



PHOENIX INNOVATIONS INC.

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User Manual for Phoenix Innovations Chiller SANDERSON UNION SPRINGS, AL



Serial # 241031
Model # P408

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Letter of Conformity

Phoenix Innovations manufactures, sells, and services food processing equipment to exact customer specifications. Our equipment is designed and manufactured to meet or exceed both safety, hygiene, and environmental standards that will be present in the food processing industry. Equipment is manufactured using stainless steel, or other acceptable plastic components in food contact areas and uses corrosion resistant materials throughout the machine when possible. Equipment is designed and built with hygiene in mind and ease of both cleaning and maintaining.

RMA Procedures

- A. When you receive your merchandise:
 - a. Please open all boxes immediately and check contents. We must be notified of any damaged or defective products within 2 business days of you receiving your products. We also request that you also inspect all of your products for obvious defects/blemishes within 2 days of receiving them.
- B. If you receive the incorrect product:
 - a. It is very rare that you will receive an incorrect product; we double-check *all* orders before we ship them. However, if we made a mistake/error in shipping (it does rarely happen), please contact us. We will issue an RMA Number and return instructions on how and where to return the product. After receipt of the incorrect part we will then ship you the correct product and *pay the shipping costs both ways*. In some instances we may choose to ship a replacement overnight providing we receive another purchase order for the replacement. If you ordered the incorrect product and would like to return it, then please see the "Returns" section.
- C. Shipping Damage:
 - a. If the packaging appears damaged on the outside, *please refuse to accept it from the carrier*; or please make sure when signing the shipper's proof-of-delivery slip, you include a note stating the package is or appears damaged. If you do accept a damaged shipment, please contact us immediately. Depending on the product and where/how it was shipped, it may be necessary for you to deal with the carrier. Also, if there was any internal (non-visible) damage, this will need to be reported to us or the carrier within two days of receiving the product.
- D. Returns:
 - a. CRITERIA REQUIRED FOR RETURNING ITEM(S)
 - i. Must be within 30 days from the day you received the item
 - ii. Item must not have been installed
 - iii. The item must be in perfect resalable condition in the original packaging
 - iv. Custom orders or quoted items are non-returnable
 - v. Item must have been shipped by a Common Carrier (UPS/FedEx/USPS) If the above criteria is met, then we will issue an RMA Number
 - b. If you ordered the wrong products and wish to return the product, you will need to contact us to request an RMA Number. Returns will be subject to a 20% Restocking fee.
 - c. Please do NOT return any product that you have ordered without contacting us for an RMA Number first. This will make processing your credit very difficult and may delay your credit.
- E. Returned Materials Authorization:
 - a. When it is necessary to return a product, please contact us to request an RMA Number. All returns, regardless of how they were shipped or where they were shipped from must be referenced by an RMA Number. Packages returned to us without an RMA number will not be returned to you. Handling returns in the manner that we do is necessary to ensure that you receive proper credit in a timely fashion.
 - b. When you request an RMA Number to return a product, we will either issue the RMA at that time, or contact the warehouse that it shipped from and request that one be issued. If we need to receive the RMA from another warehouse, we will let you know by forwarding the information to you along with shipping instructions as soon as we receive it. The instructions for return must be followed carefully.
 - c. Once the product has been received at our warehouse, it will be inspected and you will be credited for the returned product less the applicable Restocking Fee and original shipping and processing charges.
 - d. If the product is returning to another warehouse, they will contact us once they have received the product, inspected it, and we have been issued credit. Once we have been credited for the return, your credit will be issued less the Restocking Fee and original shipping and processing charges.

Safety

The Control of Hazardous Energy (Lockout/Tagout)

The following lockout/tagout program is provided only as a guide to assist employers and employees in complying with the requirements of 29 CFR 1910.147, as well as to provide other helpful information. It is not intended to supersede the requirements of the standard. An employer should review the standard for particular requirements which are applicable to their individual situation and make adjustments to this program that are specific to their company. An employer will need to add information relevant to their particular facility in order to develop an effective, comprehensive program.

Lockout/Tagout Procedure

OBJECTIVE

The objective of this procedure is to establish a means of positive control to prevent the accidental starting or activating of machinery or systems while they are being repaired, cleaned and/or serviced. This program serves to:

- A. Establish a safe and positive means of shutting down machinery, equipment and systems.
- B. Prohibit unauthorized personnel or remote control systems from starting machinery or equipment while it is being serviced.
- C. Provide a secondary control system (tagout) when it is impossible to positively lockout the machinery or equipment.
- D. Establish responsibility for implementing and controlling lockout/tagout procedures.
- E. Ensure that only approved locks, standardized tags and fastening devices provided by the company will be utilized in the lockout/tagout procedures.

ASSIGNMENT OF RESPONSIBILITY

- A. Responsible Person will be responsible for implementing the lockout/tagout program.
- B. Responsible Persons are responsible for enforcing the program and insuring compliance with the procedures in their departments.
- C. Responsible Person is responsible for monitoring the compliance of this procedure and will conduct the annual inspection and certification of the authorized employees.
- D. Authorized employees (those listed in Attachment A) are responsible for following established lockout/tagout procedures. An authorized employee is defined as a person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under 1910.147, The Control of Hazardous Energy (lockout/tagout).
- E. Affected employees (all other employees in the facility) are responsible for insuring they do not attempt to restart or re-energize machines or equipment that are locked out or tagged out. An affected employee is defined as a person whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

PROCEDURES

The ensuing items are to be followed to ensure both compliance with the OSHA Control of Hazardous Energy Standard and the safety of our employees.

Employees who are required to utilize the lockout/tagout procedure (see Attachment A) must be knowledgeable of the different energy sources and the proper sequence of shutting off or disconnecting energy means. The four types of energy sources are:

1. electrical (most common form);
2. hydraulic or pneumatic;
3. mechanical (including gravity).

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More than one energy source may be utilized on some equipment and the proper procedure must be followed in order to identify energy sources and lockout/tagout accordingly. See Attachment F for specific procedure format.

ELECTRICAL

1. Shut off power at machine and disconnect.
2. Disconnecting means must be locked or tagged.
3. All controls must be returned to their safest position.
4. Points to remember:
 - a. If a machine or piece of equipment contains capacitors, they must be drained of stored energy.
 - b. Possible disconnecting means include the power cord, power panels (look for primary and secondary voltage), breakers, the operator's station, motor circuit, relays, limit switches, and electrical interlocks.
 - c. Some equipment may have a motor isolating shut-off and a control isolating shut-off.
 - d. If the electrical energy is disconnected by simply unplugging the power cord, the cord must be kept under the control of the authorized employee or the plug end of the cord must be locked out or tagged out.

HYDRAULIC / PNEUMATIC

1. Shut off all energy sources (pumps and compressors). If the pumps and compressors supply energy to more than one piece of equipment, lockout or tagout the valve supplying energy to the piece of equipment being serviced.
2. Stored pressure from hydraulic/pneumatic lines shall be drained/bled when release of stored energy could cause injury to employees.
3. Make sure controls are returned to their safest position (off, stop, standby, inch, jog, etc.).

MECHANICAL ENERGY

Mechanical energy includes gravity activation, energy stored in springs, etc.

1. Block out or use die ram safety chain.
2. Lockout or tagout safety device.
3. Shut off, lockout or tagout electrical system.
4. Check for zero energy state.
5. Return controls to safest position.

Release from Lockout/Tagout

1. **Inspection:** Make certain the work is completed and inventory the tools and equipment that were used.
2. **Clean-up:** Remove all towels, rags, work-aids, etc.
3. **Replace guards:** Replace all guards possible. Sometimes a particular guard may have to be left off until the start sequence is over due to possible adjustments. However, all other guards should be put back into place.
4. **Check controls:** All controls should be in their safest position.
5. **Check the Work Area:** The work area shall be checked to ensure that all employees have been safely positioned or removed and notified that the lockout/tagout devices are being removed.
6. **Remove locks/tags:** Remove only your lock and / or tag.

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Service or Maintenance Involving More than One Person

When servicing and/or maintenance is performed by more than one person, each authorized employee shall place his own lock or tag on the energy isolating source. This shall be done by utilizing a multiple lock scissors clamp if the equipment is capable of being locked out. If the equipment cannot be locked out, then each authorized employee must place his tag on the equipment.

Removal of an Authorized Employee's Lockout/Tagout by the Company

Each location must develop written emergency procedures that comply with 1910.147(e)(3) to be utilized at that location. Emergency procedures for removing lockout/tagout should include the following:

1. Verification by employer that the authorized employee who applied the device is not in the facility.
2. Make reasonable efforts to advise the employee that his/her device has been removed. (This can be done when he/she returns to the facility).
3. Ensure that the authorized employee has this knowledge before he/she resumes work at the facility.
4. **Shift or Personnel Changes**

Shift or Personnel Changes

Each facility must develop written procedures based on specific needs and capabilities. Each procedure must specify how the continuity of lockout or tagout protection will be ensured at all times. See 1910.147(f)(4).

Procedures for Outside Personnel/Contractors

Outside personnel/contractors shall be advised that the company has and enforces the use of lockout/tagout procedures. They will be informed of the use of locks and tags and notified about the prohibition of attempts to restart or re-energize machines or equipment that are locked out or tagged out.

The company will obtain information from the outside personnel/contractor about their lockout/tagout procedures and advise affected employees of this information.

The outside personnel/contractor will be required to sign a certification form (see Attachment E). If outside personnel/contractor has previously signed a certification that is on file, additional signed certification is not necessary.

Training and Communication

Each authorized employee who will be utilizing the lockout/tagout procedure will be trained in the recognition of applicable hazardous energy sources, type and magnitude of energy available in the work place, and the methods and means necessary for energy isolation and control.

Each affected employee (all employees other than authorized employees utilizing the lockout/tagout procedure) shall be instructed in the purpose and use of the lockout/tagout procedure, and the prohibition of attempts to restart or re-energize machines or equipment that are locked out or tagged out.

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Training will be certified using Attachment B (Authorized Personnel) or Attachment C (Affected Personnel). The certifications will be retained in the employee personnel files.

Periodic Inspection

A periodic inspection (at least annually) will be conducted of each authorized employee under the lockout/tagout procedure. This inspection shall be performed by the (Responsible person). If (Responsible person) is also using the energy control procedure being inspected, then the inspection shall be performed by another party.

The inspection will include a review between the inspector and each authorized employee of that employee's responsibilities under the energy control (lockout/tagout) procedure. The inspection will also consist of a physical inspection of the authorized employee while performing work under the procedures.

The (Responsible person) shall certify in writing that the inspection has been performed. The written certification (Attachment D) shall be retained in the individual's personnel file.

Attachments:

ATTACHMENT A

List of Authorized Personnel
For Lockout/Tagout Procedures

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ATTACHMENT B

**Certification of Training
(Authorized Personnel)**

I certify that I received training as an authorized employer under Company Name Lockout/Tagout program. I further certify that I understand the procedures and will abide by those procedures.

AUTHORIZED EMPLOYEE SIGNATURE

DATE

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ATTACHMENT C

**Certification of Training
(Affected Personnel)**

I certify that I received training as an Affected Employee under
Company Name Lockout/Tagout Program. I further certify and understand that I am prohibited
from attempting to restart or re-energize machines or equipment that are locked out or tagged out.

AUTHORIZED EMPLOYEE SIGNATURE

DATE

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ATTACHMENT D

Lockout/Tagout Inspection Certification

I certify that *Equipment* was inspected on this date utilizing lockout/tagout procedures.
The inspection was performed while working on
Equipment.

AUTHORIZED EMPLOYEE SIGNATURE

DATE

INSPECTOR SIGNATURE

DATE

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ATTACHMENT E

Outside Personnel/Contractor Certification

I certify that _____ and _____ (outside personnel/contractor) have informed each other of our respective lockout/tagout procedures.

AUTHORIZED EMPLOYEE SIGNATURE

DATE

INSPECTOR SIGNATURE

DATE

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ATTACHMENT F

**Equipment Specific Procedure
for**

Date: _____

Machine Identification

General Description:

Manufacturer:

Model Number:

Serial Number:

* If more than one piece of same equipment, list all serial numbers.

Location of equipment:

Operator Controls

The types of controls available to the operator need to be determined. This should help identify energy sources and lockout capacity for the equipment.

List types of operator controls:

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Energy Sources

The energy sources, such as electrical, steam, hydraulic, pneumatic, natural gas, stored energy, etc.) present on this equipment are:

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**Preventative Maintenance
Weekly**

	Date	Initial
1. Check belt tension (Unload End)	/	
2. Check chain tension (Unload End).....	/	
3. Check auto lube	/	
a. Verify no red light	/	
b. Verify contains grease	/	
4. Check belt tension (Drive End)	/	
5. Check chain tension (Drive End)	/	
6. Check auto lube	/	
a. Verify no red light	/	
b. Verify contains grease	/	
7. Check electrical panels for moisture	/	
8. Verify all Estops, Pull Cords, and Safety Switches function	/	
a. Panel Estop	/	
b. Near Side Pull Cord.....	/	
c. Far Side Pull Cord	/	
d. Drive End Cover.....	/	
e. Drive End Door	/	
f. Unload End Cover.....	/	
g. Unload End Door.....	/	
9. Run all motors and check for vibration.....	/	

Signed

Date

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**Preventative Maintenance
Monthly**

	Date	Initial
1. Check belt tension (Unload End)	/	
a. Inspect for wear. Replace if needed.	/	
2. Check chain tension (Unload End).....	/	
a. Inspect for wear. Replace if needed.	/	
b. Lube chain with food safe spray grease.	/	
3. Check auto lube (Unload End)	/	
a. Verify no red light	/	
b. Verify contains grease. Change if needed.	/	
4. Check belt tension (Drive End).....	/	
a. Inspect for wear. Replace if Needed	/	
5. Check chain tension (Drive End)	/	
a. Inspect for wear. Replace if needed.	/	
b. Lube chain with food safe spray grease.	/	
6. Check auto lube (Drive End).....	/	
a. Verify no red light	/	
b. Verify contains grease	/	
7. Check electrical panels for moisture	/	
8. Verify all Estops, Pull Cords, and Safety Switches function	/	
a. Panel Estop	/	
b. Near Side Pull Cord.....	/	
c. Far Side Pull Cord	/	
d. Drive End Cover.....	/	
e. Drive End Door	/	
f. Unload End Cover	/	
g. Unload End Door.....	/	
9. Run all motors and check for vibration	/	

Signed

Date

Machine Operation

Start Up

- Close both drains on the chiller.
- Fill system to operating level.
- Turn electrical disconnect on for auger, unloader, and recirculation pump to the closed / on position.
- Install both auger covers.
- Make sure all safeties are made and in a safe position.
- Enter a dwell time in the Dwell Time box. This should be in decimal minutes. (*ie. 20:30 is 20.5*)
- Enter the Unload paddles per minute in the Unload (PPM) box.
 - paddles per minute – how many paddles pass the exit ramp per minute.
- Press the start button.
 - The Auger, Unload, Recirc Pump and Blower motor will start up.
 - The Auger, Unload and Recirc Pump will (by default) take ten seconds to get to speed.
 - The Auto Cycle Start button will illuminate on the HMI to a bright red.

Notes

- If the need arises to run one of the motors separately from the others this can be done by taking the system out of Auto. Then in the lower left-hand corner of the home screen you will find toggle button for the following motors.
 - Auger
 - Unload
 - Recirc Pump
 - Blower
- If the flow from the recirc pump is too high or too low the speed of the pump can be changed in the System Configuration screen.

Shut Down

- Press the Auto Cycle Stop button.
- The Auger and Unload ramp down to stopped.
- The Blower and Recirc Pump will continue to run.
 - To shut down the Blower and Pump press the individual buttons for those motors on the home screen.

Emergency Shutdown

In the case of an emergency the machine is equipped with two pull cords. One on either side of the machine. Pulling either of these or pushing the Estop on the panel will put the machine into Emergency Stop. The machine will immediately stop applying power to all motors and not allow you to start back up until the safety controller has been reset.

Chiller Sanitation CIP Operation

Step 1

Get with the Refrigeration maintenance dept and make sure refrigeration has been turned off to the heat exchanger.

Turn off the Chiller panel.

Lock out panel

Open both drains that are located at each end of the chiller.

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Rinse the chiller body out.

Step 2

Turn the Chiller control panel on

Reset all e-stops and touch reset button on front of control panel

On the side of the chiller, the CIP box and the water recirculation box turn the valve handle to CIP.

Turn on water, then fill the CIP side tank with water.

Go to the touch screen and turn on the recirculation pump. Watch the water level in the CIP tank; you might have to stop the pump and restart the pump a couple of times. Once water returns into the CIP tank then the heat exchanger is full of water. Then let the tank fill back up, then turn the water off. Recirculate water to clean piping once completed.

Turn the recirculation pump off on the screen.

Drain Cip tank

Step 3

Refill CIP tank with hot water, pour chemical into side tank, follow step 2 to fill heat exchanger back up and when water recirculates back into CIP tank, then start your time for the cleaning chemicals to clean.

Once completed, drain the CIP tank.

Refill the CIP tank with clean hot water and flush the system until all chemicals have been flushed out of the system.

Once completed, turn all 3 valves back to production mode

Step 4

Turn power off on panel and release to QA dept.

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Controls

PLC (Programmable Logic Controller)

Micro 800 PLC

Programming

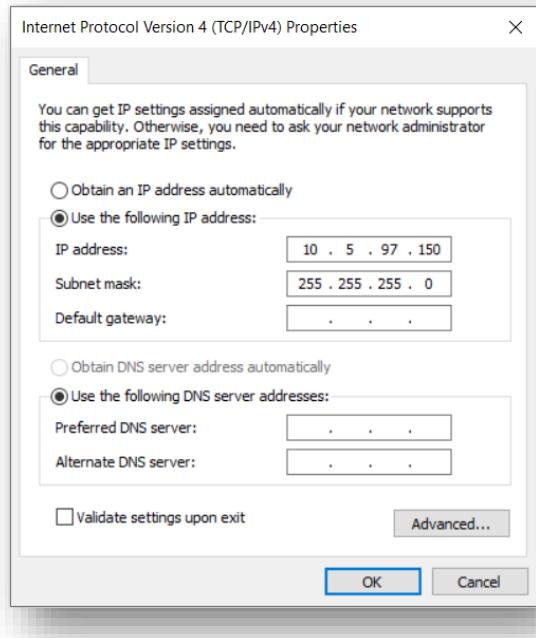
Programming a new Micro800 with Backup Card

Our programs are set to “Load On Startup”, so every time power is applied to the PLC, the program will be pulled from the memory card and saved to the PLC. After installing the new Micro800, the memory card adapter should be in the first expansion port on the front of the PLC. Once power is applied, the program should be pulled from the memory card.

Programming With Connected Components Workbench

The Micro800 series of PLC's are programmed with the program Connected Components Workbench (CCW). This can be downloaded for free on Rockwell Automation's website. These instructions show how to connect via an ethernet cord.

1. Configure the ethernet adapter settings on the computer you will be using to communicate with the Micro800.
 - a. On Windows 10, right click the windows icon and select “Network Connections”, then click “Ethernet”.
 - b. On the right side of the window, select “Change Adapter Options”.
 - c. Right click on the ethernet adapter you will be using, then click “Properties”.
 - d. Select “Internet Protocol Version 4” and click “Properties”.
 - e. Change the settings to match the picture below.



(These changes can be undone to restore normal functionality of your ethernet port)

2. Connect an ethernet cord between the PLC and computer, and apply power to the PLC.
3. If you intend to alter the program, switch the Run/Program switch to program on the bottom left corner of the PLC.
4. You can use RSLinx (part of the CCW install) to browse the PLC's in the range you configured in step 1.e. to confirm communication between the PLC and computer.

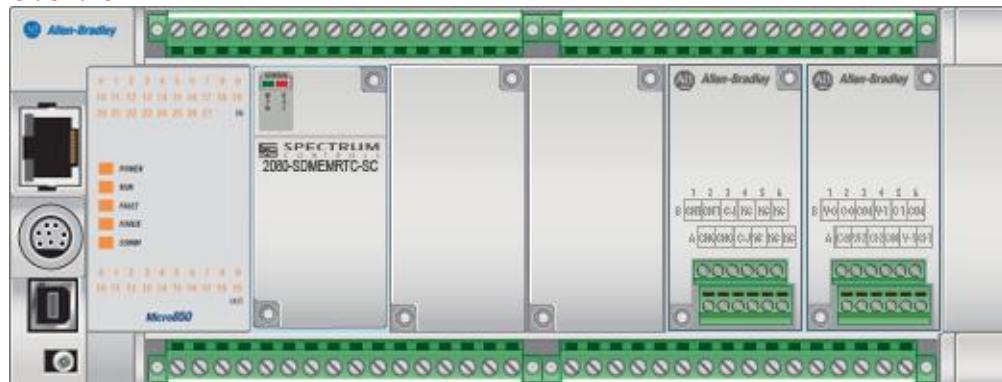
(The default IP of our PLC is 10.5.97.5, and the HMI is 10.5.97.10)

If you have experience with Studio 5000, follow this link for help with Connected Components Workbench
https://literature.rockwellautomation.com/idc/groups/literature/documents/qr/9328-qr001_en-e.pdf

Device Configuration

Controller

Overview



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General

Name	Description	Vendor Name	Catalog ID	Controller Project Version	Download Source Code
Micro850		Allen-Bradley	2080-L50E-48QBB	12	Yes

Plug-in Modules

Physical Slot	Catalog ID	When module is not present
1	2080-SDMEMRTC-SC	Do not fault controller (optional module)
4	2080-RTD2	Fault controller (required module)
5	2080-IF4	Fault controller (required module)

Startup/Faults

Mode Behavior	Fault Override	Memory Module	Hard Fault
Remote run mode	Clear Fault	2080-SDMEMRTC-SC	Stop controller

Serial Port

Common Settings

Driver	Baud Rate	Parity	Station Address
CIP Serial	38400	None	1

Protocol Control

DF1 Mode	Media	Control Line	Error Detection
Full Duplex	RS232	No Handshake	CRC

Embedded Responses	Duplicate Packet Detection	ACK Timeout	NAK Retries
After One Received	Enabled	50	3

ENQ Retries
3

USB Port

Status	Suspend State	Bus Speed	Mode	State
Enabled	Not Suspended	Full Speed	Slave Mode	Ready

Ethernet

Port Settings

Port State: Enabled

Auto-Negotiate Speed and Duplex Mode: Enabled

Internet Protocol (IP) Settings

Startup Configuration	IP Address	Subnet Mask	Gateway Address	Detect duplicate IP address
Static	10.5.97.5	255.255.255.0	0.0.0.0	Enabled

EtherNet/IP

Inactivity Timeout: 120 sec

Modbus TCP

Modbus TCP Server state: Disabled

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Plug-in Modules

2080-SDMEMRTC-SC

General

Catalog ID	Vendor Name	Description	Product Type	Slot	Revision
<u>2080-SDMEMRTC-SC</u>	Spectrum Controls	microSD card and high accuracy RTC	Specialty plug-in	1	1

Configuration

Memory Card Settings

Load on power up	Overwrite Ethernet Settings	Include Project & Logical values upon Backup/Restore
<u>Load Always</u>	True	True

2080-RTD2

General

Catalog ID	Vendor Name	Description	Product Type	Slot	Revision
<u>2080-RTD2</u>	Allen-Bradley	2-channel, non-isolated RTD module	Analog plug-in	4	1

Input

Label	Variable Name
<u>Input 0</u>	IO_P4_AI_00
<u>Input 1</u>	IO_P4_AI_01
<u>Input 2</u>	IO_P4_AI_02
<u>Input 3</u>	IO_P4_AI_03
<u>Input 4</u>	IO_P4_AI_04

Configuration

Channel	RTD Type	Data Update Rate
<u>0</u>	100 Pt 385	16.7 Hz
<u>1</u>	100 Pt 385	16.7 Hz

2080-IF4

General

Catalog ID	Vendor Name	Description	Product Type	Slot	Revision
<u>2080-IF4</u>	Allen-Bradley	4-channel, Non-isolated unipolar voltage/current analog input	Analog plug-in	5	1

Input

Label	Variable Name
<u>Input 0</u>	IO_P5_AI_00
<u>Input 1</u>	IO_P5_AI_01
<u>Input 2</u>	IO_P5_AI_02
<u>Input 3</u>	IO_P5_AI_03

Configuration

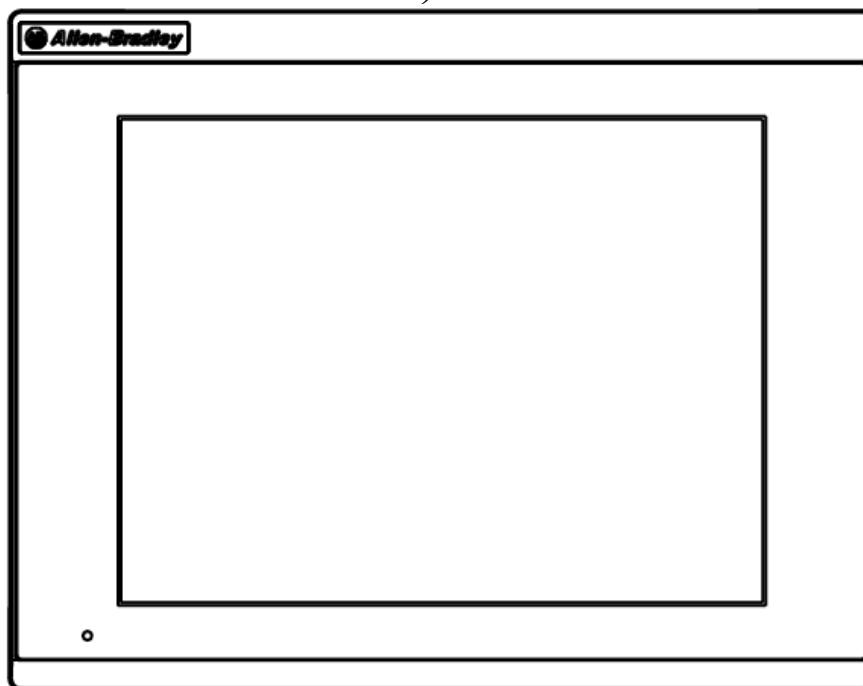
Channel	Input Type	Frequency	Input State
<u>0</u>	Current	50 Hz	Enabled
<u>1</u>	Current	50 Hz	Enabled
<u>2</u>	Current	50 Hz	Enabled
<u>3</u>	Current	50 Hz	Enabled

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HMI (Human Machine Interface)



Configuration

General

Name	Description	Vendor Name	Catalog ID	Controller Project Version	Download Source Code
PanelView 800		Allen-Bradley	271R-T10T	8	Yes

Ethernet

Port Settings

Port State: Enabled

Auto-Negotiate Speed and Duplex Mode: Enabled

Internet Protocol (IP) Settings

Startup Configuration	IP Address	Subnet Mask	Gateway Address	Detect duplicate IP address
Static	10.5.97.10	255.255.255.0	0.0.0.0	Enabled

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Home Screen

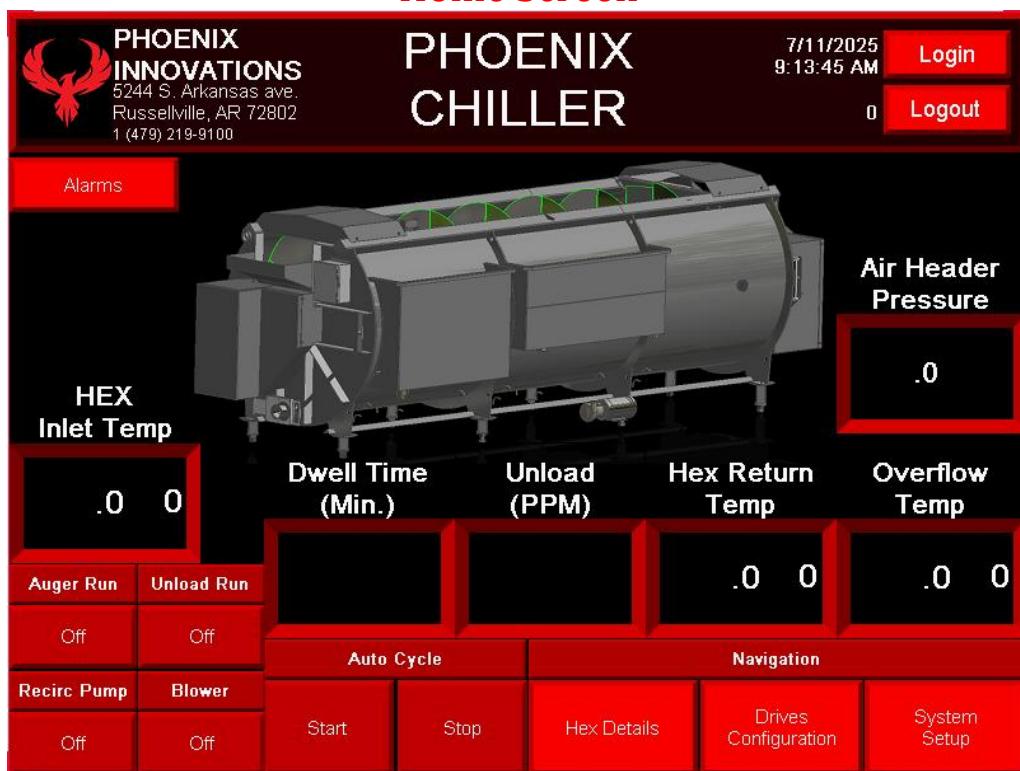


Figure 1 Home Screen Preview

Auger, Unload and Recirc Pump will illuminate green when each are running.

