TRANSTECTOR
an INFINITE brand

Series 700 A/VS Power Conditioner

Designed for the Varian Accelerators with OBI

Input Voltages: 380 VAC, 400 VAC, or 415 VAC (50 Hz)

Output Voltages: 400/230 VAC (50 Hz)

Integrated Input and Output Breakers

Intelligent Voltage Regulation (±2.0 % Output)

Internal Bypass Switch

Triple Shielded Isolation Transformer

Internal TVSS

Front Access “Zero Clearance” Cabinet



Dual Output Power Conditioner with Voltage Regulation

Submittal Package and Specifications

TRANSTECTOR SERIES 700A/VS

Specifications for Dual Output 50 Hz Power Conditioner, designed for the Trilogy™, Clinac™ IX, Silhouette™ and High Energy Linear Accelerators with On Board Imager™.

1.0 SCOPE

This specification covers the electrical characteristics of the Power Conditioner which provides clean regulated power for the entire Trilogy™, Clinac™ iX, Silhouette™ and High Energy Linear Accelerators with On Board Imager™ and peripherals.

2.0 GENERAL

The Power Line Conditioner consists of a front access power cabinet incorporating an all copper, multiple tapped, triple shield isolation/regulation transformer. The ultra low output impedance of the transformer in conjunction with the electrostatic shields assures precision hospital grade performance with excellent noise and transient attenuation. Independently controlled inverse parallel electronic switches for each of the 7 taps per phase provide tight regulation over a wide input range. Linear devices are used for line synchronization to prevent phase shift errors normally associated with simple CT zero current crossing acquisition. The microprocessor control accurately selects the correct tap to provide line voltage regulation of ±2.0 % typical, correcting for voltage disturbances within one cycle. Digital processing technique provides fast and accurate regulation without output voltage over or undershoots.

2.01 MODEL NUMBERS

MODEL INPUT VOLTAGE OUTPUT VOLTAGE FREQUENCY

Model	Input Voltage	Output Voltages
8QSW-110 K (I) -700A/VS	380 VAC nominal input	400/230 VAC 50 Hz
8RSW-110 K (I) -700A/VS	400 VAC nominal input	400/230 VAC 50 Hz
8FSW-110 K (I) -700A/VS	415 VAC nominal input	400/230 VAC 50 Hz

2.1 AGENCIES

2.1.1 STANDARDS

The systems shall be designed in accordance with:

American National Standards Institute

Institute of Electrical and Electronic Engineers

National Electric Code (NEC)

National Fire Protection Association (NFPA Article 70)

Underwriters Laboratories (UL) 1449, 1012

CE Certification Requirements

FCC Article 15, Section J, Class A

ISO 9001

2.1.1 LISTINGS

The system shall be listed to UL standard UL1012

The system shall comply to: FCC Article 15, Section J, Class A and ANSI C62.14 (electromagnetic compatibility)

The system shall be CE certified

3.0 DYNAMIC ELECTRICAL CHARACTERISTICS

3.1 OPERATING VOLTAGE AND OUTPUTS

The input voltage shall be 380 VAC, 400 VAC or 415 VAC, Delta, three phase, 50 Hz. The standard transformer design shall be capable of accepting one (1) of the three (3) input voltages: 380 VAC, 400 VAC or 415 VAC. Each unit will be pre-wired at the factory to accommodate the selected nominal input voltage. The input voltage can be changed in the field to accommodate any one of the three nominal input voltages.

3.2 LINE VOLTAGE REGULATION

Usable Input Line Voltage +15 %, -23 %.

Nominal Input Line Voltage +10 % to –15 %

3.2.1 Output Line Voltage Regulation to Output #1 for the Accelerator ±2.0 % typical
3.2.2 Output Line Voltage Regulation to Output #2 for the OBI ±3.0 % typical
3.2.3 Output Line Voltage Regulation when Output #1 and Output #2 operate simultaneously under normal conditions ±3.0 % typical.

