Submittal # 86853 **APPROVAL REQUIRED**

Project	22104386-MECH-1- Brampton Victoria Park Arena
Leader	Nevin Wong
Job Site	Brampton Victoria Park Arena
Submission Date	2025-03-27
Sold To	CONSULT MECH
Submitted By	Jaden Sebu

Contacts

Role	Customer	Contact	Our Rep
Mechanical Contractor	Con-Sult Mechanical Inc.*	Inzaman Khan	Jaden Sebu
Mechanical Contractor	Con-Sult Mechanical Inc.*	Mohammed Ali Khan Lodhi	Jaden Sebu
Designer	WSP MMM Group		Alex Forsea

Deliverables

Track #	289045		
Tag	ERV-1		
Description	RG Dual Core		
Quantity	1		
Manufacturer	Tempeff		
Specification	23 33 65 2.07		
Production Lead Time	12-14 weeks		
Revision #	1		

Notes:

ERV-1 model RG1200 c/w

- Outdoor construction with approx. Overall weigtht of 15,328 lbs with heavies section at 4310 lbs
- 575/3/60 line in, 120V for lights, and 120V for GFCI
- 2" foam injecte panels
- All section with hinged access doors and locking latches
- Multidamper switchover section complete with actuators
- SS drain pans under HEX with 1" NPT connections
- Galv HEX frame, damper blades, rods + axles
- 18ga roof and gutters
- Weather hoods
- Seismic spring isolation
- Merv10 prefilter and MERV13 final filter
- Insulated shutoff dampers with 2 position belimo actuator
- Single point power
- Non fused disconnect
- 18" roof curb as specified
- BY OTHERS: lights wired to separate switch, as well as receptible
- Piezo ring and pressure transducer on all fans
- Inlet guard for all fans
- Dirty filter swith, temp sensors

- Smoke detector
- Field mounted low-pressure transmitter for SA and RA fan tracking per spec
- BACnet controller

Attention:

1) HTS will provide equipment in accordance with the attached shop drawings.
2) Upon approved submittal and customer release, HTS will release equipment to fabrication per the published lead times. Any storage fees associated with project schedule changes will be the responsibility of the purchaser.
3) HTS can provide freight and logistics to the purchaser as an added benefit of doing business with HTS. When freight is received by the purchaser, any noticeable damage must be recorded. Otherwise, HTS is not responsible for subsequent damage claims.

Approval Stamps

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for heat recovery ventilators, including accessories, and all required power and control wiring schematics.

.2 Submit with delivery of each unit a copy of the factory inspection report, and include a copy of each report with O&M Manual project close-out data.

.3 Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this Section.

.4 Supply a spare filter set for each ventilator and store at site where directed prior to Substantial Performance of the Work.

.5 Submit a signed extended warranty direct from manufacturer to Owner covering the energy recovery wheel from material and workmanship defects for an additional 4 years after Contract warranty expires.

.6 Supply reviewed copies of ventilator/curb assembly shop drawings or product data to trade who will cut roof openings for ventilators, and ensure openings are properly located.

1.02 QUALITY ASSURANCE

.1 Heat recovery ventilator manufacturers are to be current members of Air Movement and Control Association International Inc. (AMCA), and fans are to be rated (capacity and sound performance) and certified in accordance with requirements of following standards:

.1 ANSI/AMCA Standard 210, Laboratory Method of Testing Fans for Certified Aerodynamic Performance Rating;

.2 AMCA Standard 211, Product Rating Manual for Fan Air Performance;

.3 ANSI/AMCA Standard 300, Reverberant Room Method for Sound Testing of Fans;

.4 AMCA Standard 311, Product Rating Manual for Fan Sound Performance;

.5 AMCA Standard 99-2408, Operating Limits for Centrifugal Fans;

.6 AHRI Standard 1060, Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment;

.7 ASHRAE 84, Method of Testing Air-to-Air Heat/Energy Exchangers;

.8 UL 1812, Ducted Heat Recovery Ventilators;

.9 CSA or ETL certification for all electrical components.

.2 Acceptable manufacturers are:

.1 Tempeff Dual CoreTM as basis of design;

.2 Or equivalent.

2 PRODUCTS

Provide Heat Recovery Unit

2.01 UNIT CONSTRUCTION

.1 Fabricate unit with galvanized steel panels secured with mechanical fasteners. All access doors shall be sealed with permanently applied bulb-type gasket.

.1 Panels and access doors shall be constructed as a 2-inch (50-mm) nominal thick; with injected polyurethane foam insulation. R value shall be 6.5 per inch of wall thickness. The outer panel shall be constructed of G90 galvanized steel. The inner liner shall be constructed of G90 galvanized steel. Module to module assembly shall be accomplished with self adhering foam gaskets. Manufacturer shall supply test data demonstrating less than L/240 deflection for an unsupported under 30" W.C pressure. Units that cannot demonstrate this deflection are unacceptable.

.2 Access Doors shall be flush mounted to cabinetry, with minimum of two hinges, locking latch and full size handle assembly.

2.02 SUPPLY / RETURN FANS

.1 Provide belt-drive airfoil plenum supply and return fan(s). Fan assemblies including fan, motor and sheaves shall be dynamically balanced by the manufacturer on all three planes and at all bearing supports. Manufacturer must ensure maximum fan RPM is below the first critical speed.

.2 Bearings shall be self-aligning, grease lubricated, ball or roller bearings with extended copper lubrication lines to access side of unit. Grease fittings shall be attached to the fan base assembly near access door. If not supplied at the factory, contractor shall mount copper lube lines in the field.

.3 Fan and motor shall be mounted internally on a steel base. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry.

2.03 BEARINGS AND DRIVES

.1 Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards, L-50 life at 200,000 hours – all fans, heavy duty pillow block type, self-aligning, grease-lubricated ball bearings.

.2 Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.

2.04 ELECTRICAL

.1 The air handler(s) shall bear an ETL listing label for the entire assembly. Units with only components bearing third party safety listing are unacceptable.

.2 On RG sizes 1000 through 18000 all controls shall be located on the side of the unit for ease of servicing. Alternate manufacturers who supply units with controls on roof must supply a permanently installed ladder to access controls, and appropriate safety rails on roof of unit, meeting all applicable OSHA standards.

.3 Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. All wires shall be number tagged and cross-referenced to the wiring diagram for ease of troubleshooting.

.4 Controls must include Self Diagnostics with fault error and PLC error code. On board fault detection and diagnostics that senses and alerts when the damper is not operating correctly.

.5 Fan motors shall be 1800 rpm, open drip-proof (TEFC) type. Motors shall be premium efficiency. Electrical characteristics shall be as shown in schedule.

.6 Supplier shall provide and mount [ABB] or [Danfoss] variable speed drive with electrical characteristics as shown on project schedule.

.7 Air handler manufacturer shall provide and mount a damper hand-off-auto (HOA) switch.

2.05 COOLING AND HEATING COIL SECTIONS

.1 Provide access to coils from connection side of unit for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior and gasket sleeve between outer wall and liner where each pipe extends through the unit casing to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.

.1 Identify fin, tube & casing material type and thickness.

.2 Show coil weights (shipping & operating).

.3 State air and fluid flow amounts with its associated pressure drops. For steam coils, indicate steam pressure and condensate load.

.4 Indicate entering & leaving air and water temperatures. For refrigerant coils, indicate saturated suction temperature (SST).

.2 Water Coils:

.1 Certification - Acceptable water coils are to be certified in accordance with ARI Standard 410 and bear the ARI label. Coils exceeding the scope of the manufacturer's certification and/or the range of ARI's standard rating conditions will be considered provided the manufacturer is a current member of the ARI Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with ARI Standard 410. Manufacturer must be ISO 9002 certified.

.2 Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.

.3 Fins shall have a minimum thickness of 0.0075” of aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.

.4 Coil tubes shall be 5/8 inch (16mm) OD seamless copper, 0.020" nominal tube wall thickness, expanded into fins, brazed at joints. Soldered U-bends shall be provided to minimize the effects of erosion and premature failure having a minimum tube wall thickness of .025”.

.5 Coil connections shall be N.P.T. threaded carbon steel with connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to insure complete drainage and prevent freeze-up.

.6 Coil casings shall be a formed channel frame of galvanized steel. Water heating coils, 1 & 2 row only (sans 5M type) shall be furnished as uncased to allow for thermal movement and slide into a pitched track for fluid drainage.

2.06 PARTICULATE FILTERS

.1 Filter section with filter racks and guides with hinged and latching access doors on either, or both sides, for side loading and removal of filters.

.2 Filter media shall be UL 900 listed, Class I or Class II.

.3 Flat arrangement with 2”, 50mm deep pleated panel filters. MERV 8 Pre filters and MERV 13 on the supply air side and MERV 8 Prefilter on the return air side.

2.07 ENERGY RECOVERY

COMPLY

.1 Dual Core™ Energy Recovery

.1 Unit shall be equipped with Dual CoreTM energy recovery technology. The unit shall be 90% efficient (sensible +-5%) at equal airflow in winter and up to 80% sensible in summer. It shall also provide up to 70% latent recovery. Unit shall accomplish this recovery without a defrost cycle that will reduce the effectiveness of the device. Devices employing defrost cycles that bypass the energy recovery device, or reduce the effectiveness are not acceptable. Energy recovery device shall not require frost protection in applications down to -40 degrees.

.2 Energy Cores shall be Generation 3, comprised of precisely corrugated 0.7mm (0.0276”) thick 1100 Series aluminum. Thinner aluminum is unacceptable to prevent deformation should cleaning be required to maintain indoor air quality. Spacing between plates shall be minimum 9 mm (0.35”) to assure that frost growth will not restrict airflow or reduce performance. Heat exchangers shall be a minimum or 995 mm (39”) long to assure minimum 60 second dwell time. Time between switchovers shall be minimum 60 seconds. Technologies employing shorter heat exchangers are not acceptable due to high cross leakage, and excessive cycling. Maximum allowable face velocity across heat exchangers shall be 490 fpm. Heat exchanger face velocities exceeding 490 fpm are not acceptable.

COMPLY

.3 Heat exchangers shall be sectioned for a maximum section weight of 40 kg (88 lbs) so that the heat exchangers can be easily removed for cleaning to maintain indoor air quality. Sections weighing more are not acceptable. Heat exchanger that require special equipment to remove for cleaning (cranes, hoist etc.) are not acceptable. Heat exchangers shall be durable enough to handle high pressure power washing without deformation.

.4 Unit Cross-leakage shall be maximum 1-3% as defined and tested in accordance with ASHRAE 84 Test Methods. Cross leakage exceed this amount is unacceptable. Manufacturer shall produce testing data reflecting this performance in accordance with ASHRAE 84 test method. Testing must use the tracer gas method prescribed by ASHRAE 84.

.5 Switchover damper section shall be comprised of multi section low leakage dampers operated by fast acting electric actuators. Pneumatic actuators are not acceptable. 800 CFM-7,000 CFM shall have damper switching times of 0.75 seconds. 7000 CFM-75,000 CFM shall have damper switching times of 1.25 seconds. Dampers that do not switch within the specified times without objectionable noise are not acceptable. This switch over must limit any internal cross leakage below 3%. Test report must be provided showing that the damper configuration meets this requirement. Testing must use the tracer gas method prescribed by ASHRAE 84.

.1 Single blade damper sections are not acceptable. Each damper shall control one of the 4 airways, upper-horizontal, lower-horizontal, forward-vertical and rear-vertical. Dampers shall be capable of orienting to close off outside air to the building without needing external shut off dampers.

.2 Dampers shall also be capable of orienting to allow 100% recirculation of air without using heat recovery device for off peak or unoccupied heating modes. Units incapable of these operations without extra ductwork are not acceptable. Re-circ design must be capable of pre-warming both heat exchangers simultaneously for morning warm-up cycle. Strategies that only warm one heat exchanger is unacceptable.

.3 Damper seals shall be ½" heavy thickness EPDM bulb seal. Single blade seals are unacceptable due to high leakage and poor sealing.

.4 Damper bearings shall be heavy duty greasable pillow block flange bearings. Bronze or plastic bearings are not acceptable due to high cycle requirements. Bearings shall have a minimum diameter:

.1 800-7000 CFM: ¾" Bearings, maximum of 4 shafts per unit

.2 7,000 – 21,000 CFM: 1" Bearings, maximum of 4 shafts per unit

.3 21,000 CFM and larger – 1" Bearings, maximum of 6 shafts per unit

.5 Damper shafts shall be large diameter shafts meeting:

.1 800-7,000 CFM ¾" Chromium Shafts, maximum of 4 shafts per unit

.2 7,000 – 21,000 CFM - 1" Chromium Shafts, maximum of 4 shafts per unit

.3 21,000 CFM and larger – 2' Diameter Steel shafts, maximum of 6 shafts per unit

COMPLY

.6 Technologies employing smaller diameter shafts, or more shafts per unit are unacceptable as that would be considered light duty, and insufficient to withstand the demanding nature of the application.

.7 Damper manufacturer must provide written documentation that the dampers are capable of a minimum duty cycle of 500,000 cycles annually. Damper Manufacturer shall provide a written warranty on damper manufactures letterhead confirming the warranty.

.6 Recovery cycles shall be controlled by internal programmed thermostats measuring both supply and exhaust air and optimizing performance of both heat recovery and free cooling modes.

2.08 EXTERNAL SHUT-OFF DAMPERS

.1 External Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.

.2 External Shut-off dampers shall be located on outer face of heat exchangers to retain energy when unit is shut down. Dampers located on warm (inner) side of heat exchangers are not acceptable.

3 EXECUTION

3.01 INSTALLATION OF HEAT RECOVERY VENTILATORS

.1 Provide heat recovery ventilators.

.2 Supply an assembled roof curb for each outdoor roof mounted ventilator and hand to roof trade at site on roof. Carefully locate and size roof openings. Provide gasket material supplied with curb on perimeter of curb and secure ventilator in place.

.3 For ventilators with auxiliary hydronic coils, connect each coil to system valved hydronic piping with flexible connectors in accordance with Section entitled HVAC Piping and Pumps. Provide trapped condensate drainage piping connection to cooling coil condensate drain pans in accordance with Section entitled Drainage Waste and Vent Piping and Valves.