- **HEX Inlet Temp** – Readout – Displays the water temperature at the outlet of the Heat Exchanger. (IF USING A PHOENIX HEAT EXCHANGER)
- **Motor Indicators** – Indicates that the respective motor is running.
- **Dwell Time** – Input – Controls the time the product will dwell in the Chiller. Input in minutes. *ie. 2:30 is 2.5*
- **Unload** – Input – controls the speed of the unloader. Input in Paddles Per Minute.
- **Hex Return Temp** – Readout – Shows the temperature of the water that is supplied to the Chiller.
- **Overflow Temp** – Readout - Shows the temperature of the water that is leaving the Chiller.
- **Air Header Pressure** – Readout – Shows the air pressure at the air Header.
- **Auto Cycle** – Contain the start stop button for the chiller.
- **Navigation** – This panel is for navigating to the different screens.
 - **Hex Details** – navigates to a screen that you can use to monitor the Heat Exchanger.
 - **Drives Configuration** – LOGIN REQ. – Navigates to the first drive configuration page.
 - **System Setup** – LOGIN REQ. – Navigates to the first configuration page.

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Heat Exchanger Monitor

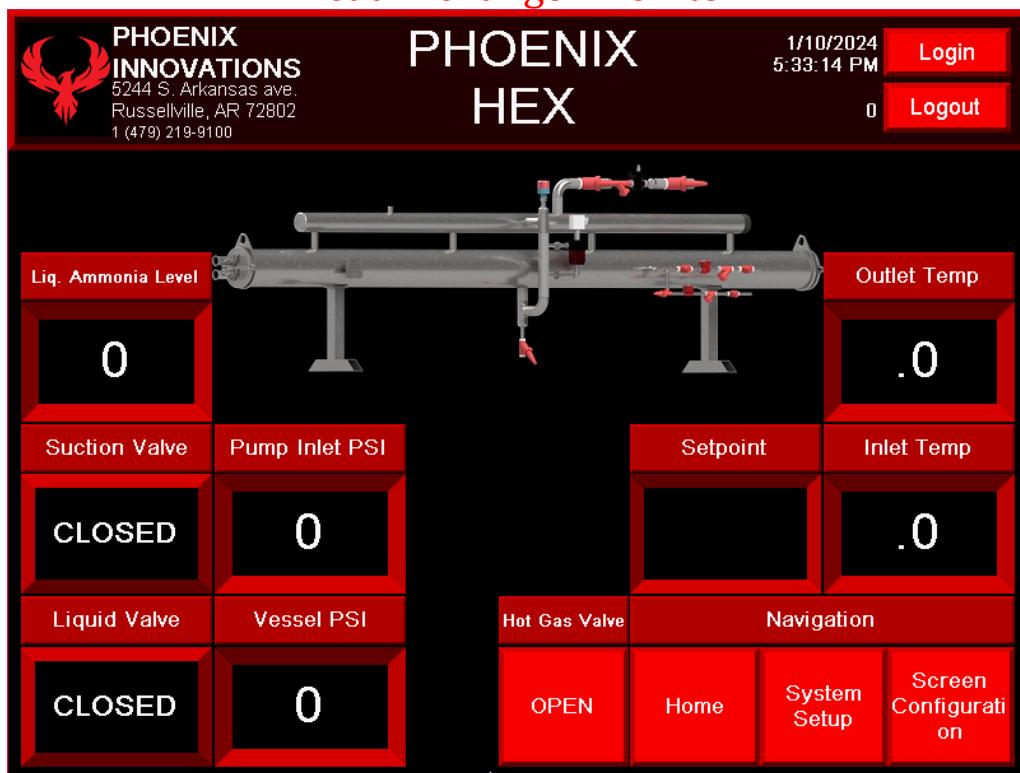


Figure 2 Heat Exchanger Monitor Preview (Login Required)

This screen only available on systems with Phoenix Innovations Heat Exchanger.

- **Liq. Ammonia Level** – Displays the level of liquid ammonia in the vessel of the heat exchanger.
- **Suction valve** – Displays the status of the suction valve. OPEN/CLOSED
- **Liquid Valve** – Displays the status of the liquid valve. OPEN/CLOSED
- **Pump Inlet PSI** – Displays the pressure at the inlet of the Heat Exchanger.
- **Vessel PSI** – Displays the ammonia pressure of the vessel.
- **Outlet Temp** – Shows the water temperature at the outlet of the Heat Exchanger. This is the water temperature the HEX is supplying to the Process.
- **Inlet Temp** – Shows the water temperature at the inlet of the Heat Exchanger. This is the water temperature the HEX is receiving from the Process.
- **Setpoint** – Display Only – Shows setpoint of the Heat Exchanger. Cannot be changed from the Chiller Control Panel.
- **Hot Gas Valve** – Displays the status of the hot gas valve. OPEN/CLOSED
- **Navigation** – This panel is for navigating to the different screens.
 - **Home** – Returns to the home screen.
 - **System Setup** – LOGIN REQ. – Navigates to the first configuration page.
 - **Screen Configuration** – LOGIN REQ. – Navigates to the built in terminal settings workspace.

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Drive Configuration

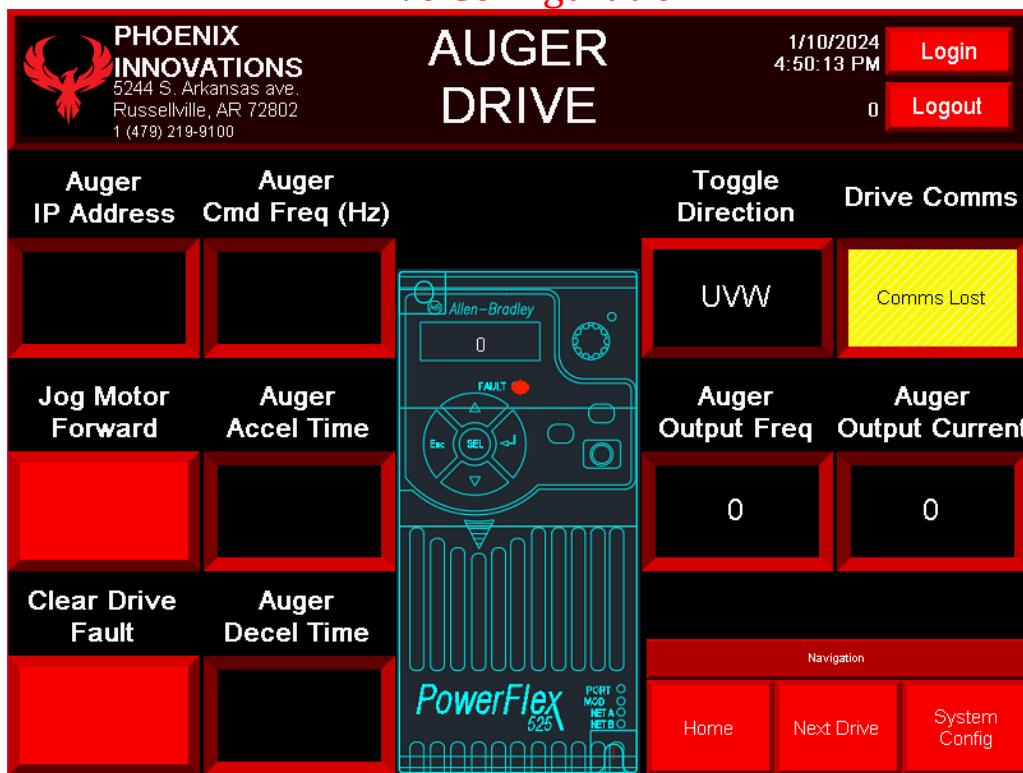


Figure 3 Drive Configuration Preview (Login Required)

- **IP Address** – Tells the PLC what address to use to control the drive.
- **CMD Freq** – The frequency the plc is telling the Drive to go.
- **Jog Motor Forward** – Turns the motor at 10 Hz.
- **Clear Drive Fault** – Will clear a dive fault.
- **Accel / Decell Time** – Sets the time it takes for the drive to get to full speed / zero speed.
- **Toggle Direction** – Sets the rotation direction of the motor.
- **Drive Comms** – Displays if the PLC has communication with the Drive.
- **Output Freq** – The frequency the drive is applying to the motor.
- **Output Current** – The current that the motor is drawing.
- **Navigation** – This panel is for navigating to the different screens.
 - **Home** – Returns to the home screen.
 - **Next Drive** – Navigates to the next Drive.
 - **System Config** – Navigates to the first configuration page.

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System Configuration

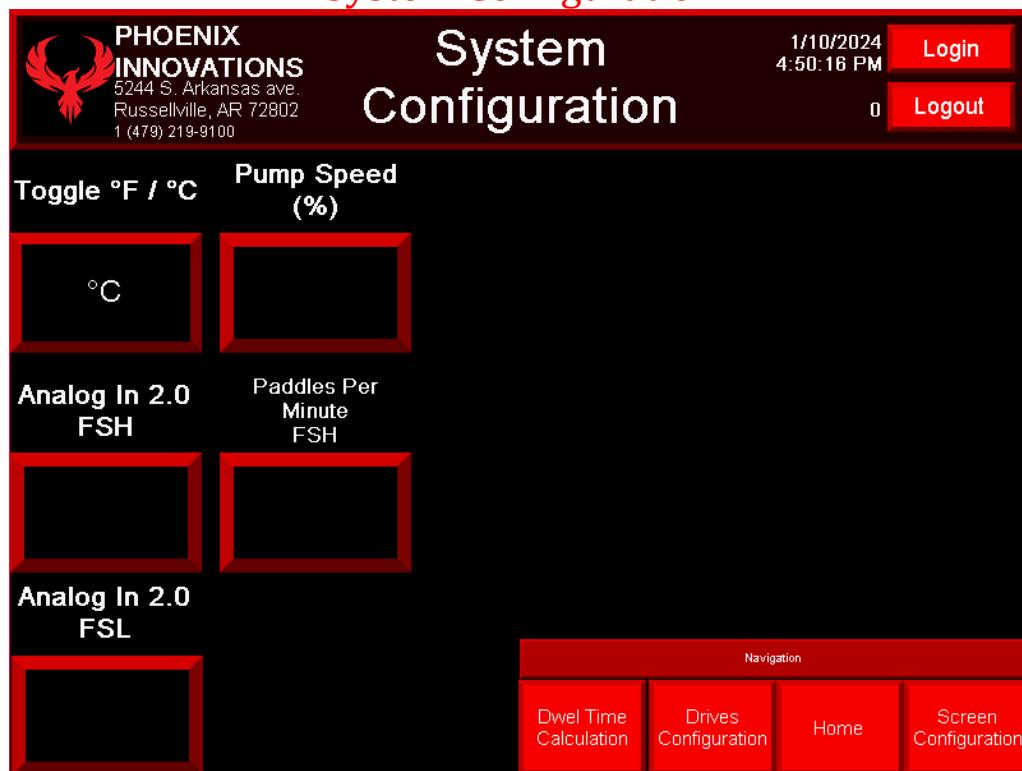


Figure 4 System Configuration Screen (Login Required)

- **Toggle °F/°C** – Configures the system to use Fahrenheit or Celsius.
- **Analog In FSH** – Sets the Full-Scale High of the Blower Pressure Transducer.
- **Analog In FSL** – Sets the Full-Scale Low of the Blower Pressure Transducer.
- **Pump Speed** – Sets the Speed of the Recirc Pump 0 – 100%
- **Paddles Per Min FSH** – Sets the scaling of the unload speed reference.
- **Navigation** – This panel is for navigating to the different screens.
 - **Dwell Time Calcs** – Navigates to the screen to calculate the dwell time scaling.
 - **Drive Configuration** - LOGIN REQ. – Navigates to the first drive configuration page.
 - **Home** – Returns to the home screen.
 - **System Config** – Navigates to the first configuration page.

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Dwell Time Calculations

Motor Speed	Drive Sheave Datum	Driven Sheave Datum	Gearbox Ratio
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Drive Sprocket Tooth Count	Driven Sprocket Tooth Count	Auger Pitch (In.)	Chiller Length (Ft.)
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Minimum Freq. (Hz.)	Minimum Dwell Time	Maximum Dwell Time	Total Ratio
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

1/10/2024
 5:35:50 PM
 0

Login
 Logout

Sheave Ratio * Gearbox Ratio *
 Sprocket Ratio = Total Ratio
 Motor Speed / Total Ratio = Auger Speed
 Chiller Length (in.)(Auger Speed *
 Auger Pitch) = Dwell Time

Navigation
 System Setup

Figure 5 Dwell Time Calculation Screen Preview (Eng Level Login Required)

This screen is for calculating the dwell time of the auger. Enter all the relevant data and the system will automatically calculate the minimum dwell, maximum dwell, and total reduction ration.

These values are used to scale the speed of the auger to achieve the appropriate dwell time.

This screen requires Engineering Level logon to access.

Dwell Time Calculations

The target Motor RPM (X) is given by:

$$X = \frac{L \times 12}{T \times P} \times \left(\frac{B}{A} \times \frac{s}{S} \times G \right)$$

where:

- N = Motor Nominal Speed (RPM)
- F = Nominal Frequency (Hz)
- L = Chiller Length (ft.)
- T = Dwell Time (min.)
- P = Auger Pitch (in.)
- A = Drive Sheave (datum)
- B = Driven Sheave (datum)
- G = Gear Box Ratio
- s = Driven Sprocket (teeth)
- S = Drive Sprocket (teeth)

The PLC computes the constant (K) as follows:

$$K = \frac{L \times 12}{P} \times \left(\frac{B}{A} \times \frac{s}{S} \times G \right) \times \frac{F_{\text{nom}}}{N}$$

The dwell times corresponding to the nominal and minimum frequencies are computed as:

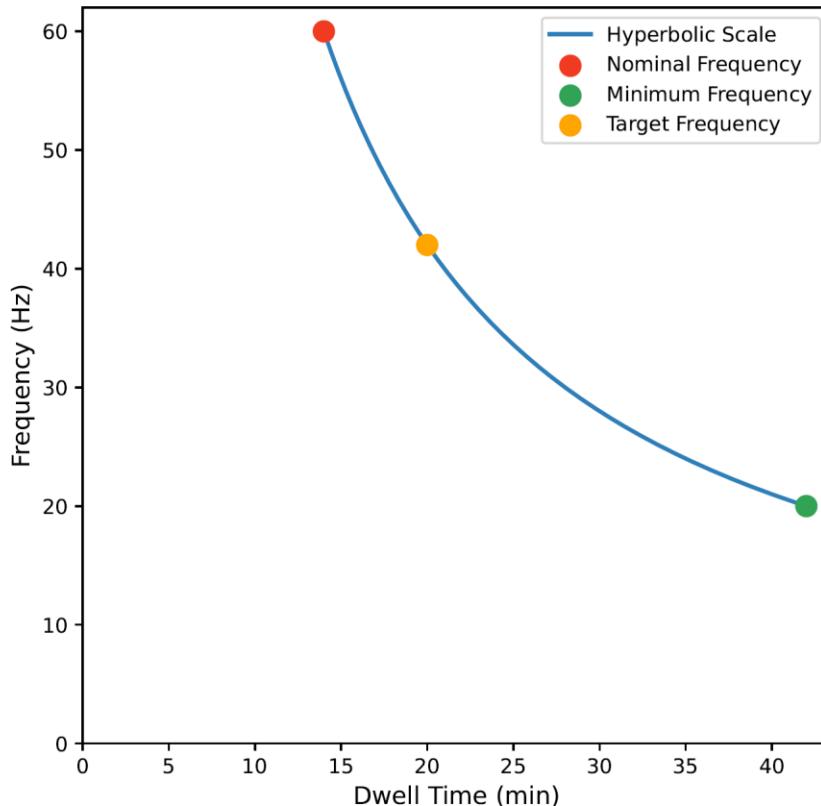
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$$T_{\text{nom}} = \frac{K}{F_{\text{nom}}} \quad \text{and} \quad T_{\min} = \frac{K}{F_{\min}}$$

The frequency at any dwell time (T) is given by:

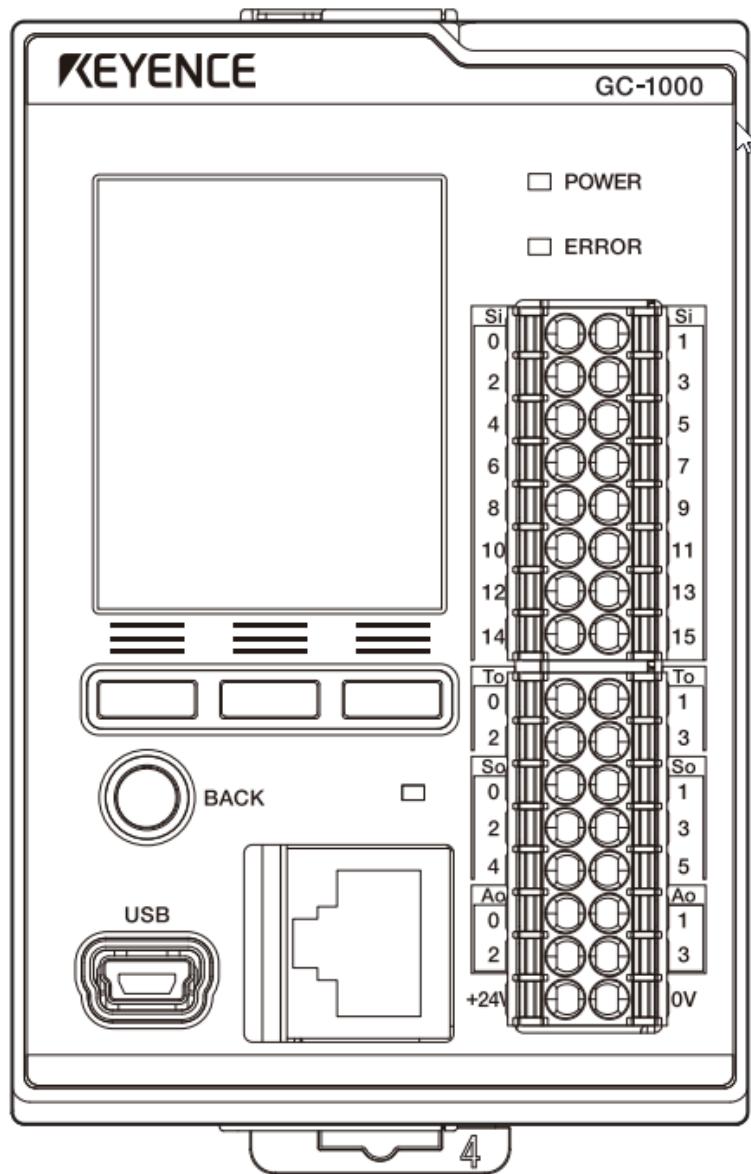
$$F(T) = \frac{K}{T}$$

Below is a sample plot of the Frequency / Dwell Time plot for a chiller:



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Keyence GC100 Safety Controller



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Keyence GC100 Safety Controller

The Keyence Safety Controller controls a safety contactor, which supplies power to all controls when energized. If the safety relays are not functioning, follow these steps to troubleshoot.

1. Verify all doors are closed and all E-Stops are pulled out.
2. Verify the Safety Controller is on and does not have an error.
 - a. If an error has occurred, follow on-screen diagnostics.
3. Verify all Safety Inputs (SI) are solid Green.
 - a. If a channel is not on refer to the safety cheat sheet (on the Panduit cover next to the controller and included here) to determine which device is open or faulty.
 - b. Verify wiring harness is secure to the controller.
4. Replacing the Safety Controller.
 - a. If the controller will not turn on or has a memory failure, it may be necessary to replace it.
 - b. Follow LOTO procedures.
 - c. Remove wiring harness from controller.
 - d. Remove controller from din rail.
 - e. Remove the cover on the left side of the controller.
 - f. Remove memory module and install in new controller.
 - g. Install new controller on din rail and reattach wiring harness.

Si		
0	1	Panel Estop
2	3	Pull Cord One
4	5	Pull Cord Two
6	7	Cover One Interlock Switch
8	9	Cover Two Interlock Switch
10	11	Cover Three Interlock Switch
12	13	Cover Two Interlock Switch
14	15	SAFETY RESET BUTTON
So		
0	1	SAFETY OUTPUT
2	3	Safe Torque Off
4	5	
Ao		
0	1	0=Panel Estop OK 1=Pull Cord 1 OK
2	3	2= Pull Cord 1 OK 3= All Guards OK

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Apply power and controller will automatically boot within 30 seconds.

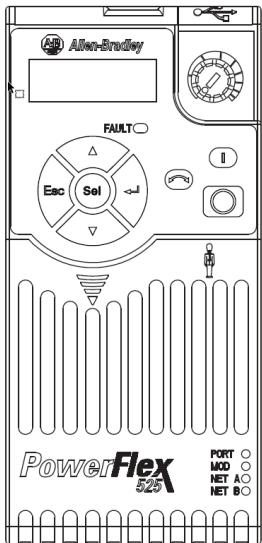
For more information, follow this link:

<https://www.keyence.com/mykeyence/?ptn=001&dlLangId=&dlLangType=en-GB>

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Drives

Auger



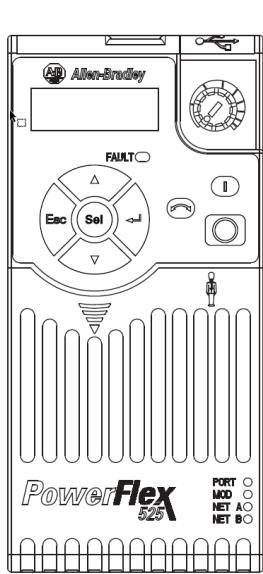
#	Name	Value	Internal	Default	Min	Max
P046	Start Source 1	EtherNet/IP	5	Keypad	1	5
P047	Speed Reference1	EtherNet/IP	15	Drive Pot	1	16
P050	Start Source 3	Keypad	1	EtherNet/IP	1	5
P051	Speed Reference3	Drive Pot	1	EtherNet/IP	1	16
T105	Safety Open En	FaultDisable	1	FaultEnable	0	1
T106	SafetyFlt RstCfg	FltClr Reset	1	PwrCycleRset	0	1
C128	EN Addr Sel	Parameters	1	BOOTP	1	2
C129	EN IP Addr Cfg 1	10	10	0	0	255
C130	EN IP Addr Cfg 2	5	5	0	0	255
C131	EN IP Addr Cfg 3	97	97	0	0	255
C132	EN IP Addr Cfg 4	20	20	0	0	255
C133	EN Subnet Cfg 1	255	255	0	0	255
C134	EN Subnet Cfg 2	255	255	0	0	255
C135	EN Subnet Cfg 3	255	255	0	0	255

Commissioning

- Lockout the High Voltage Panel
- Un-wire the old drive and remove.
- Mount the new drive.
- Wire in the drive as shown in the Schematics.
- Apply power.
- Change the Parameters shown above to the values in the value column.
- Cycle Power Being sure to allow the drive to fully shut down.

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Unload



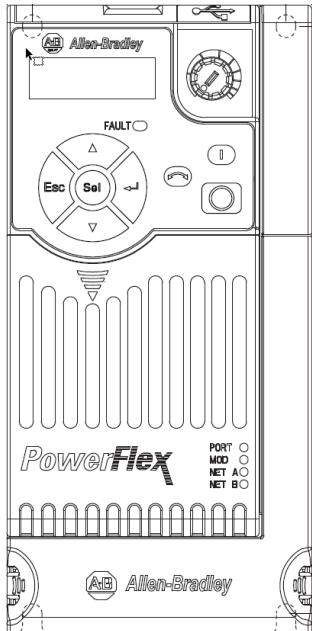
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P046	Start Source 1	EtherNet/IP	5	Keypad	1	5
P047	Speed Reference1	EtherNet/IP	15	Drive Pot	1	16
P050	Start Source 3	Keypad	1	EtherNet/IP	1	5
P051	Speed Reference3	Drive Pot	1	EtherNet/IP	1	16
T105	Safety Open En	FaultDisable	1	FaultEnable	0	1
T106	SafetyFlt RstCfg	FltClr Reset	1	PwrCycleRset	0	1
C128	EN Addr Sel	Parameters	1	BOOTP	1	2
C129	EN IP Addr Cfg 1	10	10	0	0	255
C130	EN IP Addr Cfg 2	5	5	0	0	255
C131	EN IP Addr Cfg 3	97	97	0	0	255
C132	EN IP Addr Cfg 4	21	21	0	0	255
C133	EN Subnet Cfg 1	255	255	0	0	255
C134	EN Subnet Cfg 2	255	255	0	0	255
C135	EN Subnet Cfg 3	255	255	0	0	255

Commissioning

- Lockout the High Voltage Panel
- Un-wire the old drive and remove.
- Mount the new drive.
- Wire in the drive as shown in the Schematics.
- Apply power.
- Change the Parameters shown above to the values in the value column.
- Cycle Power Being sure to allow the drive to fully shut down.

