Amendment No. 1
To
Contract No. NA170000019
For
PosiCharge Fast Charging Station - Service and Repair
Between
Binnacle, LLC
and the
City of Austin

1.0 The City hereby exercises this extension option for the subject contract. This extension option will be November 11, 2019 through November 10, 2020. One option will remain.

2.0 The total contract amount is increased by $26,000.00 by this extension period. The total contract authorization is recapped below:

Action	Action Amount	Total Contract Amount
Initial Term: 11/14/2016 – 11/13/2019	$78,000.00	$78,000.00
Amendment No. 1: Option 1 – Extension 11/14/2019 -11/13/2020	$26,000.00	$104,000.00

3.0 MBE/WBE goals do not apply to this contract.

4.0 By signing this Amendment the Contractor certifies that the vendor and its principals are not currently suspended or debarred from doing business with the Federal Government, as indicated by the GSA List of Parties Excluded from Federal Procurement and Non-Procurement Programs, the State of Texas, or the City of Austin.

5.0 All other terms and conditions remain the same.

BY THE SIGNATURES affixed below, this amendment is hereby incorporated into and made a part of the above-referenced contract.

Sign/Date: Daniel Pinch 10/22/2019

Printed Name: Daniel Pinch
Authorized Representative

Binnacle, LLC
8204 Northeast Parkway, Suite #109
North Richmond Hills, Texas 76182
(817) 807-1737
danp@binnacle.co

Sign/Date: 10-23-19

Matthew Duree
Procurement Manager

City of Austin
Purchasing Office
124 W. 8th Street, Ste. 310
Austin, Texas 78701

CONTRACT BETWEEN THE CITY OF AUSTIN ("City")
AND
Binnacle, LLC ("Contractor")
for
PosiCharge Fast Charging Stations-Service and Repair
Contract Number: NA170000019

The City accepts the Contractor's Offer (as referenced in Section 1.1.3 below) for the above requirement and enters into the following Contract.

This Contract is between Binnacle, LLC having offices at 8200 Northeast Parkway, Suite 101, North Richland Hills, TX 76182 and the City, a home-rule municipality incorporated by the State of Texas, and is effective as of the date executed by the City ("Effective Date").

Capitalized terms used but not defined herein have the meanings given them in Solicitation Number Invitation for Bid, MLM0040.

1.1 **This Contract is composed of the following documents:**

1.1.1 This Contract

1.1.2 The City's Solicitation, Invitation for Bid, MLM0040 including all documents incorporated by reference

1.1.3 Binnacle, LLC's Offer, dated October 8, 2016, including subsequent clarifications

1.2 **Order of Precedence**. Any inconsistency or conflict in the Contract documents shall be resolved by giving precedence in the following order:

1.2.1 This Contract

1.2.2 The City's Solicitation as referenced in Section 1.1.2, including all documents incorporated by reference

1.2.3 The Contractor's Offer as referenced in Section 1.1.3, including subsequent clarifications.

1.3 **Term of Contract.** The Contract will be in effect for an initial term of thirty-six (36) months and may be extended thereafter for up to two (2) additional twelve (12) month periods, subject to the approval of the Contractor and the City Purchasing Officer or his designee. See the Term of Contract provision in Section 0400 for additional Contract requirements.

1.4 **Compensation**. The Contractor shall be paid a total Not-to-Exceed amount of $78,000 for the initial Contract term and $26,000 for each extension option as indicated in the Bid Sheet, IFB Section 0600. Payment shall be made upon successful completion of services or delivery of goods as outlined in each individual Delivery Order.

1.5 **Quantity of Work.** There is no guaranteed quantity of work for the period of the Contract and there are no minimum order quantities. Work will be on an as needed basis as specified by the City for each Delivery Order

This Contract (including any Exhibits) constitutes the entire agreement of the parties regarding the subject matter of this Contract and supersedes all prior and contemporaneous agreements and understandings, whether written or oral, relating to such subject matter. This Contract may be altered, amended, or modified only by a written instrument signed by the duly authorized representatives of both parties.

In witness whereof, the parties have caused a duly authorized representative to execute this Contract on the date set forth below.

BINNACLE, LLC	**CITY OF AUSTIN**
Daniel Pinch	Monica McClure
Printed Name of Authorized Person	Printed Name of Authorized Person
Signature	Signature
President	Corporate Contract Administrator
Title:	Title:
11/14/16	November 14, 2016
Date:	Date:

CITY OF AUSTIN, TEXAS
Purchasing Office
INVITATION FOR BID (IFB)
OFFER SHEET

SOLICITATION NO: IFB MLM0040

DATE ISSUED: October 3, 2016

REQUISITION NO.: RQM16081200632

COMMODITY CODE: 9108250

FOR CONTRACTUAL AND TECHNICAL ISSUES CONTACT THE FOLLOWING AUTHORIZED CONTACT PERSON:

COMMODITY/SERVICE DESCRIPTION: PosiCharge Fast Charging Stations-Services and Repair

BID DUE PRIOR TO: October 25, 2016 at 2:00 PM Local Time

BID OPENING TIME AND DATE: October 25, 2015 at 2:15 PM Local Time

LOCATION: MUNICIPAL BUILDING, 124 W 8th STREET RM 308, AUSTIN, TEXAS 78701

Primary Point of Contact
Monica L. McClure
Corporate Contract Administrator
Phone: (512) 974-1714
E-Mail: Monica.McClure@austintexas.gov

Secondary Point of Contact
Jonathan Dalchau
Senior Buyer Specialist
Phone: (512) 974-2938
E-Mail: Jonathan.Dalchau@austintexas.gov

LIVE BID OPENING ONLINE:

For information on how to attend the Bid Opening online, please select this link:

http://www.austintexas.gov/department/bid-opening-webinars

When submitting a sealed Offer and/or Compliance Plan, use the proper address for the type of service desired, as shown below:

Address for US Mail (Only)	Address for Fedex, UPS, Hand Delivery or Courier Service
City of Austin	City of Austin, Municipal Building
Purchasing Office-Response Enclosed for Solicitation # IFB MLM0040	Purchasing Office-Response Enclosed for Solicitation # IFB MLM0040
P.O. Box 1088	124 W 8th Street, Rm 308
Austin, Texas 78767-8845	Austin, Texas 78701
	Reception Phone: (512) 974-2500

NOTE: Offers must be received and time stamped in the Purchasing Office prior to the Due Date and Time. It is the responsibility of the Offeror to ensure that their Offer arrives at the receptionist's desk in the Purchasing Office prior to the time and date indicated. Arrival at the City's mailroom, mail terminal, or post office box will not constitute the Offer arriving on time. See Section 0200 for additional solicitation instructions.

All Offers (including Compliance Plans) that are not submitted in a sealed envelope or container will not be considered.

The Vendor agrees, if this Offer is accepted within 120 calendar days after the Due Date, to fully comply in strict accordance with the Solicitation, specifications and provisions attached thereto for the amounts shown on the accompanying Offer.

SUBMIT 1 ORIGINAL, AND 1 ELECTRONIC COPY OF YOUR RESPONSE

*****SIGNATURE FOR SUBMITTAL REQUIRED ON PAGE 3 OF THIS DOCUMENT*****

This solicitation is comprised of the following required sections. Please ensure to carefully read each section including those incorporated by reference. By signing this document, you are agreeing to all the items contained herein and will be bound to all terms.

SECTION NO.	TITLE	PAGES
0100	STANDARD PURCHASE DEFINITIONS	*
0200	STANDARD SOLICITATION INSTRUCTIONS	*
0300	STANDARD PURCHASE TERMS AND CONDITIONS	*
0400	SUPPLEMENTAL PURCHASE PROVISIONS	6
0500	SPECIFICATION	6
0600	BID SHEET – Must be completed and returned with Offer	1
0605	LOCAL BUSINESS PRESENCE IDENTIFICATION FORM – Complete & return	2
0700	REFERENCE SHEET – Complete and return if required	2
0800	NON-DISCRIMINATION CERTIFICATION	*
0805	NON-SUSPENSION OR DEBARMENT CERTIFICATION	*
0810	NON-COLLUSION, NON-CONFLICT OF INTEREST, AND ANTI-LOBBYING CERTIFICATION	*
0835	NONRESIDENT BIDDER PROVISIONS – Complete & return	1
0900	MBE/WBE PROCUREMENT PROGRAM PACKAGE NO GOALS FORM – Complete & return	2

*** Documents are hereby incorporated into this Solicitation by reference, with the same force and effect as if they were incorporated in full text. The full text versions of the * Sections are available on the Internet at the following online address:**

http://www.austintexas.gov/financeonline/vendor_connection/index.cfm#STANDARDBIDDOCUMENTS

If you do not have access to the Internet, you may obtain a copy of these Sections from the City of Austin Purchasing Office located in the Municipal Building, 124 West 8th Street, Room #308 Austin, Texas 78701; phone (512) 974-2500. Please have the Solicitation number available so that the staff can select the proper documents. These documents can be mailed, expressed mailed, or faxed to you.

INTERESTED PARTIES DISCLOSURE

In addition, Section 2252.908 of the Texas Government Code requires the successful offeror to complete a Form 1295 "Certificate of Interested Parties" that is signed and notarized for a contract award requiring council authorization. The "Certificate of Interested Parties" form must be completed on the Texas Ethics Commission website, printed, signed and submitted to the City by the authorized agent of the Business Entity with acknowledgment that disclosure is made under oath and under penalty of perjury prior to final contract execution.

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

The undersigned, by his/her signature, represents that he/she is submitting a binding offer and is authorized to bind the respondent to fully comply with the solicitation document contained herein. The Respondent, by submitting and signing below, acknowledges that he/she has received and read the entire document packet sections defined above including all documents incorporated by reference, and agrees to be bound by the terms therein.

Company Name: Binnacle, LLC

Company Address: 8200 Northeast Parkway, Ste #101

City, State, Zip: North Richland Hills, Texas 76182

Federal Tax ID No. [redacted]

Printed Name of Officer or Authorized Representative: Daniel Pinch

Title: President

Signature of Officer or Authorized Representative: [signature]

Date: 10-8-16

Email Address: danp@binnacle.co

Phone Number: 817-807-1737

*** Completed Bid Sheet, section 0600 must be submitted with this Offer Sheet to be considered for award**

CITY OF AUSTIN
PURCHASING OFFICE
SUPPLEMENTAL PURCHASE PROVISIONS
SOLICITATION NUMBER: IFB MLM0040

The following Supplemental Purchasing Provisions apply to this solicitation:

1. **EXPLANATIONS OR CLARIFICATIONS:** (reference paragraph 5 in Section 0200)

   All requests for explanations or clarifications must be submitted in writing to the Purchasing Office by October 10, 2016. Submissions may be made via email to Monica.McClure@austintexas.gov, or via fax at: 512-974-2388.

2. **INSURANCE:** Insurance is required for this solicitation.

   A. **General Requirements:** See Section 0300, Standard Purchase Terms and Conditions, paragraph 32, entitled Insurance, for general insurance requirements.

      i. The Contractor shall provide a Certificate of Insurance as verification of coverage's required below to the City at the below address prior to contract execution and within 14 calendar days after written request from the City. Failure to provide the required Certificate of Insurance may subject the Offer to disqualification from consideration for award
      ii. The Contractor shall not commence work until the required insurance is obtained and until such insurance has been reviewed by the City. Approval of insurance by the City shall not relieve or decrease the liability of the Contractor hereunder and shall not be construed to be a limitation of liability on the part of the Contractor.
      iii. The Contractor must also forward a Certificate of Insurance to the City whenever a previously identified policy period has expired, or an extension option or holdover period is exercised, as verification of continuing coverage.
      iv. The Certificate of Insurance, and updates, shall be mailed to the following address:

      City of Austin Purchasing Office
      P. O. Box 1088
      Austin, Texas 78767

   B. **Specific Coverage Requirements:** The Contractor shall at a minimum carry insurance in the types and amounts indicated below for the duration of the Contract, including extension options and hold over periods, and during any warranty period. These insurance coverage's are required minimums and are not intended to limit the responsibility or liability of the Contractor.

      i. **Worker's Compensation and Employers' Liability Insurance:** Coverage shall be consistent with statutory benefits outlined in the Texas Worker's Compensation Act (Section 401). The minimum policy limits for Employer's Liability are $100,000 bodily injury each accident, $500,000 bodily injury by disease policy limit and $100,000 bodily injury by disease each employee.
         (1) The Contractor's policy shall apply to the State of Texas and include these endorsements in favor of the City of Austin:
            (a) Waiver of Subrogation, Form WC420304, or equivalent coverage
            (b) Thirty (30) day's Notice of Cancellation, Form WC420601, or equivalent coverage

      ii. **Commercial General Liability Insurance:** The minimum bodily injury and property damage per occurrence are $5,000,000 for coverage's A (Bodily Injury and Property Damage) and B (Personal and Advertising Injury).
         (1) The policy shall contain the following provisions:
            (a) Contractual liability coverage for liability assumed under the Contract and all other Contracts related to the project.
            (b) Contractor/Subcontracted Work.
            (c) Products/Completed Operations Liability for the duration of the warranty period.
            (d) If the project involves digging or drilling provisions must be included that provide Explosion, Collapse, and/or Underground Coverage.
         (2) The policy shall also include these endorsements in favor of the City of Austin:
            (a) Waiver of Subrogation, Endorsement CG 2404, or equivalent coverage

(b) Thirty (30) day's Notice of Cancellation, Endorsement CG 0205, or equivalent coverage
(c) The City of Austin listed as an additional insured, Endorsement CG 2010, or equivalent coverage

iii. **Business Automobile Liability Insurance:** The Contractor shall provide coverage for all owned, non-owned and hired vehicles with a minimum combined single limit of $5,000,000 per occurrence for bodily injury and property damage. Alternate acceptable limits are $2,500,000 bodily injury per person, $2,500,000 bodily injury per occurrence and at least $500,000 property damage liability per accident.
(1) The policy shall include these endorsements in favor of the City of Austin:
(a) Waiver of Subrogation, Endorsement CA0444, or equivalent coverage
(b) Thirty (30) day's Notice of Cancellation, Endorsement CA0244, or equivalent coverage
(c) The City of Austin listed as an additional insured, Endorsement CA2048, or equivalent coverage.

C. **Endorsements:** The specific insurance coverage endorsements specified above, or their equivalents must be provided. In the event that endorsements, which are the equivalent of the required coverage, are proposed to be substituted for the required coverage, copies of the equivalent endorsements must be provided for the City's review and approval.

3. **TERM OF CONTRACT:**

A. The Contract shall be in effect for an initial term of 36 months and may be extended thereafter for up to two (2) additional 12 month periods, subject to the approval of the Contractor and the City Purchasing Officer or his designee.

B. Upon expiration of the initial term or period of extension, the Contractor agrees to hold over under the terms and conditions of this agreement for such a period of time as is reasonably necessary to re-solicit and/or complete the project (not to exceed 120 days unless mutually agreed on in writing).

C. Upon written notice to the Contractor from the City's Purchasing Officer or his designee and acceptance of the Contractor, the term of this contract shall be extended on the same terms and conditions for an additional period as indicated in paragraph A above.

D. Prices are firm and fixed for the first twelve (12) months. Thereafter, price changes are subject to the Economic Price Adjustment provisions of this Contract.

4. **QUANTITIES:** The quantities listed herein are estimates for the period of the Contract. The City reserves the right to purchase more or less of these quantities as may be required during the Contract term. Quantities will be as needed and specified by the City for each order. Unless specified in the solicitation, there are no minimum order quantities.

5. **DELIVERY REQUIREMENTS:**

Location:
Austin-Bergstrom International Airport
3600 Presidential Blvd
Austin, Texas 78719-2301

A. The Contractor shall provide, with each delivery, a Shipping or Delivery Ticket showing the description of each item, quantity, and unit price.

B. The Contractor shall confirm the quantity to be shipped on all orders within two (2) hours of notification by phone from the City.

C. Unless requested by the City, deliveries shall not be made on City-recognized legal holidays (see paragraph 51 in Section 0300).

6. **INVOICES and PAYMENT:** (reference paragraphs 12 and 13 in Section 0300)

A. Invoices shall contain a unique invoice number and the information required in Section 0300, paragraph 12, entitled "Invoices." Invoices received without all required information cannot be processed and will be returned to the vendor.

Invoices shall be emailed to the address below.

	City of Austin
Department	Department of Aviation
Attn:	Accounts Payable
Address	3600 Presidential Blvd. Suite 411
City, State Zip Code	Austin, Texas 78719
Email	abia.invoices@austintexas.gov

B. The Contractor agrees to accept payment by either credit card, check or Electronic Funds Transfer (EFT) for all goods and/or services provided under the Contract. The Contractor shall factor the cost of processing credit card payments into the Offer. There shall be no additional charges, surcharges, or penalties to the City for payments made by credit card.

7. **WORKFORCE SECURITY CLEARANCE AND IDENTIFICATION (ID):**

A. **Airport Security**: Access to the premises must be strictly controlled. Officers, employees, subcontractors or agents of the Contractor shall never enter a restricted or operational area of the airport without the prior and express permission of ABIA or any governmental bodies having jurisdiction. Contractor assumes full liability for any and all events resulting from such from any such unauthorized incursions.

B. **Security Badges**: Contractor and employees, subcontractors or agents assigned to work on this contract

shall be required to obtain a security badge which must be worn at all times while within security restricted areas of ABIA premises . Security badge access will be limited to the minimum amount of access portals necessary. All Contractor employees, subcontractors or agents must comply with all airport and related Federal security restrictions. Violations may result in the Contractor receiving a TSA fine and/or the dismissal of the employee, subcontractors or agent from the ABIA premises. Contractor shall reimburse ABIA for any fines or penalties assessed against ABIA that are attributed to the Contractor's non-compliance.

C. **Background Investigation**: An application for each security badge can be obtained from the Airport Security and I.D. Section. A ten (10) year background investigation and fingerprinting will be conducted on all applications for security badges. The City of Austin, Department of Aviation shall incur the costs of fingerprint check and administrative fee for Contractor personnel that require access to the airport site.

D. **Badge Fees:** The City of Austin, Department of Aviation shall incur the cost of the airport security badge, for each Contractor employee, subcontractor or agent assigned to work on this contract and requires access to the airport site. Contractor is responsible for replacement costs and any other fees associated with lost security items. Any lost, stolen, or misplaced security badges will be replaced at an additional cost to the Contractor as follows: 1st replacement - $50; 2nd replacement - $75; 3rd replacement - $100; etc. Upon expiration of this contract, the Contractor shall return all security badges to the Airport Security and I.D. Section. Contractors will be charged $100 for each non-returned, non-expired badges that is over 30 days outstanding.

E. Each employee, subcontractor or agent who receives an airport security badge will be required to attend and successfully complete an Airport Safety and Security Training and Familiarization class, approximately one (1) hour in length, at no cost to the Contractor.

F. The Contractor shall comply with all other security requirements imposed by the City. The City will provide the Contactor with written notice of any revision to the security requirements. Contractor shall ensure that all employees and subcontractors are kept fully informed of all security requirements and shall update employees, subcontractors and agent as those requirements are revised.

8. **ECONOMIC PRICE ADJUSTMENT:**

A. **Price Adjustments**: Prices shown in this Contract shall remain firm for the first twelve (12) calendar months of the Contract. After that, in recognition of the potential for fluctuation of the Contractor's cost, a price adjustment (increase or decrease) may be requested by either the City or the Contractor on the anniversary date of the Contract or as may otherwise be specified herein. The percentage change between the contract price and the requested price shall not exceed the percentage change between the specified index in effect on the date the solicitation closed and the most recent, non-preliminary data at the time the price adjustment is requested. The requested price adjustment shall not exceed twenty-five percent (25%) for any single line item and in no event shall the total amount of the contract be automatically adjusted as a result of the change in one or more line items made pursuant to this provision. Prices for products or services unaffected by verifiable cost trends shall not be subject to adjustment.

B. **Effective Date**: Approved price adjustments will go into effect on the first day of the upcoming renewal period or anniversary date of contract award and remain in effect until contract expiration unless changed by subsequent amendment.

C. **Adjustments:** A request for price adjustment must be made in writing and submitted to the other Party prior to the yearly anniversary date of the Contract; adjustments may only be considered at that time unless otherwise specified herein. Requested adjustments must be solely for the purpose of accommodating changes in the Contractor's direct costs. Contractor shall provide an updated price listing once agreed to adjustment(s) have been approved by the parties.

D. **Indexes:** In most cases an index from the Bureau of Labor Standards (BLS) will be utilized; however, if there is more appropriate, industry recognized standard then that index may be selected.

i. The following definitions apply:
   (1) **Base Period:** Month and year of the original contracted price (the solicitation close date).
   (2) **Base Price:** Initial price quoted, proposed and/or contracted per unit of measure.
   (3) **Adjusted Price:** Base Price after it has been adjusted in accordance with the applicable index change and instructions provided.
   (4) **Change Factor:** The multiplier utilized to adjust the Base Price to the Adjusted Price.
   (5) **Weight %:** The percent of the Base Price subject to adjustment based on an index change.

ii. **Adjustment-Request Review:** Each adjustment-request received will be reviewed and compared to changes in the index(es) identified below. Where applicable:
   (1) Utilize final Compilation data instead of Preliminary data
   (2) If the referenced index is no longer available shift up to the next higher category index.

iii. **Index Identification:** Complete table as they may apply.

Weight % or $ of Base Price: 100%	
Database Name: Consumer Price Index	
Series ID: SMU48000004000000001	
☒ Not Seasonally Adjusted	☐ Seasonally Adjusted
Geographical Area: Texas Statewide	
Description of Series ID: Trade, Transportation and Utilities	
This Index shall apply to the following items of the Bid Sheet / Cost Proposal: Labor	

E. **Calculation:** Price adjustment will be calculated as follows:

Adjustment of a Portion of the Base Price: A portion of the Base Price changes such that only part of the price is adjusted, while the balance of the Base Price remains fixed. The portion of the Base Price subject to adjustment is defined in D iii. above.

Single Index: Adjust the Base Price by the same factor calculated for the index change.

Index at time of calculation
Divided by index on solicitation close date
Equals Change Factor
Multiplied by the Base Rate
Equals the Adjusted Price

F. If the requested adjustment is not supported by the referenced index, the City, at its sole discretion, may consider approving an adjustment on fully documented market increases.

9. **INTERLOCAL PURCHASING AGREEMENTS:** (applicable to competitively procured goods/services contracts).

   A. The City has entered into Interlocal Purchasing Agreements with other governmental entities, pursuant to the Interlocal Cooperation Act, Chapter 791 of the Texas Government Code. The Contractor agrees to offer the same prices and terms and conditions to other eligible governmental agencies that have an interlocal agreement with the City.

   B. The City does not accept any responsibility or liability for the purchases by other governmental agencies through an interlocal cooperative agreement.

10. **WORKING ON OR NEAR ENGERGIZED EQUIPMENT – ARC FLASH PROTECTION (reference Section 0300 Paragraph 11. Compliance With Health, Safety, and Environmental Regulations):** Contractor's employees shall wear at all times the proper personal protective equipment and clothing required for the head, face, torso, arms, hands, and lower body that provides a minimum Arc Thermal Protection Value (ATPV) of 12 calories per square centimeter (cal/cm^2) when working on or near energized electrical equipment, or greater, if required by the NFPA Standard 70E and/or Article 410 of the NESC for the work being performed.

11. **CONTRACT MANAGER:** The following person is designated as Contract Manager, and will act as the contact point between the City and the Contractor during the term of the Contract:

    City of Austin

    Department of Aviation

    Nick Ramirez, Planning & Engineering-Environmental Section

    Phone: 512-530-5545 or Email: Nick.Ramirez@austintexas.gov

Section 0605: Local Business Presence Identification

A firm (Offeror or Subcontractor) is considered to have a Local Business Presence if the firm is headquartered in the Austin Corporate City Limits, or has a branch office located in the Austin Corporate City Limits in operation for the last five (5) years, currently employs residents of the City of Austin, Texas, and will use employees that reside in the City of Austin, Texas, to support this Contract. The City defines headquarters as the administrative center where most of the important functions and full responsibility for managing and coordinating the business activities of the firm are located. The City defines branch office as a smaller, remotely located office that is separate from a firm's headquarters that offers the services requested and required under this solicitation.

OFFEROR MUST SUBMIT THE FOLLOWING INFORMATION FOR EACH LOCAL BUSINESS (INCLUDING THE OFFEROR, IF APPLICABLE) TO BE CONSIDERED FOR LOCAL PRESENCE.

NOTE: ALL FIRMS MUST BE IDENTIFIED ON THE MBE/WBE COMPLIANCE PLAN OR NO GOALS UTILIZATION PLAN (REFERENCE SECTION 0900).

USE ADDITIONAL PAGES AS NECESSARY

OFFEROR: Binnacle does not have local Business in Austin.

Name of Local Firm	We Are headquartered 2 Hours north in Fort Worth	
Physical Address		
Is your headquarters located in the Corporate City Limits? (circle one)	Yes	(No)
or		
Has your branch office been located in the Corporate City Limits for the last 5 years?		no
Will your business be providing additional economic development opportunities created by the contract award? (e.g., hiring, or employing residents of the City of Austin or increasing tax revenue?)	Yes	(No)

SUBCONTRACTOR(S):

Name of Local Firm	N/A	
Physical Address		
Is your headquarters located in the Corporate City Limits? (circle one)	Yes	No
or		
Has your branch office been located in the Corporate City Limits for the last 5 years	Yes	No

Will your business be providing additional economic development opportunities created by the contract award? (e.g., hiring, or employing residents of the City of Austin or increasing tax revenue?)	Yes	No

SUBCONTRACTOR(S):

Name of Local Firm	n/a	
Physical Address		
Is your headquarters located in the Corporate City Limits? (circle one)	Yes	No
or		
Has your branch office been located in the Corporate City Limits for the last 5 years	Yes	No
Will your business be providing additional economic development opportunities created by the contract award? (e.g., hiring, or employing residents of the City of Austin or increasing tax revenue?)	Yes	No

Section 0700: Reference Sheet

Responding Company Name Pinnacle, LLC

The City at its discretion may check references in order to determine the Offeror's experience and ability to provide the products and/or services described in this Solicitation. The Offeror shall furnish at least 3 complete and verifiable references. References shall consist of customers to whom the offeror has provided the same or similar services within the last 5 years. References shall indicate a record of positive past performance.

1. Company's Name: DFW Airport
   Name and Title of Contact: James Gomez - Lead QC Tech
   Project Name: Charger Training & Service Terminal D
   Present Address: International Parkway
   City, State, Zip Code: DFW Airport, TX 75261
   Telephone Number: (214) 213-4805 Fax Number ( )
   Email Address: JJGomez@dfwairport.com

2. Company's Name: JBT Corporation
   Name and Title of Contact: John Thompson
   Project Name: TBIT Project - LAX
   Present Address: 1805 West 2550 S.
   City, State, Zip Code: Ogden, UT 84401
   Telephone Number: (801) 940-1809 Fax Number (801) 629-3126
   Email Address: john.thompson@JBTC.com

3. Company's Name: United Airlines
   Name and Title of Contact: Duane Mauro
   Project Name: Battery Charger Installation & Training
   Present Address: 6018 Avion Dr.
   City, State, Zip Code: LAX, CA 90045
   Telephone Number: (224) 532-6006 Fax Number (310) 342-8414
   Email Address: duane.mauro@united.com

Section 0835: Non-Resident Bidder Provisions

Company Name Pinnacle, LLC

A. Bidder must answer the following questions in accordance with Vernon's Texas Statues and Codes Annotated Government Code 2252.002, as amended:

Is the Bidder that is making and submitting this Bid a "Resident Bidder" or a "non-resident Bidder"?

Answer: Resident Bidder

(1) Texas Resident Bidder- A Bidder whose principle place of business is in Texas and includes a Contractor whose ultimate parent company or majority owner has its principal place of business in Texas.
(2) Nonresident Bidder- A Bidder who is not a Texas Resident Bidder.

B. If the Bidder id a "Nonresident Bidder" does the state, in which the Nonresident Bidder's principal place of business is located, have a law requiring a Nonresident Bidder of that state to bid a certain amount or percentage under the Bid of a Resident Bidder of that state in order for the nonresident Bidder of that state to be awarded a Contract on such bid in said state?

Answer: n/A Which State: n/A

C. If the answer to Question B is "yes", then what amount or percentage must a Texas Resident Bidder bid under the bid price of a Resident Bidder of that state in order to be awarded a Contract on such bid in said state?

Answer: n/A

Section 0900: Minority- and Women-Owned Business Enterprise (MBE/WBE) Procurement Program No Goals Form

SOLICITATION NUMBER:	IFB MLM0040
PROJECT NAME:	PosiCharge Fast Charging Stations Service and Repair

The City of Austin has determined that no goals are appropriate for this project. Even though goals were not assigned for this solicitation, the Bidder/Proposer is required to comply with the City's MBE/WBE Procurement Program, if areas of subcontracting are identified.

If any service is needed to perform the Contract and the Bidder/Proposer does not perform the service with its own workforce or if supplies or materials are required and the Bidder/Proposer does not have the supplies or materials in its inventory, the Bidder/Proposer shall contact the Small and Minority Business Resources Department (SMBR) at (512) 974-7600 to obtain a list of MBE and WBE firms available to perform the service or provide the supplies or materials. The Bidder/Proposer must also make a Good Faith Effort to use available MBE and WBE firms. Good Faith Efforts include but are not limited to contacting the listed MBE and WBE firms to solicit their interest in performing on the Contract, using MBE and WBE firms that have shown an interest, meet qualifications, and are competitive in the market; and documenting the results of the contacts.

Will subcontractors or sub-consultants or suppliers be used to perform portions of this Contract?

No X **If no, please sign the No Goals Form and submit it with your Bid/Proposal in a sealed envelope**

Yes _____ **If yes, please contact SMBR to obtain further instructions and an availability list and perform Good Faith Efforts. Complete and submit the No Goals Form and the No Goals Utilization Plan with your Bid/Proposal in a sealed envelope.**

After Contract award, if your firm subcontracts any portion of the Contract, it is a requirement to complete Good Faith Efforts and the No Goals Utilization Plan, listing any subcontractor, sub-consultant, or supplier. Return the completed Plan to the Project Manager or the Contract Manager.

I understand that even though goals were not assigned, I must comply with the City's MBE/WBE Procurement Program if subcontracting areas are identified. I agree that this No Goals Form and No Goals Utilization Plan shall become a part of my Contract with the City of Austin.

Binnacle, LLC

Company Name

Daniel Pinch - President

Name and Title of Authorized Representative (Print or Type)

Signature

10-8-16

Date

Minority- and Women-Owned Business Enterprise (MBE/WBE) Procurement Program No Goals Utilization Plan
(Please duplicate as needed)

SOLICITATION NUMBER:	IFB MLM0040
PROJECT NAME:	PosiCharge Fast Charging Stations Service and Repair

PRIME CONTRACTOR / CONSULTANT COMPANY INFORMATION

Name of Contractor/Consultant	Binnacle, LLC		
Address	8200 Northeast Parkway, Ste #101		
City, State Zip	North Richland Hills, TX 76182		
Phone Number	817-807-1737	Fax Number	817-719-9490
Name of Contact Person	Daniel Pinch		
Is Company City certified?	Yes ☐ No ☒ MBE ☐ WBE ☐ MBE/WBE Joint Venture ☐		

I certify that the information included in this No Goals Utilization Plan is true and complete to the best of my knowledge and belief. I further understand and agree that the information in this document shall become part of my Contract with the City of Austin.

Daniel Pinch President
Name and Title of Authorized Representative (Print or Type)

Signature _____ **Date** 10-8-16

Provide a list of all proposed subcontractors / sub-consultants / suppliers that will be used in the performance of this Contract. **Attach Good Faith Effort documentation if non MBE/WBE firms will be used.**

Sub-Contractor / Sub-Consultant			
City of Austin Certified	MBE ☐ WBE ☐ Ethics / Gender Code:		☐ Non-Certified
Vendor ID Code			
Contact Person	N/A	Phone Number	
Amount of Subcontract	$		
List commodity codes & description of services			

Sub-Contractor / Sub-Consultant			
City of Austin Certified	MBE ☐ WBE ☐ Ethics / Gender Code:		☐ Non-Certified
Vendor ID Code			
Contact Person	N/A	Phone Number	
Amount of Subcontract	$		
List commodity codes & description of services			

FOR SMALL AND MINORITY BUSINESS RESOURCES DEPARTMENT USE ONLY:

Having reviewed this plan, I acknowledge that the proposer (HAS) or (HAS NOT) complied with City Code Chapter 2-9A/B/C/D, as amended.

Reviewing Counselor _____ **Date** _____ **Director/Deputy Director** _____ **Date** _____

SECTION 0600 - BID SHEET

CITY OF AUSTIN - DEPARTMENT OF AVIATION

POSICHARGE FAST CHARGING STATIONS SERVICES AND REPAIR

SOLICITATION NO.: IFB MLM0040

Special Instructions: Be advised that exceptions taken to any portion of the solicitations may jeopardize acceptance of the quote.

A bid of '0' (zero) will be interpreted by the City as a no-charge (free) item and the City will not expect to pay for that item. A bid of 'no bid' will be interpreted by the City that the proposer does not wish to bid on that item.

The quantities listed are annual estimates and not a guarantee of actual volume. The City reserves the right to purchase more or less of these quantities as may be required during the Contract Term. Quantities will be as-needed and specified by the City for each order. The City may award the contract for any item or group of items on the solicitation, or any combination deemed most advantageous to the City.

SECTION 1 - MAINTENANCE SERVICE INSPECTIONS

Proposer must be able to establish an inspection and preventive maintenance schedule for the PosiCharge fast charging stations. The prices listed for these inspection and preventive maintenance shall include all administrative, labor, transportation (travel time, mileage, fuel, etc.) , material costs (lubrication, cleaning, towels, etc.), all costs associated with obtaining necessary security clearances to perform the work, and insurance. These expenses shall be included in the Semi-Annual Maintenance Inspection flat fee unit price and shall not be paid separately. If additional repair services are needed, those repairs shall be invoiced separately using Section 2 and Section 3 pricing.

ITEM NO.	ITEM DESCRIPTION	ESTIMATED ANNUAL QUANTITY	UNIT PRICE (EACH)	EXTENDED PRICE
1	Flat fee for Semi-annual Maintenance Inspection for PosiCharge fast charging stations (per Exhibit 2).	20	**$190.00**	$3,800.00

SECTION 2 - REPAIR SERVICES

ITEM NO.	LABOR	ESTIMATED ANNUAL HOURS	HOURLY RATE	EXTENDED PRICE
2	Labor rate for services of a **Master Service Technician** during normal business hours, defined as Monday through Friday 8:00 am - 5:00 pm	10	**$110.00**	$1,100.00
3	Labor rate for services of a **Junior Service Technician** during normal business hours, defined as Monday through Friday 8:00 am - 5:00 pm	20	**$75.00**	$1,500.00
			TOTAL EXTENDED PRICE - SECTION 2	**$2,600.00**

SECTION 3 - PARTS DISCOUNT/MARK-UP

ITEM NO.	ITEM DESCRIPTION	ESTIMATED ANNUAL QUANTITY	DISCOUNT OFF PRICE (PERCENTAGE)	EXTENDED PRICE
4	Discount/Mark-Up Price List for all repair parts and associated components to complete the repair.	$10,000.00	**15.00%**	$8,500.00
			TOTAL EXTENDED PRICE FOR SECTIONS 1 THRU 3	**$14,900.00**

SECTION 4 - NON-SPECIFIED ITEMS (For Informational Purposes Only)

For other items and services the Proposer can provide other then the items and services that are listed above. The prices for these Non-Specified Items shall be based on the Price List(s) and percentage discount(s) or markup(s) as indicated below. The percentage discount(s) or markup(s) shall be fixed throughout the term of the Contract including any subsequent renewal periods, and are not subject to increase.

Proposer shall provide the manufacturer(s) name and number of the identified price list(s), the latest effective date of the identified price list(s), and either the percentage discount(s) or markup(s) to the identified price list(s) for other items and services they can provide.

ITEM NO.	NAME AND NUMBER OF PRICE LIST	LATEST EFFECTIVE DATE OF PRICE LIST	DISCOUNT FROM OR MARKUP TO PRICE LIST
5	Name: Battery Charger DC output cables with "Break-Away" protection Number: Part Number: 2280-1X20-0010-BA	10/8/2016	____10_____% Discount or _____% Markup
6	Name _____ Number _____		_____% Discount or _____% Markup

CITY OF AUSTIN, TEXAS

Purchasing Office

INVITATION FOR BID (IFB)

OFFER SHEET

SOLICITATION NO: IFB MLM0040

DATE ISSUED: October 3, 2016

REQUISITION NO.: RQM16081200632

COMMODITY CODE: 9108250

FOR CONTRACTUAL AND TECHNICAL ISSUES CONTACT THE FOLLOWING AUTHORIZED CONTACT PERSON:

COMMODITY/SERVICE DESCRIPTION: PosiCharge Fast Charging Stations-Services and Repair

BID DUE PRIOR TO: October 25, 2016 at 2:00 PM Local Time

BID OPENING TIME AND DATE: October 25, 2015 at 2:15 PM Local Time

LOCATION: MUNICIPAL BUILDING, 124 W 8th STREET
RM 308, AUSTIN, TEXAS 78701

Primary Point of Contact
Monica L. McClure
Corporate Contract Administrator
Phone: (512) 974-1714
E-Mail: Monica.McClure@austintexas.gov

Secondary Point of Contact
Jonathan Dalchau
Senior Buyer Specialist
Phone: (512) 974-2938
E-Mail: Jonathan.Dalchau@austintexas.gov

LIVE BID OPENING ONLINE:

For information on how to attend the Bid Opening online, please select this link:

http://www.austintexas.gov/department/bid-opening-webinars

When submitting a sealed Offer and/or Compliance Plan, use the proper address for the type of service desired, as shown below:

Address for US Mail (Only)	Address for Fedex, UPS, Hand Delivery or Courier Service
City of Austin	City of Austin, Municipal Building
Purchasing Office-Response Enclosed for Solicitation # IFB MLM0040	Purchasing Office-Response Enclosed for Solicitation # IFB MLM0040
P.O. Box 1088	124 W 8th Street, Rm 308
Austin, Texas 78767-8845	Austin, Texas 78701
	Reception Phone: (512) 974-2500

NOTE: Offers must be received and time stamped in the Purchasing Office prior to the Due Date and Time. It is the responsibility of the Offeror to ensure that their Offer arrives at the receptionist's desk in the Purchasing Office prior to the time and date indicated. Arrival at the City's mailroom, mail terminal, or post office box will not constitute the Offer arriving on time. See Section 0200 for additional solicitation instructions.

All Offers (including Compliance Plans) that are not submitted in a sealed envelope or container will not be considered.

The Vendor agrees, if this Offer is accepted within 120 calendar days after the Due Date, to fully comply in strict accordance with the Solicitation, specifications and provisions attached thereto for the amounts shown on the accompanying Offer.

SUBMIT 1 ORIGINAL, AND 1 ELECTRONIC COPY OF YOUR RESPONSE

*****SIGNATURE FOR SUBMITTAL REQUIRED ON PAGE 3 OF THIS DOCUMENT*****

This solicitation is comprised of the following required sections. Please ensure to carefully read each section including those incorporated by reference. By signing this document, you are agreeing to all the items contained herein and will be bound to all terms.

