SUBMITTAL COVER SHEET

DATE:	X	NEW SUBMITTAL	0430105-202
9/28/2016		RESUBMITTAL	

TO:	(Owner) Arlington County: 3201 S. Eads Street Arlington, VA 22202 (Architect) STV, Inc. - 2722 Merrilee Dr. Suite 350 Fairfax, VA 22031 (Engineer) Atkins N. America, Inc. - 2318 Mill Rd., Suite 1040 Alexandria, VA 22314	FROM:	W. M. SCHLOSSER CO., INC. 2400 51ST PLACE HYATTSVILLE, MD 20781
ATTN:	Rami Natour, Jeremy Jenkins, Patrick Standiford, George Clark		

ART Bus Facility and Streetscape Improvements
Contract Agreement 722-15

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	Subcontractor, Manufacturer, Supplier	PROJECT SPEC SECTION	REVIEW CLASSIFICATION: A/E=ARCHITECT/ENGINEER/MIN APPROVAL I=INFORMATION ONLY	NO. OF COPIES P=PAPER E=ELECTRONIC
	CNG Facility and Operations	Subcontractor, Manufacturer, Supplier	Spec. #	A/E	1E
	CNG - Compressor 1 O&M Manual	(Sub)Clean Energy	0430105	A/E	1E

Clarifications, Deviations and Comments:

This is a preliminary submittal only. Final O&M manuals will be submitted as a package per spec section 017823 - Operational and Maintenance Data. - CC, WMS

I HEREBY CERTIFY THAT THE EQUIPMENT, MATERIAL AND/OR ARTICLE SHOWN/MARKED IN THIS SUBMITTAL IS IN COMPLIANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS, CAN BE INSTALLED IN THE ALLOCATED SPACES AND IS APPROVED FOR USE.

NAME AND SIGNATURE OF CONTRACTOR

Chris Chapman, WMS

********** THIS SECTION FOR OWNER / ARCHITECT / ENGINEER USE ONLY **********

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

NAME: _____

TITLE: _____

SIGNATURE: _____

DATE IN:

DATE OUT:

ACTION TAKEN BY CONSTRUCTION MANAGER (CHECK APPLICABLE BOX):

_____ APPROVED (A)

_____ APPROVED AS NOTED (AAN)

_____ DISAPPROVED, REVISE AND RESUBMIT (RR)

_____ INFORMATION ONLY/NOT REVIEWED (FIO)

Clean Energy® COMPRESSION

43676 Progress Way
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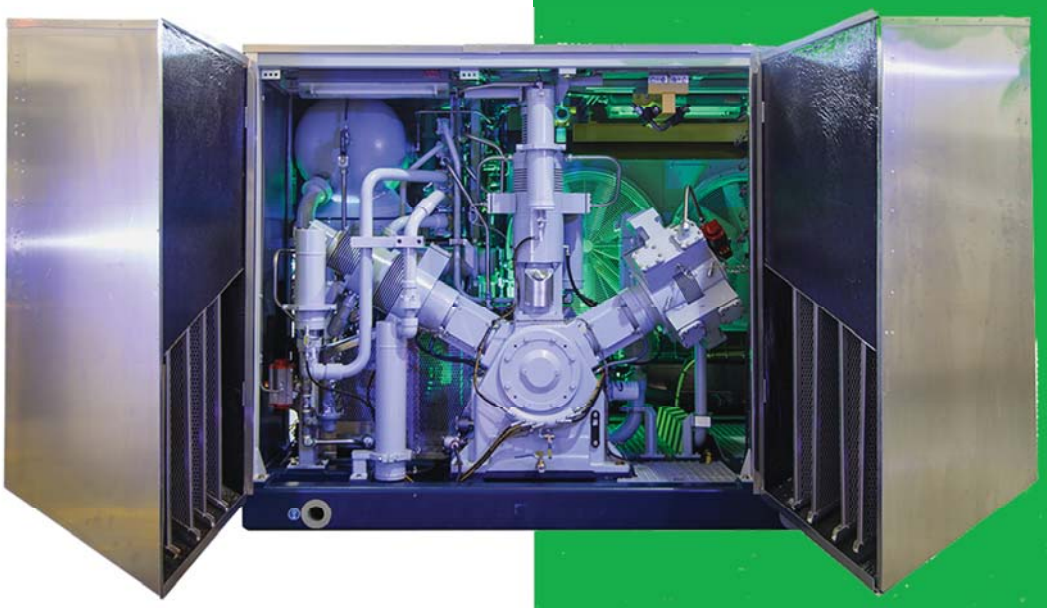
CleanCNG STANDARD

Installation, Operation and Maintenance Manual

STANDARD COMPRESSOR



CleanCNG STANDARD GAS COMPRESSOR

Installation, Operation and Maintenance Manual

Standard Compressor
2016

Serial Number: WC1043579

CBA Number: WC1041650-1

Production Date: MAY 2016

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This manual is intended for qualified personnel only. Clean Energy Compression assumes no responsibilities for injuries, or damage to property resulting for the misuse, or the misinterpretation of information contained herein.

Clean Energy Compression has made all reasonable efforts to present here the most up-to-date information available at the time of publication. However, some items may not reflect exactly what is found in the product delivered. Additionally, the pictures included in this manual are for illustration purposes only. Actual parts and specifications may vary. In case of any discrepancy, contact Clean Energy Compression immediately.

Clean Energy Compression (Canada and China) is ISO 9001-certified, and builds equipment under electrical and mechanical norms such as CE, ATEX, ASME, and PED, among others. The compliance with specific norms varies with the final product delivered. For more information about the conformity characteristics of this specific product, consult the related declarations found in this manual.

CONTENTS

1 INTRODUCTION

1.1 Purpose

The purpose of this manual is to provide operators and local maintenance personnel with the information necessary to operate, maintain, troubleshoot, and perform simple repairs. The information and procedures for these activities outlined in this manual are deemed adequate and sufficient by Clean Energy Compression.

1.2 Scope

This manual provides information on the deployment, use and upkeep of the systems under normal situations, including descriptions of routine inspections and preventive maintenance activities.

A set of relevant OEM documents complements this document package. The OEM documents are the sole responsibility of their publishers. This manual does not cover extensive maintenance procedures or retrofitting, nor is it intended for personnel training.

If information beyond the scope of this manual is required, please contact either your local CEC service center, or Clean Energy Compression Headquarters at:

43676 Progress Way
Chilliwack, BC V2R 0C3 Canada
customercare@cleanenergyfuels.com
1-604-795-9491.

For more information on CEC service centers, visit our website at www.cleanenergyfuels/compression

1.3 Receipt and Inspection

Immediately upon receipt of the equipment, take the following steps:

1. Inspect the unit for damage that may have occurred in transit: if any damage is found, file a claim with the freight company as applicable.
2. Take photos of any damage, and contact your local CEC service center to order replacement parts.
3. Locate the nameplate and verify the model ordered.

4. Contact CEC's Customer Care Service Center at customercare@cleanenergyfuels.com to schedule commissioning. All CEC equipment must be commissioned by authorized CEC personnel.

	**IMPORTANT: Do not operate the equipment until commissioning.**

2 General Safety Information and Emergency Response Procedures

2.1 Safe Work Practices

Safety must always be the prime concern of all personnel involved in the operation and maintenance of any system that employs pressurized natural gas, high power motors, and electrical controls – like the CleanCNG STANDARD Compressor.

It is absolutely essential that all safety devices and emergency response systems be fully operational, and within their certification periods, before any operation or service is performed on the CleanCNG.

All maintenance routines should comply with local occupational safety standards. For more information, consult your local work safety regulatory agency.

All operation and maintenance personnel must be properly trained by CE qualified professionals, or a CE approved third party with supervision. **Note:** Please contact Customer Care to request CEC Technical Training at customercare@cleanenergyfuels.com.

2.2 Responsibilities of the Operation Personnel

All operators should be adequately trained to perform their duties efficiently and safely. The operators must:

- Immediately report to the system supervisor any discrepancy in normal operating conditions;
- Request, use, make available to subordinates, and insist on the proper utilization of all safety equipment;
- Follow safety labels, warning signs, and written instructions without compromise or interpretations;
- Ensure that all tools, instruments, and emergency response devices necessary are available and operational at all times; and
- Understand and be capable of operating safety devices such as emergency shut-down devices (ESDs).

2.3 Responsibilities of the Qualified Maintenance Personnel

Only qualified maintenance personnel trained by Clean Energy Compression, or its representatives, should maintain system performance, while ensuring safety in and around the system.

Maintenance personnel are responsible for guaranteeing that the CleanCNG performs within the specified levels of quality and safety throughout the life of the system. For this purpose, they must:

- Not propose, accept, or condone any compromise regarding performance and safety for reasons of expediency, or otherwise;
- Ensure that all tools, instruments and emergency response devices necessary are available and operational at all times; and
- Apply cascading safety devices such as hasps, padlocks, restraining stripes and barriers whenever maintenance procedures are performed.

2.4 Visual Communication

Clean Energy Compression uses extensive visual aids based on ISO 3864-1/4 and ISO 7010 safety symbol standards, both on the equipment and within this manual. On the equipment, it is essential that all symbols remain in plain sight, clean, and in good visual condition throughout the life of the equipment. If a symbol is damaged or lost, contact Clean Energy Compression for a replacement immediately.

The following symbols may be present in different parts of the CleanCNG, or in its vicinity. Ensure that all operators understand the meaning of these symbols and the reason why they are placed at a particular location.

2.4.1 Danger Symbols

Danger symbols indicate elevated risk of death, severe injury, and catastrophic damage to property, if the instruction conveyed by the symbol is not strictly followed.

These symbols do not allow for compromise!

Elevated risk of death or injury in case of accident. Appropriate safety wear and safety devices must be used at all times.

No cigarettes, lighters, matches, or other similar material can be lit or carried in the vicinity.

No open flame, such as blow torches or welding equipment, can be used in the vicinity.

A fully operational fire extinguisher is present in the area, and rated by the local safety board for the adequate class of fire.

2.4.2 Warning Symbols

Warning symbols indicate the risk of death, injury, or damage to property, if overlooked.

General Hazard. There are intrinsic risks in the immediate vicinity. Stay alert for sudden changes in sound or light.

Electrical Hazards. These are risks related to electrical connections. Wear electrical protection equipment, such as rubber gloves and insulated shoes.

Risk of explosion, or uncontrolled release of compressed fluids or gas. Wear eye protection and/or other adequate equipment.

Risk of catching, crushing, or severing of limbs. Do not touch moving parts. Do not wear loose fitting clothing.

Hot surface. Do not touch or leave objects over the area.

Full safety gear (PPE – Certified Personal Protection Equipment), as defined by the local safety board, must be worn at all times.

2.4.3 Safety Equipment Symbols

The following symbols indicate equipment and/or devices that enhance personal safety. They are mandatory wherever these symbols are present.

Wear adequate eye protection against impact, fluids, and/or intense light.

Wear foot protection against crushing and penetration hazards.

Apply individual padlock protection (interlocking lockout hasps) whenever maintenance or service is performed.

Wear protective gloves against cuts, penetration, and heat hazards.

2.5 Safety Instructions

It is very important that you read and understand the following safety instructions. If you have any question, consult either your safety supervisor or a person more experienced with this type of system. **Do not** attempt to operate, service, repair, or clean the equipment unless you fully understand the procedures and risks involved. The following rules always apply:

- All operation, service, repair, and cleaning work must be done in compliance with local regulations.
- Use OEM parts to maintain the integrity of the design.
- Smoking is strictly forbidden in the proximity of the equipment and its supply/delivery lines.
- Highly compressed natural gas, even in small quantities, contains a large amount of energy, and can be very dangerous. Before executing any maintenance or repair work, ensure that the entire system is completely vented (open to the atmosphere).
- Rotating and moving machine parts pose a special risk of accidents. Do not remove guards and covers during operation or energized maintenance routines.

- Do not store flammable materials near the unit.
- Do not touch any wiring (exposed or not) or electrical components when the system is energized.
- If you are not a certified electrician, do not open any electrical cabinet.

WARNING: Explosion hazard!

Substitution of components may impair suitability for hazardous locations specified on the nameplate of the compressor. Do not replace any electrical equipment in a classified area, unless as a qualified Technician, you have switched off power and have followed procedures to confirm that the area is non-hazardous.

2.5.1 *Entering a Hazardous Environment*

- Do not enter the compressor room until it has been established as a safe environment.
- When work is performed in the compressor room or storage area, the atmosphere must be monitored for the presence of gas.
- When working with or around the enclosure, ensure that the area is well ventilated.

For additional standards concerning entering a hazardous environment, consult your local workplace health and safety regulatory agency.

2.5.2 *Lock-out Procedure*

Lock-out is a procedure that prevents the release of hazardous energy to ensure that the energy source is de-energized, deactivated, or otherwise inoperable. This procedure involves the use of devices such as padlocks, hasps, and chains to prevent the equipment or its modules from being energized or recharged by accident while work is being performed.

The person(s) performing the work must have full and sole control of the locking device at all times, until the work is completed. The equipment cannot be re-energized or recharged unless all locking devices have been removed by the person in charge.

When work is performed in or around the compressor skid, the motor and all electrical components must be locked out.

If work is performed on any electrical component, the entire system, including secondary power sources, must be de-energized.

During maintenance work to any of the compressor's lines, the inlet and discharge lines must be closed and locked out by applying chains and padlock to the main valves.

	**Never make copies of lock-out keys.**

2.5.3 *Opening the Electrical Cabinet*

Only qualified and authorized personnel should open the electrical control panels and cabinets.

	Read the compressor and/or panel nameplate for hazardous area classifications, as they may vary according to specific design criteria.

Before opening any control panel or electrical cabinet, turn the Online/Offline switch to the OFFLINE position, and lock out all power supplies to the panel.

Before opening explosion-proof panels, proceed as follows:

1. Lock out the compressor and piping systems within the classified area.
2. Purge all compressor and piping systems with nitrogen (N_2).
3. After completing all work in the explosion-proof panel, if applicable, replace and torque all bolts before allowing any gas to refill the compressor or piping.

The equipment is designed for Class I, Division 1 or 2 Group D hazardous or unclassified materials. For area classifications, refer to the publication CAN/CSA B108 or NFPA52 in conjunction with CEC transmittal documents that are included in the Appendix.

2.5.4 *Safety Remarks Regarding Operation*

In order to function properly, the system must be maintained in a safe, clean and stable condition at all times, and must be inspected regularly. The following instructions are intended to maximize performance and reduce the risk of accident:

- The system should only operate within its technical specifications. Any situation that forces it beyond its capacity can be dangerous both to property and personnel. Operation outside the technical specification may void the warranty.

- Substitution of components may impair suitability for hazardous locations specified on the nameplate of the compressor. Do not replace any electrical equipment in a classified area, unless

as a qualified Technician, you have switched off power and have followed procedures to confirm that the area is non-hazardous.

- Do not allow or accept modifications to any part of the system, even temporarily, as serious consequences may result. Any modification must be approved in advance by Clean Energy Compression. Unauthorized modifications may void the warranty.
- Before operating the system, ensure that no one is performing inspection or maintenance work in or around the system.
- Do not touch any piping (especially discharge piping) or any other part of the system while in operation.
- Never execute any cleaning work while the system is running or energized.

	Be aware that the compressor may start automatically at any time. Therefore, do not assume that a compressor that is not running is disconnected or de-energized.

2.5.5 *Safety Remarks in Case of Gas Leaks*

The presence of gas leaks is one of the most dangerous situations around a gas compressor. If you detect a leak or suspect that a leak exists, take the following actions immediately:

1. Isolate the machine by placing the key switch in the OFFLINE position.
2. Cut all power to the system.
3. Isolate the storage banks by closing and locking the ball valves at the storage tanks.
4. Contact your local CEC service center immediately.

2.5.6 *Arc Flash and Arc Blast Hazards*

An **arc flash** is the sudden release of large amounts of energy in the form of heat and light.

Personal exposure to an arc flash may result in a variety of serious injuries, and, in some cases, death. Workers may be injured at great distances from an arc flash, sometimes farther than 4 meters (12 feet) away.

Aside from personal injuries, equipment can be severely damaged, resulting in downtime and expensive repair work. Also, nearby flammable materials may be ignited.

3 SYSTEM OVERVIEW

The CleanCNG STANDARD compressors are heavy-duty reciprocating assemblies designed for intermittent or continuous running with minimal maintenance. This is apparent from the rugged crosshead guide design and cooling cylinders design that provide unmatched heat transfer for long and reliable operation.

The typical compressor crankcase has three throws. Each throw connects to a lubricated crosshead piston that reciprocates in a crosshead guide, providing linear guiding for the pistons of each stage. The pistons use seals and rings made of specialty plastics that allow gas compression without oil contamination of the gas stream.

A rider ring acts as a linear bearing to center the piston in the cylinder bore. The number and type of rings used in each stage are determined by the operating parameters of the stage, primarily its output pressure. The compressor is belt-driven by an electric motor mounted to the system skid.

The CleanCNG STANDARD allows for an extensive range of input pressures, from 0.01 to 25 mPa (1 to 3600 psig), with flow capacities from 150 to 2400 nm^3/h (95 to 1,500 scfm). The three-throw system can accommodate up to five compression stages. All CleanCNG STANDARD compression stages are non-lubricated, ensuring a high quality, oil-free discharge gas. The most common elements are:

Propulsion: Electric

- Motor power is dependent on flow requirements.

Number of throws: 2 to 3; number of stages: 1 to 5

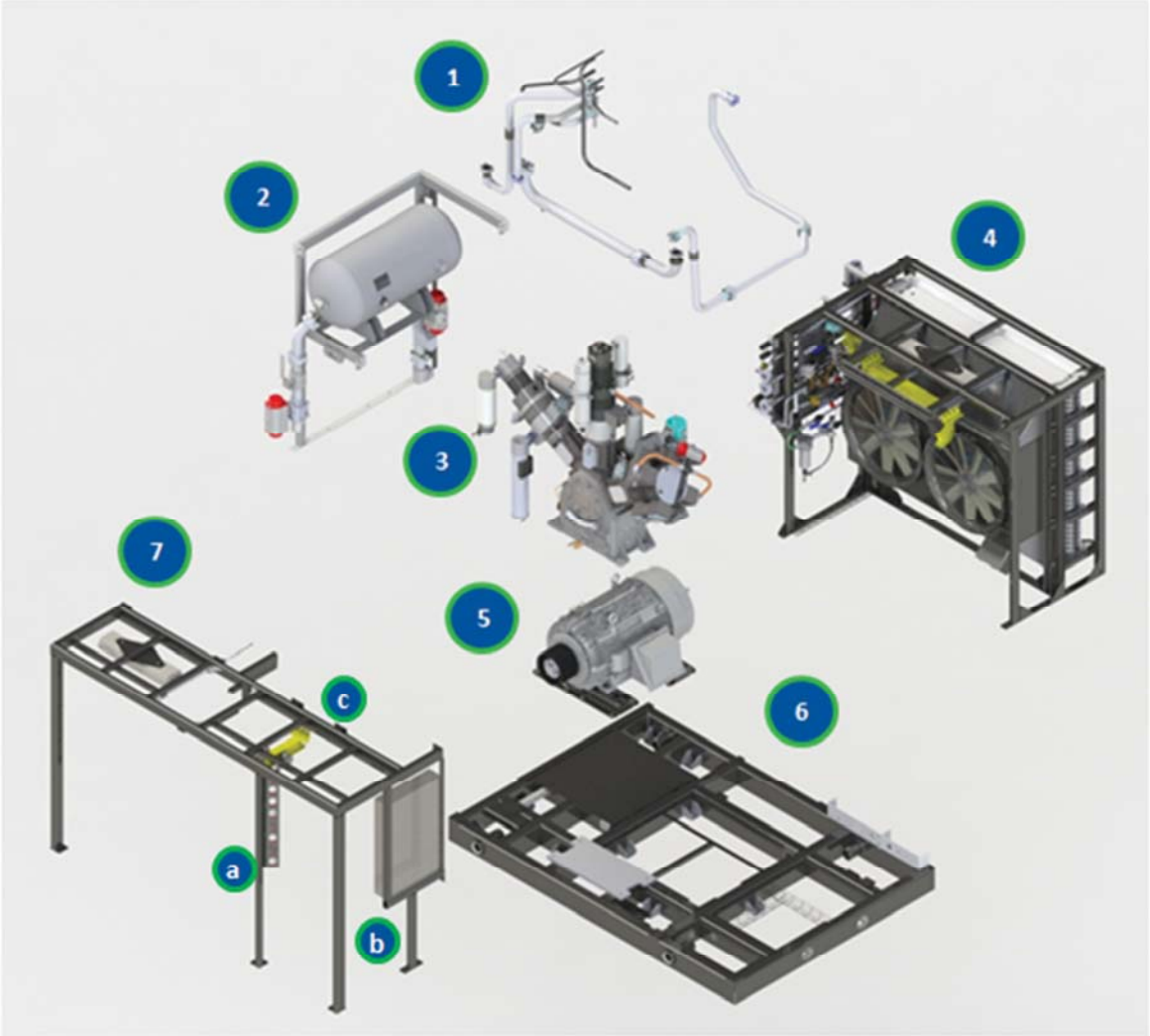
- This is a factor of the input pressure and discharge flow requirements.

Cooling system: Air

PLC control: Siemens

- **Note:** CEC can accommodate other PLC Control systems; however Siemens PLC is stock for the CleanCNG STANDARD compressor.

For specific information regarding your system, please refer to the **Engineering Drawings and Schematics** section of this document package.



Drawing: *Major Components of the CleanCNG STANDARD*

1 - Inter Stage piping
2 - Recovery Tank Assembly
3 - Compressor Block Assembly
4 - Cooler Assembly and Control Panel
5 – Motor
6 - Skid
7 - Front Enclosure, includes: a) Gauge Panel and b) Electrical Panel c) In-built Service Crane

4 DESIGN UPDATES

The CleanCNG STANDARD compressors standardize the following features for ease of implementation and maintenance:

- **Delivery options**
- **Serviceability**
- **Electrical design approach**
- **Performance**

Figure 1. *CleanCNG STANDARD*

4.1 Delivery Options

The CleanCNG STANDARD fits in standard 20ft shipping containers and the Inlet/Discharge Louvers are easily removable.

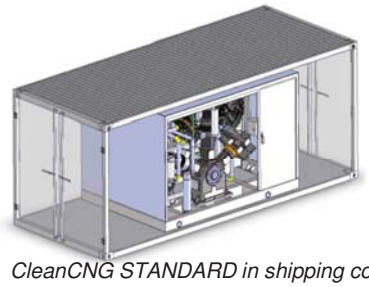


Figure 2. *CleanCNG STANDARD in shipping container*

4.2 Serviceability

Design features for the CleanCNG STANDARD that improve serviceability for technicians are, as follows:

4.2.1 Centralized Drain Location

The drain lines are front and center, making for an easy drain check. The drain lines are easily accessible from skid edge via service access.

4.2.2 Visible Oil Sight Indicator

The front-mounted oil sight indicator allows for rapid evaluation of crankcase oil levels.

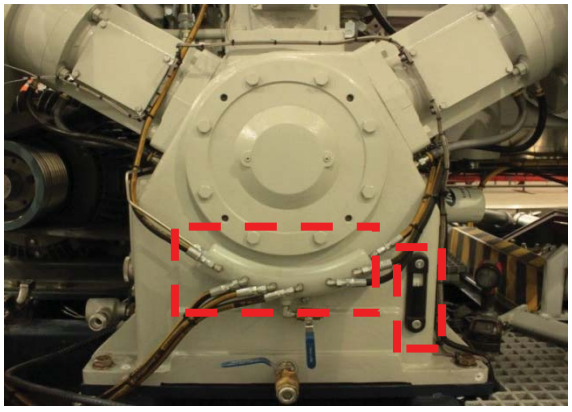


Figure 3. *Centralized drain location and oil sight indicator*

4.2.3 Built-in Multi-Function Service Cranes

Figure 4. *Built-in Multi-Function Service Cranes*

There are several conveniently located cranes to service the CBA (cylinders, seal carriers, packing cases, piston rods, sheave, bottles), and fan motors. They are modular and reconfigurable to meet the variety of lifting requirements within the package. The built-in service cranes hide-away when not in use.

4.2.4 Vertical Inter-stage Cooler Design

To access to each cooler section, a Technician opens the discharge louver doors. The shelving design of the cooler section allows a Technician to slide each section out individually to service it. Due to the simplified access, a single Technician can remove the cooler section with the aid of suitably rated lifting apparatus.

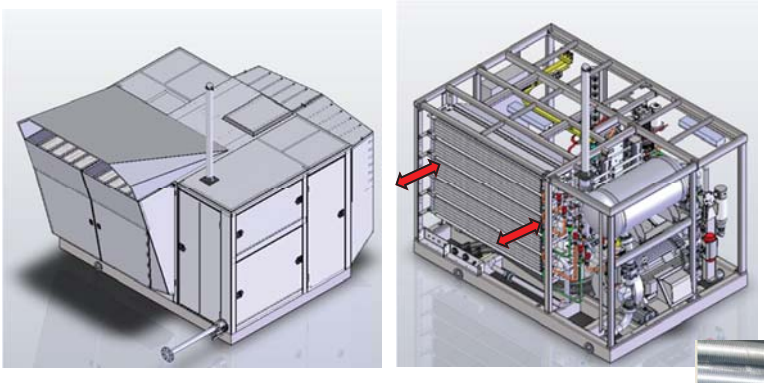


Figure 5. *Discharge louver doors*

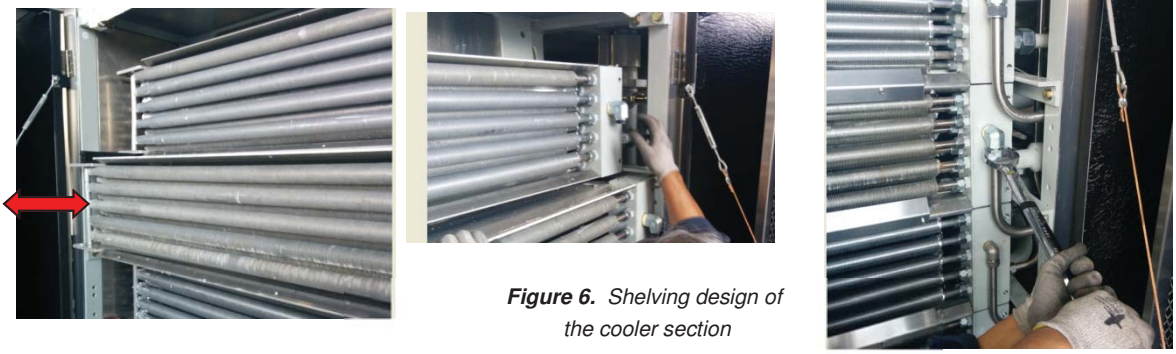


Figure 6. *Shelving design of the cooler section*

4.2.5 CBA Monitoring Ports

Test ports on each stage allow for on-site evaluation of valve performance and piston ring condition during operation.

Indicator port – NPT connections are standard on all compressors. For in-situ monitoring the installation of additional check valves is necessary.

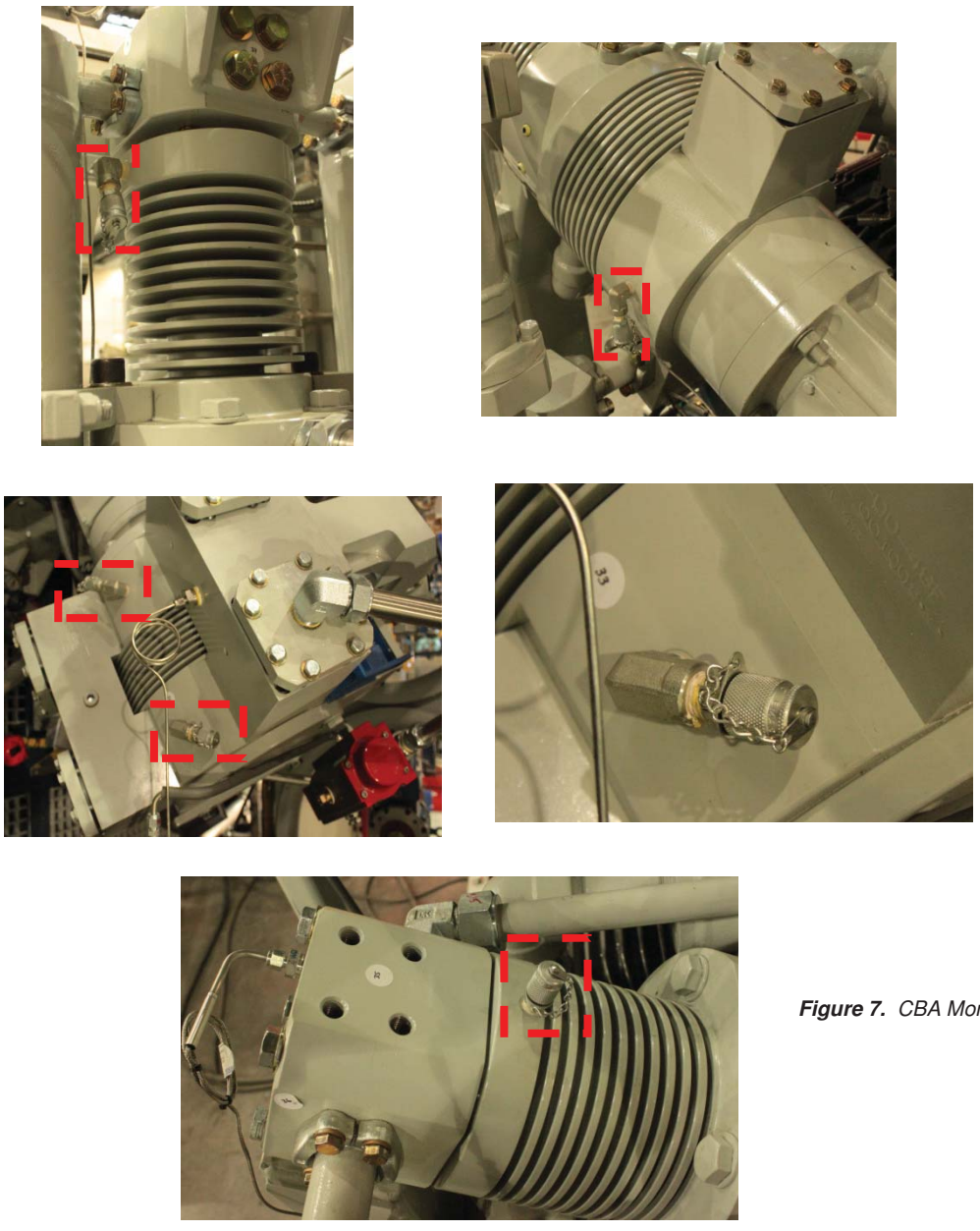


Figure 7. *CBA Monitoring Ports*

4.2.6 *Easy Access to Routine Maintenance Items*

The CleanCNG STANDARD model provides clear access to items that require routine preventative maintenance. This includes, as follows:

- Clear access to inlet & discharge filters.
- A mechanical control panel for solenoids & check valves.
- An open avenue to sheaves and belts via a service pathway.
- Integrated crane system for motor removal.
- Full access to CBA via rear service pathway and inlet louver swinging doors.
- Rear panel direct access to relief valves, assisting the annual re-certification process
- CBA center-wing access hatch, coupled with roof mount tripod for removal and servicing of center-wing.

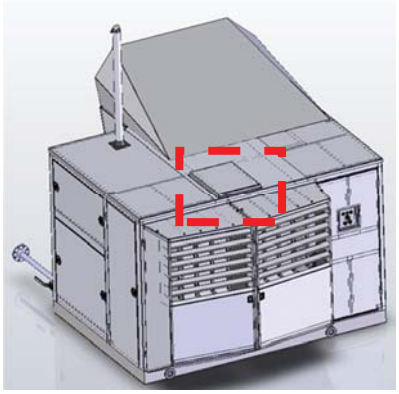


Figure 8. *CBA center-wing access hatch*

4.2.7 *Recovery Tank Isolation and Relief Valve*

There is a lockable recovery tank and relief valve (PRV), which allows full recovery tank isolation. This allows for the annual certification and servicing of the PRV without the need to vent the recovery tank. This provides cost savings and reduces environmental impact during servicing.

4.2.8 *Electrical Design Approach*

There are several electrical design features for the CleanCNG STANDARD that assist servicing, monitoring, and analysis. They are, as follows:

- **Electrical Harness Design:** The CleanCNG STANDARD harness reduces factory assembly time. The harness allows manufacturing to be shifted from Electricians to assembly line with standard quality control.

- **Electrical control panel Inside Enclosure:** Easy access to indoor control panel, which removes inclement weather concerns during servicing.
- **Global & Local Mode Controls logic:** A Master Control Panel (MCP) operating in Global Mode can control the operation of numerous compressor units linked together. In the event of a fault with the MCP (such as a lost communication), each compressor unit can switch to Local Mode, ensuring that site disruptions are minimal. Separate controls setpoints for Global and Local Modes ensure that alternative control plans are in place in the case of a fault.
- **Intelligent Dual Fan Logic:** Controls for the air fans in the Cooler assembly reduce dual fan operation to single fan operation based on inter-stage, discharge, and ambient temperature measurement to reduce operating noise and improve efficiency.
- **Built-in data logging:** Optional local data logging in .csv file format capability is built into the Master Control Panel's HMI. All instrumentation and control valve states log at user-definable sampling rate of up-to 1Hz to a USB drive. An optional higher resolution alarm buffer allows the capture of performance just prior to alarm trigger to gain further insight into the events leading up to alarm.

4.3 Site Inlet Piping and Inter-Stage Piping

The inlet line to the compressor connects to the natural gas metering system of the local gas authority. In some installations, a gas dryer may be installed between the compressor and the gas meter. It is preferable that the gas reaches the compressor as dry and clean as possible.

The supply gas passes through an inlet filter for the removal of small particles. The complete filter is composed of two components: the canister body and the filter element. The complete filter also damps out pressure pulses created by the reciprocation of the pistons, protecting the gas supply meter and regulator set.

The gas flowing to the compressor passes through a fail-safe inlet valve, which automatically isolates the compressor from the gas supply whenever the compressor shuts down.

When the compressed gas discharges from the first stage, the gas is hot. The compressed gas immediately flows through a heat exchanger, travelling through tubes that are cooled by a fan. The heat exchanger cools the gas prior to the next stage of compression.

As the gas enters the second stage of compression, it passes through the second stage scrubber bottle, which removes condensed water and other particles. As well, the scrubber bottle provides inter-stage pulsation damping: in other words, when the gas enters the volume of the second stage scrubber bottle, this volume moderates lower and upper limit pressure peaks from the push and pull of gas in pulses that occur in the crosshead in the first stage. This process repeats in subsequent stages. After the final stage, the gas flows through a final filter that removes entrained hydrocarbons and other condensates.

- For monitoring inter-stage gas pressures, there is a complete pressure gauge panel.
- For monitoring compressor inlet inter-stage and discharge temperatures, a thermocouple located in the compressor and the control panel connects to the PLC (Programmable Logic Control). The PLC controller provides a system shutdown signal in the event that any stage gas temperature exceeds the set limit.

Figure 9. *Pressure Gauge panel*

Pressure transmitters and gauges monitor lubrication and gas pressures, as specified.

Note: The specific instrumentation list is in the Engineering Drawings and Schematics section of this documentation package.

All inter-stage piping is protected from over-pressurizing by safety relief valves, which are vented to atmosphere through a common vent header, or a common discharge pipe to a safe location. The vent header serves as a manifold for relief venting, as well as for the inlet filter, scrubbers and final separator's manual drain valves.

Compressor inter-stage piping is joined using socket weld joint connections, or tubed using compression-type tube fittings. All piping and tubing is designed, manufactured, and tested in accordance with the appropriate code requirements.

4.4 Compressor Blow-Down and Gas Recovery

Located after the final stage, there is a drain valve that can open to equalize – or average - the high pressure gas from the final stage (e.g., 4500 psi in North America; 3625 psi in South America) with the low pressure gases from the first stages, and flow the gas to the recovery tank.

Figure 10. *Recovery Tank*

In other words, the drain valve opens, allowing the pressurized gas inside the compressor block and the inter-stage piping to flow into the recovery tank. This way the compressor discharges its pressurized gas on shut-down, without venting gas to the atmosphere. This method also reduces high start-up loads.

The auto-drain valve serves two functions. One, in the event of a shutdown, it reduces in stage pressure by blowing down into the inline recovery tank. Two, it enables the compressor to run in recirculation mode, which helps reduce site compressor stops and starts, thus reducing site power usage. **Note:** A set point enables duration of recirculation mode. The set point is site dependent based on site needs.

4.5 Compressor Cooling System

Fins are located on the cylinders and the inter-stage coolers (i.e., heat exchanger) for the effective expulsion of heat: in both cases, they are air-cooled.

4.6 Compressor Electrical Controls

A Programmable Logic Controller (PLC) controls the compressor. The PLC starts and stops the compressor, continuously monitors compressor status, and indicates alarm conditions. Various sensors monitor the compressor status for pressure (inlet, interstage, discharge), temperature (gas, ambient, enclosure, discharge), and other data, as required.

All other switches, motors and solenoid valves used to run the compressors have wiring to approved methods specific for that classification.

There are three switches on the compressor: Online/Offline, Remote/Local, Skid Light. Placing the switch in the Offline position stops the compressor, which remains off until the switch is returned to the Online position.

Figure 11. *Control panel: Online/Offline Switch, ESD button, and Operation Status Lights*

All compressor systems have an emergency shutdown (ESD) system that incorporates red push buttons in key positions. This system safely shuts down the compressor and all sources of gas, such as the inlet pipeline and the storage to the dispenser lines.

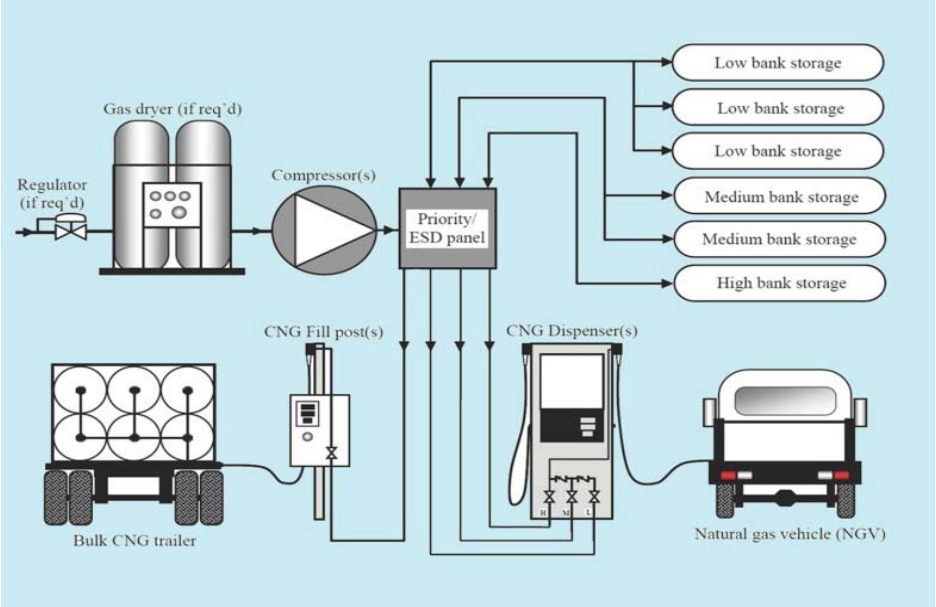
4.7 Storage Banks

Note: The use of storage banks is dependent on the site.

The storage banks in a storage bank cascade are **Low, Medium, High**, and based on discharge sequence (and not levels of pressure).

Before any discharges occur, the storage banks all contain high pressures of compressed natural gas at the same pressure settings.

Storage bank cascades allow faster filling rates, as a storage bank discharges to vehicle, until the vehicle's tank and the bank are equal in pressure.



Drawing: *Priority Panel Dispensing Sequence*

The initial differential in pressures upon connection between the bank (at a higher pressure) and the vehicle tank (at a lower pressure) increases the speed of flow, as the pressure of the CNG from the high bank rushes into the vehicle tank until they are at the same pressure.

Once the Low bank pressure is equal with the vehicle tank, the tank then fills from the next bank in the cascade – the Medium bank. Remember the Medium tank contains high pressures, still higher than the vehicle tank, until they connect and the pressures equalize. Once the Medium bank and vehicle tank equalize, then the next tank in sequence is the High bank, until the tank is full.

Note: Low banks contain the most volume to serve the needs of the vehicle tank at initially hookup. Medium banks are smaller, and high banks the smallest. The High banks are smaller because – at the end of the sequence in the cascade - the High bank is only required to top up the vehicle, and thus, does not need to contain as much gas. Storage banks are either ASME tanks or certified D.O.T. bottles

Conversely, when filling the banks, the compressor fills to the High bank first (whereas, the dispenser discharges from the Low bank first).

4.8 Priority Panel

The compressor system relies on the priority panel to ensure controlled pressure discharges to the dispensers at even flow rates. For the CleanCNG STANDARD, the priority panel is a separate panel from the compressor, which connects through tubing after the final discharge of the compressor.

The priority panel controls the distribution of gas from the compressor discharge to the storage banks, and the release of gas from the banks to the dispenser units. It determines the filling cascade sequence, starting with the high storage bank. The priority panel supplies the dispenser. (The dispenser logic controls the discharging cascade for the dispensers, starting with the low storage bank.)

When the compressor starts for the first time (see the "Commissioning" section below), the priority panel diverts the compressor discharge to any dispenser that may be serving.

If no dispenser is serving, the compressor discharge diverts to the high bank storage. As the pressure in the high bank storage reaches the top set value for that system configuration, the priority panel switches the compressor discharge to the medium bank, and subsequently to the low bank. Once all banks have reached their set pressure, the compressor shuts down, and placed on stand-by.

Conversely, the dispenser discharges gas to the vehicles from the low storage bank first. When the minimum pressure in the low bank is reached, it switches to the medium bank, and then to the high bank, as required.

Soon after the low bank starts discharging, the compressor re-starts to replenish all storage banks to capacity.

If the pressure in the high bank reaches its lower limit, the priority panel switches the discharge directly from the compressor to the dispenser/vehicle. This limits the dispenser's discharge to the nominal discharge flow of the compressor.

All valves in the priority panel are normally closed. This ensures that, in case of power loss or an emergency shut-down (ESD) event, all valves close immediately, isolating the storage from the dispenser.

5 INSTALLATION

The following information is provided only as a general guide for equipment installation.

Considering that the installation procedures vary greatly with each equipment configuration and local characteristics, it is essential to employ the services of a technician who is experienced in the installation

Note: Additional steps to deployment are specified in local codes, such as NFPS52 & CSA 108.

Note: For CleanCNG STANDARD door/louver installation, please contact CEC for the latest instructions.

5.1 Compressor Skid Installation

5.1.1 General Considerations

Before proceeding with the installation, ensure that all of the following requirements are met:

- The site layout design complies with local codes for classification of hazardous areas;
- The compressor has adequate space around the compressor skid for easy maintenance access and air flow (see CEC General Arrangement drawings for skid dimensions);
- The inlet gas pipe is routed so that access to the unit is not obstructed; and
- An emergency entrance and exit to the unit is provided, clearly marked, and free of obstacles.

5.1.2 Physical Placement and Securing

Before removing the compressor skid from its transport vehicle or container, inspect its general post-shipment condition, and verify that the packing list matches the equipment received. If you notice signs of shipping damage or components missing, **do not** proceed with the installation. Contact your supervisor for insurance and other legal proceedings that may be necessary, as well as repairs that may need to be executed. Continuing the installation process without notification may void the warranty.

Danger Zone

Due to the nature of the deployment procedures, including the equipment weight, and high energy of the latent supplies, there is an elevated risk of accidents during the installation procedures. Wear full protective gear at all times.

The compressor skid is designed to settle and be securely bolted down to a levelled, reinforced concrete foundation that is adequate to its weight (as per the General Arrangement drawings), with a 30 cm (12 inches) extra area around its perimeter. The concrete foundation must be flat and level (within 1/8" over the length of the pad).

It may be necessary to adjust the concrete thickness and reinforcements according to the weight distribution of the enclosure and the underlying soil properties. For more information, consult a civil engineer who has full knowledge of local soil and building codes.

Poorly prepared foundations and equipment installations may lead to excessive vibration, premature equipment failure, and risk of accidents, and will void equipment warranty.

5.1.3 Electrical and Piping Access Cut-outs

Electrical cables all pass through the side of the enclosure and there is no need to pre-prepare the concrete with a pass through cut out for the cables.

Note: Depending on site related needs, other cut-outs in the concrete pad may also be necessary for piping/tubing connections.

For details on locations of access plates and all electrical/piping/tubing hook-ups, refer to the General Arrangement drawings included in Appendix A of this manual.

5.1.4 Fixing the Compressor Skid to the Foundation

It is essential to bolt down the compressor skid to the foundation by using the bolt down lugs provided. Failure to do so may result in serious accidents and may void the warranty.

For fastener requirements, please refer to the CEC Construction Transmittal included in the Appendix.

The studs can be cast into the concrete foundation before the enclosure is positioned; alternatively, insert-type fasteners can be used after the enclosure is located. Do not operate the compressor until all points are secured to the foundation.

During start up commissioning, skid vibration should be taken and meet all design requirements. Please consult the CEC Commissioning Check sheet.

6 COMMISSIONING AND START-UP

6.1 Commissioning

Commissioning by authorized CEC personnel ensures the equipment is installed to CEC standards and operates as intended, as well as validates the warranty. To arrange commissioning, complete the Station Readiness Check Sheet provided by CEC and e-mail it to CEC's Customer Care department at customercare@cleanenergyfuels.com

6.2 Start-up Preparation

After completing the CNG refuelling station installation in accordance with all applicable codes, regulations, and manufacturer's instructions, the station is ready for start-up and commissioning.

The following recommended start-up procedure must be performed by qualified technical personnel only, with experience in the start-up procedures and operation of newly installed CNG refuelling equipment. This procedure is generic, and may have to be modified to suit specific sites and equipment.

EXPLOSION HAZARD

Before allowing any inlet supply gas to enter the newly installed compressors and high pressure piping assemblies of the CNG station, the entire station piping system must be purged with nitrogen as per the "Purges" section of this manual. **Failure to do so may result in an explosion inside the compressor or piping system.**

6.3 Electrical Connection

6.3.1 Electrical Requirements

The block heater, space heater, fan motors, and level switch in this system are designed and wired to explosion-proof or intrinsically safe explosion-proof standards.

Intrinsically safe wiring is present in pressure and temperature sensors located inside the compressor enclosure. The wiring to the devices, such as the sensors, switches and other intrinsically safe devices - passes through an intrinsically safe barrier to limit the current to the device. This configuration prevents sparking that might ignite gas.

Areas sufficiently distant from gas-containing equipment are considered non-hazardous and safe for locating non-intrinsically safe explosion-proof electrical panels.

For precise area classifications refer to the CSA publication *CAN/CSA B149.1 Natural Gas and Propane Installation Codes*. This publication can be obtained at the CSA website. Outside Canada, consult your regional regulatory agency.

	**Electrical Hazard** Component substitution may compromise suitability for Class I, Division 2.

6.3.2 *Electrical Control Panel Requirements*

Applicable electrical controls, including those for compressors, dispensers, priority panels, with NEMA 12, 3R, or 4 electrical panel enclosures must be located remotely from compressors and gas piping systems, in a non-hazardous area.

NEMA 4 and 3R panels are weatherproof and suitable for outdoor mounting. If subjected to cold winter temperatures, they should be equipped with thermostatically controlled space heaters.

NEMA 12 panels should be mounted in either a secure weatherproof building or a special kiosk.

The electrical control panel should be bolted to the floor or foundation.

All applicable local codes must be followed.

6.4 Discharge Louver Hatch

Clean CNG 2.0 has a Discharge Louver Hatch control valve. To control the speed that the Discharge Louver Hatch opens, there is a Flow Control Valve that controls the air pressure to the louver-actuated cylinder.

In the event that the Discharge Louver Hatch has to be adjusted in the field, you set this Flow Control Valve manually.

This Flow Control Valve is set during the assembly during Factory Acceptance Testing (FAT). However, once in the field, you may find that the Discharge Louver Hatch needs further adjustment to suit conditions.

Figure 12. *Flow Control Valve*

(IF NEEDED) To adjust the opening speed of the Discharge Louver Hatch for smooth operation:

NOTE: This is a recommended setting.

1. Ensure the Flow Control Valve is at the close Position.
2. Then set it at a half turn – from the close position.

To observe the Discharge Louver Hatch opening operation:

3. Use the Force button on the PLC Program to operate Discharge Louver Hatch during field adjustments (if required).
4. Observe the speed that the Discharge Louver Hatch opens.
5. Make adjustments as necessary.

    - The Discharge Louver Hatch should open in a smooth manner.

6.5 Purges

Before the systems can operate with gas, a series of purge operations must be executed in the sequence described in ***Table 1***.

Procedure Name	Completed
1. Pre-purging Checklist	☐
2. Compressor Piping Nitrogen Purge	☐
3. Priority/ESD Panel and Storage Cascade Nitrogen Purge	☐
4. Dispensing System Nitrogen Purge	☐
5. Compressor Piping Natural Gas Purge	☐
6. Priority/ESD Panel and Storage Cascade Natural Gas Purge	☐
7. Dispensing System Natural Gas Purge	☐

Table 1. *Sequence of Purge Procedures*

Do not execute one procedure unless the previous one has been completed successfully. Before proceeding, contact Clean Energy Compression for eliminating any fault condition.

Maintenance Alert

Some of the following instructions require manually opening and closing valves via the PLC. These functions are password-protected and can only be accessed by Clean Energy Compression service personnel, or factory-trained technicians. Call CEC for additional instructions.

6.5.1 Before You Begin

Before you begin the purge procedures, you need to connect pressure supply to the control panel, allowing all actuated controls to be enabled from the PLC Force screen.

In order to operate actuated controls, the control panel will require 80-100psig control pressure.

- Connect the pressure supply to the "Pilot Pressure In" connector (located on the outside of the skid) in the Connection Panel. **See Figure 13 – below.**

- Hand valves along the line to the control panel may be closed. Check the control panel gauge once pressure is connected. You can manually open the hand valves by adjusting the hand lever on the valve.

Figure 13. *Connection Panel – Pilot Pressure In*

6.5.2 Pre-purging Checklist

1. All compressor enclosures and storage cascades (high bank, medium bank, low bank) are positioned and anchored to the concrete slab. ☐
2. The storage cascade is connected to the priority panel, ESD panel and/or other panels. ☐
3. Inlet gas piping is installed and cathode-protected (if necessary), with the final gas connection at the flex hose complete. ☐
4. The compressor inlet isolation ball valves are closed, isolating the compressor(s) and downstream piping from the utility. ☐
5. All gas vents and relief valves from compressors and panels are ☐

properly sized and piped to a safe venting location.

6. Electrical connections for compressors, priority panel, ESD system, and dispensers are complete. ☐

7. Confirm correct control wiring to the compressors, priority panel, ESD system, and dispensers. ☐

8. Confirm correct voltages to compressors, priority panel, ESD system, and dispenser. ☐

6.5.3 *Compressor Piping Nitrogen Purge*

1. Close all drain valves on the compressor. ☐

2. Ensure that the gas inlet and discharge isolation ball valves are closed. ☐

3. Use the PLC panel to force open the inlet and recovery tank solenoid valves. (See the Note in the "Pre-purging Checklist" section above.") ☐

4. Disconnect the inlet filter drain line and connect a nitrogen gas bottle/regulator/valve combination to the drain of the inlet filter. ☐

5. Open the nitrogen gas bottle and set regulator to a pressure of 60 psig maximum. ☐

6. Open the nitrogen gas valve, allowing nitrogen gas to fill the compressor, inter-stage piping and recovery system. ☐

7. Once a positive pressure has been reached, open the drain valves to the vent header and allow the gas to exhaust through the drain lines. ☐

8. Close the valve at the nitrogen bottle, disconnect the nitrogen supply, and reconnect the drain line to inlet filter drain. ☐

9. Open the drain valves on the compressor and allow the nitrogen to vent from the piping system. ☐

10. Once the nitrogen is vented, immediately close all drain valves. ☐

11. Repeat nitrogen purge procedure for other compressors, if applicable. ☐

6.5.4 *Priority/ESD Panel and Storage Cascade Nitrogen Purge*

1. Close all compressor discharge isolation ball valves. ☐

2. Open the isolation ball valve on the priority, ESD and/or other piping panels. ☐

3. Make sure all drain valves are closed on the priority, ESD and/or ☐

other piping panel(s), as well as on the pressure vessels.

4. Open all isolation ball valves on the pressure vessels. ☐

5. Connect a nitrogen gas bottle/regulator/valve combination to a drain valve on one of the low bank pressure vessels or piping panel high pressure drain valve. ☐

6. Open the nitrogen gas bottle and set regulator to a pressure of 60 psig maximum. ☐

7. Open the nitrogen gas valve and allow the nitrogen to fill the pressure vessels, interconnection piping, priority/ESD panel, and compressor discharge piping. ☐

8. Once a positive pressure has been reached, open the drain valve on the priority/ESD panel, and allow the gas to exhaust through the drain line for a few seconds. ☐

9. Close the drain valve on the pressure vessel. Close the valve at the nitrogen bottle and disconnect the nitrogen supply. ☐

10. Open a drain valve on the priority/ESD panel and allow the nitrogen to drain from the piping system. ☐

11. Once the nitrogen is drained, immediately close all drain valves. ☐

6.5.5 *Dispensing Station Nitrogen Purge*

If applicable, execute the dispenser nitrogen purge. Refer to the dispenser manufacturer's manual.

6.5.6 *Compressor Piping Natural Gas Purge*

1. Purge each compressor piping system with natural gas, by opening the inlet gas supply isolation ball valve and allowing natural gas to enter the system. This needs to occur following the same steps and procedures of the purge with nitrogen. Please refer to the section, "Compressor Piping Nitrogen Purge." ☐

   Note: You may find leaks with a natural gas purge that were not present with nitrogen at the same pressures. You will need to investigate these leaks further.

2. Adjust the utility gas supply regulator downward to ≤ 60 psig. The lower pressure reduces the amount of gas vented to atmosphere. Alternatively, carefully throttle the gas into the compressor piping systems until a pressure of ≤ 60 psig is reached. ☐

3. Ensure that the compressor inlet and discharge isolation ball valves ☐

are closed at the completion of each natural gas purge.

6.5.7 Priority/ESD Panel and Storage Cascade Natural Gas Purge

1. Isolate all compressors from the piping system by closing their inlet and discharge isolation ball valves. ☐
2. Ensure all drain valves are closed on the priority/ESD and/or other piping panels, and on the pressure vessels. ☐
3. Open the isolation ball valve on the priority/ESD and/or other piping panels. ☐
4. Open all isolation ball valves on the pressure vessels. ☐
5. Force the priority valve electrical actuators (if applicable) open either manually, or with the PLC programmer. ☐
6. Force the inlet solenoid valve open on one compressor with the PLC programmer. ☐
7. Open the inlet gas and discharge isolation ball valves of the compressor with the energized inlet solenoid valve and allow ≤ 60 psig natural gas to flow through the compressor piping to fill the pressure vessels, interconnection piping, priority/ESD and/or other panels, and compressor discharge piping. ☐
8. Once a position pressure has been reached, open a drain valve on the priority/ESD and/or other piping panels and allow the gas to exhaust through the drain line. ☐
9. Close the inlet gas isolation ball valve and allow the natural gas to drain from the piping system. ☐
10. Once the natural gas is drained, immediately close all drain valves. ☐

6.5.8 Dispensing Station Natural Gas Purge

Execute the dispenser natural gas purge following the procedure described in CEC's *Dispenser Installation, Operation and Maintenance* manual, or the dispenser manufacturer's manual.

6.6 Start-up Procedures

These procedures describe the first-run sequence for the compressor . This sequence must be followed every time the system has stopped for maintenance, or otherwise disconnected from the main gas supply line.

Warning

Do not allow air to remain in any of the lines after maintenance.

For example, changing filters, valves and rings will allow air to enter the lines.

If it is confirmed or suspected that air may have entered any lines, the compressor or the collection tank, all previously described purge procedures **must be executed again**.

6.6.1 Compressor Start-up

1. Confirm all seals and covers on all explosion-proof boxes are in place. ☐
2. Turn on main power. ☐
3. Turn on main disconnect switches for compressors, priority and ESD panels, and dispensers. ☐
4. Turn on power at breaker panel to power up priority panel and dispenser(s). ☐
5. Turn the key switch on the priority and ESD panel to the ON position (if applicable). A green status light should be on. ☐
6. Push the green *Reset* button located on the control panel. ☐
7. This should activate the ESD system. Confirm that relay No.1 (RL1) is energized (refer to the electrical schematics) in compressor electrical control panel. Confirm that the ESD valves are in the Open position. ☐
8. Bump the compressor motor to visually confirm the correct rotation (counter clockwise looking at the sheave). If not, invert 2 phases. ☐
9. Verify that all pressure vessel isolation valves are open. ☐
10. Verify that the storage cascade isolation valves are open. ☐
11. Verify that all compressor piping drain valves are closed. ☐
12. Verify that the compressor discharge isolation valve is open. ☐

13. Verify that all dispenser drain valves and isolation valves are closed. ☐

14. Verify that the filter isolation valves are closed. ☐

15. If this is a multiple compressor installation, open the inlet gas isolation valve to the first compressor. ☐

16. Verify correct inlet gas pressure to compressor. ☐

17. Turn compressor and the control panel selector switches to the ONLINE position to start the compressor. Allow pressure to build up in the storage cascade high bank to approximately 50 psig. ☐

18. Stop the compressor. ☐

19. Start-up compressor and fill the storage cascade to 500 psig. ☐

20. Verify that the pilot regulator at the priority panel is set between 80-100 psig. ☐

21. Run compressor(s) to build up pressure in the storage cascade in 500 psig steps, and test for leaks. ☐

22. As the storage cascade pressurizes, verify the correct operation of the priority panel. ☐

23. When maximum discharge pressure has been reached, confirm the correct compressor shut-down. ☐

24. Turn the Offline/Online switches of compressor(s) to the OFFLINE position. ☐

25. Once the storage cascade has been depleted of gas, switch the compressor key switch to the ONLINE position and carry out a complete station system test. Begin by confirming the correct setting of the recovery tank regulator on start-up. ☐

7 COMPRESSOR OPERATION – INTERNAL SEQUENCE OF EVENTS

Once powered and operational, the *Ready-to-Run* message displayed on the screen and the blinking green lamp indicates that the system has all the alarms cleared, and the compressor is ready to run. From then on, the system operates automatically, according to the following a sequence of events and timeline[1].

7.1 Starting Timeline

State	Event/Time/Condition	Action
OFFLINE 	**System is offline**	■ None
STANDBY 	**Offline/Online switch to ONLINE**	■ Run light blinking ■ Motor not running
STARTUP 	**Gas request = TRUE *or* Manual Start request Oil Temperature > SP**	■ Run light solid ■ System starts. ■ 1st stage suction valve opens.
	5 seconds later	■ Main motor starts.
	Timer > Max Auto-drain Time SP	■ Auto drain valve closes. ■ Unit begins compression.
	Timer > Min Start Time SP *and* Recovery Tank Pressure < Recovery PT, Inlet Open SP	■ Skid inlet valve opens. ■ Recovery pressure begins to draw down by feeding any extra recovery tank gas into the 1st stage suction line.
COMPRESSION 	**15 seconds after main motor start**	■ Cooling fan motors starts.

Table 2. *Starting Timeline*

[1] These tables assume standard in-line recovery tank design.

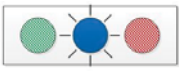
7.2 Running Timeline

State	Event/Time/Condition	Action
COMPRESSION 	**Every 20 minutes of continuous operation**	■ Cooling fan motors stops for 30 seconds. ■ Air flow through the system stops. ■ Gas detector sniffs for gas leak.
	If gas concentration is above 20% LEL*	■ Screen displays *Gas Level #1 Warning*. ■ **All fans turn on, and remain on until the concentration returns to below 5%.**
ALARM 	**If gas concentration is at or above 40% LEL***	■ Compressor shuts down. ■ Screen displays *Gas Level #2 Alarm*. ■ **The system needs to be manually reset to return to normal operation.** ■ **Fans turn off**

** LEL = Lower Explosive Limit. The LEL limits are factory default setpoints, but they can be adjusted to accommodate local codes.*

Table 3 *Running Timeline*

7.3 Running Timeline – Stopping and Stand-by

State	Event/Time/Condition	Action
RECIRCULATION 	**All fill posts filled to the desired pressure** **Storage reaches setpoint**	■ Auto drain valve opens. ■ Suction valve closes. ■ Compressor goes into recirculation (cool down) mode (if applicable). ■ Trapped gas circulates within the compressor.
	Timer > Recirculation Duration *and* Gas Request = FALSE **(Cooling set time can be adjusted from 0 to 1800 seconds)**	■ Compressor stops. ■ Skid inlet valve closes.
	Timer > Cooling set time SP	■ Cooler stops.
STANDBY 	**4 minutes later**	■ Drain valve closes. ■ System pressure is equalized allowing for unloaded restart. ■ System goes into stand-by.

Note: If compression is necessary due to the detection of low pressure at a dispenser, (a filling was requested), the compressor returns to normal operation.

Table 4. *Running Timeline – Stopping and Stand-by*

There are three Operation Status Lights. The Status Light Indicator sign provides the information for each light, as below.

Green:

- **Solid:** Standby
- **Flashing:** Startup

Blue:

- **Solid:** Compression
- **Flashing:** Recirculation

Red:

- **Solid:** Alarm
- **Flashing:** Maintenance

Figure 14a. *Operation Status Lights*

7.4 Emergency Procedure

In case of an emergency in the dispenser, compressor area, or other station areas involving a breakaway disconnection, major gas leak, fire, other malfunction, or accident, press the closest emergency shut-down (ESD) push button (Figure 13b). The location of all ESD buttons should be made familiar to all personnel.

Figure 14b. *ESD Button – Red push button, middle center of panel*

Once an ESD button is activated, all station operation shuts down immediately, as follows:

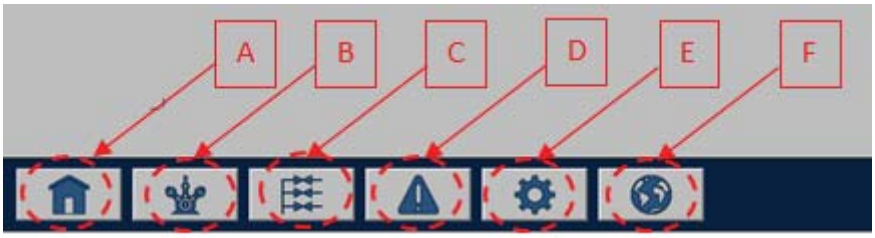
1. The compressor shuts down.
2. The pressure vessel storage cascade is isolated from the rest of the station with the fail-safe, normally closed emergency shut-down (ESD) valves.
3. The sequencing valves (*i.e.*, flow control valves in the dispenser) close, thus isolating gas from the fill nozzle.
4. All station operation ceases until the electrical controls are reset.

8 TOUCHSCREEN OPERATION – SIEMENS CONTROLLER

The system operates via a touchscreen Human Machine Interface (HMI) that controls the system variables, as described below. **Note:** The screenshots below are illustrative and may be slightly different on your unit.

8.1 Navigation Control Buttons

In the HMI, there are six touch-screen buttons available in every screen, located together in the bottom left corner. This is the **Navigation Control**.



The functions of these buttons are, as follows:

A. **Main Menu**: Return to the Main Menu screen. *(See Figure 15, Label A.)*

B. **Compressor**: View compressor performance. *(See Figure 15, Label B.)*

C. **Priority Panel**: View Priority Panel performance. *(See Figure 15, Label C.)*

D. **Alarm History**: View the Alarm History. *(See Figure 15, Label D.)*

E. **Setpoints:** View System Setpoints. *(See Figure 15, Label E.)*

F. **Global Settings**: Modify date and time. *(See Figure 15, Label F.)*

8.2 Main Menu Screen

As the home screen, the first screen that appears in the HMI is the **Main Menu** Screen. On the Main Menu screen, as well as the Navigation Control buttons, there are three more touch-screen buttons present: **Diagnostics**, **Log Setup** and **Log Control**. *(See Figure 15 below, and labels 1, 2, 3.)*

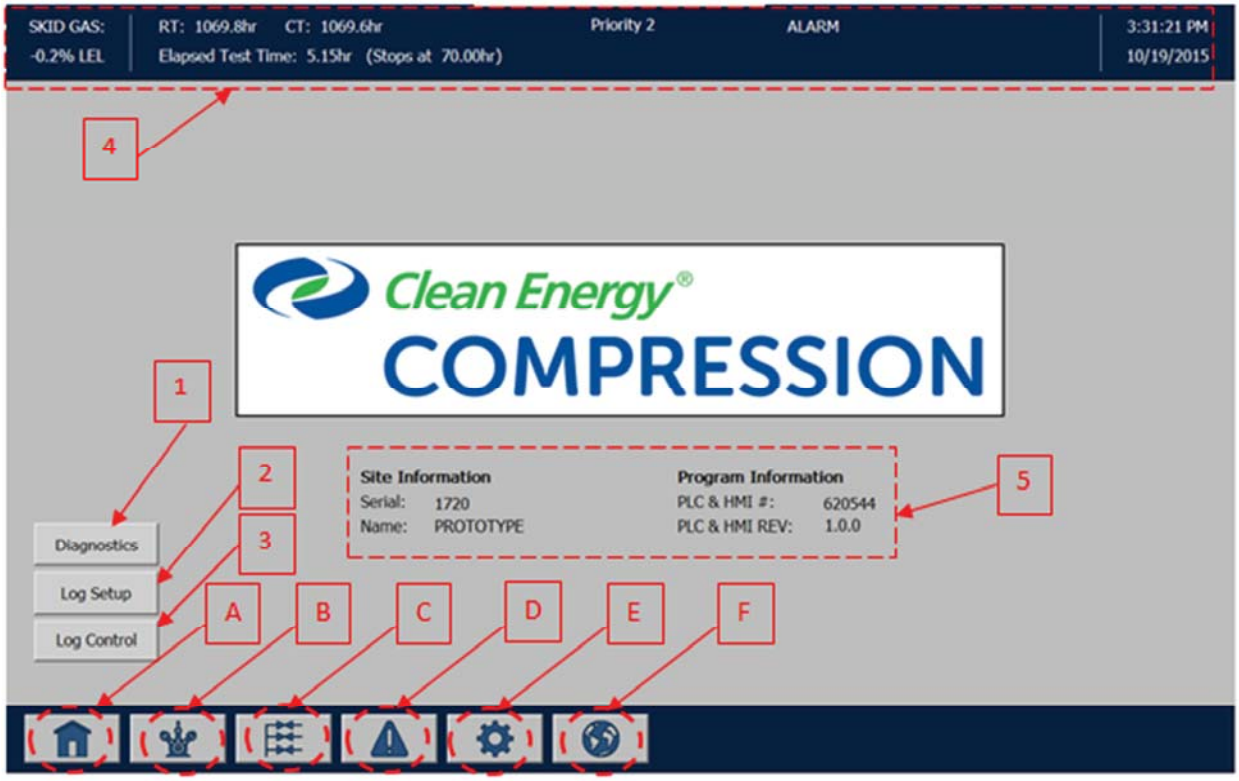


Figure 15 *Main Menu Screen*

1. Diagnostics button
2. Log Setup button
3. Log Control button
4. Compressor Status Bar
5. Site Information

A. Main Menu button
B. Compressor button
C. Priority Panel button
D. Alarm History button
E. Setpoints button
F. Global Settings button

1. The **Diagnostics** button (see Figure 15, Label 1) changes the screen to display the Network baud settings, diagnostics and other miscellaneous information.

2. The **Log Setup** button (see Figure 15, Label 2) changes the screen to display the PLC data log file settings.

3. The **Log Control** button (see Figure 15, Label 3) changes the screen to display the PLC data logging status and sampling rate.

4. The **Compressor Status Bar** always displays on top of each screen (see Figure 15, Label 4)

5. The **Site Information** center of the main screen displays the site name, compressor serial number, and date/time information (see Figure 14, Label 5)

8.3 Compressor Screen

By selecting the ***Compressor*** button, the following screen displays:

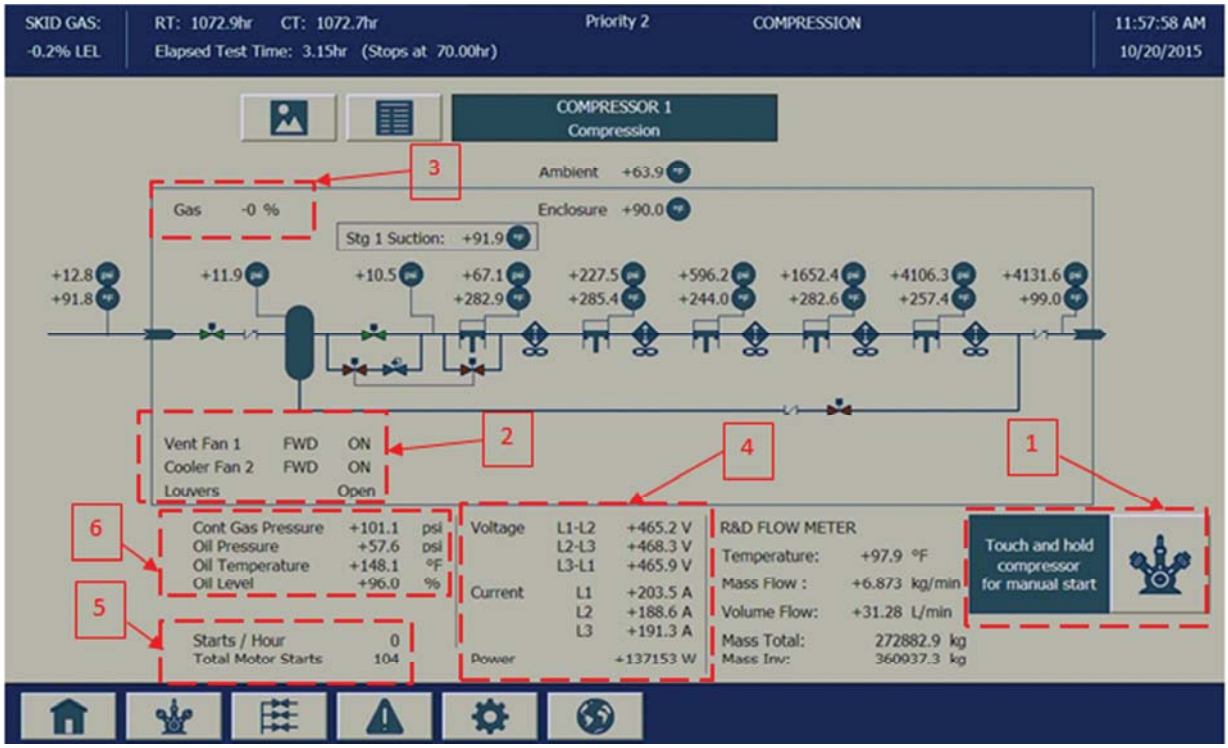


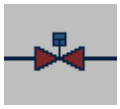
Figure 16- *HMI Compressor Screen*

1. Compressor Start
2. Fan Status
3. Gas level in LEL (Lower Explosive Limit)
4. Compressor Prime Mover Electrical (if applicable)
5. Number of starts per hour / Total Motor Starts
6. Compressor Crankcase Metrics

This screen displays the following:

1. **Compressor Start:** Pressing the compressor image on the screen (*see Figure 16, Label 1*) enables the compressor to be manually started. The compressor does not start if it is not in the ready condition or if the storage is full.

Open/Close Status of Valves: Status of process valves is indicated on the P&ID in *Figure 16*– see images below for legend:

- Open State: 
- Closed State: 

2. **Fan Status:** The status of the fan (ON/OFF) and direction of fan rotation (FWD/REV) is indicated on the screen (*See Figure 16, Label 2*.)

3. Gas level in LEL (Lower Explosive Limit) is indicated on the screen *(See Figure 16, Label 3.)*

4. **Compressor Prime Mover Electrical (if applicable):** The electrical characteristics of the compressor Prime Mover (voltage, current, and power) are indicated on the screen (*See Figure 16, Label 4.)*

5. **Number of starts per hour / Total Motor Starts:** The number of starts/hr and total number of motor starts are indicated on the screen. (*See Figure 16, Label 5.)*

6. **Compressor Crankcase Metrics:** The compressor crankcase oil pressure, temperature and level (if applicable) sensor feedback are indicated on the screen. (*See Figure 16, Label 6*.)

   - Compressor pressures (suction, inter-stage and discharge) in pounds per square inch (psi).
   - Compressor temperatures (inter-stage and discharge) in degrees Fahrenheit (°F).

8.4 Priority Panel Screen

By selecting the Priority Panel button, the following screen displays:

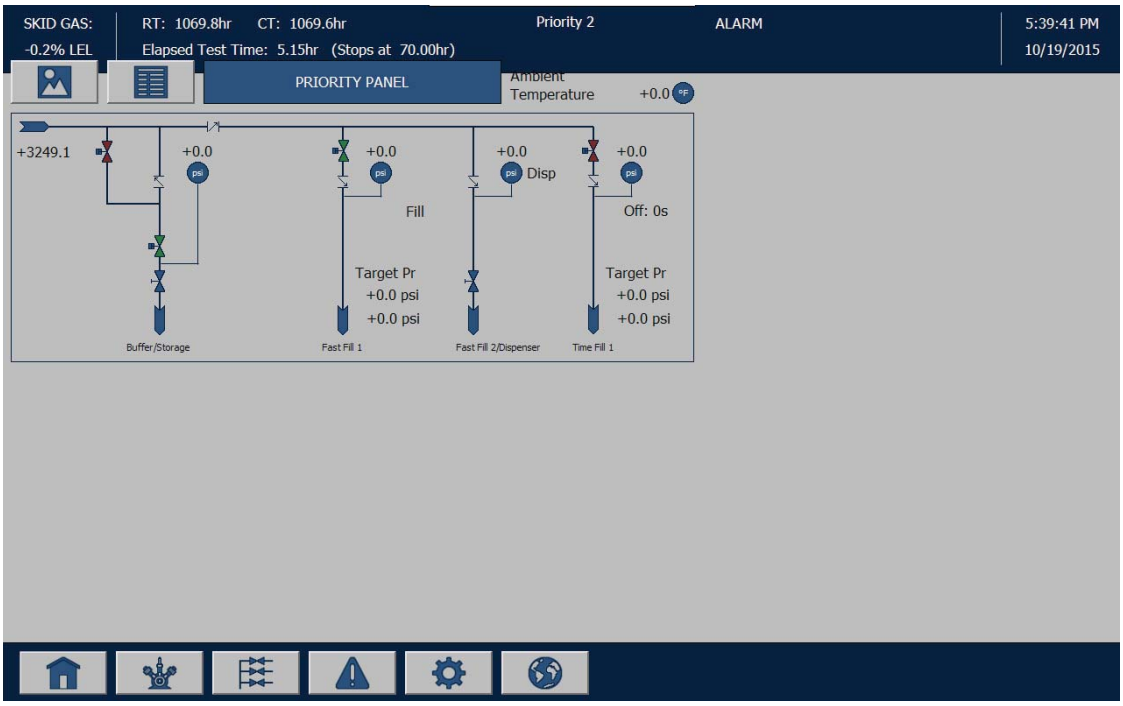


Figure 17 - *Priority Panel Screen*

This screen displays the following:

- Pressure readings (posts, time-fill and post target) in psi.
- Open/close status of each valve.
- Ambient temperature in degrees Fahrenheit (°F).

8.5 Alarm History Screen

By selecting the **Alarm History** button, the following screen displays:

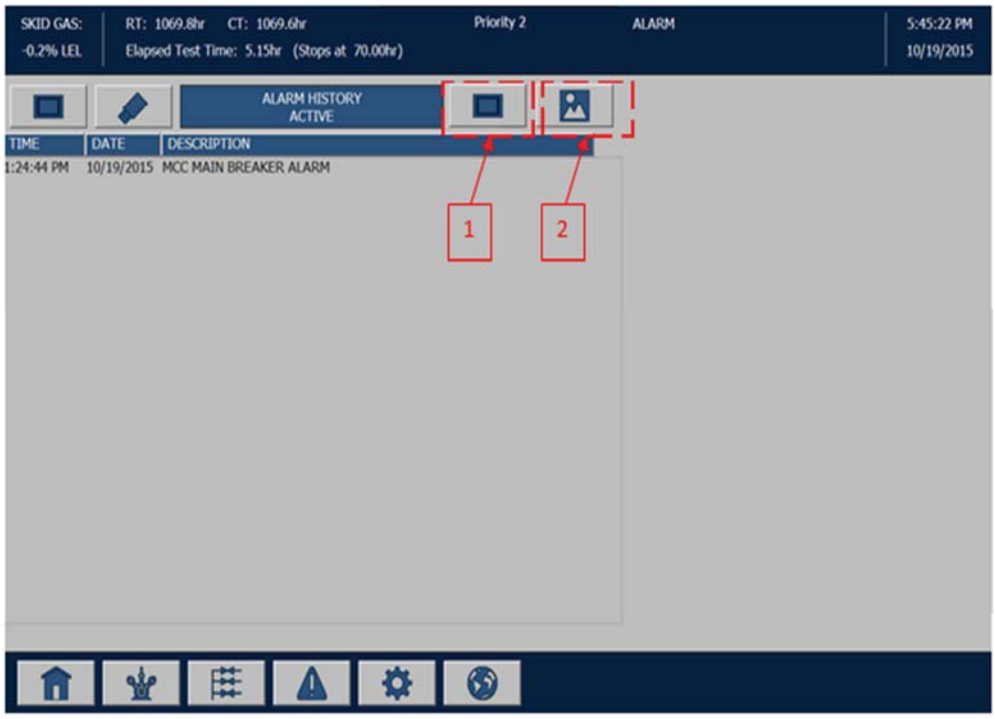


Figure 18- *Alarm History Screen*

1. **Active Alarms**, with their corresponding date/time stamp
   - Pressing the square icon brings up current active alarms. *(See Figure 18, Label 1.)*
2. **The latest 20 alarm conditions stored in the PLC,** with their corresponding date/time stamp.
   - Pressing the image icon brings up history. *(See Figure 18, Label 2.)*
   - When the list is full, the new alarm condition forces the oldest alarm condition off the list.

8.6 Setpoint Screen(s)

	**Warning** Adjustment of the setpoints should only be performed by trained and fully qualified personnel. Incorrect setting may result in erratic operation that may damage the system and/or cause accidents. **If you are not fully qualified to change setpoints, do not attempt to do it.**

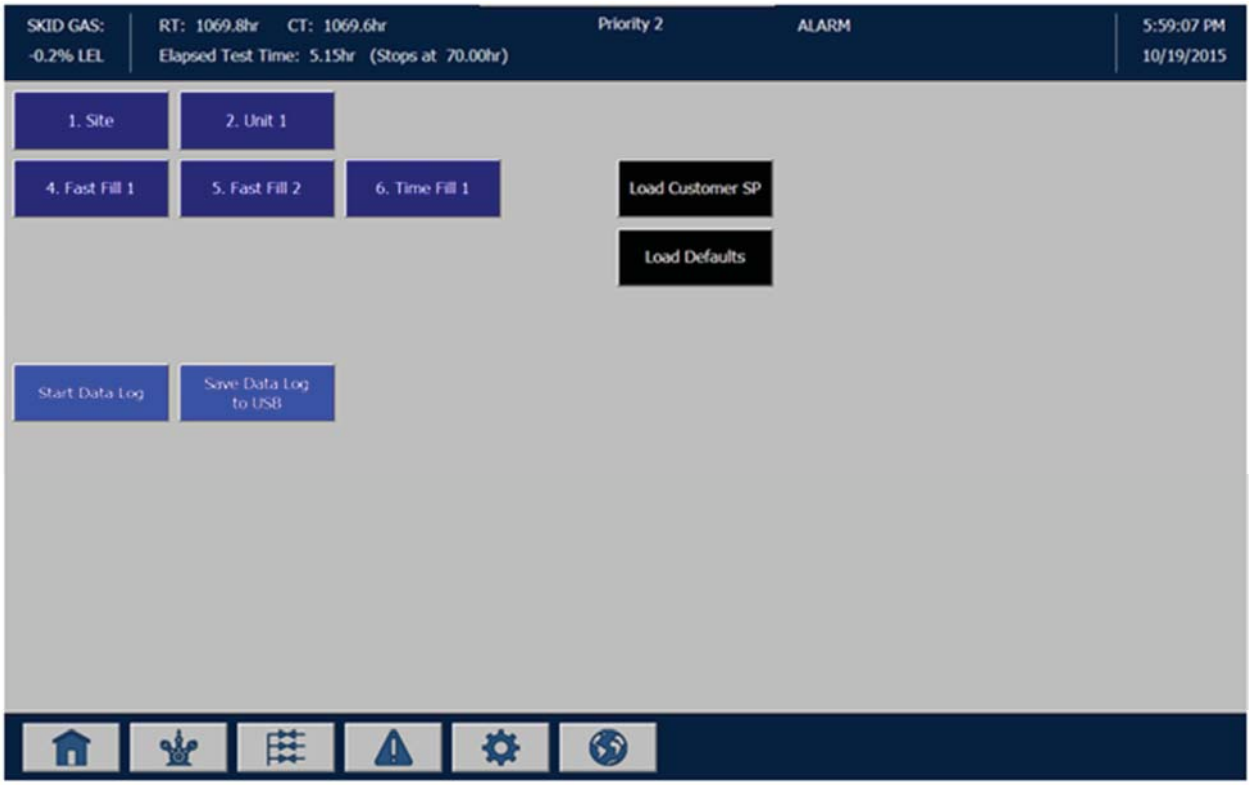


Figure 19 – *Setpoint Main Screen*

By selecting the ***Setpoint*** button, a password dialog screen displays.

Enter your password (1 to 9999) to access the Setpoint screen. The password may be changed from within the ***Setpoint Screen*** by touching the *Change Pass* key.

Once the password is confirmed, the main setpoint screen displays. There are ten Setpoint screens:

1. Site
2. Unit 1
3. Unit 2 (if applicable)
4. Fast Fill 1
5. Fast Fill 2
6. Time Fill

Start Data Log
Save Data Log to USB
Load Customer SP
Load Defaults

8.6.1 *Site Screen*

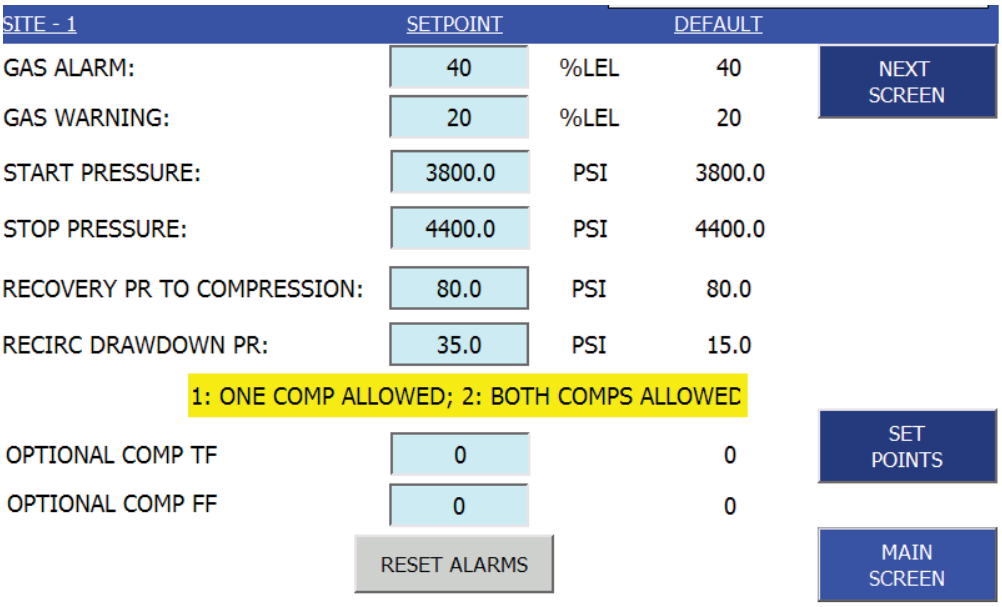


Figure 20 - *Site Screen*

This screen is to set site-level setpoint values.

To change a setpoint:

1. Select it by touching the setpoint. A numeric entry screen appears.
2. Enter the new value and press *Enter*. The new value is displayed in the *Setpoint* column, while the *Default* column is the value that was factory set to match the factory transmitters.

8.6.2 Unit 1 and Unit 2 Screen

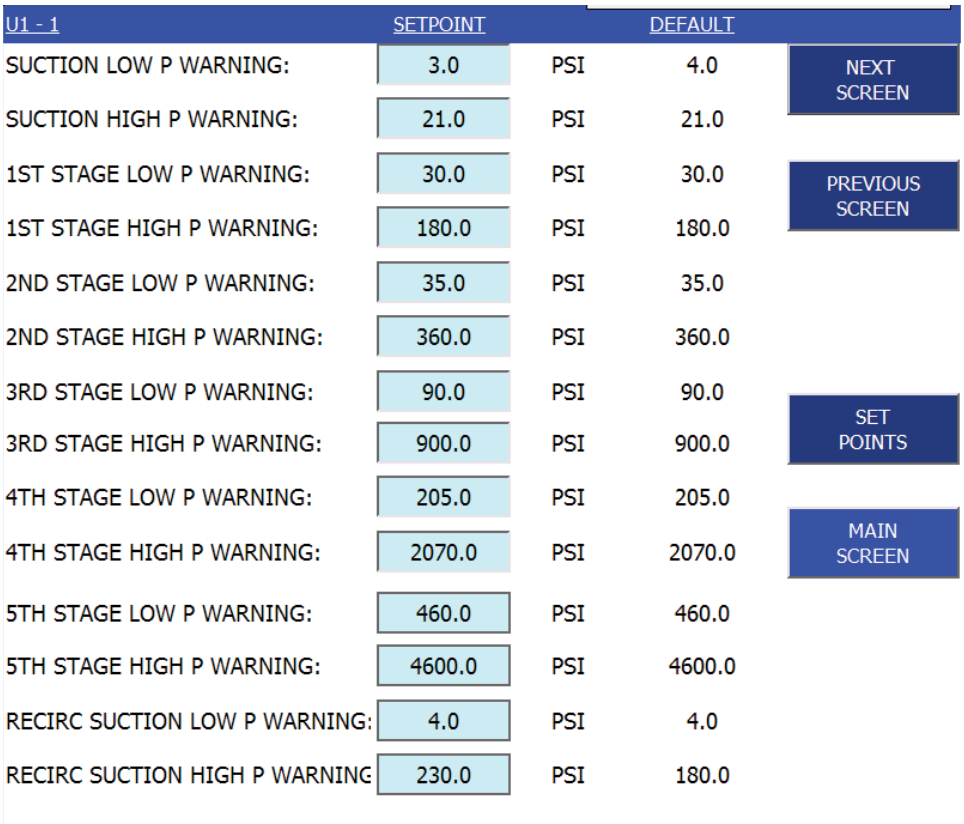


Figure 21 – *Unit 1 Screen*

This screen is to set compressor-level setpoint values. The screen layout is a mirror for Unit 2.

To change a setpoint:

1. Select it by touching the setpoint. A numeric entry screen appears.

2. Enter the new value and press *Enter*. The new value displays in the *Setpoint* column, while the *Default* column is the value that was factory set to match the factory transmitters.

8.6.3 Fast Fill Screen

This screen is to set Fast Fill 1 setpoint values. The screen layout is a mirror for Fast Fill 2 (if applicable) and Time Fill (if applicable).

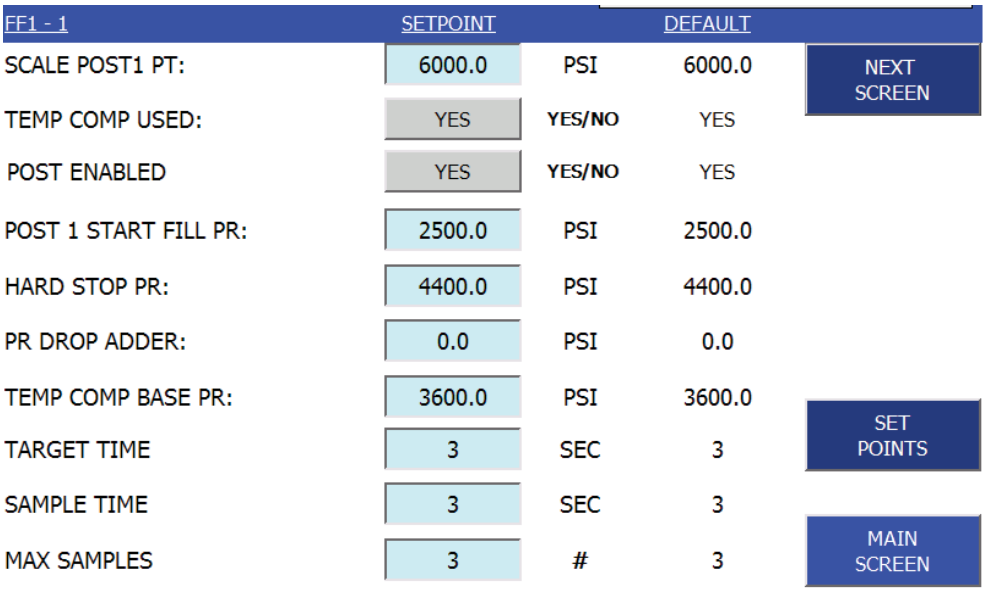


Figure 22– *Fast Fill 1 Screen*

To change a setpoint:

1. Select it by touching the setpoint. A numeric entry screen appears.
2. Enter the new value and press **Enter**. The new value displays in the **Setpoint** column. The **Default** column is the value that was factory set to match the factory transmitters.

The main characteristics of this screen are:

- The **Scale Post1 PT** setpoint is the scale to use for the pressure transducer.
- The **Temp Comp Used** toggle button indicates whether to utilize temperature compensation logic on the fill post.
- The **Post Enabled** toggle button indicates whether or not to enable the fill post
- The **Post 1 Start Fill Pr** setpoint is the pressure that the compressor begins the start sequence.
- The **Hard Stop PR** setpoint is the maximum pressure that the system compensates
- The **Pr Drop Adder** setpoint is the pressure added to the stop pressure to compensate for line pressure drop (may be positive or negative).

- The **Temp Comp Base PR** setpoint is the pressure at which the system is compensated @ 70 °F.
- The **Target Time** setpoint is the time (in seconds) that the pressure has to remain above the target pressure before closing to sample static post pressure.
- The **Sample Time** setpoint is the time (in seconds) that the post valve is closed to sample post static pressure.
- The **Max Samples** setpoint is the maximum number of samples to take when determining if end of fill has been reached.

8.7 Compressor Control Reset

Once the compressor controls have registered an alarm, the compressor cannot resume operation until the compressor controls have been reset.

To reset, proceed as follows:

1. Acknowledge all alarms displayed on the screen.
2. Press the green *Reset* button on the control panel.

The compressor returns to the *Ready to Run* state and automatically starts when required, or it may be started manually using the *Manual Start* function key.

	**WARNING** **Before resetting the compressor controls, ensure all tools and personnel are clear from the compressor area.**

8.8 Compressor Alarms

If any of the compressor sensors signals a fault condition to the PLC, the compressor shuts down, and a red alarm light comes on at the control panel and at the compressor skid (if applicable).

When the PLC registers an alarm, the alarm displays on the control panel screen until the **Acknowledge All Alarms** button is activated.

The compressor cannot start up until the fault condition has been corrected and the compressor control panel has been reset. Even if the alarm condition clears itself, the indicator light(s) remain on until the control panel is reset.

9 MAINTENANCE AND TROUBLESHOOTING

9.1 Pressure Transmitters

There are pressure transmitters located to measure **inlet gas pressure** - installed before the first compression stage, and **discharge gas pressure** - installed after the discharge filter.

Figure 23 *Pressure Transmitter*

All pressure transmitters directly connect to the PLC (Programmable Logic Controller), where their signals are compared by the PLC to high and low pressure limit setpoints. If sensor pressure exceeds the setpoint, the compressor shuts down.

All setpoints must be tested for correct compressor shutdown, as per the Preventive Maintenance Schedule. Additional pressure transmitters are available as factory-installed options.

9.2 Compressor Valves

Figure 24. *Compressor Valve*

It is essential that the compressor valves operate properly. Improper valve operation may result in inter-stage pressure build-up and temperatures that are outside of operating range, leading to compressor shut-down.

Inspect, clean and test the compressor valves as per the Preventive Maintenance Schedule.

9.3 Relief Valves

Figure 25. *Pressure Relief Valves*

Relief valves provide over-pressure protection to pressurized components of the CNG station such as piping, pressure vessels, fittings, and compressor cylinders. In the unlikely event that an interlock sensor or electrical control fails, then the relief valves safely vent the over-pressurized gas.

Each relief valve discharge port is piped either directly, or via a vent header, to the atmosphere, venting the gas to a safe location.

Relief valves are adjusted and tested at the factory to vent gas at a precise pressure setting as determined by the maximum working pressures of the components it is protecting.

WARNING

It is recommended that all pressure relief valves be removed and tested **every three years** by a certified relief valve testing shop, as per local safety codes and standards. If a valve fails to discharge at its rated pressure, it must be serviced or replaced.

DANGER!

While a relief valve has been removed:

- Do not start the system!
- Keep the all areas of the control system locked out!
- Do not plug or obstruct a relieve valve port!

9.4 Vent Headers

A vent header is a manifold that conducts all relief valve discharges for safe venting into atmosphere. The vent header is also a common collector for all condensates drained from scrubbers and filters.

The vent header should be drained every two weeks by opening the drain ball valve located at the base of the header.

9.5 Inlet Filter

The inlet filter provides particulate removal from the inlet gas to the compressor and traps condensate. It requires draining every two weeks.

To drain the inlet filter, proceed as follows:

1. Shut down the compressor.
2. Open the inlet filter drain valve located either on the bottom of the filter housing or at the bottom of the inlet pipeline. Allow the collected condensates to drain into the vent header.
3. Close the inlet filter drain valve, and restart the compressor.

After commissioning, the filter should be changed according to the following schedule:

- **First phase:** 25 hours after start-up and commission of the compressor station.
- **Second phase:** every 50 hours of operation until 475 hours after start-up.
- **Third phase:** every 1000 hours as part of a scheduled maintenance and service program.

Figure 26. *Inlet Filter: Remove screws to access filter element*

	Replacing the inlet filter element requires considerable effort and mechanical skill. Consult Clean Energy Compression, or its local representative if you have any questions.

9.6 Scrubbers

Scrubbers are small pressure vessels located in the compressor inter-stage piping, between the heat exchanger and the compressor suction inlet of all stages. The scrubber serves as a condensate trap and coarse particulate filter. In addition, it provides pulsation damping for the inlet of the compressor stage.

The scrubbers must be drained according to the Preventive Maintenance Schedule.

To drain the scrubbers:

1. Shut down the compressor.
2. Open the drain valve of the first-stage scrubber. Allow it to drain.
3. Close the drain valve immediately after draining.
4. Repeat this draining procedure for all scrubbers in sequence.
5. Start up the compressor.

Figure 27 *Scrubber*

9.7 Discharge Filter

The discharge filter contains a coalescing filter cartridge that provides final filtration for the removal of entrained hydrocarbons, condensates, and oil.

A filter without automatic drain systems must be drained every two weeks as part of a scheduled maintenance and service program.

To drain the discharge filter:

1. Shut down the compressor.
2. Close the manual valves (1) upstream and downstream of filter.
3. Open the drain valve (2) on the bottom of the filter housing bowl, and allow the condensate to drain.

Figure 28 *Discharge Filter*

4. Close the drain valve (2).

5. Open the manual valves (1) upstream and downstream of filter.

The discharge filter should be changed according to the Preventive Maintenance Schedule.

	**WARNING!** Prior to changing the any filter cartridge, the system must be shut down, all valves must be opened, and the system vented.

9.8 Recovery Tank

The recovery tank is a large pressure vessel that collects blow down gas from the compressor when it shuts down. It may also be used as a condensate sump on systems with an automatic filter, and as a scrubber drain system.

Condensates collected in this tank require draining every two weeks.

To drain the recovery tank, proceed as follows:

1. Open and maintain the valve open for about five seconds.
2. Close the valve.

9.9 Air Cooled System

Hot gas from each stage enters a finned-tube, multi-pass heat exchanger segment that uses air provided by high-capacity fans to cool down the gas before entering the next stage or delivering to the storage system.

Inspect the fins every six months.

The main points of interest are:

Tube wear: Tubes should be inspected for pitting, cracks and corrosion. The extent of wear on the tubes depends on the severity of service, and on the atmospheric conditions on site.

Tube wall thickness: Tube wall thickness can be checked externally using an ultrasonic thickness gauge.

Fan shaft alignment, bearings, and mounting bolts: bolts to be inspected for correct torque, shaft alignment to be true, and bearings for mechanical damage.

Furthermore, fins must be kept free of dirt and lint. Debris can be removed by directing compressed air perpendicular to the tubes in a direction opposite to the normal air flow.

9.10 Propulsion Elements

CleanCNG STANDARD compressors systems are powered by electrical motors. Electrical motors require little maintenance, aside from lubrication (for lubrication requirements, see the "Lubrication Schedule" section of the manual).

9.11 Belt Replacement

Recommendations on belt replacement:

- When removing or installing belts, do not pry them over pulley grooves. Instead, loosen the motor anchor nuts, and use the motor base adjustment bolts to move the motor towards the compressor.

Figure 29 *Matched Belt Set*

- For systems with more than one belt, all belts must be replaced as a matched set (from the same batch) for equal load distribution. In case a matched set is not available, interpose belts so that no two belts of the same batch are installed side by side.

- Do not install new sets of belts in drives where the sheaves have worn or damaged grooves. Replace or refurbish the sheaves to ensure a proper fit of the belts in the grooves to minimize the possibility of premature belt failure.

- Store spare belts loose, in a cool, dark, dry place, without any material lying on top.

- Check the belt tension at least two times during the first day of operation, and regularly for the first week of operation. A decrease in belt tension is expected. **Note:** If decrease in belt tension occurs beyond expected operating conditions, re-tension the belt.

9.11.1 Belt and Sheave Alignment

Note: CleanCNG STANDARD uses Optibelt 5V Banded Drive Belts.

The compressor and the prime mover sheave must be aligned as follows:

1. Use the sheave that was not moved as the reference. If both sheaves have been moved, mount the prime mover sheave first. Install the sheave 3/8 inch away from the prime mover.
2. Move and lock the prime mover sheave to the specified torque.
3. Install a laser tool such as SKF's TMEB-2 Belt Alignment Tool to the central grooves, moving the CBA sheave until the laser lines are centered with the top, middle, and lower scales.
4. If a laser tool is not available, use a straight edge. Hold or clamp the straight edge against the face of the larger sheave. Adjust the other side so that the sheaves are parallel to each other.
   The opposite sheaves face to straight-edge shows a gap of ≤ 1.5 mm - 1/16".
5. Lock the sheave bushing and apply 183 N m (135 ft-lbs) to the bolts. **Note:** This torque applies to the CBA sheave only. The motor sheave will have a different bolt torque.

	This procedure assumes that the motor and the compressor have not been moved, so that their axes are parallel to each other. In case either one has moved, is it necessary to realign them prior to aligning the sheaves. Contact Clean Energy Compression for a procedure adequate for your system model.

9.11.2 Belt Tensioning

Inspect the drive belts for wear and tension according to the Preventive Maintenance Schedule.

It is very important that belt tension be correctly adjusted. To determine belt tensioning, use either a belt deflexion chart or a tension meter.

Figure 30. *Measuring Belt*

9.11.3 Belt Deflection Chart Method

To measure the belt tensioning using a **belt deflection chart,** refer to ***Figure 33***. Apply a force of 75 N (approx, 7.5 Kg, or 17 lbs) to the midpoint of the belt.

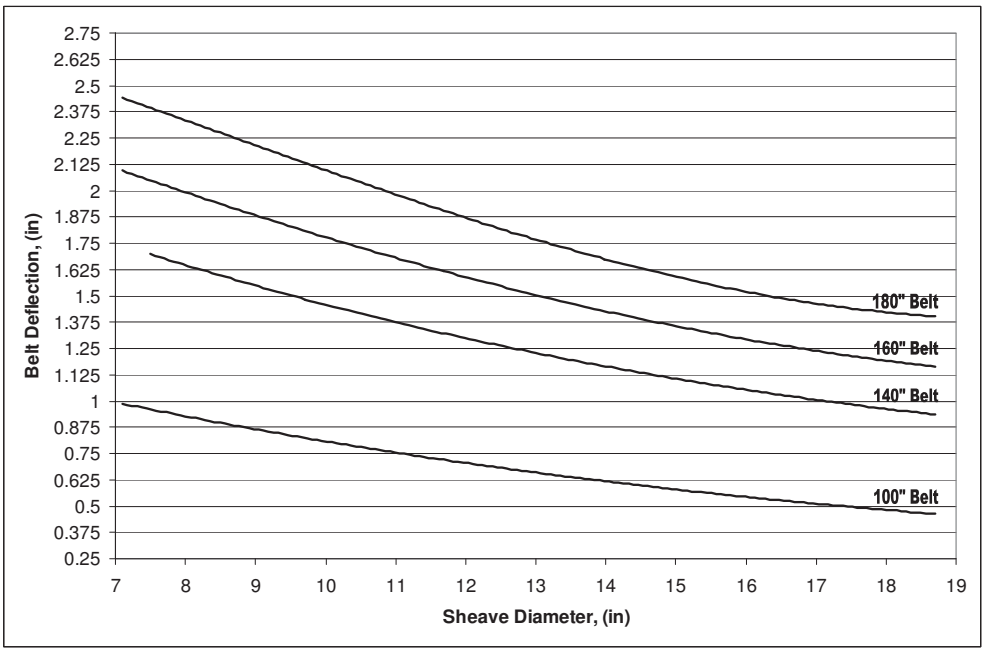


Figure 30. *Belt Deflection Chart*

Compare the reading with the point that the belt length (in inches), for the correct sheave diameter (in inches).

- If the reading is lower than the deflection reading, loosen the drive belt.
- If the reading is higher than the deflection reading, tighten the drive belt.

9.11.4 Tension Meter Method

Use good quality tension meters to measure the frequency of the belt.

> **Note:** For tension meters to measure the tension of the belt, Optibelt recommends **Optibelt-TT-mini** or the Optibelt-TT Optical. You can review their tension meters on their website, from the following link: http://www.optibelt.com/en/power-transmission/service/tools.html

To measure the belt tensioning using a tension meter, proceed as follows:

1. Activate the measuring tool and hold it approximately 10 mm (1/2 inch) to the belt.

2. Strike or strum the belt lightly at midpoint between sheaves.
3. Read the current drive belt tension from the measuring tool, and compare to the belt tension given on the nameplate.
4. Adjust as required.