PHOENIX INNOVATIONS INC.

Recirc Pump



#	Name	Value	Internal	Default	Min	Max
P046	Start Source 1	EtherNet/IP	5	Keypad	1	5
P047	Speed Reference1	EtherNet/IP	15	Drive Pot	1	16
P050	Start Source 3	Keypad	1	EtherNet/IP	1	5
P051	Speed Reference3	Drive Pot	1	EtherNet/IP	1	16
T105	Safety Open En	FaultDisable	1	FaultEnable	0	1
T106	SafetyFlt RstCfg	FltClr Reset	1	PwrCycleRset	0	1
C128	EN Addr Sel	Parameters	1	BOOTP	1	2
C129	EN IP Addr Cfg 1	10	10	0	0	255
C130	EN IP Addr Cfg 2	5	5	0	0	255
C131	EN IP Addr Cfg 3	97	97	0	0	255
C132	EN IP Addr Cfg 4	22	22	0	0	255
C133	EN Subnet Cfg 1	255	255	0	0	255
C134	EN Subnet Cfg 2	255	255	0	0	255
C135	EN Subnet Cfg 3	255	255	0	0	255

Commissioning

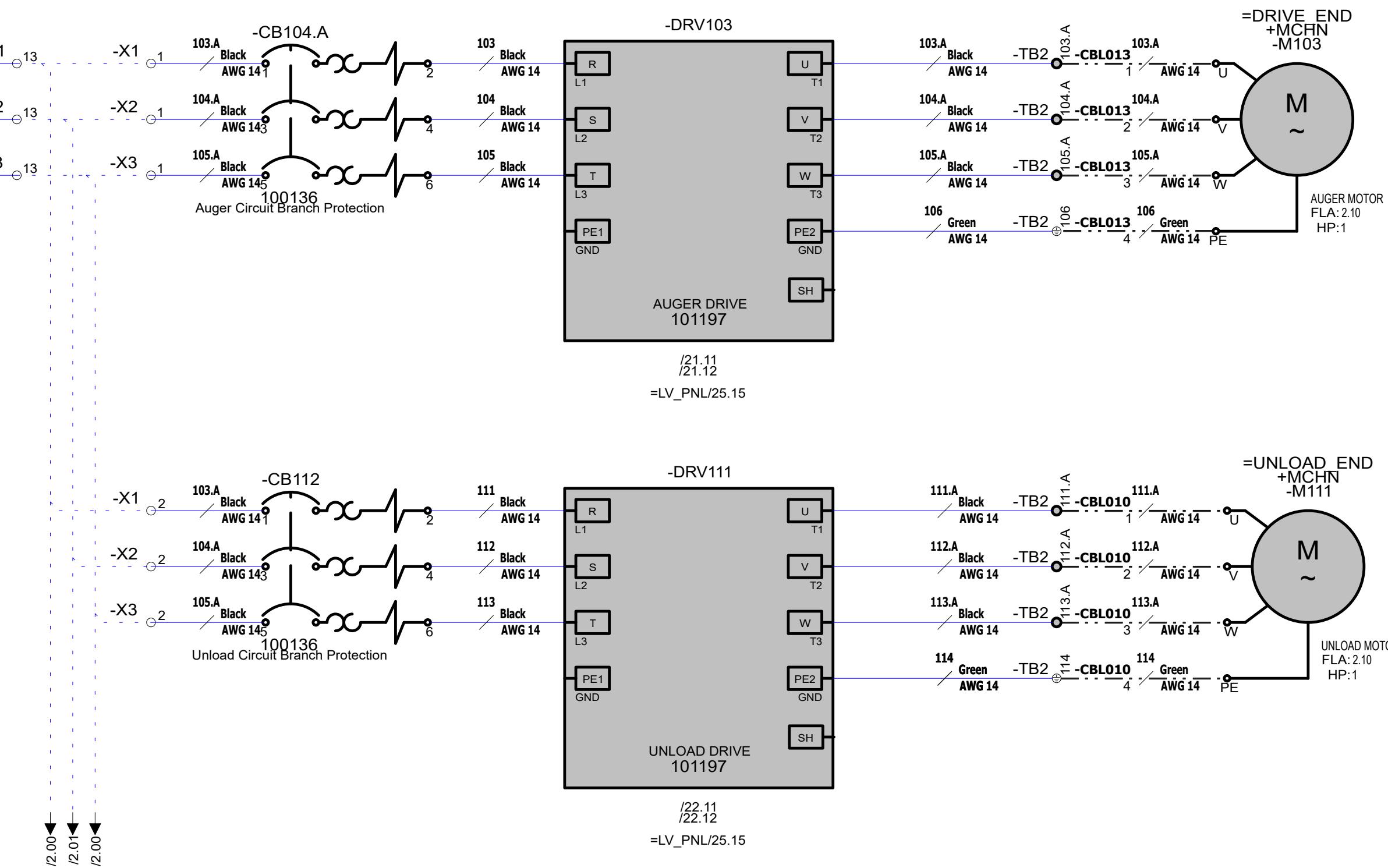
- Lockout the High Voltage Panel
- Un-wire the old drive and remove.
- Mount the new drive.
- Wire in the drive as shown in the Schematics.
- Apply power.
- Change the Parameters shown above to the values in the value column.
- Cycle Power Being sure to allow the drive to fully shut down.

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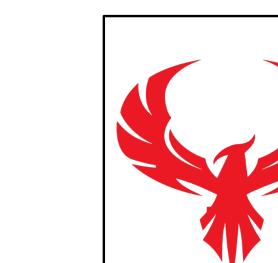
Electrical Schematics

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Mechanical Layouts



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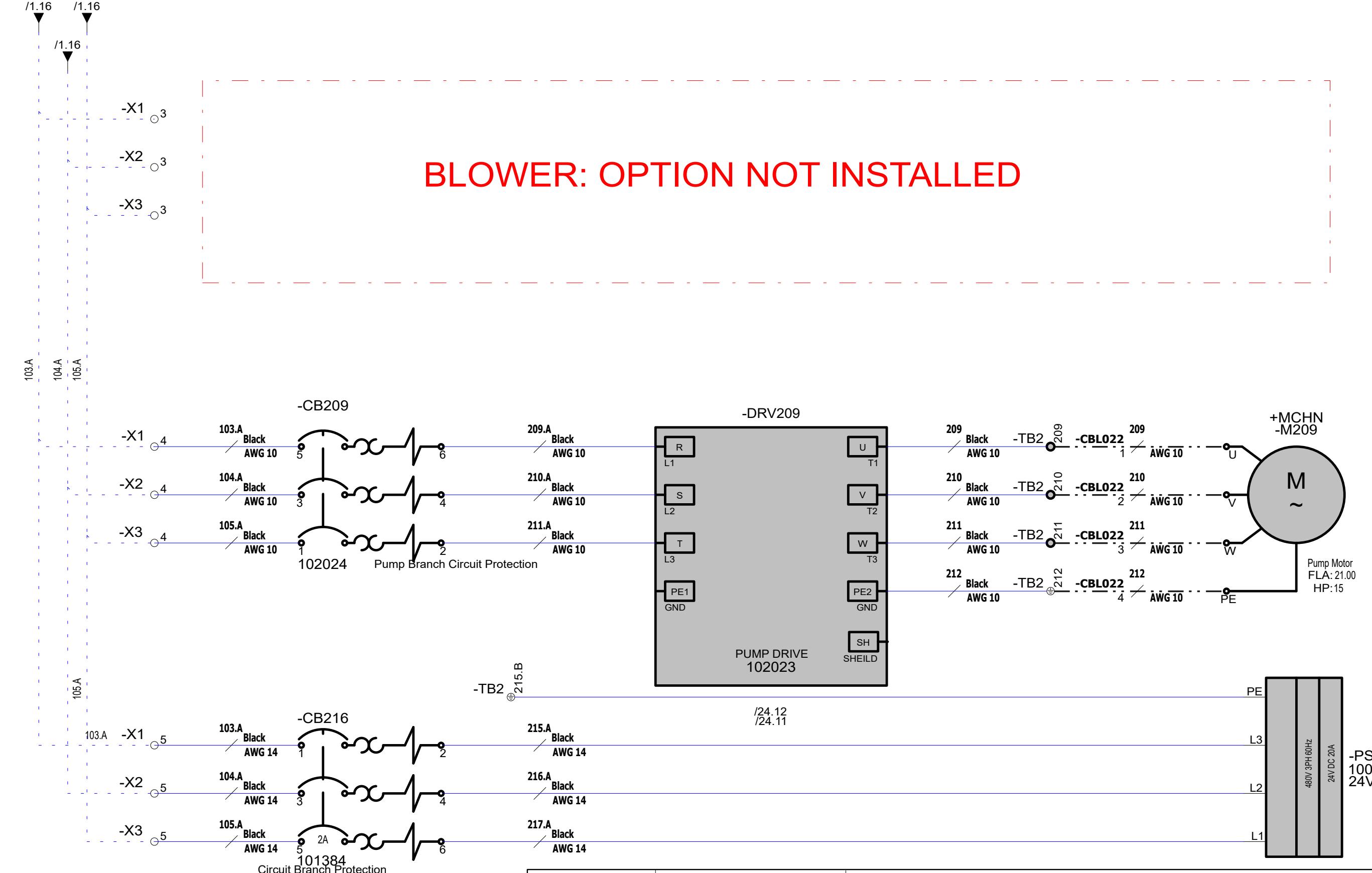
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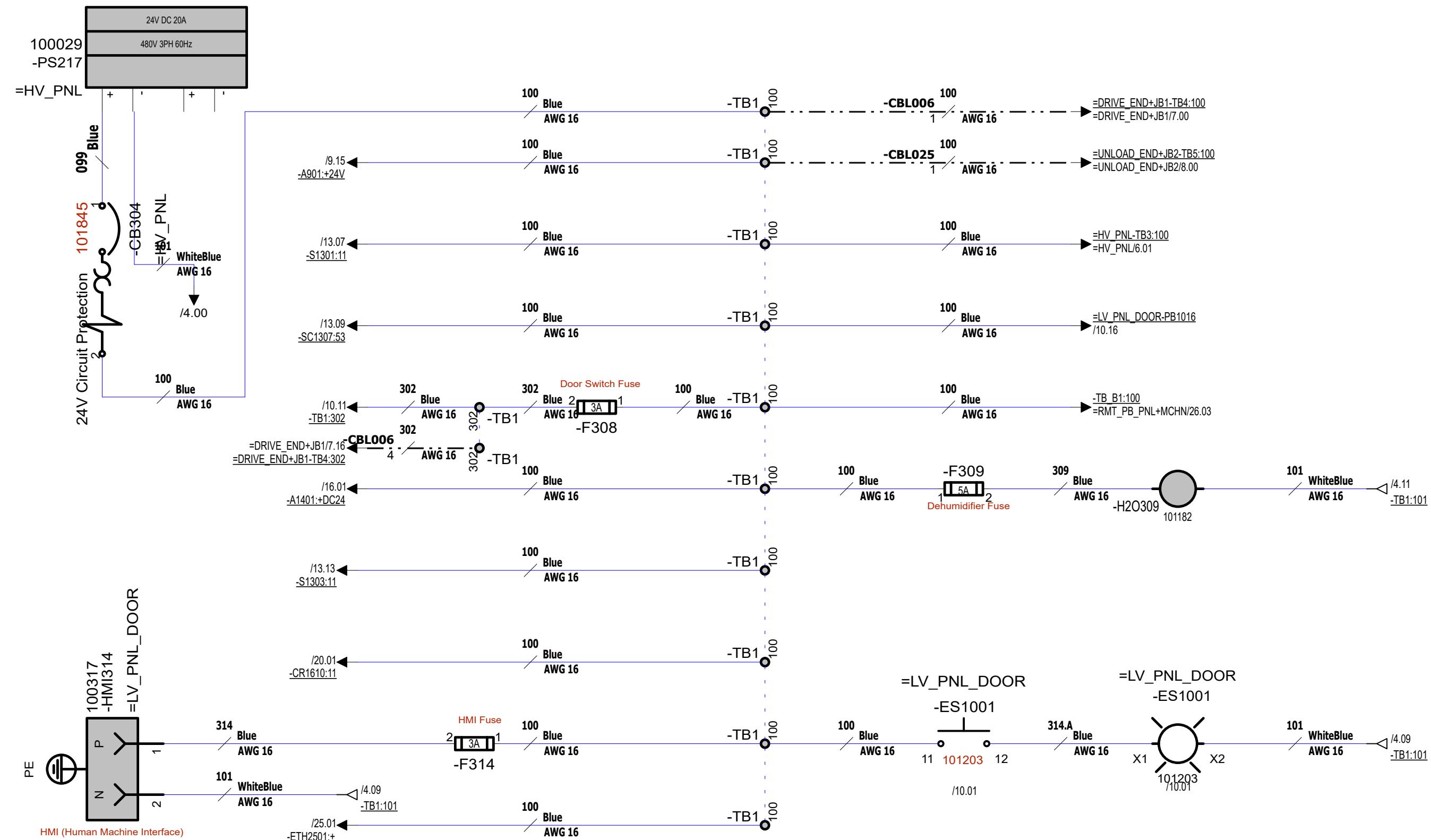
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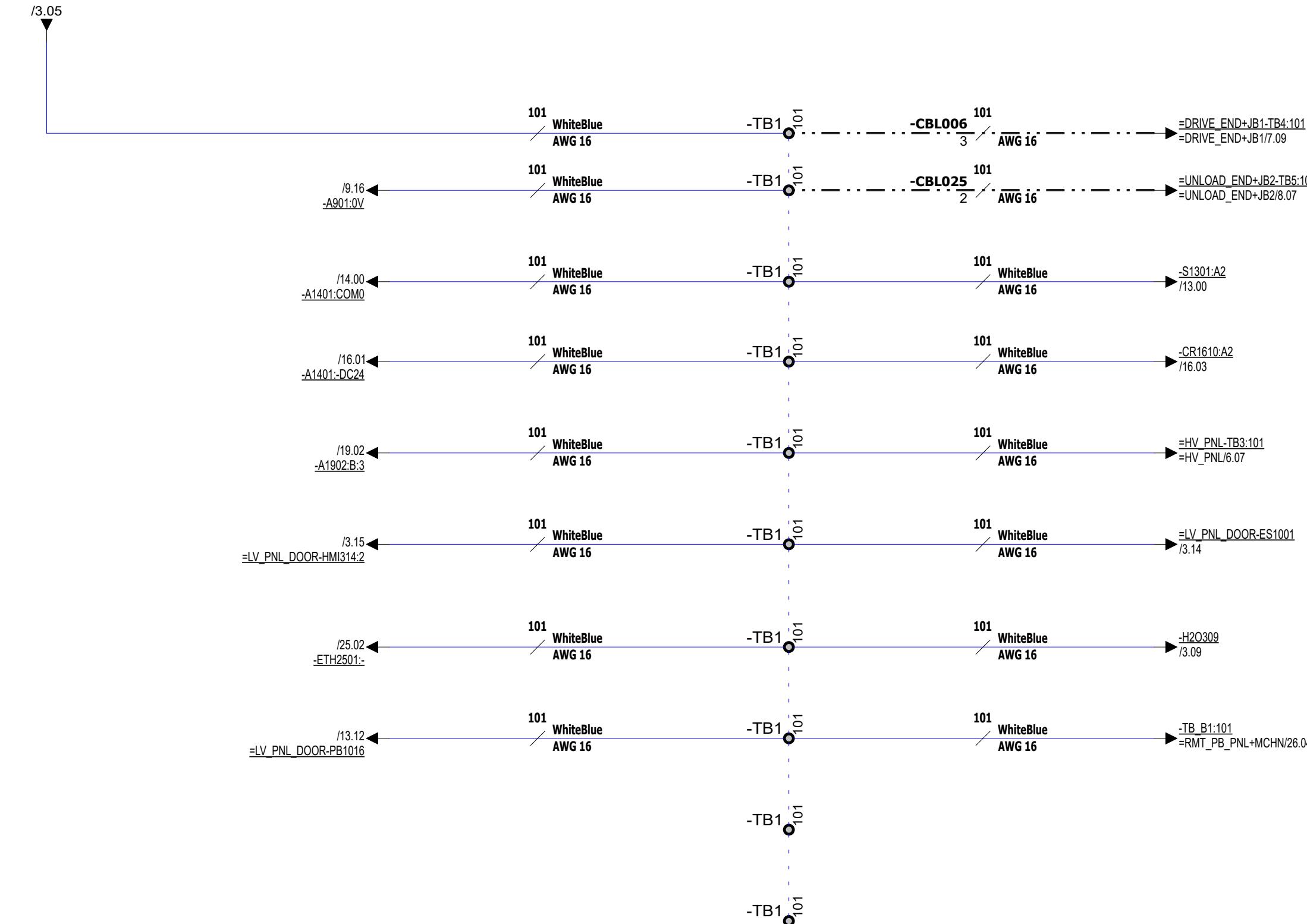
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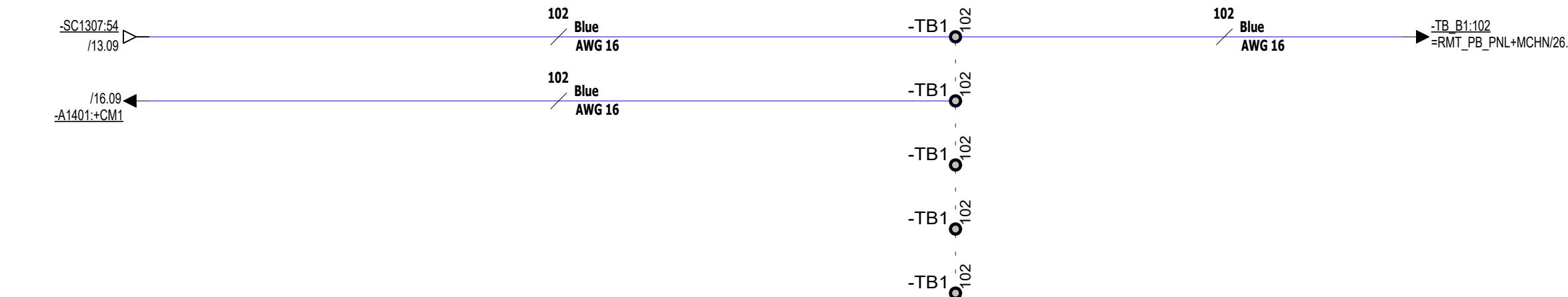
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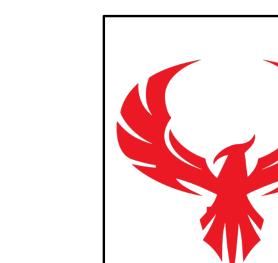
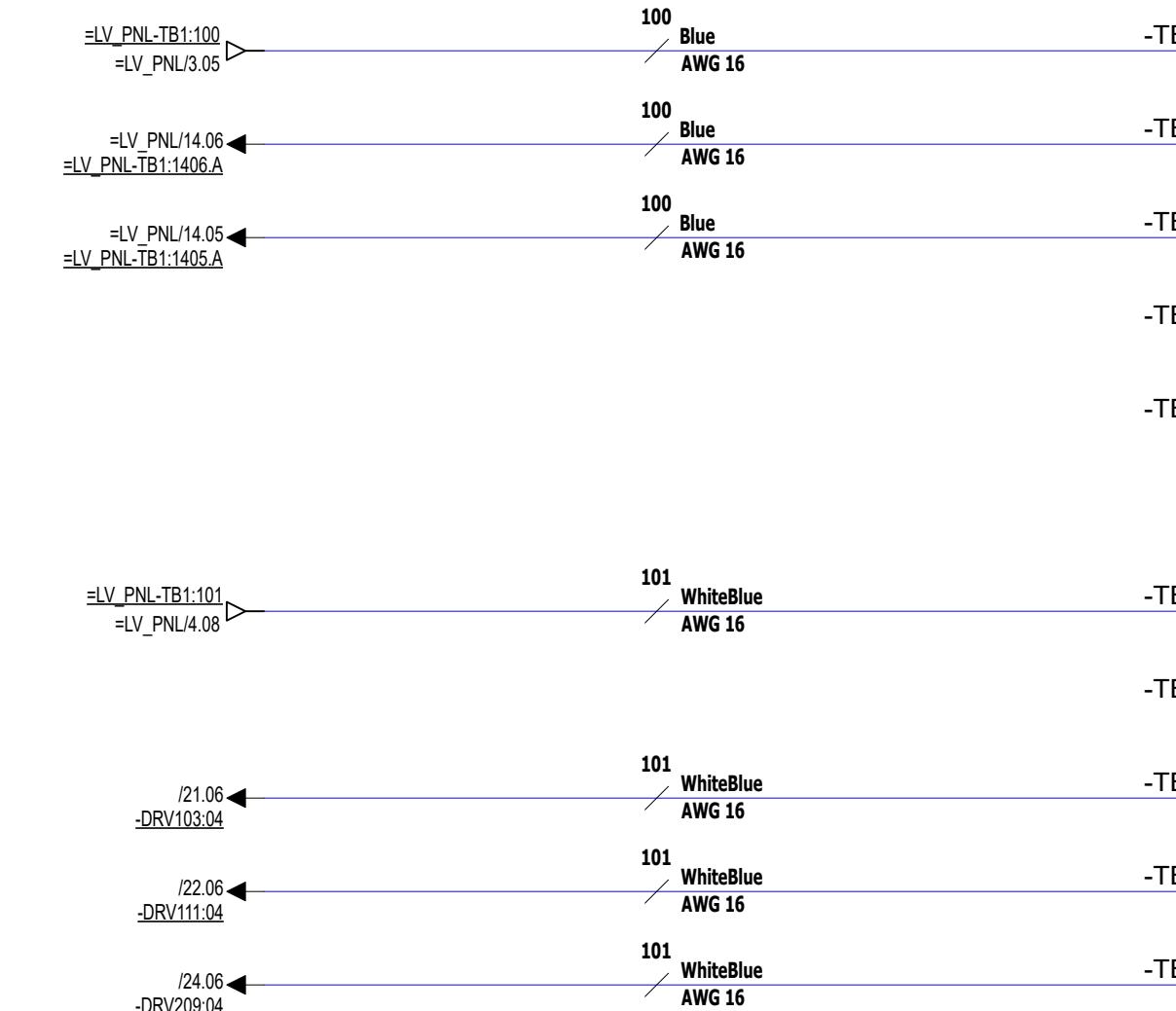
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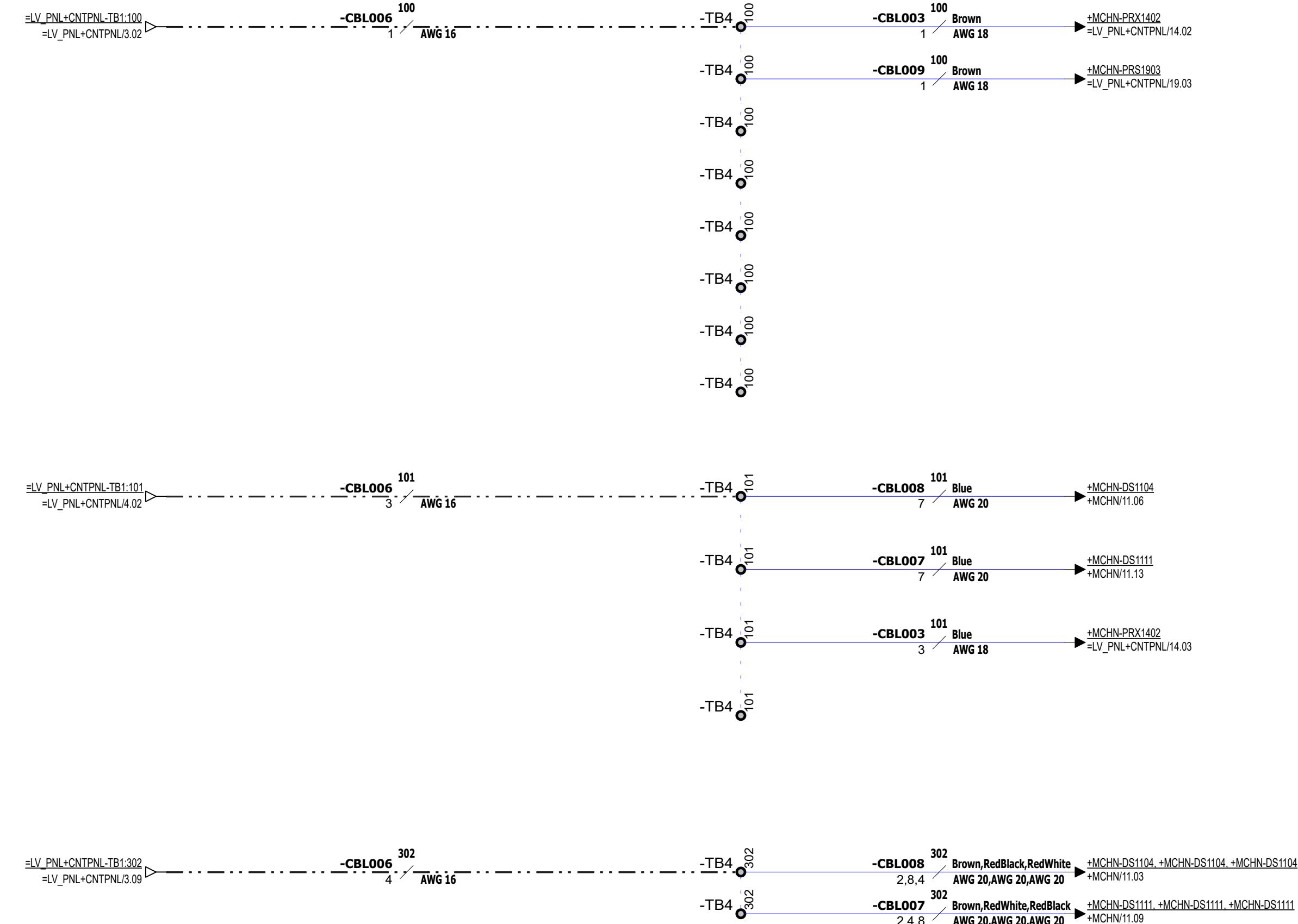