SECTION NO.	TITLE	PAGES
0100	STANDARD PURCHASE DEFINITIONS	*
0200	STANDARD SOLICITATION INSTRUCTIONS	*
0300	STANDARD PURCHASE TERMS AND CONDITIONS	*
0400	SUPPLEMENTAL PURCHASE PROVISIONS	6
0500	SPECIFICATION	6
0600	BID SHEET – Must be completed and returned with Offer	1
0605	LOCAL BUSINESS PRESENCE IDENTIFICATION FORM – Complete & return	2
0700	REFERENCE SHEET – Complete and return if required	2
0800	NON-DISCRIMINATION CERTIFICATION	*
0805	NON-SUSPENSION OR DEBARMENT CERTIFICATION	*
0810	NON-COLLUSION, NON-CONFLICT OF INTEREST, AND ANTI-LOBBYING CERTIFICATION	*
0835	NONRESIDENT BIDDER PROVISIONS – Complete & return	1
0900	MBE/WBE PROCUREMENT PROGRAM PACKAGE NO GOALS FORM – Complete & return	2

*** Documents are hereby incorporated into this Solicitation by reference, with the same force and effect as if they were incorporated in full text. The full text versions of the * Sections are available on the Internet at the following online address:**

http://www.austintexas.gov/financeonline/vendor_connection/index.cfm#STANDARDBIDDOCUMENTS

If you do not have access to the Internet, you may obtain a copy of these Sections from the City of Austin Purchasing Office located in the Municipal Building, 124 West 8th Street, Room #308 Austin, Texas 78701; phone (512) 974-2500. Please have the Solicitation number available so that the staff can select the proper documents. These documents can be mailed, expressed mailed, or faxed to you.

INTERESTED PARTIES DISCLOSURE

In addition, Section 2252.908 of the Texas Government Code requires the successful offeror to complete a Form 1295 "Certificate of Interested Parties" that is signed and notarized for a contract award requiring council authorization. The "Certificate of Interested Parties" form must be completed on the Texas Ethics Commission website, printed, signed and submitted to the City by the authorized agent of the Business Entity with acknowledgment that disclosure is made under oath and under penalty of perjury prior to final contract execution.

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

The undersigned, by his/her signature, represents that he/she is submitting a binding offer and is authorized to bind the respondent to fully comply with the solicitation document contained herein. The Respondent, by submitting and signing below, acknowledges that he/she has received and read the entire document packet sections defined above including all documents incorporated by reference, and agrees to be bound by the terms therein.

Company Name: _____

Company Address: _____

City, State, Zip: _____

Federal Tax ID No. _____

Printed Name of Officer or Authorized Representative: _____

Title: _____

Signature of Officer or Authorized Representative: _____

Date: _____

Email Address: _____

Phone Number: _____

*** Completed Bid Sheet, section 0600 must be submitted with this Offer Sheet to be considered for award**

CITY OF AUSTIN
PURCHASING OFFICE
SUPPLEMENTAL PURCHASE PROVISIONS
SOLICITATION NUMBER: IFB MLM0040

The following Supplemental Purchasing Provisions apply to this solicitation:

1. **EXPLANATIONS OR CLARIFICATIONS:** (reference paragraph 5 in Section 0200)

   All requests for explanations or clarifications must be submitted in writing to the Purchasing Office by October 10, 2016. Submissions may be made via email to Monica.McClure@austintexas.gov, or via fax at: 512-974-2388.

2. **INSURANCE:** Insurance is required for this solicitation.

   A. **General Requirements:** See Section 0300, Standard Purchase Terms and Conditions, paragraph 32, entitled Insurance, for general insurance requirements.

      i. The Contractor shall provide a Certificate of Insurance as verification of coverage's required below to the City at the below address prior to contract execution and within 14 calendar days after written request from the City. Failure to provide the required Certificate of Insurance may subject the Offer to disqualification from consideration for award
      ii. The Contractor shall not commence work until the required insurance is obtained and until such insurance has been reviewed by the City. Approval of insurance by the City shall not relieve or decrease the liability of the Contractor hereunder and shall not be construed to be a limitation of liability on the part of the Contractor.
      iii. The Contractor must also forward a Certificate of Insurance to the City whenever a previously identified policy period has expired, or an extension option or holdover period is exercised, as verification of continuing coverage.
      iv. The Certificate of Insurance, and updates, shall be mailed to the following address:

      City of Austin Purchasing Office
      P. O. Box 1088
      Austin, Texas 78767

   B. **Specific Coverage Requirements:** The Contractor shall at a minimum carry insurance in the types and amounts indicated below for the duration of the Contract, including extension options and hold over periods, and during any warranty period. These insurance coverage's are required minimums and are not intended to limit the responsibility or liability of the Contractor.

      i. **Worker's Compensation and Employers' Liability Insurance:** Coverage shall be consistent with statutory benefits outlined in the Texas Worker's Compensation Act (Section 401). The minimum policy limits for Employer's Liability are $100,000 bodily injury each accident, $500,000 bodily injury by disease policy limit and $100,000 bodily injury by disease each employee.
         (1) The Contractor's policy shall apply to the State of Texas and include these endorsements in favor of the City of Austin:
            (a) Waiver of Subrogation, Form WC420304, or equivalent coverage
            (b) Thirty (30) day's Notice of Cancellation, Form WC420601, or equivalent coverage

      ii. **Commercial General Liability Insurance:** The minimum bodily injury and property damage per occurrence are $5,000,000 for coverage's A (Bodily Injury and Property Damage) and B (Personal and Advertising Injury).
         (1) The policy shall contain the following provisions:
            (a) Contractual liability coverage for liability assumed under the Contract and all other Contracts related to the project.
            (b) Contractor/Subcontracted Work.
            (c) Products/Completed Operations Liability for the duration of the warranty period.
            (d) If the project involves digging or drilling provisions must be included that provide Explosion, Collapse, and/or Underground Coverage.
         (2) The policy shall also include these endorsements in favor of the City of Austin:
            (a) Waiver of Subrogation, Endorsement CG 2404, or equivalent coverage

(b) Thirty (30) day's Notice of Cancellation, Endorsement CG 0205, or equivalent coverage
(c) The City of Austin listed as an additional insured, Endorsement CG 2010, or equivalent coverage

iii. **Business Automobile Liability Insurance:** The Contractor shall provide coverage for all owned, non-owned and hired vehicles with a minimum combined single limit of $5,000,000 per occurrence for bodily injury and property damage. Alternate acceptable limits are $2,500,000 bodily injury per person, $2,500,000 bodily injury per occurrence and at least $500,000 property damage liability per accident.
(1) The policy shall include these endorsements in favor of the City of Austin:
(a) Waiver of Subrogation, Endorsement CA0444, or equivalent coverage
(b) Thirty (30) day's Notice of Cancellation, Endorsement CA0244, or equivalent coverage
(c) The City of Austin listed as an additional insured, Endorsement CA2048, or equivalent coverage.

C. **Endorsements:** The specific insurance coverage endorsements specified above, or their equivalents must be provided. In the event that endorsements, which are the equivalent of the required coverage, are proposed to be substituted for the required coverage, copies of the equivalent endorsements must be provided for the City's review and approval.

3. **TERM OF CONTRACT:**

A. The Contract shall be in effect for an initial term of 36 months and may be extended thereafter for up to two (2) additional 12 month periods, subject to the approval of the Contractor and the City Purchasing Officer or his designee.

B. Upon expiration of the initial term or period of extension, the Contractor agrees to hold over under the terms and conditions of this agreement for such a period of time as is reasonably necessary to re-solicit and/or complete the project (not to exceed 120 days unless mutually agreed on in writing).

C. Upon written notice to the Contractor from the City's Purchasing Officer or his designee and acceptance of the Contractor, the term of this contract shall be extended on the same terms and conditions for an additional period as indicated in paragraph A above.

D. Prices are firm and fixed for the first twelve (12) months. Thereafter, price changes are subject to the Economic Price Adjustment provisions of this Contract.

4. **QUANTITIES:** The quantities listed herein are estimates for the period of the Contract. The City reserves the right to purchase more or less of these quantities as may be required during the Contract term. Quantities will be as needed and specified by the City for each order. Unless specified in the solicitation, there are no minimum order quantities.

5. **DELIVERY REQUIREMENTS:**

Location:
Austin-Bergstrom International Airport
.
3600 Presidential Blvd
Austin, Texas 78719-2301

A. The Contractor shall provide, with each delivery, a Shipping or Delivery Ticket showing the description of each item, quantity, and unit price.

B. The Contractor shall confirm the quantity to be shipped on all orders within two (2) hours of notification by phone from the City.

C. Unless requested by the City, deliveries shall not be made on City-recognized legal holidays (see paragraph 51 in Section 0300).

6. **INVOICES and PAYMENT:** (reference paragraphs 12 and 13 in Section 0300)

A. Invoices shall contain a unique invoice number and the information required in Section 0300, paragraph 12, entitled "Invoices." Invoices received without all required information cannot be processed and will be returned to the vendor.

Invoices shall be emailed to the address below.

	City of Austin
Department	Department of Aviation
Attn:	Accounts Payable
Address	3600 Presidential Blvd. Suite 411
City, State Zip Code	Austin, Texas 78719
Email	abia.invoices@austintexas.gov

B. The Contractor agrees to accept payment by either credit card, check or Electronic Funds Transfer (EFT) for all goods and/or services provided under the Contract. The Contractor shall factor the cost of processing credit card payments into the Offer. There shall be no additional charges, surcharges, or penalties to the City for payments made by credit card.

7. **WORKFORCE SECURITY CLEARANCE AND IDENTIFICATION (ID):**

A. **Airport Security**: Access to the premises must be strictly controlled. Officers, employees, subcontractors or agents of the Contractor shall never enter a restricted or operational area of the airport without the prior and express permission of ABIA or any governmental bodies having jurisdiction. Contractor assumes full liability for any and all events resulting from such from any such unauthorized incursions.

B. **Security Badges**: Contractor and employees, subcontractors or agents assigned to work on this contract

shall be required to obtain a security badge which must be worn at all times while within security restricted areas of ABIA premises . Security badge access will be limited to the minimum amount of access portals necessary. All Contractor employees, subcontractors or agents must comply with all airport and related Federal security restrictions. Violations may result in the Contractor receiving a TSA fine and/or the dismissal of the employee, subcontractors or agent from the ABIA premises. Contractor shall reimburse ABIA for any fines or penalties assessed against ABIA that are attributed to the Contractor's non-compliance.

C. **Background Investigation**: An application for each security badge can be obtained from the Airport Security and I.D. Section. A ten (10) year background investigation and fingerprinting will be conducted on all applications for security badges. The City of Austin, Department of Aviation shall incur the costs of fingerprint check and administrative fee for Contractor personnel that require access to the airport site.

D. **Badge Fees:** The City of Austin, Department of Aviation shall incur the cost of the airport security badge, for each Contractor employee, subcontractor or agent assigned to work on this contract and requires access to the airport site. Contractor is responsible for replacement costs and any other fees associated with lost security items. Any lost, stolen, or misplaced security badges will be replaced at an additional cost to the Contractor as follows: 1st replacement - $50; 2nd replacement - $75; 3rd replacement - $100; etc. Upon expiration of this contract, the Contractor shall return all security badges to the Airport Security and I.D. Section. Contractors will be charged $100 for each non-returned, non-expired badges that is over 30 days outstanding.

E. Each employee, subcontractor or agent who receives an airport security badge will be required to attend and successfully complete an Airport Safety and Security Training and Familiarization class, approximately one (1) hour in length, at no cost to the Contractor.

F. The Contractor shall comply with all other security requirements imposed by the City. The City will provide the Contactor with written notice of any revision to the security requirements. Contractor shall ensure that all employees and subcontractors are kept fully informed of all security requirements and shall update employees, subcontractors and agent as those requirements are revised.

8. **ECONOMIC PRICE ADJUSTMENT:**

A. **Price Adjustments:** Prices shown in this Contract shall remain firm for the first twelve (12) calendar months of the Contract. After that, in recognition of the potential for fluctuation of the Contractor's cost, a price adjustment (increase or decrease) may be requested by either the City or the Contractor on the anniversary date of the Contract or as may otherwise be specified herein. The percentage change between the contract price and the requested price shall not exceed the percentage change between the specified index in effect on the date the solicitation closed and the most recent, non-preliminary data at the time the price adjustment is requested. The requested price adjustment shall not exceed twenty-five percent (25%) for any single line item and in no event shall the total amount of the contract be automatically adjusted as a result of the change in one or more line items made pursuant to this provision. Prices for products or services unaffected by verifiable cost trends shall not be subject to adjustment.

B. **Effective Date:** Approved price adjustments will go into effect on the first day of the upcoming renewal period or anniversary date of contract award and remain in effect until contract expiration unless changed by subsequent amendment.

C. **Adjustments:** A request for price adjustment must be made in writing and submitted to the other Party prior to the yearly anniversary date of the Contract; adjustments may only be considered at that time unless otherwise specified herein. Requested adjustments must be solely for the purpose of accommodating changes in the Contractor's direct costs. Contractor shall provide an updated price listing once agreed to adjustment(s) have been approved by the parties.

D. **Indexes:** In most cases an index from the Bureau of Labor Standards (BLS) will be utilized; however, if there is more appropriate, industry recognized standard then that index may be selected.

i. The following definitions apply:
   (1) **Base Period:** Month and year of the original contracted price (the solicitation close date).
   (2) **Base Price:** Initial price quoted, proposed and/or contracted per unit of measure.
   (3) **Adjusted Price:** Base Price after it has been adjusted in accordance with the applicable index change and instructions provided.
   (4) **Change Factor:** The multiplier utilized to adjust the Base Price to the Adjusted Price.
   (5) **Weight %:** The percent of the Base Price subject to adjustment based on an index change.

ii. **Adjustment-Request Review:** Each adjustment-request received will be reviewed and compared to changes in the index(es) identified below. Where applicable:
   (1) Utilize final Compilation data instead of Preliminary data
   (2) If the referenced index is no longer available shift up to the next higher category index.

iii. **Index Identification:** Complete table as they may apply.

Weight % or $ of Base Price: 100%	
Database Name: Consumer Price Index	
Series ID: SMU48000004000000001	
☒ Not Seasonally Adjusted	☐ Seasonally Adjusted
Geographical Area: Texas Statewide	
Description of Series ID: Trade, Transportation and Utilities	
This Index shall apply to the following items of the Bid Sheet / Cost Proposal: Labor	

E. **Calculation:** Price adjustment will be calculated as follows:

Adjustment of a Portion of the Base Price: A portion of the Base Price changes such that only part of the price is adjusted, while the balance of the Base Price remains fixed. The portion of the Base Price subject to adjustment is defined in D iii. above.

Single Index: Adjust the Base Price by the same factor calculated for the index change.

Index at time of calculation
Divided by index on solicitation close date
Equals Change Factor
Multiplied by the Base Rate
Equals the Adjusted Price

F. If the requested adjustment is not supported by the referenced index, the City, at its sole discretion, may consider approving an adjustment on fully documented market increases.

9. **INTERLOCAL PURCHASING AGREEMENTS:** (applicable to competitively procured goods/services contracts).

   A. The City has entered into Interlocal Purchasing Agreements with other governmental entities, pursuant to the Interlocal Cooperation Act, Chapter 791 of the Texas Government Code. The Contractor agrees to offer the same prices and terms and conditions to other eligible governmental agencies that have an interlocal agreement with the City.

   B. The City does not accept any responsibility or liability for the purchases by other governmental agencies through an interlocal cooperative agreement.

10. **WORKING ON OR NEAR ENGERGIZED EQUIPMENT – ARC FLASH PROTECTION (reference Section 0300 Paragraph 11. Compliance With Health, Safety, and Environmental Regulations):** Contractor's employees shall wear at all times the proper personal protective equipment and clothing required for the head, face, torso, arms, hands, and lower body that provides a minimum Arc Thermal Protection Value (ATPV) of 12 calories per square centimeter (cal/cm^2) when working on or near energized electrical equipment, or greater, if required by the NFPA Standard 70E and/or Article 410 of the NESC for the work being performed.

11. **CONTRACT MANAGER:** The following person is designated as Contract Manager, and will act as the contact point between the City and the Contractor during the term of the Contract:

City of Austin

Department of Aviation

Nick Ramirez, Planning & Engineering-Environmental Section

Phone: 512-530-5545 or Email: Nick.Ramirez@austintexas.gov

Section 0605: Local Business Presence Identification

A firm (Offeror or Subcontractor) is considered to have a Local Business Presence if the firm is headquartered in the Austin Corporate City Limits, or has a branch office located in the Austin Corporate City Limits in operation for the last five (5) years, currently employs residents of the City of Austin, Texas, and will use employees that reside in the City of Austin, Texas, to support this Contract. The City defines headquarters as the administrative center where most of the important functions and full responsibility for managing and coordinating the business activities of the firm are located. The City defines branch office as a smaller, remotely located office that is separate from a firm's headquarters that offers the services requested and required under this solicitation.

OFFEROR MUST SUBMIT THE FOLLOWING INFORMATION FOR EACH LOCAL BUSINESS (INCLUDING THE OFFEROR, IF APPLICABLE) TO BE CONSIDERED FOR LOCAL PRESENCE.

NOTE: ALL FIRMS MUST BE IDENTIFIED ON THE MBE/WBE COMPLIANCE PLAN OR NO GOALS UTILIZATION PLAN (REFERENCE SECTION 0900).

USE ADDITIONAL PAGES AS NECESSARY

OFFEROR:

Name of Local Firm		
Physical Address		
Is your headquarters located in the Corporate City Limits? (circle one)	Yes	No
or		
Has your branch office been located in the Corporate City Limits for the last 5 years?		
Will your business be providing additional economic development opportunities created by the contract award? (e.g., hiring, or employing residents of the City of Austin or increasing tax revenue?)	Yes	No

SUBCONTRACTOR(S):

Name of Local Firm		
Physical Address		
Is your headquarters located in the Corporate City Limits? (circle one)	Yes	No
or		
Has your branch office been located in the Corporate City Limits for the last 5 years	Yes	No

Will your business be providing additional economic development opportunities created by the contract award? (e.g., hiring, or employing residents of the City of Austin or increasing tax revenue?)	Yes	No

SUBCONTRACTOR(S):

Name of Local Firm		
Physical Address		
Is your headquarters located in the Corporate City Limits? (circle one)	Yes	No
or		
Has your branch office been located in the Corporate City Limits for the last 5 years	Yes	No
Will your business be providing additional economic development opportunities created by the contract award? (e.g., hiring, or employing residents of the City of Austin or increasing tax revenue?)	Yes	No

Section 0700: Reference Sheet

Responding Company Name _____

The City at its discretion may check references in order to determine the Offeror's experience and ability to provide the products and/or services described in this Solicitation. The Offeror shall furnish at least 3 complete and verifiable references. References shall consist of customers to whom the offeror has provided the same or similar services within the last 5 years. References shall indicate a record of positive past performance.

1. Company's Name _____

   Name and Title of Contact _____

   Project Name _____

   Present Address _____

   City, State, Zip Code _____

   Telephone Number (_____)_____ Fax Number (_____)_____

   Email Address _____

2. Company's Name _____

   Name and Title of Contact _____

   Project Name _____

   Present Address _____

   City, State, Zip Code _____

   Telephone Number (_____)_____ Fax Number (_____)_____

   Email Address _____

3. Company's Name _____

   Name and Title of Contact _____

   Project Name _____

   Present Address _____

   City, State, Zip Code _____

   Telephone Number (_____)_____ Fax Number (_____)_____

   Email Address _____

Section 0835: Non-Resident Bidder Provisions

Company Name _____

A. Bidder must answer the following questions in accordance with Vernon's Texas Statues and Codes Annotated Government Code 2252.002, as amended:

   Is the Bidder that is making and submitting this Bid a "Resident Bidder" or a "non-resident Bidder"?

   Answer: _____

   (1) Texas Resident Bidder- A Bidder whose principle place of business is in Texas and includes a Contractor whose ultimate parent company or majority owner has its principal place of business in Texas.
   (2) Nonresident Bidder- A Bidder who is not a Texas Resident Bidder.

B. If the Bidder id a "Nonresident Bidder" does the state, in which the Nonresident Bidder's principal place of business is located, have a law requiring a Nonresident Bidder of that state to bid a certain amount or percentage under the Bid of a Resident Bidder of that state in order for the nonresident Bidder of that state to be awarded a Contract on such bid in said state?

   Answer: _____ Which State: _____

C. If the answer to Question B is "yes", then what amount or percentage must a Texas Resident Bidder bid under the bid price of a Resident Bidder of that state in order to be awarded a Contract on such bid in said state?

   Answer: _____

Section 0900: Minority- and Women-Owned Business Enterprise (MBE/WBE) Procurement Program No Goals Form

SOLICITATION NUMBER:	IFB MLM0040
PROJECT NAME:	PosiCharge Fast Charging Stations Service and Repair

The City of Austin has determined that no goals are appropriate for this project. Even though goals were not assigned for this solicitation, the Bidder/Proposer is required to comply with the City's MBE/WBE Procurement Program, if areas of subcontracting are identified.

If any service is needed to perform the Contract and the Bidder/Proposer does not perform the service with its own workforce or if supplies or materials are required and the Bidder/Proposer does not have the supplies or materials in its inventory, the Bidder/Proposer shall contact the Small and Minority Business Resources Department (SMBR) at (512) 974-7600 to obtain a list of MBE and WBE firms available to perform the service or provide the supplies or materials. The Bidder/Proposer must also make a Good Faith Effort to use available MBE and WBE firms. Good Faith Efforts include but are not limited to contacting the listed MBE and WBE firms to solicit their interest in performing on the Contract, using MBE and WBE firms that have shown an interest, meet qualifications, and are competitive in the market; and documenting the results of the contacts.

Will subcontractors or sub-consultants or suppliers be used to perform portions of this Contract?

No	_____	**If no, please sign the No Goals Form and submit it with your Bid/Proposal in a sealed envelope**
Yes	_____	**If yes, please contact SMBR to obtain further instructions and an availability list and perform Good Faith Efforts. Complete and submit the No Goals Form and the No Goals Utilization Plan with your Bid/Proposal in a sealed envelope.**

After Contract award, if your firm subcontracts any portion of the Contract, it is a requirement to complete Good Faith Efforts and the No Goals Utilization Plan, listing any subcontractor, sub-consultant, or supplier. Return the completed Plan to the Project Manager or the Contract Manager.

I understand that even though goals were not assigned, I must comply with the City's MBE/WBE Procurement Program if subcontracting areas are identified. I agree that this No Goals Form and No Goals Utilization Plan shall become a part of my Contract with the City of Austin.	
Company Name	
Name and Title of Authorized Representative (Print or Type)	
Signature	**Date**

Minority- and Women-Owned Business Enterprise (MBE/WBE) Procurement Program No Goals Utilization Plan
(Please duplicate as needed)

SOLICITATION NUMBER:	IFB MLM0040
PROJECT NAME:	PosiCharge Fast Charging Stations Service and Repair

PRIME CONTRACTOR / CONSULTANT COMPANY INFORMATION

Name of Contractor/Consultant			
Address			
City, State Zip			
Phone Number		Fax Number	
Name of Contact Person			
Is Company City certified?	Yes ☐ No ☐ MBE ☐ WBE ☐ MBE/WBE Joint Venture ☐		

I certify that the information included in this No Goals Utilization Plan is true and complete to the best of my knowledge and belief. I further understand and agree that the information in this document shall become part of my Contract with the City of Austin.

Name and Title of Authorized Representative (Print or Type)

Signature **Date**

Provide a list of all proposed subcontractors / sub-consultants / suppliers that will be used in the performance of this Contract. **Attach Good Faith Effort documentation if non MBE/WBE firms will be used.**

Sub-Contractor / Sub-Consultant			
City of Austin Certified	MBE ☐ WBE ☐ Ethics / Gender Code: ☐ Non-Certified		
Vendor ID Code			
Contact Person		Phone Number	
Amount of Subcontract	$		
List commodity codes & description of services			

Sub-Contractor / Sub-Consultant			
City of Austin Certified	MBE ☐ WBE ☐ Ethics / Gender Code: ☐ Non-Certified		
Vendor ID Code			
Contact Person		Phone Number	
Amount of Subcontract	$		
List commodity codes & description of services			

FOR SMALL AND MINORITY BUSINESS RESOURCES DEPARTMENT USE ONLY:

Having reviewed this plan, I acknowledge that the proposer (HAS) or (HAS NOT) complied with City Code Chapter 2-9A/B/C/D, as amended.

Reviewing Counselor _____ **Date** _____ **Director/Deputy Director** _____ **Date** _____

CITY OF AUSTIN
SCOPE OF WORK FOR
POSICHARGE FAST CHARGING STATIONS SERVICES AND REPAIR
SOLICITATION NO: IFB MLM0040

1. PURPOSE

1.1. The City of Austin (City), seeks bids in response to this solicitation to establish a Contract with a qualified Vendor (Contractor) for services to inspect, maintain, repair, and replace PosiCharge fast charging stations on an as-needed basis as stipulated in this solicitation. The Contractor shall provide all labor, material, and necessary equipment for the proper execution of each level of inspection and preventative maintenance service and parts detailed in this specification. The inspection and maintenance services described are for use by the Department of Aviation. All services scheduled at the Austin Bergstrom International Airport shall be coordinated with the Department of Aviation Contract Manager or designee.

1.2. The City reserves the right to add or delete departments and fast charging stations as may be deemed necessary. PosiCharge fast charging stations added to the contract shall coincide with the expiration of their warranty period, and shall be added into the inspection class as mutually agreed to between the Contractor and the City. The Contractor may be required to work on a PosiCharge fast charging stations still under warranty in an emergency situation. PosiCharge fast charging stations sites are located in restricted areas at the Austin Bergstrom International Airport (ABIA).

1.3. It is the City's preference to award a single contract for the PosiCharge fast charging stations services and parts needed. Award will be based on individual or groups of specific line items, cost, or any criteria deemed by the City to be most advantageous. The City also reserves the right to refrain from awarding any lines or group of specific line items as a result of this solicitation and, instead, award the entire contract to a supplier available through a cooperative purchasing agreement.

1.4. Any services that have been omitted from this scope of work, which are clearly necessary, or in conformance with normal PosiCharge fast charging stations, preventive maintenance, and repair services shall be considered a requirement although not directly specified or called for in the scope of work.

1.5. A Successful Bidder will be awarded either the entire contract, the majority of the contract, or select line items whichever is deemed most advantageous to the City.

2. CONTRACTOR REQUIREMENTS

2.1. CONTRACTOR QUALIFICATIONS

2.1.1. The Contractor shall have a minimum of five (5) years' continuous Aviation industry experience prior to this solicitation performing inspection, maintenance, and/or repair as a prime provider for PosiCharge fast charging stations.

2.1.2. The Contractor shall be a manufacturer recommended service provider for service and repair of PosiCharge fast charging stations.

2.1.3. The Contractor shall have a full-time, operational facility with a permanent business address and the company headquarters must be located such that it can meet the all of the responsive time requirements as stated in Section 2.2.1 in this Scope of Work. Contractor shall have a functional email address and telephone and be available to provide service within 24 hours of notice by the City. The Contractor shall be regularly engaged in the business of providing repair services and parts for PosiCharge fast charging stations for a minimum of five (5) years.

2.1.4. The Contractor shall have a minimum of five (5) years' experience conducting training of staff outside of their organization and shall be capable of training City of Austin employees.

2.1.5. The Contractor shall provide and maintain a telephone dispatch system that is operational 24 hours per day, seven (7) days per week, and 365 days per year (including holidays). Telephone answering machines do not meet the requirements of this paragraph.

2.1.6. The Contractor shall provide a deliverables schedule within 30 days of contract award or as requested, that is mutually agreed upon by Contractor and the City for all units to be maintained under this contract. Maintenance shall be coordinated with the City Contract Manager or designee.

2.2. HOURS OF SERVICE

2.2.1. The Contractor shall be required to provide service for the PosiCharge fast charging stations within one business day after initial notification by the City. Contractor shall respond within one business day and the City's normal business hours which are: Monday through Friday 8:00AM to 5:00PM.

3. CONTRACTOR RESPONSIBILITIES

3.1. GENERAL REQUIREMENTS

3.1.1. The Contractor shall understand and agree that the scheduling of events at City facilities takes precedence over any scheduled maintenance and repair services agreed to by the City and the Contractor. The Contractor shall not hold the City liable, financially or otherwise, if the City needs to reschedule services with the Contractor due to a new event scheduled at a City facility. The City will make every reasonable effort to immediately notify the Contractor of changes in the City's schedule of events that may have an impact on scheduled services.

3.1.2. The Contractor shall maintain and repair all PosiCharge fast charging stations so that they operate to the original manufacturer's performance specifications.

3.1.3. The Contractor shall provide new parts with the exception of core components on renewed assemblies. Parts must meet all applicable federal, state and local requirements for quality and safety. If new parts are not available, or if Department of Aviation requests them in writing (e.g. email), remanufactured or rebuilt parts may be used. Used, factory seconds, remanufactured, shopworn, demonstrator, prototype, and discontinued parts or materials are not acceptable.

3.1.4. The Contractor warrants that ALL parts are free from manufacturer defects in material and workmanship for a minimum of twelve (12) months or for the standard period as provided by the manufacturer, whichever is for the greatest length of time. This warranty shall provide for replacement parts and shall include pickup of the defective part, delivery of the replacement part, and installation of the new part at no additional cost to the City.

3.1.5. The Contractor shall provide a copy of the manufacturer's parts warranty to the Department of Aviation Contract Manager or their designee upon contract award. The warranty period for all parts shall not start until the part is actually installed on a unit as evidenced by the City's work order.

3.1.6. The Contractor further warrants that the parts supplied under this Contract will not void existing manufacturer's warranties.

3.1.7. The Contractor shall immediately notify the Contract Manager or their designee of recall notices, warranty replacements, safety notices, or any applicable notice regarding the parts installed. Failure to report any recall, warranty replacements, safety notices or other

applicable notices within fifteen (15) calendar days of notification of such information may result in termination of the contract.

3.1.8. The Contractor shall provide a single point of contact (SPOC) who is skilled, knowledgeable, and experienced in providing service and repairs to the PosiCharge Fast Charging Stations . A City representative from the Department of Aviation should have the ability to contact the Contractor by e-mail, fax, or telephone to place an order for service. The request will include the PosiCharge Fast Charging Station part number, part description, delivery requirements, location and a unique delivery order number.

3.1.9. The Contractor shall be responsible for the immediate cleanup of the work area and the removal of debris. Cleaning of the work area shall be subject to the City representative's inspection and approval.

3.1.10. Any damages incurred to City property or equipment that is a direct result of Contractor's actions shall be the full financial responsibility of Contractor. Should the Contractor and/or his employees cause any damage to City property, the Contractor shall immediately inform the City Contract Manager or designee. The Contractor shall make repairs or replacement to the satisfaction of the City representative at no cost to the City. The City may elect, however, at its sole discretion to make repairs or replacements of damaged property and deduct the cost from any payments owed to Contractor or to recover costs if no payments are owed.

3.1.11. For service repair, the Contractor shall provide a detailed service report, including any additional or advised repairs as may be needed, to the Contract Manager or designee for signature indicating service levels performed during the visit. A copy of the signed report shall be submitted with the invoice.

3.1.12. Within three business (3) days of service, the Contractor shall provide a record of finding/service report in PDF format for each inspection performed for all levels listed in Exhibit 2 . Report may otherwise be provided at a time mutually agreed to between the Contractor and the City Contract Manager or designee. The report shall include any corrective action taken and/or needed and recommendations for replacement of major components with a written estimate including labor and materials. A copy of this report shall be submitted with the inspections invoice.

3.1.13. The replacement of major components shall not take place without prior written authorization from the Contract Manager or designee. The Contractor shall contact the Contract Manager or designee for any critical issues at the time of discovery by phone, pager, email, or any means necessary to discuss corrective action.

3.1.14. The Contractor shall post proper warning signs and/or barriers when and wherever necessary and in accordance with federal, state and local standards. The Contractor shall be responsible for notifying proper city personnel, i.e. facilities managers or building contacts, of work in progress at City facilities. The Contractor shall inform the Contract Manager or designee of any changes in scheduling.

3.1.15. The Contractor shall not store worn or defective parts on City premises at the end of the workday unless otherwise specified by the Contract Manager or designee.

3.2. Routine Maintenance Service Requirements

The Contractor shall service the following:

3.2.1. Service Inspections - Completed Semi-annually

3.2.1.1. Output Cables -Examine cables and replace any cable that exhibits signs of damage (splits, cracks, tears, exposed conductors etc.) or excessive wear.

3.2.1.2. Output Cables Connectors - Examine connectors and replace any connector that exhibits signs of damage (splits, cracks, exposed or pitted power pins, etc.) or excessive wear.

3.2.1.3. Charger Exterior - Examine the exterior of the charger for signs of damage or excessive wear. Repair or replace any charger that has been damaged in such a way that conductors are exposed or the cabinet may contact internal conductors.

3.2.1.4. Charger Interior - Vacuum out dust from air inlet and exhaust vents. It may be necessary to vacuum out dust more frequently if unit is installed in a highly dusty environment.

3.2.1.5. Charger Interior Harness connections - Examine for signs of damage or wear in all harness connections.

3.2.1.6. Check for discoloration: DC Output Contactors - Examine high current path for signs of discoloration and replace any discolored components – making sure to use correct torque on all fasteners.

3.2.1.7. DC Contactor Kilovac EV200AAANA (Note 1) - The DC contactor is designed for a life of at least 1,000,000 cycles.

3.2.1.8. AC Contactor SquareD DPA63V02 (Note 1) - The AC contactor is designed for a life of at least 200,000 cycles (operation in AC-3)

3.2.1.9. Data Contacts on Output Connectors - The data contacts in the output cable should last for a minimum of 5000 disconnect Cycles.

The table below shows how often data contacts should be replaced based on usage.

Disconnects Per Day	Replace Contacts. Every “X” Months
4	40
7	24
9	18
13	12
25	6

Note 1: Reference information given of components life expectancy.

3.3. Labor and Personnel

3.3.1. The Contractor shall be responsible for ensuring the safety of their employees, City employees, and the general public during performance of all services under this contract. The Contractor shall ensure that all crews are fully and properly equipped to perform services promptly and safely.

3.3.2. All employees of Contractor shall be subject to a 10-year background and/or fingerprint check. The Contractor shall be responsible for providing such background checks as directed by the City along with all associated costs. Background checks shall be completed solely for the City, as the City will not accept background checks performed for another City. Contractor shall provide documentation of background and fingerprint checks to the City for confirmation of each employee's fitness to begin work.

3.3.3. For services performed at the Austin Bergstrom International Airport (ABIA), the Contractor shall be responsible for any special security clearances that may be required by the Federal Aviation Administration (FAA) and shall conform to all ABIA security directives.

3.3.4. The Contractor acknowledges that fines or penalties may be assessed by the FAA as a result of contractor's non-compliance with provisions of "Airport Security". Contractor shall reimburse ABIA for any fines or penalties assessed against ABIA that are attributable to contractor's non-compliance within 10 days of receipt of written notice from ABIA that FAA has had issued a penalty.

3.3.5. In advance of any work performed on City property, the Contractor shall obtain security badges for its personnel. The Contractor personnel shall wear an identification badge at all times while on City property. The cost of replacement badging shall be the responsibility of the contractor.

3.3.6. All Contractor personnel assigned to provide services under the contract shall wear a uniform, necessary safety equipment, and company issued identification. Uniforms shall be alike and shall have the Contractor's and employee's names clearly displayed on the front of the shirt and seasonal outerwear.

4. CITY RESPONSIBILITIES

4.1. The City will provide light, water, and electricity as necessary to enable the contractor to provide the services described in this document. The Contractor shall use these facilities only to perform the contractual duties.

4.2. The City will designate an on-site point of contact.

4.3. The City will provide the Contractor with name(s) of personnel authorized to order services.

4.4. The City will provide access to the terminal ramp via the badging process and all Operations and Maintenance associated with the PosiCharge fast charging stations.