.4 Coordinate power wiring connection and provision of a disconnect switch for each ventilator in accordance with electrical work Specification where power wiring is specified.

.5 Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system manufacturer certification requirements.

.6 Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system start-up requirements.

.7 Include for a ½ day on-site heat recovery ventilator operation demonstration and training session. Training is to be a full review of all components including, but not limited to, a full heat recovery ventilator internal inspection, construction details, operation, maintenance, abnormal events, and setting up controls.

.8 Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

675 Washington Ave, WINNIPEG, MB CANADA R2K 1M4 PH: (204) 783-1902

QUOTE #: 5597 - 7 (Chris)

Project	Brampton Victoria Arena				Line In			LED Light				GFCI			
Tag(s)	ERV-1				Voltage	575-3-60		Voltage	120-1-60			Voltage	120-1-60		
Agent	HTS Canada				FLA	27.9	AMPS	FLA	0.10	AMPS		FLA	20	AMPS	
Job Number	0				AMPACITY	32	AMPS								
PO#	719217				MAX.NON-TIME DELAY FUSE	70	AMP								
					MAX.TIME DELAY FUSE	45	AMP								
					MAX.CIRCUIT BREAKER	50	AMP	MAX.CIRCUIT BREAKER	15	AMP		MAX.CIRCUIT BREAKER	20	AMPS	
Short Circuit Current Rating:	5KA				MIN.WIRE SIZE	#8	AWG	MIN.WIRE SIZE	#14	AWG		MIN.WIRE SIZE	#12	AWG	

Model

RG 12000

Approximate Weight	6936 KG	15328 LBS	**Outdoor**
Heaviest Shipping Section	1949 KG	4308 LBS	
Approx. Curb Weight	309 KG	680 LB	

Fans

Supply air fan: ANPA 25 **X1**

Exhaust air fan: ANPA 25 **X1**

Technical data

Input data	Sup. air	Exh. air
Total volume (SCFM)	11866	11866
HX Air volume (SCFM)	11866	11866
Filter	Merv 10 (2")	Merv 10 (2")
Final Filter	Merv 13 (2")	-
External pressure drop (in. W.C)	0.60	2.40

Output data		
Filter air velocity (fpm)	447	447
Design pressure drop filter (in W.C)	1.06	0.50
HX air velocity (fpm)	410	410
Pressure drop heat exch. (in W.C)	0.58	0.58
Pressure drop HX filter (in W.C)	0.00	0.00
Heating Coil 1 Pressure Drop (in W.C)	0.00	0.00
Heating Coil 2 Pressure Drop (in W.C)	0.00	0.00
Cooling Coil Pressure Drop (in W.C)	0.00	0.00
Auxillary Pressure Drop (in W.C)	0.00	0.00
Backdraft dampers pressure drop (in W.C)	0.00	0.00
Louver/Hood pressure drop (in W.C)	0.00	0.00
Intake/discharge pressure drop (in W.C)	0.02	0.02
Static pressure (in W.C)	2.26	3.50

Fan speed (rpm)	1407	1541	Per fan
Max (rpm)	2350	2350	
Fan efficiency (%)	72.49	76.57	
Required BHP	7.33	9.96	
Motor efficiency (%)	91	91.7	
Motor power rating (hp)	10.00	15.00	
Motor RPM	1175	1175	
Motor Operating Frequency (Hz)	72	79	

Power and energy demand

Input data	Calculated			
	Winter		Summer	
	DB	WB	DB	WB
Design outdoor temp. (°F)	-5.80	-5.8	86.0	73.4
Desired supply air temp. winter (°F)				
Exhaust air temperature (°F)	70.0	52.0	75.0	62.5
Output data				
Efficiency (across unit) (%)	90.0%	70.0%	77.4%	0.0%
Supply air temp. after unit (°F)	62.40	46.4	77.5	71.0
Recovered energy across unit (BTUH)	874,035	153,860	-109,160	0

Standard Features

2" Foam injected panels
All sections come with hinged access doors and locking latches
Multi-Damper switchover section complete with actuators
SS Drain Pans under Heat Exchanger(s) w/ 1"NPTConnections
Galvanized Heat Exchanger Frames
Galvanized damper blades, damper rods and axles
18Ga Roof & Gutters
Hoods

Additional Features

Exterior Casing: 24 Ga G90 Galv
Interior Casing: 24 Ga G90 Galv
10 HP WEG TEFC Premium Eff. 6 Pole 256T Frame
15 HP WEG TEFC Premium Eff. 6 Pole 284T Frame
SA Drive: FC-102-P7K5-T6-131H4021
RA Drive: FC-102-P11K-T6-131H9344
2in. Seismic Spring Isolation
SA Pre-Filter: Dafco Merv 10 (2") 400 HC
SA Final Filter: Dafco Merv 13 (2") Greenpleat
RA Pre-Filter: Dafco Merv 10 (2") 400 HC
Insulated Shutoff Dampers with 2 position Belimo actuator
Single point power
Non-fused Disconnect
Low Limit
8" 10Ga Baseframe
18" Roof Curb
Each light factory wired to separate switch, 120V BY OTHERS
Each recepticle on individual circuit, 120V BY OTHERS
Piezo Ring & Pressure Transducer on all fans
Inlet Guard on all fans
Wheel guard on all fans
Dirty filter switch
Temperature sensor
Spare set of filters
Smoke detector
Field mounted low-pressure transmitter for SA & RA fan tracking
BACNet Controller

675 Washington Ave, WINNIPEG, MB CANADA R2K 1M4 PH: (204) 783-1902

QUOTE #: 5597 - 7 (Chris)

Project	Brampton Victoria Arena				Line In			LED Light				GFCI			
Tag(s)	ERV-1				Voltage	575-3-60		Voltage	120-1-60			Voltage	120-1-60		
Agent	HTS Canada				FLA	27.9	AMPS	FLA	0.10	AMPS		FLA	20	AMPS	
Job Number	0				AMPACITY	32	AMPS								
PO#	719217				MAX.NON-TIME DELAY FUSE	70	AMP								
					MAX.TIME DELAY FUSE	45	AMP								
					MAX.CIRCUIT BREAKER	50	AMP	MAX.CIRCUIT BREAKER	15	AMP		MAX.CIRCUIT BREAKER	20	AMPS	
Short Circuit Current Rating:	5KA				MIN.WIRE SIZE	#8	AWG	MIN.WIRE SIZE	#14	AWG		MIN.WIRE SIZE	#12	AWG	

Model

RG 12000

Approximate Weight	6936 KG	15328 LBS	**Outdoor**
Heaviest Shipping Section	1949 KG	4308 LBS	
Approx. Curb Weight	309 KG	680 LB	

Fans

Supply air fan: ANPA 25 **X1**

Exhaust air fan: ANPA 25 **X1**

Technical data

Input data	Sup. air	Exh. air
Total volume (SCFM)	3170	3170
HX Air volume (SCFM)	3170	3170
Filter	Merv 10 (2")	Merv 10 (2")
Final Filter	Merv 13 (2")	-
External pressure drop (in. W.C)	0.04	0.17

Output data		
Filter air velocity (fpm)	119	119
Design pressure drop filter (in W.C)	0.08	0.04
HX air velocity (fpm)	109	109
Pressure drop heat exch. (in W.C)	0.08	0.08
Pressure drop HX filter (in W.C)	0.00	0.00
Heating Coil 1 Pressure Drop (in W.C)	0.00	0.00
Heating Coil 2 Pressure Drop (in W.C)	0.00	0.00
Cooling Coil Pressure Drop (in W.C)	0.00	0.00
Auxillary Pressure Drop (in W.C)	0.00	0.00
Backdraft dampers pressure drop (in W.C)	0.00	0.00
Louver/Hood pressure drop (in W.C)	0.00	0.00
Intake/discharge pressure drop (in W.C)	0.00	0.00
Static pressure (in W.C)	0.20	0.28

Fan speed (rpm)	391	423	
Max (rpm)	2350	2350	
Fan efficiency (%)	68.59	71.21	
Required BHP	0.18	0.23	
Actual Required bhp	**0.54**	**0.64**	Per fan
Motor efficiency (%)	91	91.7	
Motor power rating (hp)	10.00	15.00	
Motor RPM	1175	1175	
Motor Operating Frequency (Hz)	20	22	

Power and energy demand

Input data	Calculated			
	Winter		Summer	
	DB	WB	DB	WB
Design outdoor temp. (°F)	-5.80	-5.8	86.0	73.4
Desired supply air temp. winter (°F)				
Exhaust air temperature (°F)	70.0	52.0	75.0	62.5
Output data				
Efficiency (across unit) (%)	94.1%	69.7%	84.7%	0.0%
Supply air temp. after unit (°F)	65.52	47.8	76.7	70.7
Recovered energy across unit (BTUH)	244,187	40,911	-31,887	0

Standard Features

2" Foam injected panels
All sections come with hinged access doors and locking latches
Multi-Damper switchover section complete with actuators
SS Drain Pans under Heat Exchanger(s) w/ 1"NPTConnections
Galvanized Heat Exchanger Frames
Galvanized damper blades, damper rods and axles
18Ga Roof & Gutters
Hoods

Additional Features

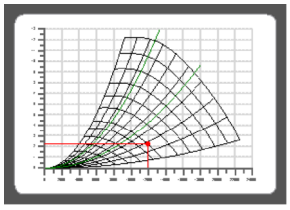
Exterior Casing: 24 Ga G90 Galv
Interior Casing: 24 Ga G90 Galv
10 HP WEG TEFC Premium Eff. 6 Pole 256T Frame
15 HP WEG TEFC Premium Eff. 6 Pole 284T Frame
SA Drive: FC-102-P7K5-T6-131H4021
RA Drive: FC-102-P11K-T6-131H9344
2in. Seismic Spring Isolation
SA Pre-Filter: Dafco Merv 10 (2") 400 HC
SA Final Filter: Dafco Merv 13 (2") Greenpleat
RA Pre-Filter: Dafco Merv 10 (2") 400 HC
Insulated Shutoff Dampers with 2 position Belimo actuator
Single point power
Non-fused Disconnect
Low Limit
8" 10Ga Baseframe
18" Roof Curb
Each light factory wired to separate switch, 120V BY OTHERS
Each recepticle on individual circuit, 120V BY OTHERS
Piezo Ring & Pressure Transducer on all fans
Inlet Guard on all fans
Wheel guard on all fans
Dirty filter switch
Temperature sensor
Spare set of filters
Smoke detector
Field mounted low-pressure transmitter for SA & RA fan tracking
BACNet Controller

Customer	
Project	**Description**
Your Ref.	**Our Ref.**

Input data

Volume	11866 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	2.26 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA25 -**	n Max 1/min	Pw Max BHP	J lb ft²
	2350		70.00



Fan Information

OV ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	2.85	2.26	0.59	9138	1407	72.49	57.56	7.33			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	89 / 63	82 / 66	86 / 77	79 / 76	77 / 77	72 / 73	72 / 73	70 / 69	**92 / 83**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	78 / 52	82 / 66	90 / 81	82 / 79	78 / 78	76 / 77	75 / 76	72 / 71	**92 / 86**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	91 / 65	86 / 70	92 / 84	89 / 86	87 / 87	81 / 82	78 / 79	74 / 73	**97 / 91**

Certificates

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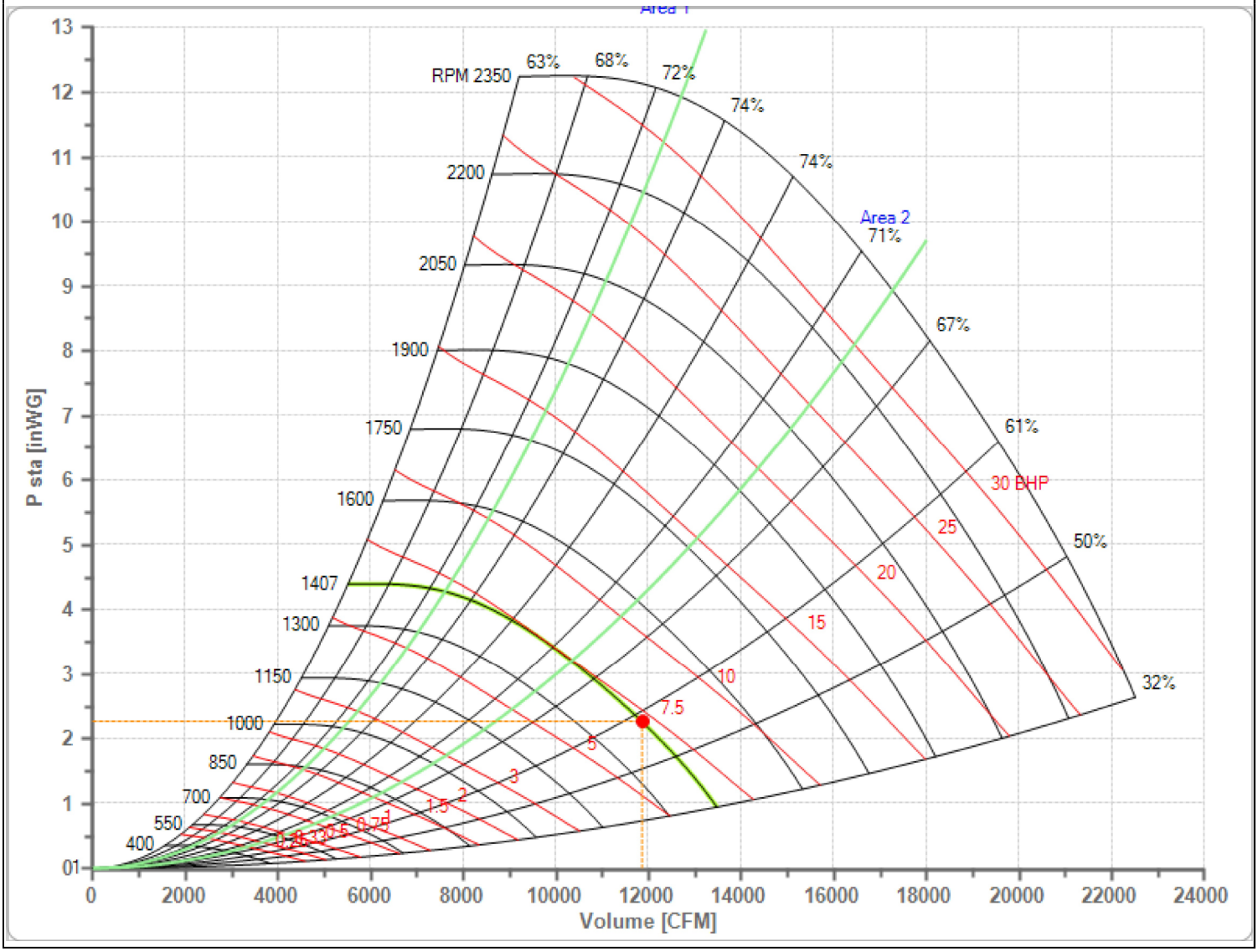
Chart

comefri fans of energy saving

SA Fan

2024-06-26
Aeolus4 1.0.23093.0 Apr 2023

Selected Fan	ANPA25 -	Fan working conditions	Free Inlet - Free Outlet
n Max	2350 1/min	Volume	11866 CFM
Pw Max		Total Pressure	2.85 In.W.G.
J	70.00 lb ft²	Static Pressure	2.26 In.W.G.
		P fan	7.33 BHP
Required working point	•	eta Tot	72.49 %
Effective working point	•	eta Sta	57.56 %
		RPM	1407 1/min
		Temperature	68.0 °F
		Altitude	0 ft