Orientation based on the tension meter reading:

- If the reading is lower than the nameplate value, tighten the drive belt.
- If the reading is higher than the nameplate value, loosen the drive belt.

Tighten or loosen the belt by releasing the motor or engine fixing bolts, and uniformly turning the adjustment bolts, as required.

To maintain parallelism, measure and annotate the distances between the base of the motor/engine at the fixing point and the edge of the base, on both sides. Maintain this difference throughout the alignment.

When moving the motor, perform the work step-by-step so that the axis parallelism is maintained and no unnecessary stress is applied to the belts and shafts.

	It is vital to maintain the motor or engine alignment with the sheave to avoid early belt and/or bearings wear.

9.12 Lubrication - Baldor® Motors

The Baldor® motor is a product of the Baldor Electric Company, of Fort Smith, AR. For detailed technical information about their products, please contact them directly.

Baldor® electrical motors may employ ball bearings or roller bearings. Some motors have no re-grease capabilities, as they are lubricated for life. Those that require lubrication use Exxon's Polyrex® EM grease, or equivalent.

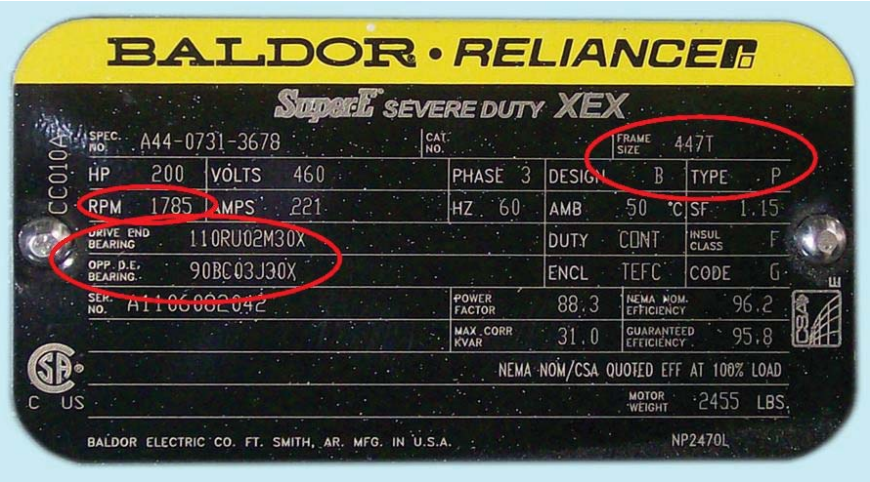


Figure 31 *Motor Nameplate*

If no equivalent is locally available, please consult Clean Energy Compression or Baldor® directly.

To decide the correct lubrication schedule using ***Table 5***, determine the frame size, bearing size, and rated speed of the Baldor motor. This information is on the motor nameplate (***Figure 30***).

9.12.1 Baldor® Motor Re-lubrication Interval (In Operating Hours)

NEMA (IEC) Frame size	Rated speed (in RPM)			
	3600	1800	1200	900
Up to 210 ind. (132)	5500	12000	18000	22000
Over 210 to 280 ind. (180)	3600	9500	15000	18000
Over 280 to 360 ind. (180)	2200*	7400	12000	15000
Over 360 to 5000 ind. (180)	2200*	3500	7400	10500

**Lubrication interval for 6313 or 6314 bearings used in 360 through 5000 frame, 2 pole motors. If roller bearings are used, they must be lubricated more frequently. Divide the re-lubrication interval by 2.*

Table 5. *Baldor® Motor Re-lubrication Interval*

9.12.2 Baldor® Motor Lubrication Multiplier (Based on Operating Conditions)

Severity of Service	Max Ambient Temperature	Atmospheric Contamination	Type of Bearing	Interval Multiplier
Standard	40 ℃	Clean; little corrosion	Deep groove ball bearing	1.0
Severe	50 ℃	Moderate dust; corrosion	Ball thrust, roller	0.5
Extreme	>50 ℃*	Severe dirt; abrasive dust; corrosion	All bearings	0.1
Low	< -30 ℃**	-		1.0

* Special high temperature grease is recommended.

** Special low temperature grease is recommended.

Table 6. *Baldor® Motor Lubrication Multiplier*

9.12.3 Baldor® Motor Lubrication – Quantity of Grease

NEMA (IEC) Frame Size	Bearing Description					
	Largest Bearing for Each Frame Size)				Volume to Add	
	Bearing	OD (D in mm)	Width (D in mm)	Weight (g/oz)	ml	Inch^3
Up to 210 ind. (132)	6307	80	21	8.4/0.30	10	0.6
Over 210 to 280 ind. (180)	6311	120	29	17.7/0.61	19	1.2
Over 280 to 360 ind. (180)	6313	140	33	23.1/0.81	25	1.5
Over 360 to 5000 ind. (180)	NU322	240	50	60.0/2.12	68	4.1

Table 7. *Baldor® Motor Lubrication — Quantity of Grease*

9.13 WEG Motors

The fans in the compressor unit use a WEG motor – W22 model line. It is a low voltage three-phase induction motor. It also offers low noise and vibration levels. Specifically in the CleanCNG STANDARD, the motors that run the fans in the compressor unit are, as follows:

- **Frame 184 TC (5HP / 3.7kw)**
- **Frame 213 TC (7.5HP / 5.5kw)**

Motors made up to frame 160 are not fitted with grease fitting, while larger frames up to frame 200 this device is optional. For frame 225 to 355 grease fitting is supplied as standard.

For more details, contact WEG directly.

Figure 32. *Oil Level Indicator*

9.14 Compressor Lubrication

Oil is stored in the crankcase sump, along with the pump. The pump driver gear is directly connected to the compressor crankshaft. Oil is

drawn into the oil pump and forced through the oil filter, mounted on the outside of crankcase wall.

The filter manifold houses a non-adjustable pressure relief valve that is upstream of the filter, protecting system from over-pressure, in case of filter clogging.

An oil level indicator gauge is located immediately below the oil filter.

On CleanCNG STANDARD compressors, two types of crosshead lubrication may be used:

For double-acting and step cylinders, the crosshead is lubricated through an oil galley that passes through the connecting rod wrist pin.

For single-acting cylinders, the oil is carried through stainless steel tubes from an oil manifold to lubrication ports on the crosshead guides.

Normal operating oil pressure range is 30-60 psig.

Figure 33. *Oil Filter*

9.14.1 Oil and Filter Change

Change the crankcase oil and filter every 1,000 hours of operation, or 6 months, whichever comes first.

	**DANGER!** As with any other maintenance operation to the compressor, ensure that the entire system is vented, turned off, and locked out. DO NOT proceed until these conditions are met.

If the compressor has been in storage for more than 6 months prior to commissioning, change the oil before start-up. Regularly inspect crankcase for moisture. If moisture is present, remove and safely discard the oil. Clean the crankcase with lint-free cloth before adding new oil.

To drain crankcase oil:

1. Remove the oil filter first.
2. Place a bucket below the oil drain pipe and open the ball valve.
3. When the oil has finished draining, close the ball valve.

If possible, drain the oil immediately after the compressor has stopped, as the oil drains easier when warm.

Before refilling the crankcase, install a new oil filter.

Refill the compressor crankcase with the recommended oil through the filler spout. Add oil slowly to avoid back pressure spills.

Crankcase oil level should be up to the full mark on the sight gauge on CleanCNG STANDARD series compressors.

Figure 34. *Refilling Compressor Crankcase*

The compressor requires a minimum of 40 litres (10.5 U.S. gallon).

9.15 Lubricants Recommendation

Any grades of oil other than the ones listed below must be approved by CEC. Failure to do so may void the warranty.

Clearly label the unit with the compressor oil make / grade currently in use. Do not mix oils.

9.15.1 Cold Climates

	Clearly label the unit with the compressor oil make / grade currently in use. Do not mix oils.

Cold climates include areas where the maximum ambient temperature is less than 30 °C. The minimum temperature is not specified. However, if it is below 10 °C, an oil heater is required. For cold climates, CEC recommends an ISO 120 or ISO 150 grade of oil. The following grades are compatible:

- Esso Compressor Oil 122
- Shell Corena P 150
- Chevron Regal® AIO 150
- Exxon Teresstic 150
- Mobil DTE Extra Heavy 150

9.15.2 Moderate Climates

	Clearly label the unit with the compressor oil make / grade currently in use. Do not mix oils.

Moderate climates include areas where the maximum ambient temperature is less than 40 °C. The minimum temperature is not specified; however, if it is below 10 °C, an oil heater is required. For moderate climates, CEC recommends an ISO 150 grade of oil. The following grades are acceptable:

- Shell Corena P 150
- Chevron AIO 150
- Exxon Teresstic 150
- Mobil DTE Extra Heavy 150

9.15.3 *Hot Climates*

	Clearly label the unit with the compressor oil make / grade currently in use. Do not mix oils.

Hot climates include areas where the maximum ambient temperature is higher than 40°C. The minimum temperature is not specified, however, if it is below 10°C, an oil heater is required. For hot climates, CEC recommends an ISO 220 grade of oil. The following grades are acceptable:

- Shell Corena NG220
- Chevron AIO 220
- Chevron Texaco Rando HD 220
- Exxon Teresstic 220
- Mobil DTE BB 220
- Esso Compressor Oil 220

9.16 Louvers Lubrication

Periodically, or as the environment dictates, lubricate the louvers joints and piston with light oil.

Clean the joints thoroughly before lubrication. It may be necessary to disconnect the Bimba® piston (if installed) to freely move the louver for cleaning.

Figure 35. *Louver Lubrication Points*

9.17 Torque Specifications

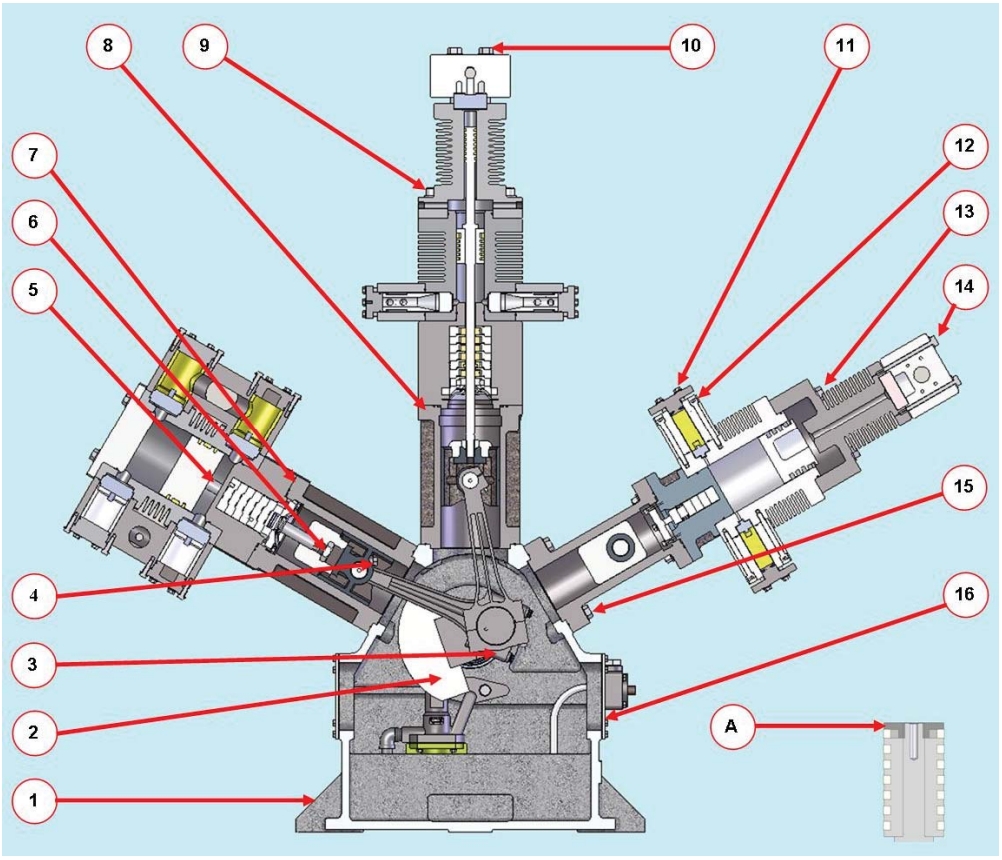


Figure 36. *Required Torque Positions*

9.17.1 CleanCNG STANDARD Series Compressor Torque Specifications

Table 8. *IMW50 Series Compressor Torque Specifications*

Key*	Item		Bolt/Nut Size	Grade (min)	Torque		Torque
					Nm	Ft-lbs	Conditions
1	Compressor Mounting Bolt on Skid		7/8 UNC	-	407 (app)	300 (app)	Non-lubricated
2	Counter-weight SHCS		5/8-18UNF	-	136	100	Loctite Blue 242
3	Connecting Rod Screw		M14-1.5	-	136	100	Loctite Blue 242
4	Con-rod Small End Bolt for Wrist Pin		1/2-20 UNF	-	108	80	Loctite Blue 242
5	Piston Nut	Aluminum Piston	3/4-16 UNF	-	136	100	Loctite Blue 242
		Steel Piston	3/4-16 UNF	-	203	150	Loctite Blue 242
		Aluminum Piston	5/8-18 UNF	-	136	100	Loctite Blue 242
		Steel Piston	5/8-18 UNF	-	136	100	Loctite Blue 242
6	Crosshead/Piston Rod Taper Nut	*5.5" extension & 18" handle wrench to reach 407 Nm (300 ft·lbs)*	1 1/6-16 UN	-	312	230	Non-lubricated
		5.5" extension & 22" handle wrench to reach 407 Nm (300 ft·lbs)			325	240	
7	Seal carrier Cap screws		5/16"	-	20	15	Non-lubricated
8	Cylinder Stud		5/8 UNC	5	183	135	Non-lubricated
9	Cylinder Bolt		3/4 UNC	5	271	200	Lubricated
10	Single Acting Cylinder Head Bolt		3/4 UNC	5	271	200	Lubricated
11	Valve Holder Bolt		3/8 UNC	5	34	25	Non-lubricated
	Valve Holder Bolt		½ UNC	5	54	40	Non-lubricated
12	Manifold Bolt		1/2 UNC	5	108	80	Non-lubricated
13	Double Acting Cylinder Head Bolt		1/2 UNC	5	102	75	Non-lubricated
14	Single Acting Cylinder Head Bolt		5/8 UNC	5	203	150	Non-lubricated
15	Crosshead Guide Bolt to Crankcase		3/4 UNC	5	271	200	Lubricated
16	Side covers		3/8 UNC	-	34	25	Non-lubricated
A**	All Single Action Retaining Nut Piston	*1.5" offset & 22" handle wrench to reach 136 Nm (100 ft-lbs)*	5/8-18 UNF	-	126	93	Loctite Blue 242
		Standard	5/8-18 UNF	-	136	100	Loctite Blue 242
Not shown	8" Dual Action Piston Nut 2961-00		1 3/16-16 UN	-	271	200	Non-lubricated

* *Keys refer to illustration on previous page* ** *Applies to Single Action assemblies only*

Range	Manufacturer	Manufacturer P/N
Torque Wrench, Adj. Click Type, U.S., Fixed-Ratchet, 50-250 ft. lb., 1/2" drive	Snap-on	QD3R250
Torque Wrench, Adj. Click Type, U.S., Flex-Ratchet, 20-100 ft. lb., 3/8" drive	Snap-on	TQFR100B

Table 9. *Recommended Torque Tools*

9.18 Preventive Maintenance Schedule

CleanCNG STANDARD COMPRESSOR Preventive Maintenance Schedule	Every 2 Weeks	Monthly	1,000 Hours (6 Months)	2,000 Hours (1 Year)	5,000 Hours	10,000 Hours	15,000 Hours	20,000 Hours	40,000 Hours
Perform a system walk-around and check for leaks.	■								
During operation, check/record/verify compressor performance data.	■								
Visually inspect compressor hoses, tubing, piping, and valves for leaks and abnormalities.	■								
Visually inspect gas panels for leaks and abnormalities.	■								
Listen for any abnormal sounds (*e.g.*, banging or hissing).	■								
Check priority panel for proper operation.	■								
Drain all inter-stage scrubbers and filters.	■								
Drain recovery tank sump and vent header.	■								
Check outlet air louver operation (if applicable).	■								
Check bolts, clamps, and nuts for tightness. Torque if necessary.	■								
Visually inspect all pressure relief devices for signs of failure or leakage.		■							
Verify ESD control function.		■							
Verify equipment warning and alarm triggers for proper function. Repair if needed.		■							
Check gas detector calibration. Recalibrate if required.			■						
Check control voltage: 120VAC to 24VDC.			■						
Check main and pilot gas regulator settings.			■						
Inspect and verify all control valve operation.			■						
Drain and replace the lubrication oil and oil filter element, and check for any unusual particles in the waste oil or crankcase.			■						

CleanCNG STANDARD COMPRESSOR Preventive Maintenance Schedule	Every 2 Weeks	Monthly	1,000 Hours (6 Months)	2,000 Hours (1 Year)	5,000 Hours	10,000 Hours	15,000 Hours	20,000 Hours	40,000 Hours
Change gas inlet and discharge filter elements, and clean filter bowl.			■						
Verify setpoints and scale of all instrumentation (pressure and temperature switches/sensors, oil level switches, flow switch, etc.).			■						
During start-up, check blow-down and recirculation functionality. Perform adjustments as required.			■						
Check heat exchanger for any obstruction or debris accumulation. Clean if required.			■						
Check drive belts, alignment and belt tension.* Replace if worn.			■						
Check vent stack for obstructions.				■					
Lubricate main drive motor bearings.**				■					
Perform vibration tests.				■					
Remove and clean compressor valves. Inspect for cracks or breakage. Leak-test with solvent. Rebuild if required.				■					
Inspect and replace piston rings.					■				
Inspect pistons, piston rods, and piston retainers. Replace if worn.					■				
Remove and rebuild compressor valves with the appropriate valve repair kit.					■				
Replace all compressor valves.						■			
Inspect and replace piston rings, rod packing, O-rings, and gaskets.						■			
Inspect cylinders and measure tolerance with a micrometer. Replace if worn.						■			
Inspect wrist pins and crosshead bushings/bearings. Replace if worn.							■		
Replace connecting rod shell bearings.								■	
Replace crankshaft assembly. Adjust end-play as necessary.									■

* Or one month after the installation of new belts.

** Lubrication intervals vary according to operating conditions. To decide the correct lubrication interval, use the manufacturer's schedule in conjunction with the information listed on the nameplate.

DISCLAIMER: This maintenance schedule is intended to be used solely as a general guide. Heavy use of the equipment, harsh environmental conditions, and/or unique site conditions may require shorter maintenance intervals than those listed in this schedule. If performance decreases or if the equipment operates unusually, contact CEC immediately. Failure to comply with the maintenance requirements will void the warranty and result in premature wear and component failure. These maintenance requirements are subject to change without prior notice.

9.19 Troubleshooting

DANGER

Troubleshooting procedures may be dangerous. Do not attempt to perform any of the suggested checks and repair suggestions unless you are fully trained to do so. Refer to the Safety Instructions section above. In case of doubt, **stop** and call CEC Service Center.

WARNING

Troubleshooting instructions are guidelines only. Do not assume that the causes for a symptom are only those described here. In the event that, after testing all possible causes and remedies, the problem is still present, or has changed to another abnormal condition, call CEC Service Center immediately for further instruction.

Problem	Indication	Possible Causes	Possible Solutions
20% GAS LEL WARNING 40% GAS LEL SHUT-DOWN (If applicable)	■ ALARM: "HIGH SKID GAS (LEVEL 2)" ■ WARNING: "HIGH GAS LEVEL 1" / "HIGH GAS LEVEL 2" ■ Vent fan running ■ Gas odour ■ Audible leak	■ Gas leak ■ Improper venting ■ Incorrect compressor reset procedure ■ Faulty gas detector ■ Voltage drop	■ Check compressor and associated piping systems for leaks by using an electronic gas detector or a liquid leak detector to identify leaks. If no leaks are found, reset the compressor and recheck during operation. ■ Check/replace vent pipe location to ensure gas does not discharge too close to gas detector. ■ Power cycle gas detector for 1–2 minutes, and then allow detector to stabilize. ■ Test and recalibrate gas detector for proper operation. Replace gas sensor if needed.

Problem	Indication	Possible Causes	Possible Solutions
ALL INTER-STAGE PRESSURES LOWER THAN NORMAL	■ ALARM: "SUCTION LOW PRESSURE"	■ Low storage pressure	■ Ensure inlet pressure is correct as per compressor design. ■ Check final discharge pressure. If very low, then all stage pressures may be low. ■ Check valve gaskets, compressor valves, and piston rings.
ESD SHUT-DOWN	■ ALARM: "ESD PUSHED" ■ Beacon light on enclosure alarm horn (if applicable)	■ ESD switch activated ■ Temporary power outage ■ Major power fluctuation ■ Faulty wiring	■ Reset ESD switch if applicable. ■ Check all systems, and then reset compressor. ■ Inspect wiring for damage.
EXCESSIVE VENTING	■ Excessive blow-by ■ Audible venting from vent stack ■ Icing at vent leg, vent hoses, and/or vent manifold	■ Worn rod packing and/or piston rod ■ Drain valve left open ■ Safety relief valve failure ■ High pressure causing relief valve to open	■ Check seal carrier gas vent rate (blow-by) on all stages for signs of severe rod packing leakage. Replace rod packing and piston rods as needed. ■ Close any drain valves left open.
GAS LEAK SUSPECTED	■ ALARM: "HIGH SKID GAS (LEVEL 2)" ■ WARNING: "HIGH GAS LEVEL 1" / "HIGH GAS LEVEL 2" ■ Gas odour present ■ Audible leak present	■ Leak at fitting, tubing, piping, component, or storage ■ Safety relief valve venting	■ Push any ESD emergency button to stop compressor operation and isolate storage. Leak or venting may persist until pressure drops at faulty component. Locate and repair leak, and then reset system. ■ Check if storage pressure is too high and adjust final discharge pressure appropriately. ■ Reset and check pressures during operation. Replace safety relief valve if faulty.

Problem	Indication	Possible Causes	Possible Solutions
HEAT EXCHANGER FAN NOT RUNNING	■ ALARM: "COOLER FAULT"	■ Overload tripped ■ Fuse blown or CB tripped ■ Excessive current draw ■ Faulty contactor	■ Reset motor overload at control panel and adjust if needed. Check against actual current draw and replace if defective. ■ Check fuses for each phase at control panel. ■ Check free rotation of fan by removing shroud and manually rotating it (system off). ■ Reset/adjust motor overload at control panel. ■ Check/replace overload against actual current. ■ Check fuses for each phase. ■ Reset the circuit breaker. ■ Reset compressor, and wait for fan to start. Check motor wiring for current draw. Check motor nameplate. ■ Check/replace contactor.
HIGH DISCHARGE PRESSURE SHUT-DOWN **(If applicable)**	■ ALARM: "DISCHARGE HIGH PRESSURE" ■ WARNING: "5th HIGH PRESSURE" ■ Discharge pressure higher than normal	■ Faulty discharge pressure switch (if applicable) ■ Faulty discharge pressure transmitter (if applicable)	■ Reset compressor and check shut-down pressure switch at gauge during operation. Switch set-points can be checked with an electrical meter during operation, or at rest using a pressure pump to activate switch. Ensure the panel is depressurized before connecting pump to tubing at switch. Adjust setpoints and/or deadband, or replace switch as needed. ■ Reset compressor and check pressure transmitter with electrical meter for correct output during operation. Transmitter output can also be checked at rest by charging it with a pressure pump. Ensure the panel is completely depressurized before connecting pump to tubing at transmitter. Replace transmitter as needed.

Problem	Indication	Possible Causes	Possible Solutions
HIGH INTER-STAGE PRESSURE **(All stages)** *NOTE: Mechanical problems likely to occur if left unattended.*	■ Pressure above normal at gauges	■ High inlet pressure ■ Failure at final stage ■ High discharge pressure ■ Worn or failing piston rings	■ If inlet pressure is increased, all inter-stage pressures are elevated during normal operation. ■ Check/replace final stage valve, gaskets, and piston rings for excessive wear and leakage. ■ *See* solutions for ***Inlet High/Low Shut-down***.
HIGH INTER-STAGE PRESSURE AND/OR TEMPERATURE ON ONE STAGE	■ Pressure and/or temperature above normal at gauge	■ Gas leakage in the higher stage, through gaskets or valves, is reducing stage efficiency, and increasing the work load of the next lower stage.	■ Check next higher stage valve, gaskets, piston rings, and rod packing for excessive wear and leakage. Replace if necessary.
HIGH INTER-STAGE TEMPERATURE SHUT-DOWN	■ ALARM: "HIGH TEMP" ■ High temperature at gauge(s)	■ Blockage of air flow through heat exchanger ■ Excessive load due to failure of next higher compression stage ■ Faulty temperature switch gauge ■ Vent fan failure (if applicable) ■ High inlet gas temperature	■ Check for obstructions, and ensure free air flow through heat exchangers. Ensure proper opening of louvers (if applicable) during operation. ■ Reset compressor and check inter-stage pressures for possible valve failure on next higher stage (which elevates pressure and load on preceding stages, and causes possible overheating). Repair/replace valves as needed. ■ Check/adjust/replace set-points and operation with electrical meter. ■ Check enclosure vent fan for proper operation. ■ Ensure louvers are operating freely. ■ *See* solutions for ***Vent Fan Motor Failure***.

Problem	Indication	Possible Causes	Possible Solutions
INLET HIGH/LOW SHUT-DOWN	■ ALARM: "SUCTION LOW PRESSURE" ■ ALARM: "SUCTION HIGH PRESSURE" ■ Normal inlet pressure at gauge ■ Low inlet pressure at gauge ■ High inlet pressure at gauge	■ Low/no pressure at gas meter ■ Suction pressure transmitter failure ■ Blockage in inlet piping ■ Faulty inlet valve ■ Clogged inlet filter ■ Inlet regulator setting too high/low ■ Recovery regulator set too high/low	■ Call local natural gas authority. ■ Ensure all inlet isolation valves are open. ■ Reset compressor and record inlet pressure during start-up. ■ Check and adjust set points and electrical connections. ■ Check/replace transmitter. ■ Check/replace inlet filter element. ■ Check/adjust function during compressor start-up. ■ Adjust inlet regulator. ■ Adjust recovery tank regulator.
LOUD BANGING NOISES	■ Loud banging/grinding noise and/or excessive vibration at compressor	■ Major mechanical failure of compressor ■ Drive belt failure ■ Safety relief valve venting	■ Push any ESD emergency button. This will stop compressor operation and isolate storage. Any leaks or venting may persist until pressure drops at compressor. *See* solutions for ***High Inter-Stage Pressure*** and ***High Inter-Stage Pressure and/or Temperature on One Stage***.
LOW COMPRESSOR FLOW	■ Slow storage recovery time and increased compressor running time during normal cycle ■ Excessive gas flow from vent pipe ■ Fill time longer than usual	■ Low inlet pressure ■ Failure at 1st stage ■ Severe rod packing leakage ■ Possible piston ring, valve, or gasket leakage problems.	■ If inlet pressure is reduced, flow rate will be proportionately lowered. *See* solutions for ***Inlet High/Low Shut-down***. ■ Check/replace 1st stage valves, gaskets, and piston rings for excessive wear and leakage. ■ Check/rebuild seal carrier gas vent rate on all stages for signs of severe rod packing leakage. ■ Check for correct valve gasket thickness or piston clearance. ■ Check for open drain valves or leaks.

Problem	Indication	Possible Causes	Possible Solutions
LOW DISCHARGE PRESSURE	■ Pressure below normal at gauge	■ Storage vessel pressure low ■ Fuelling vehicle pressure low	■ Normal operating condition. Discharge pressure normalizes as storage/vehicle reaches full pressure.
LOW FINAL DISCHARGE PRESSURE	■ Storage cascade at low pressure during filling ■ High fuelling demand (greater than compressor capacity) ■ Low time-filling vehicle pressure		■ Check pressure transmitters and scaling.
LOW INTER-STAGE PRESSURE **(All stages)**	■ Pressure below normal at gauges	■ Low inlet pressure ■ Low discharge pressure ■ Failure at 1st stage	■ If inlet pressure is reduced, all inter-stage pressures will be low during normal operation. *See* solutions for ***Inlet High/Low Shut-down***. ■ If discharge pressure is low due to reduced pressure in storage vessels, or vehicle tank during fuelling, then all inter-stage pressures are low during normal operation. Pressures normalize as storage and/or vehicle come to full pressure. ■ Check 1st stage valves, gaskets, piston rings and rod packing for excessive wear and leakage. Replace as needed.
LOW OIL LEVEL SHUT-DOWN **(If applicable)**	■ ALARM: "LOW OIL LEVEL" ■ Alarm light at control panel	■ Crankcase oil level low ■ Oil level switch out of adjustment ■ Faulty oil level switch	■ Manually check oil level in crankcase and fill if needed. ■ Adjust oil level switch as necessary. ■ Check oil level switch with electrical meter and repair/replace as needed.

Problem	Indication	Possible Causes	Possible Solutions
LOW OIL/LUBE PRESSURE SHUT-DOWN	■ Low oil pressure ■ Visible oil leakage ■ Low oil pressure at gauge ■ Normal oil pressure at gauge	■ Crankcase oil level low ■ Leak in lubrication circuit ■ Leak at oil filter ■ Relief valve faulty or out of adjustment ■ Internal oil pump failure ■ Faulty oil pressure switch gauge	■ Manually check oil level in crankcase and fill if needed. ■ Visually inspect tubing/fittings and correct leaks. ■ Tighten/replace oil filter and gasket as needed. Reset compressor and record stabilizes oil pressure during operation. ■ Remove crankcase inspection plate and inspect pick-up strainer, and clean strainer if necessary. ■ Check relief valve for proper operation. ■ Check oil pump parts for damage and replace as needed. ■ Check set-points by using pressure pump and electrical meter, with compressor shut-down. Adjust/replace as needed.
LOW STORAGE AND DISPENSER PRESSURE	■ Under-fill at dispenser ■ Storage pressure is below compressor start pressure	■ Reduced gas flow ■ Excessive fueling demand ■ Power interruption ■ Faulty discharge pressure switch or pressure transmitter	■ Pressure will normalize as excess demand decreases. (Note: Full discharge pressure will still be obtained at dispenser, but fill times may be slightly longer during peak demand.) ■ *See* solutions for ***High Discharge Pressure Shut-down***. ■ *See* solutions for ***Low Compressor Flow***.

Problem	Indication	Possible Causes	Possible Solutions
MOTOR START FAILURE	■ ALARM: "MAIN MOTOR FAULT" ■ WARNING: "SOFT START CURRENT FAULT" ■ Alarm light at control panel	■ Overload tripped ■ Fuse blown ■ CB tripped ■ Incorrect phase power supply ■ Excessive current draw ■ Faulty contactor	■ Reset motor overload at control panel. ■ Check/replace overload operation against actual current draw. ■ Check all fuses for each phase. ■ Reset the circuit breaker. ■ Check each incoming power lead for correct voltage. ■ Reset compressor and check current draw. Check motor nameplate. ■ Check free rotation of compressor and motor by pulling on belts. ■ Check inter-stage pressures 5 minutes after shut-down to ensure cylinders are unloading properly. If not free, check unloader valve/system. ■ Inspect/replace main contactors for free movement.
OIL CARRY-OVER	■ Oil in gas stream ■ Higher oil consumption	■ Worn oil wiper / piston rod	■ Check piston rod and oil wiper. ■ Conduct a blow-by test. ■ Replace worn oil wiper or piston rod if necessary.
POWER FAILURE	■ No lights on at PLC ■ Compressor will not start ■ UPS beeping (If applicable)	■ Power interruption ■ Compressor or PLC switched off ■ System alarm condition	■ Ensure the main disconnect is ON at control panel. ■ Check any fusing and/or breakers before electrical control panel and replace if needed. ■ Ensure the reset key switch in compressor enclosure is in RUN or AUTO position. (If applicable) ■ Ensure the reset key switch on PLC is in RUN position. (If applicable)

Problem	Indication	Possible Causes	Possible Solutions
PRESSURE TRANSMITTER FAULT	■ ALARM: "OIL PT FAULT" ■ ALARM: "SUCTION PT FAULT" ■ ALARM: "RECOVERY PT FAULT" ■ ALARM: "1st / 2nd / 3rd / 4th PT FAULT" ■ ALARM: "DISCHARGE PT FAULT" ■ ALARM: "POST PT FAULT" ■ ALARM: "BUFFER PT FAULT" ■ ALARM: "LOW BANK / MID BANK / HIGH BANK PT FAULT" ■ ALARM: "BYPASS PT FAULT" ■ Alarm light at control panel	■ Faulty pressure transmitter ■ Pressure transmitter out of range ■ Faulty wiring	■ Reset compressor and check pressure transmitter with electrical meter for correct output during operation. Transmitter output can also be checked at rest by activating it with a pressure pump. Ensure the panel is completely depressurized before connecting pump to tubing at transmitter. Replace transmitter as needed. ■ Check scaling and ensure that it is correct. ■ Inspect wiring for damage.
RELIEF VALVES POPPING **(Single/Continuous)**	■ Loud banging or chattering noise from vicinity of enclosure and vent pipe	■ System over-pressurization ■ Check valves icing	■ Check if storage pressure is too high and adjust final discharge pressure appropriately. ■ Reset and check pressures during operation. Replace safety relief valve if faulty.
VENT FAN MOTOR FAILURE	■ ALARM: "COOLER FAULT" ■ WARNING: "VENT FAN CB / OL" ■ Vent fan not running when enclosure temperature high, or when gas detector indicates LEL	■ Overload tripped ■ Fuse blown ■ CB tripped ■ Excessive current draw ■ Faulty contactor ■ Faulty thermostat	■ Reset/adjust motor overload at control panel. ■ Check fuses for each phase at control panel. ■ Reset circuit breaker. ■ Reset compressor and wait for vent fan to start. Check motor wiring for current draw. Check motor nameplate. ■ Check free rotation of fan by removing guard. ■ Check/replace contactor. ■ Check/adjust/replace thermostat set-points with electrical meter.

10 SPECIFICATIONS

General Specifications		
Construction Style	W	
Number of Throws	2-3	
Number of Stages	1-5	
Rated Speed	400 - 1000 RPM	
Cylinder Lubrication	Non-lubricated	
Cylinder Cooling Method	Air	
Gas Cooling Method	Air	
Drive	Electric, belt drive	
Crankcase Design	Non-pressurized	
Crankcase Material	Ductile cast iron ASTM 536-80 65-45-12	
Crankshaft	Ductile cast iron ASTM 536-80 100-70-03	
Main Bearings	Single roll taper roller	
Crosshead Design	CEC design	
Crosshead Material	Ductile cast iron ASTM 536-80 65-45-12	
Connecting Rods Material	Ductile cast iron ASTM 536-80 100-70-03	
Sealing Ring Set Material	PTFE/PEEK	
Piston Material	Aluminum alloy or steel	
Piston Ring Material	PTFE/PEEK	
Valve Manufacturer	Hoerbiger	
Valve Lubrication	Non-lubricated	
Dimensional Specifications	**Metric**	**Imperial**
Stroke	127 mm	5”
Cylinder Diameter	3,75 -234,95 mm	1.25” – 9.25”
Inlet Pressure Range	0,01 – 24,8 MPa (0,1 to 248 bar)	2 – 3,600 psig
Flow Capacity	153 – 2.416 nm^3/h	95 -1,500 scfm
Maximum Rated Brake Power	224 kW	300 HP
Crank Pin Diameter	88,9 mm	3.5”
Piston Rod Diameter	28,58 mm	1.125”
Maximum Rod Load	40.000 N	9,000 lbf
Maximum Piston Velocity	6.76 m/s	21.98 ft/s

11 TECHNICAL SUPPORT

For all parts and services inquiries, including warranty requirements, please contact your local CEC service center. For more information on CEC service centers, visit our website at www.cleanenergyfuels/compression

12 APPENDIX A: SERVICE DOCUMENTS LIST

CEC COMPRESSOR MANUAL
SERVICE DOCUMENT LIST

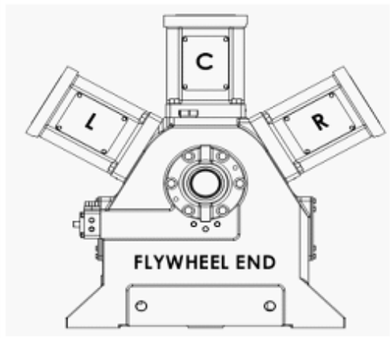
The Service Section of the Clean Energy Compression (CEC) Compressor Manual consists of drawings and other documents related to ongoing service.

As with the Main Document List, this document lists the complete set of items that comprise the CEC Compressor Manual Service Section.

Description	Document Number	Revision	Pages
RGV – RING GASKET SCHEDULE	630953	A	1
RGV – DRAWING	703278	B	1
VALVE KIT	630965	A	1
VALVE ASSEMBLY – DRAWING	703805	A	1
SHORTBLOCK UNIVERSAL 50 SERIES W/HEATER	624563	A	1
SHORTBLOCK ASSEMBLY – 50 SERIES CRANKSHAFT ASSEMBLY	210105	B	1
SHORTBLOCK ASSEMBLY – 50 SERIES CRANKCASE REAR COVER ASSEMBLY	210100	B	1
SHORTBLOCK ASSEMBLY – 50 SERIES CRANKCASE FRONT COVER ASSEMBLY	210670	C	1
OIL RELIEF VALVE ASSEMBLY	202639-00	L	1
OIL PUMP ASSEMBLY	202640	E	1
50 SERIES CONNECTING ROD ASSEMBLY	202642-00	G	1
CROSSHEAD GUIDE & CROSSHEAD GUIDE ASSEMBLY	202906-00	F	2
ASSEMBLY DRAWING – DA CYLINDER – 7.250-5.000	703303	A	2
ASSEMBLY DRAWING – DA SYLINDER – 4.500-2.750	703498	A	2
ASSEMBLY DRAWING – TANDEM CYLINDER – 3.500-2.500C_1.750-1.250H	703463	A	2
PACKING CASE COMPLETE – 50 SERIES – 7.69 CAVITY – 3000PSIG	625704	A	1
PACKING CASE COMPLETE – 50 SERIES – 6.16 CAVITY – 1200PSIG	615978	B	1
PACKING CASE COMPLETE – 50 SERIES – 5.38 CAVITY – 600PSIG	615976	B	1

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/12/15	ISF	RJT	TFJ	N/A	FIRST RELEASE

Arrangement			Cylinder / Piston				Piston Rings		Packing Rings			
Throw	*Stage*	*Lubrication*	*Size*	*Type*	*CE End Gap*	*HE End Gap*	*Sealing*	*Rider*	*Pressure Breaker*	*Sealing*	*Vent*	*Wiper*
L	1	INT	5.500	DA	0.040	0.040	332428 2	332429 1	-	321123 4	321124 1	332456 1
R	2	INT	3.500	DA	0.125	0.125	619816 4	619818 1	-	321123 5	321124 1	332456 1
C	3	INT	2.750	SACE	0.103	-	306676 5	306611 1	625708 1	625707 6	321124 1	332456 1
	4		1.375	SAHE	-	0.103	612385 + 612384(1) 3 + 3	615657 1				



Counterweights 202617-02-06

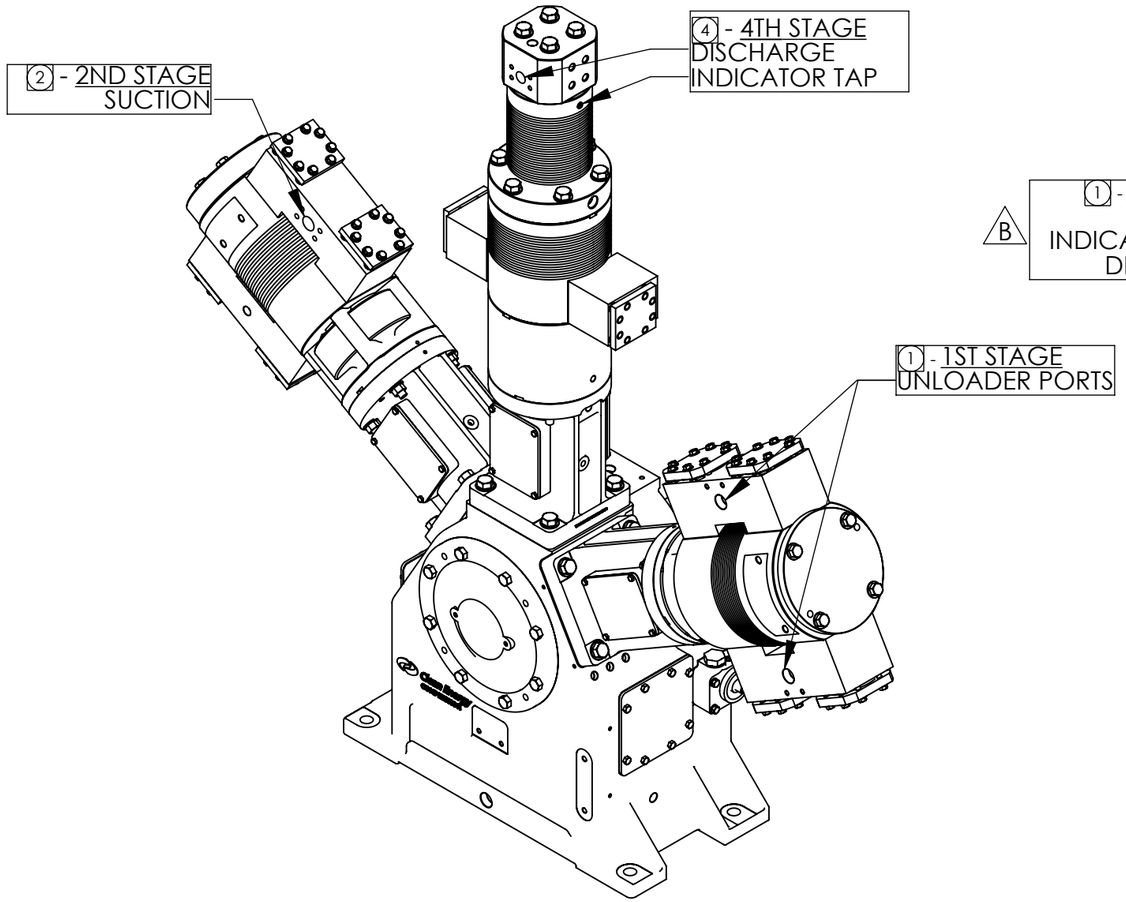
NOTES:
1. SEAL JOINT TYPE RINGS (612385) TO BE INSTALLED FURTHEST FROM PRESSURE; BUTT CUT RINGS (612384) TO BE INSTALLED CLOSEST TO PRESSURE.

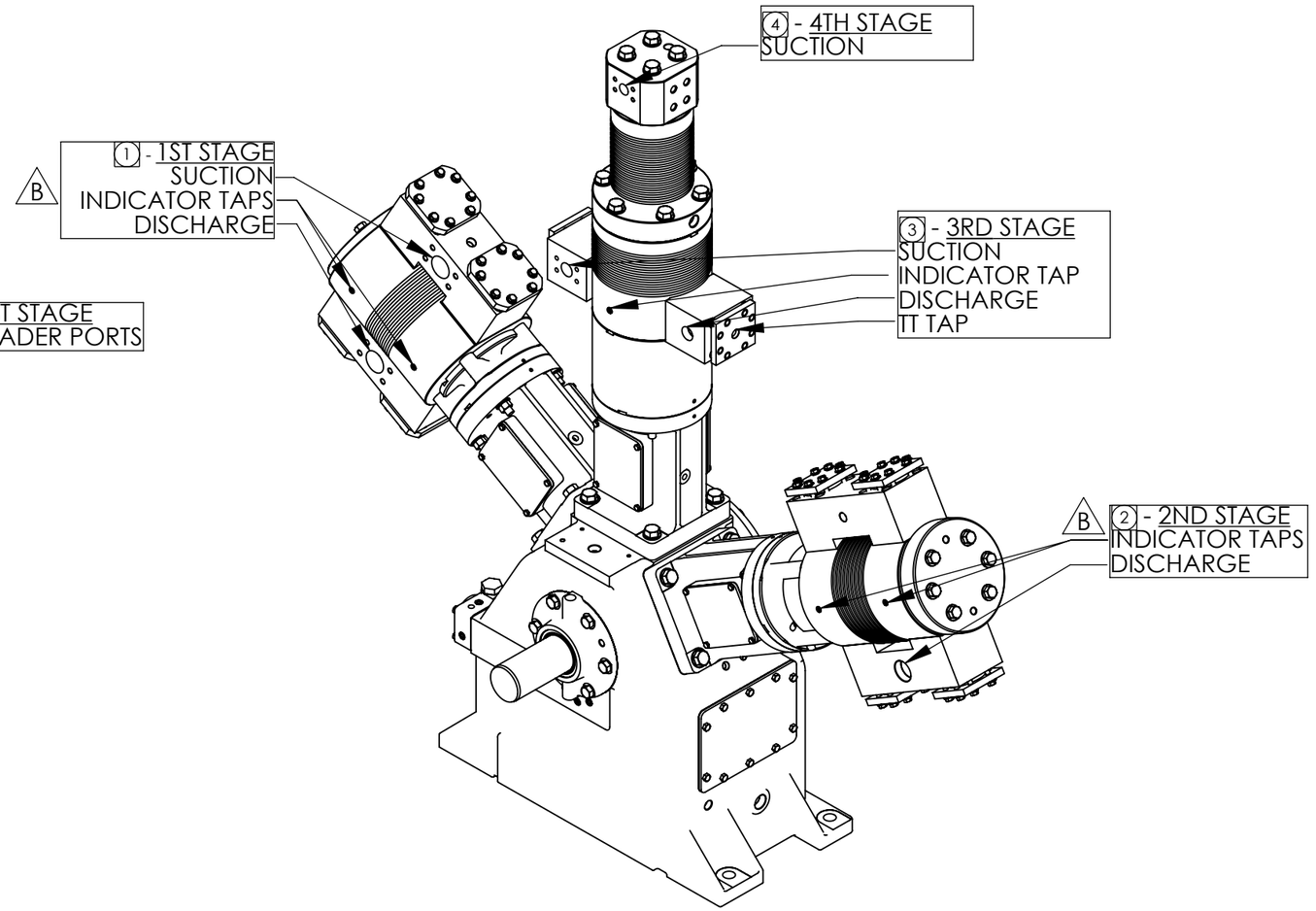
Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE
CBA 50 SERIES 55D-35D-27C13H-AC-CONFIG W

DR. ISF	2015/12/15	SIZE	DOC. NO.		REV
CK. RJT	2015/12/15	B	630953		A
AP. TFJ	2015/12/15	SCALE 1:1	WEIGHT LBS	SHEET 1 / 1	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/08/04	ISF	RJT	TFJ	N/A	FIRST RELEASE
B	2015/08/25	ISF	RJT	TFJ	N/A	FLIPPED INDICATOR TAP ORIENTATION, 1ST AND 2ND STAGES.





Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE

CBA LAYOUT - DA_DA_SACE-SAHE

DR. ISF 2015/08/04	SIZE B	DOC. NO. 703278	REV B		
CK. RJT 2015/08/04					
AP. TFJ 2015/08/04	SCALE 1:12	WEIGHT 2235.7 LBS	SHEET 1 / 1		

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2016/03/21	AC	ISF	TFJ	N/A	FIRST RELEASE

STAGE	CYLINDER & PORT				KEEPERS ①	VALVES ②	GASKETS - QTY PER VALVE				
	SIZE	ACTION	POCKET		PART NUMBER	PART NUMBER	SPACERS ③		HEIGHT	SEALING ④	
			TYPE	QTY			P/N	QTY		P/N	QTY
1	5.500	DA	SUCTION	2	208084	624898	200258	1	0.040	-	
			DISCHARGE	2	208084	625798	200258	1	0.040		
2	3.500	DA	SUCTION	2	200818	625799	200567	1	0.219	-	
			DISCHARGE	2	200818	625800	200567	1	0.219		
3	2.750	SACE	SUCTION	1	203993	330008	201388	1	0.250	-	
			DISCHARGE	1	203993	307888	201388	1	0.250		
4	1.375	SAHE	CONCENTRIC	1	-	319580	201095	1	0.040	201095 + 201096	1 + 1

NOTE:
THIS DRAWING TO BE USED IN CONJUCTION WITH ASSEMBLY DRAWING - VALVE INSTALLATION

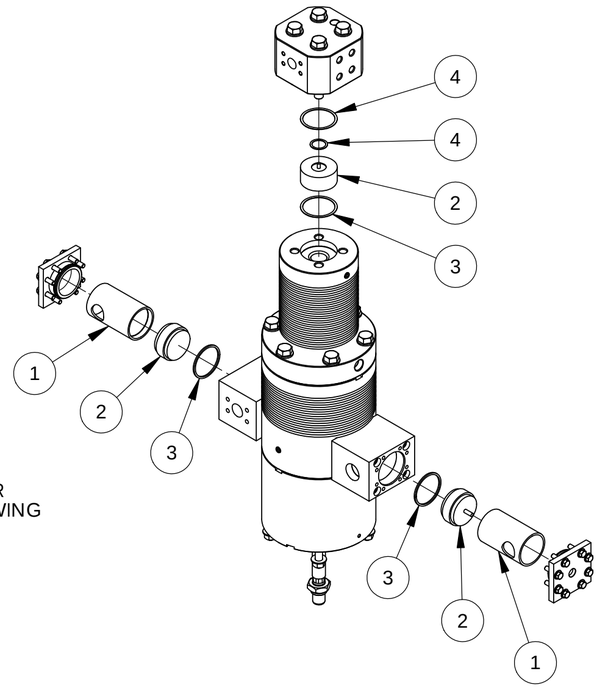
Clean Energy COMPRESSION
Chilliwack, B.C., Canada

TITLE
CBA 50 SERIES 55D-35D-27C13H CONFIG W-01

DR. AC 2016/03/21	SIZE B	DOC. NO. 630965	REV A		
CK. ISF 2016/03/21					
AP. TFJ 2016/03/21	SCALE 1:1	WEIGHT LBS	SHEET 1 / 1		

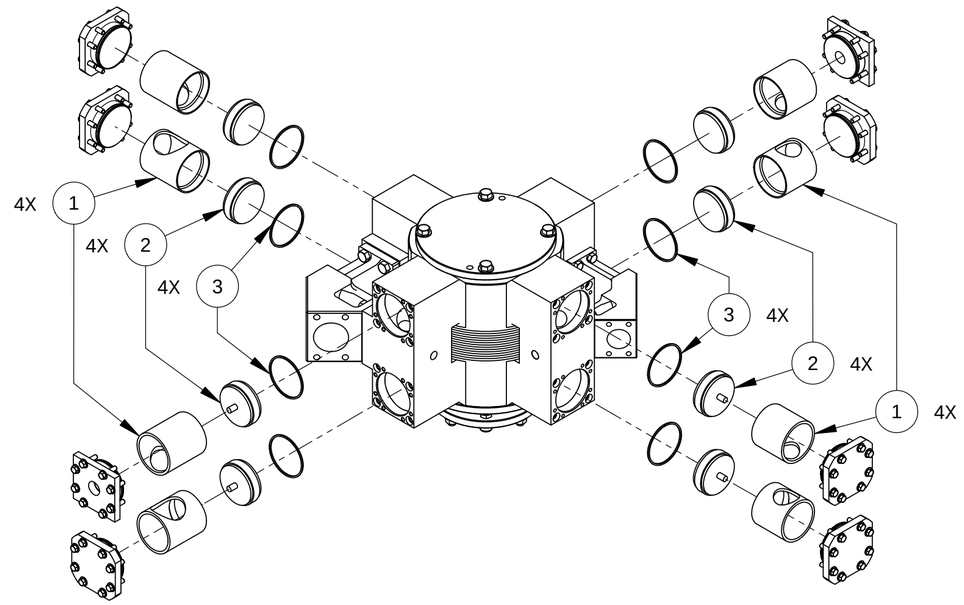
NOTE:
- COMPONENTS SUPPLIED MAY DIFFER IN IMAGE FROM THE COMPONENTS SHOWN ON THIS DRAWING
- THIS DRAWING IS TO BE USED IN CONJUNCTION WITH THE VALVE KIT COMPONENT LIST SUPPLIED
- SPACERS (3) MAY BE INSTALLED IN MULTIPLES, REFER TO VALVE KIT FOR DETAILS
- VALVE KEEPER PORT MUST BE INSTALLED SUCH THAT THE PORT IS ALIGNED WITH THE MANIFOLD PORT
- ALL VALVES MUST BE INSTALLED INTO THE CORRECT SUCTION OR DISCHARGE PORT AND IN THE CORRECT ORIENTATION
- IF ANY ITEMS ARE UNCLEAR, CONTACT CEC TECHNICAL SPECIALISTS FOR ADDITIONAL INFORMATION

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/12/08	JB	ISF	TFJ	N/A	INITIAL RELEASE



NOTES:
- THIS SECTION IS APPLICABLE FOR COMBINATIONS OF THE FOLLOWING TANDEM CYLINDERS:

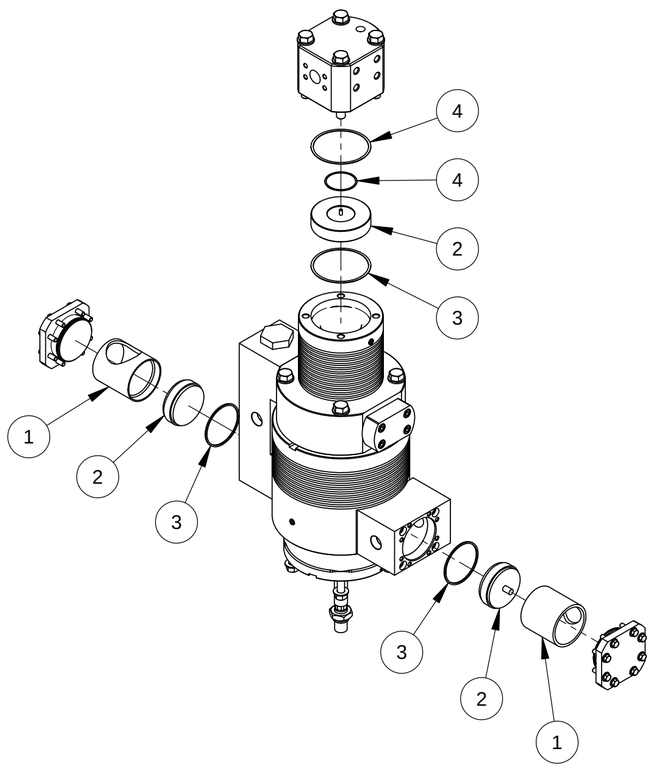
CRANK END	HEAD END
3.500"	1.750"
3.250"	1.625"
3.125"	1.500"
2.750"	1.375"
2.500"	1.250"



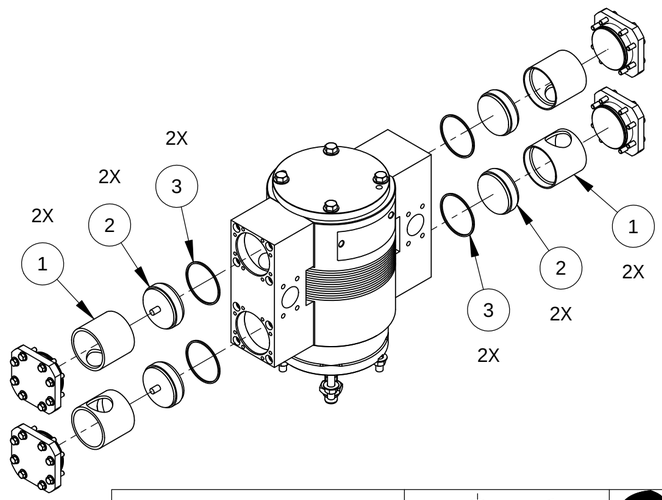
NOTES:
- THIS SECTION IS APPLICABLE FOR THE FOLLOWING DUAL ACTING CYLINDERS:
  - 9.250"
  - 8.000"

NOTES:
- THIS SECTION IS APPLICABLE FOR COMBINATIONS OF THE FOLLOWING TANDEM CYLINDERS:

CRANK END	HEAD END
7.250"	4.250"
7.000"	4.000"
6.750"	3.750"
6.250"	3.500"
5.750"	3.250"
	2.125"



NOTES:
- THIS SECTION IS APPLICABLE FOR THE FOLLOWING DUAL ACTING CYLINDERS:
  - 7.250"
  - 6.750"
  - 6.250"
  - 5.750"
  - 5.500"
  - 5.000"
  - 4.500"
  - 4.250"
  - 4.000"
  - 3.750"
  - 3.500"
  - 3.250"
  - 3.125"
  - 3.000"
  - 2.750"

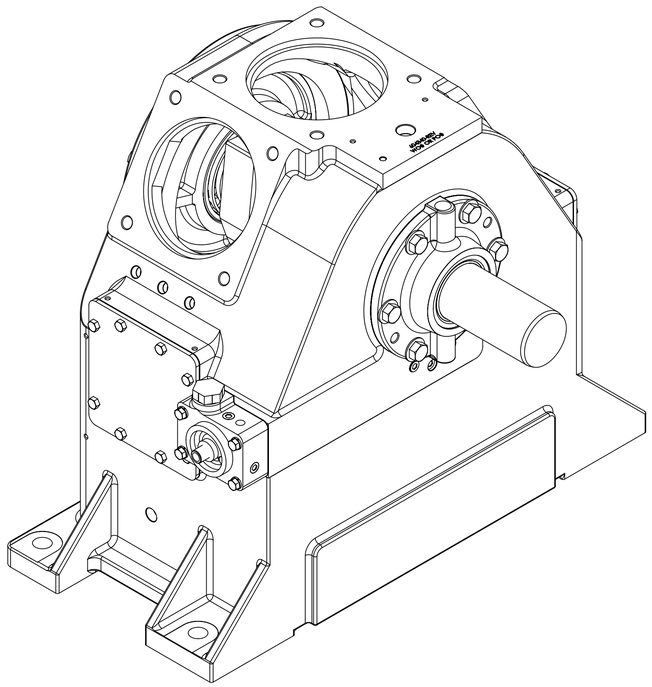


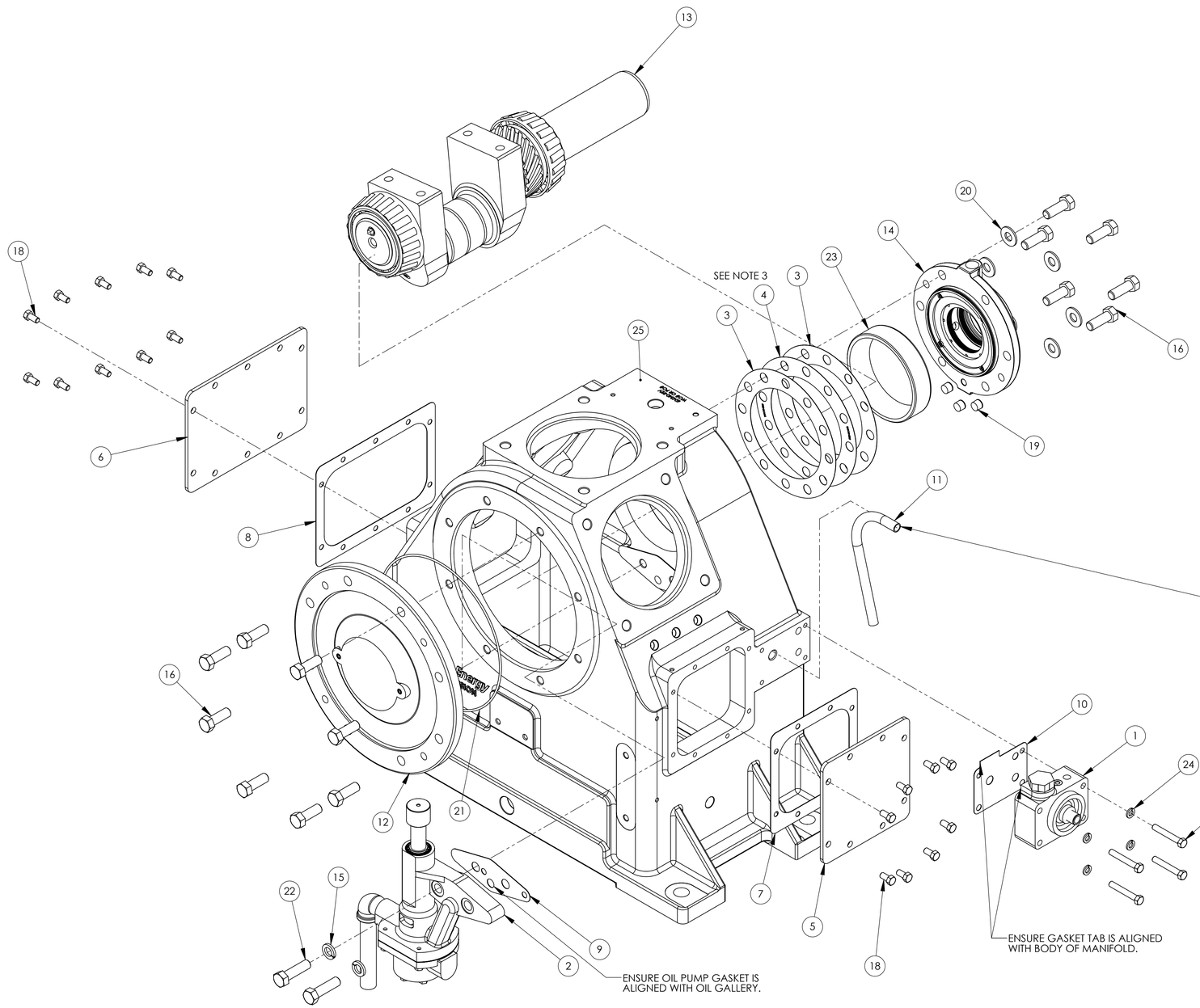
Clean Energy COMPRESSION Chilliwack, B.C., Canada

TITLE: ASSEMBLY DRAWING - VALVE INSTALLATION

DR. JB 2015/12/08	SIZE C	DOC. NO. 703805	REV A
CK. ISF 2015/12/08			
AP. TFJ 2015/12/08	SCALE 1:10	WEIGHT LBS	SHEET 1 / 1

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/05/14	ISF	TC	TFJ	N/A	FIRST RELEASE BASED ON 206058 W/ REMOVAL OF OIL FILL PORT AND CHANGE OF CRANKCASE P/N.
B	2016/02/04	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT, RENAMED AND ADDED WASHERS





REF. NO.	QTY	PART NUMBER	DESCRIPTION	UOM
1	1	202639-00	OIL RELIEF VALVE ASSEMBLY	EA
2	1	202640-00	OIL PUMP ASSEMBLY	EA
3	2	202645-00	IMW50 CRANKCASE FRONT COVER GASKET	EA
4	1	202646-00-XX	SHIM IMW50 CRANKCASE FRONT COVER	EA
5	1	202647-00	SQUARE COVER	EA
6	1	202648-00	RECTANGULAR COVER	EA
7	1	202649	SQUARE GASKET	EA
8	1	202650-00	RECTANGULAR GASKET	EA
9	1	202651	IMW50 CRANKCASE OIL PUMP BRACKET GASKET	EA
10	1	202653	IMW50 CRANKCASE OIL RELIEF VALVE GASKET	EA
11	1	202655-00	DISCHARGE TUBE	EA
12	1	210100	IMW50 CRANKCASE REAR COVER	EA
13	1	210105	CRANKSHAFT ASSEMBLY	EA
14	1	210670	IMW50 CRANK CASE FRONT COVER ASSEMBLY	EA
15	2	301487	WASHER LOCK 0.625 ZN	EA
16	14	301606	BOLT HH CS GR.5 0.625-11UNC X 1.750 ZN	EA
17	4	301728	BOLT HH CS GR.5 0.375-16UNC X 2.500 ZN	EA
18	18	301732	BOLT HH CS GR.5 0.375-16UNC X 0.750 ZN	EA
19	3	303825	PLUG PIPE HOLLOW HEX CS 0.375MNPT	EA
20	6	304528	WASHER FLAT GR 8 0.625 PLATED	EA
21	1	305663	ORING 2-276 N70D	EA
22	2	307377	BOLT HH CS GR.5 0.625-11UNC X 2.250 ZN	EA
23	1	308768	BEARING TAPER	EA
24	4	314794	WASHER LOCK 0.375 ZN	EA
25	1	604340	CRANKCASE IMW50 MACHINED W/ BLOCK HEATER	EA

NOTES :

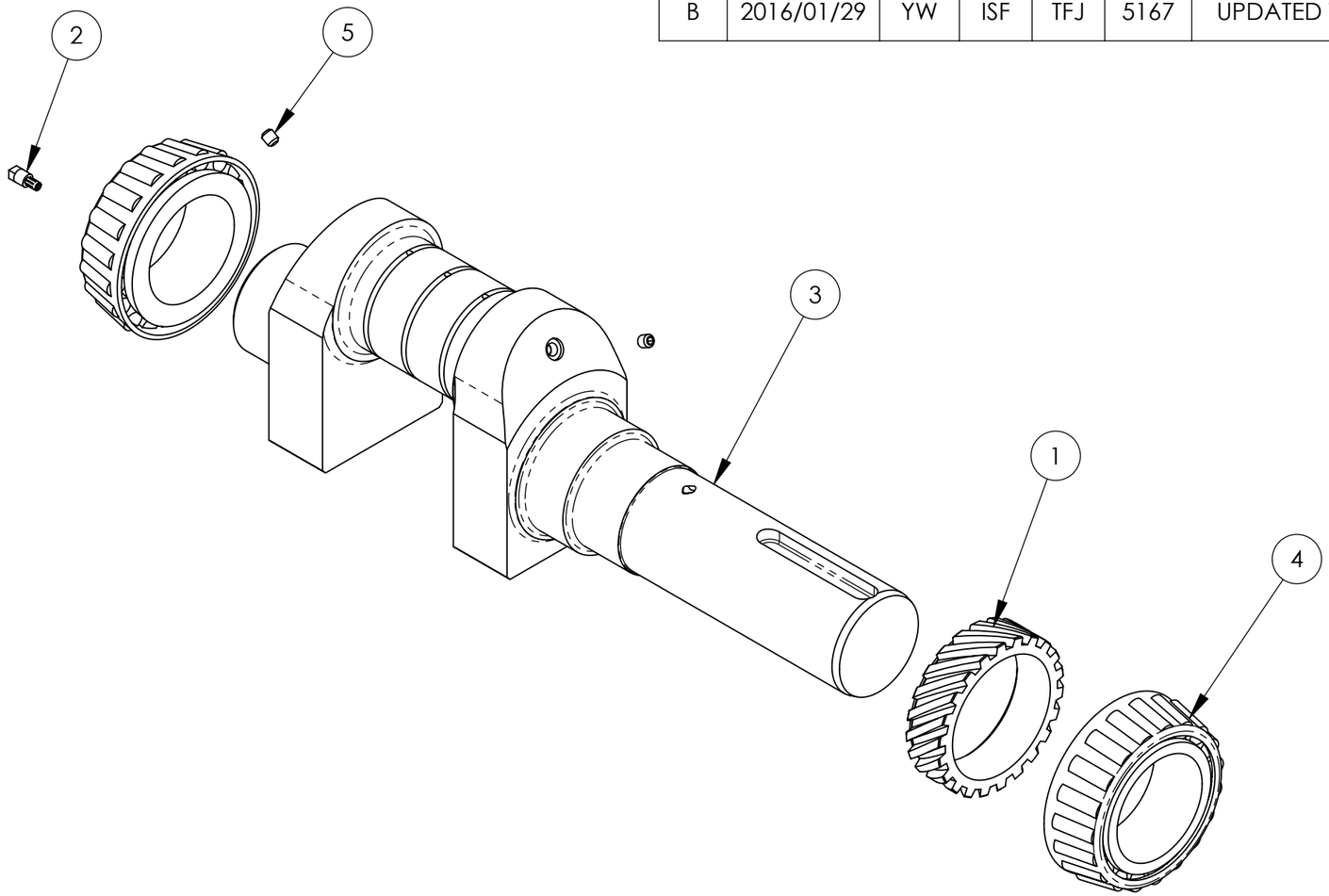
1. VERIFY CRANKCASE OIL GALLERIES ARE FREE OF CONTAMINATION AND DEBRIS BEFORE ASSEMBLY.
2. SEE WI-MF-2012-005 FOR DETAILED ASSEMBLY INSTRUCTIONS
3. SEE WI-MF-2012-005 FOR SHIM PART # AND QUANTITIES REQUIRED

Clean Energy COMPRESSION — Chilliwack, B.C., Canada

TITLE: ASSEMBLY DRAWING – SHORT BLOCK ASM – 50 SERIES

DR. ISF	2015/05/14	SIZE D	DOC. NO. 624563		REV B
CK. TC	2015/05/14				
AP. TFJ	2015/05/14	SCALE 1:4	WEIGHT 728.0 LBS		SHEET 1 / 1

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2012/02/14	ISF	CSM	N/A	N/A	FIRST RELEASE BASED ON 400008-01
B	2016/01/29	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT AND RENAMED



NOTES:
1. SEE WI-MF-2012-003 FOR DETAILED ASSEMBLY INSTRUCTIONS

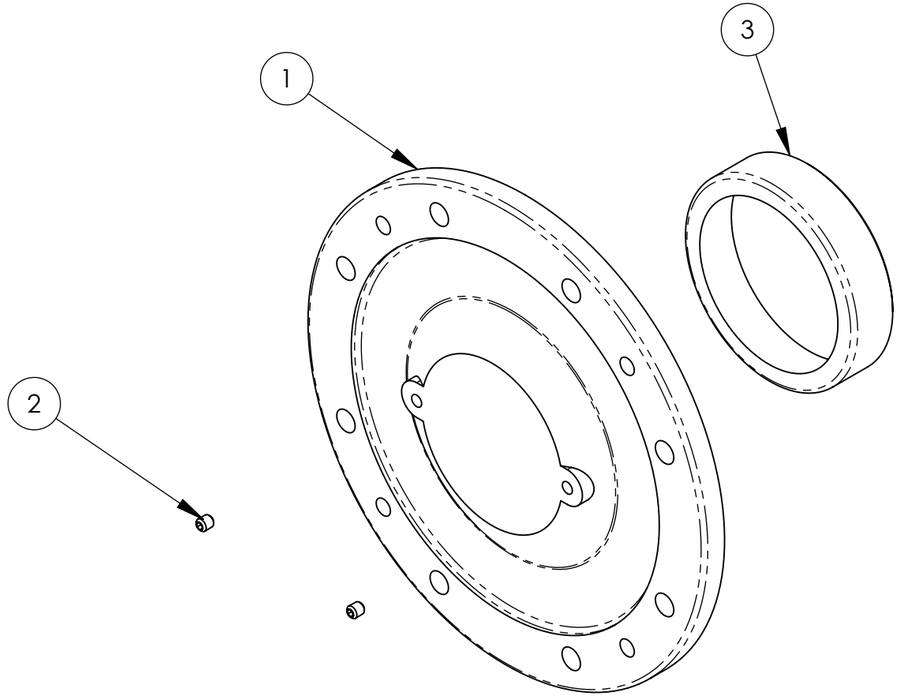
REF. NO.	QTY	PART NUMBER	DESCRIPTION
1	1	202628-00	IMW50 CRANKCASE OIL PUMP DRIVING GEAR
2	1	202692-00	1/8NPT FILTER PLUG
3	1	203394-00	CRANKSHAFT
4	2	308800	BEARING TAPER CONE
5	2	311171	PLUG PIPE SOCKET HEAD CS 0.125IN

Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE
ASSEMBLY DRAWING – CRANKSHAFT – 50 SERIES

DR. ISF 2012/02/14	SIZE B	DOC. NO. 210105	REV B	
CK. CSM 2012/02/14				
AP.	SCALE 1:4	WEIGHT LBS	SHEET 1 / 1	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2012/02/13	ISF	CSM	N/A	N/A	FIRST RELEASE
B	2016/01/29	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT AND RENAMED



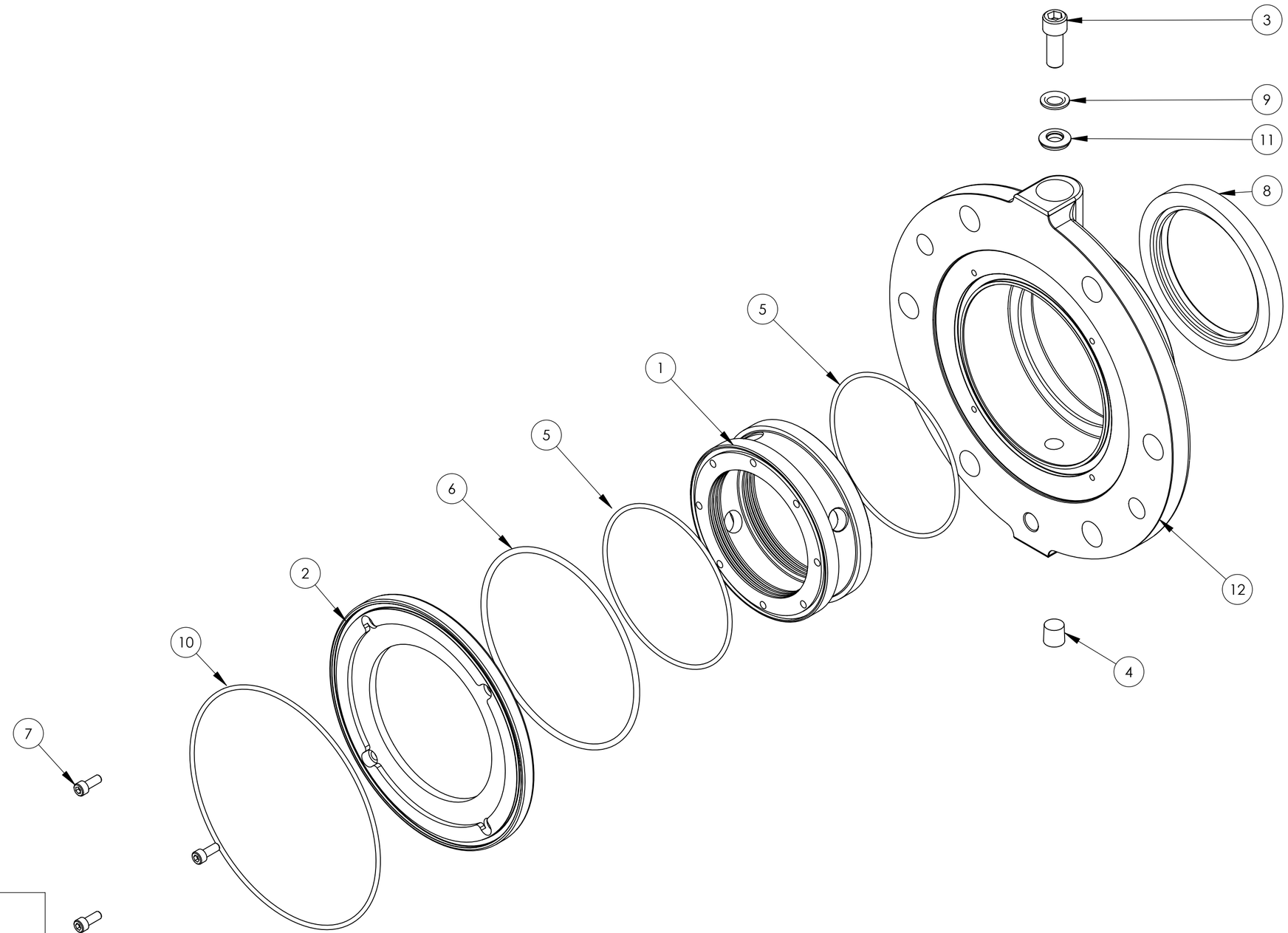
REF. NO.	QTY	PART NUMBER	DESCRIPTION
1	1	202620-01	IMW 50 CRANKCASE REAR COVER
2	2	311171	PLUG PIPE SOCKET HEAD CS 0.125IN
3	1	308768	BEARING TAPER

Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

TITLE
ASSEMBLY DRAWING – CRANKCASE REAR COVER – 50 SERIES

DR. ISF 2012/02/13	SIZE B	DOC. NO. 210100		REV B	
CK. CSM 2012/02/13					
AP.	SCALE 1:4	WEIGHT LBS	SHEET 1 / 1		

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2012/07/24	MJJ	CSM	N/A	N/A	FIRST RELEASE BASED ON 206016
B	2013/01/16	ISF	CSM	N/A	N/A	CHANGED O-RING FROM 2-156 TO 2-155
C	2016/01/29	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT AND RENAMED



REF. NO.	QTY	PART NUMBER	DESCRIPTION
1	1	206015	OIL INTRODUCING RING
2	1	210629	OIL INTRODUCING RING RETAINER
3	1	303461	SHCS CS 0.375-16UNC X 1.000
4	1	303824	PLUG HEX HOLLOW 0.25 NPT CS
5	2	305429	ORING 2-155 N70D
6	1	305595	ORING 2-249 N70D
7	4	305760	SHCS CS 10-24UNC X 0.500
8	1	306657	SEAL CRANKSHAFT
9	1	308000	WASHER SEAL FLAT 0.375IN
10	1	317111	ORING 2-163 N70D
11	1	323241	WASHER 0.375 BOND GAL
12	1	602650	FRONT COVER - IMW 50 CRANKCASE

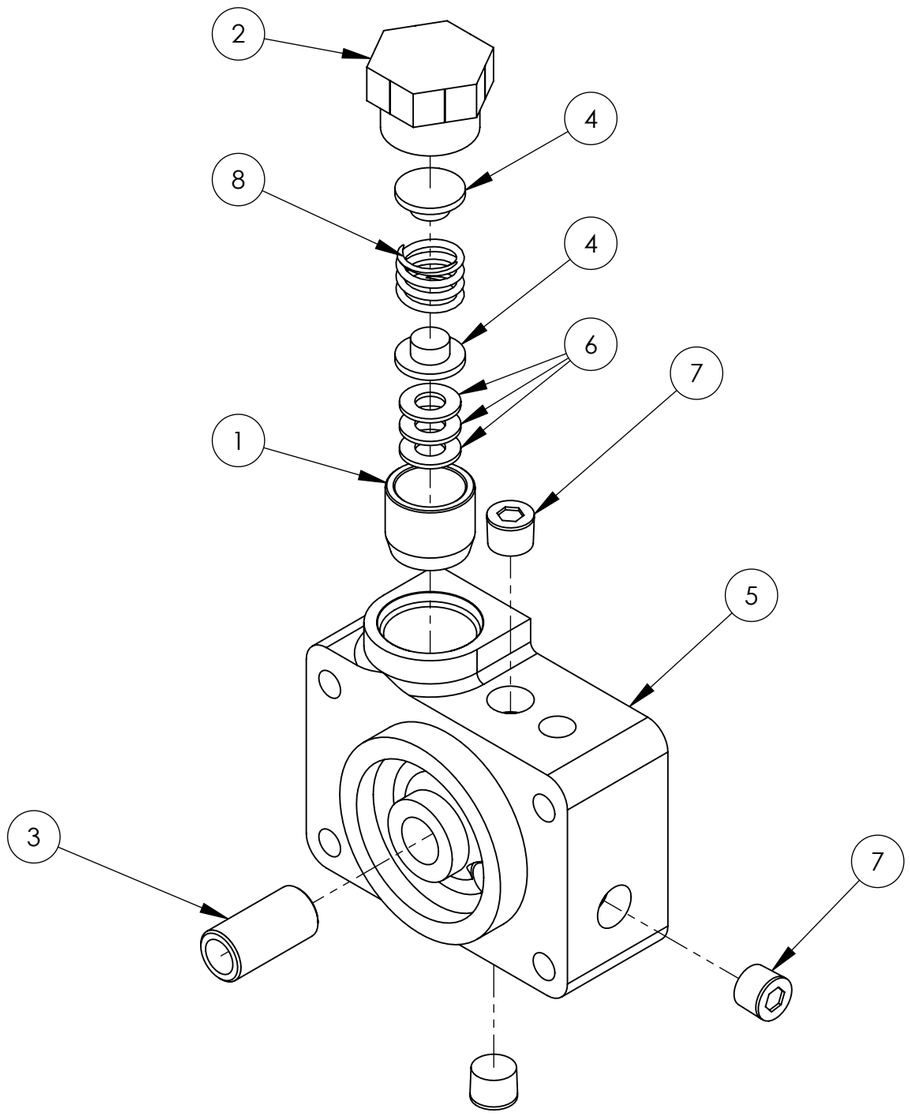
Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE

ASSEMBLY DRAWING – CRANKCASE FRONT COVER – 50 SERIES

DR. MJJ 2012/07/24	SIZE C	DOC. NO. 210670	REV C	
CK. CSM 2012/07/25				
AP.	SCALE 1:2	WEIGHT LBS	SHEET 1 / 1	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
J	2012/02/10	ISF	CSM	N/A	N/A	UPDATED ASSEMBLY
K	2013/08/20	ISF	CSM	N/A	N/A	ADDED 3X301811
L	2016/01/29	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT AND RENAMED



REF. NO.	QTY	PART NUMBER	DESCRIPTION	UOM
1	1	202631-01	PISTON, OIL RELIEF VALVE	EA
2	1	202632	HEX PLUG	EA
3	1	202656	IMW50 CRANKCASE OIL FILTER ADAPTOR	EA
4	2	202968-00	SPACER IMW50 OIL RELIEF VALVE	EA
5	1	203808	OIL RELIEF MANIFOLD	EA
6	3	301811	WASHER FLAT 0.375 ZN	EA
7	3	303825	PLUG PIPE HOLLOW HEX CS 0.375MNPT	EA
8	1	309910	SPRING # C57	EA

NOTES:
1. SEE WI-MF-2012-002 FOR DETAILED ASSEMBLY INSTRUCTIONS

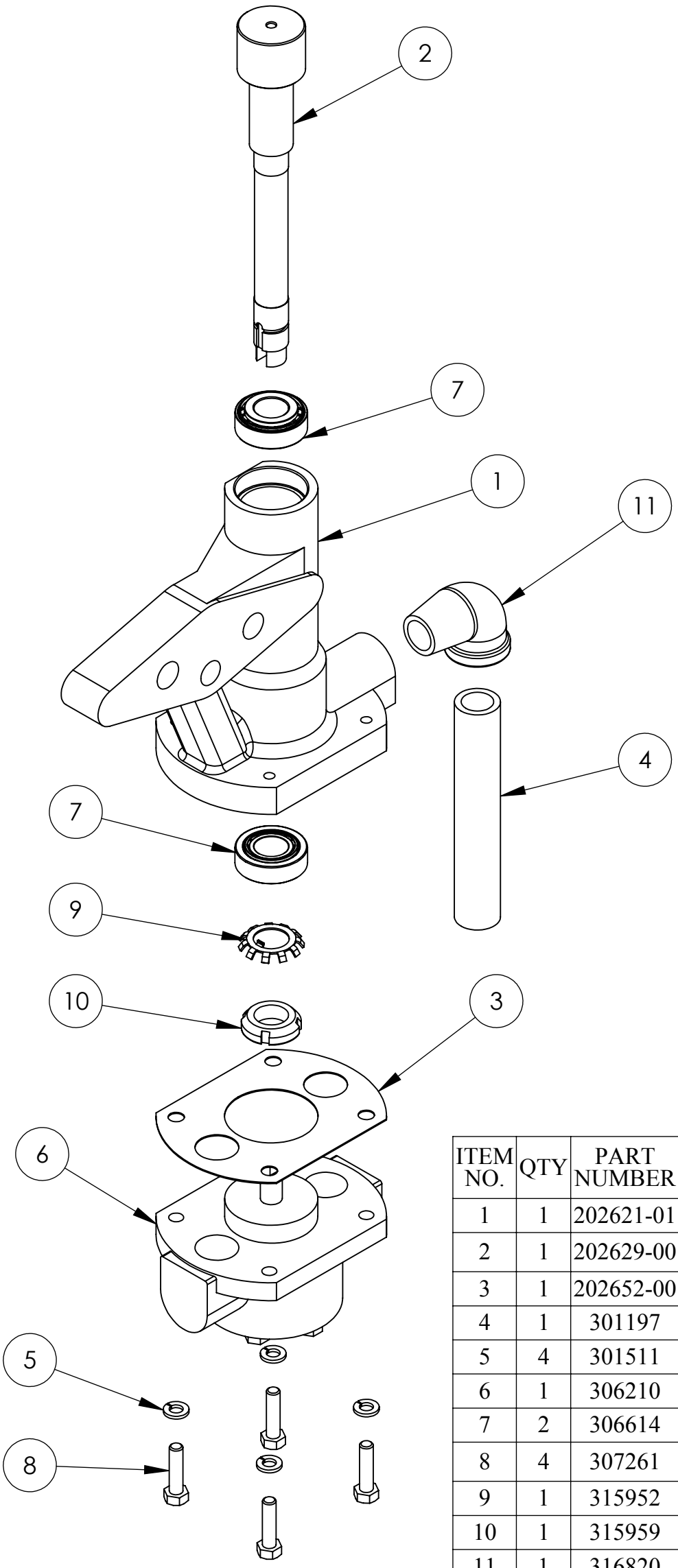
Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

TITLE
ASSEMBLY DRAWING – OIL RELIEF VALVE – 50 SERIES

DR. DY 2009/09/11	SIZE B	DOC. NO. 202639-00	REV L		
CK. BVK 2009/09/11					
AP.	SCALE 1:2	WEIGHT LBS	SHEET 1 / 1		

REVISION HISTORY

REV.	DATE	BY	CK.	DCR#	REFERENCE
D	2011/06/29	DR	EDL	N/A	UPDATED REFERENCE NUMBERS
E	2012/02/13	ISF	CSM	N/A	UPDATED PARTS



NOTES:
1. SEE WI-MF-2012-002 FOR DETAILED ASSEMBLY INSTRUCTIONS

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	202621-01	PUMP BRACKET
2	1	202629-00	OIL PUMP DRIVEN GEAR SHAFT IMW50 CRANKCASE
3	1	202652-00	GASKET, OIL PUMP
4	1	301197	NIPPLE PIPE CS 0.750MNPT X 6.000
5	4	301511	WASHER LOCK 0.313 ZN
6	1	306210	PUMP OIL 2RFD 6GPM@1800RPM
7	2	306614	BEARING
8	4	307261	BOLT HH CS GR.5 0.313-18UNC X 1.250 ZN
9	1	315952	BEARING LOCK WASHER 4
10	1	315959	BEARING NUT 4
11	1	316820	ELBOW STR 90 0.750 GALV.

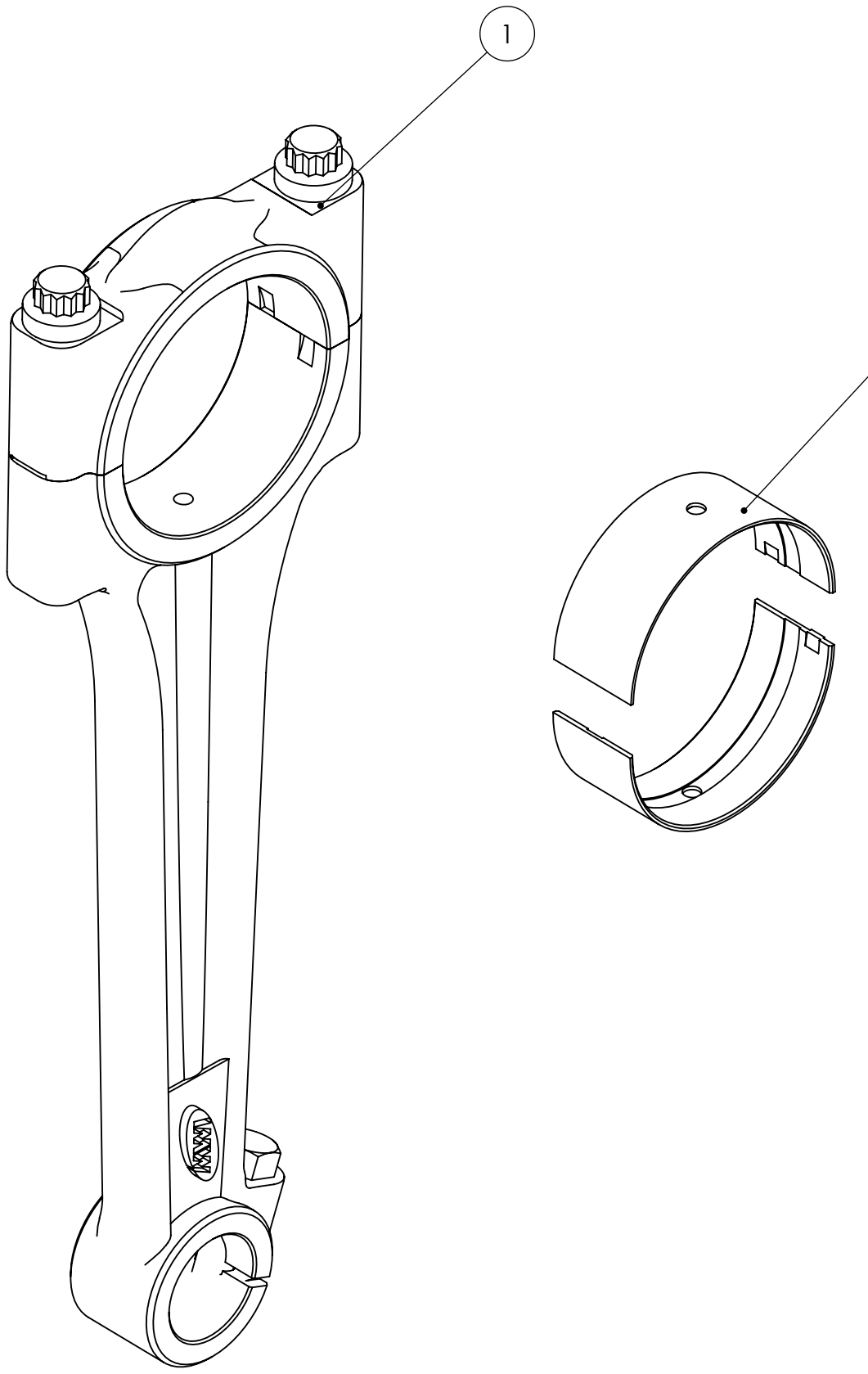
IMW Industries Ltd.
Chilliwack, BC, Canada

TITLE

IMW50 OIL PUMP ASSEMBLY

REF.| STANDARD	SIZE	FILE. NO. 202640	REV
DR. |DR 2011/06/29	B	DWG. NO. MRP ID	E
CK. |EDL 2011/06/29			
AP. |	SCALE 1:3	WEIGHT LBS	SHEET 1 / 1

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
E	2011/07/11	DR	CSM	N/A	N/A	TRANSFERED DRAWING TO SOLIDWORKS UPDATED PARTS TO MATCH BOM
F	2012/10/24	CSM	ERL	N/A	N/A	ADDED BOM TO DRAWING
G	2016/01/29	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT AND RENAMED



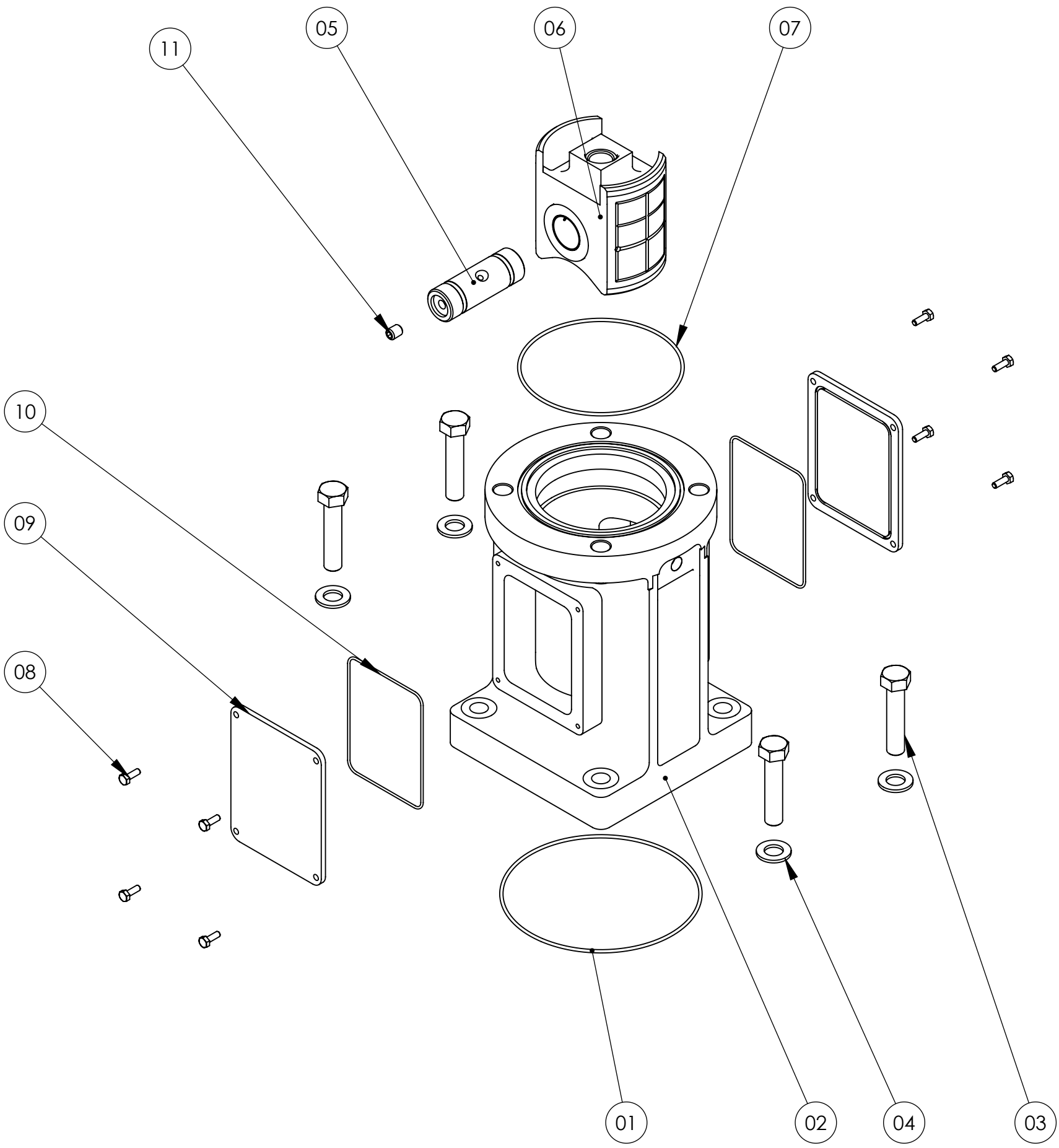
REF. NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	202618-04	CONNECTING ROD ASSEMBLY
2	1	306485	SHELL BEARING

Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE
ASSEMBLY DRAWING – CONNECTING ROD – 50 SERIES

DR.	DR 2011/11/07	SIZE B	DOC. NO. 202642-00	REV G	
CK.	CSM 2011/11/07				
AP.		SCALE 1:2	WEIGHT 10.5 LBS	SHEET 1 / 1	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
E	2011/10/24	DR	BJN	N/A	N/A	CORRECTED REFERENCE NUMBERS
F	2016/01/30	YW	ISF	TFJ	5167	UPDATED THE DRAWING LAYOUT AND RENAMED



PROPRIETARY AND CONFIDENTIAL

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Clean Energy® COMPRESSION — Chilliwack, B.C., Canada

TITLE

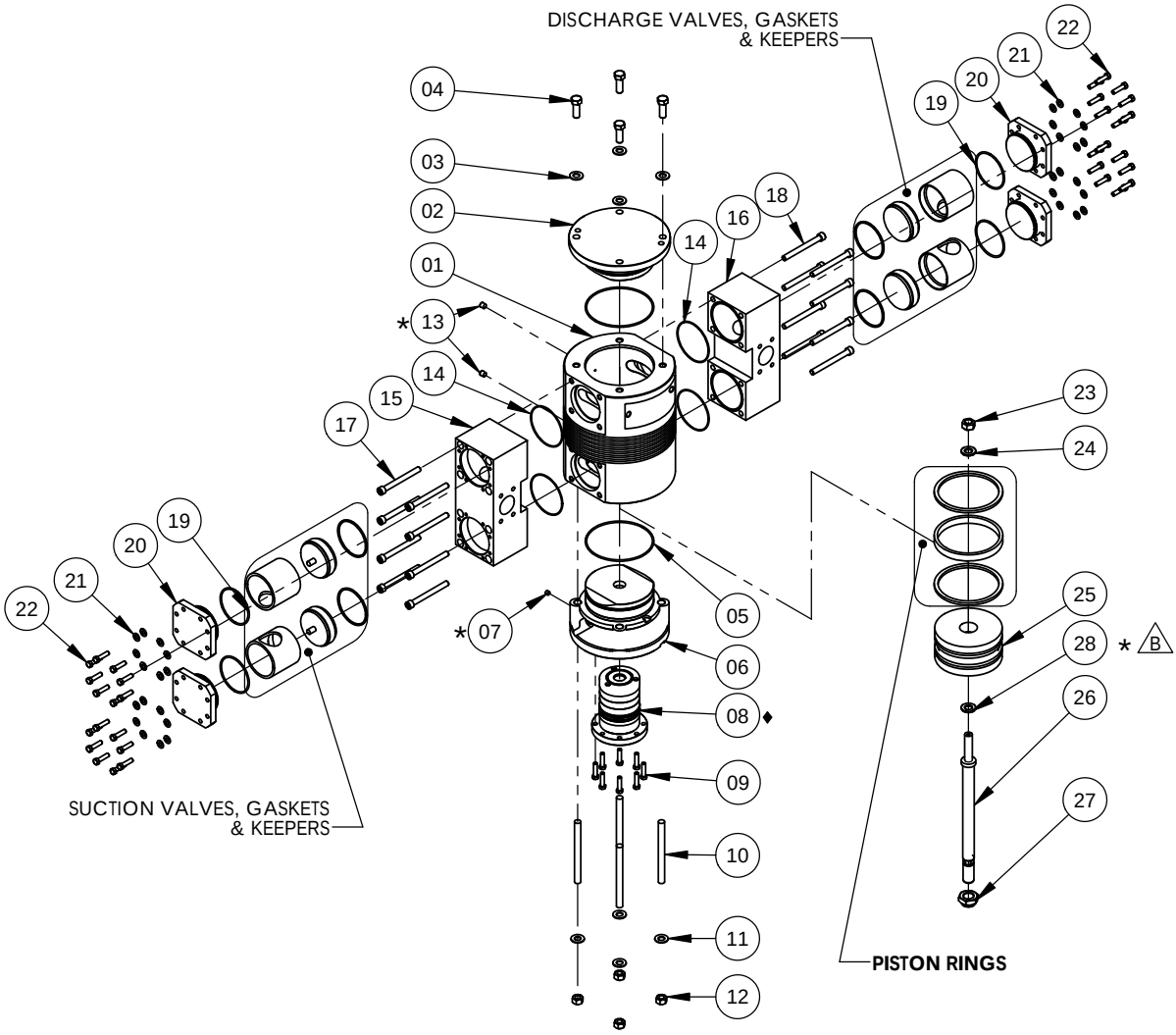
ASSEMBLY DRAWING – CROSSHEAD GUIDE ASM DA INT. LUBE – 50 SERIES

DR.	KH	2003/01/13	SIZE B	DOC. NO. 202906-00	REV F
CK.	BJN	2011/10/24			
AP.			SCALE 1:5	WEIGHT 96.8 LBS	SHEET 1 / 1

202906-00

01	1	305634	ORING 2-267 N70D
02	1	202773-01	CROSSHEAD GUIDE IMW50
03	4	318260	BOLT HH CS GR.5 0.750-10UNC X 3.500 ZN
04	4	300530	WASHER FLAT 0.750 ZN
05	1	201577	WRIST PIN INTERNAL LUBE 5 1/2 CROSSHEAD
06	1	210102	CROSSHEAD IMW50 W/ BUSHING INT. LUB.
07	1	305623	ORING 2-261 N70D
08	8	304403	BOLT HH CS GR.5 0.250-20UNC X 0.750 ZN
09	2	203408-00	COVER PLATE IMW50/ALPHA3
10	2	317111	ORING 2-163 N70D
11	1	301128	PLUG PIPE SOCKET HEAD CS 0.250IN

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/08/11	ISF	RJT	TFJ	N/A	FIRST RELEASE
B	2016/04/18	DR	ISF	TFJ	5497	ADDED PISTON WASHER (28)AND 5.125" CONFIGURATION



NOTES:

- THIS DRAWING IS APPLICABLE FOR THE FOLLOWING DUAL ACTING CYLINDERS:
  - 7.250"
  - 6.750"
  - 6.250"
  - 5.750"
  - 5.500"
  - △B 5.125"
  - 5.000"
- FOR VALVE, GASKET, KEEPER AND PISTON RING PART NUMBERS REFER TO THE APPLICABLE SHEET.
- NOTE THAT COMPONENTS SUPPLIED AND ORIENTATIONS OF PORTS MAY DIFFER IN IMAGE FROM THE COMPONENTS SHOWN ON THIS DRAWING.
- * COMPONENTS MARKED BY AN ASTERISK MAY NOT BE INCLUDED IN ALL CONFIGURATIONS. REFER TO BOM.
- ♦FULL DETAILS OF PACKING CASE COMPONENTS SHOWN ON ALTERNATE SHEET.