The design of the system shall indicate that with an input voltage of -10 % of nominal, increasing the load to 1000 % shall cause the output voltage to fall no lower than -6 %.

3.3 OUTPUT VOLTAGE

Two (2) separate voltage outputs shall be provided. Output #1 voltage shall be 400/230 VAC and Output #2 voltage shall be 400/230 VAC, both derived from a WYE configuration.

3.4 OUTPUT CONNECTIONS

A 80 A three (3) pole circuit breaker is provided for the first 400/230 VAC output and a 60 A three (3) pole circuit breaker is provided for the second 400/230 VAC output. The Transtector surge suppressor will also have a dedicated 30 A, 3 pole circuit breaker.

3.5 INPUT/OUTPUT WIRING

Input wiring sizes:

380 VAC #4 AWG to 350 KCMIL (25 mm^2 to 150 mm^2)
400 VAC #4 AWG to 350 KCMIL (25 mm^2 to 150 mm^2)
415 VAC #4 AWG to 350 KCMIL (25 mm^2 to 150 mm^2)

Output wiring sizes:

400/230 VAC 80 A breaker #14 AWG to 1/0 (2.5 mm^2 to 50 mm^2)
400/230 VAC 60 A breaker #14 AWG to 1/0 (2.5 mm^2 to 50 mm^2)

The ILSCO TA-2/0 terminal allows wire sizes from #14 to 2/0 (2.5 mm^2 to 50 mm^2) to be connected to the ground.

3.6 RESPONSE TIME

Response time is less than 1/2 cycle.

3.7 CORRECTION TIME

The output voltage is corrected within 1 cycle.

3.8 LOAD REGULATION

The output is maintained to within 2 % of nominal or less, from no load to full load.

3.9 IMPEDANCE

Output #1: impedance shall be less than 1.95 %
Measured with the linear accelerator in beam on state @ 45 kVA and OBI @ 5 kVA continuous)
Output #2: impedance shall be less than 1.95 %
Measured with the linear accelerator in standby state @ 3 kVA and OBI @ 65 A momentary)

3.10 OPERATING FREQUENCY

50 Hertz ±3 Hertz

3.11 HARMONIC DISTORTION

Less than 1 % THD added to the output waveform under any dynamic linear loading conditions presented to the line regulator.

3.12 TURN-ON CHARACTERISTICS

When energized the voltage overshoot is 5 % or less of the nominal voltage for less than 1 cycle.

3.13 OVERLOAD RATING

200 % for ten seconds.
1000 % for one cycle.

3.14 NOISE ATTENUATION

Common mode noise attenuation is typically 140 dB or greater.
Transverse mode noise attenuation is 3 dB down at 1000 Hertz, 40 dB down per decade to below 50 dB with a resistive load.

3.15 AUDIBLE NOISE

Not to exceed 55 dB measured @ 1 meter.

3.16 EFFICIENCY

Efficiency shall be > 96.5 % typical at full load, continuous KVA rating. Excitation losses shall be less than 1.5 % of kVA rating.

3.17 HEAT OUTPUT

Nominal: 1000 W (3,410 BTU)

Maximum: 2000 W (6,820 BTU)

3.18 POWER FACTOR

Input power factor shall be greater than .95 with a resistive load and reflect no triplen harmonics to the utility under non-linear loads.

3.19 LINE TO LINE BALANCE

The Power Line Conditioner shall not produce more than a 2 % phase to phase unbalance.

3.20 MEAN TIME BEFORE FAILURE

The system shall exhibit a MTBF > 10,000 hours.

3.21 ENHANCED TRANSIENT OVERVOLTAGE SURGE SUPPRESSION

The system shall incorporate a high energy Silicon Avalanche Suppressor Diode suppressor. The system shall incorporate three Transtector model ICP 240 V SASD surge suppressor modules with bases, one for each phase. The suppressor modules are 100 % silicon avalanche diode suppressor rated at 7000 A/phase. The suppressors shall be installed parallel to the secondary output of the power line conditioner to provide bi-directional and bi-polar surge protection, eliminating line or load generated transient over voltages.

