

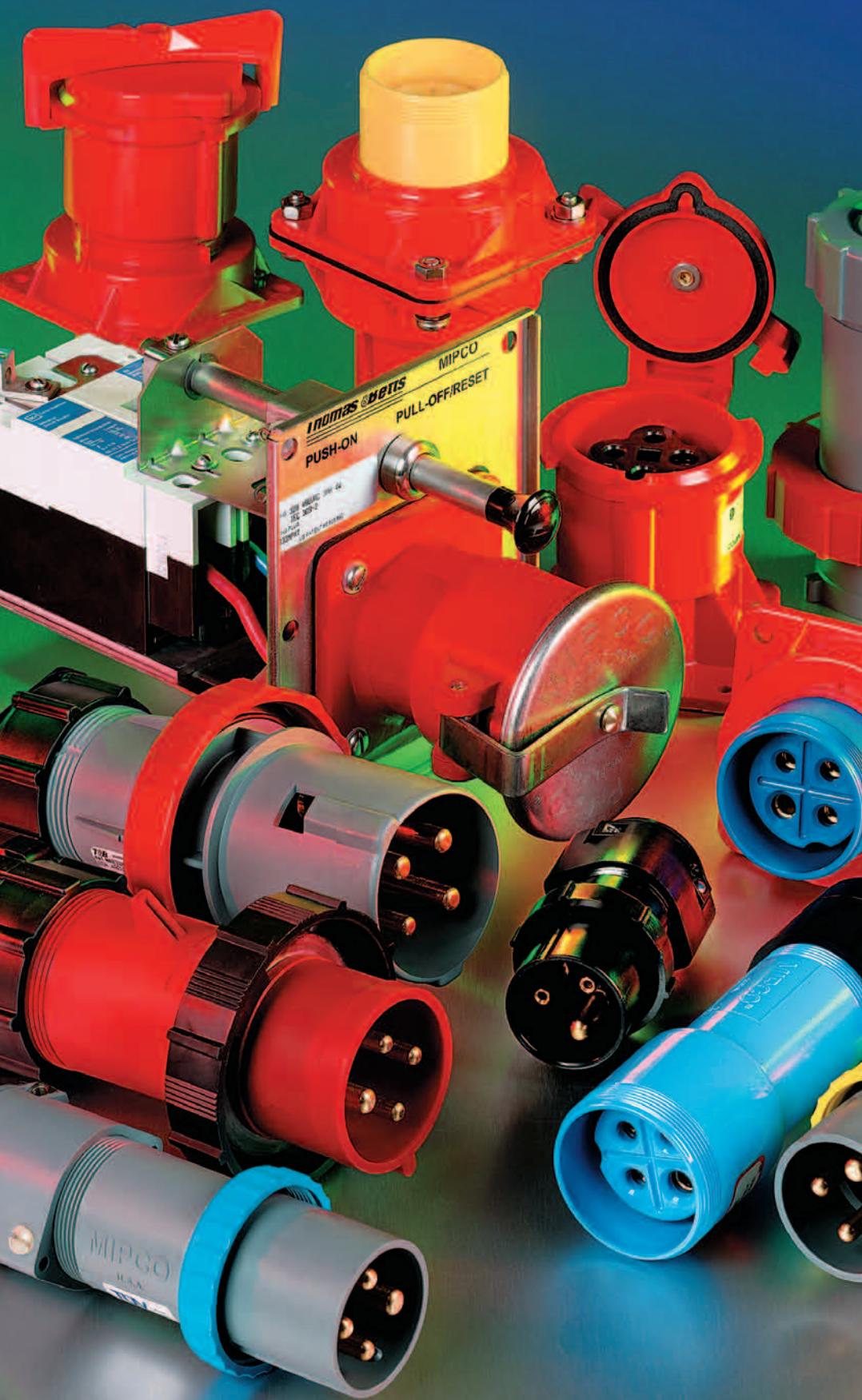


WWW.CABLEJOINTS.CO.UK  
THORNE & DERRICK UK  
TEL 0044 191 490 1547 FAX 0044 477 5371  
TEL 0044 117 977 4647 FAX 0044 977 5582  
WWW.THORNEANDDERRICK.CO.UK

**Thomas & Betts**

**Mipco™**

**Plugs, Connectors &  
Receptacles for the  
Refrigerated Container  
Industry**



*Effective  
February 2004*

### Mipco™ Sets the Standards

In today's competitive global markets, reliable equipment is essential to protect perishable cargoes from loss. Mipco™ responds to our customers with world-class quality products to meet their special needs. Mipco™ is the recognized leader in refrigerated container industry power interconnections and systems.

Mipco™ constantly monitors and updates products to meet the ever-changing demands of the market. We recently re-engineered our Interlocked Reefer Power Outlet from top to bottom, offering the ultimate in safety, reliability and durability. This new "Module" has a unique interlock mechanism that ensures plugs cannot be removed while under load.

Our customers benefit from the convenience of "one stop shopping" in our expanded line of products. Contact T&B's Customer Service Department for an authorized distributor in your area. Our worldwide distribution network stocks products to provide you with an immediate solution to your reefer needs.

Manufacturing Quality Systems  
Certified to ISO-9001



On Ship, On track or  
Dockside... Worldwide



Overview .....	1
Standard Products:	
Plugs, Connectors and Receptacles .....	2-5
Accessories .....	6
Special Products:	
Reversed Contacts Service 30A and 50A, 250 VAC .....	7
Fixed Receptacles with Monitor-Switches .....	8
Special Rated Plugs and Receptacles .....	8
Flanged Connectors .....	9
Converter Plugs and Converter Cord Sets .....	10
Standard and Special Products Technical Information .....	11
Interlocked Reefer Power Outlets. ....	12-18
Multi-Gang Enclosure Systems .....	19-21
Alternating Power Outlet .....	22-23
Index .....	24





## Standard Products – Plugs, Connectors & Receptacles



### Plug Into Mipco™ Power

Mipco™ plugs, connectors and receptacles are used extensively in ports, terminals, transport and shipboard applications to provide a safe, watertight electrical connection for refrigerated containers. Mipco construction and design benefits are a quality benchmark:

- **No corrosion:** aluminum receptacles are copper-free aluminum castings with a unique 2-layer electrostatic epoxy powder coat finish. Stainless steel and brass components are used extensively.
- **Tougher and better:** thermoplastic receptacle, connectors and plugs are made from Amtuf high abuse Nylon thermoplastic and DuraV high strength thermoplastic. Wide range chemical, UV withstand, impact and overall performance characteristics set the standard for construction.
- **Safety Listed and Approved:** We lead with safety in UL/CSA listings, approvals and certifications. “Recognized” or “non-listed” offshore supplier components just aren’t the same.

### The Mipco™ Advantage

#### Safety

- ▼ **Safety** ground pin makes first, breaks last for optimum operator safety.
- ▼ Internal O-ring seals provide **watertight integrity**, even without plug engaged or cap in place.
- ▼ Thermoset interiors provide the **safest insulation** under extreme conditions.
- ▼ Color-coded housings provide **easy identification** of mating components.

#### Durability

- ▼ Amtuf™ housings which provide three times the **impact and temperature resistance** of polycarbonate. Extremely resistant to oil, fuel, grease and most common solvents.
- ▼ Neoprene cable compression bushings with locking collars provide a **watertight, tug-proof connection**.

#### Reliability

- ▼ Solid brass contact sleeves with beryllium copper compression springs **minimize heat rise and corrosion**.
- ▼ Waterproof cable sealings and locking screw collars assure **waterproof connections**.

#### Easy Installation & Service

- ▼ Fast assembly and wiring with “drop-in” rear loaded interiors.
- ▼ A variety of optional bushing sizes available for plugs and connectors to ensure sealing to your cable.
- ▼ **Readily available service parts.**
  - Interior assemblies
  - Gland nut assemblies
  - Screw collars
  - Flap Cap/Screw Cap assemblies

**Thomas & Betts**





## Standard Products – Plugs, Connectors & Receptacles

### Waterproof Cable Sealing:

- Nut with Cable Locking Clamps
- Neoprene Compression Bushing Cable Sealing / Locking System

### Fast, Easy, Rear Load Wiring & Assembly:

- Terminal Set Screws

### The Most Durable Materials Available

- AMTUF™ High impact housings
- Thermoset Interiors

### Waterproof Locking Connections:

- Locking Screw Collars with gasket seals
- IP67 minimum

### Dry Wiring Compartments

- Interior O-Ring Seals around compartments, and each pin and sleeve assure waterproof connections

### High Reliability, High Performance Connections

- CDA 360 Solid Brass Pin & Sleeve
- Ground contacts make first; break last

### Long Lasting Self Cleaning Connections



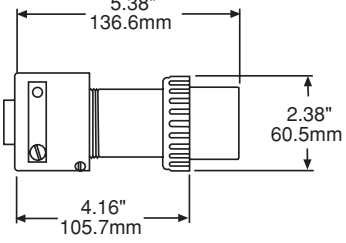

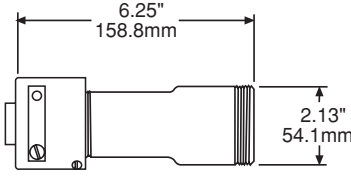



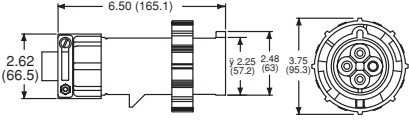



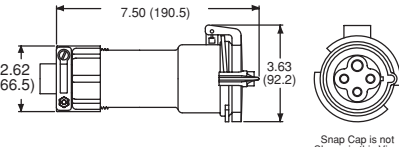


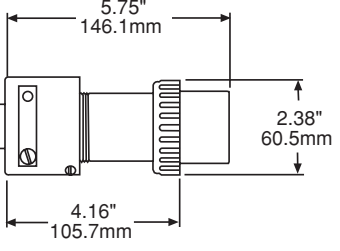

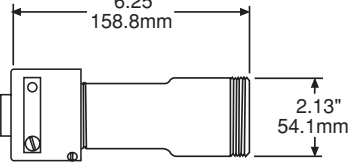


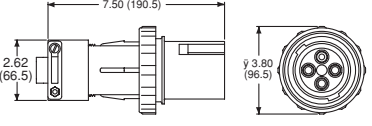

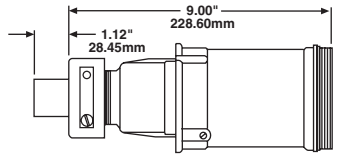


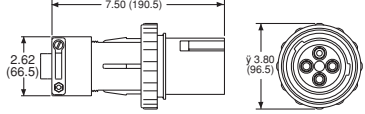

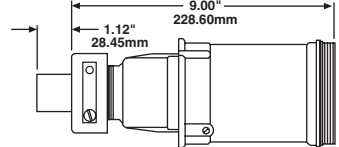
- Full Round Pin & Sleeve Contacts for maximum contact area and coolest connection

