



*Solar-Powered Security
Turnstile and Gate Systems*

Forza Group - Delta Airlines Atlanta, GA

Submitted to:

Forza Group
Delta Airlines Project
Hartsfield-Jackson Atlanta International Airport

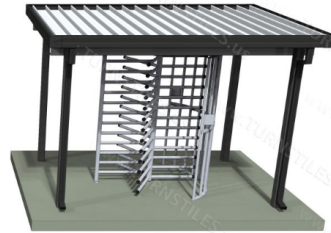
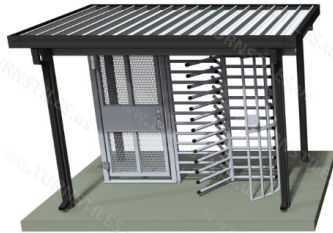
Submitted by:

www.TURNSTILES.us, Inc.
2025 Present

The TURNSTILES.us team is proud to support The Forza Group and Delta Airlines with the installation of our unique SolaTurn Solar Powered Full-Height Turnstiles and ADA Gates at the Hartsfield-Jackson Atlanta International Airport. This outdoor-ready system is designed for 72-hour solar-powered autonomy and includes full-height turnstiles and an ADA-accessible gate installed under protective canopies. We are honored to contribute to the security infrastructure of this site and invite you to review the featured equipment details, photos, and supporting documentation.

Project Submittal

SolaTurn Solar-Powered Turnstiles and Gate



Single Turnstile



ADA Gate



Anti-Reach Barrier



Turnstile Canopy



SolaTurn System

AREA - A

Area A

- (1) Full-Height Single Turnstile
- (1) Full-Height ADA Gate
- (1) Basic Post-Supported Canopy
- (1) Solar Power Package
- (1) Anti-Reach Barrier
- (1) NEMA Cabinet
- (2) Vapor Lights
- (1) Low Voltage Cable



SolaTurn Single Turnstile, ADA Gate, and Basic Canopy

AREA - B

SolaTurn Area B

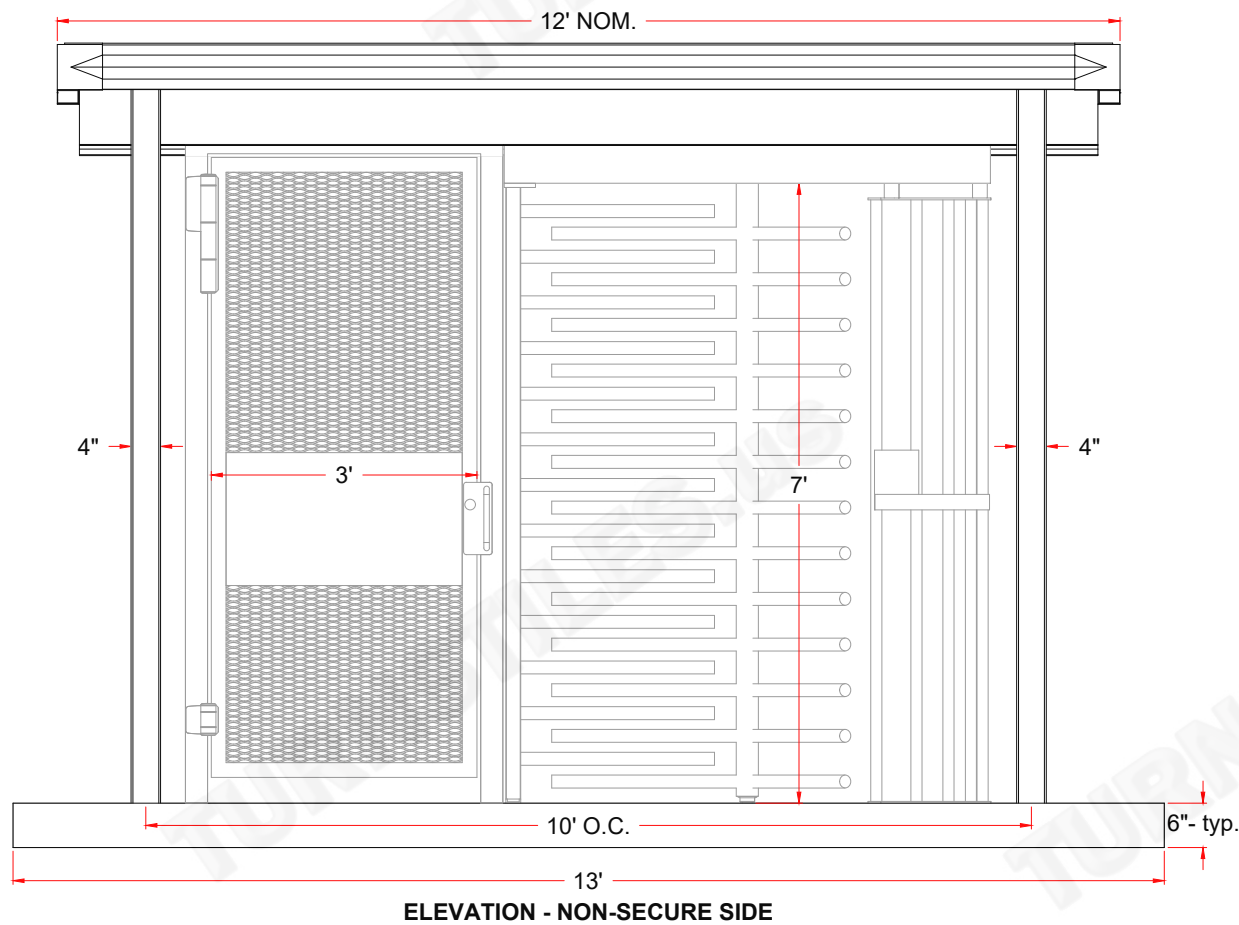
- (1) Full-Height Single Turnstile
- (1) Basic Post-Supported Canopy
- (1) Solar Power Package
- (1) NEMA Cabinet
- (2) Vapor Lights
- (1) Low Voltage Cable



SolaTurn Single Turnstile and Basic Canopy

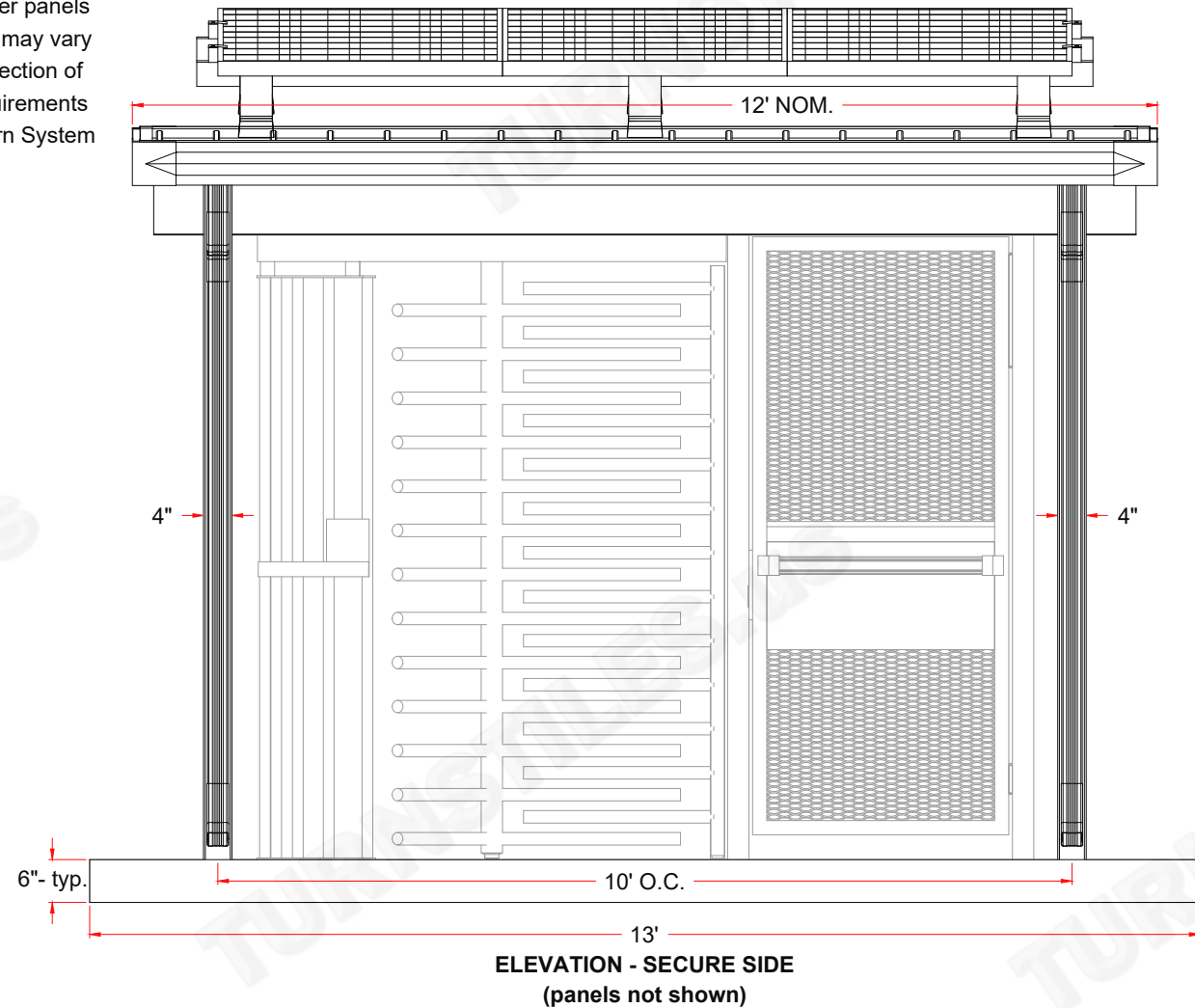
AutoCAD Drawings

*** DIMENSIONS MAY VARY SLIGHTLY IN ACTUAL INSTALLATION - FABRICATION CHANGES OR SUBSTITUTIONS RESERVED ***

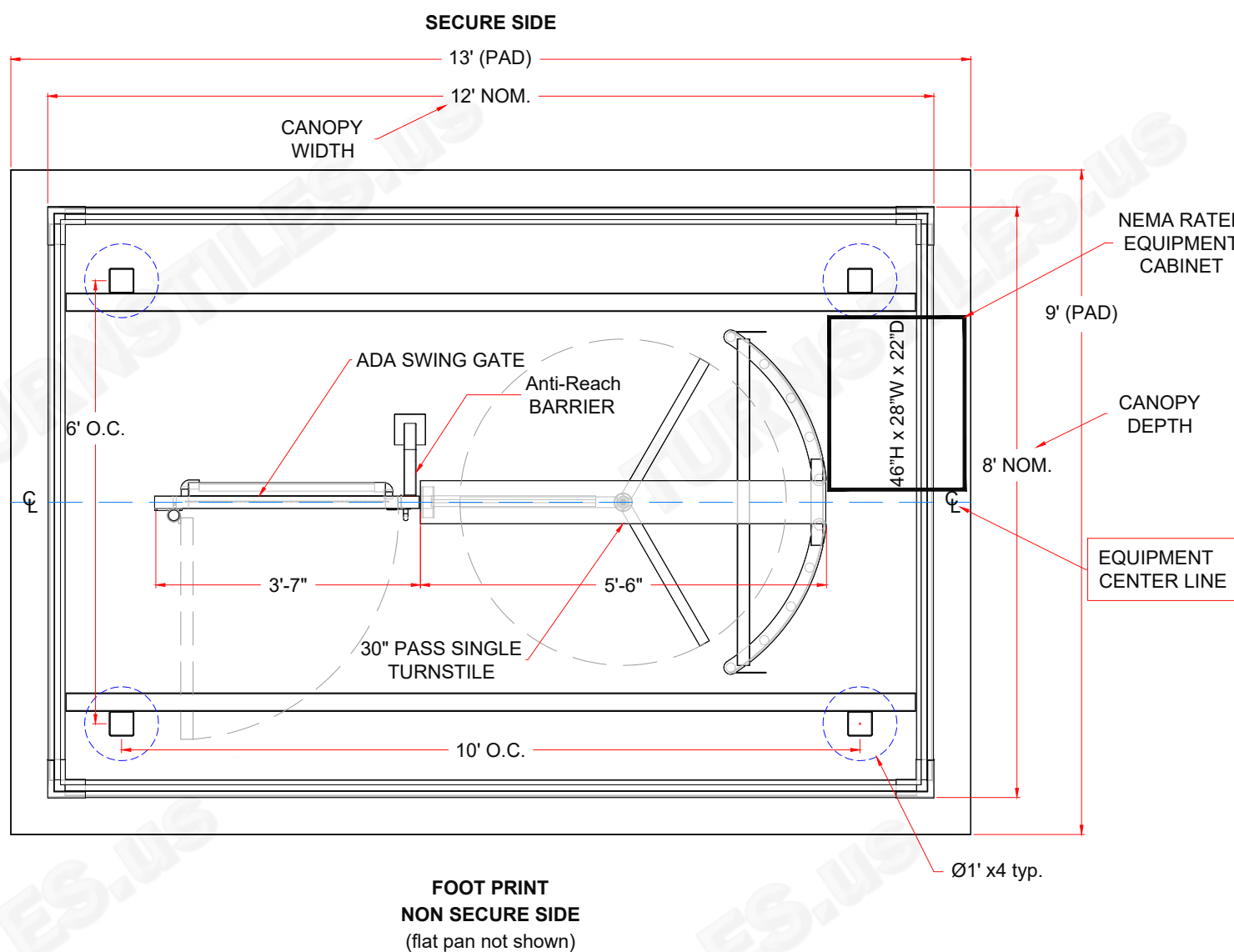


ELEVATION - NON-SECURE SIDE

* Number of SolaTurn power panels and SolaTurn Cabinet size may vary depending upon the selection of equipment and power requirements for operation of the SolaTurn System

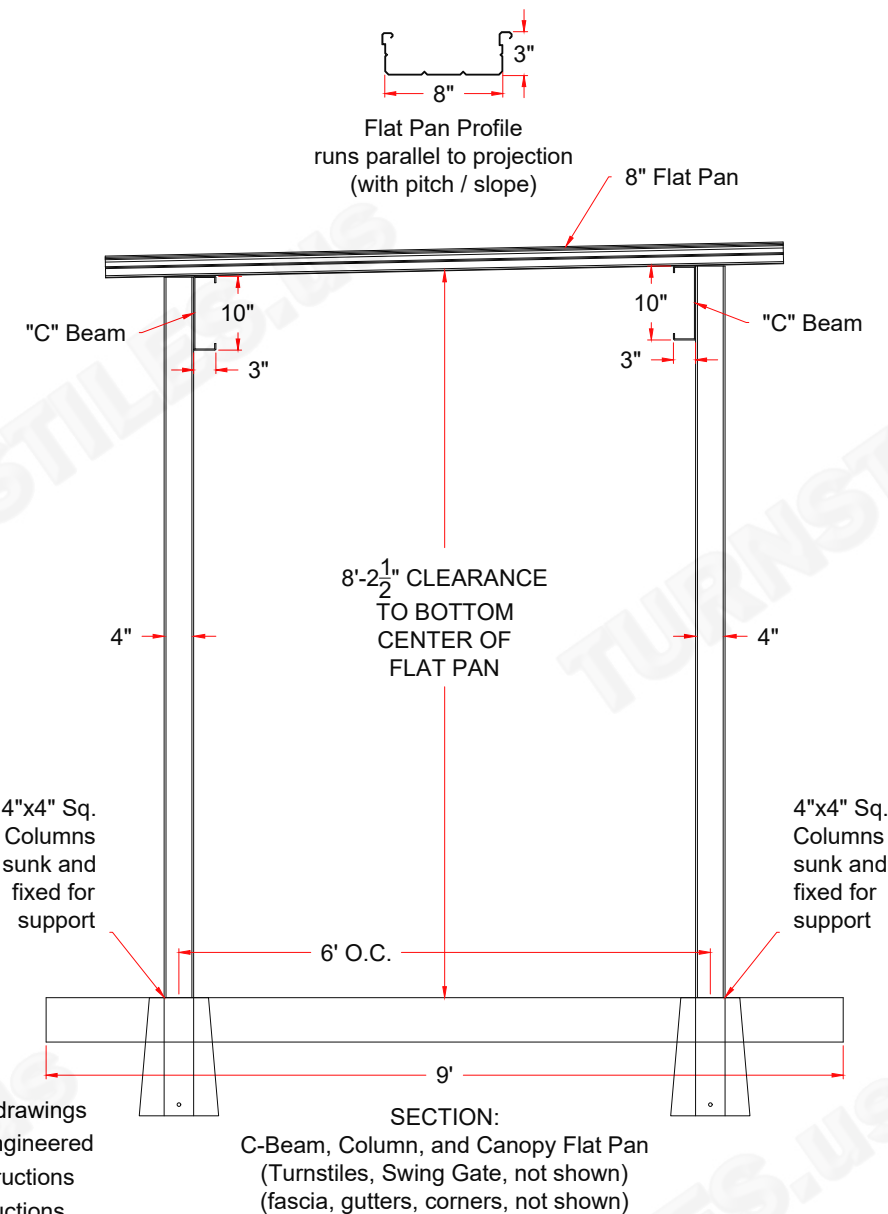


ELEVATION - SECURE SIDE
(panels not shown)



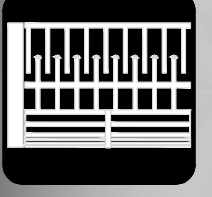
FOOT PRINT
NON SECURE SIDE
(flat pan not shown)

* refer to Canopy Assembly drawings from manufacturing and/or engineered drawings, for block-out instructions and or concrete form instructions



SECTION:
C-Beam, Column, and Canopy Flat Pan
(Turnstiles, Swing Gate, not shown)
(fascia, gutters, corners, not shown)