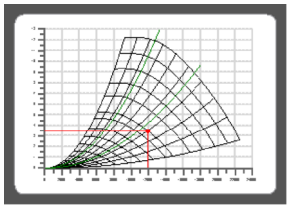


Customer	
Project	**Description**
Your Ref.	**Our Ref.**

Input data

Volume	11866 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	3.50 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA25 -**	n Max 1/min	Pw Max BHP	J lb ft²
	2350		70.00



Fan Information

OV ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	4.09	3.50	0.59	10008	1541	76.57	65.59	9.96			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	90 / 64	83 / 67	87 / 78	80 / 77	78 / 78	73 / 74	73 / 74	71 / 70	**93 / 84**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	79 / 53	81 / 65	91 / 82	83 / 80	80 / 80	77 / 78	76 / 77	73 / 72	**93 / 87**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	92 / 66	87 / 71	93 / 85	90 / 87	88 / 88	82 / 84	79 / 80	75 / 74	**98 / 92**

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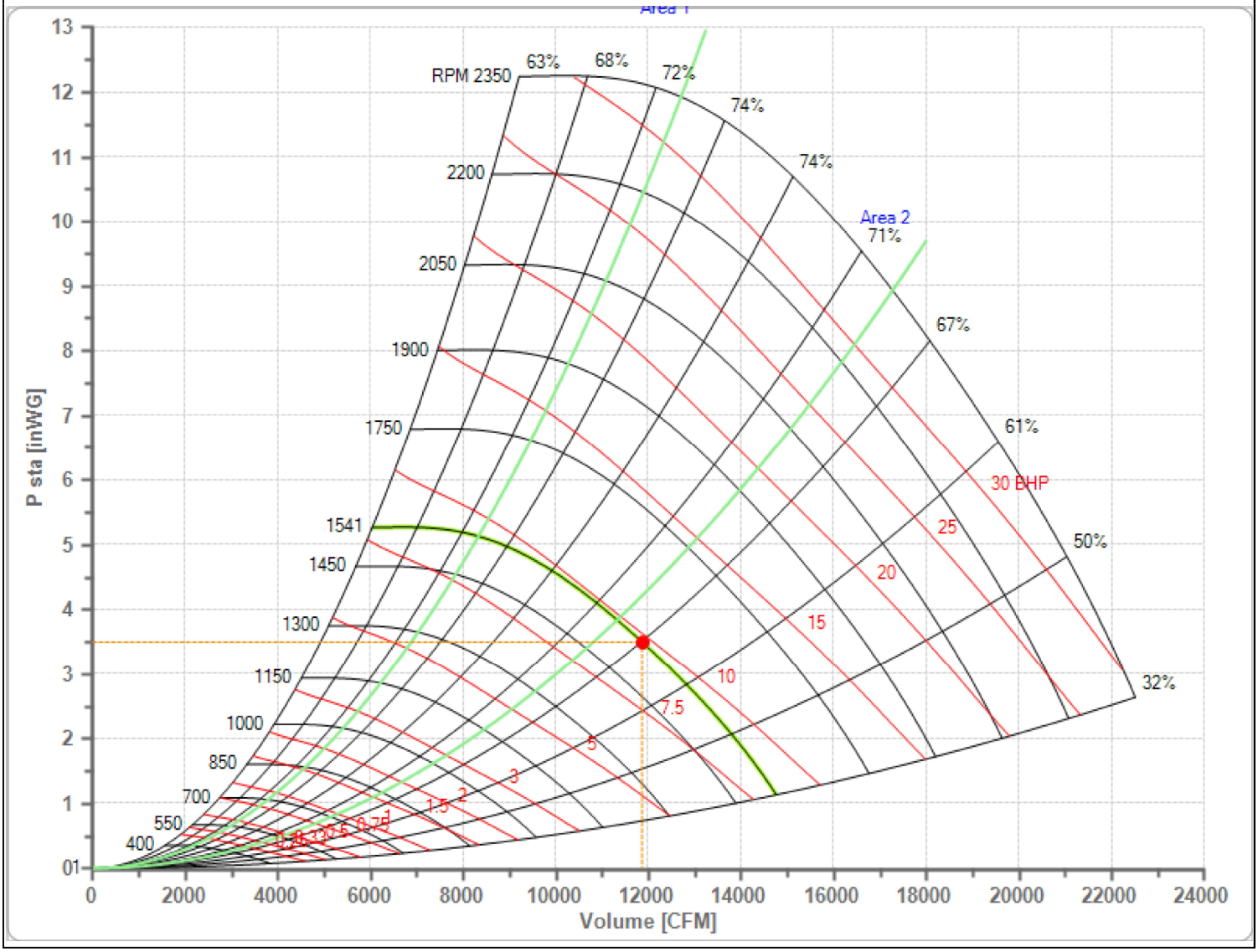
Chart

comefri fans of energy saving

EA Fan

2024-06-26
Aeolus4 1.0.23093.0 Apr 2023

Selected Fan	ANPA25 -	Fan working conditions	Free Inlet - Free Outlet
n Max	2350 1/min	Volume	11866 CFM
Pw Max		Total Pressure	4.09 In.W.G.
J	70.00 lb ft²	Static Pressure	3.50 In.W.G.
		P fan	9.96 BHP
Required working point	•	eta Tot	76.57 %
Effective working point	•	eta Sta	65.59 %
		RPM	1541 1/min
		Temperature	68.0 °F
		Altitude	0 ft

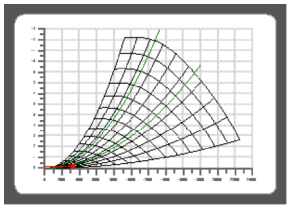


Customer	
Project	**Description**
Your Ref.	**Our Ref.**

Input data

Volume	3170 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	0.20 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA25 -**	n Max 1/min	Pw Max BHP	J lb ft²
	2350		70.00



Fan Information

OV ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	0.24	0.20	0.04	2545	391	68.59	56.73	0.18			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	57 / 31	57 / 41	53 / 44	47 / 44	44 / 44	40 / 41	41 / 42	38 / 37	**61 / 51**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	57 / 31	53 / 37	47 / 39	48 / 44	46 / 46	46 / 47	41 / 42	37 / 36	**60 / 52**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	62 / 35	61 / 44	59 / 50	57 / 53	55 / 55	51 / 52	48 / 49	44 / 42	**66 / 60**

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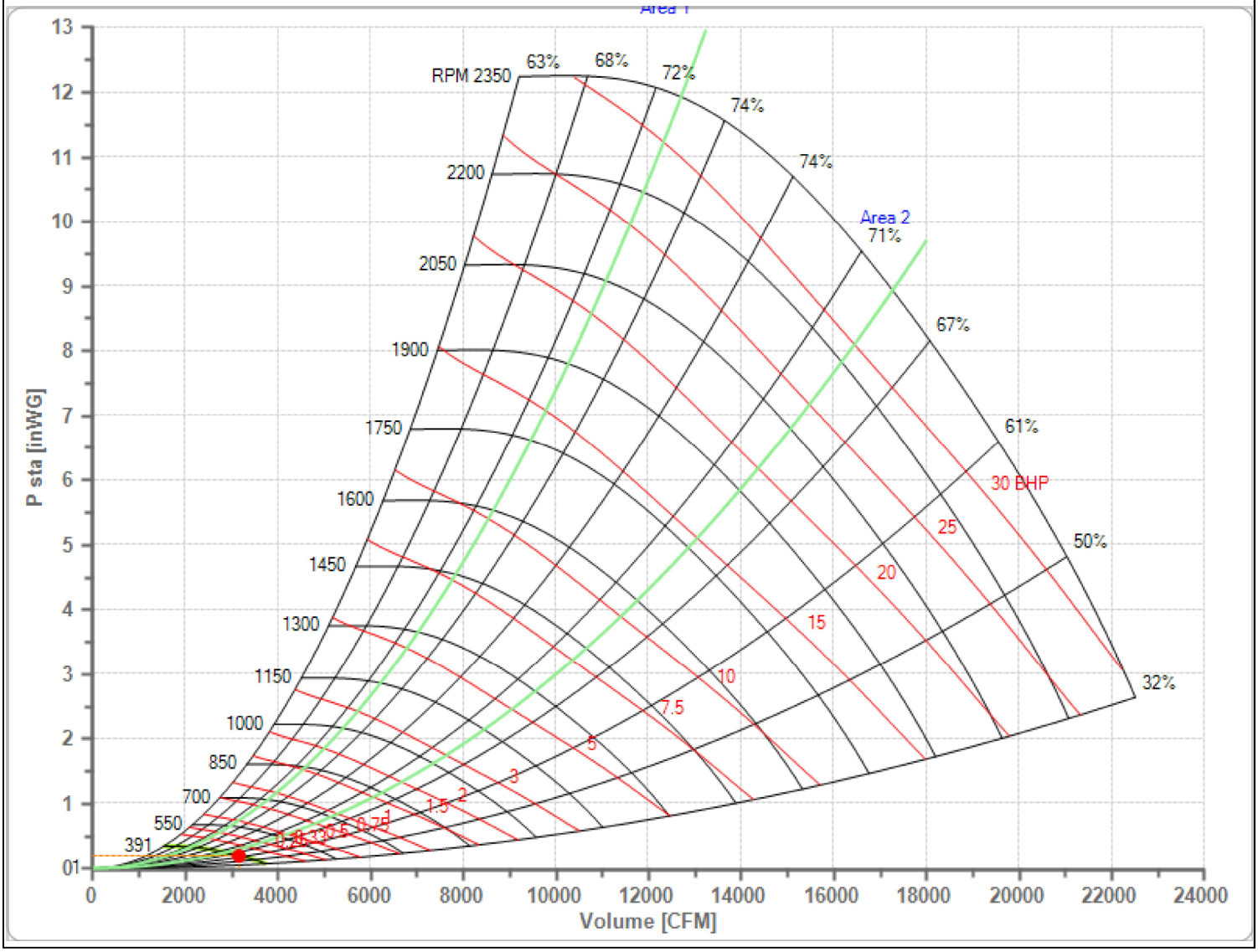
Chart

comefri fans of energy saving

SA Fan - Low Flow

2025-02-12
Aeolus4 1.0.23093.0 Apr 2023

Selected Fan	ANPA25 -	Fan working conditions	Free Inlet - Free Outlet
n Max	2350 1/min	Volume	3170 CFM
Pw Max		Total Pressure	0.24 In.W.G.
J	70.00 lb ft²	Static Pressure	0.20 In.W.G.
		P fan	0.18 BHP
Required working point	•	eta Tot	68.59 %
Effective working point	•	eta Sta	56.73 %
		RPM	391 1/min
		Temperature	68.0 °F
		Altitude	0 ft

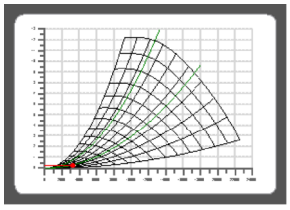


Customer	
Project	**Description**
Your Ref.	**Our Ref.**

Input data

Volume	3170 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	0.28 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA25 -**	n Max 1/min	Pw Max BHP	J lb ft²
	2350		70.00



Fan Information

OV ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	0.32	0.28	0.04	2749	423	71.21	61.95	0.23			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	58 / 32	58 / 42	54 / 46	48 / 45	45 / 45	41 / 42	42 / 43	39 / 38	**62 / 52**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	58 / 32	55 / 39	50 / 41	49 / 45	48 / 48	48 / 49	43 / 44	40 / 39	**61 / 54**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	63 / 36	62 / 46	60 / 51	58 / 54	56 / 56	52 / 53	49 / 50	45 / 44	**67 / 61**