### Dry Wiring Compartments

- Interior O-Ring Seals around compartments, and each pin and sleeve assure true “waterproof connections”

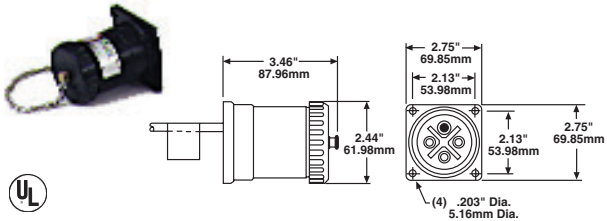
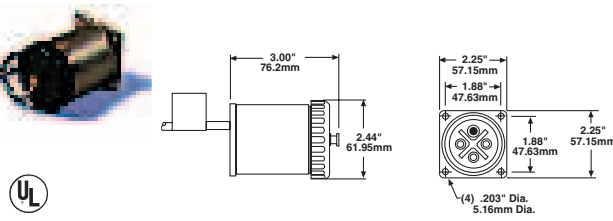
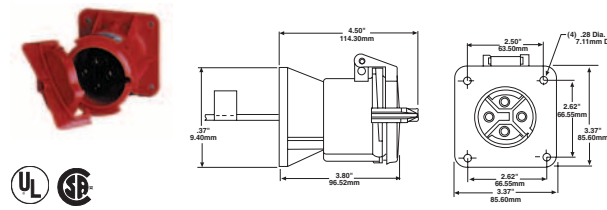
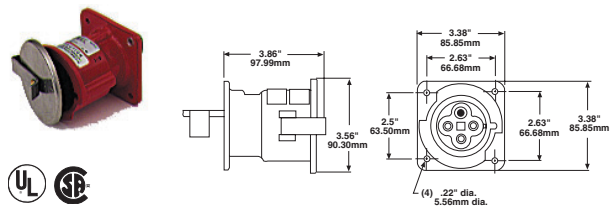
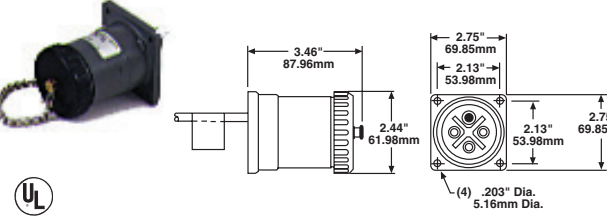
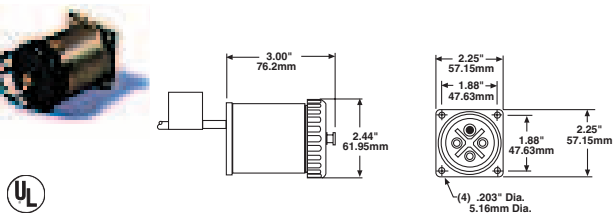
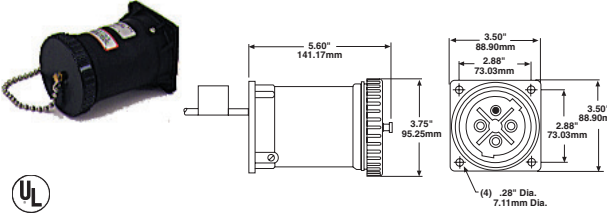
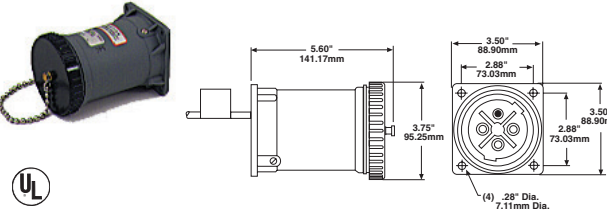
(333MPXT and 333FCV shown)

**Thomas&Betts**

Male Plugs			Female Connectors		
Cat. No.	Dimensions	Rating	Cat. No.	Dimensions	
<b>334MPXT</b>  		<b>30 AMP</b> <b>250VAC</b> 60Hz 3P4W	<b>334FC•</b> 		
<b>333MPXT★</b>   		<b>32 AMP</b> <b>380/440 VAC</b> 50/60Hz 3P4W IEC 309-2 (480) VAC-USA)	<b>333FCV▲ (DuraV Housing)</b>   	 <p>Snap Cap is not Shown in this View</p>	
<b>534MPXT</b>  		<b>50 AMP</b> <b>250VAC</b> 60Hz 3P4W	<b>534FC•</b> 		
<b>634MP2XT</b>  		<b>60 AMP</b> <b>250VAC</b> 60Hz 3P4W	<b>634FC2•</b> 		
<b>634MP4XT</b>  		<b>60 AMP</b> <b>480VAC</b> 60Hz 3P4W	<b>634FC4V▲ (DuraV Housing)</b> 		

Additional bushing sizes available for plugs and connectors to ensure sealing to your cable.  
See page 6 for ordering information.

- Polycarbonate housing.
- ▲ DuraV™ Housing, UL94V-0 Flame rated.
- ★ AMTUF® Housing

Non-Metallic Female Receptacles			Metallic Female Receptacles		
Cat. No.	Dimensions	Rating	Cat. No.	Dimensions	
<b>3034FRXTS</b>		<b>Rating</b> <b>30 AMP</b> <b>250VAC</b> 60Hz 3P4W	<b>3034FRS</b>		
<b>3334FRVS▲</b>		<b>32 AMP</b> <b>380/440 VAC</b> 50/60Hz 3P4W IEC 309-2 (480) VAC-USA)	<b>3334FRF</b>		
<b>5034FRXTS★</b>		<b>50 AMP</b> <b>250VAC</b> 60Hz 3P4W	<b>5034FRS</b>		
<b>6234FRXTS★</b>		<b>60 AMP</b> <b>250VAC</b> 60Hz 3P4W			
<b>6434FRXTS★</b>		<b>60 AMP</b> <b>480VAC</b> 60Hz 3P4W			

**For All Receptacles; Flap Cap, order using suffix “F”. Example 3334FRVF.**  
**Screw Cap, order using suffix “S”. Example 3034FRXTS.**

Additional bushing sizes available for plugs and connectors to ensure sealing to your cable. See page 6 for ordering information.

- Polycarbonate housing.
- ▲ DuraV™ Housing, UL94V-0 Flame rated.
- ★ AMTUF® Housing



### Accessories for Plugs & Connectors

#### Additional Bushing Sizes

Catalog No.	Washer & Bushing I.D.
B16779AR	0.750
B16779BR	0.875
B16779CR	0.620
B16779DR	0.700
B16779ER	1.000
B16779FR	0.800
B16779GR	0.545
B16779HR	0.925

\* For 30, 32, 50 & 60A standard devices.

### Accessories for Non-Metallic Receptacles<sup>1</sup>



Straight Adapter and Junction Box Shown Assembled.

#### Junction Box and Straight Adapter<sup>2</sup>

Straight Adapter Catalog No.	Junction Box Catalog No.	Receptacle Rating
SAM50	JM99	30A, 250V
SAM32	JM99	32A, 380/440V (480V)
SAM50	JM99	50A, 250V
SAM60	JM99	60A, 250V
SAM60	JM99	60A, 480V



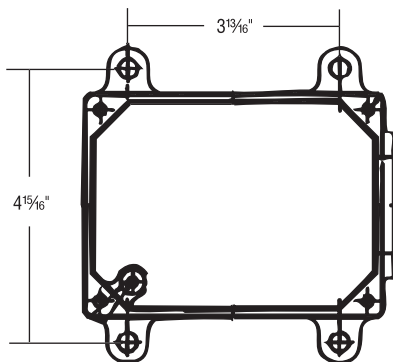
Angle Adapter and Junction Box Shown Assembled.

#### Junction Box and Angle Adapter







Angle Adapter Catalog No.	Junction Box Catalog No.	Receptacle Rating
AM50	JM99	30A, 250V
AM32	JM99	32A, 380/440V (480V)
AM50	JM99	50A, 250V
AM60	JM99	60A, 250V
AM60	JM99	60A, 480V

Notes:

1. Does not exclude 32 amp metallic receptacles
2. Adapter and Junction Box may differ from photo



JM99

Female Plugs			Male Connectors & Receptacles		
Cat. No.	Dimensions	Rating	Cat. No.	Dimensions	
<b>334FP•</b>	 5.38" 136.6mm 4.16" 105.7mm 2.38" 60.5mm	<b>30 AMP 250VAC, 60Hz 3P4W</b>	<b>334MC▲</b>	 6.25" 158.8mm 2.13" 54.1mm	
		<b>30 AMP 250VAC, 60Hz 3P4W</b>	<b>334MR▲</b>	 2.66" (67.6) 1.88" (47.8) 4.14" (105.2) 3.25" (82.6) 3.79" (96.3) 2.44" (62.0) 2.71" (68.8)	
<b>534FP•</b>	 6.00" (152.4) 2.50" (63.5) 2.38" (60.5)	<b>50 AMP 250VAC, 60Hz 3P4W</b>	<b>534MC▲</b>	 6.25" 158.8mm 2.13" 54.1mm	
		<b>50 AMP 250VAC, 60Hz 3P4W</b>	<b>534MR▲</b>	 2.66" (67.6) 1.88" (47.8) 4.14" (105.2) 3.25" (82.6) 3.79" (96.3) 2.44" (62.0) 2.71" (68.8)	

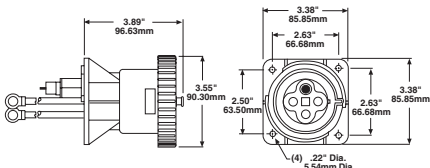
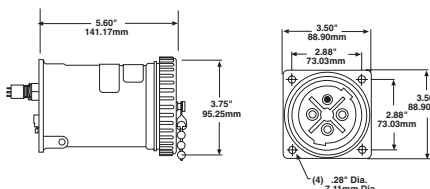
Note: Many additional bushing sizes available; see page 6.