3.21.1 TRANSIENT OVERVOLTAGE SURGE SUPPRESSOR (TVSS) ELECTRICAL PERFORMANCE

Breakdown Voltage Threshold……..Vbr 450 V @ 30 mA
Voltage Protection Level testing per ANSI 62.41-1991 and IEC 61643-1
8/20 µs Combination Wave……...Vpl 620 V @ 7000 A
UL Rating ……SVR Rating 600 V UL 1449 2nd Edition
10/1000 µs Long Wave Stress Test....VPL 520 V @ 300 A
Response Time……< 1 nanosecond

4.0 MAIN TRANSFORMER

4.1 BASIC CONSTRUCTION

The transformer windings are of all copper conductor construction with separate primary and secondary isolated windings.

4.2 MAGNETIC

Fully processed, low carbon, silicon transformer steel shall be utilized to minimize losses and provide high efficiency. Flux density will not exceed 14k gauss.

4.3 INSULATION

Class N (200° C) insulation is utilized throughout.

4.4 SHIELDING

The transformer has multiple (three) copper shields to minimize inner winding capacitance, transient and noise coupling between primary and secondary windings. Inner winding capacitance is limited to .001 pf or less.

4.5 COOLING

The transformer is designed for natural convection cooling. Fans are inside the unit.

4.6 OPERATING TEMPERATURE

The system operating range: 0 to 40 degrees C, 32 to 104 degrees Fahrenheit.

4.7 OPERATING HUMIDITY

0 to 95 % relative humidity non-condensing.

5.0 MAIN INPUT BREAKER

A main input molded case thermal magnetic circuit breaker, rated at 175 As, is furnished as an integral part of the unit. The input breaker is appropriately sized to accommodate the 110K(I) rating and the input voltages of either 380, 400 or 415 VAC.

6.0 BY-PASS SWITCH

A manually operated rotary bypass switch provides bypassing of the SCR controlled voltage regulator portion of the Power Line Conditioner. The Power Line Conditioner can be operated in either the on-line or bypassed mode with one turn of the switch. The transformer and surge suppression circuitry remains in the circuit when in the bypass mode. In bypass, Output #1 and Output #2 will be connected to the 400/230 VAC nominal tap, three (3) phase 4 wire WYE. The bypass switch is located on the front of the unit.

7.0 MONITORING

7.1 ALERT LIGHT

An indicator light shall annunciate that the output has been disabled by one of the following conditions:

(1) Transformer over-temperature
(2) SCR thermal over-temperature

7.2 INDICATING LAMPS

Output “ON” indicating lAs shall provided for each phase.

8.0 CABINET

8.1 TERMINATION

Input and output terminations shall be front access. Input terminations shall be made directly to the main input circuit breaker and the input ground terminal provided. Output terminations shall be made directly to the output circuit breakers and neutral & ground copper bus provided.

8.2 VENTILATION

Ventilation originates from the front of the cabinet, exiting through the top.

8.3 MOBILITY

The Power Line Conditioner cabinets are equipped with angle iron supports that allow for transport by pallet jack or fork lift. These can be used for mounting unit to the floor in seismic zones.

8.4 ACCESSIBILITY

The Power Line Conditioner will have front access. Access to all wiring inputs, outputs, bypass and breakers will be accessible through the front access panels. The back of the unit may be set next to a wall without impeding access. It will also incorporate with lift off side panels.

8.5 WEIGHT

Unit weight: Approximately 1254 lbs (568.8 kg)

8.6 DIMENSIONS

73.6 cm X 91.12 cm X 167.64 cm
29" W X 35.875" D X 66" H

9.0 CONTROLS

The control portion of the cabinet containing the circuit boards and connection to the semi-conductor devices is separate from the transformer section and apart from the input and output power connections.

10.0 WARRANTY

Units shall include a comprehensive warranty for the first year, covering all parts and workmanship, inclusive of on site labor and travel expenses in geographic areas covered. Consult factory for details. All units are provided with a standard two year warranty covering parts and workmanship.

