
T363012HWT	39.31 x 32.50 x 14.05 (999 x 826 x 357)	36.31 x 31.69 x 13.36 (922 x 805 x 339)	38.13 x 23.88 (968 x 606)	12.36 (314)	31.25 (794)	25.25 (641)	33.25 x 27.25 (845 x 692)	3	71.6 lbs.	BPT3630**
T483612HWT	51.29 x 36.62 x 13.93 (1303 x 930 x 354)	48.33 x 36.22 x 13.25 (1228 x 920 x 336)	50.12 x 28.50 (1273 x 724)	12.25 (311)	21.63 (549)	31.25 (794)	45.25 x 32.00 (1149 x 813)	10	96 lbs.	BPT4836**
T483616HWT	51.29 x 36.62 x 17.93 (1303 x 930 x 456)	48.33 x 32.22 x 17.25 (1228 x 920 x 438)	50.12 x 28.50 (1273 x 724)	16.25 (413)	21.63 (549)	31.25 (794)	45.25 x 32.00 (1149 x 813)	10	109 lbs.	BPT4836**
T603612HWT	64.00 x 36.50 x 14.12 (1627 x 927 x 359)	60.62 x 36.13 x 13.44 (1540 x 918 x 441)	62.75 x 28.75 (1594 x 730)	12.44 (316)	27.63 (702)	31.25 (794)	57.25 x 32.00 (1454 x 813)	11	125 lbs.	BPT6036**
T603616HWT	64.00 x 36.50 x 18.12 (1627 x 927 x 460)	60.62 x 36.13 x 17.44 (1540 x 918 x 443)	62.75 x 28.75 (1594 x 730)	16.44 (418)	27.63 (702)	31.25 (794)	57.25 x 32.00 (1454 x 813)	11	130 lbs.	BPT6036**

**Available as made to order. All measures are in inches, items in parentheses are in millimeters.*
NOTE: Mounting hole dimension is .50 inches.
***Panel ordered separately.*

Triton | Flush Bonded Window | HWT

STAINLESS STEEL HINGED, LATCHED DOWN COVER, WINDOW

CONSTRUCTION

Material (Box & Cover)	Hot Compression Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket	Poured polyurethane seamless gasket
Window	Acrylic - Super Abrasion Resistant (SAR)
Back Panel Screw Size	#3/8-16 x 1/2 Hex Bolt
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Window Temperature Range	(-26°F to +170°F) (-32°C to +76°C)
Window Flammability Rating	UL94-HB
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, CSA, CE, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

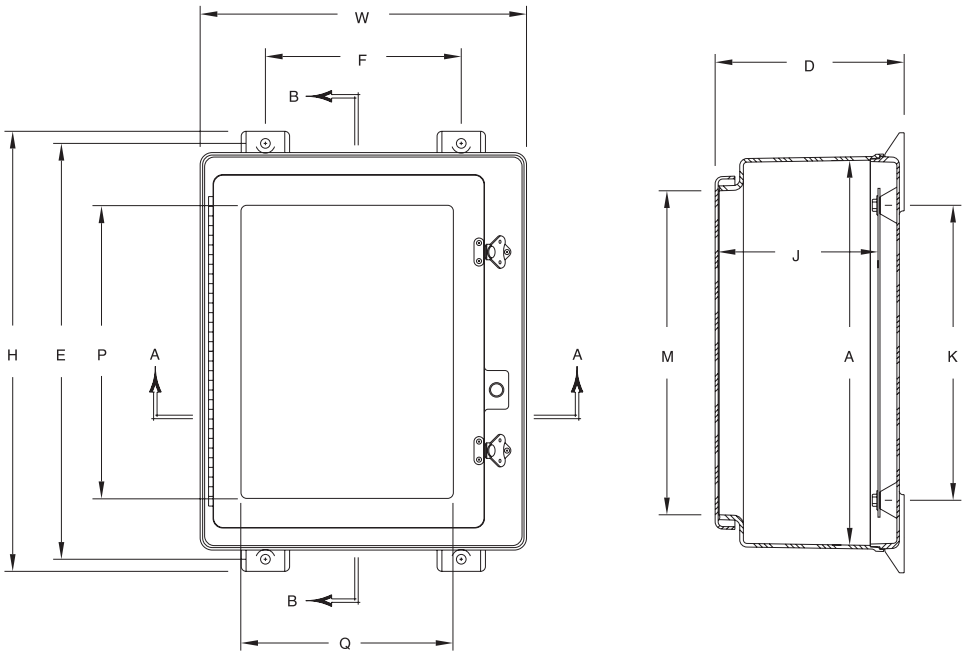
Aluminum	BPT__A	pg. 108
Carbon Steel	BPT__CS	pg. 108

ACCESSORIES

4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

MODIFICATIONS

Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11



TRITON SERIES WINDOW ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	WINDOW AREA (MAXIMUM) P X Q	MOUNTING E X F	J	K	L	ENCLOSURE OPENING M X N	NO. OF LATCHES	SHIPPING WEIGHT	PANEL NUMBER
TW24208HWT	27.00 x 21.24 x 9.90 (686 x 539 x 252)	24.05 x 20.39 x 9.25 (611 x 518 x 235)	19 x 14 (483 x 356)	25.75 x 14.00 (654 x 356)	8.25 (209)	19.25 (489)	15.25 (387)	21.25 x 16.00 (540 x 406)	4	34 lbs.	BPT2420*
TW242410HWT	27.00 x 25.24 x 11.90 (686 x 641 x 302)	24.05 x 24.39 x 11.25 (611 x 619 x 286)	19 x 18 (483 x 457)	25.75 x 17.87 (654 x 454)	10.25 (260)	19.25 (489)	19.25 (489)	21.25 x 20.00 (540 x 508)	4	45 lbs.	BPT2424*
TW30208HWT	32.86 x 20.99 x 9.89 (835 x 533 x 251)	29.90 x 20.14 x 9.23 (760 x 511 x 234)	24 x 14 (610 x 356)	31.75 x 14.25 (806 x 362)	8.23 (209)	25.25 (641)	15.25 (387)	27.00 x 16.50 (686 x 419)	5	39 lbs.	BPT3020*
TW302410HWT	33.41 x 26.32 x 11.95 (849 x 668 x 304)	30.46 x 25.47 x 11.27 (774 x 647 x 286)	25 x 19 (635 x 483)	32.25 x 18.50 (819 x 470)	10.27 (261)	25.25 (641)	19.25 (489)	27.38 x 21.25 (695 x 540)	5	54 lbs.	BPT3024*
TW363012HWT	39.31 x 32.50 x 14.05 (999 x 826 x 357)	36.31 x 31.69 x 13.36 (922 x 805 x 339)	31 x 25 (787 x 635)	38.13 x 23.88 (968 x 606)	12.36 (314)	31.25 (794)	25.25 (641)	33.25 x 27.25 (845 x 692)	5	86 lbs.	BPT3630*
TW483612HWT	51.29 x 36.62 x 13.93 (1303 x 930 x 354)	48.33 x 36.22 x 13.25 (1228 x 920 x 336)	43 x 30 (1092 x 762)	50.12 x 28.5 (1273 x 724)	1225 (311)	21.63 (549)	31.25 (794)	45.25 x 32.00 (1149 x 813)	10	99.8 lbs.	BPT4836*

All measures are in inches, items in parentheses are in millimeters
**Panel ordered separately.*

Triton | Free-Standing | HWT

SS HINGED, LATCHED DOWN COVER

CONSTRUCTION

Material (Box & Cover)	Hand Lay-up Molded Fiberglass Reinforced Polyester (Thermoset)
Gasket	Neoprene
Back Panel Screw Size	#3/8-16 Stud
Hinge and Latch Hardware	304 Stainless Steel
Soft Edge Design	Rounded Edges, Minimal Protrusions Or Exposed Pocket Areas

INDUSTRY STANDARDS

UL/cUL File #	E64358
NEMA Ratings (UL508A, UL50 & UL50e)	1, 3, 3R, 4X, 12
CSA Std. C22.2 File #	LR069014
IEC 60529 Ratings	IP66 per UL File# E362920
UL 1741 File #	E333478
Temperature Range	(-76°F to +274°F) (-60°C to +134°C)
Flammability Rating	UL94-5V
Self Extinguishing	Non-Halogenated, Non-flame propagating
NFPA No. 101 Flame Spread	Class A (1)
Impact Rating	IK10
Certifications	UL, IEC, CSA, REACH, RoHS
Outdoor UV Exposure (UL 746C)	(f1) Rated
Chemical Resistance	See chart on page 120

ACCESSORIES

BACK PANELS

Aluminum	BPT__A	pg. 108
Carbon Steel	BPT__CS	pg. 108

ACCESSORIES

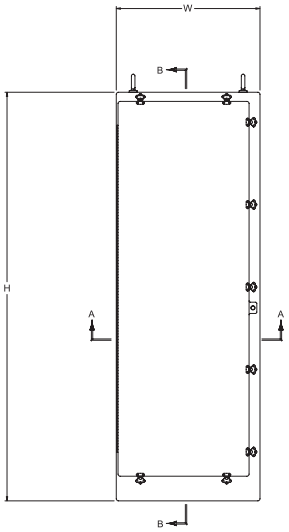
4X Breather Vent	pg. 102
4X Drain Vent	pg. 102
PluggIt	pg. 103
Thermal Accessories	pg. 115
All Other Accessories	Pg. 102-117

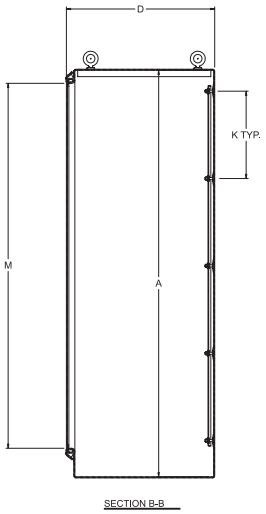
MODIFICATIONS

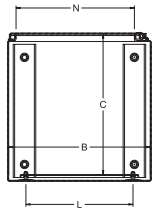
Custom Colors	pg. 10-11
Silk Screening	pg. 10-11
EMI/RFI Shielding	pg. 10-11
Custom Window	pg. 10-11
Custom Cutouts/Holes	pg. 10-11

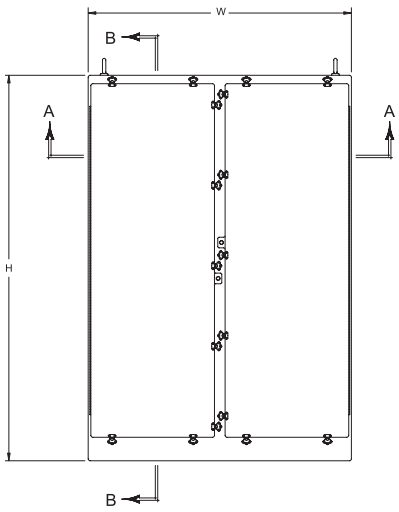
Triton | Free-Standing | HWT

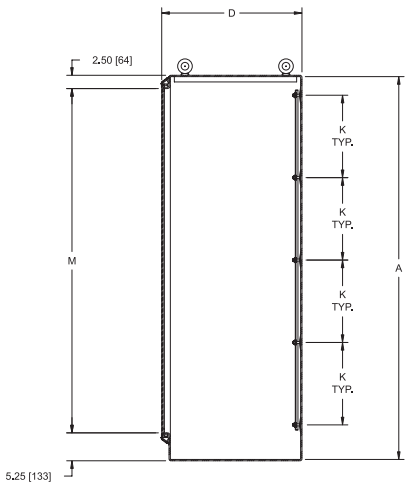
TECHNICAL DRAWINGS / DIMENSIONS

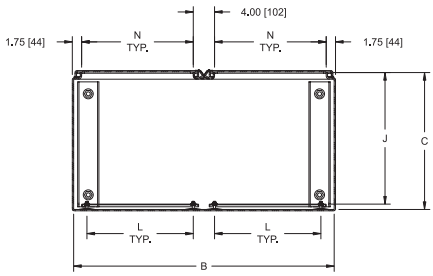












TRITON SERIES FREE STANDING ENCLOSURES

SIZE ID NUMBER	OVERALL H X W X D	INSIDE A X B X C	J	K	L	ENCLOSURE OPENING M X N	NO. OF LATCHES	SHIPPING WEIGHT	PANEL NUMBER
T722525FSHWT*	72.50 x 25.50 x 26.38 (1841 x 648 x 670)	72.00 x 25.00 x 25.88 (1829 x 635 x 657)	24.88 (632)	15.50 (388)	19.00 (483)	64.75 x 21.00 (1645 x 533)	9	230 lbs.	BPT7225**
T724925FSDDHWT*	72.50 x 49.50 x 26.38 (1842 x 1257 x 670)	72.00 x 49.00 x 25.88 (1829 x 1245 x 654)	24.88 (628)	15.50 (394)	20.00 (508)	64.75 x 21.00 (1645 x 533)	10	520 lbs.	BPT7249**
T907236FSDDHWT*	90.50 x 72.50 x 37.38 (2299 x 1842 x 949)	90.00 x 72.00 x 36.88 (2286 x 1829 x 937)	35.88 (911)	20.00 (508)	31.5 (800)	82.75 x 32.13 (2102 x 816)	24	657 lbs.	BPT9072**

**Available as made to order.*
All measures are in inches, items in parentheses are in millimeters.
NOTE: Mounting hole dimension is .50 inches.
***Panel ordered separately.*

General Accessories

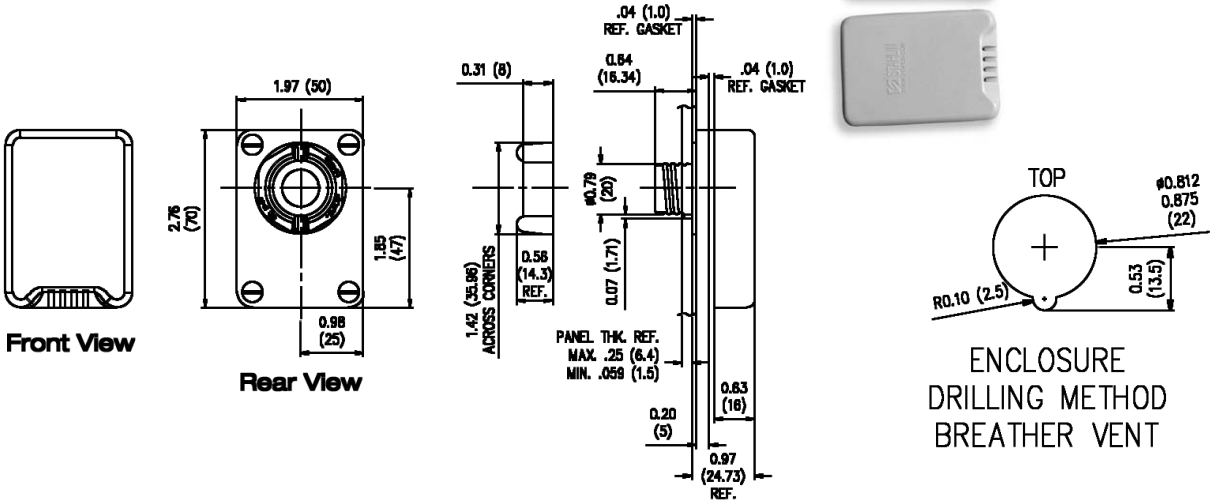
Robroy enclosures are created in standard forms and shapes, but the ability to customize into unique end user configurations may be the single best reason to buy **Robroy** products. Certain accessories are available by part number and can be added at the time of the enclosure purchase, or added later as a separate item.

By comparison, modifications are considerably more complex and end user specific and they must be implemented before the enclosure leaves the factory. All items listed as **Accessories** are available as separately priced items.

Breather Vent – 4X

Robroy's non-metallic Breather Vent allows an enclosure to "breathe" — literally allowing the free passage of air while maintaining UL Type 4X enclosure integrity as a recognized component.

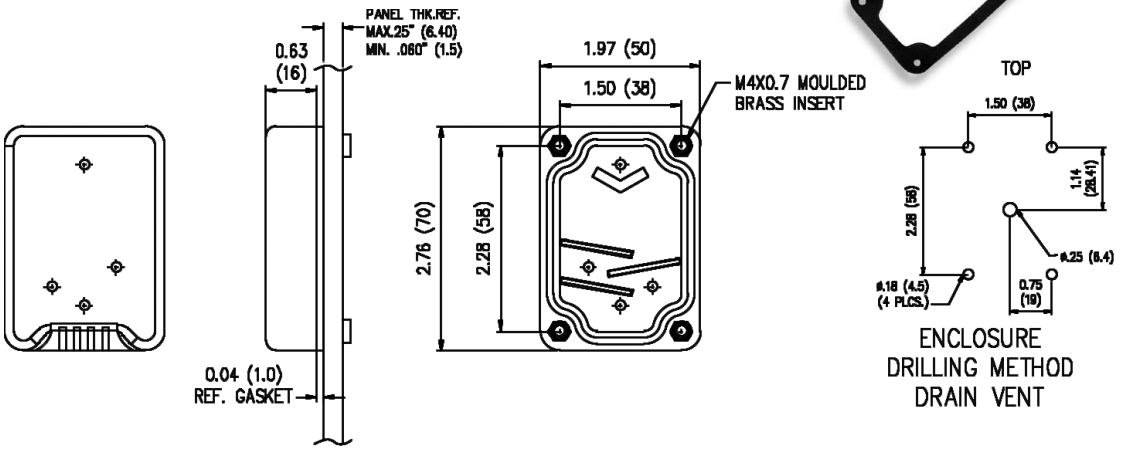
CATALOG NUMBER
REBV4XKIT



Drain Vent – 4X

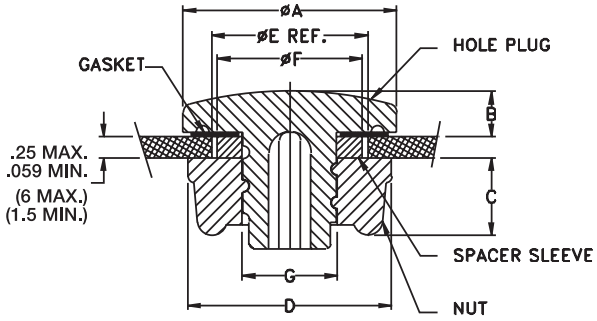
Robroy's new non-metallic Drain Vent reliably protects electrical equipment housed inside an enclosure by properly draining unwanted moisture or accumulated water from within, while maintaining UL Type 4X enclosure integrity as a recognized component.