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08-19-25	CJC
REVISED	BY
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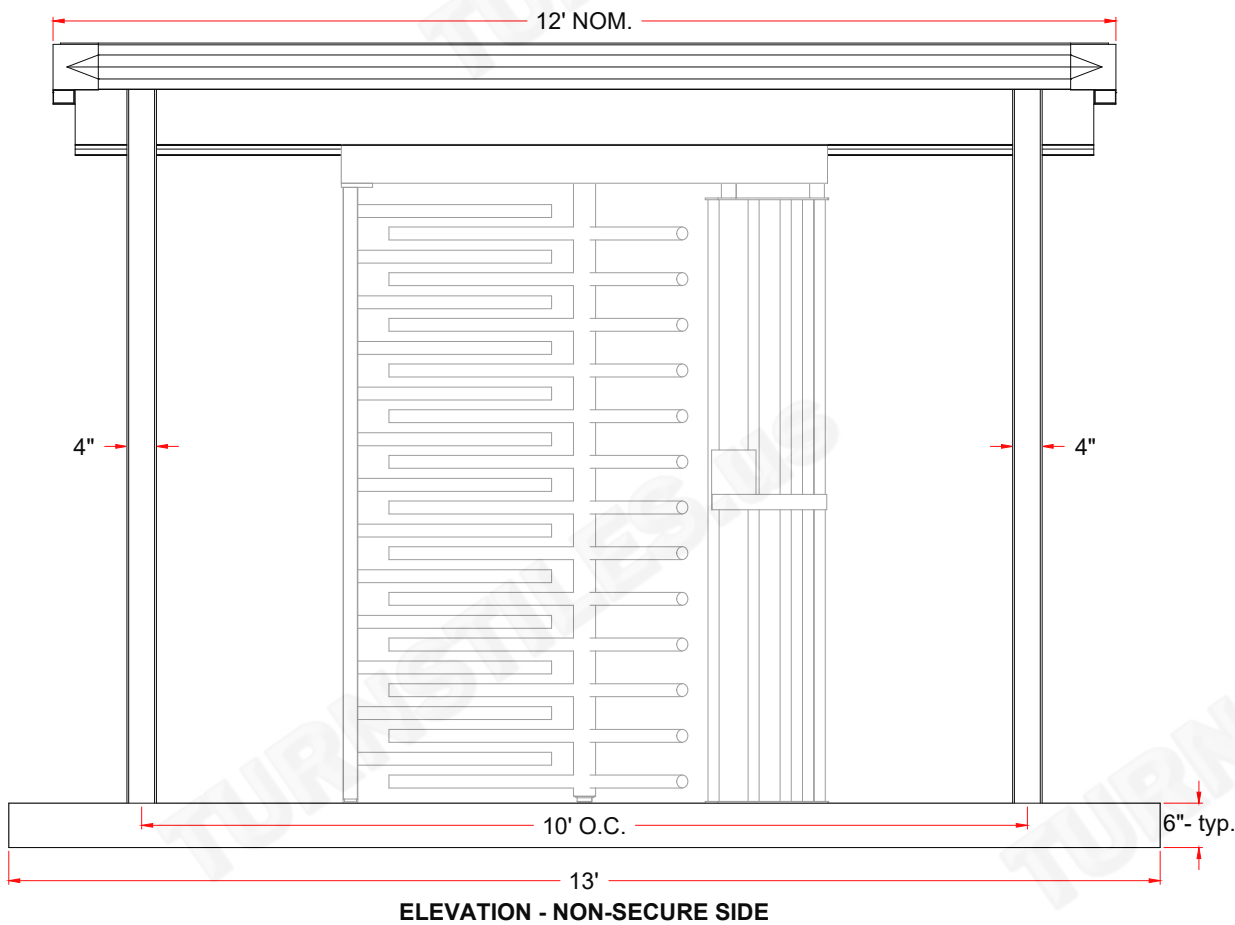
Call: 303-670-1099 | Text: 303-918-9787

patrick.mcallister@turnstiles.us

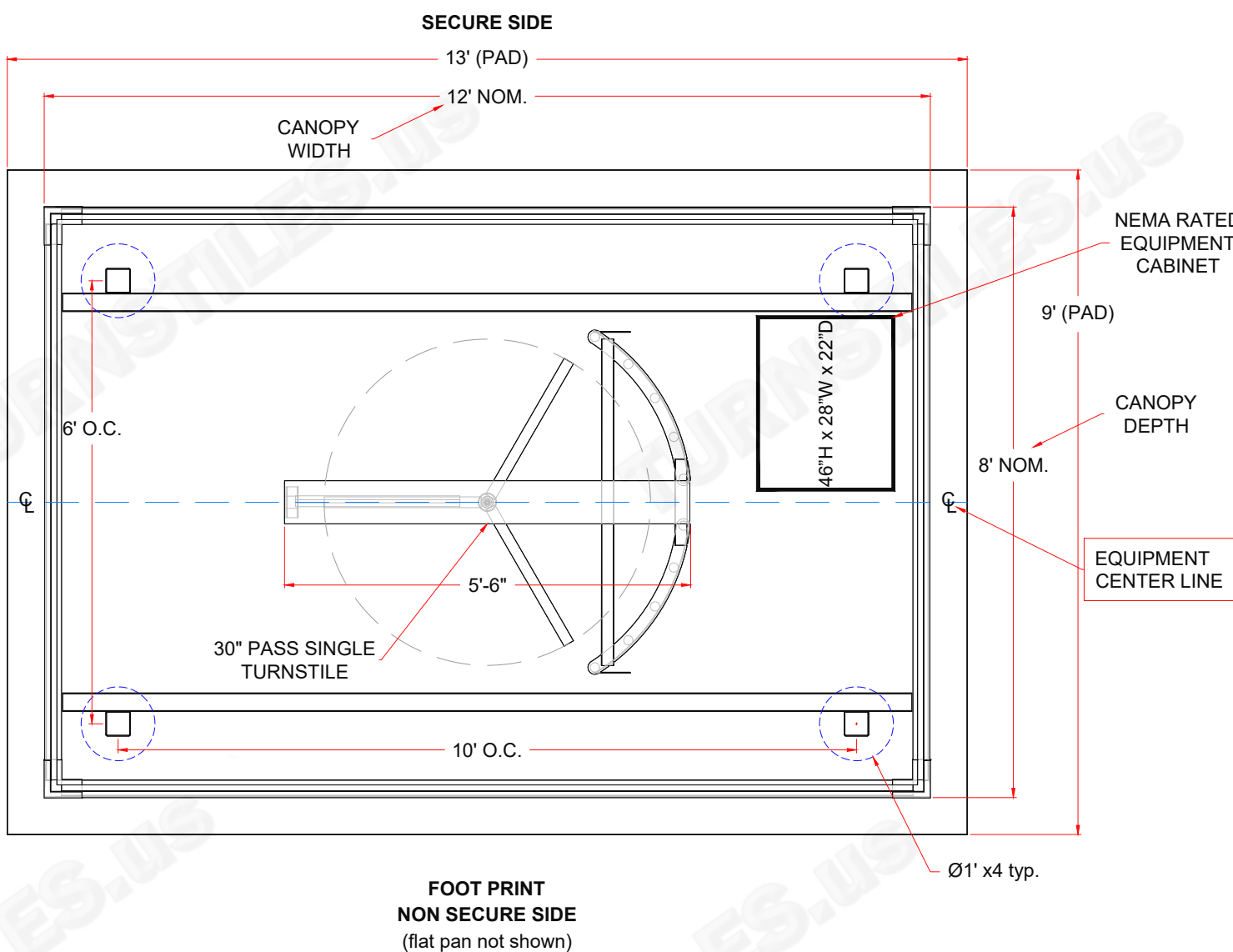
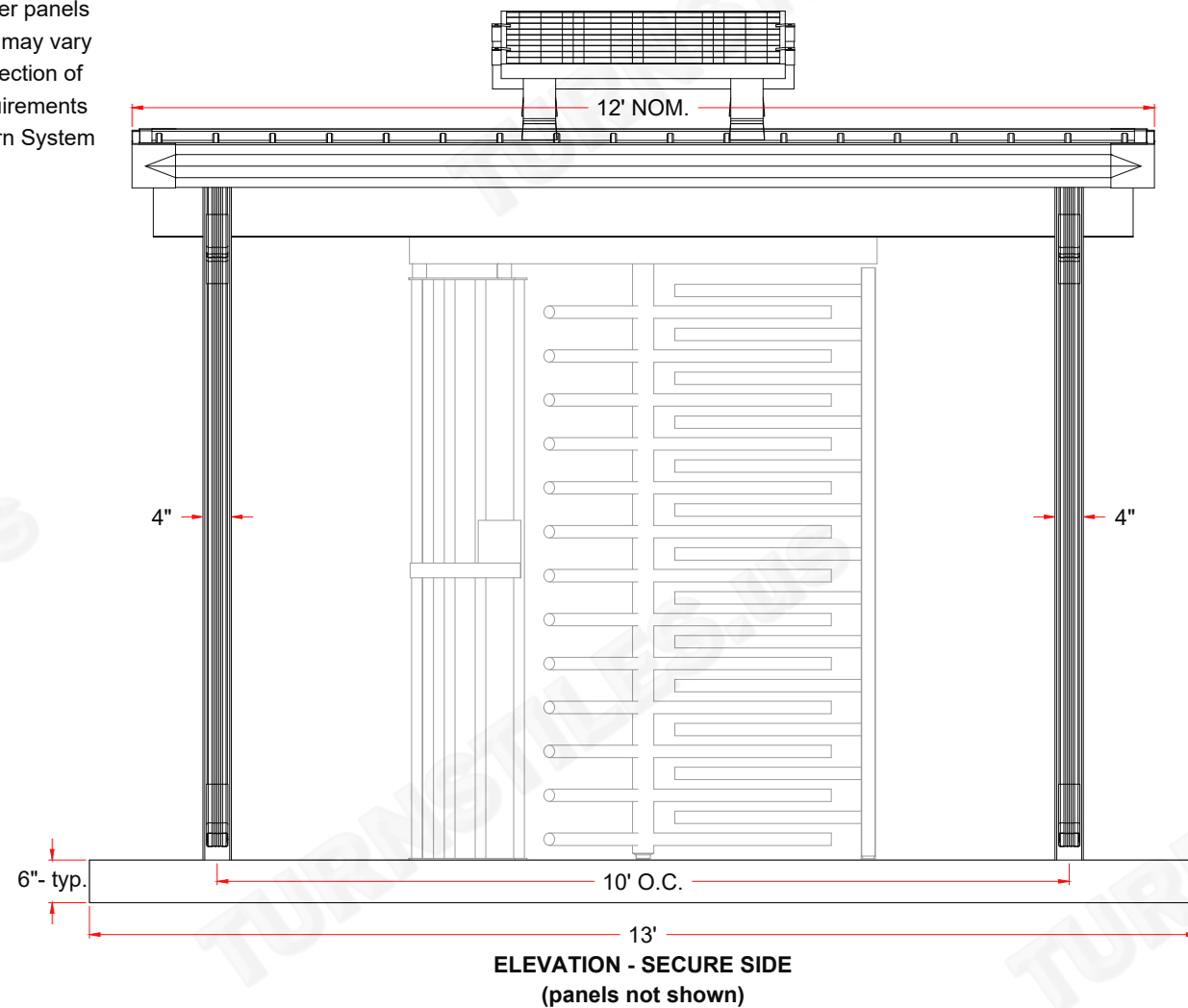
EQUIPMENT & PAD DETAIL	
FORZA GROUP Delta Airlines - Atlanta, GA 8' x 12' Canopy for Turnstile, 8' x 12' Canopy for Turnstile & ADA Swing Gate SolaTurn Powered System Detail & Dimensions	
DRAWING:	
FORZA GROUP - Delta Airlines Canopy - Turnstile - ADA Gate SolaTurn Powered ELD	
DATE:	08-19-25
PAGE:	1 OF 2

AUTHORIZED SIGNATURE: _____ DATE: ____ / ____ / ____

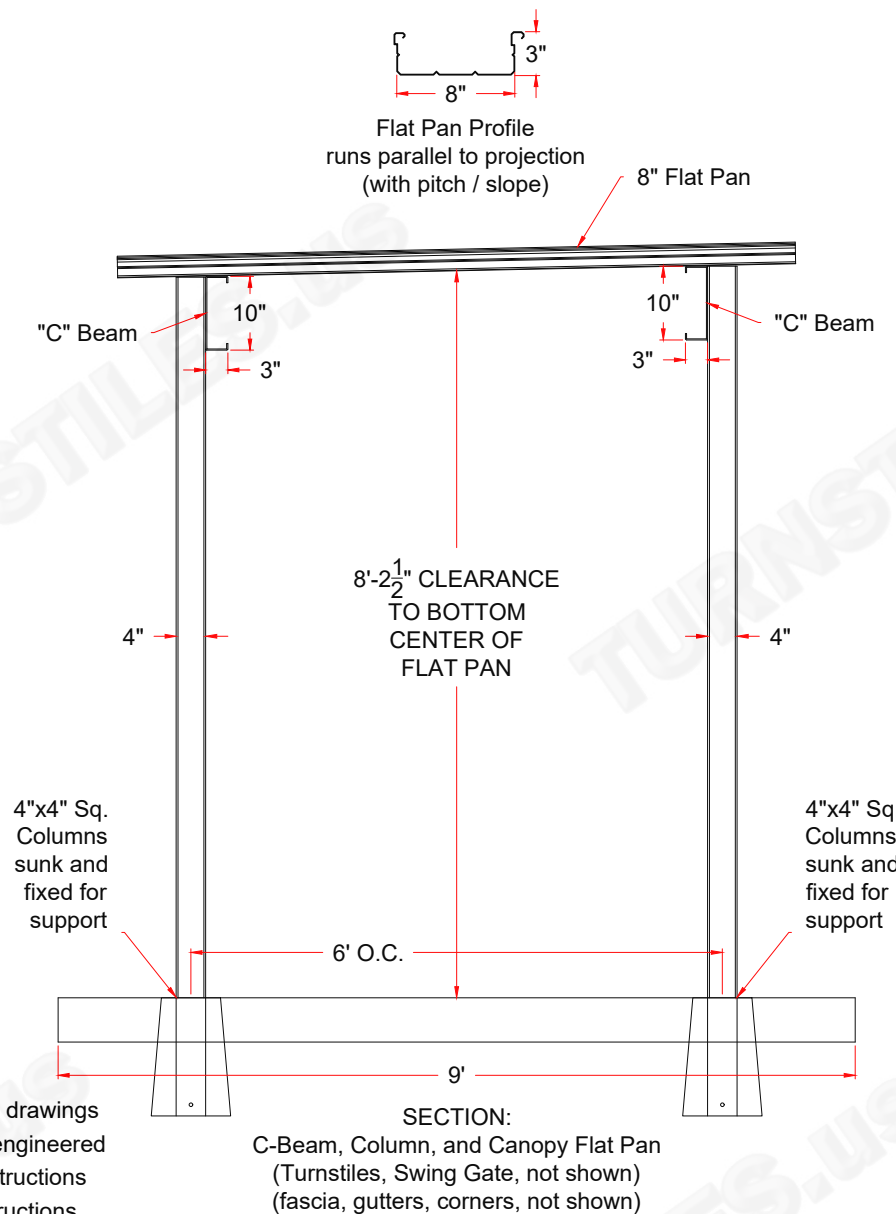
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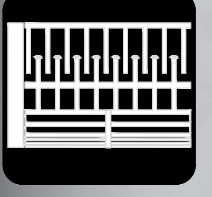
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* refer to Canopy Assembly drawings from manufacturing and/or engineered drawings, for block-out instructions and or concrete form instructions



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Product Data Sheets



SOLA TURN

Solar-Powered Turnstiles



www.TURNSTILES.us is leading the entrance security industry in clean-energy solutions with SolaTurn Solar-Powered Turnstiles. Our products are built to last and configurable to your requirements. Their unique functionality, convenience, and durability make them especially useful on construction sites. The **SolaTurn** is configurable with Full-Height Turnstiles, Gates, Portable Steel Forklift Base, Canopy Roof, Additional Solar Panels, Backup Batteries, Electrical Box, and Floodlight.



SolaTurn Turnstiles and Gates

- Full-Height Security
- Optional Portable Steel Forklift Base
- Optional Basic Turnstile Canopy
- Solar Panel Roof and Electronics Cabinet
- Bright Built-In Lighting
- Powers Turnstiles, Gates, and Accessories



OPTIONS and ACCESSORIES

Portable Base
Turnstile Canopy
Additional Battery Backups
Daylight Visible Indicator Lights
Choice of Finish / Color
Matching ADA Gates and Barriers

EntraPASS Access Control Software
Security Computer Workstation
Reader Integration
Time and Attendance Tracking
Control Options for Entry and Exit
Audio/Video CCTV Cameras





SOLA TURN

Solar-Powered Turnstiles



www.TURNSTILES.us is leading the entrance security industry in clean-energy solutions with SolaTurn Solar-Powered Turnstiles. The **SolaTurn Power Station** transforms secure entry into a self-contained, solar-powered system, built to last and configurable to your requirements.