11.0 SERVICE

Transtector shall provide immediate phone support/consultation and if possible, same day parts shipment. (Contact must be prior to 12:00 PM PST). If necessary, on site service shall be scheduled the same day for service to be conducted within 24 to 48 hours, based on customer requirements. Typical service hours are 8 AM to 5 PM Monday through Friday.

FOR ASSISTANCE CALL +1 208.762.6112 (8am-5pm Pacific Time)

AFTER HOURS CALL +1 208.755.2072

12.0 CONTACT

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Transtector Systems
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INPUT AND OUTPUT CONFIGURATION

UNIT SIZE IN KVA (I)	INPUT BREAKER SIZE	OUTPUT BREAKER #1 Accelerator	OUTPUT BREAKER #2 OBI
110 k(I)	175 A for 380 V 175 A for 400 V 175 A for 415 V	Output #1: 400/230 V @ 80 A 65 A continuous	Output #2: 400/230 V @ 60 A 65 A intermittent for 30 sec. @ 4.2 % duty cycle

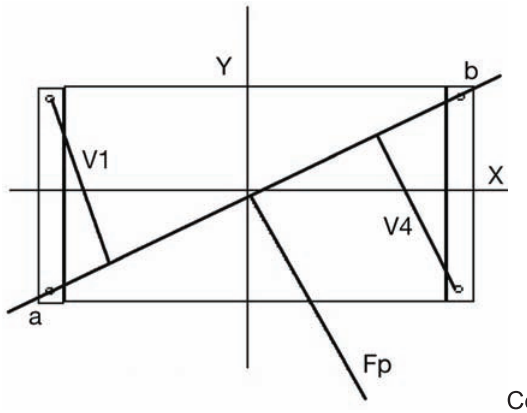
In installations where the Power Conditioner exceeds 100 ft. from the Linear Accelerator, the conductor size must be increased a minimum of 1 wire size. Contact Transtector for distances which exceeding 150 ft.

WEIGHT, BTU AND DIMENSIONS

UNIT SIZE IN KVA (I)	WEIGHT	Heat Output in BTU	WATTS LOSS	DIMENSIONS
110K(I)	1254 lbs. 568.8 kg.	3,410 Nominal 6,820 Maximum	1000 W (max 2000 W)	29"W x 35.875"D x 66"H 73.6 cm x 91.12 cm x 167.64 cm

SEISMIC CALCULATIONS 110 K(I)

Coastal California, Zone 4	Z = 0.4
Equipment Anchorage	I = 1.5
Uniform Building Code, Table 160	Cp = 0.75
	Fp = Z x I x (Cp) x Wp = 0.45 x Wp
Cabinet Weight	1254 lbs.
Center of Gravity Height	24.375 in.
	Wp(max) = 1442.1 lbs.
	Wp(min) = 1065.9 lbs.
Vertical Force	Fp = 0.45 x 1442.1 = 648.9 lbs.
Moment	Fp = 0.15 x 1442.1 = 216.3 lbs.
	Mo = 30 x 648.9 = 15818.0 in. lbs.