CATALOG NUMBER
REDV4XKIT



PluggIt!®

- Superior corrosion resistance compared to rust-prone carbon steel and other metallic alternatives helps ensure increased enclosure life expectancy.
- Cost effective when compared to either carbon or stainless steel alternatives.
- Considerably better long-term resistance to UV degradation versus UV-susceptible soft rubber plugs that turn brittle from extreme temperature variations and repeated UV exposure.
- Will not create galvanic corrosion associated with dissimilar metals sometimes used in electrical enclosures.
- Maintains all chemical resistance features of current AttaBox products.
- Flame retardant material to UL 94V-0.
- A submersion/hosedown rated component for use in electrical enclosures UL recognized to type 4X and 6P.
- IEC tested to IP66 and IP68.
- Temperature Rating: -26°F to +257°F (-32°C to +125°C)

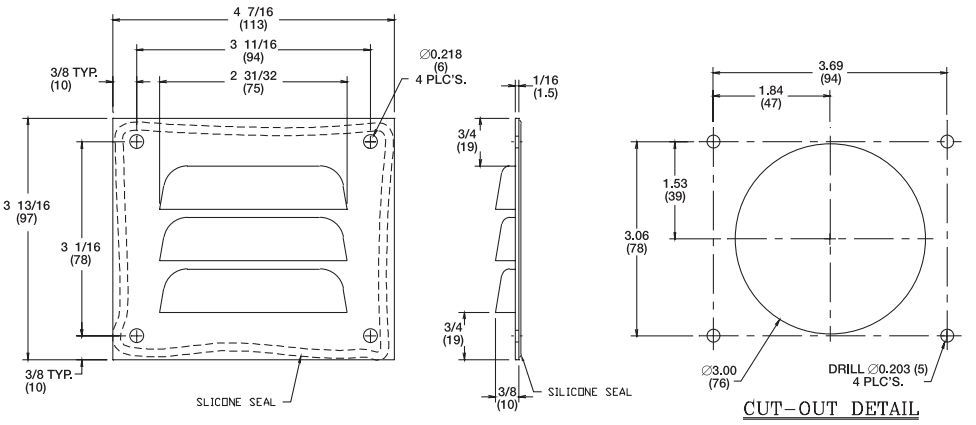


PLUGGIT!®

KIT NUMBER	ØA	B +0.05" -0.00"	C	D ACROSS FLATS	ØG	CONFIG.	ØE REF. - NOM. HOLE DIA. RANGE	ØF	COMMON INDUSTRY APPLICATIONS
REHPSERIES 1	1.00" (25.40)	0.22" (5.59)	0.35" (8.89)	0.88" (22.35)	0.44" (11.18)	CONFIG 1	0.50" - 0.56" (12.70 - 14.29)	N/A	1/2" Dia. Hole
						CONFIG 2	0.63" - 0.69" (16.00 - 17.46)	0.56" (14.22)	5/8" Dia. Hole
						CONFIG 3	0.75" - 0.81" (19.05 - 20.64)	0.68" (17.27)	3/4" Dia. Hole
REHPSERIES 1.5	1.20" (30.48)	0.22" (5.59)	0.33" (8.38)	1.04" (26.39)	0.81" (20.57)	CONFIG 3.5	0.88" (22.35)	N/A	1/2" Conduit
REHPSERIES 2	1.50" (38.10)	0.22" (5.59)	0.38" (9.63)	1.38" (35.05)	0.85" (21.59)	CONFIG 4	0.88" - 1.00" (22.35 - 25.40)	N/A	1/2" Conduit 22mm PB
						CONFIG 5	1.06" - 1.12" (26.92 - 28.45)	1.03" (26.16)	3/4" Conduit
						CONFIG 6	1.22" - 1.28" (30.73 - 32.51)	1.19" (30.22)	30mm PB
REHPSERIES 3	2.00" (50.80)	0.22" (5.59)	0.38" (9.63)	1.88" (47.75)	1.35" (34.29)	CONFIG 7	1.38" - 1.50" (35.05 - 38.10)	N/A	1" Conduit
						CONFIG 8	1.69" - 1.75" (42.67 - 44.45)	1.65" (41.91)	1-1/4" Conduit
REHPSERIES 4	2.75" (69.85)	0.22" (5.59)	0.41" (10.41)	2.63" (66.67)	1.97" (50.04)	CONFIG 9	2.00" - 2.12" (50.80 - 53.85)	N/A	1-1/2" Conduit
						CONFIG 10	2.50" - 2.56" (63.50 - 65.09)	2.44" (61.89)	2" Conduit
REHPSERIES 5	3.38" (85.85)	0.22" (5.59)	0.34" (8.63)	3.38" (85.85)	2.97" (75.44)	CONFIG 11	3.00" (76.20)	N/A	2-1/2" Conduit
REHPSERIES 6	4.00" (101.60)	0.22" (5.59)	0.34" (8.63)	4.00" (101.60)	3.59" (91.19)	CONFIG 12	3.62" (91.95)	N/A	3" Conduit
REHPSERIES 7	4.50" (114.30)	0.22" (5.59)	0.38" (9.63)	4.50" (114.30)	4.09" (103.88)	CONFIG 13	4.12" (104.65)	N/A	3-1/2" Conduit
REHPSERIES 8	5.00" (127.00)	0.22" (5.59)	0.41" (10.41)	5.00" (127.00)	4.59" (116.58)	CONFIG 14	4.62" (117.35)	N/A	4" Conduit

General Accessories

Louver Plate Vent



CATALOG NUMBER
RELP1
REHPK3KIT

Note: Kit includes LP1 plus silicone pack and four rivets.

Vent

CATALOG NUMBER	DESCRIPTION
AH-V60	Small Vent (60mm)
AH-V80	Large Vent (80mm)

Drain & Vent

CATALOG NUMBER
REDV1PVC
REDVK3KIT

Note: Kit includesDV1PVC plus silicone pack and four rivets.

Stainless Steel Screws

CATALOG NUMBER	SERIES	TYPE
2PKSSCE*	CE	Cover
4PKBPSS**	FR, CE	Back Panel
4PKBPT**	T	Back Panel
6PKBPT**	T	Back Panel
8PKBPT**	T	Back Panel

*Note: * includes cover screws and o-rings.*
*** includes back panel screws and washers.*

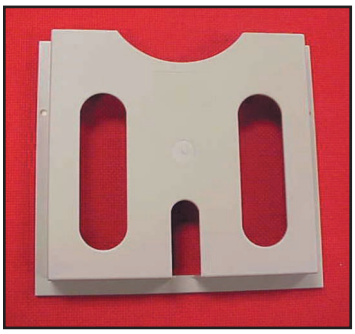
Vapor Capsule

Robroy Vapor Capsules contain a unique vapor phase inhibitor designed to protect metallic surfaces within an enclosure against airborne corrosion.

CATALOG NUMBER
REVC21

Note: Radius of Protection: 2 ft.
Normal Life Span: 1 yr.

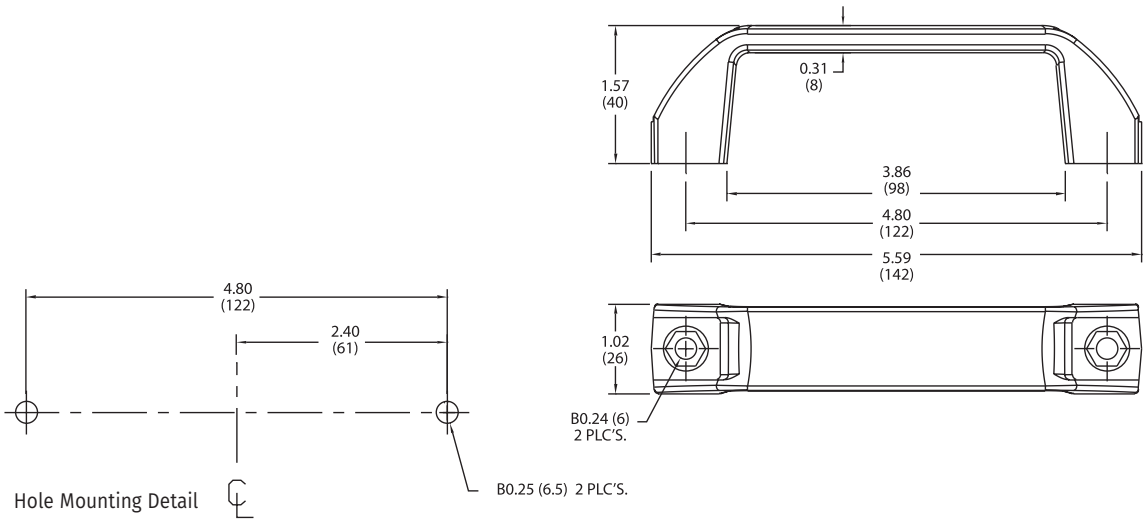
Plastic Print Pocket



Robroy's Print Pocket is self adhesive and can be utilized to store prints or other important documents within the enclosure.

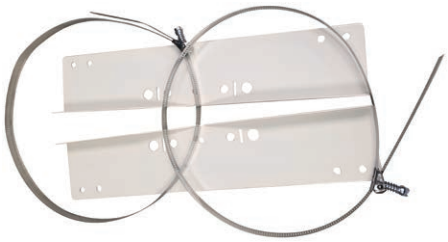
CATALOG NUMBER	HEIGHT	WIDTH	DEPTH
REPRTPKT	9.3"	10.4"	1.2"

Mountable Carrying Handle



CATALOG NUMBER
RECH109506

Pole Mount



Kit fits enclosure side that will be mounted perpendicular to pole. Comes with top and bottom flanges, stainless steel straps, and mounting screws.

CATALOG NUMBER
PM6-8
PM10-12
PM14-16
PM18-24

General Accessories

Nylon Cord Grip Fittings

Nylon cord grips are durable and easy to install. The body and sealing nut are manufactured with a tough, impact resistant nylon. Together the nut and washer form a positive sealing grip when installed through an enclosure wall. The oil resistant neoprene grommet and nylon washer fit tightly around an entrance cord, sealing out moisture, dust and foreign materials.

NEMA STD FBI-1983
UL STD 514 File No. E53599 Type 4
CSA STD 22.2 No. 18 File No. 28985 Type 4
HAZ LOC NEC 501-4(b), 502-4(a)(2), 503-3(a)
Class I, Div 2, Class II Div 1 and 2; Class III Div 1 and 2

CATALOG NUMBER	HUB DIAMETER	CABLE DIAMETER RANGE	INSIDE BODY DIAMETER
RE5122	1/2"	.250-.312	.625
RE5123	1/2"	.312-.375	.625
RE5124	1/2"	.375-.438	.625
RE5125	1/2"	.438-.500	.625
RE5126*	1/2"	.500-.562	.625
RE5146	3/4"	.562-.625	.788

**Cable jacket may have to be stripped for clearance.*

Cable Glands

CATALOG NUMBER	DESCRIPTION
RENPT 3/8	3/8" Nylon NPT cable gland
RENPT 1/2	1/2" Nylon NPT cable gland
RENPT 3/4	3/4" Nylon NPT cable gland
RENPT 1	1" Nylon NPT cable gland

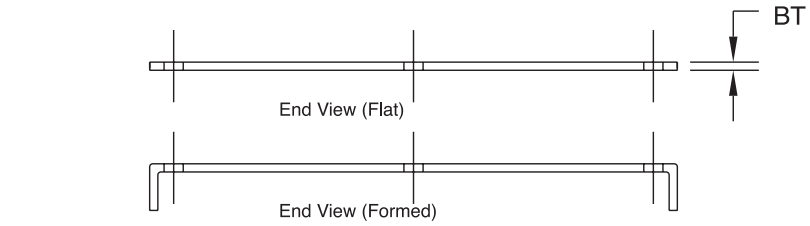
		NOMINAL O.D.		
SIZE	TYPE	2 COND	3 COND	4 COND
18	SV-SVT SJ-SJO S-SO SJTO STO	.24 .31 .39 .30 .38	.25 .34 .41 .33 .39	.26 .36 .44 .36 .42
16	SJ-SJO S-SO SJTO STO	.33 .41 .32 .39	.36 .43 .35 .42	.39 .49 .39 .47
14	SJO S-SO STO BDC	.43 .53 .52	.47 .56 .55	.61 .59 .40
12	S-SO STO BDC	.61 .59	.64 .63	.67 .67 .45
10	S-SO STO BDC	.64 .64	.69 .68	.75 .74 .50
8	S-SO STO BDC	.79 .81	.90 .85	.97 .96 .68
6	S-SO STO BDC	.91 .95	.99 1.00	1.07 .80
4	S-SO STO BDC	1.09 1.10	1.15 1.15	1.29 1.30 .94
2	STO BDC	1.29	1.34	1.08

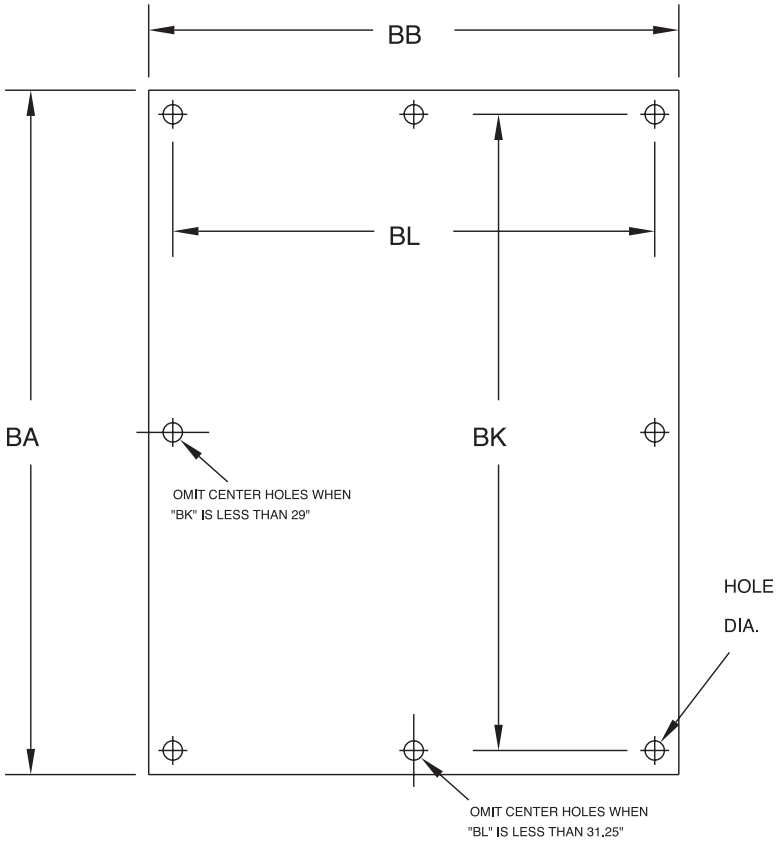
Dimensional data is taken from various cable manufacturers. It is not guaranteed but usable for general purposes.

Back Panels

CATALOG SUFFIX	MATERIAL	GRADE	FINISH
A	Aluminum	3003-H14	None
CS	Carbon Steel	1008/1010	Painted White Enamel
ABS	ABS Plastic	Polymer	Smooth/ Textured

Note: Available for all product families unless otherwise specified





Enclosure Specific Accessories | Back Panels

TYPICAL SERIES DESIGNATORS: CO, FR, CE, AH BACK PANEL DIMENSIONS

SIZE ID NUMBER	BA	BB	BK	BL	BT (A)	BT (CS)	BT (ABS)	PANEL TYPE	HOLE DIA.	# OF HOLES	WEIGHT (ALUMINUM) SUFFIX: A	WEIGHT (CARBON STEEL) SUFFIX: CS	WEIGHT (ABS) SUFFIX: ABS
BP66	4.88 (124)	4.88 (124)	4.25 (108)	4.25 (108)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	3 oz.	8 oz.	CF
BP76	6 (152)	4.88 (124)	5.38 (137)	4.25 (108)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	4 oz.	10 oz.	CF
BP86	6.88 (175)	4.88 (124)	6.25 (159)	4.25 (108)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	4 oz.	12 oz.	CF
BP88	6.88 (175)	6.88 (175)	6.25 (159)	6.25 (159)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	5 oz.	15 oz.	CF
BP96	8.25 (210)	4.88 (124)	7.63 (194)	4.25 (108)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	5 oz.	14 oz.	CF
BP108	8.88 (225)	6.88 (175)	8.25 (210)	6.25 (159)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	8 oz.	1.3 lb.	CF
BP1010	8.88 (225)	8.88 (225)	8.25 (210)	8.25 (210)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	10 oz.	1.9 lbs	CF
BP1210	10.88 (276)	8.88 (225)	10.25 (260	8.25 (210)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	12 oz.	2.1 lb.	CF
BP1412	12.88 (327)	10.88 (276)	12.25 (311)	10.25 (260	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	1.125 lb.	3 lb.	CF
BP1614	14.88 (378)	12.88 (327)	14.25 (362)	12.25 (311)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	1.5 lb.	4.1 lb.	CF
BP1816	16.88 (429)	14.88 (378)	16.25 (413)	14.250 (362)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	1.94 lb.	5.4 lb.	CF
BP2016	18.88 (479)	14.88 (378)	18.25 (463)	14.250 (362)	.080 (2)	.075 (2)	.23 (6)	Flat	.25 (6)	4	2.25 lb.	6.1 lb.	CF
BP2424	22.75 (578)	22.75 (578)	22.25 (565)	22.25 (565	.080 (2)	.075 (2)	.23 (6)	Flat	.313	4	4.4 LBS.	CF	CF

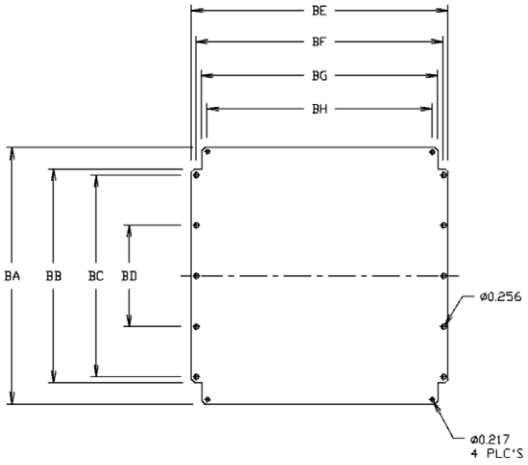
Caution: Metric units are for reference do not convert.
Note: When specifying combine Size ID Number and Material Suffix. Example: BP66A for 6x6 Aluminum Back Panel

TRITON SERIES BACK PANEL DIMENSIONS

SIZE ID NUMBER	BA	BB	BK	BL	BT (A)	BT (CS)	PANEL TYPE	HOLE DIA.	# OF HOLES	WEIGHT (ALUMINUM) SUFFIX: A	WEIGHT (CARBON STEEL) SUFFIX: CS
BPT2420	21.00 (533)	17.00 (432)	19.25 (489)	15.25 (387)	.128 (3)	.105 (3)	Flat	.50 (13)	4	4.5 lbs	10.8 lbs
BPT2424	21.00 (533)	21.00 (533)	19.25 (489)	19.25 (489)	.128 (3)	.105 (3)	Flat	.50 (13)	4	5.5 lbs	13.4 lbs
BPT3020	27.00 (686)	17.00 (432)	25.25 (641)	15.25 (387)	.128 (3)	.105 (3)	Flat	.50 (13)	4	5.8 lbs	14 lbs
BPT3024	27.00 (686)	21.00 (533)	25.25 (641)	19.25 (489)	.128 (3)	.105 (3)	Flat	.50 (13)	4	7 lbs	17 lbs
BPT3630	33.00 (838)	27.00 (686)	31.25 (794)	25.25 (641)	.128 (3)	.105 (3)	Flat	.50 (13)	4	11 lbs	27 lbs
BPT4836	45.00 (1143)	33.00 (838)	43.25 (1099)	31.25 (794)	.128 (3)	.105 (3)	Formed	.563 (14)	8	20 lbs	47 lbs
BPT6036	57.00 (1448)	33.00 (838)	55.25 (1403)	31.25 (794)	.128 (3)	.105 (3)	Formed	.563 (14)	8	25 lbs	60 lbs
BPT7225	64.00 (1626)	21.00 (533)	62.00 (1575)	19.00 (483)	.128 (3)	.105 (3)	Formed	.563 (14)	10	18.5 lbs	43 lbs
BPT7249*	64.00 (1626)	22.00 (559)	62.00 (1575)	20.00 (508)	.128 (3)	.105 (3)	Formed	.563 (14)	10	38 lbs	86 lbs
BPT7260*	64.00 (1626)	27.50 (698)	62.00 (1575)	25.50 (648)	.128 (3)	.105 (3)	Formed	.563 (14)	10	46 lbs	109 lbs
BPT9072*	82.00 (2083)	33.50 (851)	80.00 (2032)	31.50 (800)	0.125 (3)	0.105 (3)	Formed	0.563 (14)	10	72 lbs.	164 lbs.