5. Deliverables/Milestones

#	Deliverables/ Milestones	Description	Timeline (due/completion date, reference date, or frequency)	Performance Measure/ Acceptance Criteria	Contract Reference/ Section
1	Maintenance Service Schedule	Contractor shall provide a maintenance services schedule	Within 30 days of contract award	95% compliance	2.1.6
2	SPOC	Contractor shall provide a SPOC for the contract	Within two days of the scheduled date	100% compliance	3.1.8
3	Service Report	Contractor shall provide a detailed report indicating service repairs	Within one day of the scheduled date	95% compliance	3.1.11
4	Inspection Report	Contractor shall provide a detailed report indicating inspection findings	Within three days of the repair	95% compliance	3.1.12
5	Service Inspections	Contractor shall provide service inspections semi-annually	Within two days of the scheduled date	95% compliance	3.2.1

6.0 **Appendices/Exhibits**

Exhibit 1: Location of units
Exhibit 2: DVS/MVS Periodic maintenance schedule
Exhibit 3: Installation Manual
Exhibit 4: Basic Electrical Materials and Methods
Exhibit 5: Fast charging station system O&M

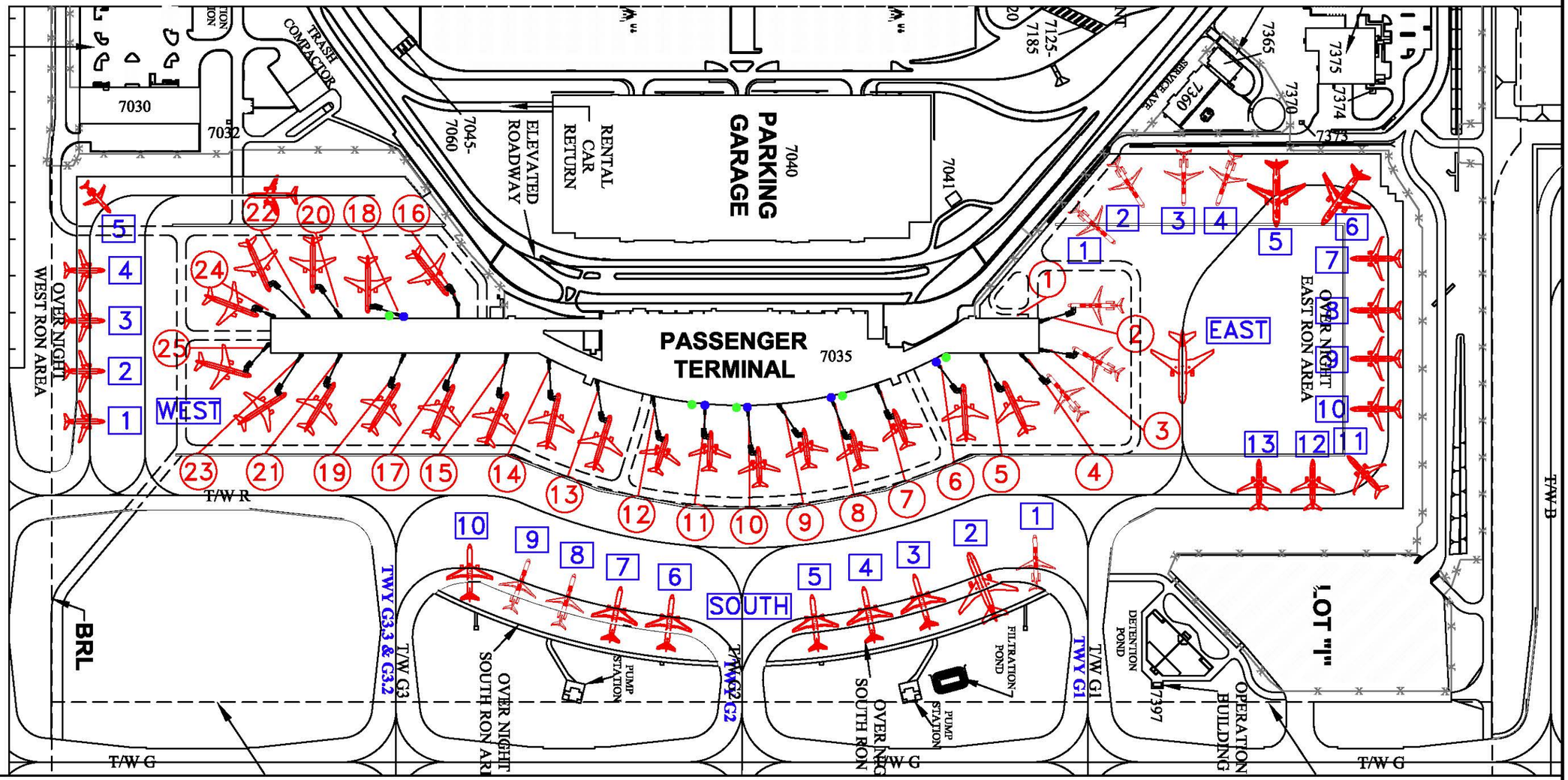
AUSTIN-BERGSTROM INTERNATIONAL AIRPORT

Charger Locations – Electric GSE

December 2012

GATE LEGEND

1. VACANT
2. VACANT
3. DELTA AIRLINES
4. VACANT
5. DELTA AIRLINES
6. DELTA AIRLINES
7. SWA AIRLINES
8. SWA AIRLINES
9. SWA AIRLINES
10. SWA AIRLINES
11. SWA AIRLINES
12. SWA AIRLINES
13. AA AIRLINES
14. AA AIRLINES
15. AA AIRLINES
16. UNITED AIRLINES
17. AA AIRLINES
18. UNITED AIRLINES
19. JETBLUE AIRWAYS
20. US AIRWAYS
21. VACANT
22. UNITED AIRLINES
23. UNITED AIRLINES
24. FRONTIER AIRLINES
25. UNITED AIRLINES



RON LEGEND:

EAST

1 DC-9-80	8 737-900W
2 DC-9-80	9 737-900W
3 DC-9-80	10 737-900W
4 DC-9-80	11 737-900W
5 767-300	12 737-900W
6 767-300	13 737-900W
7 737-900W	

SOUTH

1 DC-9-80	6 757-200
2 MD-11	7 757-200
3 757-200	8 DC-9-80
4 757-200	9 DC-9-80
5 757-200	10 757-200

WEST

1 737-700
2 737-700
3 737-700
4 737-700
5 CRJ-700

Charger Location Legend

- Jet Bridge Power Source
- Charger Location

SCALE 1"=400'

Austin-Bergstrom International Airport

L:\M20\m20n0354.dwg, CHRGR LOC

DVS/MVS PERIODIC MAINTENANCE SCHEDULE

<table>
<tr><th>Description</th><th>Maintenance Period</th><th>Every Day by User</th><th>Monthly</th><th>Every 3 Months</th><th>Yearly</th><th>Every 3 Years</th></tr>
<tr><td>Output Cables</td><td>Examine cables and replace any cable that exhibits signs of damage (splits, cracks, tears, exposed conductors etc.) or excessive wear</td><td>*</td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>Output Cable Connectors</td><td>Examine connectors and replace any connector that exhibits signs of damage (splits, cracks, exposed or pitted power pins, etc..) or excessive wear.</td><td>*</td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>Intake and Exhaust Vents</td><td>Inspect the intake vents at the back and exhaust at the lower front of the system for any reduced airflow or blockage. Remove any airflow obstruction to ensure proper system cooling.</td><td>*</td><td>*</td><td></td><td></td><td></td></tr>
<tr><td>Charger Exterior</td><td>Examine the exterior of the charger for signs of damage or excessive wear. Repair or replace any charger that has been damaged in such a way that conductors are exposed or the cabinet may contact internal conductors.</td><td>*</td><td></td><td></td><td>*</td><td></td></tr>
<tr><td>Charger Interior</td><td>Vacuum out dust from air inlet and exhaust vents. It may be necessary to vacuum out dust more frequently if unit is installed in a highly dusty environment.</td><td></td><td></td><td></td><td>*</td><td></td></tr>
<tr><td>Charger Interior Harness connections</td><td>Examine for signs of damage or wear in all harness connections.</td><td></td><td></td><td></td><td>*</td><td></td></tr>
<tr><td>Check for discoloration: DC OUTPUT CONTACTORS</td><td>Examine high current path for signs of discoloration and replace any discolored components – making sure to use correct torque on all fasteners.</td><td></td><td></td><td></td><td>*</td><td></td></tr>
<tr><td>DC Contactor Kilovac EV200AAANA (Note 1)</td><td>The DC contactor is designed for a life of at least 1,000,000 cycles</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>25</td><td>6</td></tr>
</table></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Note 1: Reference information given of components life expectancy

Configuration Management

Author: William H. Conn

Release Date: 11/15/04

ECO	Rev	Change Description	Date
5745	A	Initial Release	11/15/04

TABLE OF CONTENTS

LIST OF FIGURES

TABLES

1 SAFETY PRECAUTIONS - READ BEFORE USING

The MVS 400 and PowerStation are designed with the safety of the user as the highest priority. However, installation must comply with all local codes, and the following safety precautions must be read and observed.

1.1 SYMBOL USAGE

Throughout this manual, take special note of the information marked with the following symbols:

⚠ DANGER	Contains information about safety practices necessary to prevent personal injury or death.

⚠ WARNING	Contains information about safety practices necessary to prevent fire or equipment overheating.

⚠ CAUTION	Contains information to prevent shock hazard or possible damage to the equipment during installation and service.

NOTE: Offers helpful information for installation or usage, but does not contain personnel or equipment safety related information.

⚠ CAUTION BEFORE YOU BEGIN	• Read all instructions and cautionary markings on the Industrial PosiCharge Assembly. • Make sure you also read the IMPORTANT SAFETY INSTRUCTIONS below. • Be sure to leave these instructions with the installed unit for future reference. • Only qualified personnel should install, use or service this charger. • Read and understand these Manufacturer's instructions and your employer's safety practices manual.

⚠ **DANGER**	ELECTRIC SHOCK CAN KILL: • Touching live electrical parts can cause fatal shocks or severe burns. • The battery terminals are always electrically live, and the output circuit is live whenever the battery is connected or being charged. • The input power circuitry and internal circuits are live whenever input power is on. • An incorrectly installed or improperly grounded charger is a hazard.

- The unit must be grounded properly with a grounding conductor of size equal to or larger than that recommended by local electrical codes.
- Do not touch uninsulated battery terminals.
- Only qualified service personnel may remove the cover on the MVS 400 or PowerStation cover. There are no user serviceable parts inside. Refer all servicing to qualified service personnel. Opening the system or attempted installation or repair by other than qualified service personnel voids the warranty.
- Disconnect battery charger from input power and battery connections before installing or servicing the MVS 400. Lockout/tagout input power according to OSHA 29 CFR 1910.147.
- Do not expose to rain or perform installation/service/repair work when in standing water.
- Before disconnecting the battery, turn off the charger by pressing the stop button on the front panel of all PowerStations. PowerStations are designed to automatically stop a charge event to minimize arcing or burning of the charger connections in the event of a hot disconnect.

⚠ WARNING	OSHA INSTRUCTION STD 1-11.4 OCTOBER 30, 1978 4. Action "Battery charging" areas where power industrial truck batteries are charged only—no maintenance is performed, batteries are not removed from the trucks and no electrolyte is present in the area—are not subject to the requirement of 29 CFR 1910.178 (g) (2). The charging areas shall be in compliance with 29 CFR 1910.178 (g) (1), (8), (9), (10), (11) and (12). Personal protective equipment shall be used when and where required.

⚠ WARNING	IMPROPER INSTALLATION CAN CAUSE FIRE

- Do not install or place unit on, over or near combustible surfaces.
- Do not install unit near flammables.
- Do not block air intake or exhaust.
- Do not block airflow to the unit.
- Replace blown fuses only with same type and rating of fuse.
- Do not overload building wiring - be sure utility power service is properly sized, rated and protected to handle this unit. Use only on circuits provided with the minimum wire size specified in the installation section.
- Protective bollards should be installed where charging equipment location is subject to damage from vehicle activity.
- Do not install the charger if there is physical damage to the charger, coupler, or cable.

- Do not subject the cable or coupler to damage or stress. Do not step on the coupler cable.
- Do not hang from the coupler cable.
- Do not disassemble the MVS 400 or PowerStation.
- Only use metal conduit above ground.
- Follow the National Electrical Code (NEC) and local codes. NEC and local codes take precedence. If any instructions in this manual conflict with NEC or local codes, contact AeroVironment Inc. for further information.

2 GENERAL INFORMATION

2.1 SCOPE

This manual is intended to provide an authorized, fully trained installation technician with the information and guidance necessary to safely install the MVS 400™ and PowerStation™ equipment.

All non-standard tools are listed in Table 2.1. If parts or tools are needed in addition to those listed in this manual to perform service, this service is outside the scope of this manual and AeroVironment should be contacted directly for further assistance.

Training may be scheduled by contacting Customer Service at AeroVironment at:

(626) 357-9983 ext. 211

Fax: (626) 357-9729

E-mail: service@aerovironment.com

2.2 List of AeroVironment-Provided Equipment

Equipment Description	Quantity	Part Number	Comments
MVS 400	1	09190	
PowerStations	1-3	06900	
PowerStation Stands	0-8	08628	Optional
Cable Management Pole Assy	0-16	07233	Optional

2.3 Non-Standard Tools

Table 2.1 – Required Non-Standard Tools

No.	Equipment Description	Suggested Supplier	Part Number
A.	Multimeter	Fluke	8060A TRMS
B.	Bleed down resistor (300Ω, 10W) with alligator clips	AeroVironment, Inc.	FS-100-003
C.	Hex wrench set, SAE, 1/8" to 3/8"	---	---
D.	PowerStation Diagnostic Cable	AeroVironment, Inc.	06969

2.4 Required Literature

The following documents are required reference material for this installation procedure. Installation technicians must read and understand these documents before proceeding with installation process.

Table 2.2 – Required Reference Literature

AeroVironment Document #	Title
08628-76	PowerStation Stand Installation Guide
09416-03	Operation and Maintenance Manual, MVS 400 Fast Charging System

2.5 MVS 400 SYSTEM OVERVIEW

The MVS 400 is a complete multi-port fast charging system. The system may be configured as a stand-alone two port 40 kW fast charging system by connecting utility power and securing the unit to the floor. MVS 400 may be configured as a mult-port fast charging system by adding up to three PowerStations to create a 40 kW parallel fast-charging system comprising 4, 6, or 8 ports.

2.6 ESD Precautions

Electronic circuits are sensitive to damage from electrostatic Discharge. Persons servicing this equipment should be trained in proper techniques for avoiding ESD damage to electronic circuits. As a minimum, when handling circuit boards, wear an appropriate ESD wrist strap connected to the equipment chassis.

3 Installation Instructions

Only authorized installers or repair persons are authorized to perform the installation, maintenance, and repair of the MVS 400 and PowerStation.

3.1 Equipment Access

Be sure to use the proper size driver bits when removing or installing screws to avoid stripping the heads. A driver with a clutch setting just sufficient to drive the screws should be used to install them, this will avoid stripping the threads or breaking the threaded inserts. Screws should be started slowly after aligning the holes to avoid cross threading.

3.2 Conduit Connections

- Conduit size for all connections is 2 -1/2".
- 2-1/2" threaded hubs are provided.
- See Figure 6 for acceptable conduit entry locations

3.3 PowerStation Stand Installation

- Follow instructions in AV document 08628-76, PowerStation Stand Installation Guide

3.4 Cable Management System Installation

- Follow instructions per Figure 9.
- Note that concrete anchors are provided with installation kit.

3.5 Wiring

3.5.1 General Guidelines

- Table 3.3, Table 3.4, Table 3.5 and Table 3.6 for Input/Output parameters.
- See Figure 3 for MVS 400 Input/Output wiring. See Figure 12 for suggested PowerStation wire routing.
- Use only copper conductors and lugs for system wiring.
- External wiring and lugs are not provided.

3.5.2 Ground Wire

- Green or green with a yellow stripe and attached to the compression lug provided.

3.5.3 Output Wire

- Table 3.3, Table 3.4, Table 3.5 and Table 3.6 for wiring size (AWG) and additional information.
- Use THHN or similar type, 600V, 90° C, suitable for conduit use.
- Use copper conductors only.

3.5.4 Chassis Ground

- Table 3.3, Table 3.4, Table 3.5 and Table 3.6 for wiring size (AWG) and additional information.
- Use THHN or similar type, 600V, 90° C, suitable for conduit use.
- Use copper conductors only.

3.5.5 120 VAC Wire

- 120 VAC is from an isolated supply, limited to 10 amps, and is used for internal loads only. These wires are connected to a terminal block that can accept solid wire.
- This wire must be AWG 14 with a temperature rating of 75-90° C, use THHN or similar type, 600V, suitable for conduit use.
- See Table 3.4 for additional information.

3.6 Grounding

- MVS 400 must be connected to an equipment-grounding conductor routed with the circuit conductors. Connections must comply with all local codes and ordinances.
- The MVS 400 must be grounded in accordance with the Facilities Utility grounding method.
- See
- Table 3.3, Table 3.4, Table 3.5 and Table 3.6 for minimum ground wire size.
- The PowerStations are grounded by using the output-grounding stud in the MVS 400.
- See Figurer 1 for illustration of grounding connections.
- All other PowerStations are grounded via the first station and then the next PowerStation using the grounding stud provided in the wiring compartment in each PowerStation.

3.7 Communications and Control Cables

The communication cables from the MVS 400 to the first slave PowerStation and from each subsequent PowerStation to the next PowerStation must meet the following requirements:

A. See Table 3.5 for additional information.

B. Cable construction shall be suitable to be run in conduit.

C. Communications cables shall be constructed of 2 pairs of twisted, shielded wires. A cable comprising two twisted pairs with a single overbraid shield is also acceptable. Cable shields shall be terminated together and connected and routed per Figure 1 and Figure 12.

D. Control cables shall be constructed of 2 pairs of twisted wires. No shielding is required.

E. Conductor wire size shall be no less that 18 AWG with a minimum voltage rating of 300 volts and a minimum temperature rating of 75° C.

F. The recommended communication cable is ANIXTER wire PN: 2L-1802 POS or Alpha wire PN: 45132.

G. Communication cable wire colors are not standardized and are subject to change.

H. Wires, including shield terminations, shall be lugged using an insulated ring lug with a No. 6 hole.

3.8 Hardware

Manufacturer does not supply all external mounting hardware. User-supplied hardware may be needed to complete the installation.

3.9 Specifications

Table 3.1 – Physical Characteristics of GSE Equipment

Component	Height	Width	Depth	Weight
MVS 400	60"	32.4"	21.9"	905 lbs
PowerStation	30.0"	30.0"	19.0"	304 lbs
PowerStation on Stand	60.0"	30.0"	21.0"	363 lbs

Table 3.2 – Clearance Requirements for GSE Equipment

Component	Front	Back	Left	Right
MVS 400	36"	6"	8"	8"
PowerStation	36"	1"	6"	6"
PowerStation on PowerStation Stand	36"	6"	6"	6"

Table 3.3 – MVS 400 Input and Output Power Characteristics

Parameter	Value			
Input Voltage (VAC)	480			
Input Frequency (Hz)	60			
Number of Input Phases (Excluding Ground)	3			
Minimum Circuit Breaker Inrush Rating (Amps)	500			
Minimum Disconnect Switch Voltage Rating (VAC)	600			
Charge Port Output Voltage (VDC)	0-120			
Charge Port Output Current (Amps)	0-500			
Maximum Circuit Breaker Rating (Amps)	40	50	60	70
Input Current at Rated Output (Amps)	32	40	48	56
Minimum Input Conductor Size (AWG)	8	6	4	4
Minimum Grounding Conductor Size (AWG)	8	8	8	8
Minimum Input and Grounding Conductor Terminal Torque (in-lb)	65	65	65	65
Maximum Output Power (kW)	22.5	27	33	40
Maximum DC Bus Current (Amps)	166	201	248	305
Minimum DC Bus Conductor Size (AWG)	2/0	3/0	250 MCM or 2ea. 1/0	350 MCM or 2ea. 2/0
Minimum DC Bus Ground Wire Size (AWG)	4	4	4	2

Reference National Electrical Code. ANSI/NFPA 70.1999

Table 3.4 – Auxiliary AC Output Characteristics for MVS 400

Output Voltage (VAC)	120
Output Current (Amps)	4.2
Minimum Conductor Size (AWG)	14
Terminal Screw Size	#6
Minimum Wiring Terminal Torque (in-lb)	12

Reference National Electrical Code. ANSI/NFPA 70.1999

Table 3.5 – Communication and Control Cable Specifications

Assembly	Connects	Wire Size	Description
Communications Cables	PowerStation to PowerStation	18 AWG	Each cable contains 2 pairs of twisted, shielded (or with overbraid) wires

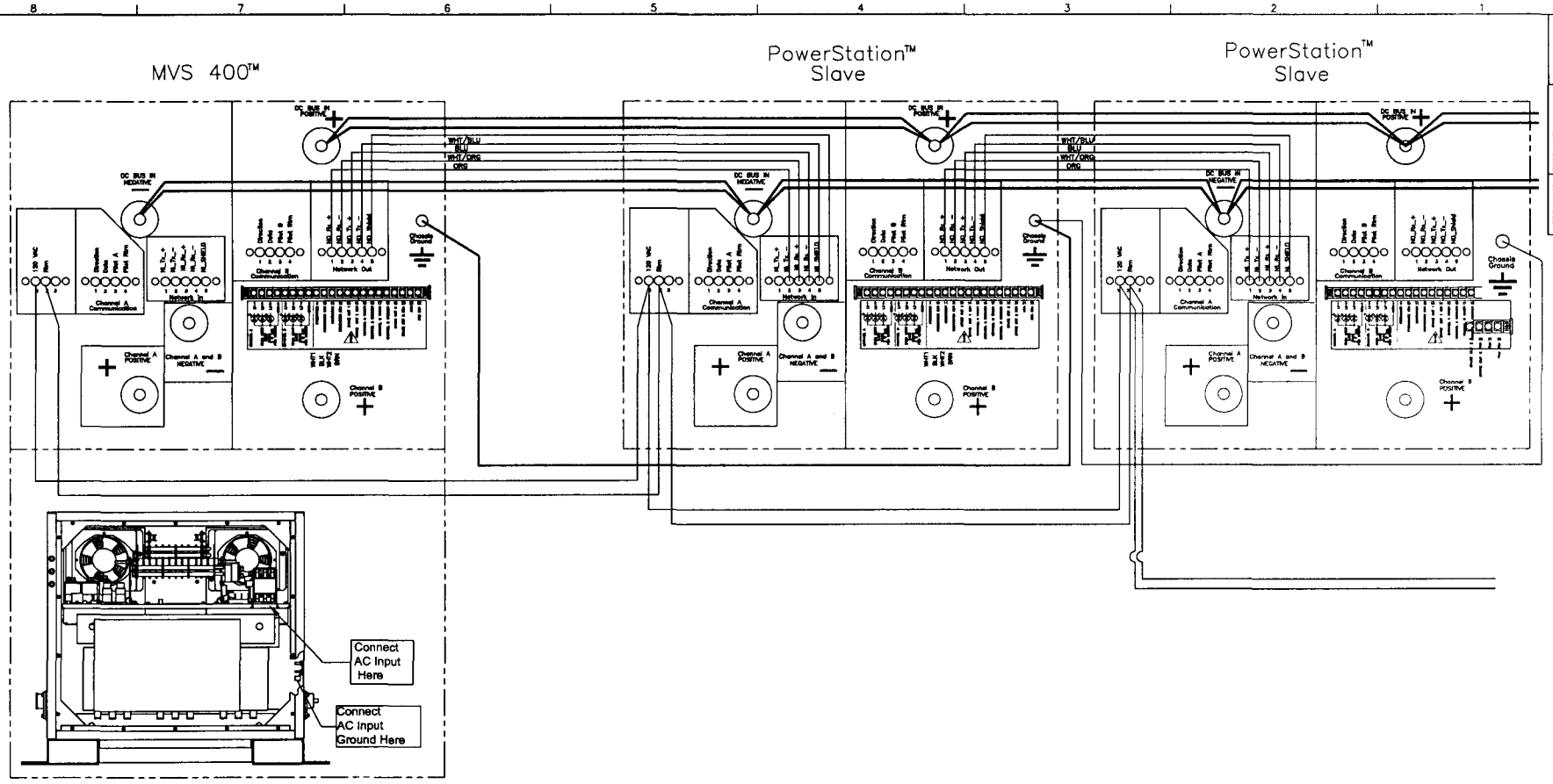
Table 3.6 – Input and Output Power Characteristics for PowerStation

Parameter	Value
Input Voltage	150VDC
Input Current, Amperes Maximum at Rated Output	305 A
DC+ and DC- BUS wire size:	See Table 3.3
Input / Output Wiring Stud Size	1/2"
Battery Charger Output Voltage Min. and Max Per Channel (VDC)	0-120
Battery Charger Output Current Min. and Max, 250A mode (Amps)	0-250
Minimum Output Wire Size in AWG, Pos. and Neg., 250A mode, AWG	2/0
Battery Charger Output Current Min. and Max, 500A mode (Amps)	0-500
Minimum Output Wire Size in AWG, Pos. and Neg., 500A mode, AWG	4/0
Minimum Input / Output Wiring Terminal Torque (in-lb)	350
Minimum Input / Output Grounding Conductor Size in AWG	2
Minimum Grounding Terminal Torque (in-lb)	200
Terminal Block Screw Torque (in-lb)	12

Reference National Electrical Code. ANSI/NFPA 70.1999

3.10 Initial Startup

Please see the Operation and Maintenance Manual, AV document #09146-03, for initial startup instructions.



MVS 400™ and PowerStation™ Wiring

1. The MVS 400™ DC output power cable may be wired from the MVS 400™ to the PowerStations™ in any sequence. These DC cables must be wired in "parallel" (not in "series") between PowerStations™.
2. The master PowerStation™ (IN THE MVS 400) Network "OUT" connects to the Network "IN" of the next PowerStation™. All other PowerStations™ have their Network cable connected to the previous PowerStation™ in a similar manner.

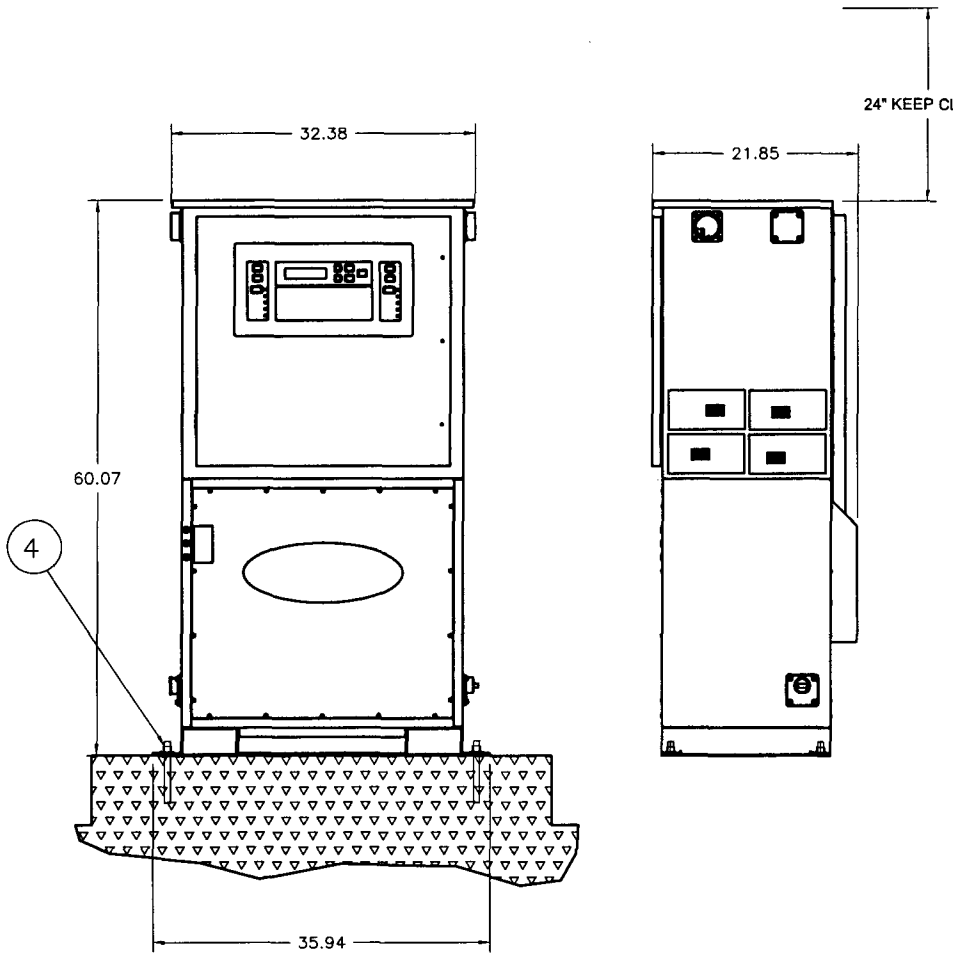
   Note: Always connect terminal 1 of Network out to terminal 1 of network in on the next PowerStation™
   Follow this procedure for terminal 2 through 5
3. The maximum number of PowerStations™ per MVS 400™ is 4, including the master.
4. The 120VAC wiring is generated within the MVS 400™ from an isolated source. The 120VAC cables must be wired in "parallel" (not in "series") between PowerStations™.

NOTES: SEE TABLES 3.3 THRU 3.7 FOR WIRING SIZE AND TYPE

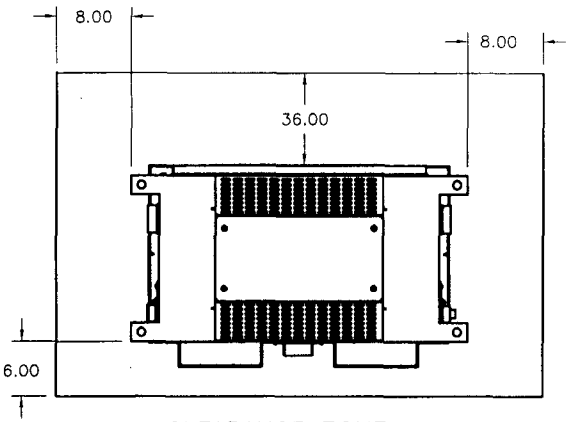
Fig. 1 MVS 400™ And PowerStation™ WIRING DIAGRAM

DWG. NO. 09415-76 | SHEET 14 | REV. A

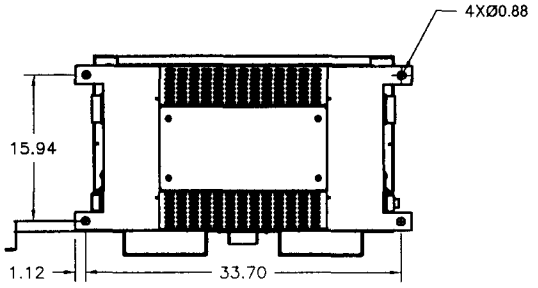
FSCM NO. 60107 | DWG. NO. 09415-76 | REV. A | SHEET 14 OF 26



MVS 400™ OUTLINE DIMENSIONS



CLEARANCE ZONES



MVS 400™ MOUNTING FOOTPRINT

C. MVS 400 MUST BE BOLTED TO CONCRETE PAD USING 5/8" ANCHOR BOLTS AS SPECIFIED

B. ALL DIMENSIONS ARE IN INCHES

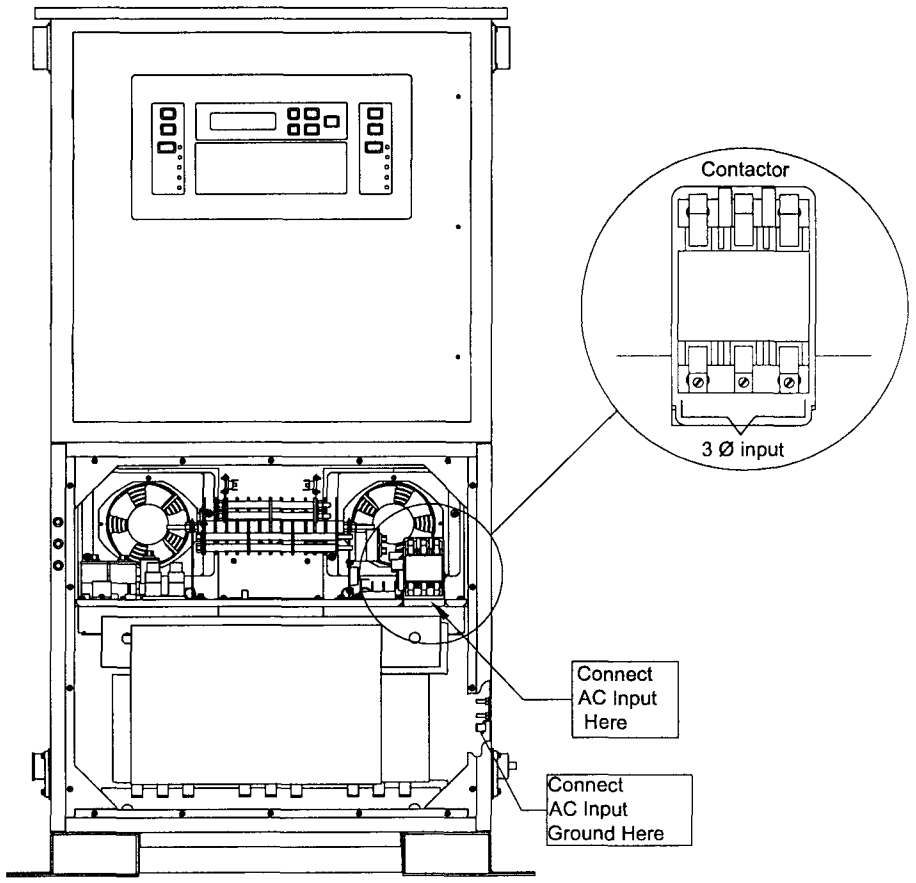
A. 6 IN. MINIMUM WORKING CLEARANCE FROM BACK WALL.
36 IN. MINIMUM WORKING CLEARANCE FROM FRONT,
6 IN. MINIMUM WORKING CLEARANCE FROM LEFT,
6 IN. MINIMUM WORKING CLEARANCE FROM RIGHT,
24 IN. MINIMUM WORKING CLEARANCE FROM TOP.

Dimensions are in inches and approximate

ITEM	QTY	DESCRIPTION
4	4	ANCHOR BOLTS, 5/8 DIA X 6.0"
		PARTS SUPPLIED BY OTHERS

FSCM NO. 60107 | DWG. NO. 09415-76 | REV. A | SHEET 15 OF 26

Fig. 2 MVS 400™ Installation



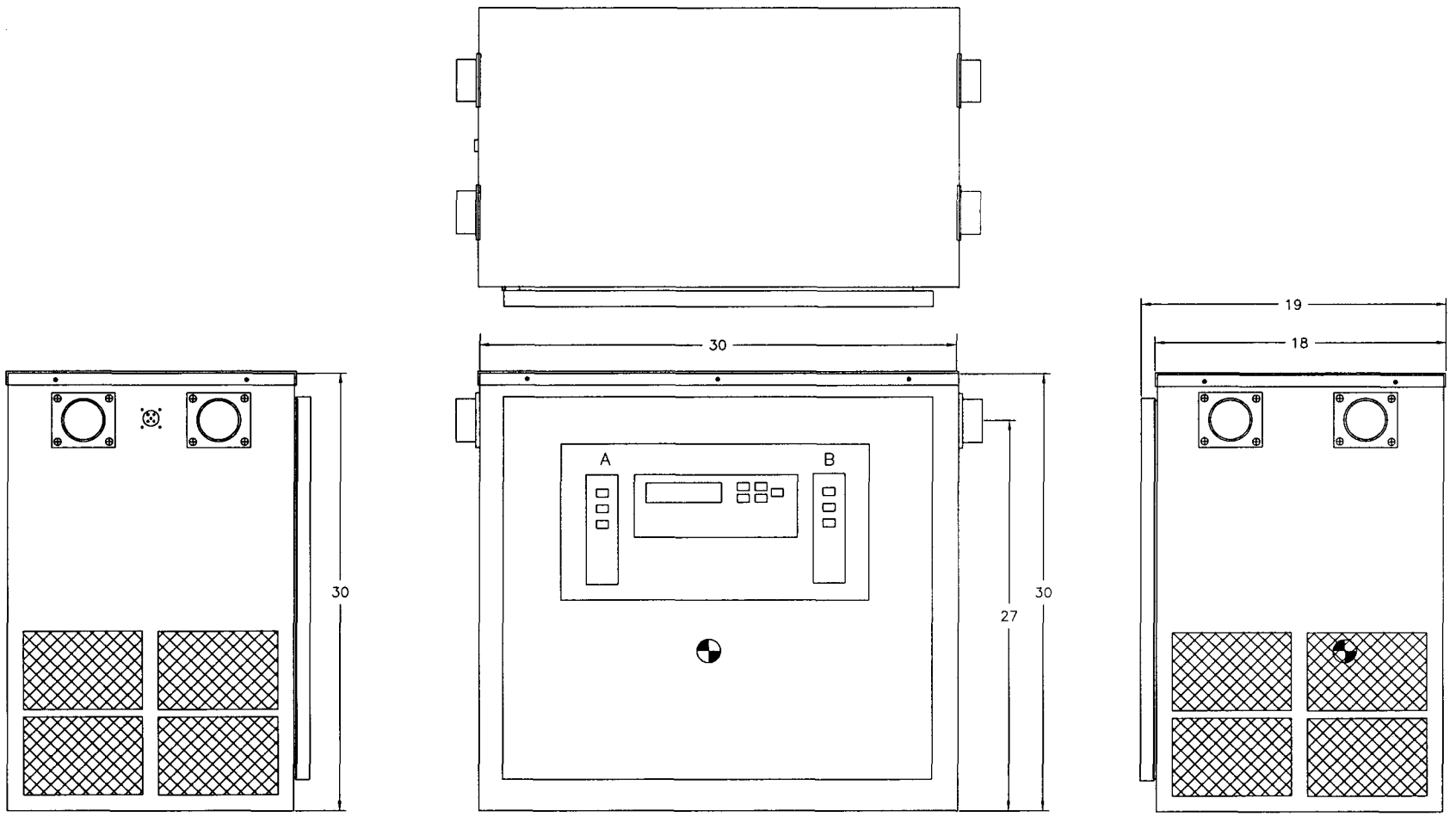
DETAIL VIEW
WIRING COMPARTMENT

C. SEE TABLES 3.3 AND 3.4 FOR WIRING INFORMATION

Fig. 3 MVS 400™ Wiring Detail

DWG. NO. 09415-76	SHEET 16	REV. A

FSCM NO.	DWG. NO.	REV.	SHEET
60107	09415-76	A	16 OF 26

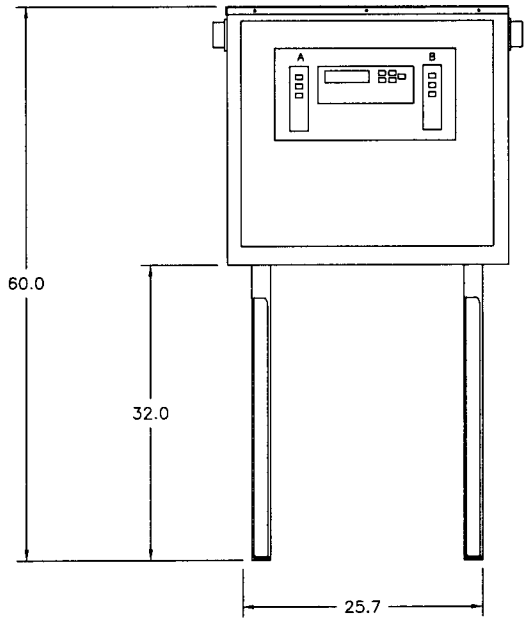


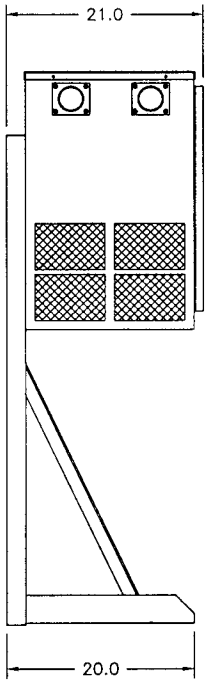
Weight is approx. 300 lbs.
Dimensions are
approximate

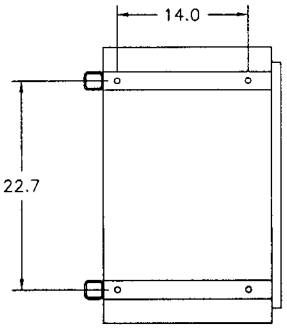
= Approximate Center of Gravity

1. ALL DIMENSIONS ARE IN INCHES.

Fig. 4 PowerStation™ Center Of Gravity





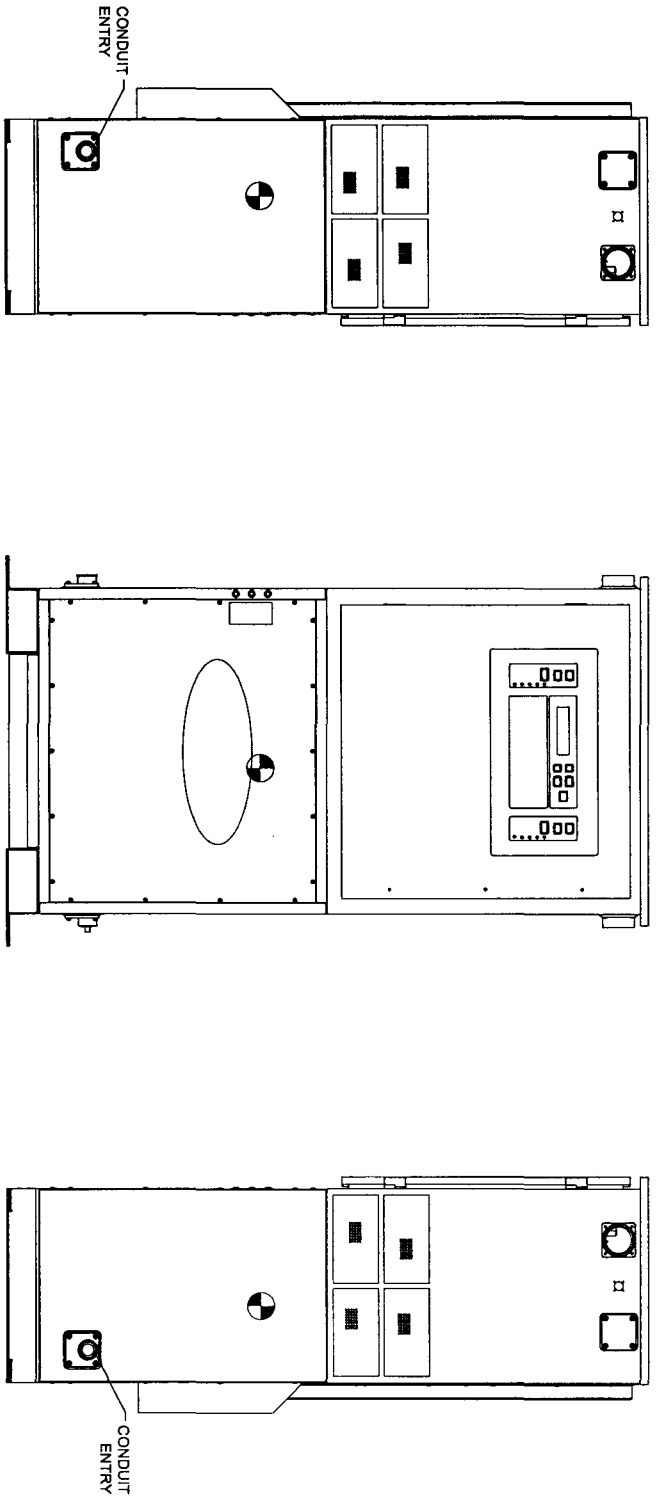


B. ALL DIMENSIONS ARE IN INCHES

A. 6 IN. MINIMUM WORKING CLEARANCE FROM BACK WALL.
36 IN. MINIMUM WORKING CLEARANCE FROM FRONT,
6 IN. MINIMUM WORKING CLEARANCE FROM LEFT,
6 IN. MINIMUM WORKING CLEARANCE FROM RIGHT