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User	J. Callahan
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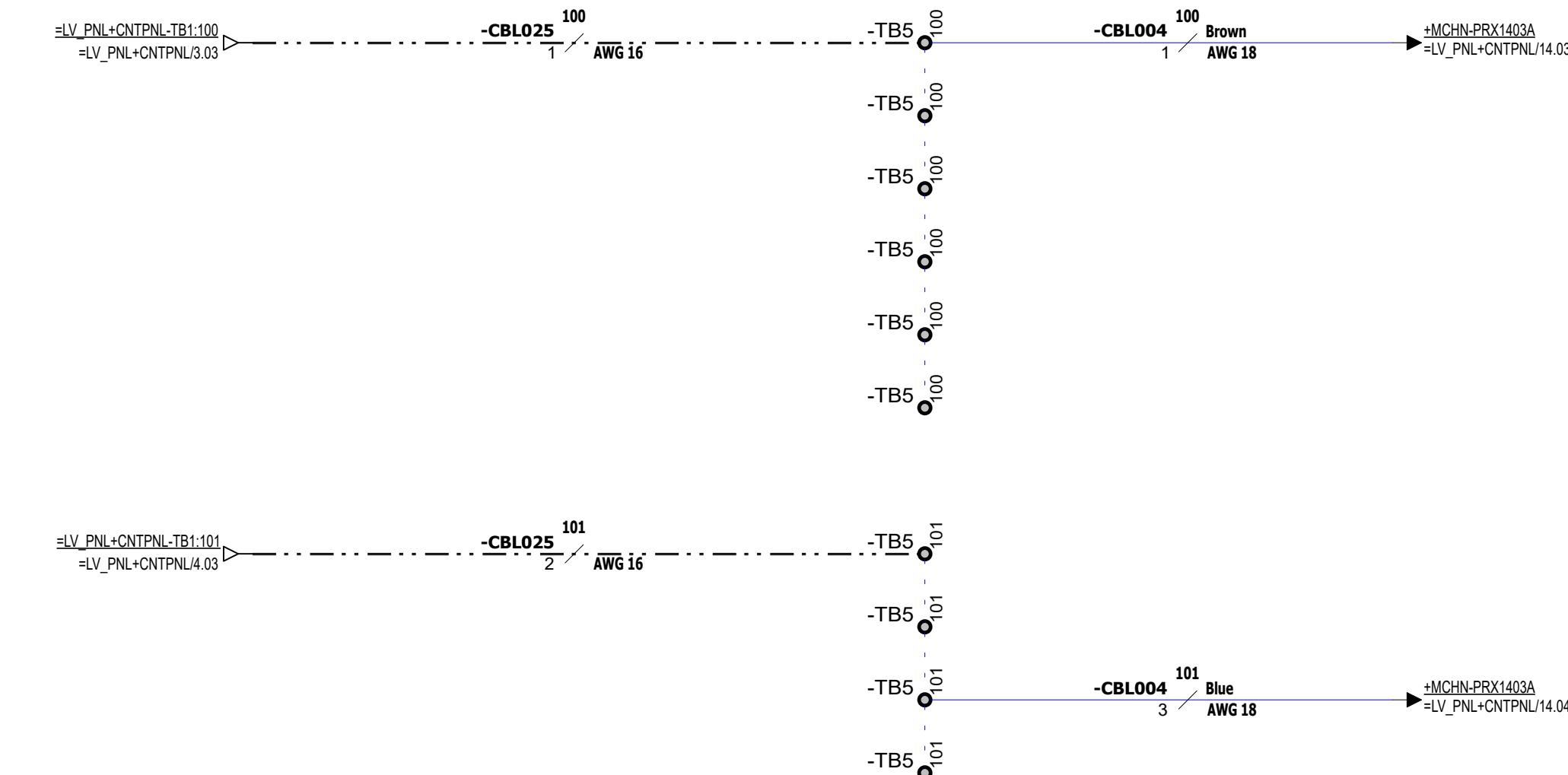
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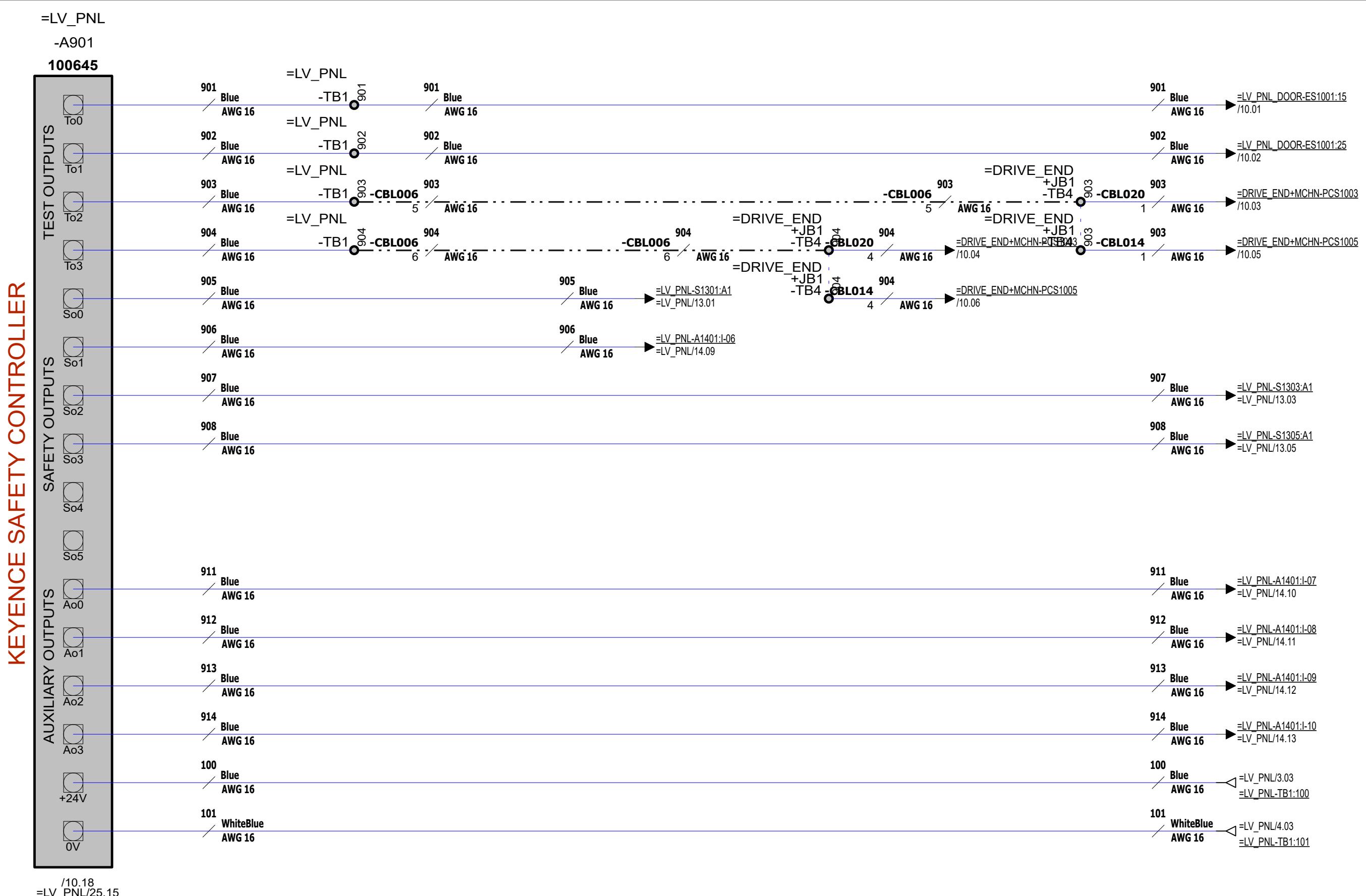
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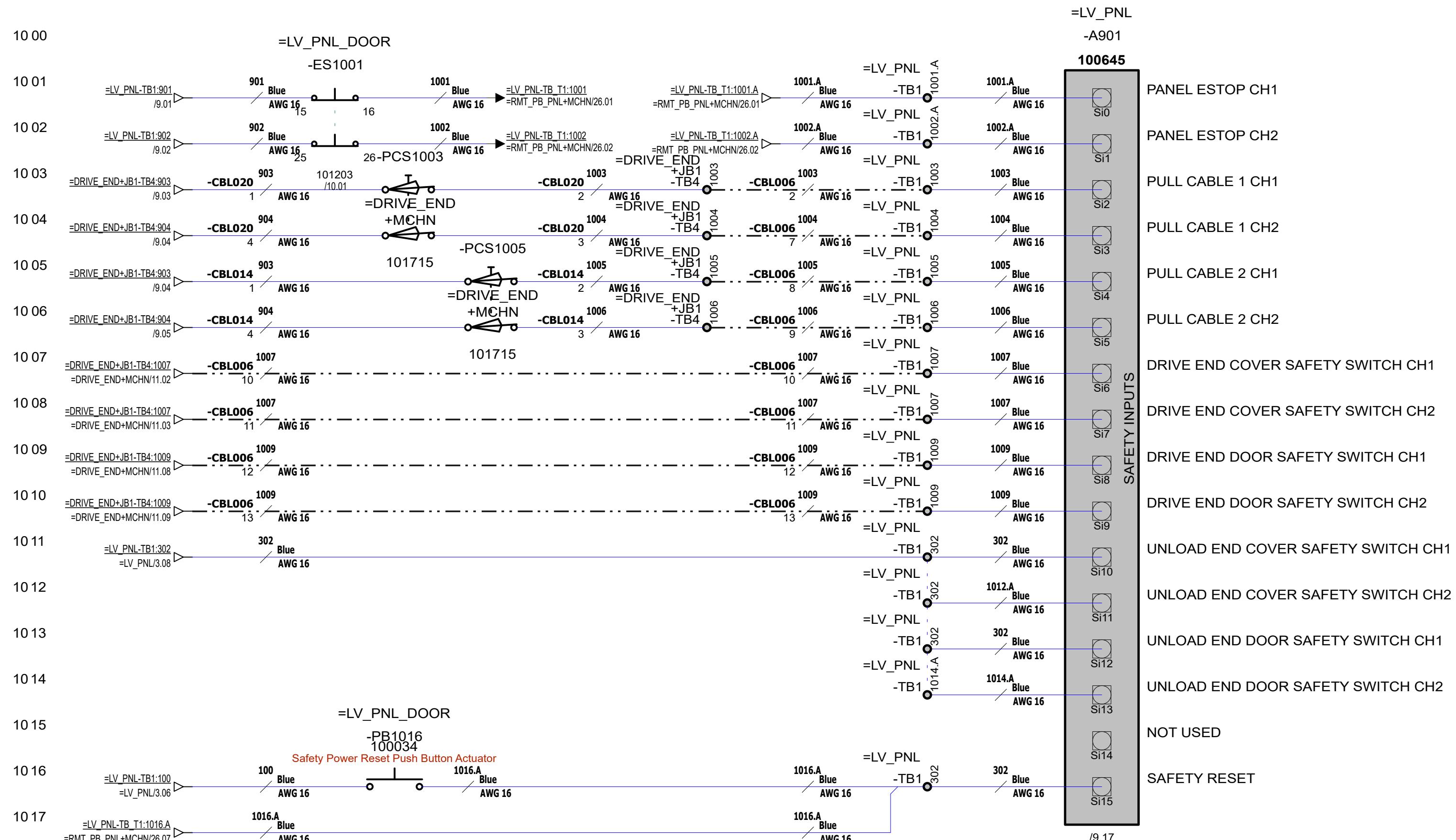
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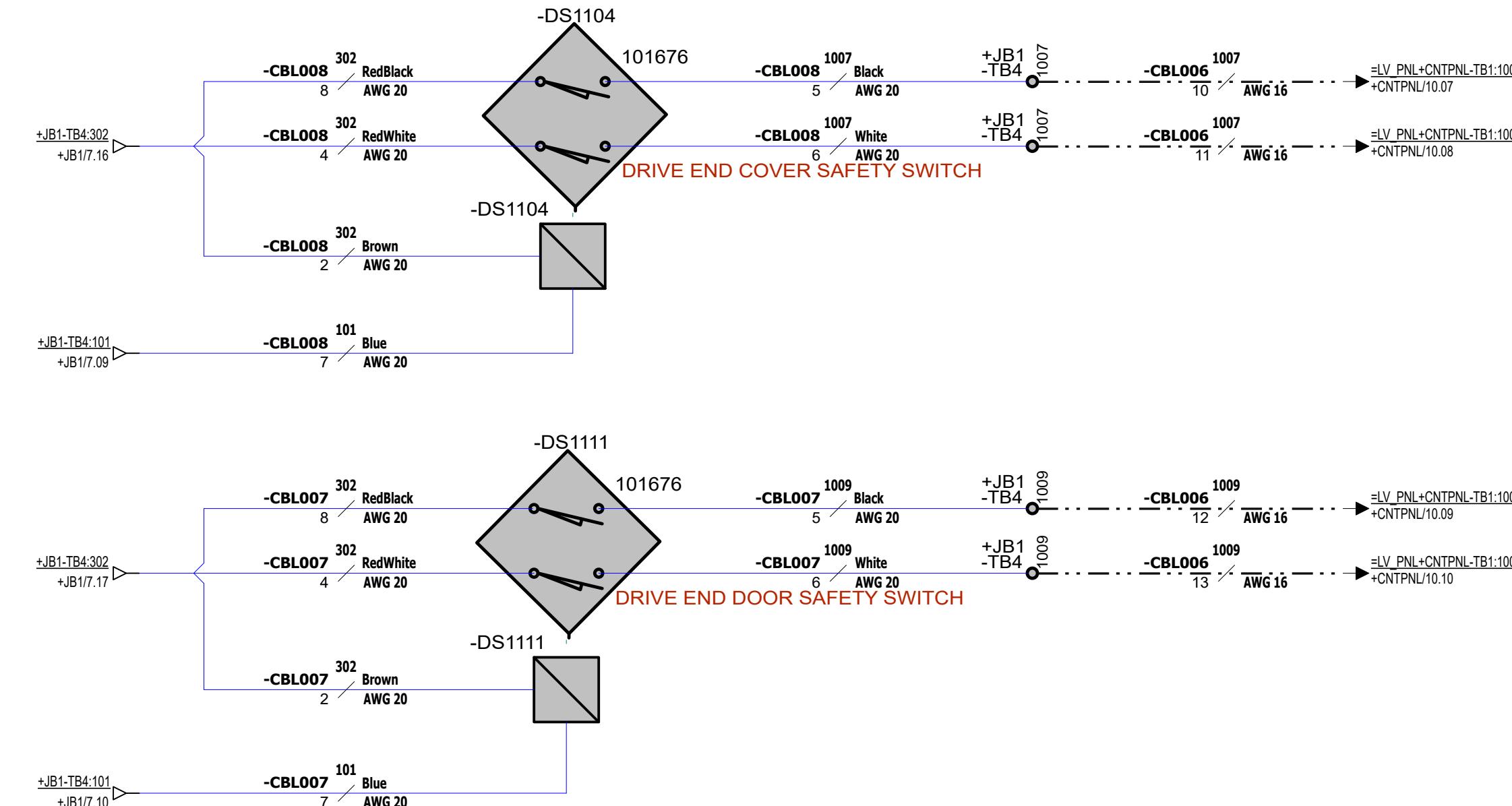
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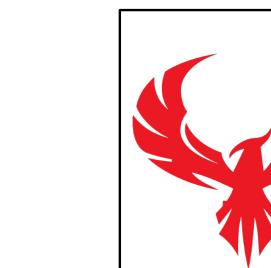
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03 - SAFETY

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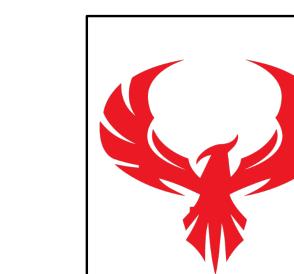
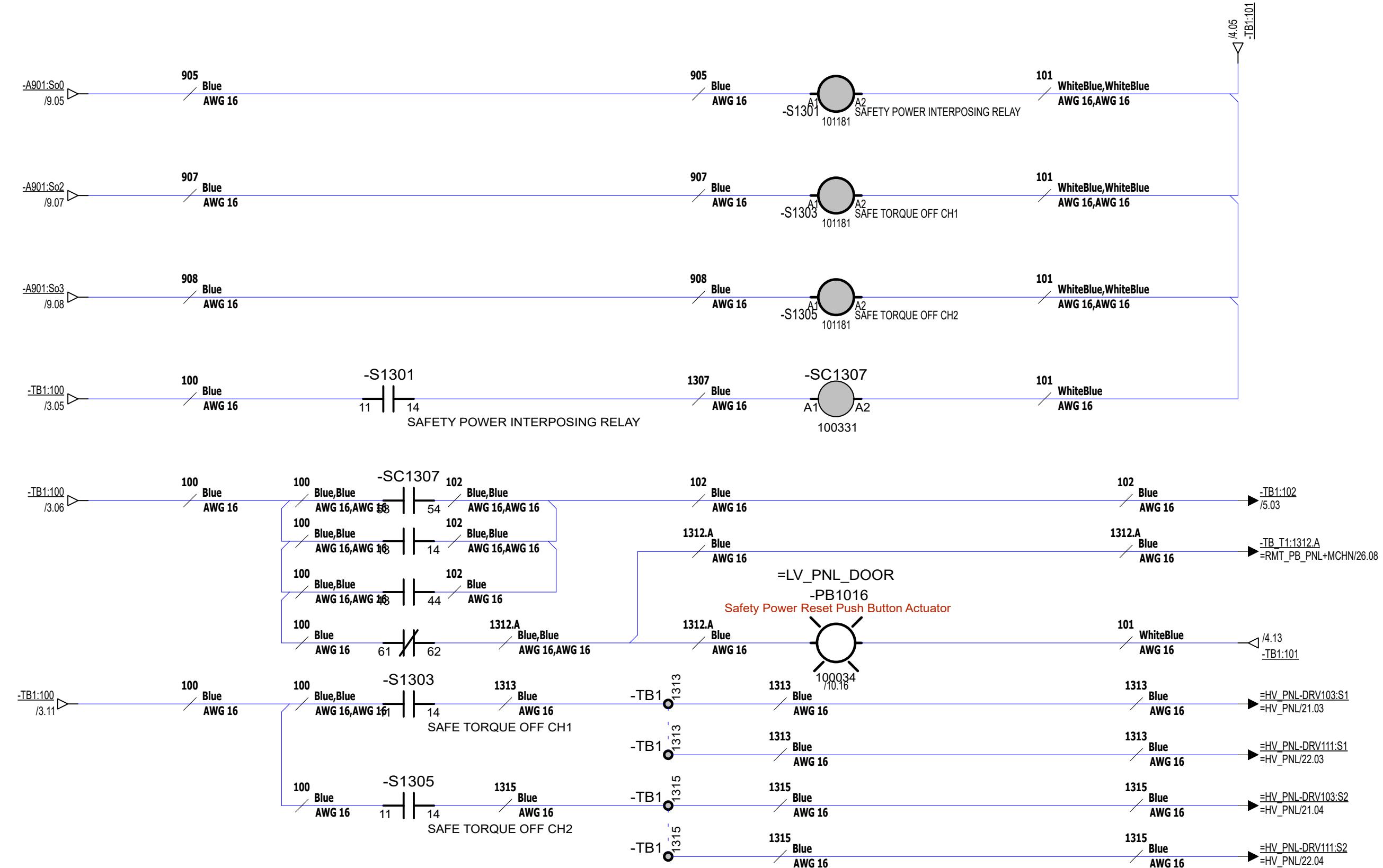
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Sheet 12 of 52 Sh.

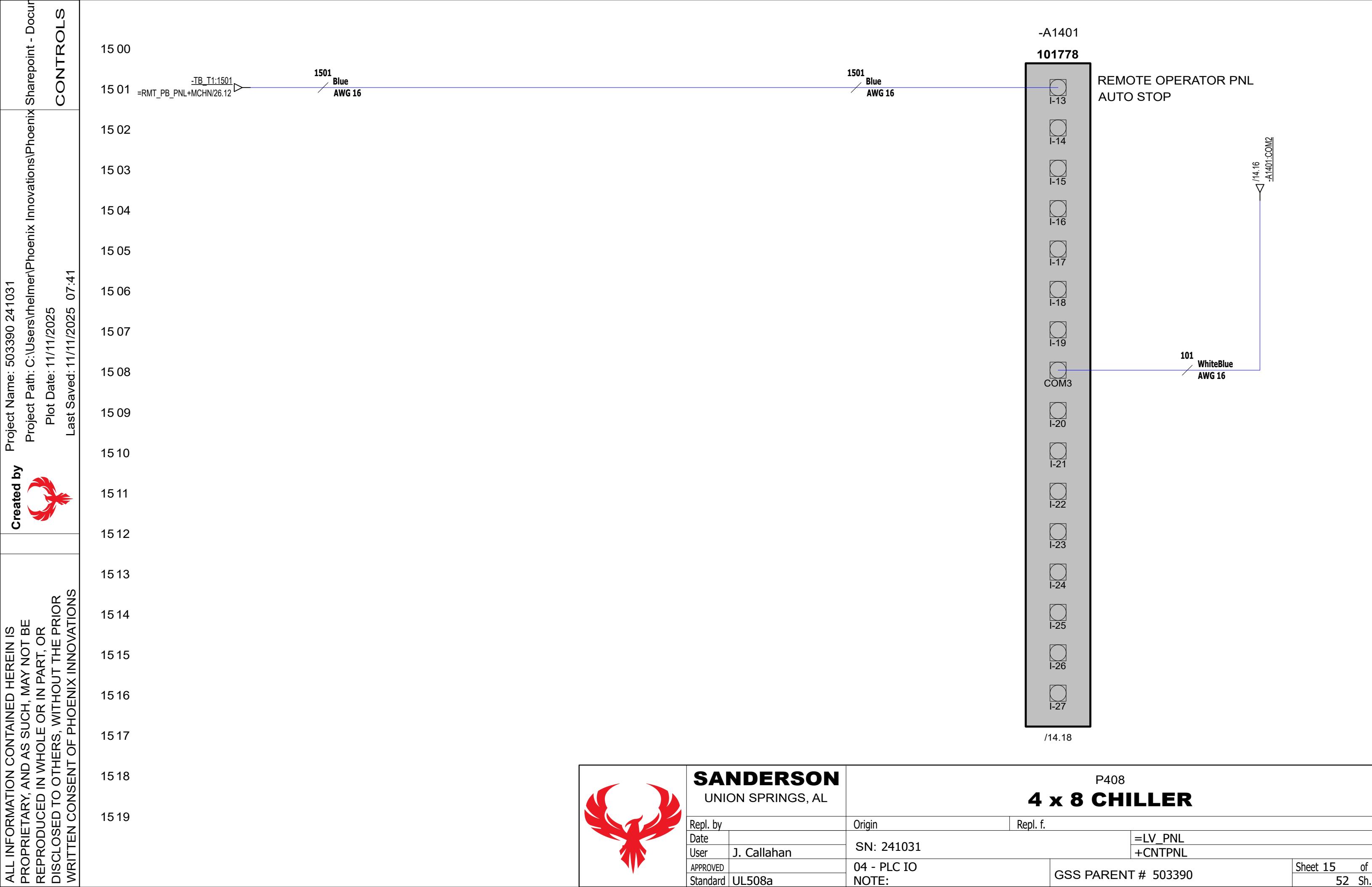


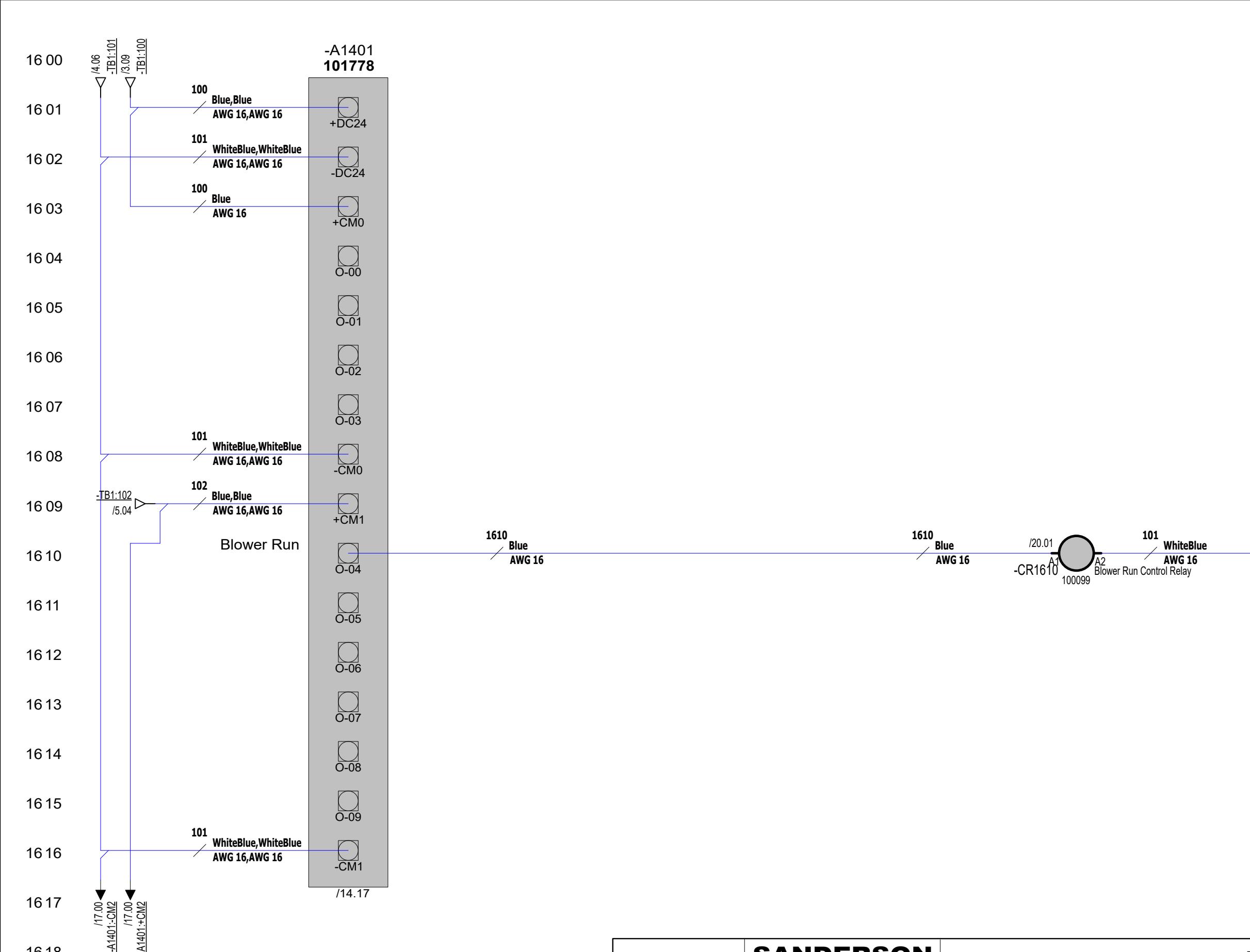
SANDERSON
UNION SPRINGS, AL

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Date			=LV_PNL
User	J. Callahan		+CNTPNL
APPROVED			
Standard	UL508a	03 - SAFETY NOTE:	GSS PARENT # 503390