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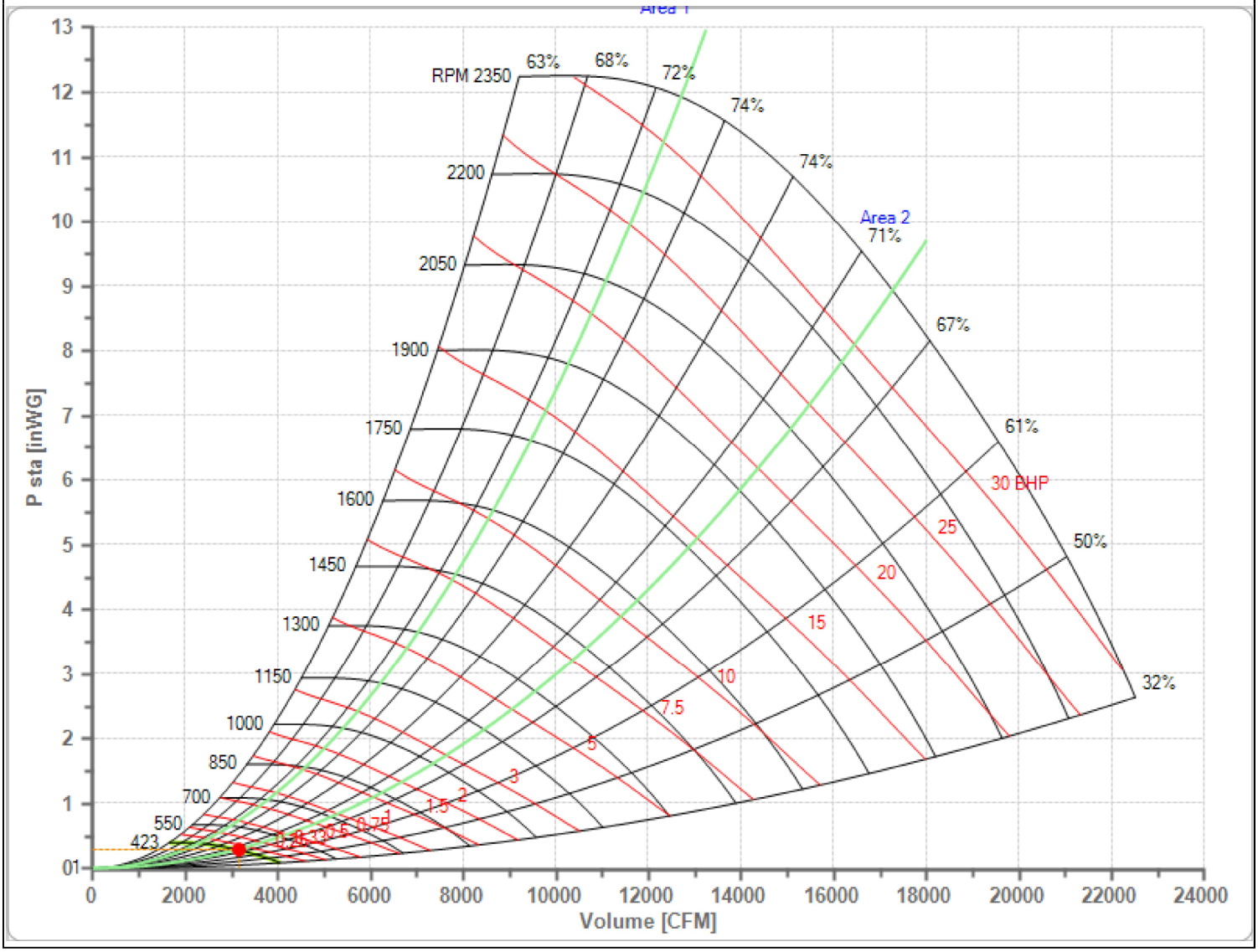
Chart

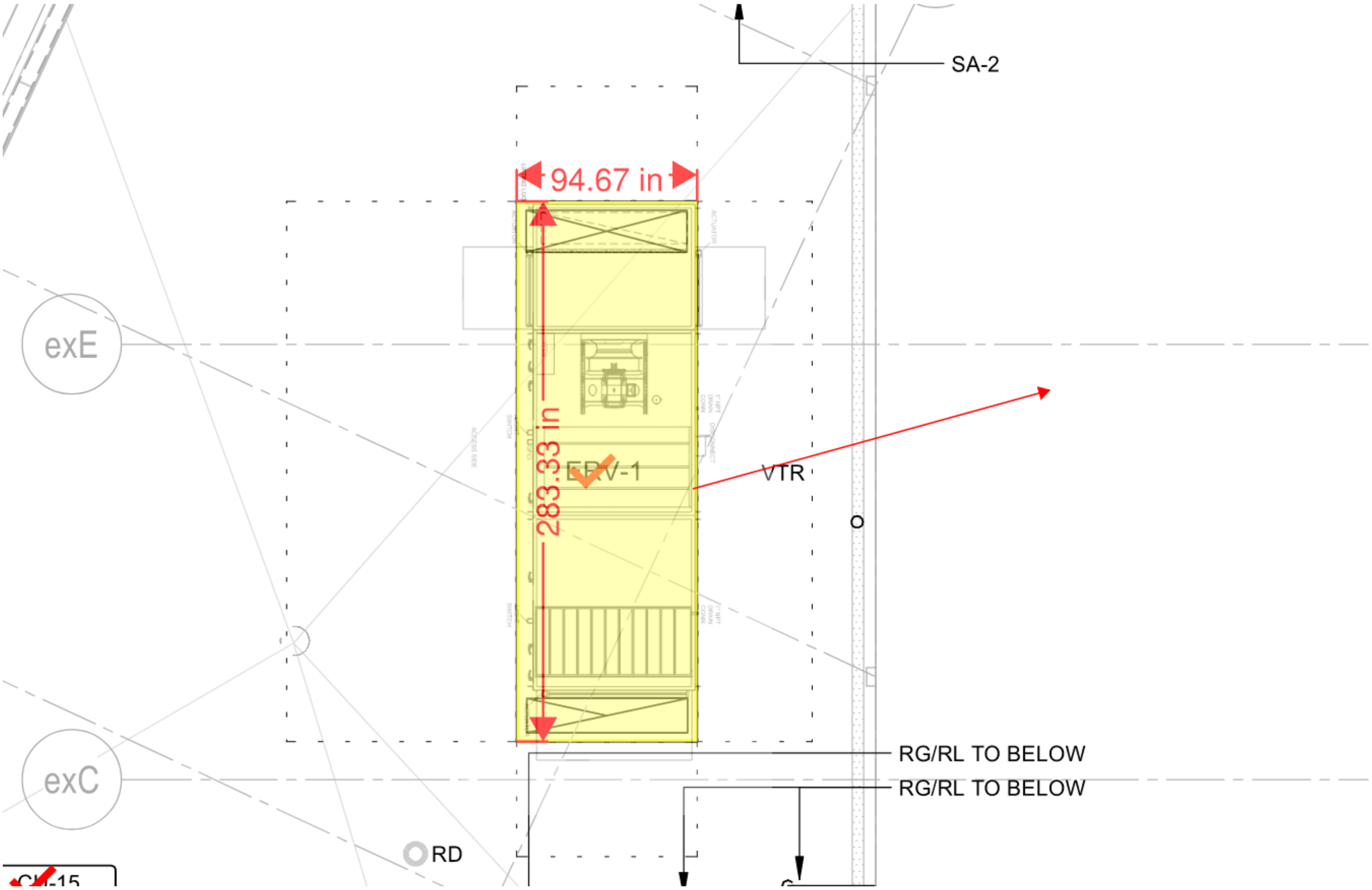
comefri fans of energy saving

EA Fan - Low Flow

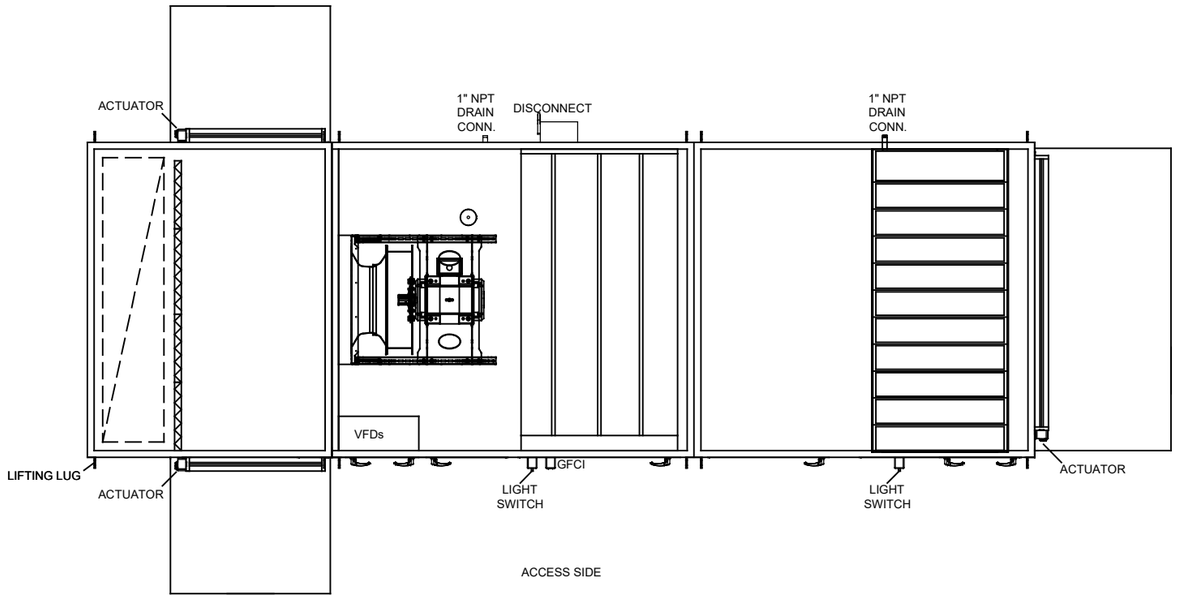
2025-02-12
Aeolus4 1.0.23093.0 Apr 2023

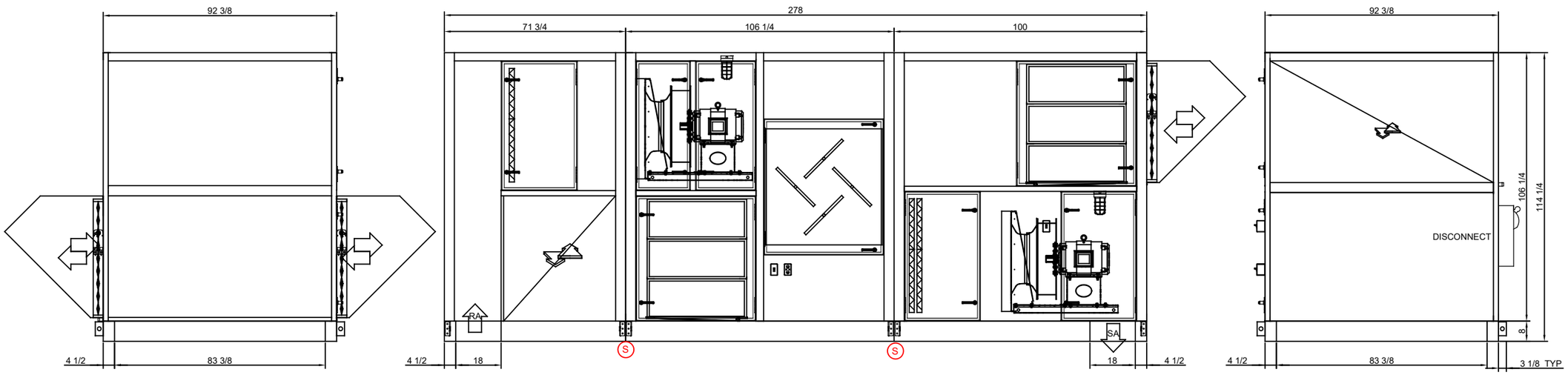
Selected Fan	ANPA25 -	Fan working conditions	Free Inlet - Free Outlet
n Max	2350 1/min	Volume	3170 CFM
Pw Max		Total Pressure	0.32 In.W.G.
J	70.00 lb ft²	Static Pressure	0.28 In.W.G.
		P fan	0.23 BHP
Required working point	•	eta Tot	71.21 %
Effective working point	•	eta Sta	61.95 %
		RPM	423 1/min
		Temperature	68.0 °F
		Altitude	0 ft




SA-2
94.67 in
283.33 in
ERV-1
VTR
exE
exC
RG/RL TO BELOW
RG/RL TO BELOW
RD

Cells:
2- 30 x 200mm x 400mm
2- 3 x 242mm x 400mm





UNIT INCLUDES FLAT ROOF WITH SPLIT CAPS (NOT SHOWN)

Ⓢ SPLIT FOR SHIPMENT

NOTES:
1. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE = SECTION SIZE.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

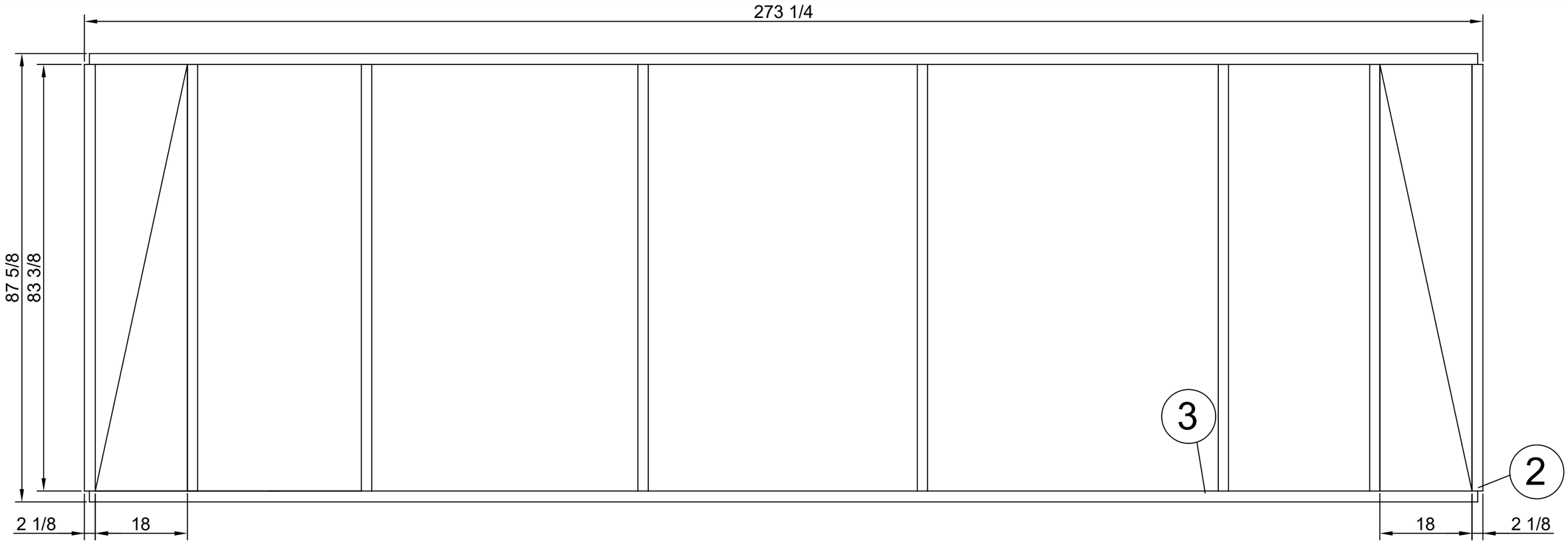
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