** Set of two panels*
Caution: Metric units are for reference;do not convert.
Note: When specifying combine Size ID Number and Material Suffix. Example: BPT3024CS for 30x24 Carbon Steel Back Panel.

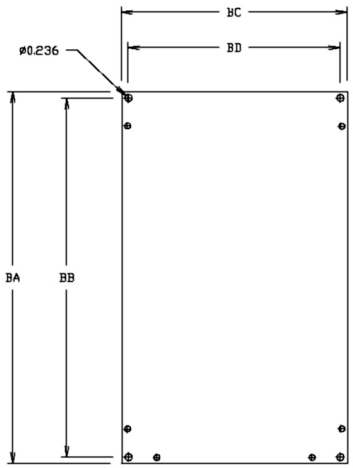
DURASHIELD DU BACK PANEL DIMENSIONS



BACK PANEL MODEL NO.	BA	BB	BC	BD	BE	BF	BG	BH	# OF HOLES
BPDU33A	2.48 (63)	1.02 (26)	N/A	N/A	2.68 (68)	2.28 (58)	1.85 (47)	N/A	2
BPDU34A	2.44 (62)	1.26 (32)	N/A	N/A	3.82 (97)	3.50 (89)	3.27 (83)	N/A	2
BPDU55A	4.21 (107)	2.44 (62)	2.05 (52)	N/A	4.29 (109)	3.74 (95)	3.39 (86)	2.83 (72)	6
BPDU59A	4.21 (107)	2.44 (62)	2.05 (52)	N/A	8.15 (207)	7.60 (193)	7.24 (184)	6.69 (170)	6
BPDU77A	5.67 (144)	3.43 (87)	2.99 (76)	N/A	5.67 (144)	5.20 (132)	4.61 (117)	4.02 (102)	6
BPDU711A	5.67 (144)	3.43 (87)	2.99 (76)	N/A	9.61 (244)	9.13 (232)	8.54 (217)	7.95 (202)	6
BPDU1010A	9.17 (233)	6.93 (176)	3.94 (100)	N/A	9.37 (238)	8.94 (227)	8.31 (211)	7.72 (196)	6
BPDU1016A	9.17 (233)	6.93 (176)	3.94 (100)	N/A	15.08 (383)	14.65 (372)	14.02 (356)	13.43 (341)	6
BPDU1414A	13.54 (344)	11.30 (287)	10.63 (270)	5.35 (136)	13.54 (344)	13.07 (332)	12.48 (317)	11.89 (302)	10
BPDU1616A	15.28 (388)	13.03 (331)	9.84 (250)	N/A	15.04 (382)	14.65 (372)	13.98 (355)	13.43 (341)	6

Caution: Metric units are for reference; do not convert.

DURASHIELD DUL BACK PANEL DIMENSIONS



BACK PANEL MODEL NO.	BA	BB	BC	BD	# OF HOLES
BPDU1812A	13.94 (354)	13.46 (342)	8.46 (215)	7.95 (202)	4
BPDU1816A	14.80 (376)	14.25 (362)	12.83 (326)	12.24 (311)	4
BPDU2416A	21.89 (556)	21.34 (542)	14.84 (377)	14.21 (361)	4

Caution: Metric units are for reference; do not convert.

Enclosure Specific Accessories | Back Panels

BANTAMBOX BACK PANEL DIMENSIONS

SIZE ID NUMBER	BA	BB	BK	BL	BT(P)	PANEL TYPE	HOLE DIA.	# OF HOLES
BPB0605P	1.89 (48)	1.61 (41)	1.50 (38)	N/A	0.06 (1.5)	Flat	0.14 (3.5)	4
BPB0808P	2.83 (72)	2.76 (70)	2.28 (58)	2.28 (58)	0.06 (1.5)	Flat	0.17 (4.3)	10
BPB1280P	4.33 (110)	2.76 (70)	3.23 (82)	2.28 (58)	0.06 (1.5)	Flat	0.18 (4.5)	10
BPB1680P	5.91 (150)	2.76 (70)	4.80 (122)	2.28 (58)	0.06 (1.5)	Flat	0.18 (4.5)	10
BPB2080P	7.48 (190)	2.76 (70)	6.38 (162)	2.28 (58)	0.06 (1.5)	Flat	0.18 (4.5)	6
BPB1212P	4.41 (112)	4.33 (110)	3.31 (84)	3.86 (98)	0.08 (2)	Flat	0.18 (4.5)	4
BPB1612P	5.94 (151)	4.41 (112)	4.70 (120)	3.56 (91)	0.08 (2)	Flat	0.19 (4.8)	4
BPB2012P	7.44 (189)	4.29 (109)	6.30 (160)	3.54 (90)	0.08 (2)	Flat	0.18 (4.5)	4
BPB2412P	9.06 (230)	4.33 (110)	7.91 (201)	3.86 (98)	0.10 (2.5)	Flat	0.18 (4.5)	4
BPB2015P	7.52 (191)	5.59 (142)	6.28 (160)	4.65 (118)	0.08 (2)	Flat	0.20 (5)	4
BPB3415P	11.65 (296)	5.39 (137)	8.66 (220)	4.41 (112)	0.10 (2.5)	Flat	0.18 (4.5)	4
BPB1616P	5.94 (151)	5.20 (132)	5.43 (138)	4.78 (122)	0.10 (2.5)	Flat	0.18 (4.5)	4
BPB2416P	9.06 (230)	5.91 (150)	7.93 (202)	5.43 (138)	0.10 (2.5)	Flat	0.19 (4.7)	4
BPB2516P	9.53 (242)	5.98 (152)	8.33 (212)	5.04 (128)	0.10 (2.5)	Flat	0.19 (4.7)	4
BPB3620P	13.58 (345)	7.44 (189)	11.81 (300)	4.61 (117)	0.10 (2.5)	Flat	0.26 (6.5)	4
BPB3023P	11.42 (290)	8.64 (220)	10.04 (255)	7.80 (198)	0.10 (2.5)	Flat	0.20 (5)	4

Caution: Metric units are for reference; do not convert.

ENDURANCE BACK PANEL DIMENSIONS

SIZE ID NUMBER	BA	BB	BK	BL	BT (A)	PANEL TYPE	HOLE DIA.	# OF HOLES
BPE1210	10.31 (262)	7.80 (198)	9.61 (244)	7.09 (180)	0.080 (2)	Flat	.31 (8)	5
BPE1620	14.17 (360)	9.76 (248)	13.46 (342)	9.06 (230)	0.080 (2)	Flat	.31 (8)	5
BPE1616	14.17 (360)	13.70 (348)	13.46 (342)	12.99 (330)	0.080 (2)	Flat	.31 (8)	5
BPE2016	18.11 (460)	13.70 (348)	17.40 (442)	12.99 (330)	0.080 (2)	Flat	.31 (8)	6
BPE2416	21.97 (558)	13.70 (348)	21.26 (540)	12.99 (330)	0.080 (2)	Flat	.31 (8)	6
BPE2420	2197 (558)	17.64 (448)	21.26 (540)	16.93 (430)	0.080 (2)	Flat	.31 (8)	6
BPE3012	29.76 (756)	9.76 (248)	29.06 (738)	9.06 (230)	0.080 (2)	Flat	.31 (8)	7
BPE3024	29.76 (756)	21.57 (548)	29.06 (738)	20.87 (530)	0.080 (2)	Flat	.31 (8)	7

Caution: Metric units are for reference; do not convert.

VIKING BACK PANEL DIMENSIONS

SIZE ID NUMBER	BA	BB	BK	BL	BT(A)	PANEL TYPE	HOLE DIA.	# OF HOLES
BPV107	9.29 (236)	5.00 (127)	7.87 (200)	4.33 (110)	.080 (2)	flat	.31 (8)	4
BPV1010	9.45 (240)	8.58 (218)	7.87 (200)	7.87 (200)	.080 (2)	flat	.31 (8)	4
BPV147	12.83 (326)	5.12 (130)	11.42 (290)	4.33 (110)	.080 (2)	flat	.31 (8)	4
BPV1410	12.83 (326)	8.66 (220)	11.42 (290)	7.87 (200)	.080 (2)	flat	.31 (8)	4
BPV1414	12.99 (330)	12.20 (310)	11.42 (290)	11.42 (290)	.080 (2)	flat	.31 (8)	4
BPV2110	20.08 (510)	8.66 (220)	18.50 (470)	7.87 (200)	.080 (2)	flat	.31 (8)	8
BPV2114	20.08 (510)	12.13 (308)	18.50 (470)	11.42 (290)	.080 (2)	flat	.31 (8)	8
BPV2121	19.21 (488)	19.21 (488)	18.50 (470)	18.50 (470)	.080 (2)	flat	.31 (8)	16
BPV2814	27.16 (690)	12.20 (310)	25.59 (650)	11.42 (290)	.080 (2)	flat	.31 (8)	8
BPV2821	26.30 (668)	19.21 (488)	25.59 (650)	18.50 (470)	.080 (2)	flat	.31 (8)	16
BPV75	6.06 (154)	3.82 (97)	5.14 (130.5)	3.34 (85.5)	.080 (2)	flat	.31 (8)	4
BPV77	5.71 (145)	5.71 (145)	5.14 (130.5)	5.14 (130.5)	.080 (2)	flat	.31 (8)	4
BPV105	9.53 (242)	3.82 (97)	8.70 (221)	3.34 (85.5)	.080 (2)	flat	.31 (8)	4
BPV55	3.94 (100)	3.94 (100)	3.34 (85.5)	3.34 (85.5)	.080 (2)	flat	.31 (8)	4

Caution: Metric units are for reference; do not convert.

MACHOBOX BACK PANEL DIMENSIONS

SIZE ID NUMBER	BA	BB	BK	BL	BT (A)	BT (CS)	HOLE DIA.	# OF HOLES
BPM2020	18 (457)	18 (457)	15.25 (387)	15.25 (387)	0.08 (2)	0.105 (3)	0.295 (7)	4
BPM2420	22 (559)	18 (457)	19.25 (489)	15.25 (387)	0.08 (2)	0.105 (3)	0.295 (7)	4
BPM2424	22 (559)	22 (559)	19.25 (489)	19.25 (489)	0.08 (2)	0.105 (3)	0.295 (7)	4

Caution: Metric units are for reference; do not convert.

Enclosure Specific Accessories
Latches for Field Replacements or Modifications

TLL150WTKIT

SSLKIT

TLL150KIT

LATCHES FOR FIELD REPLACEMENT

SIZE ID NUMBER	CONFIGURATION	FAMILY	MAINTAINS DESCRIPTION
TLL150KIT	HWT	T	Standard link lock latch used on Triton Series Type 12, 3R and 4X
TLL150WTKIT	HWT	T	Standard link lock latch used on Triton Series Type 4X top & bottom
SSLKIT	HPL	CE	Standard padlock latch used for "HPL" designations Type 4X

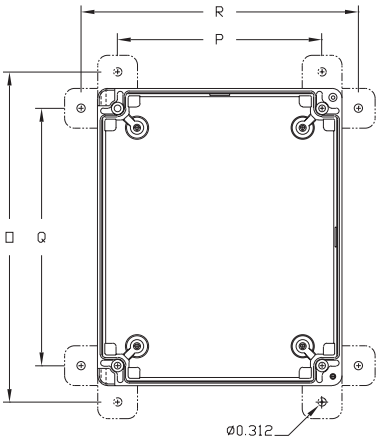
HASPKITSS

FIELD REPLACEMENTS OR MODIFICATIONS

SIZE ID NUMBER	CONFIGURATION	FAMILY	MAINTAINS DESCRIPTION
HASPKITSS	N/A	T	Stainless steel alternate hasp pin for Triton Series enclosures
HASPKITFG	N/A	T	Fiberglass alternate hasp pin for Triton Series enclosures

Enclosure Specific Accessories | Mounting Feet

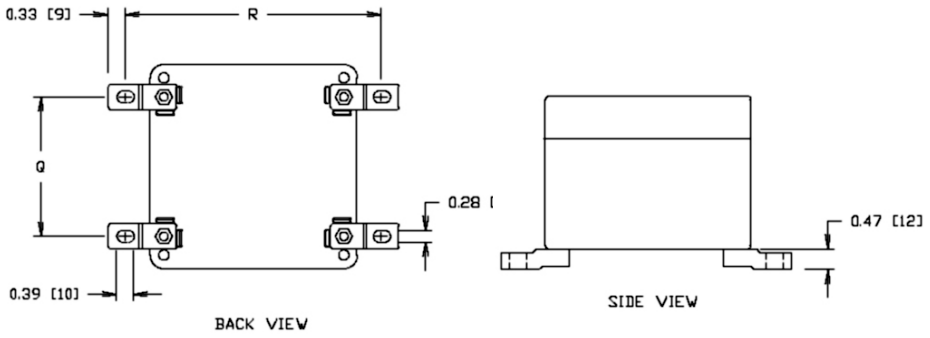
Centurion Series Mounting Feet



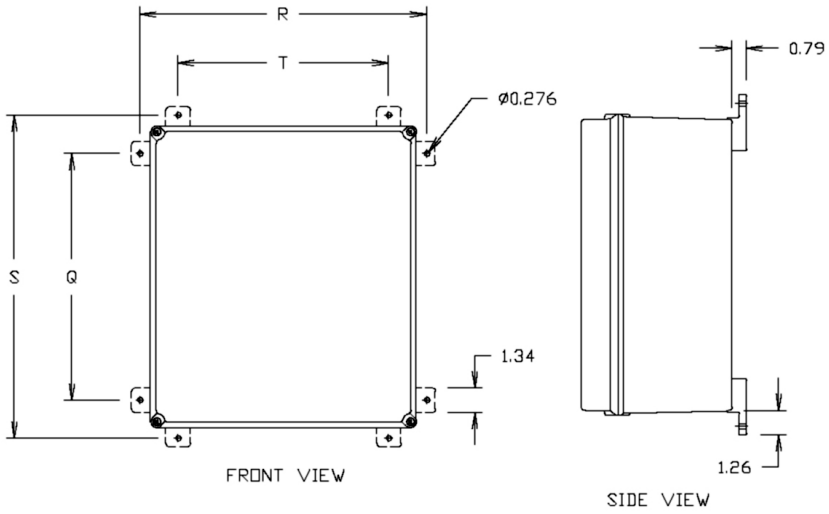
MOUNTING FEET
CEMTGFTKIT

CENTURION SERIES MOUNTING FEET DIMENSIONS				
SIZE	O	P	Q	R
707	8.46 (215)	5.71 (145)	5.71 (145)	8.46 (215)
907	10.46 (266)	5.71 (145)	7.71 (196)	8.46 (215)
1109	12.46 (316)	7.71 (196)	9.71 (247)	10.46 (266)
1311	14.46 (367)	9.71 (247)	11.71 (297)	12.46 (316)
1513	16.46 (418)	11.71 (297)	13.71 (348)	14.46 (367)

DuraShield Mounting Feet



DURASHIELD D SERIES OPTIONAL MOUNTING		
USED WITH MODEL NO.	MOUNTING Q X R	MTG FOOT KIT NO.
DU554W	3.23 x 5.98 (82 x 152)	DUMTGKIT
DU594W	3.23 x 9.84 (82 x 250)	DUMTGKIT
DU774W	4.33 x 7.32 (110 x 186)	DUMTGKIT
DU7114W	4.33 x 11.26 (110 x 286)	DUMTGKIT
DU10105W	7.87 x 11.06 (200 x 281)	DUMTGKIT
DU10165W	7.87 x 16.77 (200 x 426)	DUMTGKIT
DU14144W	12.20 x 15.20 (310 x 386)	DUMTGKIT
DU16165W	13.98 x 16.77 (355 x 426)	DUMTGKIT



DURASHIELD DL SERIES OPTIONAL MOUNTING			
USED WITH MODEL NO.	MOUNTING Q X R	MOUNTING S X T	MTG FOOT KIT NO.
DUL18127W	12.66 x 11.34 (321 x 288)	N/A	DULMTGKIT
DUL18168W	13.53 x 15.73 (344 x 400)	17.70 x 11.56 (450 x 294)	DULMTGKIT
DUL24168W	20.63 x 17.70 (524 x 450)	24.80 x 13.53 (630 x 344)	DULMTGKIT

Caution: Metric units are for reference; do not convert.

