TRANSTECTOR
an INFINITE brand

Series 700 A/V-S Power Conditioner

Designed for Varian Truebeam, Acuity or any High Energy Accelerator

Input Voltages: 208 VAC, 240 VAC, 480 VAC or 600 VAC (60 Hz)
Output Voltages: 208/120 VAC or 480/277 VAC

- Integrated Input and Output Breakers
  (1 input breaker - 1 output breaker)
- Intelligent Voltage Regulation (+/- 2.0% Output)
- Internal Bypass Switch
- Triple Shielded Isolation Transformer
- Internal TVSS
- User-Friendly LED Monitor Panel
- Front Access “Zero Clearance” Cabinet

50 kVA Power Conditioner with Voltage Regulation (60 Hz)

Submittal Package and Specifications

TRANSTECTOR SERIES 700 A/V-S
Specifications for 50kVA Power Conditioner with Voltage Regulator (60Hz)

1.0 SCOPE

This specification covers the electrical characteristics of the Transtector Power Conditioner which provides clean regulated power for the entire Varian TrueBeam, Acuity or any High Energy Accelerator.

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 VOLTAGES
Standard models		
8BLX-50K-700A/V-S	208 VAC nominal input	208/120 VAC output
8CLX-50K-700A/V-S	240 VAC nominal input	208/120 VAC output
8DLX-50K-700A/V-S	480 VAC nominal input	208/120 VAC output
8ELX-50K-700A/V-S-C	600 VAC nominal input	208/120 VAC output
8BNX-50K-700A/V-S	208 VAC nominal input	480/277 VAC output
8CNX-50K-700A/V-S	240 VAC nominal input	480/277 VAC output
8DNX-50K-700A/V-S	480 VAC nominal input	480/277 VAC output
8ENX-50K-700A/V-S-C	600 VAC nominal input	480/277 VAC output

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
- FCC Article 15, Section J, Class A
- ISO 9001:2008

2.1.2 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 TVSS shall be UL 1449 2nd Edition listed/recognized

3.0 DYNAMIC ELECTRICAL CHARACTERISTICS

3.1 OPERATING VOLTAGE AND OUTPUTS

The input voltage shall be 208VAC, 240VAC or 480VAC, Delta, three phase, 60Hz. The standard transformer design shall be capable of accepting three (3) input voltages, 208 VAC, 240 VAC or 480 VAC. Each unit will be pre-wired at the factory to accommodate the selected nominal input voltage. The input voltage and input breaker can be changed in the field to accommodate an alternative input voltage. Units with other input voltages (i.e. 380, 400, 415, 600 VAC) and/or frequencies (50 Hz) are produced upon request.

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 is typically $\pm$2.0%

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
The output voltage shall be 208/120 VAC, or 480/277 VAC, 3 phase 4 wire, in a WYE configuration

3.4 OUTPUT CONNECTIONS
A 175 Amp three (3) pole circuit breaker is provided for the 208/120 VAC output.
A 90 Amp three (3) pole circuit breaker is provided for the 480/277 VAC output.

3.5 INPUT/OUTPUT WIRING
The input/output wiring sizes are dependant upon the terminals provided by the circuit breakers.
Input wiring sizes:

208 VAC	#3/0 AWG to 350 MCM
240 VAC	#4 AWG to 4/0 AWG
480 VAC	#14 AWG to #3/0 AWG
600 VAC	#14 AWG to #3/0 AWG

Output wiring sizes:

208/120 VAC	175 Amp breaker	#4 AWG to 4/0 AWG
480/277 VAC	90 Amp breaker	#14 AWG to 3/0 AWG

The ILSCO TA-2/0 terminal allows wire sizes from #14 to 2/0 AWG 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 impedance shall be less than 2.0%.

3.10 OPERATING FREQUENCY
60 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 55dB measured @1 meter.

3.16 EFFICIENCY
Efficiency shall be > 96% typical at full load. Excitation losses shall be less than 1.5% of KVA rating.

3.17 BTU
The Power Line Conditioner shall generate no more than 6,820 BTU/Hour in typical use.

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

3.21 ENHANCED TRANSIENT OVER VOLTAGE SURGE SUPPRESSION
For 208V outputs a Transtector model MCP 120 W, silicon avalanche diode TVSS shall be installed parallel to the secondary output of the power line conditioner to provide bi-directional and bi-polar surge protection. The unit shall be non-degrading and provide ≤330 volt SVR rating. The suppression network systems shall be UL recognized/listed and conform to UL 1449 ratings when subjected to ANSI/IEEE 62.41-1991 category C1/B3 waveforms. The surge suppressor is installed on the load side of the transformer, connected in parallel.