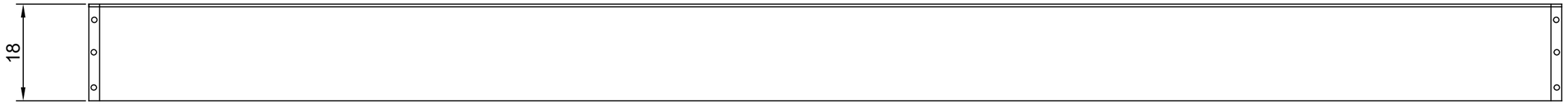
TEMPEFF
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

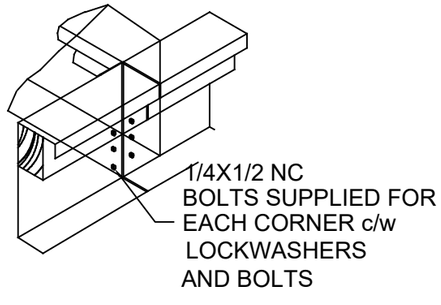
DRAWN BY	DATE	SCALE	MODEL	REV
CR	11-FEB-25	NTS	RG 12000 Type 1	0

PROJECT NAME: Brampton Victoria Arena

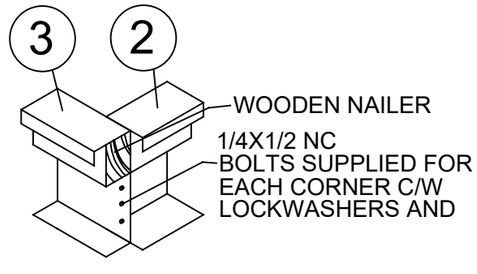
Unit Tag: ERV-1







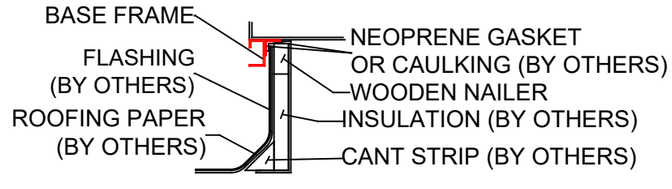
CENTER BRACING
BOLTING ASSEMBLY DETAIL #2



CORNER BOLTING DET. #1

2 CURB ENDS

3 CURB SIDES



ROOF CURB CROSS SECTION DETAIL AA

NOTES:
1. FIELD ASSEMBLED BY OTHERS.
2. SEE CUSTOMER DWG
3. ENSURE THAT THE 18" INCH CURB HEIGHT IS IN COMPLIANCE WITH LOCAL CODES.
4. RIGHT HAND CURB SHOWN/LEFT HAND OPPOSITE.

DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
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TEMPEFF
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

DRAWN BY	DATE	SCALE	MODEL	REV
CR	11-FEB-25	NTS	RG 12000 Curb	0

PROJECT NAME	
Brampton Victoria Arena	Unit Tag ERV-1

GENERAL DESCRIPTION OF FUNCTION

A Dual Core™ air handling unit comes with a regenerative cyclic dual core heat exchanger. It includes a supply and an exhaust fan (both optional) and two cores filled with specially corrugated 0.7 mm thick aluminium plates which act as heat accumulators. In between the cores is a patented damper section which changes over every 60 seconds to periodically direct warm air through one of the two cores while outside air gains heat from the other. Before each fan is a filter section (optional) to filter the air. Heat recovery is automatically activated when called upon.

The unit may also be used for cooling recovery. If the outside temperature is higher than the indoor the damper cycling starts, enabling cooling recovery. This function reduces the demand for mechanical cooling.

In the off position, the dampers all close against outdoor air thereby reducing infiltration losses through the unit.

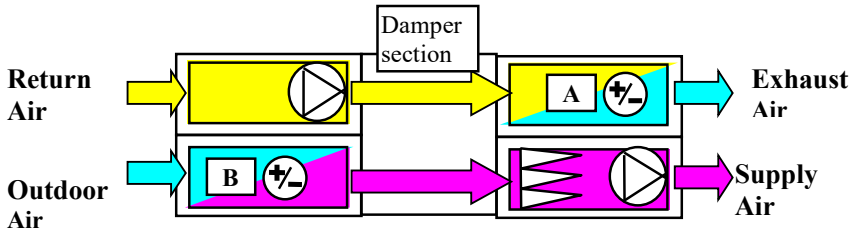
The extremely high temperature efficiency (90% +/- 5%) gives a supply air temperature just a few degrees below room temperature which in many cases allow systems to be designed without additional heating coils.

The inspection doors to fan and damper sections have lockable handles, which contributes to high security.

Principle of function

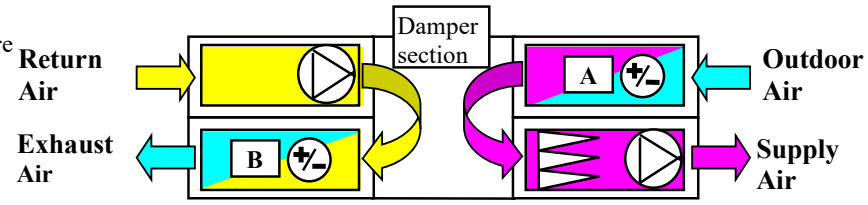
SEQUENCE 1
Exhaust air charges Core A with heat

Core B discharges heat to supply air



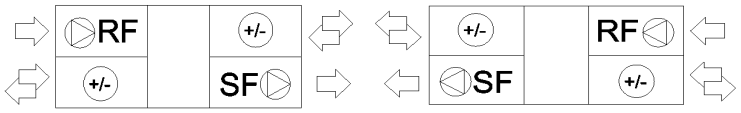
SEQUENCE 2
Exhaust air charges the Core B with heat

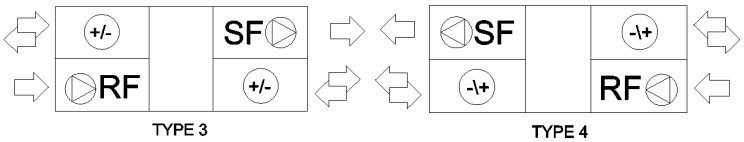
Core A discharges heat to supply air



Dampers change sequence every 60 sec.

Available configurations





Units are normally one of these configurations
Supply and exhaust air connection may also be on the backside

RG 1000-18000 Units

Sequence of Operation, BACnet

ORD

A. Testing Changeover Damper Actuators:

1. The damper motors can be tested by using the S1 switch in the damper control panel.
2. The normal position of the S1 switch is in position 0, the actuators follow the Remote or Local control signals.
3. If S1 is in position 1 the damper actuator M7 runs continuously, and in position 2 actuator M6 runs continuously. Unit will go into Damper Alarm mode if switch is left in either position for more than 5 actuator rotations.
    a. Clear Damper Alarm by resetting controller; see instructions in Additional Notes. **Follow the PLC reset procedure to prevent damage to the controller**.

B. Remote Control: Operation of the changeover damper with central control system (BMS) (for Cooling Recovery in summer, OAT sensor option must be purchased at time of order).

1. When the S2 switch is in position 2 (Remote) the changeover damper is controlled by the central control system (BMS) through physical contacts or BACnet commands.
2. When Enable contact is closed, warm-up sequence will start (see Additional Notes), shutoff dampers are not enabled and remain closed. After the warm-up sequence, the changeover damper section starts normal operation as listed below and the fans remain enabled. The shutoff dampers are enabled.
3. The changeover damper is now controlled by the internal thermistors. Supply Air (SAT) is set to 59 °F (15 °C), Return air (RAT) is set to 68 °F (20 °C), and Outside air (OAT) (if equipped) is set to 80 °F (27 °C).
    a. Press “OK” button to access controller main menu and navigate to the “ERV” page to adjust setpoints.
4. The sequence will now be:
    a. If return air < 68 °F (20 °C), heat recovery (cycling every 60 seconds).
    b. If return air > 68 °F (20 °C) and supply air > 59 °F (15 °C), free cooling (cycling every 3 hours).
    c. If return air > 68 °F (20 °C) and supply air < 59 °F (15 °C), heat recovery until supply air > 59 °F (15 °C) then it will revert to free cooling mode.
    d. If outdoor air > 80 °F (27 °C) then the unit will start cooling recovery (cycling every 60 seconds) until the outside air < 80 °F (27 °C) then it will revert to free cooling mode (if equipped with OAT sensor).

5. Recirc contact closed, changeover damper opens in both directions, shutoff dampers are disabled and close; 100% return air re-circulated back into supply air. Recirc contact opens, shutoff dampers are enabled, changeover damper remains open for 1 minute to allow shutoff dampers to open. After 1 minute delay, all dampers resume normal operation.
6. Enable Contact open, the Fan Interlocks are de-energized, disabling the fans while enabling the changeover damper to continue to cycle and the shutoff dampers to remain open for 1 minute, to prevent changeover damper damage; “Fan Ramp Down” displayed on controller’s screen.
7. Should the system fall below a low limit setpoint for 5 min, the unit shuts down, as described in B.6.
    a. Low limit alarm signal to BMS will be enabled (dry contact & BACnet signal).
    b. The low limit requires the unit turned off and then back on (remove Enable signal and then re-enable or turn S2 switch to Off and then back).

C. Local Control: Operation of the changeover damper without full central control system (BMS) (for Cooling Recovery in summer, OAT sensor option must be purchased at time of order).
    1. When the S2 switch is in position 1 (Local), warm-up sequence will start (see Additional Notes), shutoff dampers are not enabled and remain closed. After the warm-up sequence, the changeover damper section starts normal operation as listed below and the fans remain enabled. The shutoff dampers are enabled.
    2. The changeover damper is now controlled by 3 thermistors. Supply air (SAT) is set to 59 ^{o}F (15 ^{o}C), Return air (RAT) is set to 68 ^{o}F (20 ^{o}C) and Outdoor air (OAT) is set to 80^{o}F (27^{o}C).
        a. Press “OK” button to access controller main menu and navigate to the “ERV” page to adjust setpoints.
    3. The sequence will now be:
        a. If return air < 68 ^{o}F (20 ^{o}C), heat recovery (cycling every 60 seconds).
        b. If return air > 68 ^{o}F (20 ^{o}C) and supply air > 59 ^{o}F (15 ^{o}C), free cooling (cycling every 3 hours).
        c. If return air > 68 ^{o}F (20 ^{o}C) and supply air < 59 ^{o}F (15 ^{o}C), heat recovery until supply air > 59 ^{o}F (15 ^{o}C) then it will revert to free cooling mode.
        d. If outdoor air > 80 ^{o}F (27 ^{o}C) then the unit will start cooling recovery (cycling every 60 seconds) until the outside air < 80 ^{o}F (27 ^{o}C) then it will revert to free cooling mode (if equipped with OAT sensor).
    4. When the S2 switch is in position 0 (Off), the Fan Interlocks are de-energized, disabling the fans while enabling the changeover damper to continue to cycle and the shutoff dampers to remain open for 1 minute, to prevent changeover damper damage; “Fan Ramp Down” displayed on controller’s screen.
    5. Should the system fall below a low limit set point for 5 min, the unit shuts down, as described in C.4.
        a. Low limit alarm signal to BMS will be enabled (dry contact & BACnet signal).
        b. The low limit requires the unit turned off and then back on (turn S2 switch to Off and then back).

D. BACnet (if equipped) – * Optional* BACnet/IP (ethernet port) or BACnet/MSTP (RS-485 port) connectivity; unit may operate via BACnet or Standalone.

1. Press “OK” button to access controller main menu and navigate to the “BACnet” page to access the “RS-485” or the “Ethernet” pages to adjust communication settings. **Power to the controller must be cycled Off & On to permanently save the changes**, see instructions in Additional Notes.

E. Changeover Damper Alarm:

1. Should an error occur in the function of the changeover damper, the damper will be disabled.
2. Error code is displayed on controller’s screen and Red LED light is flashing.
3. The Fan Interlocks are de-energized, disabling the fans.
4. Damper alarm signal to BMS will be enabled (dry contact & BACnet signal).
5. After 1 minute delay, shut-off dampers close.
6. To reset damper alarm, controller’s power must be cycled off-on, see instructions in Additional Notes.

F. Fans, Heating and Cooling:

1. The Controller starts and stops the fans.
2. The SA and RA fan speeds are controlled by 0-10Vdc signal to VFDs from the Controller to maintain required duct pressure setpoint of 0.8”W.C.(200PA) (field adjustable) as measured by the SA & RA pressure transmitters (see section G).
    a. At startup, both SA and RA fans ramp up to the high design speed setpoint (in Hz, field-adjustable) and operate at this speed for 3 minutes to allow the system to stabilize. After the 3-minute period, the SA & RA pressure transmitter outputs are used to regulate fan speeds.
        i. Press “OK” button to access controller main menu and navigate to the “Fan status” page to adjust the starting setpoints.
3. Any type of supplemental heating or cooling of the supply air will be controlled by others (central control system).