General Accessories

Exhaust Filter

CATALOG NUMBER	DIMENSIONS (INCHES)	NEMA
REEF00003	4.21 x 4.21 in	12
REEF10003	5.9 x 5.9 in	12
REEF20003	8.03 x 8.03 in	12
REEF30003	9.9 x 9.9 in	12
REEF40003	12.8 x 12.8 in	12

Filter Fan

CATALOG NUMBER	FLOW	DIMENSIONS (INCHES)	PERFORMANCE	VOLTAGE
REFFS4023A3	Standard	4.21 x 4.21 x 2.00	15 CFM	115 V
REFFS4023A4	Standard	4.21 x 4.21 x 2.00	15 CFM	230 V
REFFS4210A3	Standard	5.9 x 5.9 x 2.9	46 CFM	115 V
REFFS4210A4	Standard	5.9 x 5.9 x 2.9	46 CFM	230 V
REFFS4411A3	Standard	8.03 x 8.03 x 4.05	76 CFM	115 V
REFFS4411A4	Standard	8.03 x 8.03 x 4.05	76 CFM	230 V
REFFS4620A3	Standard	9.9 x 9.9 x 5.0	168 CFM	115 V
REFF4830A3	Standard	9.9 x 9.9 x 5.0	168 CFM	230 V
REFFS4830A3	Standard	12.8 x 12.8 x 6.3	359 CFM	115 V
REFFS4830A4	Standard	12.8 x 12.8 x 6.3	359 CFM	230 V
REFFS4830A9	Standard	12.8 x 12.8 x 6.3	318 CFM	400V
REFFH4883A3	High	12.8 x 12.8 x 6.3	483 CFM	115 V
REFFH4883A4	High	12.8 x 12.8 x 6.3	483 CFM	230 V
REFFH4883A9	High	12.8 x 12.8 x 6.3	483 CFM	400 V

Filter Media

CATALOG NUMBER	DIMENSIONS (INCHES)	NEMA
REFM00100	3.3 x 3.3	12
REFM10100	4.6 x 4.6	12
REFM20100	6.6 x 6.6	12
REFM30100	8.5 x 8.5	12
REFM40100	11.1 x 11.1	12

Heater with Thermostat

CATALOG NUMBER	DIMENSIONS (INCHES)	PERFORMANCE	VOLTAGE
REHT125A33	5.4 x 4.1 x 4.5	125 W	115 V
REHT125A44	5.4 x 4.1 x 4.5	125 W	230 V
REHT1200A33	5.4 x 4.1 x 4.5	200 W	115 V
REHT1200A44	5.4 x 4.1 x 4.5	200 W	230 V
REHT400A33	7.5 x 4.1 x 4.5	400 W	115 V
REHT400A44	7.5 x 4.1 x 4.5	400 W	230 V
REHT800A33	7.5 x 4.1 x 4.5	800 W	115 V
REHT800A44	7.5 x 4.1 x 4.5	800 W	230 V

Touch Proof Heater

CATALOG NUMBER	DIMENSIONS (INCHES)	PERFORMANCE	VOLTAGE
REH501025	4.92 x 1.61 x 1.61	25W	100 - 240
REH501050	4.92 x 1.61 x 1.61	50W	100 - 240
REH501075	5.51 x 2.76 x 2.48	75W	100 - 240
REH501100	5.51 x 2.76 x 2.48	100W	100 - 240
REH501150	8.86 x 2.76 x 2.48	150W	100 - 240

Variable Temp Thermostat

CATALOG NUMBER	SCALE	DIMENSIONS (INCHES)	PERFORMANCE
RETC301110	(NC) Celsius	2.36 x 1.54 x 1.67	max 250V AC / 16A (p.f. 0.95), 2A (p.f. 0.75) / 50 / 60Hz, max 72V DC / max 30W
RETF301111	(NC) Fahrenheit	2.36 x 1.54 x 1.67	max 250V AC / 16A (p.f. 0.95), 2A (p.f. 0.75) / 50 / 60Hz, max 72V DC / max 30W
RETC301120	(NO) Celsius	2.36 x 1.54 x 1.67	max 250V AC / 16A (p.f. 0.95), 2A (p.f. 0.75) / 50 / 60Hz, max 72V DC / max 30W
RETF301121	(NO) Fahrenheit	2.36 x 1.54 x 1.67	max 250V AC / 16A (p.f. 0.95), 2A (p.f. 0.75) / 50 / 60Hz, max 72V DC / max 30W
RETTC301230	(NCNO) Celsius	2.36 x 2.85 x 1.67	max 250V AC / 16A (p.f. 0.95), 2A (p.f. 0.75) / 50 / 60Hz, max 72V DC / max 30W
RETTF301231	(NCNO) Fahrenheit	2.36 x 2.85 x 1.67	max 250V AC / 16A (p.f. 0.95), 2A (p.f. 0.75) / 50 / 60Hz, max 72V DC / max 30W

General Accessories

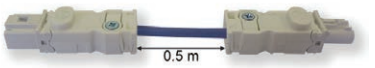
LED Lighting

CATALOG NUMBER	FUNCTION	DIMENSIONS (INCHES)	PERFORMANCE	VOLTAGE
REML400000	Motion Sensor	14 x 1.5 x 1.5	24-265V (AC/DC) 0/50/60 Hz, 4W	24-265V
RESL400100	On/off Switch	14 x 1.25 x 1.5	24-265V (AC/DC) 0/50/60 Hz, 4W	24-265V

Wieland Connector

CATALOG NUMBER	DESCRIPTION	DIMENSIONS (INCHES)
REWCF400702	Female	2.5 x .5
REWCM400703	Male	2.5 x .5

Wieland Connector



CATALOG NUMBER	DESCRIPTION	DIMENSIONS (INCHES)
REDC400721	Daisy chain w/female to male connector, 20"	20

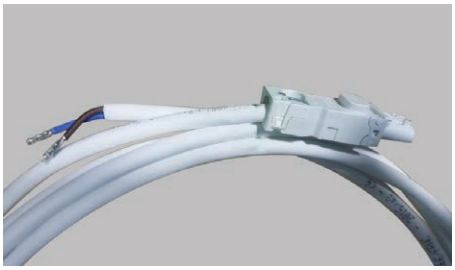
Door Switch

CATALOG NUMBER	DESCRIPTION	DIMENSIONS (INCHES)
REDSP310000	AC-Door switch-plain plunger	2.87 x 1.19 x 1.18

Mechanical Changeover Hygrostat

CATALOG NUMBER	DIMENSIONS (INCHES)	PERFORMANCE
REMCH301410	2.36 x 1.54 x 1.67	max 230V AC, 2A hum, 5A dehum

Power Cord



CATALOG NUMBER	DESCRIPTION	DIMENSIONS (INCHES)	PERFORMANCE	VOLTAGE
RELC400711	Power Cord, 118" long	118	24-265V (AC/DC) 0/50/60 Hz, 4W	24-265V

Technical Information

Enclosure Materials

The choice of material is dependent on the concentration of various corrosives present in the application environment and other physical properties necessary to meet the design specifications.

To begin the selection process, one must consider the general atmosphere as well as the corrosive agents which can be present in an application. Defining the corroding agents and determining the concentration can be a complex process. Usually several corrosive elements are present and interactions are not always well documented.

Water (and water states such as ice, snow, mist, fog, vapor) is the most common corrosive and is usually present to some extent in every enclosure application. Each environment is unique and all possible corrosive agents should be identified for the intended enclosure application.

To select the best enclosure material for an application; chemical resistance, physical strength and economic data are presented in several tables beginning on the next page. In Table 1 enclosure materials are rated on a continuum from "Recommended" to "Limited" or "Unacceptable" in three broad categories of chemicals. Since the chemical resistance categories in the table are extremely broad, some materials may perform well in specific corrosive environments within a general category and it is best to consult the detailed Chemical Resistance Information provided in Table 3.

Besides the enclosure material, the corrosion resistance of windows, gaskets, latches, etc. must also be considered. Table 4 provides corrosion resistance information that can be used to select the commonly used materials for these features.

Much of the chemical resistance information in Table 3 is based on total immersion testing in the chemical for a minimum of 30 days at 72°F. Some test specimens were evaluated using procedures outlined in ASTM D 543, Test Method for Resistance of Plastics to Chemical Reagents. The information in these tables is intended as a guide only. Total immersion testing is considered quite severe and the results may not necessarily reflect the performance under actual field conditions. The user assumes responsibility for selection of the material based on the characteristics of the application environment.

Specifications for AttaBox Enclosure Back Panel Construction Materials

Carbon Steel (CS)

A low carbon, rolled steel produced by passing bar stock through a set of rolls. AttaBox CS back panels are powder coated for appearance and protection.

Aluminum (A)

A lightweight metal that quickly forms a natural oxide layer to resist corrosion. AttaBox fabricates back panels from Type 3003 H14 Aluminum, the highest strength non-heat treatable aluminum alloy recommended for marine applications.

ABS (ABS)

Acrylonitrile butadiene styrene (ABS), a polymer panel with one smooth side, and one textured side to fit your needs. The thickest panel we offer at 0.23 inch.

Enclosure Materials

TABLE 1. BROAD CATEGORIES OF ENCLOSURE MATERIAL CHEMICAL RESISTANCE

CONTINUUM OF USE	GENERAL CATEGORY OF CHEMICALS		
	Acids	Alkalines	Solvents
⬇ ⬇ Recommended ⬇ ⬇ Acceptable ⬇ ⬇ Limited or Unacceptable ⬇ ⬇	Stainless Steel Fiberglass PC PVC Powder Coated Steel Aluminum Galvanized Steel	Fiberglass Stainless Steel PC Galvanized Steel Powder Coated Steel PVC Aluminum	Fiberglass Stainless Steel Aluminum Powder Coated Steel Galvanized Steel PC PVC

TABLE 2. RELATIVE MATERIAL STRENGTH AND COST COMPARISON OF COMMONLY USED ENCLOSURE MATERIALS

MATERIAL	RELATIVE PHYSICAL STRENGTH	RELATIVE COST	APPLICATION CONDITIONS	TEMPERATURE LIMITATIONS
Aluminum	Average	Average	Indoor and Outdoor, Marine, Solvents, Petrochemical Sulfates, Nitrates and Specific Acids.	None for enclosure applications
Fiberglass	Average	Low - Average	Indoor and Outdoor for continuously damp and highly corrosive environments. Petrochem, Water Treatment, Food Processing, Coating, Salts and Chemicals, Solar.	-40°F(C) to 250°F(121°C) AttaBox -76°F to 274°F (-60°C to 134°C)
Mild Steel: Galvanized Painted	High	Average - Low	Indoor and Outdoor where the respective coating provides acceptable protection in a mildly corrosive environment.	None for enclosure applications.
Stainless Steel	High	Average - High	Indoor and Outdoor in highly corrosive applications. Food and Dairy Processing or Marine.	None for enclosure applications.
Acrylic	Average	Low	Enclosure Windows. Weatherable, Scratch Resistant. Good resistance to Solvents.	-31°F(-35°C) to 180°F(82°C)
Polycarbonate	Average	Low - Average	Indoor and Outdoor for continuously damp and highly corrosive environments. Water Treatment, Food Processing, Coating, Salts and Chemicals, Solar.	-31°F(-35°C) to 248°F(120°C)
Nylon	Average	Low	Cord Grip, Hinges, Latches.	-22°F(-30°C) to 212°F(100°C)
Gaskets: Neoprene Silicone Urethane	Low Low Low	Low Average Average	Oil Resistance. Seams may be a problem Oil Resistance Temperature & Chemical Resistance. Water and Oil Resistance, Chemical Resistance.	-40°F(C) to 225°F(107°C) -40°F (C) to 350°F(175°C) -40°F(C) to 200°F(93°C)

Detailed material strength information is beyond the scope of this catalog and should be obtained from a materials reference; however, Table 2 provides some relative data to help with this selection.

Technical Information

Chemical Resistance – Enclosure Material

KEY:

S = Superior Resistance/Completely Unaffected under all Conditions

L = Limited Resistance, Some Chemical Attack May Occur Over Time

M = Moderate Resistance, Superficial Effects only, Testing Recommended

U = Unsatisfactory, Severe/Chemical Attack in a relatively short time

– = No Data Available

TABLE 3. CHEMICAL RESISTANCE OF ENCLOSURE MATERIALS

CHEMICAL	ALUMINUM	FIBER GLASS POLYESTER	STEEL			STAINLESS STEEL		PC	PVC
			POLYESTER POWDER	URETHANE ENAMEL	GALVANIZED	TYPE 304	TYPE 316		
Acetyldehyde	S	U	–	–	–	S	S	U	U
Acetic Acid (10%)	L	S	U	U	U	S	U	S	U
Acetone	S	L	L	U	L	S	S	U	U
Aluminum Chloride (10%)	U	S	U	U	U	U	M	S	S
Aluminum Sulfate (10%)	L	S	U	U	U	U	S	S	S
Ammonia Gas	L	S	–	–	–	S	S	–	–
Ammonium Chloride	U	S	U	U	U	S	S	S	S
Ammonium Hydroxide (10%)	S	L	U	U	U	S	S	U	S
Ammonium Nitrate (10%)	M	S	U	U	U	S	S	U	S
Ammonium Phosphate (10%)	L	M	S	L	U	S	M	S	–
Ammonium Sulfate	S	S	–	–	–	S	S	S	S
Aniline	L	U	–	–	–	S	S	U	L
ASTM #1 Oil	S	S	S	S	S	S	S	L	–
ASTM #3 Oil	S	S	S	S	S	S	S	L	–
Axle Grease	S	S	S	S	S	S	S	L	–
Benzene	S	S	–	–	S	S	S	U	L
Boric Acid (10%)	M	S	U	U	U	S	S	S	L
Bromine	U	L	U	U	U	U	U	U	U
Butyl Acetate	M	L	–	–	–	S	S	U	U
Butyric Acid	U	S	–	–	–	S	S	U	U
Calcium Chloride (10%)	L	S	U	U	U	L	S	S	L
Calcium Hydroxide (10%)	U	S	U	U	U	S	S	S	L

Chemical Resistance – Enclosure Material

TABLE 3. CONTINUED

CHEMICAL	ALUMINUM	FIBER GLASS POLYESTER	STEEL			STAINLESS STEEL		PC	PVC
			POLYESTER POWDER	URETHANE ENAMEL	GALVANIZED	TYPE 304	TYPE 316		
Calcium Hypochlorite (10%)	L	M	U	U	U	U	M	L	L
Calcium Sulfate	M	S	U	U	U	S	S	S	L
Carbolic Acid (25%)	M	L	U	U	U	S	S	U	
Carbon Disulfide	S	L	—	—	—	S	S	U	U
Carbon Tetrachloride	S	M	U	S	S	U	S	U	
Chlorine (dry)	S	S	—	—	—	S	S	U	U
Chlorine (water) 5-10 ppm	M	L	S	U	U	U	—	S	S
Chlorobenzene	S	S	—	—	S	S	S	U	
Chloroform	L	U	—	—	—	S	S	U	U
Chrome Plating Solution	U	L	U	U	U	L	L	S	—
Chromic Acid	S	S	—	—	—	U	U	U	U
Citric Acid (10%)	U	M	U	U	U	S	S	S	L
Copper Sulfate	U	S	—	—	—	S	S	S	S
Creosote	L	L	—	—	—	S	S	U	—
Cutting Fluid (5 Star) 10%	S	S	U	U	U	S	S	L	—
Cutting Fluid (Castrol 980 H)	S	S	S	U	U	S	S	L	—
Cutting Fluid (Norton 205)	U	S	U	U	U	S	S	S	—
Cutting Fluid (Rustlick) 10%	M	S	U	U	U	S	S	S	—
Cutting Oil (Dark)	S	S	S	S	S	S	S	S	—
Diethyl Ether	S	S	—	—	—	S	S	U	U
Ethyl Alcohol	S	S	M	U	S	S	S	M	S
Ethylene Dichloride	S	L	—	—	—	—	—	U	U
Ethylene Glycol	S	S	S	S	U	S	S	S	S
Ferric Chloride	U	S	U	U	U	S	U	S	S
Ferric Nitrate	—	S	—	—	—	S	S	S	S
Ferric Sulfate	M	S	—	—	—	S	S	S	S
Fluorine	S	U	—	—	—	M	—	L	U
Formaldehyde	S	S	—	—	—	L	S	S	L
Formic Acid	U	S	U	U	U	M	S	S	—
Fuel Oil (#2)	S	S	M	S	S	S	M	L	S
Gasoline	S	M	—	—	—	S	S	U	S
Glycerine	S	S	—	—	S	S	S	S	S
Hydraulic Brake Fluid	S	S	U	U	S	S	S	U	—
Hydraulic Oil	S	S	S	S	S	S	S	L	S

Technical Information

Chemical Resistance – Enclosure Material

TABLE 3. CONTINUED

CHEMICAL	ALUMINUM	FIBER GLASS POLYESTER	STEEL			STAINLESS STEEL		PC	PVC
			POLYESTER POWDER	URETHANE ENAMEL	GALVANIZED	TYPE 304	TYPE 316		
Hydrochloric Acid (10%)	U	M	U	U	U	U	U	S	S
Hydrocyanic Acid	S	U	—	—	—	S	S	L	L
Hydrofluoric Acid (20%)	U	U	U	U	U	U	U	L	L
Hydrogen Peroxide	S	M	—	—	—	L	S	S	S
Hydrogen Sulfide	M	S	—	—	—	L	S	L	L
Hypochlorus Acid	U	S	—	—	—	—	—	—	—
Isopropyl Alcohol	S	S	M	U	S	S	S	S	—
Kerosene	S	S	S	S	S	S	S	L	S
Lacquer Thinner	S	S	L	U	S	S	S	U	U
Lactic Acid	M	S	—	—	—	L	S	L	L
Lime	M	M	—	—	—	—	—	—	L
Liquid Dish Soap (10%)	M	S	U	U	U	S	M	S	S
Lubricating Oils	S	S	—	—	—	S	S	S	—
Magnesium Chloride (10%)	L	S	U	U	U	S	S	S	L
Magnesium Hydroxide (10%)	L	S	U	U	U	S	S	S	S
Mercuric Chloride (10%)	U	M	U	U	U	S	U	S	L
Methyl Ethyl Ketone	S	L	—	—	—	S	S	U	U
Methylene Chloride	S	S	U	U	M	S	S	U	U
Milk	S	S	—	—	—	S	S	S	S
Mineral Oil	S	S	—	—	—	S	S	S	S
Mineral Spirits	S	S	S	S	S	S	S	L	S
Motor Oil (10 weight)	S	S	S	S	S	S	S	S	L
Nickel Salts	L	S	—	—	—	L	S	S	S
Nitric Acid (10%)	U	M	U	U	U	S	S	L	S
Nitrobenzene	S	L	—	—	—	S	S	U	U
Oleic Acid	S	S	—	—	—	L	S	S	L
Perchlorethylene	S	S	S	U	S	S	S	U	L
Phosphoric Acid (25%)	U	L	U	U	U	S	S	S	S
Phosphoric Acid (50%)	U	U	U	U	U	S	S	S	S
Pickling Solution	U	M	U	U	U	S	M	S	—
Potassium Carbonate (10%)	U	S	S	S	L	S	S	S	L
Potassium Chloride (25%)	L	S	U	U	U	S	S	S	S
Potassium Hydroxide (25%)	U	U	U	U	U	M	M	U	S
Potassium Nitrate (10%)	U	S	U	U	U	S	S	S	S

Chemical Resistance – Enclosure Material

TABLE 3. CONTINUED

CHEMICAL	ALUMINUM	FIBER GLASS POLYESTER	STEEL			STAINLESS STEEL		PC	PVC
			POLYESTER POWDER	URETHANE ENAMEL	GALVANIZED	TYPE 304	TYPE 316		
Potassium Sulfate (10%)	L	S	U	U	U	S	S	S	L
Soap (Igepal) 10%	L	S	S	U	U	S	S	S	S
Sodium Bicarbonate (10%)	L	S	S	S	U	S	S	S	S
Sodium Bisulfate (10%)	U	L	U	U	U	S	S	S	S
Sodium Chloride (25%)	L	S	U	U	U	S	S	S	S
Sodium Hydroxide	U	U	U	U	U	M	M	U	S
Sodium Hypochlorite	U	M	U	U	U	S	M	L	S
Sodium Nitrate (10%)	M	S	U	U	U	S	S	S	S
Sodium Phosphate (10%)	L	S	U	U	U	S	S	S	S
Sulfuric Acid (25%)	U	S	U	U	U	S	S	S	S
Sulfurus Acid (10%)	U	U	U	U	U	S	S	S	S
Tannic Acid ((10%)	L	S	U	U	U	M	M	S	S
Tetrahydrofuran	M	L	U	U	U	S	S	U	U
Toluene	S	S	L	U	S	S	S	U	U
Trichloroethylene	S	U	—	—	—	L	S	U	U
Trisodium Phosphate	L	M	—	—	—	—	—	S	S
Turpentine	S	M	M	U	L	S	S	S	U
Vegetable Oils	S	S	—	—	—	S	S	S	S
Vinegar	M	S	—	—	—	S	S	S	L
Water, Industrial	L	S	L	L	L	S	S	S	S
Water, Rain	L	S	S	L	L	S	S	S	—
Water, Sea	L	S	U	U	U	S	S	S	S
Water, Tap	L	S	S	L	L	S	S	S	S
Xylene	S	S	L	U	S	S	S	U	U
Zinc Acetate	S	S	—	—	—	S	S	—	—
Zinc Chloride	L	S	S	U	U	M	S	M	L
Zinc Sulfate	S	S	—	—	—	M	S	S	S