SolaTurn Solar Power Station

Modular Energy Platform for
Gates, Turnstiles, Lighting & Security

Cabinet Enclosure:

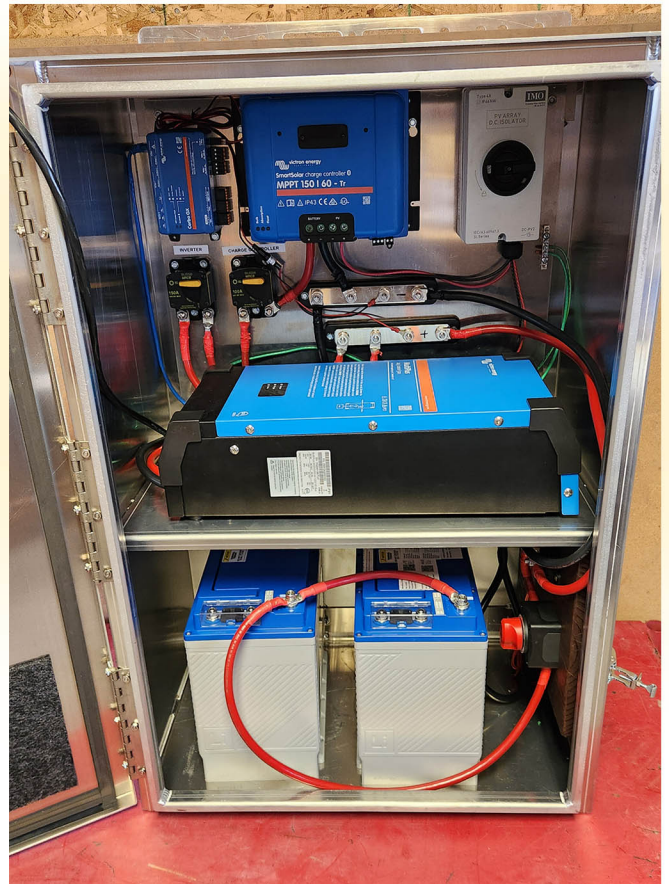
Overall (HxWxD – IN): 40.125 x 25.25 x 17.125

Inside (HxWxD – IN): 35.75 x 23.75 x 14.875

Opening (HxWxD – IN): 31.625 x 21.5

Additional Products & Services

System Expansion
EntraPASS Access Control Software
Portable Turnstiles and Gates
Intercoms and CCTV Cameras
Design and Installation



- **Off-Grid:** No trenching or grid needed
- **Modular:** Sized to fit any project
- **Expandable:** Add panels and battery cabinets
- **Compact:** All-in-one, portable or fixed
- **Reliable:** Discover lithium batteries, long life
- **Rugged:** Built for harsh, remote sites
- **Compatible:** Powers turnstiles, gates, lights etc.
- **Deployable:** Fast setup, plug-and-play

SOLATURN

SolaTurn Solar Power Station

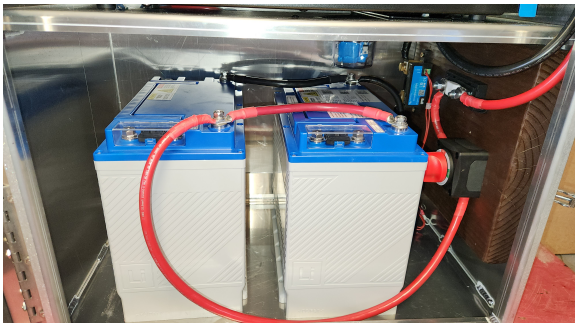
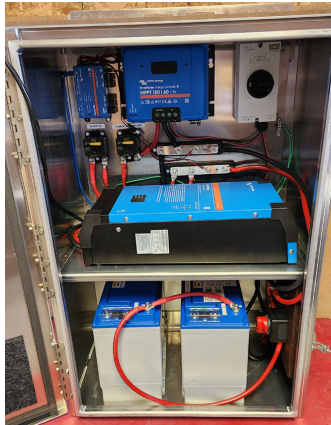
Modular Energy Platform for
Gates, Turnstiles, Lighting & Security

Cabinet Enclosure:

Overall (HxWxD – IN): 40.125 x 25.25 x 17.125

Inside (HxWxD – IN): 35.75 x 23.75 x 14.875

Opening (HxWxD – IN): 31.625 x 21.5



System Supplies and Materials

- CanadianSolar TOPHiKu6 445W Panels (x4)
- MC4-50-MF-1kV 50 ft. MC4 Solarline 2 Extender Cable
- IMO SI32-PEL64R-4 True DC Solar Isolator
- MNSR-1000 Heyco Strain Relief
- MNSPD-300-DC MidNite Solar Surge Protector for DC
- MNSPD-300-AC MidNite Solar Surge Protector for AC
- Victron SmartSolar MPPT 250/70-Tr VE.Can Charge Controller
- MTW-2-BLK #2 AWG UL MTW Cable, Black (15 ft)
- MTW-2-RED #2 AWG UL MTW Cable, Red (15 ft)
- #2 x 5/16" Stud Ring Connector, Tinned Copper (x4)
- #2 x 3/8" Stud Ring Connector, Tinned Copper (x10)
- HBT-4015-BK Heat Shrink for #4 AWG, Black (x4)
- HBT-4015-R Heat Shrink for #4 AWG, Red (x8)
- Victron VBB 250 4P Busbar (x2)
- Victron MultiPlus 24/2000/50-50 Inverter & Charger
- MEGA-fuse Holder
- MEGA-fuse 200A/80V (5 pcs)
- Victron Battery Switch On/Off 275A
- Bussmann MRCB Breaker 100A
- Victron SmartShunt 300A Battery Monitor
- Discover Lithium Blue 24V 100Ah Battery (x2)
- Victron Cerbo GX MK2 Communication Centre
- VE.Bus to USB MK3-USB Interface
- Ameresco Solar BBA-6 Battery Box
- Bussmann MRCB Breaker 150A
- VE.Direct Cable 1.8M
- RJ45 UTP Cable 1.8M (x3)
- Tamarack Solar Mount Kit 90514
- 2 Discover Lithium Blue 24V 100Ah (~5.1 kWh)

AMERESCO SOLAR

Green • Clean • Sustainable



Photographs are intended to portray typical enclosure appearance; actual appearance may vary.

Ameresco Solar supplies and distributes a complete line of enclosures to accommodate a wide range of off-grid applications. We have a large selection of enclosures and control cabinets ranging from single battery (for pole and ROHN towers) to custom skid-mounted, multi-battery enclosures. Our enclosure line has the flexibility to meet your solar system storage needs.

BBA-6 Series Features:

NEMA Ratings

- NEMA 3R (Standard), NEMA 4, NEMA 4X

Available Material and Finish

- Mill finished aluminum (Standard)
- Powder coated aluminum (White)
- Stainless steel (304 or 316)

Enclosure Dimensions

- Overall: (H) 40.125" x (W) 25.25" x (D) 17.125"
- Opening: (H) 31.625" x (W) 21.5"
- Inside: (H) 35.75" x (W) 23.75" x (D) 14.875"

Back Panel

Dimensions

- (H) 17" x (W) 21.75"

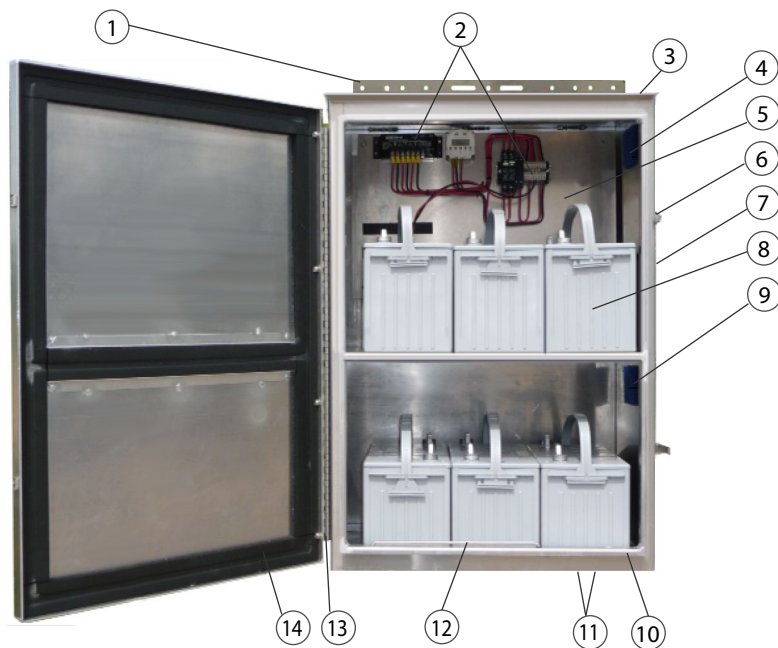
Battery Capacity

- (6) BCI Group 27
- (6) BCI Group 30
- (6) BCI Group 31
- (2) BCI Group 8G4D
- (2) BCI Group 8G8D

Weight

- 61 lbs





- ① Mounting Tab
- ② Electrical Assembly (Not included)
- ③ Rain Drip Lip
- ④ Fiberglass "Insect Proof" Screen on all Louvered Openings
- ⑤ Back Panel
- ⑥ Stainless Lockable Draw Latch
- ⑦ BBA-6 Cabinet
- ⑧ Battery (Not included)
- ⑨ Filter Media (Removable for cleaning)
- ⑩ Double Flanged Door Opening
- ⑪ (2) 1/2" NPT Knock-outs (CGB's/Conduit Fittings)
- ⑫ Door Stop
- ⑬ Stainless Steel Hinge
- ⑭ Closed Cell Neoprene Gasket

Mounting Structures



Mounts on wall using 4 lag bolts
(Bolts not included)

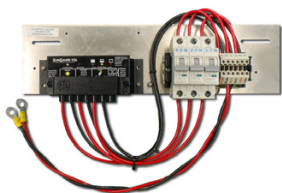


Mounts to ROHN25 tower using 4 u-bolts
(Bolts not included)



Mounts to 2-3" schedule 40 pole using 2 u-bolts
(Bolts not included)

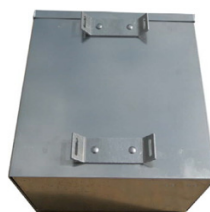
Mounting Options



Custom designed assembly sized to meet solar system requirements



Door fans available in 12V, 24V, and 48V DC/120V AC



Banding available for unique mounting structures

Additional Options:

- Breather/drain for NEMA4 - 4X (Required for all battery applications)
- Heat strips (120V, 150W with thermostat)
- Interior insulation (Low E)
- Sun shields (Available for top, sides, and door)
- Key lock (#1 or #2 Pelco)

SmartSolar Charge Controllers 250V and 99% efficiency

MPPT 250/60, 250/70, 250/85 & 250/100



Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points may be present on the power-voltage curve. Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 99%.

Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

Bluetooth Smart built-in: dongle not needed

The wireless solution to set-up, monitor and update the controller using Apple and Android smartphones, tablets or other devices.

VE.Direct

For a wired data connection to a Color Control panel, Venus GX, PC or other devices

Remote on-off

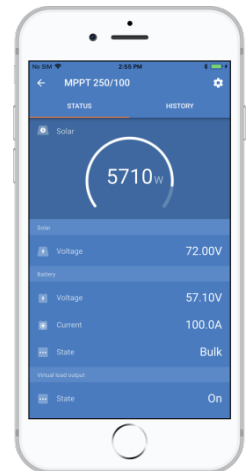
To connect for example to a VE.BUS BMS.

Programmable relay

Can be programmed (a.o. with a smartphone) to trip on an alarm, or other events.

Optional: pluggable LCD display

Remove the seal that protects the plug on the front of the controller, and plug-in the display.



SmartSolar Charge Controller	MPPT 250/60	MPPT 250/70	MPPT 250/85	MPPT 250/100
Battery voltage	12 / 24 / 48V Auto Select (software tool needed to select 36V)			
Rated charge current	60A	70A	85A	100A
Nominal PV power, 12V 1a,b)	860W	1000W	1200W	1450W
Nominal PV power, 24V 1a,b)	1720W	2000W	2400W	2900W
Nominal PV power, 48V 1a,b)	3440W	4000W	4900W	5800W
Max. PV short circuit current 2)	35A (max 30A per MC4 conn.)		70A (max 30A per MC4 conn.)	
Maximum PV open circuit voltage	250V absolute maximum coldest conditions 245V start-up and operating maximum			
Maximum efficiency	99%			
Self-consumption	Less than 35mA @ 12V / 20mA @ 48V			
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)			
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2V (adjustable: rotary switch, display, VE.Direct or Bluetooth)			
Charge algorithm	multi-stage adaptive			
Temperature compensation	-16 mV / -32 mV / -64 mV / °C			
Protection	Battery reverse polarity (fuse, not user accessible) PV reverse polarity / Output short circuit / Over temperature			
Operating temperature	-30 to +60°C (full rated output up to 40°C)			
Humidity	95%, non-condensing			
Data communication port	VE.Direct or Bluetooth			
Remote on/off	Yes (2 pole connector)			
Programmable relay	DPST AC rating: 240VAC / 4A DC rating: 4A up to 35VDC, 1A up to 60VDC			
Parallel operation	Yes (not synchronized)			

ENCLOSURE	
Colour	Blue (RAL 5012)
PV terminals 3)	35 mm ² / AWG2 (Tr models) Two sets of MC4 connectors (MC4 models 250/60 and 250/70) Three sets of MC4 connectors (MC4 models 250/85 and 250/100)
Battery terminals	35 mm ² / AWG2
Protection category	IP43 (electronic components), IP22 (connection area)
Weight	3 kg 4,5 kg
Dimensions (h x w x d) in mm	Tr models: 185 x 250 x 95 MC4 models: 215 x 250 x 95 Tr models: 216 x 295 x 103 MC4 models: 246 x 295 x 103

STANDARDS	
Safety	EN/IEC 62109-1
1a) If more PV power is connected, the controller will limit input power to the stated maximum. 1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V. 2) A PV array with a higher short circuit current may damage the controller in case of reverse polarity connection of the PV array. 3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels. Maximum current per MC4 connector: 30A (the MC4 connectors are parallel connected to one MPPT tracker)	

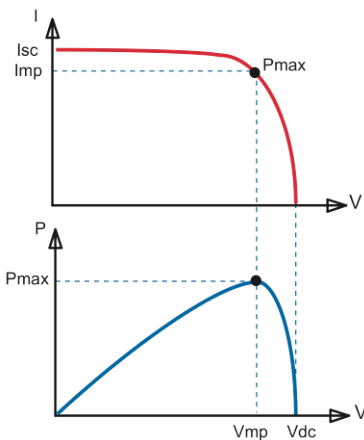


**SmartSolar Charge Controller
MPPT 250/100-Tr
with pluggable display**



**SmartSolar Charge Controller
MPPT 250/100-MC4
without display**

BlueSolar and SmartSolar MPPT Charge Controllers Overview



Maximum Power Point Tracking (MPPT)

Upper curve:

Output current (I) of a solar panel as function of output voltage (V). The Maximum Power Point (MPP) is the point P_{max} along the curve where the product $I \times V$ reaches its peak.

Lower curve:

Output power $P = I \times V$ as function of output voltage. When using a PWM (not MPPT) controller the output voltage of the solar panel will be nearly equal to the voltage of the battery, and will be lower than V_{mp} .



MPPT Control



SmartSolar Control



VictronConnect Application

Feature highlights common to all models

- Ultra-fast Maximum Power Point Tracking (MPPT).
- Advanced Maximum Power Point Detection in case of partial shading conditions.
- Outstanding conversion efficiency.
- Natural convection cooling.
- Automatic battery voltage recognition.
- Flexible charge algorithm.
- Over temperature protection and power derating when temperature is high.

Sizing options:

- Suitable for a variety of battery voltages. Most models connect to 12, 24, and 48V batteries, some only connect to 12 and 24V batteries, or only to 48V batteries.
- Charge currents rating from 10A all the way up to 100A.
- Maximum PV array Voc voltages ranging from 75V up to 250V.
- Multiple chargers can be used in parallel, for large systems we recommend to use the models with a VE.Can communication port.

PV terminal options:

- TR - one positive and one negative screw terminal.
- MC4 - 3 pairs of paralleled MC4 connectors.

Bluetooth options:

- SmartSolar models have Bluetooth.
- BlueSolar models do not have Bluetooth. They can be retrofitted to have Bluetooth by connecting the VE.Direct Bluetooth Smart dongle. Advantage: the product is not Bluetooth accessible when the dongle is not connected. Note that on the SmartSolar models, Bluetooth can be disabled.

Display options:

- VictronConnect Application. Connects via Bluetooth or via the VE.Direct - USB interface
- MPPT Control. Connects to all models via a VE.Direct cable
- SmartSolar Control Display. Plugs directly into the housing of the larger models
- GX device
- VRM website (GX monitoring device needed)

Communication ports:

- VE.Direct - all models
- VE.Direct and VE.Can - limited models. VE.Can is especially suitable for systems with multiple solar chargers. All units are simply "daisy chained" to each other with a single RJ45 cable between each unit and also between the last unit in the chain and the a GX monitoring device.

Temperature sensor options:

- Internally (all models).
- Externally via the Smart Battery Sense (only SmartSolar models).

Load output options:

- Physical output - On the 10, 15 and 20A models.
- Virtual output - via VE.Direct TX digital output cable and the BatteryProtect or a solid-state relay.

Remotely enabling and disabling the charger:

- All larger units feature the Victron standard remote on/off terminals. All models that don't feature an onboard Remote on/off terminal can be remotely controlled by using the [VE.Direct non inverting remote on/off cable - ASS030550310](#). Note that this prohibits using the VE.Direct port for anything else.

Firmware update options:

- Local updates via the VictronConnect Application (via Bluetooth or USB-VE.Direct interface)
- Remote updates via VRM website and a GX device

Optional accessories:

- VictronConnect Application (free download)
- Wire boxes, to cover and protect the terminals. See table on page 2 for wire box types
- Control and display panels: MPPT control or SmartSolar control)
- GX monitoring device (CCGX, Venus GX, Octo GX or Cerbo GX)
- Data cables: VE.Direct cable, RJ45 Cable (VE.Can models only), USB-VE.Direct interface
- External control cables: TX cable, non-inverting cable
- Bluetooth dongle (for non-smart models)

More information:

- To access the above-mentioned documents or information: press the search button on our website and enter the appropriate search word.
- For connection to a Color Control GX or other GX device

BlueSolar Charge Controller	Load output	Battery voltage	Optional display	Bluetooth	Com. port	Remote on-off	Programmable relay	Wire Box
75/10	15A	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	S 75-10/15
75/15	15A	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	S 75-10/15
100/15	15A	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	S 100-15
100/20 (up to 48V)	20A/20A/1A	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	S 100-20
100/30	No	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	M
100/50	No	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	M
150/35	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	M
150/45	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	M
150/45-Tr	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/45-MC4	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/60-Tr	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/60-MC4	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/70-Tr	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/70-MC4	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Optional dongle	VE.Direct & VE.Can	Yes	Yes	XL
250/70-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Optional dongle	VE.Direct & VE.Can	Yes	Yes	L
250/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Optional dongle	VE.Direct & VE.Can	Yes	Yes	XL

SmartSolar Charge Controller	Load output	Battery voltage	Optional display	Bluetooth	Com. port	Remote on-off	Programmable relay	Wire Box
75/10	15A	12/24V	MPPT control	Built-in	VE.Direct	No	No	S 75-10/15
75/15	15A	12/24V	MPPT control	Built-in	VE.Direct	No	No	S 75-10/15
100/15	15A	12/24V	MPPT control	Built-in	VE.Direct	No	No	S 100-15
100/20 (up to 48V)	20A/20A/1A	12/24/36/48V	MPPT control	Built-in	VE.Direct	No	No	S 100-20
100/30	No	12/24V	MPPT control	Built-in	VE.Direct	No	No	M
100/50	No	12/24V	MPPT control	Built-in	VE.Direct	No	No	M
150/35	No	12/24/36/48V	MPPT control	Built-in	VE.Direct	No	No	M
150/45	No	12/24/36/48V	MPPT control	Built-in	VE.Direct	No	No	M
150/45-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/45-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/60-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/60-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/70-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/70-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/70-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
150/70-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
150/85-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
150/85-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
150/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
150/100-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/60-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/60-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/70-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/70-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/70-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
250/70-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
250/85-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/85-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/100-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL



Color Control GX



Venus GX



Cerbo GX



Smart Battery Sense



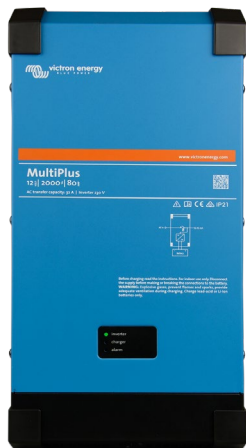
VE.Direct Bluetooth Smart Dongle



VE.Direct to USB interface

MultiPlus Inverter/Charger 2000VA 120V

12 / 24 / 48V



**MultiPlus 2000 VA
(with bottom cover)**



**MultiPlus 2000 VA
(bottom cover removed)**

Multifunctional, with intelligent power management

The MultiPlus is a powerful true sine wave inverter, a sophisticated battery charger that features adaptive charge technology, and a high-speed AC transfer switch in a single compact enclosure. Next to these primary functions, the MultiPlus has several advanced features, as outlined below.

Parallel operation and three phase capability

Up to six Multis can operate in parallel to achieve higher power output.