Fig. 5 PowerStation™ Installation

2. ALL DIMENSIONS ARE IN INCHES.



= Approximate Center of Gravity

Fig. 6 MVS 400™ CENTER OF GRAVITY & CONDUIT CONNECTION LOCATIONS

NOTE: SEE TABLES 3.6 AND 3.7 FOR INSTALLATION DATA

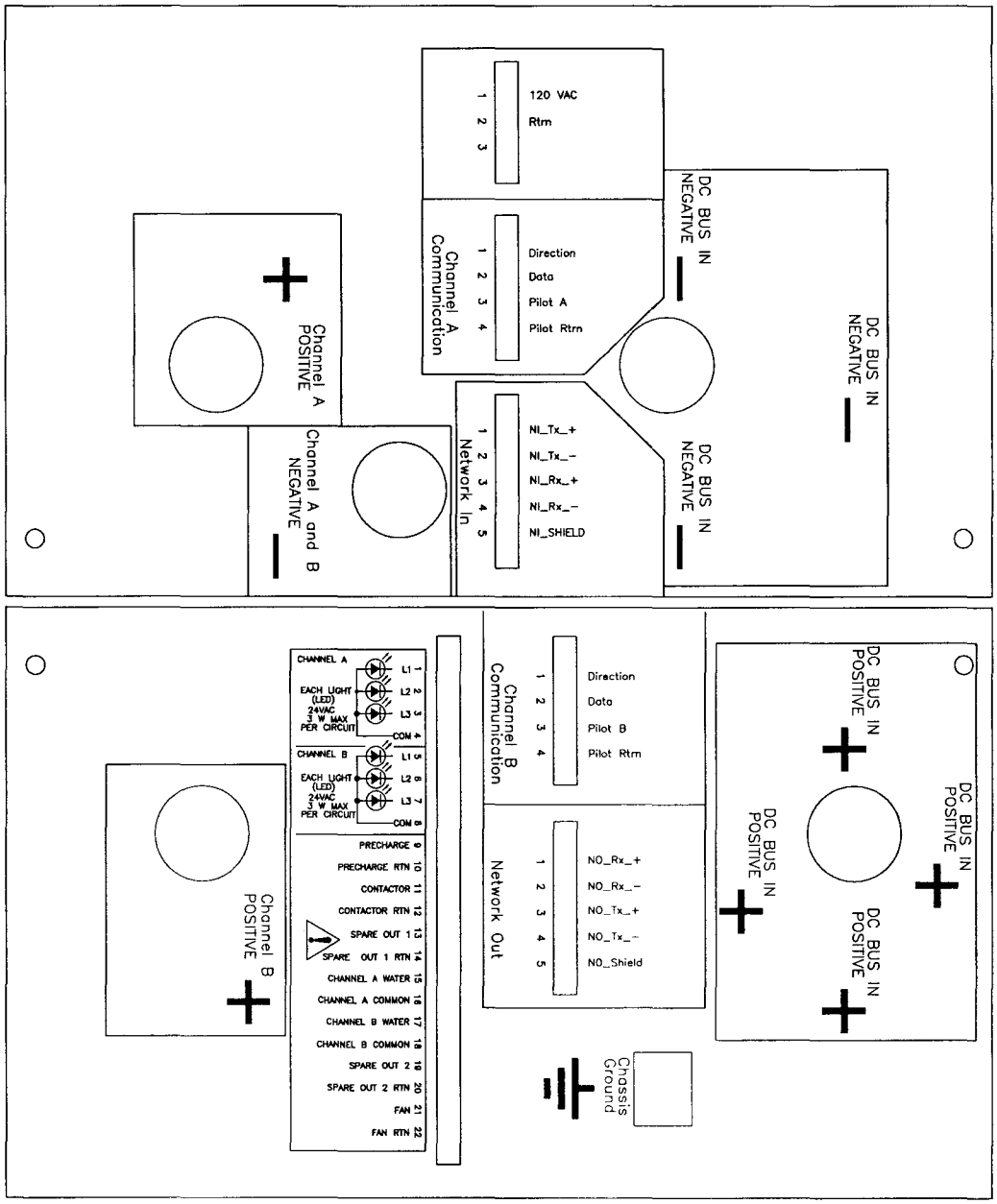
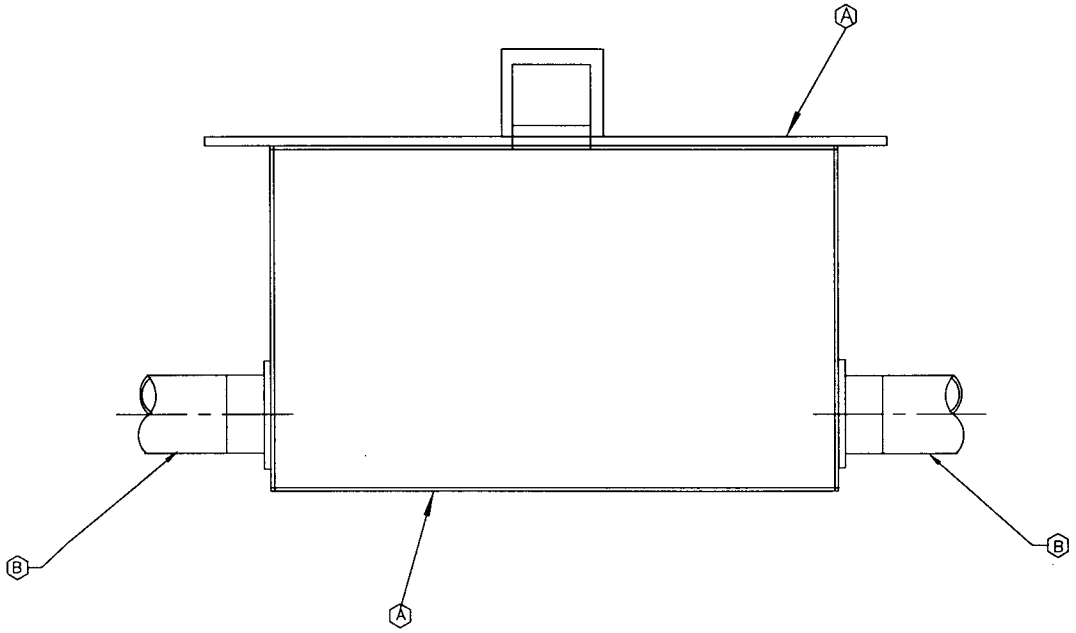


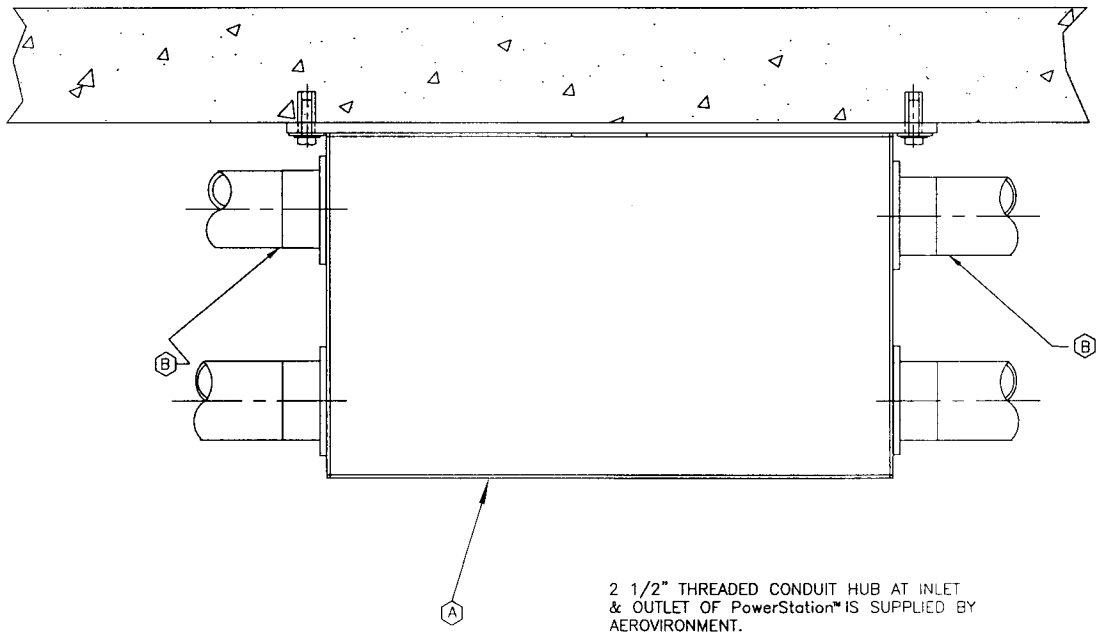
Fig. 7 PowerStation™ Field Wiring Label

FSCM NO.	DWG. NO.	REV.
60107	09415-76	A

TOP VIEW
PEDESTAL MOUNT (SQUARE TUBE)



TOP VIEW
WALL MOUNT

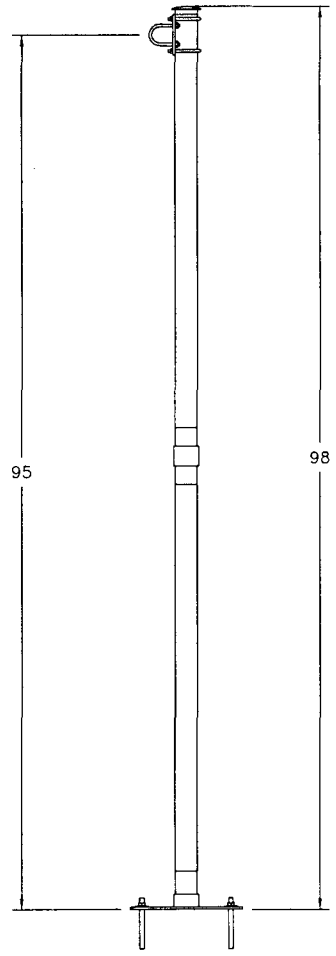


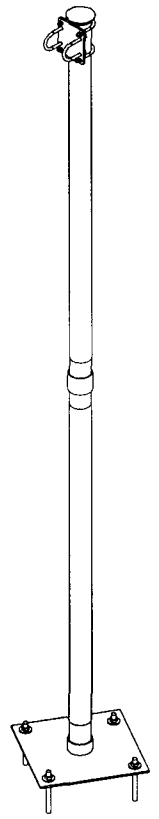
2 1/2" THREADED CONDUIT HUB AT INLET & OUTLET OF PowerStation™ IS SUPPLIED BY AEROVIRONMENT.

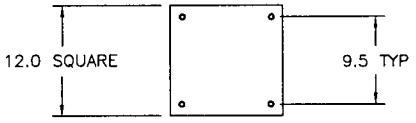
(B) OUTPUT CABLE ASSEMBLY and CONDUIT IS PROVIDED BY OTHERS

(A) PowerStation™

Fig. 8 PowerStation™ Installation Connection Wiring







B. ALL DIMENSIONS IN INCHES

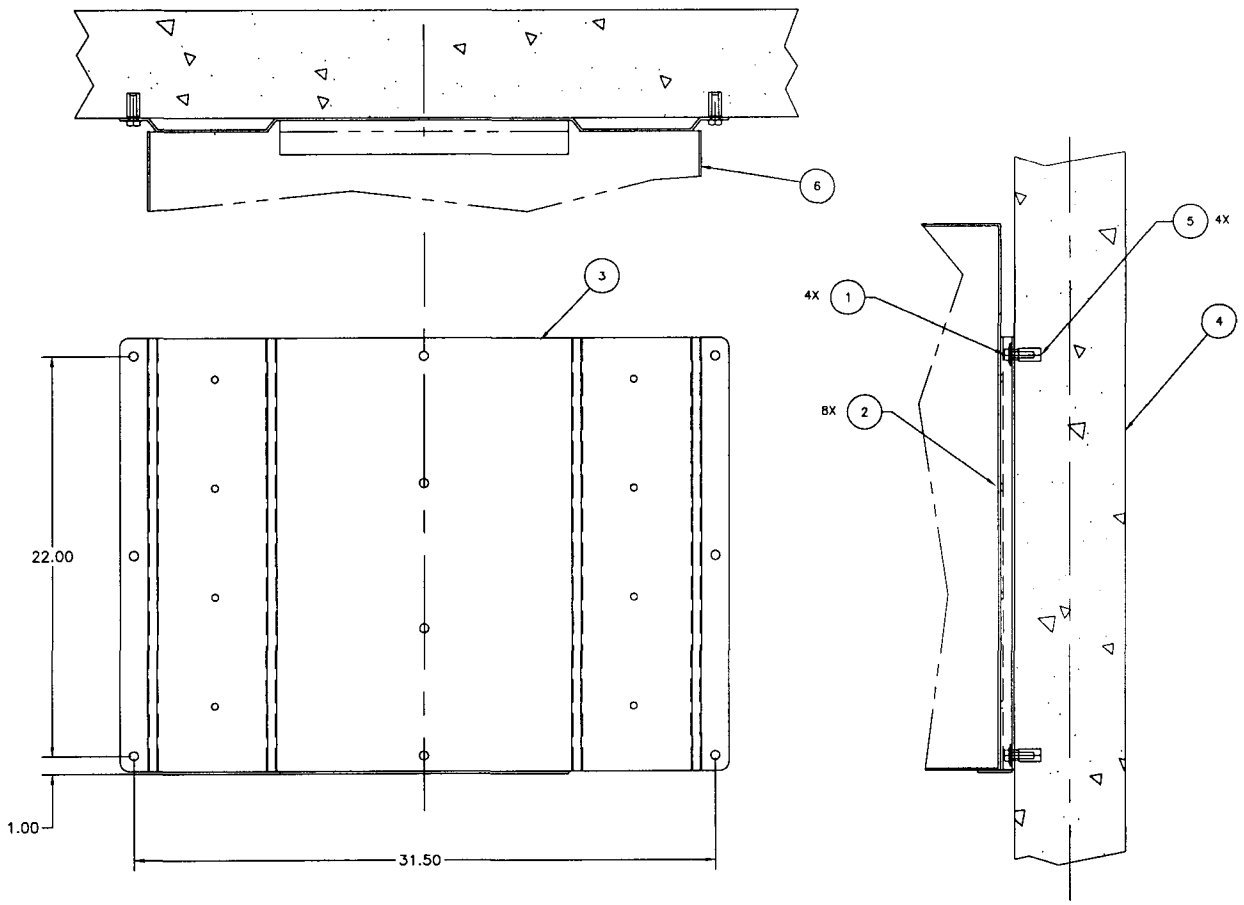
A. Power Pole Installation Instructions

1. Measure the locations for each pole.
2. Mount each pole to floor using 4 studs. Install studs into the concrete floor and bolt down pole's base.
3. Screw in first section of pole, followed by the extension piece and then second section of pole.
4. Install cable brackets supplied by AVP and attach charging cables to each pole.

Fig. 9 Power Pole™ Installation

DWG. NO. 09415-76 | SHEET 23 | REV. A

FSCM NO. 60107 | DWG. NO. 09415-76 | REV. A | SHEET 23 OF 26



⑥ PowerStation™ (PHANTOMED FOR CLARITY)

⑤ 3/8" THREADED ANCHOR INSERTS SUPPLIED BY OTHER

④ WALL, SUPPLIED BY OTHER

③ UNIVERSAL MOUNTING BACK PLATE, SUPPLIED BY AEROVIRONMENT INC WITH PowerStation™

② 1/4" SCREW, SUPPLIED BY AEROVIRONMENT, INC. WITH PowerStation™

① 3/8" HEX HEAD BOLT , SUPPLIED BY OTHERS.

1. ALL DIMENSIONS ARE IN INCHES

Fig.10 PowerStation™ Wall Mounting Plate

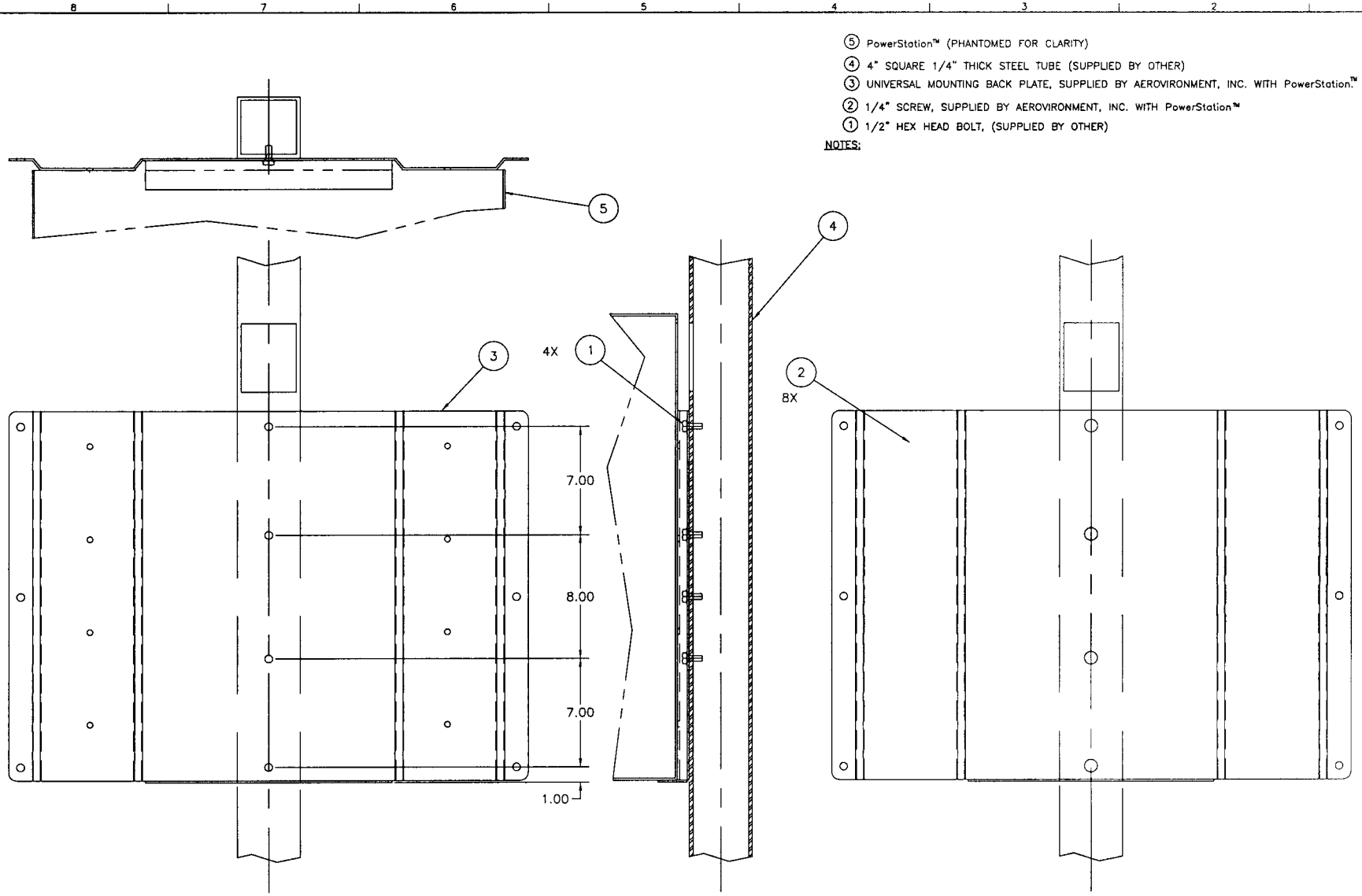


Fig 11. PowerStation™ Pole Mounting Plate

DWG. NO. 09415-76 | SHEET 24 | REV. A

FSCM NO. 60107 | DWG. NO. 09415-76 | REV. A | SHEET 24 OF 26

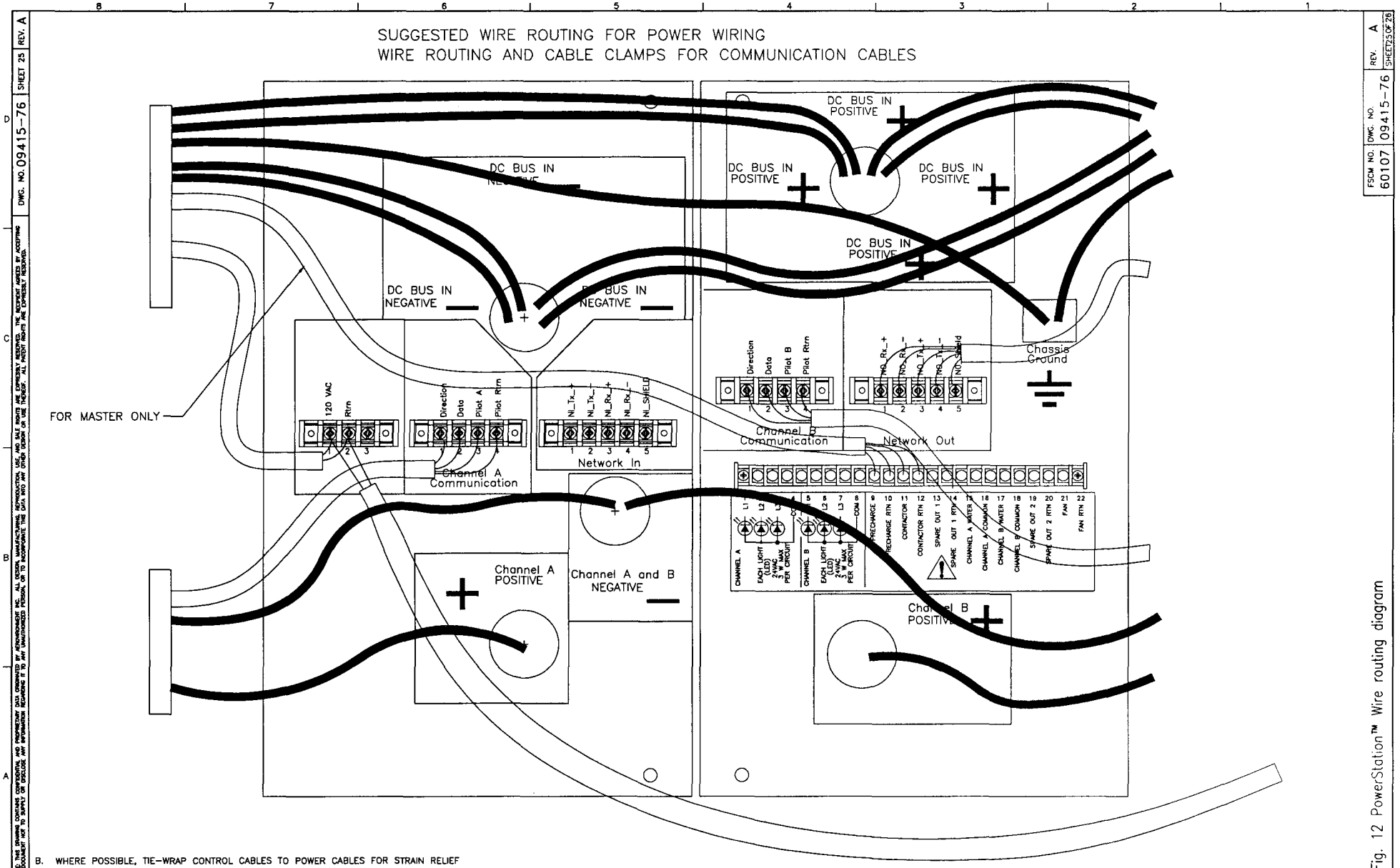
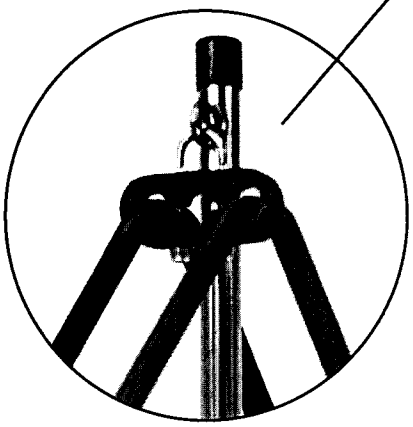


Fig. 12 PowerStation™ Wire routing diagram

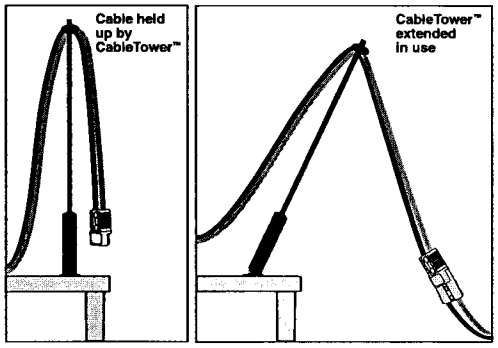
MVS 400 - INSTALLATION AND OPERATIONAL CHECKOUT				
MVS Serial #	**Slave 1 Serial #**	**Slave 2 Serial #**	**Slave 3 Serial #**	
_____	_____	_____	_____	
☐				UTILITY CONNECTIONS PROPERLY INSTALLED WITH ALL FASTENERS TIGHTENED TO SPECIFIED TORQUE
☐				ALL DC BUS CONNECTIONS PROPERLY INSTALLED WITH ALL FASTENERS TIGHTENED TO SPECIFIED TORQUE
☐				ALL SLAVE POWERSTATIONS CONNECTED TO MVS PER INSTALLATION MANUAL INSTRUCTIONS
☐	☐	☐	☐	ALL COMMUNICATION AND POWER WIRING IS PROPERLY CONNECTED ON UPPER SHELF
☐	☐	☐	☐	ALL HIGH CURRENT CABLES IN CHARGING PATH ARE SECURELY FASTENED
☐	☐	☐	☐	ALL SCREWS AND WASHERS PROPERLY INSTALLED ON DOOR AND COVER
☐	☐	☐	☐	GASKETS AND SCREWS PROPERLY INSTALLED IN CONDUIT HUBS
☐	☐	☐	☐	SCREWS AND CAP PROPERLY INSTALLED ON SERIAL PORT CONNECTOR
☐	☐	☐	☐	CONDUIT PROPERLY INSTALLED AND SEALED WITH DRIP LOOP, OR EQUIVALENT, TO PREVENT WATER INTRUSION
☐	☐	☐	☐	DRIP LOOP ON PORT "A" AND PORT "B" CHARGE CABLES
☐	☐	☐	☐	UNIT IS SECURELY MOUNTED
☐	☐	☐	☐	PORT "A" CHARGES PROPERLY WHEN CONNECTED TO VEHICLE
☐	☐	☐	☐	PORT "B" CHARGES PROPERLY WHEN CONNECTED TO VEHICLE
☐	☐	☐	☐	FRONT PANEL LED's WORK PROPERLY
☐	☐	☐	☐	DISPLAY IS FULLY OPERATIONAL
☐	☐	☐	☐	LATEST APPLICATION CODE HAS BEEN LOADED
☐	☐	☐	☐	ALL FRONT PANEL CONTROL BUTTONS ARE FUNCTIONAL
☐	☐	☐	☐	ALL POWERSTATIONS POWER UP AND NETWORK CONFIGURES CORRECTLY WHEN POWER APPLIED TO POWERSERVER

SYSTEM CHECKED BY – NAME / SIGNATURE:	/	**DATE:**	
CUSTOMER / LOCATION:	/	**GATE:**	

Unique non-conductive cable clamp included with each CableTower™



40″ Steel pole, zinc dichromate plated to prevent corrosion



Steel enclosure for safety, no pinch points

Internal 8″ heavy duty spring allows pole to tip and return to upright position

7/16″ aircraft quality mounting bolt, split washer and nut

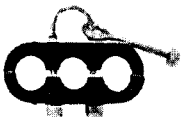
NEW

BATTERY PROTECTORS™

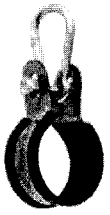
CableTower™

✓ Designed for Industrial Battery and Charger Cables

- Longer cable life
- Less damage to connector plugs
- Safer working conditions



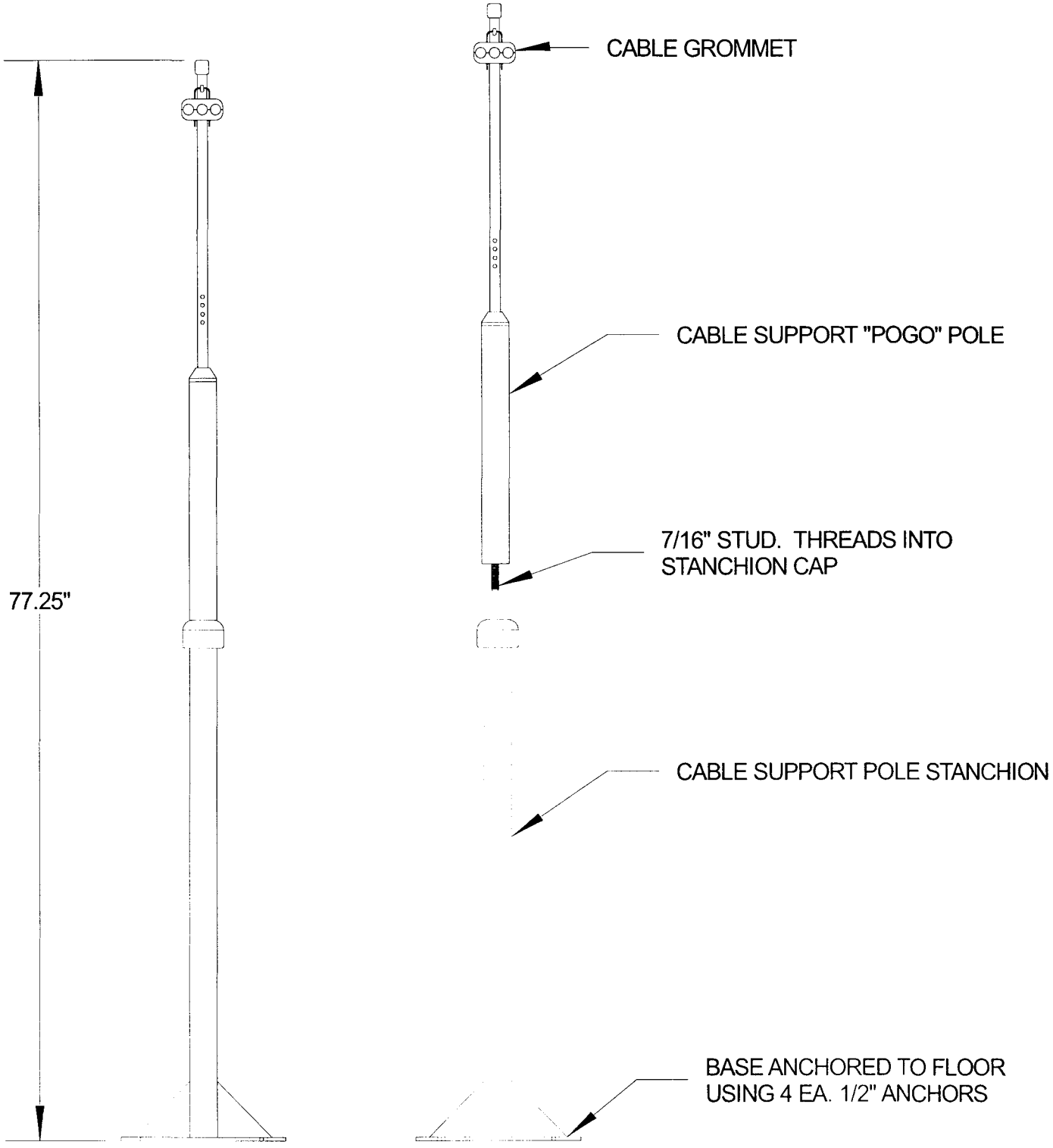
127601-001
3-Hole Replacement Clamp



127602-001
Hanger Bracket

Description	QC No.
Tower & 3-Hole Clamp	127600-001
3-Hole Replacement Clamp	127601-001
Hanger Bracket	127602-001

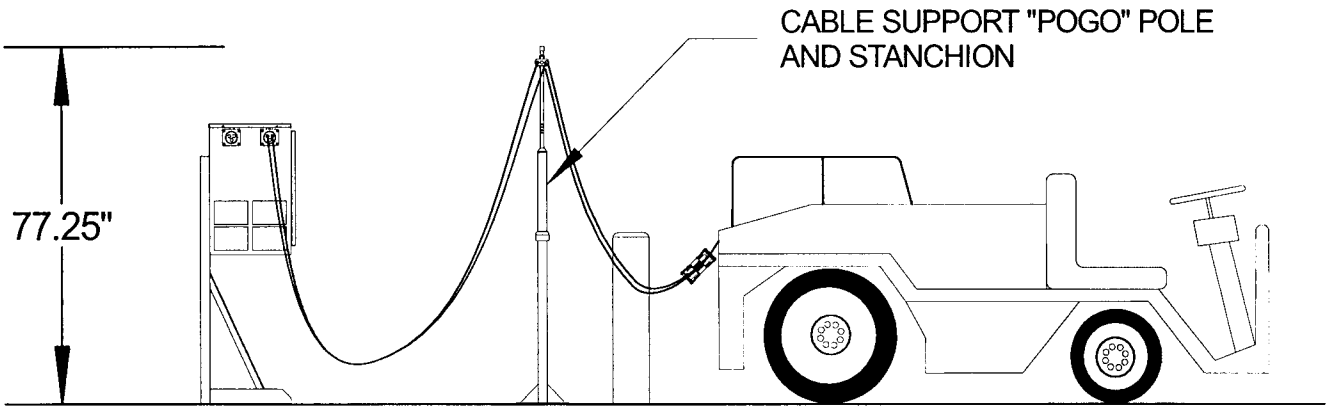
CABLE SUPPORT POLE AND STANCHION



ITEM	QTY	DESCRIPTION
		Averest, I

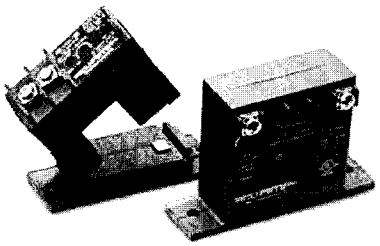
CHARGER CABLE SUPPORT POLE AND STANCHION

CABLE SUPPORT "POGO" POLE AND STANCHION INSTALLATION (TYP.)



ITEM	QTY	DESCRIPTION	CABLE SUPPORT POLE AND STANCHION
		Averest, Inc.	

ACS200 Series AC Current Switches



ACS200 series current operated switches provide the same dependable status indication as the ACS150 series, but with added resolution. A choice of three jumper-selectable input ranges allows the ACS200 to be tailored to an application and provides more precision in setpoint adjustment. Self-powered, isolated solid-state relay outputs and multiple input ranges are standard features.

Applications

Electronic Proof of Flow

- Current operated switch eliminates the need for multiple pipe or duct penetrations, lowering installed costs.
- Solid-state technology more reliable than electromechanical pressure or flow switches

Conveyors

- Detect jams and overloads; useful when interlocking multiple conveyor sections

Lighting, Heating Circuits

- Detect ON/OFF status, easier to install and less expensive than photocell or temperature sensor alternatives

Features

- Five-year warranty
- N.O./N.C. universal outputs 1A @ 240 VAC or 0.15 A @ 30 VDC.
- Status LED provides visual indication of setpoint trip and contact action.
- Self-powered operation cuts installation time and operating costs.
- Potentiometer-adjustable trip points speed start-up and allow for tailored operation.
- Choose fixed-core or split-core enclosure style. Split-core allows easy installation on existing systems; fixed-core offers more compact package for OEM or new installations.
- Built-in feet with optional 35 mm DIN rail adapter available.

Agency Approvals

UL, cUL, CE approvals accepted worldwide.