Sources: Robroy Industries Reagent Testing Lab, Corrosion Resistant Materials Handbook, 4th Edition, Noyes Data Corp., Raw Material Vendors

Technical Information

Chemical Resistance – Gaskets, Windows and Other

TABLE 4. SPECIFIC CHEMICAL RESISTANCE INFORMATION OTHER MATERIALS USED FOR ENCLOSURE FEATURES							
CHEMICAL	RIGID PVC	GLASS NYLON	GASKETS			WINDOWS	
			NEOPRENE RUBBER	SILICONE RUBBER	URETHANE	ACRYLIC	POLY CARBONATE
Acetyldehyde	U	—	S	S	—	—	—
Acetic Acid (10%)	L	U	U	M	L	S	S
Acetone	U	S	U	S	U	U	U
Aluminum Chloride (10%)	S	U	S	S	S	S	S
Aluminum Sulfate (10%)	S	L	U	S	S	S	S
Ammonia Gas	—	S	S	S	—	S	—
Ammonium Chloride	S	U	S	S	S	S	S
Ammonium Hydroxide (10%)	S	—	L	L	S	S	U
Ammonium Nitrate (10%)	S	U	U	S	S	S	U
Ammonium Phosphate (10%)	—	L	U	S	S	S	S
Ammonium Sulfate	S	U	S	S	—	—	—
Aniline	S	L	U	U	—	S	—
ASTM #1 Oil	—	—	M	S	S	S	M
ASTM #3 Oil	—	—	U	L	S	S	M
Axle Grease	—	—	L	S	S	S	M
Benzene	U	S	U	U	—	U	—
Boric Acid (10%)	L	S	S	S	S	S	S
Bromine	U	U	U	U	U	L	U
Butyl Acetate	U	S	U	U	—	U	—
Butyric Acid	U	U	U	—	—	—	—
Calcium Chloride (10%)	S	U	S	S	S	S	S
Calcium Hydroxide (10%)	S	—	U	S	L	S	S
Calcium Hypochlorite (10%)	S	U	U	S	U	M	S
Calcium Sulfate	S	U	S	S	S	S	S
Carbolic Acid (25%)	—	—	U	U	U	U	U
Carbon Disulfide	U	—	U	—	—	S	—
Carbon Tetrachloride	L	S	U	U	U	S	U
Chlorine (dry)	L	—	—	—	—	—	—
Chlorine (water) 5-10 ppm	L	—	L	S	S	S	S
Chlorobenzene	U	S	U	U	—	L	—
Chloroform	U	U	U	U	—	U	—
Chrome Plating Solution	—	—	U	U	U	S	S
Chromic Acid	L	U	U	M	—	U	—
Citric Acid (10%)	S	L	U	S	U	S	S

Chemical Resistance – Gaskets, Windows and Other

TABLE 4. CONTINUED

CHEMICAL	RIGID PVC	GLASS NYLON	GASKETS			WINDOWS	
			NEOPRENE RUBBER	SILICONE RUBBER	URETHANE	ACRYLIC	POLY CARBONATE
Copper Sulfate	S	L	S	S	—	U	—
Creosote	—	U	U	U	—	—	—
Cutting Fluid (5 Star) 10%	—	—	U	S	S	S	M
Cutting Fluid (Castrol 980 H)	—	—	L	S	S	S	L
Cutting Fluid (Norton 205)	—	—	S	S	S	S	S
Cutting Fluid (Rustlick) 10%	—	—	S	S	S	S	S
Cutting Oil (Dark)	—	—	U	S	S	S	S
Diethyl Ether	U	—	—	U	—	U	—
Ethyl Alcohol	S	—	L	S	S	U	M
Ethylene Dichloride	U	—	U	U	—	U	—
Ethylene Glycol	S	—	S	S	S	S	S
Ferric Chloride	S	U	L	S	L	S	S
Ferric Nitrate	S	U	S	M	—	—	—
Ferric Sulfate	S	U	S	M	—	—	—
Fluorine	L	—	—	U	—	—	—
Formaldehyde	L	U	U	M	—	S	—
Formic Acid	L	S	U	L	L	U	S
Fuel Oil (#2)	S	—	U	U	U	S	S
Gasoline	S	S	U	L	—	S	—
Glycerine	S	S	S	S	—	S	—
Hydraulic Brake Fluid	—	—	U	S	U	U	U
Hydraulic Oil	—	—	U	S	S	S	M
Hydrochloric Acid (10%)	S	U	L	L	U	S	S
Hydrocyanic Acid	S	—	S	M	M	—	—
Hydrofluoric Acid (20%)	L	U	U	U	—	S	M
Hydrogen Peroxide	S	U	U	M	—	S	—
Hydrogen Sulfide	S	—	U	M	—	—	—
Hypochlorus Acid	—	—	—	—	—	—	—
Isopropyl Alcohol	—	—	S	S	S	S	S
Kerosene	S	—	U	U	S	S	M
Lacquer Thinner	—	S	U	S	L	U	U
Lactic Acid	S	L	L	—	—	L	—

Technical Information

Chemical Resistance – Gaskets, Windows and Other

TABLE 4. CONTINUED

CHEMICAL	RIGID PVC	GLASS NYLON	GASKETS			WINDOWS	
			NEOPRENE RUBBER	SILICONE RUBBER	URETHANE	ACRYLIC	POLY CARBONATE
Lime	—	—	S	M	—	—	—
Liquid Dish Soap (10%)	S	—	L	S	S	S	S
Lubricating Oils	—	—	U	U	—	S	—
Magnesium Chloride (10%)	S	S	S	S	S	S	S
Magnesium Hydroxide (10%)	S	—	S	S	S	S	S
Mercuric Chloride (10%)	L	—	U	L	U	S	S
Methyl Ethyl Ketone	U	S	S	U	—	L	—
Methylene Chloride	—	U	U	S	U	U	U
Milk	S	—	S	S	—	S	—
Mineral Oil	S	—	L	M	—	S	—
Mineral Spirits	—	—	U	U	S	S	M
Motor Oil (10 weight)	—	—	U	U	S	S	S
Nickel Salts	S	—	U	S	—	—	—
Nitric Acid (10%)	S	U	U	U	U	S	L
Nitrobenzene	U	S	U	—	—	—	—
Oleic Acid	S	U	—	U	—	—	—
Perchlorethylene	—	—	U	S	U	U	U
Phosphoric Acid (25%)	S	U	S	S	U	S	S
Phosphoric Acid (50%)	S	U	S	S	U	S	S
Pickling Solution	—	—	L	M	M	S	S
Potassium Carbonate (10%)	L	S	S	S	S	S	S
Potassium Chloride (25%)	S	L	S	S	S	S	S
Potassium Hydroxide (25%)	S	S	U	L	M	U	U
Potassium Nitrate (10%)	S	L	S	S	S	S	S
Potassium Sulfate (10%)	SL	S	S	S	S	S	S
Soap (Igepal) 10%	S	—	U	S	S	S	S
Sodium Bicarbonate (10%)	S	S	S	S	S	S	S
Sodium Bisulfate (10%)	S	L	S	S	L	S	S
Sodium Chloride (25%)	S	S	S	S	S	S	S
Sodium Hydroxide	S	S	U	U	M	S	U
Sodium Hypochlorite	S	U	U	S	U	S	S
Sodium Nitrate (10%)	S	S	S	S	S	S	S

Chemical Resistance – Gaskets, Windows and Other

TABLE 4. CONTINUED

CHEMICAL	RIGID PVC	GLASS NYLON	GASKETS			WINDOWS	
			NEOPRENE RUBBER	SILICONE RUBBER	URETHANE	ACRYLIC	POLY CARBONATE
Sodium Phosphate (10%)	S	—	U	S	S	S	S
Sulfuric Acid (25%)	S	U	S	S	U	S	S
Sulfurus Acid (10%)	S	—	U	U	L	S	S
Tannic Acid ((10%)	S	U	U	L	U	S	S
Tetrahydrofuran	—	S	U	U	U	U	U
Toluene	U	S	U	U	U	U	U
Trichloroethylene	U	U	U	U	—	U	—
Trisodium Phosphate	S	—	—	—	—	—	—
Turpentine	—	S	U	L	U	S	S
Vegetable Oils	S	—	L	S	—	S	—
Vinegar	—	S	L	S	—	S	—
Water, Industrial	S	—	S	S	S	S	S
Water, Rain	S	—	S	S	S	S	S
Water, Sea	S	—	S	S	S	S	S
Water, Tap	S	—	S	S	S	S	S
Xylene	—	S	U	M	U	S	U
Zinc Acetate	—	—	—	U	—	—	—
Zinc Chloride	S	U	M	S	U	S	M
Zinc Sulfate	S	L	S	S	—	—	—

Sources: Robroy Industries Reagent Testing Lab, Corrosion Resistant Materials Handbook, 4th Edition, Noyes Data Corp., Raw Material Vendors

Technical Information

Non-Metallic Properties

SPECIFICATION: PHYSICAL PROPERTIES OF NON-METALLIC MATERIALS

Table 7 provides technical data for assistance in evaluating non-metallic enclosures and commonly used accessory materials.

TABLE 7. PHYSICAL PROPERTIES OF NON-METALLIC MATERIALS

MATERIALS TYPICAL PROPERTIES	TEST METHOD ASTM	POLYESTER FIBERGLASS (SMC)	POLYESTER FIBERGLASS HAND LAY-UP	POLYESTER FIBERGLASS PULTRUSION	ACRYLIC SHEET FOR WINDOWS	DISPENSED SILICONE GASKETS	FOAMED URETHANE GASKETS	EXTRUDED SILICONE GASKETS	NEOPRENE GASKETS	POLY-CARBONATE	PVC
Flexural Strength (psi)	D 790	17K	30K	45K	16K	N/A	N/A	N/A	N/A	15k	12.8k
Notched Izod (ft - lb/in @ 1/8")	D 256	7-22	5-30	25	0.3-0.4	N/A	N/A	N/A	N/A	13	1.3
Impact Resistance (lb-in)	UL 746C	≥216	—	—	—	N/A	N/A	N/A	N/A	1480	--
Compressive Strength (psi)	D 695	20K	35K	26K	18K	N/A	N/A	N/A	N/A	12k	10.8k
Tensile Strength (psi)	D 638	8K	17.5K	40K	10.5K	200	60	100	50	9.5k	7.5k
Specific Gravity	D 792	1.71	1.5-2.1	1.7	1.17-1.20	1.32	0.3	0.55	1.24	1.20	1.41
Flammability	UL 94	V-0 5V	—	V-0	94HB	—	—	—	—	V0, 5v	V0
Heat Deflection (°F at 264 psi)	D 648	375-500	>400	<400	205	N/A	N/A	N/A	N/A	270	176
Service Temperature Range (°F)		-76°F to +274°F	-76°F to +274°F	-40°F to +250°F	-31°F +180°F	-40°F to +350°F	-40°F to +200°F	-100°F to +500°F	-40°F to +225°F	-20° to +240°F	-4°F to +140°F
K Factor, Thermal Conductivity (BTU/hr/ft2/°F/in)		1.68	1.68	1.68	1.3	1.3	1.0	1.3	1.45	1.3	0.90
Dielectric Strength(VPM)	D 149	380	380	200	500	400	330	400	400	390	544
Arc Resistance(sec)	D 570	200+	200+	80	No Track	N/A	N/A	N/A	N/A	117	--
Water Absorption (% in 24 hr)	D 570	0.10-0.25	0.05-0.5	0.05-0.5	<0.4	0.12-0.15	<2	5	—	0.12	<0.07
Hardness (Barcol-Rockwell M-Shore A)		50-70 Barcol	60-80 Barcol	50 Barcol	105 Rockwell	18 Shore	8 Shore	—	15-95 Shore	M70/R118	R115
Shrinkage in/in Minimum		.002	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.006	--
Elongation (%)		N/A	N/A	N/A	N/A	850	100	400	100-800	N/A	50-150
Compression Set 24 hr @ 50%, 72°F		N/A	N/A	N/A	N/A	<5%	<2%	<5%	15-60	N/A	--

-- no test data available
N/A not applicable
K = 1000

AttaBox offers no guarantee or warranty as to the applicability of this chart on a particular situation as the actual conditions of use on our enclosures are beyond our control.

Non-Metallic Properties

Enclosure Weight Load Capacity

Large control enclosures 20" x 16" and above can support 200 lbs. of equipment on the back panel. Smaller-junction enclosures 18" x 16" and below should be limited to 75 lbs. Listed values assume the enclosure is vertically mounted against a reasonably flat surface and are based on a minimum safety factor of two.

Sunlight (UV) Resistance

In time sunlight may affect enclosure surface, but its electrical and mechanical properties remain unaffected. Surface roughening or discoloration caused by UV exposure is a common phenomenon encountered with all non-metal products, but it only affects surface appearance. Tests have confirmed the effect on polyester fiberglass is only 40 to 80 microns (0.0015"-.003") in depth. If appearance is a concern, an outdoor acrylic paint (clear or pigmented) will provide protection for many years. Most acrylic paints in ordinary spray cans work well.

AttaBox fiberglass enclosures are molded using a patented material formulation (SolarGuard®) which can provide up to 60% more UV resistance.

AttaBox Polycarbonate Enclosures are molded with UV protected materials. Both fiberglass and polycarbonate are rated F1 for outdoor use.

Flammability Test Methods

UL94-HB

Test is run with bars 1/2 of an inch wide and five inches long. These are held horizontally and exposed to a flame 3/4 of an inch high. Ignition is forced until one inch of sample has burned, the flame removed and the burning rate is measured. To pass UL94-HB a sample over 1/8 of an inch thick must burn slower than 1-1/2 inches per minute, and a sample 1/8 of an inch thick or less must not burn faster than 3 inches per minute.

UL94-V0

Test is run with bars 1/2 of an inch wide and five inches long, held vertically with a flame size of 3/4 of an inch high. Each sample is ignited for ten seconds, the flame allowed to go out and ignited for a second time of ten seconds. To pass UL94-V0 the flame must be out in ten seconds or less, no glow beyond thirty seconds and no burning material can fall.

UL94-5V

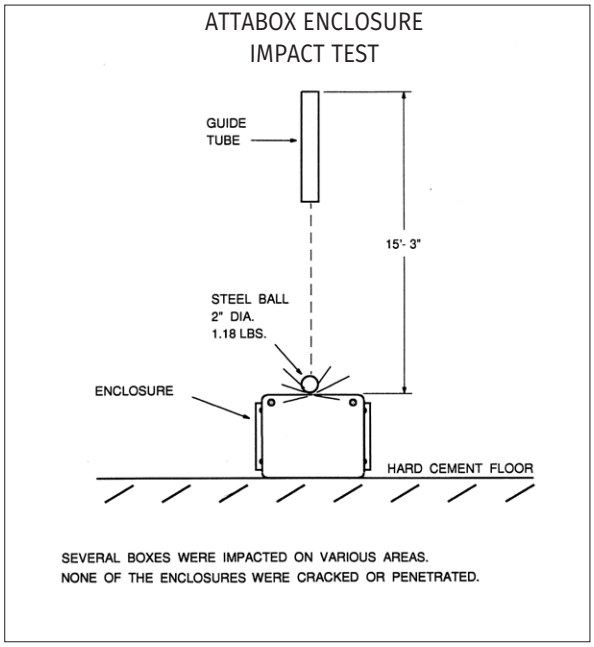
This is a newer and tougher version of UL94 test. The sample size remains the same, but the flame size increases to five inches from 3/4 of an inch and number of ignitions increases from two to five, but the duration is decreased from ten to five seconds. To pass UL94-5VA the flame must be out in sixty seconds or less, no burning material can fall and the flame cannot penetrate through the test sample.

Drilling, Sawing, Cutting and Punching

Installers find non-metallic enclosures easy to cut or drill. Ordinary drills, hacksaws, hole saws and punches cut through fiberglass with little effort. Polycarbonate enclosures are best modified using ordinary drill hole saws. Punching of polycarbonate is not recommended Carbide tip tools work best for most applications.

Impact Resistance

AttaBox enclosures are quite resistant to damage caused by falling tools or flying debris. When tested in accordance with UL Standard 746C, Section 24, these enclosures withstood an impact in excess of 216 pound-inches. The test was performed by dropping a 2" diameter solid steel ball on various areas of the enclosure from a height of 15 feet. The impact force from such a test is comparable to dropping a large wrench from 3 or 4 ft.



Integrity of the enclosure was not compromised

Technical Information

Enclosure Security

Safety

Enclosures may contain the controls or elements of a control system which are crucial to the safety of many people. Control enclosures in large chemical plants, electrical generating facilities, airports, mass transit systems or hospitals can house equipment critical to the well being of numerous individuals. In these and many other applications, rigorous security requirements are designed to protect the public and prevent unauthorized or accidental operation of control equipment.

Location

If the enclosure will be installed in a fenced area, within a building or in other secure areas, the security requirements will be affected. The selection of latches and hinges can be influenced by the location of adjacent equipment or other enclosures.

Appearance

Enclosure appearance can be influenced by both hinges and latches. Some enclosures are designed with hidden hinges and quarter turn latches to make these features less prominent.

Hinges & Latches

Access frequency – daily or annually can be an important factor in specifying the type of latches. Will the location or any specifications require a tool for opening, will it require a padlock are other considerations for latches. In many cases when the enclosure is selected the hinge type is automatically selected, because the hinge is an integral part of the enclosure. For some enclosures it is possible to select the hinge or hinge less options available.

Monetary Loss

In some applications the monetary value of the equipment in an enclosure may be sufficient to justify additional security costs. In most applications, the economic consequences of unauthorized or accidental operation of a control system will be more significant than the value of the equipment.

Enclosure Temperature Control

Overview

Electrical and electronic components are continually being reduced in size allowing designers to place more equipment in a smaller space. This concentration of equipment generates higher internal temperatures and makes heat dissipation very important. Overheating causes electrical insulation to deteriorate and shortens the life of electrical and electronic components. As a rule of thumb, for every 18°F (10°C) above room temperature (72°F or 22°C) an electronic device operates, its life expectancy is reduced by 50%

Enclosure Materials

The following information applies to gasketed and unventilated enclosures. Exterior surface finishes significantly influence temperature rise. Fiberglass, polycarbonate, and painted steel enclosures dissipate heat better than unfinished aluminum or stainless steel enclosures because the fiberglass, polycarbonate, and painted steel surfaces are more efficient thermal radiators than the unfinished surfaces. In outdoor applications light colored enclosures such as white have a high reflectance which minimizes solar heat gain compared to dark colored enclosures.

Enclosure Surface Area

The total surface area of the enclosure directly influences heat dissipation. The larger the total surface area the lower the temperature rise will be.