In addition to parallel connection, three units can be configured for three-phase output.

PowerControl - Dealing with limited generator, shore side or grid power

With the Multi Control Panel a maximum generator or shore current can be set. The MultiPlus will then take account of other AC loads and use whatever is extra for charging, thus preventing the generator or shore supply from being overloaded.

PowerAssist - Boosting the capacity of shore or generator power

This feature takes the principle of PowerControl to a further dimension. It allows the MultiPlus to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the MultiPlus will make sure that insufficient shore or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

Four stage adaptive charger and dual bank battery charging

The main output provides a powerful charge to the battery system by means of advanced 'adaptive charge' software. The software fine-tunes the three-stage automatic process to suit the condition of the battery, and adds a fourth stage for long periods of float charging. The adaptive charge process is described in more detail on the Phoenix Charger datasheet and on our website, under Technical Information. In addition to this, the MultiPlus will charge a second battery using an independent trickle charge output intended for a main engine or generator starter battery.

High start-up power

Needed to start high inrush loads such as power converters for LED lamps, halogen lamps or electric tools.

Search Mode

When Search Mode is 'on', the power consumption of the inverter in no-load operation is decreased by approx. 70%. In this mode the Multi, when operating in inverter mode, is switched off in case of no load or very low load, and switches on every two seconds for a short period. If the output current exceeds a set level, the inverter will continue to operate. If not, the inverter will shut down again.

Programmable relay

By default, the programmable relay is set as an alarm relay, i.e. the relay will de-energise in the event of an alarm or a pre-alarm (inverter almost too hot, ripple on the input almost too high, battery voltage almost too low).

Remote on / off / charger on

Three pole connector.

On-site system configuring, monitoring and control

After installation, the MultiPlus is ready to go.

Settings which can be changed with DIP switches: battery charge voltage / search mode.

For more settings use VE-Config or the VE.Bus Smart dongle.

Remote configuring and monitoring

Install a Cerbo GX or other GX product to connect to the internet.

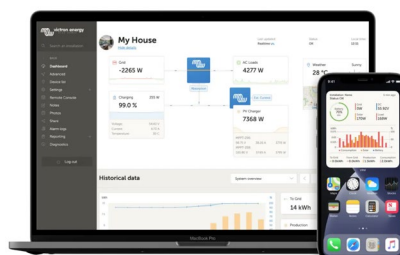
Operational data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

When connected to the internet, systems can be accessed remotely, and settings can be changed.



Ekran GX or Cerbo GX

Provides intuitive system control and monitoring and enables access to our free remote monitoring website: the VRM Online Portal.



VRM Portal

Our free remote monitoring website (VRM) will display all your system data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail or push notification.



VRM app

Monitor and manage your Victron Energy system from your smart phone and tablet. Available for both iOS and Android.

	MultiPlus 12/2000/80-50	MultiPlus 24/2000/50-50	MultiPlus 48/2000/25-50
PowerControl / PowerAssist	Yes		
Three Phase and parallel operation	Yes		
Transfer switch	50 A		
INVERTER			
Input voltage range	9,5 – 17 V	19 – 33 V	38 – 66 V
Output	Output voltage: 120VAC ± 2% Frequency: 60Hz ± 0,1% (1)		
Cont. output power at 25°C (3)	2000 VA		
Cont. output power at 25°C	1600 W		
Cont. output power at 40°C	1400 W		
Cont. output power at 65°C	1000 W		
Peak power	3500 W		
Maximum efficiency	93%	94%	95%
Zero-load power	10 W	11 W	11 W
Zero-load power in search mode	3 W	4 W	4 W
CHARGER			
AC Input voltage range	95-140 VAC		
AC input frequency range	45 – 65 Hz	55 – 65 Hz	45 – 65 Hz
Charge voltage 'absorption'	14,4 / 28,8 / 57,6 V		
Charge voltage 'float'	13,8 / 27,6 / 55,2 V		
Storage mode	13,2 / 26,4 / 52,8 V		
Charge current house battery (4)	80 A	50 A	25 A
Charge current starter battery	1A (12 V and 24 V models only)		
Battery temperature sensor	Yes		
GENERAL			
Programmable relay (5)	Yes		
Protection (2)	a – g		
VE.Bus communication port	For parallel and three phase operation, remote monitoring, and system integration		
Remote on-off	On/off		
DIP switches	Yes (7)		
Internal DC fuse	no		
Common Characteristics	Operating temp. range: -40 to +65°C (fan assisted cooling) Humidity (non-condensing): max 95%		
ENCLOSURE			
Common Characteristics	Steel (RAL 5012), IP22		
Battery-connection	M8 bolts		
230V AC-connection	Screw terminals 13 mm² (6 AWG)		
Weight	15.5 kg		
Dimensions (h x w x d)	506 x 236 x 147 mm		
STANDARDS			
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN 62109-1		
Emission Immunity	EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		
Automotive Directive	ECE R10-5		
1) Can be adjusted to 50Hz 2) Protection: a. Output short circuit b. Overload c. Battery voltage too high d. Battery voltage too low e. Temperature too high f. 230VAC on inverter output g. Input voltage ripple too high	3) Non-linear load, crest factor 3:1 4) Up to 25°C ambient 5) Programmable relay which can be set for: general alarm, DC under voltage or generator start/stop signal function AC rating: 230V/4A DC rating: 4A up to 35VDC, 1A up to 60VDC 6) Remote / battery charge voltage / inverter frequency / search mode 7) Battery charge voltage / search mode		



Digital Multi Control Panel

A convenient and low-cost solution for monitoring and control. With an on/off charger-only switch, full LED readout and a rotary knob to set PowerControl and PowerAssist levels.



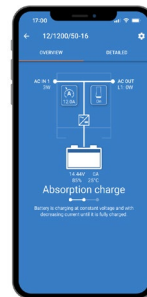
VE.Bus Smart Dongle

For monitoring and control via Bluetooth together with the VictronConnect app. It also measures battery voltage and temperature.



Interface MK3-USB

Needed to configure the MultiPlus. Can be used with the VictronConnect app or VE.Configure software. The interface connects to the MultiPlus via an RJ45 UTP cable and plugs into a USB port.



VictronConnect app

Use to monitor or configure the MultiPlus using your phone tablet or PC.



Battery Monitor

To monitor battery state of charge via Bluetooth or the VRM portal. The BMV 712 Smart has display, while the SmartShunt does not have a display. Both communicate via Bluetooth and have a VE.Direct communication port.

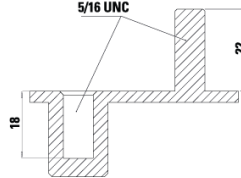
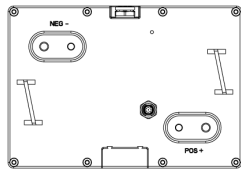
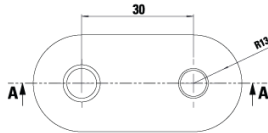
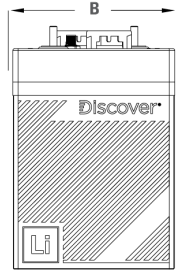
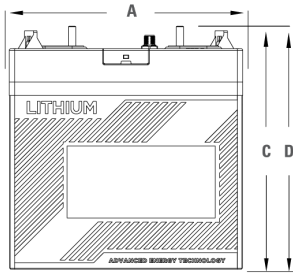
Discover®

Innovative Battery Solutions



LITHIUM PROFESSIONAL Battery

Discover® AES PROFESSIONAL LiFePO₄ battery models are purpose built to replace and fit the standard groupings of BCI 6V, 8V and 12V (GC) batteries. AES PROFESSIONAL batteries incorporate a proprietary high-current BMS that delivers superior peak power along with lightning fast 1C continuous charge and discharge rates, plus they feature COLD CHARGE functionality allowing for cold temperature charging to begin from -20°C / -4°F. Independently tested to the highest safety, performance and transportation standards, a single battery will do the work of many lead-acid batteries and unlike lead-acid batteries can be continuously operated in a Partial State of Charge (PSOC) without degrading performance.



SECTION A-A

MECHANICAL SPECIFICATIONS

Industry Reference	BCI: GC2	
Length A (in/mm)	10.2	260
Width B (in/mm)	7.1	180
Height C (in/mm)	10.0	254
Total Height D (in/mm)	10.8	275
Weight (lbs/kgs)	30.7	14.0
Terminal *	BM 5/16	
Cell(s)	Prismatic 4S4P	
Case Material	UL94-VO PBT/PC	
IP Rating	67	
Electrolyte	LiFePO ₄	

NOTE 1: Dimensions have a ±2 mm (0.08 in) tolerance. Weights may vary.
NOTE 2: Refer to [terminal guide](#) on website for torque values.

SHIPPING CLASSIFICATION

UN 3480, Class 9 (Lithium batteries)

ELECTRICAL SPECIFICATIONS

Open Circuit Voltage (V)	12.8
Charge Voltage (Bulk Vdc)	13.8 - 14.2
Max Absorption Voltage (U1 Vdc)	13.8
Float Voltage (U2 Vdc)	13.6
BMS Max. Voltage protection (Vdc)	14.6 (Approximately)
Suggested Low Voltage Cutoff (Vdc) *	12.0
BMS Min. Voltage protection (Vdc)	10.0 (Approximately)
Max. Continuous Charge Current (I Max. Adc)	115
Min. Finishing Charge Current (I Min. Adc)	2%-3% C1 / Min. 200ma
Max Continuous Discharge Current (Adc)	120
Max Peak Current (Adc)	360 A RMS (3 seconds)
Self-Discharge (25°C / 77°F)	< 3% per month
Charge Temperature	Min: -20°C Max: 45°C (-4°F to 113°F)
Discharge Temperature	Min: -20°C Max: 55°C (-4°F to 131°F)
Storage Temperature	Min: -10°C (14°F) Max: 30°C (86°F)

Electrical Specifications at 25°C.

* Do not exceed maximum voltage at the battery terminals.

CAUTION: Extra considerations must be given to depths of discharge, operating voltages and currents when designing systems for use at maximum operating temperatures.

FEATURES

DLP-GC2-12V

LYNK PORT

- Connects battery string to LYNK Gateway
- Plug and Play Multi-battery BMS communication
- J1939 Protocol
- Remote ON / OFF Capable

HIGH-PERFORMANCE BMS

- Up to 3C peak power for inverters and motor controllers
- Discharge current up to 2C
- Continuous charge current up to 1C
- Sets voltage, broadcasts, SoC and temperature
- External field replaceable fuse protection

COLD CHARGING

- Integrated self-heating

STATUS VIEW

- ON / OFF multi-color status LED

ACCESSORIES

LYNK II GATEWAY

- Closed-loop communications with chargers and motor controllers
- CAN Open / Serial CAN
- Programmable relays for LVCO, Load Shedding
- SD Memory
- Download Battery Data

LYNK LITE GATEWAY

- Closed-loop communications with chargers and motor controllers
- CAN Open / Serial CAN
- Download Battery Data
- IP 65

BATTERY DISCHARGE INDICATOR

- At-a-glance SoC display

BENEFITS

RUNS LONGER

- 2x the high-current runtime of lead-acid battery
- Up to 100% usable capacity
- Easy to parallel more capacity

LASTS LONGER

- 10x the life of lead-acid battery (BCI-06)
- Unlimited Partial State of Charge cycles
- Energy throughput warranty

CHARGES FASTER

- Up to 5x faster than new lead-acid batteries
- 2x faster than C/2 rated lithium batteries
- Opportunity charge at 1C rate anytime, regardless of SoC

SURGE POWER

- High 3C Peak Power
- Discharge Current up to 2C

HIGH-EFFICIENCY

- Up to 50% more energy efficient than a lead-acid battery
- Up to 98% round-trip efficiency

PARALLEL POWER

- Easy to parallel more capacity
- Linear scaling of charge, discharge and peak capacity

QUICK INSTALL

- Fast installation
- No special tools

RELIABLE AND SAFE

- LiFePO₄ is safe
- Maintenance-free
- UL94-5VA flame retardant case and cover
- IP 67 rated

CERTIFIED QUALITY

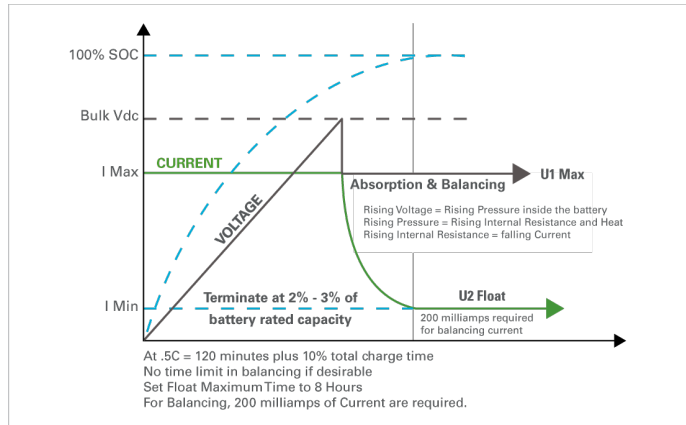
Discover® manufacturing facilities are fully certified to ISO 9001/14001 and OSHA 18001 standards.

- IEC 62619
- UL 2271
- CE
- UN 38.3

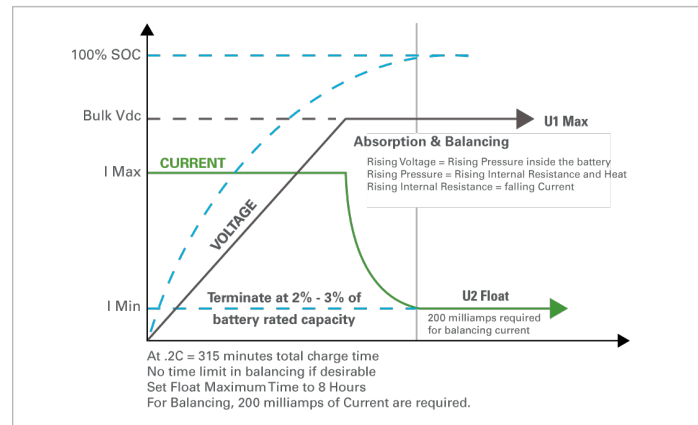
PERFORMANCE SPECIFICATIONS

Nominal Energy (kWh)	1.54	Minutes of Discharge				
Usable DoD	100%	@25A	@56A	@75A	@85A	@100A
Rated Wh Capacity (1C)	1536	288	128	96	84	72
Rated Ah Capacity (1C)	120					

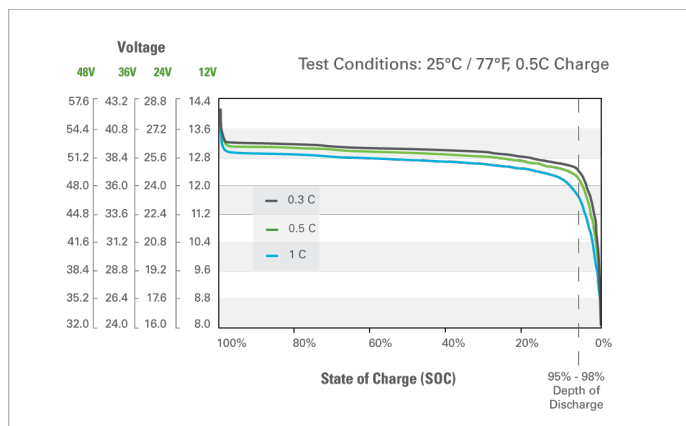
Fast Charging at .5C (2HR) to 1C (1HR)



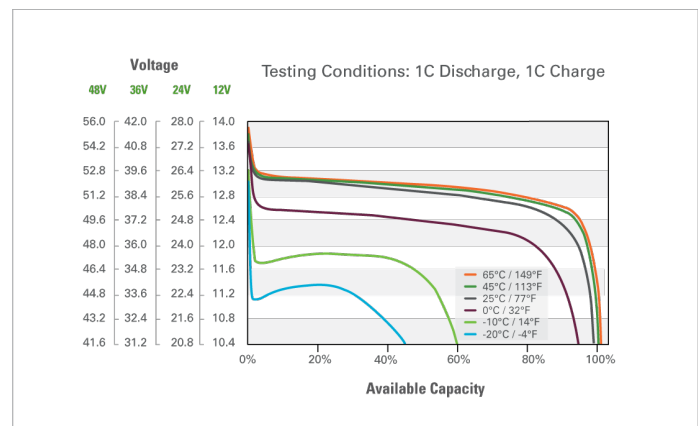
Standard to Low Rate Charging at .2C (5HR) to .5C (2HR)



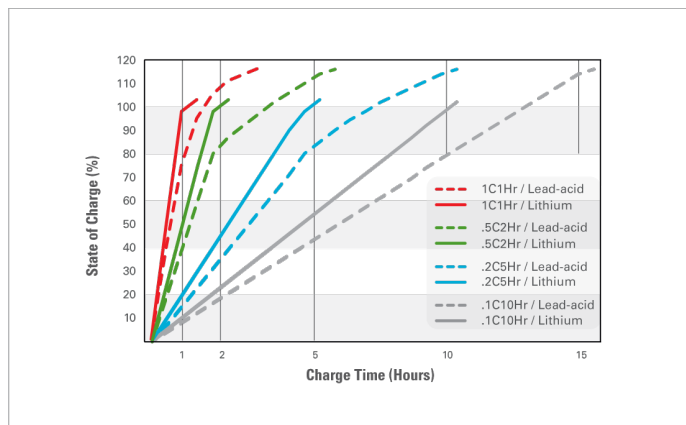
Voltage in Relation to Rate of Discharge



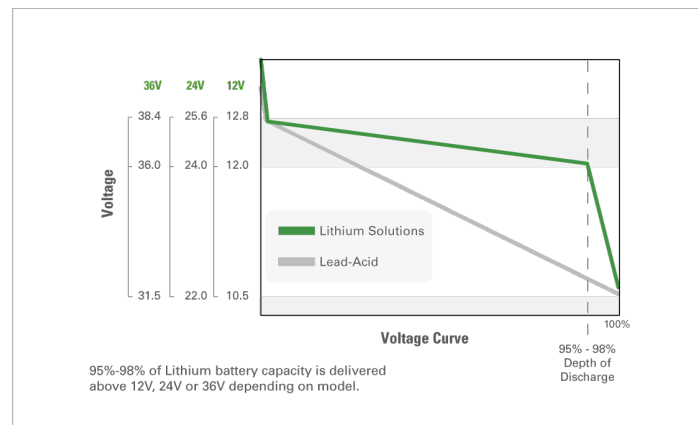
Discharge Voltage and Capacity vs. Temperature



Charge Performance (Lithium vs. Lead)



Discharge Performance (Lithium vs. Lead)



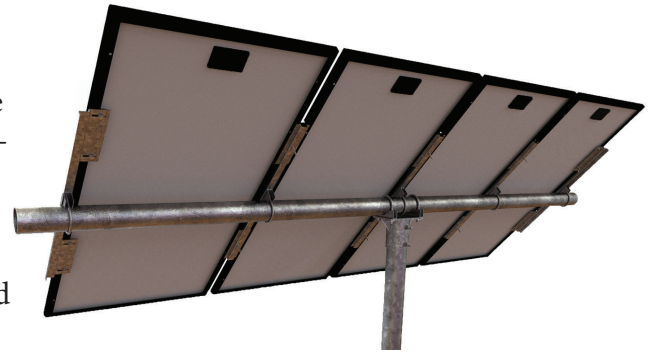
CAUTION: Direct connection to DC motors without proper safety protection, motor controllers, and external motor voltage clamping systems (such as high power anti-parallel diodes or braking resistor systems) may result in damage to the internal pack protection system which may result in unsafe situations. Please consult Discover technical support before directly connecting any motorloads. Discover® reserves the right to make adjustments to this publication at any time, without notice or obligation. Data in this publication are for reference use only and models may vary from shown. It is the responsibility of the reader of this information to verify any and all information presented herein. For more information contact us.