G. Duct Pressure Transmitters:

1. SA & RA duct pressure transmitters (provided by Tempeff; installed and wired by others) send a 0-10Vdc to the unit’s Controller and calculated inches W.C. value is sent to BMS via BACnet communication. The signal increases as duct pressure differential increases.
2. If the duct differential pressure (field-adjustable) surpasses the high setpoint or falls below the low setpoint for two minutes after the system has stabilized, the Controller will send an alarm signal to the BMS via BACnet communication and the unit will shut down as described above.
    a. Press “OK” button to access controller main menu and navigate to the “Duct Pressure” page to adjust pressure alarm setpoints and timer.
    b. The pressure alarm requires the unit to be turned off and then back on (turn S2 switch to Off and then back).

H. Additional Notes:

1. If fire alarm contacts are used, remove the factory installed jumper from terminals 101 & 150 and connect the Normally Closed fire alarm contact. If the contact opens during operation, the unit will shut down and dampers close.
2. If the SA or RA smoke detector (shipped loose) detects smoke in the duct work, an internal contact in the smoke detector will open causing the unit to shut down as described above. The manual reset button on the smoke detector's front panel must be pressed and released to reset the smoke detector and re-enable the unit.
3. Cometer Differential Pressure Transmitters included, a 0-10Vdc reading is sent to unit's Controller and a calculated CFM value is sent to BMS via BACnet communication. The signal increases as the pressure differential increases. Initial set-up of the variable pressure transmitter will be done by Tempeff and a final set-up will have to be completed on site, as per Tempeff instructions, with clean filters and a completely assembled system.
4. SA Pre & Final Dirty filter and RA Dirty filter sensors included, when filter reach a set pressure differential the switch will send a signal to BMS through BACnet communication.
5. Additional temperature sensors provided. Return Air (RAT2) to measure temperature before the RA motor, Supply Air (SAT2) to measure temperature after the SA motor and Discharge Air (DAT, shipped loose) to measure duct temperature. All temperature readings can be monitored by BMS through BACnet communication.
6. Morning warm-up sequence: When unit is enabled, the changeover damper section opens in both directions, the Fan Interlocks are energized, enabling the fans to start. After the warm-up sequence, there is an additional 1-minute delay before the changeover dampers resume normal operation.
    a. Shutoff dampers: At the end of the warm-up sequence, there is a 1-minute delay to allow the shutoff dampers to open and prove open. During this transition period, changeover damper remains open in both directions and fans remain enabled. After the transition period, warm-up sequence is disabled, and changeover damper resumes normal operation. If the shutoff damper motor end switches have not proved open, the Fan Interlocks are de-energized until the end switches make.
    b. Morning warm-up duration is set to 0 minutes from the factory unless duration is specified at time of order (field adjustable, 0 to 60 minutes). Typical duration is 30 minutes.
    c. Press "OK" button to access controller main menu and navigate to the "ERV" page to adjust morning warm-up duration timer.
7. Clear Damper Alarm by resetting controller. **Follow the PLC reset procedure to prevent damage to the controller.**
    a. PLC reset procedure: Open 24Vdc fuse holder supplying power to 101 terminals, then open fuse holder F2, and finally open fuse holder FAF1 to controller power. Wait 5 seconds. Close fuse holder FAF1. While controller is re-booting, close 24Vdc fuse holder supplying power to 101 terminals and then close fuse holder F2. Once re-boot is complete, unit can resume normal operation.

8. Controller LED code:
    a. Top LED, solid Green – Controller is powered.
    b. Second LED, flashing Red – Damper alarm.
    c. Second LED, solid Red – Low Limit alarm (or other controller monitored alarms).
    d. Third LED, flashing Yellow – Energy Recovery mode.
    e. Third LED, solid Yellow – Recirc mode or Morning Warm-up.
    f. Fourth LED, flashing Green – Free Cooling Mode.

Note: In all cases ensure that changeover damper section is first on and last off to prevent damage to changeover damper section.

Danfoss Variable Frequency Drive, FC 101-102

Programming 0-10Vdc Signal

ORD

On initial start-up, or after resetting to factory parameters, follow the Set-Up Wizard to enter motor and supply information.

P3-02 – 0.0	Minimum Reference (Hz)
P3-03 – 90.0	Maximum Reference (Hz) – Supply Air VFD
P3-03 – 90.0	Maximum Reference (Hz) – Return Air VFD
P3-15 – 1	Ref 1 Source (Analog Terminal 53) (default)
P4-12 – 0.0	Speed Low Limit (Hz) (default)
P4-14 – 90.0	Speed High Limit (Hz)
P4-19 – 90.0	Max Output (HZ) (match to Speed High Limit)
P5-10 – 8	Terminal 18 DI (Start)
P5-11 – 0	Terminal 19 DI (no operation)
P5-12 – 0	Terminal 27 DI (no operation)
P5-13 – 0	Terminal 29 DI (no operation)
P6-14 – 0.0	Terminal 53 Low Reference @ 0Vdc (Hz) (default)
P6-15 – 90.0	Terminal 53 High Reference @ 10Vdc (Hz) – Supply Air VFD (match to Maximum Reference S/A VFD)
P6-15 – 90.0	Terminal 53 High Reference @ 10Vdc (Hz) – Return Air VFD (match to Maximum Reference R/A VFD)

Press "Auto/On" button to activate the drive

P14-22 – 2 Reset to factory parameters (after pressing OK, cut off main power and wait until LCD display turns off, re-apply main power).

Note: In case of a fire-alarm the unit shuts down and disables the VFD interlock relays (only in AUTO mode). To shut down the VFD in HAND and AUTO, replace factory-jumper on safety interlock terminals 12&27 with BMS fire alarm dry contact.

!! Maximum Reference (Hz) = (maximum fan RPM / maximum motor RPM) * 60Hz **!!**

Motor Operating Frequencies:

SA; 11866 cfm @ 2.26" W.C. = 72 Hz **RA; 11866 cfm @ 3.50" W.C. = 79 Hz**

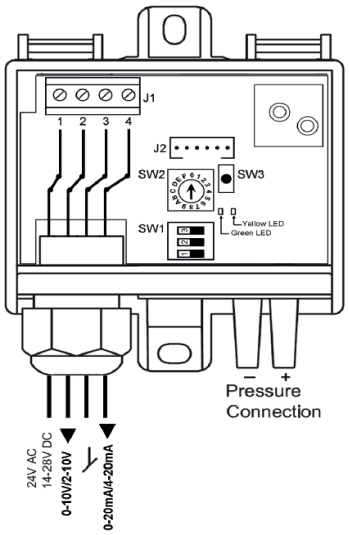
Electronic Cometer Setup Instructions - Step by Step

ORD XXXX

1 Mount the Controller.

2 Connect the Pressure Tubes.

- \- Low Connects To Piezo Ring
- \+ High Connects To Inlet Cabinet



3 Wire Terminal Lugs

- 1 24 AC or 14-28 V DC
- 2 0 - 10 V Output
- 3 Neutral
- 4 0 - 20 mA Output

4 Set SW1 DIP Switches

A DIP 1 for Output

On 2 to 10 V or 4 to 20 mA
Off 0 to 10 V or 0 to 20 mA

Output	DIP1	Terminal
0-10 V	Off	Terminal 2
2-10 V	On	
0-20 mA	Off	Terminal 4
4-20 mA	On	

B DIP2 for Damping Times

OFF 0.4 Second Samples
ON 10 Second Samples

4 Set SW1 DIP Switches (continued).

B DIP2 for Damping Times

Damping	DIP2
0,4 Sec	Off
10 Sec	On

C DIP 3 for Flow vs Pressure

OFF Displays Pressure in Pascal
ON Displays Volume in CFM

	DIP3
Pressure	*Off*
Volume	*On*

5 Disregard SW2 & SW3 Switches.

6 What is the Target Display?

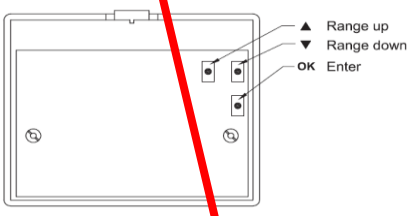
Flow CFM
TSP Pa

7 Enter settings.

A Program Controller for Pressure Display. Display will be Pascal Only.

Code	Pressure Range
50	0 to 50 Pascal (0 to 0.2" wc)
100	0 to 100 Pascal (0 to 0.4" wc)
150	0 to 150 Pascal (0 to 0.6" wc)
300	0 to 300 Pascal (0 to 1.2" wc)
500	0 to 500 Pascal (0 to 2.0" wc)
1000	0 to 1000 Pascal (0 to 4.0" wc)
1600	0 to 1600 Pascal (0 to 6.4" wc)
2500	0 to 2500 Pascal (0 to 10" wc)

1 Use the buttons on the inside of the front Cover to set Range. Toggle up until the desired range is displayed. Push okay.



Left Left Button is Up
Right Right Button is Down
Btm Bottom Button is Okay

Pressure should be displayed

Firstly, press OK button to enter the Range selection menu.
A number in the range will be flashing. Follow the steps below.

7 Enter settings (continued).

B Program Controller for volume Display. Display according to Factor.

Code	Flow Range	Code	Flow Range
1	0 to 1	500	300 to 500
3	1 to3	1000	500 to 1000
5	3 to 5	3000	1000 to 3000
10	5 to 10	5000	3000 to 5000
30	10 to 30	9999	5000 to 9999
50	30 to 50	30.00	10000 to 30000
100	50 to100	50.00	30000 to 50000
300	100 to 300	99.99	50000 to 999900

1 Use the buttons on the inside of the front Cover to set Range. Toggle up for desired range. Push okay.

2 Determine Cometer Factor
Select Cometer Factor by Chart (CFM).
Apply conversion factor to change unit as needed.
IE: CF for ATZAF FF 20 T1 = 323.1
\- or Calculate Factor *CF
*CF = CFM / √Piezo Pressure (low)

SA=313.8; RA=313.8

3 Use the buttons on the inside of the front Cover to set each digit of Factor. Toggle up for each digit until desired is displayed. Push okay. Repeat until all digits selected. Enter factor as a four digit number. Set the position of the decimal using up and down buttons. Press okay.

Flow should be displayed in CFM

LED INDICATION

The green LED is lit when the power supply has been connected correctly. The yellow LED flashes for approx. 3 secs during zeroing.

LED	ON	Flashing	Off
Green	OK		No power
Yellow		Zeroing in progress	OK

CE MARKING

OJ Electronics A/S hereby declares that the product is manufactured in accordance with Council Directive 2004 / 108 / EC on electro- magnet compatibility (and subsequent amend- ments) and Council Directive 2006 / 95 / EC on electrical equipment designed for use within certain voltage limits.

Comefri USA
330 Bill Bryan Blvd, Hopkinsville, KY 42240
Tel: 270-881-1444 Fax: 270-889-0309
sales@comefriusa.com