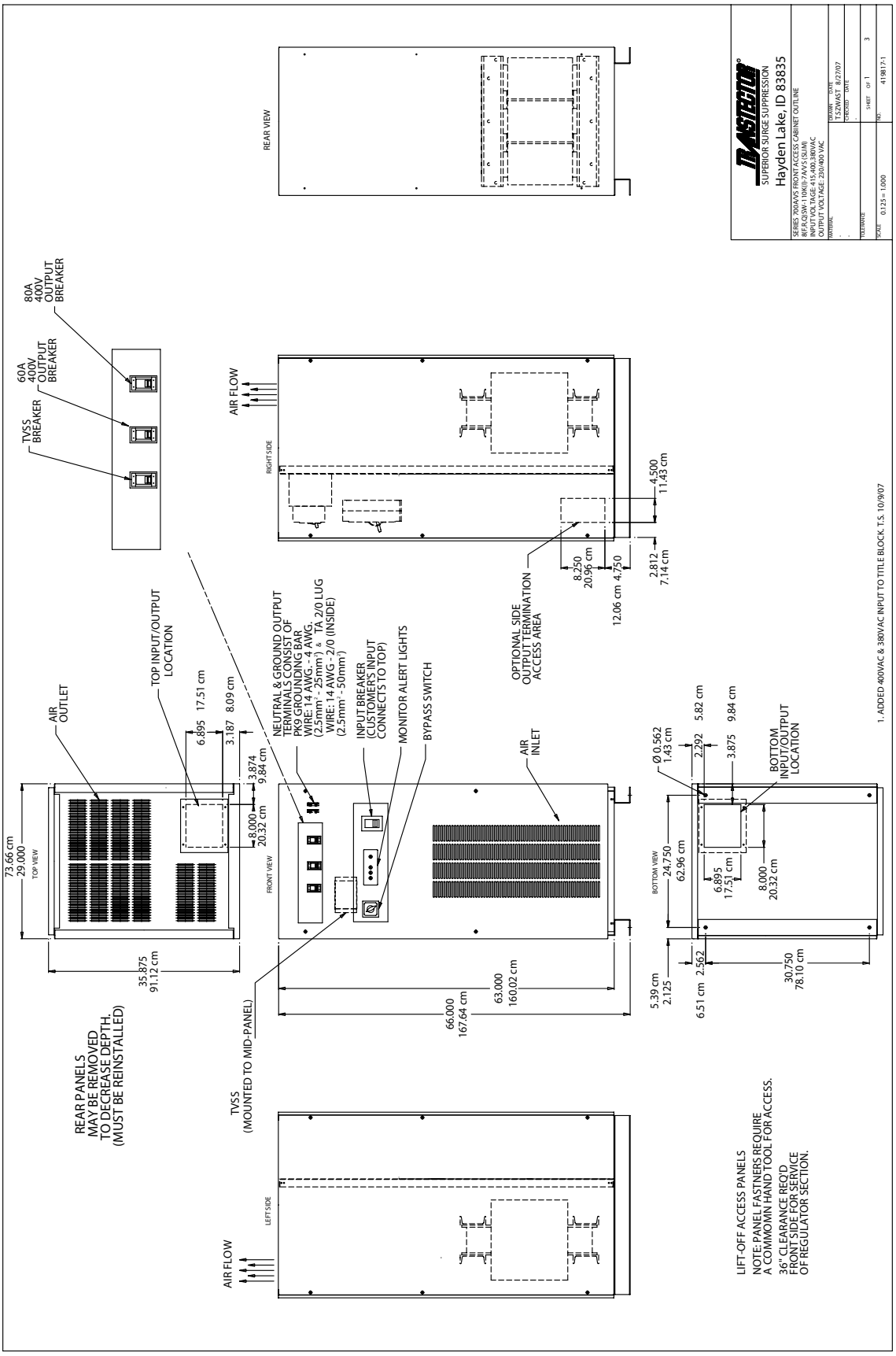


Corners (a,b) 39.5 in.
V1 =V4 = 19.3 in.
Tension = Fp x Cg /V4 = 1585.3 lbs
Shear = Wp(max)Fp/4 lbs., each anchor = 360.5 lbs.