P408

4 x 8 CHILLER





SANDERS
UNION SPRINGS,

P40

4 x 8 CHILLER

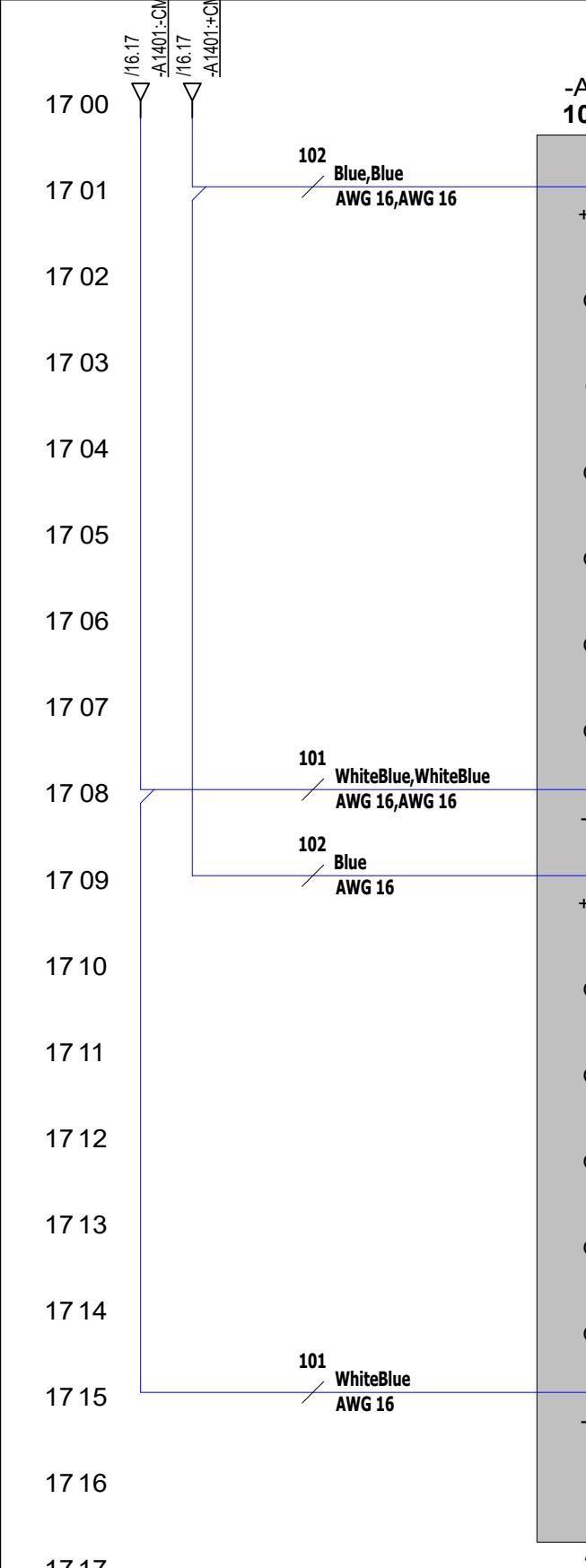
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Date			=LV_PN
User	J. Callahan	SN: 241031	+CNTPN
APPROVED		04 - PLC IO	
Standard	UL508a	NOTE:	GSS PARENT # 5033

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CONTROLS



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UNION SPRINGS, AL

Repl. by

Date

User

APPROVED

Standard

Origin

SN: 241031

J. Callahan

04 - PLC IO

NOTE:

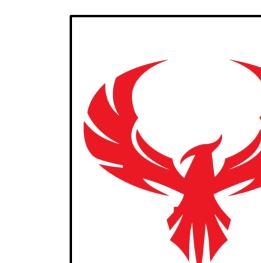
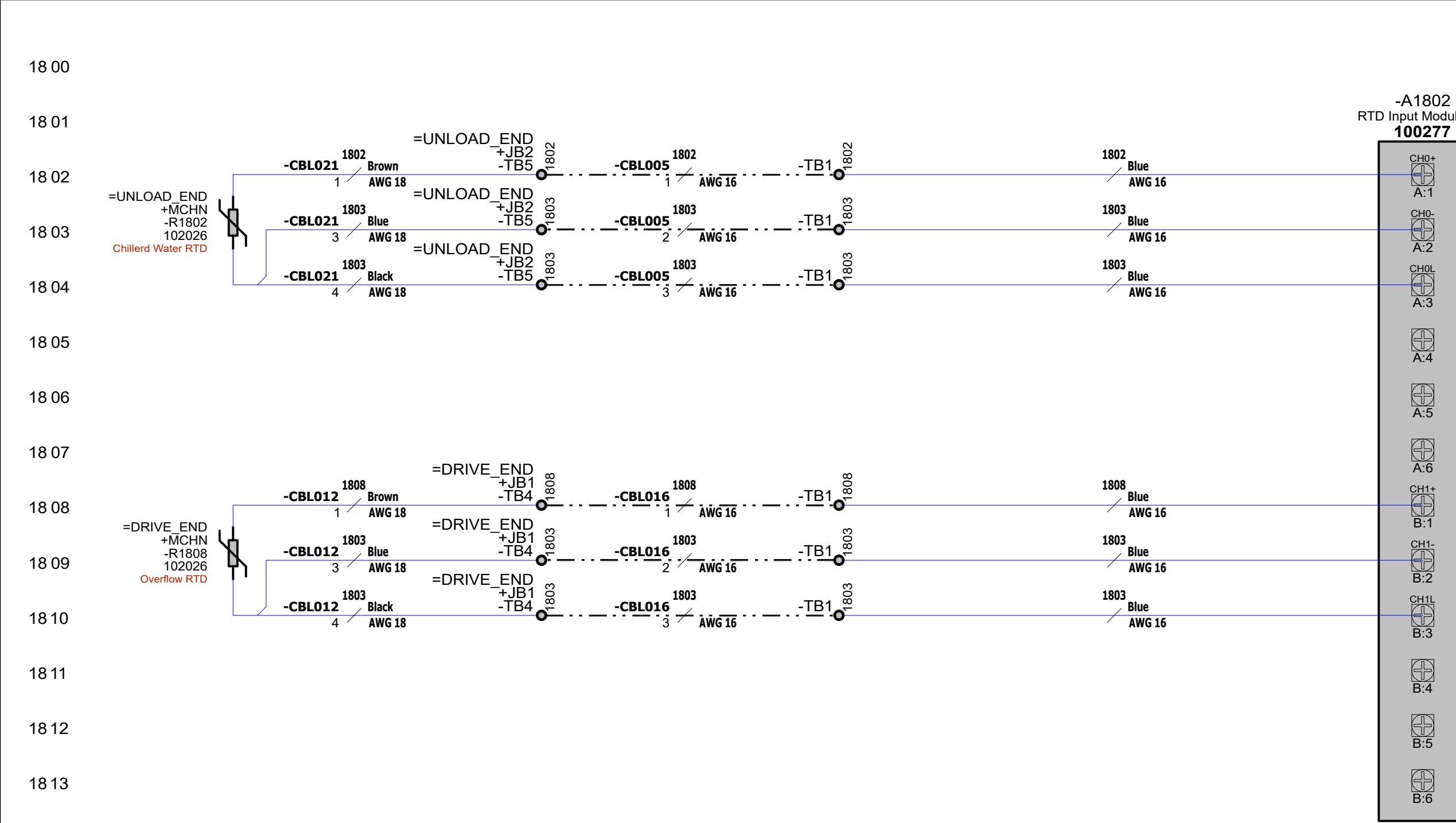
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=LV_PNL

+CNTPNL

P408
4 x 8 CHILLER

GSS PARENT # 503390



SANDERSON
UNION SPRINGS, AL

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Date

User

APPROVED

Standard

Origin

SN: 241031

J. Callahan

05 - PLC MODULES

NOTE:

P408

4 x 8 CHILLER

=LV_PNL

+CNTPNL

GSS PARENT # 503390

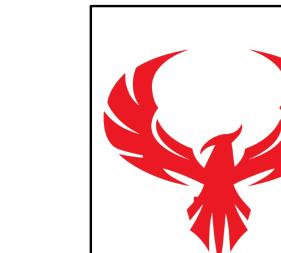
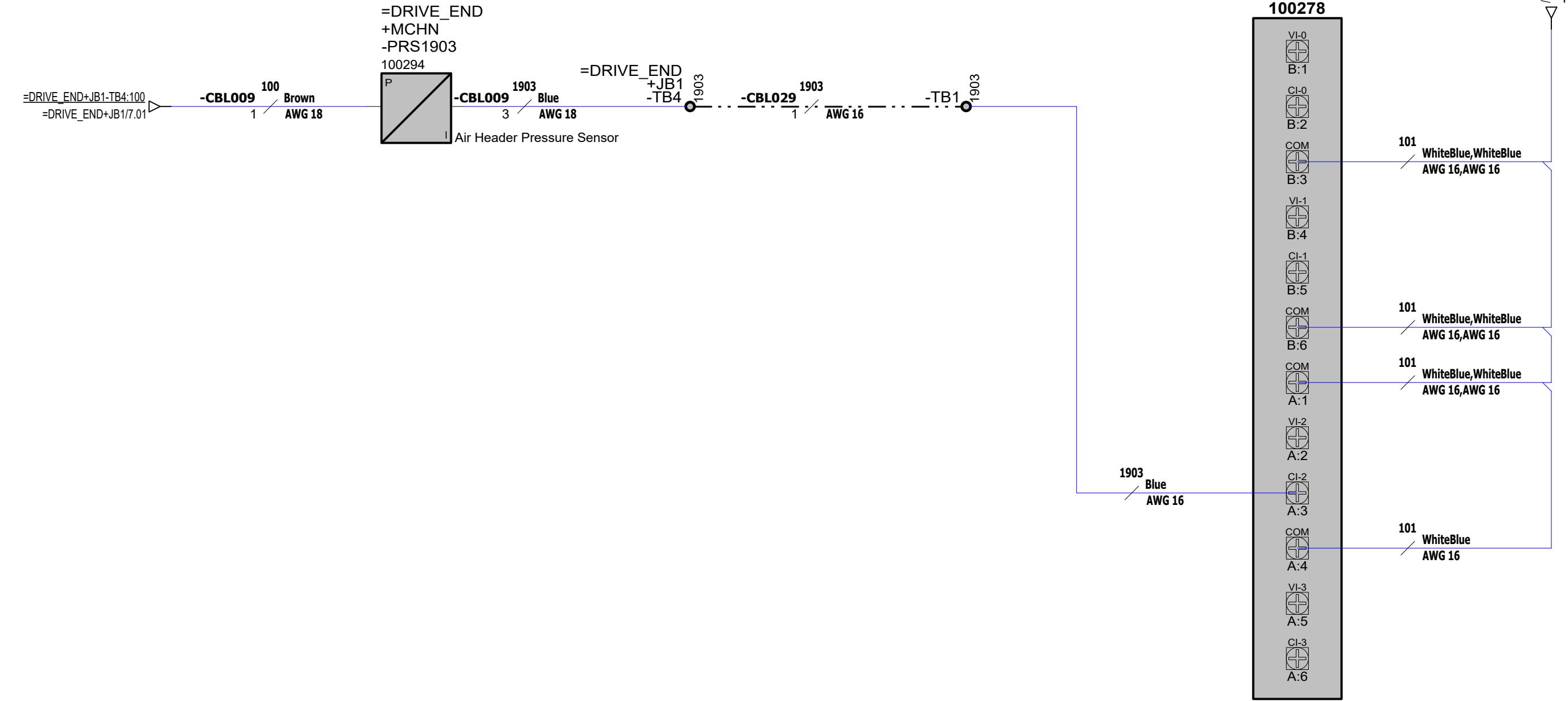
Sheet 18 of

52 Sh.

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Created by 
Project Name: 503390 241031
Project Path: C:\Users\rhelmer\Phoenix Innovations\Phoenix Sharepoint - Document
Plot Date: 11/11/2025
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CONTROLS



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UNION SPRINGS, AL

Repl. by

Date

User

APPROVED

Standard

Repl. by		Origin	Repl. f.
		SN: 241031	=LV_PNL +CNTPNL
J. Callahan			
		05 - PLC MODULES	
		NOTE:	GSS PARENT # 503390
			Sheet 19 of 52 Sh.

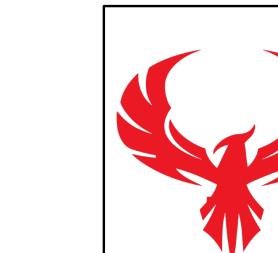
P408

4 x 8 CHILLER

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Project Path: C:\Users\rhelmer\Phoenix Innovations\Phoenix
Plot Date: 11/11/2025
Last Saved: 11/11/2025 07:41

Sharepoint - Document
CONTROLS

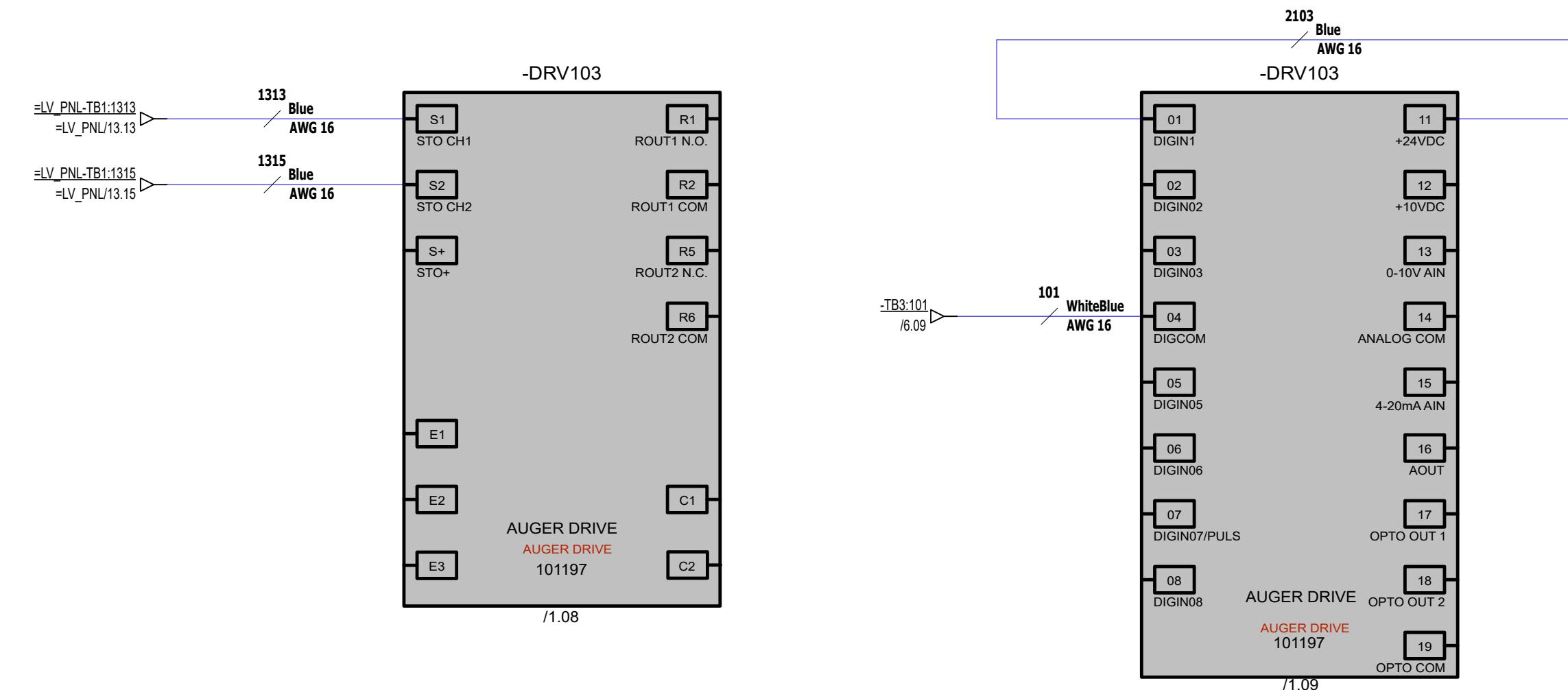


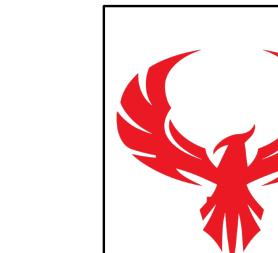
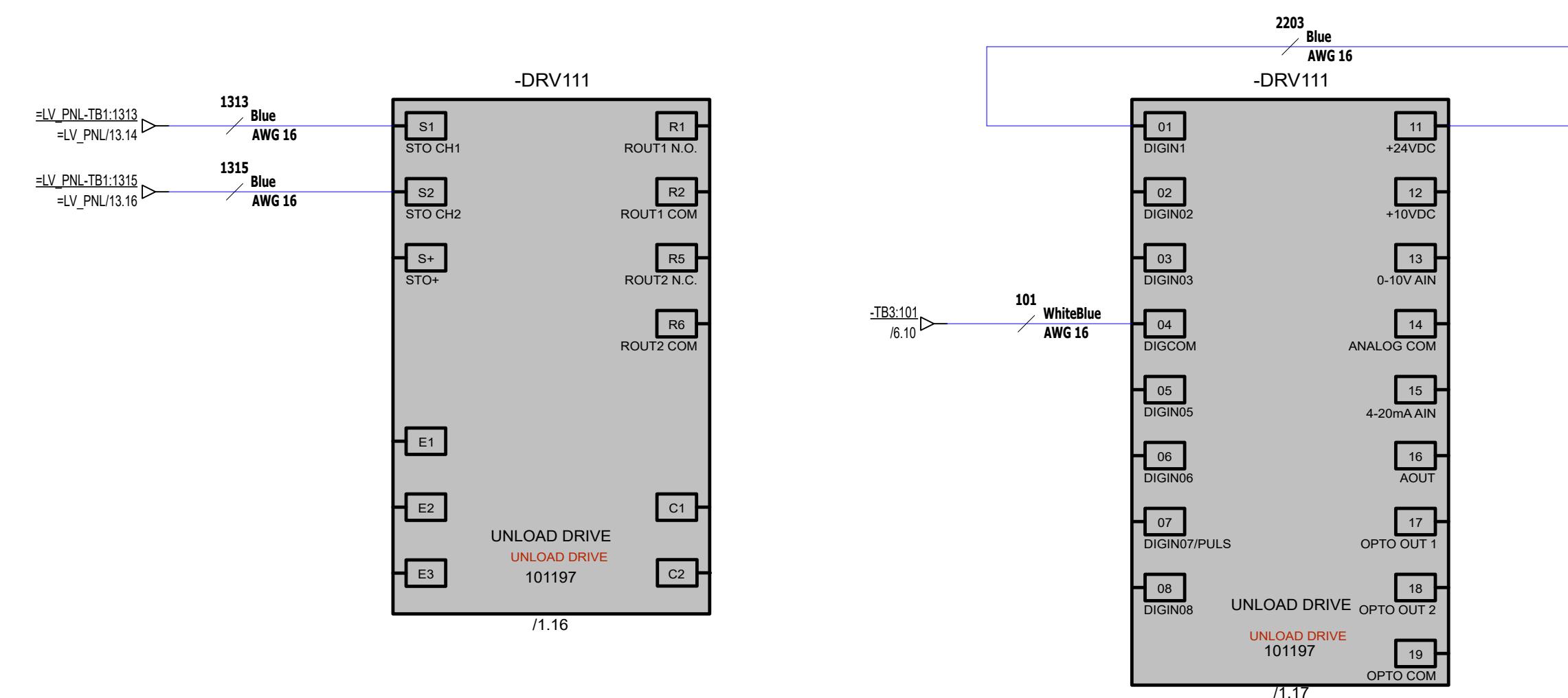
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UNION SPRINGS, AL

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User	J. Callahan		+CNTPNL
APPROVED			
Standard	UL508a	06 - RELAYS NOTE:	GSS PARENT # 503390

P408

4 x 8 CHILLER





SANDERSON
UNION SPRINGS, AL

Repl. by

Date

User

APPROVED

Standard

Origin

Repl. f.

SN: 241031

=HV_PNL

+CNTPNL

07 - DRIVES IO

NOTE:

GSS PARENT # 503390

P408

4 x 8 CHILLER

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Project Path: C:\Users\helmer\Phoenix Innovations\Phoenix Sharepoint - Document Controls
Plot Date: 11/11/2025
Last Saved: 11/11/2025 07:41



CONTROLS

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UNION SPRINGS, AL

Repl. by

Date

User J. Callahan

APPROVED

Standard UL508a

Origin

SN: 241031

07 - DRIVES IO
NOTE:

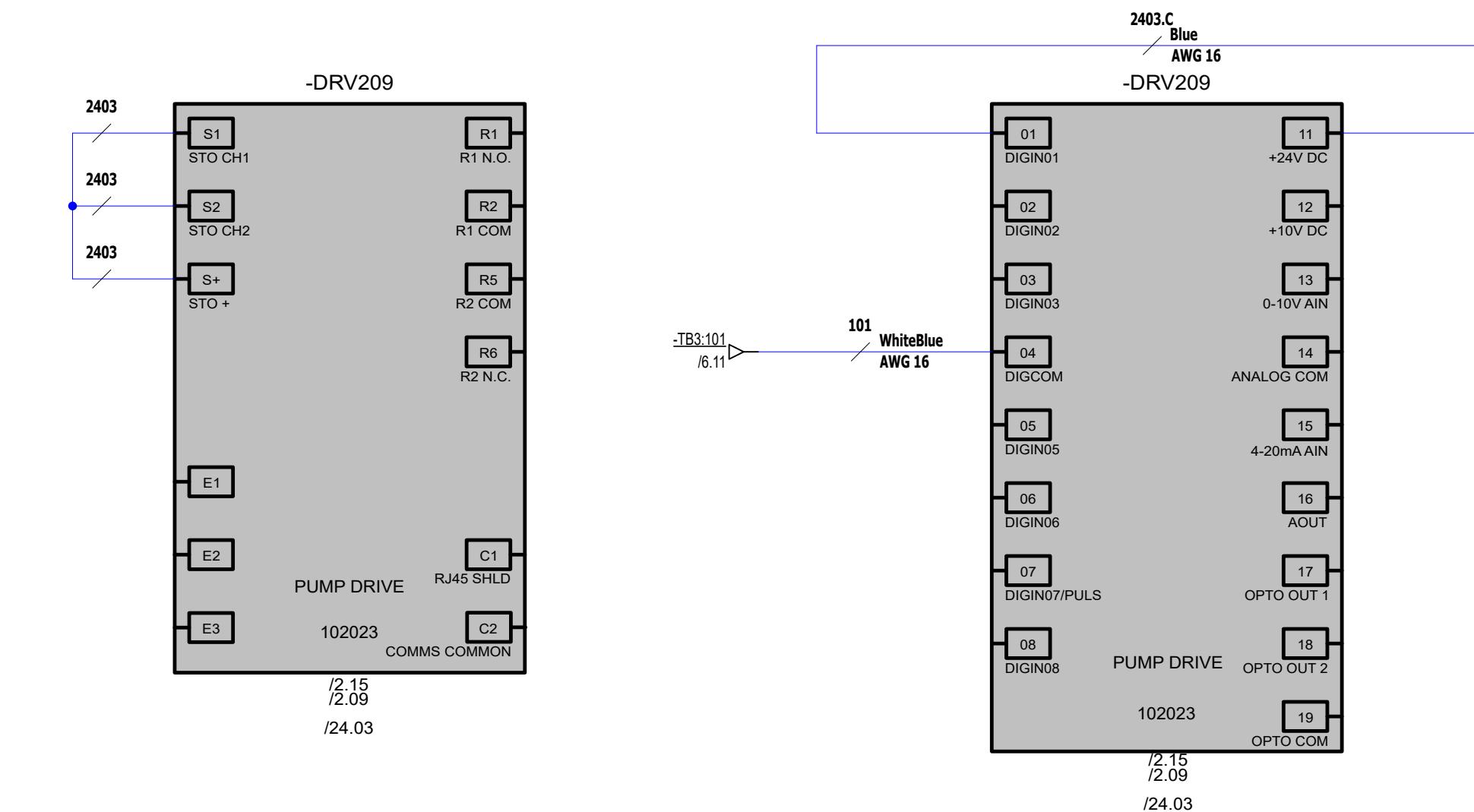
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4 x 8 CHILLER

Repl. f.

=HV_PNL
+CNTPNL

GSS PARENT # 503390

Sheet 23 of
52 Sh.