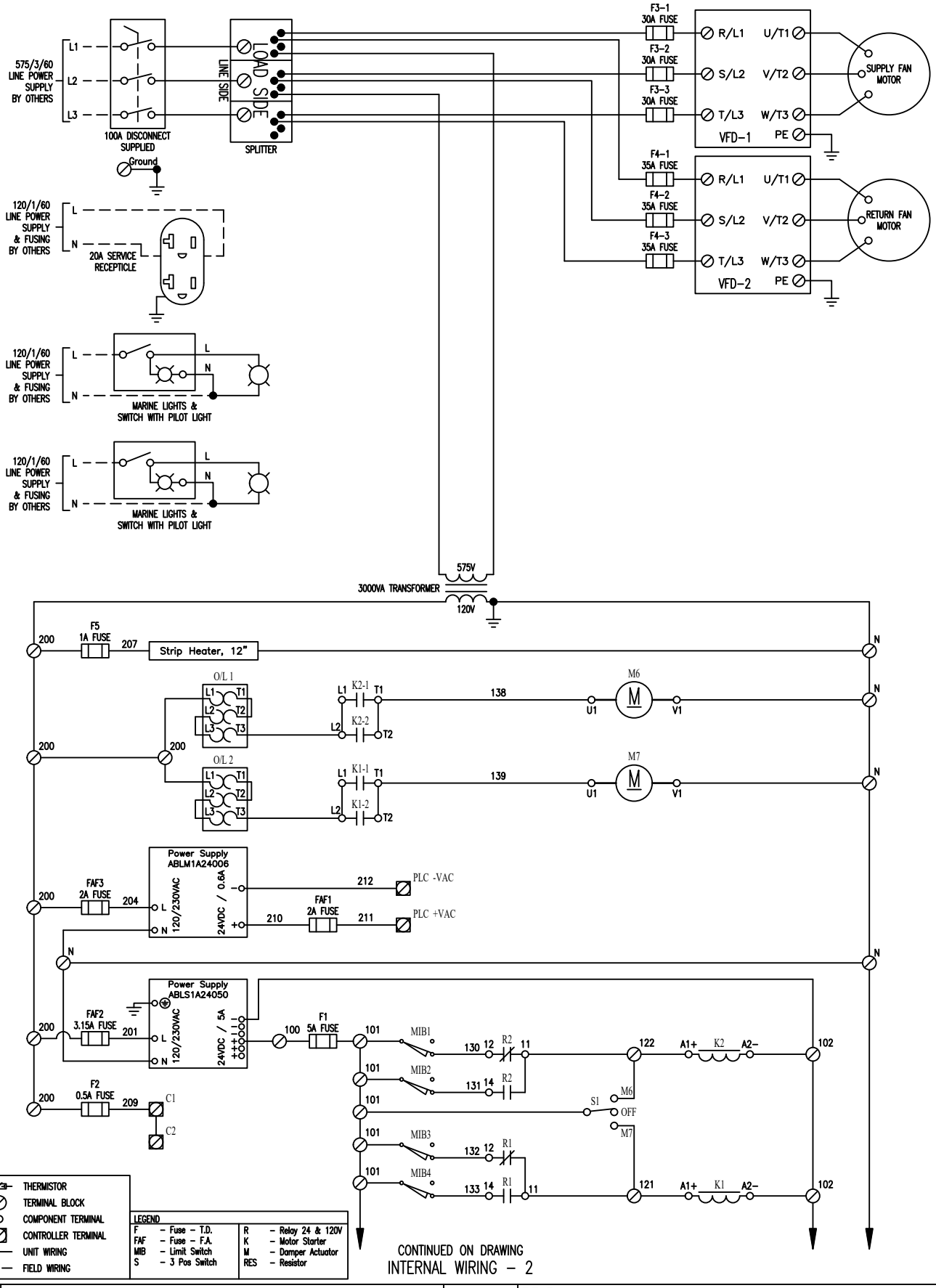
BACnet Points List ORD Sample Only

Name	Type	Instance	Read/Write	Default	Unit	Description
Bcn_iEe_SAT_setpoint	AV	0	R/W	59	°F/C	SAT heat recovery setpoint in degF/C
Bcn_iEe_RAT_setpoint	AV	1	R/W	68	°F/C	RAT heat recovery setpoint in degF/C
Bcn_iEe_OAT_setpoint	AV	2	R/W	80	°F/C	OAT cooling recovery setpoint in F/C
Bcn_iSts_SAT1display	AV	3	R		°F/C	SAT temperature converted to degF/C
Bcn_iSts_RAT1display	AV	4	R		°F/C	RAT temperature converted to degF/C
Bcn_iSts_OATdisplay	AV	5	R		°F/C	OAT temperature converted to degF/C
Bcn_iSts_DATdisplay	AV	6	R		°F/C	DAT temperature converted to degF/C
Bcn_iSts_SAT2display	AV	7	R		°F/C	Post SA motor temperature converted to degF/C
Bcn_iSts_RAT2display	AV	8	R		°F/C	Pre RA motor temperature converted to degF/C
Bcn_iSts_SA_VFD_Spt	AV	9	R/W	72	Hz	SA VFD Starting Setpoint in HZ
Bcn_iSts_RA_VFD_Spt	AV	10	R/W	79	Hz	RA VFD Starting Setpoint in HZ
Bcn_iSts_SA_Duct_Pressure_Spt	AV	11	R/W	0.8	W.C.	SA Duct Pressure Setpoint in W.C.
Bcn_iSts_RA_Duct_Pressure_Spt	AV	12	R/W	0.8	W.C.	RA Duct Pressure Setpoint in W.C.
Bcn_iSts_SA_Duct_Pressure	AV	13	R		W.C.	SA Duct Pressure Output in W.C.
Bcn_iSts_RA_Duct_Pressure	AV	14	R		W.C.	RA Duct Pressure Output in W.C.
Bcn_uiSts_SA_FanCFM	AV	15	R		cfm	SA fan airflow in CFM
Bcn_uiSts_RA_FanCFM	AV	16	R		cfm	RA fan airflow in CFM
Bcn_xEe_Metric	BV	0	R/W	FALSE		TRUE: degC; FALSE: degF for setpoints & display temps
Bcn_xSts_MIB5	BV	1	R			TRUE: vertical damper open; FALSE: dmp closed
Bcn_xSts_MIB6	BV	2	R			TRUE: horizontal damper open; FALSE: dmp closed
Bcn_xSts_BACnetEnable	BV	3	R/W	FALSE		BACnet enable
Bcn_xSts_BACnetHeatRec	BV	4	R/W	FALSE		BACnet heat recovery
Bcn_xSts_BACnetRecirc	BV	5	R/W	FALSE		BACnet recirculation
Bcn_xSts_SA_Blower	BV	6	R			SA blower enable
Bcn_xSts_RA_Blower	BV	7	R			RA blower enable
Bcn_xSts_DamperAlarm	BV	8	R			Damper alarm
Bcn_xSts_MIB1alarm	BV	9	R			MIB1 limit switch alarm
Bcn_xSts_MIB2alarm	BV	10	R			MIB2 limit switch alarm
Bcn_xSts_MIB3alarm	BV	11	R			MIB3 limit switch alarm
Bcn_xSts_MIB4alarm	BV	12	R			MIB4 limit switch alarm
Bcn_xSts_MIB5alarm	BV	13	R			MIB5 limit switch alarm
Bcn_xSts_MIB6alarm	BV	14	R			MIB6 limit switch alarm
Bcn_xSts_MIB5_0alarm	BV	15	R			MIB5 limit switch alarm before startup
Bcn_xSts_MIB6_0alarm	BV	16	R			MIB6 limit switch alarm before startup
Bcn_xSts_M6alarm	BV	17	R			Actuator M6 alarm
Bcn_xSts_M7alarm	BV	18	R			Actuator M7 alarm
Bcn_xSts_LowLimit	BV	19	R			Low limit
Bcn_xSts_Shutoff_Enable	BV	21	R			Shutoff damper relay R5 enabled
Bcn_xSts_Shutoff_ProofOpen	BV	22	R			Shutoff damper proof of open
Bcn_xSts_SA_DirtyPreFilter	BV	24	R			SA Dirty Pre-filter Switch
Bcn_xSts_SA_DirtyFinalFilter	BV	25	R			SA Dirty Final Filter Switch
Bcn_xSts_RA_DirtyFilter	BV	26	R			RA Dirty Filter Switch
Bcn_xSts_Smoke_Detector_Alarm	BV	27	R			Smoke Detector, N.C. relay
Bcn_xSts_SA_Duct_HighPress_Alarm	BV	28	R			SA Duct High Pressure Alarm
Bcn_xSts_SA_Duct_LowPress_Alarm	BV	29	R			SA Duct Low Pressure Alarm
Bcn_xSts_RA_Duct_HighPress_Alarm	BV	28	R			RA Duct High Pressure Alarm
Bcn_xSts_RA_Duct_LowPress_Alarm	BV	29	R			RA Duct Low Pressure Alarm

Notes:

1) Object name containing "Ee" indicates value stored in EEPROM non-volatile memory

2) Use BACnet points listed above to control the unit. Other points can be discovered but are disabled on this unit.



Rev	By	Description	Date

TEMPEFF

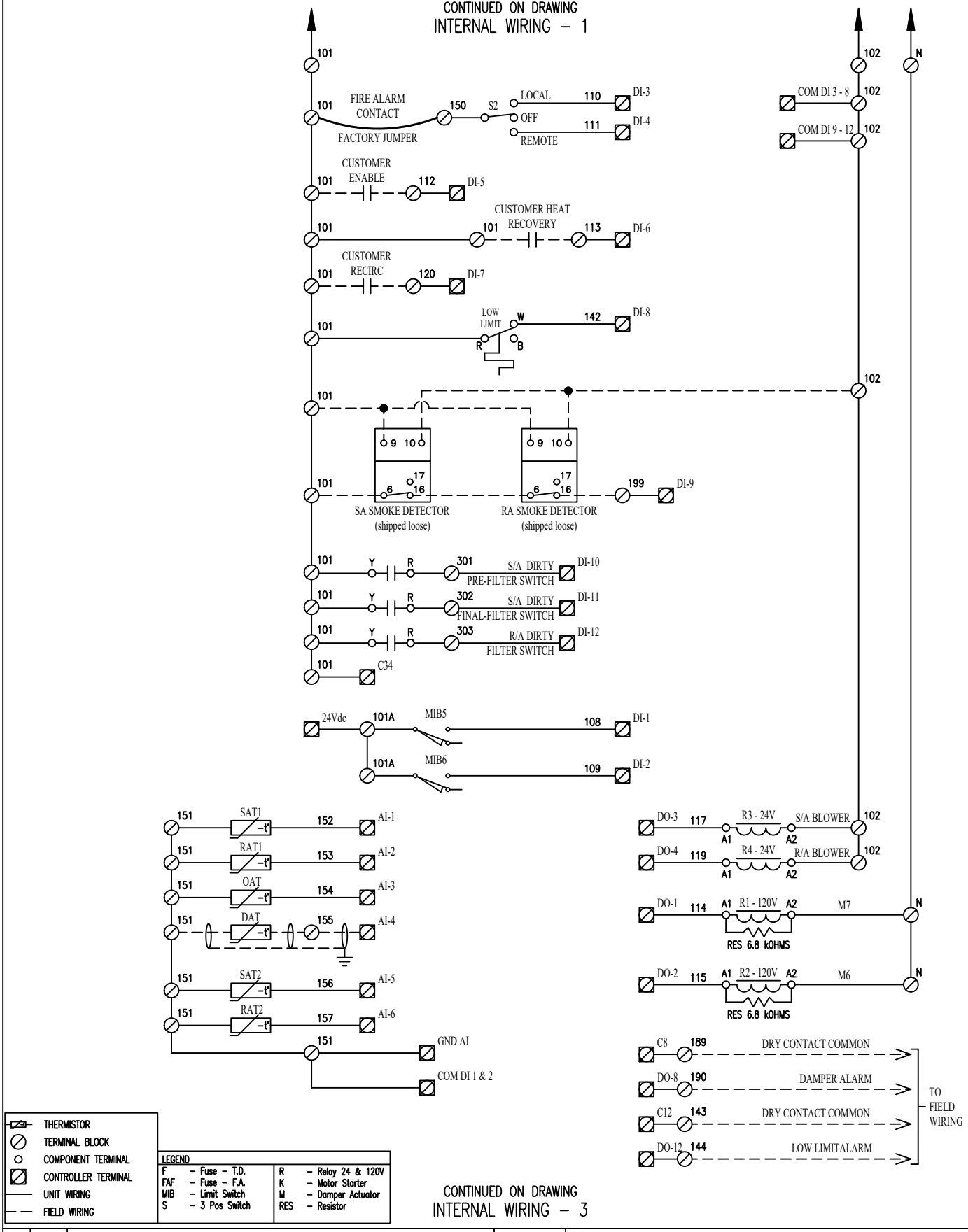
WIRING DIAGRAM

TITLE
RG Control Wiring (NERI) – 575V
SPP, VFD (FC–102), Marine Light, GFCI Receptacles.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
N.N.		N/A	RG INT WIRING 1	
CHK. BY	DATE		ORD NO.	REV
	Feb 12, 2025			–

DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.

CONTINUED ON DRAWING
INTERNAL WIRING – 1



THERMISTOR
TERMINAL BLOCK
COMPONENT TERMINAL
CONTROLLER TERMINAL
UNIT WIRING
FIELD WIRING

LEGEND			
F	– Fuse – T.D.	R	– Relay 24 & 120V
FAF	– Fuse – F.A.	K	– Motor Starter
MIB	– Limit Switch	M	– Damper Actuator
S	– 3 Pos Switch	RES	– Resistor

CONTINUED ON DRAWING
INTERNAL WIRING – 3

Rev	By	Description	Date

TEMPEFF

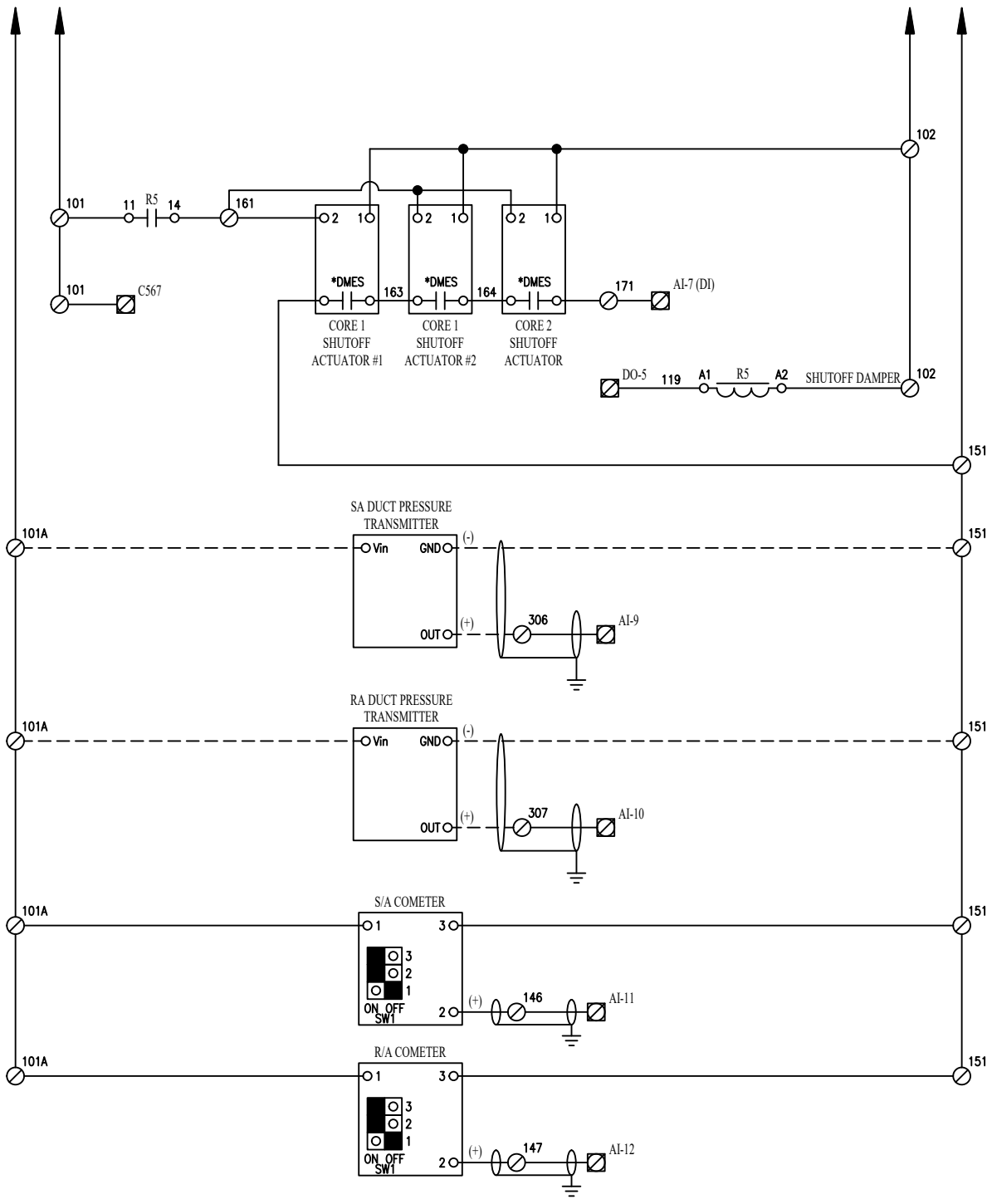
WIRING DIAGRAM

TITLE
RG Control Wiring – 575V
SPP, VFD (FC–102), Low Limit, OAT, DAT, Dirty Filter Switches, CO2 sensors.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
N.N.		N/A	RG INT WIRING 2	
CHK. BY	DATE		ORD NO.	REV
	Feb 12, 2025			–

DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.