To calculate the total internal surface area in sqft use the following equation:

Surface Area = 2[(AxB)+(AxC)+(BxC)] / 144 where the specific enclosure inside dimensions are A x B x C.

This equation uses all six (6) sides of an enclosure. If any particular side is not available for transferring heat (example the back is mounted against a cement wall) that surface area should be subtracted from the total surface area available.

Also note, enclosure volume cannot be substituted for enclosure area.

Enclosure Heat Input

The heat generated in an enclosure varies and depends on the equipment mounted in the enclosure and the application. In order to calculate Temperature Rise, this heat input or power input must be known. This information can be obtained from the component manufacturers of components to be installed in the enclosure.

Enclosure Temperature Rise (DT)

Enclosure temperature rise is the temperature difference between the air inside a non-ventilated or cooled enclosure and the ambient air outside the enclosure. The enclosure temperature rise is independent of the ambient temperature; it is dependent on the heat generated within the enclosure and the actions taken to dissipate that heat. To establish the maximum service temperature, the temperature rise value from the graph in Figure 1, must be added to the maximum ambient temperature surrounding the enclosure.

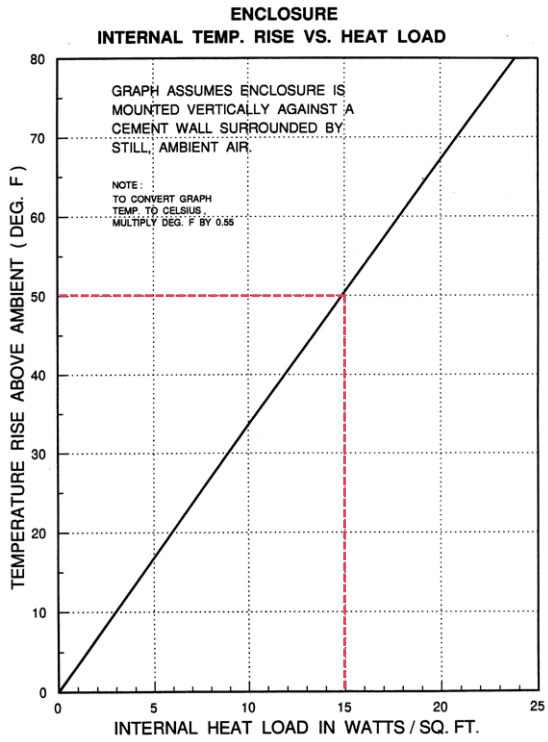
Example:

Max ambient T = 130°F

Internal Heat Load = 15 watts/sqft or 50°F estimated from Figure 1

Calculated Maximum Service Temperature = (130°F + 50°F) = 180°F

Figure 1. Internal Temperature Rise vs. Heat Load



The temperature graph was developed through empirical testing using several enclosures of various sizes. The temperatures represent an average of one temperature measurement near the bottom of the enclosure and a second measurement near the top. Electric heaters mounted equidistant from the internal surfaces of the enclosure were used as the heat source. Because hot air rises, a significant temperature gradient occurred from top to bottom. Typical of an actual installation, the top was much hotter than the bottom.

Technical Information

Enclosure Temperature Control

Influences of Heat Transfer

Convection and thermal radiation are used most often to dissipate heat from enclosures. Because polymers are a thermal insulator, a common misconception exists that non-metallic enclosures operate at significantly higher temperatures than metal enclosures. To the contrary, performance data reflect that enclosure material has little influence on the operating temperature and confirm that non-metallic and painted metallic enclosure function at nearly the same temperature with the same internal heat load. Based on these observations material thermal conductivity is not a major factor in determining heat transfer for an enclosure.

Even though the thermal conductivity of a polymer is much less than aluminum or steel, the heat transfer characteristic of non-metallic and metal enclosures are similar. Other factors such as the high thermal insulation of air contained within the enclosure along with the finish, color and total surface area of the enclosure have more influence on heat transfer than thermal conductivity. In general the finish and color of an enclosure most affect the heat transfer capability, Indoor and in outdoor applications.

Thermal conductivity is commonly measured in BTU/hr/ft²/°F/in, the K Value. K units represent the quantity of heat, which can pass through one square foot of material in one hour for every °F in temperature difference across one inch of material thickness. Larger K values indicate better heat conductivity. The K value for fiberglass is 1.68; the K value for steel is 334; the K value for aluminum is 1050, and the K value for polycarbonate is 1.3.

The heat transfer factor (Q) is measured in BTU/hr/ft²/°F or watts/ft²/°F. For the analysis in this section the Q value used for steel enclosures is 1.25 BTU/hr/ft²/°F (0.37 watts/ft²/°F); for non-metallic enclosures the Q value is 0.62 BTU/hr/ft²/°F (0.2 watts/ft²/°F). The Q value for sheet metal enclosures will vary between 1 BTU/hr/ft²/°F (0.29 watts/ft²/°F) and 5 BTU/hr/ft²/°F (1.46 watts/ft²/°F), depending on the amount of enclosure insulation.

Air as an Insulator

If metals have much better thermal conductivity, why does equipment in a polymer enclosure operate at nearly the same temperature as in metal enclosures? The air confined within the enclosure has a K value of 0.017, almost 100 times less than fiberglass specifically. The thermal resistance of the air and the enclosure wall material are in series and must be added. Because air is a superior thermal insulator compared to either polymer or steel, it is a predominant factor in establishing heat dissipation. This helps explain why equipment operates at the same temperature regardless of which enclosure material is used and also why environmental control systems heat or cool the air to control the internal temperature.

Surface Area as a Factor

Another factor, which directly influences heat dissipation, is surface area. If the enclosure surface area is doubled with a given internal heating load, the temperature rise will only be half as great. It is important to remember that surface area is not necessarily related to enclosure volume, i.e., an enclosure having twice the surface area does not always have twice the volume.

Other Related Issues

Certain applications may require the walls of an enclosure to act as a heat sink. For example, it is not uncommon to locate a high power semiconductor on the wall of a metal enclosure to dissipate heat. Non-metallic enclosures will not perform this function efficiently because the polymer walls have negligible thermal conductivity. In this application conduction is used to dissipate the heat and a fiberglass enclosure will not function the same as a metal enclosure.

Enclosure Temperature Control

Calculating Temperature Rise

Enclosure temperature rise can be approximated using the following steps and calculations:

1. Calculate the internal surface area
    a. Some common enclosure sizes and areas are already calculated and can be found in Table 1.
    b. Using the Enclosure Surface Area formula on page 136.
2. Determine the Input Power by dividing the expected heat load by the internal surface area.
3. Then using Figure 1, estimate the temperature rise by finding where the Internal Heat Load value intersects the line and reading the approximate temperature rise on the left vertical axis of the graph.

    Note these are approximations, safety factors should be considered to minimize uncertainties.

Example

An AH1816 enclosure contains a device that generates 120 watts, calculate the internal temperature rise.

Solution

1. Surface Area = 9.1sqft (method for any size use calculation on page 136 for Internal Surface Area).

2. Internal Heat Load = 120 watts / 9.1 sqft = 13.1 Watts/sqft

3. Using Figure 1, Input Power of 13.1 intersects the diagonal line corresponds to a temperature rise of 42˚F above ambient.

Technical Information

Enclosure Temperature Control

Additional Cooling Methods

When it has been determined that the heat load is too large for an enclosure to dissipate by radiation and convection, the following supplemental cooling methods are available:

Breather Vents and Louver Vents

Breather Vents and Louver Vents are designed to remove heat from the enclosure by allowing natural air circulation around the heat source and exhausting the hot air through slots or louvers. This method is relatively inexpensive and has no operating cost; however, it can only be used to dissipate a limited amount of heat and it is difficult to predict the temperature drop produced by a vent utilizing natural convection.

Circulating Fans

In larger sealed enclosures a fan can be used to circulate the air and reduce localized heat concentrations; however, the applications are limited because a closed system fan only redistributes heat, it does not dissipate the heat generated by the hot spot.

Where an enclosure does not need to be sealed from the outside environment, fans can be used to circulate air through an enclosure and dissipate the heat generated by power supplies, transformers and other heat producing equipment. Fans can provide as much as 10 times the heat transfer rate of natural convection and radiation. Once the heat input in watts/ft² is determined and temperature rise is established from Figure 1, the following equation can be used to calculate the fan flow rate:

$$\text{Fan Flow Rate (CFM)} = 3.17 \times \text{Internal Heat Load (watts)} / \text{Temperature Rise}$$

Example

Equipment in an T363012 enclosure generates sufficient heat to require a fan, which will dissipate 300 watts. The maximum ambient temperature in the application environment is 115°F. If the temperature of the other contents in the enclosure cannot exceed 125°F, what size is required?

The allowable temperature rise is 125°F - 115°F = 10°F. The application requires dissipation of 300 watts.

Solution

To determine the cubic feet per minute (CFM) required in a standard application, use the following equation (if the air density is significantly more that 0.075 lb. per cubic foot, a non-standard application exists and this equation should not be used):

$$\text{Fan Flow Rate (CFM)} = 3.17 \times 300 \text{ watts} / 10°\text{F}$$

$$\text{Fan Flow Rate (CFM)} = 95 \text{ CFM}$$

This calculation is exact, but adding an additional 25% capacity to the CFM level is standard to provide a safety factor.

$$1.25 \times \text{Fan Flow Rate (CFM)} = 1.25 \times 95 \text{ CFM} = 119 \text{ CFM}$$

If the air density is non-standard (significantly more than 1.075 lb. per cubic foot), the following equation can be used to calculate the fan capacity:

Fan Flow Rate (CFM) x 0.075 lb. per cubic foot /
Non-standard Air Density (lb. per cubic foot)

Fans can be used to draw air through an enclosure insert, exhaust hot air from an enclosure or to draw cool air into an enclosure. An inlet fan offers the following advantages:

- Raises the internal pressure, which helps keep dust and dirt out of an unsealed or frequently open enclosure.
- More turbulent airflow improves heat transfer.
- Longer fan life with cooler incoming air.

Enclosure Temperature Control

The following considerations are important in locating a fan:

- Avoid placing transformers, power supplies or other heat generating devices in front of the fan. Although this cools the device, it increases the heat load on other devices within the enclosure. It is best to place these devices near the exhaust outlet.
- To achieve maximum cooling, the inlet and outlet should be separated by the maximum distance. If the outlet and inlet are adjacent to each other, the hot outlet air will be drawn into the inlet and cooling efficiency will be reduced. In general the inlet should be at the bottom of the enclosure and the outlet at the top.
- Fans should not be used or located in areas where the airflow is restricted. A plenum is recommended to accelerate air velocity and improve fan performance. A plenum is particularly helpful when a filter is used where airborne contaminants are a problem.
- The air outlet area should at least equal the inlet area. For best results the exhaust opening should be 1.5 times the area of the fan opening.
- Air is less dense at high altitudes. For this reason airflow should be increased in high altitude applications.
- All fans used in parallel should be identical.

Heat Exchangers - Cooling

Heat exchangers are a good option when precise control of heat and humidity are not required and the heat transfer requirements are significant. The required heat exchanger capacity can be calculated using the formula,

Heat Exchanger Capacity (watts/°F) = Internal Heat Load/DT + 0.22 x Enclosure Surface Area,
Where DT = Temperature Rise.

Example

If the internal heat load is 1000 watts in an T603612 Fiberglass enclosure, what is the minimum cooling capacity for the heat exchanger unit? The Maximum ambient temperature is 130°F and the internal equipment will malfunction if the internal enclosure temperature exceeds 105°F.

Solution

Internal Heat Load = 1000 watts

Maximum Temperature Differential = Ti - To =105°F-

130°F = -25°F = [25°F], use Absolute Value.

Enclosure Surface Area = 48.48 ft2

Heat Exchanger Capacity =
1000 watts/(25°F) - 0.22 x 48.48 ft2 = 29.33 watts/°F

In this example the surface area acts to cool the enclosure and is subtracted, the Absolute Temperature Value is used because this is a temperature difference.

Air Conditioning-Cooling

Air conditioning will be required in high ambient temperature locations where precise temperature control and humidity reductions are required in a sealed enclosure. Air conditioning can also be required where neither convection, thermal radiation, louvers, slots nor a circulating fan system provide adequate cooling. Because air conditioners remove moisture from the enclosure, a condensate drain is generally required.

The four-step process to size and select the air conditioner is influenced by the internal heat load, enclosure size and the application environment. The following information is required:

Step 1. Determine the Internal Heat Load

Heat generated by all sources within the enclosure shall be added together to establish the internal heat load in watts. The heat load in watts may be multiplied by 3.413 to convert to BTU/hr.

Internal Heat Load =_____ watts X 3.413
=_____ BTU/hr.

Technical Information

Enclosure Temperature Control

Step 2. Calculate the Surface Area of the Enclosure

The surface area can be calculated by using this formula.

SURFACE AREA = [2(AxB)+2(AxC)+2(BxC)]/144 IN2 = AREA IN SQUARE FEET

If the enclosure is mounted on a wall or against another enclosure, the surface area calculation may be modified as identified in Table 2.

Step 3. Establish the Temperature Differential

The temperature differential (DT) is calculated by subtracting the maximum allowable temperature inside the enclosure (Ti) from the maximum ambient temperature outside the enclosure (To).

To - Ti = DT = _____°F

Step 4. Calculating the Required Air Conditioning Capacity

The values determined in the first three steps are used to calculate the required capacity of the air conditioner according to the following formula,

Cooling Capacity (BTU/hr) = Surface Area x DT x Q + Internal Heat Load, where Q = 0.62 BTU/hr/ft²/°F (0.2 watts/ft²/°F) for non-metallic enclosures, and 1.25 BTU/hr/ft²/°F (0.2 watts/ft²/°F) for steel.

Example

If the internal heat load is 500 watts in a T603612 fiberglass enclosure, which is wall mounted, what is the cooling capacity required for the air conditioning unit? The maximum ambient temperature is 125°F and the internal equipment will malfunction if the internal enclosure temperature exceeds 110°F.

Step 1: Internal Heat Load = 500 watts = 3.413 x 500 watts = 1707 BTU/hr

Step 2: Total Surface Area = 48 ft²

Step 3: Temperature Difference:
T = To - Ti = 125°F - 110°F = 15°F

Step 4: Air Conditioner Capacity
48.48 ft² x 15°F x 0.62 BTU/hr/ft²/°F + 1707 BTU/hr
= 2157.9 BTU/hr

48.48 ft² x 15°F x 0.2 watts/ft² +500 watts
= 645.4 watts

Air Conditioning - Heating

Some enclosure systems have minimum as well as maximum operating temperature limitations. When the equipment in an enclosure must be maintained above a minimum temperature at low ambiance, these same equations can be modified and used to calculate the supplemental heat required to select and size the heaters. The only differences are that the internal heat load will help heat the enclosure and the temperature difference, DT, is calculated by subtracting the minimum ambient temperature (To) outside the enclosure from the required temperature (Ti) inside the enclosure. The minimum supplementary heat can be calculated according to one of the following equations:

DT = To - Ti

Supplementary Heat = [Surface Area x (DT - 1)] /4.1
or = Surface Area x DT x Q
where Q = 0.2 watts/ft² °F

Enclosure Temperature Control

Example

If the internal heat load in 100 watts in an T603612 Fiberglass enclosure, which is wall mounted, what is the minimum heating capacity for the heating elements? The minimum ambient temperature is 0°F and the internal equipment will malfunction if the internal enclosure temperature drops below 40°F.

DT = To - Ti = 40°F -0°F = 40°F

Supplementary
Heat = [48.48 ft² x (40°F -1)] /4.1 = 461.2 watts
- or -
48.48 ft² x 40°F x 0.2 watts/ft² °F = 387.8 watts

Two Commonly used, but different, equations shown above have been used to show the effect of using different heat transfer values.

In addition to heating, supplementary heaters are often used in enclosures to keep the internal enclosure ambient temperature a few degrees above the ambient temperature to prevent condensation on internal equipment.

TABLE 2. CALCULATION OF ENCLOSURE SURFACE AREA DEPENDING ON LOCATION

ENCLOSURE CONFIGURATION	POSITION	FORMULA FOR SURFACE AREA
Single Enclosure, Free Standing		[2(AxB) + 2(AxC) + 2(BxC)]/144
Single Enclosure, Free Standing*		[1.8(AxB) + 1.8(AxC) + 1.4(BxC)]/144
Single Enclosure, Against a Wall		[1.4(BxA) + 1.4(BxC) + 1.8(CxA)]/144
Side by Side Enclosures; First or Last Enclosure in Bank of Enclosures		[1.4(CxA) + 1.4(BxC) + 1.8(BxA)]/144
Side by Side Enclosures; First or Last Enclosure in Bank of Enclosures Against Wall		[1.4(AxB) + 1.4(AxC) + 1.4(BxC)]/144
Side by Side Enclosures Not at the End of Enclosure Bank		[1.8(AxB) + 1.4(BxC) + (AxC)]/144
Side by Side Enclosures within an Enclosure Bank, Bank Against a Wall		[1.4(AxB) + 1.4(BxC) + (AxC)]/144
Side by Side Enclosures within an Enclosure Bank, Bank Against a Wall & Roof Above		[1.4(BxA) + 0.7(BxC) + (CxA)]/144

**Depending on the enclosure design, the complete surface area may not be exposed for cooling. This formula and the remaining ones are conservative and account for such differences.*

Technical Information

Enclosure EMI/RFI Shielding

The requirements and standards for enclosure electromagnetic compatibility are continually increasing with the proliferation of electronics for industrial process control, information processing, and communication equipment. In the United States the Federal Communications Commission establishes the requirements and regulates the amount of electromagnetic interference, (EMI). Since January 1, 1996 the European Union (EU) has enforced legislation, Electromagnetic Compatibility (EMC) Directive 89/336/EEC, which regulates the amount of EMI and Radio Frequency Interference (RFI) that products can emit or must repel to function acceptably.

While the enclosure itself is not covered by these requirements, once the electronic equipment is installed within the enclosure, the package must comply with applicable EMI/RFI directives. Shielding and electromagnetic compatibility are highly specialized with their own terminology. The following definitions will help to specify EMI/RFI compatibility and select enclosures if the acronyms and technology are unfamiliar:

Attenuation A measure of the ability to contain or repel EMI/RFI energy. It can also be called shielding effectiveness and is usually expressed in decibels (dB).

Decibel (dB) Unit to express the effectiveness of a material or system in reducing electromagnetic interference. If a shielded enclosure reduces the EMI by 30 dB, the power of the interfering wave will be reduced by a factor of 1000 in passing through the enclosure. If the EMI reduction is 40 dB, the power is reduced by a factor of 10,000. The equation for calculating attenuation in decibels is $dB = 10 \log_{10} (P1/P2)$ where P1 = power of the interference wave before it passes through the enclosure, P2 = power of the wave after it has been reduced (attenuated) by the enclosure.

Electromagnetic Emission Electrical energy radiated into the environment intentionally by an antenna or incidentally by an electronic component or power equipment during a switching operation.

Electromagnetic Field Invisible fields which surround energized conductors such as wires and antennas. A field has both electric and magnetic components.

Electromagnetic Immunity The capability of an electronic component or electrical equipment to perform its intended function in the presence of external electromagnetic fields.