- Polycarbonate housing.
- ▲ DuraV™ Housing, UL94V-0 Flame rated.
- ★ AMTUF® Housing



These receptacles include a micro switch mounted at the rear of the interior. The switch is mechanically activated by plug (ground pin) insertion. Applications include electrical interlocking, control circuits and safe switch or monitor systems. (Micro switch is a separate circuit.)

### Ordering Information

Cat. No.	Dimensions	Rating
<b>3334FRVSMS▲*</b>	 <p>3.89" 96.63mm 3.38" 85.85mm 2.63" 66.68mm 3.55" 90.30mm 2.50" 63.50mm 2.63" 66.68mm 3.38" 85.85mm (4) .22" Dia. 5.54mm Dia.</p>	<b>32 AMP</b> <b>380/440VAC</b> 50/60Hz, 3P4W IEC309-2 (480) VAC-USA
<b>6234FRMS★</b>	 <p>5.60" 141.17mm 3.75" 95.25mm 3.50" 88.90mm 2.88" 73.03mm 3.50" 88.90mm 2.88" 73.03mm (4) .28" Dia. 7.11mm Dia.</p>	<b>60 AMP</b> <b>250VAC</b> 60Hz 3P4W

\* Flap Cap also available.

Polycarbonate Housing used on 6234FRMS.

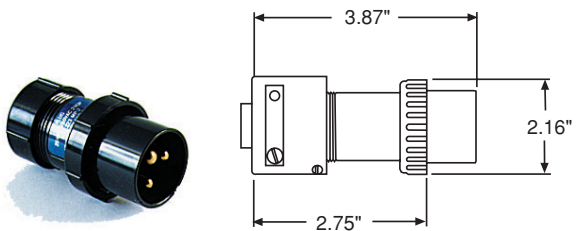
▲DuraV™ Housing Used for 3334FRVSMS, replaces 3334FRPSMS.

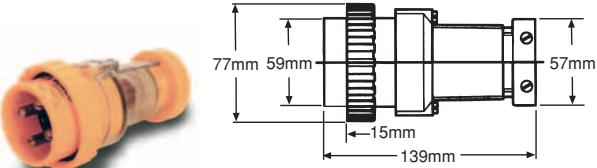
★ AMTUF® Housing

## Special Products – Special Rated Plugs and Connectors

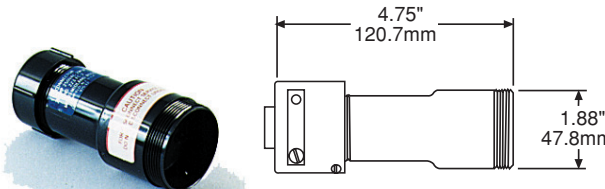
### Ordering Information: 20 Amp and Australian

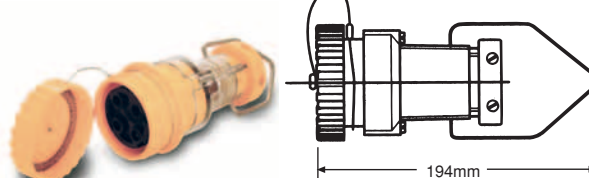
#### Male Plugs

Cat. No.	Dimensions	Rating
<b>223MP2</b>	 <p>3.87" 98.26mm 2.16" 54.91mm 2.75" 70.15mm</p>	<b>20 AMP</b> <b>250VAC,</b> 60Hz 2P3W

<b>334MP5</b>	 <p>77mm 1955mm 59mm 1500mm 15mm 381mm 139mm 3530mm 57mm 1448mm</p> <p><b>Australian</b></p>	<b>32 AMP</b> <b>Australian Standard</b> <b>440/500 VAC,</b> 50Hz 3P4W
---------------	---	--

#### Female Connectors

Cat. No.	Dimensions
<b>223FC2</b>	 <p>4.75" 120.7mm 1.88" 47.8mm</p>

<b>334FC5</b>	 <p>194mm 4928mm</p>
---------------	--

Flanged connectors are used in many trailer mount or “underslung” applications where connector needs to be mounted through a bulkhead plate or other fixed position.

### Ordering Information

Cat. No.	Dimensions	Rating
----------	------------	--------

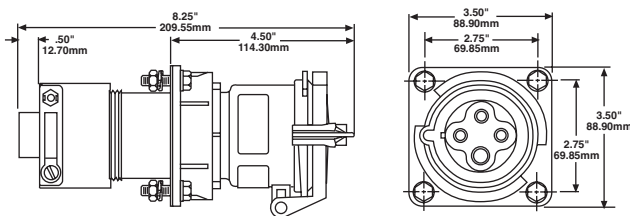
#### 333FCVF▲

**32 AMP, 380-440 VAC**

50/60Hz, 3P4W

IEC 309-2

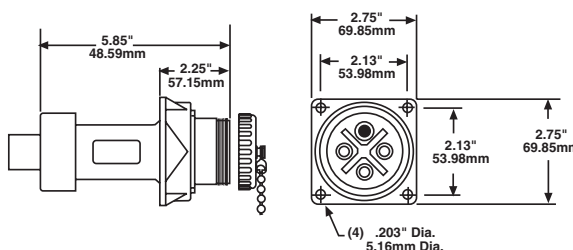
(480) VAC-USA)



#### 534FCF▲

**50 AMP, 250 VAC**

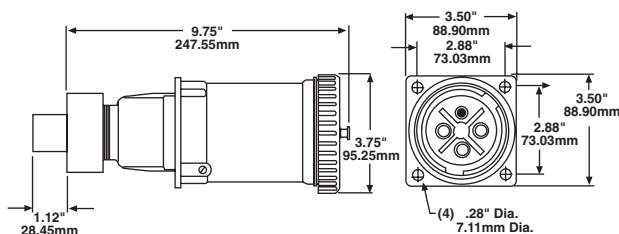
60Hz, 3P4W



#### 634FC2FXT★

**60 AMP, 250 VAC**

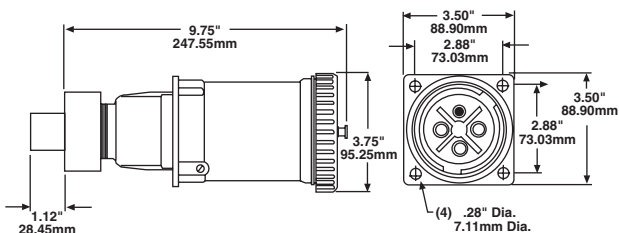
60Hz, 3P4W



#### 634FC4FXTS/0750★

**60 AMP, 480 VAC**

60Hz, 3P4W




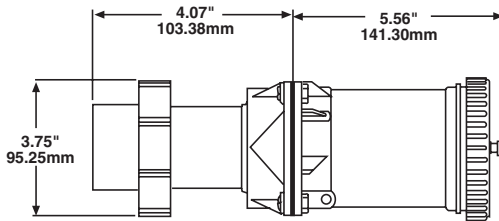
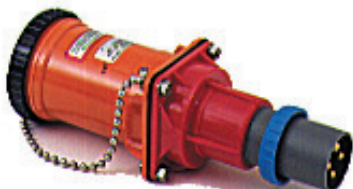
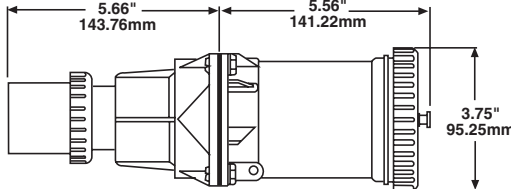

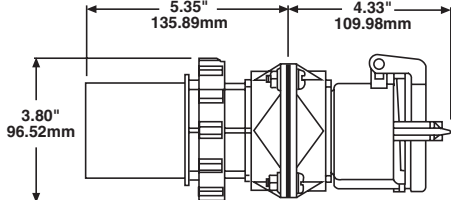

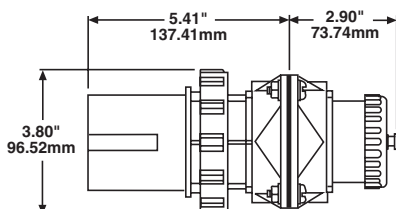
\* Polycarbonate Housing

▲DuraV™ Housing, UL94V-0 Flame rated

★ AMTUF® Housing

Converter plugs and converter cords facilitate the connection of a plug and receptacle with different ratings. Vessel sharing has become increasingly common, resulting in refrigerated containers with plug configurations that do not match the existing shipboard or port terminal receptacles. The converter plug eliminates the need for time-consuming and expensive temporary change overs when these situations are encountered.

### Converter Plugs

Cat. No.	Dimensions	Rating
 <p><b>3260CPV▲</b></p> <p><b>32 Amp</b> 380/440V Male Plug</p>	 <p>4.07" 103.38mm 5.56" 141.30mm 3.75" 95.25mm</p>	<p><b>60 Amp</b> 480VAC Female Connector</p>
 <p><b>5060CP</b></p> <p><b>50 Amp</b> 250VAC Male Plug</p>	 <p>5.66" 143.76mm 5.56" 141.22mm 3.75" 95.25mm</p>	<p><b>60 Amp</b> 250VAC Female Connector</p>
 <p><b>6032CP▲</b></p> <p><b>60 Amp</b> 250VAC Male Plug</p>	 <p>5.35" 135.89mm 4.33" 109.98mm 3.80" 96.52mm</p>	<p><b>32 Amp</b> 380/440VAC Female Connector</p>
 <p><b>6050CP</b></p> <p><b>60 Amp</b> 250VAC Male Plug</p>	 <p>5.41" 137.41mm 2.90" 73.74mm 3.80" 96.52mm</p>	<p><b>50 Amp</b> 250VAC Female Connector</p>

Note: ▲ DuraV™ Housings

### Converter Cord Sets

Converter cord sets are also available using a Mipco plug and connector, with two feet (0.6 meters) of suitably rated, four conductor cable. They are available with any plug/connector combination of the same voltage. Contact Tech Support to specify.