For 480V outputs an enhanced surge protection device (SPD) shall be installed parallel to the secondary output of the power line conditioner to provide all mode, bi-directional and bi-polar surge protection. The SPD is rated for 100 Ka per phase, 50 Ka per mode capacity. (L-L, L-N, L-G, N-G) The suppression network systems shall be UL recognized/listed and conform to UL 1449 ratings when subjected to ANSI/IEEE 62.41-1991 category C1/B3 waveforms. The surge suppressor is installed on the load side of the transformer, connected in parallel.

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
Grain oriented, stress relieved silicon transformer steel is utilized to minimize losses and provide maximum 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
0-95% relative humidity, non-condensing.

5.0 MAIN INPUT BREAKER

A main input molded case, thermal magnetic circuit breaker, rated at 125 % of the full load input current, is furnished as an integral part of the unit. For example, a 200 Amp input breaker will be provided for 208 VAC input, a 175 Amp breaker will be provided for a 240 VAC input, or a 90 A input breaker will be provided for 480 VAC input. A 70 Amp input breaker will be provided for 600 VAC input.

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. The output will remain at 208/120 VAC or 480/277 VAC, 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 lamps 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 breaker and neutral & ground copper bus provided.

The unit is constructed using an isolation transformer and is considered to be a “separately derived system”. It should be grounded in accordance with the NFPA 70 article 250.20 “Alternating-Current Circuits and Systems to be Grounded”, article 250.20 (D) “Separately Derived Systems” and article 250.30 “Grounding Separately Derived Alternating-Current Systems”.

The Output Neutral and Ground is bonded at the output of the transformer and is considered a single, separately derived, power source and should be wired accordingly.

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, output, 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 lift off side panels.

8.5 WEIGHT
Unit weight: Approximately 1142 lbs (518 kg).

8.6 DIMENSIONS
29” Wide x 35.875” Deep x 66” Height (73.6 cm x 91.12 cm x 167.64 cm).

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 within the contiguous United States (lower 48 states) shall include a comprehensive warranty for the first year, covering all parts and workmanship, inclusive of on site labor and travel expenses. All units shall further be covered under 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.

12.0 CONTACT

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INPUT AND OUTPUT BREAKER SIZE

OUTPUT KVA CONTINUOUS	INPUT BREAKER SIZE	OUTPUT BREAKER SIZE	MAX OUTPUT CURRENT
50 kVA	200A @ 208V 175A @ 240V 90A @ 480V 70A @ 600V	175A, 3P @ 208V OR 90A, 3P @ 480V	138A CONTINUOUS @ 208V 60A CONTINUOUS @ 480V

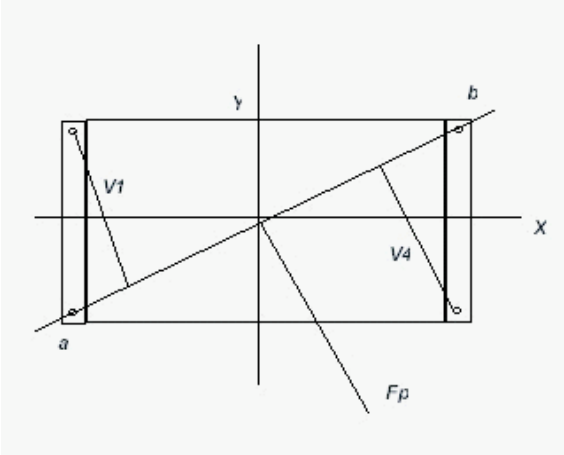
WEIGHTS, BTU AND DIMENSIONS

OUTPUT KVA	WEIGHT	OPERATIONAL BTU/HR TYPICAL	MAXIMUM BTU/HR	DIMENSIONS
50 kVA	1,142 lbs 518 kg	3,410*	6,820	29” w x 35.875” d x 66” h 73.6 cm x 91.12 cm x 167.64 cm

* Stated BTU’s / Hr is at 50KVA rated load, 100% duty cycle. Operational BTU’s / Hr is typically at 50% of rated load. Input over current protection provided by others.