EMI (ElectroMagnetic Interference) Randomly radiated electrical energy which can emanate from high voltage equipment or power lines, welding equipment, switches, relays, spark plugs, or any device that generates an electric spark or corona. The random voltages or currents generated by these sources are coupled to electronic systems with undesirable results. EMI waves are not well ordered, vary widely in intensity, and cause interference over a wide frequency range. The sun is a natural generator of EMI.

EMC (ElectroMagnetic Compatibility) The ability of electronic equipment to perform its intended function in the presence of EMI and RFI disturbances without affecting proper operation.

EMP (ElectroMagnetic Pulse) Interference caused by a large and sudden electrical discharge such as lightning. EMP is short in duration but can radiate intense power. Like EMI, EMP is not well ordered and causes interference over a wide range of frequencies.

Ohms per Square A measurement unit for electrical continuity of the metal coating applied internally to non-metallic enclosures for EMI/RFI shielding. Although the coating thickness influences shielding to some extent, the electrical continuity is much more important. The conductive coating on Robroy Enclosures typically measures less than 2 ohms per square. The surface resistance (or conductivity) measurement is without units because the surface area does not influence the reading, i.e., measurements taken on a large sheet of conductive material will yield the same result over 1sq in, 1 sq. ft, 1 sq. yd., or 1 sq. meter.

RFI (Radio Frequency Interference) Interference caused by radio waves which emanate from commercial radio and television stations, amateur radio broadcasts, radar, microwave ovens, etc. Radio waves are usually well defined in terms of amplitude and frequency.

Military specification, MIL-STD-285, is used to test the shielding effectiveness of Robroy Enclosures. The procedure involves placing a transmitting antenna within the enclosure and a receiving antenna outside the enclosure. Measurements are then made alternately with the enclosure door/cover open and closed. The difference between the open and closed measurements expressed in dB is the shielding effectiveness. Measurements are usually made at 10 frequency points ranging from 0.01 to 1000 MHz.

Depending on the enclosure design and frequency of the EMI/RFI, the attenuation of a standard AttaBox non-metallic enclosure without modification will vary between 0 and 20 dB.

Robroy Enclosures interior surfaces can be coated with a highly conductive copper coating that provides excellent EMI/RFI shielding. The coating has been tested by an independent test laboratory and provides an average attenuation of 60 dB over the frequency range from 0.01 to 10000 MHz.

The coating description and properties are provided in the following table:

COATING DESCRIPTION AND PROPERTIES	
Shielding Material	Copper
Frequency Range	1-1000MHz
Sheet Resistance	< 2.5 Ohm/Square
Attenuation	>75dB

Enclosure Installation Considerations

What is Torque?

Torque is the tendency of a force to rotate an object about an axis. Just as a force is a push or pull, a torque can be thought of as a twist. Loosely speaking, torque is a measure of the turning force on an object such as a bolt. The unit of measure is generally expressed in foot pounds or inch pounds

The formula for torque is:

t = r x F

where:

t is the torque

r = the length of the lever arm

F = the force

Properly fastened threaded products achieve their holding power from the tension (or torque) that is derived from the mating of the external and internal threads subject to the elastic limit of the material.

What torque to apply is a generally asked question, but the answer depends on the variables of material, threads' class of fit, method of thread manufacture, and thread lubrication - if any.

Table 3 is offered as the suggested maximum torque values for threaded products. The table is only a guide. Actual tests were conducted on dry, or near dry, products. Mating parts were wiped clean.

TABLE 3 – STRENGTH CHARACTERISTICS

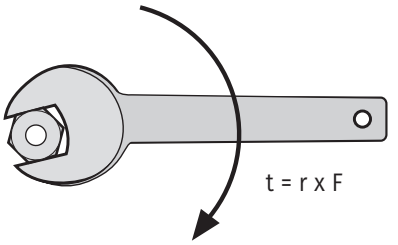
BOLT SIZE	18-8 SS	BRASS	SILICON BRONZE	ALUMINUM 2024-T4	316 SS	MONEL	NYLON*
	In. Lbs.	**In. Lbs.**	**In. Lbs.**	**In. Lbs.**	**In. Lbs.**	**In. Lbs.**	**In. Lbs.**
2-56	2.5	2.0	2.3	1.4	2.6	2.5	.44
2-64	3.0	2.5	8.0	1.7	3.2	3.1	
3-48	3.9	3.2	3.6	2.1	4.0	4.0	
3-56	4.4	3.6	4.1	2.4	4.6	4.5	
4-40	5.2	4.3	4.8	2.9	5.5	5.3	1.19
4-48	6.6	5.4	6.1	3.6	6.9	6.7	
5-40	7.7	6.3	7.1	4.2	8.1	7.8	
5-44	9.4	7.7	8.7	5.1	9.8	9.6	
6-32	9.6	7.9	8.9	5.3	10.1	9.8	2.14
6-40	12.1	9.9	11.2	6.6	12.7	12.3	
8-32	19.8	16.2	18.4	10.8	20.7	20.2	4.3
8-36	22.0	18.0	20.4	12.0	23.0	22.4	
10-24	22.8	18.6	21.2	13.8	23.8	25.9	6.61
10-32	31.7	25.9	29.3	19.2	33.1	34.9	8.2
1/4"-20	75.2	61.5	68.8	45.6	78.8	85.3	16.0
1/4"-28	94.0	77.0	87.0	57.0	99.0	106.0	20.8
5/16"-18	132	107	123	80	138	149	34.9
5/16"-24	142	116	131	86	147	160	
3/8"-16	236	192	219	143	247	266	
3/8"-24	259	212	240	157	271	294	
7/16"-14	376	317	349	228	393	427	
7/16"-20	400	327	371	242	418	451	
1/2"-13	517	422	480	313	542	584	
1/2"-20	541	443	502	328	565	613	
9/16"-12	682	558	632	413	713	774	
9/16"-18	752	615	397	456	787	855	
5/8"-11	1110	907	1030	715	1160	1330	
5/8"-18	1244	1016	1154	798	1301	1482	
3/4"-10	1530	1249	1416	980	1582	1832	
3/4"-16	1490	1220	1382	958	1558	1790	
7/8"-9	2328	1905	2140	1495	2430	2775	
7/8"-14	2318	1895	2130	1490	2420	2755	
1"-8	3440	2815	3185	2205	3595	4130	
1"-14	3110	2545	2885	1995	3250	3730	
	Ft. -Lbs.	**Ft. -Lbs.**	**Ft. -Lbs.**	**Ft. -Lbs.**	**Ft. -Lbs.**	**Ft. -Lbs.**	
1-1/8"-7	413	337	383	265	432	499	
1-1/8"-12	390	318	361	251	408	470	
1-1/4"-7	523	428	485	336	546	627	
1-1/4"-12	480	394	447	308	504	575	
1-1/2"-6	888	727	822	570	930	1064	
1-1/2"-12	703	575	651	450	732	840	

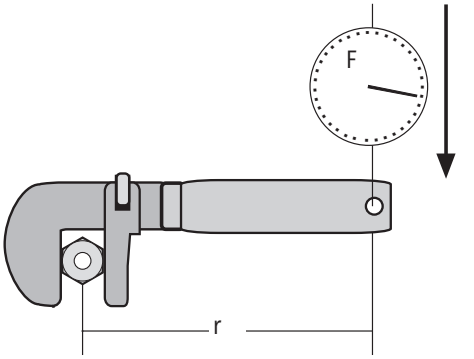
**Nylon figures are breading torque, all others represent safe working torque.*
The 3/8" diameter and under metal products were roll-threaded and, where size range permitted, were made on automatic bolt making equipment.

Technical Information

Enclosure Installation Considerations - Torque Cont. • Cutting & Drilling

Torque Formula Illustrations





Methods For Making Holes And Cutouts In Non-Metallic Enclosures

Drilling of non-metallic material has been difficult and, for some, a mystery. The ability to accurately drill holes in polymer material has been the subject matter of numerous articles and how to demonstrations. There are several types of machining operations that can be performed on polymers such as turning, drilling, routing, trimming, sanding, and milling. Most of these operations are similar to metal removal techniques but there are some differences that need to be addressed in order to make clean, high quality holes and cutouts in composites.

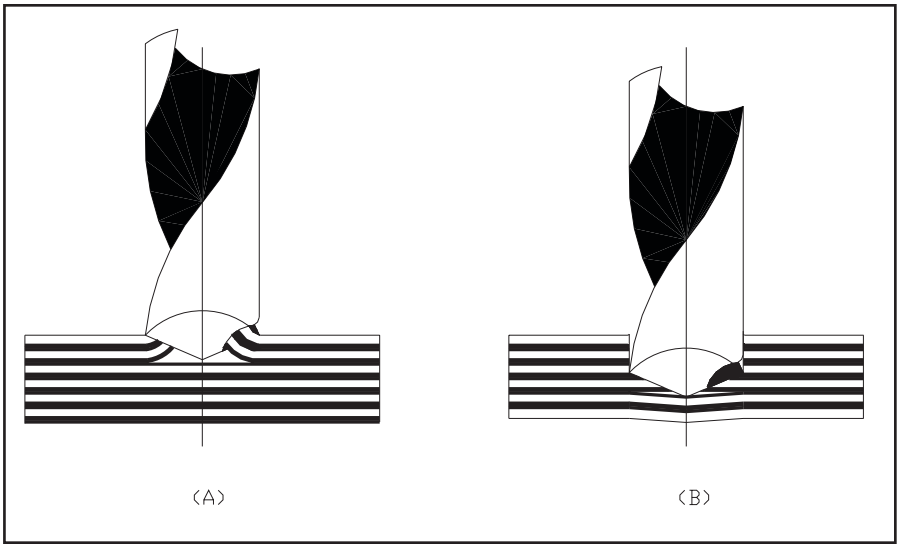
Delaminating of the outer surface or melting/strings of polymer material and glass fibers directly below the surface are the main failure modes noticed when holes or cutouts are drilled or cutout improperly. Most times excessive edge chipping around the perimeter of the cutout or hole is due to improper tools used and methods applied. Other times excessive material pulls or attached fibers not sheared off during the cutting or turning process can also cause delamination failure from the tearing action during material removal. Improper tools used and/or methods are also a culprit of this failure mode. All these can lead to downstream assembly problems, functionality problems, and become aesthetically unappealing if taken to the extreme.

The most common source of failure mode when making holes in an enclosure is a dull cutting tool. Dull tools tend to rip or tear the material. A little planning and understanding of the proper methods to machining polymers up front can make all the difference in the final outcome of the operation.

Figure A shows delamination of the surface of the part at the drill entrance.

Figure B shows similar delamination just prior to drill exit.

(Continued on the following pages)



Cutting & Drilling Continued

1. Hole Saw. The easiest and least complex method to provide an opening in a composite enclosure is to use a fine-toothed hole saw. You must first layout the size and location of the cutout, pre-drill a small hole in the center within the cutout area for the hole saw to start, and then carefully cut out the area to be removed. This is more time consuming and the least accurate method but can be accomplished in almost any environment. Keeping the saw perpendicular to the cutting surface, maintaining a consistent sawing action, and using a diamond/carbide impregnated saw or fine toothed saw will provide the highest quality cutout with minimal edge chipping.

2. Drilling, Boring. Putting round holes in enclosure walls or thru the enclosure door is the most common type of cutout. A recommended tool would be a carbide tipped or PCD diamond tipped hole saw or twist drill bit that will maintain a sharp cutting edge. HSS tools will also work but they will become dull resulting in excessive edge chipping and a poor looking hole. We also recommend using high RPM's and low feed rates when using drills. This reduces the chipping around the cutout. The single most important factor though is keeping a very sharp tool.

Using a drill with a positive rake angle and thin points or split points can help reduce cutting pressure. Feed rates must also be constant and may even be reduced upon exiting from a hole to reduce flexing of the part when the drill exits. Using a solid back surface to support the part when drilling can also aid in reducing delamination and chipping. Caution on polycarbonate to not generate enough heat that the material starts to melt or string.

3. Routing. A third method is to use a router bit and router. This method produces very clean holes and cutouts but also requires the holes and cutouts to be manually laid out beforehand and a steady hand to stay within the layout lines. The use of a jig or fixture to help guide the handheld router or the use of CNC machining centers is helpful to keep straight edges and clean cutouts. The use of diamond impregnated router bits is preferred for longevity but carbide bits will work just as well. Caution on polycarbonate to not generate enough heat that the material starts to melt or string.

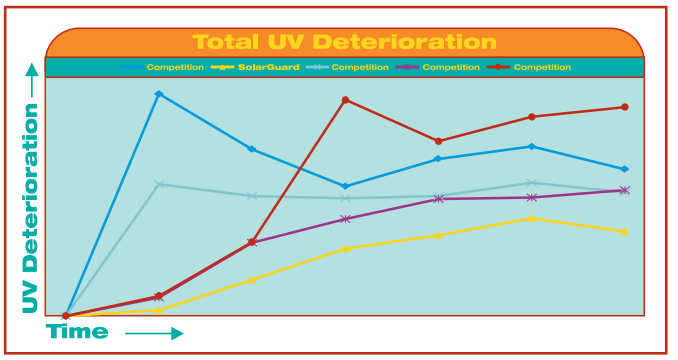
4. Punching. A fourth method is to use a standard hole punch similar to what you would use with metal boxes. This produces a good clean hole but can leave chipped edges if the punch is dull. Again maintaining sharp tools is essential to producing clean cutouts. A pilot hole is required before using a standard hole punch. Manual or hydraulic punch actuators can both be used with composite materials. Punching is not recommended on polycarbonate.

Technical Information

SOLARGUARD®

A non-haloginated fiberglass system that beats the effects of outdoor exposure plus provides the chemical and flame resistance you've come to expect from Robroy Enclosures!

SolarGuard®, in extensive comparison testing, outperformed other available SMC formulations by as much as 60% in its ability to retain gloss and color after exposure to concentrated UV light.



SolarGuard® maintained stability in thickness proving that its physical properties remain very much intact despite EMMAQUA testing that concentrates natural sunlight using 10 highly reflective mirrors to create an intensity level of approximately 8 suns!

SolarGuard® meets a NFPA No. 101 Class A flame spread index. Fire retardancy, achieved through use of alumina trihydrate fillers, meets UL 94 5V standards.

SolarGuard® is a non-haloginated system...meaning that it contains no bromine and no antimony, thereby reducing the risk of smoke-borne toxicity.

SolarGuard® requires less maintenance than paint, wax or gel-coat alternatives used to prolong the life of electrical enclosures in outdoor environments.

How Does SolarGuard® Do What It Does?

SolarGuard's® patented double-protection formula was developed in AttaBox's FormRight lab.

Due to its chemical composition and other additives, SolarGuard® is able to reduce the effects of UV degradation such as surface roughening and fiber blooming.

How does SolarGuard® achieve this level of performance?

SolarGuard® features proprietary double-protection formulation technology that significantly enhances the molecular bond strength and crosslinking that occurs during the curing process in thermosetting polyester sheet molding compounds (SMC). Robroy's SolarGuard® system fights polymer degradation by making it much more difficult for UV light to attack molecular bonds of both primary chains and crosslinks.

A special UV Absorber is added to the SolarGuard® formulation which acts to absorb UV energy, then to release it without damaging the polymer chain. The neo-pentyl glycol (NPG) isopthalic based resin system of SolarGuard® ensures UL 94 5V fire retardancy, but provides a much stronger bond of the polymer chain resulting in significantly improved weathering resistance.

As the standard SMC formulation for most Robroy fiberglass electrical products, SolarGuard® provides an unsurpassed level of UV resistance, fire retardancy, chemical resistance and safe, durable performance...all without adding cost to Robroy's world class electrical enclosures.

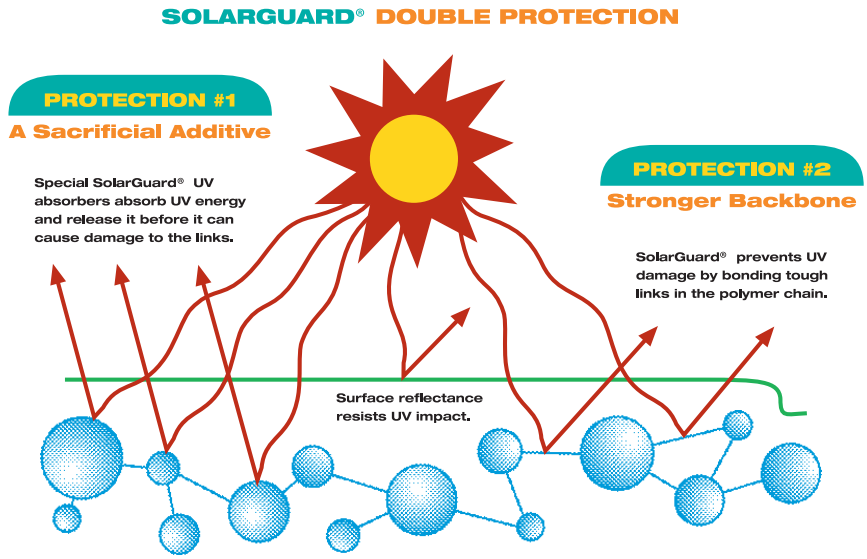
How SolarGuard® Benefits You!
AT A GLANCE: DOUBLE PROTECTION THAT WORKS!

1.) THE SOLARGUARD® WAY

The SolarGuard® formulation is a neo-pentyl glycol (NPG) isopthalic based resin system that contains no bromine. Therefore, there are no weak links in the polymer chain making the UV energy required to break these links significantly greater. The result? SolarGuard® SMC material provides much better UV weathering characteristics. Fire retardancy requirements are still achieved and maintained via fillers that meet UL 94 5V standards.

2.) THE SOLARGUARD® WAY

The special UV absorber is also added into SolarGuard® and works to absorb UV energy and release it without damaging the polymer chain. This is achieved by absorbing UV energy and emitting the light at a different wavelength and frequency than that of the electrons in the carbon-carbon bonds. This prevents the polymer bonds from breaking apart. This material will also absorb UV energy more readily than the links of the polymer chain thus providing increased protection of the polyester material and increased resistance to the damaging effects of UV radiation.



THE SOLARGUARD® DIFFERENCE

- Between a 32-and-60 % improvement, compared to other SMC formulations, in its ability to retain gloss and color after exposure to concentrated UV light.
- Material thickness remains very stable, demonstrating that the physical properties of SolarGuard® are still very much intact after rigorous testing.
- Excellent chemical resistance in both exposed vapor and total submersion applications.
- ASTM flame spread testing meets a NFPA No. 101 Class A (I) Flame Spread Index.
- Potential toxic emissions have been eliminated or substantially reduced from elimination of materials such as bromine, tin and antimony. Other acid gasses have been reduced or eliminated along with significant reductions of black smoke when burned. This formulation is considered to be non-halogenated.

Technical Information

SOLARGUARD®

A unique SMC system for maximizing polymer chain and crosslink bonding.
Up to 60% more UV-resistant compared with other available formulations.
Meets UL 94 5V Fire-Retardancy Standards plus NFPA No. 101 Class A Flame Spread Index.
Eliminates toxic bromine and antimony.
Available to you at NO additional finished-product cost.