## Standard and Special Products – Plugs, Connectors & Receptacles

### Technical Specifications

#### Performance – Electrical

<b>Dielectric Voltage Withstand</b>	3,000 Volts
<b>Max. Working Voltage</b>	Minimum creepage distance and minimum clearance per UL 840
<b>Temperature Rise</b>	Max. 30° C temperature rise at full rated current after 50 cycles of overload at 150% rated current at .75pf.

#### Performance – Mechanical

<b>Impact Resistance</b>	Per UL1682 Paragraph 34
<b>Cord Accommodation</b>	Round portable service cords. 10 standard diameters from .405" to 1.00", custom sizes to spec.
<b>Terminal Identification</b>	In accordance with UL1682
<b>Cable Pull Out Force</b>	In accordance with UL1682
<b>Product Identification</b>	Identification label or molded in name.

#### Performance – Environmental

<b>Moisture Resistance</b>	Per UL1682 Paragraph 49. Watertight/flap screw cover on receptacle, O-Rings on all pins and sleeves, interiors and plug shell. Watertight even when not engaged.
<b>Flammability</b>	HB or better per UL94 (housing) V0 or better per UL 94 (interior)
<b>Operating Temperatures</b>	Maximum Continuous: 95° C / 203° F Minimum: -29°C / -20°F w/o impact (Polycarbonate) -40°C / -40°F w/o impact (AMTUF™ and DuraV)
<b>Chemicals</b>	Resists standard industrial hydrocarbons, acids, bases and solvents.


#### Materials

<b>Contact Carrier Interior</b>	Molded arc resistant UL94-V0 thermoset
<b>Housing, Gland Nuts Screw Collar Rings</b>	Amtuf™ (Nylon), DuraV™ or Polycarbonate, High Impact Thermoplastic
<b>O-Rings</b>	Buna-N (Nitrile)
<b>Contacts: Pins &amp; Sleeves</b>	Brass CDA 360
<b>Hinge Pins (Receptacle)</b>	Stainless Steel
<b>Terminals</b>	Brass CDA 360
<b>Terminal Screws Flap Springs Assembly Screws Nuts, Hardware</b>	Stainless Steel or Brass
<b>Bushing Glide Washer</b>	20 Amp - Nylon 30, 50 & 60 Amp - Aluminum
<b>Cable Clamp Bushing</b>	Neoprene or Santoprene

#### Approvals

Meets requirements for NEMA 4, 4X, & IP 67.

UL & CSA Listed as indicated on previous page.

 • E138024 & E47956

 • LR96445

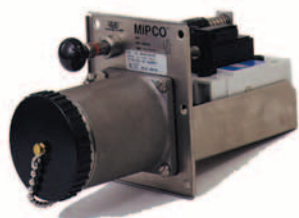




## Interlocked Reefer Power Outlets



M433-30F22



M464-30S22

### *No One Does it Like Mipco™*

Mipco Interlocked Reefer Power Outlets are used extensively in port terminals and shipboard applications to provide a safe, watertight electrical connection for refrigerated containers. They feature a heavy duty, interlocked UL/CSA listed and circuit breaker protected electrical power outlet. This ensures the outlet cannot be switched 'live' until a plug is fully engaged and the actuator rod is pushed to the 'On' position. Pulling the actuator rod to the 'Off' position manually de-energizes the circuit. The circuit de-energizes automatically if the plug is accidentally withdrawn while in the 'On' position. Also, the interlock mechanism 'breaks' the circuit while the pin and sleeve contacts are still engaged. This provides total operator safety and protection against shock hazard while eliminating arcing damage to the plug and receptacle.

The modular design pioneered by Mipco allows for quick, easy installation and maintenance. Mipco engineers designed the Interlocked Reefer Power Outlet for the utmost **safety, durability, and reliability.**

### *The Mipco™ Advantage*

#### Safety

- ▼ Patented Interlock Mechanism **protects against shock hazard** and cannot be overridden like other designs.
- ▼ Plug **cannot be inserted or withdrawn under load. Ground pin activates interlock.**
- ▼ Thermoset interiors provide the **safest insulation** under extreme conditions.
- ▼ UL 489 listed circuit breaker for **optimum operator and circuit protection.**
- ▼ Non-conductive knob is oversize for **safe, easy operation.**

#### Durability

- ▼ Heavy duty ½" diameter stainless steel actuator rod offers **superior resistance to corrosion and abuse.**
- ▼ UL 489 listed circuit breaker **is resettable after circuit interruption.**
- ▼ Heavy gage stainless steel platform and aluminum receptacle housing **resists corrosion and physical damage.**
- ▼ O-ring sealed insulator, contact sleeves, ground pin, interlock actuating pin and actuator rod **insures watertight integrity of wiring compartment, when screw cover or plug is removed.**

#### Reliability

- ▼ Segmented Solid brass contact sleeves with beryllium copper compression springs **minimize heat rise and corrosion.**
- ▼ UL 489 listed circuit breaker **provides branch circuit protection per NEC.**

#### Easy Installation & Service

- ▼ Mipco's 'Modular Design' makes installation and maintenance **fast and inexpensive** with easy accessibility to individual parts.
- ▼ 4 screw, 3 wire receptacle service.
- ▼ One piece interlock mechanism requires **no adjustment and simplifies maintenance.**
- ▼ Complete line of **service parts readily available.**
  - Receptacle assembly
  - Circuit breaker assembly
  - Interior assembly
  - Linkage kits
  - Hardware kits
  - Flap cap / Screw cap assemblies

**Thomas & Betts**



## Interlocked Reefer Power Outlets

### 2 Compact Frame Choices: **22K AIC or 65K AIC protection**

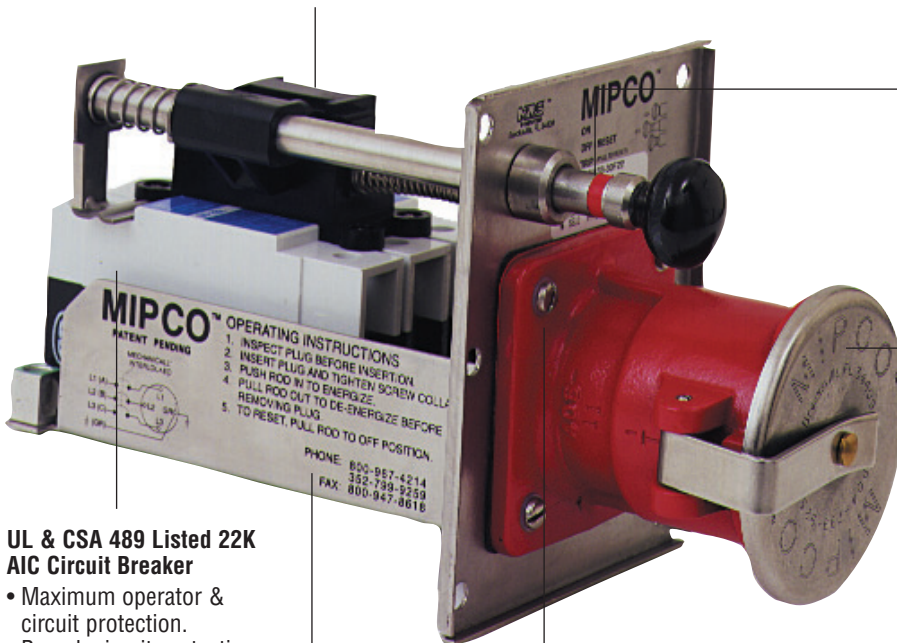
#### 22K AIC @ 480 Volts

Compact Frame 6-Bolt Interlocked Reefer Power Outlet with Nominal Inrush Current Protection

Cat. No.  
**M433-30F22**  
**SHOWN**

#### Patented Mechanical Interlock Mechanism

- Protects against shock hazard.
- Eliminates arcing damage.
- Automatically de-energizes the circuit upon plug withdrawal; even if actuating rod is jammed in the "On" position.



#### Heavy Duty Actuating Rod

- Superior durability.
- Located away from the receptacle for maximum operator safety.
- Withstands user abuse.

#### Stainless Steel Self-aligning, Flap Cap

- Assures a positive environmental seal.
- Maximum corrosion resistance.
- Withstands user abuse.

#### UL & CSA 489 Listed 22K AIC Circuit Breaker

- Maximum operator & circuit protection.
- Branch circuit protection per NEC.

#### Heavy Gauge Stainless Steel Platform

- Maximum durability from user abuse.
- Corrosion resistant.

#### Receptacle Mounting Design

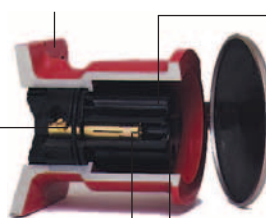
- Easy installation and service (4 stainless steel screws, 3 wires).

#### Metallic Receptacle Housing

- Withstands physical abuse.
- Corrosion resistant.

#### Ground Pin Actuates Interlocking Mechanism

- Assures grounding integrity with ground pin.
- Receptacle is de-energized upon plug removal. When plug is reinserted, switch can be operated.



#### Thermoset interiors

- High heat and arc resistant.

#### O-ring sealed Interiors and Sleeves

- Seals wiring compartment from environment.
- Eliminates accidents and burnouts.

#### Segmented Contact Sleeves w/ Compression Springs

- Consistent contact pressure.
- Minimizes heat rise & corrosion.
- Self cleaning pins & sleeves for longer life.

#### Safe Power By Design –

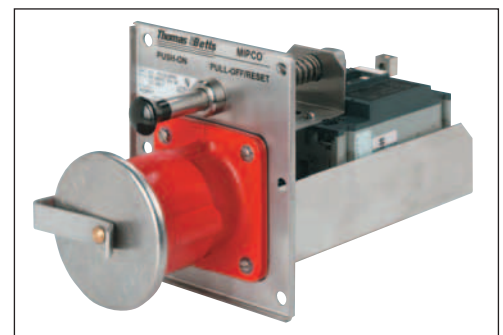
Best Designed Receptacle In The Industry

#### 65K AIC @ 480 Volts **NEW**

**Compact** Frame 6-Bolt Interlocked Reefer Power Outlet with High Inrush Current Protection. Several unique Patent Pending design features.

Now you can get a circuit breaker rated for 65,000 Amps of inrush current at 480 volts with **small, 6-bolt interlocked "standard" reefer power outlet mounting dimensions.**

- **Smaller Enclosures** – Overall size and cost of entire enclosure is significantly reduced.
- **Easy Upgrades** – If inrush (AIC) requirements change, the 65K AIC module can replace 22K modules in existing installations.
- **Mipco Construction Quality & Flexibility:** The 65K and 22K AIC modules share the same design and mounting dimensions.