Clean Energy COMPRESSION Chilliwack, B.C., Canada

TITLE

ASSEMBLY DRAWING - DA CYLINDER - 7.250-5.000

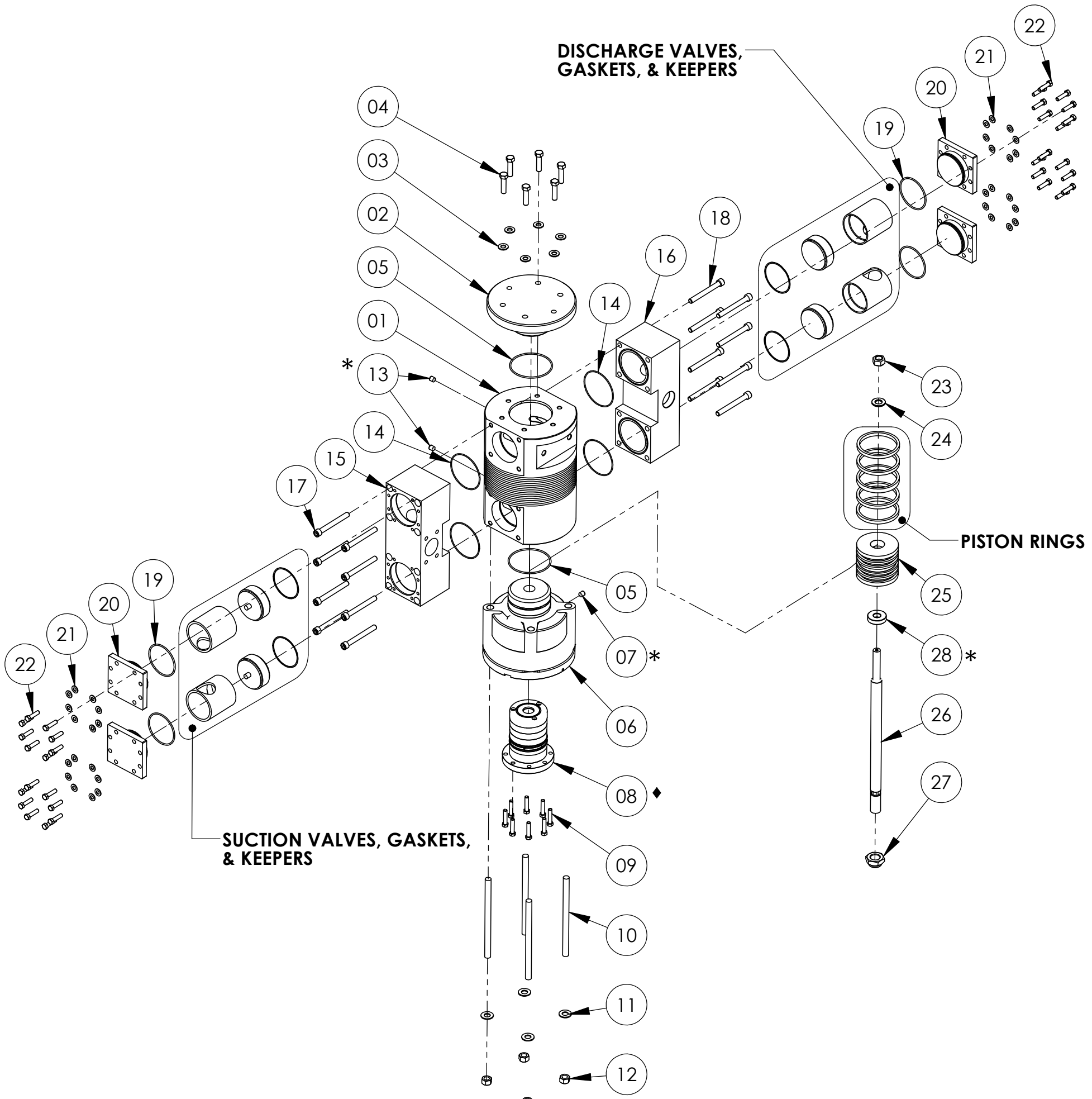
DR.	ISF	2015/08/11	SIZE	DOC. NO.	REV
CK.	RJT	2015/08/11	B	703303	B
AP.	TFJ	2015/08/11	SCALE 1:12	WEIGHT 399.0 LBS	SHEET 1 / 1

5.500” Cylinder Assembly

Drawing # 703303 Rev A

Position #	Quantity	Part Number	Description
01	1	624536	CYLINDER 5.500 DA AC IMW50 - PT PORT
02	1	207600	CYLINDER HEAD 5.500 DA IMW50
03	4	304528	WASHER FLAT GR 8 0.625 PLATED
04	4	307380	BOLT HH CS GR.8 0.625-11UNC X 2.000 PLT
05	2	316918	ORING 2-252 V90D
06	1	624551	SEAL CARRIER 5.500 BORE - 50 SERIES
07	1	303822	PLUG PIPE HOLLOW HEX CS 0.125MNPT
08	1	615976	PACKING CASE COMPLETE - 50 SERIES - 5.38 CAVITY - 600PSI
09	8	301726	BOLT HH CS GR.5 0.375-16UNC X 1.750 ZN
10	4	200305	STUD 0.625IN X 6-5/8 LG
11	4	304528	WASHER FLAT GR 8 0.625 PLATED
12	4	301765	NUT HEX CS GR.8 0.625UNC PLATED
13	2	303824	PLUG PIPE HOLLOW HEX CS 0.250MNPT
14	4	305434	ORING 2-156 V90D
15	1	626299	MANIFOLD DA 88CRO - 2.000F - 50 SERIES
16	1	626299	MANIFOLD DA 88CRO - 2.000F - 50 SERIES
17	8	305802	SHCS CS 0.500-13UNC X 5.000
18	8	305802	SHCS CS 0.500-13UNC X 5.000
19	4	305572	ORING 2-240 V90D
20	4	201706	VALVE HOLDER 88CRO
21	32	301836	WASHER FLAT GR 8 0.375 PLATED
22	32	302785	BOLT HH CS GR.8 0.375-16UNC X 1.500 PLT
23	1	200921	NUT PISTON RETAINING
24	1	200292	WASHER PISTON TOP
25	1	207601	PISTON IMW50 5.500 DA ALUMINUM
26	1	201711	PISTON ROD IMW50 17.625 LG
27	1	210103	CROSSHEAD TAPER NUT 1.063

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/09/25	AC	ISF	TFJ	N/A	FIRST RELEASE



NOTES:

- THIS DRAWING IS APPLICABLE FOR THE FOLLOWING DUAL ACTING CYLINDERS:
  - 4.500"
  - 4.250"
  - 4.000"
  - 3.750"
  - 3.500"
  - 3.250"
  - 3.125"
  - 3.000"
  - 2.750"
- FOR VALVE, GASKET, KEEPER AND PISTON RING PART NUMBERS REFER TO THE APPLICABLE SHEET.
- NOTE THAT COMPONENTS SUPPLIED AND ORIENTATIONS OF PORTS MAY DIFFER IN IMAGE FROM THE COMPONENTS SHOWN ON THIS DRAWING.
- * COMPONENTS MARKED BY AN ASTERISK MAY NOT BE INCLUDED IN ALL CONFIGURATIONS. REFER TO BOM.
- ♦ FULL DETAILS OF PACKING CASE COMPONENTS SHOWN ON ALTERNATE SHEET.

Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE

ASSEMBLY DRAWING - DA CYLINDER - 4.500-2.750

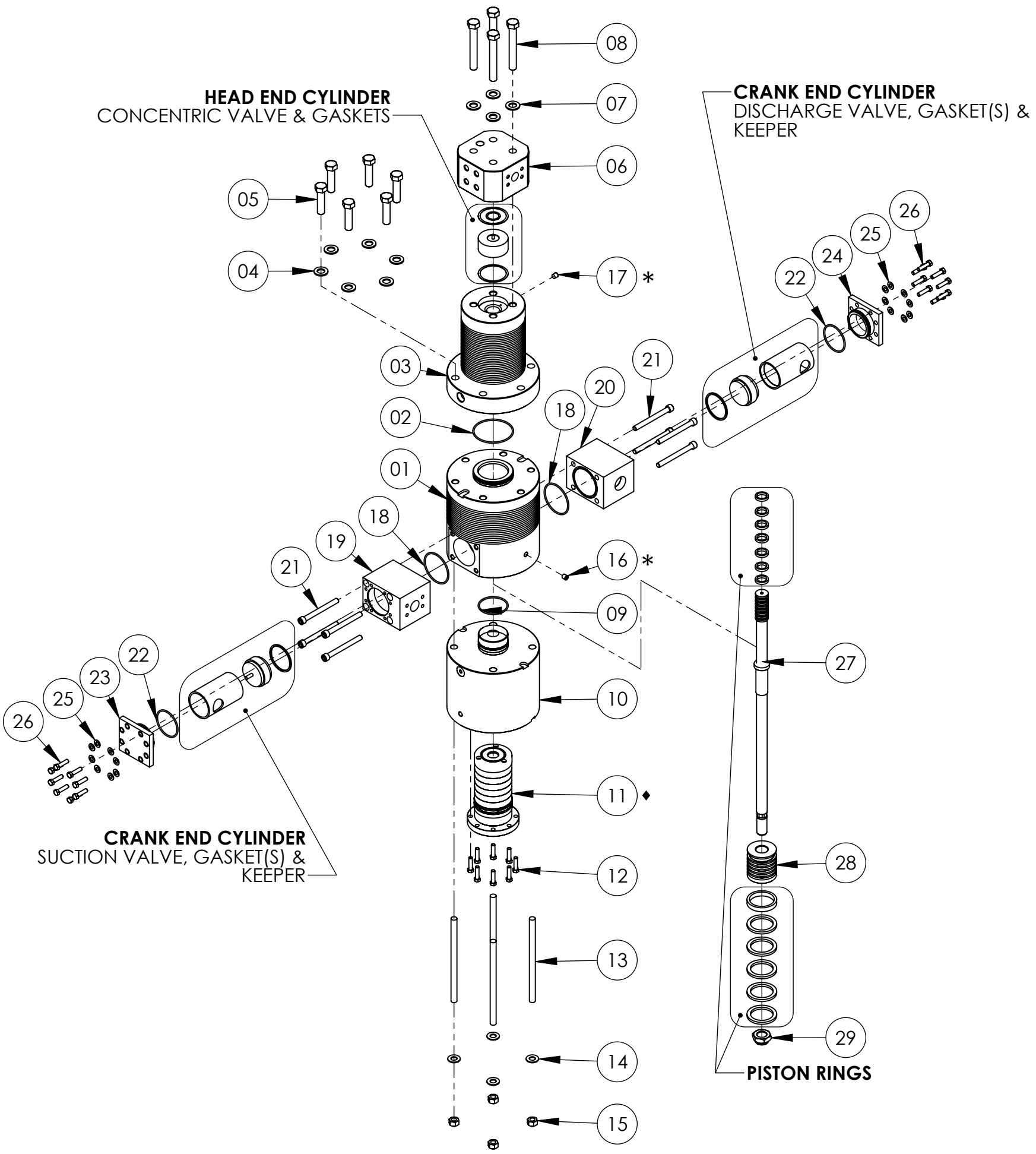
DR.	AC	2015/09/25	SIZE B	DOC. NO. 703498	REV A
CK.	ISF	2015/09/25			
AP.	TFJ	2015/09/25	SCALE 1:32	WEIGHT LBS	SHEET 1 / 1

3.500” Cylinder Assembly

Drawing # 703498 Rev A

Position #	Quantity	Part Number	Description
01	1	625397	CYLINDER 3.500 DA AC - SENSE PORT - 50 SERIES
02	1	625436	CYLINDER HEAD 3.500 BORE - 50 SERIES
03	6	304528	WASHER FLAT GR 8 0.625 PLATED
04	6	307379	BOLT HH CS GR.8 0.625-11UNC X 2.750 PLT
05	2	305560	ORING 2-236 V90D
06	1	625370	SEAL CARRIER 3.500 BORE - 50 SERIES
07	1	303822	PLUG PIPE HOLLOW HEX CS 0.125MNPT
08	1	615978	PACKING CASE COMPLETE - 50 SERIES - 6.16 CAVITY - 1200PSI
09	8	301726	BOLT HH CS GR.5 0.375-16UNC X 1.750 ZN
10	4	200679	STUD - STUD 0.625IN X 9.5 LG
11	4	304528	WASHER FLAT GR 8 0.625 PLATED
12	4	301765	NUT HEX CS GR.8 0.625UNC PLATED
13	2	303824	PLUG PIPE HOLLOW HEX CS 0.250MNPT
14	4	305563	ORING 2-237 V90D
15	1	201048-20F	MANIFOLD 1.25IN FLANGE 1ST STG VALVE
16	1	201048-24N	MANIFOLD 1 1/2 IN NPT
17	8	317008	SHCS CS 0.500-13UNC X 4.500 ZN
18	8	317008	SHCS CS 0.500-13UNC X 4.500 ZN
19	4	305552	ORING 2-233 V90D
20	4	200266	VALVE HOLDER 2ND STAGE
21	32	301836	WASHER FLAT GR 8 0.375 PLATED
22	32	302785	BOLT HH CS GR.8 0.375-16UNC X 1.500 PLT
23	1	200921	NUT PISTON RETAINING
24	1	200292	WASHER PISTON TOP
25	1	203169-00	PISTON IMW50 3.500 DA STEEL
26	1	201260-01	PISTON ROD IMW50 20.438 LG NECKED
27	1	210103	CROSSHEAD TAPER NUT 1.063

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/09/16	ISF	RJT	TFJ	N/A	FIRST RELEASE



NOTES:

- THIS DRAWING IS APPLICABLE FOR COMBINATIONS OF THE FOLLOWING TANDEM CYLINDERS:

CRANK END	HEAD END
3.500"	1.750"
3.250"	1.625"
3.125"	1.500"
2.750"	1.375"
2.500"	1.250"

- FOR VALVE, GASKET, KEEPER AND PISTON RING PART NUMBERS REFER TO THE APPLICABLE SHEET.
- NOTE THAT COMPONENTS SUPPLIED AND ORIENTATIONS OF PORTS MAY DIFFER IN IMAGE FROM THE COMPONENTS SHOWN ON THIS DRAWING.
- * COMPONENTS MARKED BY AN ASTERISK MAY NOT BE INCLUDED IN ALL CONFIGURATIONS. REFER TO BOM.
- ♦ FULL DETAILS OF PACKING CASE COMPONENTS SHOWN ON ALTERNATE SHEET.

Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

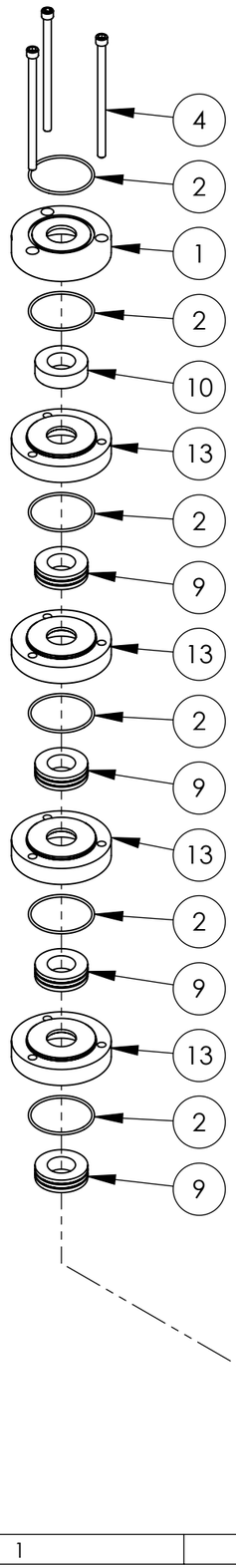
TITLE
ASSEMBLY DRAWING - TANDEM CYLINDER - 3.500-2.500C_1.750-1.250H

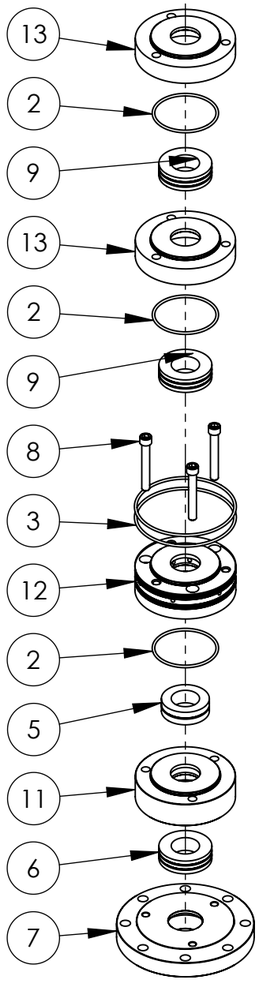
DR. ISF	2015/09/17	SIZE	DOC. NO.		REV
CK. RJT	2015/09/17	B	703463		A
AP. TFJ	2015/09/17	SCALE 1:12	WEIGHT 485.5 LBS		SHEET 1 / 1

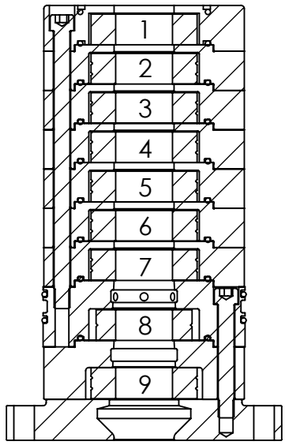
2.750" Cylinder Assembly

Drawing # 703463 Rev A

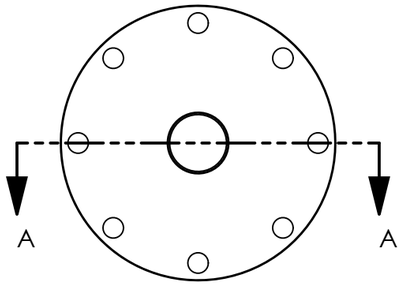
Position #	Quantity	Part Number	Description
01	1	624538-H	CYLINDER 2.750 SACE AC IMW50 - PT PORT - HARDENED
02	1	305579	ORING 2-242 V90D
03	1	619616-H	CYLINDER 1.375 SAHE AC - SENSE PORT - HARDENED - 50 SERIES
04	6	304530	WASHER FLAT GR 8 0.750 PLATED
05	6	303126	BOLT HH CS GR.8 0.750-10UNC X 3.000 PLT
06	1	620364	HEAD 24/54MM VALVE 16F-16F-12N TOP PORT
07	4	304530	WASHER FLAT GR 8 0.750 PLATED
08	4	303213	BOLT HH CS GR.8 0.750-10UNC X 5.500 PLT
09	1	305539	ORING 2-230 V90D
10	1	624553	SEAL CARRIER 2.750 BORE - 50 SERIES
11	1	625704	PACKING CASE COMPLETE - 50 SERIES - 7.69 CAVITY - 3000PSIG
12	8	301726	BOLT HH CS GR.5 0.375-16UNC X 1.750 ZN
13	4	200307	STUD - STUD 0.625IN X 11 1/4 LG
14	4	304528	WASHER FLAT GR 8 0.625 PLATED
15	4	301765	NUT HEX CS GR.8 0.625UNC PLATED
16	1	303824	PLUG PIPE HOLLOW HEX CS 0.250MNPT
17	1	303824	PLUG PIPE HOLLOW HEX CS 0.250MNPT
18	2	305536	ORING 2-229 V90D
19	1	628457	MANIFOLD SACE 37RS - 1.250SF
20	1	628103	MANIFOLD SACE 37RS - 1.000NPT
21	8	317008	SHCS CS 0.500-13UNC X 4.500 ZN
22	2	305521	ORING 2-224 V90D
23	1	628154	VALVE HOLDER 37RS
24	1	628163	VALVE HOLDER 37RS - 0.500NPT PORT
25	12	301823	WASHER FLAT GR 8 0.500 X 1.06 OD PLATED
26	12	303204	BOLT HH CS GR.8 0.500-13UNC X 1.500 PLT
27	1	201420-01	PISTON ROD IMW50 1.375 SAHE







SECTION A-A
SCALE 1 : 3



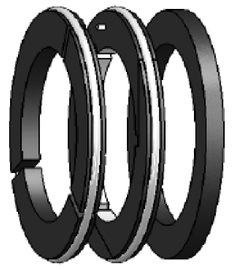
NOTES:
1. REFER TO WI-MF-2011-043 FOR ASSEMBLY INSTRUCTIONS.
2. SHCS TO BE SNUG-TIGHT.

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/06/12	ISF	RJT	TFJ	N/A	FIRST RELEASE

ROD RING ORIENTATIONS

PRESSURE →

GROOVE 1
PRESSURE BREAKER
GROOVES TO FACE PRESSURE



GROOVES 2-7
RADIAL CUT
TANGENT CUT
BACK-UP RING
RADIAL CUT TO FACE PRESSURE

GROOVE 8
DOUBLE STEP
TANGENT PAIR
PINS TO FACE PRESSURE

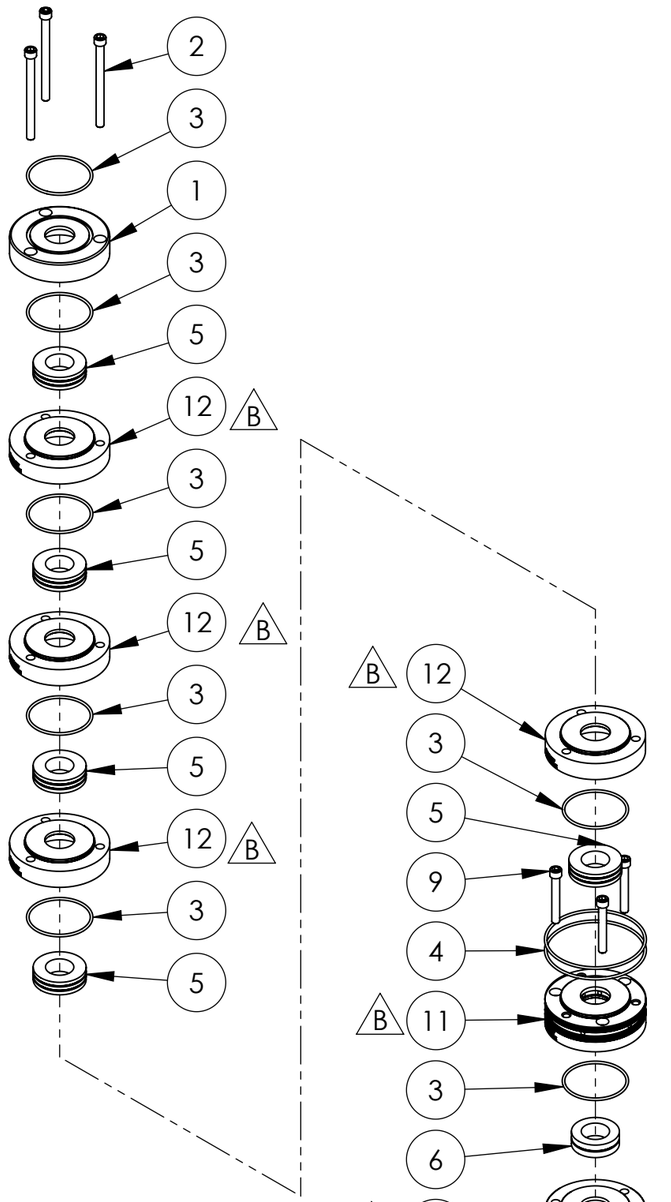
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200308	IMW50 TOP BLOCK	1
2	305407	ORING 2-143 V90D	9
3	305425	ORING 2-153 V75D	2
4	319218	SHCS CS 0.313-24UNF X 5.500	3
5	321124	VENT RING	1
6	332456	WIPER RING	1
7	615960	BASE BLOCK - 50 SERIES PACKING	1
8	617398	SHCS CS 0.313-24UNF X 2.250	3
9	625707	SEALING RING	6
10	625708	BREAKER RING	1
11	625734	WIPER CUP - 50 SERIES PACKING	1
12	625735	VENT BLOCK - 50 SERIES	1
13	625772	STANDARD BLOCK - 50 SERIES	6

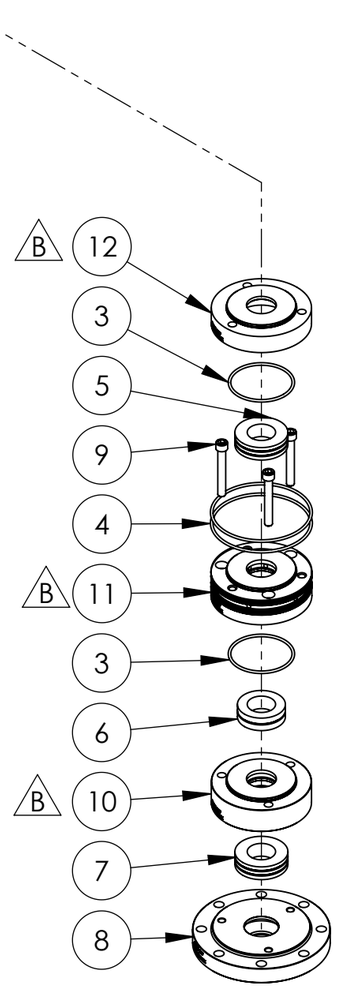
Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

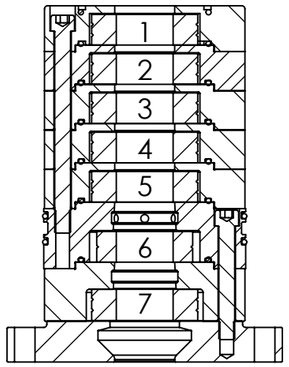
TITLE
PACKING CASE COMPLETE - 50 SERIES - 7.69 CAVITY - 3000PSIG

DR. ISF 2015/06/01	SIZE B	DOC. NO. 625704	REV A	
CK. RJT 2015/06/12				
AP. TFJ 2015/06/12	SCALE 1:6	WEIGHT 24.2 LBS	SHEET 1 / 1	

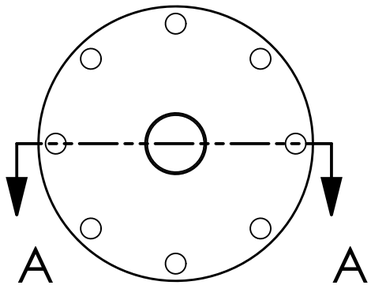
REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
01	2014/07/25	CSM	ISF	CSM	N/A	FIRST RELEASE
A	2014/10/11	ISF	BMB	N/A	N/A	REDUCED SHCS LENGTH FROM 2.500 TO 2.250
B	2015/06/15	ISF	RJT	TFJ	3752	REMOVED 1 X 200309, 1 X 200310, 1 X 615959; ADDED 1 X 625734, 1 X 625735; CHANGED 4 X 200309 TO 4 X 625772



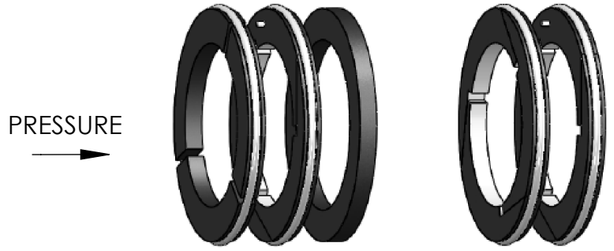




SECTION A-A
SCALE 1 : 3



ROD RING ORIENTATIONS



GROOVES 1-5
RADIAL CUT
TANGENT CUT
BACK-UP RING
RADIAL CUT TO FACE PRESSURE

GROOVE 6
DOUBLE STEP
TANGENT PAIR
PINS TO FACE PRESSURE

NOTES:
1. REFER TO WI-MF-2011-043 FOR ASSEMBLY INSTRUCTIONS.
2. SHCS TO BE SNUG TIGHT.

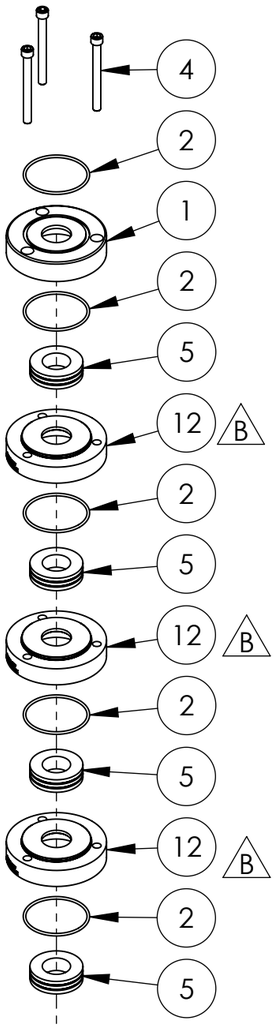
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200308	IMW50 TOP BLOCK	1
2	304686	SHCS CS 0.313-24UNF X 4.000	3
3	305407	ORING 2-143 V90D	7
4	305425	ORING 2-153 V75D	2
5	321123	SEALING RING	5
6	321124	VENT RING	1
7	332456	WIPER RING	1
8	615960	BASE BLOCK - 50 SERIES PACKING	1
9	617398	SHCS CS 0.313-24UNF X 2.250	3
10	625734	WIPER CUP - 50 SERIES PACKING	1
11	625735	VENT BLOCK - 50 SERIES	1
12	625772	STANDARD BLOCK - 50 SERIES	4

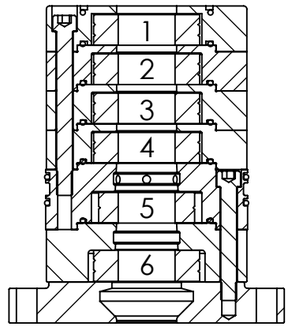
Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

TITLE
PACKING CASE COMPLETE - 50 SERIES - 6.16 CAVITY - 1200PSIG

DR. CSM 2014/07/25	SIZE	DOC. NO.	REV		
CK. ISF 2014/07/30	B	615978	B		
AP. TFJ 2015/06/15	SCALE 1:6	WEIGHT 20.2 LBS	SHEET 1 / 1		

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
1	2014/07/30	CSM	ISF	CSM	N/A	FIRST RELEASE
A	2014/10/20	ISF	BB	N/A	N/A	REDUCED SHCS LENGTH FROM 2.500 TO 2.250
B	2015/06/15	ISF	RJT	TFJ	3752	REMOVED 1 X 200309, 1 X 200310, 1 X 615959; ADDED 1 X 625734, 1 X 625735; CHANGED 3 X 200309 TO 3 X 625772

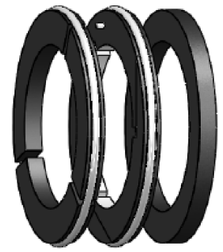




SECTION A-A
SCALE 1 : 3

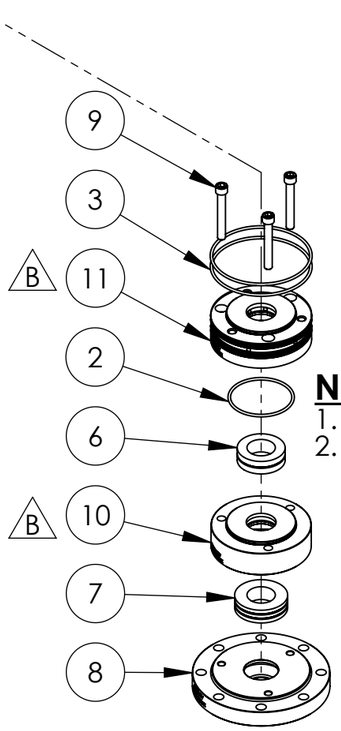
ROD RING ORIENTATIONS

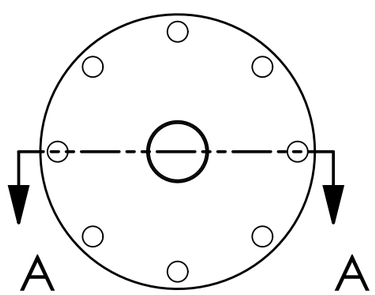
PRESSURE →



GROOVES 1-4
RADIAL CUT
TANGENT CUT
BACK-UP RING
RADIAL CUT TO FACE PRESSURE

GROOVE 5
DOUBLE STEP
TANGENT PAIR
PINS TO FACE PRESSURE





NOTES:
1. REFER TO WI-MF-2011-043 FOR ASSEMBLY INSTRUCTIONS.
2. SHCS TO BE SNUG TIGHT.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200308	IMW50 TOP BLOCK	1
2	305407	ORING 2-143 V90D	6
3	305425	ORING 2-153 V75D	2
4	319184	SHCS CS 0.313-24UNF X 3.250	3
5	321123	SEALING RING	4
6	321124	VENT RING	1
7	332456	WIPER RING	1
8	615960	BASE BLOCK - 50 SERIES PACKING	1
9	617398	SHCS CS 0.313-24UNF X 2.250	3
10	625734	WIPER CUP - 50 SERIES PACKING	1
11	625735	VENT BLOCK - 50 SERIES	1
12	625772	STANDARD BLOCK - 50 SERIES	3

Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

TITLE
PACKING CASE COMPLETE - 50 SERIES - 5.38 CAVITY - 600PSIG

DR. CSM 2014/07/25	SIZE B	DOC. NO. 615976		REV B	
CK. ISF 2014/07/30					
AP. TFJ 2015/06/15	SCALE 1:6	WEIGHT 18.2 LBS	SHEET 1 / 1		

13 APPENDIX B: INSTALLATION DOCUMENTS LIST

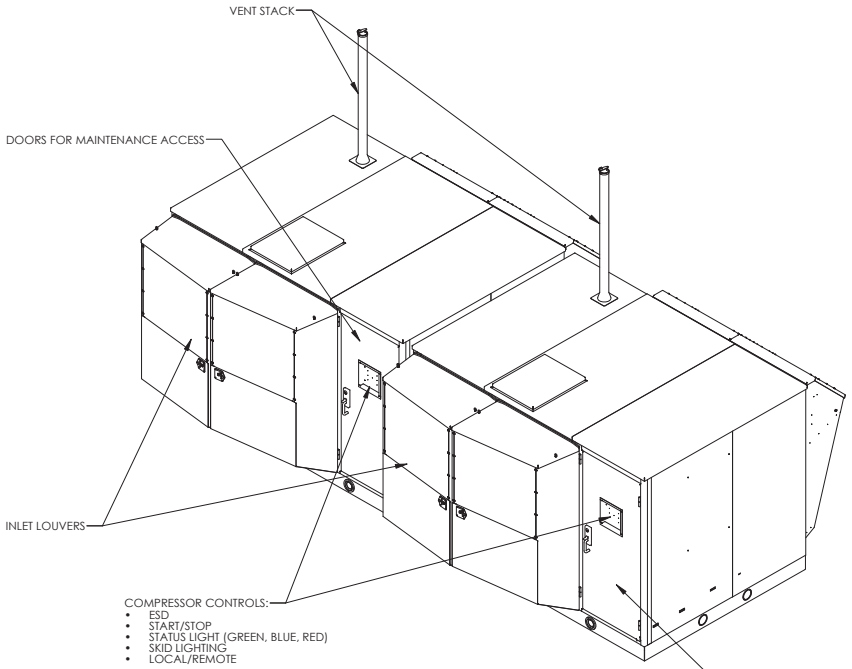
CEC COMPRESSOR MANUAL
INSTALLATION DOCUMENT LIST

The Installation Section of the CEC Compressor manual consists mainly of drawings used for site layout and design, as well as piping schematics. Included in this section are also any useful procedures related to or preceding installation.

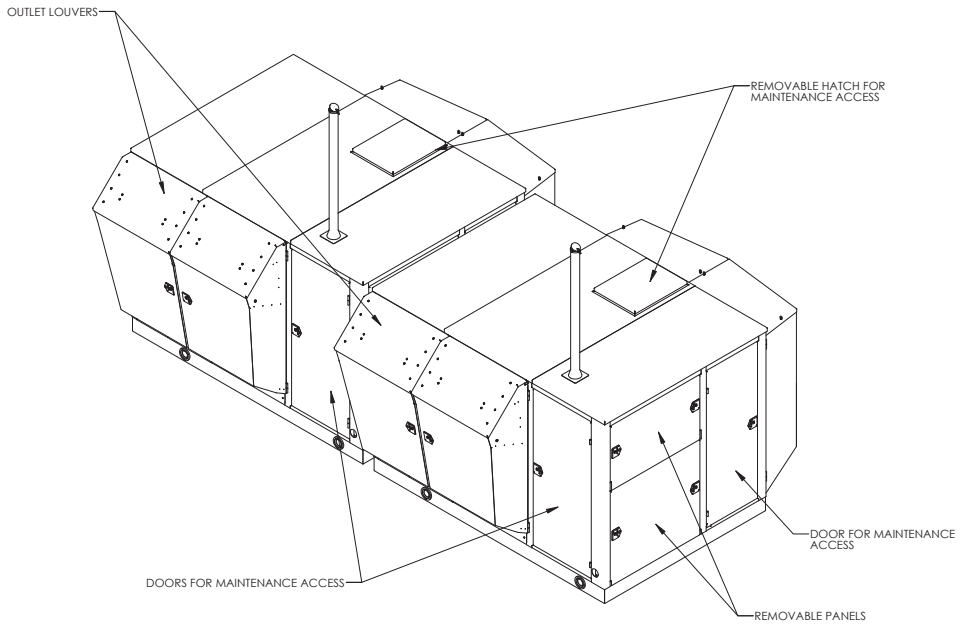
As with the Main Document List, this document lists the complete set of items that comprise the CEC Compressor Manual Installation Section.

Description	Document Number	Revision	Pages
GENERAL ARRANGEMENT DRAWING	702860	E	7
GENERAL ARRANGEMENT CONNECTIONS	702873	C	1
ELECTRICAL SINGLE LINE & CABLE DIAGRAM	703902	A	6
LOAD CALCULATIONS & INSTALLATION SCHEDULE	703901	A	3
SCHEMATIC	632901	A	11
TERMINATION DRAWING	703882	A	11
GROUNDING DRAWING	703762	A	4
MCC SCHEMATIC	703455	C	15
MCC-C SCHEMATIC	703456	B	14
MCP SCHEMATIC	703353	C	17
COMPRESSOR PIPING IMW50	703356	B	1
COMPRESSOR GAS PIPING BILL OF MATERIALS	703851	A	4
PRIORITY PANEL FLOW P&ID	703855	B	1
PRIORITY PANEL FLOW P&ID BOM	703856	B	2
PRIORITY PANEL ELECTRICAL SCHEMATIC & CONDUIT SCHEDULE	703166	C	10
PRIORITY PANEL GENERAL ARRANGEMENT	702692	B	3
PRIORITY PANEL GENERAL ARRANGEMENT CONNECTIONS	704209	A	1
PRIORITY PANEL CONNECTIONS SPECIFICATION	704210	A	1

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
C	2015/07/14	AC	SVW	TC	N/A	UPDATED COG IN SHEET 7C3
D	2015/09/21	AC	RJT	TFJ	N/A	UPDATED ZONES AND NOTES
E	2015/11/12	AC	SVW	TFJ	N/A	UPDATED MOUNTING DIMENSIONS AND NOTES, AND HAZARDOUS ZONE NOTES



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW

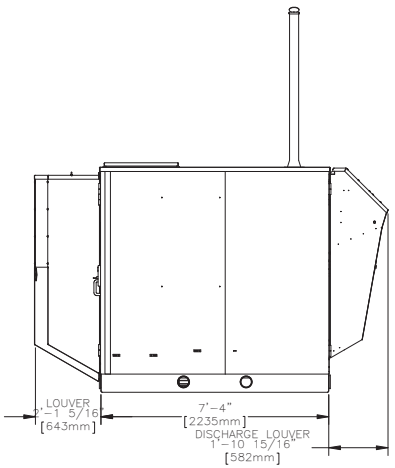
NOTE:
- APPROXIMATE WEIGHT: 34,000LBS (15,422KG) FOR TOTAL COMPRESSOR PACKAGE
- APPROXIMATE WEIGHT: 17,000LBS (7711KG) PER SINGLE COMPRESSOR
- COMPRESSOR UNITS SHOULD BE LIFTED INDIVIDUALLY

Clean Energy COMPRESSION — Chilliwack, B.C., Canada

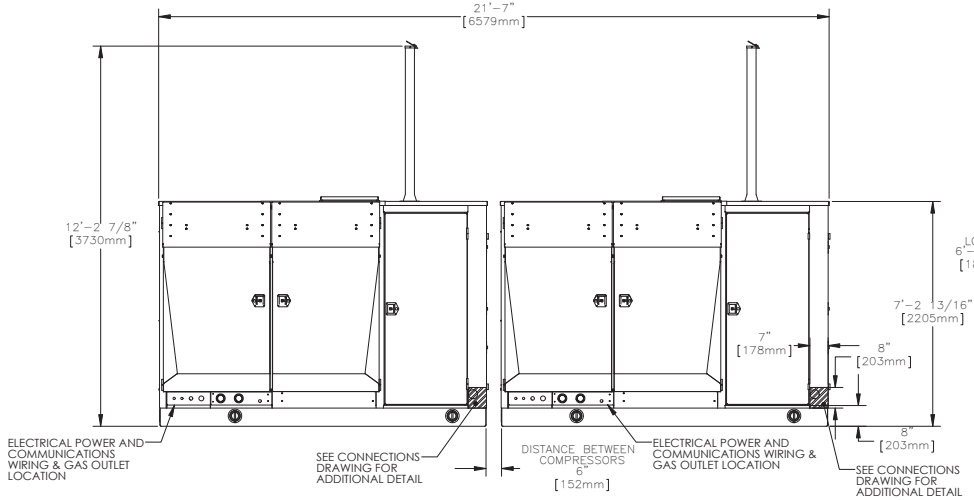
TITLE: TWIN CONFIG COMPRESSOR CONSTRUCTION TRANSMITTAL

DR.	AC	2015/04/24	SIZE	DOC. NO.	REV
CK.	SVW	2015/04/24	D	702860	E
AP.	TFJ	2015/04/24	SCALE 1:24		SHEET 1 / 7

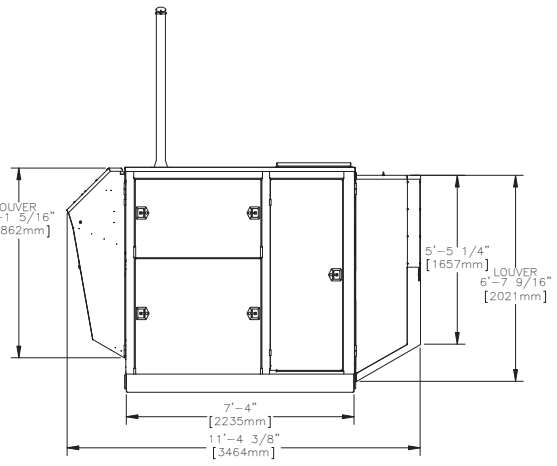
REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
-	-	-	-	-	-	SEE SHEET1



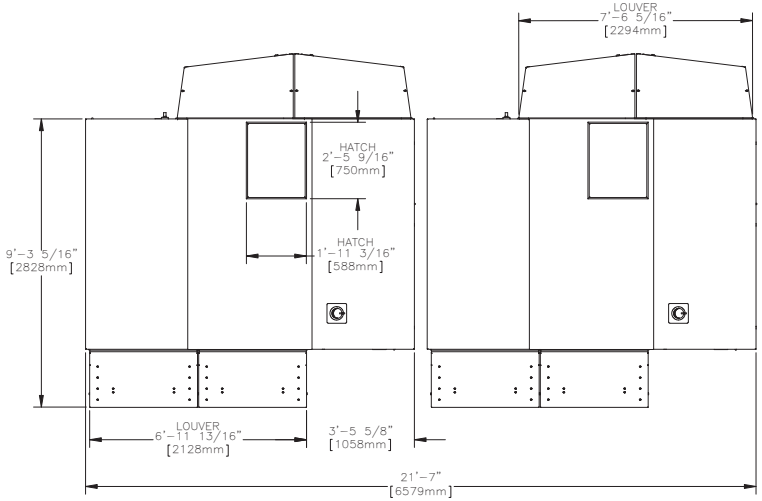
COMPRESSOR RIGHT VIEW



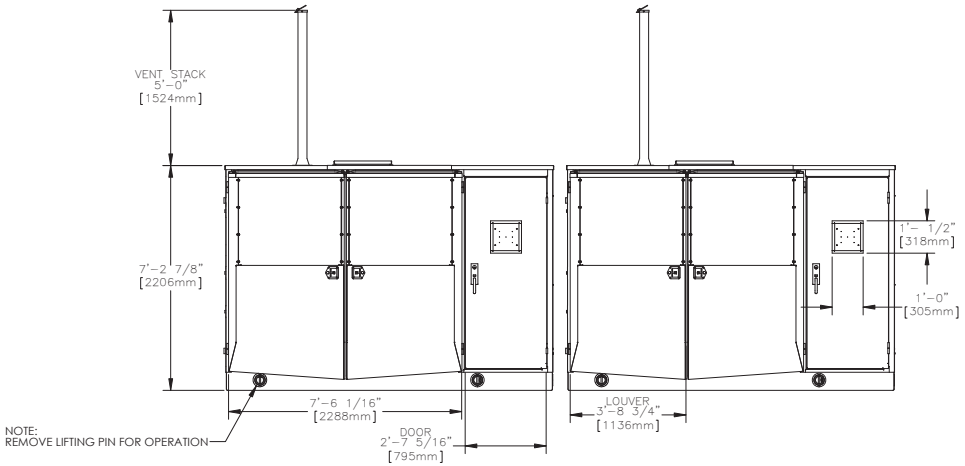
COMPRESSOR REAR VIEW



COMPRESSOR LEFT VIEW



COMPRESSOR PLAN VIEW



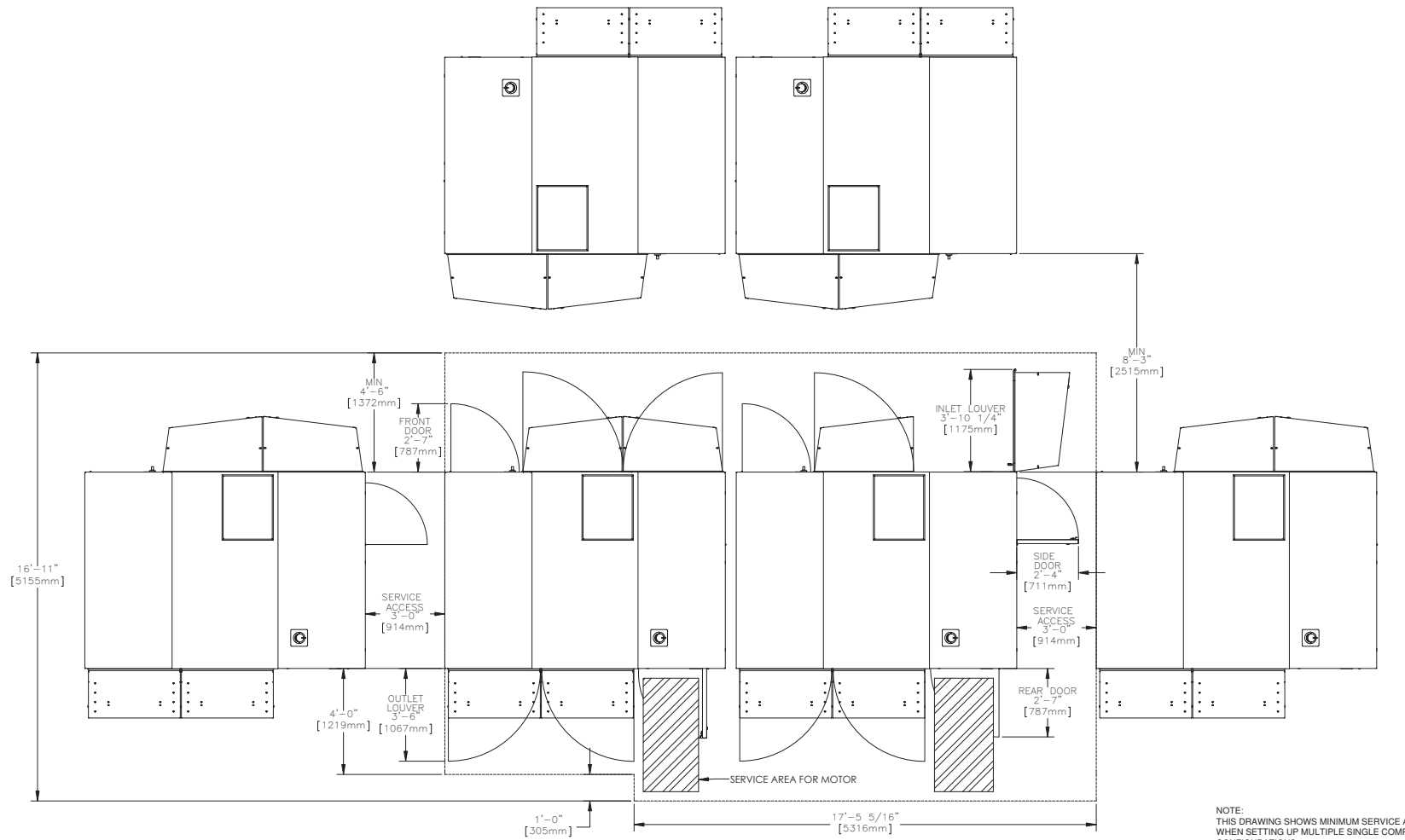
COMPRESSOR FRONT VIEW

Clean Energy COMPRESSION
Chilliwack, B.C., Canada

TITLE
TWIN CONFIG COMPRESSOR
CONSTRUCTION TRANSMITTAL

DR.	AC	2015/04/24	SIZE	DOC. NO.	REV
CK.	SVW	2015/04/24	D	702860	E
AP.	TFJ	2015/04/24	SCALE 1:24		SHEET 2 / 7

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
-	-	-	-	-	-	SEE SHEET1



TOP VIEW - SHOWING DOOR/LOUVER OPENINGS AND REQUIRED CLEARANCE FOR AIRFLOW

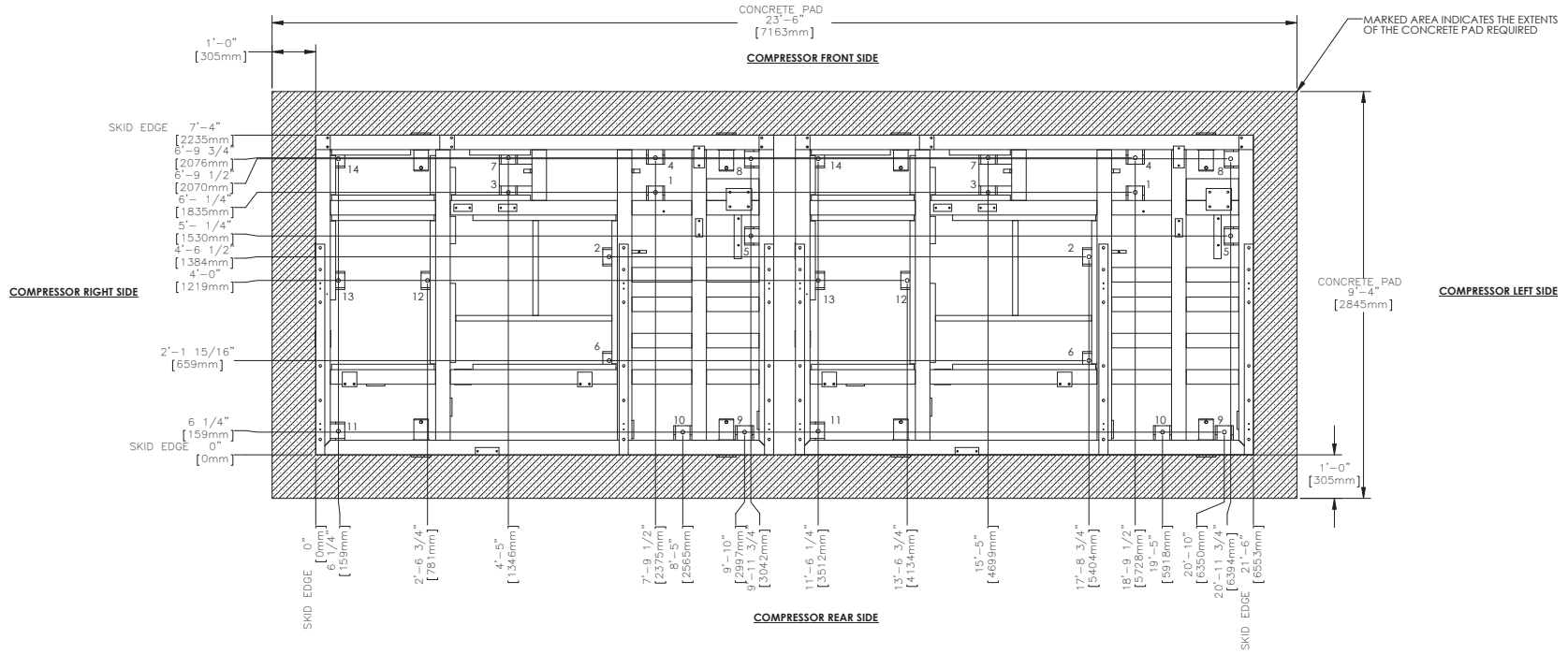
NOTE:
THIS DRAWING SHOWS MINIMUM SERVICE ACCESS NEEDED
WHEN SETTING UP MULTIPLE SINGLE COMPRESSOR
CONFIGURATIONS

Clean Energy COMPRESSION
Chilliwack, B.C., Canada

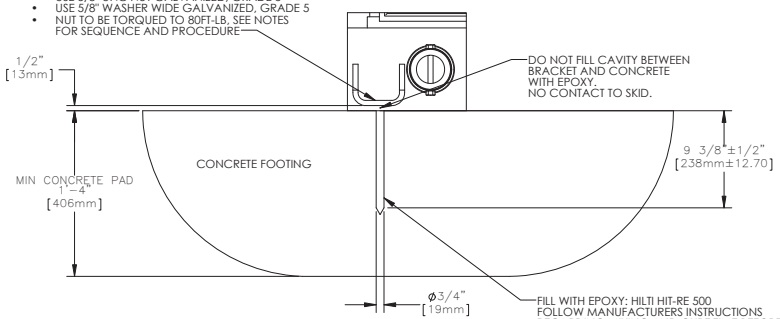
TITLE
TWIN CONFIG COMPRESSOR
CONSTRUCTION TRANSMITTAL

DR.	AC	2015/04/24	SIZE	DOC. NO.	REV
CK.	SVW	2015/04/24	D	702860	E
AP.	TFJ	2015/04/24	SCALE 1:24		SHEET 3 / 7

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
-	-	-	-	-	-	SEE SHEET1



NOTE:
- USE 5/8" UNC ALL THREADED ROD ASTM A193 GR. B7 X 12" GALVANIZED
- USE 5/8" UNC NUT GALVANIZED, GRADE 5
- USE 5/8" WASHER WIDE GALVANIZED, GRADE 5
- NUT TO BE TORQUED TO 80FT-LB, SEE NOTES FOR SEQUENCE AND PROCEDURE



TORQUE ACCORDING TO SEQUENCE INDICATED BY NUMBERS WITHIN SKID DRAWING ABOVE. TORQUE SEQUENCE HAS TO BE APPLIED TO BOTH SKIDS IN THE SAME MANNER
1. TORQUE ALL NUTS TO 30FT-LB
2. TORQUE ALL NUTS TO 60FT-LB
3. TORQUE ALL NUTS TO 80FT-LB

SKID BOLTING LOCATIONS

(INTERNAL COMPONENTS HIDDEN FOR CLARITY)

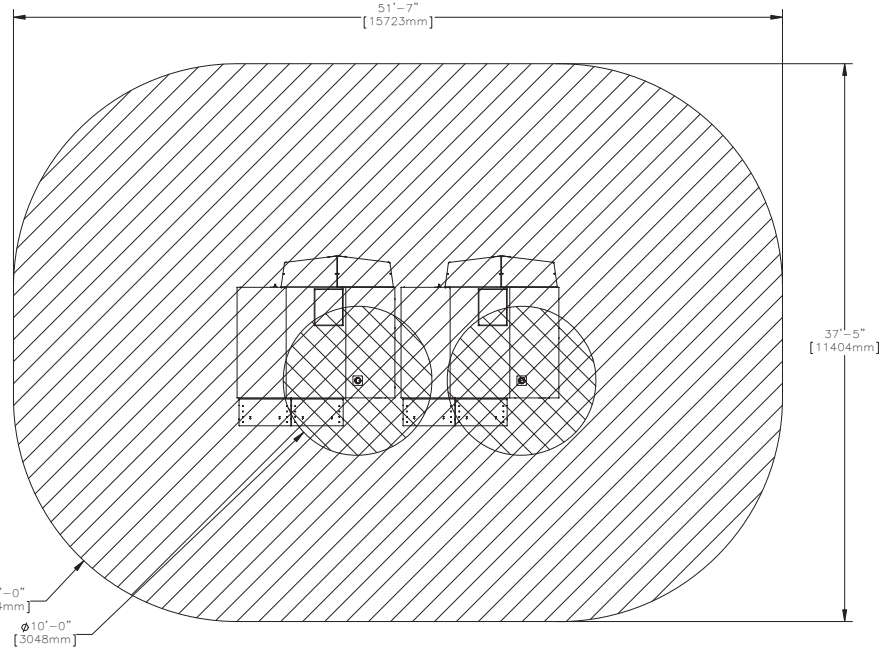
NOTE:
1. FOR INFORMATION REGARDING ANCHORS AND INSTALLATION, REFER TO CLEAN ENERGY COMPRESSION SITE PREPARATION MANUAL

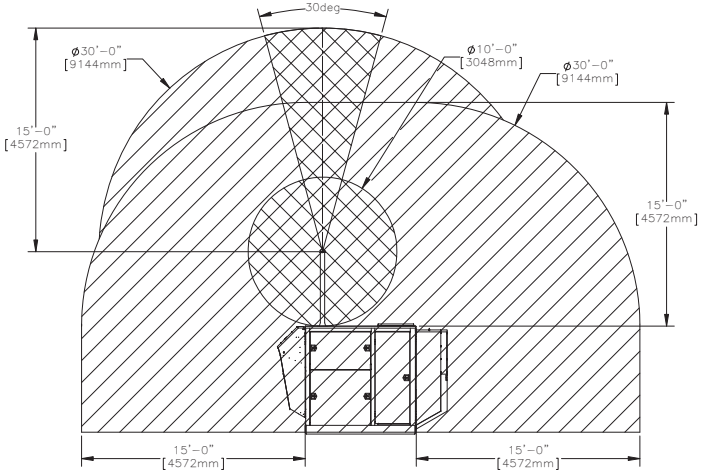
Clean Energy COMPRESSION Chilliwack, B.C., Canada

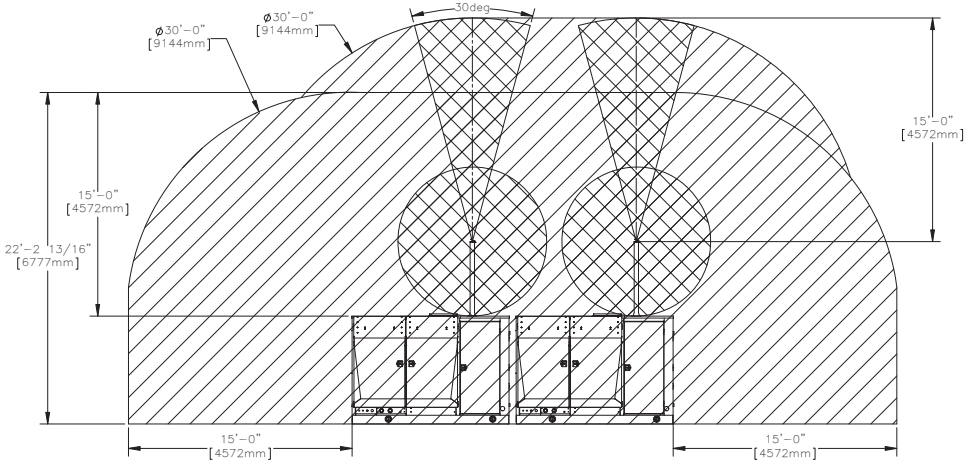
TITLE: TWIN CONFIG COMPRESSOR CONSTRUCTION TRANSMITTAL

DR. AC	2015/04/24	SIZE D	DOC. NO. 702860	REV E
CK. SVW	2015/04/24			
AP. TFJ	2015/04/24	SCALE 1:24		SHEET 4 / 7

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
-	-	-	-	-	-	SEE SHEET1







HAZARDOUS ZONE PER NFPA 52

CLASS I, DIV 1, GROUP D

CLASS I, DIV 2, GROUP D

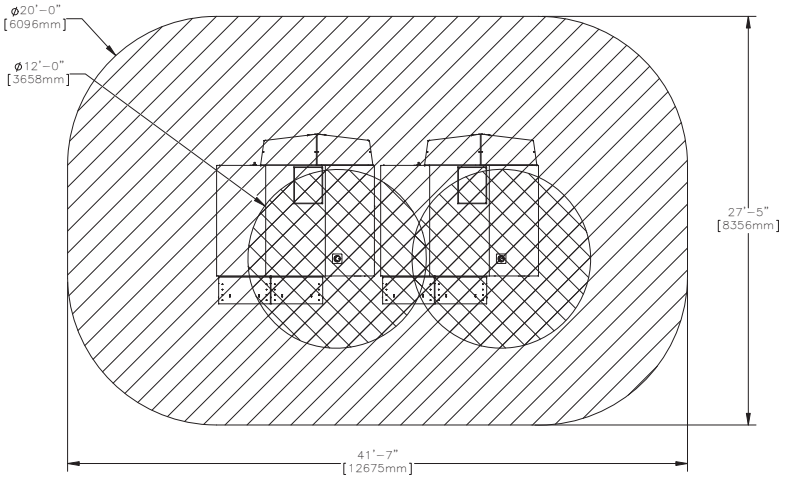
NOTES:
1. THIS DRAWING DEPICTS THE HAZARDOUS AREA CLASSIFIED AS REQUIRED IN COMPLIANCE WITH NFPA 52 FOR PRIVATE CNG FUELING STATION WHEN INSTALLED OUTDOORS WITHOUT ANY ROOF OR CANOPY.
2. THE INTERIOR OF THE COMPRESSOR ENCLOSURE IS CLASSIFIED AS CLASS I DIVISION 2 BASED ON THE INSTALLATION OF EXHAUST FAN INTERLOCKED WITH A GAS DETECTOR INSIDE THE ENCLOSURE WHICH FUNCTIONS TO SHUT DOWN THE GAS SUPPLY AND COMPRESSORS, AND ACTIVATE THE EXHAUST FAN WHEN THE CONCENTRATION OF GAS WITHIN THE ENCLOSURE REACHES 20% OF THE LOWER EXPLOSIVE LIMIT (LEL). THE EXHAUST FAN INCORPORATES CONTROLS FOR MANUAL ACTIVATION.
3. IN THE EVENT THAT A GAS CONCENTRATION OF 40% LEL IS DETECTED IN THE COMPRESSOR ENCLOSURE, A STATION SHUTDOWN SHALL OCCUR IMMEDIATELY ALONG WITH THE ISOLATION OF POWER TO ALL COMPONENTS THAT ARE NOT RATED FOR CLASS I DIVISION 1 AS A MINIMUM IN THE ENCLOSURE.
4. VENT PIPING SHIPPED LOOSE AND TO BE INSTALLED ON SITE.
5. LOCATION OF COMPRESSOR ON SITE SHALL COMPLY WITH NFPA 52.
6. ELECTRICAL CLASSIFICATION FROM THE ENCLOSURE OPENINGS UP TO 15 FEET IS CLASS I, DIV 2, GROUP D.
7. HAZARDOUS ZONE CLASSIFIED IN ACCORDANCE WITH NFPA 52-2013 SEC 7.4.2.9

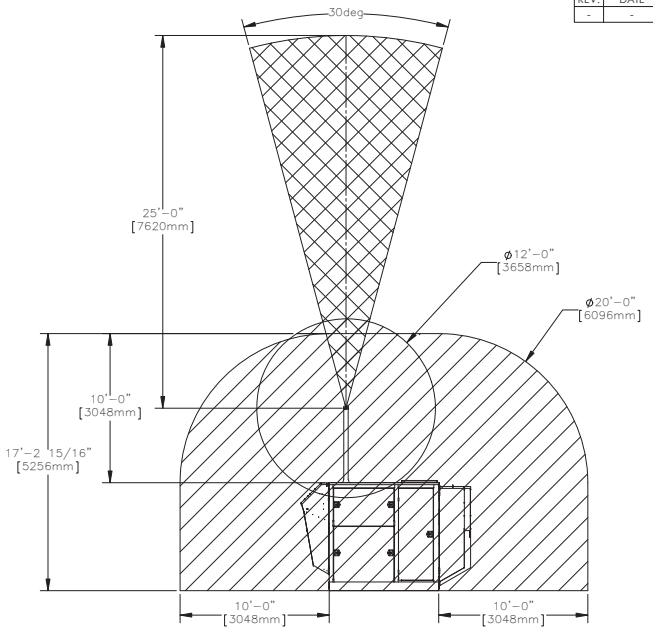
Clean Energy COMPRESSION — Chilliwack, B.C., Canada

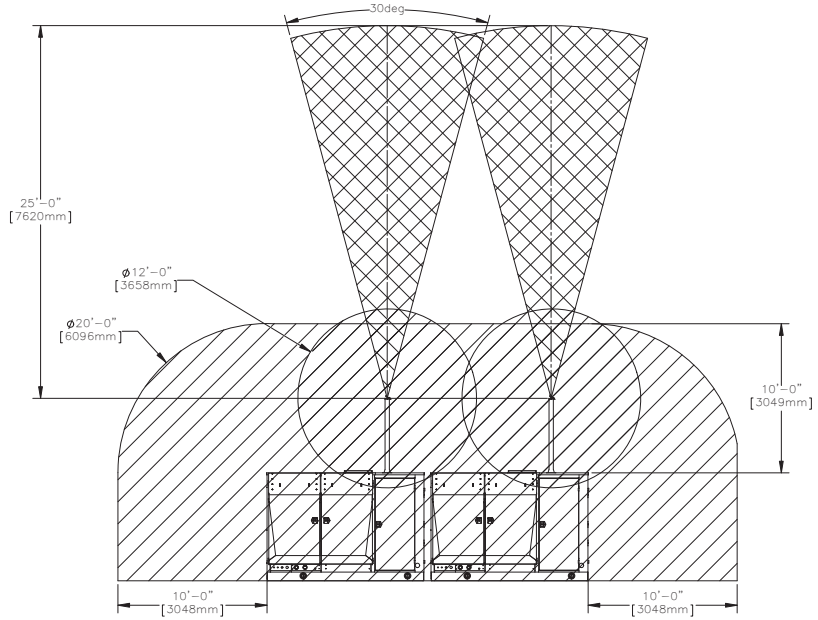
TITLE: TWIN CONFIG COMPRESSOR CONSTRUCTION TRANSMITTAL

DR.	AC	2015/04/24	SIZE	DOC. NO.	REV
CK.	SVW	2015/04/24	D	702860	E
AP.	TFJ	2015/04/24	SCALE 1:24		SHEET 5 / 7

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
-	-	-	-	-	-	SEE SHEET1







HAZARDOUS ZONE PER CSA B108

CLASS I, ZONE 1, GROUP IIA

CLASS I, ZONE 2, GROUP IIA

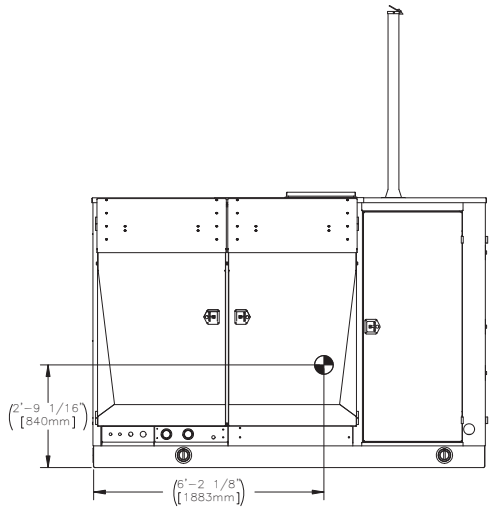
NOTES:
1. THIS DRAWING DEPICTS THE HAZARDOUS AREA CLASSIFIED AS REQUIRED IN COMPLIANCE WITH CSA B108 FOR A PRIVATE CNG FUELING STATION WHEN INSTALLED OUTDOORS WITHOUT ANY ROOF OR CANOPY.
2. THE INTERIOR OF THE COMPRESSOR ENCLOSURE IS CLASSIFIED AS CLASS I ZONE 2 GROUP II A (DIV 2, GROUP D) BASED ON THE INSTALLATION OF EXHAUST FAN INTERLOCKED WITH A GAS DETECTOR INSIDE THE ENCLOSURE WHICH FUNCTIONS TO SHUT DOWN THE GAS SUPPLY AND COMPRESSORS, AND ACTIVATE THE EXHAUST FAN WHEN THE CONCENTRATION OF GAS WITHIN THE ENCLOSURE REACHES 10% OF THE LOWER EXPLOSIVE LIMIT (LEL). THE EXHAUST FAN INCORPORATES CONTROLS FOR MANUAL ACTIVATION.
3. IN THE EVENT THAT A GAS CONCENTRATION OF 20% LEL IS DETECTED IN THE COMPRESSOR ENCLOSURE, A STATION SHUTDOWN SHALL OCCUR IMMEDIATELY ALONG WITH THE ISOLATION OF POWER TO ALL COMPONENTS THAT ARE NOT RATED FOR CLASS 1 DIVISION 1 AS A MINIMUM IN THE ENCLOSURE.
4. VENT PIPING SHIPPED LOOSE AND TO BE INSTALLED ON SITE.
5. LOCATION OF COMPRESSOR ON SITE SHALL COMPLY WITH CSA B 108.
6. ELECTRICAL CLASSIFICATION FROM THE ENCLOSURE OPENINGS UP TO 10 FEET IS CLASS I, ZONE 2 GROUP II A (DIV 2, GROUP D).
7. HAZARDOUS ZONE CLASSIFIED IN ACCORDANCE WITH CSA B108-2006 SEC 4.2 & 7.15

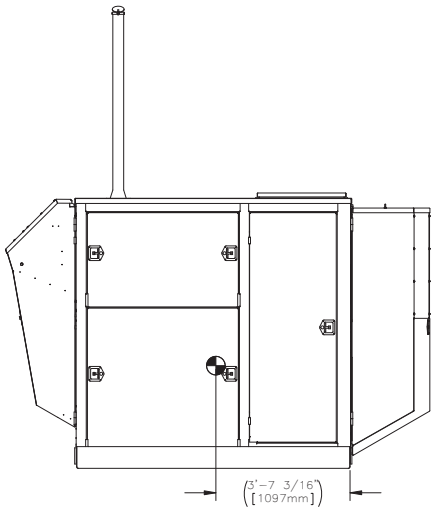
Clean Energy COMPRESSION — Chilliwack, B.C., Canada

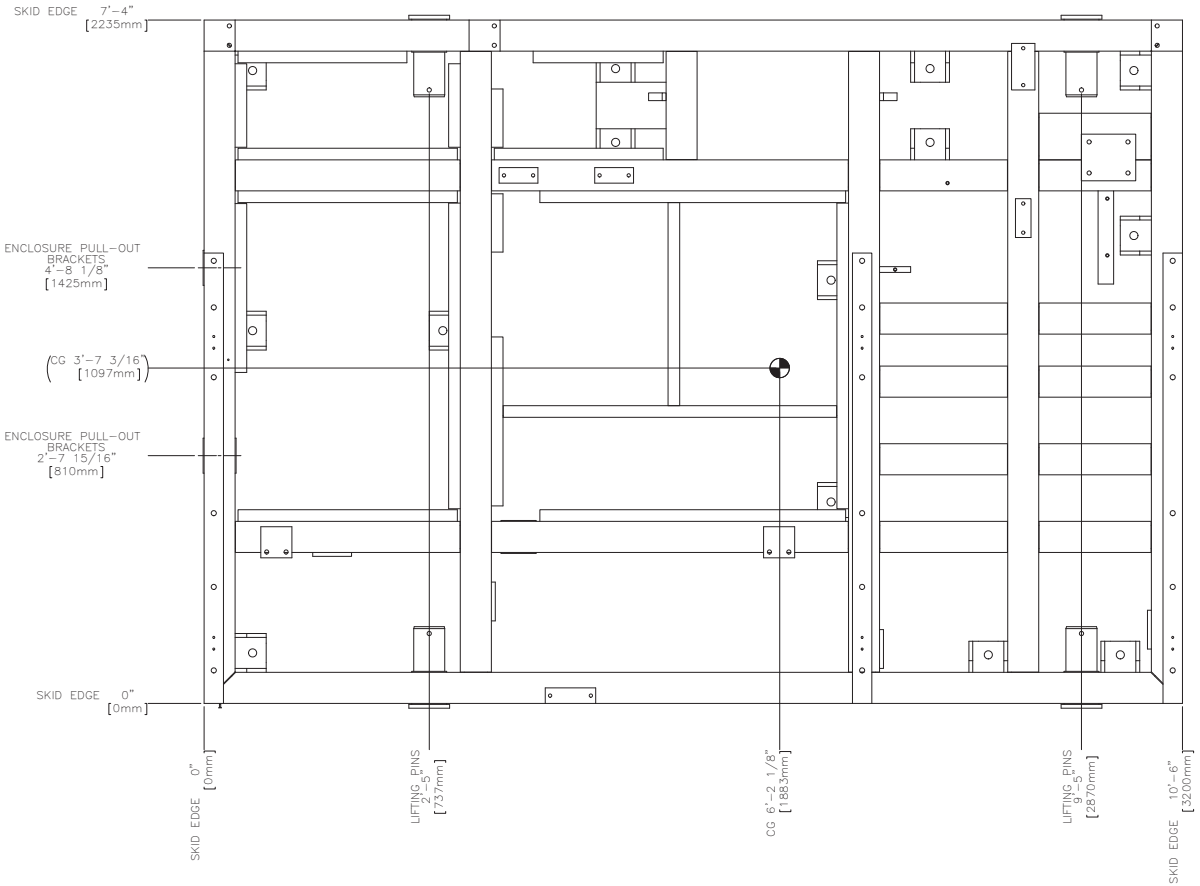
TITLE: TWIN CONFIG COMPRESSOR CONSTRUCTION TRANSMITTAL

DR. AC	2015/04/24	SIZE D	DOC. NO. 702860	REV E
CK. SVW	2015/04/24			
AP. TFJ	2015/04/24	SCALE 1:24		SHEET 6 / 7

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
-	-	-	-	-	-	SEE SHEET1







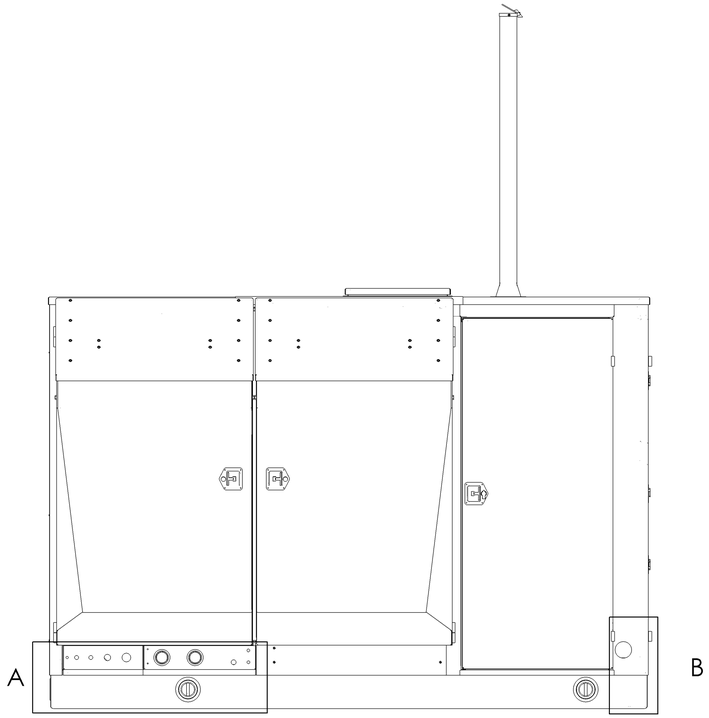
NOTE:
- LIFTING PINS P/N 624814
- UNIT NOT TO BE LIFTED WITH LOUVERS IN PLACE
- USE ALL FOUR LIFTING PINS TO LIFT THE UNIT
- USE OF SPREADER BAR IS REQUIRED
- NO LIFTING CABLES TO TOUCH ENCLOSURE
- CENTRE OF GRAVITY DIMENSIONS ARE TO BE USED AS REFERENCE ONLY. THESE DIMENSIONS ARE SUBJECT TO CHANGE

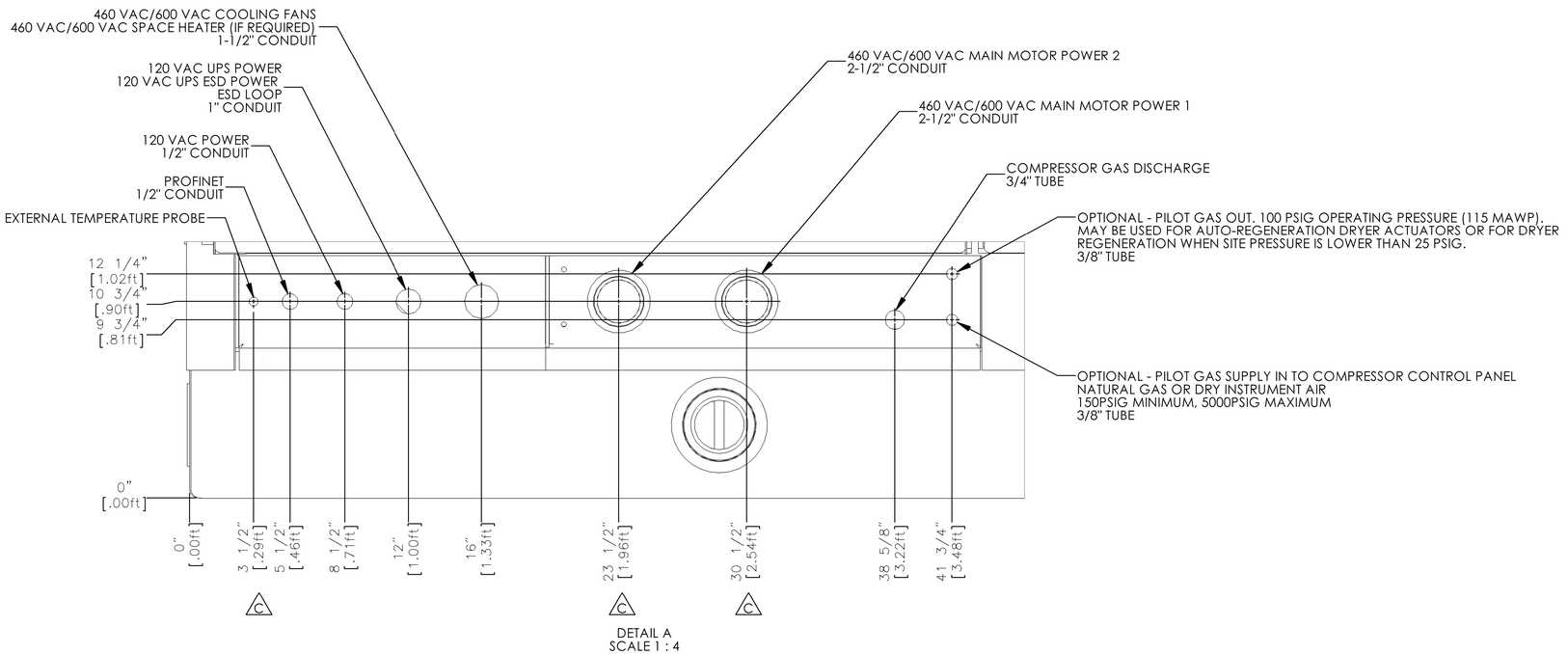
Clean Energy COMPRESSION
Chilliwack, B.C., Canada

TITLE: TWIN CONFIG COMPRESSOR CONSTRUCTION TRANSMITTAL

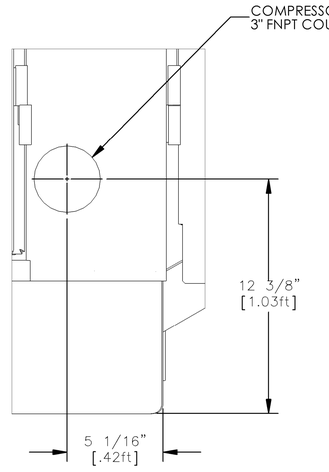
DR. AC	2015/04/24	SIZE D	DOC. NO. 702860	REV E
CK. SVW	2015/04/24			
AP. TFJ	2015/04/24	SCALE 1:24		SHEET 7 / 7

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/04/27	AC	SVW	TFJ	N/A	INITIAL RELEASE
B	2015/08/20	AC	SVW	TFJ	N/A	UPDATED CONDUIT SIZES, ADDED 600VAC
C	201602/19	AC	RJT	TFJ	N/A	ADDED MAIN MOTOR AND EXTERNAL TEMPERATURE PROBE LOCATIONS





DETAIL A
SCALE 1 : 4



DETAIL B
SCALE 1 : 4

Clean Energy COMPRESSION
Chilliwack, B.C., Canada

TITLE
SINGLE CONFIG COMPRESSOR 460VAC/600VAC CONNECTIONS

DR. AC	2015/04/27	SIZE	DOC. NO.		REV
CK. SVW	2015/04/27	D	702873		C
AP. TFJ	2015/05/12	SCALE 1:32		SHEET 1 / 1	

NOTES

1.WIRING SHALL COMPLY WITH NFPA 2015 OR LOCAL CODE ELECTRICAL INSTALLATIONS AND ASSOCIATED STANDARDS FOR HAZARDOUS LOCATIONS AS NEEDED.

2.ALL BOXES AND ENLCOSURES FOR EMERGENCY CIRCUITS SHALL BE PERMANETLY MARKED SO THEY WILL BE READILY IDENTIFIED AS A COMPONENT OF AND EMERGENCY CIRCUTS OR SYSTEMS.

3.CABLE DESIGNATION FOR REFERENCE ONLY.

4.REVISIONS ON DRAWINGS SHALL BE INDICATED BY A TRIANGLE WITH THE REVISION LETTER AS SEEN BELOW: △B

5.SPECIAL NOTES IN THE DRAWING SHALL BE MARKED WITH A HEXAGON AND NOTE NUMBER AS SEEN BELOW: ⬡6

6.CONDUIT AND CABLES TO BE SPECIFIED AND APPROVED BY CUSTOMER.

SHEET REFERENCE

REVISION HISTORY

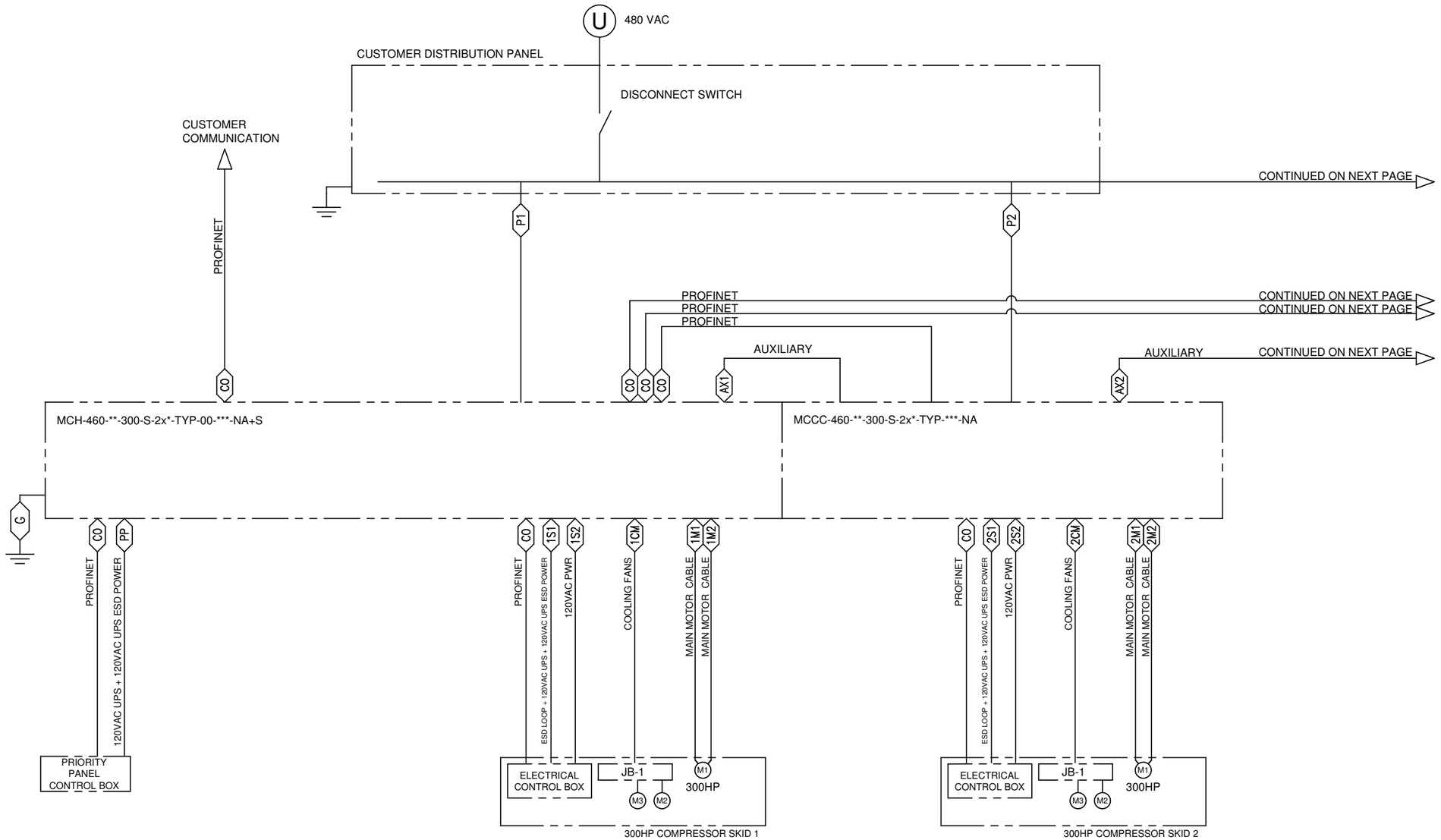
REV.	DATE	BY	CK.	AP.	ECO #	REFERENCE
A	2016-03-10	MJ	MAE	BMB	--	FIRST RELEASE

Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE
SITE ELECTRICAL CLEANCNG-460-300-TYP-11241000000
Revision History

DR. | MJ	2016-03-09	SIZE B	DOC. NO. 703902	REV A
CK. | MAE	2016-03-10			
AP. | BMB	2016-03-10	SCALE: N/A	SHEET: 1 /6	



Clean Energy COMPRESSION

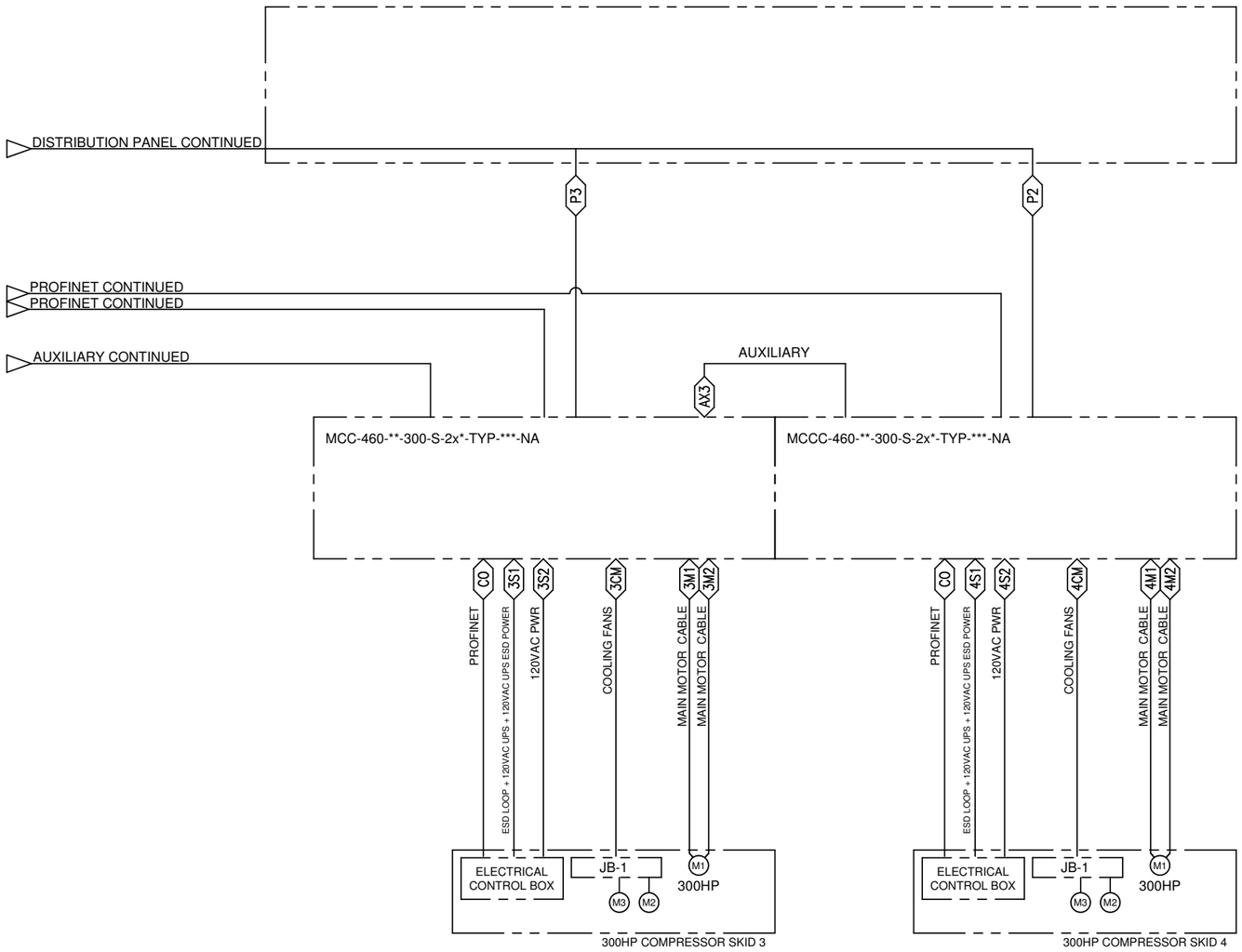
Chilliwack, B.C., Canada

TITLE

SITE ELECTRICAL CLEANCNG-460-300-TYP-11241000000

Electrical Single Line diagram

DR. | MJ	2016-03-09	SIZE	DOC. NO.		REV
CK. | MAE	2016-03-10	B	703902		A
AP. | BMB	2016-03-10	SCALE: N/A		SHEET:	2 /6



Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE

SITE ELECTRICAL CLEANCNG-460-300-TYP-11241000000

Electrical Single Line diagram

DR. | MJ	2016-03-09	SIZE	DOC. NO.		REV
CK. | MAE	2016-03-10	B	703902		A
AP. | BMB	2016-03-10	SCALE: N/A		SHEET:	3 /6

CONDUIT #P1	MCH MAIN POWER FEED
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED CABLE:	2x250 MCM, 3C+E CABLE

CONDUIT #P2	MCCC MAIN POWER FEED
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED CABLE:	2x250 MCM, 3C+E CABLE

CONDUIT #P3	MCC MAIN POWER FEED
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED CABLE:	2x250 MCM, 3C+E CABLE

CONDUIT #G	CONTROL GROUND
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE
RECOMMENDED CABLE:	2/0 AWG STRANDED WIRE (GREEN) 1000V

CONDUIT #CO	COMMUNICATION
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE
RECOMMENDED CABLE:	CAT5e OR CAT6 ETHERNET CABLE(WITH RJ45 CONNECTOR) IN 0.5" RIGID CONDUIT

CONDUIT #AX1	MCH TO MCCC AUXILLARY (POWER AND ESD)
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 12C CABLE, BY 14 AWG CABLE IN 1.0" RIGID CONDUIT

CONNECTIONS:

MCH	MCCC	TYPE	DESCRIPTION
C-X1	C-X1	T90 STRANDED, AWG 14	120VAC POWER
C-X2	C-X2	T90 STRANDED, AWG 14	120VAC POWER NEUTRAL
C-UPS	C-UPS	T90 STRANDED, AWG 14	120VAC UPS POWER
U-N	U-N	T90 STRANDED, AWG 14	120VAC UPS POWER NEUTRAL
C-DC	C-DC	T90 STRANDED, AWG 14	24VDC POWER
COM	COM	T90 STRANDED, AWG 14	24VDC POWER COMMON
K12-00	RE-00	T90 STRANDED, AWG 14	RELAY OUTPUT FOR ESD
K12-01	RE-01	T90 STRANDED, AWG 14	RELAY OUTPUT FOR ESD RETURN
C-E1	ESD-IN	T90 STRANDED, AWG 14	ESD LOOP
C-E2	ESD-OUT	T90 STRANDED, AWG 14	ESD LOOP

CONDUIT #AX2	MCCC TO MCC AUXILLARY (ESD)
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 3C+E CABLE, BY 14 AWG CABLE IN 0.5" RIGID CONDUIT

CONNECTIONS:

MCCC	MCC	TYPE	DESCRIPTION
AE1	ESD-IN	T90 STRANDED, AWG 14	ESD LOOP
AE2	ESD-OUT	T90 STRANDED, AWG 14	ESD LOOP

CONDUIT #AX3	MCC TO MCCC AUXILLARY (POWER AND ESD)
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 12C CABLE, BY 14 AWG CABLE IN 1.0" RIGID CONDUIT

CONNECTIONS:

MCC	MCCC	TYPE	DESCRIPTION
C-X1	C-X1	T90 STRANDED, AWG 14	120VAC POWER
C-X2	C-X2	T90 STRANDED, AWG 14	120VAC POWER NEUTRAL
C-UPS	C-UPS	T90 STRANDED, AWG 14	120VAC UPS POWER
U-N	U-N	T90 STRANDED, AWG 14	120VAC UPS POWER NEUTRAL
C-DC	C-DC	T90 STRANDED, AWG 14	24VDC POWER
COM	COM	T90 STRANDED, AWG 14	24VDC POWER COMMON
K12-00	RE-00	T90 STRANDED, AWG 14	RELAY OUTPUT FOR ESD
K12-01	RE-01	T90 STRANDED, AWG 14	RELAY OUTPUT FOR ESD RETURN
AE1	ESD-IN	T90 STRANDED, AWG 14	ESD LOOP
AE2	ESD-OUT	T90 STRANDED, AWG 14	ESD LOOP

CONDUIT #PP	PRIORITY PANEL
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 3C+E CABLE, BY 14 AWG CABLE IN 0.5" RIGID CONDUIT

CONNECTIONS:

MCH	PRIORITY PANEL	TYPE	DESCRIPTION
2U-L	U-L	T90 STRANDED, AWG 14	120VAC UPS POWER
2U-LE	U-LE	T90 STRANDED, AWG 14	120VAC UPS ESD POWER
U-N	U-N	T90 STRANDED, AWG 14	NEUTRAL (UPS)
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #1M1 & #1M2	MAIN MOTOR 300HP - COMP 1
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	2x4/0 AWG, 3C+E CABLE IN 2X (2.5") RIGID CONDUIT

CONNECTIONS:

MCH	Main Motor JB	TYPE	DESCRIPTION
SS1-T1	M1-L1	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L1
SS1-T2	M1-L2	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L2
SS1-T3	M1-L3	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L3

Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE

SITE ELECTRICAL CLEANCNG-460-300-TYP-11241000000

Conduit Lists

DR. | MJ	2016-03-09	SIZE	DOC. NO.		REV
CK. | MAE	2016-03-10	B	703902		A
AP. | BMB	2016-03-10	SCALE: N/A		SHEET:	4 /6

CONDUIT #1CM	COOLING+COOLING/VENT MOTORS - COMP 1
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	1 x 7C CABLE, BY 14 AWG CABLE IN 1.5" RIGID CONDUIT

CONNECTIONS:

MCH1	Motors JB1	TYPE	DESCRIPTION
OL2-T1	M2-L1	T90 STRANDED, AWG 14	VENT/MOT HP-L1
OL2-T2	M2-L2	T90 STRANDED, AWG 14	VENT/MOT HP-L2
OL2-T3	M2-L3	T90 STRANDED, AWG 14	VENT/MOT HP-L3
OL3-T1	M3-L1	T90 STRANDED, AWG 14	COOL/MOT HP-L1
OL3-T2	M3-L2	T90 STRANDED, AWG 14	COOL/MOT HP-L2
OL3-T3	M3-L3	T90 STRANDED, AWG 14	COOL/MOT HP-L3
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #1S2	SKID 1 LIGHT/BLOCK HEATER (120VAC POWER) - COMP 1
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 3C+E CABLE, BY 14 AWG CABLE IN 0.5" RIGID CONDUIT

CONNECTIONS:

MCH1	SKID CONTROL BOX	TYPE	DESCRIPTION
1-L1	1-L1	T90 STRANDED, AWG 14	120VAC POWER-LIGHT
1-L2	1-L2	T90 STRANDED, AWG 14	120VAC POWER-BLOCK HEATER
N	N	T90 STRANDED, AWG 14	NEUTRAL
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #1S1	ESD LOOP+120VAC UPS POWER+120VAC UPS ESD POWER - COMP 1
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 7C CABLE, BY 14 AWG CABLE IN 1" RIGID CONDUIT

CONNECTIONS:

MCH1	SKID CONTROL BOX	TYPE	DESCRIPTION
1U-L	U-L	T90 STRANDED, AWG 14	120VAC UPS POWER
1U-LE	U-LE	T90 STRANDED, AWG 14	120VAC UPS ESD POWER
U-N	U-N	T90 STRANDED, AWG 14	UPS NEUTRAL
1E1	E1	T90 STRANDED, AWG 14	ESDI
1E2	E2	T90 STRANDED, AWG 14	ESDO
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #2M1 & #2M2	MAIN MOTOR 300HP - COMP 2
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	2x4/0 AWG, 3C+E CABLE IN 2X (2.5") RIGID CONDUIT

CONNECTIONS:

MCCC2	Main Motor JB	TYPE	DESCRIPTION
SS1-T1	M1-L1	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L1
SS1-T2	M1-L2	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L2
SS1-T3	M1-L3	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L3

CONDUIT #2CM	COOLING+COOLING/VENT MOTORS - COMP 2
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	1 x 7C CABLE, BY 14 AWG CABLE IN 1.5" RIGID CONDUIT

CONNECTIONS:

MCCC2	Motors JB1	TYPE	DESCRIPTION
OL2-T1	M2-L1	T90 STRANDED, AWG 14	VENT/MOT HP-L1
OL2-T2	M2-L2	T90 STRANDED, AWG 14	VENT/MOT HP-L2
OL2-T3	M2-L3	T90 STRANDED, AWG 14	VENT/MOT HP-L3
OL3-T1	M3-L1	T90 STRANDED, AWG 14	COOL/M0T HP-L1
OL3-T2	M3-L2	T90 STRANDED, AWG 14	COOL/M0T HP-L2
OL3-T3	M3-L3	T90 STRANDED, AWG 14	COOL/M0T HP-L3
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #2S2	SKID 2 LIGHT/BLOCK HEATER (120VAC POWER) - COMP 2
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 3C+E CABLE, BY 14 AWG CABLE IN 0.5" RIGID CONDUIT

CONNECTIONS:

MCCC2	SKID CONTROL BOX	TYPE	DESCRIPTION
1-L1	1-L1	T90 STRANDED, AWG 14	120VAC POWER-LIGHT
1-L2	1-L2	T90 STRANDED, AWG 14	120VAC POWER-BLOCK HEATER
N	N	T90 STRANDED, AWG 14	NEUTRAL
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #2S1	ESD LOOP+120VAC UPS POWER+120VAC UPS ESD POWER - COMP 2
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 7C+E CABLE, BY 14 AWG CABLE IN 1" RIGID CONDUIT

CONNECTIONS:

MCCC2	SKID CONTROL BOX	TYPE	DESCRIPTION
1U-L	U-L	T90 STRANDED, AWG 14	120VAC UPS POWER
1U-LE	U-LE	T90 STRANDED, AWG 14	120VAC UPS ESD POWER
U-N	U-N	T90 STRANDED, AWG 14	UPS NEUTRAL
1E1	E1	T90 STRANDED, AWG 14	ESDI
1E2	E2	T90 STRANDED, AWG 14	ESDO
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #3M1 & #3M2	MAIN MOTOR 300HP - COMP 3
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	2x4/0 AWG, 3C+E CABLE IN 2X (2.5") RIGID CONDUIT

CONNECTIONS:

MCC3	Main Motor JB	TYPE	DESCRIPTION
SS1-T1	M1-L1	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L1
SS1-T2	M1-L2	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L2
SS1-T3	M1-L3	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L3

Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE

SITE ELECTRICAL CLEANCNG-460-300-TYP-11241000000

Conduit Lists

DR. | MJ	2016-03-09	SIZE	DOC. NO.		REV
CK. | MAE	2016-03-10	B	703902		A
AP. | BMB	2016-03-10	SCALE: N/A		SHEET:	5 /6

CONDUIT #3CM	COOLING+COOLING/VENT MOTORS - COMP 3
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	1 x 7C CABLE, BY 14 AWG CABLE IN 1.5" RIGID CONDUIT

CONNECTIONS:

MCC3	Motors JB1	TYPE	DESCRIPTION
OL2-T1	M2-L1	T90 STRANDED, AWG 14	VENT/MOT HP-L1
OL2-T2	M2-L2	T90 STRANDED, AWG 14	VENT/MOT HP-L2
OL2-T3	M2-L3	T90 STRANDED, AWG 14	VENT/MOT HP-L3
OL3-T1	M3-L1	T90 STRANDED, AWG 14	COOL/MOT HP-L1
OL3-T2	M3-L2	T90 STRANDED, AWG 14	COOL/MOT HP-L2
OL3-T3	M3-L3	T90 STRANDED, AWG 14	COOL/MOT HP-L3
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #3S2	SKID 3 LIGHT/BLOCK HEATER (120VAC POWER) - COMP 3
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 3C+E CABLE, BY 14 AWG CABLE IN 0.5" RIGID CONDUIT

CONNECTIONS:

MCC3	SKID CONTROL BOX	TYPE	DESCRIPTION
1-L1	1-L1	T90 STRANDED, AWG 14	120VAC POWER-LIGHT
1-L2	1-L2	T90 STRANDED, AWG 14	120VAC POWER-BLOCK HEATER
N	N	T90 STRANDED, AWG 14	NEUTRAL
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #3S1	ESD LOOP+120VAC UPS POWER+120VAC UPS ESD POWER - COMP 3
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 7C+E CABLE, BY 14 AWG CABLE IN 1" RIGID CONDUIT

CONNECTIONS:

MCC3	SKID CONTROL BOX	TYPE	DESCRIPTION
1U-L	U-L	T90 STRANDED, AWG 14	120VAC UPS POWER
1U-LE	U-LE	T90 STRANDED, AWG 14	120VAC UPS ESD POWER
U-N	U-N	T90 STRANDED, AWG 14	UPS NEUTRAL
1E1	E1	T90 STRANDED, AWG 14	ESDI
1E2	E2	T90 STRANDED, AWG 14	ESDO
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #4M1 & #4M2	MAIN MOTOR 300HP - COMP 4
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	2x4/0 AWG, 3C+E CABLE IN 2X (2.5") RIGID CONDUIT

CONNECTIONS:

MCCC4	Main Motor JB	TYPE	DESCRIPTION
SS1-T1	M1-L1	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L1
SS1-T2	M1-L2	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L2
SS1-T3	M1-L3	T90 STRANDED, 2X4/0 AWG	MOT 300 HP-L3

CONDUIT #4CM	COOLING+COOLING/VENT MOTORS - COMP 4
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	460 VAC, 3PH, 60 HZ
RECOMMENDED:	1 x 7C CABLE, BY 14 AWG CABLE IN 1.5" RIGID CONDUIT

CONNECTIONS:

MCCC4	Motors JB1	TYPE	DESCRIPTION
OL2-T1	M2-L1	T90 STRANDED, AWG 14	VENT/MOT HP-L1
OL2-T2	M2-L2	T90 STRANDED, AWG 14	VENT/MOT HP-L2
OL2-T3	M2-L3	T90 STRANDED, AWG 14	VENT/MOT HP-L3
OL3-T1	M3-L1	T90 STRANDED, AWG 14	COOL/MOT HP-L1
OL3-T2	M3-L2	T90 STRANDED, AWG 14	COOL/MOT HP-L2
OL3-T3	M3-L3	T90 STRANDED, AWG 14	COOL/MOT HP-L3
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #4S2	SKID 4 LIGHT/BLOCK HEATER (120VAC POWER) - COMP 4
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 3C+E CABLE, BY 14 AWG CABLE IN 0.5" RIGID CONDUIT

CONNECTIONS:

MCCC4	SKID CONTROL BOX	TYPE	DESCRIPTION
1-L1	1-L1	T90 STRANDED, AWG 14	120VAC POWER-LIGHT
1-L2	1-L2	T90 STRANDED, AWG 14	120VAC POWER-BLOCK HEATER
N	N	T90 STRANDED, AWG 14	NEUTRAL
GND	GND	T90 STRANDED, AWG 14	GROUND

CONDUIT #4S1	ESD LOOP+120VAC UPS POWER+120VAC UPS ESD POWER - COMP 4
SUPPLIER:	CUSTOMER
WIREING METHOD:	AS PER LOCAL CODE (FRAME GND WIRE)
VOLTAGE:	120 VAC, 1PH
RECOMMENDED:	1 x 7C+E CABLE, BY 14 AWG CABLE IN 1" RIGID CONDUIT

CONNECTIONS:

MCCC4	SKID CONTROL BOX	TYPE	DESCRIPTION
1U-L	U-L	T90 STRANDED, AWG 14	120VAC UPS POWER
1U-LE	U-LE	T90 STRANDED, AWG 14	120VAC UPS ESD POWER
U-N	U-N	T90 STRANDED, AWG 14	UPS NEUTRAL
1E1	E1	T90 STRANDED, AWG 14	ESDI
1E2	E2	T90 STRANDED, AWG 14	ESDO
GND	GND	T90 STRANDED, AWG 14	GROUND

Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE

SITE ELECTRICAL CLEANCNG-460-300-TYP-11241000000

Conduit Lists

DR. | MJ	2016-03-09	SIZE	DOC. NO.		REV
CK. | MAE	2016-03-10	B	703902		A
AP. | BMB	2016-03-10	SCALE: N/A		SHEET:	6 /6

Load Budget and Cable Sizing Calculator

Load Budget

Document No.:	**703901**
Document Rev.:	**A**
Configuration:	**460-300-TYP-2X7FAN-EXT-11241000000**
Compressor Model:	**CleanCNG standard Unit**
MCH MODEL:	**MCH-460-**-300-S-2X7-TYP-00-EXT-NA**
MCC-C MODEL:	**MCCC-460-**-300-S-2X7-TYP-EXT-NA**
MCC MODEL:	**MCC-460-**-300-S-2X7-TYP-EXT-NA**

Source	**Value**	**Unit**
Voltage (Power)	460	VAC
Voltage (Control)	120	VAC
Frequency:	60	Hz

REVISION HISTORY				
REV	DATE (YYYY-MM-DD)	REFERENCE	ECO#	BY / CK / APR
A	2016-03-10	Initial Version	N/A	MJ / MAE / BMB

INCOMING POWER

Main Bus												
Item	**Model**		**Supplier**	**Voltage (V)**	**Phases**	**Consumed Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
MCH1	MCH-460-**-300-S-2X7-TYP-00-EXT-NA		CEC	460	3	310.15	kVA	393.87	0.89	310.15	kVA	
MCCC2	MCCC-460-**-300-S-2X7-TYP-EXT-NA		CEC	460	3	305.15	kVA	383.00	0.89	305.15	kVA	
MCC3	MCC-460-**-300-S-2X7-TYP-EXT-NA		CEC	460	3	310.15	kVA	393.87	0.89	310.15	kVA	
MCCC4	MCCC-460-**-300-S-2X7-TYP-EXT-NA		CEC	460	3	305.15	kVA	383.00	0.89	305.15	kVA	
							TOTAL	**1553.74**		**1230.61**	**kVA**	**upstream steady state**

RATED POWER

MCH1	**MCH-460-**-300-S-2X7-TYP-00-EXT-NA**											
Item	**Model**	**Quantity**	**Supplier**	**Voltage (V)**	**Phases**	**Rated Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
Main Motor Drive	1800RPM 460-3-60 449T TEFC	1		460	3	300	hp	361.00	0.89	287.62	kVA	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
Internal Control Trans.	Control Transformer	1		460	1	5	kVA	10.87	0.90	5.00	kVA	
							TOTAL	**MAX 393.87 A**		**310.15**	**kVA**	**upstream steady state**

MCCC2	**MCCC-460-**-300-S-2X7-TYP-EXT-NA**											
Item	**Model**	**Quantity**	**Supplier**	**Voltage (V)**	**Phases**	**Rated Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
Main Motor Drive	1800RPM 460-3-60 449T TEFC	1		460	3	300	hp	361.00	0.89	287.62	kVA	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
							TOTAL	**MAX 383.00 A**		**305.15**	**kVA**	**upstream steady state**

MCC3	**MCC-460-**-300-S-2X7-TYP-EXT-NA**											
Item	**Model**	**Quantity**	**Supplier**	**Voltage (V)**	**Phases**	**Rated Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
Main Motor Drive	1800RPM 460-3-60 449T TEFC	1		460	3	300	hp	361.00	0.89	287.62	kVA	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
Internal Control Trans.	Control Transformer	1		460	1	5	kVA	10.87	0.90	5.00	kVA	
							TOTAL	**MAX 393.87 A**		**310.15**	**kVA**	**upstream steady state**

MCCC4	**MCCC-460-**-300-S-2X7-TYP-EXT-NA**											
Item	**Model**	**Quantity**	**Supplier**	**Voltage (V)**	**Phases**	**Rated Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
Main Motor Drive	1800RPM 460-3-60 449T TEFC	1		460	3	300	hp	361.00	0.89	287.62	kVA	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	1		460	3	7.5	hp	11.00	0.80	8.76	kVA	
							TOTAL	**MAX 383.00 A**		**305.15**	**kVA**	**upstream steady state**

CONTROL TRANSFORMER LOAD

MCH1 CONTROL TRANSFORMER												
Item		**Quantity**	**Supplier**	**Voltage (V)**	**Phases**	**Rated Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
MCH1 Internal Power	Regular Power	1		120	1	0.59	kVA	4.92	1.00	0.59	kVA	
MCCC2 Power	Regular Power	1		120	1	0.59	kVA	4.92	1.00	0.59	kVA	
CMP Power	Regular Power	2		120	1	0.44	kVA	3.65	1.00	0.88	kVA	
MCH1 UPS Power	Regular Power	1		120	1	1.47	kVA	12.21	1.00	1.47	kVA	
									TOTAL	**3.52**	**kVA**	

MCC3 CONTROL TRANSFORMER												
Item		**Quantity**	**Supplier**	**Voltage (V)**	**Phases**	**Rated Power**	**Power Unit**	**FLA / Unit (A)**	**Power Factor**	**Total Consumed Power**		**Commment**
MCC3 Internal Power	Regular Power	1		120	1	0.59	kVA	4.92	1.00	0.59	kVA	
MCCC4 Power	Regular Power	1		120	1	0.59	kVA	4.92	1.00	0.59	kVA	
CMP Power	Regular Power	2		120	1	0.44	kVA	3.65	1.00	0.88	kVA	
MCC3 UPS Power	Regular Power	1		120	1	0.77	kVA	6.44	1.00	0.77	kVA	
									TOTAL	**2.83**	**kVA**	

UPS POWER LOAD

MCH1 UPS Item		Quantity	Supplier	Voltage (V)	Phases	Rated Power	Power Unit	FLA / Unit (A)	Power Factor	Total Consumed Power		Commment
MCH1 Internal Power	UPS Power	1		120	1	0.88	kVA	7.35	1.00	0.88	kVA	
MCCC2 Internal Power	UPS Power	1		120	1	0.09	kVA	0.72	1.00	0.09	kVA	
Priority Panel Power	UPS Power	1		120	1	0.16	kVA	1.34	1.00	0.16	kVA	
CMP Power	UPS Power	2		120	1	0.17	kVA	1.40	1.00	0.34	kVA	
									TOTAL	**1.47**	**kVA**	

MCC3 UPS Item		Quantity	Supplier	Voltage (V)	Phases	Rated Power	Power Unit	FLA / Unit (A)	Power Factor	Total Consumed Power		Commment
MCC3 Internal Power	UPS Power	1		120	1	0.35	kVA	2.92	1.00	0.35	kVA	
MCCC4 Internal Power	UPS Power	1		120	1	0.09	kVA	0.72	1.00	0.09	kVA	
CMP Power	UPS Power	2		120	1	0.17	kVA	1.40	1.00	0.34	kVA	
									TOTAL	**0.77**	**kVA**	

INCOMING BREAKER AND CABLE SIZING

Main Breaker in Each Panel						Derating	Max/Startup Amps			Voltage Drop (%)			
Item	Model	FLA / Unit (A)	Voltage (V)	Length (m)	Phases	(temp, conduit)	(A)	Size (AWG/KCMIL)	Z/km (Ohms)	Continuous	Startup	Breaker	Comment
MCH1	MCH-460-**-300-S-2X7-TYP-00-EXT-NA	393.87	460	50	3	0.91	1837.87	2x250 MCM, 3C+E CABLE	0.11	0.85%	3.73%	3P 800A	
MCCC2	MCCC-460-**-300-S-2X7-TYP-EXT-NA	383.00	460	50	3	0.91	1827.00	2x250 MCM, 3C+E CABLE	0.11	0.82%	3.63%	3P 800A	
MCC3	MCC-460-**-300-S-2X7-TYP-EXT-NA	393.87	460	50	3	0.91	1837.87	2x250 MCM, 3C+E CABLE	0.11	0.85%	3.73%	3P 800A	
MCCC4	MCCC-460-**-300-S-2X7-TYP-EXT-NA	383.00	460	50	3	0.91	1827.00	2x250 MCM, 3C+E CABLE	0.11	0.82%	3.63%	3P 800A	
SITE Equipment MAIN feed total		1553.74 A				Sequential start	2997.74 A						

OUTGOING BREAKER AND CABLE SIZING

MCH1	MCH-460-**-300-S-2X7-TYP-00-EXT-NA					Derating				Voltage Drop (%)			
Item	Model	FLA / Unit (A)	Voltage (V)	Length (m)	Phases	(temp, conduit)	Max/Startup Amps	Size (AWG/KCMIL)	Z/km (Ohms)	Continuous	Startup	Breaker	Comment
Main Motor Drive	1800RPM 460-3-60 449T TEFC	361.00	460	50	3	0.91	1805.00	2x4/0 AWG, 3C+E CABLE	0.13	0.86%	3.46%	N/A	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	1.70%	3.74%	3P 20A	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	1.70%	3.74%	3P 20A	
MCCC2 Power	Regular Power	4.92	120	50	1	0.73	4.92	14 AWG	10.10	2.07%	2.07%	1P 15A	
CMP Power	Regular Power	3.65	120	50	1	0.73	3.65	14 AWG	10.10	1.54%	1.54%	1P 6A	
MCCC2 Internal Power	UPS Power	0.72	120	50	1	0.73	0.72	14 AWG	10.10	0.30%	0.30%	1P 10A	
Priority Panel Power	UPS Power	1.34	120	50	1	0.73	1.34	14 AWG	10.10	0.56%	0.56%	1P 6A	
CMP Power	UPS Power	1.40	120	50	1	0.73	1.40	14 AWG	10.10	0.59%	0.59%	1P 6A	

MCCC2	MCCC-460-**-300-S-2X7-TYP-EXT-NA					Derating				Voltage Drop (%)			
Item	Model	FLA / Unit (A)	Voltage (V)	Length (m)	Phases	(temp, conduit)	Max/Startup Amps	Size (AWG/KCMIL)	Z/km (Ohms)	Continuous	Startup	Breaker	Comment
Main Motor Drive	1800RPM 460-3-60 449T TEFC	361.00	460	50	3	0.91	1805.00	2x4/0 AWG, 3C+E CABLE	0.13	0.86%	3.46%	N/A	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	1.70%	3.74%	3P 20A	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	1.70%	3.74%	3P 20A	

MCC3	MCC-460-**-300-S-2X7-TYP-EXT-NA					Derating				Voltage Drop (%)			
Item	Model	FLA / Unit (A)	Voltage (V)	Length (m)	Phases	(temp, conduit)	Max/Startup Amps	Size (AWG/KCMIL)	Z/km (Ohms)	Continuous	Startup	Breaker	Comment
Main Motor Drive	1800RPM 460-3-60 449T TEFC	361.00	460	50	3	0.91	1805.00	2x4/0 AWG, 3C+E CABLE	0.13	0.86%	3.46%	N/A	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	1.70%	3.74%	3P 20A	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	1.70%	3.74%	3P 20A	
MCCC4 Power	Regular Power	4.92	120	50	1	0.73	4.92	14 AWG	10.10	2.07%	2.07%	1P 15A	
CMP Power	Regular Power	3.65	120	50	1	0.73	3.65	14 AWG	10.10	1.54%	1.54%	1P 6A	
MCCC4 Internal Power	UPS Power	0.72	120	50	1	0.73	0.72	14 AWG	10.10	0.30%	0.30%	1P 10A	
CMP Power	UPS Power	1.40	120	50	1	0.73	1.40	14 AWG	10.10	0.59%	0.59%	1P 6A	

MCCC4	MCCC-460-**-300-S-2X7-TYP-EXT-NA					Derating				Voltage Drop (%)			
Item	Model	FLA / Unit (A)	Voltage (V)	Length (m)	Phases	(temp, conduit)	Max/Startup Amps	Size (AWG/KCMIL)	Z/km (Ohms)	Continuous	Startup	Breaker	Comment
Main Motor Drive	1800RPM 460-3-60 449T TEFC	361.00	460	50	3	0.91	1805.00	2x4/0 AWG, 3C+E CABLE	0.13	0.86%	3.46%	N/A	
Vent Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	0.98%	3.74%	3P 20A	
Cooling Fan Motor	1800RPM 460-3-60 213TC XPFC	11.00	460	50	3	0.73	88.00	14 AWG, 3C+E CABLE	8.22	0.98%	3.74%	3P 20A	

DRAWING REVISION HISTORY

Revision number marked on drawings next to each revision. Indicated by: A

REV	DESCRIPTION	DATE	BY	CK BY	AP BY	ECO
A	Issued for manufacturing.	2016.03.14	MAE	MJ	BMB	5350

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE STD CLEANCNG COMPRESSOR CONTROL BOX COVER PAGE

DR. | MAE (2016-03-14)

CK. | MJ (2016-03-14)

AP. | BMB (2016-03-14)

SIZE A

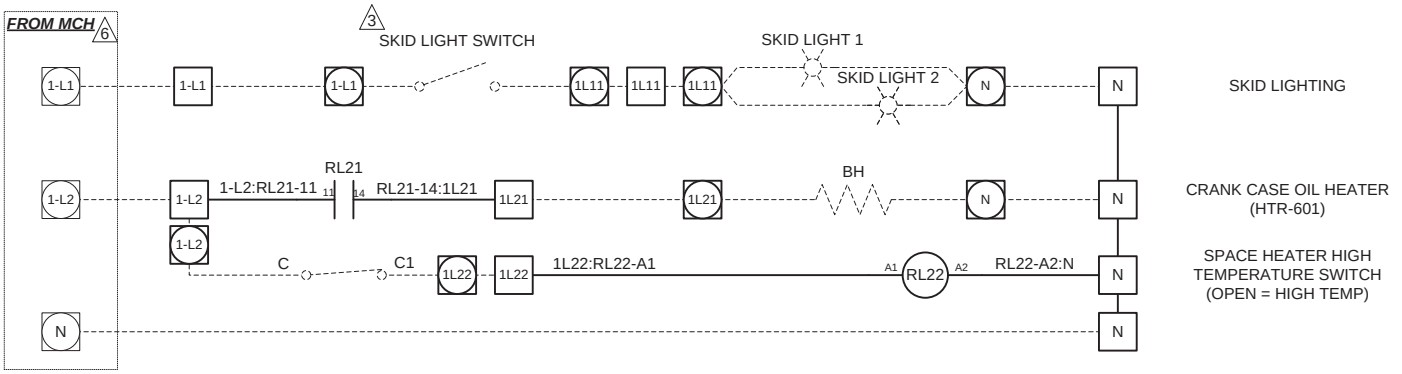
DOC. NO. 632901

REV A

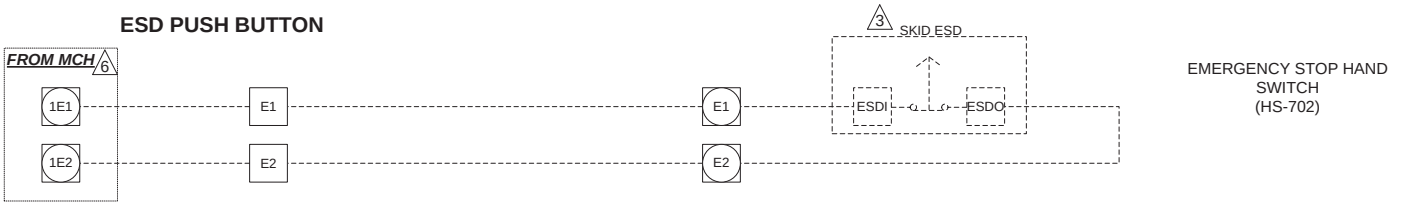
SCALE -

SHEET 1 of 11

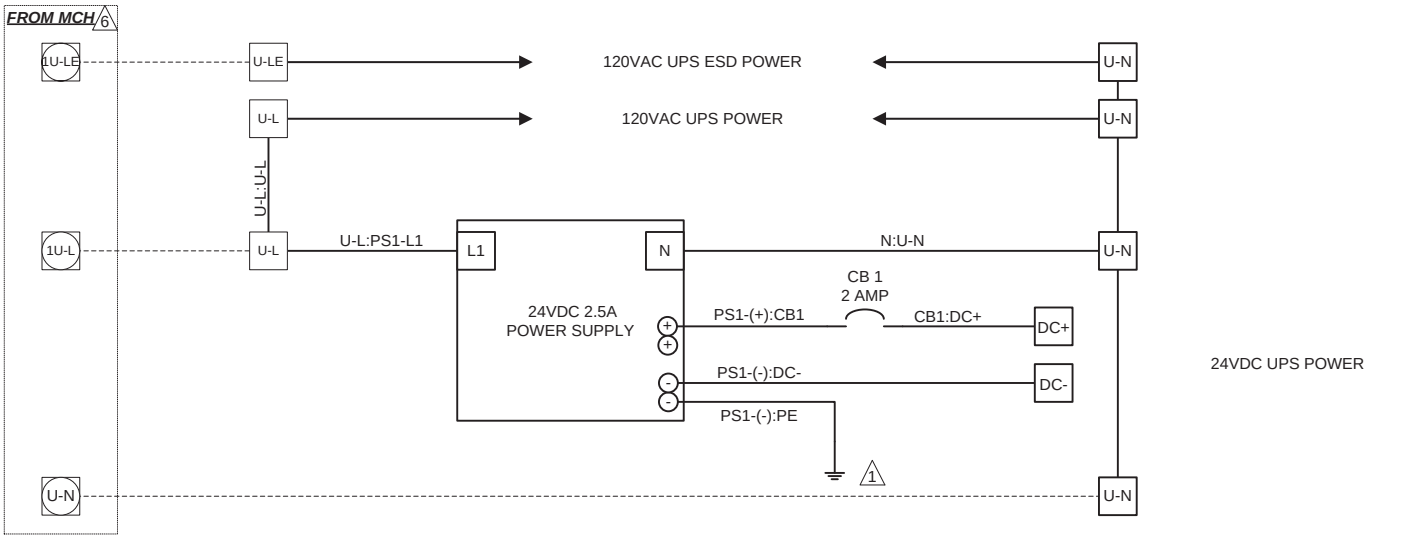
120VAC POWER



ESD PUSH BUTTON



120VAC UPS ESD POWER & 120VAC UPS POWER



COMMUNICATION

NOTES:

- ---- DASHED LINES INDICATE WIRING REMOTE TO THIS PANEL
- 123 INDICATES INTERNAL TERMINAL BLOCK & NUMBER
- (123) INDICATES EXTERNAL TERMINAL BLOCK & NUMBER
- INDICATES JUNCTION
- 3 TO BE INSTALLED IN OPERATOR STATION. USE HERMETICALLY SEALED COMPONENTS.
- ALL COMPONENTS MUST BE RATED FOR CLASS I DIVISION 2 OR HIGHER.

WIRE NUMBERS	SIZE	COLOR	TYPE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L1,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
PROFINET	CAT5e		

1 THE PROTECTIVE CONDUCTOR OF THE LINE SUPPLY MUST BE CONNECTED AT THE " PE " TERMINAL. IF PELV (PROTECTED EXTRA LOW VOLTAGE) IS REQUIRED, THEN " - " TERMINAL OF DC OUTPUT CAN BE CONNECTED TO THE " PE " TERMINAL OF THE SUPPLY SIDE OR ANY OTHER POINT AS LONG AS THE " PE " TERMINAL IS GROUNDED.

6 CONNECTION TERMINAL DESIGNATORS INDICATED AS EXAMPLE. CONNECTIONS SHOULD BE DETERMINED ON SITE. USE THE SITE INSTALLATION DRAWINGS TO WIRE FROM THE MCH/MCC/MCCC AS INDICATED.

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE: STD CLEANCNG COMPRESSOR CONTROL BOX
POWER CONNECTIONS

DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 2 of 11	

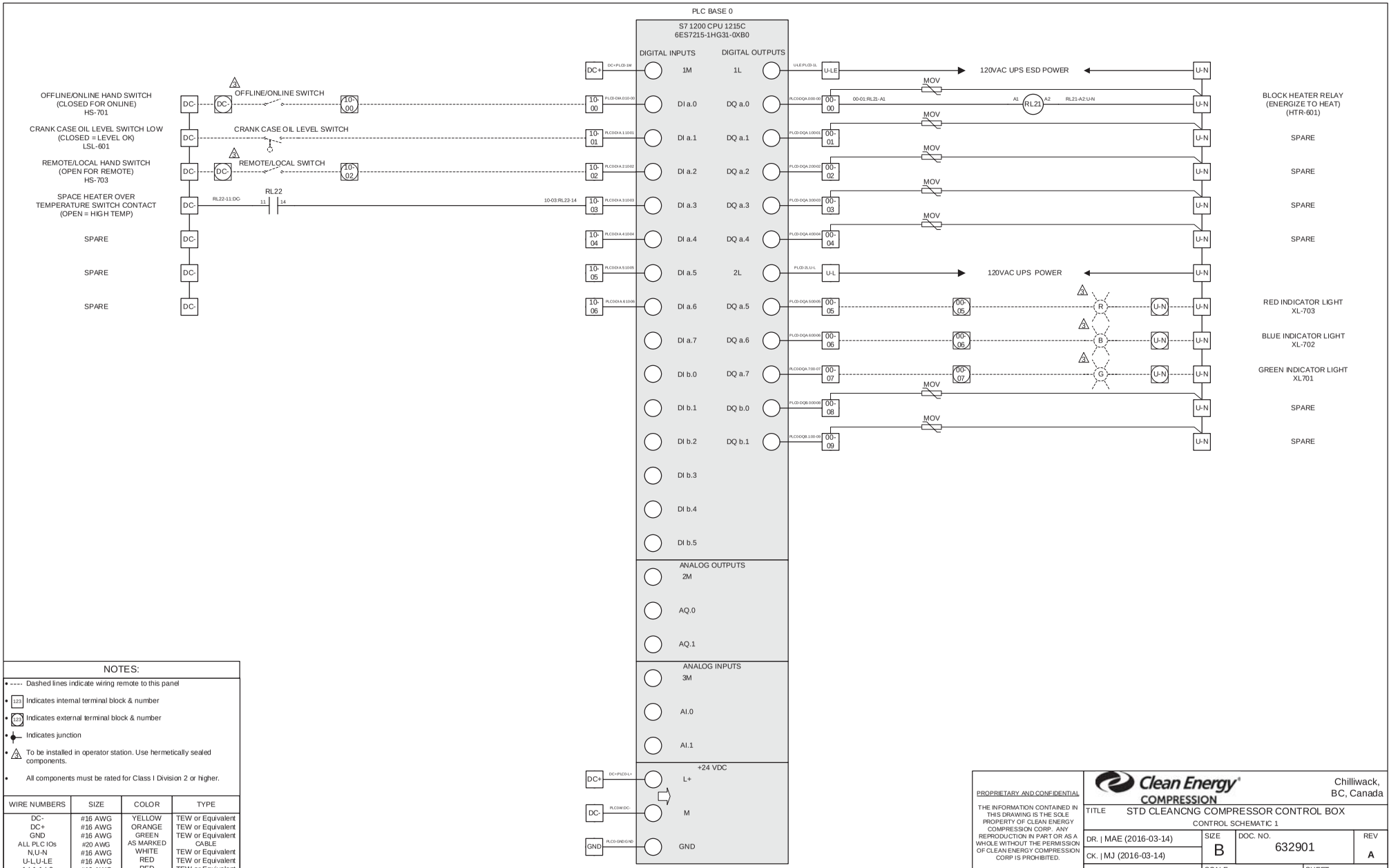
PLC OVERVIEW

PROFINET
COMMUNICATION
(PAGE 2)

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE	STD CLEANCNG COMPRESSOR CONTROL BOX PLC DIAGRAM		
DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 3 of 11	



NOTES:

- ---- Dashed lines indicate wiring remote to this panel
- 123 Indicates internal terminal block & number
- 123 Indicates external terminal block & number
- Indicates junction
- 3 To be installed in operator station. Use hermetically sealed components.
- All components must be rated for Class I Division 2 or higher.

WIRE NUMBERS	SIZE	COLOR	TYPE
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
ALL PLC IOs	#20 AWG	AS MARKED	CABLE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent

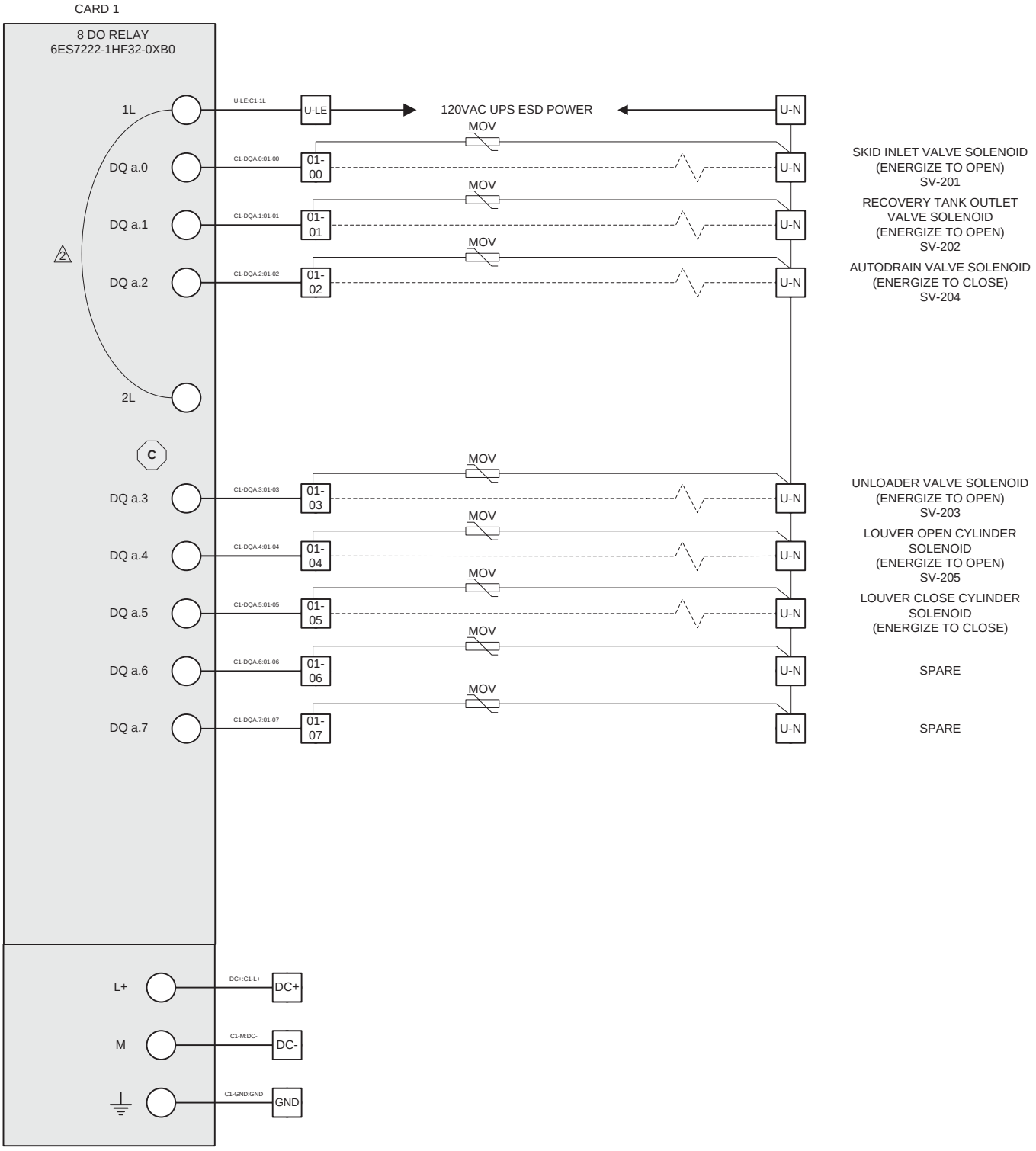
Clean Energy COMPRESSION

Chilliwack, BC, Canada

TITLE: STD CLEANCNG COMPRESSOR CONTROL BOX
CONTROL SCHEMATIC 1

DR. | MAE (2016-03-14)
CK. | MJ (2016-03-14)
AP. | BMB (2016-03-14)

SIZE: B
DOC. NO.: 632901
REV: A
SCALE: -
SHEET: 4 of 11



NOTES:

- Dashed lines indicate wiring remote to this panel.
- 143 Indicates internal terminal block & number.
- 124 Indicates external terminal block & number.
- Indicates junction
- 2 Jumper U-LE power on PLC card.

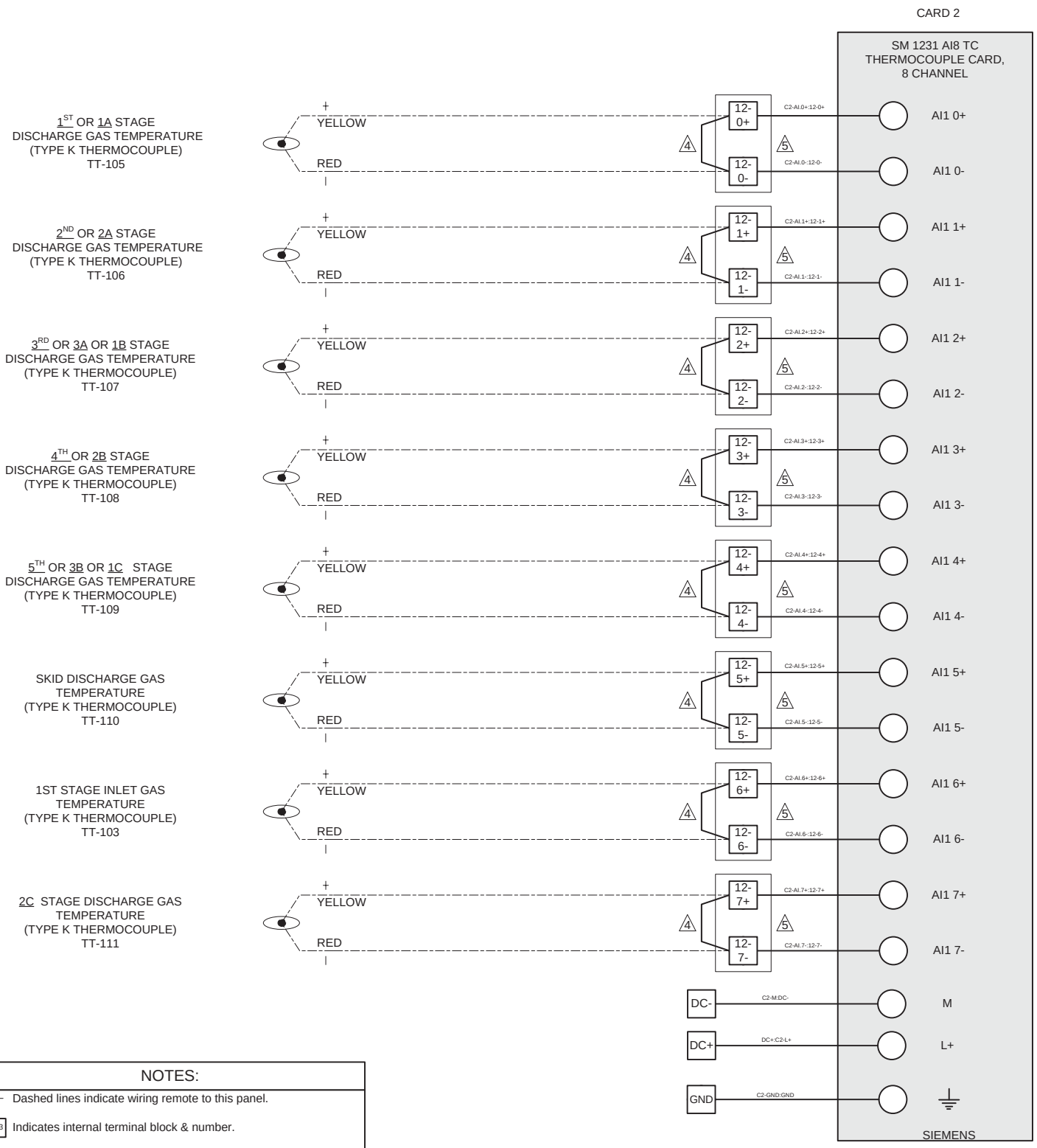
WIRE NUMBERS	SIZE	COLOR	TYPE
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
ALL PLC IOs	#20 AWG	AS MARKED	CABLE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L1,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE STD CLEANCNG COMPRESSOR CONTROL BOX
CONTROL SCHEMATIC 2

DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 5 of 11	



NOTES:

- --- Dashed lines indicate wiring remote to this panel.
- 143 Indicates internal terminal block & number.
- 124 Indicates external terminal block & number.
- Indicates junction
- 4 Install jumpers for all thermocouple terminals on initial build. Remove a jumper only when connecting a thermocouple. Reinstall jumper if thermocouple is removed.
- 5 Use only Type K thermocouple terminals and 20AWG wire

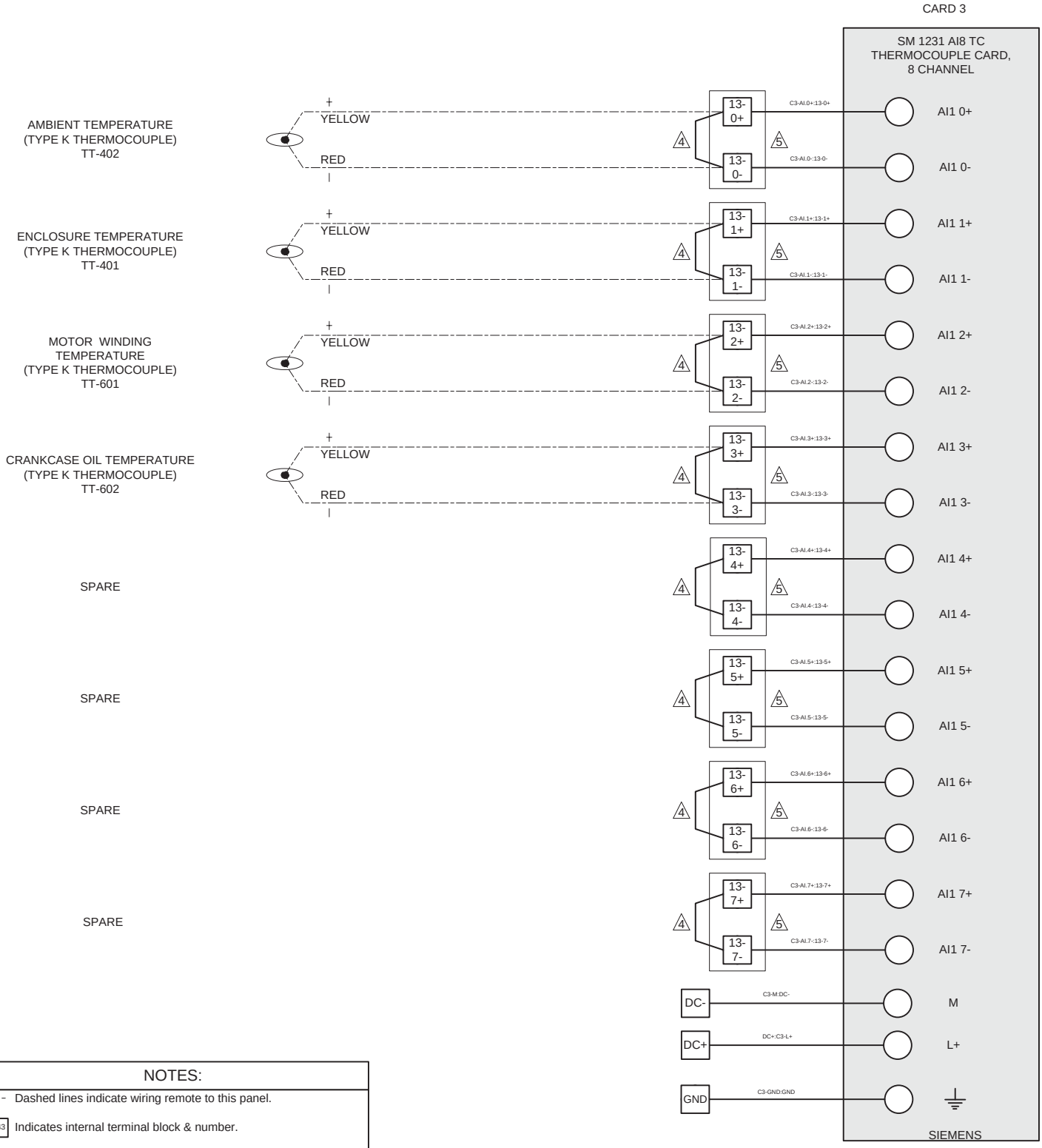
WIRE NUMBERS	SIZE	COLOR	TYPE
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
ALL PLC IOs	#20 AWG	AS MARKED	CABLE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L1,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE STD CLEANCNG COMPRESSOR CONTROL BOX
CONTROL SCHEMATIC 3

DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 6 of 11	



NOTES:

- --- Dashed lines indicate wiring remote to this panel.
- 143 Indicates internal terminal block & number.
- 124 Indicates external terminal block & number.
- Indicates junction
- 4 Install jumpers for all thermocouple terminals on initial build. Remove a jumper only when connecting a thermocouple. Reinstall jumper if thermocouple is removed.
- 5 Use only Type K thermocouple terminals and 20AWG wire

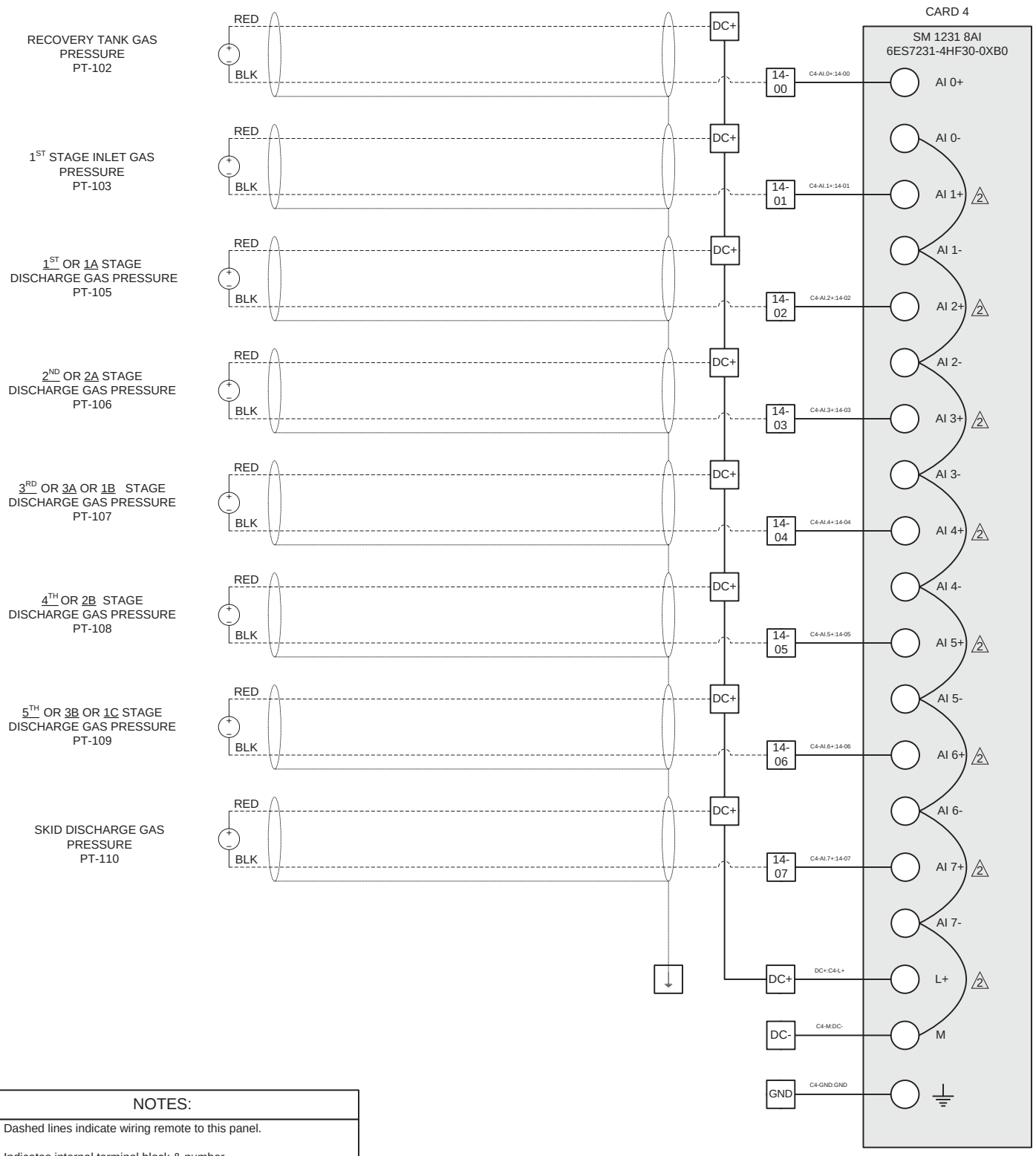
WIRE NUMBERS	SIZE	COLOR	TYPE
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
ALL PLC IOs	#20 AWG	AS MARKED	CABLE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L1,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE STD CLEANCNG COMPRESSOR CONTROL BOX
CONTROL SCHEMATIC 4

DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 7 of 11	



NOTES:

- ---- Dashed lines indicate wiring remote to this panel.
- [143] Indicates internal terminal block & number.
- (124) Indicates external terminal block & number.
- Indicates junction
- 2 Jumper DC- power on PLC card. Use DC- wire color and size.

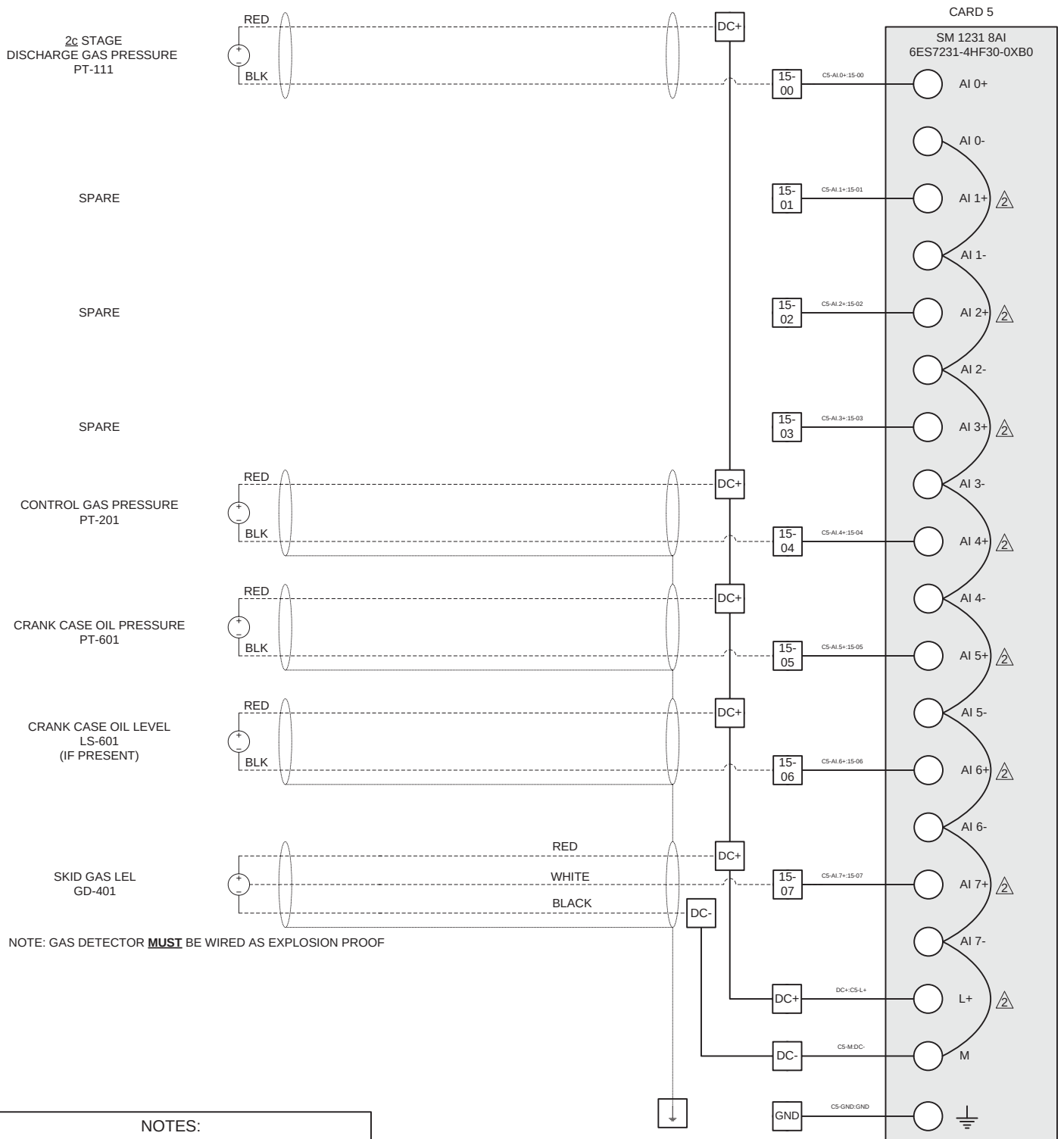
WIRE NUMBERS	SIZE	COLOR	TYPE
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
ALL PLC IOs	#20 AWG	AS MARKED	CABLE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L1,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE: STD CLEANCNG COMPRESSOR CONTROL BOX
CONTROL SCHEMATIC 5

DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 8 of 11	



NOTE: GAS DETECTOR **MUST** BE WIRED AS EXPLOSION PROOF

NOTES:

- ---- Dashed lines indicate wiring remote to this panel.
- [143] Indicates internal terminal block & number.
- (124) Indicates external terminal block & number.
- Indicates junction
- 2 Jumper DC- power on PLC card. Use DC- wire color and size

WIRE NUMBERS	SIZE	COLOR	TYPE
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
ALL PLC IOs	#20 AWG	AS MARKED	CABLE
N,U-N	#16 AWG	WHITE	TEW or Equivalent
U-L1,U-LE	#16 AWG	RED	TEW or Equivalent
1-L1,1-L2	#16 AWG	RED	TEW or Equivalent

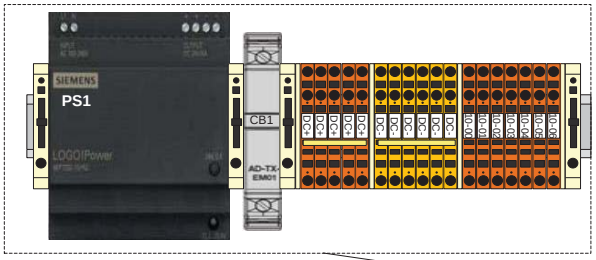
Clean Energy® COMPRESSION

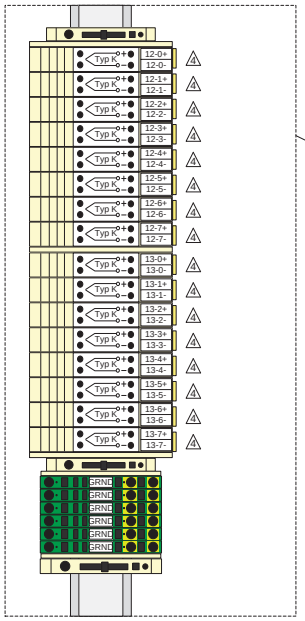
Chilliwack, BC, Canada

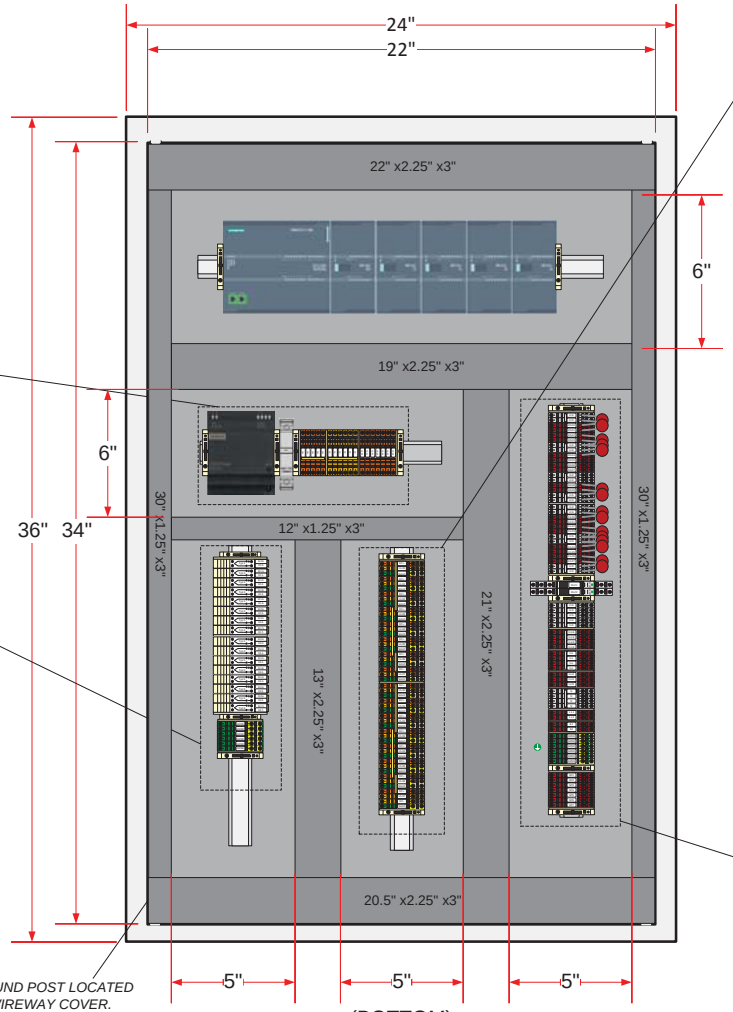
TITLE: STD CLEANCNG COMPRESSOR CONTROL BOX
CONTROL SCHEMATIC 6

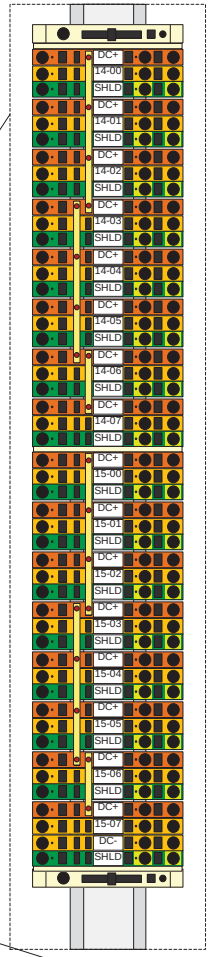
DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 9 of 11	

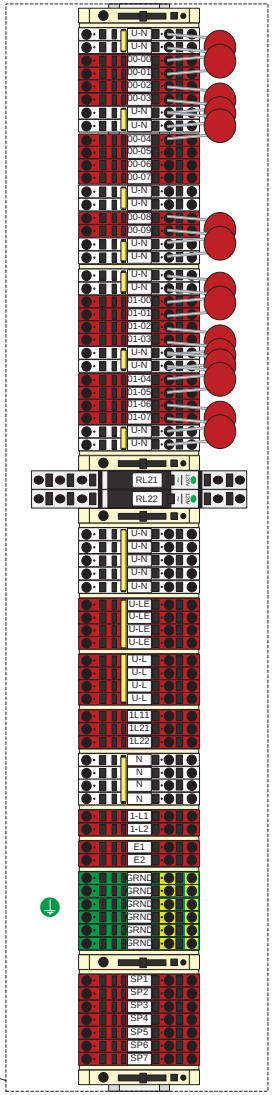
INTERNAL VIEW











• -INDICATES CONNECTING TOOTH FOR JUMPER. REMOVE OTHER TEETH.

• PANEL GROUND POST LOCATED UNDER WIREWAY COVER. CUT BACK 1.5" OF WIREWAY CHANNEL. DO NOT CUT BACK WIREWAY COVER. INSTALL GROUND WIRE TO DOOR GROUND POINT.

(BOTTOM)
WIRING NOT SHOWN IN LAYOUT

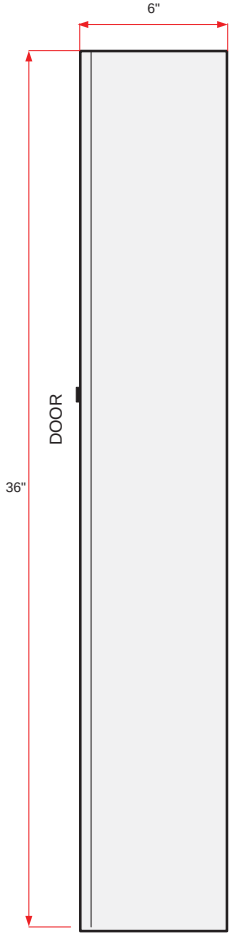
⚠ *INSTALL JUMPERS FOR ALL THERMOCOUPLE TERMINALS ON INITIAL BUILD. REMOVE A JUMPER ONLY WHEN CONNECTING A THERMOCOUPLE. REINSTALL JUMPER IF THERMOCOUPLE IS REMOVED.*

Clean Energy COMPRESSION
Chilliwack, BC, Canada

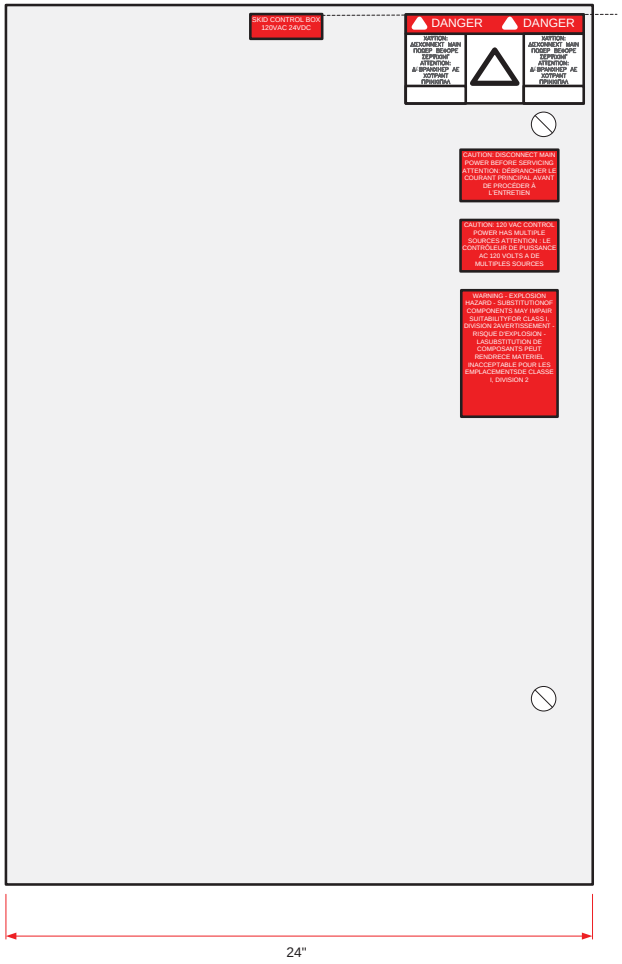
TITLE	STD CLEANCNG COMPRESSOR CONTROL BOX PANEL LAYOUT		
DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 10 of 11	

CONTROL PANEL GENERAL ASSEMBLY

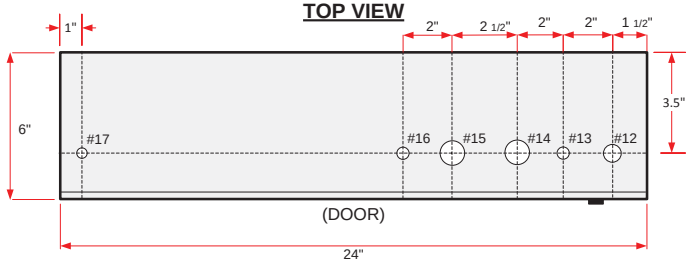
SIDE VIEW



FRONT VIEW



TOP VIEW



BOTTOM VIEW

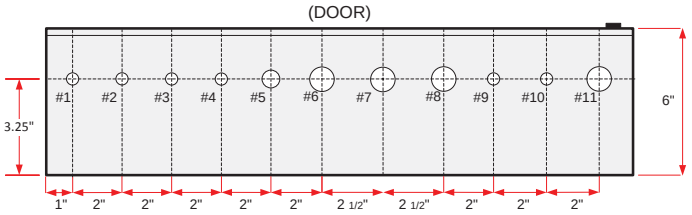


TABLE: CONTROL PANEL CABLE ENTRY SIZE

Hole #	Component Entry	Entry Size
#1	Discharge/Ambient/Oil TT's	1/2"
#2	Gas Detector	1/2"
#3	Block Heater	1/2"
#4	Space Heater	1/2"
#5	Solenoids(all)	3/4"
#6	Control Gas PT & Oil Level Switch & Discharge PT	1"
#7	Interstage TT's & Inlet TT & Oil PT	1"
#8	Interstage TT's	1"
#9	PROFINET (Customer)	1/2"

Hole #	Component Entry	Entry Size
#10	120VAC Power (Customer)	1/2"
#11	120VAC UPS POWER 120VAC UPS ESD POWER ESD Loop (Customer)	1"
#12	Pilot Devices to Control Station	3/4"
#13	ESD to Control Station	1/2"
#15	Recovery PT & Inlet PT & Interstage PT	1"
#14	Interstage PT's	1"
#16	Skid Lighting	1/2"
#17	Skid Internal TT	1/2"

Clean Energy COMPRESSION

Chilliwack, BC, Canada

TITLE	STD CLEANCNG COMPRESSOR CONTROL BOX PANEL DIAGRAM AND CABLE ENTRIES		
DR. | MAE (2016-03-14)	SIZE A	DOC. NO. 632901	REV A
CK. | MJ (2016-03-14)			
AP. | BMB (2016-03-14)	SCALE -	SHEET 11 of 11	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2016/03/14	JC	MAE	BMB	NA	RELEASE FOR MANUFACTURE

CLEANCNG COMPRESSOR ELECTRICAL COMPONENT WIRING
OVERALL TERMINATION DRAWING

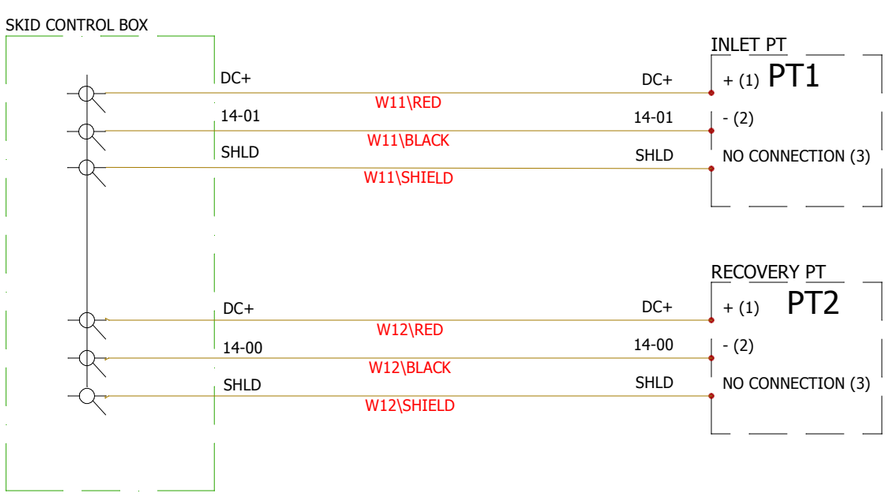
Clean Energy COMPRESSION

Chilliwack, B.C., Canada

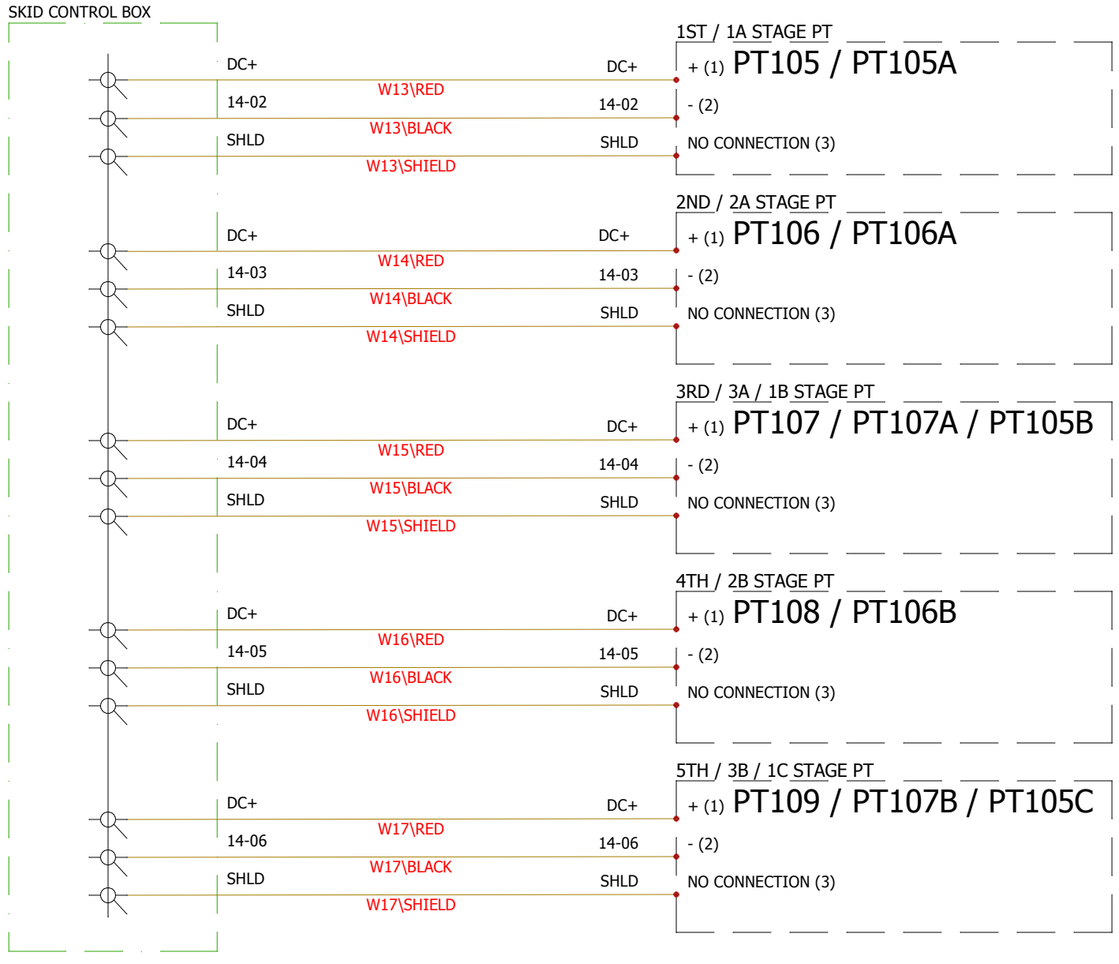
TITLE: OVERALL TERMINATION DRAWING
COVER SHEET

DR. | JC	2016/03/11	SIZE B	DOC. NO. 703882	REV A
CK. | MAE	2016/03/14			
AP. | BMB	2016/03/14	SCALE 1 : 1	SHEET 01 / 11	

H01 - PRESSURE TRANSMITTERS



NUMBER OF INTERSTAGE PRESSURE TRANSMITTERS TO BE DETERMINED FROM COMPRESSOR MODEL



Clean Energy COMPRESSION

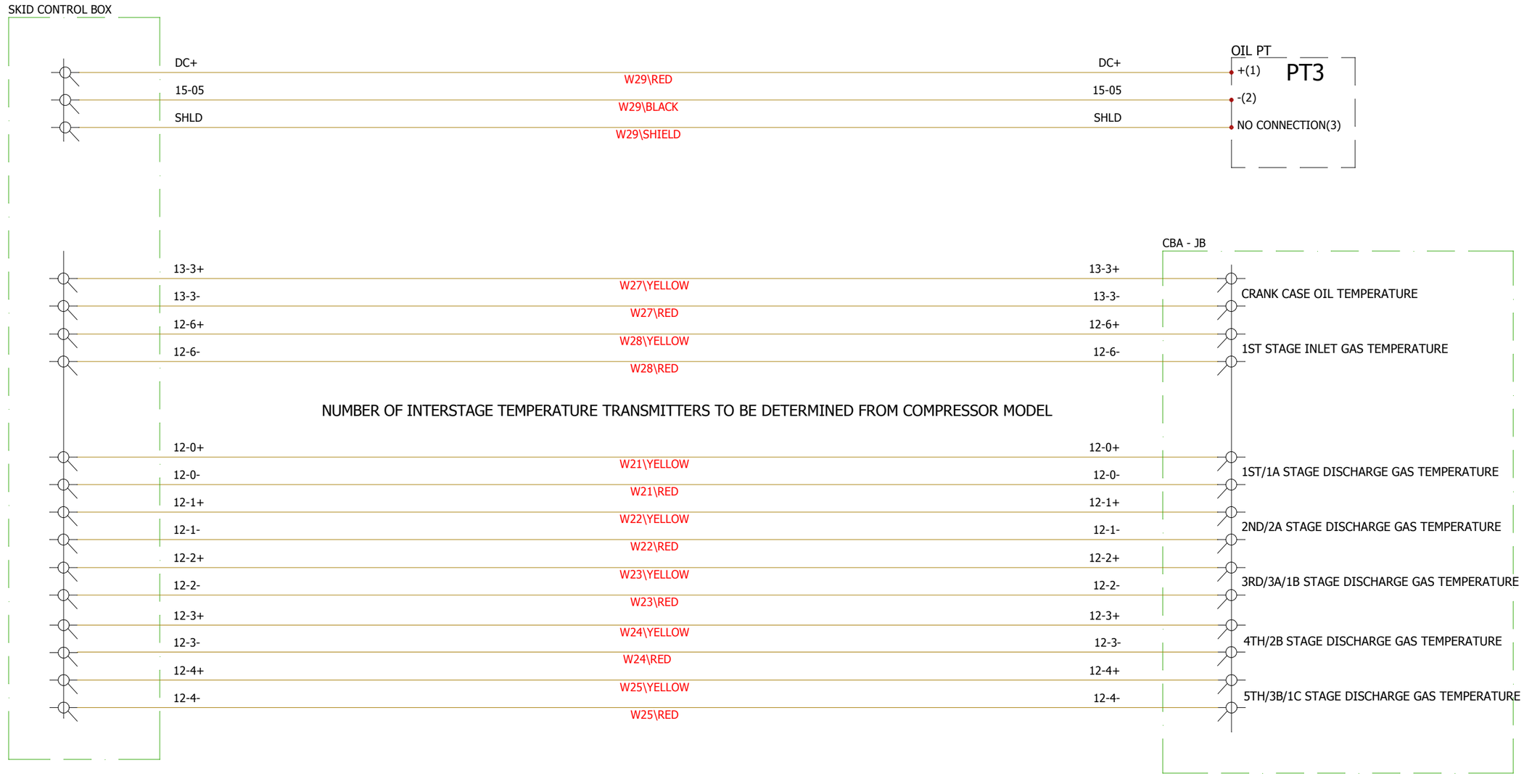
Chilliwack, B.C., Canada

TITLE

OVERALL TERMINATION DRAWING
WIRE LABEL - PRESSURE TRANSMITTERS

DR. | JC	2016/03/11	SIZE	DOC. NO.		REV
CK. | MAE	2016/03/14	B	703882		A
AP. | BMB	2016/03/14	SCALE 1 : 1		SHEET 02 / 11	

H02 - INTERSTAGE THERMOCOUPLES AND OIL PRESSURE TRANSMITTER



Clean Energy COMPRESSION

Chilliwack, B.C., Canada

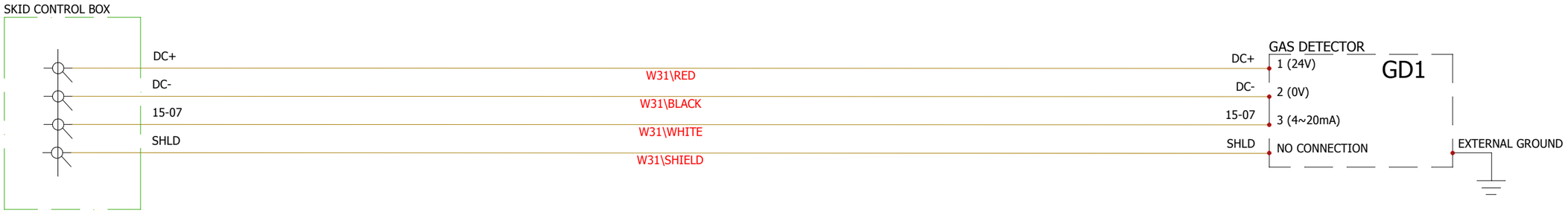
TITLE

OVERALL TERMINATION DRAWING

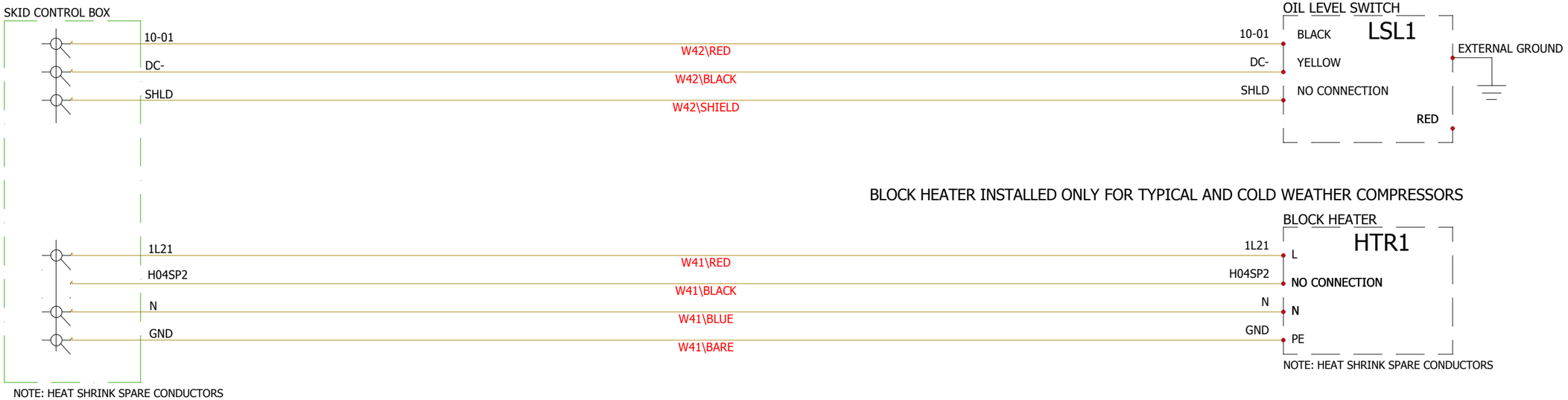
WIRE LABEL - INTERSTAGE TCs & OIL PT

DR. | JC	2016/03/11	SIZE	DOC. NO.		REV
CK. | MAE	2016/03/14	B	703882		A
AP. | BMB	2016/03/14	SCALE 1 : 1	SHEET	03 / 11	

H03 - GAS DETECTOR



H04 - BLOCK HEATER AND OIL LEVEL SWITCH



Clean Energy COMPRESSION

Chilliwack, B.C., Canada

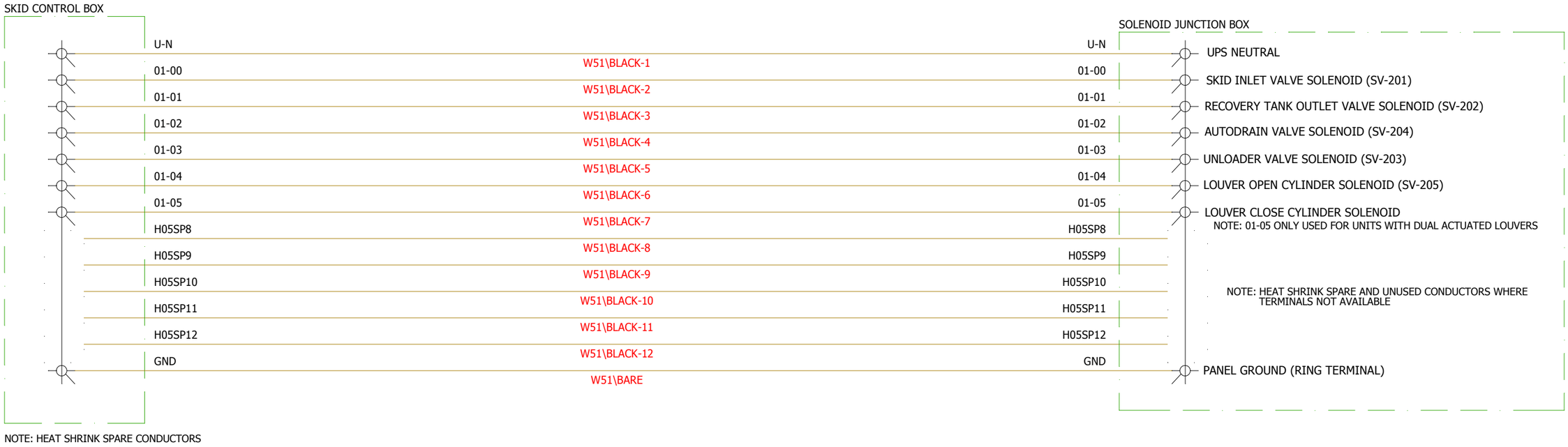
TITLE

OVERALL TERMINATION DRAWING

WIRE LABEL - GAS DETECTOR / OIL LEVEL SWITCH & BLOCK HEATER

DR. | JC	2016/03/11	SIZE	DOC. NO.		REV
CK. | MAE	2016/03/14	B	703882		A
AP. | BMB	2016/03/14	SCALE 1 : 1		SHEET 04 / 11	

H05 - SOLENOIDS



NOTE: HEAT SHRINK SPARE CONDUCTORS

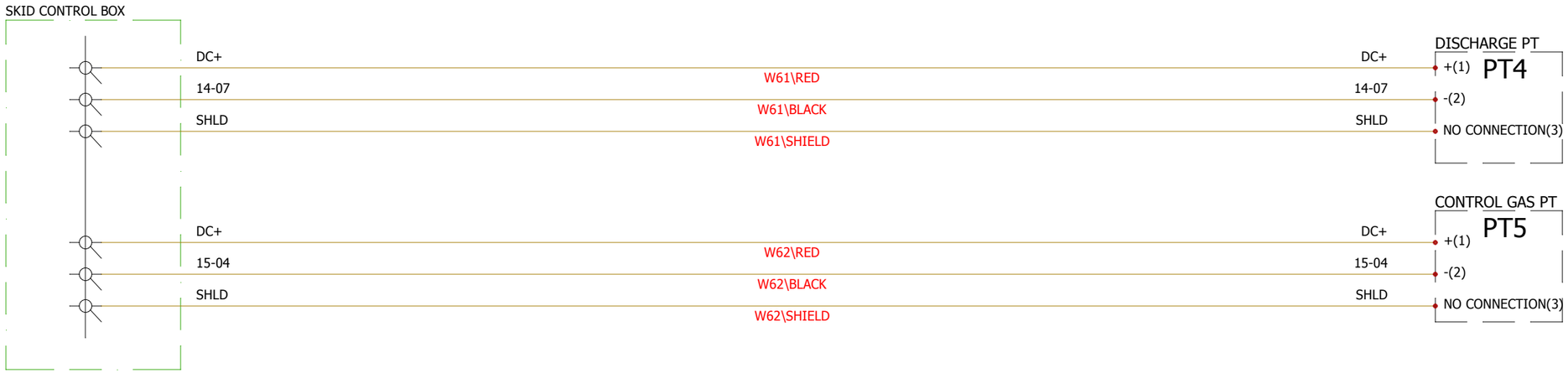
Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE: OVERALL TERMINATION DRAWING
WIRE LABEL - SOLENOIDS

DR. | JC	2016/03/11	SIZE B	DOC. NO. 703882		REV A
CK. | MAE	2016/03/14				
AP. | BMB	2016/03/14	SCALE 1 : 1		SHEET 05 / 11	

H06 - DISCHARGE AND CONTROL GAS PRESSURE TRANSMITTERS



Clean Energy COMPRESSION

Chilliwack, B.C., Canada

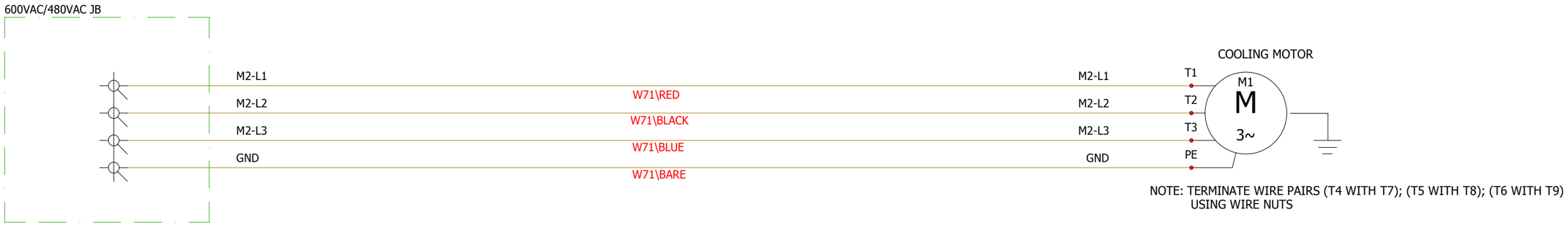
TITLE

OVERALL TERMINATION DRAWING

WIRE LABEL - CONTROL AND DISCHARGE PTS

DR. | JC	2016/03/11	SIZE	DOC. NO.	REV
CK. | MAE	2016/03/14	B	703882	A
AP. | BMB	2016/03/14	SCALE 1 : 1	SHEET	06 / 11

H07 - COOLING MOTOR M2



NOTE: TERMINATE WIRE PAIRS (T4 WITH T7); (T5 WITH T8); (T6 WITH T9)
USING WIRE NUTS

H08 - COOLING MOTOR M3

NOTE: TERMINATE WIRE PAIRS (T4 WITH T7); (T5 WITH T8); (T6 WITH T9)
USING WIRE NUTS

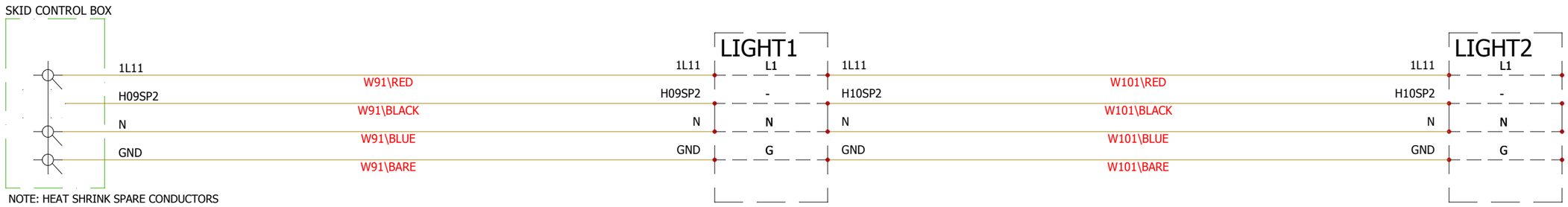
Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE
OVERALL TERMINATION DRAWING
WIRE LABEL - COOLING MOTOR M2 & COOLING MOTOR M3

DR. | JC	2016/03/11	SIZE	DOC. NO.		REV
CK. | MAE	2016/03/14	B	703882		A
AP. | BMB	2016/03/14	SCALE 1 : 1		SHEET	07 / 11

H09 - SKID LIGHT 1 & H10 - SKID LIGHT 2



NOTE: HEAT SHRINK SPARE CONDUCTORS

Clean Energy COMPRESSION

Chilliwack, B.C., Canada

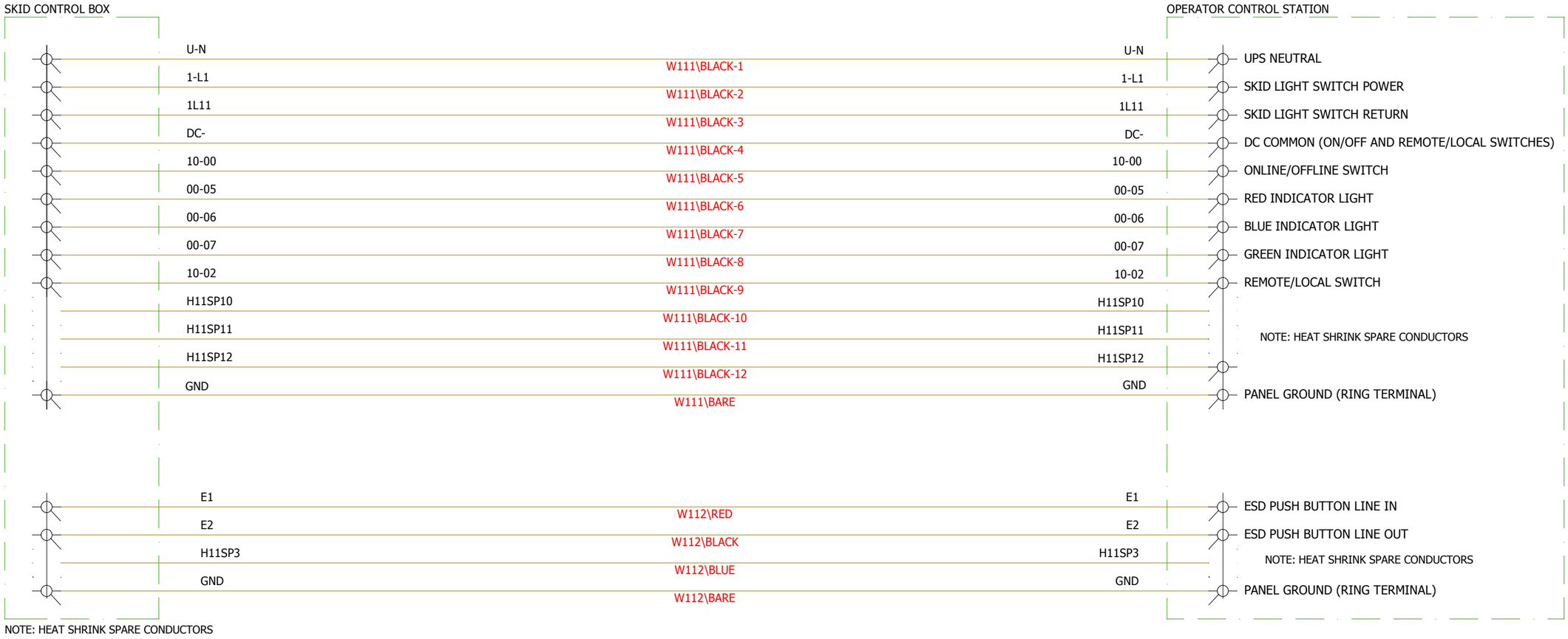
TITLE

OVERALL TERMINATION DRAWING

WIRE LABEL - SKID LIGHT 1 & SKID LIGHT 2

DR. | JC	2016/03/11	SIZE	DOC. NO.		REV
CK. | MAE	2016/03/14	B	703882		A
AP. | BMB	2016/03/14	SCALE 1 : 1		SHEET	08 / 11

H11 - OPERATOR CONTROL STATION



Clean Energy COMPRESSION

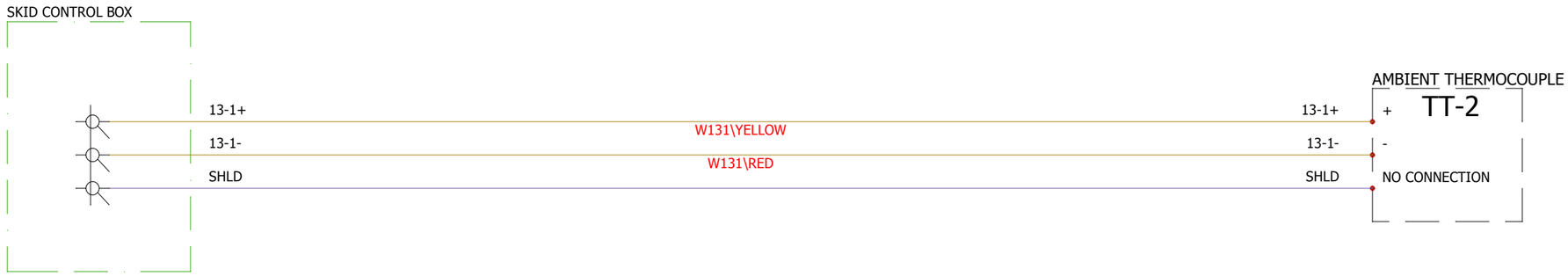
Chilliwack, B.C., Canada

TITLE: OVERALL TERMINATION DRAWING
WIRE LABEL- OPERATOR CONTROL STATION

DR. | JC	2016/03/11	SIZE B	DOC. NO. 703882	REV A
CK. | MAE	2016/03/14			
AP. | BMB	2016/03/14	SCALE 1 : 1	SHEET 09 / 11	

H12 - DISCHARGE GAS THERMOCOUPLE

H13 - AMBIENT THERMOCOUPLE



Clean Energy COMPRESSION

Chilliwack, B.C., Canada

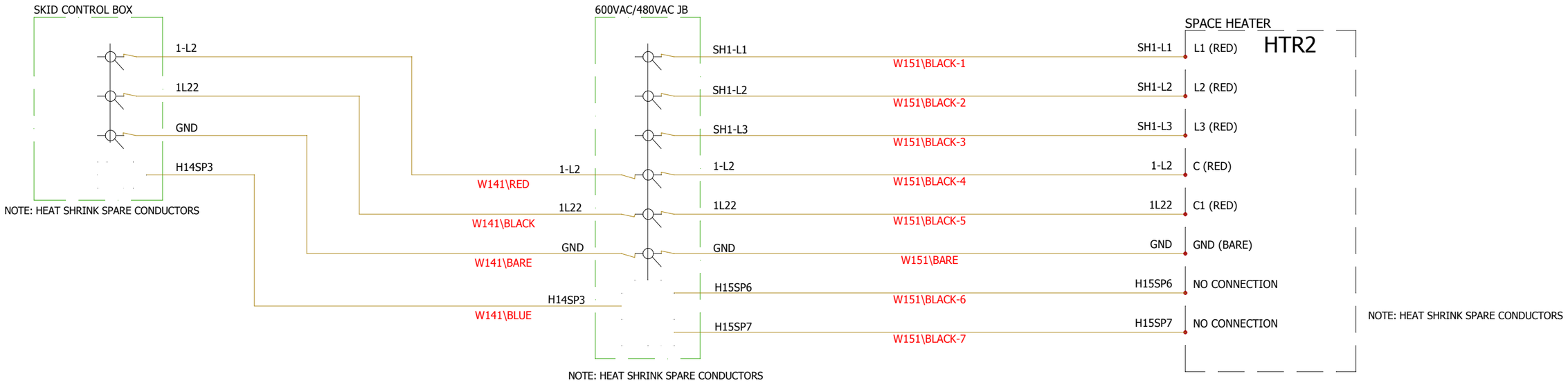
TITLE

OVERALL TERMINATION DRAWING

WIRE LABEL - GAS DISCHARGE & AMBIENT THERMOCOUPLES

DR. | JC	2016/03/11	SIZE	DOC. NO.	REV
CK. | MAE	2016/03/14	B	703882	A
AP. | BMB	2016/03/14	SCALE 1 : 1	SHEET	10 / 11

H14+H15 - SPACE HEATER (INSTALLED ON COLD WEATHER COMPRESSOR PACKAGES ONLY)



Clean Energy COMPRESSION

Chilliwack, B.C., Canada

TITLE

OVERALL TERMINATION DRAWING

WIRE LABEL - SPACE HEATER

DR. | JC	2016/03/11	SIZE	DOC. NO.		REV
CK. | MAE	2016/03/14	B	703882		A
AP. | BMB	2016/03/14	SCALE 1 : 1		SHEET 11 / 11	

DRAWING REVISION HISTORY

Revision number marked on drawings next to each revision. Indicated by: A

REV	DESCRIPTION	DATE	BY	CK BY	AP BY	ECO
A	Original Issue	2016/03/24	MJ	MAE	BMB	-

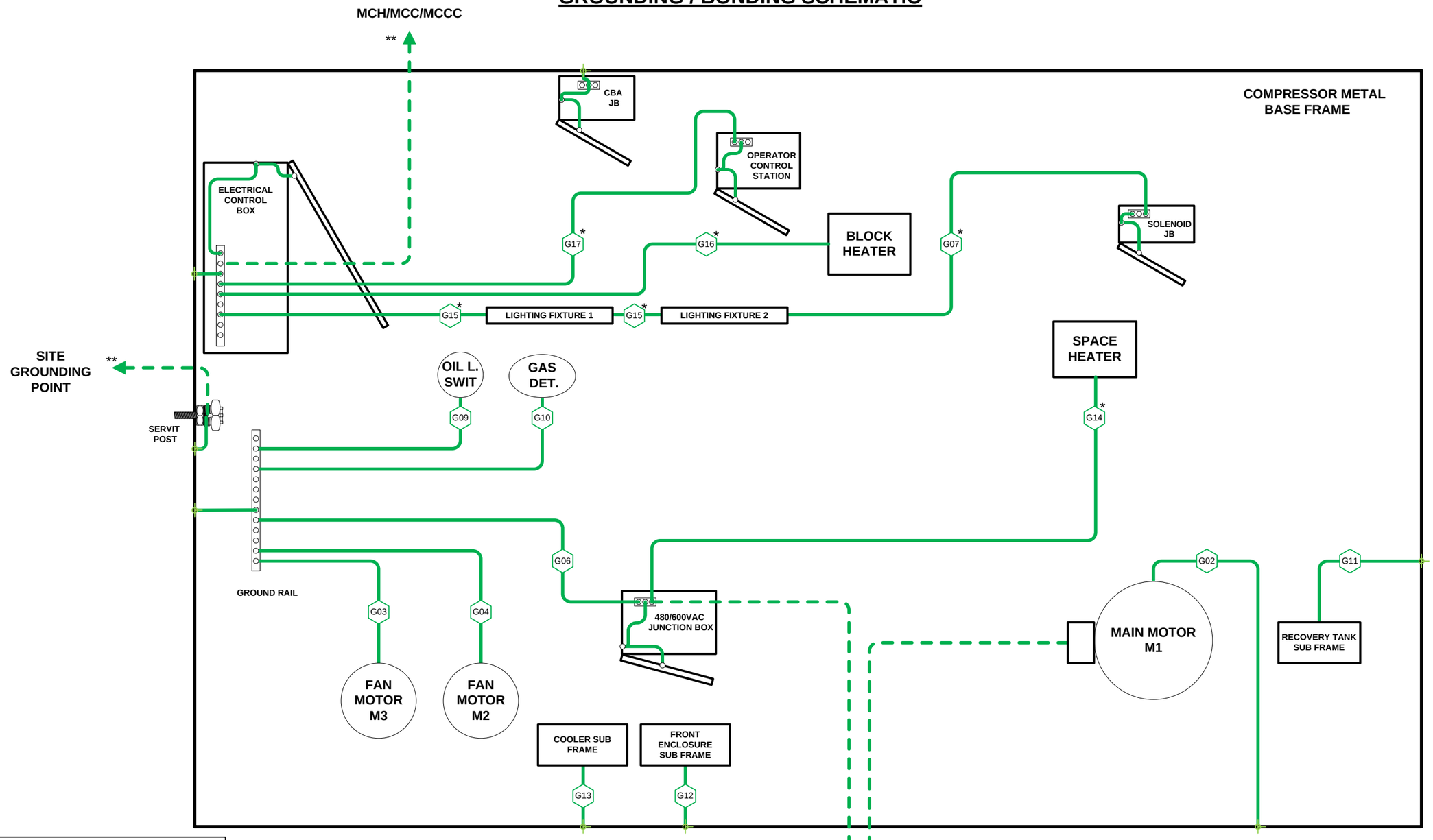
Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE: CLEANCNG 2.0 GROUNDING SCHEMATIC
COVER SHEET

DR. | MJ (2016-02-18)	SIZE A	DOC. NO. 703762	REV A
CK. | MAE (2016-03-21)			
AP. | BMB (2016-03-21)	SCALE -	SHEET 1 of 4	

GROUNDING / BONDING SCHEMATIC



NOTES:

* : Grounding conductor of power/signal cable is used to ground/bond the component.

** : Grounding shall be done by customer based on local codes. See site load budget and single line for power requirements and recommended cable size.

- References: Article 250 NEC 2011 NFPA 70 & CSA 22.2 SECTION 10

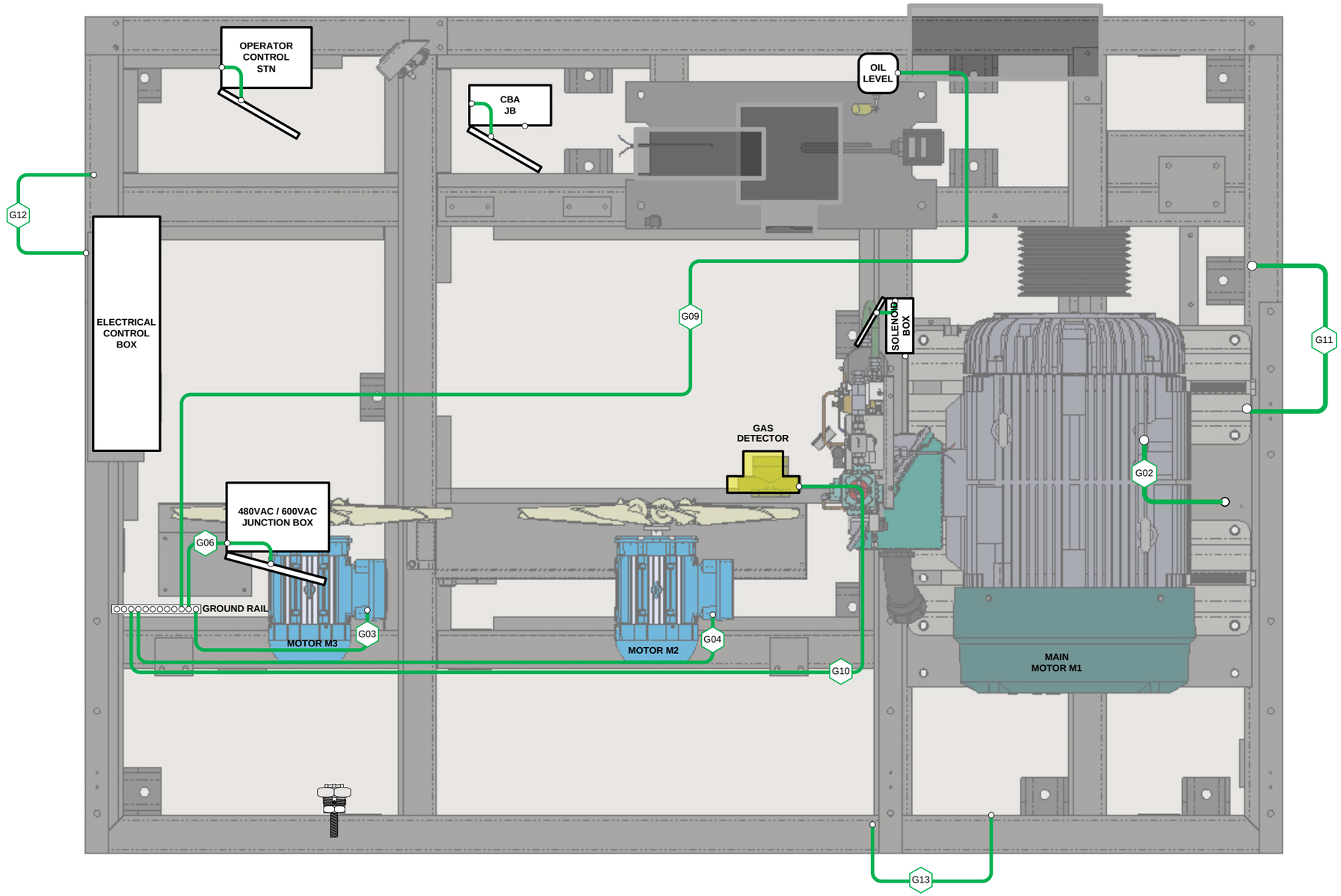
00	GROUNDING/BONDING CONDUCTOR(SEE PAGE.4)
	INDICATE JUNCTION TO SKID BASE FRAME
	CUSTOMER GROUND/BONDING CONDUCTOR
	INDICATES GROUNDING CONNECTION

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE	CLEANCNG 2.0 GROUNDING SCHEMATIC GROUNDING / BONDING SCHEMATIC		
DR. | MJ (2016-02-18)	SIZE A	DOC. NO. 703762	REV A
CK. | MAE (2016-03-21)			
AP. | BMB (2016-03-21)	SCALE -	SHEET	2 of 4

GROUNDING / BONDING LAYOUT OVERVIEW



- Wire trays shall be welded to a grounded frame or a minimum of 12 awg THHN green bond wire used to electrically connect each tray to the next tray. Each set of trays must be grounded to the ground rail (s) using only ground connection rated lugs or connectors.
- Ring terminals, compression fittings or grounding locknuts to bare metal or threaded connections are used for ground /bond at the equipment side.
- Ground symbol placed beside each ground/bond connection point.
- Customer Skid Grounding
  - Wiring method: As per local code
  - Connection to main supply ground to be minimum 2 AWG
- References: Article 250 NEC 2011 NFPA 70 & CSA 22.2 SECTION 10
- GROUND / BOND WIRE (SEE WIRE LIST ON NEXT PAGE)

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE: CLEANCNG 2.0 GROUNDING SCHEMATIC
GROUNDING / BONDING LAYOUT OVERVIEW

DR. | MJ (2016-02-18)	SIZE A	DOC. NO. 703762	REV A
CK. | MAE (2016-03-21)			
AP. | BMB (2016-03-21)	SCALE -	SHEET 3 of 4	

GROUNDING / BONDING WIRE REFERECE TABLE

WIRE ID	DESCRIPTION	FROM	TO	WIRE TYPE	REMARKS
G02	MAIN MOTOR M1 FRAME BONDING JUMPER	SKID METAL BASE FRAME	MAIN MOTOR M1	1 CONDUCTOR 2 AWG	THHN/GRN
G03	FAN MOTOR M3 FRAME BONDING JUMPER	GROUND RAIL	FAN MOTOR M3	1 CONDUCTOR 10 AWG	THHN/GRN
G04	FAN MOTOR M2 FRAME BONDING JUMPER	GROUND RAIL	FAN MOTOR M2	1 CONDUCTOR 10 AWG	THHN/GRN
G06	480/600VAC JB BONDING JUMPER	GROUND RAIL	480/600VAC JB	1 CONDUCTOR 10 AWG	THHN/GRN
G07*	120VAC SOLENOID JB BONDING JUMPER	GROUND RAIL	120 VAC SOLENOID JB	1 CONDUCTOR 10 AWG	THHN/GRN
G09	OIL LEVEL SWITCH FRAME BONDING JUMPER	GROUND RAIL	OIL LEVEL SWITCH	1 CONDUCTOR 10 AWG	THHN/GRN
G10	GAS DETECTOR FRAME BONDING JUMPER	GROUND RAIL	GAS DETECTOR	1 CONDUCTOR 10 AWG	THHN/GRN
G11	RECOVERY TANK SUB FRAME BONDING JUMPER	SKID METAL BASE FRAME	RECOVERY TANK SUB FRAME	1 CONDUCTOR 8 AWG	THHN/GRN
G12	FRONT ENCL.SUB FRAME BONDING JUMPER	SKID METAL BASE FRAME	FRONT ENCL.SUB FRAME	1 CONDUCTOR 8 AWG	THHN/GRN
G13	COOLER SUB FRAME BONDING JUMPER	SKID METAL BASE FRAME	COOLER SUB FRAME	1 CONDUCTOR 8 AWG	THHN/GRN
G14*	SPACE HEATER BONDING JUMPER	480/600VAC JB	SPACE HEATER	GND WIRE OF SUPPLY CABLE	N.A
G15*	LIGHT FIXTURES GROUNDING CONDUCTOR	ELEC.CONT. BOX RAIL	LIGHT FIXTURES	GND WIRE OF SUPPLY CABLE	N.A
G16*	BLOCK HEATER GROUNDING CONDUCTOR	ELEC.CONT. BOX RAIL	BLOCK HEATER	GND WIRE OF SUPPLY CABLE	N.A
G17*	OPERATOR PANEL GROUNDING CONDUCTOR	ELEC.CONT. BOX RAIL	OPERATOR PANEL	GND WIRE OF SUPPLY CABLE	N.A

NOTES:

* : Grounding conductor of power/signal cable is used to ground/bond the component.