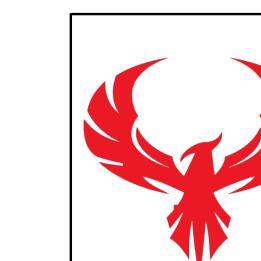
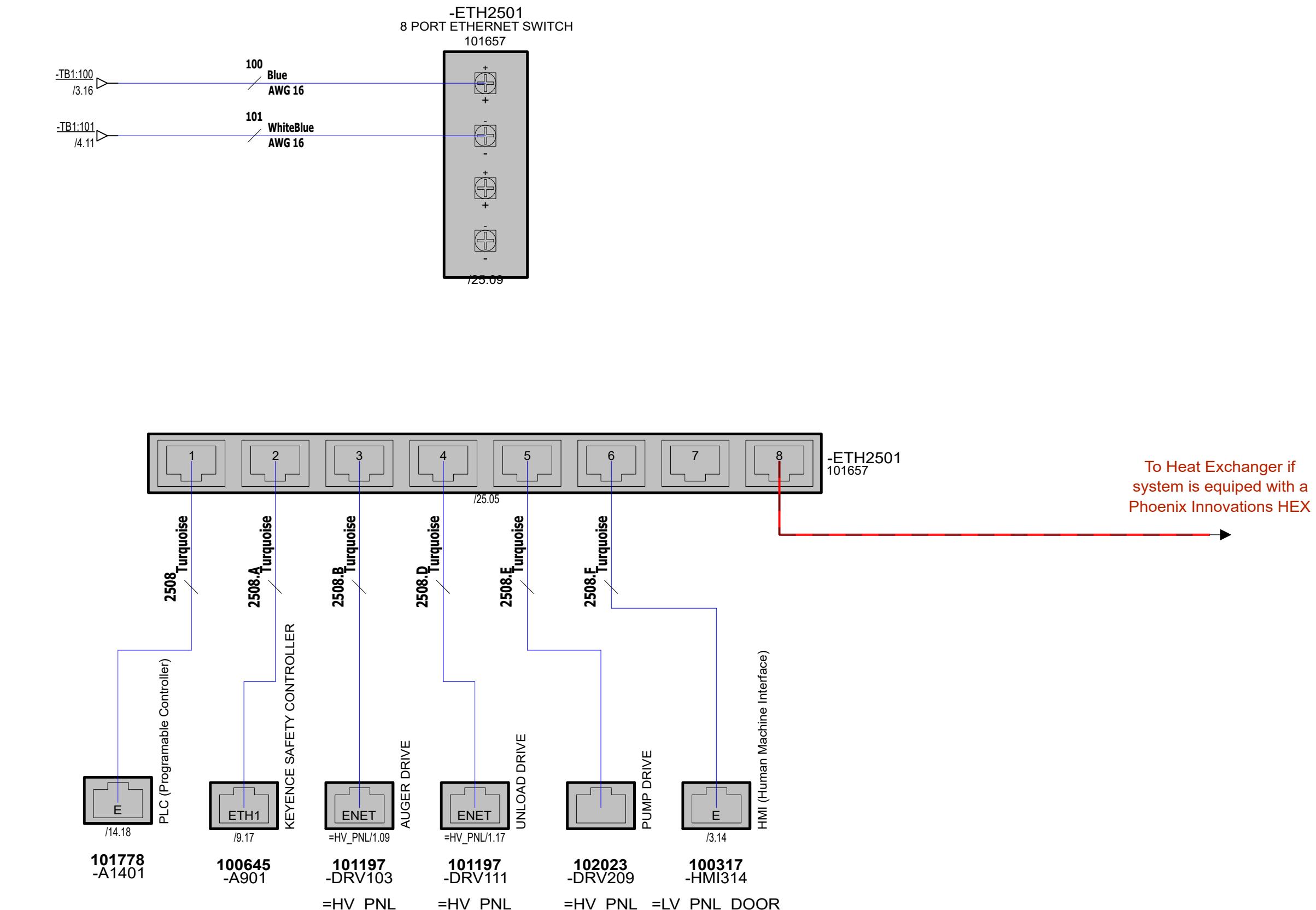


SANDERS
UNION SPRINGS, A

P408

4 x 8 CHILLER

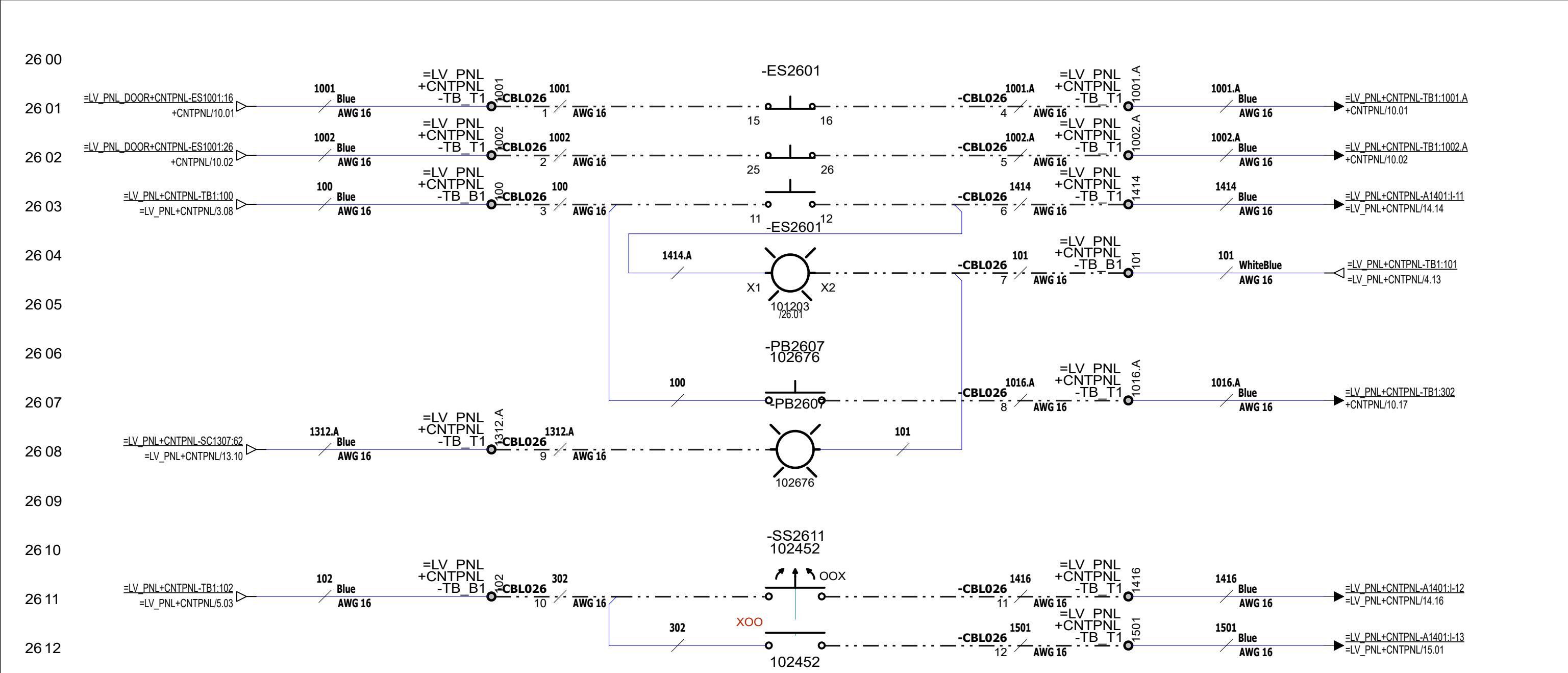
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Date				=HV_PNL
User	J. Callahan	SN: 241031		+CNTPNL
APPROVED		07 - DRIVES IO	GSS PARENT # 503390	Sheet 24 of
Standard	UL508a	NOTE:		52 Sh



SANDERSON
UNION SPRINGS, AL

P408
4 x 8 CHILLER

Repl. by	Origin	Repl. f.
Date		=LV_PNL
User	J. Callahan	+CNTPNL
APPROVED		
Standard	UL508a	
NOTE:	08 - NETWORKING	GSS PARENT # 503390



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UNION SPRINGS, AL

Repl. by

Date

User

APPROVED

Standard

Origin

SN: 241031

09 - Misc additions

P408
4 x 8 CHILLER

=RMT_PB_PNL
+MCHN

GSS PARENT # 503390

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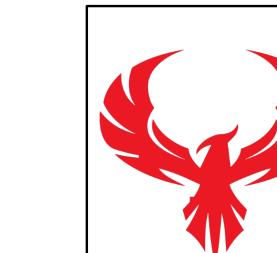
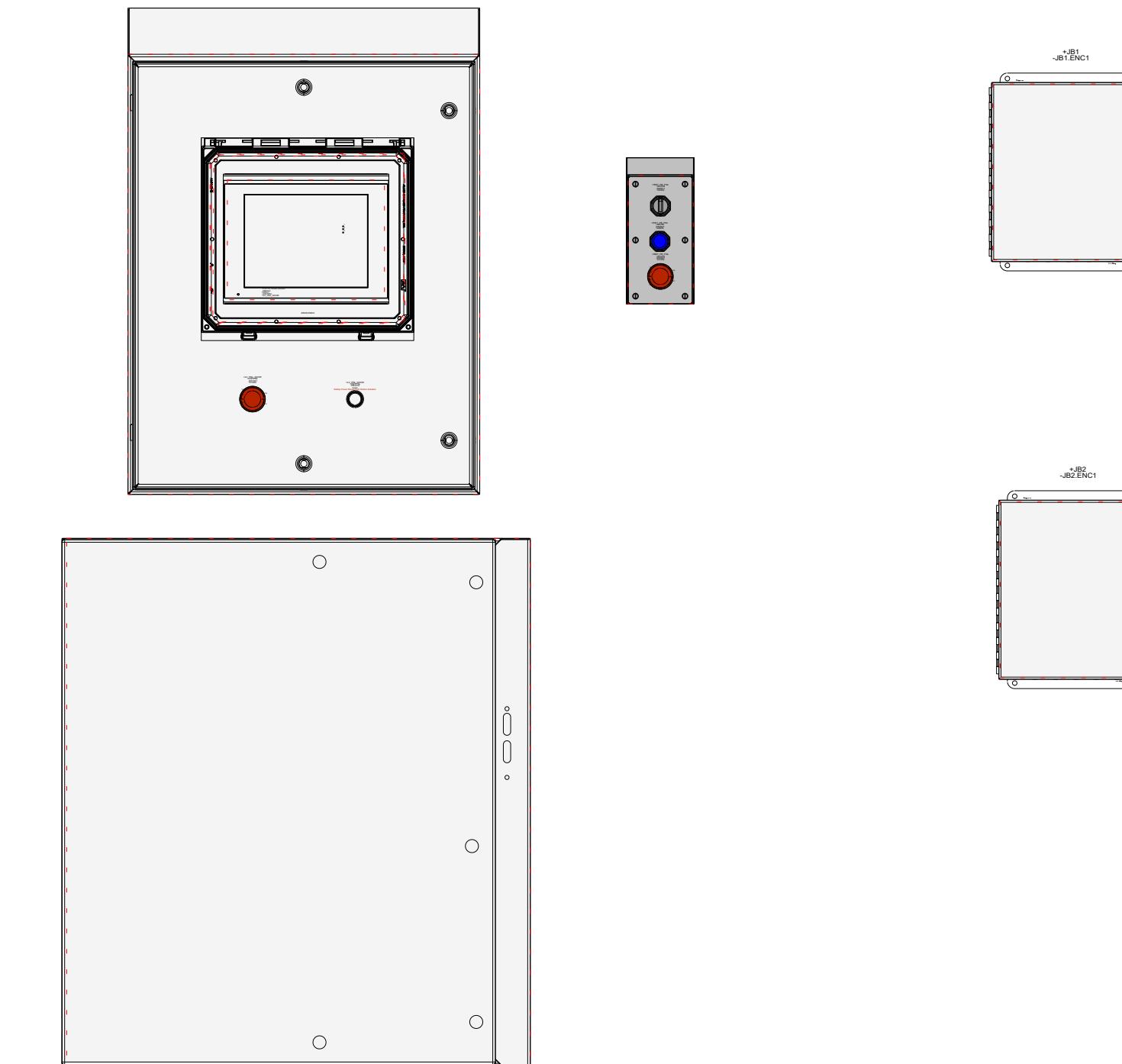
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CONTROLS

CONTROLS

Status	Change	Date	Name



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UNION SPRINGS, AL

P408

4 x 8 CHILLER

Repl. by

Date

User

Proved

Standard

Origin

SN: 241031

J. Callahan

99 - PANEL LAYOUTS
NOTE:

GSS PARENT # 503390

Sheet 27 of

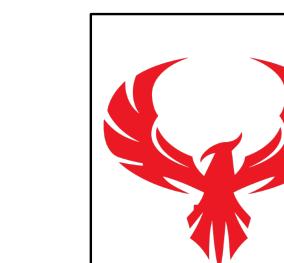
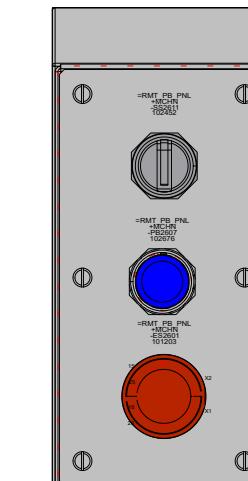
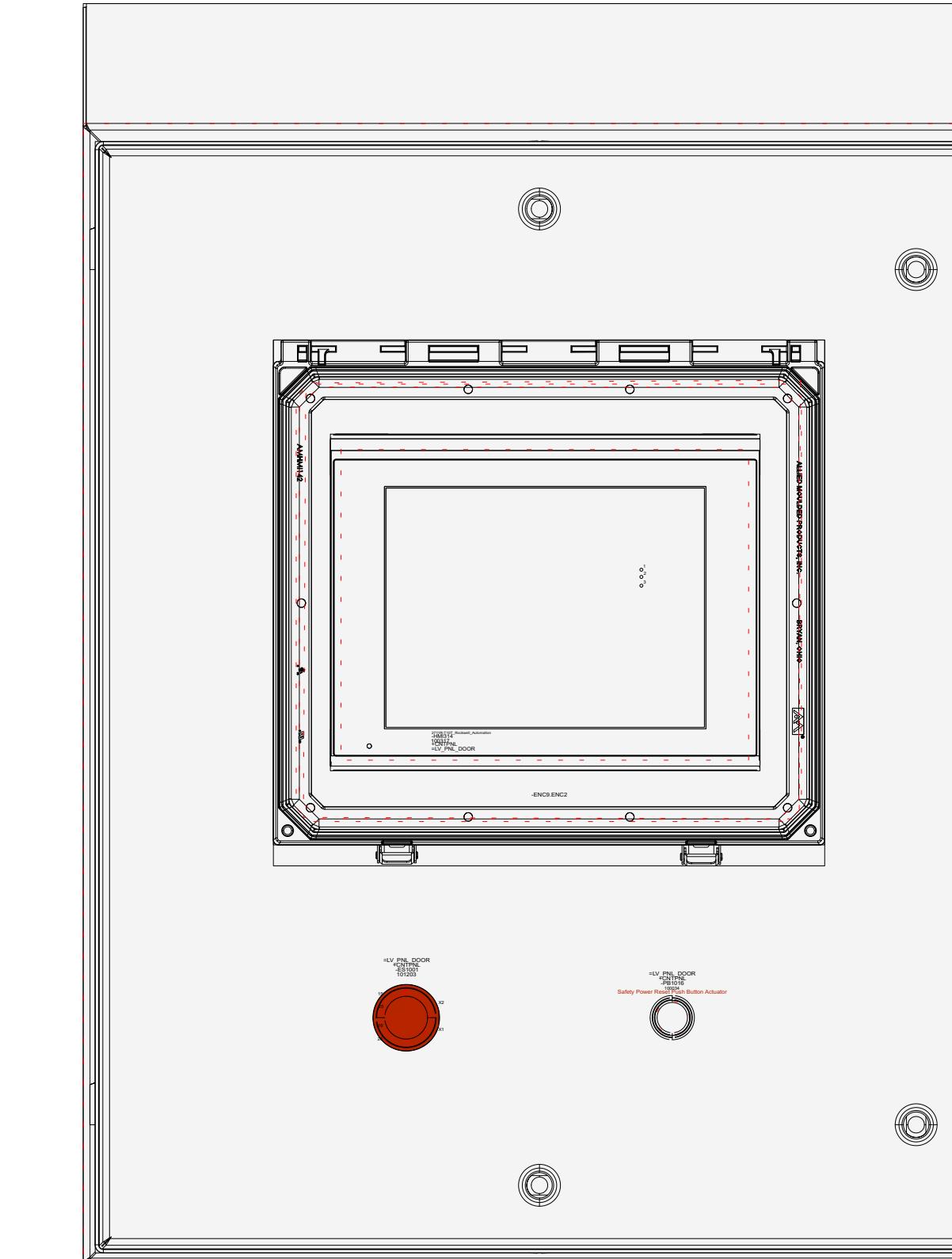
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UNION SPRINGS, AL

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Date

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Standard

Origin

SN: 241031

Repl. f.

99 - PANEL LAYOUTS

NOTE:

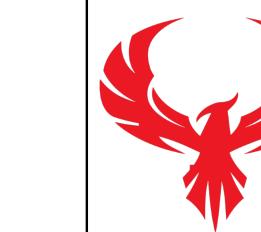
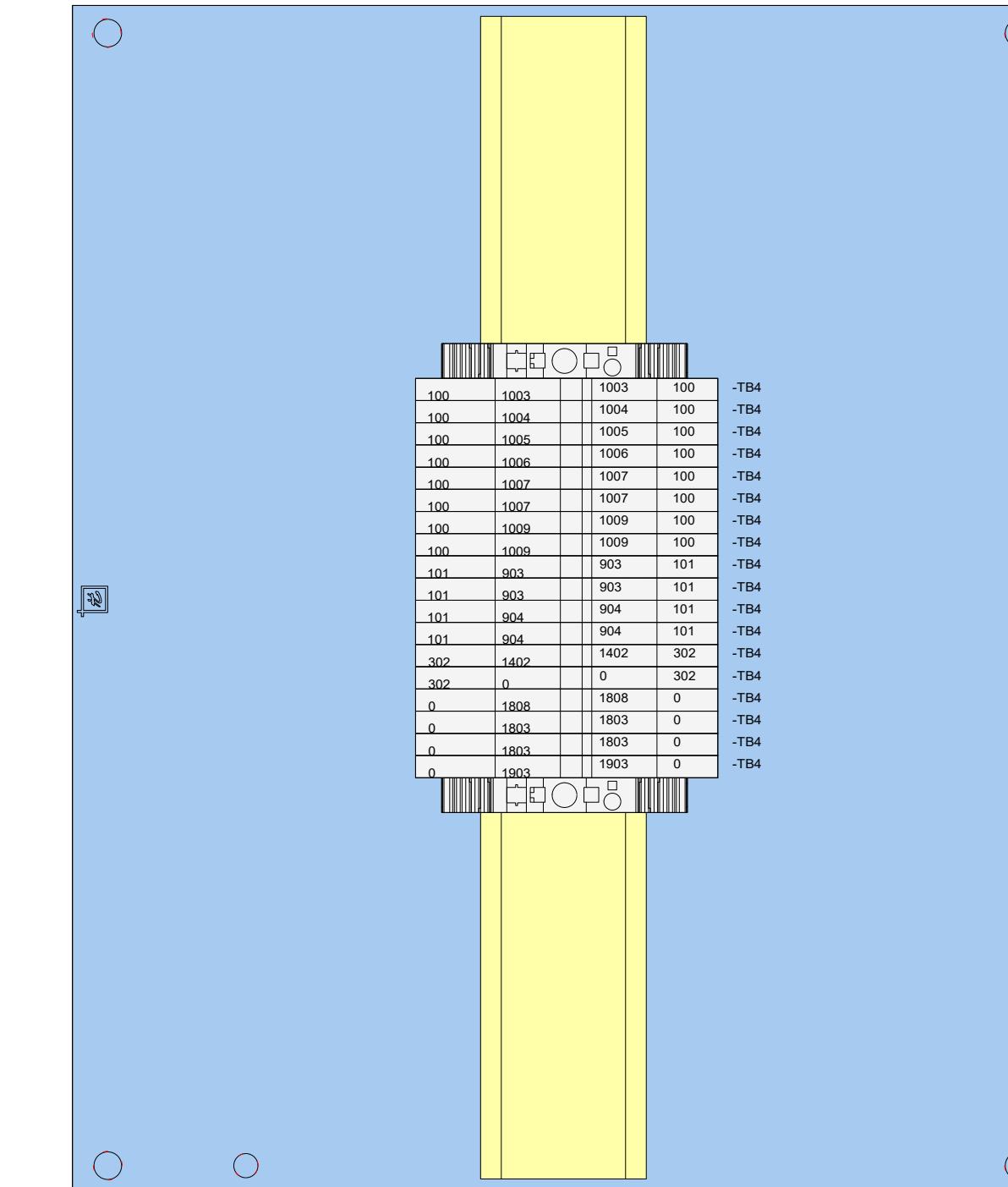
P408
4 x 8 CHILLER

GSS PARENT # 503390

Sheet 28 of
52 Sh.

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Date

User

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Standard

Origin

SN: 241031

J. Callahan

UL508a

99 - PANEL LAYOUTS
NOTE:

P408
4 x 8 CHILLER

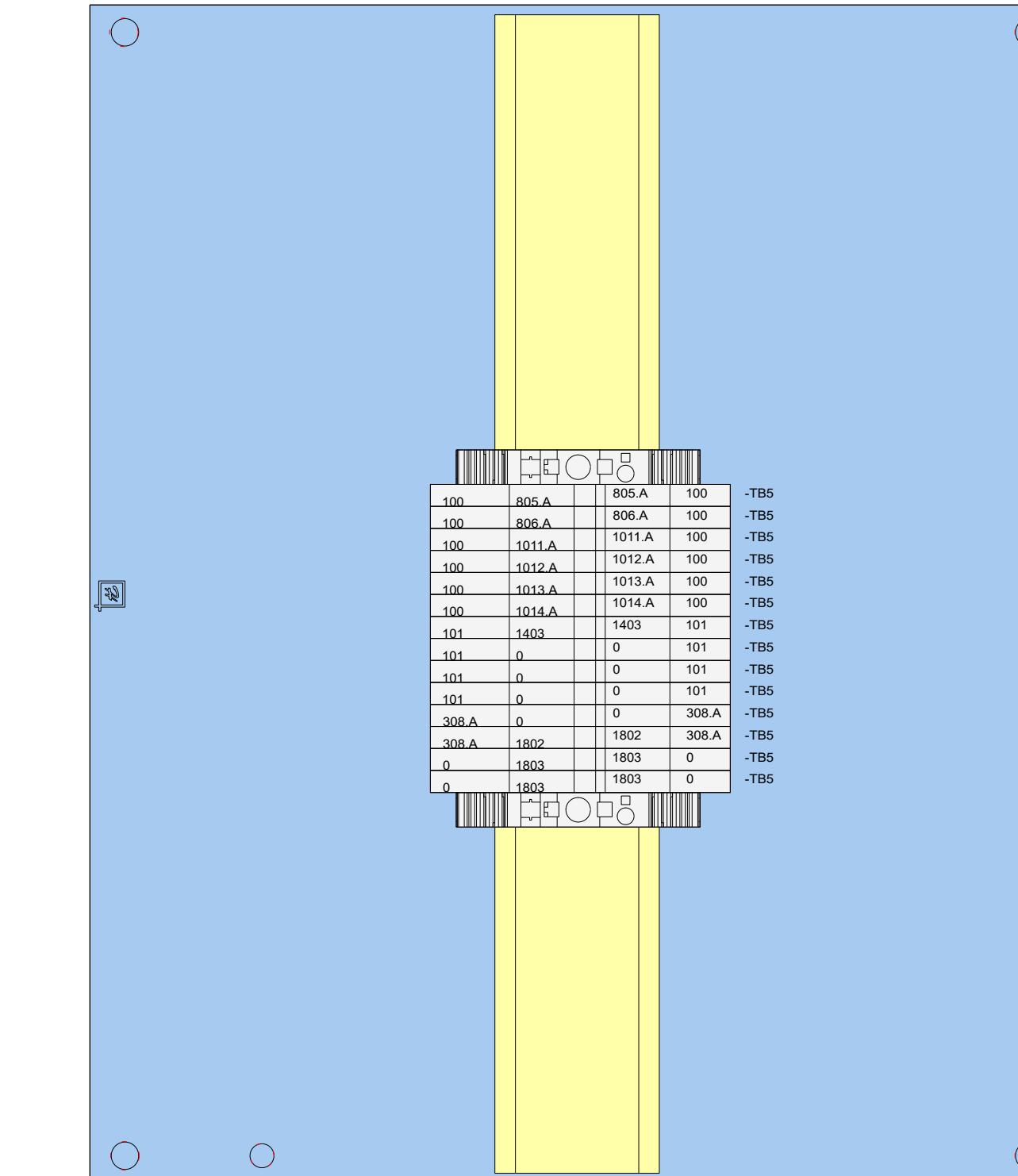
GSS PARENT # 503390

Sheet 29 of
52 Sh.

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CONTROLS



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UNION SPRINGS, AL

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Origin

SN: 241031

J. Callahan

UL508a

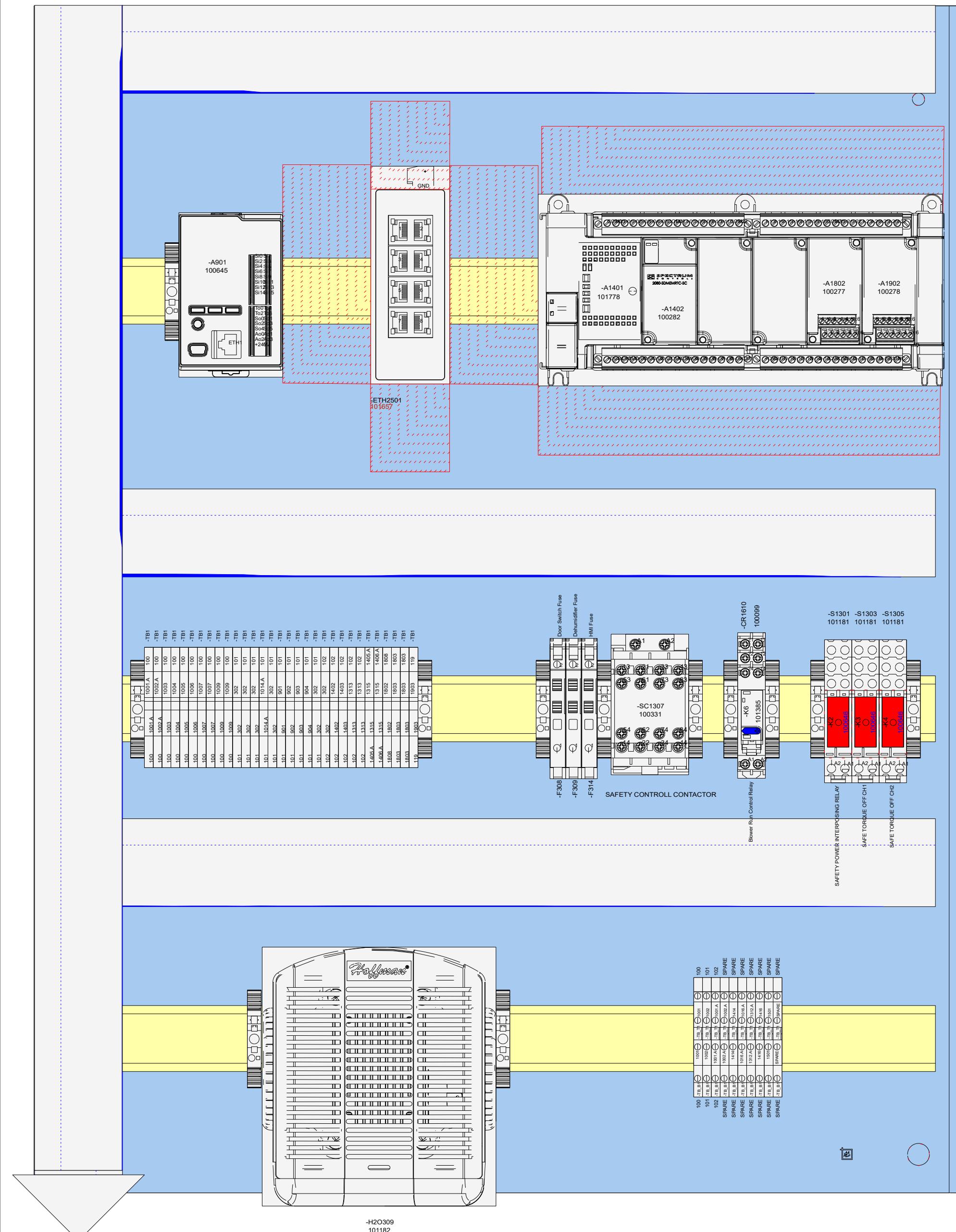
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NOTE:

P408
4 x 8 CHILLER

GSS PARENT # 503390

Sheet 30 of

52 Sh.



SANDERSON
UNION SPRINGS, AL

R108

P408

UNION SPRINGS, AL	4 x 8 CHILLER		
Repl. by	Origin	Repl. f.	
Date			=LV_PNL
User	J. Callahan		+CNPPL
APPROVED		99 - PANEL LAYOUTS	Sheet 31 of
Standard	UL508a	NOTE:	GSS PARENT # 503390
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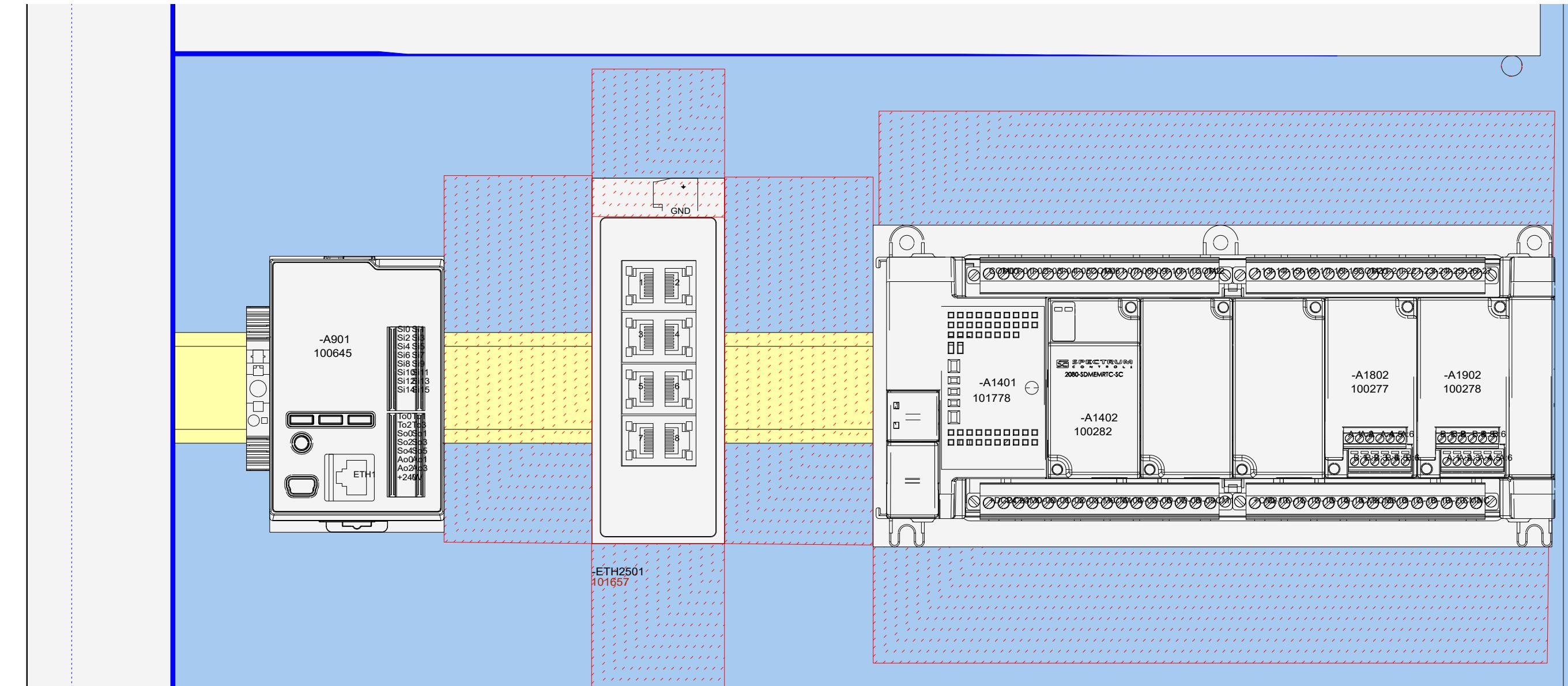
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UNION SPRINGS, AL

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=LV_PNL

+CNTPNL

99 - PANEL LAYOUTS
NOTE:

P408
4 x 8 CHILLER

GSS PARENT # 503390

Sheet 32 of

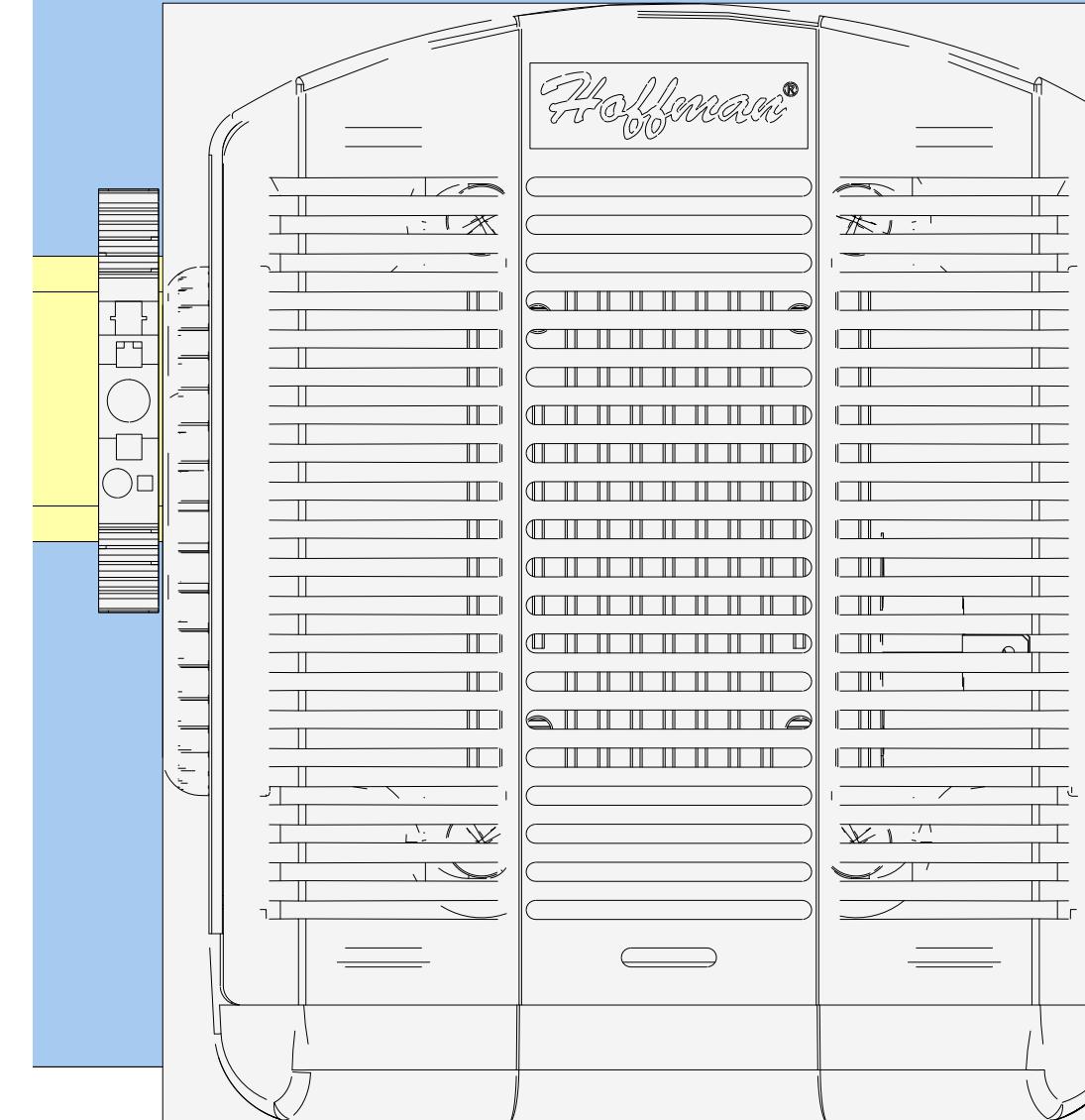
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Standard

Origin

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99 - PANEL LAYOUTS
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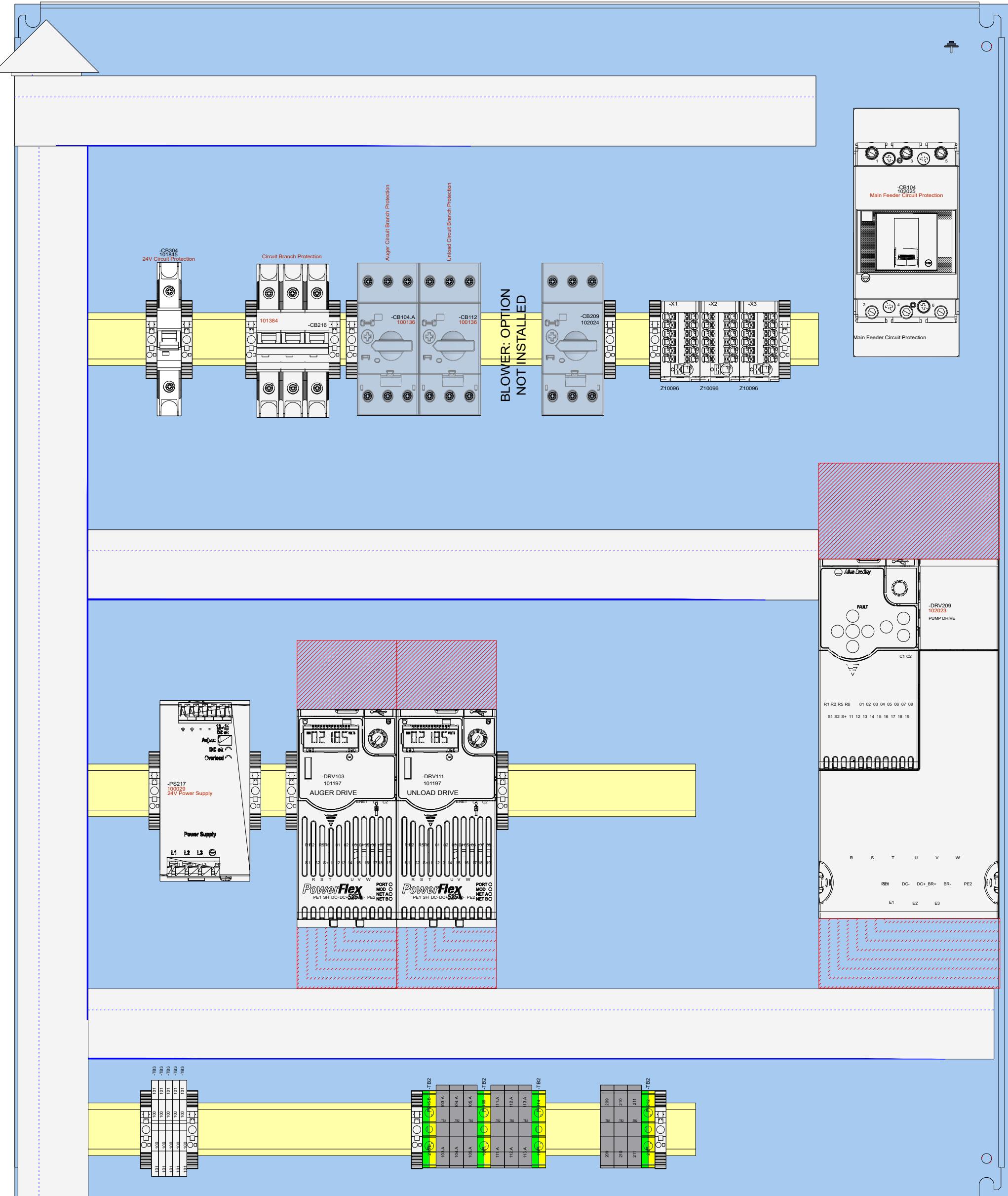
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P408

4 x 8 CHILLER

SAFETY POWER





SANDERSON
UNION SPRINGS, AL

P408

4 x 8 CHILLER

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Origin

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Date

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User

J. Callahan

+CNTPNL

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99 - PANEL LAYOUTS

GSS PARENT # 503390

Standard

UL508a

Sheet 35 of

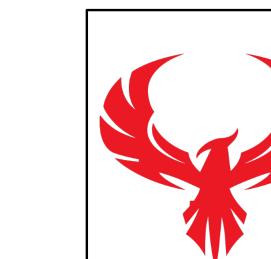
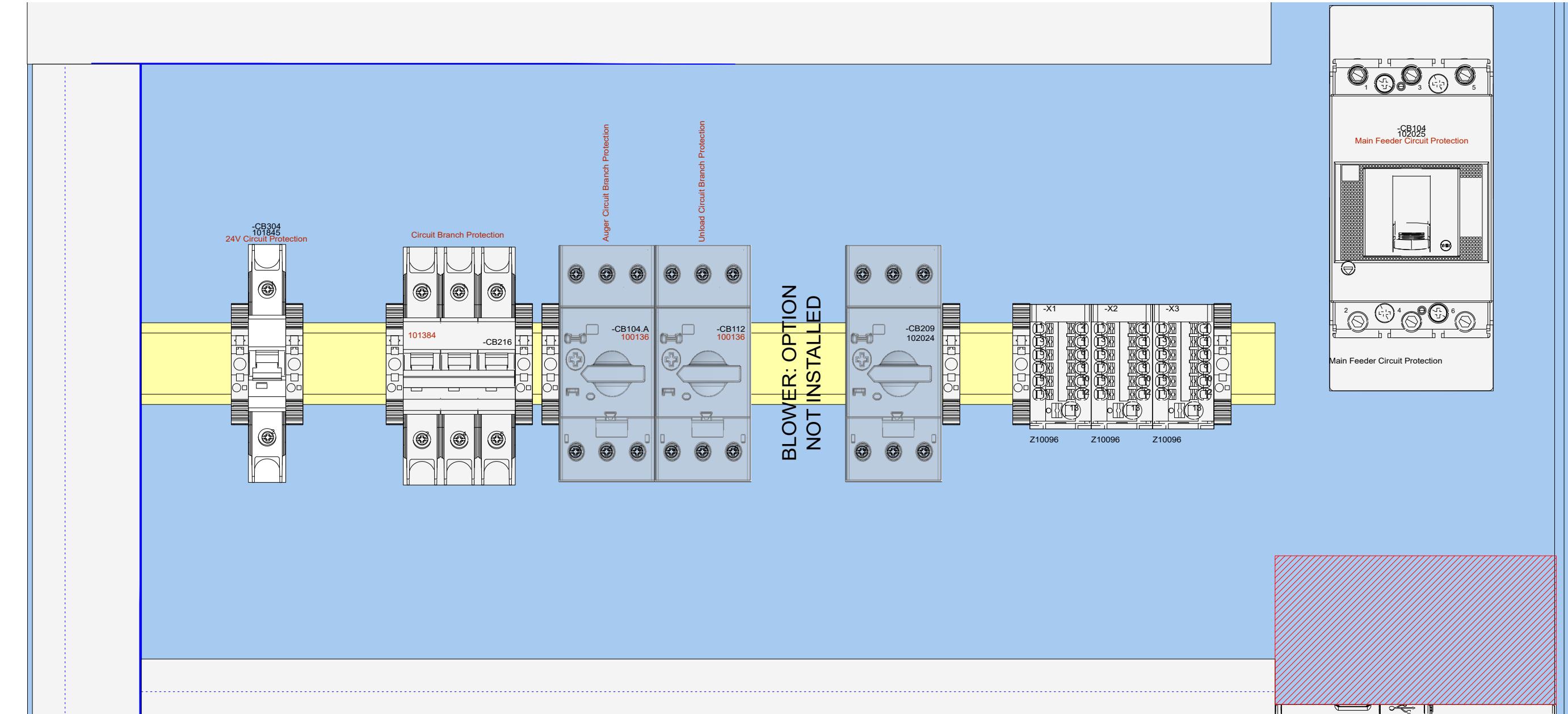
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UNION SPRINGS, AL

P408

4 x 8 CHILLER

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Date

User

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Standard

Origin

SN: 241031

J. Callahan

UL508a

Repl. f.

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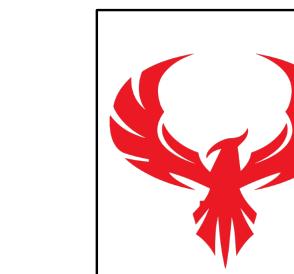
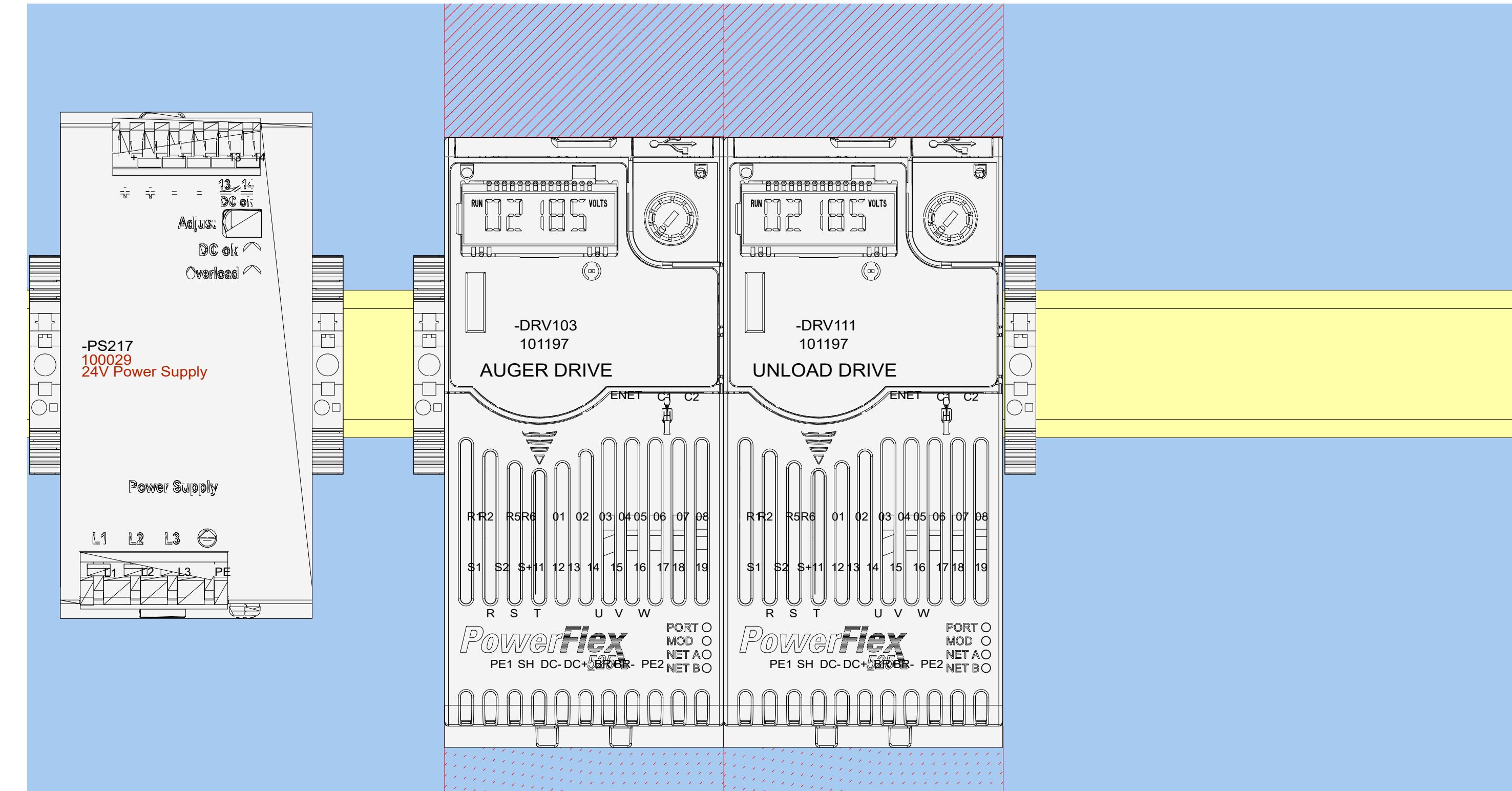
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99 - PANEL LAYOUTS
NOTE:

GSS PARENT # 503390

Sheet 36 of

52 Sh.



SANDERSON
UNION SPRINGS, AL

Repl. by

Date

User

Proved

Standard

Origin

SN: 241031

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+CNTPNL

99 - PANEL LAYOUTS
NOTE:

P408
4 x 8 CHILLER

GSS PARENT # 503390

Sheet 37 of

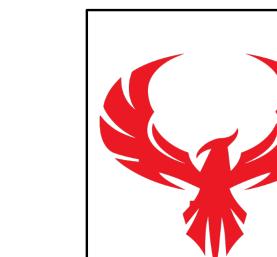
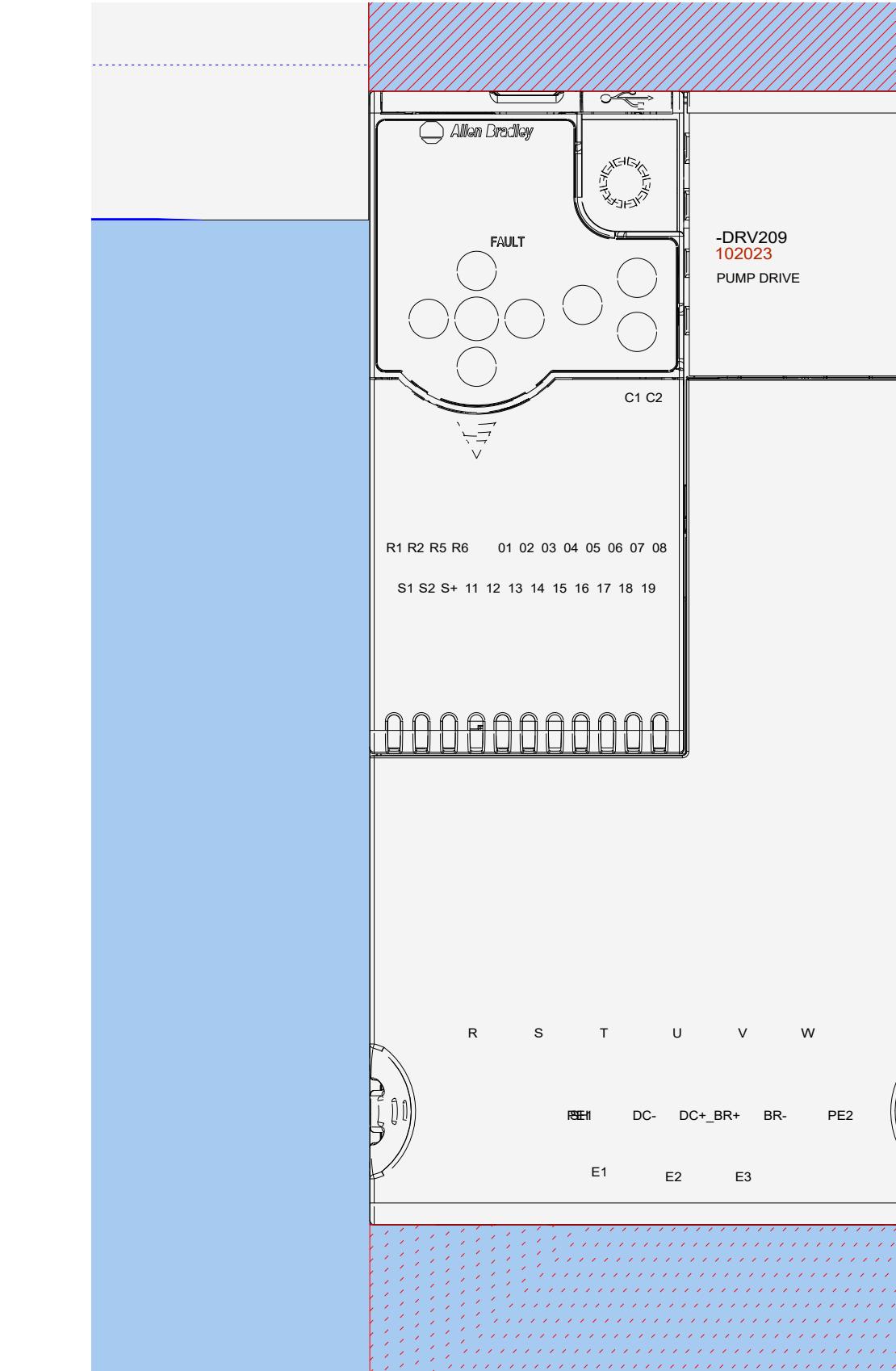
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Project Path: C:\Users\rhelmer\Phoenix Innovations\Phoenix Sharepoint - Document
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UNION SPRINGS, AL

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Origin

SN: 241031

J. Callahan

UL508a

Repl. f.
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99 - PANEL LAYOUTS
NOTE:

P408
4 x 8 CHILLER

GSS PARENT # 503390

Sheet 38 of
52 Sh.



CONTROLS



4254 S Arkansas Ave
Russellville, AR 72802
479-219-9100

UL #: 3357337

Phoenix Innovations
Industrial Control Panel
Serial Number: **241031-1**
Full Load Current: **26.30A**
Largest Motor: **15.0 HP**
Largest Load: **21.0A**
Voltage: **480V**
Phase and Freq: **3PH 60Hz**
SCCR: **5KA**
Enclosure Rating: **TYPE 1**
Drawing Number **241031**



SANDERSON
UNION SPRINGS, AL

Repl. by	
Date	
User	J. Callahan
APPROVED	
Standard	UL508a

Origin	Repl. f.
SN: 241031	
101 - DATAPLATES NOTE:	

P408
4 x 8 CHILLER

GSS PARENT # 503390



4254 S Arkansas Ave
Russellville, AR 72802
479-219-9100

UL #: 3357337

Phoenix Innovations

Industrial Control Panel

Serial Number: **241031-2**

Full Load Current: **NA**

Largest Motor: **NA**

Largest Load: **NA**

Voltage: **24V**

Phase and Freq: **DC**

SCCR: **5KA**

Enclosure Rating: **TYPE 1**

Drawing Number **241031**



SANDERSON
UNION SPRINGS, AL

Repl. by

Date

User

APPROVED

Standard

Origin

Repl. f.

SN: 241031

J. Callahan

NOTE:

101 - DATAPLATES

P408
4 x 8 CHILLER

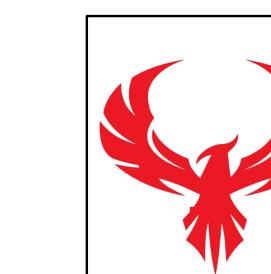
GSS PARENT # 503390

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52 Sh.