Catalog Number MT433-30F65 Shown

**Thomas & Betts**

## Interlocked Reefer Power Outlets



M432-30S22



M433-30F22



M452-50S22



M464-30S22

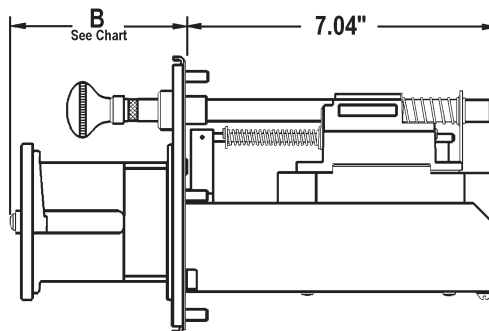
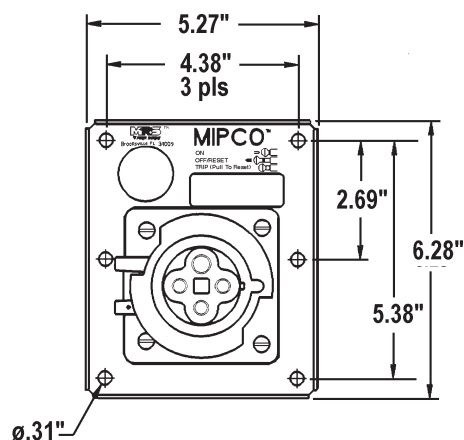
### Interlocks with Metallic Receptacle Housings

Interlocked Power Outlet Cat. No.		Amps	Voltage Ratings	Poles, Wires	Trip Rating † Amps	Mating Plug Cat. No.*
Flap Cap	Screw Cap					
M432-30F22	M432-30S22	30	250V, 60Hz	3P4W	30	334MPXT
M433-30F22	M433-30S22	32	380/440V 50/60Hz <sup>1</sup>	3P4W	30	333MPXT
M452-50F22	M452-50S22	50	250V, 60Hz	3P4W	50	534MPXT
M462-50F22	M462-50S22	60	250V, 60Hz	3P4W	50	634MP2XT
M464-60F22	M464-60S22	60	480V, 60Hz	3P4W	60	634MP4XT

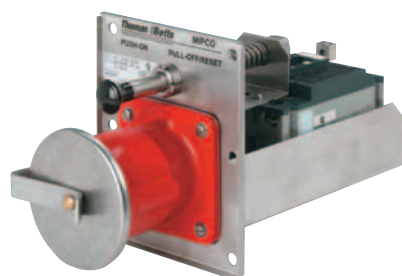
\* Note: Mating plugs are sold separately.

† Note: Other trip ratings available upon request.

<sup>1</sup> Note: 480VAC/60Hz US. Common Rating



Amperage	B
30 & 50A	3.23"
32A	4.00"
60A	5.10"



MT433-30F65

### Interlocks with 65K AIC Circuit Breaker

Interlocked Power Outlet Cat. No.		Amps	Voltage Ratings	Poles, Wires	Trip Rating † Amps	Mating Plug Cat. No.*
Flap Cap	Screw Cap					
MT433-30F65	MT433-30S65	30	380/440V 50/60Hz <sup>1</sup>	3P4W	30	333MPXT

\* Note: Mating plugs are sold separately.

<sup>1</sup> Note: 480VAC/60Hz US. Common Rating

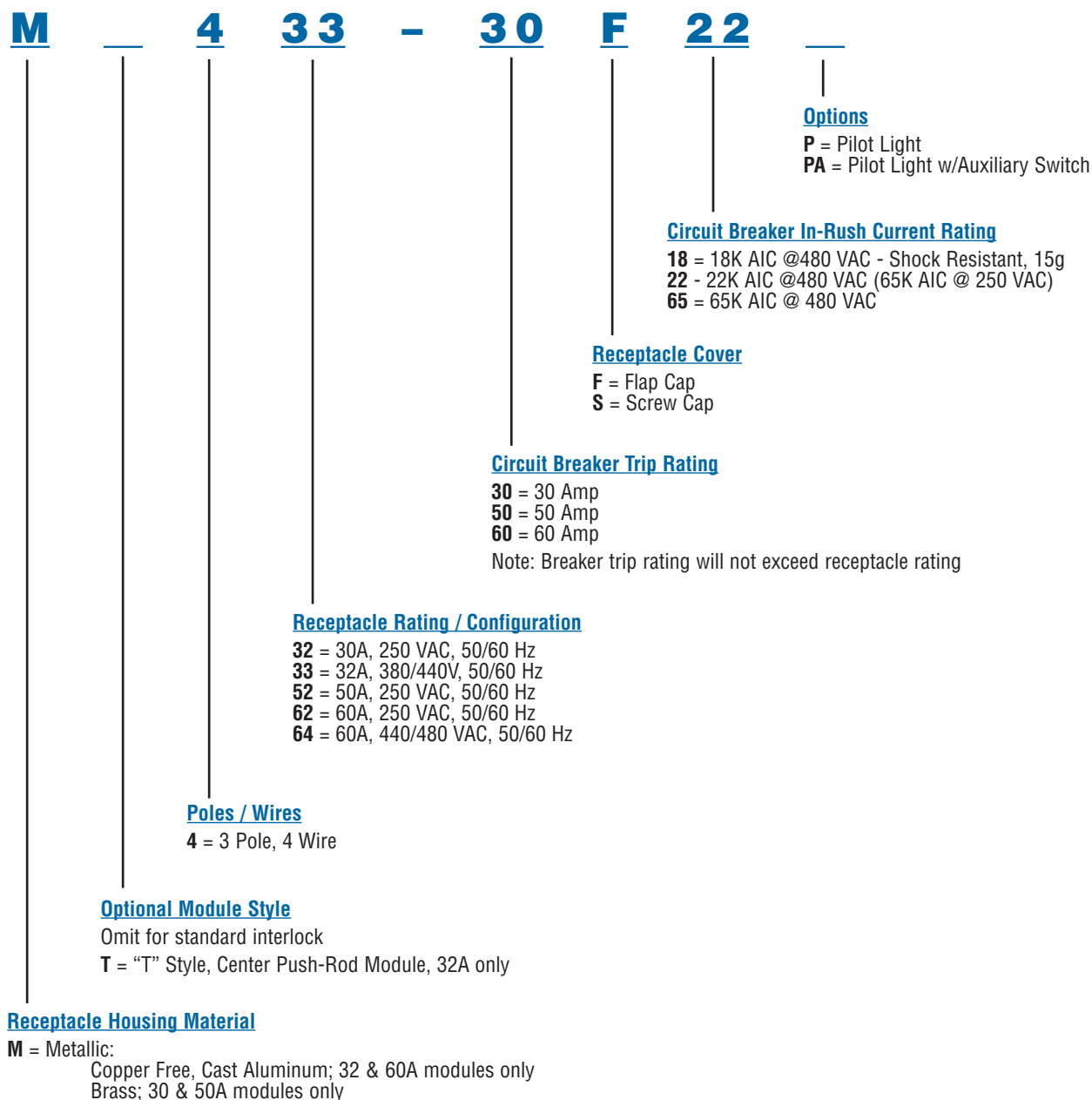


## Interlocked Reefer Power Outlets

### Catalog Construction Guide

Mipco interlocked reefer power outlet catalog numbers are easily specified using the guide below.

Options include pilot lamps and/or auxiliary switch construction.







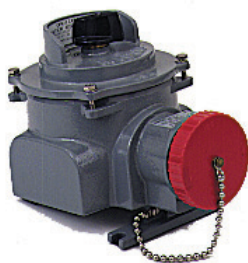
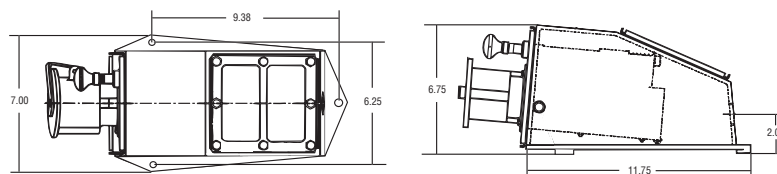
1BMT433-30F65

### Interlocks Complete with Single Gang Cast Aluminum Enclosure

Cat. No.		Amps	Voltage Ratings	Poles, Wires	Trip Rating † Amps	Mating Plug Cat. No. *
Flap Cap	Screw Cap					
1BM432-30F22	1BM432-30S22	30	250V, 60Hz	3P4W	30	334MPXT
1BM433-30F22	1BM433-30S22	30	380/440V 50/60Hz¹	3P4W	30	333MPXT
1BMT433-30F65	1BMT433-30S65	30	380/440V 50/60Hz¹	3P4W	30	333MPXT
1BM452-30F22	1BM452-30S22	30	250V, 60Hz	3P4W	30	534MP2XT
1BM462-30F22	1BM462-30F22	30	250V, 60Hz	3P4W	30	634MP4XT
1BM464-30F22	1BM464-30S22	30	480V, 60Hz	3P4W	30	634MPXT

\* Note: Mating plugs are sold separately.

¹ Note: 480VAC/60Hz US. Common Rating



### Special Rotary Switch Interlock

Cast Aluminum (or Brass) switched interlocked used for trailer, rail and common feed shipboard applications. Circuit protection normally is upstream of load.

Cat. No.	Dimensions	Rating
SR33341B		<b>32 AMP, 380-440 VAC</b> 50/60Hz, 3P4W IEC309-2, 3h (480 VAC-USA)

### Accessories

**Single Gang Enclosure** – Copper free cast aluminum for maximum corrosion resistance and durability, these can be ordered separately or complete with interlocked outlet, by using a “1B” prefix with any interlocked outlet catalog number.

**Wedge Gaskets** – Molded neoprene wedge gaskets provide drainage 4° down angle for interlocked outlets; easily installed behind front plate and are easily installed.

**Large Frame Adapter Plate Kit** – Stainless steel adapter plate kit allows small frame 6-bolt interlocked outlets to replace large frame 8-bolt outlets. Kit bolts to existing 8-bolt enclosure opening.