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE: CLEANCNG 2.0 GROUNDING SCHEMATIC
GROUNDING / BONDING WIRE REFERECE TABLE

DR. | MJ (2016-02-18)	SIZE A	DOC. NO. 703762	REV A
CK. | MAE (2016-03-21)			
AP. | BMB (2016-03-21)	SCALE -	SHEET 4 of 4	

REVISION HISTORY						
REV.	**DATE**	**BY**	**CK.**	**AP.**	**ECO #**	**REFERENCE**
A	2015.11.27	AP	SVW / MAE	TFJ	---	ISSUED FOR CONSTRUCTION
B	2015.12.01	AP	SVW /MAE	TFJ	---	ADDED RELAY 13 ON PAGE 5. CHANGED RELAY CONNECTIONS AND LABELS
C	2016.04.06	SRS	MAE	TFJ	---	MODIFIED ESD LOOP AS PER NCR 30974. INCREASED WIRE TEXT SIZE FOR READABILITY AFTER PRINTING

MCC CLEANCNG DRAWING PACKAGE
703455

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE: MCC CLEANCNG DRAWING PACKAGE
COVER/REVISION SHEET

DR. | AP 2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE 2015.11.27			
AP. | TFJ 2015.11.27	SCALE: N/A	SHEET: 1 /15	

LEGEND:

ITEM	DESCRIPTION
140	INTERNAL TERMINAL BLOCK AND NUMBER
	PROXIMITY SWITCH
K1	CONTACTOR COIL
	NORMALLY OPEN/CLOSED CONTACTOR
	BREAKER
	PLUG
	RECEPTACLE
G	INDICATOR LIGHT, (G=GREEN, R=RED, B=BLUE, W=WHITE)
	NORMALLY OPEN/CLOSED SWITCH
	PUSH BUTTON DOUBLE POLE SWITCH
	LEVEL SWITCH
	TEMPERATURE SWITCH
	PRESSURE SWITCH
	JUNCTION
	TRANSMITTER
	ISOLATED BARRIER
	SOLENOID
	PROTECTIVE EARTH
	THERMOCOUPLE
	METAL OXIDE VARISTOR (MOV)
	PANEL FAN
	PANEL HEATER
	HORN
	OVERLOAD PROTECTION
	TRANSFORMER

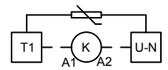
NOTES:

1. THE NAMING CONVENTION IN THIS DOCUMENT APPLIES TO IS OUTLINED IN DOCUMENT NUMBER 703272. EXAMPLE: MCC-460-65-150-S-2X5-CWP-EXT-NA+L
2. OBJECTS SHOWN ARE INCLUDED IN THE 4 FAN OPTION MODELS (MCC-*-*-*-*-4X5-*-*-*)
3. OBJECTS SHOWN ARE INCLUDED IN THE 2 FAN OPTION MODELS (MCC-*-*-*-*-2X5-*-*-* AND MCC-*-*-*-*-2X7-*-*-*)
4. OBJECTS SHOWN ARE INCLUDED IN THE COLD WEATHER PACKAGE MODELS (MCC-*-*-*-*-*-CWP-*-*)
5. OBJECTS SHOWN WILL ONLY BE INSTALLED ON THE OUTDOOR MODELS (MCC-*-*-*-*-*-*-EXT-*)
6. OBJECTS ARE INCLUDED ON THE LIGHT OPTION MODELS (MCC-*-*-*-*-*-*-*-*-*+L)
7. OVERLOAD RELAY SETTINGS FOR O/L2, O/L3, O/L4, O/L5 (SEE TABLE 7)
8. METAL OXIDE VARISTORS SHALL BE INSTALLED ON PLC DIGITAL OUTPUT TERMINALS (SEE EXAMPLE)
9. AUX1, AUX2, AND ESD EXPANSION LOOP E-STOP CONNECTION WIRE JUMPERS TO BE INCLUDED IN FACTORY BUILD. WIRED JUMPERS MUST BE REMOVED TO INSTALL SITE WIRING TO E-STOP DEVICES
10. THIS DOCUMENT FOLLOWS THE VOLTAGE NAMING SCHEME OUTLINED IN DOCUMENT 702686
11. NOTE SYMBOL TO THE LEFT APPLIES TO ENTIRE PAGE OF THE DOCUMENT
12. THIS DOCUMENT IS FOR USE FOR NORTH AMERICAN MODELS ONLY
13. TRANSFORMER TAP IS CONNECTED AS PER MODEL SUPPLY VOLTAGE 600VAC MODEL (MCC-600-*-*-*-*-*-*-*-*-*) IS WIRED TO THE H3 TAP VIA WIRE CB8-T3:T1-H3. 460VAC MODEL (MCC-460-*-*-*-*-*-*-*-*-*) IS WIRED TO H2 TAP VIA WIRE CB8-T3:T1-H2.
14. THE WIRE NAMING SCHEME IS AS FOLLOWS: <SOURCE>-<PIN>:<DESTINATION>-<PIN>
15. THE WIRE COLOR IN THE PANEL CAN BE DETERMINED USING THE TABLE ON THE RIGHT. WIRE TYPES NOT INDICATEDED IN THE TABLE SHALL BE INDICATED IN THE BOM ACCORDING TO THE WIRE NAME AS SPECIFIED IN NOTE 14
16. EQUIPMENT IS OPTIONAL DEPENDING ON SITE CONFIGURATION WHICH IS FOR REFERENCE ONLY. FOR DETAILED INFORMATION SEE EQUIPMENT DRAWING.
17. CIRCUIT BREAKER 1 (CB1) SETTINGS
    1) L DIP SWITCHES SET TO 0.04 (HIGH), 0.08 (HIGH), 0.16 (HIGH), 0.32(HIGH)
    2) t1 DIP SWITCH SET TO 12s (LOW)
    3) S/I DIP SWITCH SET TO I (LOW)
    4) I3 DIP SWITCHES (SEE TABLE)
    5) t2 DIP SWITCH NOT APPLICABLE
    6) N DIP SWITCH SET TO OFF, 50% (LOW, LOW) (N DIP SWITCH MAY NOT BE AVAILABLE ON ALL MODELS)
18. TYP : A00-05:K2F-A1
    CWP : A00-05:K2R-31X
19. TYP : A00-07:K3F-A1
    CWP : A00-07:K3R-31X
20. TYP : A02-03:K4F-A1
    CWP : A02-02:K4R-31X
21. TYP : A02-05:K5F-A1
    CWP : A02-05:K5R-31X

7

FAN OVERLOAD RELAY SETTINGS					
	MOTOR			OVERLOAD RELAY SETTINGS	
MODEL	VOLTAGE	HP	FLA (A)	TRIP CLASS	TRIP CURRENT (A)
MCC-460-*-*-*-X5-*-*-*	460	5	6.6	10E	6.5
MCC-600-*-*-*-X5-*-*-*	575	5	5.3	10E	5.5
MCC-460-*-*-*-X7-*-*-*	460	7.5	9.4	10E	9.5
MCC-600-*-*-*-X7-*-*-*	575	7.5	7.5	10E	7.5

8



15

ELECTRICAL PANEL WIRE COLOR	
BLACK	UNGROUNDED AC CONTROL CIRCUIT CONDUCTORS (HIGH VOLTAGE, 480V, 600V)
RED	UNGROUNDED AC CONTROL CIRCUITS AS LESS THAN SUPPLY VOLTAGE (120V)
BLUE	UNGROUNDED DC CONTROL CIRCUITS
ORANGE	UNGROUNDED CONTROL CIRCUITS OR OTHER WIRING THAT MAY REMAIN ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION (BEING FED FROM A SEPARATE PANEL)
WHITE	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT (NEUTRAL)
WHITE W/ BLU	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT
GREEN	EARTH / GROUND

WIRE COLORS DEFINED BY UL 508A AND NFPA 79.

17

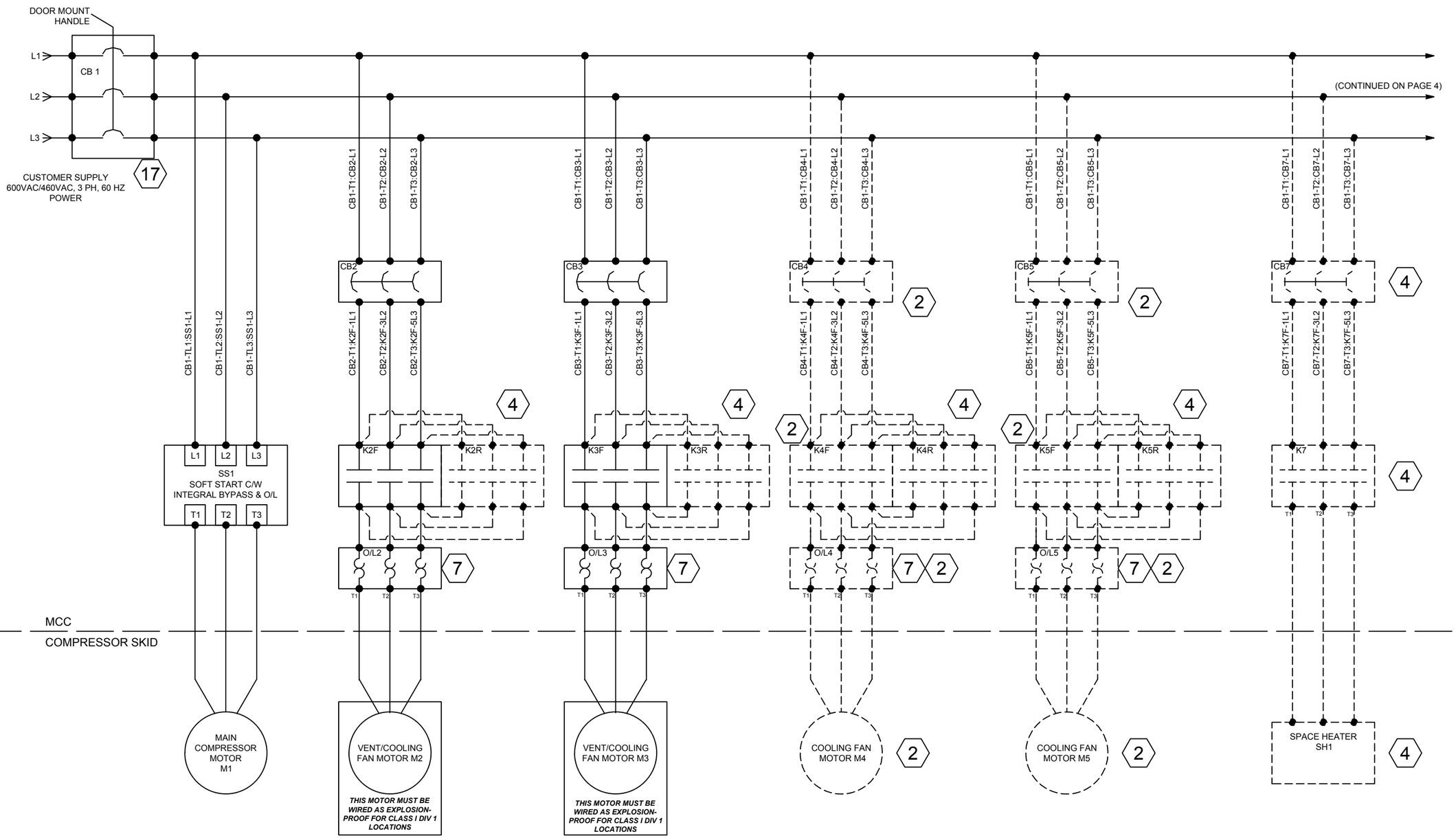
MAIN CIRCUIT BREAKER (CB1) I3 DIP SETTING				
MODEL	POWER (HP)	VOLTAGE (V)	BREAKER (A)	DIP SETTING
MCC-600-*-150-*-*-*-*-*	150	600	300	0 0 0 1
MCC-460-*-150-*-*-*-*-*	150	460	400	0 0 0 1
MCC-600-*-250-*-*-*-*-*	250	600	400	1 0 0 1
MCC-460-*-250-*-*-*-*-*	250	460	600	0 0 0 1
MCC-600-*-300-*-*-*-*-*	300	600	600	0 0 0 1
MCC-460-*-300-*-*-*-*-*	300	460	800	0 0 0 1

DIP SETTING 1 IS HIGH AND 0 IS LOW. POSITION IS READ LEFT TO RIGHT FOR I3

Clean Energy® COMPRESSION — Chilliwack, B.C., Canada

TITLE: MCC CLEANCNG DRAWING PACKAGE
SYMBOLS/LEGEND/NOTES

DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: N/A	SHEET: 2 /15	



Clean Energy® COMPRESSION

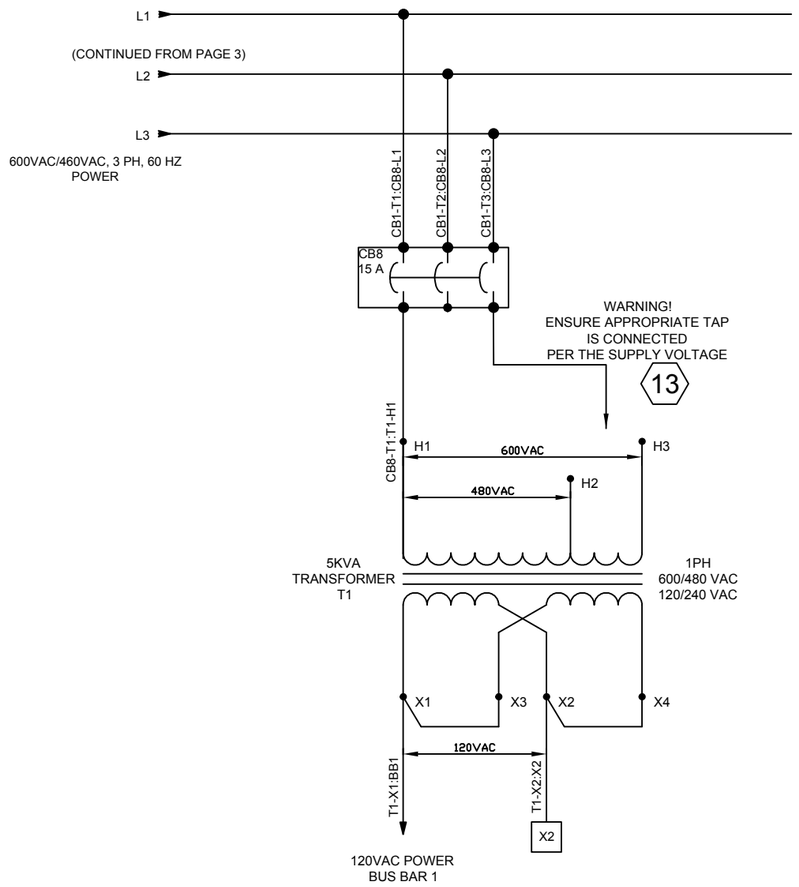
Chilliwack, B.C., Canada

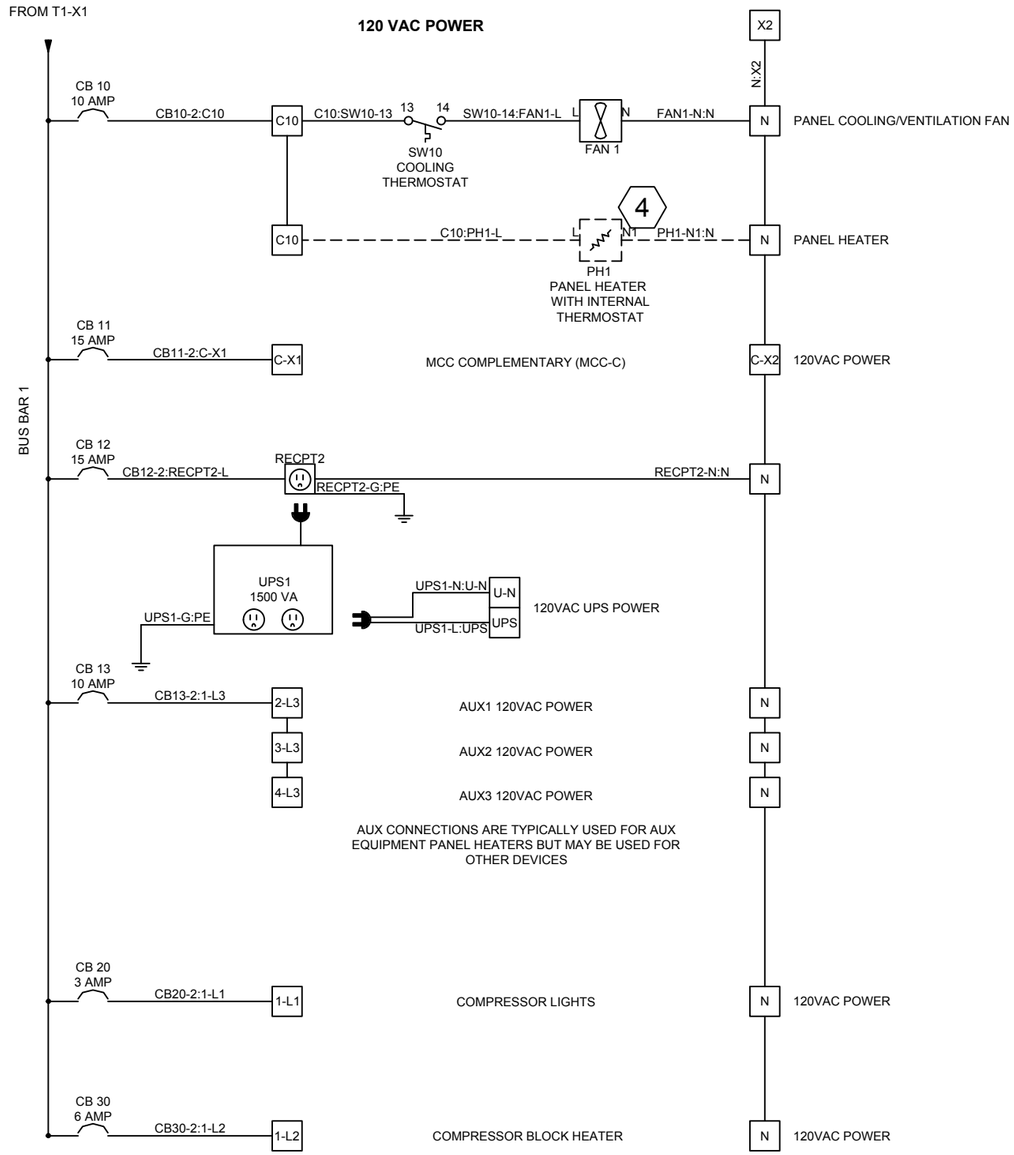
TITLE

MCC CLEANCNG DRAWING PACKAGE

POWER SCHEMATIC

DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: N/A	SHEET: 3 /15	





Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

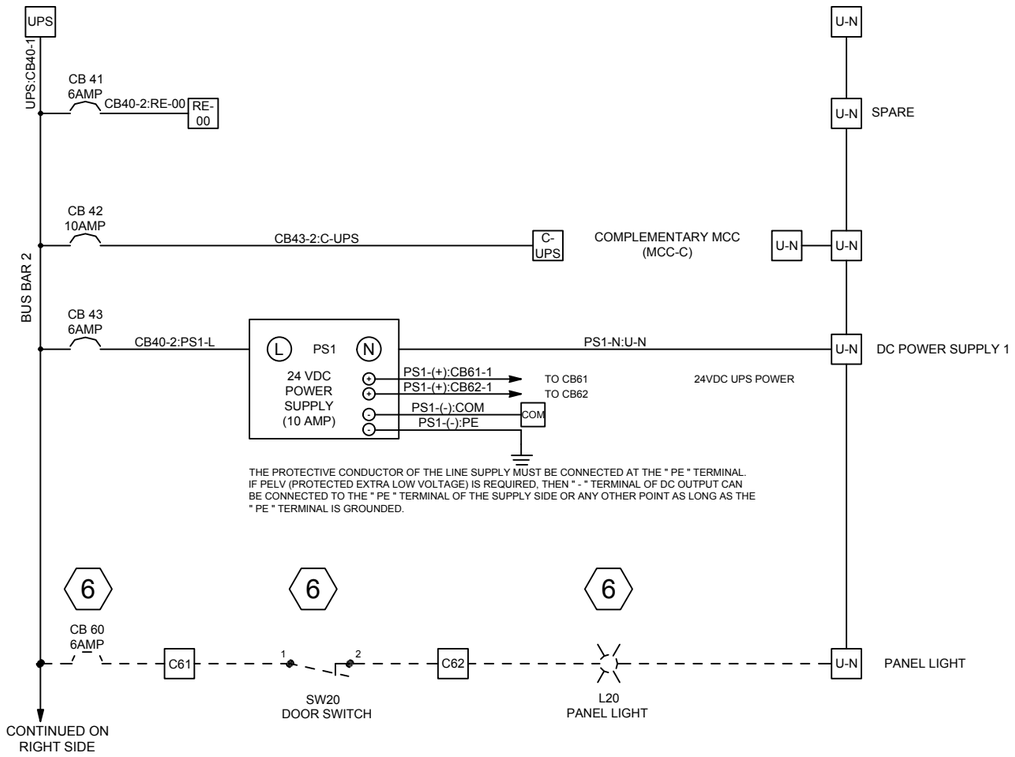
TITLE

MCC CLEANCNG DRAWING PACKAGE

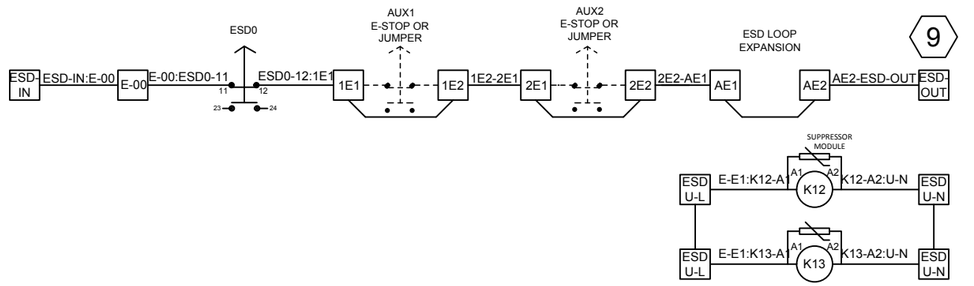
POWER SCHEMATIC

DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: N/A	SHEET: 4 /15	

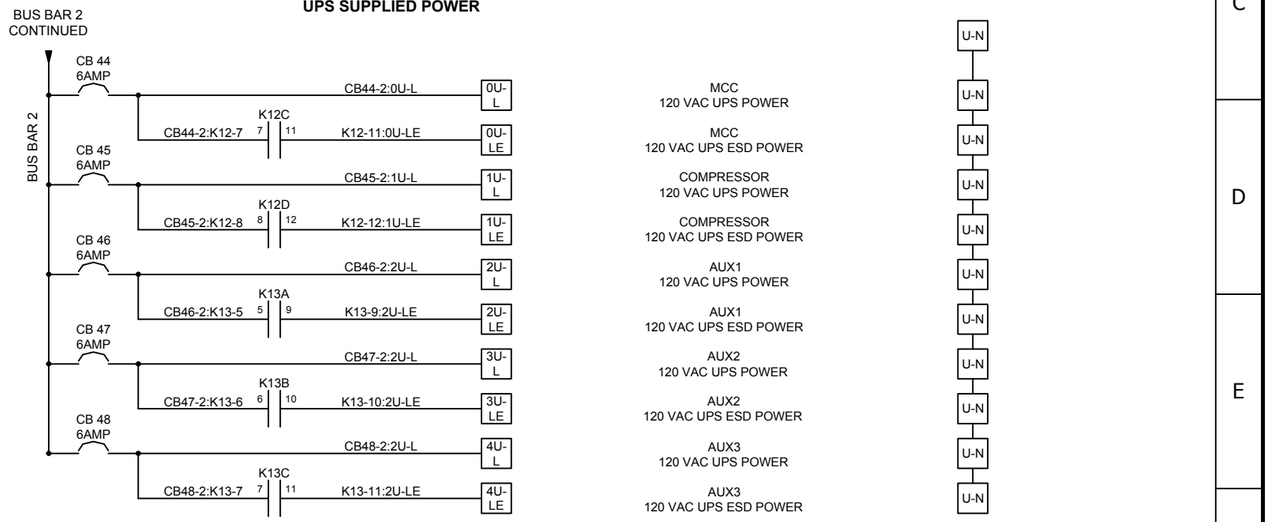
120 VAC POWER



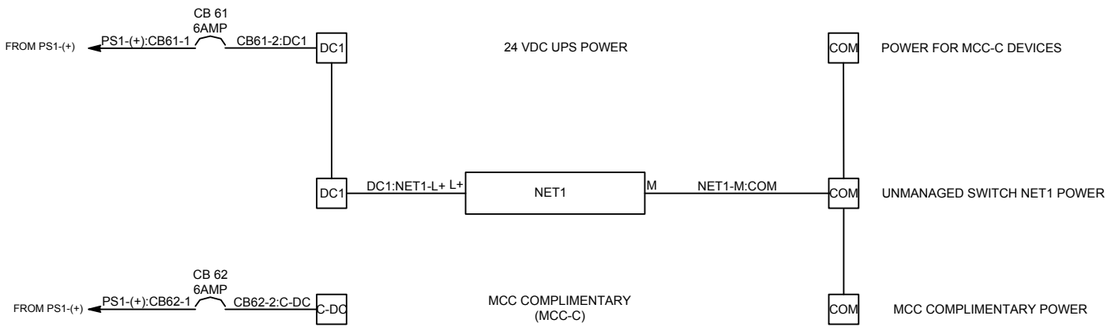
SEE SITE PLAN IF NEEDED

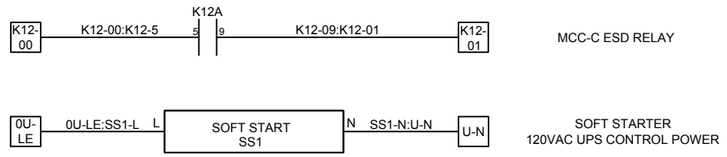


UPS SUPPLIED POWER



24VDC POWER





Clean Energy® COMPRESSION

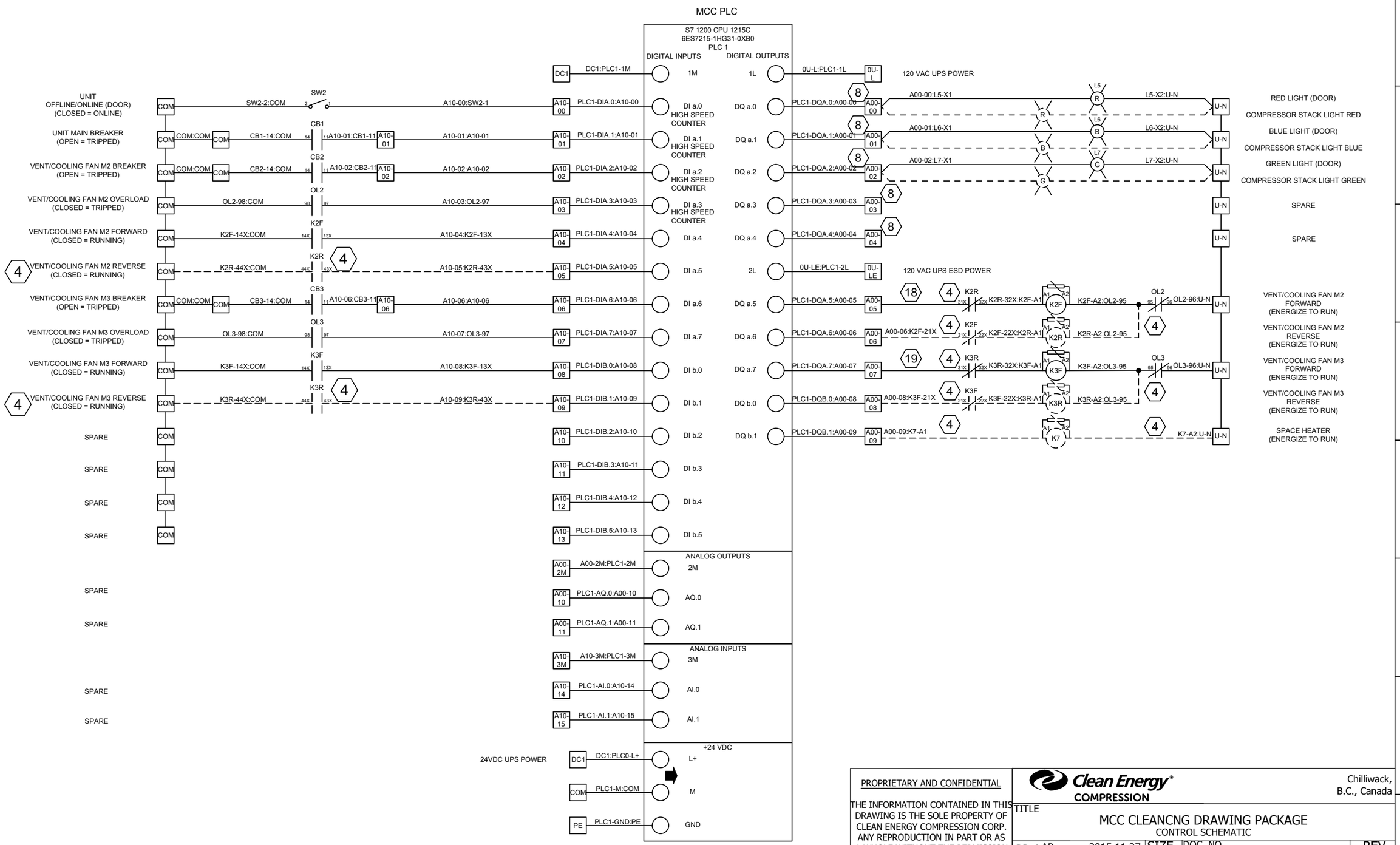
Chilliwack, B.C., Canada

TITLE

MCC CLEANCNG DRAWING PACKAGE

CONTROL SCHEMATIC

DR. | AP	2015.11.27	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.11.27	B	703455	C
AP. | TFJ	2015.11.27	SCALE: N/A	SHEET:	5 /15



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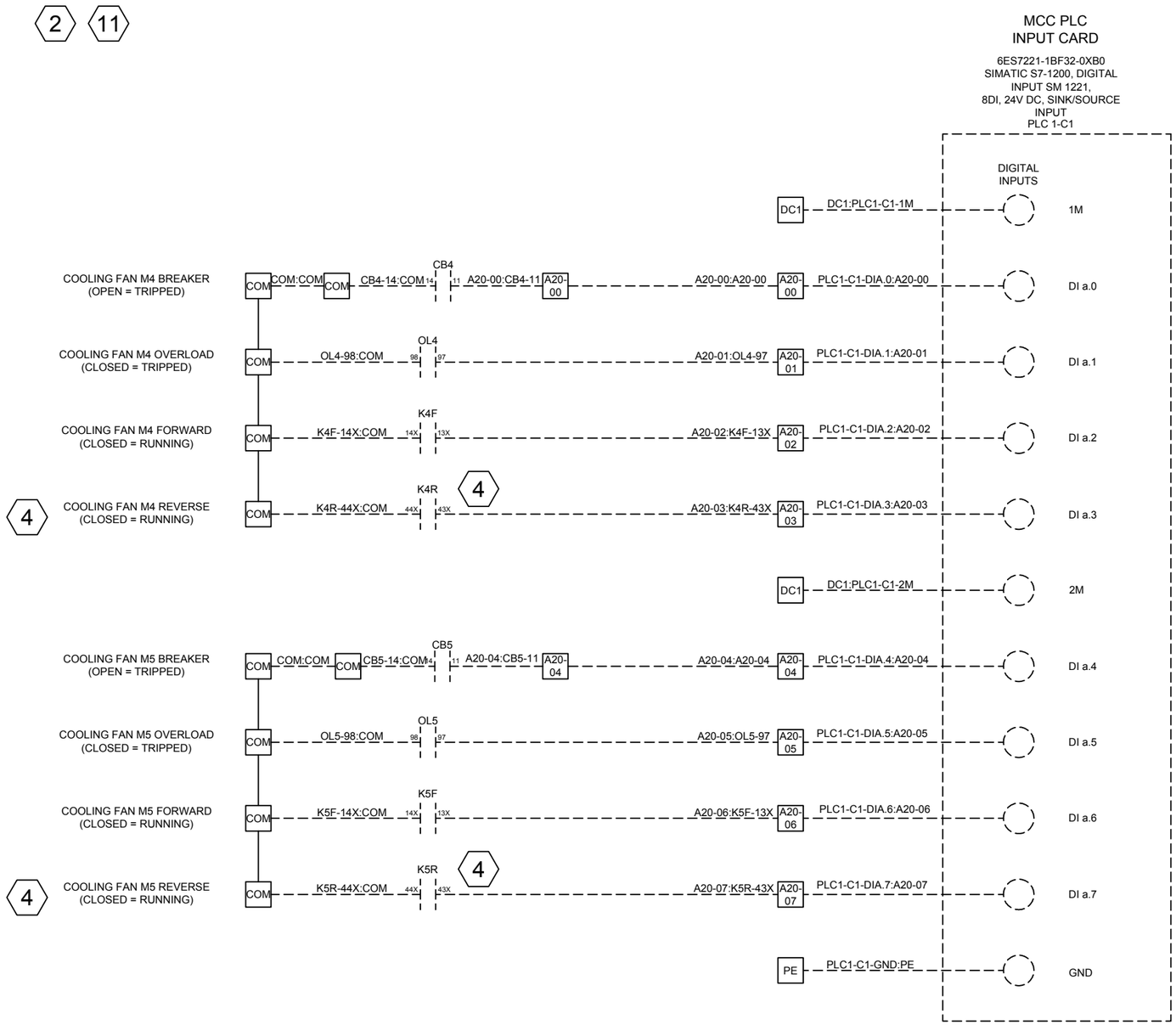
Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE: MCC CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: N/A	SHEET: 6 /15	



Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCC CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: N/A	SHEET: 7 /15	

2 11

MCC PLC
OUTPUT CARD

6ES7222-1HF32-0XB0
SIMATIC S7-1200, DIGITAL OUTPUT
SM 1222, 8DO, RELAY 2A

PLC 1-C2

DIGITAL OUTPUTS

1L — 0U-L:PLC1-C2-1L → 0U-L

DQ a.0 — PLC1-C2-DQA 0:A02-00 → A02-00 → 8

DQ a.1 — PLC1-C2-DQA 1:A02-01 → A02-01 → 8

DQ a.2 — PLC1-C2-DQA 2:A02-02 → A02-02 → 8

2L — 0U-LE:PLC1-C2-2L → 0U-LE

DQ a.3 — PLC1-C2-DQA 3:A02-03 → A02-03 → 20 → K4R 31X 32X K4R-32X:K4F-A1 → K4F A1 A2 → K4F-A2:OL4-95 → OL4 95 96 OL4-96:U-N → U-N → COOLING FAN M4 FORWARD (ENERGIZE TO RUN)

DQ a.4 — PLC1-C2-DQA 4:A02-04 → A02-04 → A02-04:K4F-21X → 4 → K4F 21X 22X K4F-22X:K4R-A1 → K4R A1 A2 → 4 → K4R-A2:OL4-95 → U-N → COOLING FAN M4 REVERSE (ENERGIZE TO RUN) → 4

DQ a.5 — PLC1-C2-DQA 5:A02-05 → A02-05 → 21 → K5R 31X 32X K5R-32X:K5F-A1 → K5F A1 A2 → K5F-A2:OL5-95 → OL5 95 96 OL5-96:U-N → U-N → COOLING FAN M5 FORWARD (ENERGIZE TO RUN)

DQ a.6 — PLC1-C2-DQA 6:A02-06 → A02-06 → A02-06:K5F-21X → 4 → K5F 21X 22X K5F-22X:K5R-A1 → K5R A1 A2 → 4 → K5R-A2:OL5-95 → U-N → COOLING FAN M5 REVERSE (ENERGIZE TO RUN) → 4

DQ a.7 — PLC1-C2-DQA 7:A02-07 → A02-07 → 8 → U-N → SPARE

U-N — SPARE

U-N — SPARE

U-N — SPARE

+24 VDC

24VDC UPS POWER — DC1 — DC1:PLC1-C2-L+ → L+

COM — PLC1-C2-M:COM → M

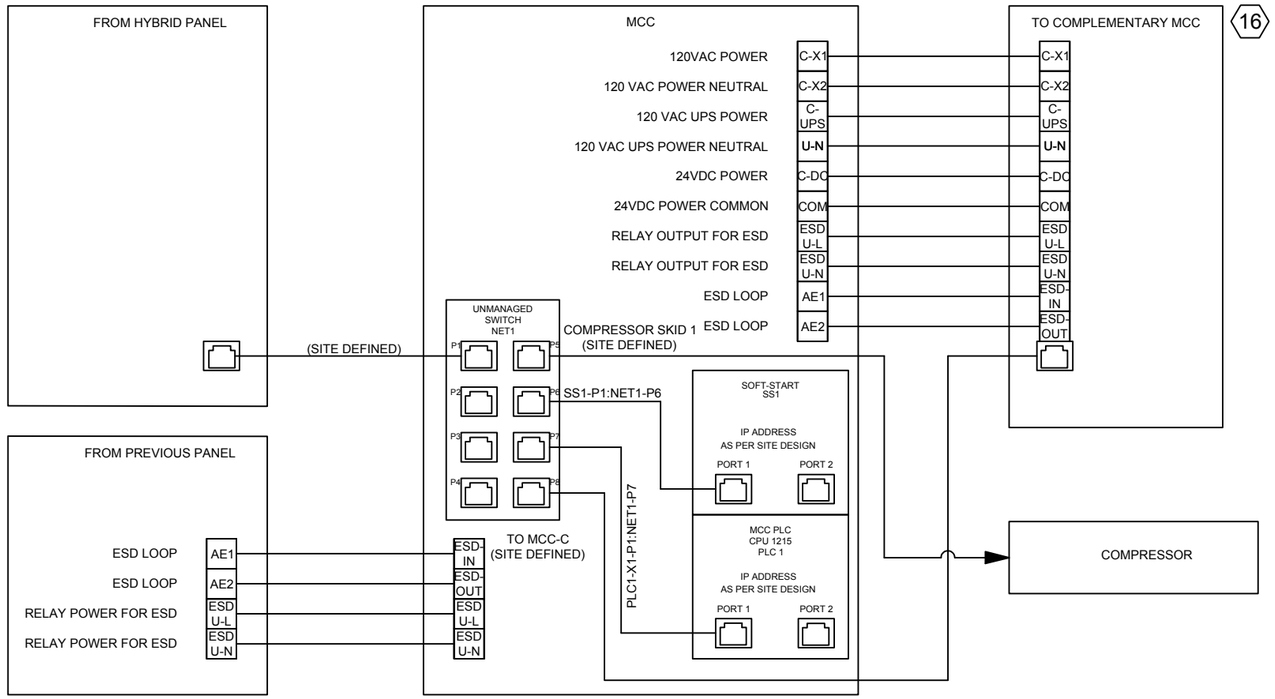
PE — PLC1-C2-GND:PE → GND

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCC CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: 1:16	SHEET: 8 /15	



Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

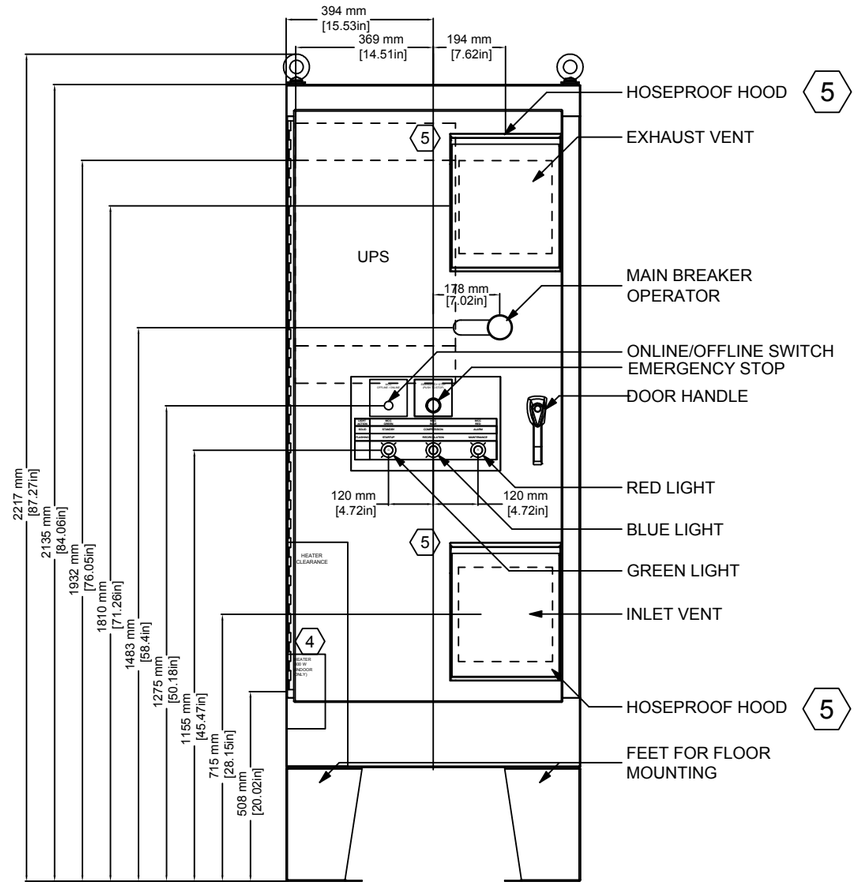
MCC CLEANCNG DRAWING PACKAGE

COMMUNICATION DIAGRAM

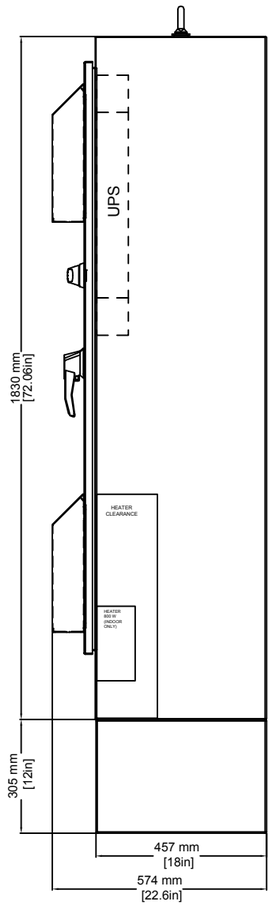
DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: 1:16	SHEET: 9 /15	

3 11

2 FAN MCC

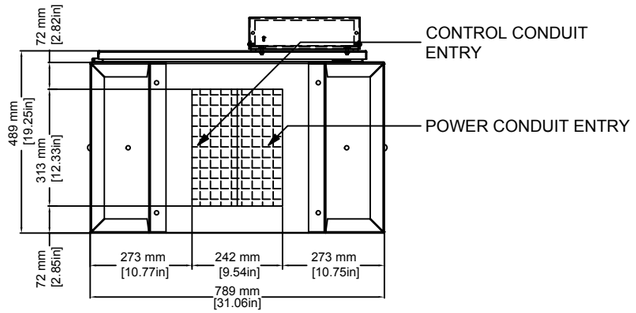


FRONT VIEW



SIDE VIEW

NOTE:
THIS IS A CONCEPTUAL MODEL ONLY



BOTTOM VIEW

Clean Energy® COMPRESSION

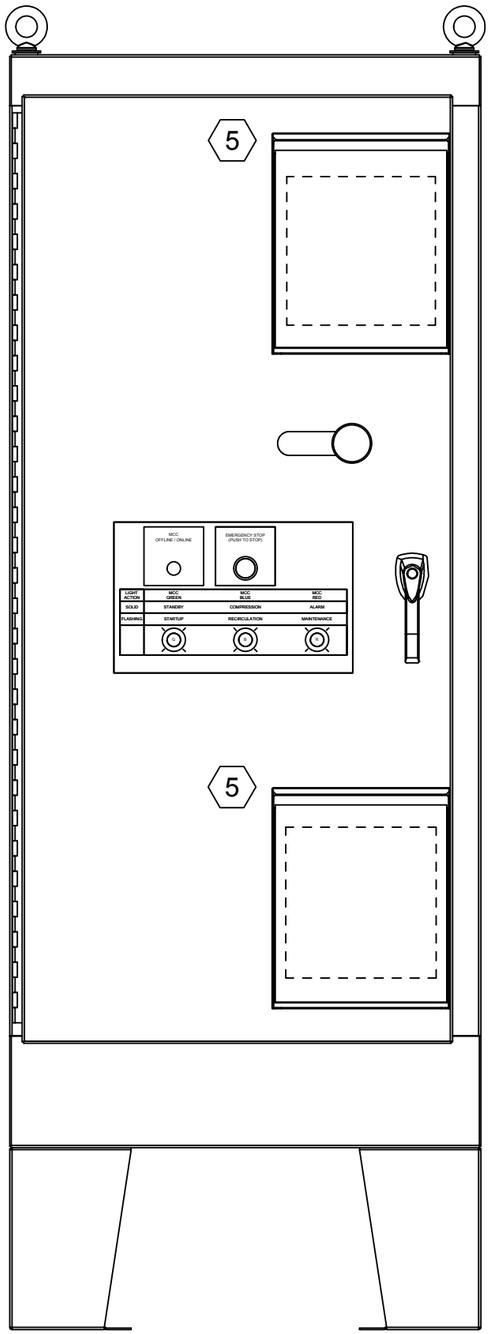
Chilliwack, B.C., Canada

TITLE
MCC CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE EXTERNAL LAYOUT

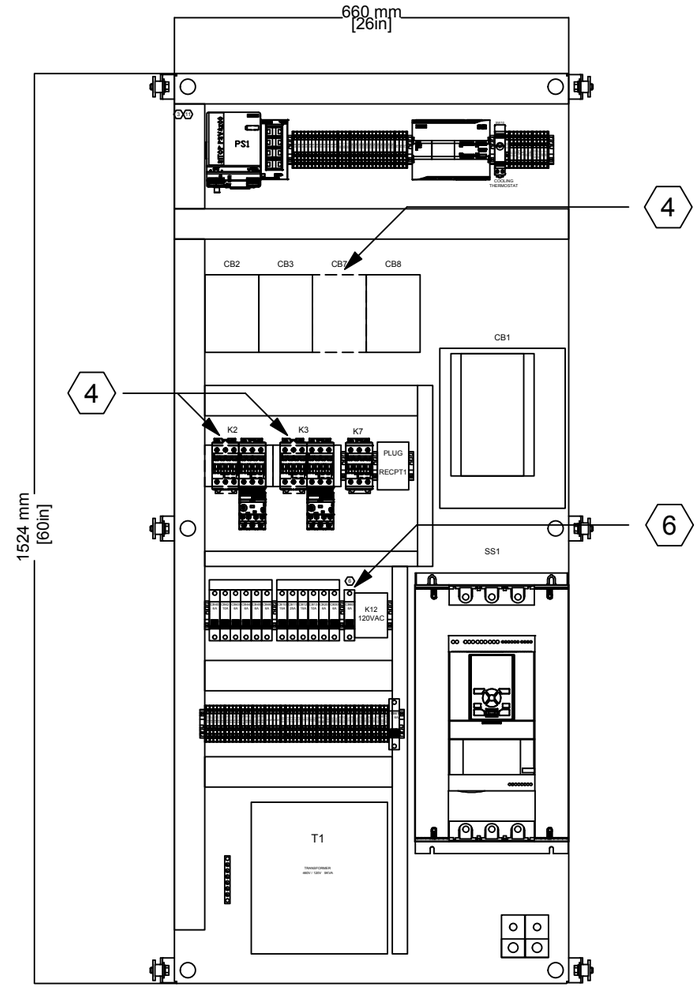
DR. | AP	2015.11.27	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.11.27	B	703455	C
AP. | TFJ	2015.11.27	SCALE: 1:16	SHEET:	10 /15

3 11

2 FAN MCC



FRONT VIEW



INNER VIEW

NOTE:
THIS IS A CONCEPTUAL MODEL ONLY

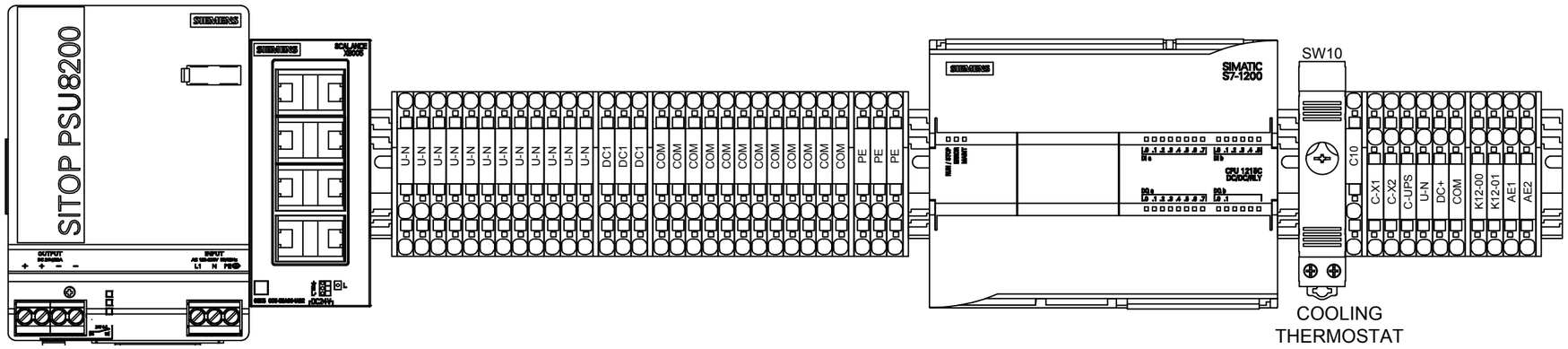
Clean Energy® COMPRESSION

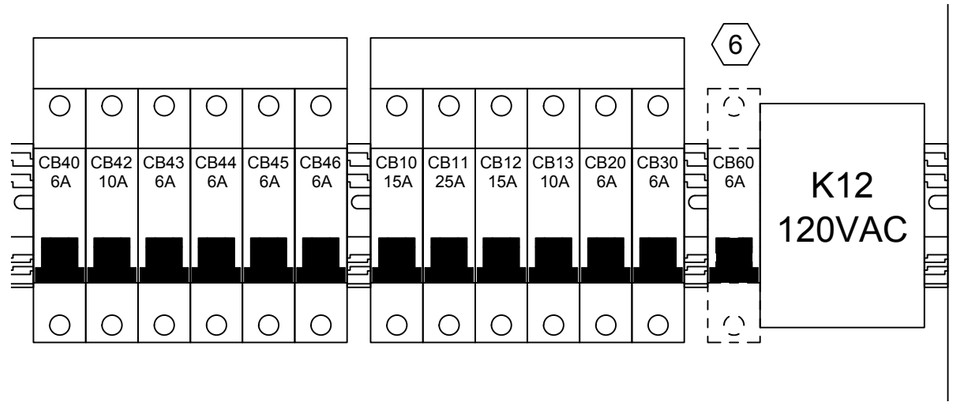
Chilliwack, B.C., Canada

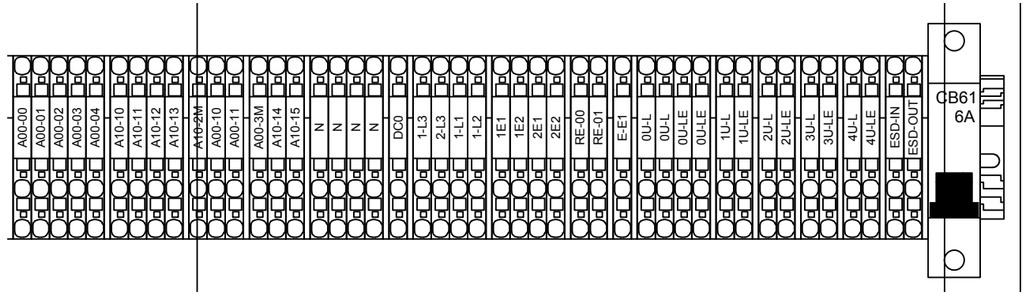
TITLE

MCC CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE INTERNAL LAYOUT

DR. | AP	2015.11.27	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.11.27	B	703455	C
AP. | TFJ	2015.11.27	SCALE: 1:10	SHEET: 11 /15	







NOTE:
THIS IS A CONCEPTUAL MODEL ONLY

Clean Energy® COMPRESSION

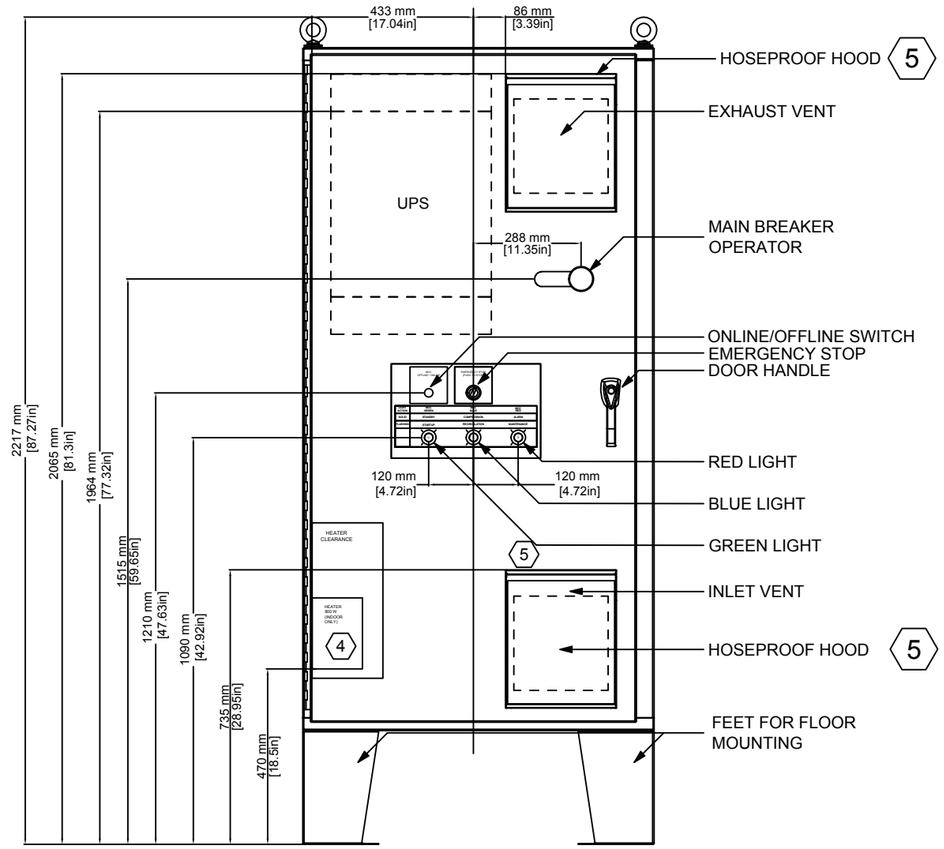
Chilliwack, B.C., Canada

TITLE: MCC CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE LAYOUT DETAIL

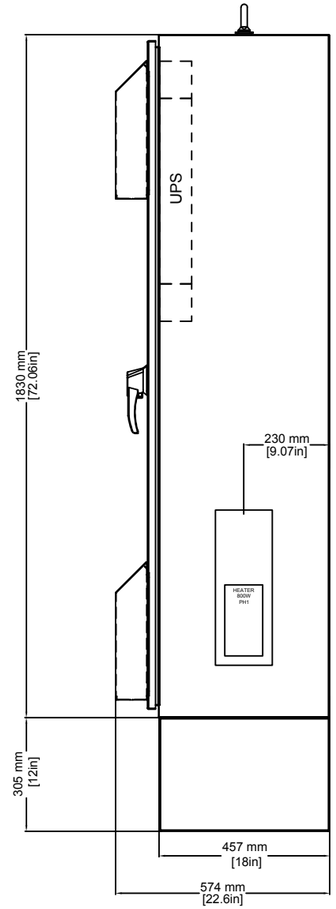
DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: 1:2	SHEET: 12 /15	

2 11

4 FAN MCC

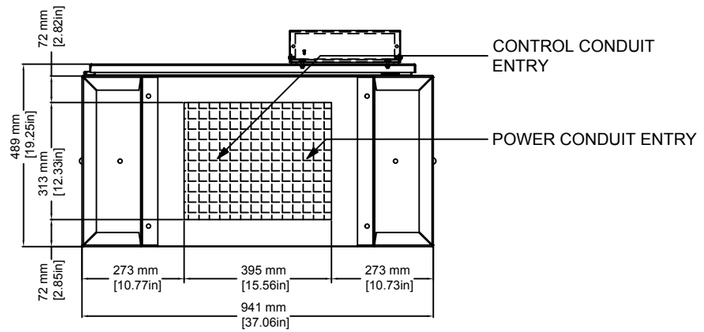


FRONT VIEW



SIDE VIEW

NOTE:
THIS IS A CONCEPTUAL MODEL ONLY



BOTTOM VIEW

Clean Energy® COMPRESSION

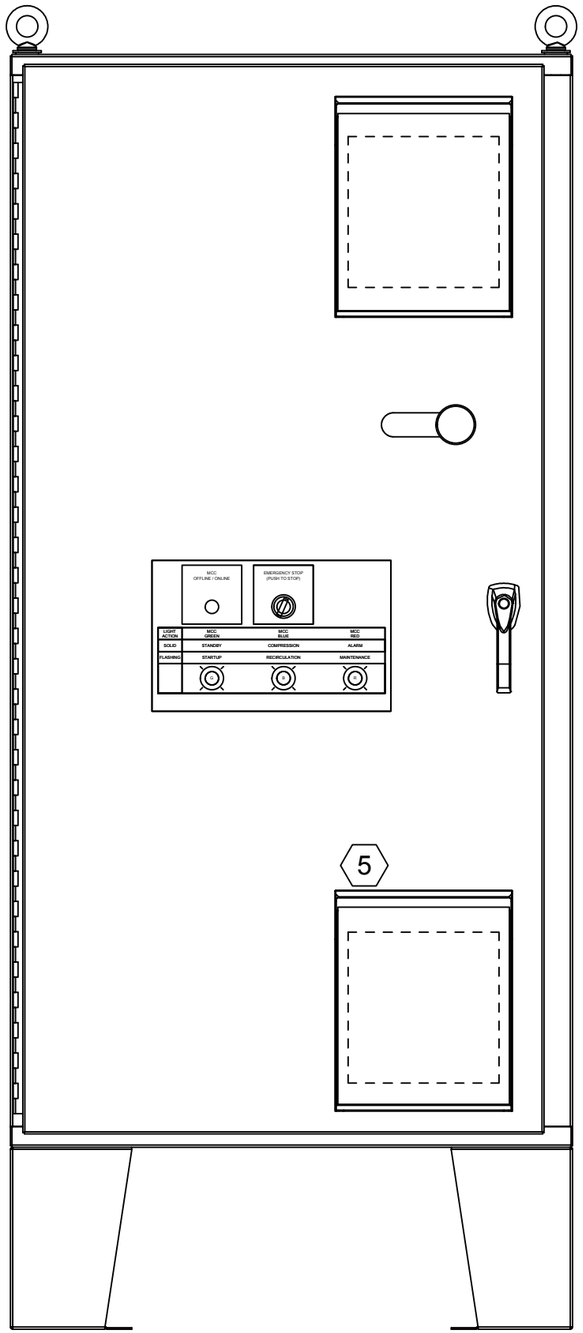
Chilliwack, B.C., Canada

TITLE

MCC CLEANCNG DRAWING PACKAGE
72X37 ENCLOSURE EXTERNAL LAYOUT

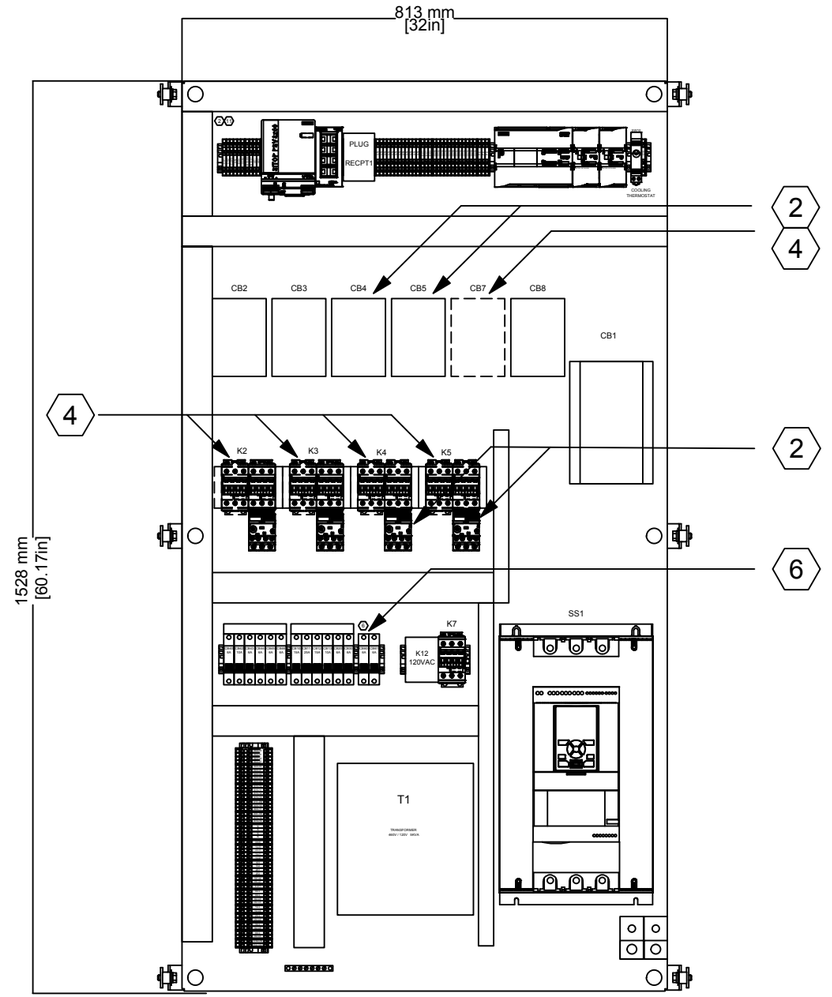
DR. | AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK. | SVW/MAE	2015.11.27			
AP. | TFJ	2015.11.27	SCALE: 1:16	SHEET: 13 /15	

4 FAN MCC



NOTE:
THIS IS A
CONCEPTUAL
MODEL ONLY

FRONT VIEW



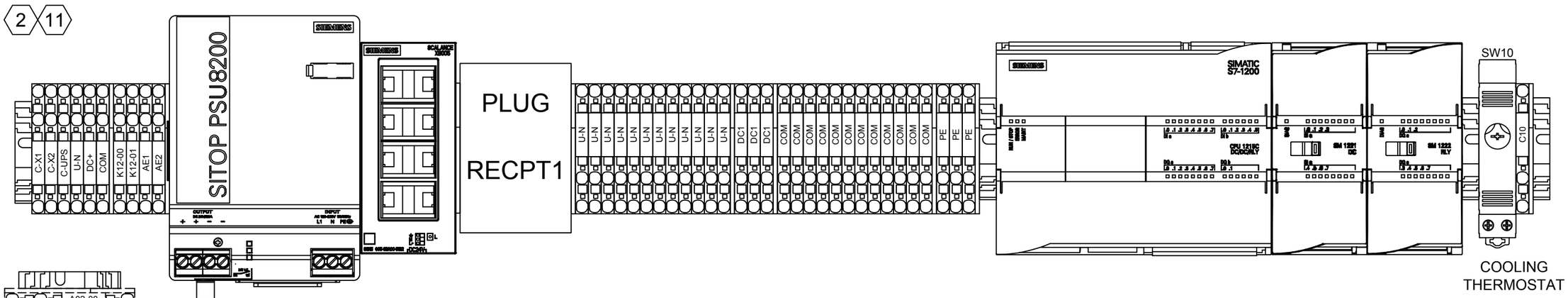
INNER VIEW

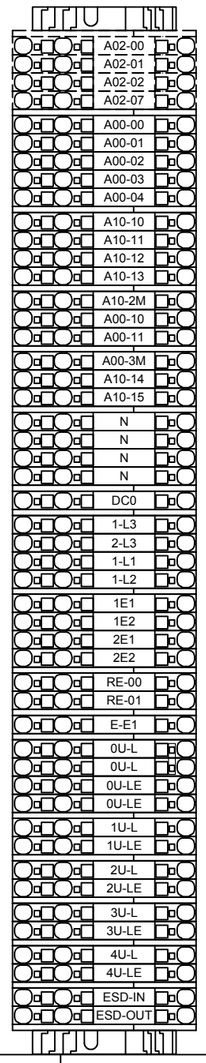
Clean Energy® COMPRESSION

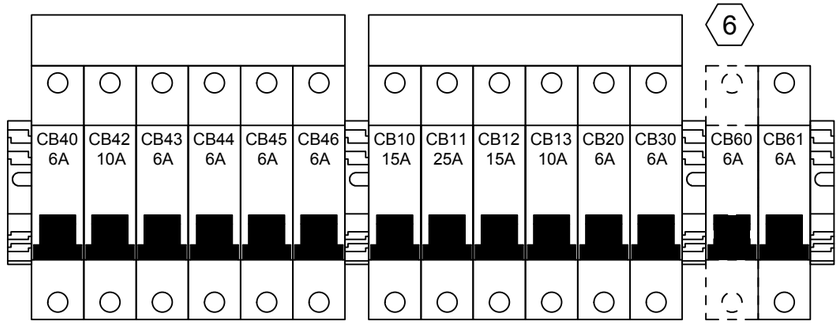
Chilliwack, B.C., Canada

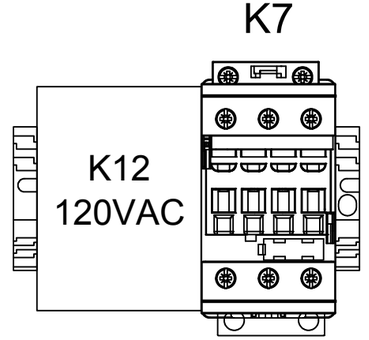
TITLE: MCC CLEANCNG DRAWING PACKAGE
72X37 ENCLOSURE LAYOUT

DR.	AP	2015.11.27	SIZE B	DOC. NO. 703455	REV C
CK.	SVW/MAE	2015.11.27			
AP.	TFJ	2015.11.27	SCALE: 1:10	SHEET: 14 /15	









NOTE:
THIS IS A CONCEPTUAL MODEL ONLY

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

MCC CLEANCNG DRAWING PACKAGE
72X37 ENCLOSURE LAYOUT DETAIL

DR. | AP	2015.11.27	SIZE	DOC. NO.		REV
CK. | SVW/MAE	2015.11.27	B	703455		C
AP. | TFJ	2015.11.27	SCALE: 1:2		SHEET: 15 /15	

REVISION HISTORY						
REV.	**DATE**	**BY**	**CK.**	**AP.**	**ECO #**	**REFERENCE**
A	2015.11.26	AP	SVW / MAE	TFJ	---	ISSUED FOR CONSTRUCTION
B	2016.04.06	SRS	MAE	TFJ	---	MODIFIED ESD LOOP AS PER CHANGE REQUEST. INCREASED WIRE TEXT SIZE FOR READABILITY AFTER PRINTING

MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
703456

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
COVER/REVISION SHEET

DR. | AP 2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE 2015.11.26			
AP. | TFJ 2015.11.26	SCALE: N/A	SHEET: 1 /14	

LEGEND:

ITEM	DESCRIPTION
140	INTERNAL TERMINAL BLOCK AND NUMBER
	PROXIMITY SWITCH
K1	CONTACTOR COIL
	NORMALLY OPEN/CLOSED CONTACTOR
	BREAKER
	PLUG
	RECEPTACLE
G	INDICATOR LIGHT, (G=GREEN, R=RED, B=BLUE, W=WHITE)
	NORMALLY OPEN/CLOSED SWITCH
	PUSH BUTTON DOUBLE POLE SWITCH
	LEVEL SWITCH
	TEMPERATURE SWITCH
	PRESSURE SWITCH
	JUNCTION
	TRANSMITTER
	ISOLATED BARRIER
	SOLENOID
	PROTECTIVE EARTH
	THERMOCOUPLE
	METAL OXIDE VARISTOR (MOV)
	PANEL FAN
	PANEL HEATER
	HORN
	OVERLOAD PROTECTION
	TRANSFORMER

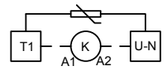
NOTES:

1. THE NAMING CONVENTION IN THIS DOCUMENT APPLIES TO IS OUTLINED IN DOCUMENT NUMBER 702973. EXAMPLE: MCCC-460-65-150-S-2X5-CWP-EXT-NA+L
2. OBJECTS SHOWN ARE INCLUDED IN THE 4 FAN OPTION MODELS (MCCC-*-*-*-*-4X5-*-*-*)
3. OBJECTS SHOWN ARE INCLUDED IN THE 2 FAN OPTION MODELS (MCCC-*-*-*-*-2X5-*-*-* AND MCCC-*-*-*-*-2X7-*-*-*)
4. OBJECTS SHOWN ARE INCLUDED IN THE COLD WEATHER PACKAGE MODELS (MCCC-*-*-*-*-*-CWP-*-*)
5. OBJECTS SHOWN WILL ONLY BE INSTALLED ON THE OUTDOOR MODELS (MCCC-*-*-*-*-*-*-EXT-*)
6. OBJECTS ARE INCLUDED ON THE LIGHT OPTION MODELS (MCCC-*-*-*-*-*-*-*-*+L)
7. OVERLOAD RELAY SETTINGS FOR O/L2, O/L3, O/L4, O/L5 (SEE TABLE)
8. METAL OXIDE VARISTORS SHALL BE INSTALLED ON PLC DIGITAL OUTPUT TERMINALS (SEE EXAMPLE)
9. AUX1, AUX2, AND ESD EXPANSION LOOP E-STOP CONNECTION WIRE JUMPERS TO BE INCLUDED IN FACTORY BUILD. WIRED JUMPERS MUST BE REMOVED TO INSTALL SITE WIRING TO E-STOP DEVICES
10. THIS DOCUMENT FOLLOWS THE VOLTAGE NAMING SCHEME OUTLINED IN DOCUMENT 702686
11. NOTE SYMBOL TO THE LEFT APPLIES TO ENTIRE PAGE OF THE DOCUMENT
12. THIS DOCUMENT IS FOR USE FOR NORTH AMERICAN MODELS ONLY
13. THE WIRE NAMING SCHEME IS AS FOLLOWS: <SOURCE>-<PIN>:<DESTINATION>-<PIN>
14. THE WIRE COLOR IN THE PANEL CAN BE DETERMINED USING THE TABLE ON THE RIGHT. WIRE TYPES NOT INDICATEDED IN THE TABLE SHALL BE INDICATED IN THE BOM ACCORDING TO THE WIRE NAME AS SPECIFIED IN NOTE 13
15. EQUIPMENT IS OPTIONAL DEPENDING ON SITE CONFIGURATION WHICH IS FOR REFERENCE ONLY. FOR DETAILED INFORMATION SEE EQUIPMENT DRAWING.
16. CIRCUIT BREAKER 1 (CB1) SETTINGS
    1) L DIP SWITCHES SET TO 0.04 (HIGH), 0.08 (HIGH), 0.16 (HIGH), 0.32(HIGH)
    2) t1 DIP SWITCH SET TO 12s (LOW)
    3) S/I DIP SWITCH SET TO I (LOW)
    4) I3 DIP SWITCHES (SEE TABLE)
    5) t2 DIP SWITCH NOT APPLICABLE
    6) N DIP SWITCH SET TO OFF, 50% (LOW, LOW) (N DIP SWITCH MAY NOT BE AVAILABLE ON ALL MODELS)
17. TYP : A00-05:K2F-A1
    CWP : A00-05:K2R-31X
18. TYP : A00-07:K3F-A1
    CWP : A00-07:K3R-31X
19. TYP : A02-03:K4F-A1
    CWP : A02-02:K4R-31X
20. TYP : A02-05:K5F-A1
    CWP : A02-05:K5R-31X

7

FAN OVERLOAD RELAY SETTINGS					
	MOTOR			OVERLOAD RELAY SETTINGS	
MODEL	VOLTAGE	HP	FLA (A)	TRIP CLASS	TRIP CURRENT (A)
MCCC-460-*-*-*-*X5-*-*-*	460	5	6.6	10E	6.5
MCCC-600-*-*-*-*X5-*-*-*	575	5	5.3	10E	5.5
MCCC-460-*-*-*-*X7-*-*-*	460	7.5	9.4	10E	9.5
MCCC-600-*-*-*-*X7-*-*-*	575	7.5	7.5	10E	7.5

8



14

ELECTRICAL PANEL WIRE COLOR	
BLACK	UNGROUNDED AC CONTROL CIRCUIT CONDUCTORS (HIGH VOLTAGE, 480V, 600V)
RED	UNGROUNDED AC CONTROL CIRCUITS AS LESS THAN SUPPLY VOLTAGE (120V)
BLUE	UNGROUNDED DC CONTROL CIRCUITS
ORANGE	UNGROUNDED CONTROL CIRCUITS OR OTHER WIRING THAT MAY REMAIN ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION (BEING FED FROM A SEPARATE PANEL)
WHITE	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT (NEUTRAL)
WHITE W/ BLU	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT
GREEN	EARTH / GROUND

WIRE COLORS DEFINED BY UL 508A AND NFPA 79.

16

MAIN CIRCUIT BREAKER (CB1) I3 DIP SETTING				
MODEL	POWER (HP)	VOLTAGE (V)	BREAKER (A)	DIP SETTING
MCCC-600-*-150-*-*-*-*-*	150	600	300	0 0 0 1
MCCC-460-*-150-*-*-*-*-*	150	460	400	0 0 0 1
MCCC-600-*-250-*-*-*-*-*	250	600	400	1 0 0 1
MCCC-460-*-250-*-*-*-*-*	250	460	600	0 0 0 1
MCCC-600-*-300-*-*-*-*-*	300	600	600	0 0 0 1
MCCC-460-*-300-*-*-*-*-*	300	460	800	0 0 0 1

DIP SETTING 1 IS HIGH AND 0 IS LOW. POSITION IS READ LEFT TO RIGHT FOR I3

Clean Energy® COMPRESSION — Chilliwack, B.C., Canada

TITLE: MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
SYMBOLS/LEGEND/NOTES

DR. | AP 2015.11.26	SIZE B	DOC. NO. 703456		REV B
CK. | SVW/MAE 2015.11.26				
AP. | TFJ 2015.11.26	SCALE: N/A		SHEET: 2 /14	

DOOR MOUNT HANDLE

L1
L2
L3

CB 1

CUSTOMER SUPPLY
600VAC/460VAC, 3 PH, 60 HZ
POWER

16

CB1-T1:SS1-L1
CB1-T2:SS1-L2
CB1-T3:SS1-L3

L1 L2 L3

SS1
SOFT START C/W
INTEGRAL BYPASS & O/L

T1 T2 T3

MAIN
COMPRESSOR
MOTOR
M1

CB1-T1:CB2-L1
CB1-T2:CB2-L2
CB1-T3:CB2-L3

CB2

CB2-T1:K2F-1L1
CB2-T2:K2F-3L2
CB2-T3:K2F-5L3

4

K2F K2R

O/L2

7

T1 T2 T3

VENT/COOLING
FAN MOTOR M2

THIS MOTOR MUST BE WIRED AS EXPLOSION-PROOF FOR CLASS I DIV 1 LOCATIONS

CB1-T1:CB3-L1
CB1-T2:CB3-L2
CB1-T3:CB3-L3

CB3

CB3-T1:K3F-1L1
CB3-T2:K3F-3L2
CB3-T3:K3F-5L3

4

K3F K3R

O/L3

7

T1 T2 T3

VENT/COOLING
FAN MOTOR M3

THIS MOTOR MUST BE WIRED AS EXPLOSION-PROOF FOR CLASS I DIV 1 LOCATIONS

CB1-T1:CB4-L1
CB1-T2:CB4-L2
CB1-T3:CB4-L3

CB4

2

CB4-T1:K4F-1L1
CB4-T2:K4F-3L2
CB4-T3:K4F-5L3

2 4

K4F K4R

O/L4

7 2

T1 T2 T3

COOLING FAN
MOTOR M4

2

CB1-T1:CB5-L1
CB1-T2:CB5-L2
CB1-T3:CB5-L3

CB5

2

CB5-T1:K5F-1L1
CB5-T2:K5F-3L2
CB5-T3:K5F-5L3

2 4

K5F K5R

O/L5

7 2

T1 T2 T3

COOLING FAN
MOTOR M5

2

CB1-T1:CB7-L1
CB1-T2:CB7-L2
CB1-T3:CB7-L3

CB7

4

CB7-T1:K7F-1L1
CB7-T2:K7F-3L2
CB7-T3:K7F-5L3

K7

4

T1 T2 T3

SPACE HEATER
SH1

4

MCC-C

COMPRESSOR SKID

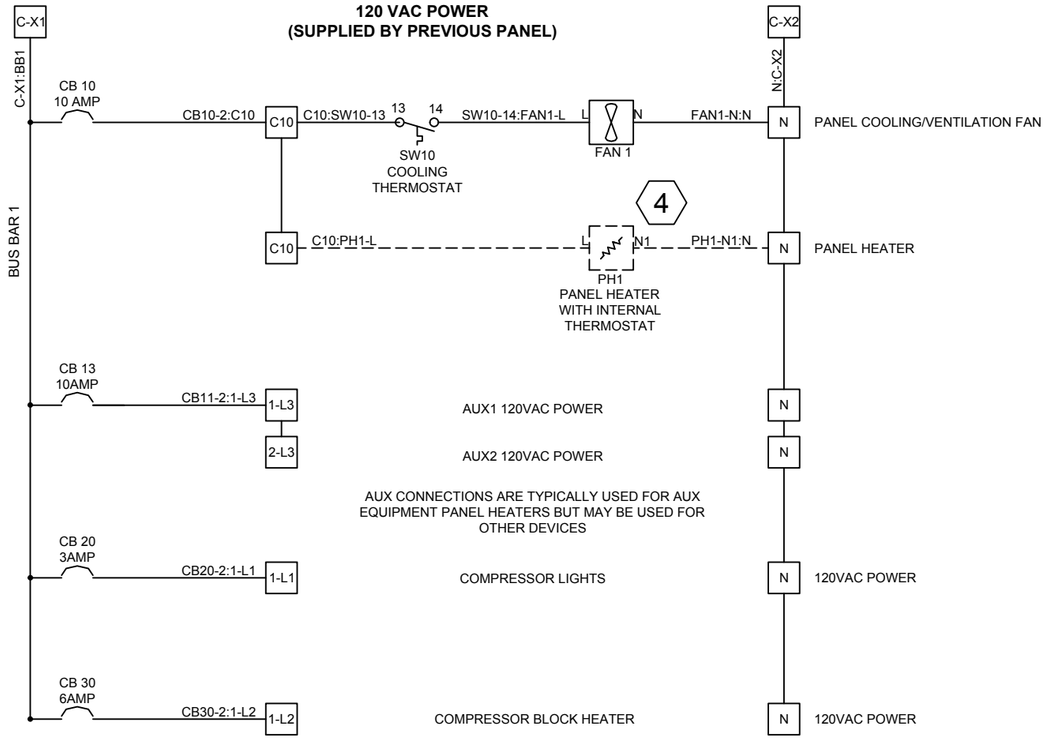
Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

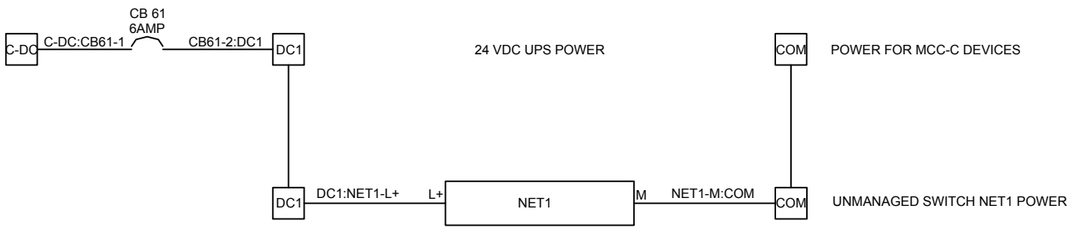
TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
POWER SCHEMATIC

DR. | AP	2015.11.26	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.11.26	B	703456	B
AP. | TFJ	2015.11.26	SCALE: N/A	SHEET:	3 /14

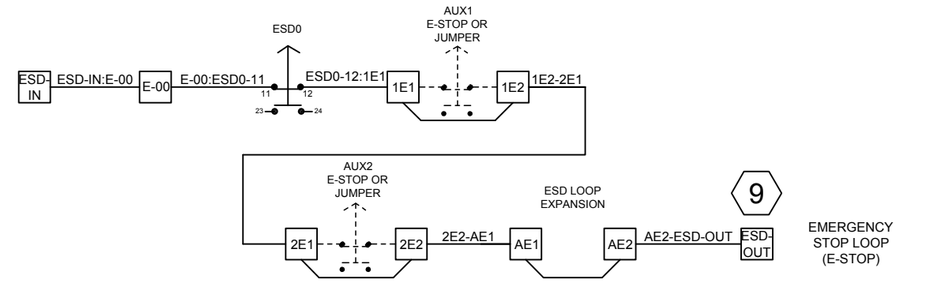
120 VAC POWER (SUPPLIED BY PREVIOUS PANEL)



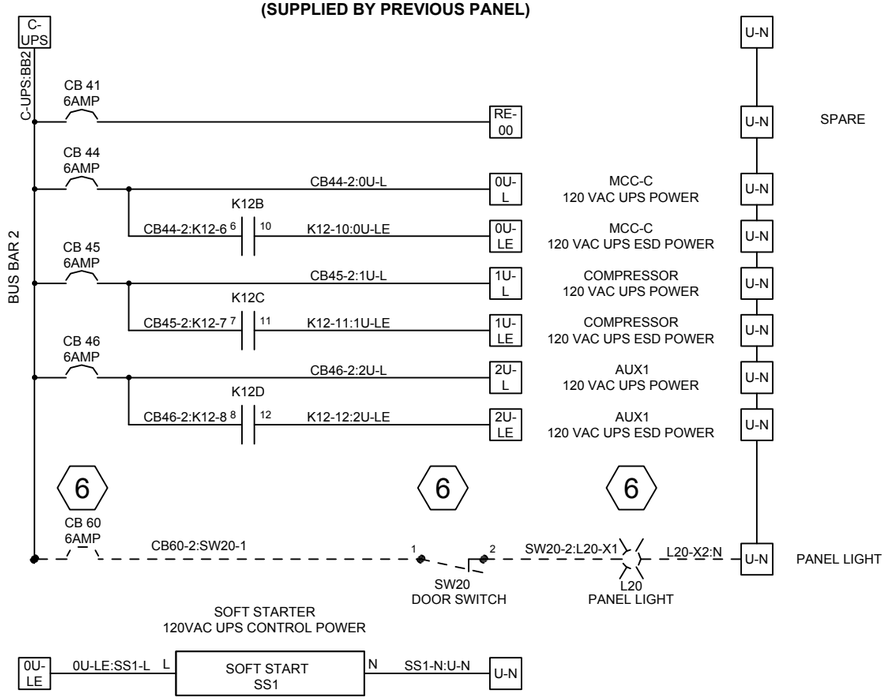
24VDC POWER (SUPPLIED BY PREVIOUS PANEL)



SEE SITE PLAN IF NEEDED



UPS SUPPLIED POWER (SUPPLIED BY PREVIOUS PANEL)



Clean Energy® COMPRESSION

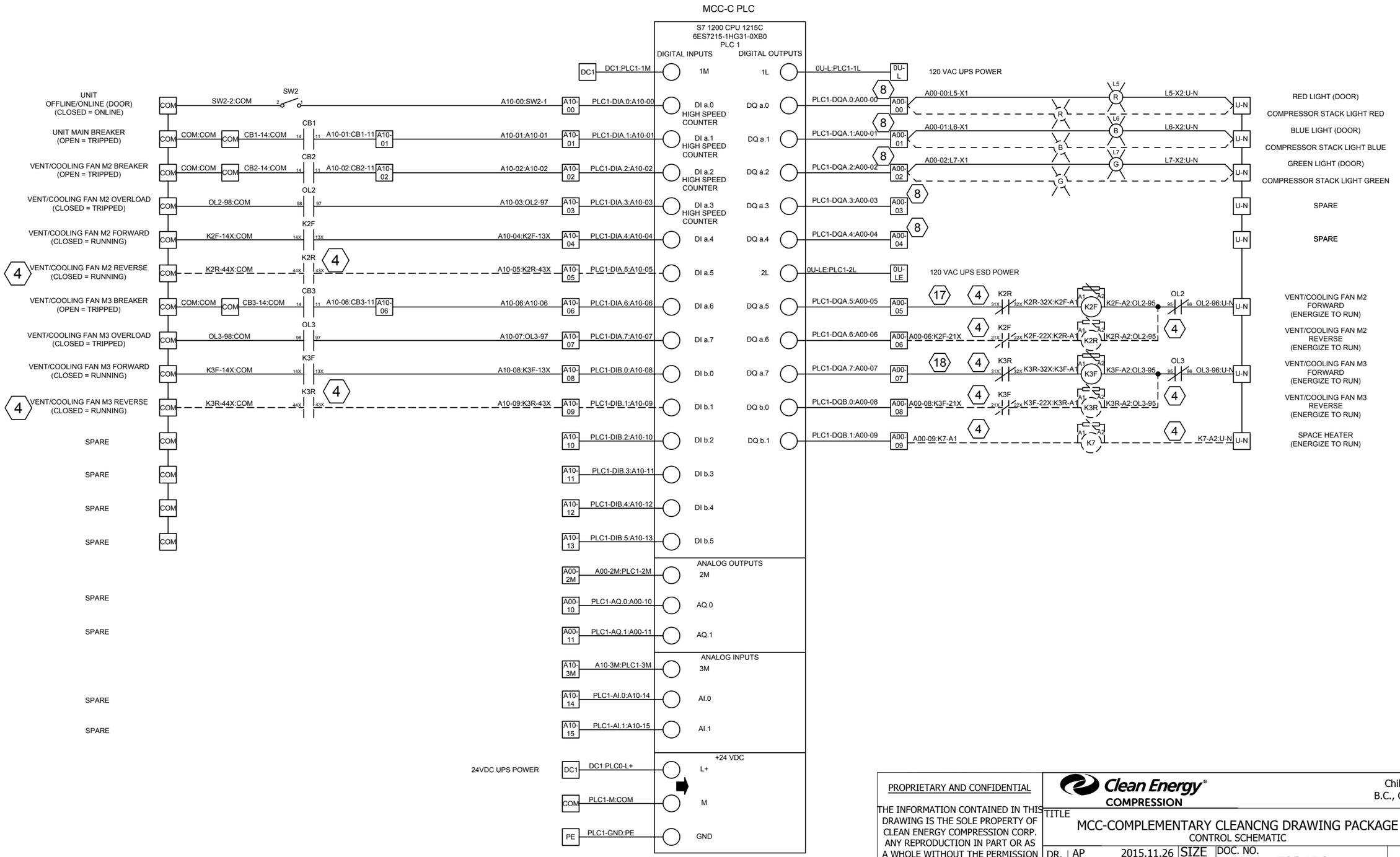
Chilliwack, B.C., Canada

TITLE

MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE

POWER SCHEMATIC

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: N/A	SHEET: 4 /14	



Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE

CONTROL SCHEMATIC

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: N/A	SHEET: 5 /14	

2 11

MCC-C PLC
INPUT CARD

6ES7221-1BF32-0XB0
SIMATIC S7-1200, DIGITAL INPUT
SM 1221,
8DI, 24V DC, SINK/SOURCE INPUT
PLC 1-C1

DIGITAL
INPUTS

DC1 — DC1:PLC1-C1-1M — 1M

COOLING FAN M4 BREAKER (OPEN = TRIPPED) — COM — COM:COM — COM — CB4-14:COM — CB4 14 11 — A20-00:CB4-11 — A20-00 — A20-00:CB4-11 — A20-00 — PLC1-C1-DIA.0:A20-00 — DI a.0

COOLING FAN M4 OVERLOAD (CLOSED = TRIPPED) — COM — OL4-98:COM — OL4 98 97 — A20-01:OL4-97 — A20-01 — PLC1-C1-DIA.1:A20-01 — DI a.1

COOLING FAN M4 FORWARD (CLOSED = RUNNING) — COM — K4F-14X:COM — K4F 14X 13X — A20-02:K4F-13X — A20-02 — PLC1-C1-DIA.2:A20-02 — DI a.2

4 COOLING FAN M4 REVERSE (CLOSED = RUNNING) — COM — K4R-44X:COM — K4R 44X 43X 4 — A20-03:K4R-43X — A20-03 — PLC1-C1-DIA.3:A20-03 — DI a.3

DC1 — DC1:PLC1-C1-2M — 2M

COOLING FAN M5 BREAKER (OPEN = TRIPPED) — COM — COM:COM — COM — CB5-14:COM — CB5 14 11 — A20-04:CB5-11 — A20-00 — A20-04:A20-04 — A20-04 — PLC1-C1-DIA.4:A20-04 — DI a.4

COOLING FAN M5 OVERLOAD (CLOSED = TRIPPED) — COM — OL5-98:COM — OL5 98 97 — A20-05:OL5-97 — A20-05 — PLC1-C1-DIA.5:A20-05 — DI a.5

COOLING FAN M5 FORWARD (CLOSED = RUNNING) — COM — K5F-14X:COM — K5F 14X 13X — A20-06:K5F-13X — A20-06 — PLC1-C1-DIA.6:A20-06 — DI a.6

4 COOLING FAN M5 REVERSE (CLOSED = RUNNING) — COM — K5R-44X:COM — K5R 44X 43X 4 — A20-07:K5R-43X — A20-07 — PLC1-C1-DIA.7:A20-07 — DI a.7

PE — PLC1-C1-GND:PE — GND

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: N/A	SHEET: 6 /14	

2 11

MCC-C PLC
OUTPUT CARD

6ES7222-1HF32-0XB0
SIMATIC S7-1200, DIGITAL OUTPUT
SM 1222, 8DO, RELAY 2A

PLC 1-C2

DIGITAL OUTPUTS

1L — 0U-L:PLC1-C2-1L — 0U-L

DQ a.0 — PLC1-C2-DQA 0:A02-00 — A02-00 — 8

DQ a.1 — PLC1-C2-DQA 1:A02-01 — A02-01 — 8

DQ a.2 — PLC1-C2-DQA 2:A02-02 — A02-02 — 8

2L — 0U-LE:PLC1-C2-2L — 0U-LE

DQ a.3 — PLC1-C2-DQA 3:A02-03 — A02-03 — 19 — 4 — K4R 31X/32X — K4R-32X:K4F-A1 — K4F A1/A2 — K4F-A2:OL4-95 — OL4 95/96 — OL4-96:U-N — U-N — COOLING FAN M4 FORWARD (ENERGIZE TO RUN)

DQ a.4 — PLC1-C2-DQA 4:A02-04 — A02-04 — A02-04:K4F-21X — 4 — K4F 21X/22X — K4F-22X:K4R-A1 — K4R A1/A2 — K4R-A2:OL4-95 — COOLING FAN M4 REVERSE (ENERGIZE TO RUN) — 4

DQ a.5 — PLC1-C2-DQA 5:A02-05 — A02-05 — 20 — 4 — K5R 31X/32X — K5R-32X:K5F-A1 — K5F A1/A2 — K5F-A2:OL5-95 — OL5 95/96 — OL5-96:U-N — U-N — COOLING FAN M5 FORWARD (ENERGIZE TO RUN)

DQ a.6 — PLC1-C2-DQA 6:A02-06 — A02-06 — A02-06:K5F-21X — 4 — K5F 21X/22X — K5F-22X:K5R-A1 — K5R A1/A2 — K5R-A2:OL5-95 — COOLING FAN M5 REVERSE (ENERGIZE TO RUN) — 4

DQ a.7 — PLC1-C2-DQA 7:A02-07 — A02-07 — 8 — U-N — SPARE

U-N — SPARE

U-N — SPARE

U-N — SPARE

+24 VDC

24VDC UPS POWER — DC1 — DC1:PLC1-C2-L+ — L+

COM — PLC1-C2-M:COM — M

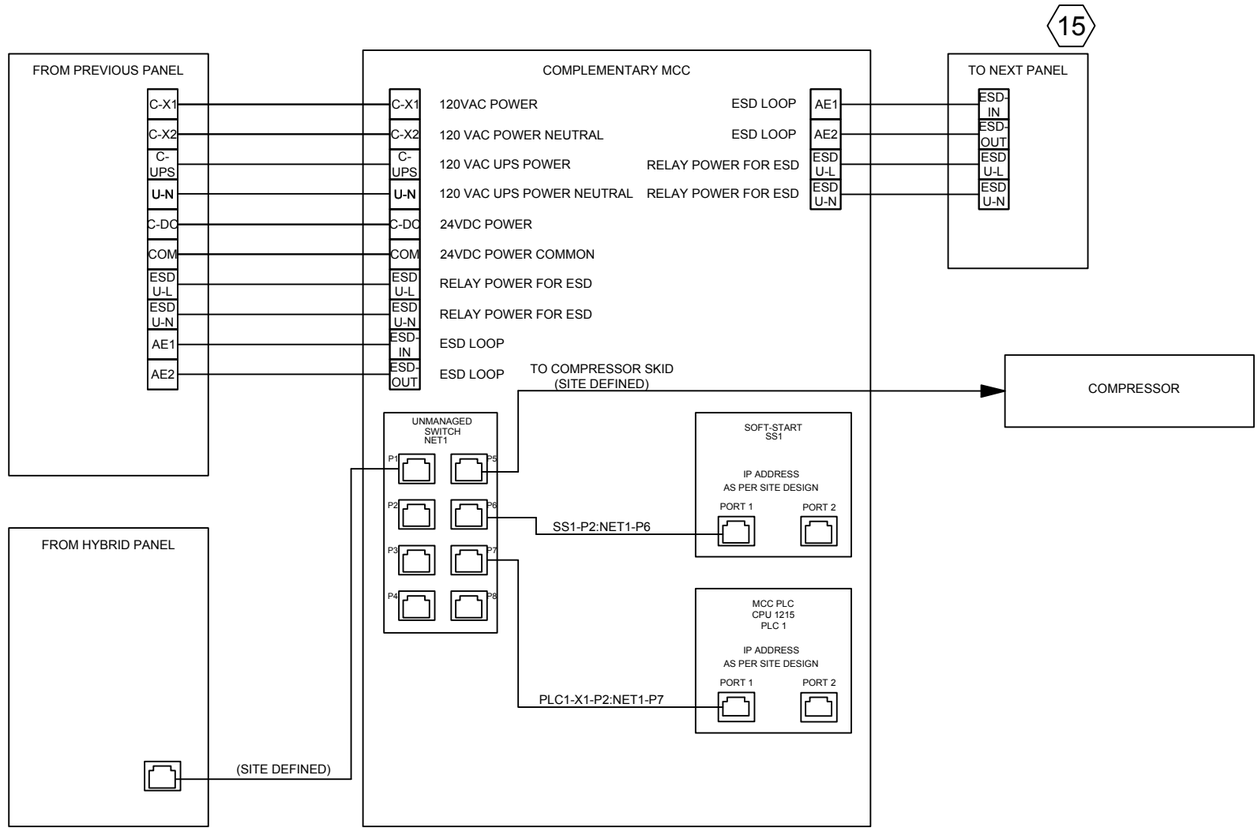
PE — PLC1-C2-GND:PE — GND

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: N/A	SHEET: 7 /14	



Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

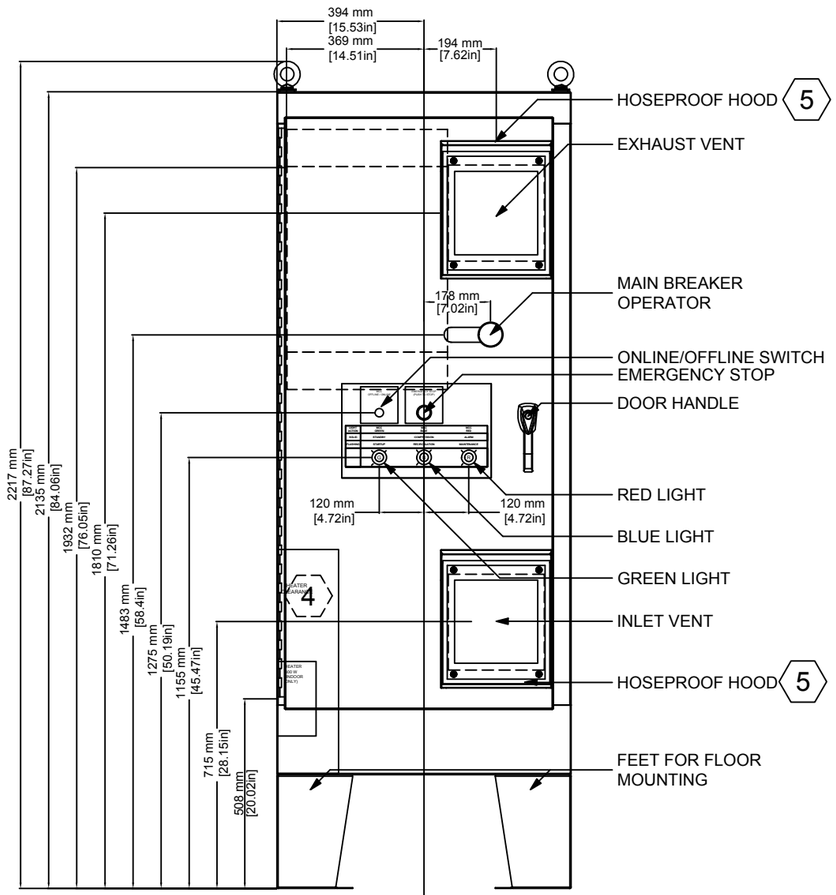
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE

CONTROL SCHEMATIC

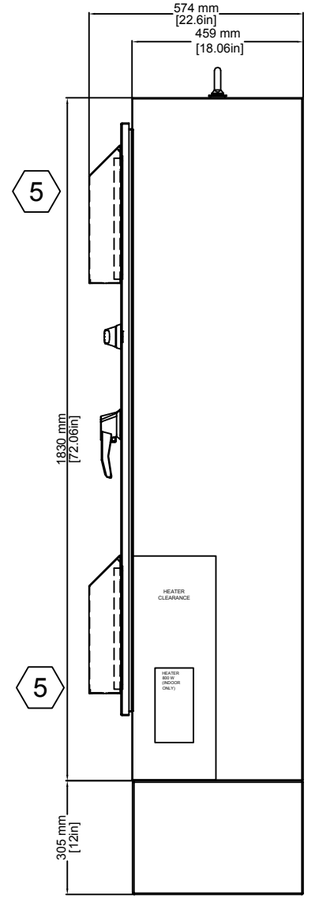
DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: 1:16	SHEET: 8 /14	

3 11

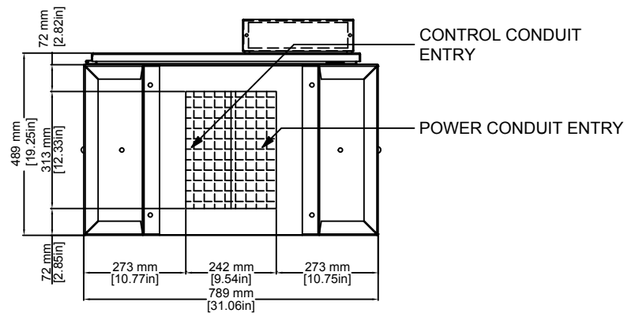
2 FAN MCC-C



FRONT VIEW



SIDE VIEW



BOTTOM VIEW

NOTE:
THIS IS A CONCEPTUAL MODEL ONLY

Clean Energy® COMPRESSION

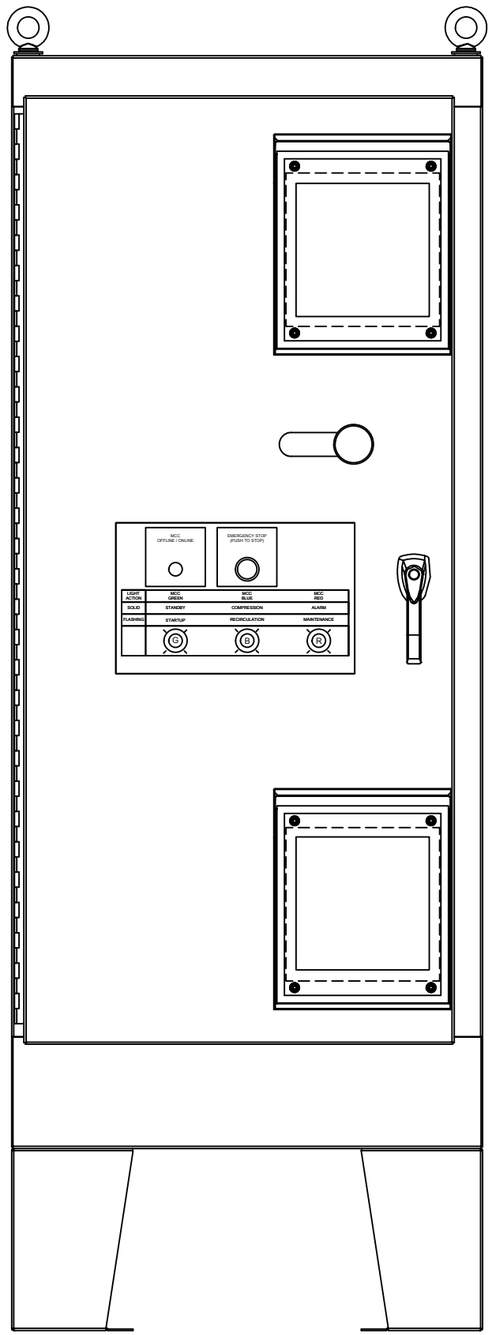
Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
72x31 ENCLOSURE EXTERNAL LAYOUT