Part Number	Description	Pcs/Pkg	Wt (lb)	Price
ACS200-AA-F	N.O. AC adjustable current switch, fixed core	1	0.40	<--->
ACS200-AA-S	N.O. AC adjustable current switch, split core	1	0.40	<--->
ACS200-CA-F	N.C. AC adjustable current switch, fixed core	1	0.40	<--->
ACS200-CA-S	N.C. AC adjustable current switch, split core	1	0.40	<--->
ACS200-AD-F	N.O. DC adjustable current switch, fixed core	1	0.40	<--->
ACS200-AD-S	N.O. DC adjustable current switch, split core	1	0.40	<--->
ACS200-CD-F	N.C. DC adjustable current switch, fixed core	1	0.40	<--->
ACS200-CD-S	N.C. DC adjustable current switch, split core	1	0.40	<--->
Accessories				
DRA-2	DIN rail adapters, 1.69"x0.39"x0.75" (43x10x19 mm)	2	0.40	<--->

Range Jumper	Range - Fixed Core	Range Split Core	Maximum Input Amps 6 Sec max	Maximum Input Amps 1 Sec max
NONE	1 to 6 A	1.75 to 6 A	400	600
MID	6 to 40 A	6 to 40 A	500	800
HIGH	40 to 175 A	40 to 200 A	800	1200

Delay	LOW Range	MID Range	HIGH Range
ON Delay	0.23 sec max	0.05 sec max	0.03 sec max
OFF Delay	0.02 sec max	0.02 sec max	0.01 sec max
	6%	4%	3%

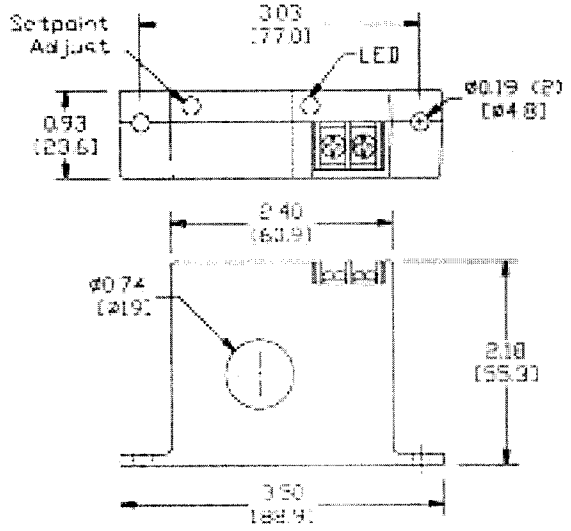
Part Number	Minimum Load Operating Current
ACS200-AA-F	20 mA
ACS200-AA-S	20 mA
ACS200-CA-F	20 mA
ACS200-CA-S	20 mA
ACS200-AD-F	1 mA
ACS200-AD-S	1 mA
ACS200-CD-F	1 mA
ACS200-CD-S	1 mA

Power Supply		None - Self-powered
Output		Isolated solid-state switch
Output Rating		N.O./N.C. AC: 1A @ 240 VAC N.O./N.C. DC: 0.15A @ 30 VDC
Response Time		40 - 120 ms
Off State Leakage		< 10 µA
Input Ranges		Jumper selectable: N.O. Fixed core: 1 to 175 A. Split core: 1.75 to 200 A; N.C. Fixed core: 1 to 175 A. Split core: 1.5 to 200 A
Hysteresis		low: 0.15A; mid: 0.3; high: 0.9A
Overload (1 second duration)		low: 600 A; mid: 800 A; high: 1,200 A
Isolation Voltage		UL listed to 1,270VAC. Tested to 5,000 VAC (1 minute max)
Frequency Range		6 to 100 Hz
Case		UL 94V-0 flammability rated
Environmental	Temperature	-58 to 149°F (-50 to 65°C)
	Humidity	0 to 95% RH, non-condensing
Agency Listings		UL listed 508, UL file E222847, CE approved

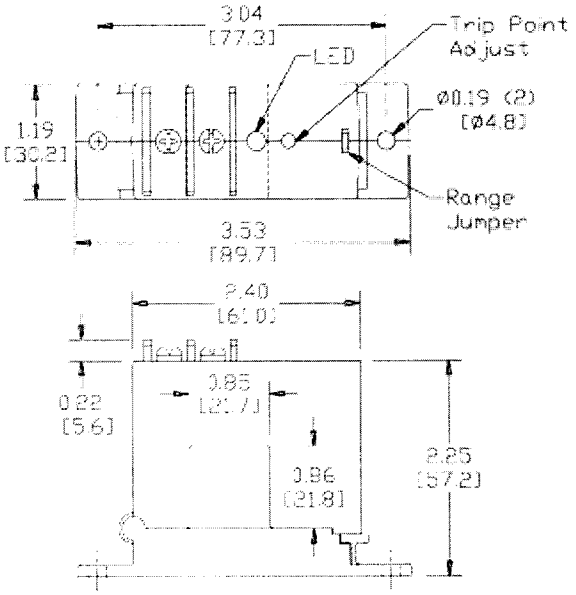
ACS200 Series AC Current Switches

Dimensions

Inches [mm]

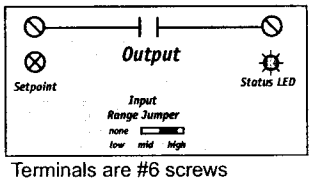


ACS200 Series Fixed Core

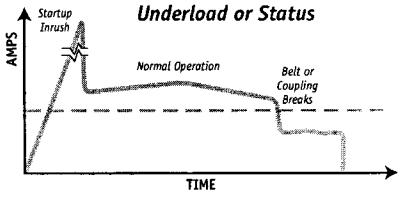


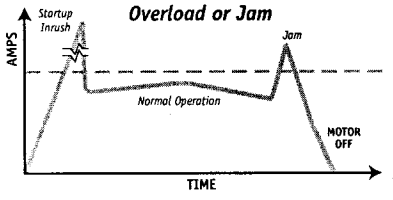
ACS200 Series Split Core

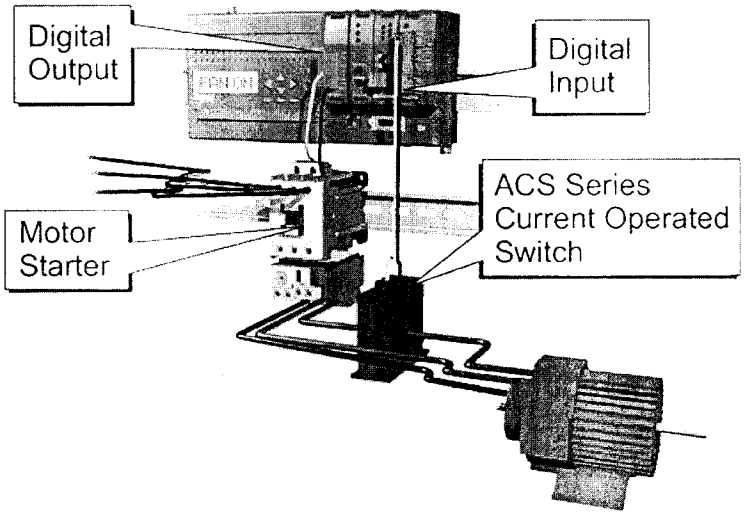
Connections



Terminals are #6 screws
Use up to 14 AWG copper wire







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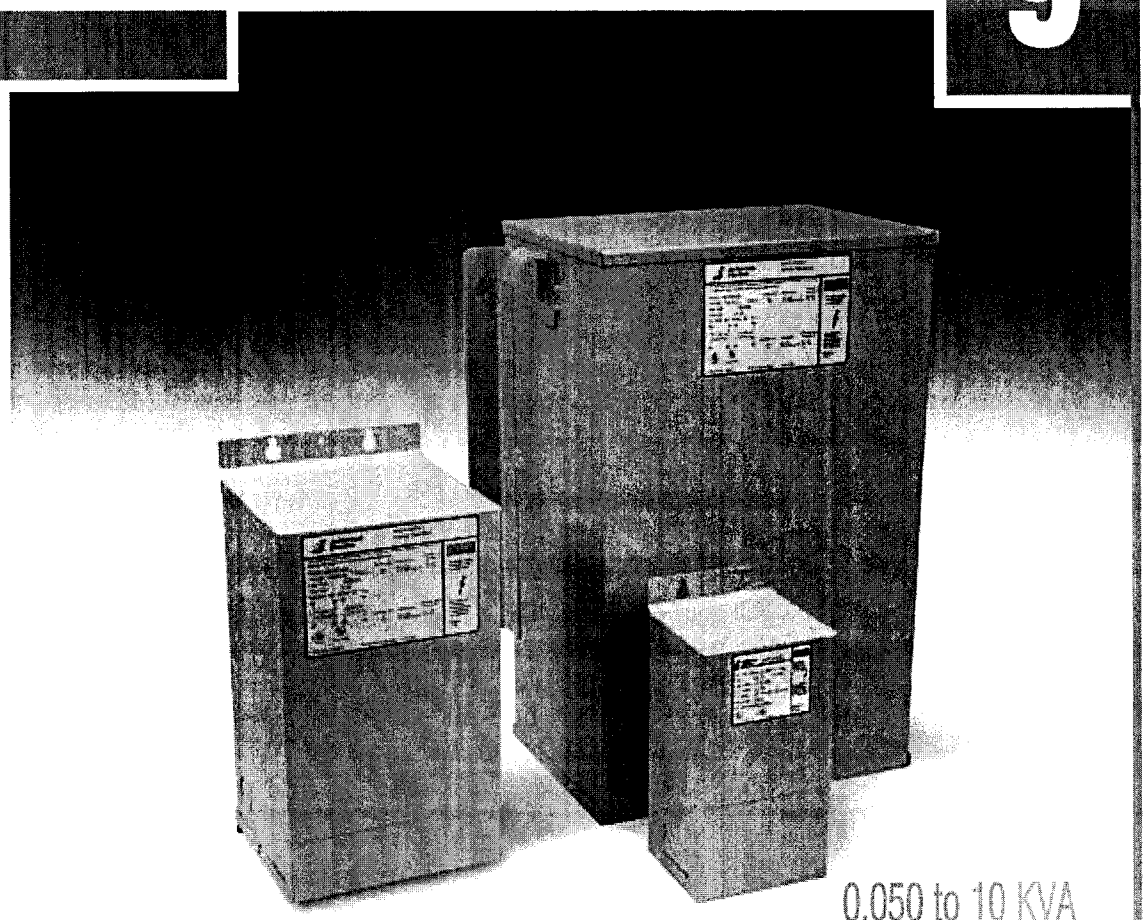


0.050 to 10 KVA

Contents

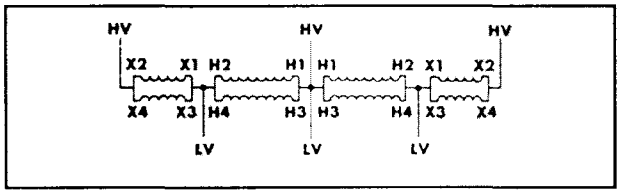
Three-Phase KVA Capacity of Encapsulated Powerformers™ Connected in Open-Delta

Maximum load capabilities requiring two Powerformers

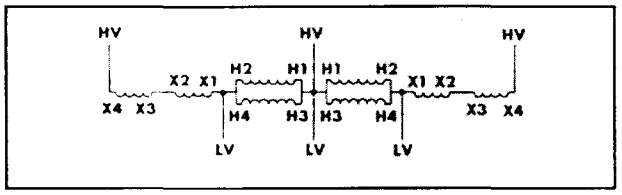
Low Voltage (LV)	High Voltage (HV)	Catalog Number	Load Required*	01 .100 KVA	11 .150 KVA	21 .250 KVA	31 .500 KVA	41 .750 KVA	51 1.0 KVA	61 1.5 KVA	71 2.0 KVA	81 3.0 KVA	91 5.0 KVA	Wiring Diagram
200	240	416-14xx	KVA	0.86	1.29	2.1	4.3	6.4	8.6	12.9	17.2	25.0	43.0	10
			Amperes	2.1	3.1	5.1	10.3	15.4	20.7	31.0	41.4	60.1	103.4	
208	236	416-12xx	KVA	1.27	1.91	3.1	6.3	9.5	12.7	19.1	25.5	38.2	63.7	12
			Amperes	3.1	4.7	7.6	15.4	23.2	31.1	46.7	62.4	93.4	155.8	
212	240	416-12xx	KVA	1.29	1.94	3.2	6.4	9.7	12.9	19.4	25.8	38.0	64.0	12
			Amperes	3.1	4.7	7.7	15.4	23.3	31.0	46.7	62.1	91.4	154.0	
208	230	416-11xx	KVA	1.65	2.47	4.1	8.2	12.3	16.5	24.7	33.0	49.5	82.5	12
			Amperes	4.1	6.2	10.3	20.6	30.9	41.4	62.0	82.8	124.3	207.1	
218	240	416-11xx	KVA	1.73	2.59	4.3	8.6	12.9	17.3	25.9	34.6	51.0	86.0	12
			Amperes	4.2	6.2	10.3	20.7	31.0	41.6	62.3	83.2	122.7	206.9	
225	240	416-12xx	KVA	2.59	3.89	6.4	12.9	19.4	25.9	38.9	51.9	77.0	129	11
			Amperes	6.2	9.4	15.4	31.0	46.7	62.3	93.6	124.8	185.2	310.3	
229	240	416-11xx	KVA	3.46	5.18	8.6	17.3	25.9	34.6	51.8	69.2	103	173	11
			Amperes	8.3	12.5	20.7	41.6	62.3	83.2	124.6	166.5	247.8	416.2	
230	253	416-14xx	KVA	1.81	2.72	4.5	9.0	13.6	18.1	27.2	36.3	54.0	90.0	9
			Amperes	4.1	6.2	10.3	20.5	31.0	41.3	62.1	82.8	123.2	205.4	
230	276	416-14xx	KVA	0.99	1.49	2.4	4.9	7.4	9.9	14.9	19.9	29.0	49.0	10
			Amperes	2.1	3.1	5.0	10.2	15.5	20.7	31.2	41.6	60.7	102.5	
240	252	416-11xx	KVA	3.64	5.47	9.1	18.2	27.2	36.4	54.7	72.8	109	182	11
			Amperes	8.3	12.5	20.8	41.7	62.3	83.4	125.3	166.8	249.7	417.0	
240	264	416-11xx	KVA	1.9	2.86	4.7	9.5	14.2	19.0	28.6	38.1	57.0	95.0	12
			Amperes	4.2	6.3	10.3	20.8	31.1	41.6	62.5	83.3	124.7	207.8	
240	272	416-12xx	KVA	1.47	2.2	3.6	7.3	11.0	14.7	22.0	29.4	44.1	73.6	12
			Amperes	3.1	4.7	7.6	15.5	23.3	31.2	46.7	62.4	93.6	156.2	
240	288	416-14xx	KVA	1.03	1.55	2.5	5.1	7.7	10.3	15.5	20.7	31.0	51.0	10
			Amperes	2.1	3.1	5.0	10.2	15.4	20.6	31.1	41.5	62.1	102.2	
437	480	416-14xx	KVA	1.73	2.59	4.3	8.6	12.9	17.3	25.9	34.6	51.0	86.0	12
			Amperes	2.1	3.1	5.2	10.3	15.5	20.8	31.2	41.6	61.3	103.4	
457	480	416-14xx	KVA	3.46	5.18	8.6	17.3	25.9	34.6	51.8	69.2	103	173	11
			Amperes	4.2	6.2	10.3	20.8	31.2	41.6	62.3	83.2	123.9	208.1	
480	504	416-14xx	KVA	3.64	5.47	9.1	18.2	27.2	36.4	54.7	72.8	109	183	11
			Amperes	4.2	6.3	10.4	20.8	31.2	41.7	62.7	83.4	124.9	209.6	
480	528	416-14xx	KVA	1.9	2.86	4.7	9.5	14.2	19.0	28.6	38.1	57.0	95.0	12
			Amperes	2.1	3.1	5.1	10.4	15.5	20.8	31.3	41.7	62.3	103.9	

* Load required is calculated based on the low voltage as the load.

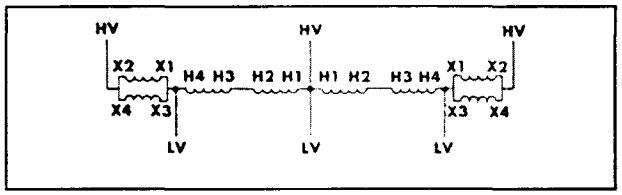
Buck-Boost Wiring Diagram 9



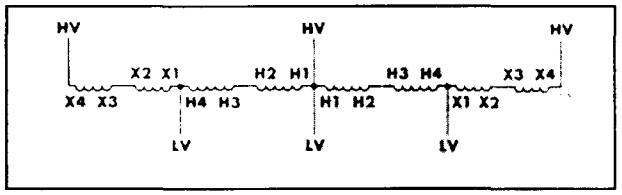
Buck-Boost Wiring Diagram 10



Buck-Boost Wiring Diagram 11



Buck-Boost Wiring Diagram 12



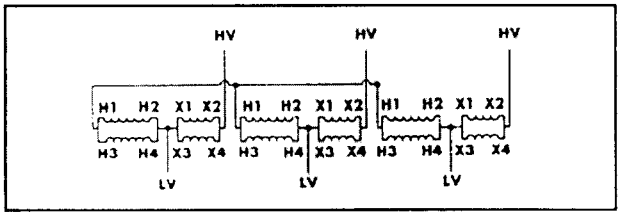
Three-Phase KVA Capacity of Encapsulated Powerformers™ Connected in Wye

Maximum load capabilities requiring three Powerformers

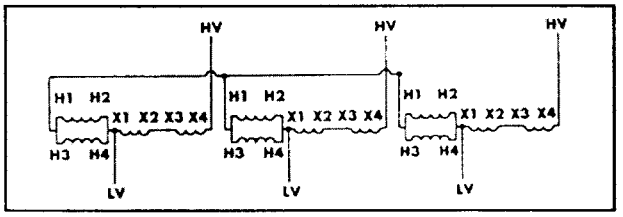
Low Voltage (LV)	High Voltage (HV)	Catalog Number	Load Required*	01 .100 KVA	11 .150 KVA	21 .250 KVA	31 .500 KVA	41 .750 KVA	51 1.0 KVA	61 1.5 KVA	71 2.0 KVA	81 3.0 KVA	91 5.0 KVA	Wiring Diagram
164	208	416-12	KVA	1.1	1.7	2.8	5.6	8.4	11.2	16.8	22.0	34.0	56.0	6
			AMPS	3.89	5.89	9.79	18.9	29.4	38.9	58.9	78.9	117	197	
173	208	416-11	KVA	1.5	2.2	3.7	7.5	11.2	15.0	22.5	30.0	45.0	75.0	6
			AMPS	5.0	7.5	12.5	25.0	37.0	50.0	75.0	100	150	250	
183	208	416-12	KVA	2.2	3.3	5.6	11.2	16.8	22.5	33.7	45.0	67.0	112	5
			AMPS	7.07	10.5	17.6	34.9	52.8	70.7	105	141	212	354	
189	208	416-11	KVA	3.0	4.5	7.5	15.0	22.5	30.0	45.0	60.0	90.0	150	5
			AMPS	9.17	13.7	22.9	45.8	68.8	91.7	137	183	275	458	
208	229	416-11	KVA	3.3	4.9	8.2	16.5	24.7	33.0	49.5	66.0	99.0	165	5
			AMPS	9.17	13.7	22.9	45.8	68.8	91.7	137	183	275	458	
208	235	416-12	KVA	2.5	3.8	6.3	12.7	19.1	25.5	38.2	51.0	76.5	127	5
			AMPS	7.08	10.5	17.6	35.0	52.5	70.8	105	141	212	350	
208	249	416-11	KVA	1.8	2.7	4.5	9.0	13.5	18.0	27.0	36.0	54.0	90.0	6
			AMPS	5.0	7.5	12.5	25.0	37.5	50.0	75.0	100	150	250	
208	263	416-12	KVA	1.4	2.1	3.5	7.1	10.6	14.2	21.4	28.0	42.0	71.0	6
			AMPS	3.91	5.91	9.83	19.1	29.1	39.1	59.1	79.1	118	191	
346	416	416-14	KVA	1.5	2.2	3.7	7.5	11.2	15.0	22.5	30.0	45.0	75.0	6
			AMPS	2.5	3.75	6.25	12.5	18.5	25.0	37.5	50.0	75.0	125	
367	416	416-12	KVA	2.2	3.3	5.6	11.2	16.8	22.5	33.7	45.0	67.0	112	8
			AMPS	3.53	5.28	8.82	17.4	26.4	35.3	52.8	70.7	106	174	
378	416	416-11	KVA	3.0	4.5	7.5	15.0	22.5	30.0	45.0	60.0	90.0	150	8
			AMPS	4.58	6.88	11.4	22.9	34.4	45.8	68.8	91.7	137	229	
390	416	416-12	KVA	4.5	6.7	11.2	22.5	33.7	45.0	67.5	90.0	135	225	7
			AMPS	6.66	10.0	16.6	33.3	49.7	66.6	100	133	200	333	
397	416	416-11	KVA	6.0	9.0	15.0	30.0	45.0	60.0	90.0	120	180	300	7
			AMPS	8.73	13.1	21.8	43.6	65.5	87.3	131	174	262	436	
398	438	416-14	KVA	3.1	4.7	7.8	15.7	23.6	31.5	47.2	63.0	94.0	157	5
			AMPS	4.56	6.82	11.3	22.6	33.9	45.6	68.2	91.3	136	229	
398	478	416-14	KVA	1.7	2.5	4.3	8.6	12.9	17.2	25.9	34.0	51.0	86.0	6
			AMPS	2.50	3.75	6.25	12.5	18.7	25.0	37.5	50.0	75.0	125	
416	437	416-11	sKVA	6.3	9.4	15.7	31.5	47.2	63.0	94.5	126	189	315	7
			AMPS	8.75	13.1	21.8	43.7	65.4	87.5	131	175	262	437	
416	443	416-12	KVA	4.8	7.2	12.0	24.0	36.0	48.0	72.0	96.0	144	240	7
			AMPS	6.66	10.0	16.6	33.3	50.0	66.6	100	133	200	333	
416	457	416-11	KVA	3.3	4.9	8.2	16.5	24.7	33.0	49.5	66.0	99.0	165	8
			AMPS	4.58	6.87	11.4	22.9	34.1	45.8	68.7	91.6	137	229	
416	471	416-12	KVA	2.5	3.8	6.3	12.7	19.1	25.5	38.2	51.0	76.5	127	8
			AMPS	3.54	5.29	8.83	17.5	26.2	35.4	52.9	70.8	106	175	
416	498	416-14	KVA	1.8	2.7	4.5	9.0	13.5	18.0	27.0	36.0	54.0	90.0	6
			AMPS	2.5	3.75	6.25	12.5	18.7	25.0	37.5	50.0	75.0	125	

* Load required is calculated based on the low voltage as the load.

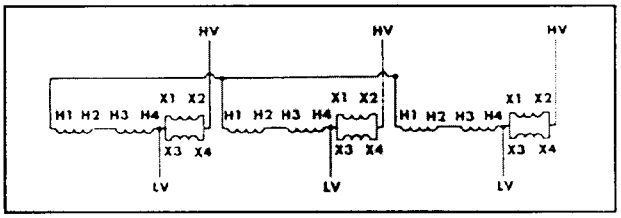
Buck-Boost Wiring Diagram 5



Buck-Boost Wiring Diagram 6



Buck-Boost Wiring Diagram 7



Buck-Boost Wiring Diagram 8

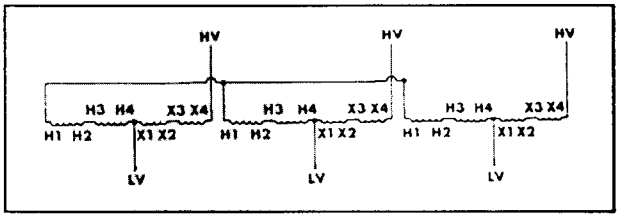


Figure 2

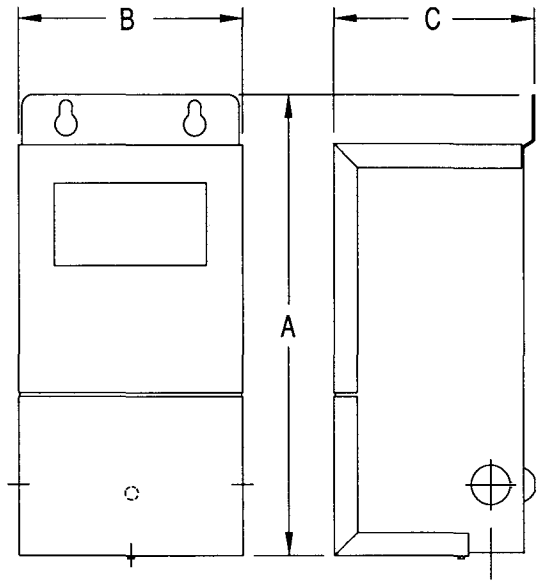


Figure 3

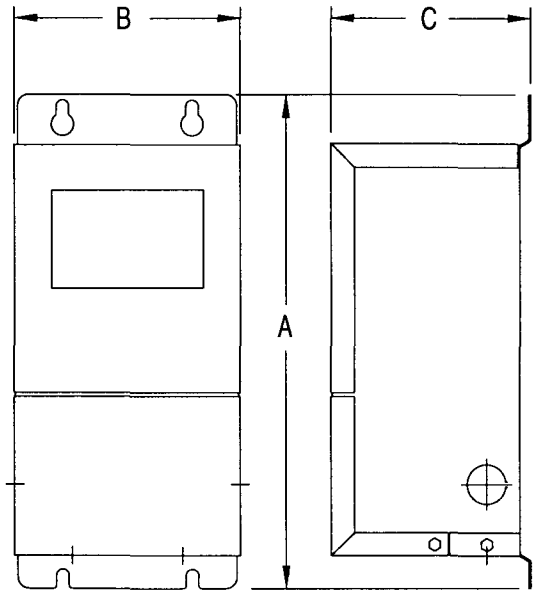
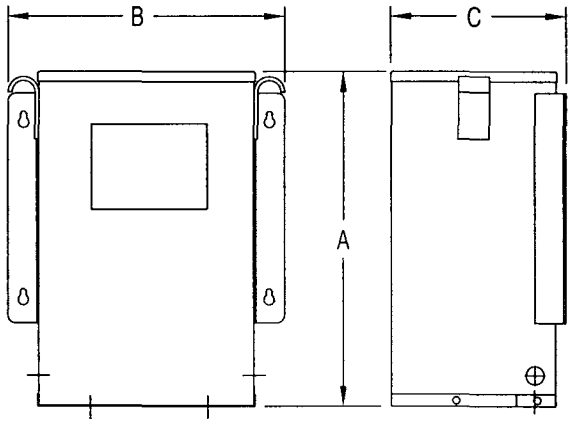


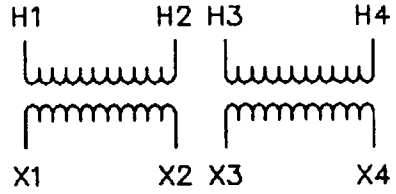
Figure 4



S240B Wiring Diagram & Connections*

Wiring Diagram

Primary: 120 X 240
Secondary: 12/24



Connections

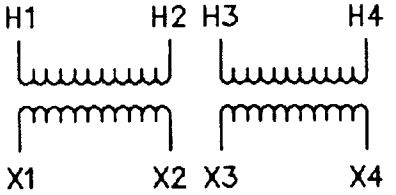
Primary Volts	Interconnect	Primary Lines Connect To
240	H2 to H3	H1-H4
120	H1 to H3 H2 to H4	H1-H4

Sec. Volts	Interconnect	Secondary Lines Connect To
24	X2 to X3	X1-X4
12	X1 to X3 X2 to X4	X1-X4

S240C Wiring Diagram & Connections*

Wiring Diagram

Primary: 120 X 240
Secondary: 16/32



Connections

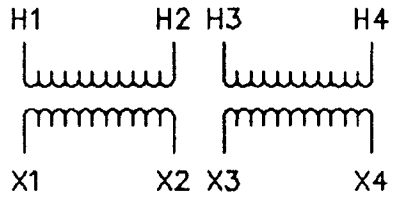
Primary Volts	Interconnect	Primary Lines Connect To
240	H2 to H3	H1-H4
120	H1 to H3 H2 to H4	H1-H4

Sec. Volts	Interconnect	Secondary Lines Connect To
32	X2 to X3	X1-X4
16	X1 to X3 X2 to X4	X1-X4

S480E Wiring Diagram & Connections*

Wiring Diagram

Primary: 240 X 480
Secondary: 24/48



Connections

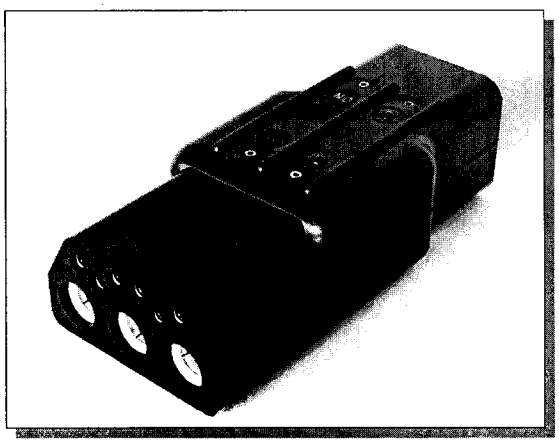
Primary Volts	Interconnect	Primary Lines Connect To
480	H2 to H3	H1-H4
240	H1 to H3 H2 to H4	H1-H4

Sec. Volts	Interconnect	Secondary Lines Connect To
48	X2 to X3	X1-X4
24	X1 to X3 X2 to X4	X1-X4

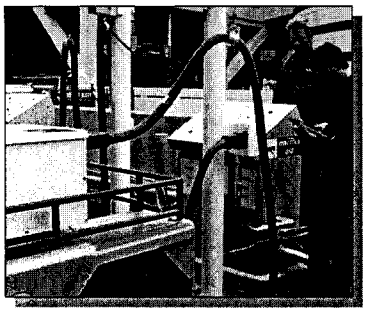
NOTE: Electrostatic shields are optionally available and not shown in all wiring diagrams.

Apollo™ Power Connectors

J&B AVIATION SERVICES
A DIVISION OF GSE HOLDINGS INC.



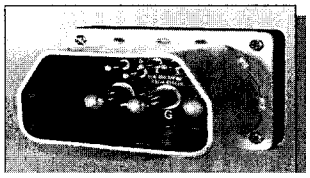
Apollo EV Charging Connectors deliver high current to industrial electric vehicles operating in harsh environments. Connectors are designed to work with off-board chargers which supply electrical charging current to battery packs at rates of up to 400 Amperes. Connectors are suitable for outdoor use and are field-proven to withstand severe handling.



Optional LED State of Charge Indicators provide operators with state of charge information. Optional Power Switches allow users to engage power remotely.

BIW's exclusive PowerGlide™ contact design (patents applied for) ensures low insertion forces and excellent electrical performance for the life of the product. The Apollo 270 (not pictured) is a lightweight 200A connector, which is 40% lighter than the standard connector.

Receptacle Connector



The Receptacle Connector is intended to be used with a power interlock which allows the contacts to be energized only while engaged with a mating plug connector. The glass reinforced receptacle body plate is virtually indestructible during normal use.

The optional Receptacle Shield helps guide the plug during engagement and prevents contact with live connector components. Electrical attachments to the rear of the receptacle are made with lug terminals. An optional Rear Cover prevents access to live parts.

J&B AVIATION SERVICES
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Vacaville, CA 95688

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Phone 1-707-469-2600
Fax 1-707-469-2620
sales@jandbaviation.com

Apollo Charging Connector Performance

• Current Rating — Power Contacts	
Apollo 400 Series	400 A Continuous; 600 A for 15 minutes
Apollo 200 Series	200 A Continuous; 300 A for 15 minutes
• Power Contacts	2 each
• Ground Contacts	1 — First Make, Last Break
• Control Contacts	5 each
• Pilot Contacts	1 — Last Make, First Break
• Current Rating — Control Contacts	35 A Continuous
• Mechanical Crushing Load	2000 lbs. Minimum
• Connector Engagement Force	30 lbs. Maximum
• Engagement Cycles	Tested to 10,000

ITW GSE GROUP
J&B aviation
Make the *RIGHT* connection.®

Follow us:

Apollo™ Power Connectors

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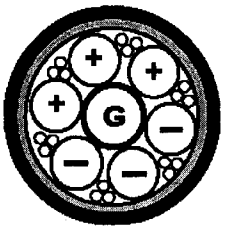
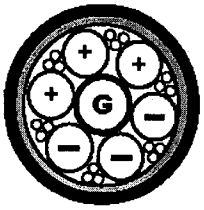
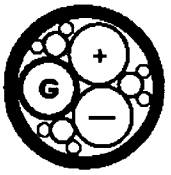


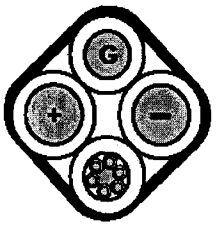
450 Amp
Fast Charge Cable
Cable #JB0018



200 Amp
Fast Charge Cable
Cable #JB0016



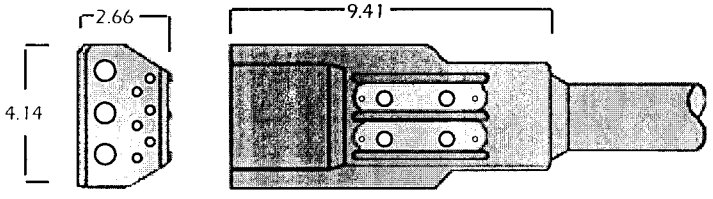
93 Amp
Equalization Charge Cable
Cable #JB0004



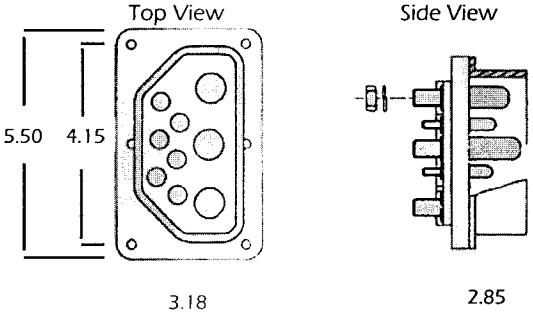
Banded Cables
Amps as Required

	450 Amp Fast Charge Cable Cable #JB0018	200 Amp Fast Charge Cable Cable #JB0016	93 Amp Equalization Charge Cable Cable #JB0004	Banded Cables Amps as Required
Positive Conductors	3 each AWG 2	3 each AWG 4	1 each AWG 4	1 or 2 As Required
Negative Conductors	3 each AWG 2	3 each AWG 4	1 each AWG 4	1 or 2 As Required
Ground Conductors	1 each AWG 2/0	1 each AWG 2/0	1 each AWG	4 As Required
Control Conductors	6 x 3 AWG 18 Shielded	6 x 3 AWG 18 Shielded	3 each AWG 9 6 each AWG 14	6 each AWG 18 Shielded
Insulation Material	EPR Rubber	EPR Rubber	EPR Rubber	EPR Rubber
Jacket Material	Neoprene, Rayon Reinforced	Neoprene, Rayon Reinforced	Neoprene, Rayon Reinforced	Neoprene
Stranding	Class M, Extra Flexible	Class M, Extra Flexible	Class M, Extra Flexible	Class K or M
Voltage Rating	150 VDC	150 VDC	150 VDC	150 VDC
Current Rating	450 A	200 A	93 A	As Required
Overcurrent	600 A for 15 minutes	300 A for 15 minutes	125 A for 15 minutes	TBD
Operating Temperature	-55°C to +55°C	-55°C to +55C	-55°C to +55°C	-55°C to +55°C
Storage Temperature	-55°C to +65°C	-55°C to +65°C	-55°C to +65°C	-55°C to +65°C
Diameter	1.95 inches	1.65 inches	1.25 inches	Varies with Amperes
Bending Radius	14 inches	10 inches	9 inches	Requirements
Weight / Ft.	3.1 lbs/ft	2.1 lbs/ft	1.2 lbs/ft	

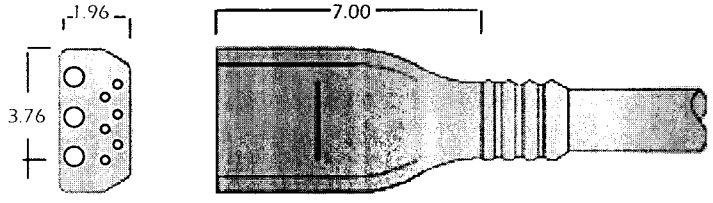
Apollo™ 400/200 Amp Power Connector Dimensions



Apollo™ Power Receptacle Connector



Apollo™ 200 Amp Lightweight Power Connector Dimensions



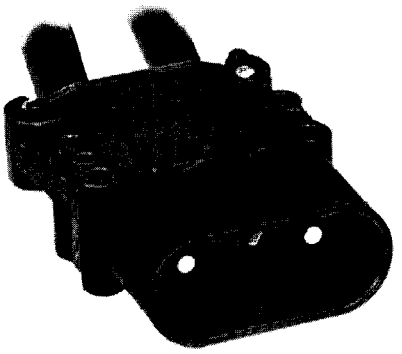
EBC Connectors

The Anderson Power Products "A" Series Euro Battery Connector (EBC) uses the DIN43589-1 form factor which has been specially configured for North American fast battery charging systems.

Unlike other DIN43589-1 connectors, our "A" Series offers contact and crimp tooling selections developed for both American Wire Gauge and Metric cable. We also offer a broader range of auxiliary wire contacts for communication control applications.

The connector design incorporates an advanced, cost effective contact carrier for ease of assembly and fewer components. All materials are selected to ensure years of reliable service under adverse battery environments.

Features



• Impact resistant plastic housing
PA6 (Nylon) housings provide superior impact resistance to stand up to rough usage

• Up to four auxiliary contacts
Can be used for battery monitoring and charger communications. Auxiliary contact sizes available from 10AWG to 18AWG.