Outlet Frame Size	Cat. No.		
	Single Enclosure	Wedge Gasket Kit	8 Bolt Adapter Kit
Small Frame 6 – Bolt	1255-01R	980-50R	523R



## Interlocked Reefer Power Outlets

### Technical Specifications

#### Performance – Electrical

<b>Dielectric Voltage Withstand</b>	3,000 Volts
<b>Max. Operating Voltage</b>	480VAC
<b>Circuit Protection</b>	U.L. 489 listed CSA certified circuit breaker.
<b>FLA Interrupting Capacity</b>	Specified breaker rating.
<b>Short Circuit Withstand Rating</b>	22,000 AIC, 65,000 AIC Specified breaker or 18,000 AIC (Shock Resistant).
<b>Operations</b>	>10,000 cycles at rated current.

#### Performance - Mechanical

<b>Mounting</b>	(6) 5/16" diameter through holes.
<b>Breaker Terminals</b>	Pressure screw lugs (slotted) accepts 14-1/0 AWG wire.
<b>Terminal Identification</b>	In accordance with UL489 and UL1682 A,B,C,G (earth ground) on line side.
<b>Product Identification</b>	External label on face plate.
<b>Operations</b>	>25,000 cycles of operation.

#### Performance - Environmental

<b>Moisture</b>	Watertight screw cover or spring loaded self aligning flap cap. O-rings on all sleeves, interior, interlock actuating pin and circuit breaker actuator rod bushings. Gasket on receptacle and module flange.
<b>Operating Temperatures</b>	Min. Continuous -20° F (non-enclosed) Max. Continuous +140° F
<b>Chemicals</b>	Resists common industrial hydrocarbons, acids, bases and solvents.
<b>UV Resistance</b>	Polyurethane enamel (32A) and natural metallic finishes provide maximum UV protection.

#### Materials

<b>Receptacle Housing Metallic</b>	30A/50A - Brass (natural) 32 A - Copper free Aluminum 356-T6 (red epoxy powder coated) 60A - Copper free Aluminum 356-T6 (natural).
<b>Non-Metallic</b>	30A/50A & 60A AMTUF™ 32A – DURAV™
<b>Interior</b>	Molded arc resistant thermoset phenolic (U.L. 94-V0 flame rating).
<b>Contact Sleeves</b>	Brass with beryllium copper compression springs.
<b>Terminal Screws</b>	Brass, Slotted
<b>O-Rings</b>	Buna-N (Nitrile)
<b>Gaskets</b>	Neoprene
<b>Mounting Platform</b>	Heavy gauge stainless steel welded construction.
<b>Actuator Rod</b>	1/2 inch diameter solid stainless steel. Heavy duty non-conductive impact resistant plastic knob.
<b>Ground Lug</b>	(Aluminum) Terminal screw (slotted) accepts up to #2 AWG wire.
<b>Interlock Mechanism</b>	Sealed self lubricating thermoplastic.
<b>Flap Cap</b>	12 gauge stainless steel, gasketed cover.
<b>Screw Cap</b>	High impact plastic, gasketed
<b>Washers</b>	Nylon
<b>Springs, Fasteners</b>	Stainless Steel

#### Approvals

**Underwriters Laboratory (U.L.)** – Sections 489, 1682 and 1686.

**CSA Section** – C22.2-182.1

**Federal Department of Transportation** – Federal Register volume 47, number 68, subpart 11.79 **United States Coast Guard (USCG)**

**International Electro-Technical Commission (IEC)** – 32 Amp devices conform to IEC 309-1 and 309-2

**International Standards Organization (ISO)** – ISO 1496/2, Annex 1



• E47955



• LR96445

**Thomas & Betts**

### Engineering Specifications

#### 1.0 SCOPE

- 1.1 This document covers pin and sleeve marine/industrial grade, reefer power outlet assemblies. Useable in dry, damp, wet, outdoor marine locations for providing electrical power to refrigerated containers. Assemblies shall be UL listed with enclosures incorporating interlocked reefer power outlets in a modular multi-gang arrangement. Devices are factory wired to a UL recognized power distribution block and rated 30, 32, 50, and/or 60 amps at 250 or 480 VAC, 50 – 60 Hz. Devices are also rated for continuous use in temperatures from -20 degrees to +140 degrees F. These devices must provide internal environmental seals for marine and extreme wet applications, and are to be mechanically interlocked.
- 1.2 All assemblies specified shall be manufactured by Mipco as complete assemblies and shall be marked as stated.

#### 2.0 PRODUCT CLASSIFICATION

##### ENCLOSURES:

- 2.1 **Construction** – All enclosures shall be specified either 12 or 14 gauge stainless steel, and shall conform to NEMA 4X requirements for watertight, dust-tight, and corrosion resistance.
- 2.2 **Access Panel** – Each enclosure shall provide an access panel designed to allow complete wiring compartment accessibility. Bolted plate or hinged panel to be specified.
- 2.3 **Power Distribution Block** – All interlocked reefer power outlet assemblies shall be factory wired to a U.L. recognized power distribution block. Line lugs shall accommodate a range of wire sizes compatible with the total amperage rating of all enclosed receptacles

##### RECEPTACLES

- 2.4 **Interlocked Receptacles** – The receptacles shall be of a modular design, mechanically interlocked to allow the circuit to be energized only after a mating plug is fully inserted into the receptacle and the actuating rod is pushed forward. All interlocked receptacles shall allow the de-energizing of the circuit before mated contacts are disengaged upon plug removal. Plug ground pin will activate interlock mechanism. The mounting dimensions shall be the same for interlocked receptacles with a high (65K) or nominal (greater than or equal to 20K) inrush current circuit breaker to allow for future upgrades.
- 2.5 **Grounding** – The grounding of the device shall be accomplished through a separate ground (earth) that will make first and break last. Plug ground pin will activate interlock mechanism. The ground pole shall be bonded to a UL recognized ground block labeled for connection to the ground conductor.  
\* All non-current carrying metallic components must be grounded to insure complete system grounding.
- 2.6 **Housings** – Receptacle housings shall be metallic, copper free aluminum or thermoplastic with performance equal to or greater than DuraV' or AMTUF™, and have a flame rating no less than UL94 V0.
- 2.7 **Interiors** – Receptacle interiors must be molded thermoset, UL94 V0 and be replaceable for ease of maintenance.

- 2.8 **Contact Sleeves** – Quad-slit brass contact sleeves shall have contact pressure springs of electromotively similar material to maintain consistent contact pressure between sleeves and mating male pins and prevent galvanic corrosion.
- 2.9 **Environmental Seals** – Each device must have an environmental seal or O-ring around all interiors and around each sleeve to prevent water and contaminants from entering the wiring compartment. The seals shall provide waterproof capability if plug or screw cap are removed.
- 2.10 **Circuit Protection** – Each interlocked receptacle must be protected by a molded cased, thermal-magnetic type, UL 489 listed circuit breaker. The circuit breaker must also comply with NEC Articles 240 and 430 for branch circuit protection.
- 2.10a **High Inrush Current Protection Requirements** – Circuit breaker shall have a minimum 65,000 amp interrupting capacity.
- 2.10b **Nominal Inrush Current Protection Requirements** – Circuit breaker shall have a minimum (18,000 high shock) 22,000 amp interrupting capacity.
- 2.11 **Flap Cover or Screw Cover Option** – Flap cover option must provide weather-tight capability to the exposed contacts by utilizing a spring actuated self closing flap. Watertight capability shall be obtained by using a gasketed screw cap.

#### 3.0 DESIGN AND WIRING REQUIREMENTS

- 3.1 **Wiring** – All enclosure assemblies must be factory wired to conform to guidelines stated in the NEC for wire sizing, Table 310-16 and wire bending space, Article 373-6. Wiring of individual interlocked reefer outlets must allow for the removal/replacement without opening the access door.
- 3.2 **Conduit Entry** – Assemblies shall include a conduit entrance with an aluminum conduit hub; size and location to be specified.

#### 4.0 APPLICABLE COMPLIANCES

- 4.1 **Underwriters Laboratories (UL)** – The enclosure assemblies specified herein shall be listed in applicable sections of UL Standards 489, 1682 and 1686.
- 4.2 **Canadian Standard Association (CSA)** – The devices shall be listed in the applicable sections of CSA C22.2-182.1.
- 4.3 **American Bureau of Shipping (ABS)**
- 4.4 **Federal Department of Transportation** – shall comply with Federal Register volume 47, number 68, subpart 11.79 and the United States Coast Guard (USCG).
- 4.5 **International Electro-Technical Commission (IEC)** – The 32 ampere devices specified shall conform to IEC 309-1, and IEC 309-2, EN60309.
- 4.6 **International Standards Organization (ISO)** – The 32 ampere devices specified shall conform to ISO 1496/2, Annex L.



## Multi-Gang Enclosure Systems



Pedestal Mount



Horizontal Mount



Bunker Mount



Horizontal Mount



Vertical Mount

### *Mipco...A World of Applications*

Mipco Multi-gang Enclosures offer maximum application flexibility to suit all installation requirements. For ports/terminals, railcars, trailer chassis manufacturers, maintenance facilities or shipboard use, our modular design concept has become the industry standard. All enclosures are manufactured to meet the industry's and Mipco's highest standards for safety, durability and reliability.

#### Safety

- ▼ **Operator safe** with U.L. listings and C.S.A. approvals for up to any number of interlocked reefer power outlets.

#### Durability

- ▼ **Watertight, dust tight and corrosion resistant**, continuous seam welded 14 gauge stainless steel enclosures (12 gauge available). Conforms to NEMA 4X requirements.

#### Reliability

- ▼ **Minimize equipment downtime** with access panels designed for complete wiring compartment accessibility. Bolted or hinged covers with padlock latches available.
- ▼ **Reliable** Mipco interlocked reefer power outlets installed in enclosures are shipped contractor-ready: pre-wired to terminal blocks with one entry and termination for easy connection to main feeder cable.

#### Standard Enclosures

**Standard** assemblies are available for 2,3,4,5 and 6 gang enclosures that can be manufactured to meet your specific needs. Standard bunker, horizontal, vertical, and pedestal mounted enclosure layouts are shown on following pages.

Contact Mipco for our "Mipco standard enclosure assembly engineering and specification guide" to design multi-gang enclosures quickly and easily shown on following pages. Options available include pilot lights for visual power indication and monitoring sockets used for remote sensing, defrost or other temperature control monitoring.