PGRM POLE MOUNT

for SOLAR PANEL MOUNTING



- The PGRM Series Pole Mount can be used to mount up to 6 solar modules with a frame thickness between 1.18" and 2"
- Install up to 92 square feet of modules on a single 4" Schedule 40 pole and up to 130 square feet of modules on two 4" schedule 40 poles
- Suitable for wind speeds up to 115 MPH
- For high wind locations add an additional vertical pole
- Tilt angle can be adjusted from 0° to 60° and is easily adjusted seasonally
- All sizes can ship by UPS Ground
- Simple one-person installation and adjustment



User supplies 4" schedule 40 steel pipe(s) for vertical pole and a 3" schedule 40 steel pipe for the horizontal beam.



Calculation of the required horizontal beam length (L) in inches:

$L = W \times N + (N + 1) \times 1.4$ where N = number of modules and W = module width in inches

Part Number	Description
UNI-PGRM/1P1	POLE MOUNT FOR 1 MODULE WITH 1 VERTICAL POLE
UNI-PGRM/2P1	POLE MOUNT FOR 2 MODULES WITH 1 VERTICAL POLE
UNI-PGRM/3P1	POLE MOUNT FOR 3 MODULES WITH 1 VERTICAL POLE
UNI-PGRM/4P1	POLE MOUNT FOR 4 MODULES WITH 1 VERTICAL POLE
UNI-PGRM/5P1	POLE MOUNT FOR 5 MODULES WITH 1 VERTICAL POLE
UNI-PGRM/5P2	POLE MOUNT FOR 5 MODULES WITH 2 VERTICAL POLES
UNI-PGRM/6P1	POLE MOUNT FOR 6 MODULES WITH 1 VERTICAL POLE
UNI-PGRM/6P2	POLE MOUNT FOR 6 MODULES WITH 2 VERTICAL POLES
70-0300-PGM	ADDITIONAL POLE CAP FOR HIGH WIND LOCATIONS

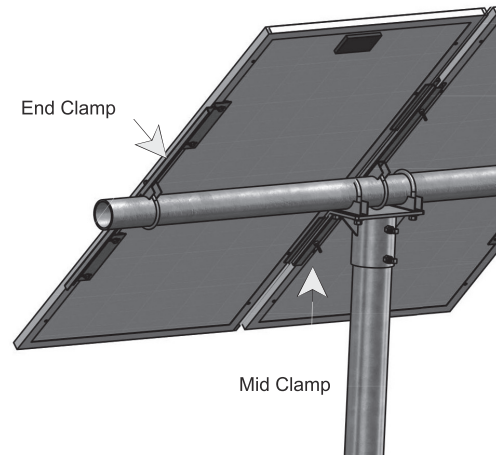
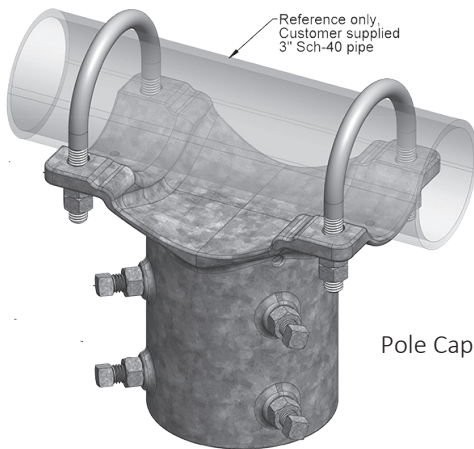
PGRM POLE MOUNT COMPONENTS

for SOLAR PANEL MOUNTING



VERTICAL AND HORIZONTAL SCHEDULE 40 PIPE IS NOT INCLUDED - PURCHASE LOCALLY

- The PGRM Series Pole Mount can be used to mount up to 6 solar modules with a frame thickness between 1.18" and 2"
- All parts are made from galvanized steel with stainless-steel hardware
- Two sizes of module clamps:
 35-inch long for modules with frame length of 38 to 72 inches
 47-inch long for modules with frame length of 72 to 96 inches.
- Tilt angle can be adjusted from 0° to 90° and is easily adjusted seasonally
- Parts can ship by UPS



User supplies 4" schedule 40 steel pipe(s) for vertical pole and a 3" schedule 40 steel pipe for the horizontal beam. Calculation of the required horizontal beam length (L) in inches:
 $L = 5 + (Q \times W) + ((Q-1) \times 1.28)$ where Q = module quantity, W = module width

Part Number	Description	Weight (lbs.)
70-0300-PGM-B	POLE CAP FOR 4" SCH-40 OR SCH-80 VERTICAL POST (4.5" O.D.)	12
PGRM-MID	MID CLAMP - 35-INCH USE ONE BETWEEN EACH MODULE	7
PGRM-END	END CLAMPS - 35-INCH USE TWO PER MOUNT	6
PGRM-MID-47	MID CLAMP - 47-INCH USE ONE BETWEEN EACH MODULE	9
PGRM-END-47	END CLAMPS - 47-INCH USE TWO PER MOUNT	8

SI32 Series - Switch Disconnecter Data Current & Voltage



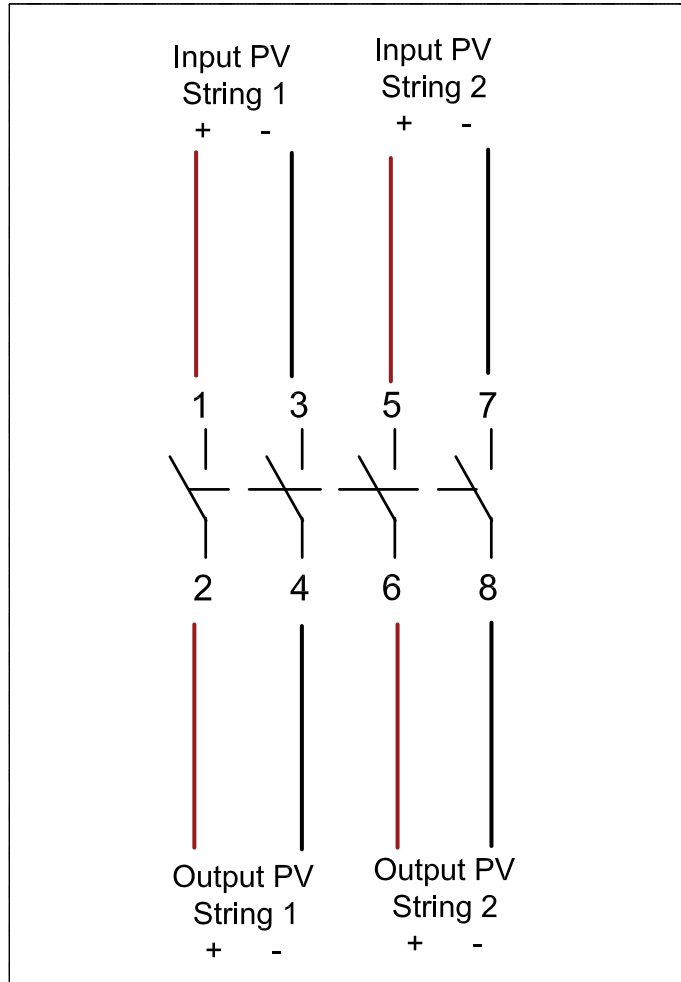
Switch Disconnecter Voltage, Current and Associated Data

Identification	Rating Data			
Switch, unenclosed – catalogue number (with DC-PV2 rating)	SI32-DBL-4*			
Specific dedicated individual enclosure – catalogue number (with minimum IP56NW rating)	N/A			
Assembly of switch and dedicated individual enclosure – catalogue number	SI32-PEL64R-4*			
I_{th} rated thermal current, unenclosed, at 40°C shade ambient air temperature	32A			
I_{the} rated thermal current, indoor, at 40°C shade ambient air temperature, in a specific dedicated enclosure	32A			
I_{the} rated thermal current, outdoors, at 40°C shade ambient air temperature, without solar effects in a specific dedicated enclosure IP66NW	32A			
I_{the} solar current value, outdoors, at 40°C shade ambient air temperature with solar effects in a specific dedicated enclosure rated IP66NW	32A			
I_{the} solar current value, outdoors, at 60°C shade ambient air temperature with solar effects in a specific dedicated enclosure rated IP66NW	28.2A			
 	U_e rated Operational Voltage V d.c	I_e DC-PV2 rated operational current A	$I_{(make)}$ and $I_{(break)}$ DC-PV2 $4 \times I_e$ A	Min Cable Size mm ²
1 Pole 	≤500	14	56	2.5mm ²
	600	8	32	
	700	3	12	
	800	3	12	
	900	2	8	
	1000	2	8	
2 Poles Series 	≤500	32	128	6mm ²
	600	27	108	4mm ²
	700	22	88	
	800	17	68	
	900	12	48	
	1000	6	24	2.5mm ²
4 Poles Series 	≤500	32	128	6mm ²
	600	32	128	
	700	32	128	
	800	32	128	
	900	32	128	
	1000	32	128	

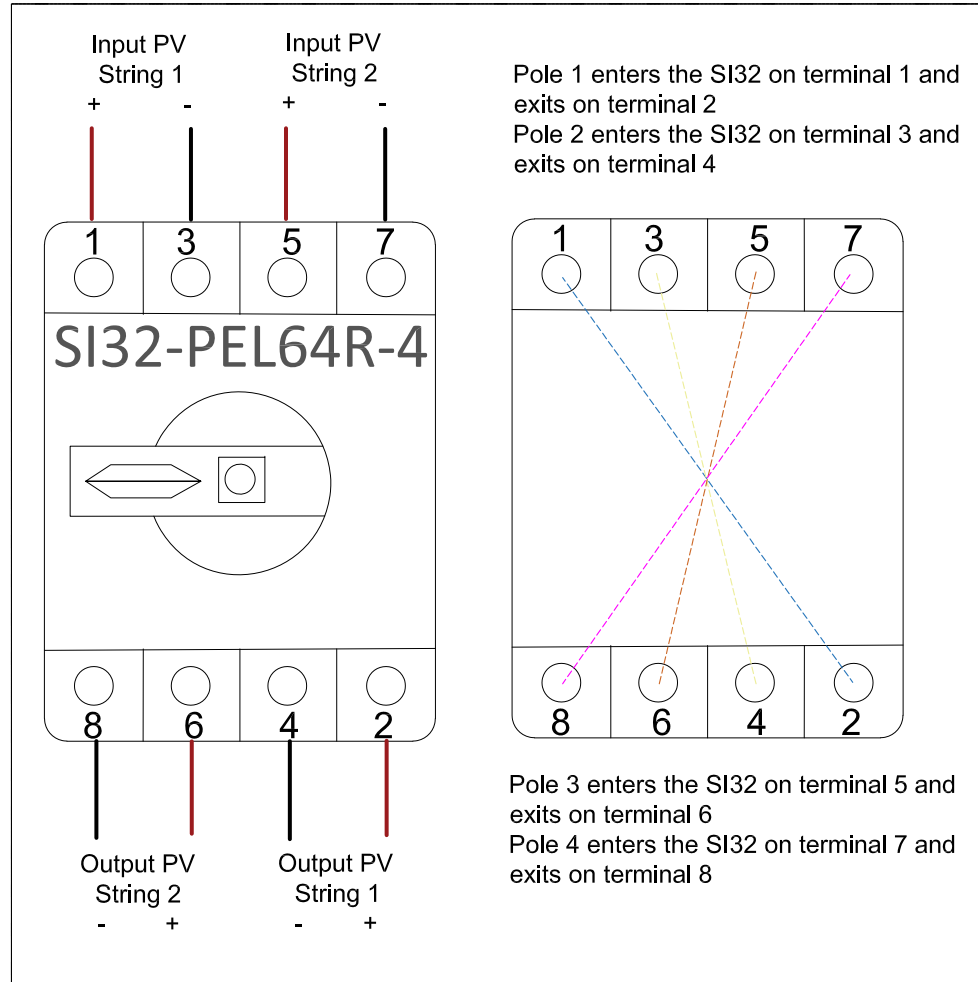
* Can be followed by T, M25A or T-M25A.

T= 2x2 poles series, M25A= M25 threaded gland entries

Schematic Diagram



Connection Diagram



SI32-PEL64R-4 Schematic & Connection Diagram

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"Stay Connected with Heyco" Solar Products

HEYCO



- Integral Sealing Ring ensures a superior seal at the clearance or threaded mounting hole location, every time.
- IP 68 rated.
- Widest range of approved cable diameters.
- Cordgrips with an -SM suffix have Skinned-Over Break-thru glands that offer the flexibility to use from 1 to 31 of the available holes while still providing a liquid tight seal around the wire.
- All accompanying Cordgrips are made of nylon construction with TPE sealing glands that resist salt water, weak acids, gasoline, alcohol, oil, grease, and common solvents. (This feature is not assessed by UL.)
- For locknut specifications or to order locknuts separately, see pages 3-13 & 3-14.
- Multi-hole glands are only to be used with Heyco Liquid Tight Cordgrips and are not sold separately.
- For our complete range of Heyco Cordgrips, see Section 3 of the Heyco Catalog.

Heyco®-Tite UL Listed/Recognized and CSA Certified Liquid Tight Cordgrips for Solar Applications

Multi-Hole, NPT Hubs with Integral Sealing Ring - IP 68 Rated

The Ultimate in Liquid Tight Strain Relief Protection

GLAND CONFIGURATION Conductors			PART NUMBER Black	DESCRIPTION	UL/CSA or cULus	PART DIMENSIONS									
Size mm.	Type *	No.				A Clearance Hole Dia.	B Max. O.A. Length	C Thread Length	D Wrenching		E Nut Flat Size				
						in.	mm.	in.	mm.	in.	mm.	Thickness in.	mm.	in.	mm.
Standard Multi-Hole Gland - Assembled Metal Locknuts INCLUDED															
4,5	USE-2	9	M8437GBF	LTCG 1	cULus	1.326	33,8	2.41	61,2	.76	19,3	.30	7,6	1.73	43,9
		13	M4524GBG	LTCG 1-1/4	cULus	1.680	42,7	2.69	68,3	.78	19,8	.30	7,6	2.05	52,1
5,2	USE-2	2	M3231GAE	LTCG 1/2	UL/CSA	.875	22,2	1.70	43,2	.61	15,5	.21	5,3	.98	24,9
		3	M3234GAF	LTCG 3/4	UL/CSA	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4	1.30	33,0
		4	M3234GAG		UL/CSA	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4	1.30	33,0
5,6	USE-2	3	M3200GAH	LTCG LL 1/2	UL/CSA	.875	22,2	1.68	42,7	.44	11,2	.25	6,4	1.06	27,0
Skinned-Over Break-thru Solar Masthead Gland - Assembled Metal Locknuts INCLUDED															
5,5	USE-2	5	M3234GBR-SM	SMCG 3/4	cULus	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4	1.30	33,0
		9	M8437GBK-SM	SMCG 1	cULus	1.326	33,8	2.41	61,2	.76	19,3	.30	7,6	1.73	43,9
		13	M4524GBM-SM	SMCG 1-1/4	cULus	1.680	42,7	2.69	68,3	.78	19,8	.30	7,6	2.05	52,1
		21	M3317GBQ-SM	SMCG 1-1/2	cULus	1.920	48,8	2.81	71,4	.76	19,3	.36	9,1	2.48	63,0
		31	M3321GBY-SM	SMCG 2	cULus	2.400	60,8	2.92	74,2	.79	20,1	.42	10,7	2.73	69,3
5,6	USE-2	3	M3200GAH-SM	SMCG LL 1/2	UL/CSA	.875	22,2	1.68	42,7	.44	11,2	.25	6,4	1.06	27,0
7,7	PV 1000 or USE-2**	3	M3234GBS-SM	SMCG 3/4	UL/CSA	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4	1.30	33,0
		5	M8437GBT-SM	SMCG 1	UL/CSA	1.326	33,8	2.41	61,2	.76	19,3	.30	7,6	1.73	43,9
		9	M4524GBW-SM	SMCG 1-1/4	UL/CSA	1.680	42,7	2.69	68,3	.78	19,8	.30	7,6	2.05	52,1
		11	M3317GBZ-SM	SMCG 1-1/2	cULus	1.920	48,8	2.81	71,4	.76	19,3	.36	9,1	2.48	63,0
		19	M3321GBX-SM	SMCG 2	UL/CSA	2.400	60,8	2.92	74,2	.79	20,1	.42	10,7	2.73	69,3
8,9	PV 1000	7	M4524GCJ-SM	SMCG 1-1/4	UL/CSA	1.680	42,7	2.69	68,3	.78	19,8	.30	7,6	2.05	52,1
		9	M3317GCK-SM	SMCG 1-1/2	cULus	1.920	48,8	2.81	71,3	.76	19,3	.36	9,1	2.48	63,0
		12	M3321GCM-SM	SMCG 2	UL/CSA	2.400	60,8	2.93	74,3	.79	20,1	.42	10,7	2.75	69,9
Other Configurations with Approval Potential - Locknuts not included															
6,0	***	2	M3200GAJ	LTCG LL 1/2	-	.875	22,2	1.68	42,7	.44	11,2	.25	6,4	1.06	27,0
		4	M3234GBC	LTCG 3/4	-	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4	1.30	33,0
6,5	***	6	M8437GAL	LTCG 1	-	1.326	33,8	2.41	61,2	.76	19,3	.30	7,6	1.73	43,9
			M4524GAL	LTCG 1-1/4	-	1.680	42,7	2.69	68,3	.78	19,8	.30	7,6	2.05	52,1
7,0	PV 1000	3	M3234GAM	LTCG 3/4	-	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4	1.30	33,0
7,4	PV 1000	2	M3234GAN												

*AWG 10 and 12 for both USE-2 and PV 1000 except 4,5 mm Conductors Recognized for AWG 12 only.