• Low mating forces
Connectors can be mated and unmated without the necessity of added hardware

• Hexagonal voltage key for 24V, 36V, 48V, 72V, 80V, or 96V
Key prevents mating of different operating voltages

Note: Will not mate with "E" Series Housings

SPECIFICATIONS

Electrical		Mechanical	
Current Rating (Amperes) *		Life	
UL	350	a. No Load (mating cycles)	>5000
EN1175-1:1998	320	b. Under Load (Hot Plug 5 mating cycles @96V)	800A
CSA	270		
Voltage Rating		Average Mating / Unmating Force (lbf)	12
UL / CSA	600	(N)	53
EN1175-1:1998	150	Degree of Protection	IP23
Wire Range		Acid Resistence	1.10g / cm^3
- Power Contacts - AWG (mm^2)	#1/0 to #4/0 (50 / 95)	Contact Retention - minimum (lbf)	100
- Auxiliary Contacts - AWG (mm^2)	#18 to #10 (1.5 / 6)	(N)	445
Dielectric Withstanding Voltage (AC)	2,200	Materials	
Average Contact Resistance (micro-ohms)	30	Housing	PA6 (Nylon) glass filled
Operating Temperature (°C)	-25° to 105°	Contacts	Copper alloy, silver plate
(°F)	-13° to 221°	Hardware	Steel, zinc chromate plate

** Current derating curves must be observed as current capacity will vary dependent on wire cross section and ambient temperature. Maximum current carrying capacity is measured at 40°C / 104°F using the maximum wire cross section permissible, crimped to contacts using APP recommended tooling.*

ORDERING INFORMATION

Connector Part Number Selection

Series	Gender	Main Contact		Handle	Coding Key	Auxiliary Contacts	Packaging
A32	4	01	-	1	0	B	9

4	Plug			9	Individual
1	None - Order Separately		0	None	8 Bulk
2	#1/0 AWG / 50 mm^2		A	(2) Lower Auxiliary Contacts (320-22)	
3	#2/0 AWG / 70 mm^2		B	(2) Upper Auxiliary Contacts (320-24)	
4	#3/0 AWG / 95 mm^2		C	(2) Lower Auxiliary Contacts & (320-22)	
5	#4/0 AWG	0 Grey, Wet Cell		(2) Upper Auxiliary Contacts (320-24)	
0	No	2 Green, Dry Cell			
1	Black	3 Yellow, Universal			

Accessories

Part Number	Description
160-12	#10 ($6mm^2$) Lower aux contact
160-14	#12 ($4mm^2$) Upper aux contact
16-89	Handle kit - low profile
32-89	Handle kit - high profile
A320LP-MK	Latch plate for mating side
A320HL-MK	Handle with latch & hardware
994G4	Manual release bracket & handle
993G4	Manual release mounting plate for mating half

HEADQUARTERS: Anderson Power Products®, 13 Pratts Junction Road, Sterling, MA 01564-2305 USA T:978-422-3600 F:978-422-3700
EUROPE: Anderson Power Products® Ltd., Unit 3, Europa Court, Europa Boulevard, Westbrook, Warrington, Cheshire, WA5 7TN United Kingdom T: +44 (0) 1925 428390 F: +44 (0) 1925 428399
ASIA / PACIFIC: IDEAL Anderson Asia Pacific Ltd., Unit 922-928 Topsail Plaza, 11 On Sum Street, Shatin N.T., Hong Kong T:+(852) 2636 0836 F:+(852) 2635 9036
CHINA: IDEAL Anderson Technologies (Shenzhen) Ltd., Block A8 Tantou Western Industrial Park, Songgang Baoan District, Shenzhen, P.R. China 518105 T: +(86) 755 2768 2118 F: +(86) 755 2768 2218
TAIWAN: IDEAL Anderson Asia Pacific Ltd., Taiwan Branch, 4F-2, No.116, Dadun 20th St., Situn District, Taichung City 407, Taiwan (R.O.C.) T: +(886) 4 2310 6451 F:+(886) 4 2310 6460
www.andersonpower.com

A32 Male DIN 43589-1

ORDERING INFORMATION

Tooling

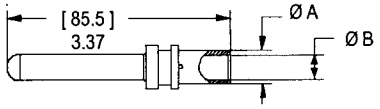
Part Number	Description
1309G4	Hand tool for auxiliary contacts #14/18 AWG (2.5 / 2.5 mm²)
1387G3	Hydraulic tool for power contacts
E160-36	Extraction tool

Note: For tooling die information, see tooling chart on website

DIMENSIONS

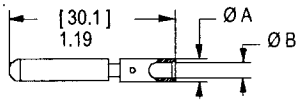
Pin Contact

Part Number	- Wire - AWG	mm²	- Ø A - in.	mm	- Ø B - in.	mm
320-1050	#1/0	50	0.57	14.5	0.43	11.0
320-1070	#2/0	70	0.67	17.0	0.51	13.0
320-1095	#3/0	95	0.78	19.8	0.59	15.0
320-1004	#4/0	N/A	0.78	19.8	0.61	15.6



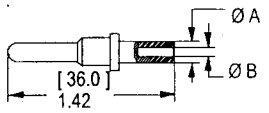
Upper Auxiliary Contact

Part Number	- Wire - AWG	mm²	- Ø A - in.	mm	- Ø B - in.	mm
160-14	#12	4	0.16	4.1	0.11	2.8
320-24	#18 / 14	1.5 / 2.5	0.18	4.6	0.09	2.2

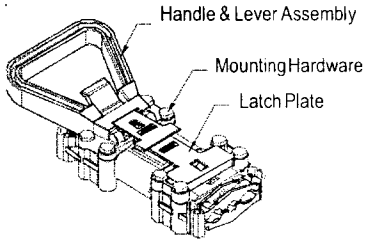


Lower Auxiliary Contact

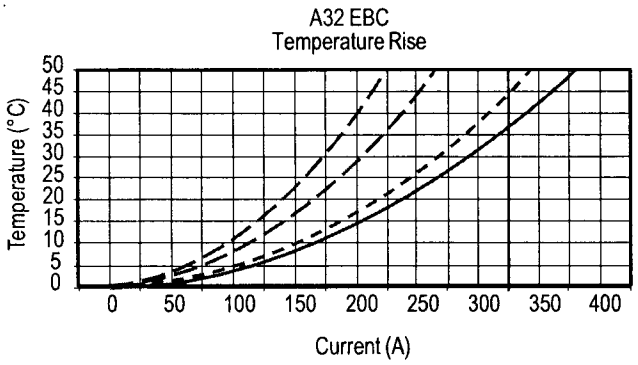
Part Number	- Wire - AWG	mm²	- Ø A - in.	mm	- Ø B - in.	mm
160-12	#10	6	0.20	5.1	0.15	3.8
320-22	#18 / 14	1.5 / 2.5	0.18	4.6	0.09	2.2



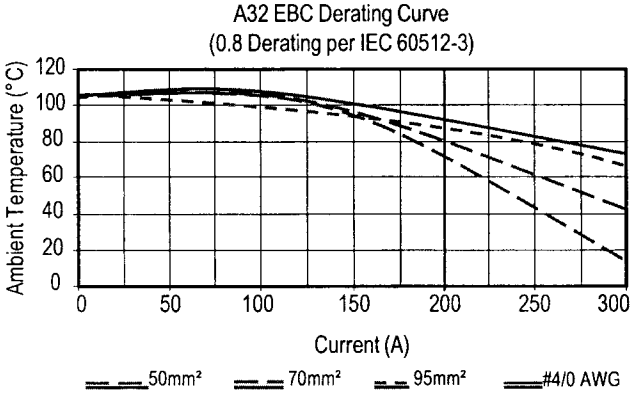
Handle / Lever Assembly / Latch



TEMPERATURE CHARTS

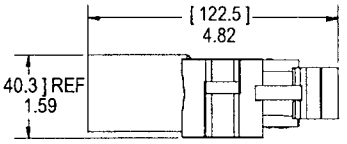


Note: Temperature ratings based on Power Contacts energized only

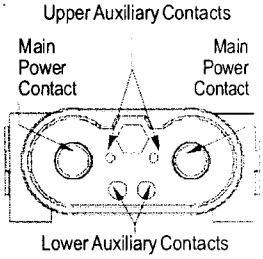


Note: Temperature ratings based on Power Contacts energized only

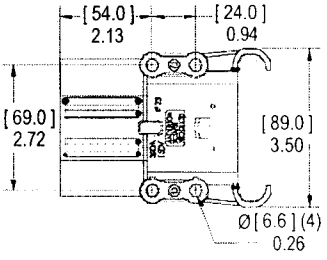
Housing Side View



Housing Front View



Housing Top View



c UL us File No. E26228

All Data Subject To Change Without Notice

DS-A32EBCM REV06

HEADQUARTERS: Anderson Power Products®, 13 Pratts Junction Road, Sterling, MA 01564-2305 USA T:978-422-3600 F:978-422-3700
EUROPE: Anderson Power Products® Ltd., Unit 3, Europa Court, Europa Boulevard, Westbrook, Warrington. Cheshire, WA5 7TN United Kingdom T: +44 (0) 1925 428390 F: +44 (0) 1925 428399
ASIA / PACIFIC: IDEAL Anderson Asia Pacific Ltd., Unit 922-928 Topsail Plaza, 11 On Sum Street, Shatin N.T., Hong Kong T:+(852) 2636 0836 F:+(852) 2635 9036
CHINA: IDEAL Anderson Technologies (Shenzhen) Ltd., Block A8 Tantou Western Industrial Park, Songgang Baoan District, Shenzhen, PR. China 518105 T: +(86) 755 2768 2118 F: +(86) 755 2768 2218
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www.andersonpower.com

T3218

BASIC ELECTRIAL MATERIALS & METHODS O & M MANUALS

Fast Charging System ABIA

10/10/2013

Electrical Contractor:
TAG Electric of Austin, L.P.
1404 Central Commerce Circle
Pflugerville, TX 78660
Phone: 512-251-6700

TAG

TAG Electric of Austin, L.P.

Date: September 10, 2013

TAG Electric of Austin
1404 Central Commerce Circle
Pflugerville, Texas 78660

TAG Project No: 92307

RE: Warranty Letter: Fast Charging System ABIA

Gentlemen:

This letter is to confirm and certify that TAG Electric of Austin, L.P. will warranty all Parts, Labor, and Materials for above reference project. **This warranty is in effect for a period of one year starting with date of substantial completion.** During warranty period any defective equipment and/or materials will be replaced free of change. The effective start date of the warranty for this project will be 08/13/2013.

Vandalism, misuse of equipment, and acts of God are excluded from warranty.

Thank You,
TAG Electric of Austin, L.P.
Services By TAG, L.L.C.

Keith L. Hanson
Branch Manager

Keith Hanson
Tag Electric
1404 Central Commerce Cir
Pflugerville, TX 78660
(512) 251-6700

RE: Warranty for PosiCharge Battery Chargers purchased for the Austin/Bergstrom International Airport via Tag Electric's subcontract No: 92307-900.00

Mr. Hanson,

This letter is to confirm the terms of the warranty offered by Averest, Inc and AeroVironment, Inc. for the PosiCharge charging equipment supplied by Averest, Inc. to fulfill Tag Electric's subcontract No: 92307-900.00. The equipment is as follows:

5 - PosiCharge PowerStations part number 06900
Serial Numbers: SOC10421200100, SOC10421200101, SOC10421200102, SOC10421200103, SOC10421200104

5 - PosiCharge MVS-400 Servers part number 09190
Serial Numbers: SOC10451200104/SOC10441200066, SOC10451200102/SOC10441200067, SOC10451200106/SOC10441200072, SOC10451200107/SOC10441200073, SOC10451200105/SOC10441200074

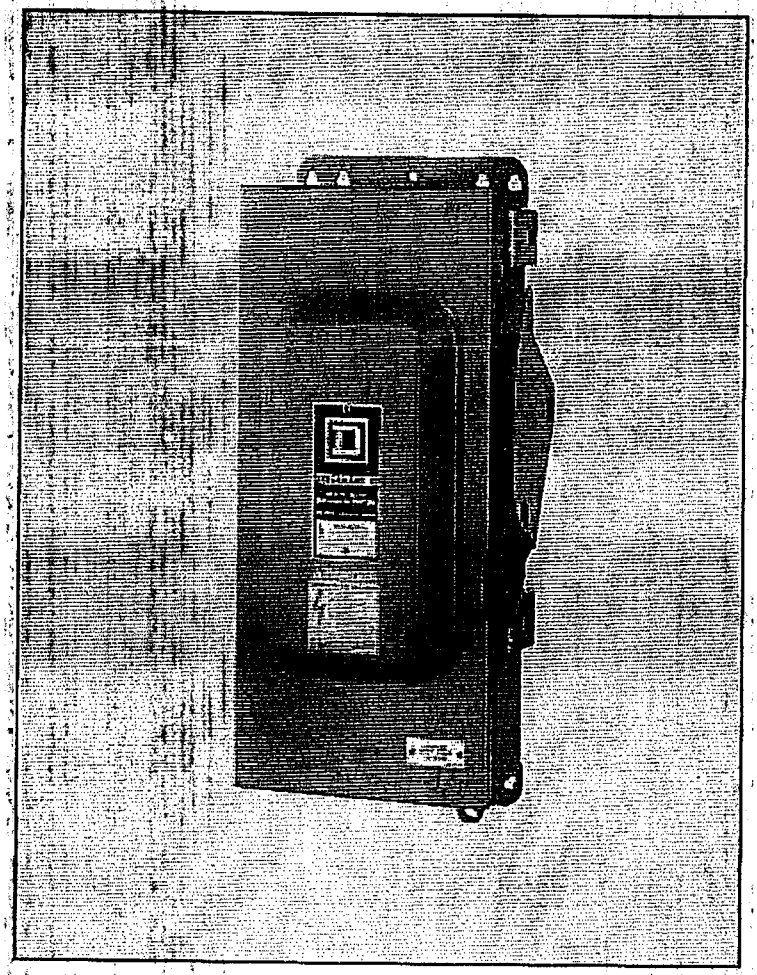
The effective start date of the warranty for this equipment will be 08/13/2013. The warranty includes Full Coverage (labor, travel, freight and parts) for the first year of operation. For complete details regarding the warranty including additional parts coverage that extends beyond the first year see the enclosed document titled "AeroVironment, Inc. Terms and Conditions of Sale – Industrial PosiCharge™ Products."

Sincerely

Gabriel Sampson
President
Averest, Inc.

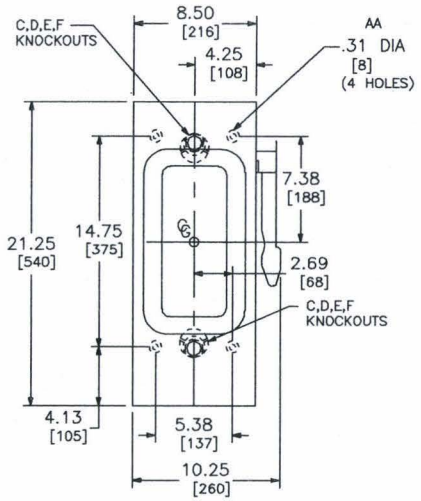
Heavy Duty Safety Switches

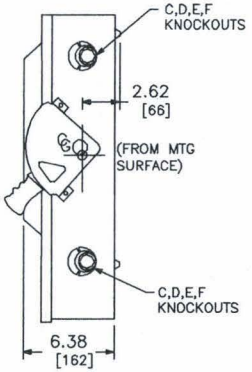
Class 3110

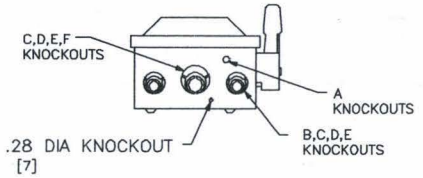


CONTENTS

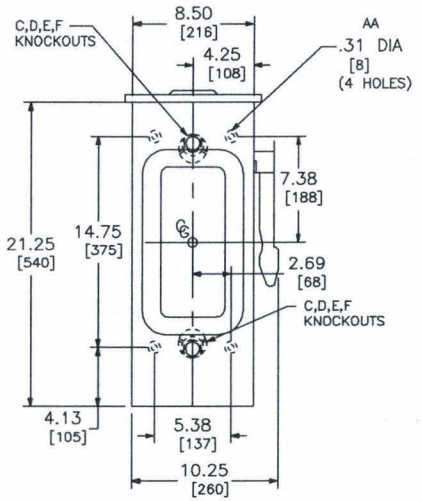
SQUARE D
GROUPE SCHNEIDER

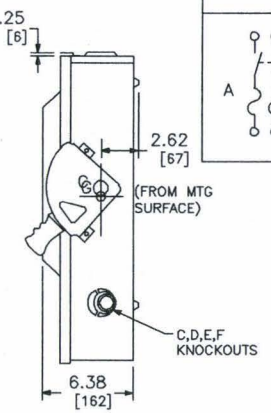


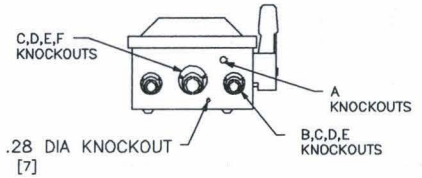




NEMA TYPE 1







NEMA TYPE 3R ▲

WIRING DIAGRAMS	
FUSIBLE	NOT FUSIBLE
A B	C

TERMINAL LUGS ‡			
AMPERES	MAX. WIRE	MIN. WIRE	TYPE
100	#1/0 AWG	#12 AWG	AL
	#1/0 AWG	#14 AWG	CU

KNOCKOUTS				
SYMBOL	CONDUIT SIZE		DIAMETER	
	IN	MM	IN	MM
A	.50	13	.88	22
B	.75	19	1.13	29
C	1.00	25	1.38	35
D	1.25	32	1.75	45
E	1.50	38	2.00	51
F	2.00	51	2.50	64

DUAL DIMENSIONS: INCHES / MILLIMETERS

CATALOG NUMBER	VOLTAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS										
			250VAC			480VAC			600VAC			250 VDC	600 VDC
			STD	MAX		STD	MAX		STD	MAX			
			3Ø	1Ø	3Ø	3Ø	1Ø	3Ø	3Ø	1Ø	3Ø	MAX	MAX
H323N	240VAC	B	15	–	30	–	–	–	–	–	–	–	–
H323NRB	240VAC	B	15	–	30	–	–	–	–	–	–	–	–
H363	600VAC;600VDC	A	–	–	–	25	–	60	30	–	75	20	40
H363RB	600VAC;600VDC	A	–	–	–	25	–	60	30	–	75	20	40
H363N	600VAC	B	–	–	–	25	–	60	30	–	75	–	–
H363NRB	600VAC	B	–	–	–	25	–	60	30	–	75	–	–
HU363	600VAC;600VDC	C	–	15	40	–	30	75	–	40	75	20	40
HU363RB	600VAC;600VDC	C	–	15	40	–	30	75	–	40	75	20	40

SEISMIC NOTES:
USE (4) 1/4" DIA GRADE 5 STEEL MOUNTING BOLTS @ HOLES AA
MAX CONFIGURED WEIGHT 22 LB FOR THE PURPOSE OF DETERMINING SEISMIC ANCHORAGE REQUIREMENTS. FOR ALL OTHER APPLICATIONS, CONTACT SQUARE D COMPANY.

H363NRB

NOTES:
FINISH – GRAY BAKED ENAMEL.
UL LISTED – FILE E-2875
ALL NEUTRALS – INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
SHORT CIRCUIT CURRENT RATINGS:
10,000 AMPERES WITH CLASS H OR K FUSES
200,000 AMPERES WITH CLASS R FUSES HAVING CLASS R REJECTION KITS OR CLASS J FUSES.
WHEN MOUNTING THESE SWITCHES, ALLOW 4.00/[102] MIN. CLEARANCE BETWEEN ENCLOSURES FOR OPENING OF SIDE HINGED DOOR.
▲ NEMA TYPR 3R SWITCHES HAVE PROVISIONS FOR MAXIMUM 2.50/[64] BOLT-ON B-HUB.
‡ LUGS SUITABLE FOR 60°C OR 75°C COPPER OR ALUMINUM CONDUCTORS.

HEAVY DUTY SAFETY SWITCHES – SEISMIC
VISIBLE BLADE TYPE
100 AMPERE
ENCLOSURE – NEMA TYPE 1 GENERAL PURPOSE
NEMA TYPE 3R RAINPROOF

SQUARE D
Schneider Electric

DWG# NO. 1905S

JUNE 2009

REF DWG #1905

Application Data

Description

Heavy Duty Safety Switches may be used as a means for disconnecting a load from its supply, or for opening and closing a circuit. When equipped with fuses, overload and short circuit protection are also provided.

Application

Heavy Duty Safety Switches are designed for the following applications:

- Commercial and industrial installations.
- Up to 600 Vac or 600 Vdc maximum.
- Up to 200,000 rms symmetrical amperes short circuit current.
- 30 through 1200 amperes.
- Horsepower ratings.
- Two or three fusible switched poles with or without insulated, groundable neutral.
- Four fusible switched poles, neutral not available.
- Two or three not fusible, switched poles with or without insulated, groundable neutral.
- Four not fusible switched poles, neutral not available.
- Six not fusible switched poles, neutral not available.

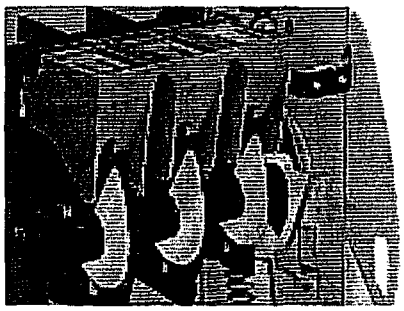
Standards

Heavy Duty Safety Switches are manufactured in accordance with these standards.

- UL98, Standard for Safety, Enclosed and Dead Front Switches. UL Listed under File E2875, or E154828.
- NEMA Standards Publication KS1, Enclosed Switches.
- Federal Specifications WS-865c for Type HD.
- CSA Certified – C22.2 No.4.
- NOM Certified.

Construction

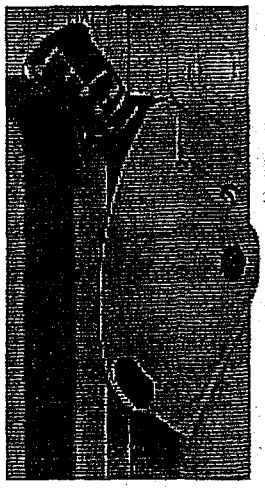
- Visible blades for positive blade position.
- Optional viewing window – allows visual verification of blade position without opening door. Not available on all devices, contact Square D Sales Offices.



Visible Blades

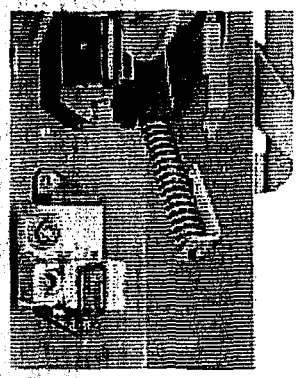
- Red and black handle indication for switch position.

E Series

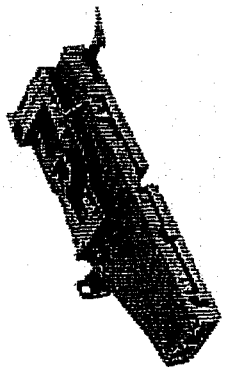


F Series

- F Series handle/lockplate is field replaceable.
- F Series RB devices have side opening covers.
- Highly visible ON-OFF marking.
- Quick-make, quick-break spring driven operating mechanism.
- F Series operating mechanism is a field replaceable, enclosed modular design.



E Series Operating Mechanism



F Series Operating Mechanism

Application Data

Technical Data:

Horsepower Ratings
Typical Horsepower Ratings: Check Catalog Number For Specific Ratings of Heavy Duty Safety Switches

Ampere Rating	Fusible														Not Fusible							
	240 Vac				480 Vac				600 Vac				Vdc		240 Vac		480 Vac		600 Vac		Vdc	
	Std.		Max.		Std.		Max.		Std.		Max.				Max.		Max.		Max.			
	1PH	3PH	1PH	3PH	1PH	3PH	1PH	3PH	1PH	3PH	1PH	3PH	250V	600V	1PH	3PH	1PH	3PH	1PH	3PH	250V	600V
30	1½	3	3	7½	3	5	7½	15	3	7.5	10	20	5	15	5	10	7½	20	10	30	5	15
60	3	7½	10	15	5	15	20	30	10	15	25	50	10	30	10	20	25	50	30	60	10	30
100	7½	15	15	30	10	25	30	60	15	30	40	75	20	50	20	40	40	75	40	75	20	50
200	15	25	...	60	25	50	50	125	30	60	50	150	40	50	...	60	...	125	...	150	40	50
400	...	50	...	125	...	100	...	250	...	125	...	350	50	...	...	125	...	250	...	350	50	...
600	...	75	...	200	...	150	...	400	...	200	...	500	...	...	...	200	...	400	...	500	...	...
800	50	100	50	250	50	200	50	500	50	250	50	500	50	50	50	250	50	500	50	500	50	50
1200	50	100	50	250	50	200	50	500	50	250	50	500	50	50	50	250	50	500	50	500	50	50

Short Circuit Withstand Ratings

Heavy Duty Safety Switch	UL Listed Fuse Class	UL Listed Short Circuit Withstand Rating †† (RMS Symmetrical Amperes)
Fusible or Not Fusible◊	H K	10,000
	R J L	200,000

◊ UL Listed, short-circuit withstand ratings as shown apply to not fusible switches when protected by the corresponding class fuse.
†† Short circuit withstand ratings apply to AC only.
Note: I^2t and Ip values for Square D heavy duty safety switches are the same as published UL maximum acceptable I^2t and Ip values for corresponding class fuse.

Electrical Interlock Ratings

Electrical interlocks for Heavy Duty Safety Switches are available factory installed or in kit form for field installation. A pivot arm operates from the switch mechanism, breaking the control circuit before the main switch blades break. Electrical interlock kits are UL Listed. Refer to current Square D Digest for appropriate electrical interlock catalog number.

Electrical Interlock Contact Ratings♦

Interlock Type	AC – 50 or 60 Hz				DC		
	Volts	Make	Break	Cont.	Volts	Make & Break	Cont.
1 NO/1 NC Contact (-1 Suffix)	120 240 480 600	40A 20A 10A 8A	15A 10A 6A 5A	15A 15A 15A 15A	115 230 600	.50A .25A .05A	15A 15A 15A
2 NO/2 NC Contacts (-2 Suffix)	120 240 480 600	30A 15A 7.5A 6.0A	3.0A 1.5A .75A .60A	10A 10A 10A 10A	115 230 600	1.0A .30A .10A	10A 10A 10A

♦ Single pole single throw interlock kits are rated 1/2 HP @ 110 and 220 Vac.
-1 Suffix utilizes a 9007A01 limit switch.
-2 Suffix utilizes a 9007C03 limit switch.

Terminal Lug Data For NEMA Type 1, 3R, and 4X Switches

Ampere Rating	NEMA Type Enclosure	Conductors Per Phase	Wire Range Wire Bending Space Per NEC Table 373-6	Lug Wire Range▲	Optional VERSA-CRIMP® Compression Lug Field Installable
30	1, 3R, 4X■	1	#12-6 AWG (Al) or #14-6 AWG (Cu)	#12-2 AWG (Al) or #14-2 AWG (Cu)	...
60	1, 3R, 4X■	1	#12-3 AWG (Al) or #14-3 AWG (Cu)	#12-2 AWG (Al) or #14-2 AWG (Cu)	...
100	1, 3R, 4X■	1	#12-1/0 AWG (Al) or #14-1/0 AWG (Cu)	#12-1/0 AWG (Al) or #14-1/0 AWG (Cu)	VCEL-021-14S1
200	1, 3R	1	#6 AWG – 250 kcmil (Al/Cu)	#6 AWG – 300 kcmil (Al/Cu)	VCEL-030-516H
400	1, 3R	1 or 2	#1/0 AWG – 750 kcmil (Al/Cu) or #1/0 AWG – 300 kcmil (Al/Cu)	#1/0 AWG – 750 kcmil (Al/Cu) and #1/0 AWG – 300 kcmil (Al/Cu)	VCEL-075-12H1 or VCEL-030-516H1 and VCEL-050-12H1
600	1, 3R	2	#3/0 AWG – 500 kcmil (Al/Cu)	#3/0 AWG – 500 kcmil (Al/Cu)	VCEL-050-12H1
800	1, 3R/5	3	#3/0 AWG – 750 kcmil (Al/Cu)	#3/0 AWG – 750 kcmil (Al/Cu)	H8LKE2
1200	1, 3R/5	4	#3/0 AWG – 750 kcmil (Al/Cu)	#3/0 AWG – 750 kcmil (Al/Cu)	H12LKE2

▲ 30-100 ampere switches suitable for 60°C or 75°C conductors. 200-1200 ampere switches suitable for 75°C conductors.
■ 4X Fiberglass Reinforced Polyester and KRYDON® Switches.

TRI-ONIC®

TR & TRS

Ferraz Shawmut

TIME DELAY/CLASS RK5

THE INDUSTRY'S MOST POPULAR FUSE FOR MOTOR CIRCUIT PROTECTION.

With advanced material technology added to the existing product, the TR and TRS current-limiting time-delay fuses are engineered for overcurrent protection of motors and transformers, service entrance equipment, feeder and branch circuits. Tri-Onic fuse's proven time-delay characteristic safely handles harmless starting currents and inrush currents associated with today's motors and transformers. Now available with optional SmartSpot® blown fuse indication technology.

Features/Benefits

- **Optional Solid State SmartSpot Indicator**
- **Time delay** for motor start-ups and transformer inrush currents without nuisance opening
- **Current limiting** for low peak let-thru current
- **Rejection-style design** prevents replacement errors (when used with recommended fuse blocks)
- **Easy-to-read label** for quick recognition and replacement
- **Metal-embossed date and catalog number** for traceability and lasting identification
- **Fiberglass body** provides dimensional stability in harsh industrial settings
- **High-grade** silica filler ensures fast arc quenching and high current limitation

HIGHLIGHTS:

- Time Delay
- Current Limiting
- AC & DC Rated

APPLICATIONS:

- Motor Circuits
- Mains
- Feeders
- Branch Circuits
- Transformers
- Service Entrance Equipment
- General-purpose Protection

Ratings

- **TR**

AC: 1/10 to 600A, 250VAC, 200kA I.R.

DC: 1/10 to 2-8/10A, 250VDC, 20kA I.R.

3 to 30A, 160VDC, 20kA I.R.

35 to 400A, 250VDC, 20kA I.R.

450 to 600A, 160VDC, 20kA I.R.

- **TRS**

AC: 1/10 to 600A, 600VAC, 200kA I.R.

DC: 1/10 to 12A, 600VDC, 20kA I.R.

15 to 60A, 300VDC, 20kA I.R.

70 to 600A, 600VDC, 20kA I.R.

Approvals

- UL Listed to Standard 248-12 File E2137
- CSA Certified to Standard C22.2 No. 248.12
- DC Listed to UL Standard 248 TRS only

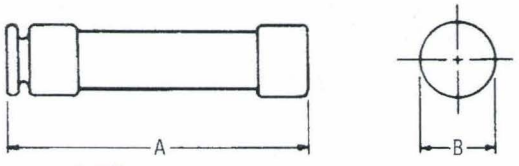
TIME DELAY/CLASS RK5 FUSES

TR & TRS

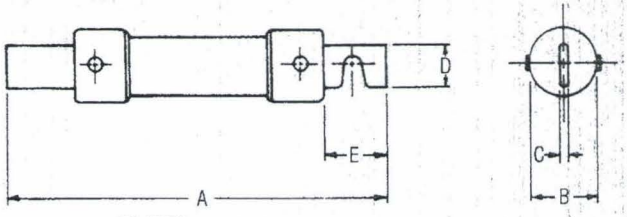
Standard Fuse Ampere Ratings, Catalog Numbers

Ampere Rating	Catalog Number 250V	Catalog Number 600V	Ampere Rating	Catalog Number 250V	Catalog Number 600V	Ampere Rating	Catalog Number 250V	Catalog Number 600V
1/10	TR1/10R*	TRS1/10R*	3-1/2	TR3-1/2R*	TRS3-1/2R*	50	TR50R	TRS50R
15/100	TR15/100R*	TRS15/100R*	4	TR4R*	TRS4R*	60	TR60R	TRS60R
2/10	TR2/10R*	TRS2/10R*	4-1/2	TR4-1/2R*	TRS4-1/2R*	70	TR70R	TRS70R
3/10	TR3/10R*	TRS3/10R*	5	TR5R*	TRS5R*	75	TR75R*	TRS75R*
4/10	TR4/10R*	TRS4/10R*	5-6/10	TR5-6/10R*	TRS5-6/10R*	80	TR80R	TRS80R
1/2	TR1/2R*	TRS1/2R*	6	TR6R*	TRS6R*	90	TR90R	TRS90R
6/10	TR6/10R*	TRS6/10R*	6-1/4	TR6-1/4R*	TRS6-1/4R*	100	TR100R	TRS100R
8/10	TR8/10R*	TRS8/10R*	7	TR7R*	TRS7R*	110	TR110R	TRS110R
1	TR1R*	TRS1R*	8	TR8R	TRS8R	125	TR125R	TRS125R
1-1/8	TR1-1/8R*	TRS1-1/8R*	9	TR9R*	TRS9R	150	TR150R	TRS150R
1-1/4	TR1-1/4R*	TRS1-1/4R*	10	TR10R	TRS10R	175	TR175R	TRS175R
1-4/10	TR1-4/10R*	TRS1-4/10R*	12	TR12R	TRS12R	200	TR200R	TRS200R
1-6/10	TR1-6/10R*	TRS1-6/10R*	15	TR15R	TRS15R	225	TR225R	TRS225R
1-8/10	TR1-8/10R*	TRS1-8/10R*	17-1/2	TR17-1/2R*	TRS17-1/2R	250	TR250R	TRS250R
2	TR2R*	TRS2R*	20	TR20R	TRS20R	300	TR300R	TRS300R
2-1/4	TR2-1/4R*	TRS2-1/4R*	25	TR25R	TRS25R	350	TR350R	TRS350R
2-1/2	TR2-1/2R*	TRS2-1/2R*	30	TR30R	TRS30R	400	TR400R	TRS400R
2-8/10	TR2-8/10R*	TRS2-8/10R*	35	TR35R	TRS35R	450	TR450R	TRS450R
3	TR3R*	TRS3R*	40	TR40R	TRS40R	500	TR500R	TRS500R
3-2/10	TR3-2/10R*	TRS3-2/10R*	45	TR45R	TRS45R	600	TR600R	TRS600R

Note: Optional blown fuse visual indication available. To order, place "ID" at the end of the catalog number. Example: #TRS30RID
* Not available with optional blow fuse indicator.



0-60A



61-600A

Dimensions

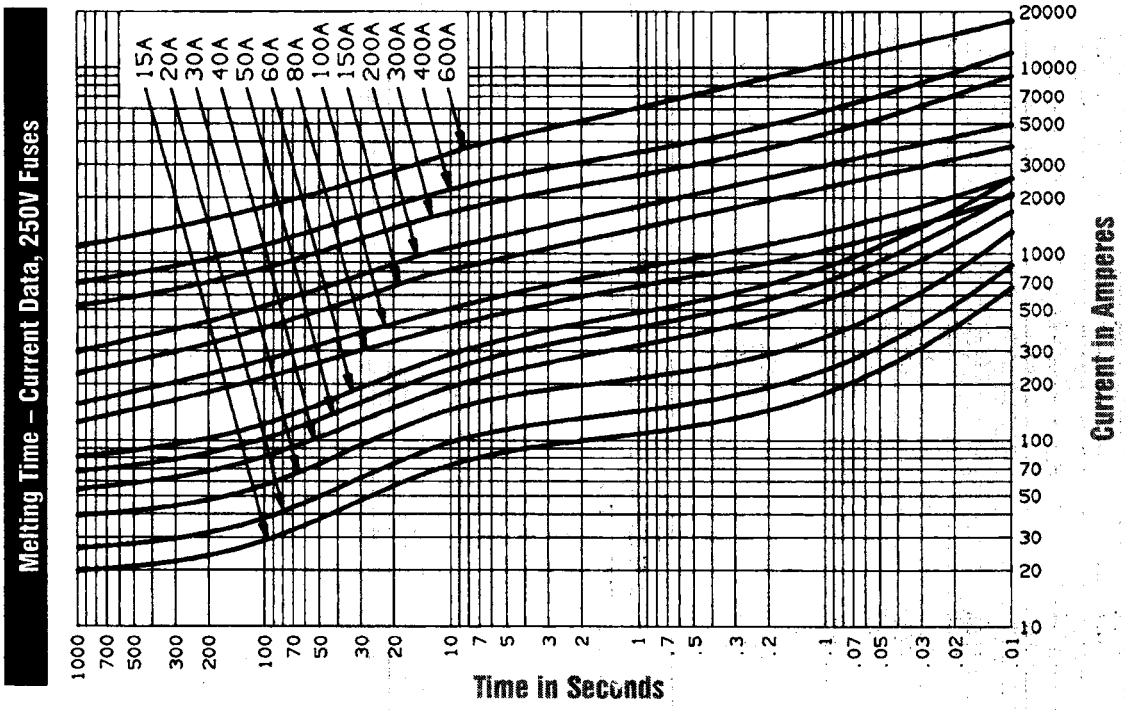
AMPERE RATING	A In.	A mm	B In.	B mm	C In.	C mm	D In.	D mm	E In.	E mm
250V-TR FUSES										
0-30	2	51	9/16	14	-	-	-	-	-	-
31-60	3	76	13/16	21	-	-	-	-	-	-
61-100	5-7/8	149	1-1/16	27	1/8	3	3/4	19	1	25
101-200	7-1/8	181	1-9/16	40	3/16	5	1-1/8	28	1-3/8	35
201-400	8-5/8	219	2-1/16	53	1/4	6	1-5/8	41	1-7/8	48
401-600	10-3/8	264	2-9/16	66	1/4	6	2	51	2-1/4	57
600V-TRS FUSES										
0-30	5	127	13/16	21	-	-	-	-	-	-
31-60	5-1/2	139	1-1/16	27	-	-	-	-	-	-
61-100	7-7/8	200	1-5/16	34	1/8	3	3/4	19	1	25
101-200	9-5/8	244	1-13/16	46	3/16	5	1-1/8	28	1-3/8	35
201-400	11-5/8	295	2-9/16	66	1/4	6	1-5/8	41	1-7/8	48
401-600	13-3/8	340	3-1/8	80	1/4	6	2	51	2-1/4	57

Recommended Fuse Blocks With Box Connectors For Tri-onic® Class RK5 Fuses

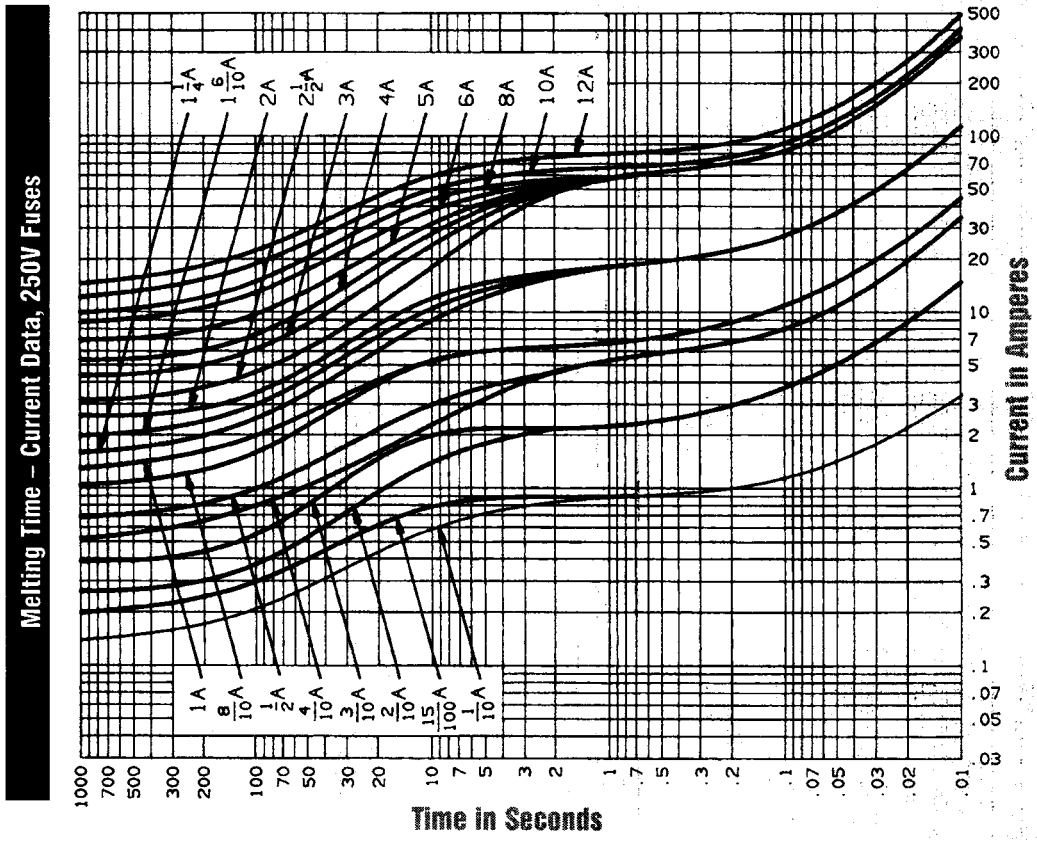
Fuse Ampere Rating	Catalog Number 250V 1 Pole	250V 3 pole	600V 1 pole	600V 3 pole
0-30	20306R	20308R	60306R	60308R
31-60	20606R	20608R	60606R	60608R
61-100	21036R	21038R	61036R	61038R
101-200	22001R	22003R	62001R	62003R
201-400	24001R	24003R	64001R	64003R
401-600	2631R	2633R	6631R	6633R