#### Custom Enclosures

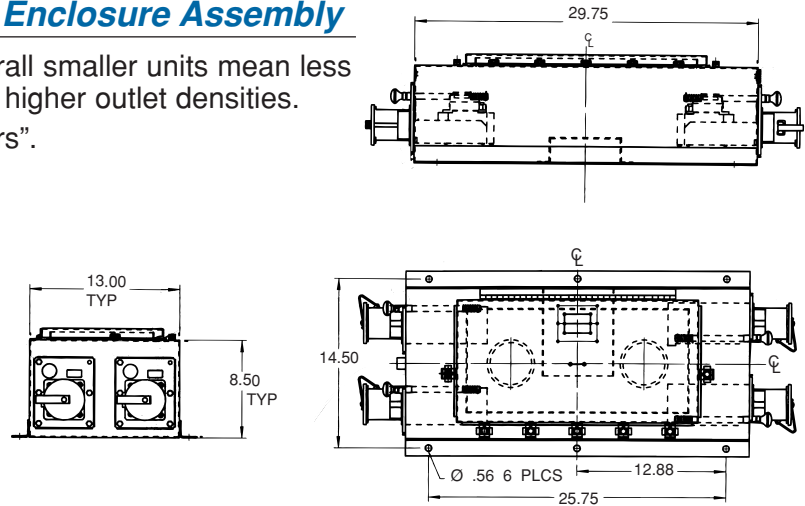
**Custom** multi-gang mounting arrangements or totally custom enclosures are available, for vertical, horizontal, pole, bunker, wall pedestal or any other installation. Consult Mipco for assistance in planning for your installation. Engineering drawings of various configurations with exact specifications are available upon request.

**Thomas & Betts**



### Mipco™ Standard “Bunker” Mount Enclosure Assembly

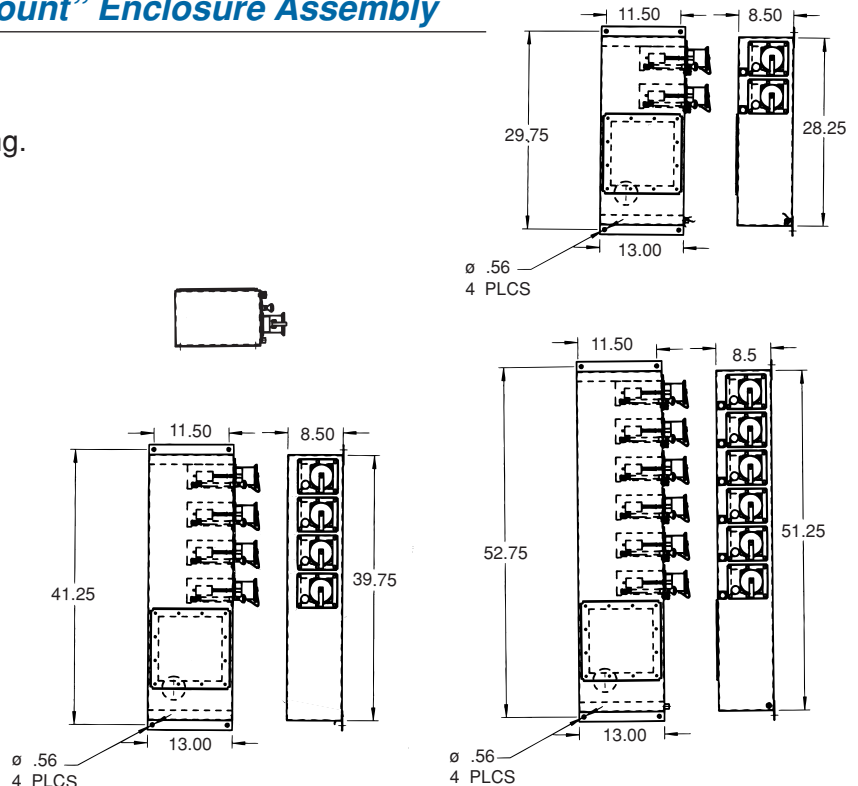
- **Smaller Size, Bigger Performance:** Overall smaller units mean less facilities investment in concrete, etc., plus higher outlet densities.
- Low-profile, protected by concrete “bunkers”.
- Trucking or land-based terminals.
- Contact Mipco for Specification Guide.



Catalog number BØ4M2F3BR2F1XX shown. Interlocked reefer power outlet standard: M433-30F22.

### Mipco™ Standard “Horizontal Mount” Enclosure Assembly

- Low-profile.
- Land based terminal installations.
- Vertical surface for ship-board mounting.

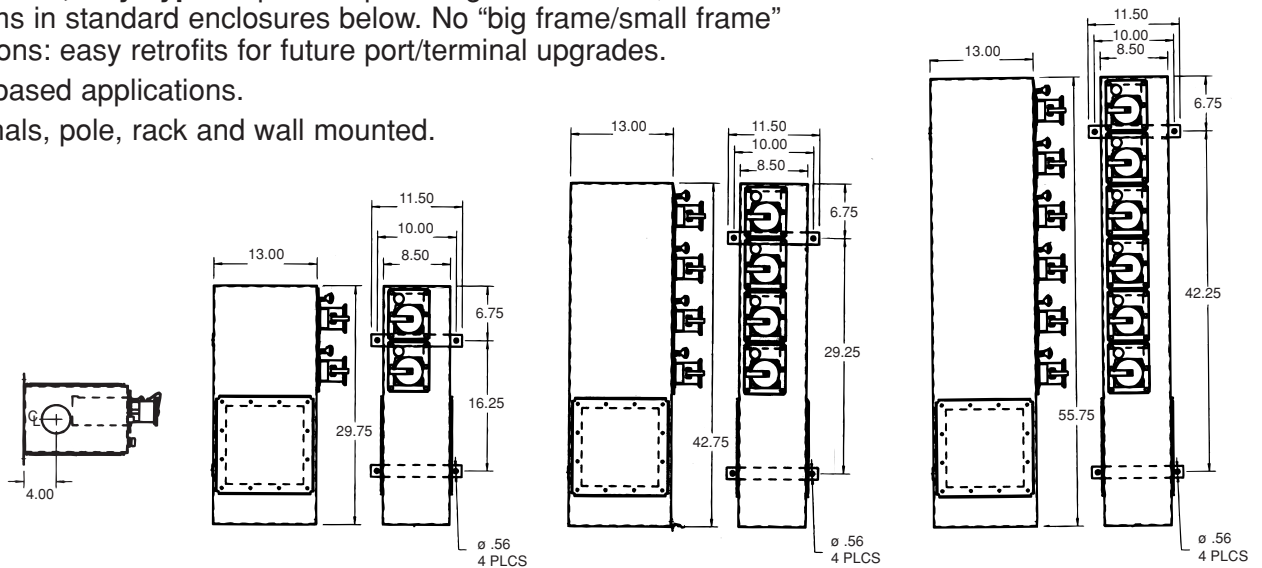


Catalog number HØ6M2F3BF1C1XX (6-GANG), HA4M2F3BF1C1XX (4-GANG), and HA2M2F3BF1C1XX (2-GANG) shown. Interlocked reefer power outlet used: M433-30F22.

All systems customizable with many options.

### Mipco™ Standard “Vertical Mount” Enclosure Assembly

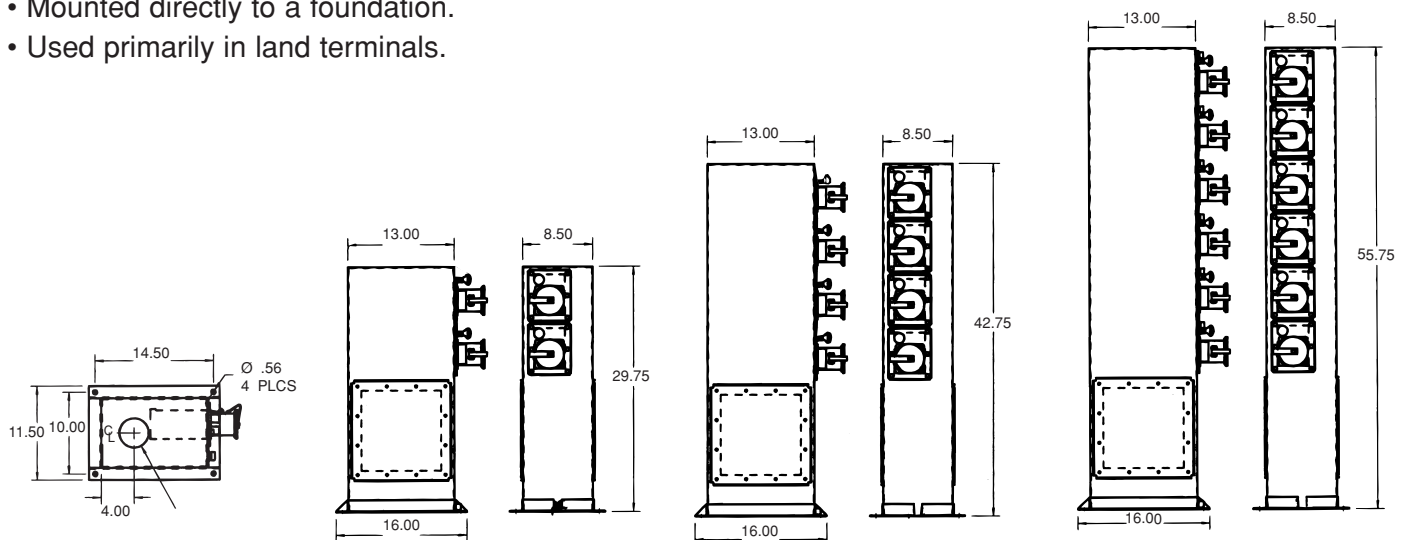
- **Same Size, Any Type:** Mipco-unique designs mean 18K, 22K or 65KAIC systems in standard enclosures below. No “big frame/small frame” questions: easy retrofits for future port/terminal upgrades.
- Land-based applications.
- Terminals, pole, rack and wall mounted.



Catalog number VØ6M2F3BC1D1XX (6-gang), VA4M2F3BC1D1XX (4-GANG), AND VA2M2F3BC1D1XX (2-GANG) shown. Interlocked reefer power outlet standard: M433-30F22.