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: 1:16	SHEET: 9 /14	

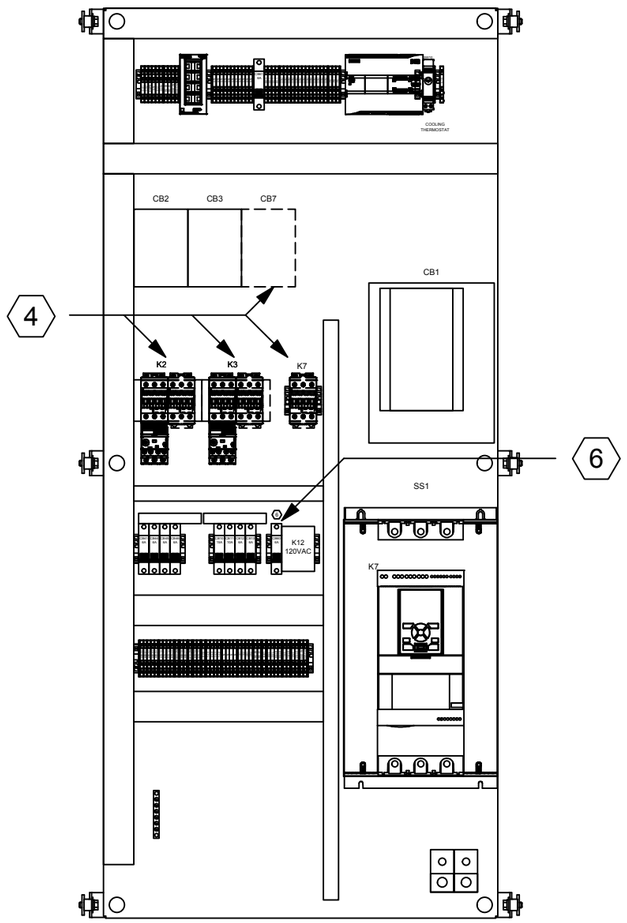
3 11

2 FAN MCC-C



FRONT VIEW

NOTE:
THIS IS A
CONCEPTUAL
MODEL ONLY



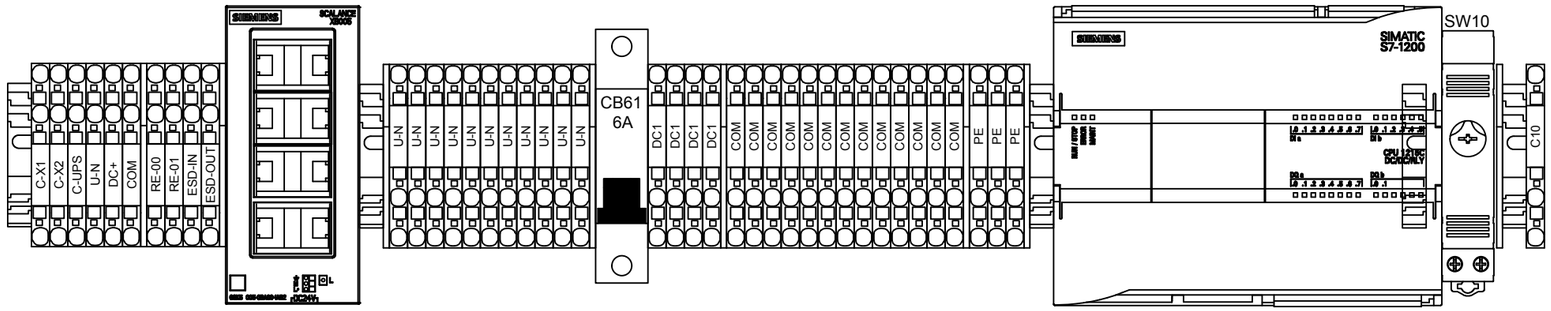
INNER VIEW

Clean Energy® COMPRESSION

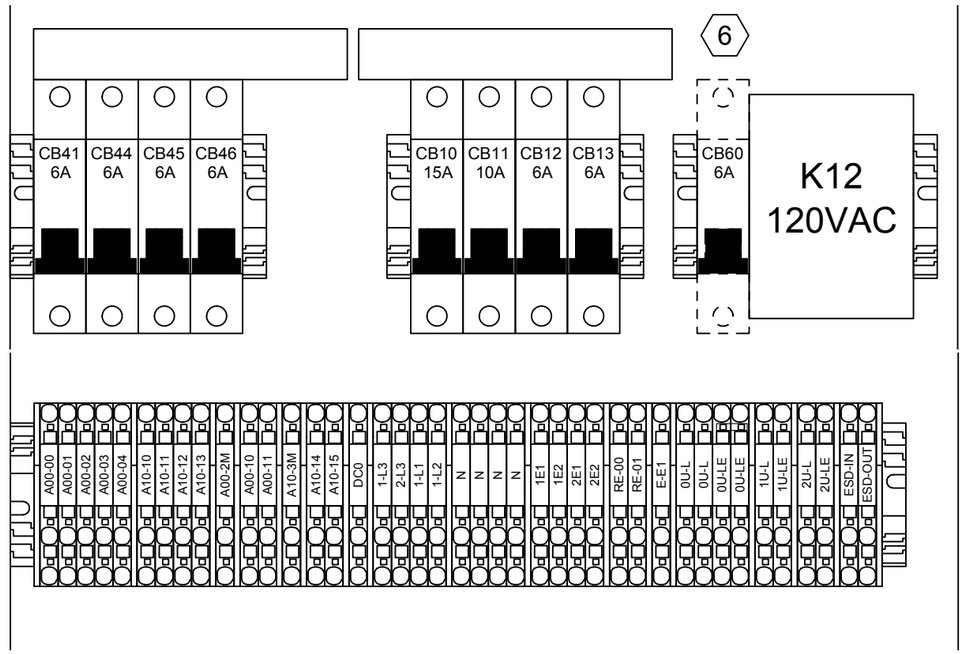
Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE LAYOUT

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: 1:16	SHEET: 10 /14	



COOLING
THERMOSTAT



NOTE:
THIS IS A CONCEPTUAL
MODEL ONLY

Clean Energy® COMPRESSION

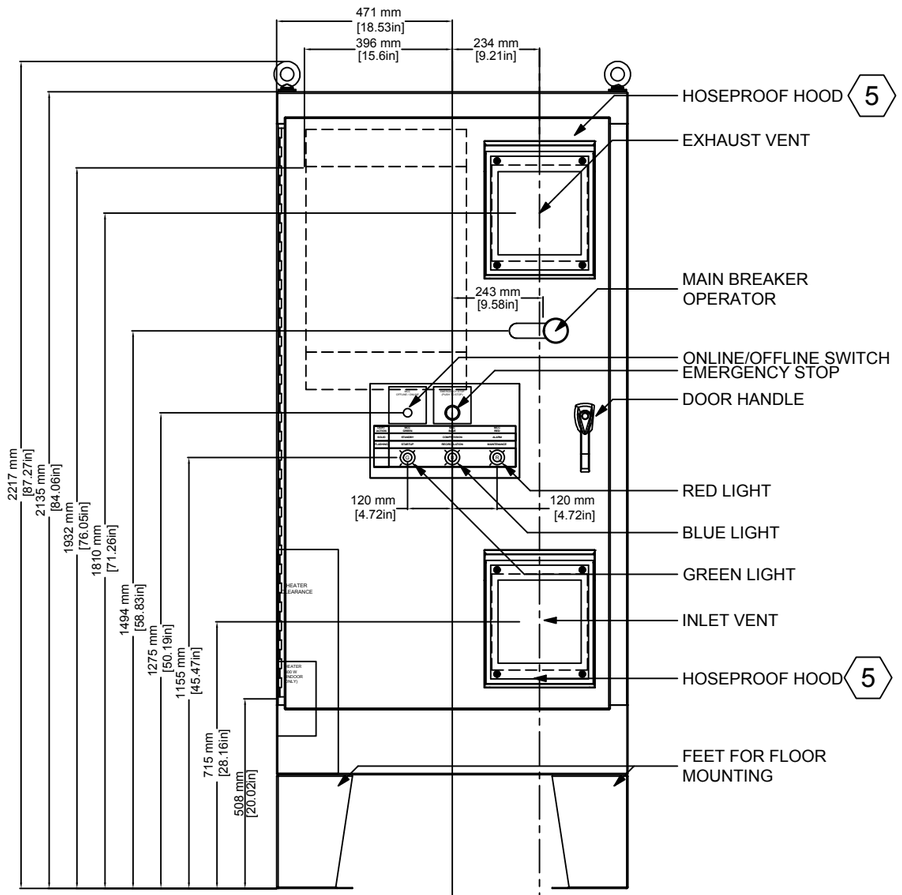
Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE LAYOUT DETAIL

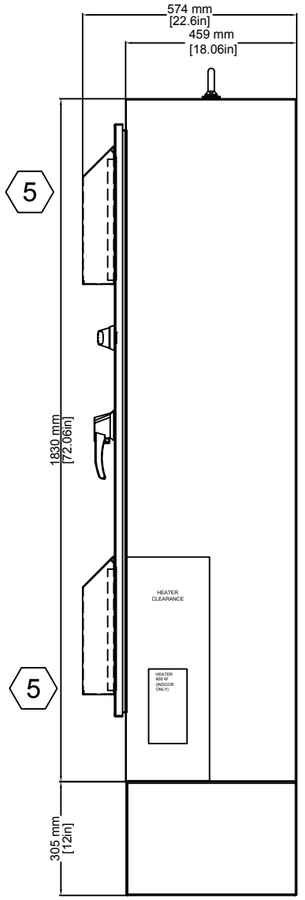
DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: 1:2	SHEET: 11 /14	

2 11

4 FAN MCC-C

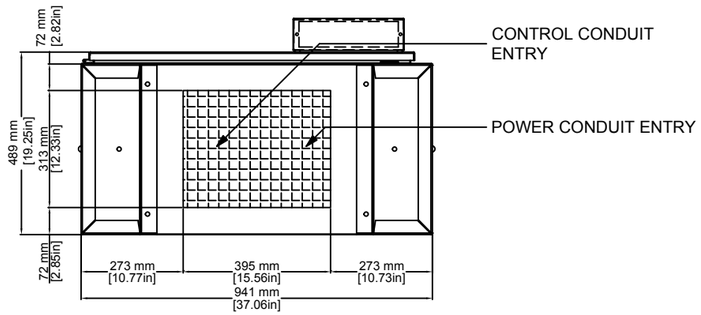


FRONT VIEW



SIDE VIEW

NOTE:
THIS IS A CONCEPTUAL MODEL ONLY



BOTTOM VIEW

Clean Energy® COMPRESSION

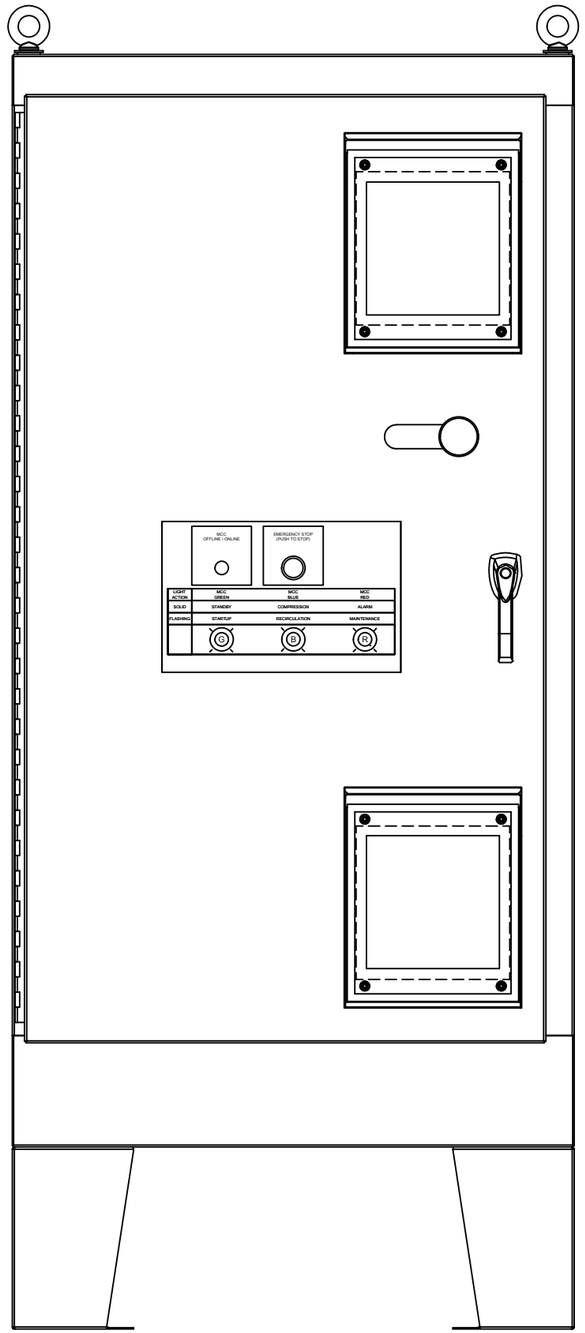
Chilliwack, B.C., Canada

TITLE: MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
72X37 ENCLOSURE EXTERNAL LAYOUT

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: 1:16	SHEET: 12 /14	

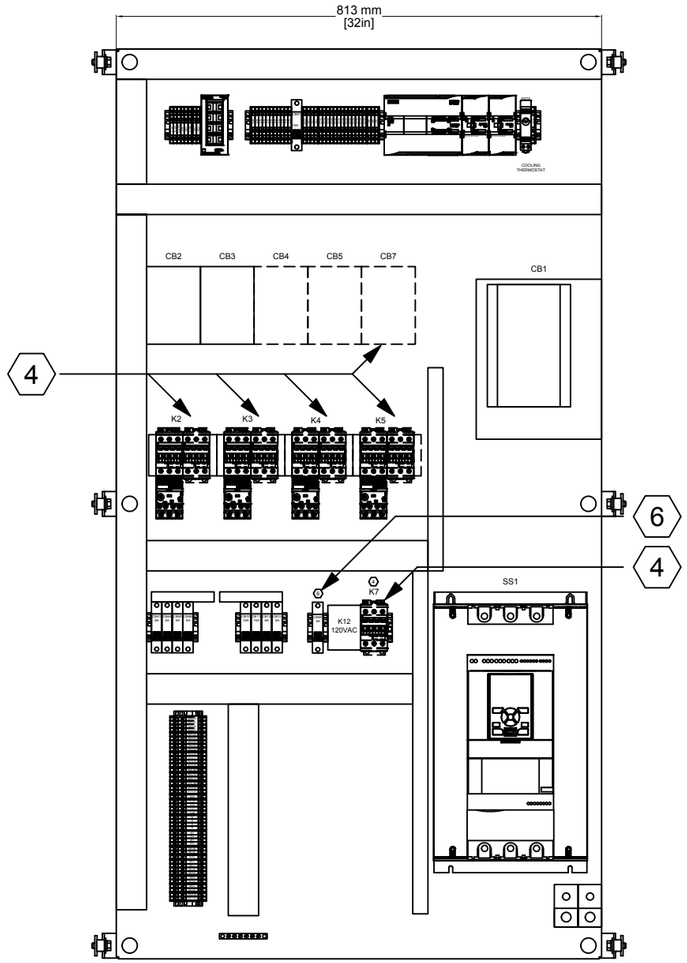
2 11

4 FAN MCC-C



NOTE:
THIS IS A CONCEPTUAL MODEL ONLY

FRONT VIEW



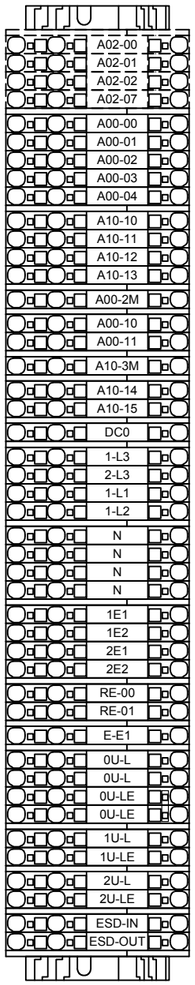
INNER VIEW

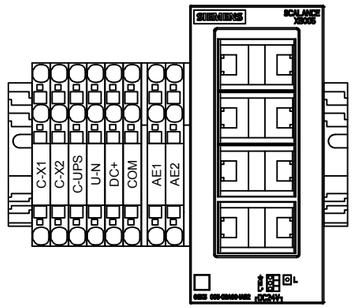
Clean Energy® COMPRESSION

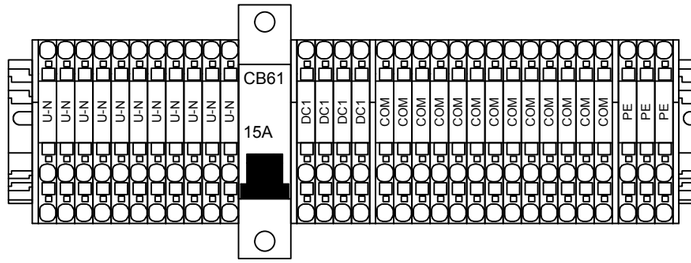
Chilliwack, B.C., Canada

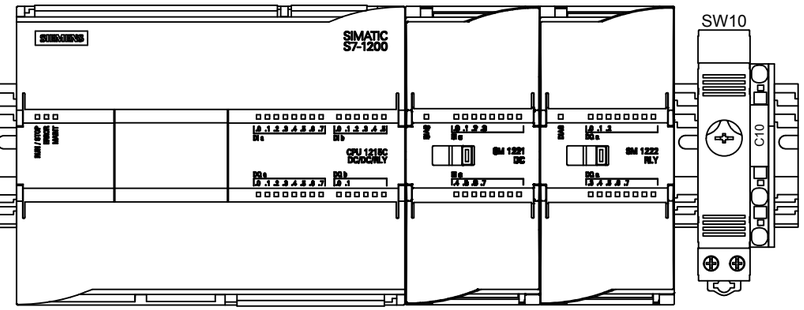
TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE LAYOUT

DR. | AP	2015.11.26	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.11.26	B	703456	B
AP. | TFJ	2015.11.26	SCALE: 1:10	SHEET: 13 /14	

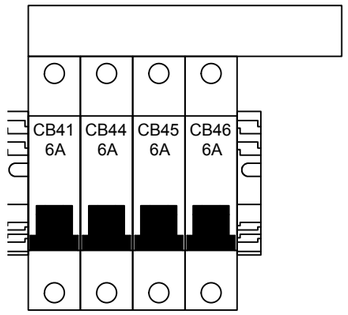


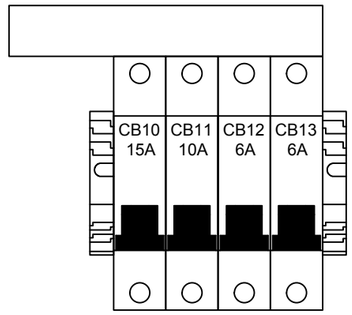


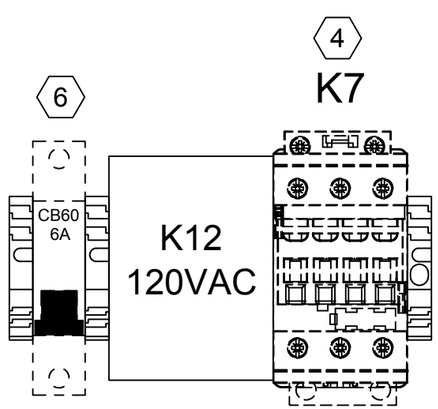




COOLING
THERMOSTAT







NOTE:
THIS IS A CONCEPTUAL
MODEL ONLY

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCC-COMPLEMENTARY CLEANCNG DRAWING PACKAGE
72X31 ENCLOSURE LAYOUT DETAIL

DR. | AP	2015.11.26	SIZE B	DOC. NO. 703456	REV B
CK. | SVW/MAE	2015.11.26			
AP. | TFJ	2015.11.26	SCALE: 1:2	SHEET: 14 /14	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO #	REFERENCE
A	2015.10.15	AP	SVW / MAE	TFJ	---	ISSUED FOR CONSTRUCTION
B	2015.11.04	AP	SVW / MAE	TFJ	4709	REMOVED WIRE GAUGE TABLE. ADDED WIRE COLOR TABLE. UPDATED 120V FUSE VALUES. HMI WIRING ADDED. ADDED NET1 WIRING. ADDED CB62 FOR MCC-C POWER. ADDED TERMINAL BLOCKS FOR DISCONNECT STATUS ON CB1,2,3,4,5. ADDED TERMINAL BLOCKS FOR PLC CONNECTIONS ON PLC1-C1 AND PLC1-C2. COMPRESSOR, AUX AND ESD TERMINAL BLOCK LAYOUT UPDATE. UPDATED CIRCUIT BREAKERS TERMINAL NAMES TO MATCH THE MODEL. OPTIONAL NOTES ADDED TO OUTPUT RELAY WIRES FOR PLC1 AND PLC-C2.
C	2016.04.06	SRS	MAE	TFJ		UPDATED WIRE SIZES TO BE LEGIBLE AFTER PRINT. MODIFIED ESD LOOP CONNECTIONS. ADDED TERMINALS C60-1 AND C60-2 ACROSS SW20 IN Pg. 5. AS PER NCR# 30947 Doc. 703353BRL01.pdf.UPDATED/LAYOUTTO AS-BUILT

MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
703353

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE: MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
COVER/REVISION SHEET

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE 2015.10.15			
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 1 /17	

LEGEND:

ITEM	DESCRIPTION
140	INTERNAL TERMINAL BLOCK AND NUMBER
	PROXIMITY SWITCH
K1	CONTACTOR COIL
	NORMALLY OPEN/CLOSED CONTACTOR
	BREAKER
	PLUG
	RECEPTACLE
G	INDICATOR LIGHT, (G=GREEN, R=RED, B=BLUE, W=WHITE)
	NORMALLY OPEN/CLOSED SWITCH
	PUSH BUTTON DOUBLE POLE SWITCH
	LEVEL SWITCH
	TEMPERATURE SWITCH
	PRESSURE SWITCH
	JUNCTION
	TRANSMITTER
	ISOLATED BARRIER
	SOLENOID
	PROTECTIVE EARTH
	THERMOCOUPLE
	METAL OXIDE VARISTOR (MOV)
	PANEL FAN
	PANEL HEATER
	HORN
	OVERLOAD PROTECTION
	TRANSFORMER

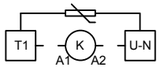
NOTES:

1. THE NAMING CONVENTION IN THIS DOCUMENT APPLIES TO IS OUTLINED IN DOCUMENT NUMBER 703272. EXAMPLE: MCH-460-65-150-CA-2X5-30-CWP-EXT-NA+L
2. TRANSFORMER TAP IS CONNECTED AS PER MODEL SUPPLY VOLTAGE 600VAC MODEL (MCH-600-*-*-*-*-*-*-*-*) IS WIRED TO THE H3 TAP VIA WIRE CB8-T3:T1-H3. 460VAC MODEL (MCH-460-*-*-*-*-*-*-*-*) IS WIRED TO H2 TAP VIA WIRE CB8-T3:T1-H2.
3. OBJECTS SHOWN ARE INCLUDED IN THE 4 FAN OPTION MODELS (MCH-*-*-*-*-4X5-*-*-*-*)
4. DRYER BREAKER IS NOT INSTALLED ON THE NO DRYER BREAKER MODEL (MCH-*-*-*-*-*-00-*-*-*) BUT WILL BE INSTALLED ON ALL THE OTHER MODELS. EXAMPLE: MCH-*-*-*-*-*-50-*-*-* WILL HAVE A 50 AMP BREAKER
5. OBJECTS SHOWN ARE INCLUDED IN THE COLD WEATHER PACKAGE MODELS (MCH-*-*-*-*-*-*-CWP-*-*)
6. OBJECTS SHOWN WILL ONLY BE INSTALLED ON THE OUTDOOR MODELS (MCH-*-*-*-*-*-*-*-EXT-*)
7. OUTDOOR MODELS WILL INCLUDE HMI COVER. 7-INCH HMI COVER INCLUDED IN STANDARD OUTDOOR MODEL (MCH-*-*-*-*-*-*-EXT-*) AND 12 INCH HMI COVER ON EXTENDED OUTDOOR MODELS (MCH-*-*-*-*-*-*-*-EXT-*+E).
8. OBJECTS ARE INCLUDED ON THE LIGHT OPTION MODELS (MCH-*-*-*-*-*-*-*-*-*+L)
9. OVERLOAD RELAY SETTINGS FOR O/L2, O/L3, O/L4, O/L5 (SEE TABLE)
10. AUX 1 THROUGH AUX4, SITE A THROUGH SITE B AND ESD LOOP EXPANSION E-STOP CONNECTION WIRE JUMPERS TO BE INCLUDED IN FACTORY BUILD. THIS IS A GENERIC NAMING SCHEME SUGGESTION, AND CAN BE CHANGED AS SUITABLE. WIRED JUMPERS MUST BE REMOVED TO INSTALL SITE WIRING TO E-STOP DEVICES.
11. REMOVE WIRE JUMPERS TO INSTALL ADDITIONAL ONSITE E-STOP INPUT WHICH MUST BE RESET BEFORE E-STOP CIRCUIT CAN BE RESET
12. METAL OXIDE VARISTORS SHALL BE INSTALLED ON PLC DIGITAL OUTPUT TERMINALS (SEE EXAMPLE)
13. OBJECTS SHOWN ARE EXTERNAL COMPONENTS THAT MAY BE INSTALLED ON SITE. TERMINAL BLOCKS ARE PROVIDED AS MARKED FOR CONNECTIONS
14. NOTE SYMBOL TO THE LEFT APPLIES TO ENTIRE PAGE OF THE DOCUMENT
15. THIS DOCUMENT FOLLOWS THE VOLTAGE NAMING SCHEME OUTLINED IN DOCUMENT 702686
16. ESD TRIP STATUS FOR MCC
17. THIS DOCUMENT IS FOR NORTH AMERICAN MODELS ONLY
18. THE WIRE NAMING SCHEME IS AS FOLLOWS: <SOURCE>-<PIN>:<DESTINATION>-<PIN>
19. THE WIRE COLOR IN THE PANEL CAN BE DETERMINED USING THE TABLE ON THE RIGHT
20. WIRE TYPES NOT SPECIFIED IN NOTE 19 ARE INDICATED IN THE BOM BY THE WIRE NAME
21. EQUIPMENT IS OPTIONAL DEPENDING ON SITE CONFIGURATION WHICH IS FOR REFERENCE ONLY. FOR DETAILED INFORMATION SEE EQUIPMENT DRAWING.
22. OBJECTS ARE INCLUDED ON THE EXTRA SWITCH OPTION MODELS (MCH-*-*-*-*-*-*-*-*-*+S)
23. CIRCUIT BREAKER 1 (CB1) SETTINGS
    1) L DIP SWITCHES SET TO 0.04 (HIGH), 0.08 (HIGH), 0.16 (HIGH), 0.32(HIGH)
    2) t1 DIP SWITCH SET TO 12s (LOW)
    3) S/I DIP SWITCH SET TO I (LOW)
    4) I3 DIP SWITCHES (SEE TABLE)
    5) t2 DIP SWITCH NOT APPLICABLE
    6) N DIP SWITCH SET TO OFF, 50% (LOW, LOW) (N DIP SWITCH MAY NOT BE AVAILABLE ON ALL MODELS)
24. TYP : A00-05:K2F-A1
    CWP : A00-05:K2R-31X
25. TYP : A00-07:K3F-A1
    CWP : A00-07:K3R-31X
26. TYP : A02-03:K4F-A1
    CWP : A02-02:K4R-31X
27. TYP : A02-05:K5F-A1
    CWP : A02-05:K5R-31X
28. OPTIONAL ADDITIONAL DIALER CARD (MCH-*-*-*-*-*-*-*-*-*+D)

9

FAN OVERLOAD RELAY SETTINGS					
	MOTOR			OVERLOAD RELAY SETTINGS	
MODEL	VOLTAGE	HP	FLA (A)	TRIP CLASS	TRIP CURRENT (A)
MCH-460-*-*-*-X5-*-*-*	460	5	6.6	10E	6.5
MCH-600-*-*-*-X5-*-*-*	575	5	5.3	10E	5.5
MCH-460-*-*-*-X7-*-*-*	460	7.5	9.4	10E	9.5
MCH-600-*-*-*-X7-*-*-*	575	7.5	7.5	10E	7.5

12



19

ELECTRICAL PANEL WIRE COLOR	
BLACK	UNGROUNDED AC CONTROL CIRCUIT CONDUCTORS (HIGH VOLTAGE, 480V, 600V)
RED	UNGROUNDED AC CONTROL CIRCUITS AS LESS THAN SUPPLY VOLTAGE (120V)
BLUE	UNGROUNDED DC CONTROL CIRCUITS
ORANGE	UNGROUNDED CONTROL CIRCUITS OR OTHER WIRING THAT MAY REMAIN ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION (BEING FED FROM A SEPARATE PANEL)
WHITE	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT (NEUTRAL)
WHITE W/ BLU	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT
GREEN	EARTH / GROUND

WIRE COLORS DEFINED BY UL 508A AND NFPA 79.

23

MAIN CIRCUIT BREAKER (CB1) I3 DIP SETTING				
MODEL	POWER (HP)	VOLTAGE (V)	BREAKER (A)	DIP SETTING
MCH-600-*-150-*-*-*-*-*	150	600	300	0 0 0 1
MCH-460-*-150-*-*-*-*-*	150	460	400	0 0 0 1
MCH-600-*-250-*-*-*-*-*	250	600	400	1 0 0 1
MCH-460-*-250-*-*-*-*-*	250	460	600	0 0 0 1
MCH-600-*-300-*-*-*-*-*	300	600	600	0 0 0 1
MCH-460-*-300-*-*-*-*-*	300	460	800	0 0 0 1

DIP SETTING 1 IS HIGH AND 0 IS LOW. POSITION IS READ LEFT TO RIGHT FOR I3

Clean Energy® COMPRESSION — Chilliwack, B.C., Canada

TITLE: MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
SYMBOLS/LEGEND/NOTES

DR. | AP	2015.10.15	SIZE: B	DOC. NO.: 703353	REV: C
CK. | SVW/MAE	2015.10.15			
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET: 2 /17	

DOOR MOUNT HANDLE

L1
L2
L3

CB 1

CUSTOMER SUPPLY
600VAC/460VAC, 3 PH, 60 HZ
POWER

23

(CONTINUED ON PAGE 4)

CB1-T1:CB6-L1
CB1-T2:CB6-L2
CB1-T3:CB6-L3
CB6
4

CB1-T1:SS1-1L1
CB1-T2:SS1-3L2
CB1-T3:SS1-5L3

L1 L2 L3
SS1
SOFT START C/W
INTEGRAL BYPASS & O/L
T1 T2 T3

CB1-T1:CB2-L1
CB1-T2:CB2-L2
CB1-T3:CB2-L3
CB2

CB2-T1:K2F-1L1
CB2-T2:K2F-3L2
CB2-T3:K2F-5L3

K2F
5
K2R

O/L2
9
T1 T2 T3

CB1-T1:CB3-L1
CB1-T2:CB3-L2
CB1-T3:CB3-L3
CB3

CB3-T1:K3F-1L1
CB3-T2:K3F-3L2
CB3-T3:K3F-5L3

K3F
5
K3R

O/L3
9
T1 T2 T3

CB1-T1:CB4-L1
CB1-T2:CB4-L2
CB1-T3:CB4-L3
CB4
3

CB4-T1:K4F-1L1
CB4-T2:K4F-3L2
CB4-T3:K4F-5L3

3
K4F
5
K4R

O/L4
9 3
T1 T2 T3

CB1-T1:CB5-L1
CB1-T2:CB5-L2
CB1-T3:CB5-L3
CB5
3

CB5-T1:K5F-1L1
CB5-T2:K5F-3L2
CB5-T3:K5F-5L3

3
K5F
5
K5R

O/L5
9 3
T1 T2 T3

CB1-T1:CB7-L1
CB1-T2:CB7-L2
CB1-T3:CB7-L3
CB7
5

CB7-T1:K7-1L1
CB7-T2:K7-3L2
CB7-T3:K7-5L3

K7
5

T1 T2 T3

MCH

SITE EQUIPMENT

COMPRESSOR SKID

GAS DRYER

MAIN
COMPRESSOR
MOTOR
M1

VENT/COOLING
FAN MOTOR M2

THIS MOTOR MUST BE WIRED AS EXPLOSION-PROOF FOR CLASS I DIV 1 LOCATIONS

VENT/COOLING
FAN MOTOR M3

THIS MOTOR MUST BE WIRED AS EXPLOSION-PROOF FOR CLASS I DIV 1 LOCATIONS

COOLING FAN
MOTOR M4
3

COOLING FAN
MOTOR M5
3

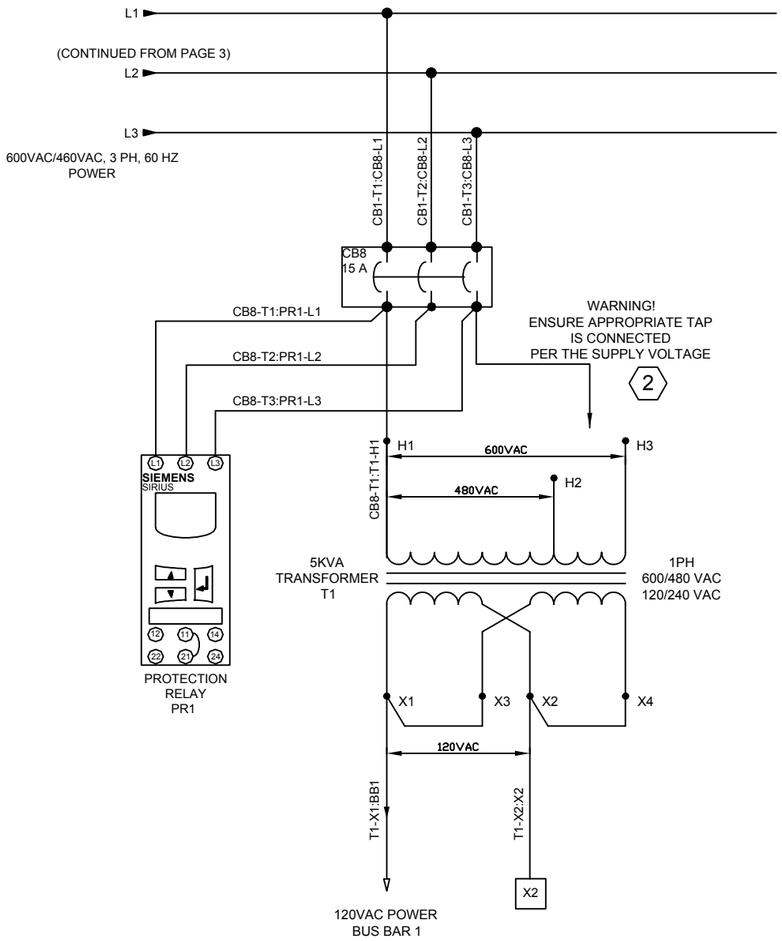
SPACE HEATER
SH1
5

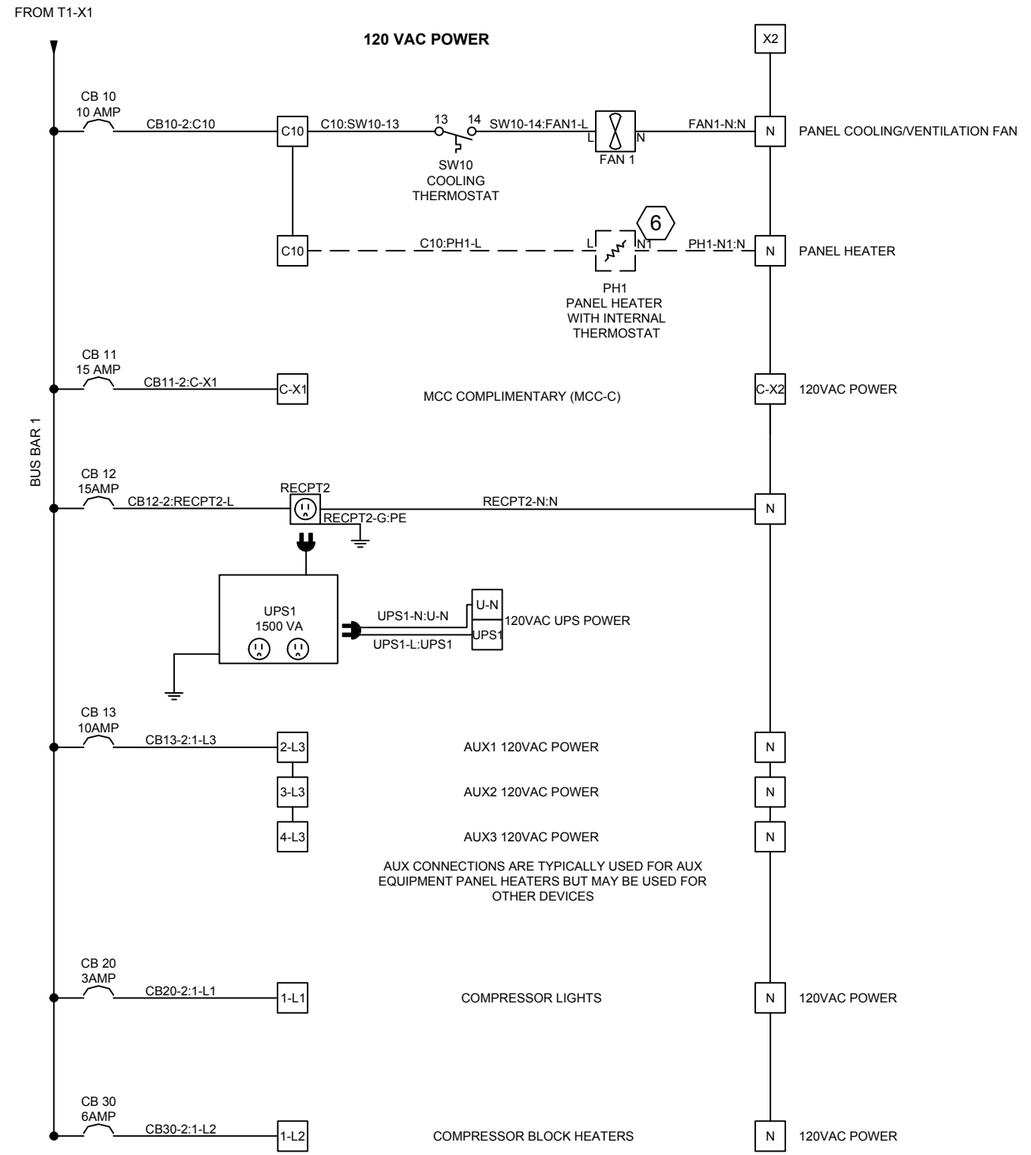
Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
POWER SCHEMATIC

DR. | AP	2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE	2015.10.15			
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET: 3 /17	





Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

POWER SCHEMATIC

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C	
CK. | SVW/MAE 2015.10.15				
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 4 /17		

UPS SUPPLIED POWER

UPS1
UPS1:BB2
CB 40 6AMP — CB40-2:RECPT1-L — GFCI RECPT1 — RECPT1-N:U-N — U-N — PANEL RECEPTACLE 500 VA ONLY
RECPT1-G:PE

CB 41 6AMP — CB41-2:E-00 — E-00 — E-00:ESD0:11 — ESD0:12:1E1 (E-STOP PANEL ESD0 (DOOR) (SEE PAGE 6))
1E1 — COMPRESSOR E-STOP OR JUMPER — 1E2 — 1E2:2E1 — 2E1 — AUX1 E-STOP OR JUMPER — 2E2 — 2E2:3E1 — 3E1 — AUX2 E-STOP OR JUMPER — 3E2 — 3E2:4E1 — 4E1 — AUX3 E-STOP OR JUMPER — 4E2 — 4E2:AE1 — 10

SITE A E-STOP OR JUMPER — C-E1 — C-E2 — A-E2:B-E1 — B-E1 — SITE B E-STOP OR JUMPER — B-E2 — B-E2:C-E1 — AE1 — ESD LOOP EXPANSION — AE2 — C-E2:K11-A1 — K11 (SUPPRESSOR MODULE) — K11-A2:U-N — U-N — 10 — EMERGENCY STOP LOOP RELAY (E-STOP)

SW1 RESET (SEE PAGE 6) — E-00 — E-00:SW1-23 — SW1-24:E-E1 — E-E1 — E-E1:K11-5 — K11A — K11-9:E-E2 — E-E2 — 11 — E-E3 — E-E3:K12-A1 — K12 (SUPPRESSOR MODULE) — K12-A2:U-N — U-N — EMERGENCY STOP RELAY (RESET)

K12B — E-00:K12-6 — K12-10:E-E1

E-E3 — E-E3:K13-A1 — K13 — K13-A2:U-N — U-N — EMERGENCY STOP RELAY POWER TO NEXT PANEL

ESD U-L — ESD U-N — ESD U-L CONNECTED TO PLC OUTPUTS UNDER ESD INTERLOCK

CB 42 10AMP — CB42-2:C-UPS — C-UPS — MCC COMPLIMENTARY (MCC-C) — U-N — U-N

CB 43 6AMP — CB43-2:PS1-L1 — L — PS1 — N — PS1-N:U-N — U-N — DC POWER SUPPLY 1

24 VDC POWER SUPPLY (10 AMP)
PS1-(+):CB61-1 — TO CB61
PS1-(+):CB62-1 — TO CB62 — 24VDC UPS POWER
PS1-(-):COM — COM
PS1-(-):PE

8 — CB 60 6AMP — CB60-2:SW20-1 — C60-1 — 1 — 2 — SW20 (DOOR SWITCH) — C60-2 — SW20-2:L20-L — L20 (PANEL LIGHT) — L20-N:U-N — U-N — PANEL LIGHT

THE PROTECTIVE CONDUCTOR OF THE LINE SUPPLY MUST BE CONNECTED AT THE " PE " TERMINAL. IF PELV (PROTECTED EXTRA LOW VOLTAGE) IS REQUIRED, THEN " - " TERMINAL OF DC OUTPUT CAN BE CONNECTED TO THE " PE " TERMINAL OF THE SUPPLY SIDE OR ANY OTHER POINT AS LONG AS THE " PE " TERMINAL IS GROUNDED.

CONTINUED ON RIGHT SIDE

CB 61 6AMP — FROM PS1 — PS1-(+):CB61-1 — CB61-2:DC1 — DC1 — 24 VDC UPS POWER — COM — POWER FOR HYBRID DEVICES

DC1 — DC1:NET1-L+ — L+ — NET1 — M — NET1-M:COM — COM — UNMANAGED SWITCH NET1 POWER

DC1 — DC1:HMI-L+ — L+ — HMI — M — HMI-M:COM — COM — HMI POWER

CB 62 6AMP — FROM PS1 — PS1-(+):CB62-1 — CB62-2:C-DC — C-DC — MCC COMPLIMENTARY (MCC-C) — COM — MCC COMPLIMENTARY POWER

BUS BAR 2 CONTINUED

BUS BAR 2

CB 44 6AMP — CB44-2:0U-L — 0U-L — HYBRID 120 VAC UPS POWER
CB44-2:K12-7 — K12C — 7 — 11 — K12-11:0U-LE — 0U-LE — HYBRID 120 VAC UPS ESD POWER

CB 45 6AMP — CB45-2:1U-L — 1U-L — COMPRESSOR 120 VAC UPS POWER
CB45-2:K12-8 — K12D — 8 — 12 — K12-12:1U-LE — 1U-LE — COMPRESSOR 120 VAC UPS ESD POWER

CB 46 6AMP — CB46-2:2U-L — 2U-L — AUX1 120 VAC UPS POWER
CB46-2:K13-5 — K13A — 5 — 9 — K13-9:2U-LE — 2U-LE — AUX1 120 VAC UPS ESD POWER

CB 47 6AMP — CB47-2:3U-L — 3U-L — AUX2 120 VAC UPS POWER
CB47-2:K13-6 — K13B — 6 — 10 — K13-10:3U-LE — 3U-LE — AUX2 120 VAC UPS ESD POWER

CB 48 6AMP — CB48-2:4U-L — 4U-L — AUX3 120 VAC UPS POWER
CB48-2:K13-7 — K13C — 7 — 11 — K13-11:4U-LE — 4U-LE — AUX3 120 VAC UPS ESD POWER

U-N ×10

K12- 00 — K12-00:K12-5 — K12A — 5 — 9 — K12-9:K12-01 — K12- 01 — MCC-C ESD RELAY

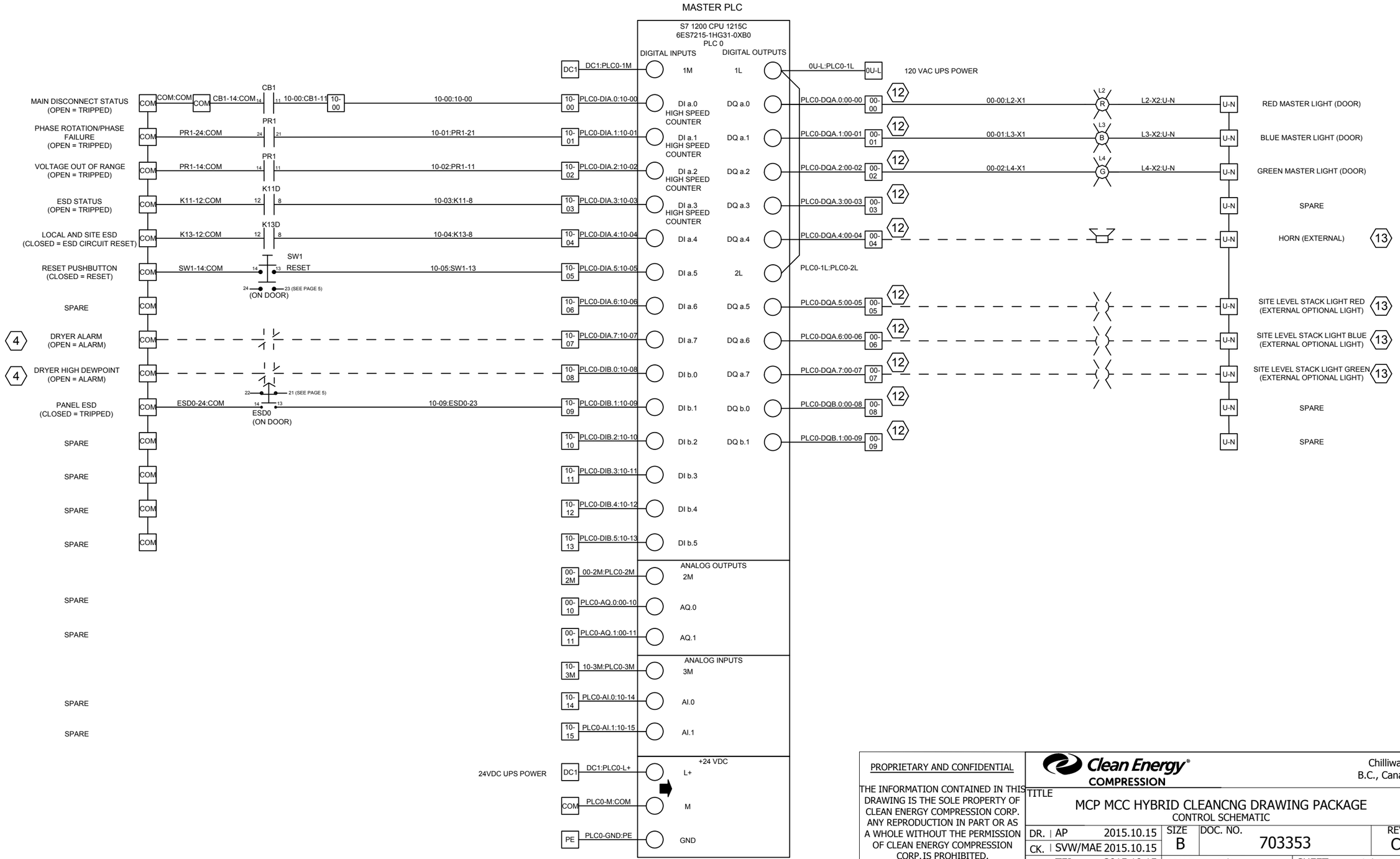
130 — 130:K11-6 — K11B — 6 — 10 — K11-10:131 — 131 — RELAY OUTPUT TO INDICATE ESD TRIP FOR CUSTOMER USE (OPEN INDICATES PRESSED ALARM)

0U- LE — 0U-LE:SS1-L — L — SOFT START SS1 — N — SS1-N:U-N — U-N — SOFT STARTER 120VAC UPS CONTROL POWER

Clean Energy® COMPRESSION — Chilliwack, B.C., Canada

TITLE: MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.10.15	SIZE	DOC. NO.		REV
CK. | SVW/MAE	2015.10.15	B	703353		C
AP. | TFJ	2015.10.15	SCALE: N/A		SHEET:	5 /17



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Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

CONTROL SCHEMATIC

DR. | AP	2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE	2015.10.15			
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET: 6 /17	

MASTER PLC
RELAY CARD

6ES7222-1HF32-0XB0
SIMATIC S7-1200, DIGITAL OUTPUT
SM 1222, 8DO, RELAY 2A
PLC 0 C-1

DIGITAL OUTPUTS

1L	CDR:PLC0-C1-1L	CDR		CUSTOMER DIALER RETURN (CUSTOMER CONNECTION)
DQ a.0	PLC0-C1-DQA.0-:01-00	01-00	12	ZONE 1 RELAY (HIGH = ALARM)
DQ a.1	PLC0-C1-DQA.1-:01-01	01-01	12	ZONE 2 RELAY (HIGH = ALARM)
DQ a.2	PLC0-C1-DQA.2-:01-02	01-02	12	ZONE 3 RELAY (HIGH = ALARM)
2L	CDR:PLC0-C1-2L	CDR		CUSTOMER DIALER RETURN (CUSTOMER CONNECTION)
DQ a.3	PLC0-C1-DQA.3-:01-03	01-03	12	ZONE 4 RELAY (HIGH = ALARM)
DQ a.4	PLC0-C1-DQA.4-:01-04	01-04	12	ZONE 5 RELAY (HIGH = ALARM)
DQ a.5	PLC0-C1-DQA.5-:01-05	01-05	12	ZONE 6 RELAY (HIGH = ALARM)
DQ a.6	PLC0-C1-DQA.6-:01-06	01-06	12	ZONE 7 RELAY (HIGH = ALARM)
DQ a.7	PLC0-C1-DQA.7-:01-07	01-07	12	ZONE 8 RELAY (HIGH = ALARM)

SEE CUSTOMER SITE DRAWINGS

+24 VDC

24VDC UPS POWER	DC1:PLC0-C1-L+	DC1	L+
	PLC0-C1-M:COM	COM	M
	PLC0-C1-GND:PE	PE	GND

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE	2015.10.15			
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET: 7 /17	

28 14

MASTER PLC
RELAY CARD

6ES7222-1HF32-0XB0
SIMATIC S7-1200, DIGITAL OUTPUT
SM 1222, 8DO, RELAY 2A
PLC 0 C-2

DIGITAL OUTPUTS

1L	CDR:PLC0-C2-1L — CDR		CUSTOMER DIALER RETURN (CUSTOMER CONNECTION)
DQ a.0	PLC0-C2-DQA.0-:01-00 — 01-00	12	ZONE 09 RELAY (HIGH = ALARM)
DQ a.1	PLC0-C2-DQA.1-:01-01 — 01-01	12	ZONE 10 RELAY (HIGH = ALARM)
DQ a.2	PLC0-C2-DQA.2-:01-02 — 01-02	12	ZONE 11 RELAY (HIGH = ALARM)
2L	CDR:PLC0-C2-2L — CDR		CUSTOMER DIALER RETURN (CUSTOMER CONNECTION)
DQ a.3	PLC0-C2-DQA.3-:01-03 — 01-03	12	ZONE 12 RELAY (HIGH = ALARM)
DQ a.4	PLC0-C2-DQA.4-:01-04 — 01-04	12	ZONE 13 RELAY (HIGH = ALARM)
DQ a.5	PLC0-C2-DQA.5-:01-05 — 01-05	12	ZONE 14 RELAY (HIGH = ALARM)
DQ a.6	PLC0-C2-DQA.6-:01-06 — 01-06	12	ZONE 15 RELAY (HIGH = ALARM)
DQ a.7	PLC0-C2-DQA.7-:01-07 — 01-07	12	ZONE 16 RELAY (HIGH = ALARM)

SEE CUSTOMER SITE DRAWINGS

24VDC UPS POWER

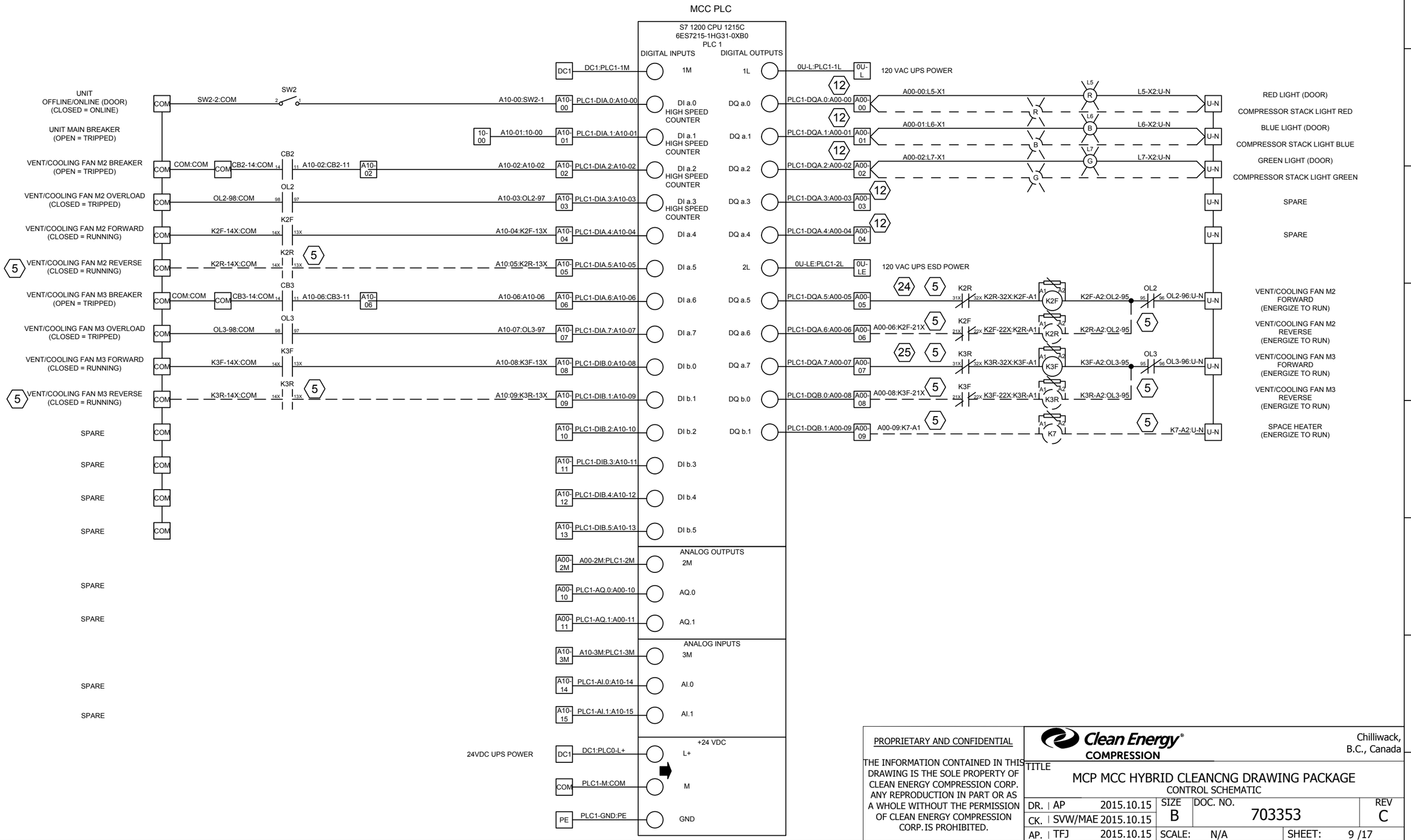
DC1	DC1:PLC0-C2-L+	+24 VDC	L+
COM	PLC0-C2-M:COM		M
PE	PLC0-C2-GND:PE		GND

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP	2015.10.15	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.10.15	B	703353	C
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET:	8 /17



Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE

MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

CONTROL SCHEMATIC

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C	
CK. | SVW/MAE 2015.10.15				
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 9 /17		

3 14

MCC PLC
INPUT CARD

6ES7221-1BF32-0XB0
SIMATIC S7-1200, DIGITAL INPUT
SM 1221,
8DI, 24V DC, SINK/SOURCE INPUT
PLC 1-C1

DIGITAL
INPUTS

						DC1	DC1:PLC1-C1-1M		1M
COOLING FAN M4 BREAKER (OPEN = TRIPPED)	COM	COM:COM	COM	CB4-14:COM	CB4 14 11	A20-00:CB4-11	A20-00	A20-00:A20-00	A20-00	PLC1-C1-DIA.0:A20-00	DI a.0
COOLING FAN M4 OVERLOAD (CLOSED = TRIPPED)	COM			OL4-98:COM	OL4 98 97			A20-01:OL4-97	A20-01	PLC1-C1-DIA.1:A20-01	DI a.1
COOLING FAN M4 FORWARD (CLOSED = RUNNING)	COM			K4F-14X:COM	K4F 14X 13X			A20-02:K4F-13X	A20-02	PLC1-C1-DIA.2:A20-02	DI a.2
5 COOLING FAN M4 REVERSE (CLOSED = RUNNING)	COM			K4R-44X:COM	K4R 44X 43X 5			A20-03:K4R-43X	A20-03	PLC1-C1-DIA.3:A20-03	DI a.3
						DC1	DC1:PLC1-C1-2M		2M
COOLING FAN M5 BREAKER (OPEN = TRIPPED)	COM	COM:COM	COM	CB5-14:COM	CB5 14 11	A20-04:CB5-11	A20-04	A20-04:A20-04	A20-04	PLC1-C1-DIA.4:A20-04	DI a.4
COOLING FAN M5 OVERLOAD (CLOSED = TRIPPED)	COM			OL5-98:COM	OL5 98 97			A20-05:OL5-97	A20-05	PLC1-C1-DIA.5:A20-05	DI a.5
COOLING FAN M5 FORWARD (CLOSED = RUNNING)	COM			K5F-14X:COM	K5F 14X 13X			A20-06:K5F-13X	A20-06	PLC1-C1-DIA.6:A20-06	DI a.6
5 COOLING FAN M5 REVERSE (CLOSED = RUNNING)	COM			K5R-44X:COM	K5R 44X 43X 5			A20-07:K5R-43X	A20-07	PLC1-C1-DIA.7:A20-07	DI a.7
						PE	PLC1-C1-GND:PE		GND

Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

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MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE 2015.10.15			
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 10 /17	

3 14

MCC PLC
OUTPUT CARD

6ES7222-1HF32-0XB0
SIMATIC S7-1200, DIGITAL OUTPUT
SM 1222, 8DO, RELAY 2A

PLC 1-C2

DIGITAL OUTPUTS

1L — 0U-L:PLC1-C2-1L — 0U-L

DQ a.0 — PLC1-C2-DQA.0:A02-00 — A02-00 — 12

DQ a.1 — PLC1-C2-DQA.1:A02-01 — A02-01 — 12

DQ a.2 — PLC1-C2-DQA.2:A02-02 — A02-02 — 12

2L — 0U-LE:PLC1-C2-2L — 0U-LE

DQ a.3 — PLC1-C2-DQA.3:A02-03 — A02-03 — 26 — K4R 31X 32X K4R-32X:K4F-A1 — K4F A1 A2 — K4F-A2:OL4-95 — OL4 95 96 — OL4-96:U-N — U-N — COOLING FAN M4 FORWARD (ENERGIZE TO RUN)

DQ a.4 — PLC1-C2-DQA.4:A02-04 — A02-04 — 5 — A02-04:K4F-21X — K4F 21X 22X K4F-22X:K4R-A1 — K4R A1 A2 — K4R-A2:OL4-95 — 5 — COOLING FAN M4 REVERSE (ENERGIZE TO RUN) — 5

DQ a.5 — PLC1-C2-DQA.5:A02-05 — A02-05 — 27 — K5R 31X 32X K5R-32X:K5F-A1 — K5F A1 A2 — K5F-A2:OL5-95 — OL5 95 96 — OL5-96:U-N — U-N — COOLING FAN M5 FORWARD (ENERGIZE TO RUN)

DQ a.6 — PLC1-C2-DQA.6:A02-06 — A02-06 — 5 — A02-06:K5F-21X — K5F 21X 22X K5F-22X:K5R-A1 — K5R A1 A2 — K5R-A2:OL5-95 — 5 — COOLING FAN M5 REVERSE (ENERGIZE TO RUN) — 5

DQ a.7 — PLC1-C2-DQA.7:A02-07 — A02-07 — 12 — U-N — SPARE

U-N — SPARE

U-N — SPARE

U-N — SPARE

+24 VDC

24VDC UPS POWER — DC1 — DC1:PLC1-C2-L+ — L+

COM — PLC1-C2-M:COM — M

PE — PLC1-C2-GND:PE — GND

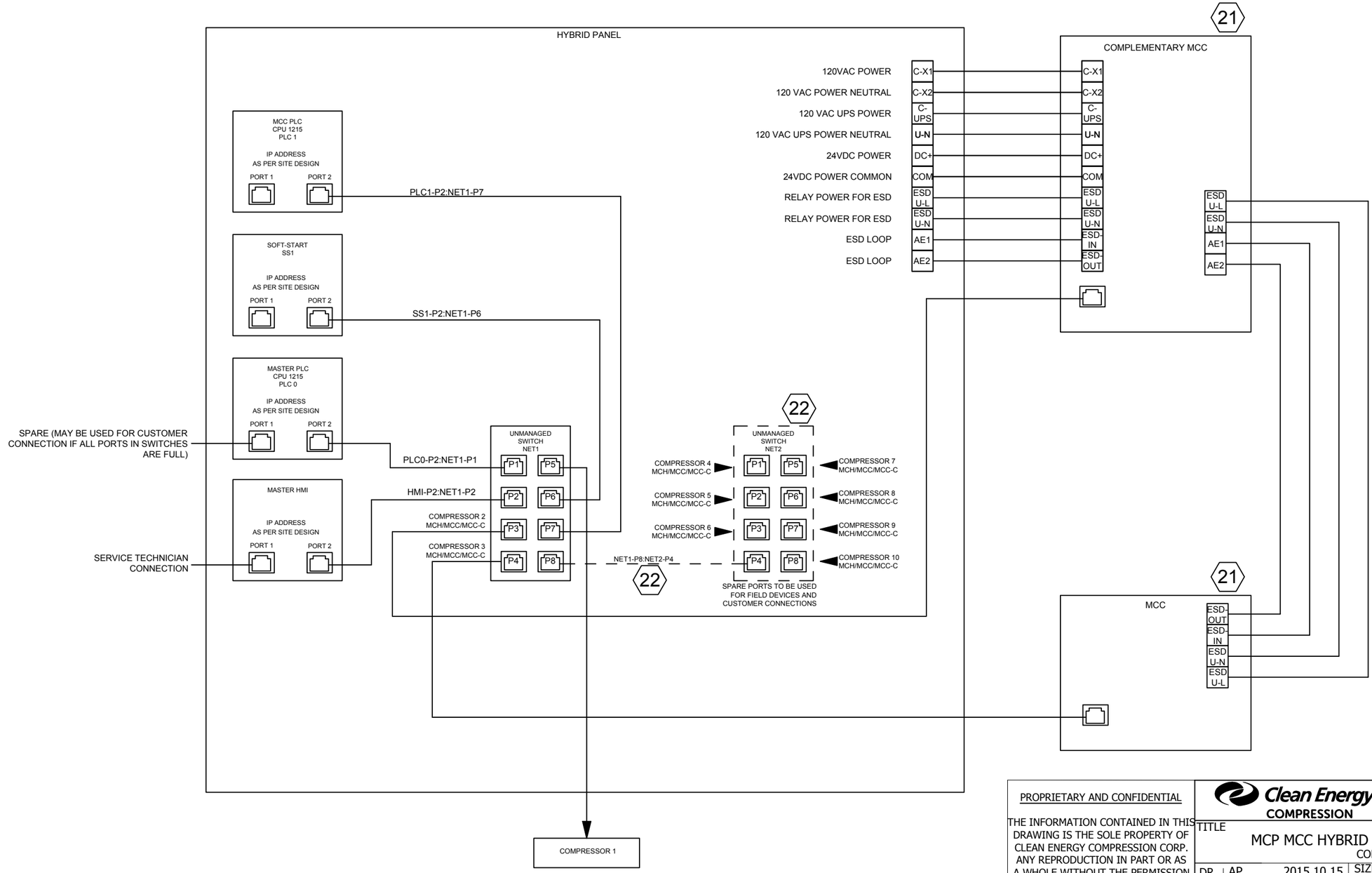
Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

TITLE
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE
CONTROL SCHEMATIC

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE 2015.10.15			
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 11 /17	

CONFIGURATION 1: WITH MCC-C AND MCC



Clean Energy® COMPRESSION

Chilliwack, B.C., Canada

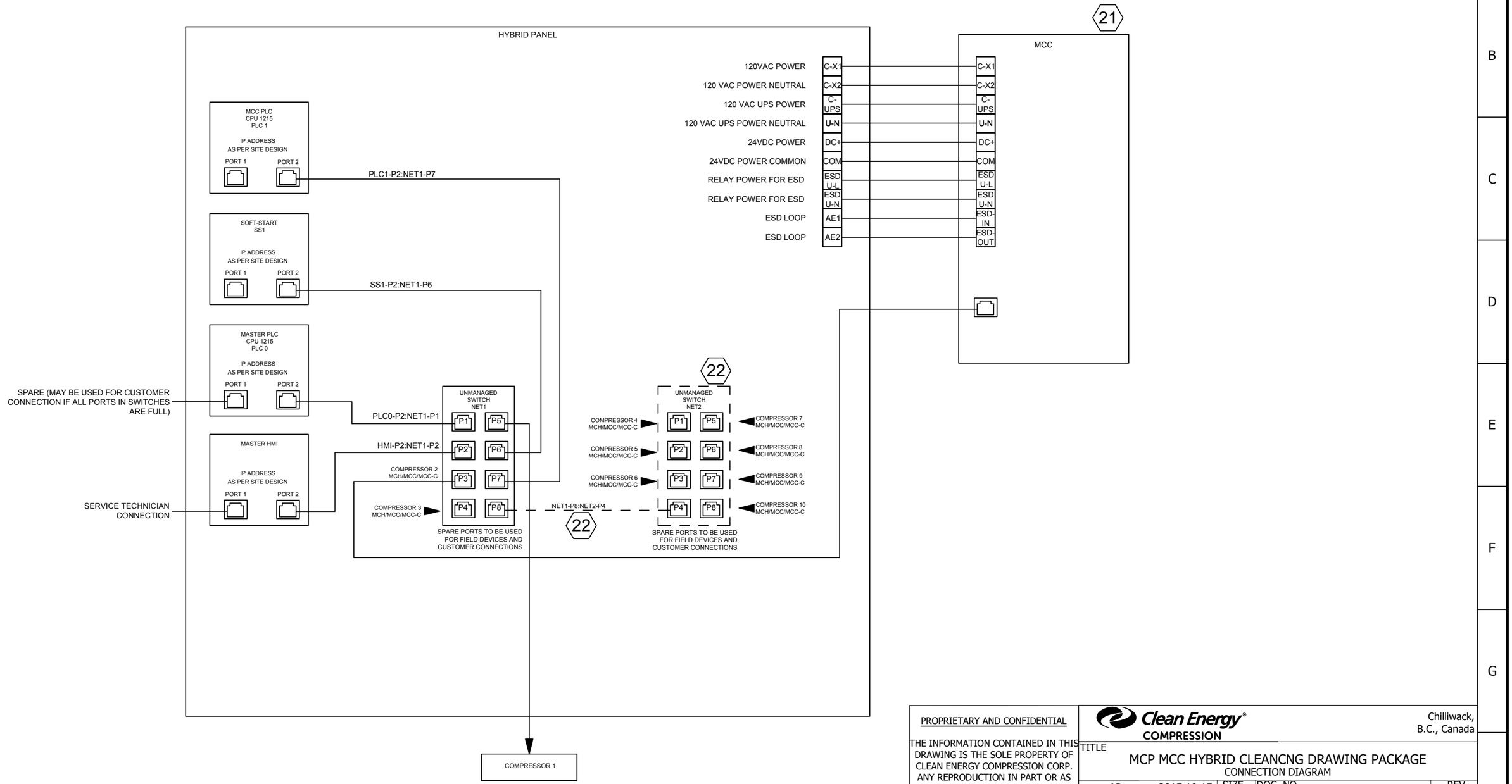
TITLE

MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

CONNECTION DIAGRAM

DR. | AP	2015.10.15	SIZE	DOC. NO.	REV
CK. | SVW/MAE	2015.10.15	B	703353	C
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET:	12 /17

CONFIGURATION 2: WITH MCC WITHOUT MCC-C



Clean Energy® COMPRESSION

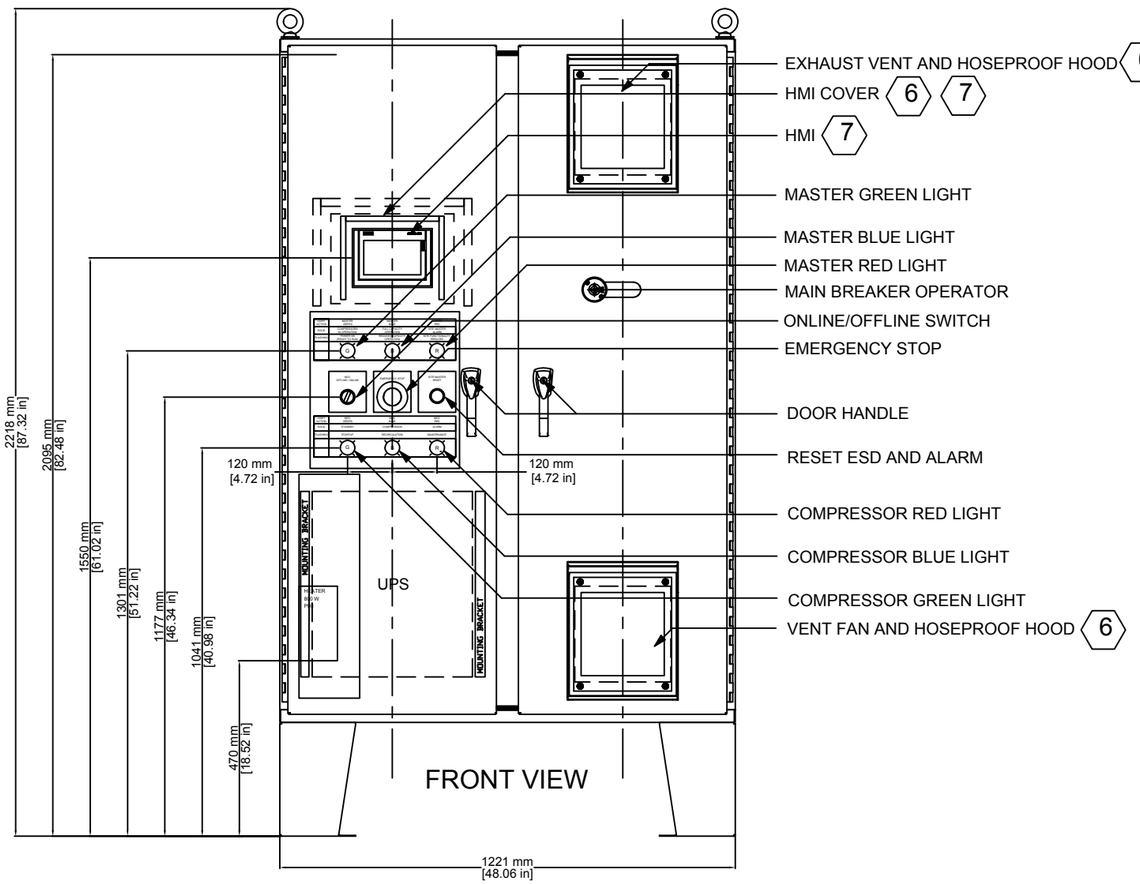
Chilliwack, B.C., Canada

TITLE

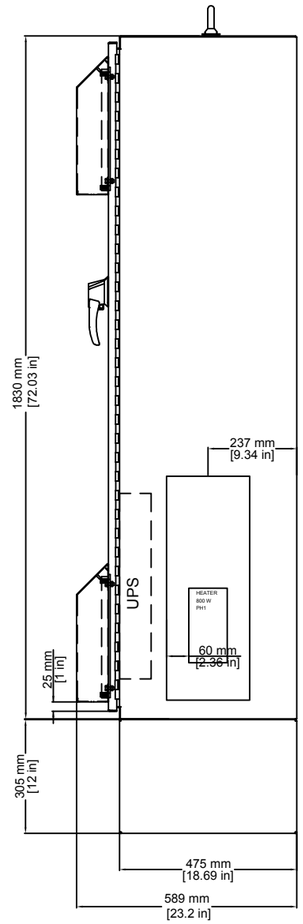
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

CONNECTION DIAGRAM

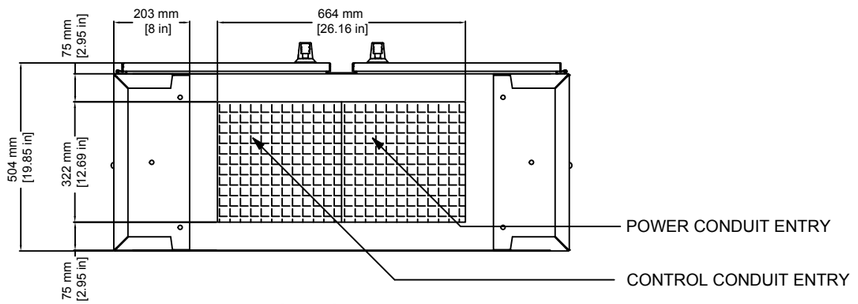
DR. | AP	2015.10.15	SIZE	DOC. NO.		REV
CK. | SVW/MAE	2015.10.15	B	703353		C
AP. | TFJ	2015.10.15	SCALE: N/A		SHEET:	13 /17



FRONT VIEW



SIDE VIEW



BOTTOM VIEW

Clean Energy® COMPRESSION

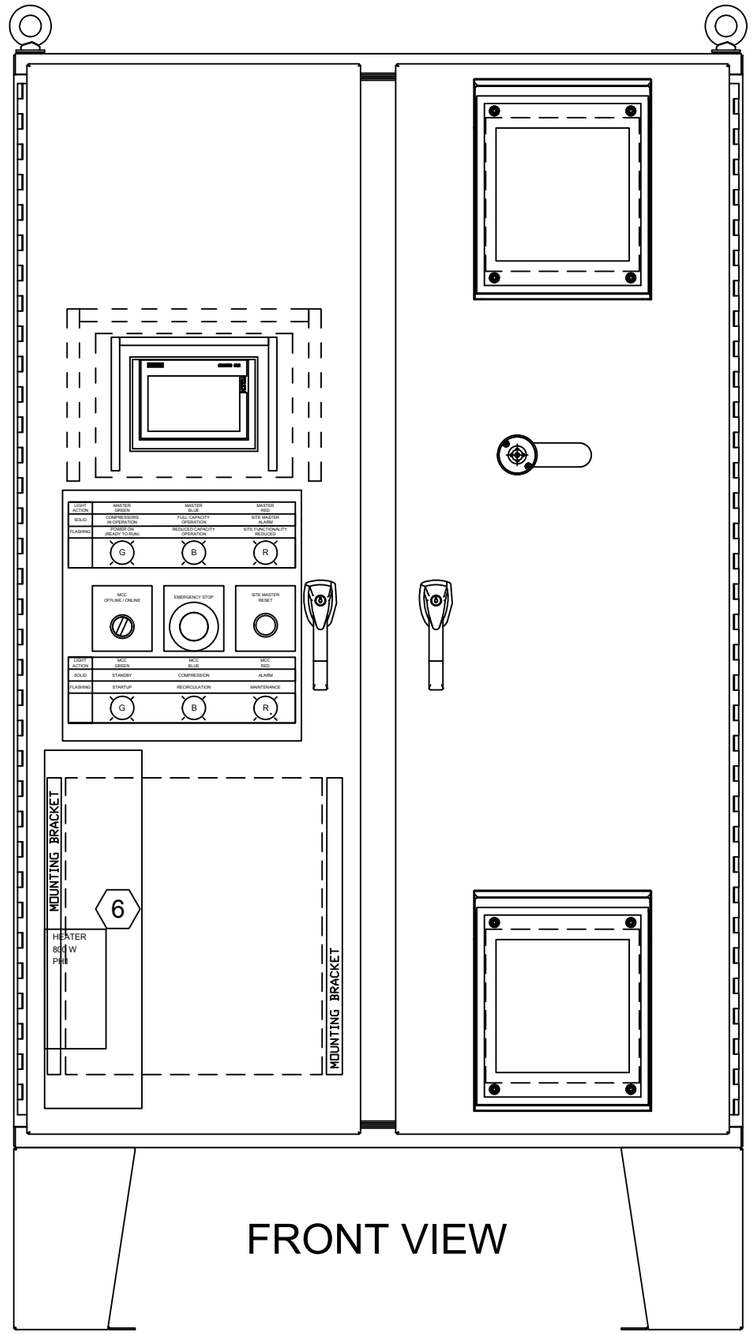
Chilliwack, B.C., Canada

TITLE

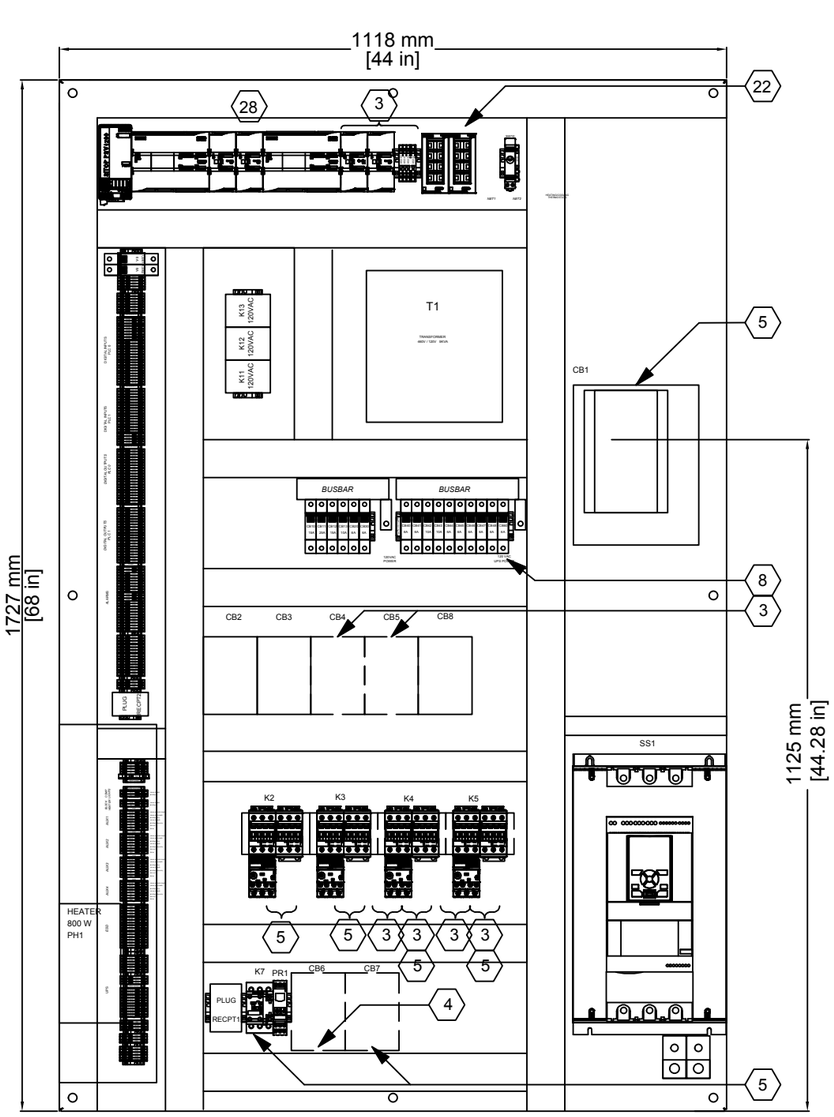
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

PANEL DIAGRAM (DIMMENSIONS)

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C	
CK. | SVW/MAE 2015.10.15				
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 14 /17		



FRONT VIEW



INNER VIEW

Clean Energy® COMPRESSION

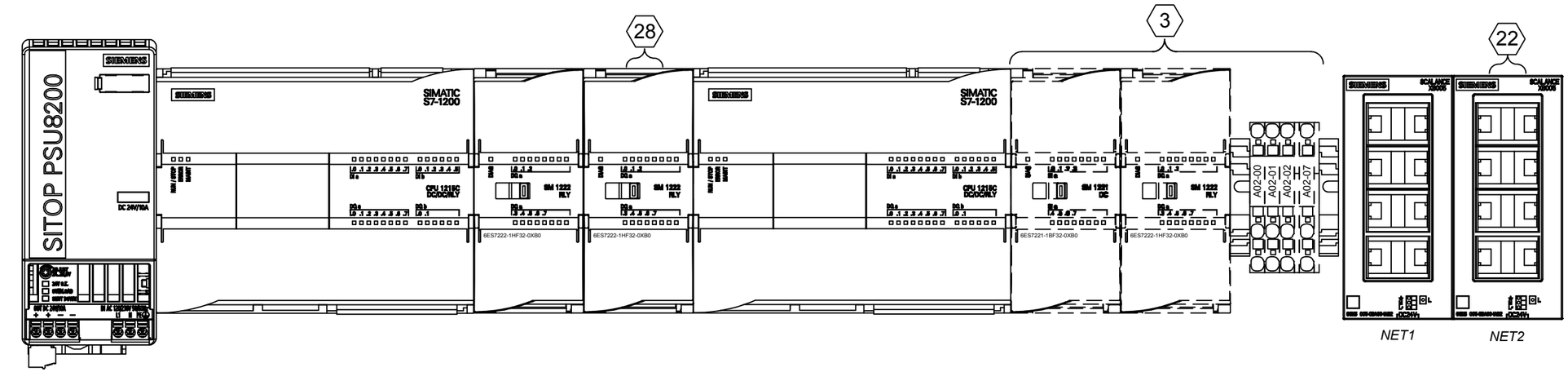
Chilliwack, B.C., Canada

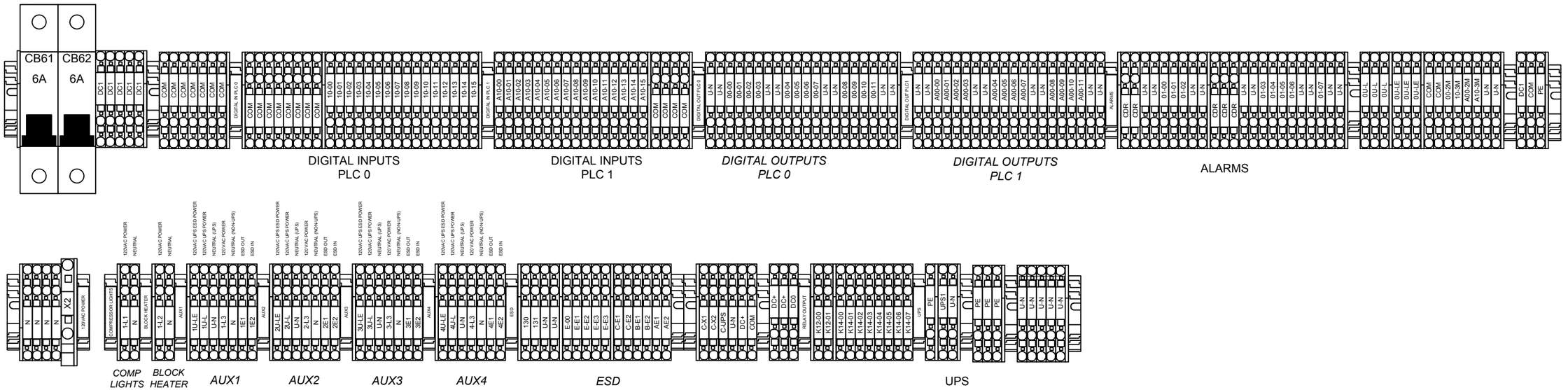
TITLE

MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

PANEL LAYOUT

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C	
CK. | SVW/MAE 2015.10.15				
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 15 /17		





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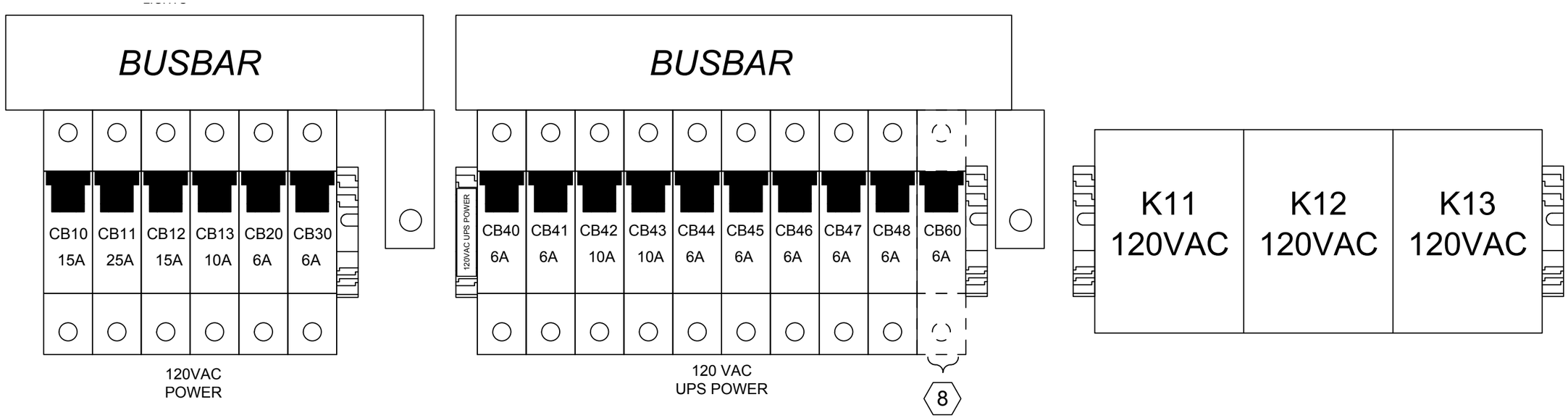
MCP MCC HYBRID CLEANCNG DRAWING PACKAGE

PANEL LAYOUT (DETAILS)

DR. | AP	2015.10.15	SIZE B	DOC. NO. 703353	REV C
CK. | SVW/MAE	2015.10.15			
AP. | TFJ	2015.10.15	SCALE: N/A	SHEET: 16 /17	



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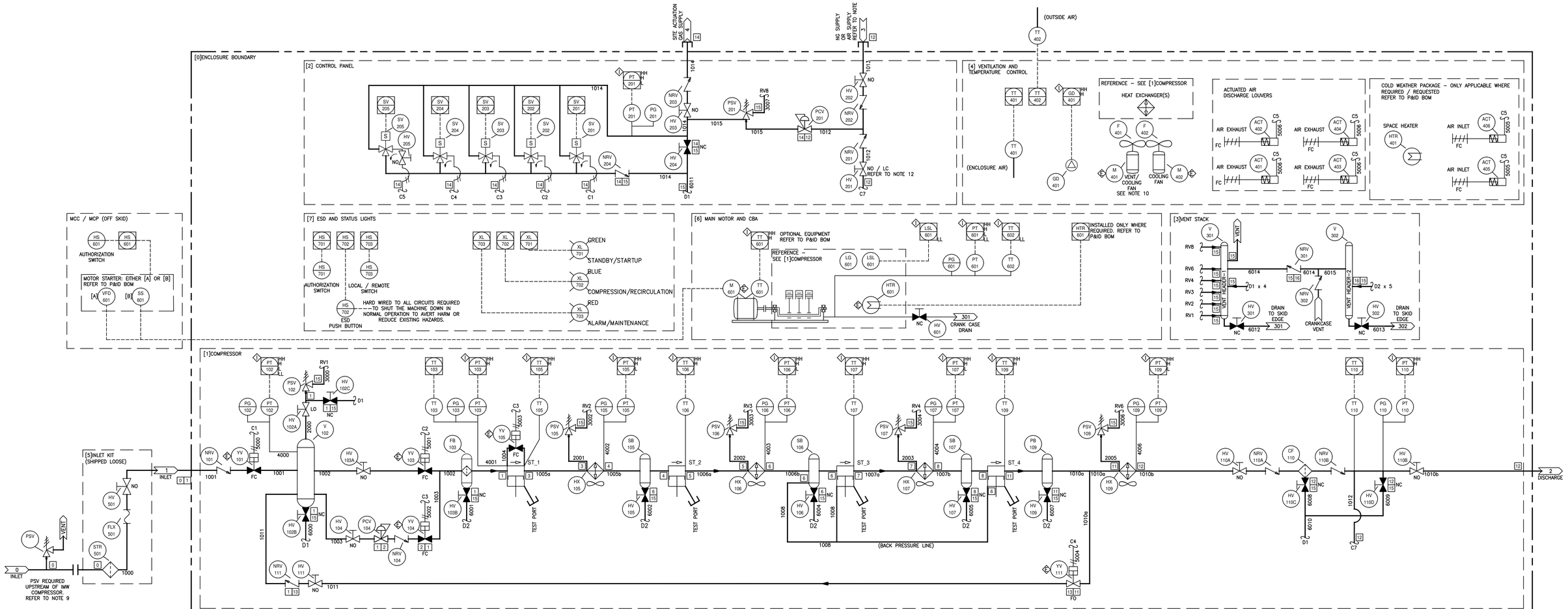
PANEL LAYOUT (DETAILS)

DR. | AP 2015.10.15	SIZE B	DOC. NO. 703353	REV C	
CK. | SVW/MAE 2015.10.15				
AP. | TFJ 2015.10.15	SCALE: N/A	SHEET: 17 /17		

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/10/05	AP	ISF/RJT	TFJ	N/A	INITIAL RELEASE BASED ON 702917-A
B	2016/03/29	AC	RJT	TFJ	N/A	UPDATED FINAL STAGE LINE SIZES AND TAG NUMBERS



NOTES:

1. CEC WARRANTS THAT THE DESIGN INFORMATION GIVEN IS AN ADEQUATE AND ACCURATE REPRESENTATION OF THE AS–BUILT PRESSURE PIPING SYSTEM.

2. MINIMUM TEMPERATURE INSIDE ENCLOSURE WHILE OPERATING SHALL NOT BE BELOW –20°C.

3. SEE P&ID BOM FOR THE FOLLOWING:
   - APPLICABLE DESIGN CODES.
   - FLUID SERVICE.
   - PRESSURE TEST REQUIREMENTS.
   - EQUIPMENT SPECIFICATIONS.
   - PIPE / TUBE SPECIFICATIONS.
   - COMPONENT MECHANICAL SETPOINTS.
   - ZONE PRESSURE AND TEMPERATURE RATINGS.

4. FOR PIPE SPECIFICATION REFER TO PIPE SPOOL DRAWINGS.

5. THREADED PIPE FITTINGS SHALL COMPLY TO ANSI B16.11 AND PIPE THREADS TO ASME B1.20.1.

6. FLANGE FITTINGS SHALL COMPLY TO ANSI B16.5.

7. ALL OTHER PIPE FITTINGS TO BE RATED PER ASME B31.3 AND CSA B51.

8. PRESSURE MAY BE ENTRAINED AT ANY POINT IN THE SYSTEM; ENSURE ALL LINES ARE PROPERLY ISOLATED AND DEPRESSURIZED FOR THE DURATION OF ALL MAINTENANCE WORK.

9. ZONE [0] IS NOT PROTECTED FROM AN OVER PRESSURE SITUATION BY THE COMPRESSOR SYSTEM AND MUST BE PROTECTED BY UPSTREAM COMPONENTS SUCH AS A PRESSURE SAFETY VALVE OR OTHER PRESSURE RELIEVING DEVICE. PRESSURE RELIEVING DEVICE CAPACITY MUST BE GREATER THAN THE MAXIMUM FLOW RATE FROM A FAILURE SUCH AS THE METER SET ASSEMBLY REGULATOR FAILED OPEN. REFER TO P&ID BOM FOR ZONE [0] PRESSURE RATING.

10. VENT FAN M–401 / F–401 INSTALLED CLOSEST TO CBA ON COMPRESSOR PACKAGE.

11. AIR SUPPLY REQUIRES MINIMUM PRESSURE TO OPERATE. REFER TO P&ID BOM OR SITE SCHEMATIC FOR DETAILS. AIR CANNOT BE USED WITH NG LINE PER NOTE 12.

12. WHEN AIR SUPPLY IS USED, NG LINE FROM COMPRESSOR MUST BE LOCKED OUT AND TAGGED AS CLOSED.

13. INSTRUMENTATION SYMBOLS AND IDENTIFICATION PER ANSI/ISA–5.1–2009 OR AS INDICATED IN LEGEND.

COMPONENTS

- MANUAL VALVE
- ACTUATED VALVE
- NON–RETURN VALVE (CHECK VALVE)
- AIR COOLED HEAT EXCHANGER
- FILTER (STRAINER)
- PRESSURE SAFETY VALVE (PRESSURE RELIEF VALVE)
- SOLENOID 3 WAY VALVE – 2 POSITION ARROW INDICATES DE–ENERGIZED PATH
- PRESSURE REDUCING REGULATOR, SELF CONTAINED
- PILOT LIGHT
- COMPRESSION POINT / CYLINDER
- DAMPER
- TANK (VESSEL)
- MOTOR
- FLEXIBLE CONNECTION / HOSE
- ELECTRIC HEATER
- SPRING RETURN PISTON ACTUATOR
- FAN

INSTRUMENT SYMBOLS

- INSTRUMENTS AND DEVICES – FIELD MOUNTED (OR) INSTRUMENT TAG
- INSTRUMENTS AND DEVICES – ON MAIN PANEL OR SCREEN
- PROGRAMMABLE LOGIC CONTROL – ON MAIN PANEL OR SCREEN

ANNOTATIONS

- INTERLOCK – INITIATES CHANGE OF POSITION
- EMERGENCY – CHANGES POSITION WHEN E–STOP IS PRESSED
- PRESSURE / TEMPERATURE ZONE

LINE TYPES

- ARROW INDICATES DIRECTION OF FLOW
- CAPPED PIPE
- FLANGE
- PIPING / PROCESS CONNECTION
- ELECTRICAL SIGNAL
- PNEUMATIC SIGNAL
- COMMUNICATION LINK OR SYSTEM BUS
- INSTRUMENT SUPPLY

INSTRUMENT IDENTIFICATION:

ACT = ACTUATOR.
CF = COALESCING FILTER.
F = FAN.
FB = FILTER BOTTLE.
FC = FAIL CLOSED.
FLX = FLEX HOSE.
FO = FAIL OPENED.
GD = GAS DETECTOR.
HS = HAND SWITCH.
HTR = ELECTRIC HEATER.
HV = HAND VALVE.
HX = HEAT EXCHANGER.
LC = LOCKED CLOSED.
LG = LEVEL GAUGE/GLASS (INDICATOR).
LO = LOCKED OPEN.
LSL = LEVEL SWITCH LOW.
M = MOTOR.
NC = NORMALLY CLOSED.
NG = NATURAL GAS.
NO = NORMALLY OPEN.
NRV = NON RETURN VALVE.
PB = PULSATION BOTTLE.
PCV = PRESSURE CONTROL VALVE.
PG = PRESSURE GAUGE (INDICATOR).
PSL = PRESSURE SWITCH LOW.
PSH = PRESSURE SWITCH HIGH.
PSV = PRESSURE SAFETY VALVE.
PT = PRESSURE TRANSMITTER.
SB = SCRUBBER BOTTLE.
SS = SOFT STARTER.
STR = STRAINER.
SV = SOLENOID VALVE.
TG = TEMPERATURE GAUGE (INDICATOR).
TSH = TEMPERATURE SWITCH HIGH.
TT = TEMPERATURE TRANSMITTER.
TW = THERMOWELL.
XL = STATUS LIGHT.
YY = ACTUATED VALVE.
V = VESSEL.
VFD = VARIABLE FREQUENCY DRIVE.

INSTRUMENT IDENTIFICATION PREFIX:

ALL INSTRUMENT IDENTIFICATIONS (TAG NUMBERS) ON THIS DRAWING SHALL INCLUDE AN EQUIPMENT PREFIX WHEN REFERENCED BY DESIGN DOCUMENTATION THAT INCLUDES THIS EQUIPMENT, SUCH AS SITE LEVEL CONTROL LOGIC NARRATIVES. THE PREFIX SHALL BE CP*, WHERE * IS THE UNIT NUMBER IDENTIFYING THIS PARTICULAR PIECE OF EQUIPMENT. FOR EXAMPLE, THE INSTRUMENT IDENTIFICATION FOR THE RECOVERY TANK PRESSURE TRANSMITTER PT–102 ON COMPRESSOR UNIT #1 IS CP1–PT–102, AND THE SAME INSTRUMENT ON COMPRESSOR UNIT #2 IS CP2–PT–102.

ALARMS:

HH = ALARM HIGH HIGH CAUSES SHUTDOWN OF EQUIPMENT.
H = ALARM HIGH CAUSES WARNING.
L = ALARM LOW CAUSES WARNING.
LL = ALARM LOW LOW CAUSES SHUTDOWN OF EQUIPMENT.

Clean Energy® COMPRESSION — Chilliwack, B.C., Canada

TITLE: 50 SERIES 4-STAGE INLINE TANK SINGLE CLEAN 2.0

DR.	AP	2015/09/11	SIZE	DOC. NO.	REV
CK.	ISF	2015/09/11	D	703356	B
AP.	TFJ	2015/09/11	SCALE 1:1		SHEET 1 / 1

Clean Energy® COMPRESSION

DOCUMENT NO:	703851
DOCUMENT REV:	A
TITLE:	50 SERIES 4-STAGE INLINE TANK SINGLE CLEAN 2.0 460V TYP W
TYPE:	P&ID BILL OF MATERIALS
REFERENCE P&ID DRW NO:	703356 Rev. A

REVISION HISTORY

REV	DATE	REFERENCE	ECO#	BY / CK / APR
A	2016/01/25	INITIAL RELEASE	N/A	AC / RJT / TFJ

ENGINEERING RELEASE STAMP 2"X 3" - DO NOT DELETE

DO NOT BUILD IF STAMP NOT PRESENT

PRODUCTION CONTROL STAMP 2"X 3" - DO NOT DELETE

DO NOT BUILD IF STAMP NOT PRESENT

GENERAL NOTES

APPLICABLE DESIGN CODES: ASME B31.3, NFPA 52
SERVICE: NORMAL FLUID SERVICE
FLUID: SWEET DRY NATURAL GAS
FINAL ASSEMBLY TEST PRESSURE SETPOINTS PER ZONE. PNEUMATIC TEST PRESSURES OF 1.1 - 1.33 TIMES THE DESIGN PRESSURE AS PER ASME B31.3 SEC 345.5.1, TEST PSV SETPOINTS AS PER ASME B31.3 SEC 345.5.2, AND TESTING NOT REQUIRED FOR VENT ZONES OPEN TO ATMOSPHERE AS PER ASME B31.3 SEC 345.1(D).