CONTINUED ON DRAWING
INTERNAL WIRING – 2



THERMISTOR	
TERMINAL BLOCK	
COMPONENT TERMINAL	
CONTROLLER TERMINAL	
UNIT WIRING	
FIELD WIRING	

DAMPER MOTOR END SWITCHES (*DMES)

LF24–S US	S1 – S3	NFB24–S	S4 – S6
TFB24–S	S1 – S3	AFB24–S	S4 – S6
		EFB24–S	S4 – S6

LEGEND

F	– Fuse – T.D.	R	– Relay 24 & 120V
FAF	– Fuse – F.A.	K	– Motor Starter
MIB	– Limit Switch	M	– Damper Actuator
S	– 3 Pos Switch	RES	– Resistor

Rev	By	Description	Date

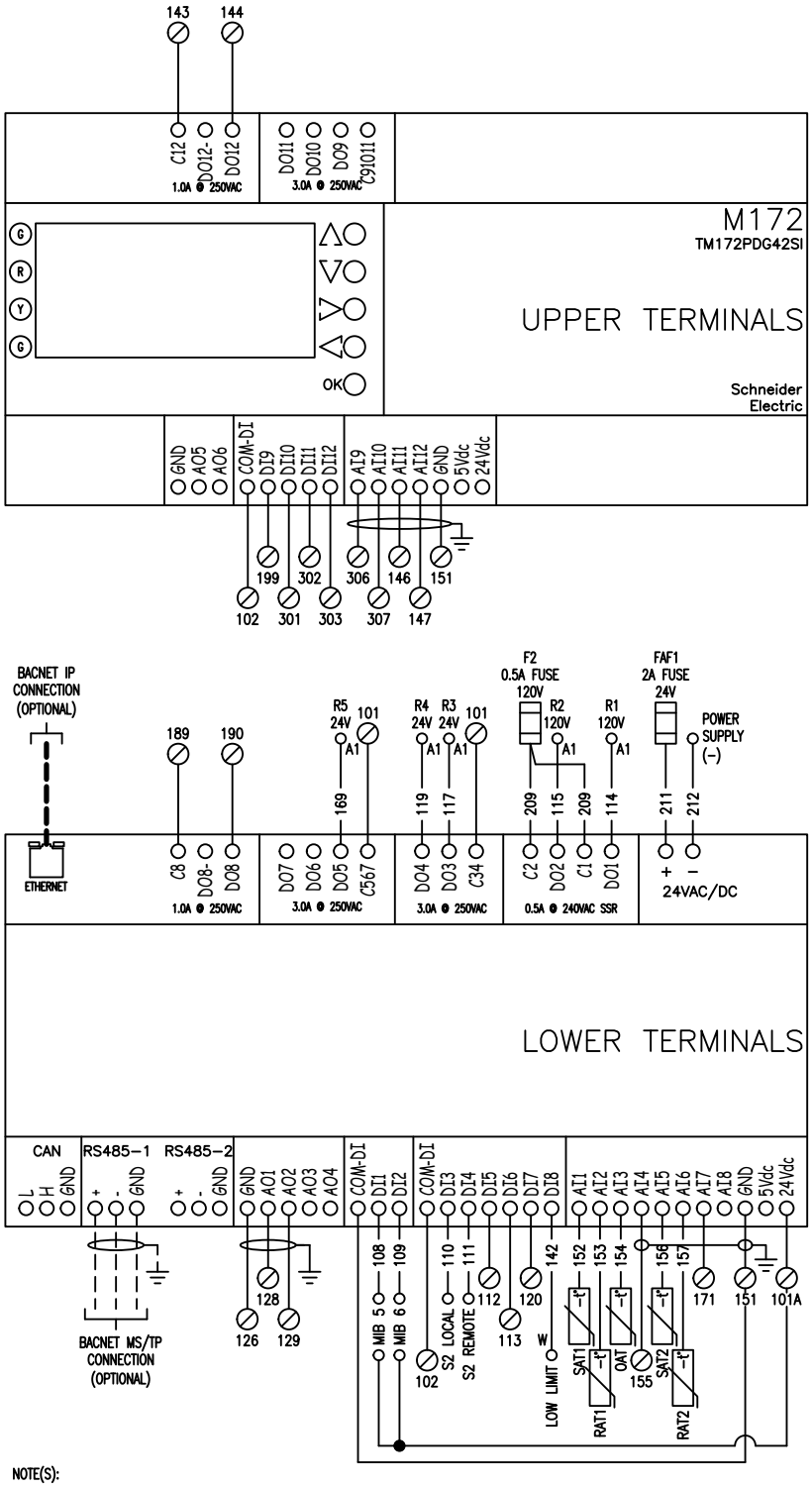
TEMPEFF

WIRING DIAGRAM

TITLE
RG Control Wiring – 575V
Shut–off dampers, Pressure Transmitters, Cometers.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
N.N.		N/A	RG INT WIRING 3	
CHK. BY	DATE		ORD NO.	REV
	Feb 12, 2025			–

DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.



NOTE(S):

A – IF ANY OF THE ORIGINAL WIRE SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 90°C AND AN 600Vac INSULATION RATING.

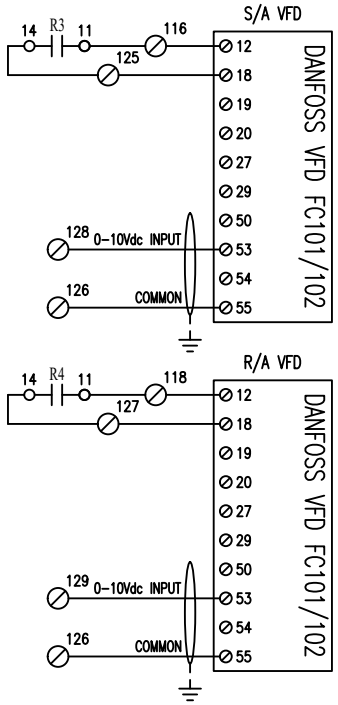
B – FIELD WIRING VOLTAGE DROP NOT TO EXCEED 10%.

C – ALL FIELD WIRING SHOWN SHALL BE COMPLETED BY INSTALLER.

D – ALL WIRING TO COMPLY WITH THE NEC (NFPA 70), CEC (CSA C22.2), OR LOCAL CODE WHICH EVER IS APPLICABLE.

E – IF FIRE ALARM CONTACTS ARE USED, REMOVE THE FACTORY INSTALLED JUMPER FROM TERMINALS 101 & 150. CONNECT THE N.C. FIRE ALARM CONTACTS. IF FIRE ALARM CONTACT OPENS, UNIT SHUTS DOWN. !! FOR OTHER OPERATION OPTIONS, CONTACT FACTORY !!

DANFOSS SPEED CONTROL IS DONE IN THE VFD USING PARAMETERS 3-02 (MIN SPEED) AND 3-03 (MAX SPEED).



Rev	By	Description	Date

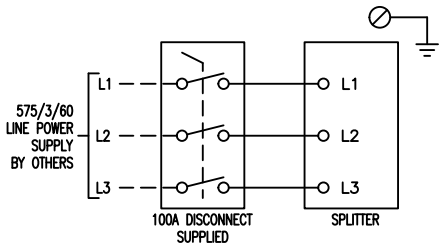
TEMPEFF

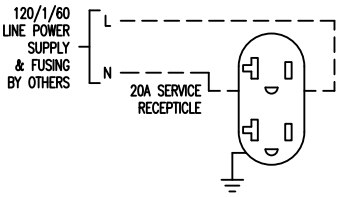
WIRING DIAGRAM

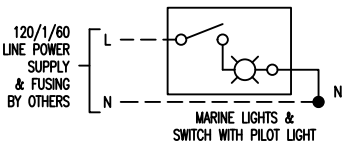
TITLE
RG Field Wiring – 575V
SPP, VFD (FC-102), Low Limit, OAT, DAT,
Dirty Filter Switches, Cometers, Press. Trans.

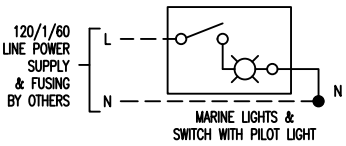
DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
N.N.		N/A	RG FIELD WIRING 1	
CHK. BY	DATE		ORD NO.	REV
	Feb 12, 2025			–

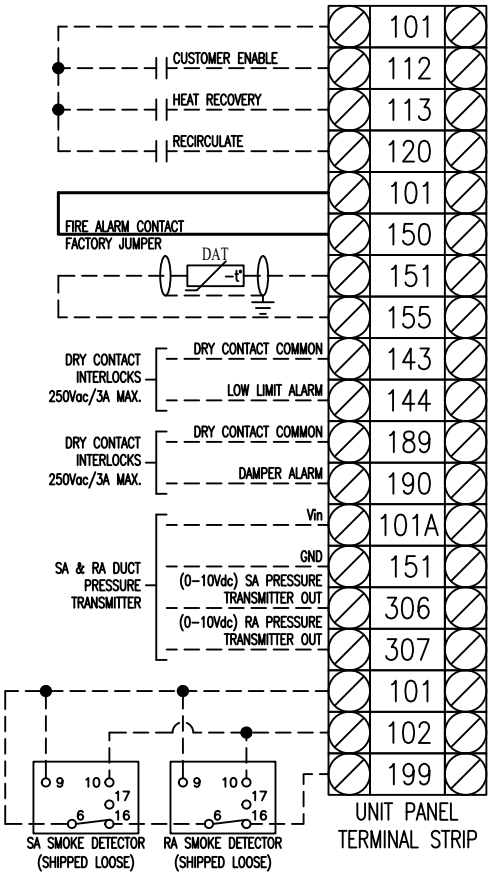
DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.











Rev	By	Description	Date

TEMPEFF

WIRING DIAGRAM

TITLE
RG Field Wiring – 575V
SPP, VFD (FC-102), Marine Light, GFCI Receptacles.
DAT, CO2 Sensors, Low Limit, Duct Trans Press..

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
N.N.		N/A	RG FIELD WIRING 2	
CHK. BY	DATE		ORD NO.	REV
	Feb 12, 2025			–

DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.

Schneider RG Troubleshooting – Damper Alarm

Damper has a built-in alarm for testing the function of the internal components. If the damper goes into alarm the unit will shut down. Clear Damper Alarm by resetting Controller. **Follow the PLC reset procedure to prevent damage to the Controller**.

A. M6 Motor Alarm:
    a. Use S1 switch (Position 2) to test movement on motor; when enabled, the motor will turn.
    b. If motor moves on motor test, check NC contacts on MIB1 and MIB2 for continuity.
    c. If motor does not move:
        i. Check NC contacts on MIB1 and MIB2 for continuity.
        ii. Check motor starter (K2) for continuity.
        iii. Manually enable relay (R2) and check for continuity across relay contacts.
        iv. Check motor leads for voltage. Motor may defective; contact Tempeff.

B. M7 Motor Alarm:
    a. Use S1 switch (Position 1) to test movement on motor; when enabled, the motor will turn.
    b. If motor moves on motor test, check NC contacts on MIB3 and MIB4 for continuity.
    c. If motor does not move:
        i. Check NC contacts on MIB3 and MIB4 for continuity.
        ii. Check motor starter (K1) for continuity.
        iii. Manually enable relay (R1) and check for continuity across relay contacts.
        iv. Check motor leads for voltage. Motor may defective; contact Tempeff.

C. MIB1 Alarm – M6 Closed Position:
    a. Damper motor will not stop at MIB1; motor (M6) will just spin.
        i. Check that arm is making contact with the motor CAM (adjust position of limit switch if necessary).
        ii. Temporarily remove relay (R2), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either side not working replace limit switch.

D. MIB2 Alarm – M6 Open Position:
    a. Damper motor will not stop at MIB2; motor (M6) will just spin.
        i. Check that arm is making contact with the motor CAM (adjust position of limit switch if necessary).
        ii. Temporarily remove relay (R2), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either side not working replace limit switch.

E. MIB3 Alarm – M7 Closed Position:
    a. Damper motor will not stop at MIB3; motor (M7) will just spin.
        i. Check that arm is making contact with the motor CAM (adjust position of limit switch if necessary).
        ii. Temporarily remove relay (R1), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either side not working replace limit switch.

F. MIB4 Alarm – M7 Open Position:
    a. Damper motor will not stop at MIB4; motor (M7) will just spin.
        i. Check that arm is making contact with the motor CAM (adjust position of limit switch if necessary).
        ii. Temporarily remove relay (R1), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either side not working replace limit switch.

G. MIB5 Alarm – M6 Proof of Open:
    a. Blowers will enable for either 1 cycle or not at all, after a 10 second delay the unit will disable.
        i. Check that the arm is making contact with the end collar when the M6 motor cam is on MIB2.
            1. Adjust the collar if micro switch is on flat.
            2. Adjust the micro switch to make contact with collar.
    b. MIB5_0 Alarm:
        i. Alarm occurs when unit is Disabled.

H. MIB6 Alarm – M7 Proof of Open:
    a. Blowers will enable for either 1 cycle or not at all, after a 10 second delay the unit will disable.
        i. Check that the arm is making contact with the end collar when the M7 motor cam is on MIB4.
            1. Adjust the collar if micro switch is on flat.
            2. Adjust the micro switch to make contact with collar.
    b. MIB6_0 Alarm:
        i. Alarm occurs when unit is Disabled.

PLC Reset Procedure:

A. Open 24Vdc fuse holder supplying power to 101 terminals, then open fuse holder F2, and finally open fuse holder FAF1 to Controller power.
B. Wait 5 seconds.
C. Close fuse holder FAF1. While Controller is re-booting, close 24Vdc fuse holder supplying power to 101 terminals and then close fuse holder F2.
D. Once re-boot is complete, unit can resume normal operation.