SEISMIC CALCULATIONS

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	1142 lbs.
Center of Gravity Height	23.75 in.
	Wp (max) = 1442.1 lbs x 1.15 = 1313.3 lbs.
	Wp (min) = 1065.9 lbs. x 0.85 = 970.7 lbs.
	Fp = 0.45 x 1313.3 = 591 lbs.
Vertical Force	(Fp) = 0.15 x 1313.3 = 197 lbs.
Moment	Mo = 23.75 x 591 = 14036.25 in. lbs.
	Tension = Fp x Cg / V4 = 1406.7 lbs.
	Shear = Wp(max)Fp/4 lbs., each anchor= 328.3 lbs.

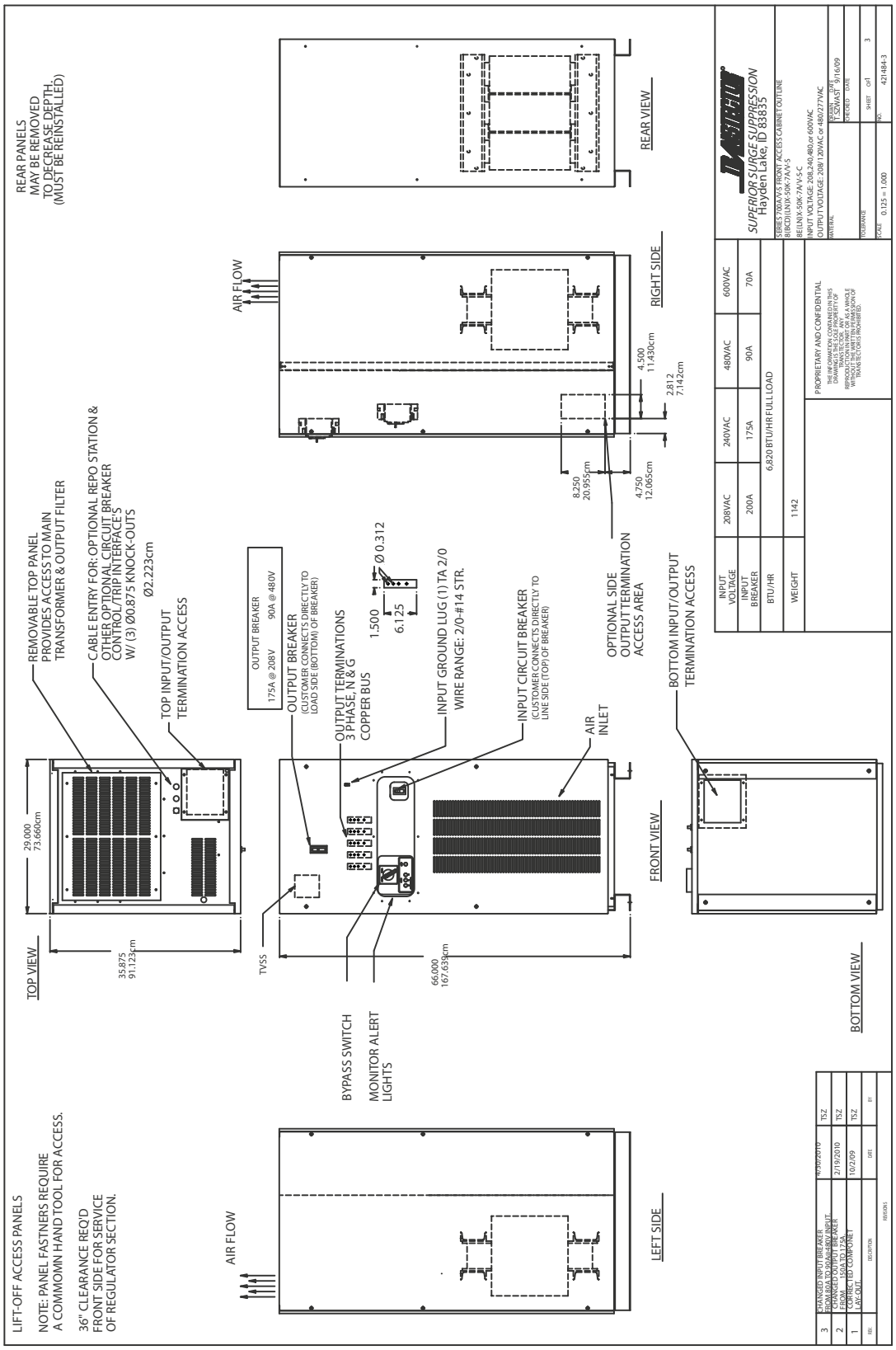


Corners (a,b) 39.5 in
V1=V4 = 19.3 in.