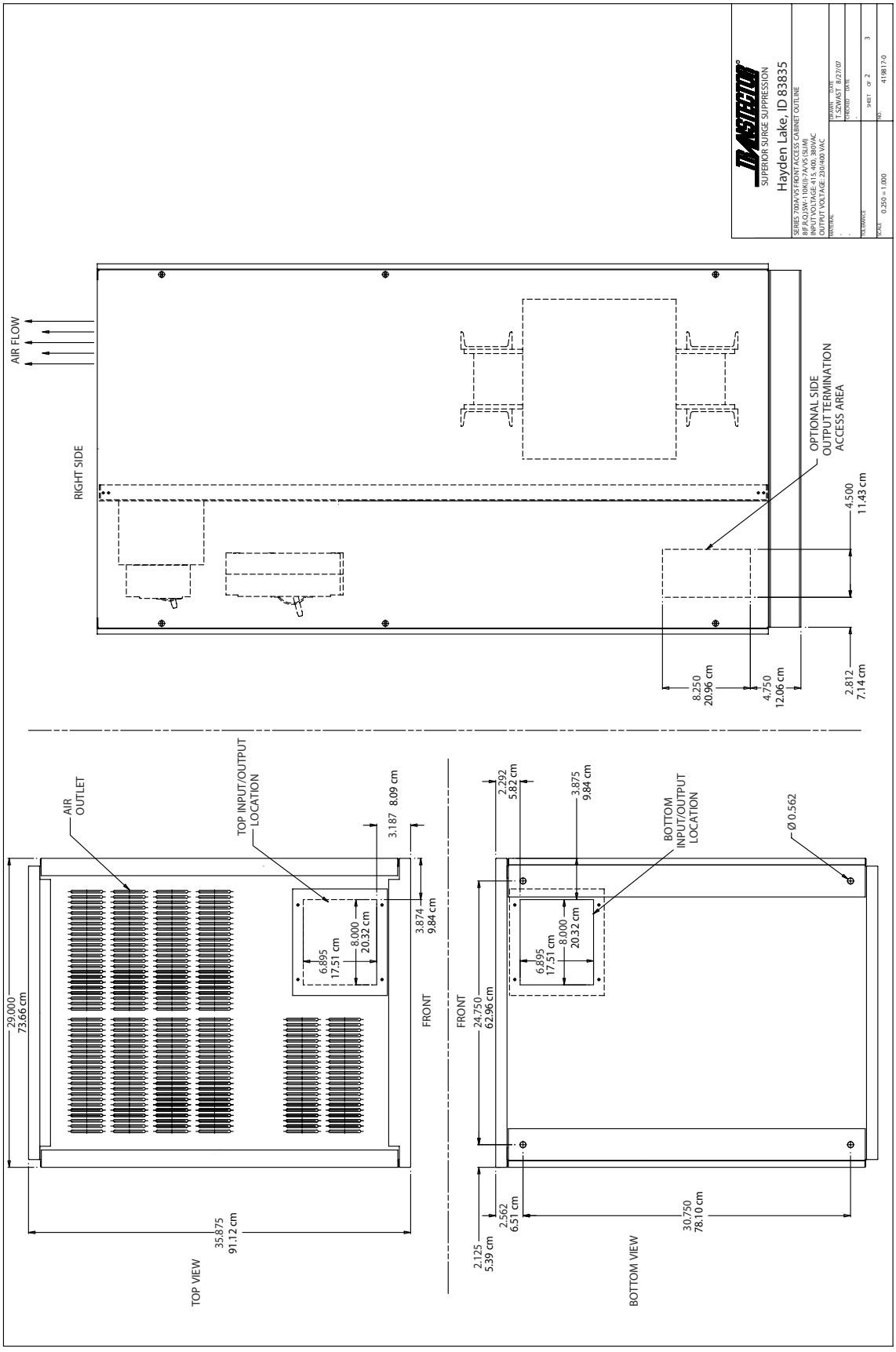
EXAMPLE: <Rawl Power Bolt # 6913>
3/8” embedded 2.5” in minimum 2000psi concrete
Tension Rating of bolt: 5200 lbs.
Shear Rating of bolt: 7270 lbs.

Interaction = (T/Tbolt) + (S/Sbolt)
Interaction = .35
Interaction = < 1 (OK)

COMPONENT LOCATION DIAGRAM I



COMPONENT LOCATION DIAGRAM II



INSTALLATION AND MAITENANCE CLEARANCE

All connections for customer inputs and outputs and all operational components are front access for ease of installation.