TIME DELAY/CLASS RK5 FUSES

TR15 TO 600



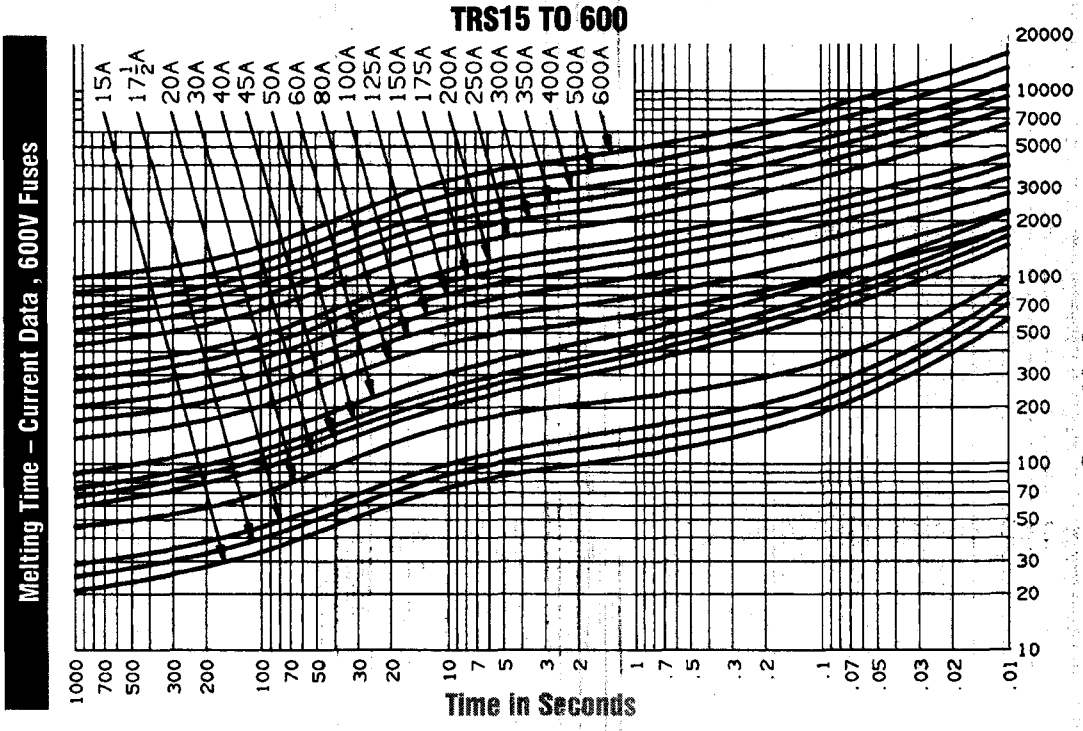
TR1/10 TO 12



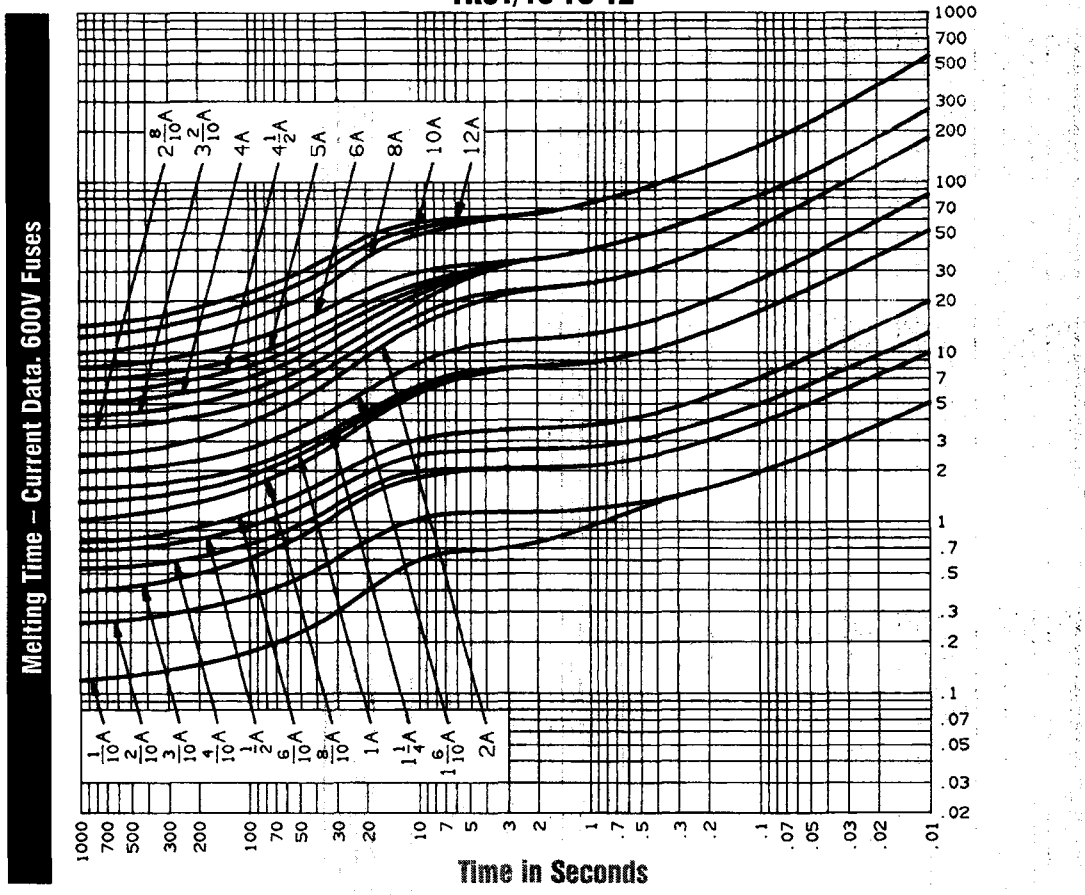
TIME DELAY/CLASS RK5 FUSES

B

TRS15 TO 600

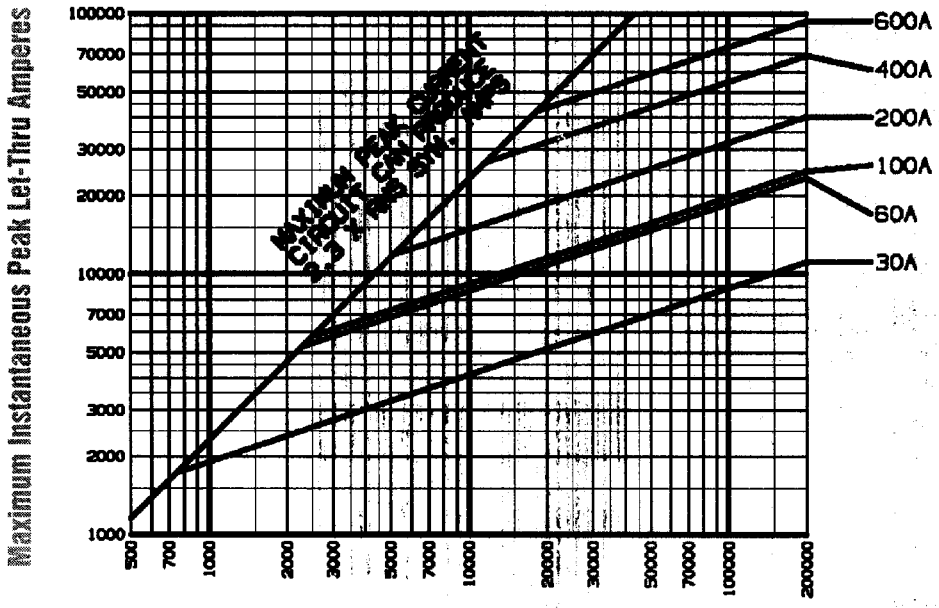


TRS1/10 TO 12

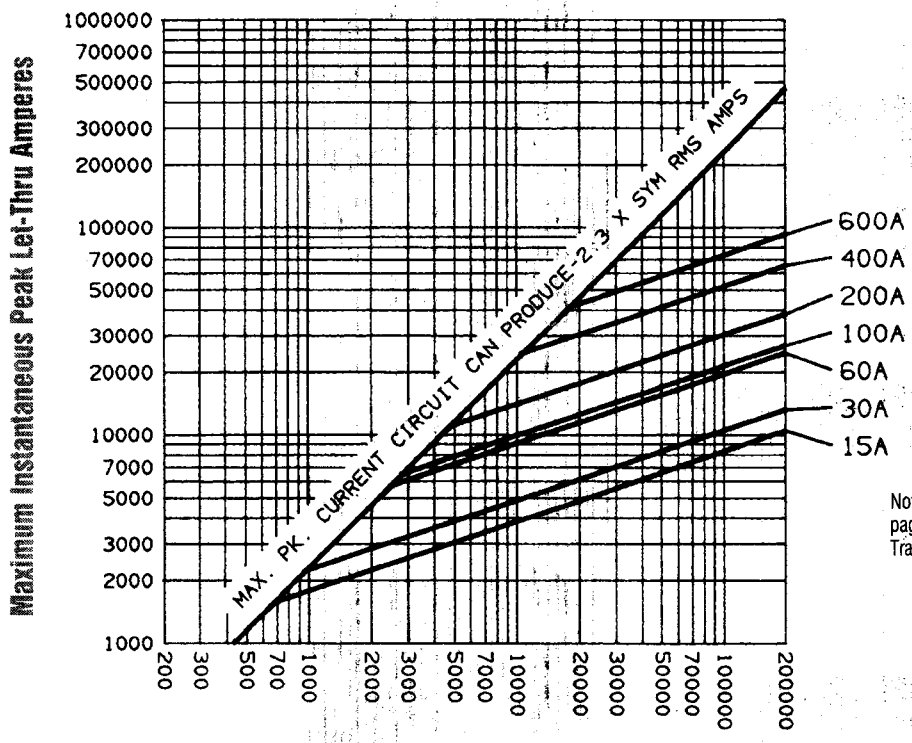


TIME DELAY/CLASS RK5 FUSES

Peak Let-Thru Current Data – TR30 to 600, 250 Volts AC



Peak Let-Thru Current Data – TRS15 to 600, 600 Volts AC



Note: See Application Information page L9 for All Motor and Transformer Tables.

40271-080-04
07/2005
Lexington, KY, USA

Replaces / Reemplaza / Remplace 40271-080-03 02/2001

EIK1 and EIK2 (Series F05) Electrical Interlock Kit
Accesorios de bloqueo eléctrico EIK1 y EIK2 (serie F05)
Kit d'interverrouillage électrique EIK1 et EIK2 (série F05)

Class Clase Classe
3110, 3130, 3140

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

PRECAUTIONS | **PRECAUCIONES** | **PRÉCAUTIONS**

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device to confirm power is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma NFPA 70E.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado para confirmar la desenergización del equipo.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnel (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension à valeur nominale appropriée pour s'assurer que l'alimentation est coupée.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

INSTALLATION

Mounting on 60 A Heavy Duty or 100 A General or Heavy Duty Safety Switches, and 30 A, 60 A or 100 A Double Throw Safety Switches

NOTE: For installation in 200 A switches, see page 3.

Square D 60 A heavy duty switches include Series F1, F3, or F5 for 600 V and F1 or F3 for 240 V. Square D 30, 60 or 100 A double throw switches are Series F5.

INSTALACIÓN

Montaje en los interruptores de seguridad de servicio pesado de 60 A o de servicio pesado o general de 100 A, y en los interruptores de seguridad de doble tiro de 30, 60 ó 100 a

NOTA: Para instalar en interruptores de 200 A, consulte la página 3.

Los interruptores de servicio pesado de 60 A Square D incluyen las series F1, F3 o F5 para 600 V y F1 o F3 para 240 V. Los interruptores de doble tiro de 30, 60 ó 100 A Square D son serie F5.

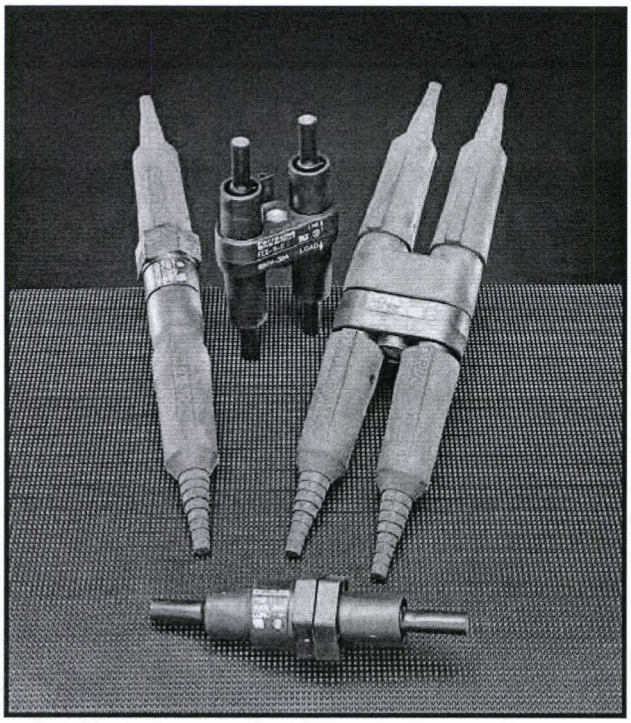
INSTALLATION

Montage sur des interrupteurs de sécurité de 60 A pour service intensif ou de 100 A universels ou pour service intensif, et sur des interrupteurs de sécurité de 30, 60 ou 100 a bidirectionnels

REMARQUE : Pour installer dans des interrupteurs de 200 A, voir la page 3.

Les interrupteurs pour service intensif de 60 A Square D comprennent les séries F1, F3 ou F5 pour 600 V et F1 ou F3 pour 240 V. Les interrupteurs bidirectionnels de 30, 60 ou 100 A Square D sont de la série F5.

FEB, FEC, FEX, FEY 600 VOLT/IN-LINE FUSE HOLDERS



Ferraz Shawmut's complete line of single and dual pole in-line fuse holders accommodate either 1-1/2" x 13/32" (10x38mm) midget or Class CC fuses. The fuse holders are designed for quick installation. Securing nuts or screws are captive thus speeding installation by reducing the need to locate and assemble loose components in the field. Three internal O-rings per pole seal the fuse holder providing a water-resistant compartment for the fuse. The captive O-rings are colored (blue for single pole and red for dual pole) for quick detection. Optional cone shaped insulator boots can be slipped on to provide a watertight seal (breakaway versions come with boots standard). Both single and dual pole versions have an optional breakaway feature which safely disconnects the load in case of a pole knockdown. Fuses remain safely encapsulated within the watertight fuse holder on the load side. Once the pole has been reinstalled the fuse holder can be easily reconnected.

HIGHLIGHTS

- Breakaway version quickly disconnects line side during pole knockdown in compliance with state and federal highway commission standards
- 3 O-rings per pole for water tight applications
- Colored O-rings for quick detection
- Single and dual poles
- Accepts midget or Class CC fuses
- Wide assortment of terminal variations
- High heat, impact resistant insulator
- Captive nut or screw for quick installations
- Polarized dual pole provides simultaneous disconnection
- Permanently installed neutral versions quickly identified by white nuts
- Tulip fuse clip for improved contact and low losses
- Environmentally friendly-no lead solder used
- Highly visible catalog number even with insulation boots installed
- Wire gage size identified on insulation boots for quick, accurate trimming

APPLICATIONS:

- Street lighting
- Parking lot lighting
- Traffic signaling
- Sports lighting
- Boats and marinas
- Humid/corrosive environments

H

Ratings

- 600 VAC, 30A Short Circuit Current Rating: Midget Fuse 100kA, Class CC, 200kA
- Temperature Rating 155°C

Approvals

- UL Listed Class CC Guide IZLT, File E52283
- UL Recognized Component Midget Guide IZLT2, File E52283
- CSA Certified Class CC and Midget Class 6225, File 32169

Recommended Fuse Usage

FEB and FEX holders will accomodate these Ferraz Shawmut Fuses:

Midget (1-1/2" x 13/32", 10 x 38mm): ATQ, ATM, TRM, OTM, GGU, GFN, A13X-2, A25Z-2, A60Q-2, A6Y-2B

FEC and FEY holders will accomodate these Ferraz Shawmut Fuses:

Class CC: ATDR, ATMR, ATQR

FEB, FEC, FEX, FEY 600 VOLT/IN-LINE FUSE HOLDERS

Catalog Numbering System

Family	Load Terminal		Line Terminal		Option
	Type	Material	Type	Material	
FEB-	1	1 _	1	1	-BA

Nomenclature Legend

Family	Desicription
FEB	Single pole midget
FEC	Single pole Class CC
FEX	Dual Pole midget
FEY	Dual pole Class CC
FEBN	Single pole neutral

Load or Line Terminal Type						
Terminal End View	Terminal	Type		No. Per Terminal	Solid	Stranded
	11	Cu Crimp	#8–#12 #12–#14	1 2	Yes Yes	Yes Yes
	21	Cu Crimp	#10 #6 #4	2 1 1	Yes Yes Yes	Yes Yes No
	31	Cu Criimp	#10 #4	2 1	Yes No	Yes Yes
	41	Cu Crimp	#6 #2	2 1	Yes No	Yes Yes
	81	Cu single Set Screw	#2–#12	1	Yes	Yes
	91	Cu Double Seet Screw	#2–#12	1 each	Yes	Yes
	82	Al single Set Screw	#2–#12	1	Yes	Yes
	92	Al double Set Screw	#2–#12	1 each	Yes	Yes

Option
Description
BA (breakaway version equipped with breakaway stud,breakaway boot, and insulating boots for both line and load sides)

Notes:

1. Non-breakaway units do not include insulator boots. These optional cone shaped boots are available to provide a watertight installation. The insulator boots are designed to form a watertight seal over conductors, but due to varying wire insulation sizes it is suggested that tape wrap be utilized for best results.

FSB1 = Single conductor boot (used to cover all crimp type & single set screw terminals)

FSB2 = Double conductor boot (used to cover all double set screw (Y-type) terminals)

Insulator boot trimming instructions: Locate wire gage size to be utilized marking on the boot and cut just beneath it.

2. Tightening torque for single and double set screw terminations: 35 lbs.-in.
3. Tightening torque for dual pole fastening screw: 10-15 lbs.-in.
4. FEBN versions have a permanently mounted dummy fuse for neutral applications.

FEB, FEC, FEX, FEY 600 VOLT/IN-LINE FUSE HOLDERS

Ferraz Shawmut In-Line Fuse Holder Family - Typical Combination Chart

Midget (10x38mm)	Midget (10x38mm) Breakaway	Class CC	Class CC Breakaway	Midget (10x38mm) Dual Pole	Midget (10x38mm) Dual Pole Breakaway	Class CC Dual Pole	Class CC Dual Pole Breakaway
FEB-11-11	FEB-11-11-BA	FEC-11-11	FEC-11-11-BA	FEX-11-11	FEX-11-11-BA	FEY-11-11	FEY-11-11-BA
FEB-11-21	FEB-11-21-BA	FEC-11-21	FEC-11-21-BA	FEX-11-21	FEX-11-21-BA	FEY-11-21	FEY-11-21-BA
FEB-11-31				FEX-11-31		FEY-11-31	
FEB-11-41	FEB-11-41-BA			FEX-11-41	FEX-11-41-BA	FEY-11-41	
	FEB-11-81-BA						
FEB-11-82	FEB-11-82-BA						
FEB-11-91	FEB-11-91-BA	FEC-11-91	FEC-11-91-BA				FEY-11-91-BA
FEB-11-92	FEB-11-92-BA						
FEB-11-S							
FEB-21-11							
FEB-21-21	FEB-21-21-BA	FEC-21-21	FEC-21-21-BA	FEX-21-21	FEX-21-21-BA	FEY-21-21	FEY-21-21-BA
FEB-21-91	FEB-21-91-BA						
FEB-31-31	FEB-31-31-BA						
FEB-41-41	FEB-41-41-BA						
FEB-81-81	FEB-81-81-BA	FEC-81-81	FEC-81-81-BA	FEX-81-81			FEY-81-81-BA
FEB-81-91	FEB-81-91-BA			FEX-81-91	FEX-81-91-BA		
FEB-81-S							
FEB-82-82	FEB-82-82-BA						
FEB-82-92	FEB-82-92-BA						
	FEB-91-91-BA						
FEBN-11-11	FEBN-11-11-BA						
FEBN-11-91	FEBN-11-91-BA						
FEBN-81-81	FEBN-81-81-BA						
FEB-SS							

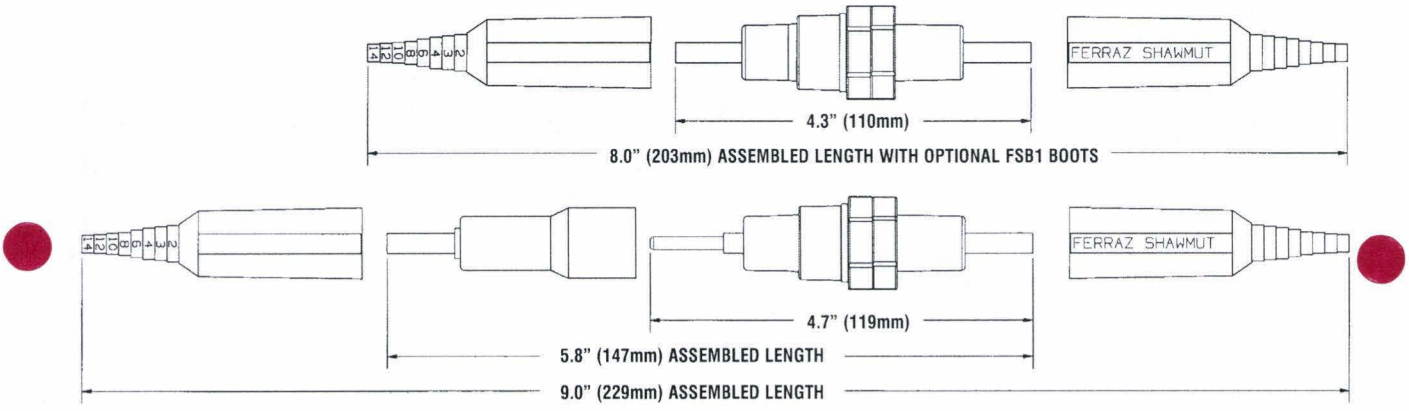
Note: Consult factory for other configurations.

Crimping Tools Reference Chart, The following crimping tools (or equivalent) are recommended:

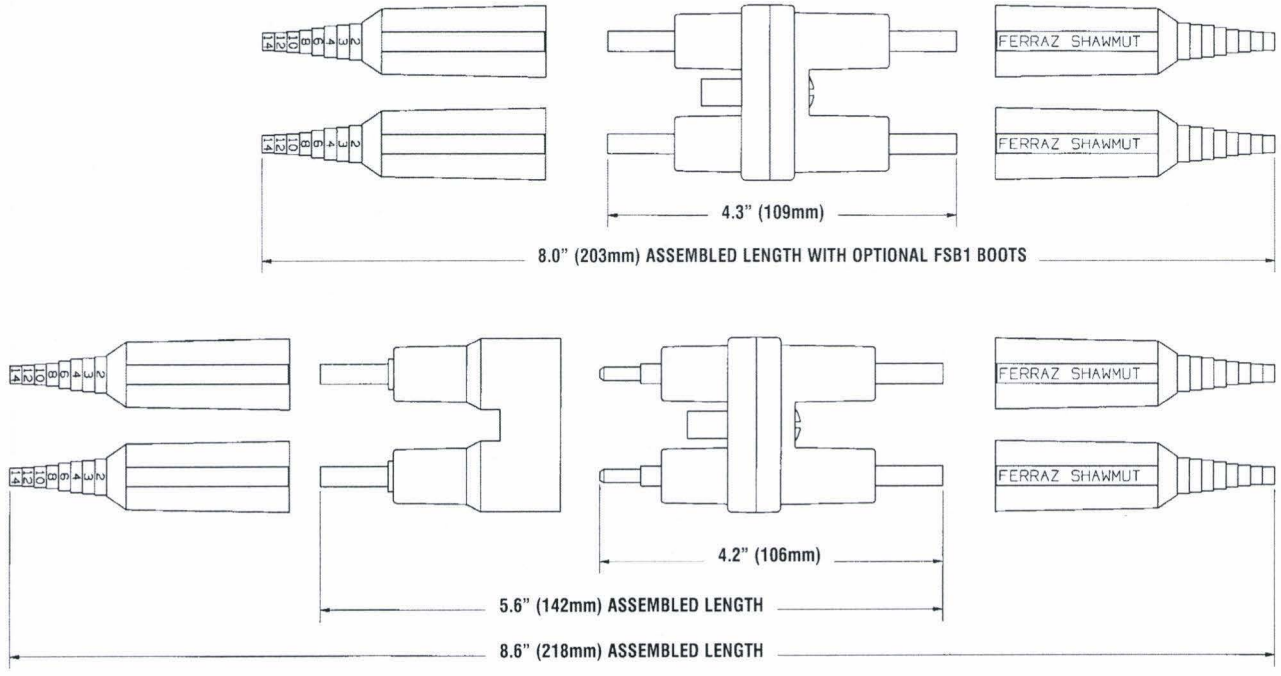
Terminal Type	FCI-Burndy	T&B
1	Y8MRB-1	WT-111M
2	Y2MR	TBM2/TBM5 BLUE DIE, WT-115-A DIE O
3	Y2MR	TBM2/TBM5 GREY DIE, WT-115-A DIE E
4	Y2MR	TBM2/TBM5 BROWN DIE, WT-115-A DIE F

FEB, FEC, FEX, FEY 600 VOLT/IN-LINE FUSE HOLDERS

FEB and FEC, Non-Breakaway and Breakaway Assembly Drawings



FEX and FEY, Non-Breakaway and Breakaway Assembly Drawings



ATM Fast-Acting Midget Fuses

Amp-Trap® midget fast-acting ATM fuses are rated 600 volts AC and DC, with a 100kA interrupting rating. These ratings give the ATM a wide range of applications not covered by other midget fuses. In addition, ratings of 30/35, 30/40 and 30/50 amperes are offered for specific applications such as capacitor protection. These ATM fuses must still be considered 30A fuses because of their dimensions, but are able to withstand much higher inrush currents and tougher duty cycles. (Not for Branch Circuit Protection).

Features/Benefits:

- For supplemental protection of small motors and transformers
- Extended ratings for special protection of capacitors and circuits with high inrush currents
- 600VDC ratings for a wide variety of applications including photovoltaic and solar applications.
- Can be used with UltraSafe™ fuse holders
- 1 1/2" x 13/32" (10mm x 38mm) dimensions

Highlights:

- Fast-acting
- Special Ratings (Above 30A)

Applications:

- Supplemental protection of of circuits up to 600VAC and 600VDC with 100kA I.R.

Catalog Numbers (amps)

ATM1/10	ATM6
ATM1/8	ATM7
ATM2/10	ATM8
ATM1/4	ATM10
ATM1/2	ATM12
ATM3/4	ATM15
ATM1	ATM20
ATM1-1/2	ATM25
ATM2	ATM30
ATM3	ATM30/35*
ATM4	ATM30/40*
ATM5	ATM30/50*

** are not continuous current rated devices*

Recommended Fuse Blocks for Midget (10x38mm) Fuses

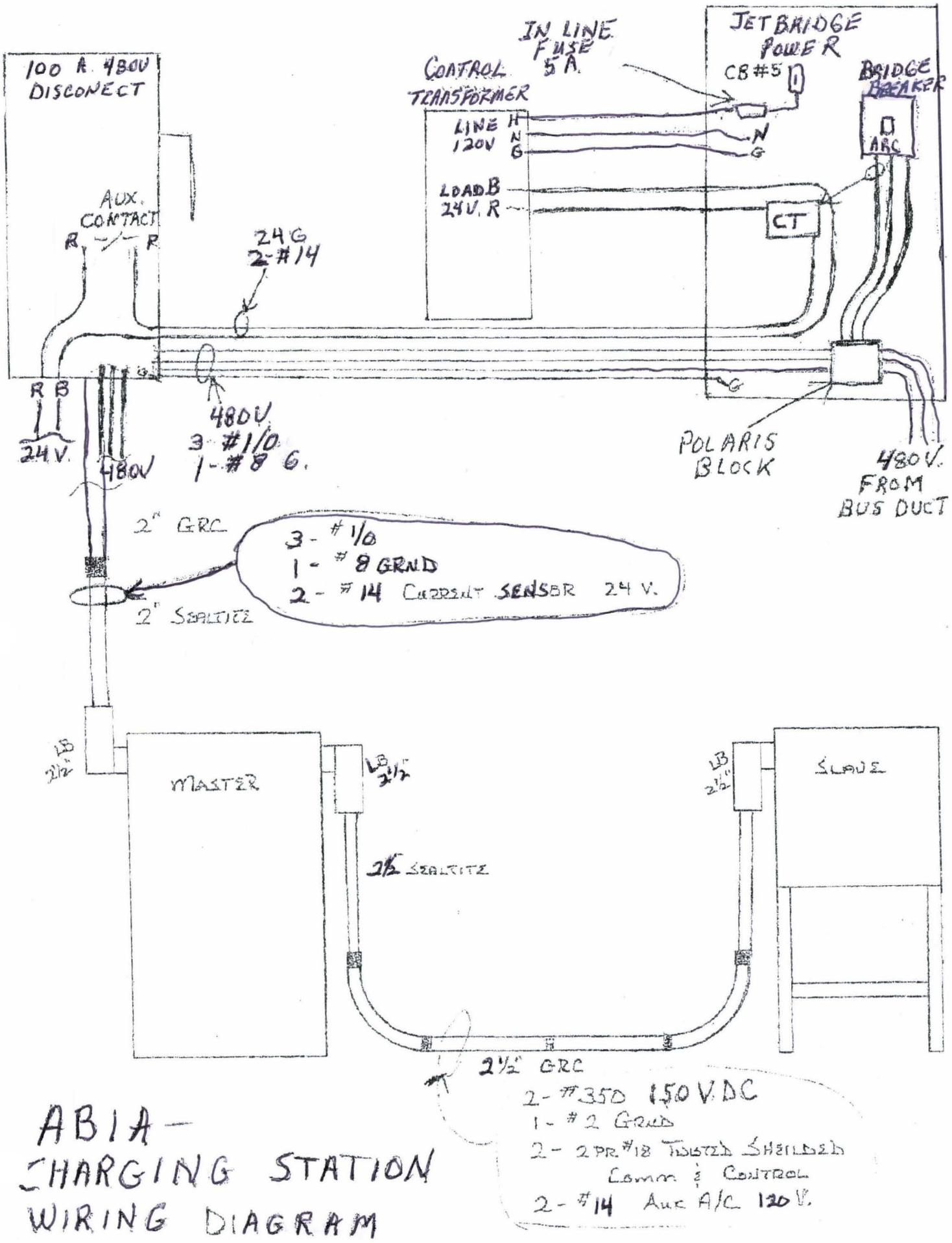
Number of Poles	Catalog Number			
	UltraSafe™ Indicating Fuse Holder	Screw Connector	Pressure Plate Connector	Copper Box Connector
Adder		30310	30320	30350
1	USM1I	30311	30321	30351
2	USM2I	30312	30322	30352
3	USM3I	30313	30323	30353
3	USFM10I			

Ratings:

Volts : 600VAC / DC
Amps : 1/10 to 30A
: (35 to 50A AC only)
I.R. : 100kA I.R.
: 10kA I.R. AC (35 to 50A)

Approvals:

- UL listed to standard 248-14 (1/10 to 30A) File E33925
- DC Listed to UL Standard 248-14 (1/10 to 30A)
- CSA Certified to Standard C22.2 No. 248.14 (1/10 to 30A)



ABIA — CHARGING STATION WIRING DIAGRAM

CONFIGURATION MANAGEMENT

Author: William H. Conn

Release Date: 6/10/04

REV	ECO #	Description	Date
A	5531	Initial Release	6/10/04

Table of Contents

List of Figures

List of Tables

1 Overview

The Dual Vehicle (DVS) Fast Charging System (Figure 1.1) is an advanced charging system that can quickly and safely charge industrial batteries.

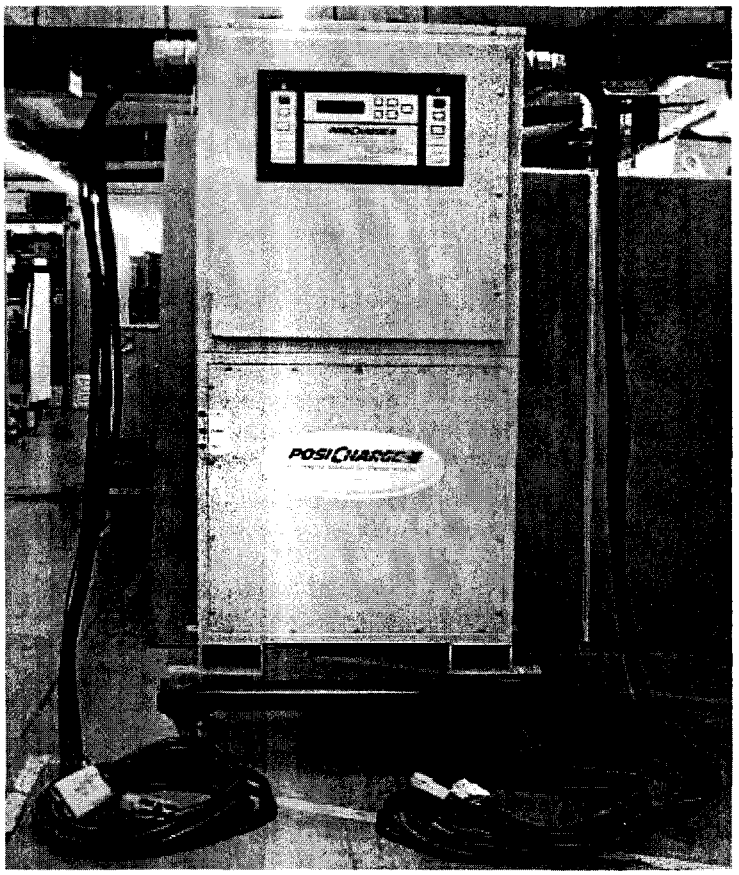


Figure 1.1. DVS 400 Fast Charging System

Charging intelligence is built into the system to make charging extremely simple: just plug in any IPC compatible battery and the system starts charging it correctly. There is no need to be concerned about which charger is designed or programmed for which battery. After completing a charge, the system shuts off automatically.

The DVS's Rapid Charging Intelligence (RCI) makes it capable of charging much more quickly than a conventional charger without damage to the battery. Battery voltage and temperature are monitored precisely, allowing charging to be as rapid as possible without exceeding manufacturers' recommendations. The charge history of the pack is tracked and equalization is

automatically performed on the pack according to a pre-set schedule. This results in better use of the batteries with minimal effort on the user's part.

1.1 Getting Started

Before you begin, take the time to familiarize yourself with the Cautions in Section 2. To get your system up and running quickly perform the following steps:

1. Ensure the DVS 400 Fast Charging System installation and utility power requirements are followed. (Refer to DVS 400 Installation Manual, P/N 09190-76).
2. Install the Battery Monitor / Identifier (BMID) onto the battery pack. (Refer to BMID Manual)
3. Once BMID is installed, the battery pack may be connected to the charger.
4. If your BMID does not come pre-configured, you will need to initialize the new BMID. (Refer to BMID Programming and Advanced Features Manual PN 06701)
5. Once the BMID has been initialized, the battery pack is ready to begin charging.

1.2 Applicable Documents

TITLE	AV Part Number
DVS 400 Installation Manual	09190-76
BMID Installation Manual	06864
BMID Programming and Advanced Features	06701

2 Safety Precautions - Read before using

2.1 Symbol usage

Throughout this manual, take special note of the information marked with the following symbols:

⚠ DANGER	Contains information about safety practices necessary to prevent personal injury or death.

⚠ WARNING	Contains information about safety practices necessary to prevent fire or equipment overheating.

⚠ CAUTION	Contains information to prevent shock hazard or possible damage to the equipment during installation and service.

NOTE: Offers helpful information for installation or usage, but does not contain personnel or equipment safety related information.

2.2 Safety Instruction

⚠ CAUTION BEFORE YOU BEGIN	• Read all instructions and cautionary markings on the Industrial PosiCharge DVS 400 Assembly. • Make sure you also read the IMPORTANT SAFETY INSTRUCTIONS below. • Be sure to leave these instructions in a safe and easily accessible location for future reference. • Only qualified personnel, familiar with the local code, should install and service this charger. • Read and understand the manufacture's instructions and your employer's safety practices manual.

⚠ DANGER	ELECTRIC SHOCK CAN KILL: Touching live electrical parts can cause fatal shocks or severe burns. The battery terminals are always electrically live, and the output circuit is live whenever the battery is connected or being charged. The input power circuitry and internal circuits are live whenever input power is on. An incorrectly installed or improperly grounded charger is a hazard.

- The unit must be grounded properly with a grounding conductor of size equal to or larger than that recommended by local electrical codes or the installation section of this manual.
- Do not touch the uninsulated portion of the output battery connector or an uninsulated battery terminal.

- Do not remove the cover. There are no user serviceable parts inside. Refer all servicing to qualified service personnel. Opening the system, or attempted repair by other than qualified service personnel, voids the warranty.
- Disconnect battery charger from input power and battery connections before installing or servicing. Lockout/tagout input power according to OSHA 29 CFR 1910.147.
- Do not use when in standing water.
- Before disconnecting the battery, turn off the charger by pressing the stop button on the front panel. The DVS 400 is designed to automatically stop a charge event to minimize arcing or burning of the charger connections in the event of a hot disconnect.
- The charging leads must be capable of the full rated current of the DVS 400, and inspected frequently for wear, cuts and abrasion. Do not use worn, damaged, undersized, or poorly spliced cable.
- The DVS 400 power connector may be damaged by misuse or abuse. Frequently inspect the connector for cracking, pitting of contacts, fraying of wires or signs of connector fatigue. Should any indication be present, immediate replacement of the connector will be necessary.
- Do not wear rings, watches, necklaces, tie clips, or conductive jewelry when working with batteries, as a short circuit through conductive jewelry may cause severe burns.

⚠ DANGER	BATTERY GASES AND ELECTROLYTE CAN BE HAZARDOUS: Charging batteries produces fumes and gases that may be hazardous.

- Charging batteries may leak corrosive electrolyte that can cause skin and eye irritation and damage equipment and clothing. Avoid contact and follow battery manufacturer's recommended practices for cleaning the battery pack.
- Thoroughly wash all items brought into contact with battery electrolyte with a solution of baking soda and water.
- Batteries produce explosive gases. Do not smoke, perform operations that cause sparking, or have an ignition source near batteries.
- Ventilate the area to prevent the buildup of fumes and gases.

⚠ WARNING	IMPROPER INSTALLATION CAN CAUSE FIRE

- Do not install or place unit on, over or near combustible surfaces.
- Do not install unit near flammables.
- Do not block or filter airflow to the unit (allow minimum of 6" clearance around unit).
- Ensure that the BMID is properly installed according to the BMID installation instructions.
- Replace blown fuses only with same type and rating of fuse.

- Do not overload building wiring - be sure power supply system is properly sized, rated and protected to handle this unit. Use only on circuits provided with the minimum wire size specified in the installation section.

2.3 Technical Support

Call AeroVironment for technical support any time a procedural question arises. DO NOT perform a procedure you do not understand. AeroVironment can be contacted during normal working hours (Pacific Standard Time) by calling Customer Service at (626) 357-9983, ext. 211.

3 System Description

The DVS 400 Fast Charging System is a transistor-based fast charging system that provides all of the battery charging and equalizing required for your application. It provides a constant current-constant voltage-constant current (IEI) charge profile that precisely controls the charge rate, and optimally charges your batteries by precisely adjusting the current in response to the batteries' capacity, temperature and age.