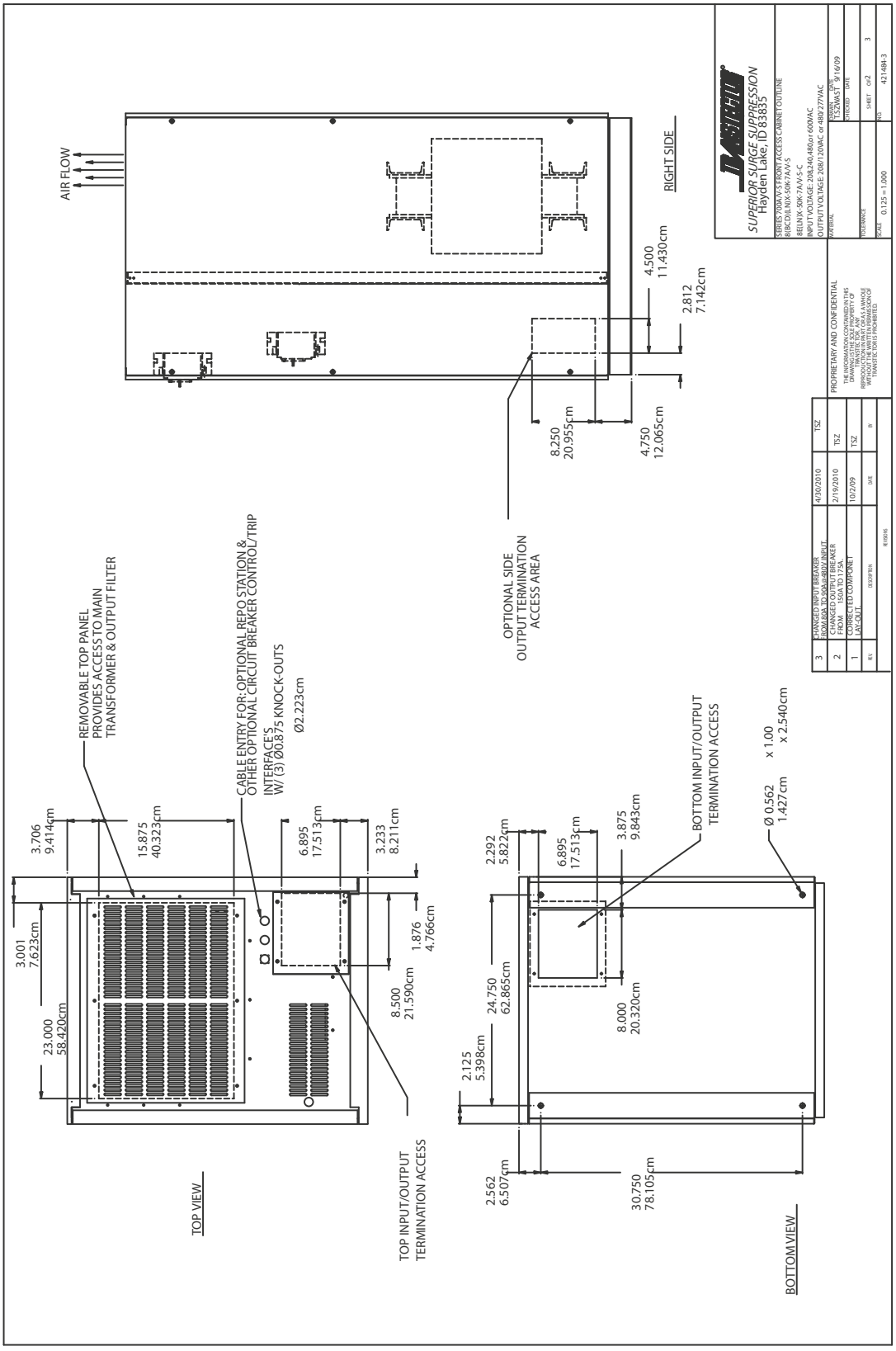
EXAMPLE: <Rawl Power Bolt # 6913>
3/8” embedded 2.5” / min 2000 psi concrete
Tension rating of bolt: 5200 lbs.
Shear rating of bolt: 7270 lbs.

Interaction = (T/Tbolt) + (S/Sbolt)
Interaction = 0.32
Interaction = < 1.00 (OK)

CABINET OUTLINE



CABINET OUTLINE



CABINET OUTLINE