**8 AWG USE-2 Wire

***Depends on actual wire: 10 AWG USE-2 or 12 AWG PV 1000.



Use Heyco Multi-Hole Cordgrips with Heyco Female Threaded Couplings and Heyco-Flex III Tubing to insulate exposed PV wiring when making complete liquid tight connections to solar combiner or inverter enclosures. See page 3-1 for details.

Material	Nylon 6/6 with TPE sealing gland
Certifications	- UL Listed under Underwriters' Laboratories File E51579 - cULus Recognized under the Component Program of Underwriters' Laboratories File E51579 to both Canadian and U.S. requirements - CSA Certified by the Canadian Standards Association File 93876
Flammability Rating	94-V2
Temperature Range	Static -40°F (-40°C) to 239°F (112°C) Dynamic -4°F (-20°C) to 212°F (100°C)
IP Rating	IP 68

MidNite Surge Protection Devices

PART NUMBER	MNSPD-115	MNSPD-300-AC	MNSPD-300-DC	MNSPD-600
Nominal Voltage	0 to 90 VAC 0 to 115 VDC	0 to 250 VAC	0 to 300 VDC	0 to 480 VAC 0 to 600 VDC
MCOV	180V	470V	470V	780V
VPR Line to Ground	600V	1200V	1200V	1800V
Suggested Placement	Up to 90VAC circuits, 12V, 24V, 48VDC battery circuits	120/240 VAC circuits	Off-grid PV combiners Charge controller inputs up to 300VDC	316V/480 VAC circuits Grid-tie PV combiners Grid-tie inverter input Non-Isolated Inverters
Type	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1
Diagnostic Blue LED	MNSPD-300-AC LED indicates when voltage is present between L1 + ground and L2 + ground MNSPD-115, MNSPD-300-DC and MNSPD-600: LED indicates when voltage is present between L1 + L2 (PV+ PV-)			
Thermal Disconnect	Internal Fuse			
Response Time	<1 micro sec.			



Surge Protection You Can Count On!

MidNite Solar Surge Protection Devices are type 1 devices, designed for indoor and outdoor applications. Engineered for both AC and PV DC electrical systems, they provide protection to service panels, load centers or electronic devices that are directly connected to a MidNite Surge Protection Device (SPD).

Compare our SPDs against other surge protection devices. You will see there is no comparison in both our price and features. All our SPDs are made in the USA and have a 5 year warranty.

Model No.	Max Operating Voltage	Surge Current per Phase	Configuration	MCOV	SCCR	VPR 600V/3kA L G
MNSPD-115	100 VAC/150VDC	80kA	1 Ø, 3-wire (2 Legs)	180V L-N	10kA	600V
MNSPD-300-AC	300VAC	80kA	1 Ø, 3-wire (2 Legs)	470V L-N	10kA	1200V
MNSPD-300-DC	385VDC	80kA	1 Ø, 3-wire (2 Legs)	470V L-N	10kA	1200V
MNSPD-600	480VAC/600VDC	80kA	1 Ø, 3-wire (2 Legs)	780V L-N	10kA	1800V

MIDNITE SOLAR INC.

Surge Protection

Surge Protection You Can Count On!

MidNite Solar Surge Protection Devices are type 1 devices, designed for indoor and outdoor applications. Engineered for both AC and PV DC electrical systems, they provide protection to service panels, load centers or electronic devices that are directly connected to a MidNite Surge Protection Device (SPD).

MidNite's SPD's are offered in four models to protect a variety of different voltage ranges. They achieve this protection by clamping surge voltage to a level that your system can sustain without damaging the components of the system.

Compare our SPD's against other surge protection devices. You will see there is no comparison in both our price and features. All our SPD's have a 5 year warranty.

With lightning you only get one chance, so get the best!



MNSPD300ACFM (Cut-in box)
(MNSPD-300-AC included)



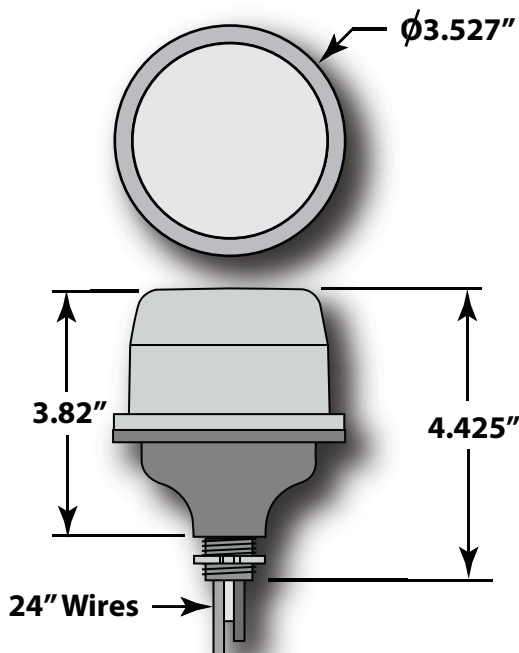
Four Models:

MNSPD-115
MNSPD-300-AC
MNSPD-300-DC
MNSPD-600



MidNite Surge Protection Devices

PART NUMBER	MNSPD-115	MNSPD-300-AC	MNSPD-300-DC	MNSPD-600
Nominal Voltage	0 to 90 VAC 0 to 115 VDC	0 to 250 VAC	0 to 300 VDC	0 to 480 VAC 0 to 600 VDC
MCOV	180V	470V	470V	780V
VPR Line to Ground	600V	1200V	1200V	1800V
Suggested Placement	Up to 90VAC circuits, 12V, 24V, 48VDC battery circuits	120/240 VAC circuits	Off-grid PV combiners Charge controller inputs up to 300VDC	316V/480 VAC circuits Grid-tie PV combiners Grid-tie inverter input Non-Isolated Inverters
Type	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1
Diagnostic Blue LED	MNSPD-300-AC LED indicates when voltage is present between L1 + ground and L2 + ground MNSPD-115, MNSPD-300-DC and MNSPD-600: LED indicates when voltage is present between L1 + L2 (PV+ PV-)			
Thermal Disconnect	Internal Fuse			
Response Time	<1 micro sec.			



Performance

Surge Current Rating per Phase	80kA
Short Circuit Current Rating	10kA

Fusing	Individually fused MOVs
Thermal Fusing	Yes
Over current Fusing	Yes
Operating Frequency	0 to 500 Hz

Mechanical Description

Enclosure	Polycarbonate UL94V-0
Environmental Rating	Type 4X
Connection Method	#12 AWG
Weight	1 lb.
Mounting Method	1/2" Conduit Knockout
Operating Altitude	Sea Level – 12,000' (3,658 Meters)
Storage Temp	-40° F to +185° F (-40° C to +85° C)
Operating Temp	-40° F to +185° F (-40° C to +85° C)

Diagnostics

Blue status LED, one per leg

Listings and Performance

UL Standard for Safety, UL 1449 Surge Protective Devices-Fourth Edition
CSA C22.2 No. 8-M1986 Electromagnetic Interference (EMI) Filters, Fourth Edition

Model No.	Max Operating Voltage	Surge Current per Phase	Configuration	MCOV	SCCR	VPR 600V/3kA L G
MNSPD-115	100 VAC/150VDC	80kA	1 Ø, 3-wire (2 Legs)	180V L-N	10kA	600V
MNSPD-300-AC	300VAC	80kA	1 Ø, 3-wire (2 Legs)	470V L-N	10kA	1200V
MNSPD-300-DC	385VDC	80kA	1 Ø, 3-wire (2 Legs)	470V L-N	10kA	1200V
MNSPD-600	480VAC/600VDC	80kA	1 Ø, 3-wire (2 Legs)	780V L-N	10kA	1800V

Series 187 Marine Rated Circuit Breaker (MRCB)

Manual Reset Circuit Breakers With Switch Function

Specifications

Single Pole Thermal Type Breakers

Applications: Typically used in DC power systems in marine applications (as a main or branch circuit breaker), truck and bus systems, RV systems, add-on protection for accessories, lift gates, etc. This unit is external ignition protected and weatherproof.

Rating: 25-200A, 48Vdc

Interrupt Rating: Main Breaker Protection Interrupt Rating (5,000A@ 14Vdc, 3,000A@ 28Vdc and 1,500A@ 48Vdc).

Operating Temperature Rating: -40°F (-40°C) to 185°F (85°C)

Storage Temperature Rating: -40°F (-40°C) to 260°F (125°C)

Materials: Black UL-rated 94V0 thermoset plastic body. Cover and lever are UL-rated 94V0 thermoplastic

Marking: Standard marking includes amp/volt ratings. Custom markings also available

Termination: 5/16-18 threaded studs

Torque Rating: 75 in-lbs (8.5N•m) max

Mounting Torque Rating: Panel or surface-mount options; 50 in-lbs (5.6 N•m) max

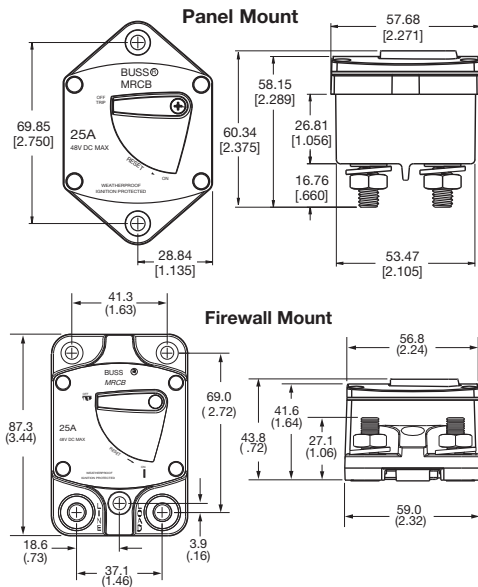
Ingress Protection Rating: IP66

Features / Options: A manual reset circuit breaker with On-Off switch capability

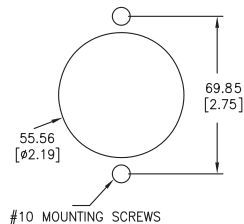
Compliances: ABYC E-11; CE; SAE J1171 (ignition protected)

Consult factory for time characteristic curves.

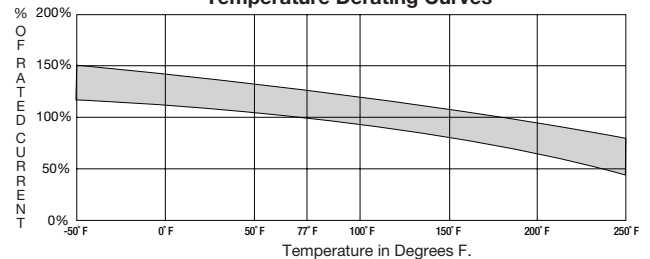
Dimensions - mm(in) (Dims. shown are for reference only. Consult factory for latest prints)



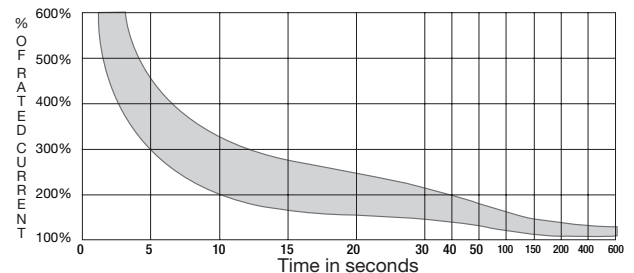
Mounting Template



Temperature Derating Curves



Time vs Percent of Rated Current



Part Numbering System

Series

187

187 - Manual Reset - Switching Style Circuit Breaker

Rating

025

025 - 25 amps
030 - 30 amps
035 - 35 amps
040 - 40 amps
050 - 50 amps
060 - 60 amps
070 - 70 amps
080 - 80 amps
100 - 100 amps
110 - 110 amps
120 - 120 amps
135 - 135 amps
150 - 150 amps
200 - 200 amps

Mounting

F

F - Surface mount
P - Panel mount

Hardware

00

00 - No hardware
03 - Stainless nuts & lockwashers - installed on studs
04 - Stainless nuts & lockwashers - supplied bulk packed

Marking

1

1 - Standard marking; Part Number, Amp Rating
(Consult factory for special marking options.)

COOPER Bussmann

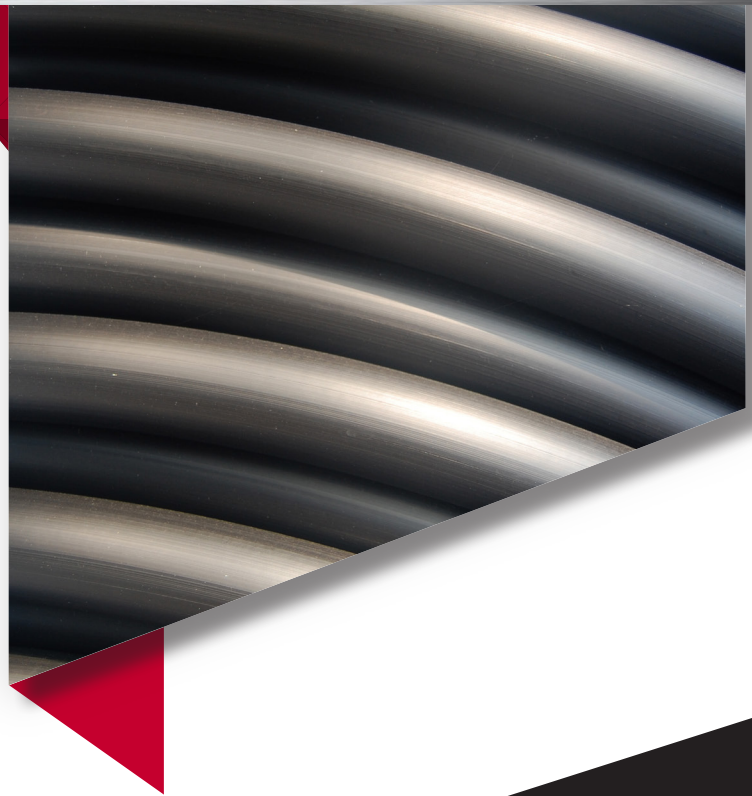
DIRECTTM

MANUFACTURING

All-Flex[®]

All-Flex[®] multipurpose power cable is used in transformers, UPS, switchboard panels, controls, electronic circuits and meters. Applications include battery cable, battery charger cable, motor lead and power hookup cable. Approved for both indoor and outdoor use.

- UL AWM Syles: 1232 - 1283 - 1284 - 1337 - 1338 - 1339 - 10070 - 10269
- MTW & THW
- BC-5W2 Boat Cable
- TEW FT1
- UL1426
- VW 1
- RoHS
- CSA Approved



CONSTRUCTION:

CONDUCTORS

Class K 30 Gauge bare or tinned copper

INSULATION

PVC Jacket

TEMP RANGE

105C° dry 75C° Wet Rated 600V

STOCK SIZES

500' Reels, Custom Sizes and Packaging upon request



Resists
Moisture



Resists
Abrasion



Resists
Acid



Resists
Diesel/Fuel



Resists
Oil



Resists
Weather



Made in
U.S.A.

CABLE OPTIONS



CONSTRUCTION

GAUGE	STRANDING	INSULATION		NOMINAL O.D.		WEIGHT LBS/1000'
		IN	MM	IN	MM	
#6	166/.010	.060	1.52	.305	7.47	106
#4	429/.010	.060	1.52	.350	8.89	160
#2	676/.010	.060	1.52	.419	10.64	241
#1	845/.010	.080	2.03	.490	12.44	315
1/0	1066/.010	.080	2.03	.530	13.46	391
2/0	1339/.010	.080	2.03	.579	14.70	478
3/0	1677/.010	.080	2.03	.632	16.05	594
4/0	2109/.010	.080	2.03	.695	17.85	735
250 MCM	2527/.010	.100	2.54	.793	20.14	884
350 MCM	3478/.010	.100	2.54	.915	23.24	1192
500 MCM	5054/.010	.100	2.54	1.380	35.05	1277



SunGen® XLPE, Photovoltaic Wire 2000 V, UL Type PV or RHW-2 Single Conductor, Copper

SPEC 5851
March, 2016



Product Construction:

Conductor:

- 12 AWG thru 2 AWG bare copper, compressed, Class B or Class C stranding per ASTM B33 and B8
- 1 AWG thru 1000 kcmil bare copper, compressed, Class B stranding per ASTM B33 and B8

Insulation:

- Flame-retardant Cross-linked Polyethylene (XLPE), black

Print:

- GENERAL CABLE® (PLANT OF MFG) SUNGEN® 2000 V PV WIRE DIR BUR OR RHW-2 (SIZE) XLPE 90°C WET OR DRY SUN RES (UL) -40°C VW-1 OR C(UL) 2000 V RPVU90 FT1 MONTH/ YEAR OF MFG SEQUENTIAL FOOTAGE MARK

Options:

- Tinned coated copper
- Other sizes and stranding options available upon request
- Now available in colors
- Available in UL 1685 CT Flame rated ≥ 1 AWG RHW-2



Applications:

- Single conductor, sunlight-resistant, direct burial photovoltaic wire rated 90°C wet or dry, 2000 V for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in Section 690.31(A) and other applicable parts of the National Electrical Code (NEC), NFPA 70

Features:

- Rated 90°C wet and dry
- Rated for direct burial
- Deformation-resistant at high temperatures
- Excellent moisture resistance, exceeds UL 44
- Stable electrical properties over a broad temperature range
- Increased flexibility
- Excellent resistance to crush and compression cuts
- UV/sunlight-resistant
- Meets cold bend and cold impact tests at -40°C

Compliances:

Industry Compliances:

- UL 4703 Type PV, UL File # E343277
- c(UL) CSA C22.2 No. 271 RPVU90 File # E343277
- National Electrical Code (NEC)
- UL 44 Type RHW-2, UL File # E39406

Flame Test Compliances:

- UL 1581 VW-1

Other Compliances:

- EPA 40 CFR, Part 261 for leachable lead content per TCLP
- OSHA Acceptable

Packaging:

- Material cut to length and shipped on non-returnable wood reels

CATALOG NUMBER	COND. SIZE (AWG/kcmil)	NUMBER OF WIRES	NOMINAL COND. O.D.		MINIMUM AVG. INSULATION THICKNESS		NOMINAL CABLE DIAMETER		COPPER WEIGHT		NET WEIGHT	
			INCHES	mm	INCHES	mm	INCHES	mm	LBS/ 1000 FT	kg/km	LBS/ 1000 FT	kg/km