The keypad and display on the front of the DVS 400 provide the user interface to the charger. The alphanumeric display panel constantly updates the charger and battery status, and allows access into the programming menus through the keypad. Four status LEDs allow the user to determine from a distance when the charge is in progress, at 80% complete, fully charged, or in equalization. A fault/warning LED serves to alert the user to fault conditions.

The DVS 400 works with a small monitoring device mounted on the battery called the battery monitor/identifier (BMID). The BMID enables the charger to automatically adjust the charge to match the requirements of all of the batteries in your fleet, without needing to worry about mismatching batteries and chargers.

Each BMID is pre-configured with the following information:

1. An identification number, which can help track the charging history of a specific battery.
2. A type code, indicating the manufacturer and type of battery.
3. The number of cells in the battery.
4. The ampere-hour capacity of the battery.
5. The start current limit of the battery pack for optimal charging.
6. The State of Charge (SOC) limit of the battery. This will determine the SOC at which the charging will stop.
7. Internal resistance.
8. Maximum ampere-hours between equalizations.
9. Maximum days between equalizations.
10. Equalization day of the week.
11. Voltage limit for Fast Charging and Equalization.
12. Battery temperature foldback.
13. Initialize BMID.

Typically, the battery dealer or another authorized service technician will install the BMID on the battery and configure it before delivery to the customer. BMIDs may also be reconfigured on site through the charger front panel (see the "BMID Programming and Advanced Features Manual").

3.1 Options and Accessories

The following options and accessories are available through your authorized Industrial PosiCharge DVS 400 Fast Charging System dealer. For any other replacement parts, contact AeroVironment customer service directly:

Battery Monitor and Identifiers (BMID)
Many different sizes and types of industrial battery packs may be charged with the DVS 400 Fast Charging System. Choose the correct BMID for the nominal voltage of your pack.

24V BMID	P/N 08342-003
36V – 48V BMID	P/N 08219-003
72V – 80V BMID	P/N 06619-003

Thermistor Options
Choose the correct thermistor type for your battery. Submersible thermistors are designed for installation through the battery case into the battery electrolyte of flooded battery cells. Exterior thermistors are designed to be glued onto the exterior of sealed batteries. DO NOT submerge exterior thermistors into electrolyte, as thermistor corrosion will result in erroneous readings.

Submersible (flooded battery) thermistor	P/N 06644
Exterior (sealed battery) thermistor	P/N 06645

Diagnostic Cable	P/N 06969

4 System Installation

Refer to the DVS 400 Installation Manual (09190-76) that came with your system.

5 Operation

Fast charging dramatically reduces the time to recharge a battery to a high state of charge. Fast charging makes it possible to opportunity charge during available breaks, shift changes and other idle time and keep a vehicle running all day long without changing batteries. In most two- and three-shift operations, fast charging can eliminate the need for a battery changing room, freeing up floor space and personnel for productive activities and reducing battery inventory by up to 65%. Fast charging also increases productivity by eliminating down time for battery changing and avoiding low voltage operation that can reduce vehicle performance.

5.1 System Start Up

Once the system has been properly installed (mechanically and electrically) it is ready to be powered. When you first power up your DVS 400 Fast Charging System, it will perform a lamp test. The display will then show the initial status screen containing the model number and the software version. The DVS 400 will then sequence through the two more status screens before reaching "Charger Ready Connect Vehicle". See
Figure **5.1**. When initialization is complete, the screens for each charge port will alternate. Note that there is an arrow in the upper left or right corner of the screen indicating which channel's data is currently being displayed.

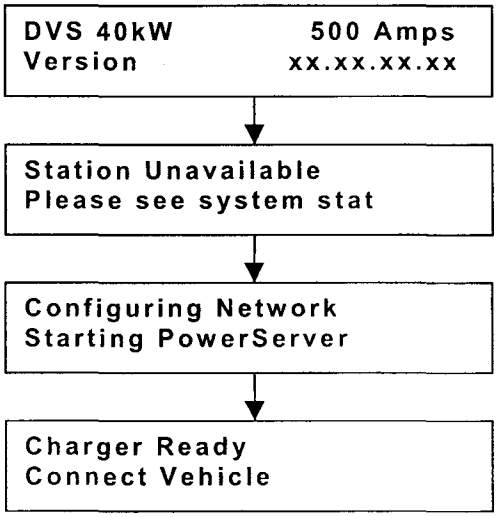


Figure 5.1. Start up Screens

5.2 Charging

(Note: The numbers shown as part of the screen display in this section of the manual are for illustration purposes only. The actual numerical combination of voltage, current, and temperature will vary with the type of battery pack being charged.)

Step 1: Connect battery to charger

To start charging, simply connect the battery to either charge port of the charger. The charger will establish communication with the BMID, calculate the current state of charge, identify the correct charging profile, and start charging. At each step, the charger will display the corresponding Status screen (see Figure 5.2). During "Preparing for Charge", the DVS 400 counts down while preparing to charge. Charging preparation includes measuring the Open Circuit Voltage (OCV) of the battery pack and calculating the State of Charge (SOC) to determine what the initial current should be to charge the pack properly. Once the charge starts, and the "Charging" screen is displayed, the current is ramped up from zero to the target initial current while the charger monitors the pack voltage.

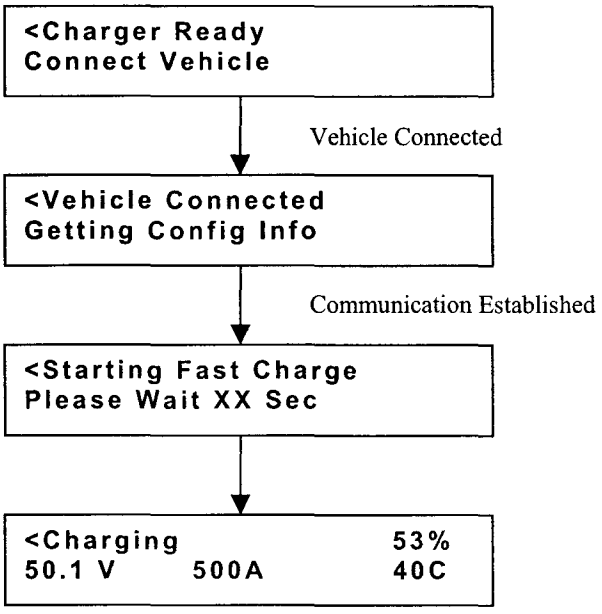


Figure 5.2. Connecting Status Screens

Note that the screen examples shown above have a left-facing arrow at the left of line 1. This indicates that the display applies to charge port A. A right-facing arrow at the right of line 1 indicates that the display applies to charge port B. The display screen will periodically update the charging data as the charge progresses. In addition, the front panel has several status LEDs that indicate the current status of the vehicle under charge and whether it is scheduled for an equalization charge (see Figure 5.3 and Table 5.1).

Table 5.1. LED Labels and Meanings

LED Label	Color	When Steady Lit	When Flashing
Equalizing	green	Battery undergoing equalization	Equalization scheduled
Charge Complete	green	Charge Complete and stopped	N/A
80% Charged	green	The Battery SOC is >= 80%	N/A
Charging	amber	Battery connected and charging	N/A
Fault/Warning	red	Fault (charge stopped)	Warning (check log)

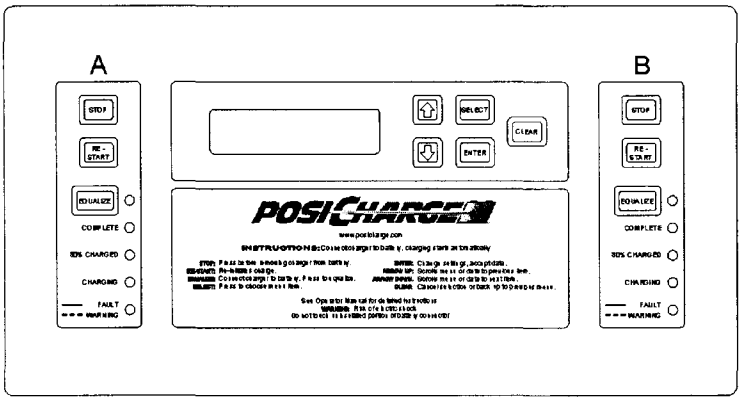


Figure 5.3. Front Panel Layout

Step 2: Stop Charging

Once the battery has been fast-charged to the SOC preset in the BMID, the DVS 400 will stop the charge and illuminate the "Charge Complete" LED. If an equalization charge is scheduled for this battery pack, the Charge Complete will not illuminate until the equalization has been completed. The operator may stop charging at any time without waiting for the charge to complete, by pressing the "STOP" button.

After a charge has been completed or stopped by the user, the screen will indicate the method in which the charge was stopped and the data values just before the end of charging will be displayed (see Figure 5.4).

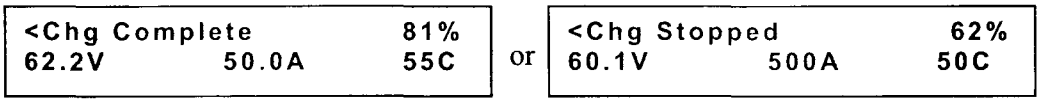


Figure 5.4. Charge Complete Screens

Step 3: Disconnect battery cables from charger

NOTE: If the operator disconnects the cables without pressing STOP, the charger will immediately stop charging and prevent any arcing or damage to either the charger or battery. However it is strongly recommended that operators press the STOP button first.

5.3 Equalization

Proper equalization is necessary for the health of the pack. Too little equalizing may lead to sulfation and decreased capacity, whereas excessive equalizing may lead to high water loss and more maintenance. We recommend equalizing at least once a week, but twice a week is optimal for pack life under continuous use.

The equalization schedule is stored in the BMID and run automatically (see the "BMID Programming and Advanced Features Manual" for information on how to modify the pre-set equalization schedule). To manually schedule an equalization during a charge, simply press the "Equalize" button at any time during a charge, the equalize light will start flashing indicating an equalization is scheduled, and the battery pack will be equalized following the fast charge.

To bypass the fast charge and start an equalization charge on a battery pack at any state of charge, press and hold the "Equalize" button for three (3) seconds, the equalize light will illuminate without flashing, and the charger will start a full equalization on the pack without a fast charge.
To cancel a requested equalization charge, press the Equalize button and the Equalize LED will turn off.

⚠ CAUTION	Always run a full equalization charge *prior* to a fast charge on any battery pack that has had a cell replaced to ensure the pack is balanced.

5.4 Full / Over Charging

Full/Over Charging is a feature that allows the user to fully charge a battery to 100% and then Over Charge the battery for a predetermined period of time. This feature resembles the Equalization procedure in that Over Charging utilizes the Finish Current setting of Equalization. However, this feature enables the user to set a time window when Full/Over Charge can take place. It also allows the user to control the length of time that the battery is Over Charged. If the charger is actively charging during the time window set by the user, and the feature is enabled, Full/Over Charging will be performed. The time window, as well as the length of Over Charging, is set through the "Full/Over Charge Setup" submenu of the "Charger Configuration" menu.

5.5 Reduced Charging

Reduced Charging allows the user to set a predetermined rate of current during a user defined time window. The current, as sell as the time window, is set through the "Reduced Charge Rate Setup" Submenu of the "Charger Configuration" menu. If the charger is actively charging during the time window, and the feature is enabled, the charging current will be reduced to the user-selected value. The current will remain at this level as long as the charge is within the specified window.

5.6 Viewing Charge Data or Fault / Warning Screens

While charging, the display screen is periodically updated with the latest charging data including voltage, current, battery temperature, and battery state of charge. If there is a fault or warning, the fault or warning message will be displayed instead.

Charging data. This screen displays the voltage, current, state of charge, and temperature of the battery. During a charge, the screen will say "Charging" and the data will be updated periodically. See Figure 5.5.

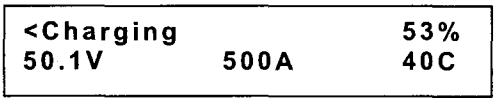


Figure 5.5. Representative Charging Data Screens

Fault/Warning Screens

In the event of a fault or a warning, a fault/warning screen will appear automatically (see Figure 5.6). The fault/warning screen shows an assigned fault number and the name that indicates the type of fault or warning. Check Table 6.2and Table 6.3 in the troubleshooting guide for a complete listing of faults and warnings.

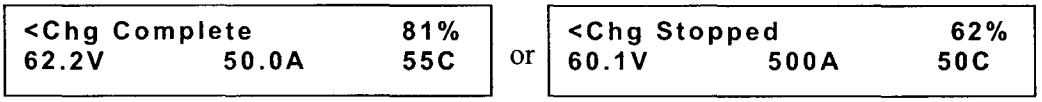


Figure 5.6. Representative Fault or Warning Screens

5.7 Data Logs, Charger Configuration and Advanced Programming Features

The DVS 400 Fast Charging System's user interface allows a trained user to configure many of the charge parameters and review recorded data stored in the system's internal data logger. All configuration programming is performed through menus that are accessible directly through the display and the keypad. By pressing the "Select" key, you will enter the top-level menu of the advanced features menu (see Figure 5.7).

Details on how to access the advanced features and configuration menus are in the "BMID Programming and Advanced Features Manual".

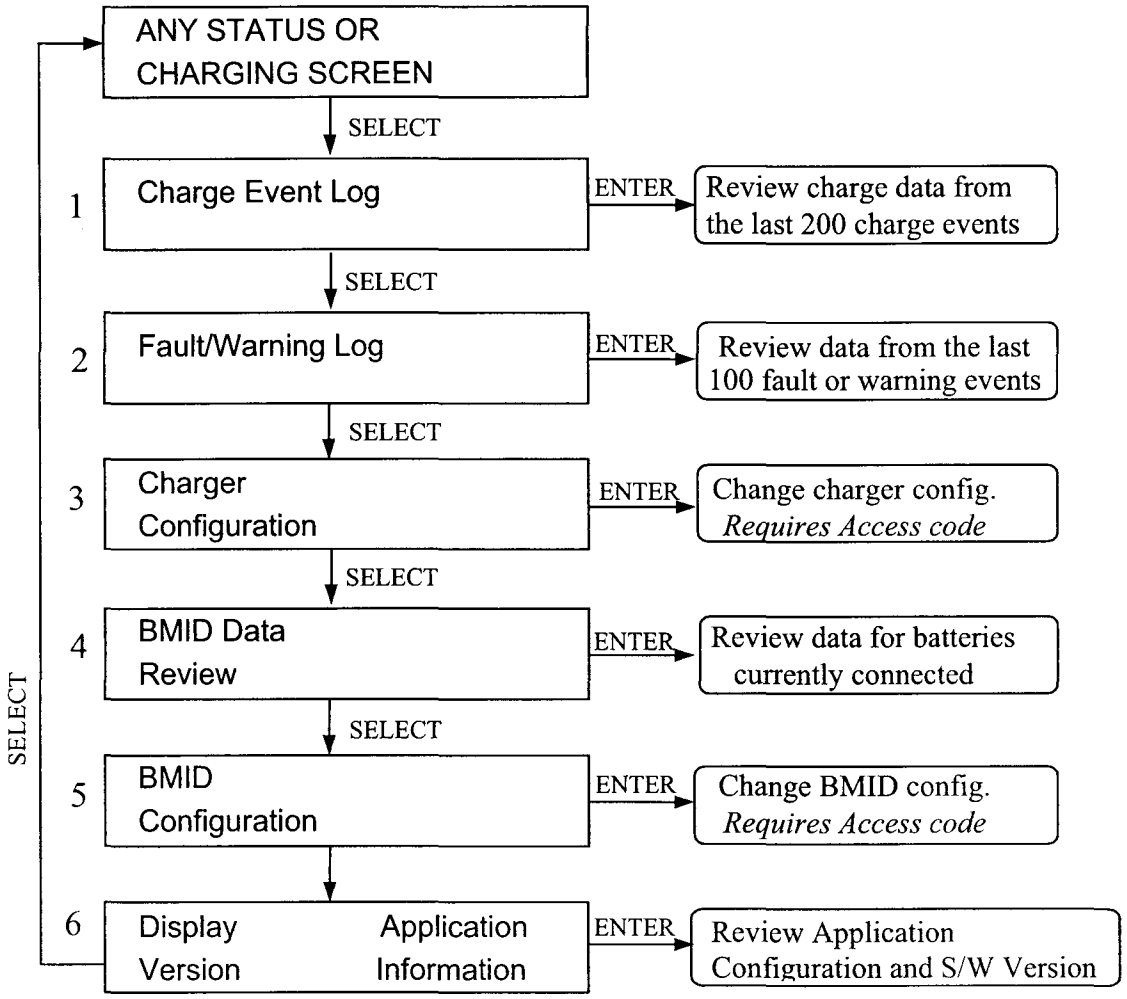


Figure 5.7. Top Level Menu for Advanced Features

1. Charge Event Log - Allows you to scroll through the data from the last 200 charge events.
2. Fault/Warning Log - Allows you to scroll through the last 100 fault or warning events.
3. Charger configuration - A programming mode for setting the date and time, modifying charge algorithms, setting the equalization schedule, and controlling charge times. Requires an access code to enter this mode.
4. BMID Data Review - Lists all of the BMID parameters for the unit(s) presently connected or charging, plus all of the stored charge history and equalization data.
5. BMID Configuration - A programming mode for modifying the BMID parameters of the unit(s) presently connected. Requires an access code to enter this mode.
6. Display Application Version Information – Allows user to view software version and hardware configuration information.

5.8 External Status Indicator Configuration (Optional)

If the DVS 400 is configured to drive external status lights, assignment of light outputs will be possible for visual presentation of the current state of the charger. A set of three lights per port may be controlled to alert the user to the current state of the charger. This is useful when the user is in a position where the front panel of the DVS 400 is not visible. The lights will show what the charger is currently doing. The assignment of the lights is configured through the "Extern Light Port X" submenu of the "Charger Configuration" menu.

6 DVS 400 Periodic Maintenance

Maintenance Schedule

ITEM	SERVICE	INTERVAL
DC Power Output Cables	Inspect and Replace	As Needed
SBX/SYX Connectors	Inspect, Rework or Replace	As Needed

6.1 DC Power Output Cable Service

Refer to the DVS 400 field service manual, 09190-76, for output cable installation instructions. Use only AV replacement cable part number 07391 to ensure safe and reliable service.

⚠ WARNING	Use only connectors and cable that are rated for the full continuous current rating of the unit.

If you have questions regarding a specific cable assembly or need to obtain documents, please contact AeroVironment Customer Service.

6.1.1 SBX/SYX Connector Service

The auxiliary contact pins in SBX and SYX connectors sometimes make intermittent contact when the vehicle is plugged in to the PosiCharge Charger. This results in a BMID Comm fault or no recognition by the charger that a vehicle is plugged in.

Check the red and black auxiliary pins in each connector. One or more of the communication pins in the red and black auxiliary connectors may not be seated properly or there may be damage to the auxiliary connector housing. A correctly seated pin is all the way forward inside the housing. An incorrectly seated pin is visibly pushed back inside the housing and the tip of the housing tongue can be seen. Damaged connector housings must be replaced. Contact AeroVironment for recommended replacement parts.

NOTE
If an SBX or SYX connector is mounted to a vehicle, it must be removed from its mount before the roll pins that retain the auxiliary contacts may be removed.

Procedure:

1) Remove the two retaining roll pins from the SBX or SYX housing
2) Pull the red and black auxiliary housings from the SBX or SYX housing
3) Remove the incorrectly seated pin from the auxiliary housing
4) Rework the pin so that the tongue of the pin is inline with the pin body or at a slight downward angle (Figure 3 shows the CORRECT alignment. Figure 4 shows the INCORRECT alignment).

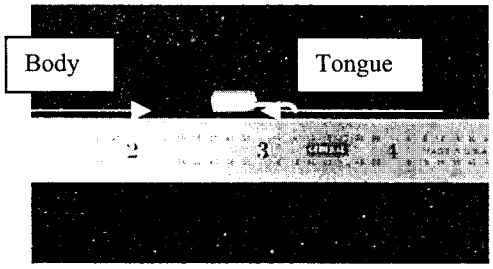


Figure 6.1 Correct Pin Alignment

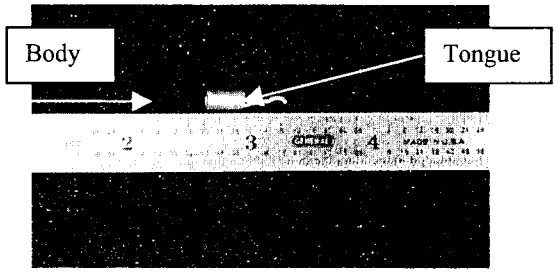


Figure 6.2 Incorrect Pin Alignment

5) Insert the pin into the red or black auxiliary housing (Note: An audible click can be heard when the pin fully engages. Pull on the wire to make certain that the pin is properly seated).
6) Reassemble the connector assemblies and test.

The following connector kits are available from AeroVironment:

1) P/N 06435 - Yellow
2) P/N 06436 – Blue
3) P/N 07280 – Green

Each kit includes:

(1) SYX 350A 600V Connector, (2) 4/0 Lugs, (2) Roll Pins, (2) Aux. Contact Pins, (1) Red Aux. Connector, (1) Blk Aux. Connector

Additional kits or individual parts may be available. Contact AeroVironment Customer Service for more information.

6.2 Troubleshooting

6.2.1 How to Use This Section

The following tables should be used in diagnosing trouble with your DVS 400 Fast Charging System. Use **Table 6.1** to relate symptoms to probable causes. Find the symptom that best describes the problem in the first column and go through the probable causes in the second column. Then use the third column to identify the appropriate action for that probable cause. See section 6.2.5 for a detailed description of each action. **Table 6.3** lists fault codes that may be displayed on the front panel of the DVS 400. Find the fault code displayed on the DVS 400 and use **Table 6.2** to find a description of the fault code and an action code.

Table 6.3 lists the Charge Termination Codes. This table can be used to interpret charge termination codes / messages listed in the Charge Event logs.

6.2.2 ESD Precautions

Electronic circuits are sensitive to damage from electrostatic Discharge. Persons servicing this equipment should be trained in proper techniques for avoiding ESD damage to electronic circuits. As a minimum, when handling circuit boards, wear an appropriate ESD wrist strap connected to the equipment chassis.

6.2.3 Problem Symptoms and Action Key

Table 6.1 Problem symptoms and Action Key

Symptom	Probable cause(s)	Action
No Display or LED's	No AC to charger	D
	Miswiring of AC input	D
	120VAC Input Fuse Blown	C
One or more LED's do not illuminate during lamp test	Burnt out LED	II
Display Illegible	Noisy Environment	E
	Bad Control Board	B
	Corrosion on internal components	EE
	Display connector not properly seated	II
Control panel not responding to input	Bad control board	B
	Noisy Environment	E
	Damaged membrane switch	II
Charger does not start charge when battery connected	Output connector not completely connected	F
	BMID is bad or reading out of range	G
	Pilot line disconnected	F
	Bad Control board	B
	Loose or incorrect signal wiring	F
	Corrosion on the signal pins	EE
	Battery over discharged	K
Charger stops charge before complete	Battery overheat	H,P
	Loss of communication line	F
	Bad cell within pack	I
	Algorithm/capacity mismatch	J
	Charger overheating	AA
	Incorrect BMID configuration	J
Charger works intermittently	Loose input or output wiring	F
	Loose BMID connections	F,G
	Low local utility voltage	DD
	Corrosion of internal components	EE
Battery takes too long to charge	Algorithm/capacity mismatch	J
	Bad BMID	G
	Shorted or worn BMID wire	F
	Loose power cable or battery interconnect	Q
	SOC mismatch within pack	I
	Battery too hot when charge started	H,P
	Battery brought in at extremely low SOC	K
Pack failing to equalize	BMID misprogrammed	J
Output cables or Connector too warm during charge	Cable undersized for length and current	N
	Connector underrated for current	N
	Bad crimp or connection within connector	N
	Short in output cables	F
	Bad cell within pack	I

Symptom	Probable cause(s)	Action
Battery doesn't last full shift	Algorithm/capacity mismatch Incorrect equalization schedule Batteries are under watered Bad cell within pack Bad BMID Premature disconnection of charge cable	J O P I G F
Battery water usage too high	Algorithm/capacity mismatch Incorrect equalization schedule Battery temperature too high	J O H,P
Battery temperatures too high	Loose interconnection between batteries Pack/Algorithm mismatch Batteries underwatered Cell SOC mismatch Incorrectly installed temp sensor	Q J P I F,G
Charge connector arcs when disconnected	Bad Control board	B
Noisy unit	Loose Sheet metal Loose Fan blade or mount Noisy Transformer Miswiring of AC input	R R A D
Excess fumes during charging	Algorithm overcharging batteries Underwatered batteries	J P
History files incorrect	Bad or noisy control board Bad BMID	B G

6.2.4 Fault Messages

Table 6.2 Fault Codes and Action Key

Code	Fault Messages	Description	Action
100	OS System Failure	Power on self test/OS failure	A
101	Logic Supply Failure	Logic power supply failure	B
102	ADC Failure	A to D Converter failure	B
103	ADC Ref Invalid	A to D Converter inputs invalid	B
104	Battery Backup Failure	Backup Battery disconnected or dead	FF
105	Pilot Int. Failure	Pilot interrupts stopped occurring	F
106	PS1 Overvoltage	Powerstage #1(port A) voltage too high	S
107	PS1 Overcurrent	Powerstage #1(port A) current too high	T
108	PS1 Undercurrent	Powerstage #1(port A) current too low	U
109	PS1 Trans Failure	Powerstage #1(port A) transistor failure	V
110	PS1 General Failure	Powerstage #1(port A) current sensor fault	W
111	PS1 Overtemp Failure	Powerstage #1(port A) temperature too high	Y

Code	Fault Messages	Description	Action
112	PS2 Overvoltage	Powerstage #2(port B) voltage too high	S
113	PS2 Overcurrent	Powerstage #2(port B) current too high	T
114	PS2 Undercurrent	Powerstage #2(port B) current too low	U
115	PS2 Trans Failure	Powerstage #2(port B) transistor failure	V
116	PS2 General Failure	Powerstage #2(port B) current sensor fault	W
117	PS2 Overtemp Failure	Powerstage #2(port B) temperature too high	Y
118	DCBus VDC Too Low	Common DC Bus Voltage Too Low	X
119	DCBus VDC Too High	Common DC Bus Voltage Too High	X
125	Charger Power Reduced	Available power is cutback due to heat	AA
126	Temp Sensor Failure	Invalid temperature sensor reading	NN
128	Internal Failure	Power Supply Internal Hardware Failure	B
129	Power Imbalance	Power Stage power imbalance in 500A mode	JJ
132	Invalid Pilot on Port A	Battery connected with invalid pilot circuit	MM
133	Chrg Vdc Port A Low	Battery voltage too low for charger	Z
134	Chrg Vdc Port A High	Battery voltage too high for charger	Z
135	BMID A Vbat Too Low	Battery voltage too low for BMID	L
136	BMID A Vbat Too High	Battery voltage too high for BMID	L
137	Tbat Too High on Port A	Battery temp too high	H
138	BMID Comm Fail Port A	BMID link lost after charge started	F
139	BMID Config Warning on Port A	BMID not adequately configured for charger usage	M
140	BMID Config Mismatch on Port A	BMID data doesn't match battery parameters	J
141	BMID Failure on Port A	BMID reporting a critical failure	G
142	BMID Temp Sensor Failure on Port A	BMID temp sensor out of valid range	G
143	Vbat Mismatch on Port A	BMID and terminal voltages don't match	KK
144	Battery Overdischarged on Port A	Battery excessively discharged	K
145	Early Charge Termination on Port A	Charge terminated unexpectedly	BB
164	Invalid Pilot on Port B	Battery connected with invalid pilot circuit	MM
165	Chrg Vdc Port B Low	Battery voltage too low for charger	Z
166	Chrg Vdc Port B High	Battery voltage too high for charger	Z
167	BMID B Vbat Too Low	Battery voltage too low for BMID	L
168	BMID B Vbat Too High	Battery voltage too high for BMID	L

Code	Fault Messages	Description	Action
169	Tbat Too High on Port B	Battery temp too high	H
170	BMID Comm Fail Port B	BMID link lost after charge started	F
171	BMID Config Warning on Port B	BMID not adequately configured for charger usage	M
172	BMID Config Mismatch on Port B	BMID data doesn't match battery parameters	J
173	BMID Failure on Port B	BMID reporting a critical failure	G
174	BMID Temp Sensor Failure on Port B	BMID temp sensor out of valid range	G
175	Vbat Mismatch on Port B	BMID and terminal voltages don't match	KK
176	Battery Overdischarged on Port B	Battery excessively discharged	K
177	Early Charge Termination on Port B	Charge terminated unexpectedly	BB

6.2.5 Actions

A) Not field serviceable. Contact your Authorized DVS 400 Fast Charging System service provider.

B) This component may be replaced by a qualified service technician. Refer to the section listed in the right column for more information. Contact AeroVironment Customer Service for availability of spare parts.

C) Disconnect AC power and check the 120VAC fuse behind the AC utility power access panel. A good fuse should measure 0 Ohms across the fuse. If the fuse has blown, replace it with the same size and rating of fuse.

D) Check that the AC wiring is connected properly to a 3-phase circuit, the unit is grounded, and that the circuit breaker is closed.

E) Identify equipment that shares the same voltage supply line, and temporarily shut it down. If the charger starts to respond normally, check the grounds on all of the installed equipment

F) Check the output wiring of the BMID unit.

1. Ensure that all of the power and signal connectors are completely mated, and that there is no physical damage to the connector or pitting on the contact that could cause poor connections.
2. Check that the communication and pilot wires are connected to the unit. Check that all pins are seated correctly in each connector.
3. Visually inspect the insulation on all of the wires and verify that there are no shorts or burnt spots on any of the wires. Check the continuity between the wire and chassis ground using a multi-meter.
4. Verify that the BMID is installed properly (Refer to BMID manual.

G) Visually inspect the BMID and the thermistor. If the potting of the BMID looks cracked, or the thermistor appears corroded, avoid erratic charging by replacing these components even if functional problems have not yet occurred. Temporarily attach another BMID or thermistor to the pack. If the problem is resolved, replace the bad component. If the problem persists, plug the vehicle into another charge port. If this corrects the problem, check continuity on all BMID interfaces on the original charge port.

H) The DVS 400 Fast Charging System contains built-in safety systems, which will fold back charge in response to high battery temperatures, and stop charge completely if the batteries get above a manufacturer's specified threshold temperature. If the charger has stopped because of a false reading of a high battery temperature, check the installation of the BMID and the integrity of the thermistor, reinstall or replace as needed. If the batteries are overheating, allow the batteries to cool down before charging again. (Note: Use of ventilated battery packs and/or fans may be required in certain applications. Contact AeroVironment Customer Service)

I) If a cell within a pack is failing, or a failed module has been replaced with a new module, there will be a state of charge (SOC) mismatch within the pack, which will prevent the pack from charging properly. Before running a fast charge, make sure you run a long equalization on the pack to bring it back into balance. Failure to run equalization on a serviced battery pack prior to fast charging may result in damage to the new module. If the problem persists or grows worse, replace the battery pack.

J) Choosing the charge algorithm is very important for the life and utility of the battery pack. An algorithm that is not matched to the battery being charged will result in undercharge, overcharge or excessive heating of the battery during charge. Use the Charge Configuration menu to make sure the charge configuration is appropriate for your battery and application. Use the BMID Configuration menu to check that the BMID installed on the pack has the correct battery manufacturer type-code, the correct capacity of the cells, and the correct number of cells.

K) A battery that is connected at a state of charge (SOC) which is too low to be fast charged safely will be charged at a low rate until it has recovered sufficiently to accept fast charging. In this case, the user must press and hold the EQ button to force charging to begin.

L) If the battery voltage reported by the BMID goes below the minimum allowable volts per cell or exceeds the maximum allowable volts per cell during a charge event the fault is set. The minimum/maximum allowable volts/cell are based upon the battery type selected in the BMID Configuration. Check the battery charge path for shorts or opens. Check the battery for defective or damaged cells. If no problems are found replace the BMID.

M) This fault is usually the result of an unprogrammed BMID or an improperly programmed BMID. Using the BMID Configuration menu verify that the BMID installed on the pack has the correct battery manufacturer type-code, the correct capacity of the cells, and the correct number of cells input.

N) Refer to the Installation Manual for correct cable and connector sizing. Check the crimp or solder joint between the cable and the connector pins to ensure good electrical contact. Replace the connector if the case is damaged.

O) The equalization schedule is very important to the life of the batteries. If the batteries are being equalized too infrequently, or the equalization is interrupted too often, the capacity will start to degrade. If the batteries are being equalized too often, there will be excessive water loss requiring higher maintenance. Adjust the equalization schedule for the batteries based on the use level. See the "BMID Programming and Advanced Features Manual" for reprogramming instructions.

P) Flooded lead acid batteries must be watered as part of a regular maintenance schedule. Insufficient watering will result in reduced capacity, overheating and reduced life. Consult your battery manufacturer's guidelines for a watering schedule and proper procedures.

Q) Loose battery interconnects or power cables increase the resistance of the pack and can cause overheating and/or slow charging. Using insulated gloves and tools, check the torque on all bolted interconnects and power cables, and verify that welded interconnects have not loosened.

R) Tighten all screws and fasteners as needed.

S) Check for opens in the charge path (contactors, output cables). Check DVS 400 Control Board connectors P12 (Output Voltage Sense) and P15 (To Contactors). Check that all wire crimps are secure.

T) Shut down the unit and check for shorts or problems in the output cable. Check current sensors and check their harnesses P11/P12 for continuity.

U) Undercurrent faults may be caused by a loose connection or faulty contactor in the high current path. The fault indicates a 15A discrepancy between the current requested and the current delivered. Check the DVS 400 current sensors, verify that the DVS 400 contactors are closing and check for loose connections. If the DVS 400 contactors are not closing check/replace relays K1 to K4 on the control board or the drivers U10 and U71. Replace the control board if required.

V) Indicates that the 150V DC Buss dropped below 100V or exceeded 200V. Check the utility power for spikes and periodic phase drops. Transistor faults may be caused by excessive heat.

W) Current sensor faults may be caused by a poor connection or faulty cable. Check all connections to current sensor carefully before replacing a current sensor.

X) Indicates that the 150V DC Buss dropped below 110V or rose above 170V creating a continuous error for 10 seconds.

Y) If there is no sign of excessive heat, a temperature fault may indicate a faulty temperature switch. In this case, check for normal operation of temperature switches.

Z) Check to make sure that your battery pack is properly wired to the output connector, and that there are no shorted or damaged cells. Check that connector P12 on the DVS 400 control board is properly seated and that all pins are making contact. A low Vdc fault indicates the charger has sensed less than 10V. A High Vdc fault indicates greater than 150V has been sensed by the charger.

AA) Allow the unit to cool down, and verify that the AC input wiring is correct and the intake and exhaust vents are clear of blockage. Re-start the charge. If the unit overheats again, contact your Authorized DVS 400 Service Provider.

BB) Charge was terminated before scheduled end. If not terminated by user, check Table 6.1 for possible causes.

CC) Check the AC input with a multimeter to ensure that all three phases are connected and at the correct voltage. If input power is correct, and the problem persists, contact your authorized DVS 400 Fast Charging System service provider.

DD) Check the utility line voltage. If the voltage is more than 10% below the rated value, remove other loads from circuit. If the voltage problem persists, contact your local utility company.

EE) Exposure to excessive moisture or corrosive environments may cause intermittent faults. Corroded parts should be replaced.

FF) Use the Charger Configuration menu to clear the 'Battery Backed RAM'. (Note: Disconnecting the backup battery to the computer board automatically sets this fault. When reconnected the fault must be cleared) If the fault continues the memory/clock backup battery may need to be replaced.

GG) Not used

HH) Not used

II) If the display is intermittent or dark, the display connector may be loose. Open the unit and inspect the control board to display interface. Check to make sure that all standoffs on the control board are screwed down firmly to the front panel and are securely holding the control board at all locations. Correct any problems found with the standoffs and cycle power to the DVS 400. If this does not correct the problem, replace the door assembly. Burned out LED's usually indicate a damaged membrane. Replace the door assembly.

JJ) A power imbalance in 500A mode is indicated when the DVS 400 is delivering unequal current through each channel. This can result from a contactor problem, a loose connection in the high current path of one channel, a malfunction in the current sensor, or a malfunction on the control board.

KK) If a VBAT MISMATCH error occurs, check the DVS 400 display and observe the voltage. If the voltage looks correct for the battery, the problem is most likely in the high current path or the voltage sense path. Check for continuity throughout the high current path from the power board to the battery in the vehicle. Check that all cables connections are tight and that all contactors in the path are functioning properly.

LL) If the voltage observed on the DVS 400 display does not seem appropriate for the battery in use, the problem is in the BMID and the BMID should be replaced.

MM) If an invalid pilot signal is indicated, check the pilot signal wiring. If the pilot signal wiring and connections check out, check the charger with another vehicle to isolate the problem to either the charger or the vehicle. If the problem goes away when another vehicle is used, replace the BMID in the vehicle that caused the fault. If the fault persists when the vehicle is changed, replace the control board in the DVS 400.

NN) Reseat the power stage Temp Sense connectors. Check the heat sink thermistors (Resistance should be greater than 60K ohms).

6.2.6 Charge Termination Codes

The following table should be used to interpret charge termination codes.

Table 6.3 Charge Termination Codes

Code	Message	Description
1	INVALID BATTERY VOLTAGE	Fast Charge, Amp-hours exceeded
2	SOC OVER START LIMIT	SOC too high to start a charge
3	FC AHR LIMIT	Fast Charge, Amp-hours exceeded
4	FC BAT TEMP LIMIT	Fast Charge, battery temp limit exceeded
5	FC BMID COM LOST	Fast Charge, BMID communications lost
6	FC CURRENT TIME LIMIT	Fast Charge, CC mode time limit exceeded
7	FC VOLTAGE TIME LIMIT	Fast Charge, CV mode time limit exceeded
8	FC USER STOP	Fast Charge, user stopped (stop button or disconnected)
9	SOC LIMIT REACHED	Fast Charge, normal termination, FC SOC limit reached
10	FINISH CURRENT REACHED	Fast Charge, normal termination, Finish current reached
11	FINISH AHR LIMIT	Finish Charge, Amp-hours exceeded
12	FINISH BAT TEMP LIMIT	Finish Charge, battery temp limit
13	FINISH BMID COM LOST	Finish Charge, BMID communications lost
14	FINISH TIME LIMIT	Finish Charge, CV mode time limit exceeded
15	FINISH USER STOP	Finish Charge, user stopped (stop button or disconnected)
16	FULL AHR LIMIT	Full/Over charge, Amp-hours exceeded
17	FULL BAT TEMP LIMIT	Full/Over charge, battery temp limit exceeded
18	FULL BMID COM LOST	Full/Over charge, BMID communications lost
19	FULL TIME LIMIT	Full/Over charge, mode time limit exceeded
20	FULL USER STOP	Full/Over charge, user stopped (stop button or disconnected)
21	FULL CHARGE UNAVAIL	Full/Over charge, charge window closed, stopped
22	FULL CHARGE COMPLETE	Full/Over charge, completed normally
23	EQ BAT TEMP LIMIT	EQ, battery temp limit exceeded
24	EQ BMID COM LOST	EQ, BMID communications lost
25	EQ TIME LIMIT	EQ, time limit exceeded
26	EQ USER STOP	EQ, user stopped (stop button or disconnected)
27	EQ COMPLETED	EQ, normally completed