COMPRESSOR (1)**

REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
CF-110	202967-00	FILTER COALESCING CF-5500-7-CS 5500	5500 PSIG @ 200F	-20F	CEC	
FB-103	625167	PARTICULANT PULSATION FILTER 10.0L/61-32	650PSIG @ 400F	-20F	CEC	
HV-102A	327663	VALVE BALL SS 1.000FNPT	1000 PSIG @200F	-50F	TRIAC	
HV-102B	324449	VALVE BALL SS 0.500FNPT	1000 PSIG @200F	-50F	TRIAC	
HV-102C	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-103A	338551	VALVE BALL 2WAY 2.00FNPT 800PSI	525PSIG @ 250F	-40F	TRIAC	
HV-103B	329528	VALVE BALL SS 2WAY 0.250FNPT 6000PSI	6000PSIG @ 446F	-22F	DK LOK	
HV-104	327663	VALVE BALL SS 1.000FNPT	1000 PSIG @200F	-50F	TRIAC	
HV-105	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-106A	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-106B	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-107	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-108	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-110A	607373	VALVE BALL SS 2WAY 0.750T CNG	5000 PSIG @260F	-40F	DK LOK	
HV-110B	607373	VALVE BALL SS 2WAY 0.750T CNG	5000 PSIG @260F	-40F	DK LOK	
HV-110C	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-110D	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-111	607373	VALVE BALL SS 2WAY 0.750T CNG	5000 PSIG @260F	-40F	DK LOK	
HX-105	618873	COOLER SECTION 4P-16T 24N 2500PSI	2500PSIG @ 400F	-20F	CEC	
HX-106	618873	COOLER SECTION 4P-16T 24N 2500PSI	2500PSIG @ 400F	-20F	CEC	
HX-107	618875	COOLER SECTION 4/8P-16/8T 16N 5000PSI	5000PSIG @ 400F	-20F	CEC	
HX-108	618875	COOLER SECTION 4/8P-16/8T 16N 5000PSI	5000PSIG @ 400F	-20F	CEC	
NRV-101	331355	VALVE CHECK CS 310@1000PSIG 2.000FNPT	1000PSIG @ 140F	-20F	AOP	
NRV-104	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-110A	307014	VALVE CHECK CS INTERN 0.500FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-110B	307014	VALVE CHECK CS INTERN 0.500FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-111	307014	VALVE CHECK CS INTERN 0.500FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
PB-109	205105	BOTTLE PULS. 5500PSIG 0.75X0.75-0.75BP	5500 PSIG @ 400F	-20F	CEC	
PCV-104	329794	REGULATOR PRES 627 1.000FNPT 70-150PSI 0.5 ORIFICE	1000 PSIG @ 180F	-40F	FISHER	
PG-102	322457	GAUGE PRES 2.5IN DIAL 70 BAR/1000 PSIG	1000PSIG @ 140F	-20F	WIKA	
PG-103	322457	GAUGE PRES 2.5IN DIAL 70 BAR/1000 PSIG	1000PSIG @ 140F	-20F	WIKA	
PG-105	322457	GAUGE PRES 2.5IN DIAL 70 BAR/1000 PSIG	1000PSIG @ 140F	-20F	WIKA	
PG-106	329858	GAUGE PRES 2.5IN DIAL 102 BAR/1500 PSIG	1500PSIG @ 140F	-20F	WIKA	
PG-107	322459	GUAGE PRES 2.5IN DIAL 345/5000 PSIG	5000PSIG @ 140F	-20F	WIKA	
PG-108	322604	GAUGE PRES 2.5IN DIAL 414 BAR/6000 PSIG	6000PSIG @ 140F	-20F	WIKA	
PG-110	322604	GAUGE PRES 2.5IN DIAL 414 BAR/6000 PSIG	6000PSIG @ 140F	-20F	WIKA	
PSV-102	619099	VALVE RELIEF 1.00MNPT-1.00FNPT 575PSIG	2999 PSIG @ 400F	-20F	MERCER	
PSV-105	619099	VALVE RELIEF 1.00MNPT-1.00FNPT 575PSIG	2999 PSIG @ 400F	-20F	MERCER	

PSV-106	619101	VALVE RELIEF 1.00MNPT-1.00FNPT 1200PSIG	2999 PSIG @ 400F	-20F	MERCER	
PSV-107	624506	VALVE RELIEF 0.75MNPT-1.00FNPT 3525PSIG	8700PSIG @ 400F	-20F	MERCER	
PSV-108	625593	VALVE RELIEF 0.75FNPT-1.00FNPT 5000PSIG	8700PSIG @ 400F	-20F	MERCER	
PT-102	319946	TRANSMITTER PRES 0-1000 PSIG 0.250 MNPT	1740PSIG @ 221F	-22F	WIKA	
PT-103	319946	TRANSMITTER PRES 0-1000 PSIG 0.250 MNPT	1740PSIG @ 221F	-22F	WIKA	
PT-105	319946	TRANSMITTER PRES 0-1000 PSIG 0.250 MNPT	1740PSIG @ 221F	-22F	WIKA	
PT-106	319942	TRANSMITTER PRES 0-6000 PSIG 0.250 MNPT	14500PSIG @ 221F	-22F	WIKA	
PT-107	319942	TRANSMITTER PRES 0-6000 PSIG 0.250 MNPT	14500PSIG @ 221F	-22F	WIKA	
PT-108	319942	TRANSMITTER PRES 0-6000 PSIG 0.250 MNPT	14500PSIG @ 221F	-22F	WIKA	
PT-110	319942	TRANSMITTER PRES 0-6000 PSIG 0.250 MNPT	14500PSIG @ 221F	-22F	WIKA	
SB-105	204097	BOTTLE SCRUBBER 1200PSIG 1.5X1.25-0.75BP	1200PSIG @ 400F	-20F	CEC	
SB-106	204097	BOTTLE SCRUBBER 1200PSIG 1.5X1.25-0.75BP	1200PSIG @ 400F	-20F	CEC	
SB-107	204295	BOTTLE SCRUBBER 4000PSIG 1.0X1.0-0.75BP	4000PSIG @ 400F	-20F	CEC	
TT-103	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
TT-105	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
TT-106	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
TT-107	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
TT-108	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
TT-110	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
V-102	624743	TANK REC HORIZ 90GAL 590PSIG 24IN DIA 53.5IN LONG WITH FEET	590 PSIG @ 400F	-20F	STEEL FAB	
YV-101	327615	VALVE BALL CS 2.000FNPT W/ACT	800 PSIG @ 160F	-20F	TRIAC	
	327615 ACT	ACTUATOR INCLUDED WITH 327615	150PSIG @ 175F	-20F	TRIAC	
YV-103	327615	VALVE BALL CS 2.000FNPT W/ACT	800 PSIG @ 160F	-20F	TRIAC	
	327615 ACT	ACTUATOR INCLUDED WITH 327615	150PSIG @ 175F	-20F	TRIAC	
YV-104	327614	VALVE BALL CS 1.000FNPT W/ACT 1000PSIG	800PSIG @ 160F	-40F	TRIAC	
	327614 ACT	ACTUATOR INCLUDED WITH 327614	150PSIG @ 175F	-20F	TRIAC	
YV-105	333711	VALVE BALL SS 1.000FNPT W/ACT	950PSIG @ 250F	-40F	TRIAC	
	333711 ACT	ACTUATOR INCLUDED WITH 333711	150PSIG @ 175F	-20F	TRIAC	
YV-111	625551	VALVE BALL SS 2WAY 0.750T W/ACT NO 5000PSIG -40F TO 150F	5000PSIG @ 150F	-40F	PARKER	
	625551 ACT	ACTUATOR INCLUDED WITH 625551	120PSIG @ 213F	-67F	PARKER	

CONTROL PANEL (2)**

REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
HV-201	624917	VALVE BALL SS 2WAY 0.250FNPT 10000PSI LOCKING	10000PSIG @ 500F	-65F	DK LOK	
HV-202	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-203	329528	VALVE BALL SS 2WAY 0.250FNPT 6000PSI	6000PSIG @ 446F	-22F	DK LOK	
HV-204	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-205	613840	VALVE SPEED CONTROL 0.250 NPT AL	60PSIG @ 140F	-30F	SMC	
NRV-201	307219	VALVE CHECK SS C4L 0.250T 6000PSIG @0.3PSIG RUBBER	5000PSIG @ 390F	-15F	PARKER	
NRV-202	307219	VALVE CHECK SS C4L 0.250T 6000PSIG @0.3PSIG RUBBER	5000PSIG @ 390F	-15F	PARKER	
NRV-203	307219	VALVE CHECK SS C4L 0.250T 6000PSIG @0.3PSIG RUBBER	5000PSIG @ 390F	-15F	PARKER	
NRV-204	307219	VALVE CHECK SS C4L 0.250T 6000PSIG @0.3PSIG RUBBER	5000PSIG @ 390F	-15F	PARKER	
PCV-201	310533	REGULATOR PILOT 0.250FNPT 6000PSIG	6000PSIG @ 200F	-20F	FISHER	
PG-201	322454	GAUGE PRES 2.5IN DIAL 14 BAR/200PSIG	200PSIG @ 140F	-40F	WIKA	
PSV-201	619097	VALVE RELIEF 1.00MNPT-1.00FNPT 115PSIG	2999 PSIG @ 400F	-20F	MERCER	
PT-201	319943	TRANSMITTER PRES 0-500 PSIG 0.25MNPT	1160PSIG @ 221F	-22F	WIKA	
SV-201	338492	VALVE SOL 3WAY 120V-50/60HZ	125PSIG @ 125F	32F	ASCO	
SV-202	338492	VALVE SOL 3WAY 120V-50/60HZ	125PSIG @ 125F	32F	ASCO	
SV-203	338492	VALVE SOL 3WAY 120V-50/60HZ	125PSIG @ 125F	32F	ASCO	
SV-204	338492	VALVE SOL 3WAY 120V-50/60HZ	125PSIG @ 125F	32F	ASCO	
SV-205	338492	VALVE SOL 3WAY 120V-50/60HZ	125PSIG @ 125F	32F	ASCO	

VENT STACK (3)**

REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
HV-301	307515	VALVE BALL BRASS 5044A 0.250FNPT CLS600	600PSIG @ 160F	-20F	TOYO	
HV-302	307515	VALVE BALL BRASS 5044A 0.250FNPT CLS600	600PSIG @ 160F	-20F	TOYO	
NRV-301	625655	VALVE CHECK SWING BRASS 0.750 FNPT 600PSIG - 20F TO 140F	600PSIG @ 140F	-20F	TOYO	
NRV-302	625655	VALVE CHECK SWING BRASS 0.750 FNPT 600PSIG - 20F TO 140F	600PSIG @ 140F	-20F	TOYO	
V-301	619927	VENT HEADER WELDMENT CLEANCNG	500PSIG @ 400F	-20F	CEC	
V-302	620038	VENT MANIFOLD CBA DRAINS	NOT PRESSURE RETAINING		CEC	

VENTILATION AND TEMPERATURE CONTROL (4)**

REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
ACT-401	625550	CYLINDER AIR SA SR 1.06ID 7.0IN STROKE COLD	250PSIG @ 200F	-40F	BIMBA	
ACT-402	625550	CYLINDER AIR SA SR 1.06ID 7.0IN STROKE COLD	250PSIG @ 200F	-40F	BIMBA	
ACT-403	625550	CYLINDER AIR SA SR 1.06ID 7.0IN STROKE COLD	250PSIG @ 200F	-40F	BIMBA	
ACT-404	625550	CYLINDER AIR SA SR 1.06ID 7.0IN STROKE COLD	250PSIG @ 200F	-40F	BIMBA	
ACT-405	N/A					

ACT-406	N/A					
F-401	624507	FAN 30/9-9/32.5/PAG/4ZL/SH 1.375 3T&3C/BR			MULTI-WING	
F-402	624507	FAN 30/9-9/32.5/PAG/4ZL/SH 1.375 3T&3C/BR			MULTI-WING	
GD-401	609737	GAS DETECTOR INFRARED 4-20MA SENSEPOINT UL/CSA			HONEYWELL	
HTR-401	N/A					
M-401	325995	MOTOR 7.5HP 1500/1800RPM 380/460-3-50/60 213TC XPFC			WEG	
M-402	325995	MOTOR 7.5HP 1500/1800RPM 380/460-3-50/60 213TC XPFC			WEG	
TT-401	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	
TT-402	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	

INLET KIT (5**)						
REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
FLX-501	338523	HOSE BRAIDED 3.0IN 300# RF FLG X MNPT 36LG 316PSI AT 70F LT	316 PSIG @ 300F	-40F	AR THOMSON	
HV-501	330267	VALVE BALL 2WAY 3.00FNPT 800PSI	800 PSIG @ 175F	-40F	TRIAC	
STR-501	320082	STRAINER CONE CS 3.0 SCH80 300# 100 MESH 100PCT OPEN	NOT PRESSURE RETAINING	-20F	FPS	

MAIN MOTOR AND CBA (6**)						
REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
HTR-601	625163	HEATER BLOCK OIL 1NPT 120V 400W CCSAUS	NOT PRESSURE RETAINING		CALORITECH	
HV-601	307512	VALVE BALL BRASS 5044A 1.000FNPT CLS600	600PSIG @ 160F	-20F	TOYO	
LG-601	311073	SIGHT GLASS IMW-LVA-20-T-A-M12 - IMW CUSTOM 9D0050 5" IND.	NOT PRESSURE RETAINING		MP FILTRI	
LSL-601	310999	SWITCH LEVEL L971 4A@250VAC 0.5MNPT	30PSIG @ 275F	-15F	MURPHY	
M-601	329795	MOTOR 300HP 1800RPM 460-3-60 449T TEFC F2 C1D2 2 X 2.500 ODE	NOT PRESSURE RETAINING		BALDOR	
PG-601	322454	GAUGE PRES 2.5IN DIAL 14 BAR/200PSIG	200PSIG @ 140F	-40F	WIKA	
PT-601	319943	TRANSMITTER PRES 0-500 PSIG 0.25MNPT	1160PSIG @ 221F	-22F	WIKA	
TT-602	607735	THERMOCOUPLE TYPE K 240IN LEADS 0.250	SAME AS FITTING	-50F	WIKA	

PIPING & TUBING			
LINE	PART #	DESCRIPTION	LOCATION
1000	210426	NIPPLE PIPE SA-333 3.0NPTX12 SCH80 PAINT	Inlet Kit
1001	350621	PIPE SA-106 GR.B 3.000NPS X SCH80 PNO	Inlet
1002	350621	PIPE SA-106 GR.B 3.000NPS X SCH80 PNO	Recovery Line
1003	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Recovery PCV Line
1004	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Unloader
1005a	350647	PIPE SA-106 GR.B 2NPS X SCH80 PNO	Stage 1 Discharge
1005b	350647	PIPE SA-106 GR.B 2NPS X SCH80 PNO	Stage 2 Suction
1006a	304192	TUBE CS SA-179 1.250 X 0.120	Stage 2 Discharge
1006b	304192	TUBE CS SA-179 1.250 X 0.120	Stage 3 Suction
1007	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Stage 3 Back Pressure
1008a	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Stage 3 Discharge
1008b	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Stage 4 Suction
1010a	312898	TUBE SS SA-213 T316 0.750 X 0.109, BRIGHT ANNEALED	Stage 4 Discharge
1010b	312898	TUBE SS SA-213 T316 0.750 X 0.109, BRIGHT ANNEALED	Final Discharge
1011	304320	TUBE SS SA-213 T316 0.500 X 0.065, BRIGHT ANNEALED	Auto Drain
1012	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Control Gas
1013	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Control Gas Skid inlet
1014	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Control Gas
1015	304320	TUBE SS SA-213 T316 0.500 X 0.065, BRIGHT ANNEALED	Control Gas
2000	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Recovery Relief
2001	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	1st stage Relief
2002	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	2nd stage Relief
2003	312898	TUBE SS SA-213 T316 0.750 X 0.109, BRIGHT ANNEALED	3rd Stage Relief
2004	312898	TUBE SS SA-213 T316 0.750 X 0.109, BRIGHT ANNEALED	4th Stage Relief
3000	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Recovery Vent
3002	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	1st stage Vent
3003	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	2nd stage Vent
3004	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	3rd Stage Vent
3005	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	4th Stage Vent
3007	304192	TUBE CS SA-179 1.250 X 0.120	Control Gas Vent
4000	319332	TUBE SS SA-213 T316 0.125 X 0.028, BRIGHT ANNEALED	Recovery Instrument
4001	319332	TUBE SS SA-213 T316 0.125 X 0.028, BRIGHT ANNEALED	Inlet Instrument
4002	319332	TUBE SS SA-213 T316 0.125 X 0.028, BRIGHT ANNEALED	1st Stage Instrument
4003	319332	TUBE SS SA-213 T316 0.125 X 0.028, BRIGHT ANNEALED	2nd Stage Instrument
4004	319332	TUBE SS SA-213 T316 0.125 X 0.028, BRIGHT ANNEALED	3rd Stage Instrument

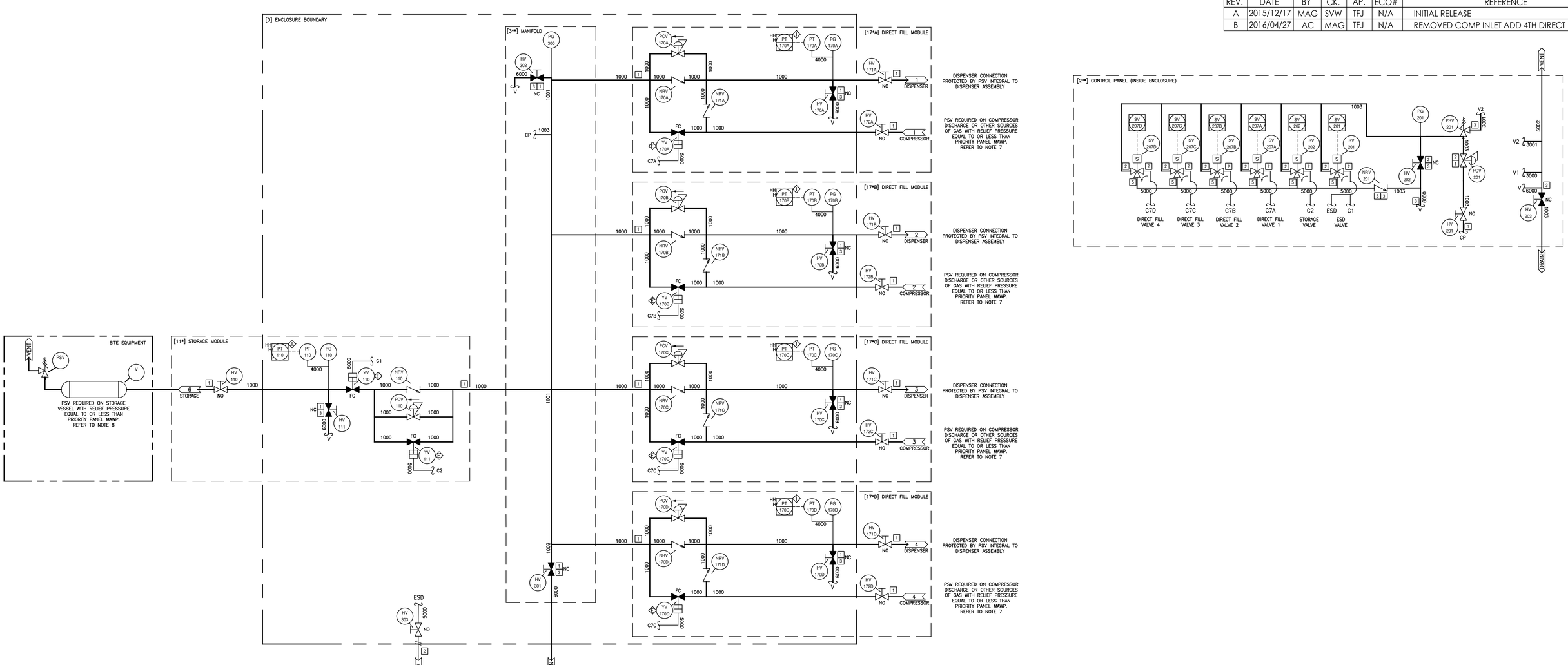
4005	319332	TUBE SS SA-213 T316 0.125 X 0.028, BRIGHT ANNEALED	4th Stage Instrument
5000	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Inlet Control Gas
5001	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Recovery Control Gas
5002	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Recovery PCV Control Gas
5003	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Unloader Control Gas
5004	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Auto Drain Control Gas
5005	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Inlet Louver Actuator Control Gas
5006	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Outlet Louver Actuator Control Gas
6000	319462	HOSE RUBBER SINGLE BRAID 0.250	Recovery Tank Drain
6001	319462	HOSE RUBBER SINGLE BRAID 0.250	Inlet Filter Drain
6002	319462	HOSE RUBBER SINGLE BRAID 0.250	2nd Bottle Drain
6003	319462	HOSE RUBBER SINGLE BRAID 0.250	2nd Pulsation Bottle Drain
6004	319462	HOSE RUBBER SINGLE BRAID 0.250	3rd Bottle Drain
6005	310734	HOSE RUBBER DOUBLE BRAID 0.250	4th Bottle Drain
6008	310734	HOSE RUBBER DOUBLE BRAID 0.250	Discharge Filter Drain
6009	310734	HOSE RUBBER DOUBLE BRAID 0.250	Discharge Drain
6010	310734	HOSE RUBBER DOUBLE BRAID 0.250	Discharge Combine Drain
6011	319462	HOSE RUBBER SINGLE BRAID 0.250	Solenoid Vent Drain
6012	319462	HOSE RUBBER SINGLE BRAID 0.250	Vent Header Drain
6013	319462	HOSE RUBBER SINGLE BRAID 0.250	Drain Bottle Drain
6014	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	Drain Bottle to Vent Header
6015	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	Drain Bottle to Vent Header

SETPOINTS	
PCV-104	100 PSIG
PCV-201	100 PSIG

ZONE	DESIGN PRESSURE	DESIGN TEMPERATURE	TEST PRESSURE	TEST PSV SETPOINT	TEST PSV
0	200 PSIG	-40F TO 150F	SITE PIPING ZONE TESTED ON SITE		
1	575 PSIG	-20F TO 150F	690 PSIG	740 PSIG	628085
2*	160 PSIG	-20F TO 150F	209PSIG*	230 PSIG*	602652*
3	575 PSIG	-20F TO 400F	690 PSIG	740 PSIG	628085
4	575 PSIG	-20F TO 150F	690 PSIG	740 PSIG	628085
5	1200 PSIG	-20F TO 400F	1440 PSIG	1490 PSIG	628089
6	1200 PSIG	-20F TO 150F	1440 PSIG	1490 PSIG	628089
7	3525 PSIG	-20F TO 400F	4230 PSIG	4280 PSIG	628093
8	3525 PSIG	-20F TO 150F	4230 PSIG	4280 PSIG	628093
9	5000 PSIG	-20F TO 400F	6000 PSIG	6050 PSIG	628095
12	5000 PSIG	-20F TO 150F	6000 PSIG	6050 PSIG	628095
13	5000 PSIG	-20F TO 150F	6000 PSIG	6050 PSIG	628095
14	115 PSIG	-20F TO 150F	138 PSIG	150 PSIG	628081
15	500 PSIG	-20F TO 150F	VENT ZONE TESTING NOT REQUIRED		
16	< 15 PSIG	-20F TO 150F	VENT ZONE TESTING NOT REQUIRED		

*TEST PRESSURE CAN BE INCREASED TO THE SAME AS ZONE 1 IF THE REGULATOR DIAPHRAGM IS REMOVED

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/12/17	MAG	SVW	TFJ	N/A	INITIAL RELEASE
B	2016/04/27	AC	MAG	TFJ	N/A	REMOVED COMP INLET ADD 4TH DIRECT MODULE



NOTES:

1. CLEAN ENERGY COMPRESSION CORPORATION WARRANTS THAT THE DESIGN INFORMATION GIVEN IS AN ADEQUATE AND ACCURATE REPRESENTATION OF THE AS-BUILT PRESSURE PIPING SYSTEM.

2. MINIMUM TEMPERATURE WHILE OPERATING SHALL NOT BE BELOW -40°C.

3. SEE P&ID BOM FOR THE FOLLOWING:
   - APPLICABLE DESIGN CODES.
   - FLUID SERVICE.
   - PRESSURE TEST REQUIREMENTS.
   - EQUIPMENT SPECIFICATIONS.
   - PIPE / TUBE SPECIFICATIONS.
   - COMPONENT MECHANICAL SETPOINTS.
   - ZONE PRESSURE AND TEMPERATURE RATINGS.

4. THREADED PIPE FITTINGS SHALL COMPLY TO ANSI B16.11 AND PIPE THREADS TO ASME B1.20.1.

5. ALL OTHER PIPE FITTINGS TO BE RATED PER ASME B31.3 AND CSA B51.

6. PRESSURE MAY BE ENTRAINED AT ANY POINT IN THE SYSTEM; ENSURE ALL LINES ARE PROPERLY ISOLATED AND DEPRESSURIZED FOR THE DURATION OF ALL MAINTENANCE WORK.

7. ZONE [1] IS NOT PROTECTED FROM AN OVER PRESSURE SITUATION BY THE PRIORITY PANEL COMPONENTS AND MUST BE PROTECTED BY UPSTREAM COMPONENTS SUCH AS A PRESSURE SAFETY VALVE OR OTHER PRESSURE RELIEVING DEVICE ON THE COMPRESSOR DISCHARGE.

8. CONNECTED STORAGE VESSELS MUST CONTAIN A PRESSURE SAFETY VALVE OR OTHER PRESSURE RELIEVING DEVICE WITH A SETPOINT EQUAL OR LESS THAN THE PRIORITY PANEL MAWP. THIS WILL ENSURE PRESSURE INCREASES DUE TO temperature INCREASES DO NOT CAUSE PRESSURE HIGHER that THE PRIORITY PANEL MAWP.

9. FILL POST CONNECTION IS PROTECTED BY PSV WHICH SHALL LIMIT THE PRESSURE AT THE FILL POST TO NO MORE THAN 125 PERCENT OF THE NGV CYLINDER MARKER SERVICE PRESSURE. FOR EXAMPLE THE MAXIMUM PRESSURE OF A 3600 PSIG RATED CYLINDER SHALL NOT EXCEED 4500 PSIG.

10. INSTRUMENTATION SYMBOLS AND IDENTIFICATION PER ANSI/ISA-5.1-2009 OR AS INDICATED IN LEGEND.

COMPONENTS

- MANUAL VALVE
- ACTUATED VALVE
- NON-RETURN VALVE (CHECK VALVE)
- AIR COOLED HEAT EXCHANGER
- FILTER (STRAINER)
- PRESSURE SAFETY VALVE (PRESSURE RELIEF VALVE)
- SOLENOID 3 WAY VALVE - 2 POSITION ARROW INDICATES DE-ENERGIZED PATH
- PRESSURE REDUCING REGULATOR, SELF CONTAINED
- BACK PRESSURE REGULATOR, SELF CONTAINED
- COMPRESSION POINT / CYLINDER
- DAMPER
- TANK (VESSEL)
- MOTOR
- FLEXIBLE CONNECTION / HOSE
- ELECTRIC HEATER
- SPRING RETURN PISTON ACTUATOR
- FAN
- PILOT LIGHT

INSTRUMENT SYMBOLS

- INSTRUMENTS AND DEVICES - FIELD MOUNTED (OR) INSTRUMENT TAG
- INSTRUMENTS AND DEVICES - ON MAIN PANEL OR SCREEN
- PROGRAMMABLE LOGIC CONTROL - ON MAIN PANEL OR SCREEN

ANNOTATIONS

- INTERLOCK - INITIATES CHANGE OF POSITION
- EMERGENCY - CHANGES POSITION WHEN E-STOP IS PRESSED
- PRESSURE / TEMPERATURE ZONE

LINE TYPES

- ARROW INDICATES DIRECTION OF FLOW
- CAPPED PIPE
- FLANGE
- PIPING / PROCESS CONNECTION
- ELECTRICAL SIGNAL
- PNEUMATIC SIGNAL
- COMMUNICATION LINK OR SYSTEM BUS
- INSTRUMENT SUPPLY
- MODULE BOUNDARY
- OPTIONAL MODULE BOUNDARY

INSTRUMENT IDENTIFICATION:

ACT = ACTUATOR.
CF = COALESCING FILTER.
F = FAN.
FB = FILTER BOTTLE.
FC = FAIL CLOSED.
FLX = FLEX HOSE.
FO = FAIL OPENED.
GD = GAS DETECTOR.
HS = HAND SWITCH.
HTR = ELECTRIC HEATER.
HV = HAND VALVE.
HX = HEAT EXCHANGER.
LC = LOCKED CLOSED.
LG = LEVEL GAUGE/GLASS (INDICATOR).
LO = LOCKED OPEN.
LSL = LEVEL SWITCH LOW.
M = MOTOR.
NC = NORMALLY CLOSED.
NG = NATURAL GAS.
NO = NORMALLY OPEN.
NRV = NON RETURN VALVE.
PB = PULSATION BOTTLE.
PCV = PRESSURE CONTROL VALVE.
PG = PRESSURE GAUGE (INDICATOR).
PSL = PRESSURE SWITCH LOW.
PSH = PRESSURE SWITCH HIGH.
PSV = PRESSURE SAFETY VALVE.
PT = PRESSURE TRANSMITTER.
SB = SCRUBBER BOTTLE.
SS = SOFT STARTER.
STR = STRAINER.
SV = SOLENOID VALVE.
TG = TEMPERATURE GAUGE (INDICATOR).
TSH = TEMPERATURE SWITCH HIGH.
TT = TEMPERATURE TRANSMITTER.
TW = THERMOWELL.
XL = STATUS LIGHT.
YV = ACTUATED VALVE.
V = VESSEL.
VFD = VARIABLE FREQUENCY DRIVE.

INSTRUMENT IDENTIFICATION PREFIX:

ALL INSTRUMENT IDENTIFICATIONS (TAG NUMBERS) ON THIS DRAWING SHALL INCLUDE AN EQUIPMENT PREFIX WHEN REFERENCED BY DESIGN DOCUMENTATION THAT INCLUDES THIS EQUIPMENT, SUCH AS SITE LEVEL CONTROL LOGIC NARRATIVES. THE PREFIX SHALL BE PP*, WHERE * IS THE UNIT NUMBER IDENTIFYING THIS PARTICULAR PIECE OF EQUIPMENT. FOR EXAMPLE, THE INSTRUMENT IDENTIFICATION FOR THE STORAGE MODULE OUTLET HAND VALVE HV-110 ON PRIORITY PANEL #1 IS PP1-HV-110, AND THE SAME INSTRUMENT ON PRIORITY PANEL #2 IS PP2-HV-110.

ALARMS:

HH = ALARM HIGH HIGH CAUSES SHUTDOWN OF EQUIPMENT.
H = ALARM HIGH CAUSES WARNING.
L = ALARM LOW CAUSES WARNING.
LL = ALARM LOW LOW CAUSES SHUTDOWN OF EQUIPMENT.

Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

TITLE: PRIORITY PANEL DIRECT 4C4D0F

DR.	MAG	2015/12/17	SIZE: D	DOC. NO.: 703855	REV: B
CK.	SVW	2015/12/17			
AP.	TFJ	2015/12/17	SCALE: 1:1		SHEET 1 / 1

Clean Energy® COMPRESSION

DOCUMENT NO:	703856
DOCUMENT REV:	B
TITLE:	PP-DIRECT-5000-2500-4C4D0F-12-TYP
TYPE:	P&ID BILL OF MATERIALS
REFERENCE P&ID DRW NO:	703855 REV B

REVISION HISTORY

REV	DATE	REFERENCE	ECO#	BY / CK / APR
A	2015/12/17	INITIAL RELEASE	N/A	MAG / SVW / TFJ
B	2016/04/28	UPDATING TO CORRECT NAMING, ADDED DIRECT FILL MODULE #4	N/A	AC / MAG / TFJ

ENGINEERING RELEASE STAMP 2"X 3" - DO NOT DELETE

PRODUCTION CONTROL STAMP 2"X 3" - DO NOT DELETE

GENERAL NOTES

APPLICABLE DESIGN CODES: ASME B31.3, NFPA 52
SERVICE: NORMAL FLUID SERVICE
FLUID: SWEET DRY NATURAL GAS
FINAL ASSEMBLY TEST PRESSURE SETPOINTS PER ZONE. PNEUMATIC TEST PRESSURES OF 1.1 - 1.33 TIMES THE DESIGN PRESSURE AS PER ASME B31.3 SEC 345.5.1, TEST PSV SETPOINTS AS PER ASME B31.3 SEC 345.5.2, AND TESTING NOT REQUIRED FOR VENT ZONES OPEN TO ATMOSPHERE AS PER ASME B31.3 SEC 345.1(D).

PRIORITY PANEL (1)**

REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
STORAGE MODULE						
NRV-110	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
PCV-110	201825-01	REGULATOR BACK PRESSURE HIGH FLOW	6000 PSIG @ 200F	-40F	CEC	
YV-111	603161	VALVE BALL SS 2WAY 0.750T W/ACT NC 6000PSIG -67F TO 213F	5000PSIG @ 150F	-40F	PARKER	
	603161 ACT	ACTUATOR INCLUDED WITH 603161	120PSIG @ 213F	-67F	PARKER	
YV-110	603161	VALVE BALL SS 2WAY 0.750T W/ACT NC 6000PSIG -67F TO 213F	5000PSIG @ 150F	-40F	PARKER	
	603161 ACT	ACTUATOR INCLUDED WITH 603161	120PSIG @ 213F	-67F	PARKER	
PG-110	326397	GAUGE PRES SS CASE 2.5DIAL 414BAR/6000PSIG LT	6000PSIG @ 140F	-40F	WIKA	
HV-111	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
PT-110	615805	TRANSMITTER PRES 0-5000 PSIG 0.250NPT EXPF	11600PSIG @ 212F	-40F	WIKA	
HV-110	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
DIRECT FILL MODULE #1						
YV-170A	603161	VALVE BALL SS 2WAY 0.750T W/ACT NC 6000PSIG -67F TO 213F	5000PSIG @ 150F	-40F	PARKER	
	603161 ACT	ACTUATOR INCLUDED WITH 603161	120PSIG @ 213F	-67F	PARKER	
NRV-170A	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-171A	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
PCV-170A	201825-01	REGULATOR BACK PRESSURE HIGH FLOW	6000 PSIG @ 200F	-40F	CEC	
HV-170A	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-171A	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
HV-172A	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
PG-170A	326397	GAUGE PRES SS CASE 2.5DIAL 414BAR/6000PSIG LT	6000PSIG @ 140F	-40F	WIKA	
PT-170A	615805	TRANSMITTER PRES 0-5000 PSIG 0.250NPT EXPF	11600PSIG @ 212F	-40F	WIKA	
DIRECT FILL MODULE #2						
YV-170B	603161	VALVE BALL SS 2WAY 0.750T W/ACT NC 6000PSIG -67F TO 213F	5000PSIG @ 150F	-40F	PARKER	
	603161 ACT	ACTUATOR INCLUDED WITH 603161	120PSIG @ 213F	-67F	PARKER	
NRV-170B	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-171B	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
PCV-170B	201825-01	REGULATOR BACK PRESSURE HIGH FLOW	6000 PSIG @ 200F	-40F	CEC	
HV-170B	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-171B	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
HV-172B	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
PG-170B	326397	GAUGE PRES SS CASE 2.5DIAL 414BAR/6000PSIG LT	6000PSIG @ 140F	-40F	WIKA	
PT-170B	615805	TRANSMITTER PRES 0-5000 PSIG 0.250NPT EXPF	11600PSIG @ 212F	-40F	WIKA	

DIRECT FILL MODULE #3						
YV-170C	603161	VALVE BALL SS 2WAY 0.750T W/ACT NC 6000PSIG -67F TO 213F	5000PSIG @ 150F	-40F	PARKER	
	603161 ACT	ACTUATOR INCLUDED WITH 603161	120PSIG @ 213F	-67F	PARKER	
NRV-170C	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-171C	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
PCV-170C	201825-01	REGULATOR BACK PRESSURE HIGH FLOW	6000 PSIG @ 200F	-40F	CEC	
HV-170C	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-171C	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
HV-172C	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
PG-170C	326397	GAUGE PRES SS CASE 2.5DIAL 414BAR/6000PSIG LT	6000PSIG @ 140F	-40F	WIKA	
PT-170C	615805	TRANSMITTER PRES 0-5000 PSIG 0.250NPT EXPF	11600PSIG @ 212F	-40F	WIKA	
DIRECT FILL MODULE #4						
YV-170D	603161	VALVE BALL SS 2WAY 0.750T W/ACT NC 6000PSIG -67F TO 213F	5000PSIG @ 150F	-40F	PARKER	
	603161 ACT	ACTUATOR INCLUDED WITH 603161	120PSIG @ 213F	-67F	PARKER	
NRV-170D	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
NRV-171D	307015	VALVE CHECK CS INTERN 0.750FNPT @6000PSI	6000PSIG @ 400F	-100F	KEPNER	
PCV-170D	201825-01	REGULATOR BACK PRESSURE HIGH FLOW	6000 PSIG @ 200F	-40F	CEC	
HV-170D	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-171D	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
HV-172D	607374	VALVE BALL SS 2WAY 1.000T CNG	5000 PSIG @260F	-40F	DK LOK	
PG-170D	326397	GAUGE PRES SS CASE 2.5DIAL 414BAR/6000PSIG LT	6000PSIG @ 140F	-40F	WIKA	
PT-170D	615805	TRANSMITTER PRES 0-5000 PSIG 0.250NPT EXPF	11600PSIG @ 212F	-40F	WIKA	

CONTROL PANEL (2**)						
REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
HV-201	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-202	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-203	307515	VALVE BALL BRASS 5044A 0.250FNPT CLS600	600PSIG @ 160F	-20F	TOYO	
NRV-201	626105	VALVE CHECK SS 0.250T 6000PSIG @ 1/3 PSIG -45F TO 250F	6000PSIG @ 250F	-45F	PARKER	
PCV-201	310533	REGULATOR PILOT 0.250FNPT 6000PSIG	6000PSIG @ 200F	-40F	FISHER	
PG-201	326394	GAUGE PRES SS 2.5DIAL 14BARG/200PSIG LT	200PSIG @ 140F	-40F	WIKA	
PSV-201	331877	VALVE RELIEF 0.75MNPT-1.00FNPT 115 PSI	2400PSIG @ 400F	-20F	MERCER	
SV-201	326345	VALVE SOL 3WAY 120V-50/60HZ LOW TEMP	150PSIG @ 200F	-40F	ASCO	
SV-202	326345	VALVE SOL 3WAY 120V-50/60HZ LOW TEMP	150PSIG @ 200F	-40F	ASCO	
SV-207A	326345	VALVE SOL 3WAY 120V-50/60HZ LOW TEMP	150PSIG @ 200F	-40F	ASCO	
SV-207B	326345	VALVE SOL 3WAY 120V-50/60HZ LOW TEMP	150PSIG @ 200F	-40F	ASCO	
SV-207C	326345	VALVE SOL 3WAY 120V-50/60HZ LOW TEMP	150PSIG @ 200F	-40F	ASCO	
SV-207D	326345	VALVE SOL 3WAY 120V-50/60HZ LOW TEMP	150PSIG @ 200F	-40F	ASCO	

MANIFOLD (3**)						
REF	PART #	DESCRIPTION	MAWP	MIN TEMP	MFG NAME	
HV-301	326331	VALVE BALL SS 2WAY 0.250FNPT 6000PSI	5000 PSIG @ 260F	-65F	DK LOK	
HV-302	332207	VALVE NEEDLE CS 0.250MNPT - 0.250FNPT	6000PSIG @ 446F	-40F	ALCO	
HV-303	326331	VALVE BALL SS 2WAY 0.250FNPT 6000PSI	5000 PSIG @ 260F	-65F	DK LOK	
PG-300	326397	GAUGE PRES SS CASE 2.5DIAL 414BAR/6000PSIG LT	6000PSIG @ 140F	-40F	WIKA	

PIPING & TUBING			
LINE	PART #	DESCRIPTION	LOCATION
1000	312898	TUBE SS SA-213 T316 0.750 X 0.109, BRIGHT ANNEALED	MODULE TUBING
1001	312898	TUBE SS SA-213 T316 0.750 X 0.109, BRIGHT ANNEALED	MANIFOLD
1002	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	MANIFOLD DRAIN
1003	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	CONTROL GAS
2000	NOT USED		FILL POST RELIEF
3000	NOT USED		FILL POST PSV VENT
3001	312144	TUBE SS SA-213 T316 1.000 X 0.095, BRIGHT ANNEALED	CONTROL GAS PSV VENT
3002	302896	PIPE AL ASTM B221 6063 1.500 X SCH40	VENT STACK
4000	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	INSTRUMENT
5000	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	CONTROL GAS
6000	303747	TUBE SS SA-213 T316/316L 0.250 X 0.035, BRIGHT ANNEALED	DRAIN

REF	SETPOINTS
PCV-110	4300 PSIG
PCV-170A	4300 PSIG
PCV-170B	4300 PSIG
PCV-170C	4300 PSIG
PCV-170D	4300 PSIG
PCV-201	100 PSIG

ZONE	DESIGN	DESIGN	TEST	TEST PSV	TEST PSV
1	5000 PSIG	-20F TO 150F	6000 PSIG	6050 PSIG	333814
2	115 PSIG	-20F TO 150F	138 PSIG	150 PSIG	331878
3	< 15 PSIG	-20F TO 150F	VENT ZONE OPEN TO ATM TESTING NOT REQUIRED		
4	NOT USED				
5	< 15 PSIG	-20F TO 150F	VENT ZONE OPEN TO ATM TESTING NOT REQUIRED		

EXEMPTIONS & NOTES:

- COMPONENTS UPSTREAM TO NRV-201 RATED TO ZONE 2 INCASE OF CHECK VALVE FAILURE IN THE CLOSED POSITION

DRAWING REVISION HISTORY

Revision number marked on drawings next to each revision. Indicated by: A

REV	DESCRIPTION	DATE	DR BY	CK BY	AP BY	ECO
A	Original Issue	2015-07-02	MAE	MJ/SVW	TFJ	4193
B	Updated Wiring Guide to Add Bypass Panel-P8	2016-02-03	MJ	MAE/ERL	TFJ	5200
C	Updated Wiring Guide to Add 8 Solenoid Panel	2016-04-01	MAE	MJ	BMB	5415

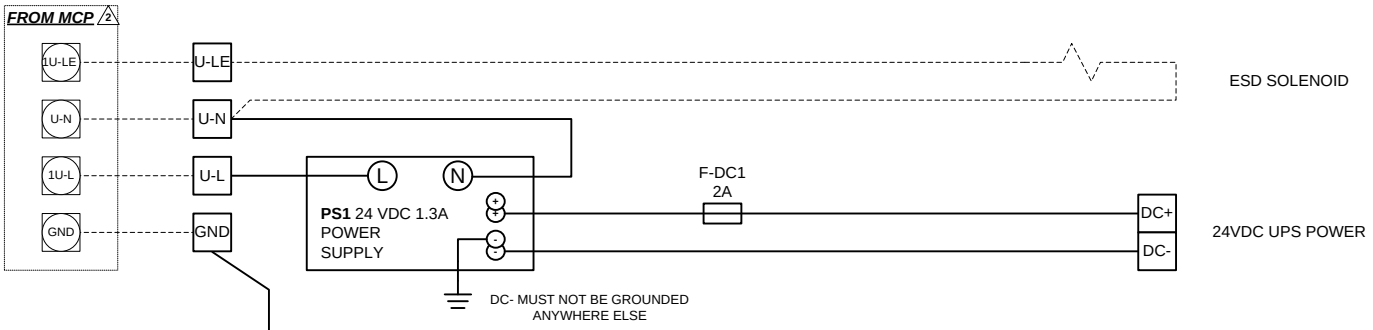
Clean Energy® COMPRESSION

Chilliwack, BC, Canada

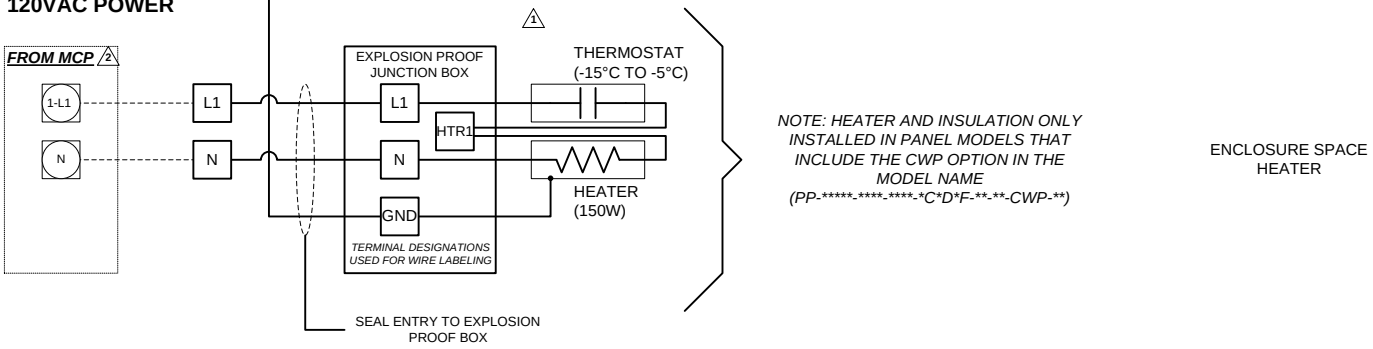
TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC
COVER PAGE

DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 1 of 10	

120VAC UPS ESD POWER & 120VAC UPS POWER



120VAC POWER



COMMUNICATION

NOTES:

- ---- Dashed lines indicate wiring remote to this panel.
- 143 Indicates internal terminal block & number.
- 124 Indicates external terminal block & number.
- Indicates junction
- 1 For heater connections and arrangement in the electrical box, see heater installation manual.
- 2 Connection terminal designators indicated as example. Connections should be determined on site. Use the site installation drawings to wire from the MCP.

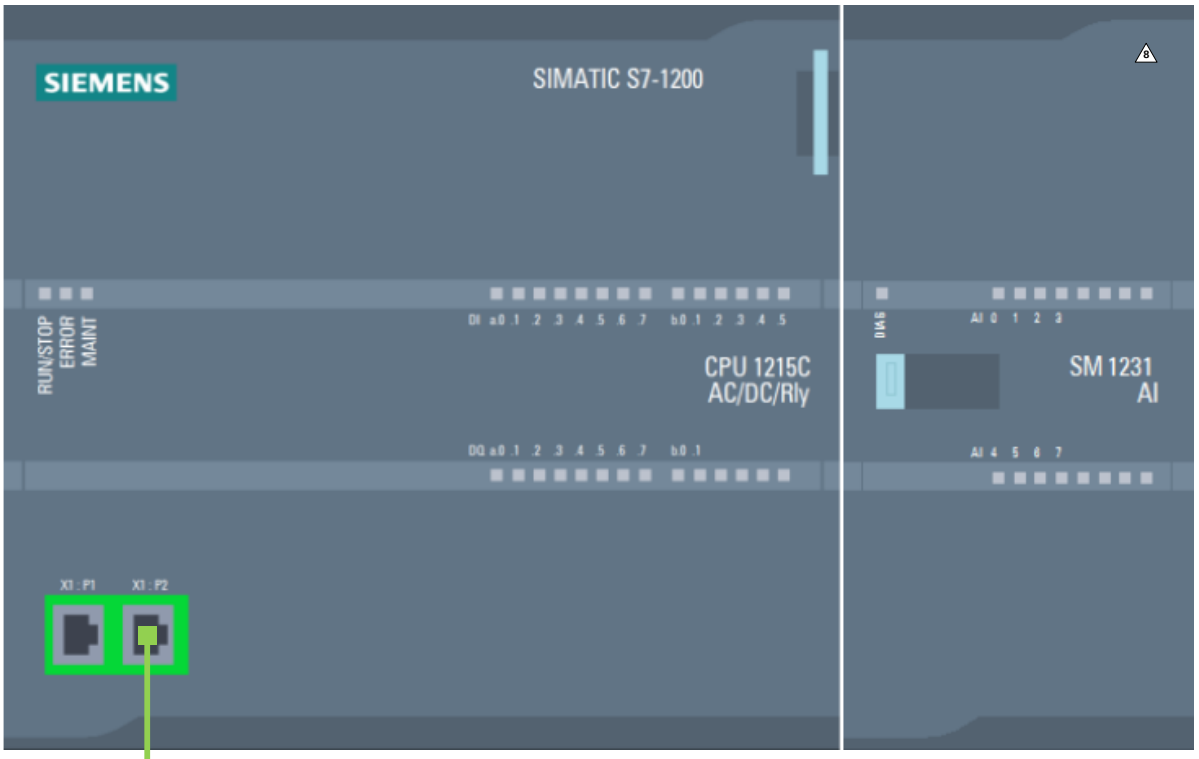
WIRE NUMBERS	SIZE	COLOR	TYPE
N, U-N	#16 AWG	WHITE	TEW or Equivalent
U-L, U-LE, L1	#16 AWG	RED	TEW or Equivalent
DC-	#16 AWG	YELLOW	TEW or Equivalent
DC+	#16 AWG	ORANGE	TEW or Equivalent
GND	#16 AWG	GREEN	TEW or Equivalent
PROFINET	#22-#24 AWG	VARIOUS	CAT5e

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC
POWER CONNECTIONS

DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 2 of 10	



PROFINET COMMUNICATION

NOTES:

- ---- Dashed lines indicate wiring remote to this panel.
- 143 Indicates internal terminal block & number.
- 124 Indicates external terminal block & number.
- Indicates junction
- 8 Card 1 **not** required for Bypass Panel

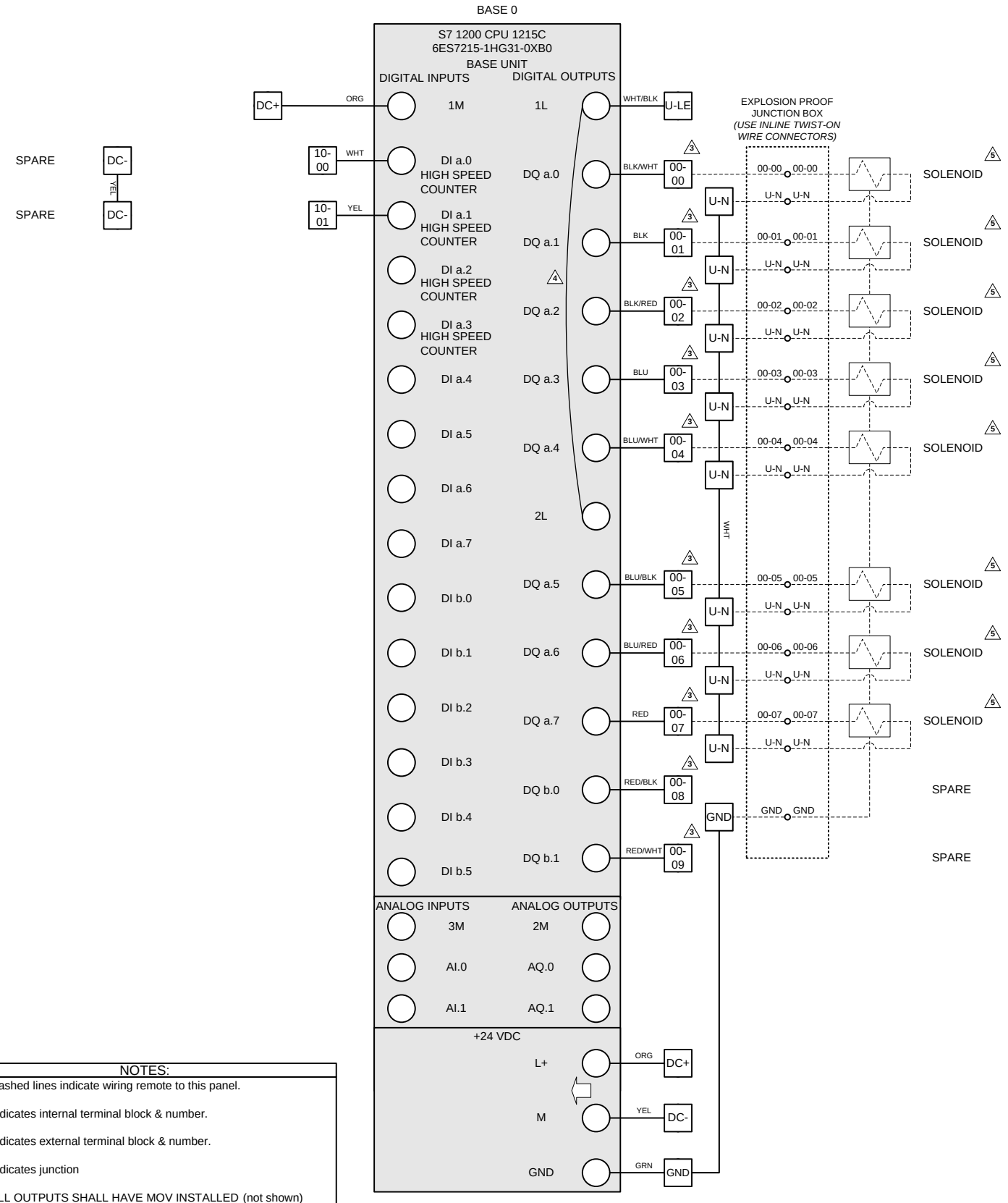
WIRE NUMBERS	SIZE	COLOR	TYPE
PROFINET	#22-#24 AWG	VARIOUS	CAT5e

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC
PLC AND NETWORK

DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 3 of 10	



NOTES:

- ---- Dashed lines indicate wiring remote to this panel.
- [143] Indicates internal terminal block & number.
- (124) Indicates external terminal block & number.
- Indicates junction
- △3 ALL OUTPUTS SHALL HAVE MOV INSTALLED (not shown)
- △4 Wire jumper from L1 to L2.
- △5 See page 8 for connection details

WIRE NUMBERS	SIZE	COLOR	TYPE
U-N PLC INPUT/OUTPUT DC- DC+ PROFINET	#16 AWG #20 AWG #16 AWG #16 AWG CAT5e	WHT AS MARKED YELLOW ORANGE	TEW or Equivalent CABLE TEW or Equivalent TEW or Equivalent

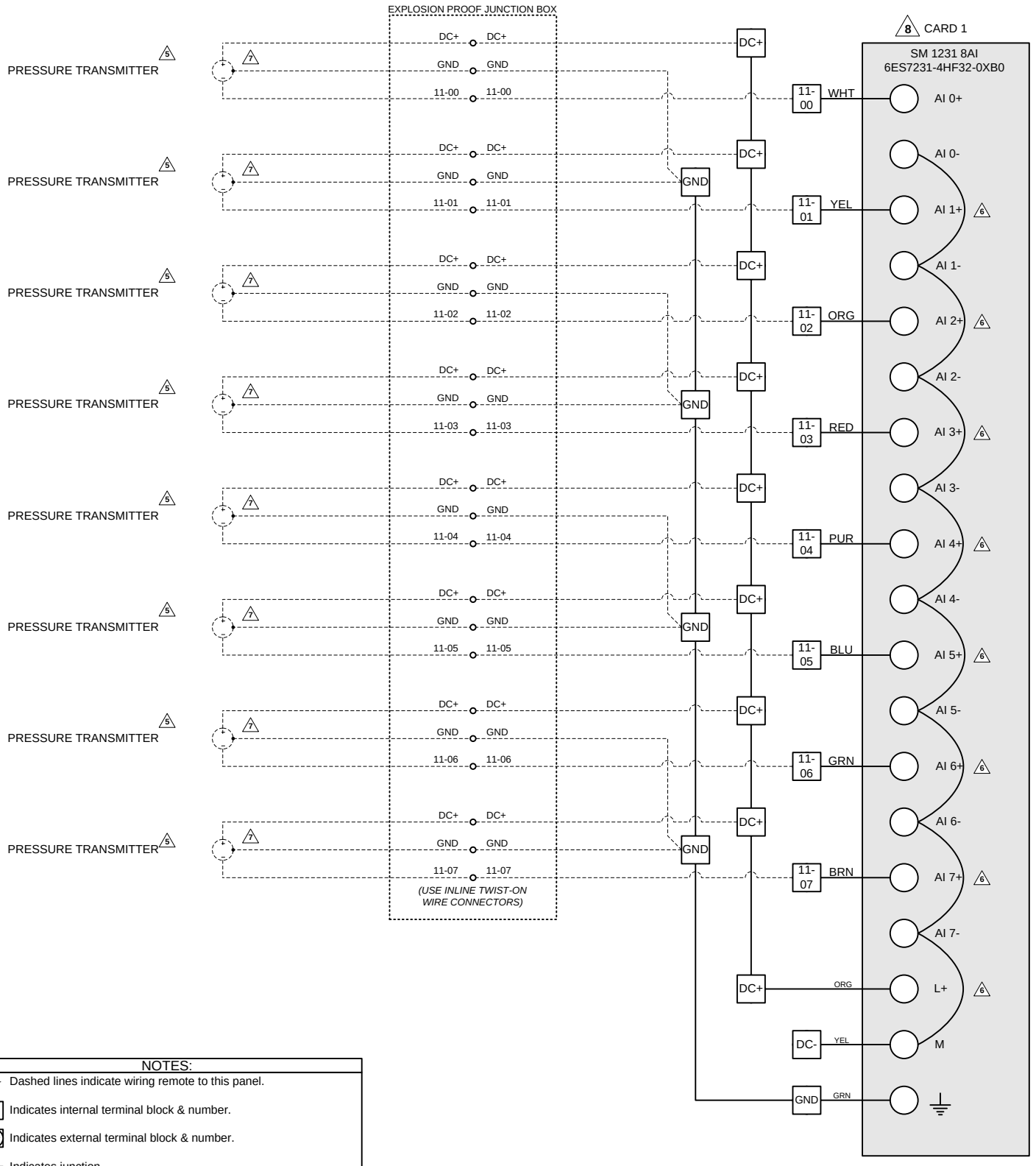
Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC

CONTROL SCHEMATIC 1

DR. | MAE (2015-07-13)	SIZE	DOC. NO.	REV
CK. | MJ/SVW (2015-08-05)	A	703166	c
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET	4 of 10



NOTES:

- --- Dashed lines indicate wiring remote to this panel.
- [143] Indicates internal terminal block & number.
- (124) Indicates external terminal block & number.
- Indicates junction.
- 5 See page 8 for connection details
- 6 Jumper DC- to card negative inputs
- 7 Use device wiring
- 8 Card 1 **not** required for Bypass Panel

WIRE NUMBERS	SIZE	COLOR	TYPE
ALL PLC INPUTS DC- DC+	#20 AWG #16 AWG #16 AWG	AS MARKED YELLOW ORANGE	CABLE TEW or Equivalent TEW or Equivalent

Clean Energy® COMPRESSION

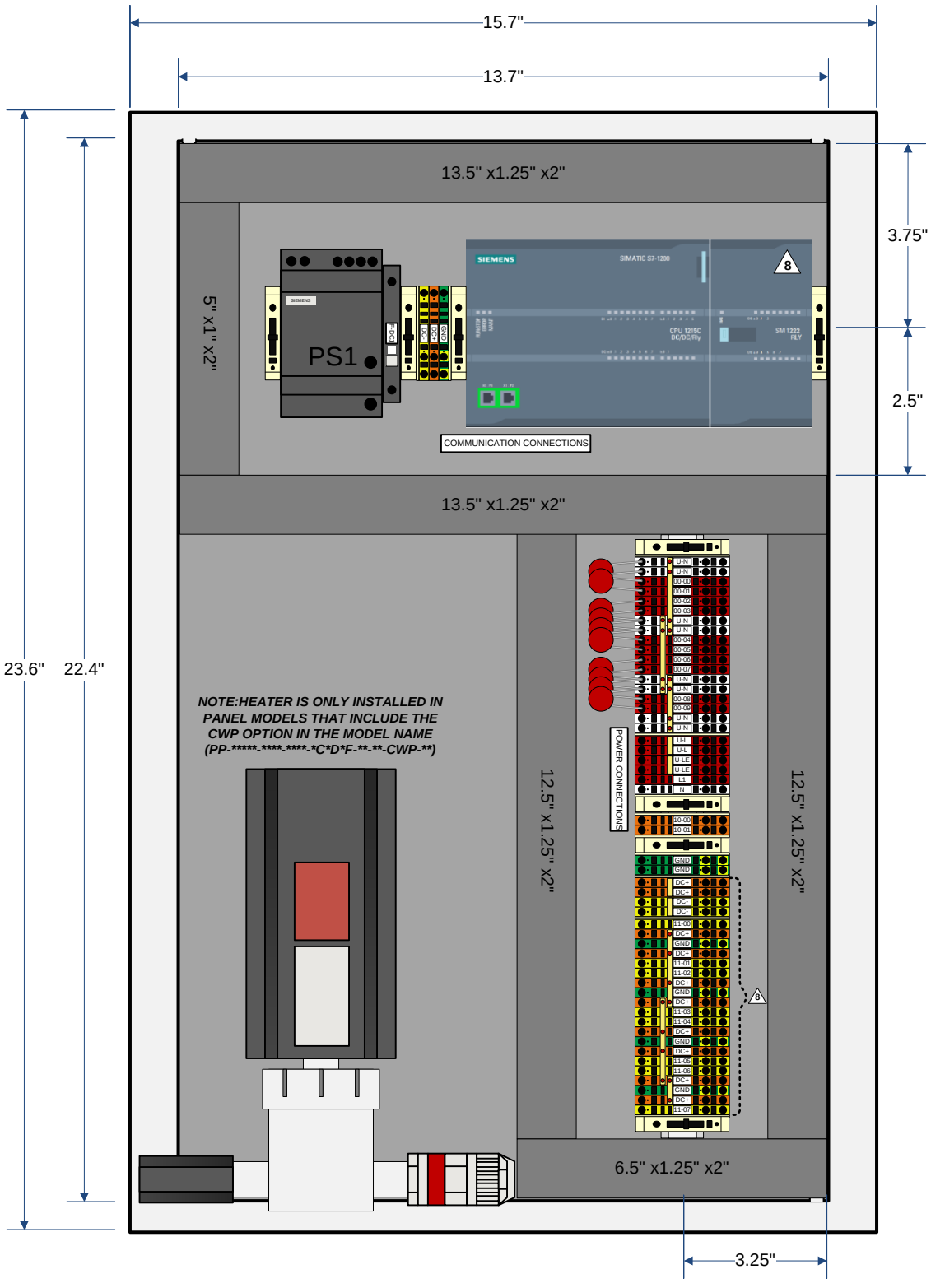
Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC

CONTROL SCHEMATIC 2

DR. | MAE (2015-07-13)	SIZE	DOC. NO.	REV
CK. | MJ/SVW (2015-08-05)	A	703166	C
AP. | TFJ (2015-09-01)	SCALE MIXED		SHEET 5 of 10

PANEL LAYOUT



NOTES:

- ⚠8 Card 1 and bracketed PT terminals **not** required for bypass panel

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

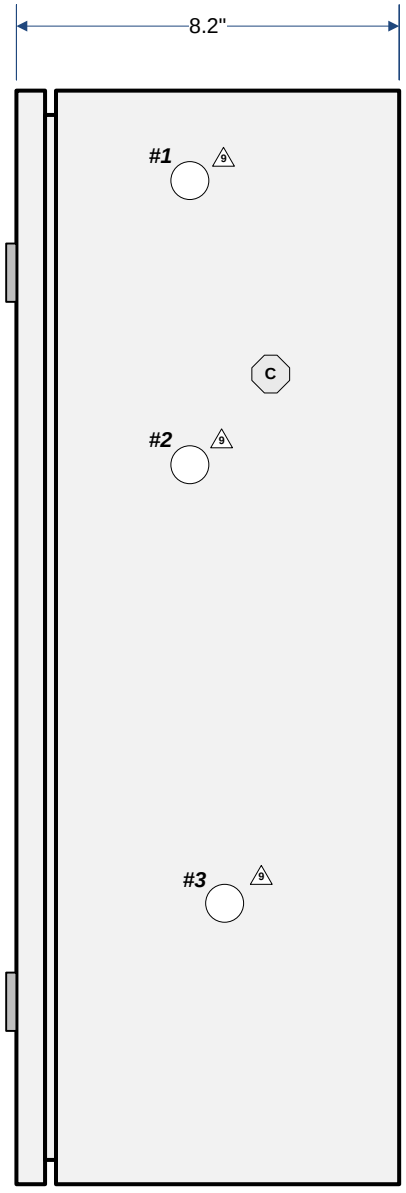
TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC

PANEL LAYOUT

DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 6 of 10	

CONTROL PANEL GENERAL VIEW

SIDE VIEW



FRONT VIEW

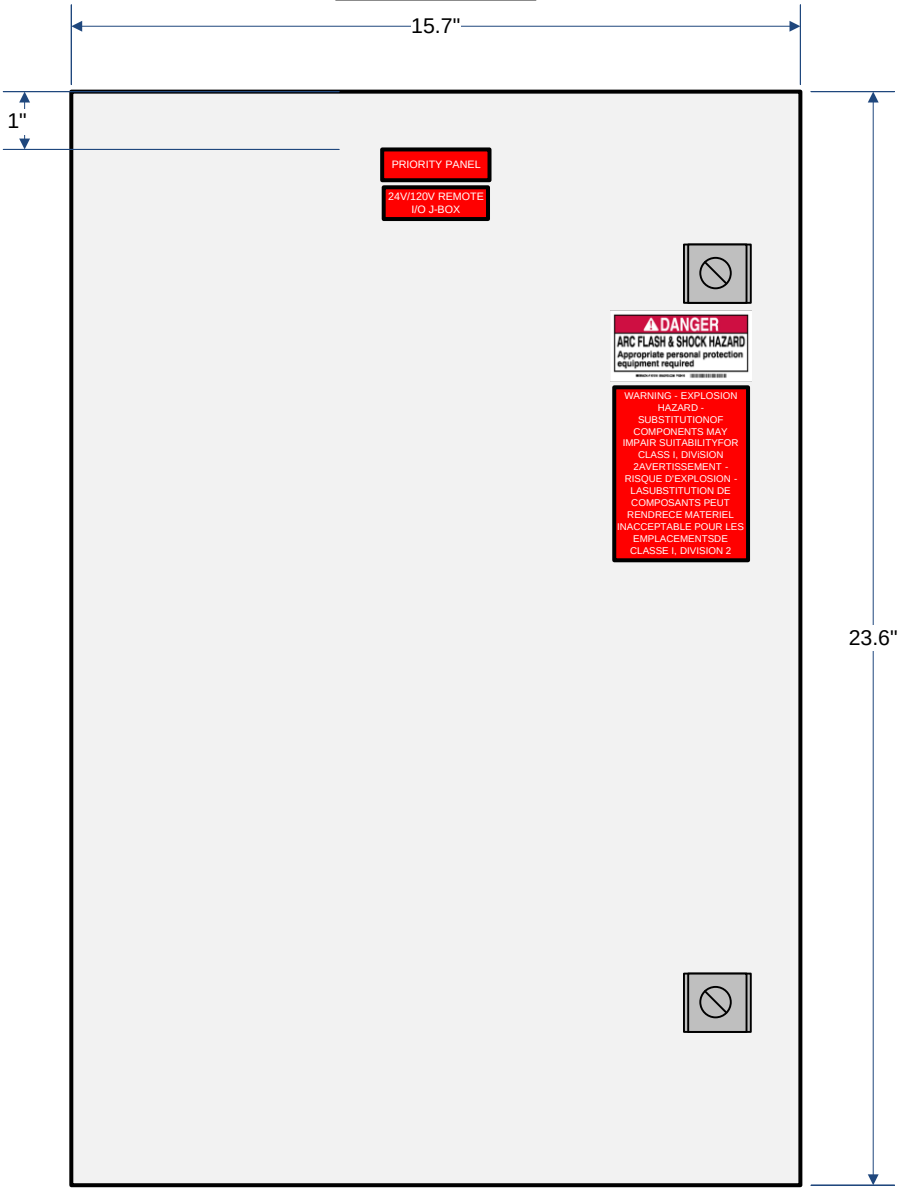


TABLE: PANEL CABLE ENTRY SIZE

Hole #	Component Entry	Entry Size
#1, #2	SOLENOIDS	1"
#3	PRESSURE TRANSMITTERS	1"

C

NOTES:

- 9 See mechanical general arrangement drawing for hole dimension, count and location. Holes to be created on main build.

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC

PANEL DIMENSIONS AND CUTOUTS

DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 7 of 10	

C

PRIORITY PANEL WIRING GUIDE

(REFER TO MAIN BUILD MODEL NUMBER)

DIRECT WIRE	1LINE SV#	3LINE SV#	DIRECT SV#	BYPASS SV#	IO Label	CARD INPUT
ESD SOLENOID	SV201	SV201	SV201	NA	U-LE	*NA*

PLC BASE UNIT	1LINE SV#	3LINE SV#	DIRECT SV#	BYPASS SV#	IO Label	CARD INPUT
STORAGE / HIGH BANK STORAGE/BYPASS CV1	SV202	SV203	SV202	SV201	00-00	*CH1*
MEDIUM BANK STOREAGE / DIRECT 1/BYPASS CV2		SV204	SV207A	SV202	00-01	*CH2*
LOW BANK STOREAGE / DIRECT 2 / BYPASS CV3		SV205	SV207B	SV203	00-02	*CH3*
FILL POST 1 / BYPASS CV4	SV206A	SV206A	SV206	SV204	00-03	*CH4*
FILL POST 2 / DIRECT 3	SV206B	SV206B	SV207C		00-04	*CH5*
MANIFOLD SPLIT	SV208	SV208	SV208		00-05	*CH6*
DIRECT 4			SV207D		00-06	*CH7*
RESERVED					00-07	*CH8*

PLC CARD 1	1LINE PT#	3LINE PT#	DIRECT PT#	BYPASS PT# SV#	IO Label	CARD INPUT
STORAGE / HIGH BANK STORAGE	PT110	PT121	PT110		11-00	*CH1*
MEDIUM BANK STOREAGE / DIRECT 1		PT130	PT170A		11-01	*CH2*
LOW BANK STOREAGE / DIRECT 2		PT140	PT170B		11-02	*CH3*
FILL POST 1	PT150A	PT150A	PT150		11-03	*CH4*
FILL POST 2 / DIRECT 3	PT150B	PT150B	PT170C		11-04	*CH5*
DISPENSER / HIGH BANK DISPENSER / DIRECT 4	PT160	PT120	PT170D		11-05	*CH6*
RESERVED					11-06	*CH7*
RESERVED					11-07	*CH8*

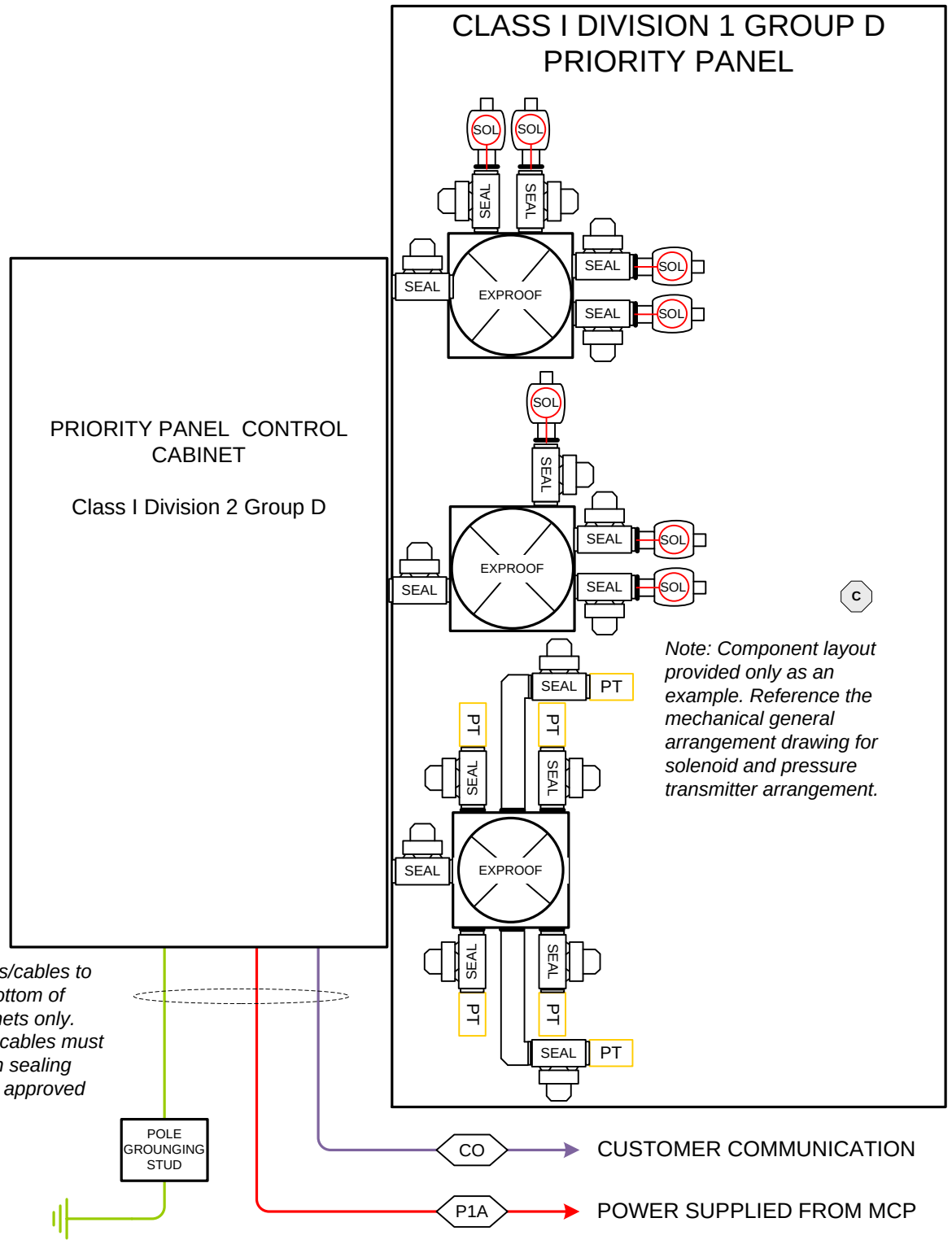
- See page 9 for represented position and Mechanical drawing for tag.
- Use the identification tags in the above table with the priority panel model and general arrangement drawing to determine the installation of Solenoids and Pressure transmitters:
  Example: PP-1LINE-****-****-*C1D2F-DF-**-***-**: ESD, Storage, Fill post 1, Fill post 2, Manifold Split, Dispenser.
  ESD and Storage is included for all models.

Clean Energy® COMPRESSION — Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC WIRING GUIDE

DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 8 of 10	

COMPONENT GENERAL VIEW



LEGEND:

120VAC POWER / CONTROL

COMMUNICATION

Clean Energy® COMPRESSION

Chilliwack, BC, Canada

TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC
GENERAL COMPONENT ARRANGEMENT

DR. | MAE (2015-07-13)	SIZE	DOC. NO.	REV
CK. | MJ/SVW (2015-08-05)	A	703166	C
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET	9 of 10

CONDUIT #CO **PLC INTERCONNECTION COMMUNICATION CABLE**

SUPPLIER: CUSTOMER
WIRING METHOD: AS PER LOCAL CODE
RECOMMENDED: CAT5e or CAT6 ETHERNET CABLE (with RJ45 CONNECTOR)

CONDUIT #P1A **120V POWER (PRIORITY PANEL)**

WIRING METHOD: AS PER LOCAL CODE
RECOMMENDED: min 7 Conductor #14AWG

	MCP 120V Control Area	PRIORITY PANEL	DESCRIPTION	TYPE	SIZE
	U-N	U-N	UPS Neutral	T90 Stranded	14 AWG
	1U-LE	U-LE	120VAC ESD UPS Power	T90 Stranded	14 AWG
	1U-L	U-L	120VAC UPS Power	T90 Stranded	14 AWG
	GND	GND	Ground	T90 Stranded	14 AWG
⚠9	1-L1	L1	120VAC Power	T90 Stranded	14 AWG
⚠9	N	N	Neutral	T90 Stranded	14 AWG
	SP	SP	Spares	T90 Stranded	14 AWG

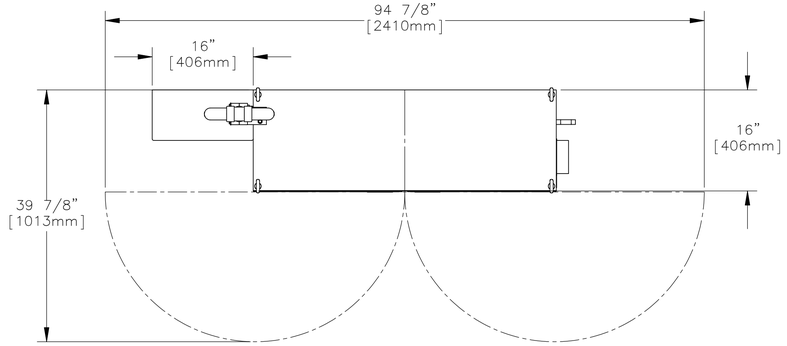
NOTES:
- ⚠9 WIRE IS ONLY INSTALLED IN PANEL MODELS THAT INCLUDE THE CWP OPTION IN THE MODEL NAME (PP-*****-****-****-*C*D*F-**-**-CWP-**)

Clean Energy® COMPRESSION
Chilliwack, BC, Canada

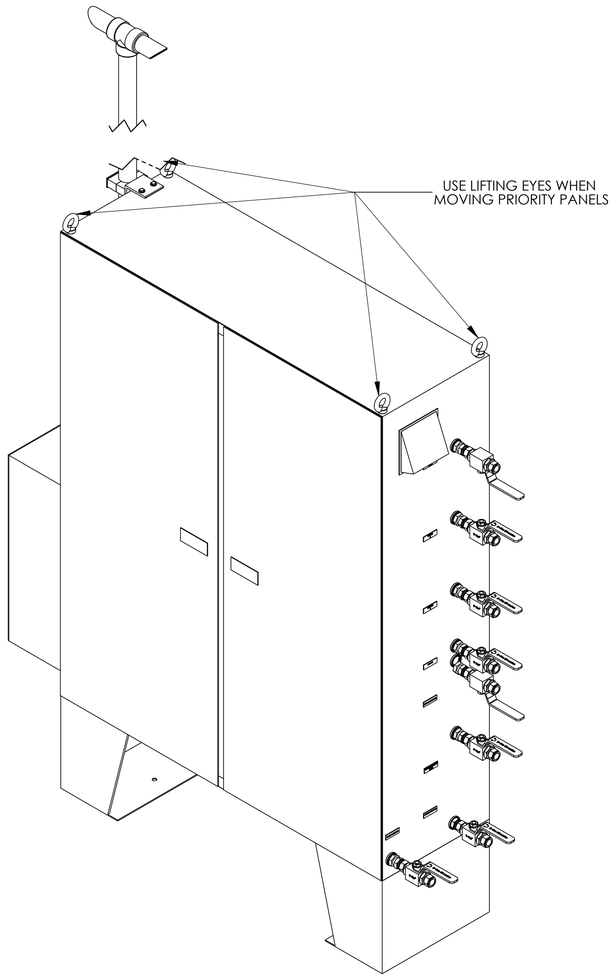
TITLE PRIORITY PANEL ELECTRICAL CONTROL SCHEMATIC WIRING LIST

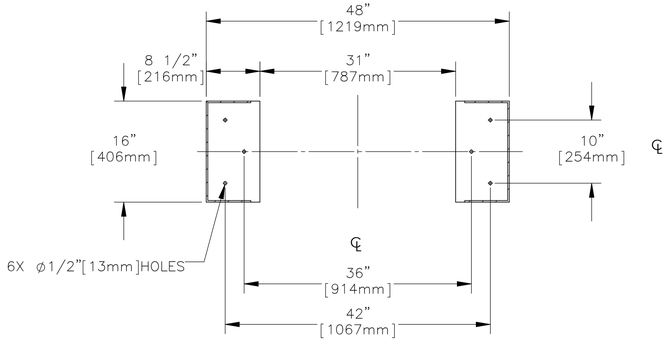
DR. | MAE (2015-07-13)	SIZE A	DOC. NO. 703166	REV C
CK. | MJ/SVW (2015-08-05)			
AP. | TFJ (2015-09-01)	SCALE MIXED	SHEET 10 of 10	

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2015/02/24	JW	EL	N/A	N/A	FIRST RELEASE
B	2015/09/15	AP	SVW	TFJ	4308	UPDATED ZONES, CREATED NEW SHEET FOR CSA HAZARDOUS ZONES

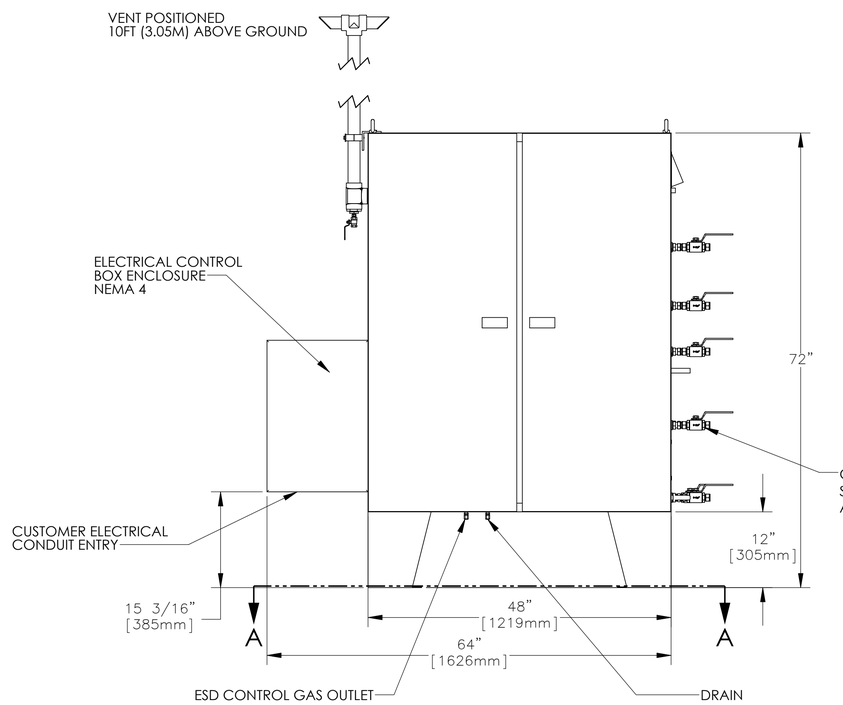


DOOR SWING





SECTION A-A
(MOUNTING FOOTPRINT/BOLT PATTERN)



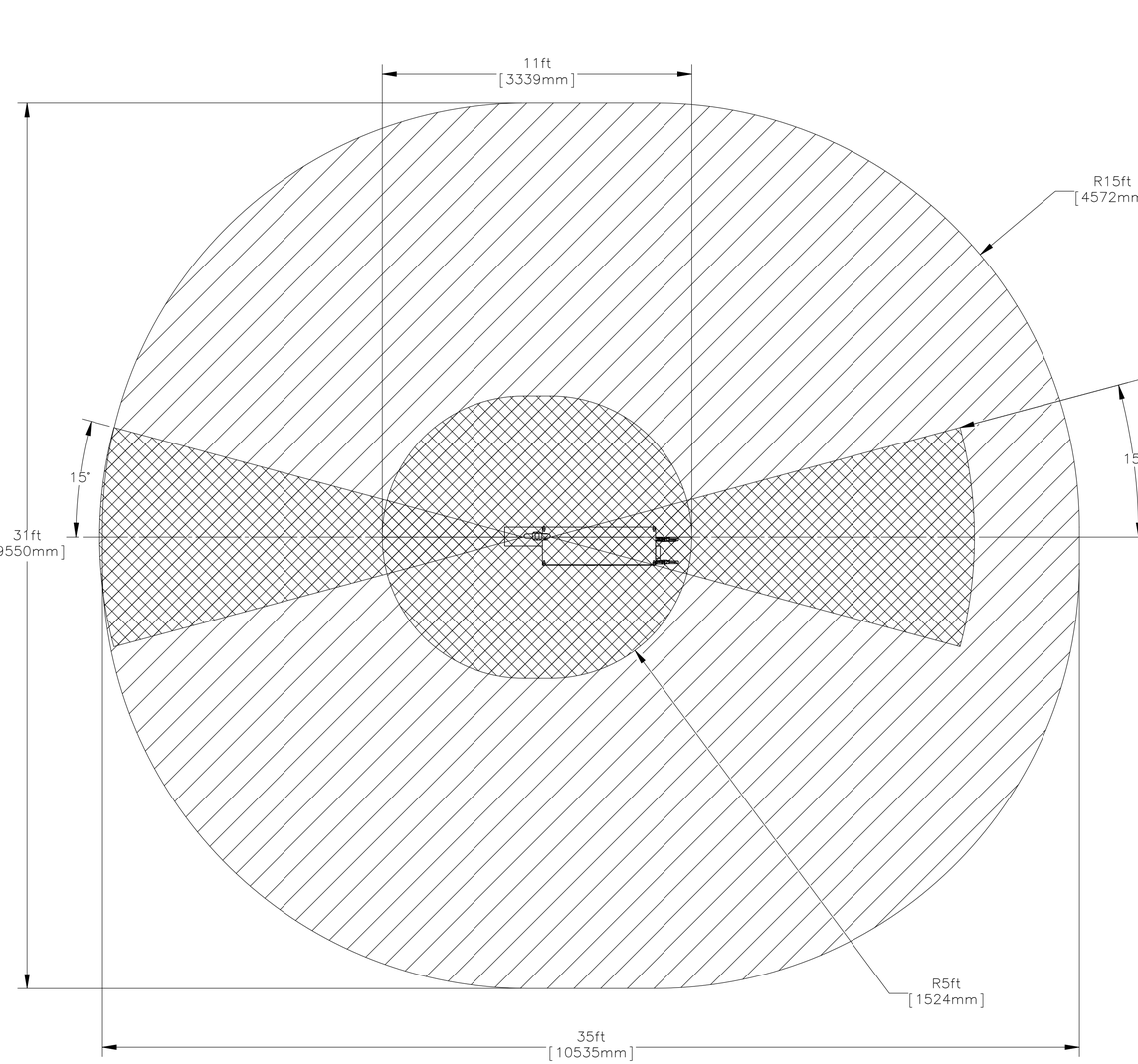
DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:			
UNITS:	INCHES	X/X	±1/16
FINISH:	125 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±.5°

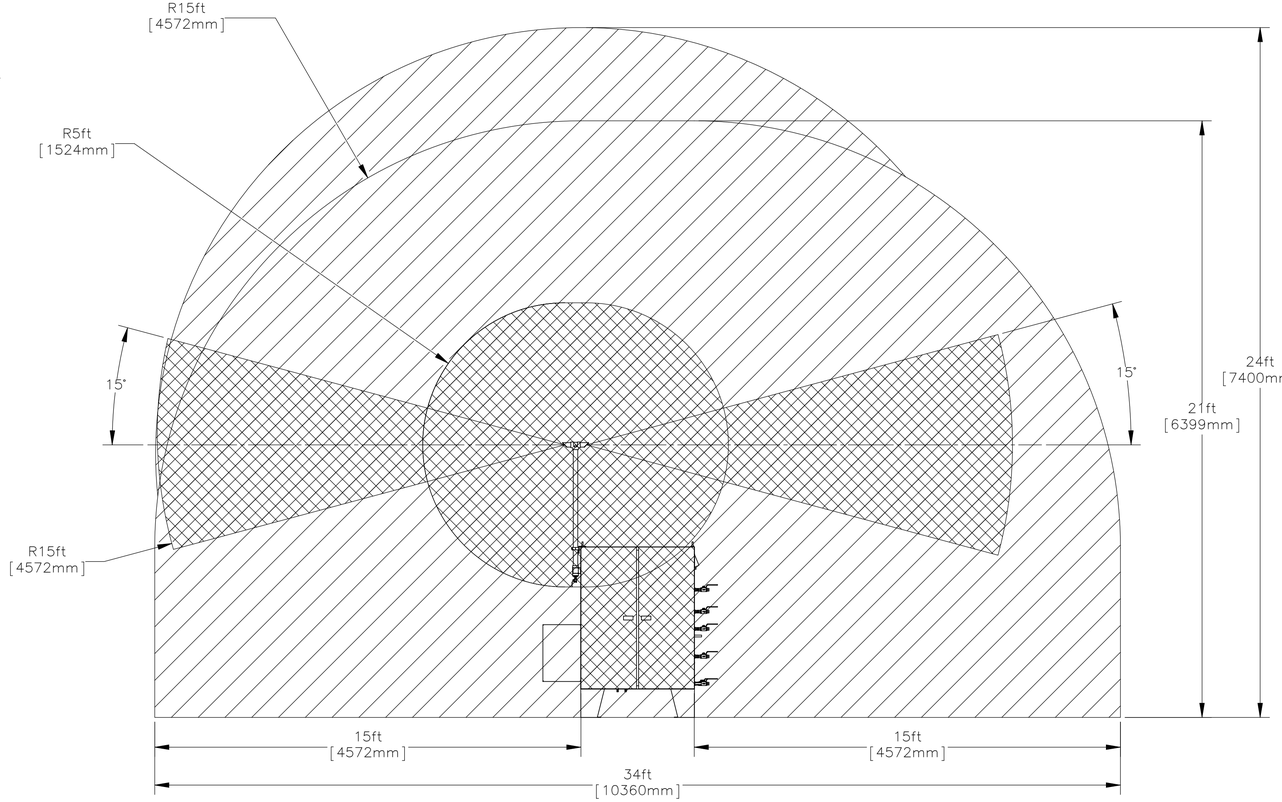
Clean Energy COMPRESSION — Chilliwack, B.C., Canada

TITLE: STANDARD PRIORITY PANEL TRANSMITTAL

DR.	JW	2015/03/16	SIZE: D	DOC. NO.: 702692	REV: B
CK.	EL	2015/03/16			
AP.	TFJ	2015/09/29	SCALE 1:12	WEIGHT 466.7 LBS	SHEET 1 / 3

HAZARDOUS ZONES AS PER NFPA 52





CLASS 1, DIV 1, GROUP D

CLASS 1, DIV 2, GROUP D

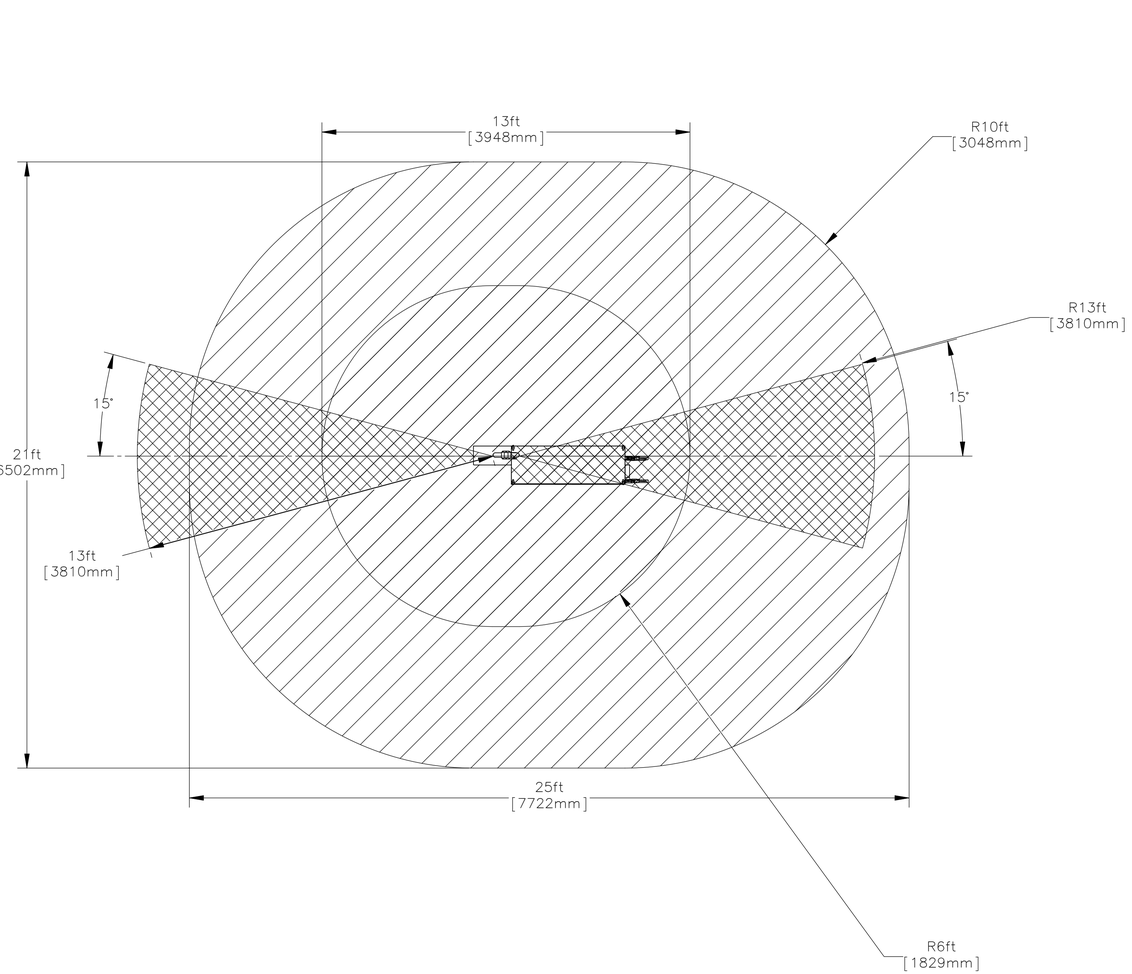
NOTES:
1. THIS DRAWING DEPICTS THE HAZARDOUS AREA CLASSIFIED AS REQUIRED IN COMPLIANCE WITH NFPA 52 FOR PRIVATE CNG FUELING STATION WHEN INSTALLED OUTDOORS WITHOUT ANY ROOF OR CANOPY
2. THE INTERIOR OF THE PRIORITY PANEL LARGE ENCLOSURE IS CLASSIFIED AS CLASS 1 DIVISION 1 GROUP D
3. THE INTERIOR OF THE PRIORITY PANEL SMALL ELECTRICAL ENCLOSURE IS CLASSIFIED AS CLASS 1 DIVISION 2 GROUP D
4. VENT PIPING SHIPPED LOOSE AND TO BE INSTALLED ON SITE
4. LOCATION OF PRIORITY PANEL ON SITE SHALL COMPLY WITH NFPA 52
5. ELECTRICAL CLASSIFICATION FROM THE ENCLOSURE OPENINGS UP TO 15 FEET IS CLASS 1, DIVISION 2, GROUP D
6. HAZARDOUS ZONE DIMENSIONS DERIVED FROM NFPA 52-2013 SEC 7.4.2.9

Clean Energy COMPRESSION Chilliwack, B.C., Canada

TITLE: STANDARD PRIORITY PANEL TRANSMITTAL

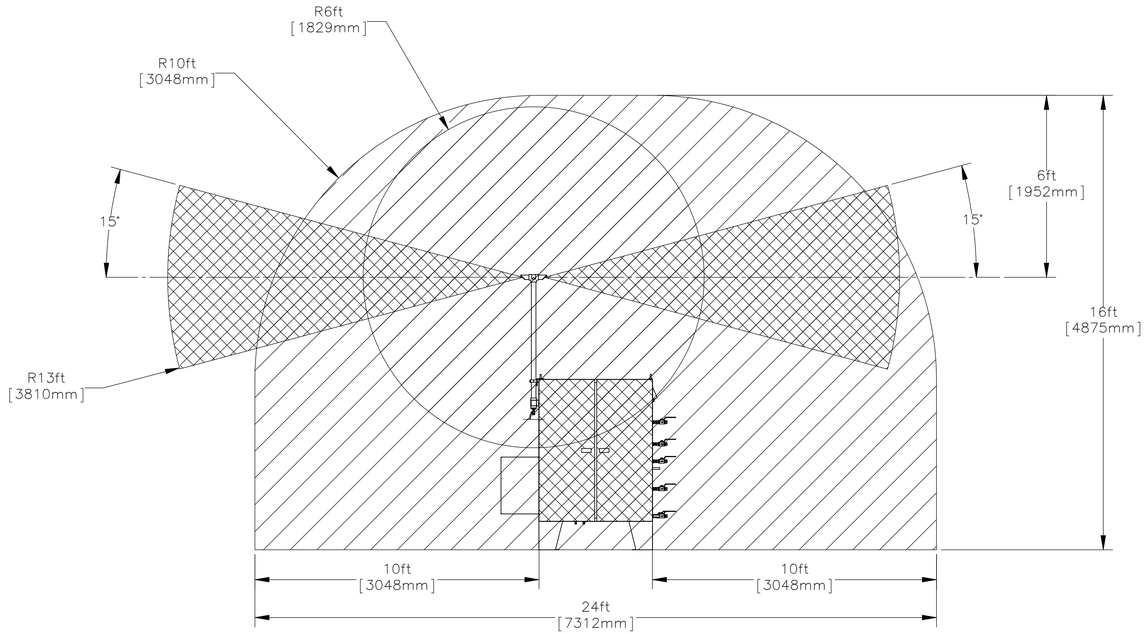
DR. JW	2015/03/16	SIZE	DOC. NO.		REV
CK. EL	2015/03/16	D	702692		B
AP. TFJ	2015/09/29	SCALE 1:32	WEIGHT 466.7 LBS		SHEET 2 / 3

HAZARDOUS ZONES AS PER CSA B108



CLASS 1, ZONE 1, GROUP IIA

CLASS 1, ZONE 2, GROUP IIA



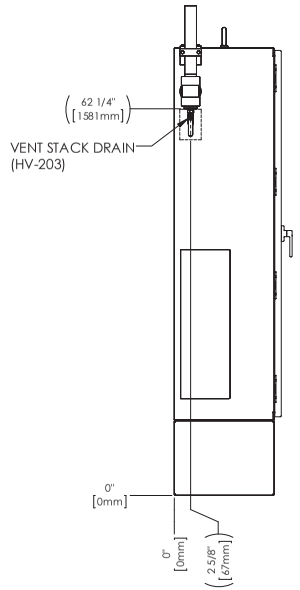
NOTES:
1. THIS DRAWING DEPICTS THE HAZARDOUS AREA CLASSIFIED AS REQUIRED IN COMPLIANCE WITH CSA B108 FOR PRIVATE CNG FUELING STATION WHEN INSTALLED OUTDOORS WITHOUT ANY ROOF OR CANOPY
2. THE INTERIOR OF THE PRIORITY PANEL LARGE ENCLOSURE IS CLASSIFIED AS CLASS 1 ZONE 1 GROUP IIA
3. INTERIOR OF SMALL ELECTRICAL ENCLOSURE IS CLASSIFIED AS CLASS 1 ZONE 2 GROUP IIA
4. VENT PIPING SHIPPED LOOSE AND TO BE INSTALLED ON SITE
5. LOCATION OF PRIORITY PANEL ON SITE SHALL COMPLY WITH CSA B108
6. ELECTRICAL CLASSIFICATION FROM THE ENCLOSURE OPENINGS UP TO 10 FEET IS CLASS 1, ZONE 2 GROUP II A
7. HAZARDOUS ZONE DIMENSIONS DERIVED FROM CSA B108-2006 SEC 4.2 & 7.15

Clean Energy COMPRESSION Chilliwack, B.C., Canada

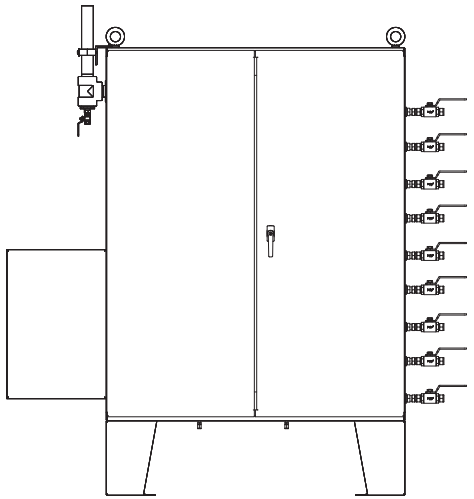
TITLE: STANDARD PRIORITY PANEL TRANSMITTAL

DR. JW	2015/03/16	SIZE	DOC. NO.		REV
CK. EL	2015/03/16	D	702692		B
AP. TFJ	2015/09/29	SCALE 1:32	WEIGHT 466.7 LBS		SHEET 3 / 3

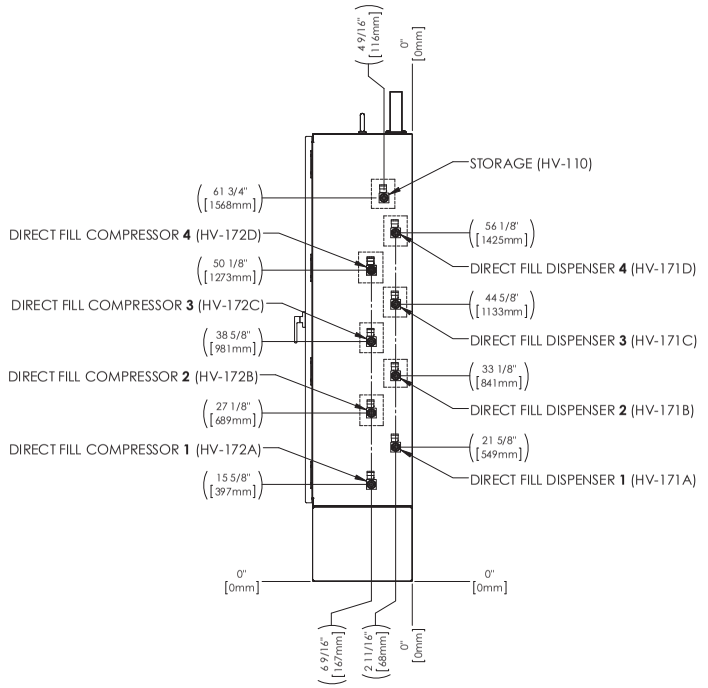
REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
A	2016/05/02	AD	MAG	TFJ	N/A	INITIAL RELEASE



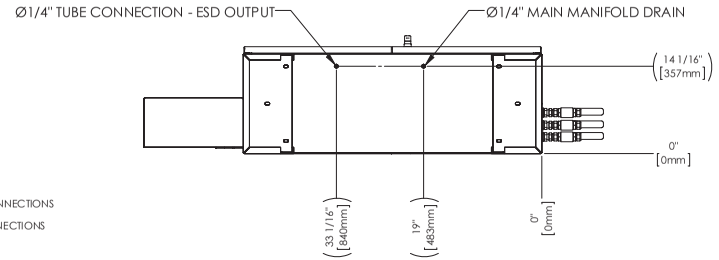
LEFT PANEL VIEW



FRONT PANEL VIEW



RIGHT PANEL VIEW



BOTTOM PANEL VIEW

PP-DIRECT-5000-2500-XCXD...

NUMBER OF DISPENSER CONNECTIONS

NUMBER OF COMPRESSOR CONNECTIONS

NOTES:
1. COMPONENTS SHOWN MAY DIFFER VISUALLY FROM BUILD COMPONENTS.
2. THIS IS A GENERIC CONNECTIONS DRAWING FOR DIRECT FILL PRIORITY PANELS. SEE PRIORITY PANEL CONNECTION SPECIFICATION FOR CONNECTION TYPE AND SIZE.

DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:			
UNITS:	INCHES	X/X	±1/16
FINISH:	125 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±.5°

Clean Energy COMPRESSION — Chilliwack, B.C., Canada

TITLE: DIRECT FILL 2500 CONNECTIONS DRAWING

DR.	AD	2016/05/02	SIZE	DOC. NO.	REV
CK.	MAG	2016/05/02	D	704209	A
AP.	TFJ	2016/05/02	SCALE 1:10		SHEET 1 / 1

Clean Energy® COMPRESSION

DOCUMENT NO:	**704210**
DOCUMENT REV:	**A**
TITLE:	**PP-DIRECT-5000-2500-4C4D0F-12-TYP**
TYPE:	**PRIORITY PANEL CONNECTION SPECIFICATION**
CONNECTIONS DRW NO:	**704209 REV.A**

REVISION HISTORY

REV	DATE	REFERENCE	ECO#	BY / CK / APR
A	2016/04/27	INITIAL RELEASE	N/A	AC / MAG / TFJ

ENGINEERING RELEASE STAMP 2"X 3" - DO NOT DELETE

PRODUCTION CONTROL STAMP 2"X 3" - DO NOT DELETE

COMPRESSOR CONNECTIONS

REF	DESCRIPTION	CONNECTION	CONNECTION SIZE
HV-172A	DIRECT FILL MODULE #1	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-172B	DIRECT FILL MODULE #2	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-172C	DIRECT FILL MODULE #3	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-172D	DIRECT FILL MODULE #4	REQUIRED	3/4'' TUBE PARKER SWAGE

DISPENSER CONNECTIONS

REF	DESCRIPTION	CONNECTION	CONNECTION SIZE
HV-171A	DIRECT FILL MODULE #1	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-171B	DIRECT FILL MODULE #2	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-171C	DIRECT FILL MODULE #3	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-171D	DIRECT FILL MODULE #4	REQUIRED	3/4'' TUBE PARKER SWAGE

GENERAL CONNECTIONS

REF	DESCRIPTION	CONNECTION	CONNECTION SIZE
HV-110	STORAGE MODULE CONNECTION	REQUIRED	3/4'' TUBE PARKER SWAGE
HV-203	VENT STACK DRAIN	REQUIRED	1/4'' FNPT (PLUGGED)

14 APPENDIX C: ADDITIONAL DOCUMENTS AND SERIAL NUMBER LIST

CEC COMPRESSOR MANUAL ADDITIONAL DOCUMENTS AND SERIAL NUMBER LIST

	COMPRESSOR MODEL NUMBER		COMP. SERIAL NO.	CBA SERIAL NO.		Data Input Recorded by:	
	CLEANCNG 5500DA-300-4500-4AC		WC1043579	WC1041650-1 / 630953		S.HOWES	
					Drawing/Doc. No.	*Additional Information*	*# of Pgs.*
1A	**MANUFACTURER'S CERTIFICATE OF QUALITY**						1
1B	**TK COMPRESSOR SPECIFICATION**					AS REQUIRED	
2	***Prime Mover***	***Make***	***Part Number***	***Serial No.***			
	Gas Engine	or ☐ N/A					
	Electric Motor	BALDOR or ☐ N/A		A1512222056			NA
3	***Recovery Tank***	STEEL FAB or ☐ N/A		797989			2
4	***Particulate Pulsation Filter***	or ☐ N/A					
	Inlet	CEC or ☐ N/A		1038648-4	625167		
	Exhaust	CEC or ☐ N/A		1041145-01	202967-00		
	Exhaust	or ☐ N/A					
	Exhaust	or ☐ N/A					
	Exhaust	or ☐ N/A					
5	***Scrubber/Pulsation Bottles***						
		CEC or ☐ N/A		1036532-2	204097		
		CEC or ☐ N/A		1034232-4	204097		
		CEC or ☐ N/A		1039788-2	204295		
		or ☐ N/A					
		or ☐ N/A					
		or ☐ N/A					
	Discharge	CEC or ☐ N/A		1039233-3	205105		
	Discharge	or ☐ N/A					
6	***Heat Exchanger***						
	Stg 1	CEC		1041690-2	618873		
	Stg 2	CEC		1041690-1	618873		
	Stg 3	CEC		1041692-4	618875		
	Stg 4	CEC		1041692-3	618875		
	N/A						
7	***Pressure Relief Valve***	***Make***				***Set Pressure (PSIG or BARG)***	
	Control Panel	MERCER		1225167	115	PSIG	
	Stg 1	MERCER		1225171	575	PSIG	
	Stg 2	MERCER		1233701	1200	PSIG	
	Stg 3	MERCER		1225126	3525	PSIG	
	Stg 4	MERCER		1233001	5000	PSIG	
	Recovery Tank	MERCER or ☐ N/A		1225174	575	PSIG	
	Inlet	or ☐ N/A					
8	**OTHER**						
	Gas Detector 1	HONEYWELL		K0360315470058			1
	Gas Detector 2						
	Hose Certificate						
	BV (Bureau Veritas) Certificates						
	NAMEPLATE						1

MANUFACTURER'S CERTIFICATE OF QUALITY COMPRESSORS

Clean Energy Compression Corp. (CEC) (formerly IMW, IMW Industries Inc.) hereby certifies thatCEC is the manufacturer of the following compressed natural gas (CNG) fueling equipment:

Type: CNG Compressor
Model: CLENACNG 5500DA-300-4500-4AC **Year:** 2016
Serial #: WC1043579

CEC certifies that this equipment is manufactured with new materials and components only and is designed and certified in accordance with the applicable codes and standards set forth for the manufacture of CNG equipment in North America (table below).