Proof Through Performance

Physical Properties of SolarGuard®

MATERIALS TYPICAL PROPERTIES	TEST METHOD ASTM	SOLARGUARD POLYESTER FIBERGLASS (SMC)
Flexural Strength (psi)	D 790	17K
Notched Izod (ft-lb/in @ 1/8")	D256	11
Impact Resistance (lb-in)	UL 746C	≥216
Compressive Strength (psi)	D 695	20K
Tensile Strength (psi)	D 638	8K
Specific Gravity	D 792	1.71
Flammability	UL 94	V-0 & V-5
Heat Deflection (°F at 264 psi)	D 648	375-500
Service Temperature Range (°F)		-76°F to 274°F (-60°C to 134°C)
K Factor, Thermal Conductivity (BTU/ft2/°F)		1.68
Dielectric Strength (VPM)	D 149	380
Arc Resistance (sec)	D 495	190
Water Absorption (% in 24 hr)	D 570	0.10-0.25
Hardness (Barcol-Rockwell M-Shore A)		50-70 Barcol
Shrinkage in/in Minimum		.002

Note: Product comparison data resulting from independent, third-party accelerated testing can be obtained by contacting Robroy Enclosures.

SolarGuard® Flame Spread Classification Per NFPA No 101 ASTM E162 Surface Flammability Of Materials

CLASS	RANGE	TYPE	SOLARGUARD TEST RESULTS
Class A (I)	0 to 25	Flame Spread	Robroy SolarGuard flame spread index 20.59
Class B (II)	26 to 75	Flame Spread	
Class C (III)	76 to 100	Flame Spread	

SolarGuard® optical Density Test Result Summary ASTM E662 Specific Optical Density Of Smoke Generated By Solid Material

	NON-FLAMING	FLAMING
Ds @ 1.5 min. (avg)	0.0	0.3
Ds @ 4.0 min. (avg)	0.0	9.9
Dm (corr) (avg)	10.8	181.9

Testing Procedures Used To Ensure That SolarGuard® Meets Or Exceeds All Relative Industry Standards

- UL 746 C Polymeric Materials Used In Electrical Equipment Evaluations
- UL 50 Enclosures For Electrical Equipment
- UL 508 Industrial Control Panels.

Additional tests have been performed above and beyond these industry guidelines to aid in providing the end user with a premium product for a broad range of uses. These tests were performed using ASTM standards and other government approved procedures. Test standards and evaluation criteria are:

- Chemical resistance testing (submerged and vapor), 37 various chemicals (acids, bases)
- ASTM E162 Flame Spread
- ASTM E662 Smoke Density
- Particulate dust weight (NIOSH 05000), Acid gases HBr, HCl, HNO3, HPO4, H2SO4 (NIOSH 7903), Cyanide (NIOSH 7904), Metals (NIOSH 7300), VOC's with TIC's (EPA TO-14/TO-15), PAH (NIOSH 5506), Carbon Monoxide, Carbon Dioxide, Visual Fiberglass (NIOSH 7400), Ammonia, NO, NO2, HS2.

Additional UV testing has been performed under the following guidelines and evaluation criteria. Exposure testing is performed in Arizona in accordance with ASTM G90-98, Spray Cycle 1 (EMMAQUA, day spray with nighttime wetting).

- ASTM G 147-96 Standard Practice for Conditioning and Handling of Non-Metallic Materials for Natural and Artificial Weathering Test
- ASTM G 90-98 Standard Practice for Performing Accelerated Outdoor Weathering of Non-Metallic Materials Using Concentrated Natural Sunlight
- ASTM D 660-93 Method for Evaluating Degree Checking of Exterior Paints
- ASTM D 2244-93 Test Method for Calculation of Color Difference from Instrumentally Measured Color Coordinates
- ASTM E 308-96 Standard Practice for Computing the Colors of Objects by Using the CIE System
- ASTM D1729-96 Practice for Visual Appraisal of Color and Color Difference of Diffusely-Illuminated Opaque Materials
- ASTM D 661-93 Method for Evaluating Degree of Cracking of Exterior Paints
- SFTS-1 (Wash)) 92-03-30 Method of Cleaning Exposed Specimens Prior to Inspection, Method A, Washed With Deionized Water and Soft Sponge
- ASTM D 523-89 (1999) Test Method for Specular Gloss
- ASTM D 4214-89 Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films, Method D, Transparent Tape Method

UV correlation testing has been performed using accelerated artificial weathering devices. Tests were performed using a QUV A Fluorescent Bulb Weatherometer. The test method utilizes a QUV machine, which consists of 2 banks of 4 fluorescent lights each that emit light in the UV-A (340 nm) wavelength. This UV wavelength simulates normal outdoor sunlight. The second part of the test utilizes water vapor to simulate rain/fog. The exposure cycle consist of alternating 4 hours of UV-A at 65 degree C and 4 hours of 100% relative humidity at 50 degree C. Testing is in accordance with ASTM G154 specifications.

Glossary

Industry Acronyms and Enclosure Terms

ANCE National Standardization and Certification of the Electrical Sector Association Col. Fuentes de Tecamachalco Naucalpan de Juarez C.P. 53950, Edo. de Mexico ANCE performs standards functions in Mexico which are similar to those of ANSI in the United States and CSA in Canada.

ANSI American National Standards Institute 1430 Broadway New York, NY 10018

Arc Resistance Measures electrical-breakdown conditions. Arc resistance is measured as time, in seconds that it takes for an electrical current to arc across a distance along the insulating surface. The higher the value, the greater the resistance to break down.

ASTM American Society for Testing and Materials 100 Barr Harbor Drive Conshohocken, PA 19428

Attenuation A measure of the ability to contain or repel EMI/RFI energy.

Bonding Establishing a low impedance conducting path between conductors in an electrical system.

BTU British Thermal Unit. A measure of the amount of heat required to raise the temperature of 1 lb. of water 1°F. This unit is commonly used to rate air conditioning capacity.

CANENA Council for Harmonization of Electrotechnical Standardization of North America, harmonizes standards among Canada, Mexico and the United States.

Composite The combination of reinforcing fibers, usually glass or carbon, and a polymer resin. The fiber reinforcement provides physical properties which exceed the resin alone.

Compression Set A physical property of gasket materials, the difference between the initial height of a never compressed gasket and the same gasket after being compressed for a given time period divided by the original height and expressed as a percentage. A lower number is desirable.

Compressive Strength Describes how much weight a non-moving, specified size and shape a material can withstand before crushed. Compressive strength is measured in thousands of pounds per square inch. Higher numbers indicate stronger materials.

Conduction 1. Electrical — The flow of electrical current in a material. 2. Thermal — The transfer of kinetic energy from one molecule to another as heat flows from a hot area to a cold area.

Continuity A low impedance conducting path between conductors in an electrical system.

Convection The transfer of heat by mixing fluids, either naturally or forced as by a fan or air conditioning.

Cover The unhinged portion of an enclosure that closes an opening.

CSA Canadian Standards Association 178 Rexdale Boulevard Etobicoke, Ontario Canada M9W 1R3

dB (decibel) Unit to express the effectiveness of a material or system in reducing electromagnetic interference. If an enclosure reduces the EMI by 30 dB, the power of the interfering wave will be reduced by a factor of 1000 in passing through the enclosure. The equation for calculating attenuation in decibels is dB = 10 log10 (P1/P2) where P1 = power of the interference wave before it passes through the enclosure, P2 = power of the wave after it has been reduced (attenuated) by the enclosure.

Deflection Temperature Under Load (DTUL)

Measure the temperature at which a material deflects a given amount under a given load. It was developed for thermoplastic materials which soften considerably when heated. It has a relatively little value as a design figure for reinforced thermosetting polymers.

Density Is the weight of a materials per unit volume. It is measured in pounds per cubic foot (lbs./cu. Ft). Higher numbers indicate heavier materials.

Design Test Tests to confirm performance of a product designed to an applicable standard, not intended to be a production test.

Industry Acronyms and Enclosure Terms

Dielectric Strength Is an indication of the electrical strength of a material as an insulator. The specimen is placed between heavy cylindrical brass electrodes that carry electrical current. For short-term tests, the voltage is increased from zero to breakdown at a uniform rate. Breakdown by these tests means passage of sudden excessive current through the specimen; it can be verified by instruments and visible damage. The dielectric strength of an insulating material is the voltage gradient at which electric failure or breakdown occurs. The dielectric strengths of materials vary greatly with several conditions such as humidity and geometry. Is is not possible to apply the standard test values directly to field use unless all condition, including specimen dimension, are the same. Because of this, the dielectric-strength test results are of relative rather that absolute value as specification guides.

Door The hinged portion of an enclosure that closes an opening.

Electromagnetic Emission Electrical energy radiated into the environment intentionally by an antenna or incidentally by an electronic component or power equipment during a switching operation.

Electromagnetic Field Invisible fields which surround energized conductors such as wires and antennas. A field has both electric and magnetic components.

Electromagnetic Immunity The capability of an electronic component or electrical equipment to perform its intended function in the presence of external electromagnetic fields.

EMI ElectroMagnetic Interference. Randomly radiated electrical energy which varies in frequency and intensity and is coupled to electronic systems with undesirable results. Sources include power lines, high voltage equipment, switches, relays or any device that generates an electric spark or corona.

EMC ElectroMagnetic Compatibility. The ability of electronic equipment to perform its intended function in the presence of EMI and RFI disturbances without affecting proper operation.

EMP ElectroMagnetic Pulse. Interference caused by a large and sudden electrical discharge such as lightning.

Enclosure A surrounding case constructed to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment. Enclosure Type definitions describe the application and the environmental conditions for which an enclosure will provide protection.

EU European Union

Flammability 94V-0 is a rating which is used to establish the flammability of enclosure materials. It is performed by exposing a specimen of the material in a vertical position to a flame and determining if it burns and for how long it continues to burn after the flame is removed.

Flexural Strength Also known as bending strength. It describes how much of a non-moving weight can be applied before a materials yields or breaks. It is measured in thousands of pounds per square inch. Higher numbers mean the material is stronger and can withstand a heavier load.

Grounding Intentionally establishing a low impedance current path between conducting materials at the same potential, not necessarily energized, of an electrical system and the earth at zero potential. Grounds are extremely critical to protect equipment and personnel from electrical shock.

Hazardous Area Area where electrical equipment is installed and ignitable flammable gases and vapors; flammable and combustible liquids; combustible dusts or ignitable fibers and flyings are or could be present. See National Electrical Code, Articles 501-505 and 511-517.

Heat Deflection Temperature The temperature at which a composite specimen begins to deflect when exposed to a prescribed load.

Heat Distortion Temperature See Heat Deflection Temperature, both terms are used.

hz, hertz The measure of frequency, defined as one cycle/sec.

IEC International Electrotechnical Commission
1 Rue de Varembei CH-1211
Geneva 20, Switzerland

Glossary

Industry Acronyms and Enclosure Terms

Indoor Locations Areas which are protected from exposure to the weather.

Impact Strength – IZOD A measure of how much energy is absorbed by the material when it is broken by a moving weight. There area many different test methods for measuring impact. IZOD is but one of these methods. IZOD is measured in foot pounds per inch of width. (This is sometimes given as foot pounds per inch of notch.) Higher numbers mean that the materials will absorb more energy before it is broken by a moving weight.

K Factor A measure of the effectiveness of a material as a thermal insulator. It represents the quantity of heat which can pass through one square foot of material in one hour for every degree Fahrenheit of temperature difference across one inch of material thickness.

Mhz, Megahertz A measure of frequency, defined as one million cycles/sec.

Mold Shrinkage Is the difference in dimensions between the cold mold and cold part.

NEC National Electric Code, an NFPA document.

NEMA National Electrical Manufacturers Association 1300 North 17th St, Suite 1847 Rosslyn, VA 22209

NFPA National Fire Protection Association 1 Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101

Non-hazardous Areas Area where electrical equipment is installed and ignitable flammable gases and vapors; flammable and combustible liquids; combustible dusts or ignitable fibers and flyings are not present. See NEC Articles 501-501 and 511-517 as well as the above definition of Hazardous Areas.

Non-ventilated Constructed so as to provide no intentional circulation of external air through the enclosure.

Ohms per Square A measurement unit for electrical continuity of the metal coating applied internally to fiberglass enclosures for EMI/RFI shielding. The surface resistance (conductivity) measurement is without units because the surface areas does not influence the reading, i.e., measurements will yield the same result over 1 in2, 1 cm2 or 1 m2.

Outdoor Locations Areas which are exposed to the weather.

Relative Permittivity Is the ration of the capacitance of a particular material to the capacitance of air. The relative permittivity of most insulating materials varies from 2 to 10, air having 1. Higher values indicate greater insulating qualities.

RFI Radio Frequency Interference. Interference caused by radio waves which emanate from commercial radio and television stations, amateur radio broadcasts, radar, microwave ovens, etc. Radio waves are usually well defined in terms of amplitude and frequency.

Seamless Gasket The polymer gasket which is automatically dispensed and chemically reacts to form a gasket which has no seams.

SMC Sheet Molding Compound. The fiberglass-polyester material used to mold AttaBox Enclosures. The compression molding process used to make AttaBox fiberglass enclosures.

Specific Gravity Is the ration of the density of a material to the density of water. It can be obtained by dividing a material's density in lbs/ft to the 3rd power by 62.36.

Specific Heat (Thermal Capacity) Defines how much heat is needed to raise the temperature of one pound of material one degree F. It is measured in BTUs per pound per degree Fahrenheit (BTU/lb/~). Higher numbers mean that it takes more heat energy to raise the temperature of a material.

Strip Gasket The neoprene material which is cut in strips and attached to the enclosure with an adhesive.

Temperature Rise The temperature difference between air inside the enclosure and the ambient air outside the enclosure.

Industry Acronyms and Enclosure Terms

Tensile Elongation When a specified size and shape bar of a material is pulled, it gets longer. Elongation tells how much longer it gets before it breaks.

Tensile Modulus Measure of the ability of a material to withstand load without permanent deformation. It is normally measured as the slope of a the straight line portion of a plot of stress vs. strain. Is is measured in millions of pounds per square inch.

Tensile Strength Describes how much of a non-moving load a material can withstand before it no longer returns to its original length upon removal of the load. Tensile strength is measured in thousands of pounds per square inch. Higher numbers indicate materials which can withstand a stronger pull before failure.

Thermal Coefficient of Expansion Measures how much the length of a material will change when the material is heated or cooled. The value given is based on the inch as a unit. The number given shows how much this materials will increase in length if the temperature of the material is raised one degree Fahrenheit (in/in/˚F). Higher numbers mean that the material will expand or lengthen more for each degree rise in temperature. Smaller numbers indicate relative stability to change no matter what temperature.

Thermal Conductivity Known as the K factor. It measures the transfer of heat from one side of a material to the other side. It is measured as BTUs per hour per unit area (square feet) for a thickness of one inch and a temperature difference of one degree Fahrenheit between both sides of the material in the same amount of time.

Thermal Radiation The transfer of energy by electromagnetic waves.

Thermoplastic A polymer which becomes solid when the temperature falls below its melting point. A thermoplastic polymer, once cured, can be reheated, melted and shaped into something else.

Thermoset A polymer which is cured at a given temperature, an irreversible chemical reaction. A thermoset polymer, once cured, cannot be heated again and shaped into something else.

Torque Torque is the tendency of a force to rotate an object about an axis. Just as a force is a push or pull, torque can be thought of as a twist. The unit of measure is generally expressed in foot pounds or inch pounds.

UL Underwriters Laboratories
333 Pfingsten Road
Northbrook, IL 60062

ULC Underwriters Laboratories of Canada
7 Crouse Road
Scarborough, Ontario
Canada M1R 3A9

UV Ultraviolet Light. The component of sun light above the visible spectrum that affects polymer materials in long term exposures.

Ventilated Constructed so as to provide for the circulation of external air through the enclosure to remove excess heat, fumes, or vapors.

Volume Resistivity Is the electrical resistance between opposite aces of a unit cube (1 cm to the 3rd power) of a given material. This resistance is expressed in ohms. Higher values indicate greater insulating qualities.

Water Absorption A physical property of materials. A specimen of the material is weighed, placed in water for 24 hours and reweighed. The difference between the initial weight and the weight after water exposure is expressed as a percentage.

Part Number Index

Heartland™ Series 12

Opaque Cover (AH)
AH664 - AH242410 14 - 17

Clear Cover (AH_C)
AH664C - AH242410C 14 - 17

Commander™ Series 18

Fiberglass (CO) | Blank
CO332 - CO1732 20 - 23

Fiberglass (CO) | 30mm In-Line
CO1PB - CO6PB 24 - 25

Fiberglass (CO) | 22mm In-Line
CO1PB22 - CO6PB22 26 - 27

Fiberglass (CO) | 30mm Multi-Hole
CO4PBW - CO9PBW 28 - 29

Polycarbonate (CO)
COPC432 - COPC2PB22 30 - 31

BantamBox™ Series 32

Opaque Cover (BB) | W
BB050504W - BB302311W 34 - 37

Clear Cover (BBCC) | W
BBCC050504W - BBCC302311W 38 - 41

Viking™ Series 42

Opaque Cover (V) | W, HW & HPL
V1076W - V555W 44 - 48

Clear Cover (VCC) | W, HW & HPL
VCC1076W - VCC555W 49 - 53

DuraShield™ Series 54

Opaque Cover (DU) | W
DU333W - DU16165W 56 - 57

Clear Cover (DUL) | W
DUL18127W - DUL24168W 58 - 59

Endurance™ Series 60

Opaque Cover (E) | HQT
E12106HQT - E302412HQT 62 - 63

Freedom™ Series 64

(FR) | HW & HPL
FR60604HW - FR201610HW 66 - 69

Flush Bonded Window (FRW) | HPL
FRW60604HPL - FRW201610HPL 70 - 72

(FRW) | Viewing Window Cover
FRW60604 - FRW201610 73

Panel Management System 74 - 81

Centurion™ Series 82

(CE) | HW & HPL
CE707HW - CE1513HW 84 - 86

Flush Bonded Window (CEW) | HW & HPL
CEW707HW - CEW1513HW 87 - 89

MachoBox™ Series 90

(M) | HPL
M2020HPL - M2424HPL 92 - 93

Triton™ Series 94

(T) | HWT
T24208HWT - T603616HWT 96 - 97

Flush Bonded Window (TW) | HWT
TW24208HWT - TW483612HWT 98 - 99

Free-Standing (T_FS) | HWT
T722525FSHWT - T907236FSDDHWT 100 - 101

Accessories 102

Breather Vent & Drain Vent 102
PluggIt® 103
Louver Plate Vent 104
Vent 104
Drain & Vent 104
Stainless Steel Screws 104
Vapor Capsule 105
Plastic Print Pocket 105
Mountable Carrying Handle 105
Pole Mount 105
Nylon Cord Grip Fittings 106

Back Panels

Typical Back Panels 108
Triton Back Panels 108
DuraShield Back Panels 109
BantamBox Back Panels 110
Endurance Series Back Panels 110
Viking Series Back Panels 111
MachoBox Series Back Panels 111

Enclosure Specific Accessories

Latches for Field Replacement 112
Centurion & DuraShield Mounting Feet 113

General Accessories

Filters 114
Thermal and Electrical Accessories 115 - 117

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BantamBox™

Viking™

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