12 AWG - 1000 kcmil CONDUCTORS

5851.711200B	12	19/.0185	0.089	2.25	0.075	1.91	0.239	6.06	20	29	38	55
426400	10	19/.0234	0.112	2.84	0.075	1.91	0.262	6.65	32	47	53	76
426300	8	19/.0295	0.141	3.58	0.085	2.16	0.311	7.90	51	74	79	115
5851.710600B*	6	19/.0372	0.180	4.57	0.085	2.16	0.353	8.95	81	118	115	168
5851.710400B*	4	19/.0469	0.235	5.96	0.085	2.16	0.405	10.27	129	188	169	246
5851.710200B*	2	19/.0591	0.296	7.52	0.085	2.16	0.466	11.84	205	298	253	369
5851.710100B*	1	19/.0664	0.322	8.18	0.105	2.67	0.532	13.51	258	375	323	469
5851.715100B*	1/0	19/.0745	0.362	9.19	0.105	2.67	0.572	14.53	326	474	397	577
5851.715200B*	2/0	19/.0837	0.405	10.29	0.105	2.67	0.615	15.62	411	598	489	712
5851.715300B*	3/0	19/.0940	0.456	11.58	0.105	2.67	0.666	16.92	518	754	605	880
5851.715400B*	4/0	19/.1055	0.512	13.00	0.105	2.67	0.722	18.34	653	950	750	1091
5851.716250B*	250	37/.0822	0.558	14.17	0.120	3.05	0.798	20.27	772	1123	892	1299
5851.716300B*	300	37/.0900	0.611	15.52	0.120	3.05	0.851	21.62	926	1347	1057	1539
5851.716350B*	350	37/.0972	0.661	16.79	0.120	3.05	0.901	22.89	1063	1547	1202	1749
5851.716400B*	400	37/.1040	0.706	17.93	0.120	3.05	0.946	24.03	1235	1797	1383	2012
5851.716500B*	500	37/.1159	0.789	20.04	0.120	3.05	1.029	26.14	1509	2196	1674	2435
5851.716600B*	600	61/.0992	0.866	22.00	0.135	3.43	1.136	28.85	1883	2740	2084	3032
5851.716750B*	750	61/.1109	0.968	24.59	0.135	3.43	1.238	31.45	2316	3370	2540	3696
5851.717000B*	1000	61/.1280	1.117	28.37	0.135	3.43	1.387	35.23	3088	4494	3346	4869

12 AWG - 2 AWG CONDUCTORS

5851.711200B7	12	7/.0305	0.089	2.26	0.075	1.91	0.242	6.15	20	29	38	56
406400	10	7/.0385	0.113	2.87	0.075	1.91	0.266	6.76	32	47	53	77
426600	8	7/.0481	0.142	3.61	0.085	2.16	0.312	7.92	51	74	80	116
5851.710600B7*	6	7/.0612	0.178	4.52	0.085	2.16	0.348	8.84	81	118	115	167
5851.710400B7*	4	7/.0772	0.225	5.72	0.085	2.16	0.395	10.03	129	188	168	244
5851.710200B7*	2	7/.0974	0.283	7.19	0.085	2.16	0.462	11.73	205	298	252	366

12 AWG - 2 AWG CONDUCTORS

5851.7112007	12	7/.0305	0.089	2.26	0.075	1.91	0.242	6.15	20	29	38	56
5851.7111007	10	7/.0385	0.113	2.87	0.075	1.91	0.266	6.76	32	47	53	77
5851.7108007	8	7/.0481	0.142	3.61	0.085	2.16	0.312	7.92	51	74	80	116
5851.7106007*	6	7/.0612	0.178	4.52	0.085	2.16	0.348	8.84	81	118	115	167
5851.7104007*	4	7/.0772	0.225	5.72	0.085	2.16	0.395	10.03	129	188	168	244
5851.7102007*	2	7/.0974	0.283	7.19	0.085	2.16	0.462	11.73	205	298	252	366

Dimensions and weights are nominal; subject to industry tolerances.

* Non-stock item; minimum runs apply. Please contact Customer Service for price and delivery.

Heat Shrink Tube

Use of Heat Shrink Tube Extends Life of Cables & Connectors



Protects Against Corrosion

Heat shrink tube protects battery cables and connectors from corrosive acid fumes near batteries. It also protects against oil, fuel, water, salt, grease, animal acids and other chemicals.

Identifies Positive & Negative Polarity

Use red heat shrink tube on positive cables, black on negative cables. Color coded battery cables are easier to route and to service.

Acts as Strain Relief & Prevents Abrasion

Heat shrink tube acts as a strain relief between the cable and connector. It can also be used where abrasion is a potential cause of failure. Long heavy battery cables can fail because of fatigue caused by vibration.

	MagnaTube™
Material	Polyolefin
Shrink Ratio	3:1
Wall Thickness After Shrinking	1/8"
Water Proof	Yes
Colors	Red & black
Melttable Sealant	Yes
UL Approval	Yes # 486D
Typical Use	Battery connectors – heavy duty
Operating Temperature	-55 C to +110 C -67 F to +230 F

Expanded & shrunk diameters may vary $\pm 15\%$

Heat Shrink MagnaTube

- Premium quality for heavy duty applications or for use in abusive environments requiring protection from abrasion
- Inner surface lined with adhesive sealant which melts when heated; permanently seals connection as tube cools and shrinks
- Conforms to DOD Mil-DTL-23053/15A Class 1 and 2 specifications



MagnaTube				
Expanded Diameter	Shrunk Diameter	Use With	Black	Red
3/8"	1/8"	6 - 8 Ga.	5611B	5612R
1/2"	3/16"	6 - 2 Ga.	5651B	5651R
3/4"	1/4"	4 - 2/0 Ga.	5613B	5614R
1-1/8"	3/8"	1/0 - 250 MCM	5615B	5616R
1-1/2"	1/2"	4/0 - 250 MCM	5617B	5618R
2"	5/8"	250 MCM	5619B	5619R



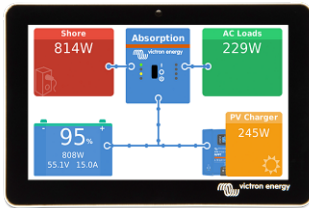
Cerbo GX, Cerbo-S GX and GX Touch



Cerbo GX



Accessories included with the Cerbo GX



GX Touch (optional display for Cerbo GX and Cerbo-S GX)



GX Touch 50 & 70 protective plastic cover (not for the Flush model)

WiFi indicator LED

The Cerbo GX can connect to a WiFi Network

Bluetooth indicator LED

The Cerbo GX can be accessed directly via Bluetooth using the VictronConnect app.

Cerbo GX: communication-centre

This communication-centre allows you to always have perfect control over your system from wherever you are and to maximise its performance. Simply access your system via our Victron Remote Management (VRM) portal, or access it directly, using the optional GX Touch screen, a Multi-Functional Display (MFD) or our VictronConnect app thanks to its Bluetooth capability.

GX Touch: display accessory

The GX Touch 50 and GX Touch 70 series are display accessories for the Cerbo GX. The five inch and seven inch touch screen displays are available in two versions: top/wall (GX Touch 50 and 70) or flush mount (GX Touch 50 and 70 Flush). They give an instant overview of your system and allows you to adjust settings. Simply connect the display to the Cerbo GX with just one cable. The GX Touch displays have a waterproof design and are simple to install. The supplied (from serial number HQ2242 – not for GX Touch Flush) protection cover prevents damage from UV light during prolonged exposure to the sun.

Remote Console on VRM

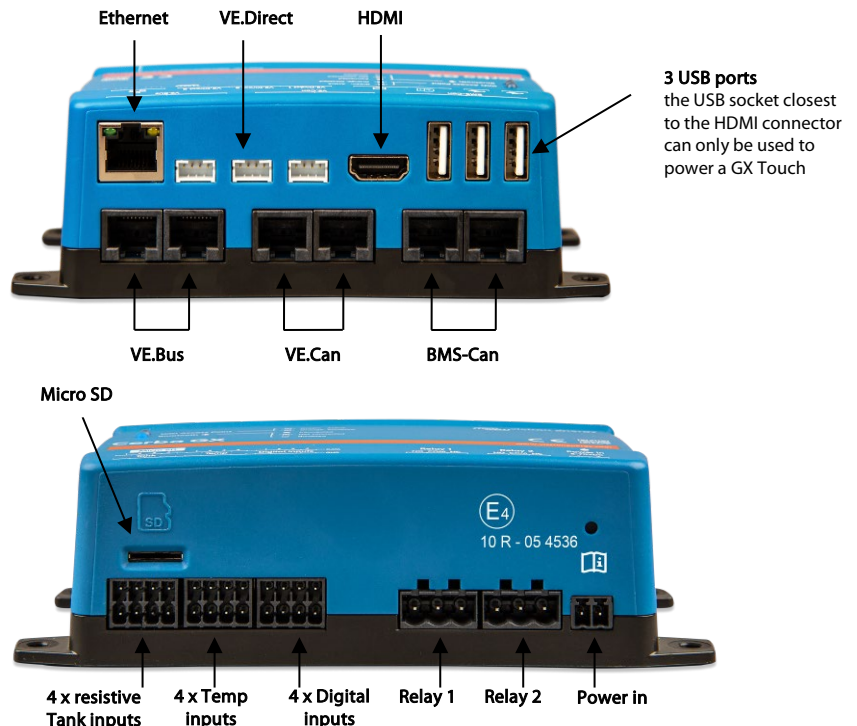
Monitor, control and configure the Cerbo GX remotely, over the internet. Just like if you were standing in front of the device, using Remote Console. The same functionality is also available on the local network LAN, or using the WiFi Access Point of the Cerbo GX.

Perfect monitoring & control

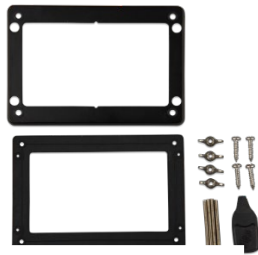
Instantly monitor the battery state of charge, power consumption, power harvest from PV, generator, and mains, or check tank levels and temperature measurements. Easily control the shore power input current limit, (auto)start/stop generator(s) or change any setting to optimise the system. Follow up on alerts, perform diagnostic checks and resolve complications remotely.

Simple mounting and configuration

The Cerbo GX is easily mountable and can also be mounted on a DIN-Rail using the DIN35 adapter small, (not included). Its separate touchscreen can be bolted on a dashboard, eliminating the need to create perfect cut-outs (like with the Color Control GX). Connection is easy via just one cable, taking away the hassle of having to bring many wires to the dashboard. The Bluetooth feature enables a quick connection and configuration via our VictronConnect app.



Cerbo GX, Cerbo-S GX and GX Touch



Accessories included with the GX Touch 50 / 70

Optional accessories for GX Touch 50 / 70 only



GX Touch adapter for CCGX cut-out

This adapter is designed to easily replace the CCGX display with the newer GX Touch 50 or the GX Touch 70. Contents of the packaging are the metal bracket, the plastic bezel, and four mounting screws.



Accessories included with the GX Touch 50 / 70 Flush



Temperature sensor for Quattro, MultiPlus and GX Device (such as the Cerbo GX)



DIN35 adapter small
DIN-Rail adapter to easily mount a device on a DIN-Rail. Suitable for the Cerbo GX.

	Cerbo GX (PN BPP900450100)	Cerbo GX BPP900450110 + BPP900451100	Cerbo-S GX
Supply voltage	8 – 70 VDC		
Power draw without GX Touch	2.8 W @ 12 V		
Power draw with GX Touch	Backlight off: 3.8 W @ 12 V Backlight at max: 4.8 W @ 12 V		
Mounting	Wall or DIN rail (35 mm) ⁽²⁾		
Communication ports			
VE.Direct ports (always isolated)	3 (max. possible VE.Direct devices: 15) ⁽³⁾		
VE.Bus (always isolated)	2 paralleled RJ45 sockets		
VE.Can	Yes - non isolated	Yes VE.Can 1 isolated VE.Can 2 non-isolated	Yes – non-isolated
BMS-Can port	Yes – BMS-Can only	Yes – see VE.Can	No
Bluetooth	Yes ⁽⁴⁾		
Ethernet	10/100 RJ45 socket - isolated except shield ⁽⁷⁾		
WiFi	Built-in		
USB	2 USB Host ports & 1 power only port	3 USB Host ports	2 USB Host ports & 1 power only port
IO			
Resistive tank level inputs	4		0
Temperature sense inputs	4		0
Digital Inputs	4 ⁽⁶⁾		4 ⁽⁶⁾
Relays ⁽⁵⁾	2 x NO/NC DC up to 30 VDC: 6 A DC up to 70 VDC: 1 A AC: 6 A, 125 VAC		
Other			
Outer dimensions (h x w x d)	78 x 154 x 48 mm		
Operating temperature range	-20 to +50 °C		
IP Rating	IP20		
Standards			
Safety	IEC 62368-1		
EMC	EN 301489-1, EN 301489-17		
Automotive	ECE R10-6		
	GX Touch 50 / GX Touch 70		GX Touch 50 Flush / GX Touch 70 Flush
Mounting	Top/wall mount with included mounting accessories		Flush mount or embossed (totally flush)
Protection cover	Included with every GX Touch from serial number HQ2242 Can also be purchased individually: Part # BPP900462050: GX Touch 50 protection cover Part # BPP900462070: GX Touch 70 protection cover		No
Display Resolution	GX Touch 50: 800 x 480GX Touch 70: 1024 x 600		
IP Rating	IP54 (without connectors)		IP65 (when installed with the included rubber gasket)
Outer dimensions (h x w x d)	GX Touch 50: 87 x 128 x 12.4 mm GX Touch 70: 113 x 176 x 13.5 mm GX Touch 50 Flush: 94 x 136 x 12 mm GX Touch 70 Flush: 120 x 184 x 13 mm		
Cable length	2 meter		
Notes			
1.	For more detailed information about the Cerbo GX and the GX Touch, please visit the Victron GX product range page at Victron live: www.victronenergy.com/live/venus-os:start		
2.	DIN rail mounting requires an additional accessory - DIN35 adapter small .		
3.	The listed maximum in above table is the total connected VE.Direct devices such as MPPT Solar Charge controllers. Total means all directly connected devices plus the devices connected over USB. The limit is mostly bound by CPU processing power. Note that there is also a limit to the other type of devices of which often multiple are connected: PV Inverters. Up to three or four three phase inverters can typically be monitored on a CCGX. Higher power CPU devices can monitor more.		
4.	Bluetooth functionality is intended to be used to assist with initial connection and networking configuration. You cannot use Bluetooth to connect to other Victron products (e.g. SmartSolar charge controllers).		
5.	In Cerbo GX hardware there are two relays. Currently, Relay 1 can be used for programming as an alarm relay, generator start/stop, tank pump, temperature-controlled relay or manual operation. Relay 2 is available for programming as a temperature-controlled relay or manual operation in the Relay menu of the GX (requires firmware 2.80 or higher).		
6.	The digital inputs on the Cerbo GX PN BPP900450100 and Cerbo-S GX are not able to do pulse counting.		
7.	On Cerbo GX PN BPP900450110 and BPP900451100, the RJ45 sockets are rotated 180 degrees to make it easier to remove the cable.		

The High-Security Series

HS427-S | HS430-S | HS439-S | HS448-S

Full-Height Turnstile (Single) | Interior & Exterior Application

TURNSTILES.us manufactures the most reliable full-height turnstiles available. The High-Security Series units can be engineered to meet all your security and control requirements, and can be created as stand-alone units, or as part of an integrated system. Available in stainless steel (304 or 316), carbon steel with powder coating, or hot-dipped galvanized finish. These units can be fitted for any application with leading edge technology and features.

Controls and Interfaces:

- Biometric Integration
- Fail-Open or Fail-Secure Locking
- Card Readers
- Push-Button and Wireless Remotes
- Electronic/LCD Counters
- Manual Key Override – both directions
- Indicator Lights



Optional black or safety orange end caps available.



Also available in hot-dipped galvanized or powder coat finishes.



Size Options (pedestrian clearance):

HS427-S: 27" (685.8mm)

HS430-S: 30" (762mm)

HS439-S: 38.5" (978mm)

HS448-S: 49.319" (1252.7mm)

304 Stainless, No. 4 Satin finish (shown)

Optional full canopy available in stainless steel.



Shown (below) HS430-S powder coated turnstile with optional ADA Mesh Gate and custom size Filler Barrier (made to your job's requirements)



Standard powder coating color selections:

Additional colors available and can be quoted upon request.

							
60% Gloss Black	60% Gloss White	RAL 1013 Oyster White	RAL 9007 Grey Aluminum	RAL 5023 Distant Blue	RAL 5010 Gentian Blue	RAL 6002 Leaf Green	RAL 8028 Terra Brown

We're the #1 Choice of Top Architects, Security Pros and Engineers

For more than 30 years, TURNSTILES.us has been the globally trusted name in pedestrian control equipment. Made in the USA and shipped worldwide, we are the first choice of leading architects, facility managers, security consultants, and engineers. Whether your project requires high security full-height turnstiles, waist high units, or matching ADA accessible gates, TURNSTILES.us is the secure choice. We're experienced in access control systems, from card readers to biometric scanning, to give you the power to control access.