CEC certifies that all electrical components incorporated into this equipment are approved by the Canadian Standards Association (CSA) or Underwriter's Laboratories (UL) and are suitable for the environment in which they are used.

CEC certifies that this equipment is suitable for the purpose for which it was designed and can be operated safely when used in accordance with the manufacturer's instructions and recommendations.

The equipment referenced on the certificate has been manufactured / assembled in Canada.

COMPONENT / ASSEMBLY	CODE / STANDARD	CERTIFICATION
Compressor Unit	ANSI NGV 4.8/CSA 12.8, NFPA 52, B108	Comply in Design/Purchase/Manufacture
Electrical Components	CSA, UL	Third Party (as required)
Electrical Panels / Wiring	CSA C22.1, NFPA 52, NFPA 70	Third Party (as required)
Pressure Piping & Fittings	ASME B31.3, CSA B51	BC Safety Authority "MA" Licence
Pressure Vessels	ASME Section VIII, Div.1, CSA B51	ASME "U" Certificate Of Authorization, National Board Certificate of Authorization to Register & BC Safety Authority "MA" Licence
Quality Management System	ISO 9001	SAI Global Certificate of Registration
Relief Valves	ASME Section VIII, Div.1	"UV" Stamped By Other

CODE / STANDARD	DESCRIPTION
ANSI NGV 4.8/CSA 12.8	Natural Gas Fueling Station Reciprocating Compressor Guidelines
ASME B31.3	Process Piping Code
ASME Section VIII, Div.1	American Society Of Mechanical Engineers Boiler & Pressure Vessel Code
CSA	Canadian Standards Association
CSA B51	Boiler, Pressure Vessel and Pressure Piping Code
CSA C22.1	Canadian Electrical Code, Part I, Safety Standard for Electrical Installations
ISO 9001	Quality Management System Requirements
NFPA 52	Vehicular Gaseous Fuel Systems Code
NFPA 70	National Electrical Code
UL	Underwriters Laboratories

Certified true and correct,

Brian Nguyen
President

FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS

(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)

As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by Steel Fab, A Division of Samuel Pressure Vessel Group, Inc., 58 Samuel Way, Lebanon, Virginia, 24266
(Name and address of Manufacturer)

2. Manufactured for IMW INDUSTRIES
(Name and address of Purchaser)

3. Location of Installation UNKNOWN
(Name and address)

4. Type	(Manufacturer's serial number)	(CRN)	(Drawing number)	(National Board number)	(Year built)
Horizontal (Horizontal or vertical, tank)	**797989 to 797994**	R1817.5C	C105906 REV 4	**797989-797994**	2015

5. ASME Code, Section VIII, Division 1	[Edition and Addenda, if applicable (date)]	(Code Case numbers)	(Special service per UG-120(d))
	2013/ N/A	None	None

6. Shell:	(Material spec. number, grade)	(Nominal thickness)	(Corr. allow.)	(Inner diameter)	[Length (overall)]
	SA516-70	.500''	None	2' 0" (OD)	3' 1.75"

Body Flanges on Shells

No.	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Location	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

7. Seams:	[Long. (welded, dbl., sngl., lap, butt)]	[R.T.(spot or full)]	(Eff.,%)	(H.T. temp)	(Time, hr)	[Girth. (welded, dbl., sngl., lap, butt)]	[R.T. (spot or full)]	(Eff., %)	(No. of courses)
	Type No.1	NONE	70%	N/A	N/A	Type No. 2	NONE	65%	1

8. Heads: (a) Material SA516-70 (Spec. no., grade) (b) Material SA516-70 (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	END	.438''	NA	N/A	N/A	2:1	N/A	N/A	N/A	Concave
(b)	END	.438''	NA	N/A	N/A	2:1	N/A	N/A	N/A	Convex

Body Flanges on Heads

	Location	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material
(a)	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**		**N/A**	**N/A**	**N/A**

9. MAWP 590 psi (Internal) N/A (External) at max. temp. 400 °F (Internal) N/A (External)

Min. design metal temp. -20 °F at 590 psi . Hydro, pneu., or comb. test pressure HYRDO at 767 psi .

Proof test N/A .

10. Nozzles, inspection and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
UNKNOWN	**1**	**3.00"**	**THREADED FITTING**	**SA181 CL70**		**UG-11(a)(1)**		**INHERENT**	**FIG UW-16.2(c)**		
UNKNOWN	**1**	**3.00"**	**THREADED FITTING**	**SA181 CL70**		**UG-11(a)(1)**		**INHERENT**	**FIG UW-16.2(c)**		
INSPECTION	**2**	**2.00"**	**3000#**	**SA105**		**.312"**		**INHERENT**	**FIG. UW-16.1(y-2)**		**SHELL**
UNKNOWN	**2**	**1.00"**	**3000#**	**SA105**		**.217"**		**INHERENT**	**FIG. UW-16.1(y-2)**		
DRAIN	**1**	**.500"**	**3000#**	**SA105**		**.142"**		**INHERENT**	**FIG. UW-16.1(z-2)**		**HEAD**

11. Supports: Skirt **NO** (Yes or no) Lugs 0 (Number) Legs 0 (Number) Other **CHANNEL FOOT (2)** (Describe) Attached **BOTTOM - WELD** (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors, have been furnished for the following items of the report:

N/A

(Name of part, item number, Manufacturer's name and identifying stamp)

Constructed under the provision of UG-90 (c)(2). No safety device provided per UG-125(a). UG-20(f) applies.

FORM U1-A (Back)

NB Number 797989-797994

CERTIFICATE OF SHOP/FIELD COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. "U" Certificate of Authorization Number 23846 expires November 28, 2015 .

Date 10/30/2015 Co. name **Steel Fab, A Division of Samuel Pressure Vessel Group, Inc.** (Manufacturer) Signed (Representative)

CERTIFICATE OF SHOP/FIELD INSPECTION

Vessel constructed by **Steel Fab, A Division of Samuel Pressure Vessel Group, Inc.** at **58 Samuel Way, Lebanon, Virginia, 24266**

I, the undersigned, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and employed by OneCIS Insurance Company, of Lynn, MA

have inspected the component described in this Manufacturer's Data Report on October 30, 2015 , and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 10/30/2015 Signed (Authorized Inspector) Commissions 12048A, VA921 [National Board (incl. endorsements)]

PRESSURE TEST REPORT

Test Standard ASME B31.3

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1038648
Part ID	625167
Part Description	PARTICULANT PULSATION FILTER 10.0L/61-32 1/2" SENSOR PORT
Sequence ID	20
Serial #	WC1038648-4
Drawing ID (incl Rev.)	625167 REV D

TEST REQUIREMENTS

Type (media)	Hydrostatic
Design Pressure (PSIG)	650
Test Pressure (PSIG)	845
	(Approx. 58.26 BAR, 5826.07 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
1267.5	3380

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-494	Gauge, Pressure	0 to 2000 PSIG	20 PSIG	2016/03/20
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/01/13

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
Top Cap	A105958	Top Flange Cover	J2861	All Heat Numbers Verified (Certs on File).
Bottom Cap	J3999			
Shell	1436845V			
Channel	352142			Checked By: Warehouse
Bolt (4)	3S244			

Metal Temp (> MDMT +30 F)	60 F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Aaron Henry	Witnessed By	Dave Kuhn
Employee #	1064	Employee #	010

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	845	845		11:00 AM
(2) Pressure Off	845	845		11:10 AM

Test Completed By	Aaron Henry	Witnessed By	Dave Kuhn
Employee #	1064	Employee #	010

Witnessed by AI (when req'd): **Date:**

NOTES

Welded by 612

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.
CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Hydrostatic Test Type Confirmed

PASS

Report Completed By: Jordan Parkes
Report Date: 2016/01/13

DESIGN SPECIFICATIONS

MAWP: 650 PSIG @ 400 °F
MDMT: -20 °F @ 650PSIG
INTERNAL VOLUME: 630 CUBIC IN
USED FOR: SWEET DRY NATURAL GAS
HIGHEST DEW POINT OF NATURAL GAS: -37 °F
IMPACT TESTING: NOT REQUIRED AS PER ASME SECTION VIII, DIV 1, UCS-66 (D)
INSPECTION PORTS: NOT APPLICABLE AS PER ASME SECTION VIII, DIV 1, UG-46, NON-CORROSIVE MEDIA
CORROSION ALLOWANCE: NONE
CAP / SHELL JOINT EFFICIENCY, E: 1.00
PWHT: NONE

APPLICABLE DESIGN CODES

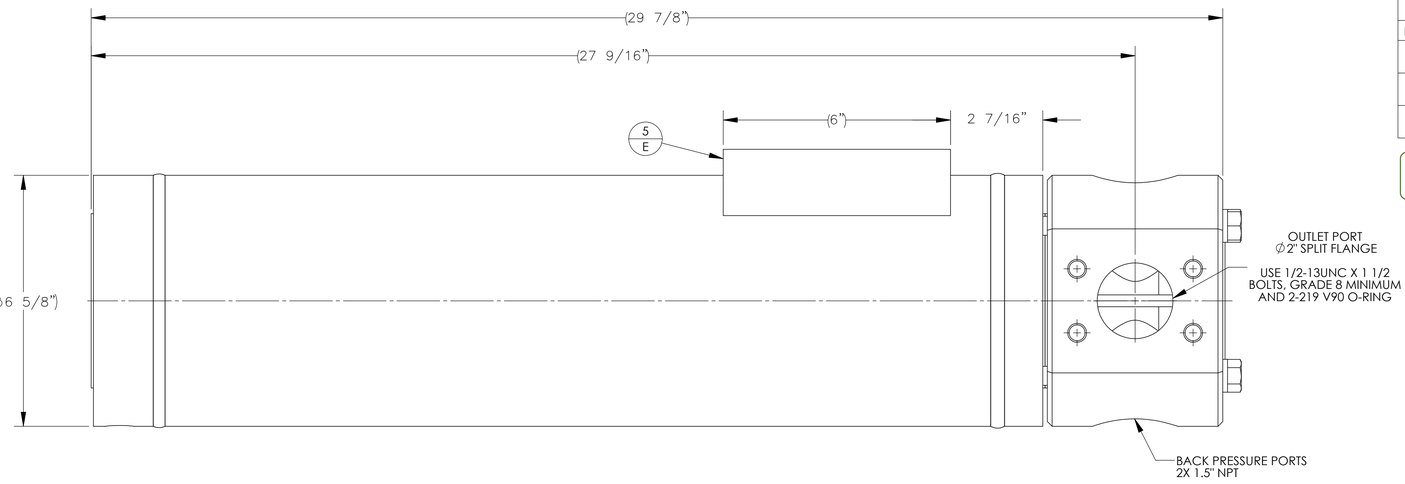
CSA B51-09, BOILER, PRESSURE VESSEL AND PRESSURE PIPING CODE

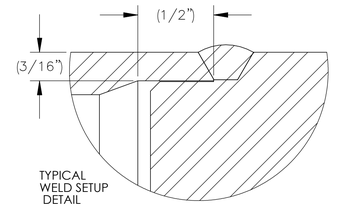
ASME SECTION VIII, DIVISION 1
BOILER AND PRESSURE VESSEL CODE
2013 EDITION

NDE REQUIREMENTS

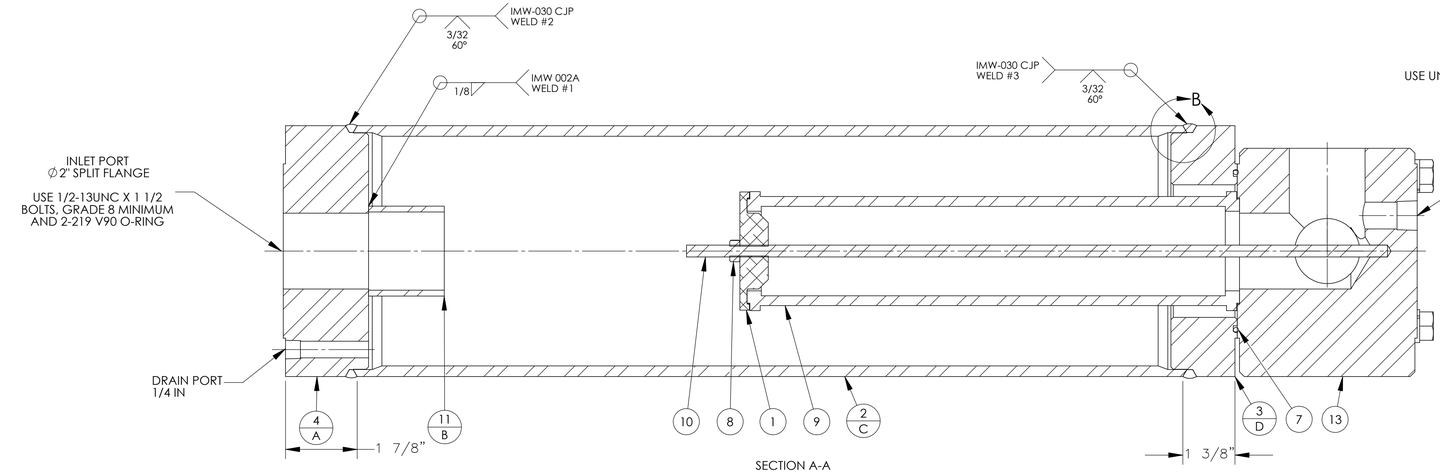
HYDROSTATIC PRESSURE TEST AT 845 PSIG (1.3X DESIGN PRESSURE) TO ASME SECTION VIII PARAGRAPH UG-99

NO RADIOGRAPHIC EXAMINATION REQUIRED

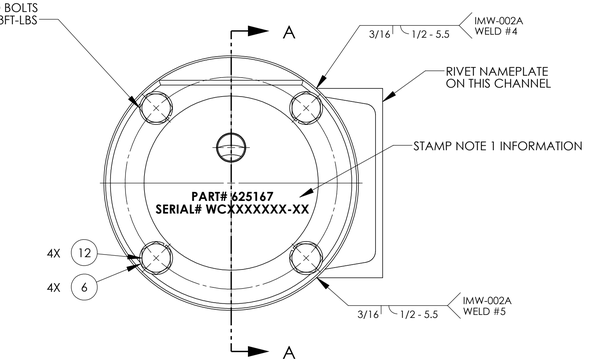




DETAIL B
SCALE 2 : 1



SECTION A-A



LABEL MINIMUM FONT SIZE 5/32"
MFG SERIAL # AS PER NOTES

CERTIFIED BY Clean Energy® COMPRESSION PART # 625167

MFG SERIAL # _____ YEAR BUILT _____

MAWP	650	PSIG AT	400	°F
MAEWP	N/A	PSIG AT	N/A	°F
MDMT	-20	°F AT	650	PSIG
CRN				

ITEM NO.	QTY	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	MATERIAL DIMENSION
1	1	203607	BOTTLE PARTICULANT PULSATION ELEMENT COVER	ASTM SB-221 6061-T6511	3.125OD X 1.0LG
2	1	205456	BOTTLE PARTICULANT PULSATION SHELL 22IN	ASME SA-106 GR.B P&O	6NPS SCH40 X 22.0LG
3	1	205463	BOTTLE PARTICULANT PULSATION TOP CAP	ASME SA-105	7.000OD X 2.0LG
4	1	205801	BOTTLE PARTICULANT PULSATION BOTTOM CAP	ASME SA-105	7.000OD X 2.5LG
5	1	301574	LABEL CHANNEL	CS A36 C4 X 5.4LB/FT	6.0LG
6	4	302359	WASHER LOCK GR.8 0.500 ZN	SAE CS GR.8 ZN	0.500
7	1	305579	ORING 2-242 V90D	VITON 90DU	2-242
8	1	307233	NUT HEX CS GR.5 0.313UNC ZN	SAE CS GR. 5 ZN	0.313UNC
9	1	318256	FILTER ELEM PARTICULANT 25 MICRON		
10	1	319423	THREADED ROD	A307 GR. 2	0.313-18UNC X 18.5LG
11	1	350605	LIQUID RETAINER	ASME SA-106 GR. B	2NPS SCH40 X 2.0LG
12	4	617417	BOLT HH CS SA-193 0.500-13UNC X 5.75	CS SA-193 B7 Gr. 5	
13	1	625168	TOP FLANGE COVER	ASME SA-105	7.000OD X 7.0LG

NOTES:

1. REFER TO WELDED COMPONENT MARKING INSTRUCTION WI-MF-2015-004
2. RECORD WELDING AND COMPONENT DETAILS ON FORM FO-MF-2015-003
3. BOTTLE INTERIOR TO BE FREE OF LOOSE RUST, MILL SCALE, AND OTHER DETRIMENTAL FOREIGN MATTER AS WELL AS OIL, GREASE, DRAWING AND CUTTING COMPOUNDS AND OTHER SOLUBLE CONTAMINANTS FROM STEEL SURFACES.
4. RIVET NAMEPLATE ON LOCATION SPECIFIED IN DRAWING.
5. THIS PRESSURE VESSEL DESIGN HAS BEEN REGISTERED AND GIVEN A CRN NUMBER: TBD
6. THIS CRN REGISTRATION EXPIRES IN: TBD
7. DRAWING REVISIONS ALTERING PRESSURE VESSEL DESIGN, MAWP OR MDMT MUST BE RESUBMITTED TO THE CRN ISSUING ENTITY FOR APPROVAL PRIOR TO MANUFACTURE.
8. NAMEPLATE FILE "625167 - NAMEPLATE" CAN BE FOUND IN SHAREPOINT
9. ALL MATERIALS ARE SUITED TO -20F (-29C) MDMT WITHOUT CHARPY IMPACT TESTING PER ASME SECTION VIII, DIV 1, UCS-66(a)
10. INSPECT SHELL AND CAP EDGES PRIOR TO WELDING PER ASME VIII DIV.1 PARA UG-93(D04).
11. WELDING SPECIFICATION: CJP (COMPLETE JOINT PENETRATION)
12. SURFACE PROTECTION:
    1. ALL THREADED HOLES, PORTS AND SEALING FACES TO BE PLUGGED/PROTECTED PRIOR TO SURFACE PREP AND PAINTING
    2. EXTERIOR SURFACE PREPPED TO SSPC-SP11 FOLLOWED BY SSPC-SP1 OR BETTER (REFER TO: WI-MF-2013-026).
    3. PAINT SYSTEM APPLICATION ACCORDING TO: WI-MF-2014-001.
    4. COLOR: IMW STANDARD GREY

REVISION HISTORY

REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
B	2015/07/20	AC	GS	TFJ	3959	CORRECTED CONNECTION PORT NOTE FROM 1/4" TO 1/2" NPT
C	2015/08/24	AC	SB	TFJ	4159	UPDATED NOTES AND NDE REQUIREMENTS
D	2015/09/21	AC	SVW	TFJ	4351	UPDATED IMPACT TESTING NOTES

APPROVED
By Tamas Jozsa at 2:55 pm, Sep 21, 2015

DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:			
UNITS:	INCHES	X/X	±1/16
FINISH:	250 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±1.0°

Clean Energy® COMPRESSION Chilliwack, B.C., Canada

TITLE
PARTICULANT PULSATION FILTER 10.0L/61-32-1/2" SENSOR PORT

DR.	MAG	2015/06/11	SIZE	DOC. NO.	REV
CK.	GS	2015/06/11	D	625167	D
AP.	TFJ	2015/06/11	SCALE 1:4	WEIGHT 108.1 LBS	SHEET 1 / 1

PRESSURE TEST REPORT

Test Standard ASME SECTION VIII Division 1

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1041145
Part ID	202967-00
Part Description	Filter Coalescing CF-5500-7-CS 5500
Sequence ID	20
Serial #	WC1041145-1
Drawing ID (incl Rev.)	202967-00 REV G

TEST REQUIREMENTS

Type (media)	Hydrostatic
Design Pressure (PSIG)	5500
Test Pressure (PSIG)	7150
	(Approx. 492.98 BAR, 49297.53 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
10725	28600

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-537	Gauge, Pressure	0 to 15000 PSIG	150 PSIG	2017/02/23
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/03/15

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
Filter Head	A145739			All Heat Numbers Verified (Certs on File).
Filter Housing	H2254AC			
				Checked By: Warehouse

Metal Temp (> MDMT +30 F)	60F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Ramil Bantigue	Witnessed By	Clayton Harrison
Employee #	1237	Employee #	300

Test Steps	Target (PSIG)	Actual Readings (PSIG) Primary Gauge	Secondary Gauge	Time
(1) Pressure On	7,150	7150		7:20 PM
(2) Pressure Off	7,150	7150		7:30 PM

Test Completed By	Ramil Bantigue	Witnessed By	Clayton Harrison
Employee #	1237	Employee #	300

Witnessed by AI (when req'd): **Date:**

NOTES

RESULTS

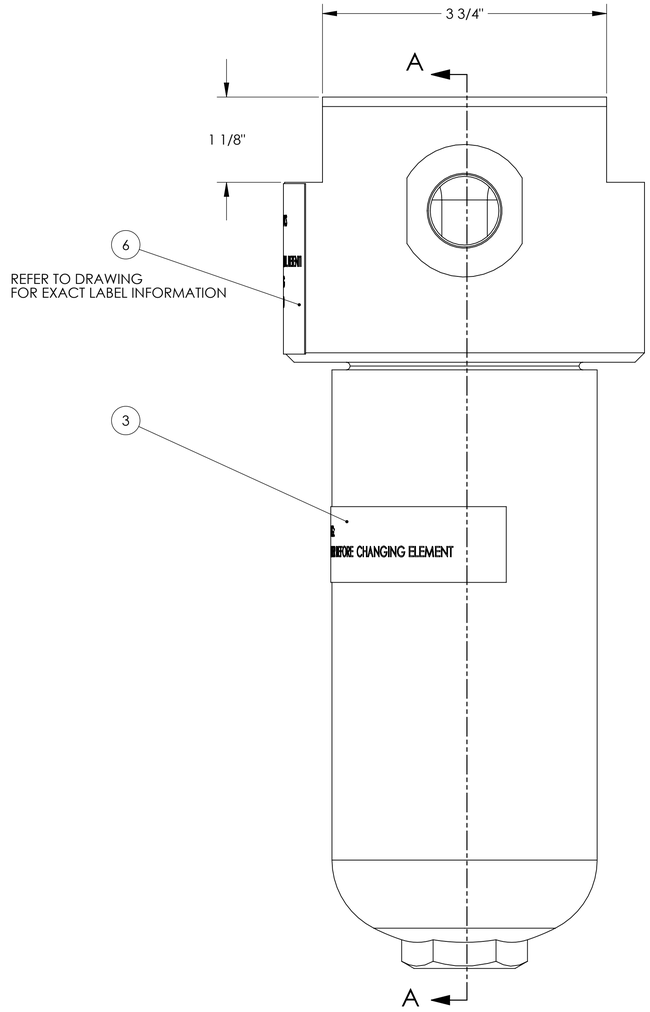
Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.
CEC hereby certifies the UUT stated above was tested with the following results:

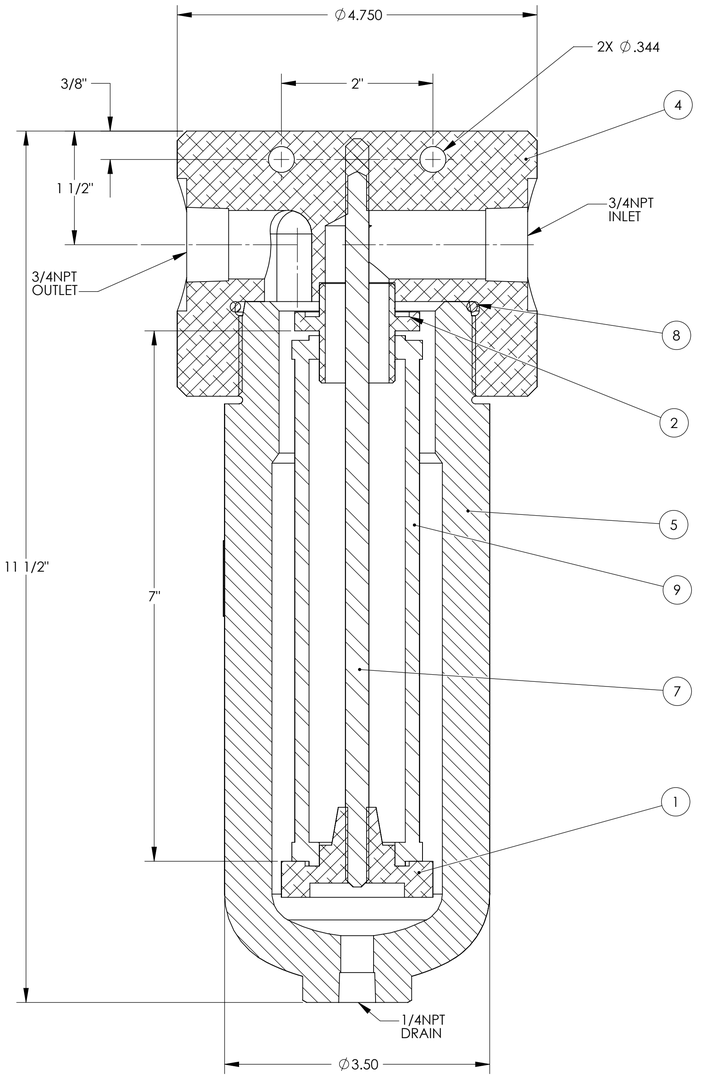
- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Hydrostatic Test Type Confirmed

PASS

Report Completed By: Daryl Cameron
Report Date: 2016/03/15

REVISION HISTORY					
REV.	DATE	BY	CK.	DCR#	REFERENCE
E	2012/01/31	DR	ERL	2154	ADDED PN 201773-05 AND 207645 / UPDATED ITEM NUMBERS TO MATCH BOM
F	2012/10/10	BJN	DJS	N/A	REDUCED MAXIMUM TEMPERATURE FROM 400F TO 200F, IMPACT EXEMPTION NOTE
G	2014/04/04	RSP	TC	5039	UPDATED ASME CODE REFERENCE





SECTION A-A

ITEM	QTY.	PART NUMBER	DESCRIPTION	UOM	WEIGHT
1	1	201773-04	CF-5500-5-SS ELEMENT COVER	EA	0.144
2	1	201773-05	CF-5500-5-SS FILTER ELEMENT SEAT	EA	0.06
3	1	201773-06	FILTER WARNING LABEL	EA	0.0
4	1	202967-01	FILTER HEAD	EA	13
5	1	202967-02	CF 5500-7-CS FILTER HOUSING	EA	14
6	1	207645	LABEL FILTER PF300-13-AL	EA	0.0
7	1	210038	ROD REDI CS 9.875 X 0.313 OD	EA	0.2
8	1	305555	ORING 2-234 V90D	EA	0.01
9	1	310632	FILTER ELEM GFN 10 MIC 1.625X1.000X7.000	EA	1.8

NOTES :

DESIGN SPECIFICATIONS:
- MAWP: 5500 PSIG @ 200°F
- MDMT: -20°F @ 5500 PSIG
- SERVICE: SWEET DRY NATURAL GAS
- HIGHEST DEW POINT OF NATURAL GAS: -37°F
- CORROSION ALLOWANCE: NONE
- PWHT: NONE
- VOLUME: 0.0181 FT^3

PERFORMANCE DATA OF THE FILTER:
MAXIMUM FLOW RATE (@ 4PSI)
- 880 SCFM @ 3000 PSIG WORKING PRESSURE
- 1000 SCFM @ 3600 PSIG WORKING PRESSURE
- 1080 SCFM @ 4000 PSIG WORKING PRESSURE
- 1160 SCFM @ 4500 PSIG WORKING PRESSURE
- 1220 SCFM @ 5000 PSIG WORKING PRESSURE

MAXIMUM PRESSURE DROP: 10 PSI

G
APPLICABLE DESIGN CODES:
- ASME SECTION VIII, DIVISION 1, BOILER AND PRESSURE VESSEL CODE 2013
- CSA B51-09, BOILER, PRESSURE VESSEL, AND PRESSURE PIPING CODE.

NDE REQUIREMENT: PRESSURE TEST TO ASME SECTION VIII
- HYDROSTATICALLY TEST AT 7150 PSIG
- (1.3 TIMES DESIGN PRESSURE)
- IMPACT TESTING EXEMPT PER ASME Sec VIII, Div. 1, UG-20(f)(1)(b), CURVE B
- NO RADIOGRAPHIC EXAMINATION REQUIRED

CANADIAN REGISTRATION NUMBER:
- THIS FITTING DESIGN HAS BEEN REGISTERED AND GIVEN A CRN (SEE NAMEPLATE).
- ANY REVISIONS TO THE PRESSURE PARTS REQUIRE THE DESIGN TO BE RESUBMITTED FOR APPROVAL.
- SEE NAMEPLATE FOR EXPIRATION DATE.

ASSEMBLY:
1. STAMP "INLET" ON INLET SIDE OF HEAD, "OUTLET" ON OUTLET SIDE OF HEAD,
"FLOW DIRECTION ARROW" ON BOTH INSTALLATION SURFACES.
2. WARNING LABEL SHOULD BE ATTACHED TO THE BOWL.
3. BOWL TO HEAD TIGHTNING TORQUE: 30 ± 5 FT-LB

IMW Industries Ltd.
Chilliwack, BC, Canada

TITLE
5500 PSIG COALESCING FILTER
MODEL: CF-5500-7-CS

REF. I STANDARD	SIZE	DOC NO. 202967-00	REV G
DR. IDCA	D	MRP ID 202967-00	
CK. IDVL 2011/06/06			
AP. IDVL 2011/06/13	SCALE 1:1	WEIGHT 29 LBS	SHEET 1 / 1

DVL 2011/06/13

PRESSURE TEST REPORT

Test Standard ASME B31.3

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1036532
Part ID	204097
Part Description	BOTTLE SCRUBBER 1200PSIG 1.5x1.25-0.75BP
Sequence ID	20
Serial #	WC1036532-1~5
Drawing ID (incl Rev.)	204097 REV G

TEST REQUIREMENTS

Type (media)	Hydrostatic
Design Pressure (PSIG)	1200
Test Pressure (PSIG)	1560
	(Approx. 107.56 BAR, 10755.82 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
2340	6240

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1220	Gauge, Pressure	0 to 3000 PSIG	30 PSIG	2016/10/26
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2015/12/29

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
Top Cap	J3999AC			All Heat Numbers Verified (Certs on File).
Shell	574686			
Bottom Cap	J3999			Checked By: Warehouse

Metal Temp (> MDMT +30 F)	60 F	**WATER TEMP >70F (ASME SECT I)**	N/A
Test Commenced By	Ron Trynchy	Witnessed By	Timothy Goody
Employee #	1221	Employee #	695

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	1,560	1560		9:45 AM
(2) Pressure Off	1,560	1560		9:55 AM

Test Completed By	Ron Trynchy	Witnessed By	Timothy Goody
Employee #	1221	Employee #	695

Witnessed by AI (when req'd): **Date:**

NOTES

Welded by 612

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.
CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Hydrostatic Test Type Confirmed

PASS

Report Completed By: Jordan Parkes
Report Date: 2015/12/29

PRESSURE TEST REPORT

Test Standard ASME B31.3

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1034232
Part ID	204097
Part Description	Bottle Scrubber 1200PSIG 1.5x1.25-0.75BP
Sequence ID	20
Serial #	WC1034232-1~5
Drawing ID (incl Rev.)	204097 Rev G

TEST REQUIREMENTS

Type (media)	Hydrostatic
Design Pressure (PSIG)	1200
Test Pressure (PSIG)	1560
	(Approx. 107.56 BAR, 10755.82 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
2340	6240

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1220	Gauge, Pressure	0 to 3000 PSIG	30 PSIG	2016/10/26
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2015/12/29

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
Shell	132739			All Heat Numbers Verified (Certs on File).
Top Cap	J3999AC			
Bottom Cap	J3999			Checked By: Warehouse

Metal Temp (> MDMT +30 F)	60 F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Ron Trynchy	Witnessed By	Timothy Goody
Employee #	1221	Employee #	695

Test Steps	Target (PSIG)	Actual Readings (PSIG) Primary Gauge	Secondary Gauge	Time
(1) Pressure On	1,560	1560		6:49 AM
(2) Pressure Off	1,560	1560		6:59 AM

Test Completed By	Ron Trynchy	Witnessed By	Timothy Goody
Employee #	1221	Employee #	695

Witnessed by AI (when req'd): **Date:**

NOTES

Welded by 509.

RESULTS

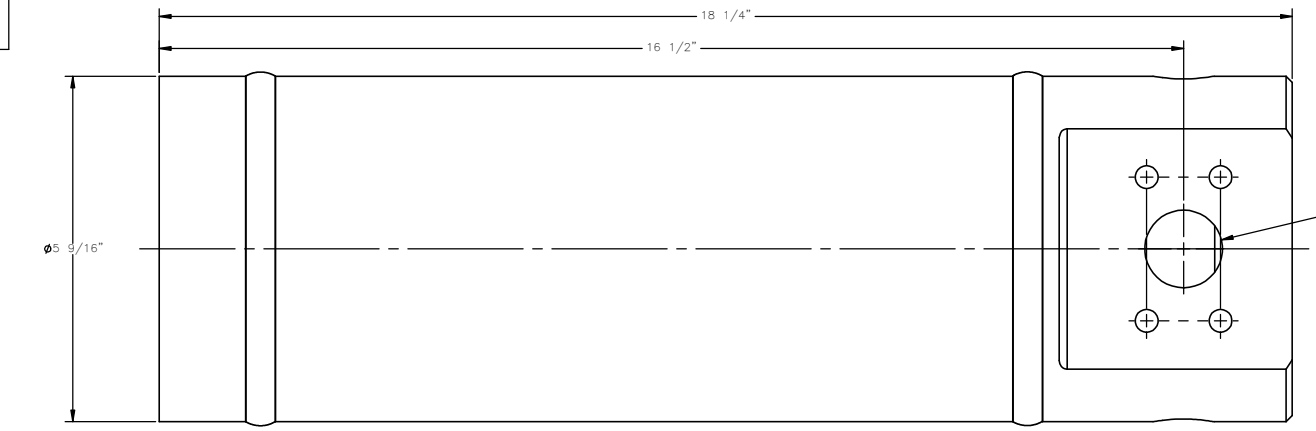
Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.
CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Hydrostatic Test Type Confirmed

PASS

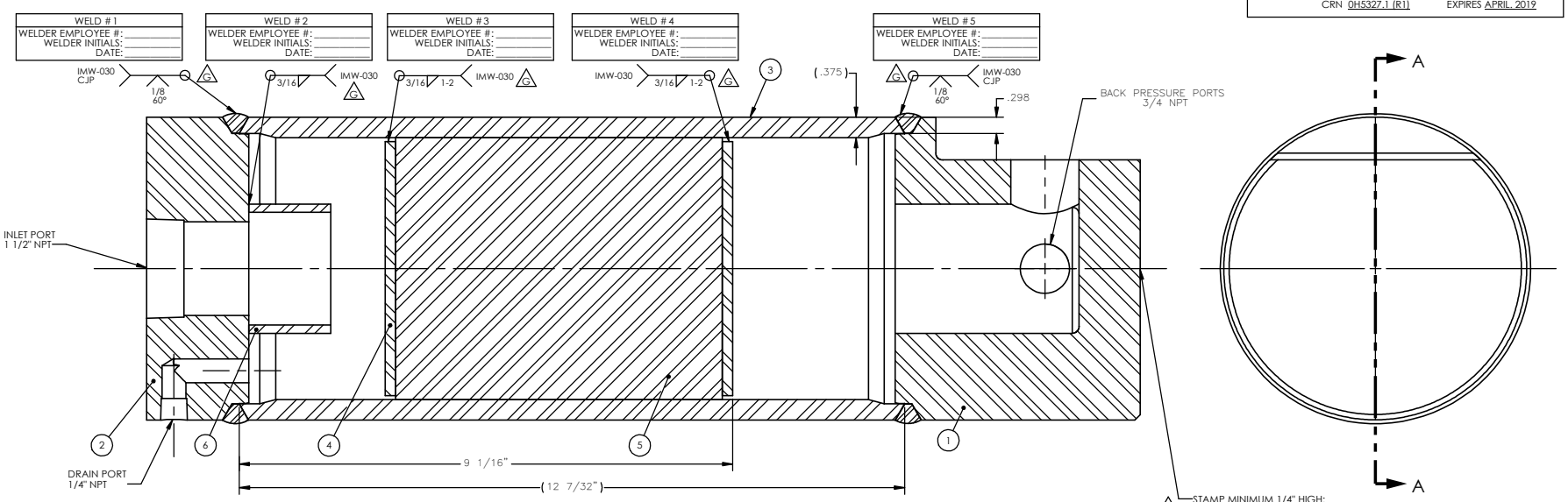
Report Completed By: Timothy Goody
Report Date: 2015/12/29

REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	DCR#	REFERENCE
D	2011/01/26	JDC	N/A	N/A	N/A	UPDATED ASME AND CSA CODES
E	2013/03/27	GS	ERL	ERL	1756	CHANGED PART NUMBER AND SPECIFICATION; ADDED NOTE; ADDED WELDING PROCESS OPTION
F	2014/04/04	RSP	TC	TC	5039	UPDATED ASME CODE REFERENCE
G	2014/09/22	SB	SV	SV	N/A	STAMP INFO UPDATE; BOLT & O RING INFO DELETED; WELD SYMBOLS UPDATED



NOTE:
1. STAMP PART# AND WO# AS SHOWN G

CERTIFIED BY
IMW INDUSTRIES LTD.
MAWP 1200 PSI AT 400 °F
MAEWP N/A PSI AT N/A °F
MDMT -20 °F AT 1200 PSI
MFG. SERIAL NO. _____
YEAR BUILT _____
CRN 0H5327.1 (R1) EXPIRES APRIL. 2019



SECTION A-A

ITEM NO.	QTY.	DESCRIPTION	SIZE	UOM	SPECIFICATION	PART NUMBER
1	1	SCRUBBER BOTTLE TOP CAP	5.563 OD	EA	CS SA-105	204098
2	1	SCRUBBER BOTTLE BOTTOM CAP	5.563 OD	EA	CS SA-105	204099
3	1	SCRUBBER BOTTLE SHELL	5.563 OD	EA	CS SA-106 GR.B	204100
4	2	MESH PAD RETAINER	4.67OD	EA	CS	204291
5	1	FILTER PAD	5.0 DIA X 6.0 LG	EA	SS	306526
6	1	LIQUID RETAINER	2"SCH 40 X 1.5LG	FT	PIPE SA-106 GR.B 2NPS X SCH40 PNO	350605

APPLICABLE DESIGN CODES

CSA B51-09
BOILER, PRESSURE VESSEL AND PRESSURE PIPING CODE

ASME SECTION VIII, DIVISION 1BOILER AND PRESSURE VESSEL CODE 2013

CANADIAN REGISTRATION NUMBER
THIS FITTING DESIGN HAS BEEN REGISTERED AND GIVEN A CRN 0H5327.1.

ANY REVISIONS TO THE PRESSURE PARTS REQUIRE THE DESIGN TO BE RESUBMITTED FOR APPROVAL.

NDE REQUIREMENTS

HYDROSTATICALLY TEST AT 1560 PSIG
(1.3 TIMES DESIGN PRESSURE)

NO RADIOGRAPHIC EXAMINATION REQUIRED

DESIGN SPECIFICATIONS

MAWP: 1200 PSIG @ 400°F
MDMT: -20°F @ 1200 PSIG
INTERNAL VOLUME: 220 CUBIC IN
USED FOR: SWEET DRY NATURAL GAS
PER NFPA 52 1998
HIGHEST DEW POINT OF NATURAL GAS: -37 °F
CORROSION ALLOWANCE: NONE
CAP / SHELL JOINT EFFICIENCY, E: 1.00

PWHT: NONE

DIMENSIONING & TOLERANCING PER ASME Y14.5M–1994, U.S.C.S.

UNITS: INCHES | DEC XX ±1/16 | XXX ±.01
FINISH: 64 MICRO INCH | XXXX ±.1
INNER RAD: .03 MAX | ANGLES ±.005
OUTER EDGE: .03 MIN. x 45°

IMW Industries Ltd.
Chilliwack, B.C., Canada

TITLE: SCRUBBER BOTTLE 5" 1200 PSIG WITH BACK PRESSURE PORTS

REF. STANDARD		SIZE	REV
DR. SB 2014/09/22		D	G
CK. SV 2014/09/22		DWG NO. / MRP ID	204097
AP.		SCALE 1:1	WEIGHT 58.0
			SHEET 1 / 1

PRESSURE TEST REPORT

Test Standard ASME B31.3

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1039788
Part ID	204295
Part Description	Bottle Scrubber 4000PSIG 1.0x1.0-0.75BP
Sequence ID	20
Serial #	WC1039788-1~5
Drawing ID (incl Rev.)	204295 Rev G

TEST REQUIREMENTS

Type (media)	Hydrostatic
Design Pressure (PSIG)	4000
Test Pressure (PSIG)	5200
	(Approx. 358.53 BAR, 35852.75 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
7800	20800

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1218	Gauge, Pressure	0 to 10000 PSIG	100 PSIG	2016/07/20
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/03/11

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
Shell	1426122			All Heat Numbers Verified (Certs on File).
Top Cap	J0861			
Bottom Cap	B16862			Checked By: Warehouse

Metal Temp (> MDMT +30 F)	60 F	**WATER TEMP >70F (ASME SECT I)**	N/A
Test Commenced By	Aaron Henry	Witnessed By	Timothy Goody
Employee #	1064	Employee #	695

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	5,200	5200		8:20 AM
(2) Pressure Off	5,200	5200		8:30 AM

Test Completed By	Aaron Henry	Witnessed By	Timothy Goody
Employee #	1064	Employee #	695

Witnessed by AI (when req'd): **Date:**

NOTES

Welded by 165,612,1051.

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.

CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Hydrostatic Test Type Confirmed

PASS

Report Completed By: Timothy Goody

Report Date: 2016/03/14

DESIGN SPECIFICATIONS

MAWP:4000 PSIG @ 400°F
MDMT: -20°F @ 4000 PSIG
INTERNAL VOLUME: 110 CUBIC IN
USED FOR: SWEET DRY NATURAL GAS
PER NFPA 52
HIGHEST DEW POINT OF NATURAL GAS: -37°F
CORROSION ALLOWANCE: NONE
CAP / SHELL JOINT EFFICIENCY, E: 1.00

PWHT: NONE

APPLICABLE DESIGN CODES

CSA B51-14
BOILER, PRESSURE VESSEL AND PRESSURE PIPING CODE

ASME SECTION VIII, DIVISION 1
BOILER AND PRESSURE VESSEL CODE 2013

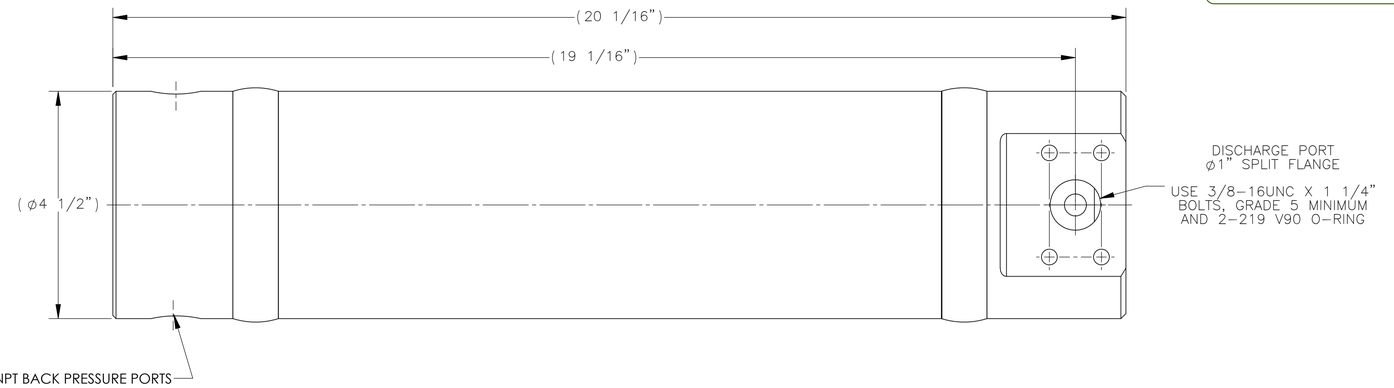
NDE REQUIREMENTS

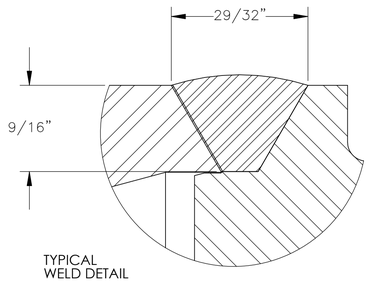
HYDROSTATICALLY TEST AT 5200 PSIG
(1.3 TIMES DESIGN PRESSURE)

NO RADIOGRAPHIC EXAMINATION REQUIRED

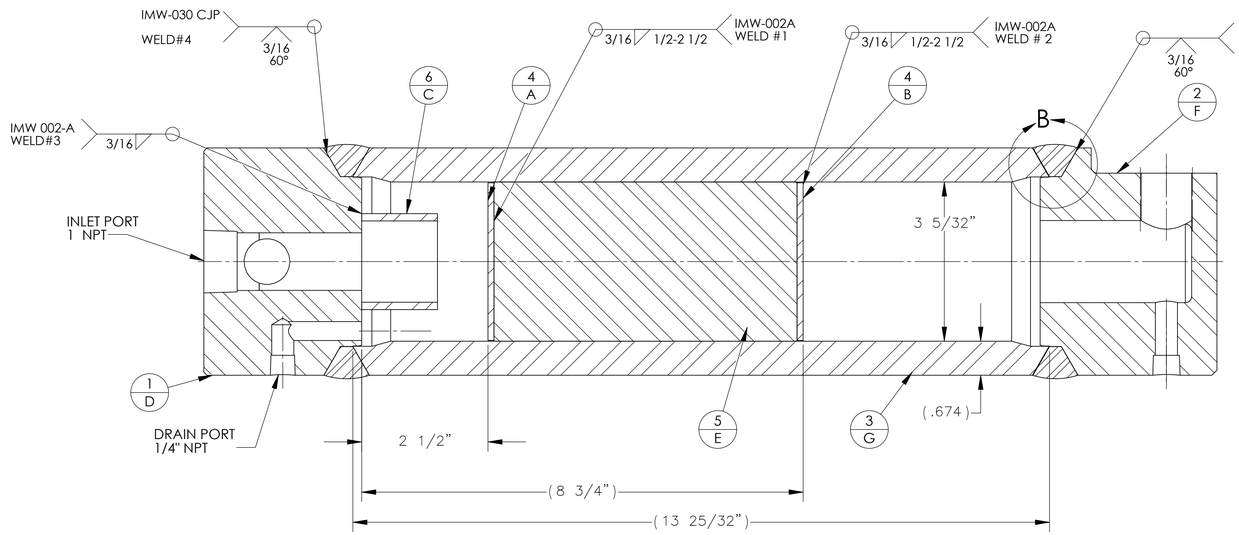
REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
E	2013/03/26	TC	N/A	N/A	DGR 4155	PART 604042 WAS 301345
F	2014/04/04	RSP	N/A	N/A	5039	UPDATED ASME CODE REFERENCE
G	2015/12/14	DR	SB	TFJ	4798	UPDATED TO CURRENT DRAWING & WELD TEMPLATE

APPROVED
By Tamas Jozsa at 10:54 am, Dec 17, 2015

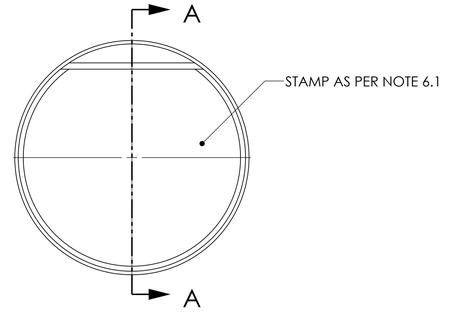




DETAIL B
SCALE 2 : 1



SECTION A-A



NOTES:

DESIGN:
1. THIS FITTING DESIGN HAS BEEN REGISTERED AND GIVEN A CRN NUMBER 0H09387.2
2. DRAWING REVISIONS ALTERING PRESSURE VESSEL DESIGN, MAWP OR MDMT MUST BE RESUBMITTED TO THE CRN ISSUING ENTITY FOR APPROVAL PRIOR TO MANUFACTURE
3. ALL MATERIALS ARE SUITED TO -20F(-29C) MDMT WITHOUT CHARPY IMPACT TESTING PER ASME SECTION VIII, DIV 1, UCS-66(a)

MANUFACTURE:
4. BOTTLE INTERIOR TO BE FREE OF LOOSE RUST, MILL SCALE, AND OTHER DETRIMENTAL FOREIGN MATTER AS WELL AS OIL, GREASE, DRAWING AND CUTTING COMPOUNDS AND OTHER SOLUBLE CONTAMINANTS
5. WELDING SPECIFICATION: CJP (COMPLETE JOINT PENETRATION)
6. MARK PRESSURE COMPONENTS PER WORK INSTRUCTION WI-MF-2015-004
   1. COMPLETE SERIAL NUMBER DEFINED AS COMPLETE WORK ORDER NUMBER PLUS CURRENT COMPONENT WORK ORDER COUNT E.G. WCXXXXXXX-XX
   2. WHERE REQUIRED MARK CRN NUMBER PER WORK INSTRUCTION WI-MF-2015-004
   3. WHERE REQUIRED MARK ASME PRESSURE VESSEL MARKINGS PER WORK INSTRUCTION WI-MF-2015-004
7. SURFACE PROTECTION:
   1. ALL THREADED HOLES, PORTS AND SEALING FACES TO BE PLUGGED/PROTECTED PRIOR TO SURFACE PREP AND PAINTING
   2. EXTERIOR SURFACE PREPPED TO SSPC-SP11 FOLLOWED BY SSPC-SP1 OR BETTER (REFER TO: WI-MF-2013-026).
   3. PAINT SYSTEM APPLICATION ACCORDING TO: WI-MF-2014-001.
   4. COLOR: CECC STANDARD GREY

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	SPECIFICATION	SIZE	UOM
1	1	204296	SCRUBBER BOTTLE BOTTOM CAP	CS SA-105	4.5 OD	EA
2	1	204297	SCRUBBER BOTTLE TOP CAP	CS SA-105	4.5 OD	EA
3	1	204333	SCRUBBER BOTTLE SHELL	CS SA-106 GR.B	4.5OD	EA
4	2	204376	MESH PAD RETAINER	CS	2.95 OD	EA
5	1	306526	FILTER PAD	SS	3.38 DIA X 6.0 LG	EA
6	1	604042	LIQUID RETAINER	CS SA-106	1.5 X SCH 40 X 1.5 LG	EA

DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:

UNITS:	INCHES	X/X	±1/16
FINISH:	250 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±.5°

Clean Energy COMPRESSION
Chilliwack, B.C., Canada

TITLE
SCRUBBER BOTTLE 4" 4000 PSIG
WITH BACK PRESSURE PORTS

DR. DY 2007-07-09	SIZE D	DOC. NO. 204295	REV G
CK.			
AP.	SCALE 2:3	WEIGHT 71.1 LBS	SHEET 1 / 1

PRESSURE TEST REPORT

Test Standard ASME SECTION VIII Division 1

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1039233
Part ID	205105
Part Description	Bottle Puls. 5500PSIG 0.75x0.75-0.75BP
Sequence ID	20
Serial #	WC1039233-3
Drawing ID (incl Rev.)	205105 REV F

TEST REQUIREMENTS

Type (media)	Hydrostatic
Design Pressure (PSIG)	5500
Test Pressure (PSIG)	7150
	(Approx. 492.98 BAR, 49297.53 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
10725	28600

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1044	Gauge, Pressure	0 to 15000 PSIG	150 PSIG	2016/04/27
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/02/04

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
Shell	J5772			All Heat Numbers Verified (Certs on File).
Top Cap	H9594			
Bottom Cap	H9594			Checked By: Warehouse

Metal Temp (> MDMT +30 F)	60F	**WATER TEMP >70F (ASME SECT I)**	N/A
Test Commenced By	Daryl Cameron	Witnessed By	Kevin Joinson
Employee #	910	Employee #	694

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	7,150	7150		5:30 PM
(2) Pressure Off	7,150	7150		5:50 PM

Test Completed By	Daryl Cameron	Witnessed By	Kevin Joinson
Employee #	910	Employee #	694

Witnessed by AI (when req'd): **Date:**

NOTES

Welded By 997

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.

CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Hydrostatic Test Type Confirmed

PASS

Report Completed By: Daryl Cameron

Report Date: 2016/02/04

DESIGN SPECIFICATIONS

MAWP:5500 PSIG @ 400˚F
MDMT: -20˚F @ 5500 PSIG
INTERNAL VOLUME: 105.8 CUBIC IN
USED FOR: SWEET DRY NATURAL GAS
PER NFPA 52
HIGHEST DEW POINT OF NATURAL GAS: -37˚F
CORROSION ALLOWANCE: NONE
CAP / SHELL JOINT EFFICIENCY, E: 1.00

PWHT: NONE

APPLICABLE DESIGN CODES

CSA B51-03
BOILER, PRESSURE VESSEL AND PRESSURE PIPING CODE

ASME SECTION VIII, DIVISION 1BOILER AND PRESSURE VESSEL CODE 2013

NDE REQUIREMENTS

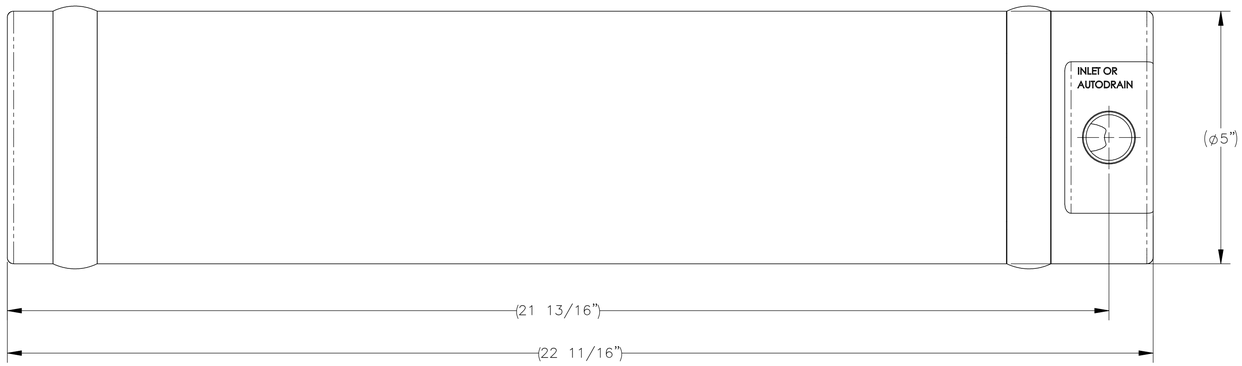
HYDROSTATICALLY TEST AT 7150 PSIG
(1.3 TIMES DESIGN PRESSURE)

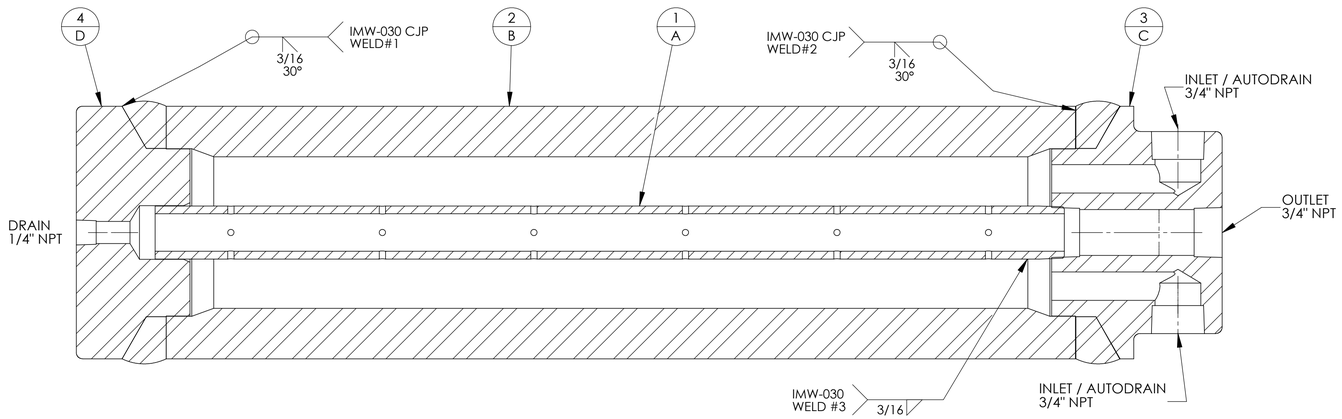
NO RADIOGRAPHIC EXAMINATION REQUIRED

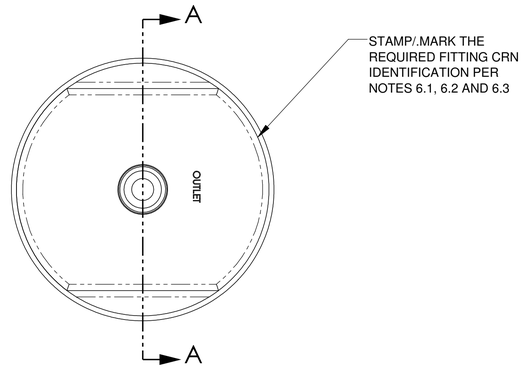
APPROVED
By Tamas Jozsa at 8:07 pm, Jan 06, 2016

REVISION HISTORY

REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
D	2013/06/05	KKL	GSL	N/A	N/A	ADDED WELD SYMBOL (C5), GD&T TABLE (B4)
E	2014/04/04	RSP	TC	N/A	DCR5039	UPDATED ASME CODE REFERENCE
F	2015/12/23	DR	SB	TFJ	4883	UPDATED DRAWING TO NEW STANDARD







SECTION A-A

NOTES:
DESIGN:
1. THIS FITTING DESIGN HAS BEEN REGISTERED AND GIVEN A CRN NUMBER 0H5328.1, 0H09386.2
2. DRAWING REVISIONS ALTERING PRESSURE VESSEL DESIGN, MAWP OR MDMT MUST BE RESUBMITTED TO THE CRN ISSUING ENTITY FOR APPROVAL PRIOR TO MANUFACTURE
3. ALL MATERIALS ARE SUITED TO -20F(-29C) MDMT WITHOUT CHARPY IMPACT TESTING PER ASME SECTION VIII, DIV 1, UCS-66(a)

MANUFACTURE:
4. BOTTLE INTERIOR TO BE FREE OF LOOSE RUST, MILL SCALE, AND OTHER DETRIMENTAL FOREIGN MATTER AS WELL AS OIL, GREASE, DRAWING AND CUTTING COMPOUNDS AND OTHER SOLUBLE CONTAMINANTS
5. WELDING SPECIFICATION: CJP (COMPLETE JOINT PENETRATION)
6. MARK PRESSURE COMPONENTS PER WORK INSTRUCTION WI-MF-2015-004
   1. COMPLETE SERIAL NUMBER DEFINED AS COMPLETE WORK ORDER NUMBER PLUS CURRENT COMPONENT WORK ORDER COUNT E.G. WCXXXXXXX-XX
   2. WHERE REQUIRED MARK CRN NUMBER PER WORK INSTRUCTION WI-MF-2015-004
   3. WHERE REQUIRED MARK ASME PRESSURE VESSEL MARKINGS PER WORK INSTRUCTION WI-MF-2015-004

SURFACE PROTECTION:
7. ALL THREADED HOLES, PORTS AND SEALING FACES TO BE PLUGGED/PROTECTED PRIOR TO SURFACE PREP AND PAINTING
8. EXTERIOR SURFACE PREPPED TO SSPC-SP11 FOLLOWED BY SSPC-SP1 OR BETTER (REFER TO: WI-MF- 2013-026).
9. PAINT SYSTEM APPLICATION ACCORDING TO: WI-MF-2014-001.
10. COLOR: CECC STANDARD GREY

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	UOM	SPECIFICATION
1	1	203363-00	BAFFLE 5 IN PULSATION DAMPER	EA	CS SA-106
2	1	205102	PULSATION BOTTLE SHELL	EA	CS SA-106 GR.B
3	1	205103	PULSATION BOTTLE HEAD .75NPT	EA	CS SA-105
4	1	205104	PULSATION BOTTLE DRAIN .25NPT	EA	CS SA-105

DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:

UNITS:	INCHES	X/X	±1/16
FINISH:	125 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±.5°

Clean Energy® COMPRESSION
Chilliwack, B.C., Canada

TITLE
PULSATION BOTTLE 5500 PSIG

DR. EDL 2007/11/27	SIZE D	DOC. NO. 205105	REV F	
CK.				
AP.	SCALE 2:3	WEIGHT 92 LBS	SHEET 1 / 1	

PRESSURE TEST REPORT

Test Standard ASME SECTION VIII Division 1

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1041690
Part ID	618873
Part Description	Cooler Section 4P-16T 24N 2500PSI
Sequence ID	40
Serial #	WC1041690-2
Drawing ID (incl Rev.)	618873 REV B

TEST REQUIREMENTS

Type (media)	Pneumatic
Design Pressure (PSIG)	2500
Test Pressure (PSIG)	3000
	(Approx. 206.84 BAR, 20684.28 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
4500	12000

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1219	Gauge, Pressure	0 to 5000 PSIG	50 PSIG	2016/08/26
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/03/28

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
In Out	A150889			All Heat Numbers Verified (Certs on File).
In Out	A150889			
Plugs	A145763 (4)			Checked By: Warehouse
Tubes	15-274			

Metal Temp (> MDMT +30 F)	60F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	2,500	2500		6:20 PM
(2) Pressure Off	2,500	2500		6:30 PM

Test Completed By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

Witnessed by AI (when req'd): **Date:**

NOTES

Note: Zone/Line was brought up to test pressure, then reduced down to design pressure as per ASME B31.3, 345.5.5.

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.

CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Pneumatic Test Type Confirmed

PASS

Report Completed By: Daryl Cameron

Report Date: 2016/03/29

PRESSURE TEST REPORT

Test Standard ASME SECTION VIII Division 1

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1041690
Part ID	618873
Part Description	Cooler Section 4P-16T 24N 2500PSI
Sequence ID	40
Serial #	WC1041690-1
Drawing ID (incl Rev.)	618873 REV B

TEST REQUIREMENTS

Type (media)	Pneumatic
Design Pressure (PSIG)	2500
Test Pressure (PSIG)	3000
	(Approx. 206.84 BAR, 20684.28 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
4500	12000

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1219	Gauge, Pressure	0 to 5000 PSIG	50 PSIG	2016/08/26
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/03/28

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
In Out	A150889			All Heat Numbers Verified (Certs on File).
In Out	A150889			
Plugs	A145763 (4)			Checked By: Warehouse
Tubes	15-274			

Metal Temp (> MDMT +30 F)	60F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	2,500	2500		6:20 PM
(2) Pressure Off	2,500	2500		6:30 PM

Test Completed By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

Witnessed by AI (when req'd): **Date:**

NOTES

Note: Zone/Line was brought up to test pressure, then reduced down to design pressure as per ASME B31.3, 345.5.5.

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.

CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Pneumatic Test Type Confirmed

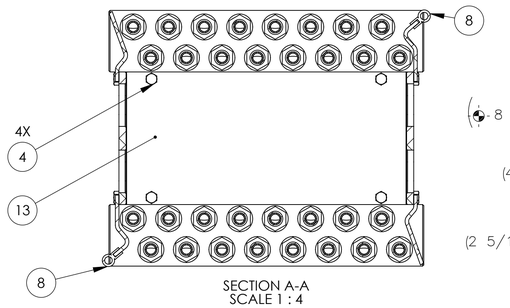
PASS

Report Completed By: Daryl Cameron

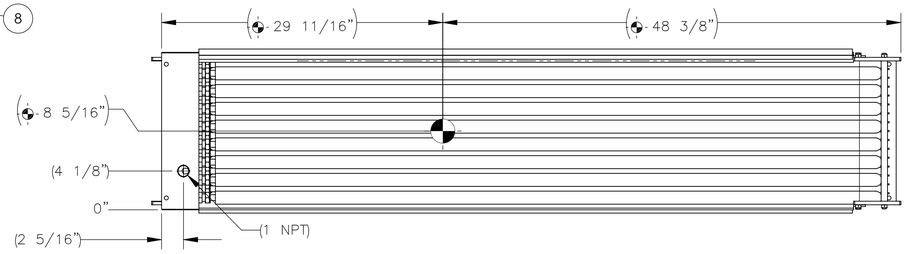
Report Date: 2016/03/29

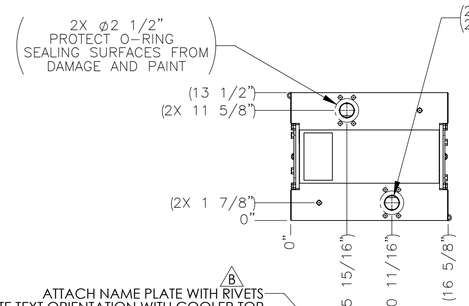
REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
01	2015/05/15	RJT	TC	TFJ	N/A	FIRST RELEASE, DERIVED FROM 206110
A	2015/06/03	RJT	TC	TFJ	3565	UPDATES FOR HEADERS, END PLUGS WERE ORB-24, ADDED NAME PLATE
B	2015/08/05	HS	TC	TFJ	4034	CHANGE REFERENCE DIM TO CRITICAL, UPDATE TO RIVET NAME PLATE

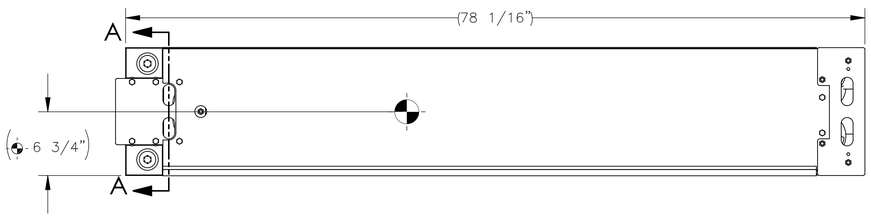
APPROVED
By Tamas Jozsa at 7:18 pm, Aug 06, 2015

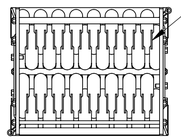


SECTION A-A
SCALE 1 : 4

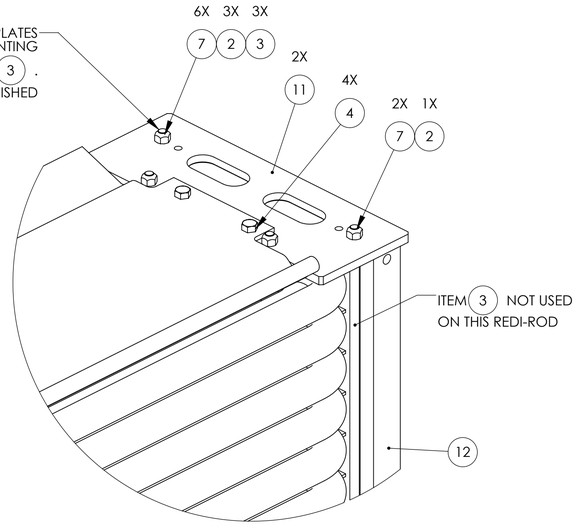






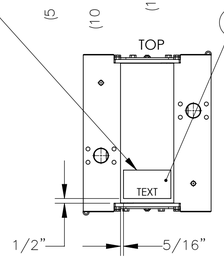


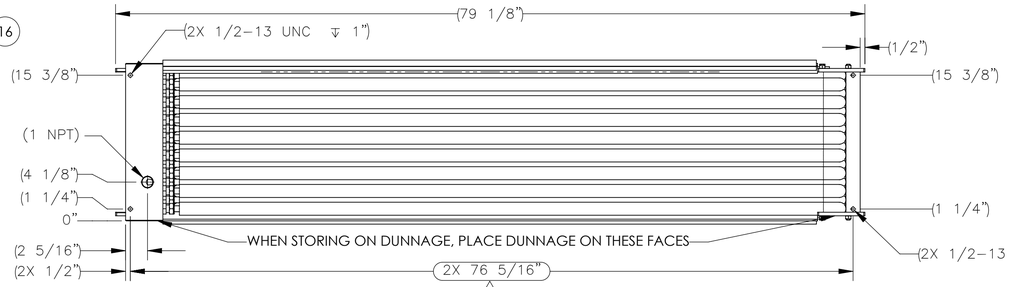
TIGHTEN NUTS UNTIL SIDE PLATES BOTTOM OUT ON MOUNTING BAR (12) OR TUBE SUPPORT (3). TRIM REDI-RODS WHEN FINISHED



DETAIL C
SCALE 1 : 3

(B) ATTACH NAME PLATE WITH RIVETS
NOTE TEXT ORIENTATION WITH COOLER TOP
RECORD REQUIRED INFO ON NAME PLATE





NOTES:

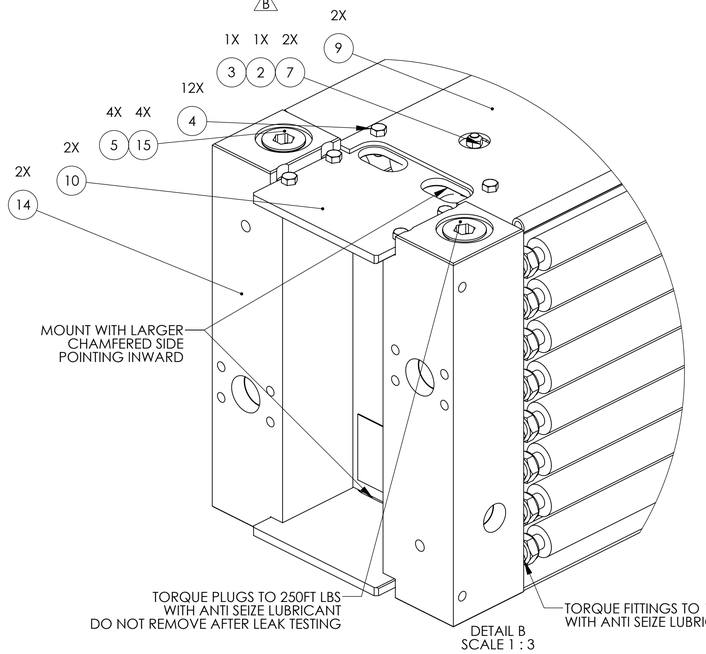
DESIGN SPECIFICATIONS:
- SERVICE: SWEET NATURAL GAS
- CORROSION ALLOWANCE:
- - TUBES: 0.007"
- - HEADERS: 1/32"
- VOLUME: 955IN^3
- MAWP: 2500 PSIG @ 400 °F
- MDMT: -20 °F @ 2500 PSIG

APPLICABLE DESIGN CODES
- ASME SECTION VIII, DIVISION 1, BOILER AND PRESSURE VESSEL CODE 2013
- CSA B51-09, BOILER, PRESSURE VESSEL, AND PRESSURE PIPING CODE.

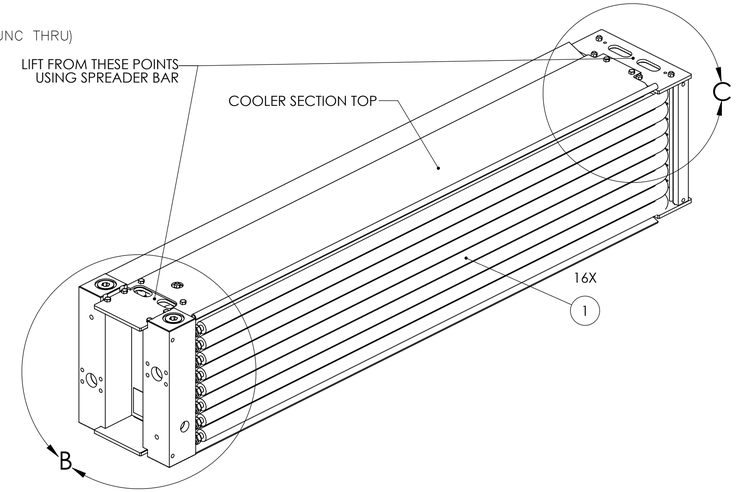
NDE REQUIREMENT: PRESSURE TEST TO ASME SECTION VIII
- HYDROSTATIC TEST PRESSURE: 3250PSIG (1.3 X MAWP)
- OR PNEUMATIC TEST PRESSURE: 3000PSIG (1.2 X MAWP)

NOTES:
1. THREAD END PLUGS AND BODIES OF CS TUBE FITTINGS INTO HEADERS. PAINT HEADER ASSEMBLY PER NOTES BELOW PRIOR TO ASSEMBLY OF REMAINING COMPONENTS.
   1. ALL O-RING SEALING SURFACES FOR 1.5 SAE PORTS TO BE MASKED/PROTECTED PRIOR TO SURFACE PREP AND PAINTING.
   2. ALL THREADED HOLES TO BE PLUGGED/PROTECTED PRIOR TO SURFACE PREP AND PAINTING.
   3. EXTERIOR SURFACES PREPPED TO SSPC-SP11 OR BETTER (REFER TO: WI-MF-2013-026).
   4. PAINT SYSTEM APPLICATION ACCORDING TO: WI-MF-2014-001.
   5. COLOR: CECC STANDARD GREY.
2. TORQUE 3/8-16UNC FASTENERS TO 15FT-LB LUBED (20FT-LBS DRY).
3. REFER TO PROCESS PLAN 703002 FOR ASSEMBLY AND TEST PROCEDURES.

REF. NO.	QTY.	PART NUMBER	DESCRIPTION	UOM	WEIGHT (lbs)
1	16	203315-00	FORMED FIN TUBE 4P 0.625x0.065	EA	17.5
2	5	205731	REDI ROD COOLER SECTION 8 TUBES	EA	0.5
3	4	205807	COOLER SECTION TUBE SUPPORT PIPE 8 TUBES	EA	0.2
4	20	303446	BOLT HH CS GR.5 0.375-16UNC X 1.000 ZN	EA	0.1
5	4	305375	ORING 2-128 V90D	EA	0.00
6	45	327666	RUBBER EDPM 2.000IN X 2.000IN X 0.125IN	EA	0.0
7	10	328331	NUT HEX LOCK GR9 CS 0.375 IN	EA	0.0
8	2	328345	WEATHERSTRIP EDGE TRIM STRAIGHT BUBBLE (CUT TO 69IN LONG)	EA	1.0
9	2	618852	SHEET SIDE PAN 0.188IN X 13.375IN X 70.375IN AL	EA	17.2
10	2	618853	PLATE CLAMP FRONT 0.375IN X 7.0IN X 9.5IN AL	EA	2.2
11	2	618854	PLATE CLAMP BACK 0.375IN X 5.0IN X 13.5IN AL	EA	2.2
12	1	618858	BAR MOUNTING 16T 0.75IN X 1.5IN X 15.25IN AL	EA	1.6
13	1	618862	SHEET HEADER BLANK 16T 0.08IN X 7.0IN X 14.75IN AL	EA	0.8
14	2	618867	HEADER RETURN 16T COOLER SECTION	EA	58.5
15	4	624816	PLUG SA-105 SAE -20N 1.625-12UN HEX	EA	0.48
16	1	625083	NAME PLATE 5IN X 3IN X 0.041IN (HEAT EXCHANGER PSIG/F)	EA	0.1



DETAIL B
SCALE 1 : 3



DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:			
UNITS:	INCHES	X/X	±1/16
FINISH:	250 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±.5°

Clean Energy COMPRESSION Chilliwack, B.C., Canada

TITLE: COOLER SECTION 4P-16T 24N 2500PSI

DR.	TC	2015/05/15	SIZE D	DOC. NO. 618873	REV B
CK.	RJT	2015/05/15			
AP.	TFJ	2015/05/15	SCALE 1:8	WEIGHT 451.9 LBS	SHEET 1 / 1

PRESSURE TEST REPORT

Test Standard ASME SECTION VIII Division 1

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1041692
Part ID	618875
Part Description	Cooler Section 4/8P-16/8T 16N 5000PSI
Sequence ID	40
Serial #	WC1041692-4
Drawing ID (incl Rev.)	618875 REV B

TEST REQUIREMENTS

Type (media)	Pneumatic
Design Pressure (PSIG)	5000
Test Pressure (PSIG)	6000
	(Approx. 413.69 BAR, 41368.55 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
9000	24000

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1218	Gauge, Pressure	0 to 10000 PSIG	100 PSIG	2016/07/20
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/03/29

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
In Out	A150889			All Heat Numbers Verified (Certs on File).
In Out	A150889			
Plugs	A145763 (4)			Checked By: Warehouse
Tubes	015090072			

Metal Temp (> MDMT +30 F)	60F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	5,000	5000		6:28 PM
(2) Pressure Off	5,000	5000		6:45 PM

Test Completed By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

Witnessed by AI (when req'd): **Date:**

NOTES

Note: Zone/Line was brought up to test pressure, then reduced down to design pressure as per ASME B31.3, 345.5.5.

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.

CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Pneumatic Test Type Confirmed

PASS

Report Completed By: Daryl Cameron

Report Date: 2016/03/29

PRESSURE TEST REPORT

Test Standard ASME SECTION VIII Division 1

UNIT UNDER TEST (UUT) DATA

Work Order ID	WC1041692
Part ID	618875
Part Description	Cooler Section 4/8P-16/8T 16N 5000PSI
Sequence ID	40
Serial #	WC1041692-3
Drawing ID (incl Rev.)	618875 REV B

TEST REQUIREMENTS

Type (media)	Pneumatic
Design Pressure (PSIG)	5000
Test Pressure (PSIG)	6000
	(Approx. 413.69 BAR, 41368.55 kPa)
Duration (minutes)	10

Min Gauge (1.5 * Test Pressure)	**Max Gauge (4 * Test Pressure)**
9000	24000

PRESSURE GAUGE(S) USED

Serial #	Description	Range	Accuracy +/-	Cal. Due
PRIMARY				
IMW-1218	Gauge, Pressure	0 to 10000 PSIG	100 PSIG	2016/07/20
SECONDARY (If Used)				

TEST DATA

MDMT (see drawing) -20

Test Commenced On (YYYY/MM/DD) 2016/03/29

PART DESCRIPTION	HEAT NUMBER	PART DESCRIPTION	HEAT NUMBER	HT# VERIFICATION
In Out	A150889			All Heat Numbers Verified (Certs on File).
In Out	A154903			
Plugs	A145763 (4)			Checked By: Warehouse
Tubes	015090072			

Metal Temp (> MDMT +30 F)	60F	**WATER TEMP >70F (ASME SECT I)**	N/A

Test Commenced By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

		Actual Readings (PSIG)		
Test Steps	**Target (PSIG)**	**Primary Gauge**	**Secondary Gauge**	**Time**
(1) Pressure On	5,000	5000		6:28 PM
(2) Pressure Off	5,000	5000		6:45 PM

Test Completed By	Daryl Cameron	Witnessed By	Clayton Harrison
Employee #	910	Employee #	300

Witnessed by AI (when req'd): **Date:**

NOTES

Note: Zone/Line was brought up to test pressure, then reduced down to design pressure as per ASME B31.3, 345.5.5.

RESULTS

Pressure gauge(s) used were calibrated and traceable to National and/or International Standards.

CEC hereby certifies the UUT stated above was tested with the following results:

- ✓ Valid Pressure Gauge(s) Used
- ✓ Heat Numbers Verified
- ✓ Test Pressure Attained
- ✓ Test Pressure Maintained
- ✓ Test Duration Attained
- ✓ Pneumatic Test Type Confirmed

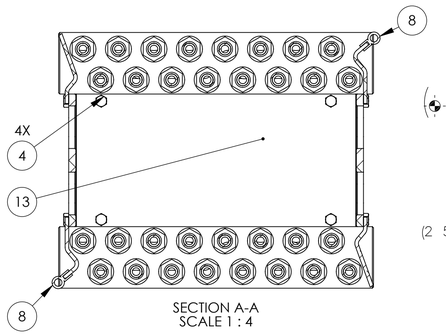
PASS

Report Completed By: Daryl Cameron

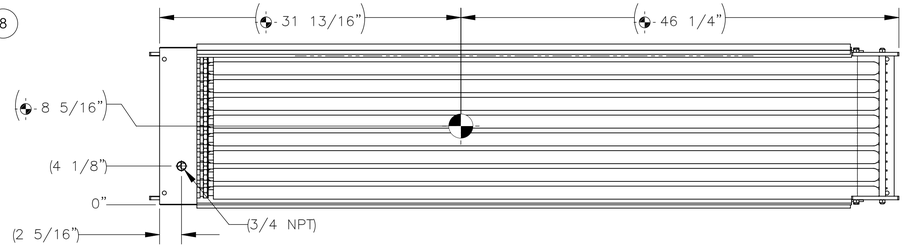
Report Date: 2016/03/29

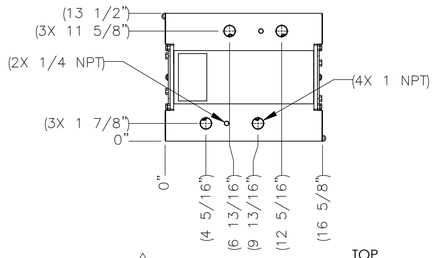
REVISION HISTORY						
REV.	DATE	BY	CK.	AP.	ECO#	REFERENCE
01	2015/05/15	TC	RJT	TFJ	N/A	FIRST RELEASE, DERIVED FROM 208235
A	2015/06/03	TC	RJT	TFJ	3565	UPDATES FOR HEADERS, END PLUGS WERE ORB-24, ADDED NAME PLATE
B	2015/08/05	HS	TC	TFJ	4034	CHANGE REFERENCE DIM TO CRITICAL, UPDATE TO RIVET NAME PLATE

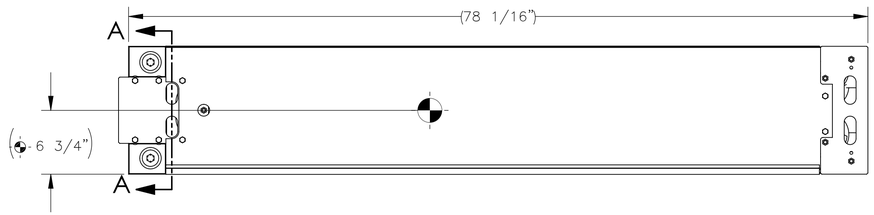
APPROVED
By Tamas Jozsa at 7:19 pm, Aug 06, 2015

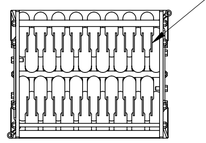


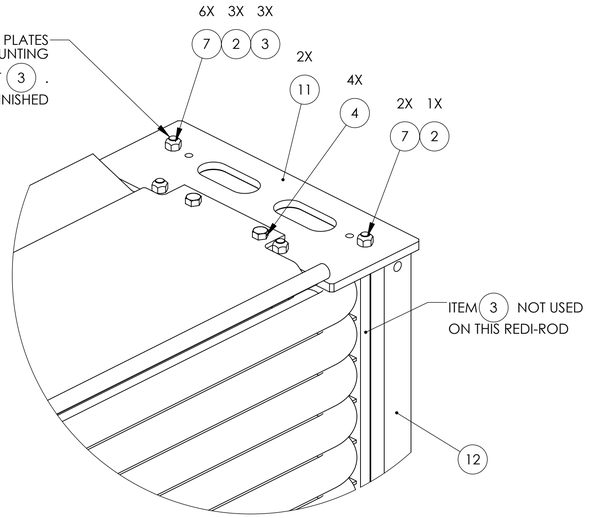
SECTION A-A
SCALE 1 : 4



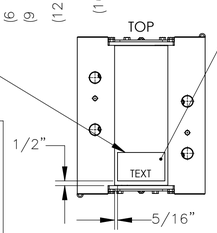


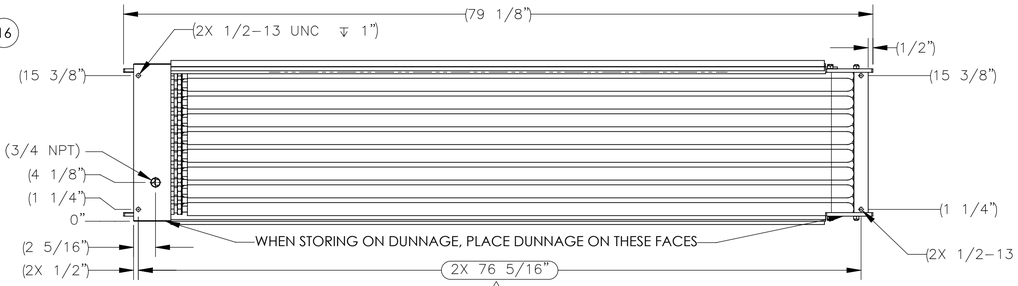






DETAIL C
SCALE 1 : 3





NOTES:

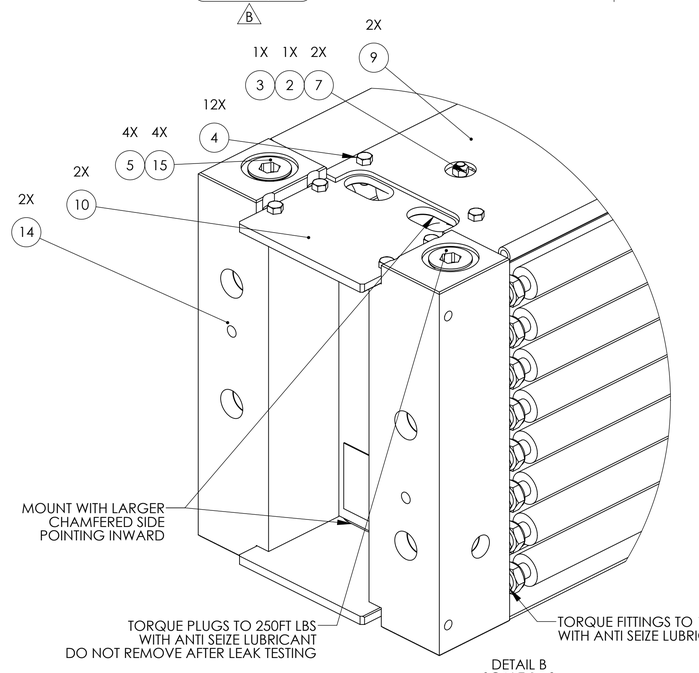
DESIGN SPECIFICATIONS:
- SERVICE: SWEET NATURAL GAS
- CORROSION ALLOWANCE:
  - TUBES: 0.002"
  - HEADERS: 1/32"
- VOLUME: 665INA3
- MAWP: 5000 PSIG @ 400 °F
- MDMT: -20 °F @ 5000 PSIG

APPLICABLE DESIGN CODES
- ASME SECTION VIII, DIVISION 1, BOILER AND PRESSURE VESSEL CODE 2013
- CSA B51-09, BOILER, PRESSURE VESSEL, AND PRESSURE PIPING CODE.

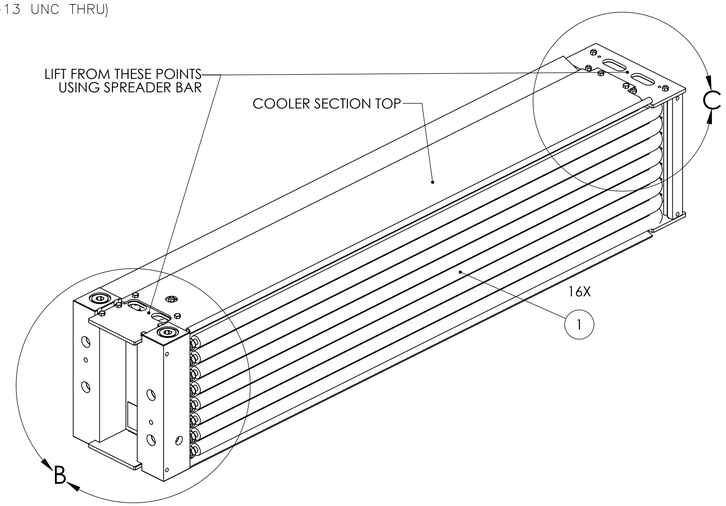
NDE REQUIREMENT: PRESSURE TEST TO ASME SECTION VIII
- HYDROSTATIC TEST PRESSURE: 6500PSIG (1.3 X MAWP)
- OR PNEUMATIC TEST PRESSURE: 6000PSIG (1.2 X MAWP)

NOTES:
1. THREAD END PLUGS AND BODIES OF CS TUBE FITTINGS INTO HEADERS. PAINT HEADER ASSEMBLY PER NOTES BELOW PRIOR TO ASSEMBLY OF REMAINING COMPONENTS.
   1. ALL THREADED HOLES TO BE PLUGGED/PROTECTED PRIOR TO SURFACE PREP AND PAINTING.
   2. EXTERIOR SURFACES PREPPED TO SSPC-SP11 OR BETTER (REFER TO: WI-MF-2013-026).
   3. PAINT SYSTEM APPLICATION ACCORDING TO: WI-MF-2014-001.
   4. COLOR: CECC STANDARD GREY.
2. TORQUE 3/8-16UNC FASTENERS TO 15FT-LB LUBED (20FT-LBS DRY).
3. REFER TO PROCESS PLAN 703002 FOR ASSEMBLY AND TEST PROCEDURES.

REF. NO.	QTY.	PART NUMBER	DESCRIPTION	UOM	WEIGHT (lbs)
1	16	203315-01	FORMED FIN TUBE 4P 0.625x0.109	EA	24.5
2	5	205731	REDI ROD COOLER SECTION 8 TUBES	EA	0.5
3	4	205807	COOLER SECTION TUBE SUPPORT PIPE 8 TUBES	EA	0.2
4	20	303446	BOLT HH CS GR.5 0.375-16UNC X 1.000 ZN	EA	0.1
5	4	305375	ORING 2-128 V90D	EA	0.00
6	45	327666	RUBBER EDPM 2.000IN X 2.000IN X 0.125IN	EA	0.0
7	10	328331	NUT HEX LOCK GR9 CS 0.375 IN	EA	0.0
8	2	328345	WEATHERSTRIP EDGE TRIM STRAIGHT BUBBLE (CUT TO 69IN LONG)	EA	1.0
9	2	618852	SHEET SIDE PAN 0.188IN X 13.375IN X 70.375IN AL	EA	17.2
10	2	618853	PLATE CLAMP FRONT 0.375IN X 7.0IN X 9.5IN AL	EA	2.2
11	2	618854	PLATE CLAMP BACK 0.375IN X 5.0IN X 13.5IN AL	EA	2.2
12	1	618858	BAR MOUNTING 16T 0.75IN X 1.5IN X 15.25IN AL	EA	1.6
13	1	618862	SHEET HEADER BLANK 16T 0.08IN X 7.0IN X 14.75IN AL	EA	0.8
14	2	618869	HEADER IN-OUT 1.00FNPT 16T COOLER SECTION	EA	59.0
15	4	624816	PLUG SA-105 SAE -20N 1.625-12UN HEX	EA	0.48
16	1	625083	NAME PLATE 5IN X 3IN X 0.041IN (HEAT EXCHANGER PSIG/F)	EA	0.1



DETAIL B
SCALE 1 : 3



DIMENSIONING & TOLERANCING PER ASME Y14.5M-2009. U.S.O.:			
UNITS:	INCHES	X/X	±1/16
FINISH:	250 µIN.	.X	±.1
INNER RADII:	.03 MAX.	.XX	±.01
OUTER EDGE:	.03 MIN. X 45°	.XXX	±.005
		ANGLES	±.5°

Clean Energy COMPRESSION — Chilliwack, B.C., Canada

TITLE: COOLER SECTION 4/8P-16/8T 16N 5000PSI

DR.	TC	2015/05/15	SIZE: D	DOC. NO.: 618875	REV: B
CK.	RJT	2015/05/15			
AP.	TFJ	2015/05/15	SCALE 1:8	WEIGHT 564.7 LBS	SHEET 1 / 1

Office Number
1-800-833-6402

Webpage
www.mercervalve.net

Fax Number
405-495-8728

Email
sales@ mercervalve.net

MERCER VALVE CO., INC.®
AUTO SEAT TECHNOLOGY®

CERTIFICATE OF COMPLIANCE

Customer Name: CLEAN ENERGY COMPRESSION
43676 PROGRESS WAY CHILLIWACK BC V2R 0C3 CANADA

Customer PO Number: PO1073434

Item Description: **Qty:** (8) 81-17151V36G11 1" MNPT X 1" FNPT
Series 8100 Serial Number(s) 1225160 - 1225167
Set @ 115 psi Customer PN
Capacity SCFM Air 438
Repair Kit Number: 11V1G11

Mercer Valve Sales Order Number: CQ895
Mercer Valve Job Order Number: CQ895-6
Valve Setting Instructions:

Set Pressure Tolerance: 3%
Test Medium: Air

Leakage tight at 10% below set pressure

This certifies that the valves purchased on the above sales order number were built per section VIII, Division 1 of ASME boiler and pressure vessel code as indicated by the UV on the nameplate.

01/18/2016

Certified Individual
Quality Control

Office Number
1-800-833-6402

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www.mercervalve.net

Fax Number
405-495-8728

Email
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AUTO SEAT TECHNOLOGY®

CERTIFICATE OF COMPLIANCE

Customer Name: CLEAN ENERGY COMPRESSION
43676 PROGRESS WAY CHILLIWACK BC V2R 0C3 CANADA

Customer PO Number: PO1073434

Item Description: **Qty:** (10) 91-17D51T11E1 1" MNPT X 1" FNPT
Series 9100 Serial Number(s) 1225168 - 1225177
Set @ 575 psi Customer PN
Capacity SCFM Air 1184
Repair Kit Number: 1D1T1E2

Mercer Valve Sales Order Number: CQ895
Mercer Valve Job Order Number: CQ895-7
Valve Setting Instructions:
CDTP: 580.8
Set Pressure Tolerance: 3%
Test Medium: Air

Leakage tight at 10% below set pressure

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01/18/2016

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Customer Name: CLEAN ENERGY COMPRESSION
43676 PROGRESS WAY CHILLIWACK BC V2R 0C3 CANADA

Customer PO Number: PO1075709

Item Description: **Qty:** (3) 91-17C51P11E1 1" MNPT X 1" FNPT
Series 9100 Serial Number(s) 1233699 - 1233701
Set @ 1200 psi Customer PN
Capacity SCFM Air 1241
Repair Kit Number: 1C1P1E2

Mercer Valve Sales Order Number: CT397
Mercer Valve Job Order Number: CT397-4
Valve Setting Instructions:
CDTP: 1212
Set Pressure Tolerance: 3%
Test Medium: Air

Leakage tight at 10% below set pressure

This certifies that the valves purchased on the above sales order number were built per section VIII, Division 1 of ASME boiler and pressure vessel code as indicated by the UV on the nameplate.

03/04/2016

Certified Individual
Quality Control

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MERCER VALVE CO., INC.®
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CERTIFICATE OF COMPLIANCE

Customer Name: CLEAN ENERGY COMPRESSION
43676 PROGRESS WAY CHILLIWACK BC V2R 0C3 CANADA

Customer PO Number: PO1073434

Item Description: **Qty:** (5) 91-M2C61P1541 ¾" MNPT X 1" FNPT
Series 9100 Mod-20 Serial Number(s) 1225123 - 1225127
Set @ 3525 psi Customer PN
Capacity SCFM Air 3618
Repair Kit Number: 1C1P143

Mercer Valve Sales Order Number: CQ896
Mercer Valve Job Order Number: CQ896-1
Valve Setting Instructions:
CDTP: 3560.3
Set Pressure Tolerance: 3%
Test Medium: Air

Leakage tight at 10% below set pressure

This certifies that the valves purchased on the above sales order number were built per section VIII, Division 1 of ASME boiler and pressure vessel code as indicated by the UV on the nameplate.

Lisa Taylor

Certified Individual
Quality Control

01/18/2016

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MERCER VALVE CO., INC.®
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CERTIFICATE OF COMPLIANCE

Customer Name: CLEAN ENERGY COMPRESSION
43676 PROGRESS WAY CHILLIWACK BC V2R 0C3 CANADA

Customer PO Number: PO1075536

Item Description: **Qty:** (2) 91-M1C61P5641 ¾" FNPT X 1" FNPT
Series 9100 Mod-20 Serial Number(s) 1233000 - 1233001
Set @ 5000 psi Customer PN
Capacity SCFM Air 5127
Repair Kit Number: 1C1P143

Mercer Valve Sales Order Number: CT142
Mercer Valve Job Order Number: CT142-2
Valve Setting Instructions:
CDTP: 5050
Set Pressure Tolerance: 3%
Test Medium: Air

Leakage tight at 10% below set pressure

This certifies that the valves purchased on the above sales order number were built per section VIII, Division 1 of ASME boiler and pressure vessel code as indicated by the UV on the nameplate.

Lisa Taylor — 03/01/2016
Certified Individual
Quality Control

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CERTIFICATE OF COMPLIANCE

Customer Name: CLEAN ENERGY COMPRESSION
43676 PROGRESS WAY CHILLIWACK BC V2R 0C3 CANADA

Customer PO Number: PO1073434

Item Description: **Qty:** (10) 91-17D51T11E1 1" MNPT X 1" FNPT
Series 9100 Serial Number(s) 1225168 - 1225177
Set @ 575 psi Customer PN
Capacity SCFM Air 1184
Repair Kit Number: 1D1T1E2

Mercer Valve Sales Order Number: CQ895
Mercer Valve Job Order Number: CQ895-7
Valve Setting Instructions:
CDTP: 580.8
Set Pressure Tolerance: 3%
Test Medium: Air

Leakage tight at 10% below set pressure

This certifies that the valves purchased on the above sales order number were built per section VIII, Division 1 of ASME boiler and pressure vessel code as indicated by the UV on the nameplate.

01/18/2016

Certified Individual
Quality Control

CERTIFICATE OF INSPECTION & TEST

Honeywell Analytics is committed to providing proven, tested and reliable products. Each instrument is manufactured and tested according to ISO9001 documented procedures and calibrated prior to final inspection.

UNIT INSPECTED & TESTED			
Product name: *Sensepoint XCD (UL/Inmetro Approved)*	**Unit Serial No:** *K0360315470058*	**Transmitter Serial No:** *K0354015470058*	**Sensor Serial No:** *K0254715470058*
Product part No: *SPXCDULNRX*	**Gas Type:** *CH4*		**Range:** *0~100 %LEL*

ITEMS TESTED	
Magnetic key operation - *Pass*	**Calibrate 4 to 20mA -** *Pass*
LCD operation - *Pass*	**Current output at fault (1±0.3mA) -** *Pass*
Back Light Operation - *Pass*	**Current output at inhibit condition (2mA) -** *Pass*
Software version - *F/W_6M, SRS_1, EEP_15*	**Visual inspection -** *Pass*
Relay Operation - *Pass*	**Standard accessories -** *Pass*
RS485 Operation - *N/A*	

ZERO ADJUSTMENT	
Gas(or Current) Applied: Fresh Air	
mA Output: *(if applicable)* *3.99mA* / *4±0.05 mA*	**Concentration Display:** *(if applicable)* *0%LEL* / *0%LEL*

SPAN ADJUSTMENT		
Gas(or Current) Applied: *CH4*	**Concentration:** *50%LEL*	**Acceptable Range:** *50±2%LEL*
mA Output: *(if applicable)* *12.177mA* / *12±0.38 mA*	**Concentration Display:** *(if applicable)* *50%LEL* / *50%LEL*	

FULL ADJUSTMENT		
Gas(or Current) Applied: *N/A*	**Concentration:** *N/A*	**Acceptable Range:** *N/A*
mA Output: *(if applicable)* *N/A*	**Concentration Display:** *(if applicable)* *N/A*	

It is hereby confirmed that the above unit has been inspected and found free from manufacturing defects and to operate correctly prior to despatch from the factory.

Inspected & Tested by : 	*Date : 2015-11-23*

Users are reminded that all instruments should be calibrated as part of the on site commissioning procedure to prove the operation of the overall gas detection system. Refer to product manual for details.

Clean Energy®
COMPRESSION

www.imw.ca

COMPRESSOR SKID

MODEL	CLEANCNG 5500DA-300-4500-4AC		
SERIAL NUMBER		CRN #	N/A
DATE OF MANUFACTURE			

INLET PRESSURE	50 TO 90 PSIG 3.4 TO 6.2 BARG	MAXIMUM DISCHARGE PRESSURE	4500 PSIG 310 BARG

FLOW RATE: 689 SCFM / 1168 Sm3/h AT 90 PSIG / 6.2 BARG

(Flow rate specified at Ambient Temperature 20°C, Ambient Pressure 1 atm, Gas Temperature 15°C)

VOLTAGE	460V	120V	MAIN MOTOR POWER	300HP
PHASE	3	1		
RATED LOAD AMPERES	346A	6.7A	FREQUENCY	60Hz
AMBIENT TEMPERATURE	-4F TO 113F -20C TO 45C		TEMP CODE	T2

C ETL US LISTED Intertek
3189474

EQUIPMENT SUITABLE FOR CLASS I, DIV. 2, GROUP D ENVIRONMENT

CONFORMS TO ANSI/ISA Std 12.12.01 & UL Std 508A

CERTIFIED TO CSA Std C22.2 No. 213 & CSA Std 22.2 No.14

LOCK OUT POWER BEFORE SERVICING

FOR NATURAL GAS USE ONLY

MADE IN CANADA