### Mipco™ Standard “Pedestal Mount” Enclosure Assembly

- Mounted directly to a foundation.
- Used primarily in land terminals.



Catalog number PØ6M2F3BP1F1XX (6-gang), PØ4M2F3BP1F1XX (4-gang), and PØ2M2F3BP1F1XX (2-gang) shown. Interlocked reefer power outlet standard: M433-30F22.

All systems customizable with many options.



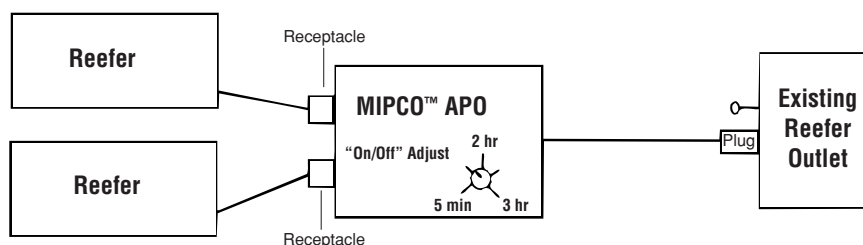
## Alternating Power Outlet (APO)



### Service Application

The Alternating Power Outlet (APO) is a portable power distribution box which provides an alternative means of powering reefer or tank containers when there is a shortage of outlets. The Mipco™ APO is designed for outdoor use and is available in 32 Amps/480 Volts. The APO is comprised of an enclosure with two female fixed receptacles and a single male plug attached with a short length of flexible cable. When the connections are secured and the power is engaged, the two female receptacles are then energized on an alternating basis. The on/off time interval is set by the user to be any time between 5 minutes and three hours. Both container plugs remain permanently connected to the APO but only one receptacle is energized at any given time. The upstream circuit is not overloaded, which can occur with Y-cords or common distribution boxes.

#### WIRING DIAGRAM:



### Features

- ▼ Dead Front construction and interlocked cover for maximum operator safety.
- ▼ Individual pilot lights to identify “live” receptacle.
- ▼ Pad-lockable cover for maximum safety.
- ▼ Internally adjustable solid-state timer(s) with 5 minutes to 3 hours “on” time per outlet.
- ▼ Handle design provides integral cord storage and ease of portability.
- ▼ Anti-skid feet minimize shifting and elevate enclosure above standing water.
- ▼ NEMA 4X corrosion resistant enclosure.

### Optional Features (Consult Factory)

- ▼ Dual adjustment capability to individually set “On” time of each outlet.
- ▼ Pilot lights with integral momentary push button for manual operation of outlets.
- ▼ Other customized features to meet specific customer requirements available upon request:
- ▼ Timing Range – Cable Length – Inlet vs. Plug – Electrical Interface

### Ordering Information

Alternating Power Outlet Cat. No.	Rating	Standard Parts Included Receptacles (2)	Plug
3334APO	32A/480VAC	3334FRVF	333MPXT



## Alternating Power Outlet (APO)

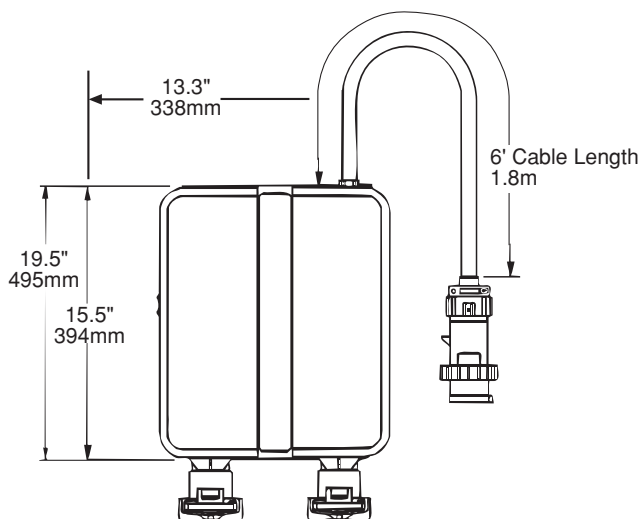
### Technical Specifications

#### Performance – Electrical

<b>Style</b>	3 Pole, 4 Wire
<b>Rating</b>	32 Amp 480 VAC Plug & Receptacle CEE-17 3-h
<b>Transformer</b>	50 VA Class A, Fused
<b>Contactors</b>	50 Amp rating, 480 VAC heavy duty coil

#### Performance – Mechanical

<b>Terminals</b>	Receptacle – Female Contact Sleeves (4), Copper Alloy  Plug – Male Pins (4), Copper Alloy
<b>Plug Terminal Connection</b>	32A, 480VAC – .187" (4.75mm)
<b>Wire Hole Diameter</b>	
<b>Cable</b>	Standard Length 6' 32A, 480VAC – #8/4 SO
<b>Pilot Light</b>	Green recessed lights (2)
<b>Timer</b>	Solid state encapsulated. Range 5 min. to 180 min.
<b>Weight</b>	26 lbs. (11.8 kg) Approximately



#### Performance – Environmental

<b>Moisture</b>	Per UL1682 Paragraph 49.
<b>Resistance</b>	Watertight/flap screw cover on receptacle, O-rings on all pins and sleeves, interiors and plug shell. Watertight even when not engaged.
<b>Flammability</b>	HB or better per UL94
<b>Operating Temperatures</b>	Maximum Continuous: 95°C / 203°F Minimum: -29°C / -20°F w/o impact
<b>Chemicals</b>	Resists standard industrial hydrocarbons, acids, bases and solvents.
<b>Enclosure</b>	Meets requirements for NEMA 4, 4X, 6 & IP67

#### Materials

<b>Enclosure</b>	Non-Metallic NEMA 4X fiberglass reinforced polyester
<b>Handle Assembly</b>	Aluminum (gray epoxy powder coated)
<b>Receptacle Housing</b>	Amtuf™ Molded Polyamide
<b>Plug Housing</b>	Amtuf™ Molded Polyamide
<b>External Fasteners</b>	Stainless Steel
<b>Gaskets</b>	Neoprene
<b>Mounting Feet</b>	Rubber (Neoprene)
<b>Latch</b>	Stainless Steel (Padlockable)

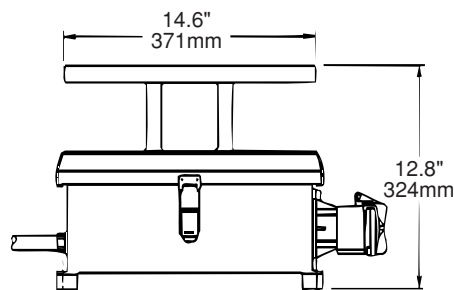
#### Approvals



• E108856



• E108856



**Thomas & Betts**



CATALOG NUMBER	PAGE NUMBER	CATALOG NUMBER	PAGE NUMBER	CATALOG NUMBER	PAGE NUMBER	CATALOG NUMBER	PAGE NUMBER
1BM432-30F22	16	333FCV	4	6032CP	10	B16779FR	6
1BM432-30S22	16	333MPXT	4, 14, 16	6050CP	10	B16779GR	6
1BM433-30F22	16	334FC	4	6234FRMS	8	B16779HR	6
1BM433-30S22	16	334FC5	8	6234FRXTS	5	JM99	6
1BM452-30F22	16	334FP	7	634FC2	4	M432-30F22	14
1BM452-30S22	16	334MC	9	634FC2FXT	9	M432-30S22	14
1BM462-30F22	16	334MP5	8	634FC4FXTS/0750	9	M433-30F22	12, 13, 14
1BM464-30F22	16	334MPXT	4, 14, 16	634FC4V	4	M433-30S22	14
1BM464-30S22	16	334MR	7	634MP2XT	4, 14	M452-50F22	14
1BMT433-30F65	16	33FCVF	9	634MP4XT	4, 14, 16	M452-50S22	14
1BMT433-30S65	16	5034FRS	5	634MPXT	16	M462-50F22	14
1255-01R	16	5034FRXTS	5	6434FRXTS	5	M462-50S22	14
223FC2	8	5060CP	10	980-50R	16	M464-30S22	12
223MP2	8	523R	16	AM32	6	M464-60F22	14
3034FRS	5	534FC	4	AM50	6	M464-60S22	14
3034FRXTS	5	534FCF	9	AM60	6	MT433-30F65	13, 14
3260CPV	10	534FP	7	B16779AR	6	MT433-30S65	14
3334APO	22	534MC	7	B16779BR	6	SAM32	6
3334FRF	5	534MP2XT	16	B16779CR	6	SAM50	6
3334FRVS	5	534MPXT	4, 14	B16779DR	6	SAM60	6
3334FRVSMS	8	534MR	7	B16779ER	6	SR33341B	16



[WWW.CABLEJOINTS.CO.UK](http://WWW.CABLEJOINTS.CO.UK)  
**THORNE & DERRICK UK**  
 TEL 0044 191 490 1547 FAX 0044 477 5371  
 TEL 0044 117 977 4647 FAX 0044 977 5582  
[WWW.THORNEANDDERRICK.CO.UK](http://WWW.THORNEANDDERRICK.CO.UK)

For U.S. Customer Service and Order Inquiries, call 1-800-816-7809 or fax 1-800-816-7810.  
For International Service and Order Inquiries, call (U.S.) 901-252-5400 or fax 901-252-1330.  
For Canadian Customer Service and Order Inquiries, call 450-347-5318 or fax 450-347-1976.

For U.S. Technical Support, call 1-888-862-3289 or fax 901-252-1321.  
For International Technical Support, call (U.S.) 901-252-5000, enter 1, 6672.  
For tool service and repair, call 1-800-284-TOOL (8665).

Call **1-800-858-6022** for our toll-free 24-hour Fax-On-Demand service for technical documentation, brochures and product literature or contact our internet site at **[www.tnb.com](http://www.tnb.com)**.

***Thomas & Betts***



© 2004 Thomas & Betts Corporation. All rights reserved.  
Printed in U.S.A. 2/04 Order No. GM-MP100

**WWW.CABLEJOINTS.CO.UK**  
**THORNE & DERRICK UK**  
**TEL 0044 191 490 1547 FAX 0044 477 5371**  
**TEL 0044 117 977 4647 FAX 0044 977 5582**  
**WWW.THORNEANDDERRICK.CO.UK**