	Depth	Width	Passage Width	Passage Height	Overall Height
	A*	B*	C*	D*	E*
HS427-S	57.375" (1457.3mm)	62" (1574.8mm)	27" (685.8mm)	84" (2133.6mm)	91" (2311.4mm)
HS430-S	59.250" (1505mm)	66" (1676.4mm)	30" (762mm)	84" (2133.6mm)	91" (2311.4mm)
HS439-S	76" (1930.4mm)	84" (2133.6mm)	38.5" (978mm)	84" (2133.6mm)	91" (2311.4mm)
HS448-S	96.187" (2443.1mm)	106" (2692.4mm)	49.319" (1252.7mm)	84" (2133.6mm)	91" (2311.4mm)

The High-Security Series

HS427-S | HS430-S | HS439-S | HS448-S

Full-Height Turnstile (Single) | Interior & Exterior Application

Applications:

Ideal for controlling orderly flow of foot traffic in both indoor and outdoor settings

Design & Construction:

- Designed for secure operation with aesthetics in mind
- Featuring fully welded exterior components
- Minimal exposed stainless steel hardware
- Heavy gauge materials meeting ASTM standards

Dimensions:

HS427-S

- Pedestrian Clearance: 27" (685.8mm)
- Width: 62" (1574.8mm)
- Depth: 57.375" (1457.3mm)

HS430-S

- Pedestrian Clearance: 30" (762mm)
- Width: 66" (1676.4mm)
- Depth: 59.250" (1505mm)

Arm & Barrier Tubing Sizes (HS427-S & HS430-S):

- Standard: 1 1/2" (38.1mm) diameter 14 gauge
- Optional: 1 3/4" (44.4mm) diameter 14 gauge (16 gauge - Stainless Steel models)

HS439-S

- Pedestrian Clearance: 38.5" (978mm)
- Width: 84" (2133.6mm)
- Depth: 76" (1930.4mm)

HS448-S

- Pedestrian Clearance: 49.319" (1252.7mm)
- Width: 106" (2692.4mm)
- Depth: 96.187" (2443.1mm)

Arm & Barrier Tubing Sizes (HS439-S & HS448-S):

- Standard: 1 3/4" (44.4mm) diameter 14 gauge

All Models:

- Overall Exterior Height: 91" (2311.4mm)
- Passage Height: 84" (2133.6mm)
- Removal of Cover: Minimum of 4" needed

* Dimensions are subject to change without notice

Available Finishes:

- Hot dipped galvanized carbon steel
- Carbon steel with powder coating (standard color is black/ other colors available upon request)
- Our signature 304 stainless steel, No. 4 satin finish, or 316 stainless

Operation Features

6500 Series Control Head:

- Auto-indexing (self-centering) with adjustable hydraulic shock suppression
- Hardened tool steel locking bars, cam and roller assemblies
- Permanently lubricated bearings
- Your choice of manual or electronic control on both directions
- Nearly universal integration to any number of access control systems
- Your choice on each electronic direction of locking or unlocking on power failure

Options:

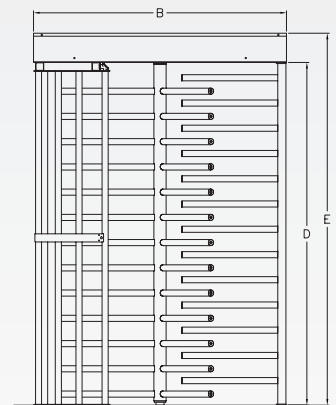
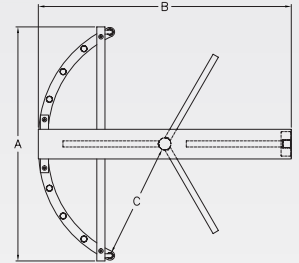
- Card reader mounting plates
- Daylight visible indicator lights
- Bi-directional key overrides
- Lockout bar (padlock not included)
- Decorative arm caps
- Stainless steel overhead full canopy
- Half canopy (covers passageway)
- 8 digit key resettable LCD counter with seven year lithium battery
- Cold weather package, including thermostat controlled heater and insulated mainframe
- Push button and wireless remotes
- Heel guard arm covers
- Additional options available upon request

Warranty:

Units are warranted against defects in materials and workmanship for a period of one year from date of delivery. See warranty information for specific details.

Matching Swing Gate available:

(see model HS336 and model HS348 Manual Passage Gate information)



* Dimensions are approximate based on chart on reverse side

Electrical Specifications:

Input Voltage: 100-240 VAC
 Input Current: 1.3 - .55 A
 Frequency: 50/60 Hz

Storage Temperature: -40 to 158°F
 Operating Temperature: -4 to 131°F
 (Cold weather package available)

Operating Voltage: 24VDC
 Operating Current: 1.2 A (typical)

Standards and Codes:

Austenitic stainless steel:
 ASTM A240, A249, A276

Hot rolled steel:
 AISI C-1020, AISI C-1018

Hot dipped galvanizing:
 ASTM A-143, ASTM A-153-80

All fasteners provided meet IFI ANSI/
 ASME Fastener Standards

American Welding Society (AWS)
 Standard D 1.1



The 6500 Series Control Head is certified to conform to the following standards:
 UL 294, UL 325, UL Subject 2593,
 CAN/ULC S319 & CSA C22.2#247



Advantage International Registrar
 is an ISO 9001:2015 company

The High-Security Series

Manual or Electronic Passage Gate | Interior & Exterior Application

HS336-ADA | HS348-ADA



HS336 (stainless steel)

* All models available in stainless steel, powder coat or galvanized.

The Truly "Custom" ADA Gate:

Our HS336-ADA is our ADA solution to perimeter security. This self-closing, heavy duty swing gate provides a wheelchair accessible 36" passage width (with an overall width of 43.375"), or the HS348 (with an overall width of 55.375"). It's low voltage strike lock can be used mechanically or electronically depending on your needs. It features our hinging system that only requires 5ft. pounds of opening force. It is available in all of our standard finishes including stainless steel (304 or 316), carbon steel with powder coating, or hot-dipped galvanized, to match our turnstiles perfectly. Your choice of standard vertical bars or reach prevention mesh allows for a custom experience. A treadplate walkway adds additional rigidity and helps in preventing installation mishaps.



Panic hardware, guard and mesh should be used for Free Exit situations.

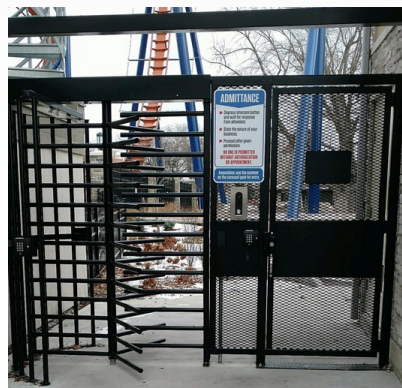
Panic bar not available without mesh.



HS336 - Front
(powder coat
with mesh)



HS336 - Back
(stainless steel
with mesh)



HS430 with mesh filler barrier and
HS336-ADA mesh gate.



HS348-ADA galvanized
gate and turnstile

We're the #1 Choice of Top Architects, Security Pros and Engineers

For more than 30 years, TURNSTILES.us has been the globally trusted name in pedestrian control equipment. Made in Ohio and shipped worldwide, we are the first choice of leading architects, facility managers, security consultants, and engineers. Whether your project requires high security full-height turnstiles, waist high units, or matching ADA accessible gates, TURNSTILES.us is the secure choice. We're experienced in access control systems, from card readers to biometric scanning, to give you the power to control access.



Standard powder coating color selections:

Additional colors available and can be quoted upon request.

							
Geiger Black II 60% Gloss (aka Vulcan Black)	RAL 9003 Signal White	RAL 1013 Oyster White	RAL 9007 Grey Aluminum	RAL 5023 Distant Blue	RAL 5010 Gentian Blue	RAL 6002 Leaf Green	RAL 8028 Terra Brown

The High-Security Series

HS336-ADA | HS348-ADA

Manual or Electronic Passage Gate | Interior & Exterior Application



Applications:

Ideal for controlling orderly flow of foot traffic in both indoor and outdoor settings (matching gate to our High-Security Full-Height Single and Tandem Turnstiles)

Available Finishes:

- Hot dipped galvanized carbon steel
- Carbon steel with powder coating
(standard color is black/ other colors available upon request)
- Our signature 304 stainless steel, No. 4 satin finish
- For any **outdoor** or **wet indoor** application, you must order Galvanized, **PC OVER GALV**, or stainless (preferably 316). We do not warranty any "PC only" product that is placed in wet environments.

Design & Construction:

- Designed for secure operation with aesthetics in mind
- Featuring fully welded exterior components
- Minimal exposed hardware
- Heavy gauge materials meeting ASTM standards

Installation Methods:

- Core drilling of frame posts (preferred)
- 1/2" concrete anchors from tread plate (requires removing core legs from frame)

Operation:

- Field reversible electronic strike (24VDC) can be set to lock or open on power failure
- Gate can also be unlocked with no power by configuring the strike fail lock and using a key
- Gate automatically swings closed with standard hydraulic door closer
- Voltage for electronic strike can be taken from nearby turnstile power supply
- Opening force: 5ft. lbs.

Options:

- Panic bar (-ms only)
- Magnetic lock (replaces strike)
- Motorized gate opener for interior applications only (requires 110VAC, adds 3" to overall height of gate)
- Push buttons (wired or wireless)
- Variable passage widths (up to 40"); or you can choose our 48" option
- Additional options available upon request

Dimensions:

HS336-ADA/HS348-ADA

Size of opening (pedestrian clearance):

- HS336-ADA 36" (914.4mm)
- HS348-ADA 48" (1219.2mm)

Frame:

- 2" X 3" (50.8mm X 76.2mm) 11 gauge box tubing

Swing Gate:

- 2" X 2" (50.8mm X 50.8mm) 11 gauge box tubing

Exterior Height:

- 91" (2311.4mm)

Interior Height:

- 87.812" (2230.4mm)

Available Door Filler Materials:

- 1 1/2" Diameter 14 gauge (38.1mm)
- 1 3/4" Diameter 14 gauge (44.4mm) (HD Model) (16 gauge on stainless models)
- 3/4" #9 Expanded Metal Mesh (Flattened) (MS-Mesh Model)

* Dimensions are subject to change without notice

Standard Hardware:

Door Closer:

- Locinox Mammoth 180

Deadlatch:

- Adams Rite 4510 Series with 31/32" Backset

Strike:

- Adams Rite 7100 Series Electronic Strike, 24VDC

Cylinder:

- Schlage C keyway - standard
- SFIC available

Optional Hardware:

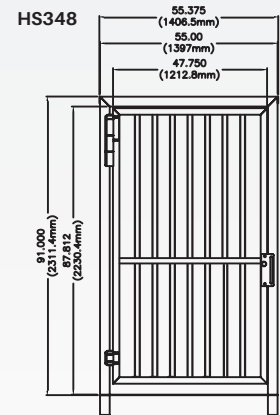
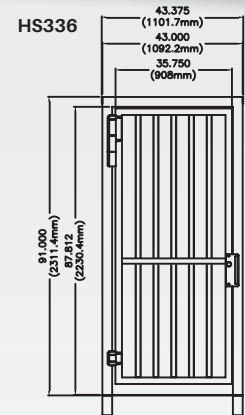
Door Opener:

- Norton 5730 Low Energy Operator, Aluminum

Push to Exit Panic Bar:

- Adams Rite 8400 Exit Device, Aluminum
- We can source additional custom hardware choices. Please provide your required specs for a quotation.

Matching Full-Height Turnstiles Available in Single (HS427-S, HS430-S, HS439-S, HS448-S) and Tandem (HS427-T, HS430-T) Designs.



Warranty:

Units are warranted against defects in materials and workmanship for a period of one year from date of delivery. See warranty information for specific details.

Electrical Specifications:

UL Listed Electronic Strike:
Input Voltage: 24VDC
Input Current: 170 mA

Standards and Codes:

Austenitic stainless steel:
ASTM A240, A249, A276

Hot rolled steel:
AISI C-1020, AISI C-1018

Hot dipped galvanizing:
ASTM A-143, ASTM A-153-80

All fasteners provided meet IFI ANSI/
ASME Fastener Standards

American Welding Society (AWS)
Standard D 1.1



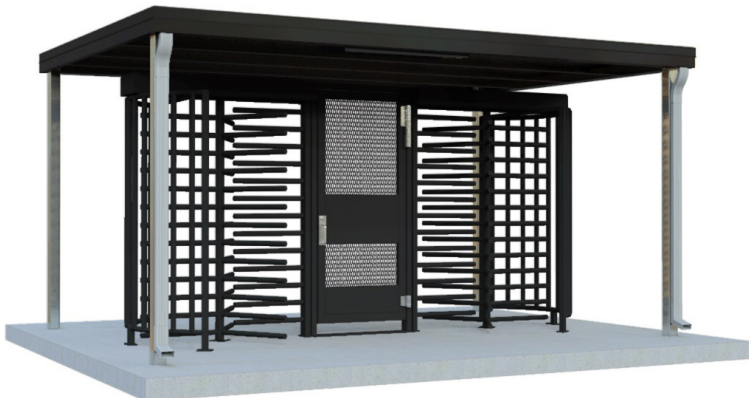
Turnstile Canopy Shelters

www.TURNSTILES.us offers a complete line of extruded & roll formed canopies & walkway covers.

Extruded systems are available in both painted & anodized finishes to harmonize with the widest range of architectural designs. Roll formed components are manufactured from only the highest quality, tested materials. Roll formed canopies are an economical alternative to extruded covers.

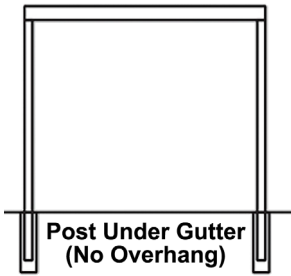
Canopies are available in several configurations, and we offer options to add enclosed walls, partitions, doors, and more.

Detailed shop drawings, bearing the seal of a Registered Engineer, are provided when required.

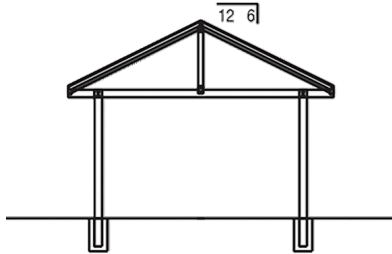


CONFIGURATIONS

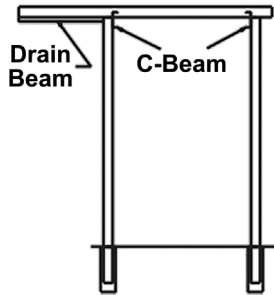
STANDARD



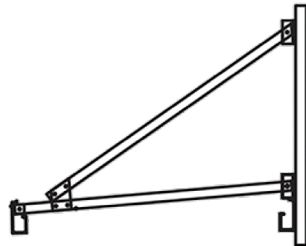
GABLE CANOPY



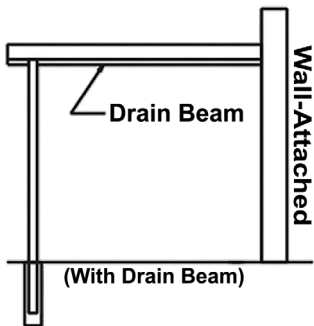
BUS CANOPY



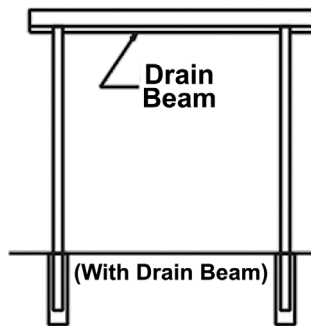
OVERHEAD SUPPORT



SINGLE OVERHANG



DOUBLE OVERHANG

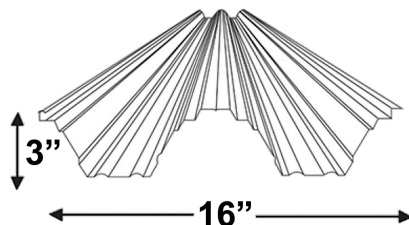


SERVICE, QUALITY & VALUE

ROLL FORMED DECKING / PANELS

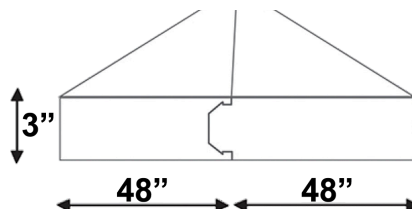
16" x 3" W-PAN

Roll formed aluminum W-Pans provide maximum coverage per dollar. Available in .025 & .032 metal thickness for spans to 14'1" at 20 p.s.f. live load, & L/60 deflection.



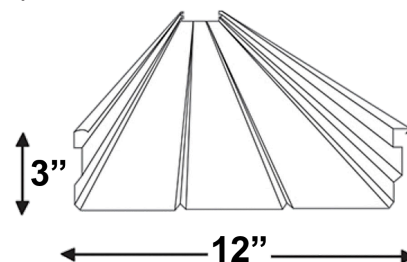
INSULATED ROOF PANEL

Stucco embossed .024 aluminum skin laminated to expanded polystyrene core for 2", 3", 4" or 6" thick panels.



12" x 3" FLAT PAN

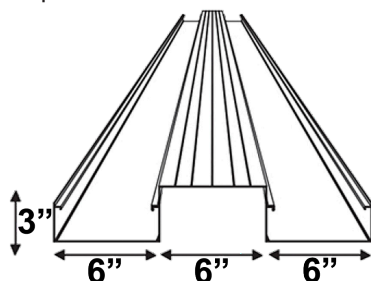
Roll formed aluminum Flat Pans provide smooth underside. Available in .025 & .032 metal thickness for spans to 12'1" at 20 p.s.f. live load, & L/60 deflection.



EXTRUDED DECKING

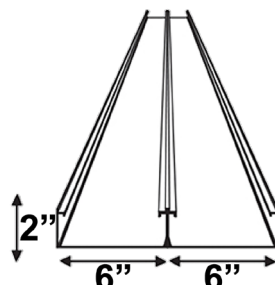
ECONO DECKING

.062 6063-T6 extruded aluminum decking sections offer maximum economy for spans to 14'8" at 20 p.s.f. live load L/60 deflection.



.062 FLUSH DECKING - 2"

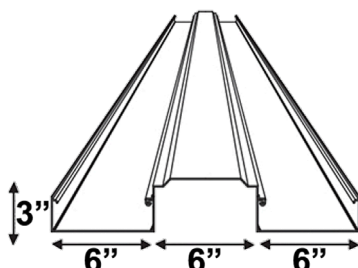
.062 6063-T6 extruded aluminum decking sections offer maximum economy for spans to 14'8" at 20 p.s.f. live load L/60 deflection.



LONG SPAN DECKING

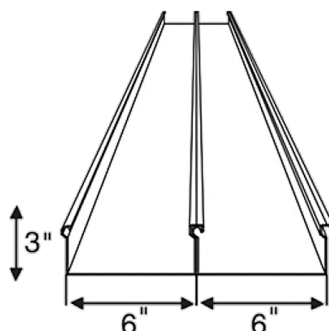
.075 6063-T6 extruded aluminum decking sections allow increased column of bent spacing for spans to 20'0" at 20 p.s.f. live load, limiting deflection to L/60.

Ref: #95131 Compliance Report



.078 FLUSH DECKING - 3"

.078 6063-T6 extruded aluminum decking sections provide smooth underside to decking system for spans to 14'9" at 20 p.s.f. live load & L/60 deflection.



STRUCTURAL COMPONENTS



6" x 3" x .050
Rollformed
Aluminum
Fascia/Gutter



7" x 3" x .094
Extruded
Aluminum
Fascia/Gutter



8" x 4" x .125
Extruded
Aluminum
Fascia/Gutter

Application Drawings
available upon request.

Canopies are fully engineered to comply
with all building codes.

Specifications subject to
change without notice.
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Thank You!

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COMPANY BRIEF

www.TURNSTILES.us, Inc.
Small Business

CAGE: 36SD8
GSA: GS 07F 9239S
DUNS: 181428611
NAICS: 238990
SIC: 1799

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TURNSTILES.us is a professional organization specializing in the physical and electronic securing of building entrances with Turnstiles, Mantraps, EntraPASS Access Control Hardware, and Software since 1989. We are a U.S. Federal Government Contract Holder and are registered with the U.S. Federal Government System for Award Management.

TURNSTILES.us headquarters is located in the Rocky Mountain Region of Colorado. Our team of engineers and sales professionals are strategically located across the United States to enable us to address our clientele. Our expert project team offers turnkey solutions for commercial public sector and private markets including access control system analysis, design, installation, and implementation, and raises the bar for the highest standards in the turnstile security industry.