Device/Quantity-Bill of Material with Device Function



Project name:	503390 241031	Creation date:	11. Nov. 2025 07:40:31	rhelmer
Amount	PART NUMBER (Component code)	GSS description		Supplier / Manufacturer
	Device designation	Placement	Function	
1	100029	POWER SUPPLY 20 AMP 24VDC		Allen-Bradley
	-PS217	/2.17	24V Power Supply	
1	100032	PB LED MODULE 22MM		Allen-Bradley
	-PL1			
1	100034	PB MOMENTARY RED LED 22MM		Allen-Bradley
	-PB1016	/10.16	Safety Power Reset Push Button Actuator	
1	100036	NO CONTACT BLOCK 22MM		Allen-Bradley
	-A2			
1	100099	8 BLADE RELAY SOCKET		
	-CR1610	/16.10	Blower Run Control Relay	
2	100136	CIRCUIT BREAKER 2.5-4.0 AMP		Allen-Bradley
	-CB104.A	/1.04	Auger Circuit Branch Protection	
	-CB112	/1.12	Unload Circuit Branch Protection	
1	100143	ENCLOSURE 36X32X12		nVent HOFFMAN
	-ENC1	/27.F3		
1	100258	PROXIMITY SENSOR INDUCTIVE		
	-PRX1402	/14.02		
1	100263	LEVER KIT FOR DISC. ENCLOSURES		Allen-Bradley
	-3			
1	100265	LIMIT SWITCH LOW ENERGY		Allen-Bradley
	-PRX1403A	/14.03		
2	100268	LUG KIT		
	-1			
	-2			
1	100277	MICRO800 4CH RTD IN MODULE		Rockwell_Automation
	-A1802	/18.02		



SANDERSON
UNION SPRINGS, AL

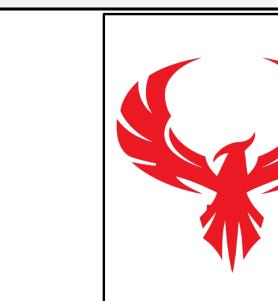
Repl. by	Origin	Repl. f.
Date		
User		
APPROVED		
Standard		

P408
4 x 8 CHILLER

SN: 241031	
102 - BOM	
GSS PARENT # 503390	



Amount	PART NUMBER (Component code)	GSS description		Supplier / Manufacturer
		Placement	Function	
1	100278	MICRO800 4CH ANALOG IN MODULE		Rockwell Automation
	-A1902	/19.02		
1	100282	MICRO850 SD CARDADAPTERMODULE		Rockwell_Automation
	-A1402	/27.B4		
1	100294	TRANSDUCER 240PSI 4-20MA NPT		
	-PRS1903	/19.03	Air Header Pressure Sensor	
1	100308	PLASTIC LATCH FOR PB - 22MM		Allen-Bradley
	-A1			
1	100317	TOUCH PANEL PV800 10IN		Rockwell_Automation
	-HMI314	/3.14	HMI (Human Machine Interface)	
1	100331	SAFETY CONTROL CONTACTOR		Allen-Bradley
	-SC1307	/13.07	SAFETY CONTROL CONTACTOR	
1	100645	SAFETY CONTROLLER		
	-A901	/9.01	KEYENCE SAFETY CONTROLLER	
3	100646	8A 24VDC SAFETY RELAY		Allen-Bradley
	-K2	/31.82		
	-K3	/31.82		
	-K4	/31.82		
3	101181	8 PIN RELAY SOCKET		
	-S1301	/13.01	SAFETY POWER INTERPOSING RELAY	
	-S1303	/13.03	SAFE TORQUE OFF CH1	
	-S1305	/13.05	SAFE TORQUE OFF CH2	
1	101182	DEHUMIDIFIER		
	-H2O309	/3.09		
1	101183	VENT DRAIN 2x1.38 PLY/SS		
	-VENT1			
5	101193	CABLE 10M M12 5PIN YLW ST		Phoenix
	-CBL003			
	-CBL004			
	-CBL009			
	-CBL012			
	-CBL021			



SANDERSON
UNION SPRINGS, AL

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Date

User

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Standard

Origin

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SN: 241031

102 - BOM

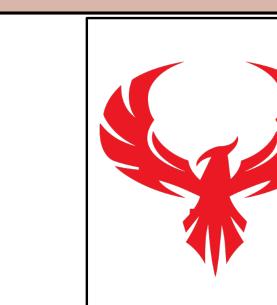
GSS PARENT # 503390

P408

4 x 8 CHILLER

Amount	Part Number (Component code)	GSS description			Supplier / Manufacturer			
	Device designation	Placement	Function					
2	101195	ENLOSURE 12X10X6 SS CLAMPED			nVent HOFFMAN			
		-ENC5	/27.B6					
		-ENC8	/27.D6					
2	101197	DRIVE PF525 2 HP 480V			Allen-Bradley			
		-DRV103	/1.03	AUGER DRIVE				
		-DRV111	/1.11	UNLOAD DRIVE				
2	101203	PUSH-PULL DEVICE 30MM			Allen-Bradley			
		-ES1001	/10.01					
		-ES2601	/26.01					
1	101384	CIRCUIT BREAKER 2A 3PH			Allen Bradley			
		-CB216	/2.16	Circuit Branch Protection				
1	101385	RELAY DC 24V 8A						
		-K6	/31.64					
1	101392	ENCLOSURE 30X24X12 HIGH-SHED			nVent HOFFMAN			
		-ENC3	/27.C3					
1	101657	8 Port Ethernet Switch UM			Rockwell_Automation			
		-ETH2501	/25.01					
1	101662	KINGSTON X0038MGPQV SD CARD						
		-SD1						
4	101676	SWITCH NON CONTACT UC						
		-DS1104	/11.04	DRIVE END COVER SAFETY SWITCH				
		-DS1111	/11.11	DRIVE END DOOR SAFETY SWITCH				
		-PRS1202A						
		-PRS1208A						
1	101714	14" X12" HMI COVER LATCHED						
		-ENC9	/27.B3					
4	101715	E-STOP LIFELINE 4			Rockwell_Automation			
		-PCS1003	/10.03					
		-PCS1005	/10.05					
		-SC1003A						
		-SC1005A						
12	101731	CORD 8PIN10M SAFETY INTERLOK						

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SANDERSO
UNION SPRINGS, AL

P408

4 x 8 CHILLER

Repl. by		Origin	Repl. f.
Date		SN: 241031	
User			
APPROVED		102 - BOM	GSS PARENT # 503390
Standard			Sheet BOM3 of 52 Sh

CONTROLS				
Amount	Part Number (Component code)	GSS description		Supplier / Manufacturer
	Device designation	Placement	Function	
	-CBL001			
	-CBL002			
	-CBL007			
	-CBL008			
	-CBL015			
	-CBL019			
	-1			
	-2			
	-1			
	-2			
	-3			
	-4			
1	101778	Micro800 48 pt controller		Allen-Bradley
	-A1401	/14.01	PLC (Programable Controller)	
1	101845	CIRCUIT BREAKER 1 P. 10A		Allen Bradley
	-CB304	/3.04	24V Circuit Protection	
2	102015	PULL CORD TENSION KIT		
	-PC1			
	-PC2			
1	102023	DRIVE PF525 15 HP 480V		Allen-Bradley
	-DRV209	/2.09	PUMP DRIVE	
1	102024	CIRCUIT BREAKER 18-25A		Allen-Bradley
	-CB209	/2.09	Pump Branch Circuit Protection	
1	102025	CIRCUIT BREAKER 45A 3PH		Allen-Bradley
	-CB104	/1.04	Main Feeder Circuit Protection	
2	102026	1/2" RTD 50 MM INS LNG		
	-R1808	/18.08	Overflow RTD	
	-R1802	/18.02	Chillerd Water RTD	
1	102452	SELECTOR SW 3POS SPR RET C		
	-SS2611	/26.11		
2	102665	ENLOSURE 12X10X5 GRAY CLAMPS		
	-ENC6	/29.F4		
	-ENC7	/30.F4		
1	102676	PB MOMENTARY BLUE LED 30MM		Allen-Bradley

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Project Name: 503390 241031
Project Path: C:\Users\helmer\Phoenix Innovations\Phoenix Sharepoint - Document

Plot Date: 11/11/2025

Last Saved: 11/11/2025 07:41



SANDERSON
UNION SPRINGS, AL

P408

4 x 8 CHILLER

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User

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Standard

SN: 241031

102 - BOM

GSS PARENT # 503390

Sheet BOM4 of

52 Sh.

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Project Name: 503390 241031
Project Path: C:\Users\rhelmer\Phoenix Innovations\Phoenix Sharepoint - Document Controls



CONTROLS

Amount	PART NUMBER (Component code)	GSS description		Supplier / Manufacturer
	Device designation	Placement	Function	
	-PB2607	/26.07		
2	500145	JBOX BACK PANEL		nVent HOFFMAN
	-ENC6	/29.F4		
	-ENC7	/30.F4		
1	501253	Low Voltage panel back plate		nVent HOFFMAN
	-ENC4	/27.C3		
1	501258	back plate for 36*30 cdsc		nVent HOFFMAN
	-ENC2	/27.F3		
1	503938	ELECTRICAL STAND HTR/CHL BRO		
	-STND1			



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Date

User

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Origin

Repl. f.

SN: 241031

P408

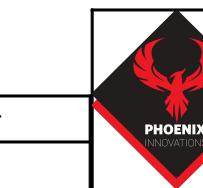
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102 - BOM

GSS PARENT # 503390

Sheet BOM5 of
52 Sh.

Simplified Complete BOM



Creation Date:	11. Nov. 2025 07:40:40	User:	rhelmer
Project name:	503390 241031		

CONTROLS

Project Name: 503390 241031

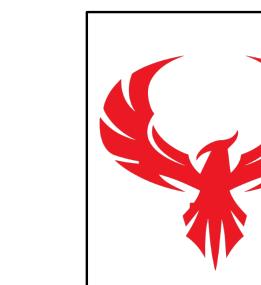
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Plot Date: 11/11/2025 07:41

Created by

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Amount	Part Number	GSS description	Used ✓ / #	1	101183	VENT DRAIN 2x1.38 PLY/SS		1	102676	PB MOMENTARY BLUE LED 30MM	
1	100029	POWER SUPPLY 20 AMP 24VDC		5	101193	CABLE 10M M12 5PIN YLW ST		2	500145	JBOX BACK PANEL	
1	100032	PB LED MODULE 22MM		2	101195	ENLOSURE 12X10X6 SS CLAMPED		1	501253	Low Voltage panel back plate	
1	100034	PB MOMENTARY RED LED 22MM		2	101197	DRIVE PF525 2 HP 480V		1	501258	back plate for 36*30 cdsc	
1	100036	NO CONTACT BLOCK 22MM		2	101203	PUSH-PULL DEVICE 30MM		1	503938	ELECTRICAL STAND HTR/CHL BRO	
1	100099	8 BLADE RELAY SOCKET		1	101384	CIRCUIT BREAKER 2A 3PH					
2	100136	CIRCUIT BREAKER 2.5-4.0 AMP		1	101385	RELAY DC 24V 8A					
1	100143	ENCLOSURE 36X32X12		1	101392	ENCLOSURE 30X24X12 HIGH-SHED					
1	100258	PROXIMITY SENSOR INDUCTIVE		1	101657	8 Port Ethernet Switch UM					
1	100263	LEVER KIT FOR DISC. ENCLOSURES		1	101662	KINGSTON X0038MGPQV SD CARD					
1	100265	LIMIT SWITCH LOW ENERGY		4	101676	SWITCH NON CONTACT UC					
2	100268	LUG KIT		1	101714	14" X12" HMI COVER LATCHED					
1	100277	MICRO800 4CH RTD IN MODULE		4	101715	E-STOP LIFELINE 4					
1	100278	MICRO800 4CH ANALOG IN MODULE		12	101731	CORD 8PIN10M SAFETY INTERLOK					
1	100282	MICRO850 SD CARDADAPTERMODULE		1	101778	Micro800 48 pt controller					
1	100294	TRANSDUCER 240PSI 4-20MA NPT		1	101845	CIRCUIT BREAKER 1 P. 10A					
1	100308	PLASTIC LATCH FOR PB - 22MM		2	102015	PULL CORD TENSION KIT					
1	100317	TOUCH PANEL PV800 10IN		1	102023	DRIVE PF525 15 HP 480V					
1	100331	SAFETY CONTROL CONTACTOR		1	102024	CIRCUIT BREAKER 18-25A					
1	100645	SAFETY CONTROLLER		1	102025	CIRCUIT BREAKER 45A 3PH					
3	100646	8A 24VDC SAFETY RELAY		2	102026	1/2" RTD 50 MM INS LNG					
3	101181	8 PIN RELAY SOCKET		1	102452	SELECTOR SW 3POS SPR RET C					
1	101182	DEHUMIDIFIER		2	102665	ENLOSURE 12X10X5 GRAY CLAMPS					



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UNION SPRINGS, AL

P408

4 x 8 CHILLER

Repl. by	Origin	Repl. f.
Date		
User		
APPROVED		
Standard		
102 - BOM		GSS PARENT # 503390
		Sheet SBOM 1 of 52 Sh.

Field Cable List with Individual Connection



Project name: 503390 2410

Creation date: 11.11.2025 07

Cable Designation	Article number		Source loc.	Source designation	Destination loc.	Destination designation
Core Number	Conductor Size	Sheet Location per Conductor	Wire Number	Source device	Color (field assigned if not pre-defined)	Destination device
-CBL005	16 AWG 4 Conductor Shielded		=LV_PNL +CNTPNL	-TB1	=UNLOAD_END+JB2	-TB5
1	AWG 16	/18.02	1802	-TB1		-TB5
2	AWG 16	/18.03	1803	-TB1		-TB5
3	AWG 16	/18.04	1803	-TB1		-TB5
4	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
-CBL006	16 AWG 18 CONDUCTOR WITH SHIELD		=LV_PNL +CNTPNL	-TB1	=DRIVE_END+JB1	-TB4
1	AWG 16	/3.02	100	-TB1		-TB4
2	AWG 16	/10.03	1003	-TB1		-TB4
3	AWG 16	/4.02	101	-TB1		-TB4
4	AWG 16	/3.09	302	-TB1		-TB4
5	AWG 16	/9.03	903	-TB1		-TB4
6	AWG 16	/9.04	904	-TB1		-TB4
7	AWG 16	/10.04	1004	-TB1		-TB4
8	AWG 16	/10.05	1005	-TB1		-TB4
9	AWG 16	/10.06	1006	-TB1		-TB4
10	AWG 16	/10.07	1007	-TB1		-TB4
11	AWG 16	/10.08	1007	-TB1		-TB4
12	AWG 16	/10.09	1009	-TB1		-TB4
13	AWG 16	/10.10	1009	-TB1		-TB4
14	AWG 16	/14.02	1402	-TB1		-TB4
15	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
16	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
17	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
18	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
-CBL010	14 AWG 3C wG Motor Leads		=HV_PNL +CNTPNL	-TB2	=UNLOAD_END+MCHN	-M111
1	AWG 14	/1.11	111.A	-TB2		-M111
2	AWG 14	/1.12	112.A	-TB2		-M111
3	AWG 14	/1.13	113.A	-TB2		-M111

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P408

4 x 8 CHILLER

Repl. by	Origin	Repl. f.
Date		
User	SN: 241031	
APPROVED	104 - Pull List	GSS PARENT # 503390
Standard		Sheet CON1 of 52 Sh

Field Cable List with Individual Connection



Project name: 503390 2410

Creation date: 11.11.2025 07

Cable Designation	Article number		Source loc.	Source designation	Destination loc.	Destination designation
Core Number	Conductor Size	Sheet Location per Conductor	Wire Number	Source device	Color (field assigned if not pre-defined)	Destination device
4	AWG 14	/1.14	114	-TB2	Green	-M111
-CBL011	10 AWG 3C wG Motor Leads					
1	AWG 10	NOT USED	NOT USED	NOT USED		NOT USED
2	AWG 10	NOT USED	NOT USED	NOT USED		NOT USED
3	AWG 10	NOT USED	NOT USED	NOT USED		NOT USED
4	AWG 10	NOT USED	NOT USED	NOT USED	Green	NOT USED
-CBL013	14 AWG 3C wG Motor Leads		=HV_PNL +CNTPNL	-TB2	=DRIVE_END+MCHN	-M103
1	AWG 14	/1.03	103.A	-TB2		-M103
2	AWG 14	/1.04	104.A	-TB2		-M103
3	AWG 14	/1.05	105.A	-TB2		-M103
4	AWG 14	/1.06	106	-TB2	Green	-M103
-CBL016	16 AWG 4 Conductor Shielded		=LV_PNL +CNTPNL	-TB1	=DRIVE_END+JB1	-TB4
1	AWG 16	/18.08	1808	-TB1		-TB4
2	AWG 16	/18.09	1803	-TB1		-TB4
3	AWG 16	/18.10	1803	-TB1		-TB4
4	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
-CBL022	10 AWG VFD Cable		=HV_PNL +CNTPNL	-TB2	=HV_PNL+MCHN	-M209
1	AWG 10	/2.09	209	-TB2		-M209
2	AWG 10	/2.10	210	-TB2		-M209
3	AWG 10	/2.11	211	-TB2		-M209
4	AWG 10	/2.12	212	-TB2		-M209
-CBL025	16 AWG 12 Conductor Shielded		=LV_PNL +CNTPNL	-TB1	=UNLOAD_END+JB2	-TB5
1	AWG 16	/3.03	100	-TB1		-TB5
2	AWG 16	/4.03	101	-TB1		-TB5
3	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
4	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED

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P40

4 x 8 CHILLER

Repl. by	Origin	Repl. f.
Date	SN: 241031	
User		
APPROVED	104 - Pull List	GSS PARENT # 503390
Standard		Sheet CON2 of 52 Sh

Field Cable List with Individual Connections



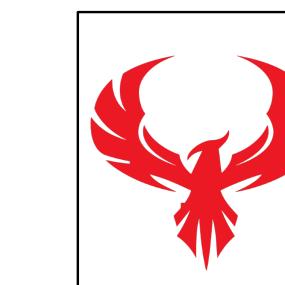
Project name: 503390 241031

Creation date: 11.11.2025 07:40

 Project Name: 503390 241031
 Project Path: C:\Users\rhelmer\Phoenix Innovations\Phoenix Innovations\rhelmer
 Plot Date: 11/11/2025
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Cable Designation	Article number	Source loc.	Source designation	Destination loc.	Destination designation	
Core Number	Conductor Size	Sheet Location per Conductor	Wire Number	Source device	Color (field assigned if not pre-defined)	Destination device
5	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
6	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
7	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
8	AWG 16	/14.03	1403	-TB1		-TB5
9	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
10	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
11	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
12	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
-CBL026	16 AWG 12 Conductor Shielded	=LV_PNL +CNTPNL	-TB_T1	=RMT_PB_PNL+MCHN		-ES2601
1	AWG 16	/26.01	1001	-TB_T1		-ES2601
2	AWG 16	/26.02	1002	-TB_T1		-ES2601
3	AWG 16	/26.03	100	-TB_B1		-ES2601
4	AWG 16	/26.01	1001.A	-TB_T1		-ES2601
5	AWG 16	/26.02	1002.A	-TB_T1		-ES2601
6	AWG 16	/26.03	1414	-TB_T1		-ES2601
7	AWG 16	/26.04	101	-TB_B1		-ES2601
8	AWG 16	/26.07	1016.A	-TB_T1		-PB2607
9	AWG 16	/26.08	1312.A	-TB_T1		-PB2607
10	AWG 16	/26.11	302	-TB_B1		-SS2611
11	AWG 16	/26.11	1416	-TB_T1		-SS2611
12	AWG 16	/26.12	1501	-TB_T1		-SS2611
-CBL029	16 AWG 4 Conductor Shielded	=LV_PNL +CNTPNL	-TB1	=DRIVE_END+JB1		-TB4
1	AWG 16	/19.03	1903	-TB1		-TB4
2	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
3	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED
4	AWG 16	NOT USED	NOT USED	NOT USED		NOT USED


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P408

4 x 8 CHILLER

Repl. by

Origin

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Date

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Standard

SN: 241031

104 - Pull List

GSS PARENT # 503390

Sheet CON3 of
52 Sh.



Field Cable List without Individual Connection

Project name: 503390 241

Creation date: 11. Nov. 2025 07:41:

rhelmer

Count	Cable Type	Description		Supplier
	Device designation	From	To	
1	10 AWG 3C wG Motor Leads	Must be rated for at least 600V, Must meet environmental conditions. Must be ran in conduit.		Contractor
	-CBL011			
1	10 AWG VFD Cable	Must be ran in separate conduit from control cables. Shield Must be drained at the motor and at the drive.		Contractor
	-CBL022	=HV_PNL +CNTPNL -TB2	=HV_PNL +MCHN -M209	
2	16 AWG 12 Conductor Shielded	Shield must be drained on the end closest to the controller		Contractor
	-CBL025	=LV_PNL +CNTPNL -TB1	=UNLOAD_END +JB2 -TB5	
	-CBL026	=LV_PNL +CNTPNL -TB_T1	=RMT_PB_PNL +MCHN -ES2601	
2	14 AWG 3C wG Motor Leads	Must be rated for at least 600V, Must meet environmental conditions. Must be ran in conduit.		Contractor
	-CBL010	=HV_PNL +CNTPNL -TB2	=UNLOAD_END +MCHN -M111	
	-CBL013	=HV_PNL +CNTPNL -TB2	=DRIVE_END +MCHN -M103	
1	16 AWG 18 CONDUCTOR WITH SHIELD			Contractor
	-CBL006	=LV_PNL +CNTPNL -TB1	=DRIVE_END +JB1 -TB4	
3	16 AWG 4 Conductor Shielded	Shield must be drained on the end closest to the controller		Contractor
	-CBL005	=LV_PNL +CNTPNL -TB1	=UNLOAD_END +JB2 -TB5	
	-CBL016	=LV_PNL +CNTPNL -TB1	=DRIVE_END +JB1 -TB4	
	-CBL029	=LV_PNL +CNTPNL -TB1	=DRIVE_END +JB1 -TB4	

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UNION SPRINGS, A.

P408

4 x 8 CHILLER

Repl. by	Origin	Repl. by
Date	SN: 241031	
User		
APPROVED	104 - Pull List	
Standard		

Origin Perl

OM-244824

ON. 211031

104 - Full List

202 PARENT // 503206

GOSTAKENT # 505550

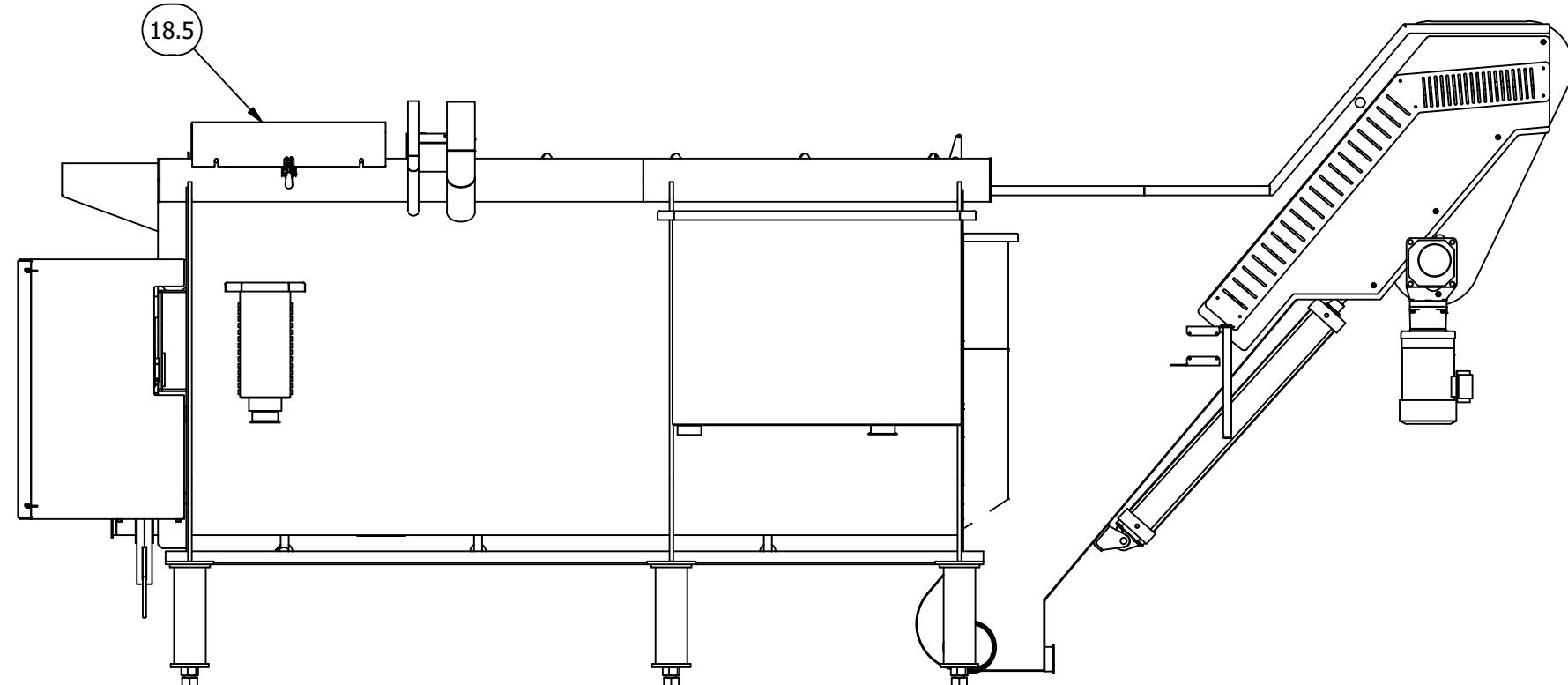
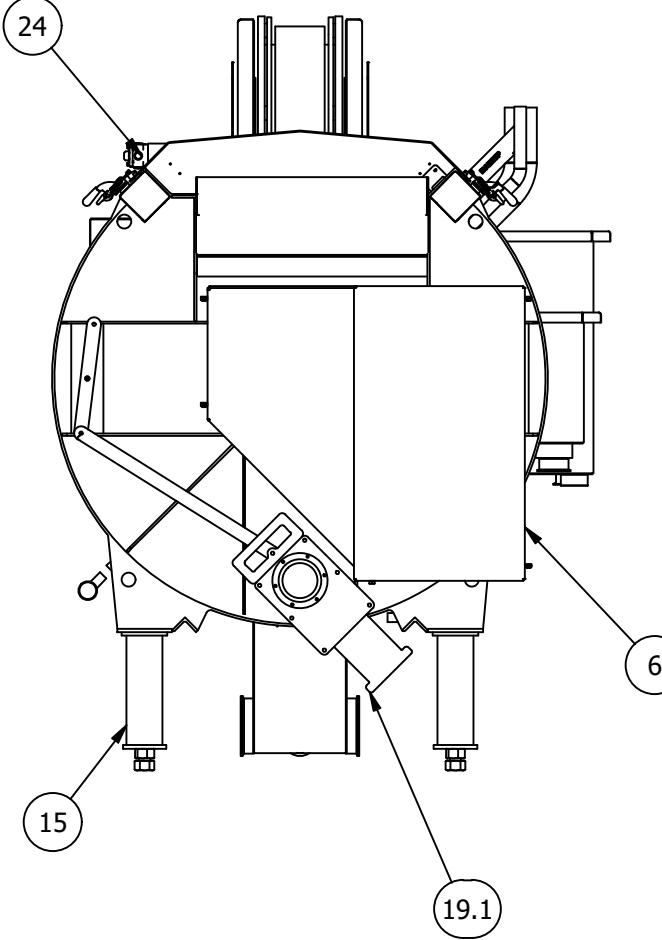
Sheet CBLS1 of

52 Sh

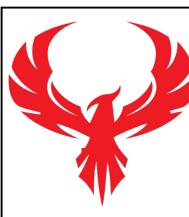
PART NUMBER: 501635-241031

DESCRIPTION: 4X8 CU CHILLER LH

JOB NUMBER:



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
6	1	501793	4ft Drive Guard RH
15	6	504015	LEG ASSEMBLY - 12IN
18.5	1	501804	Small Guard Top
19.1	1	501200	4" SLIDE GATE VALVE
24	1	Pull Cable AB	Pull Cable AB



PHOENIX INNOVATIONS

4254 S. ARKANSAS AVE. RUSSELLVILLE, AR 72802

PART NO.
501635-241031

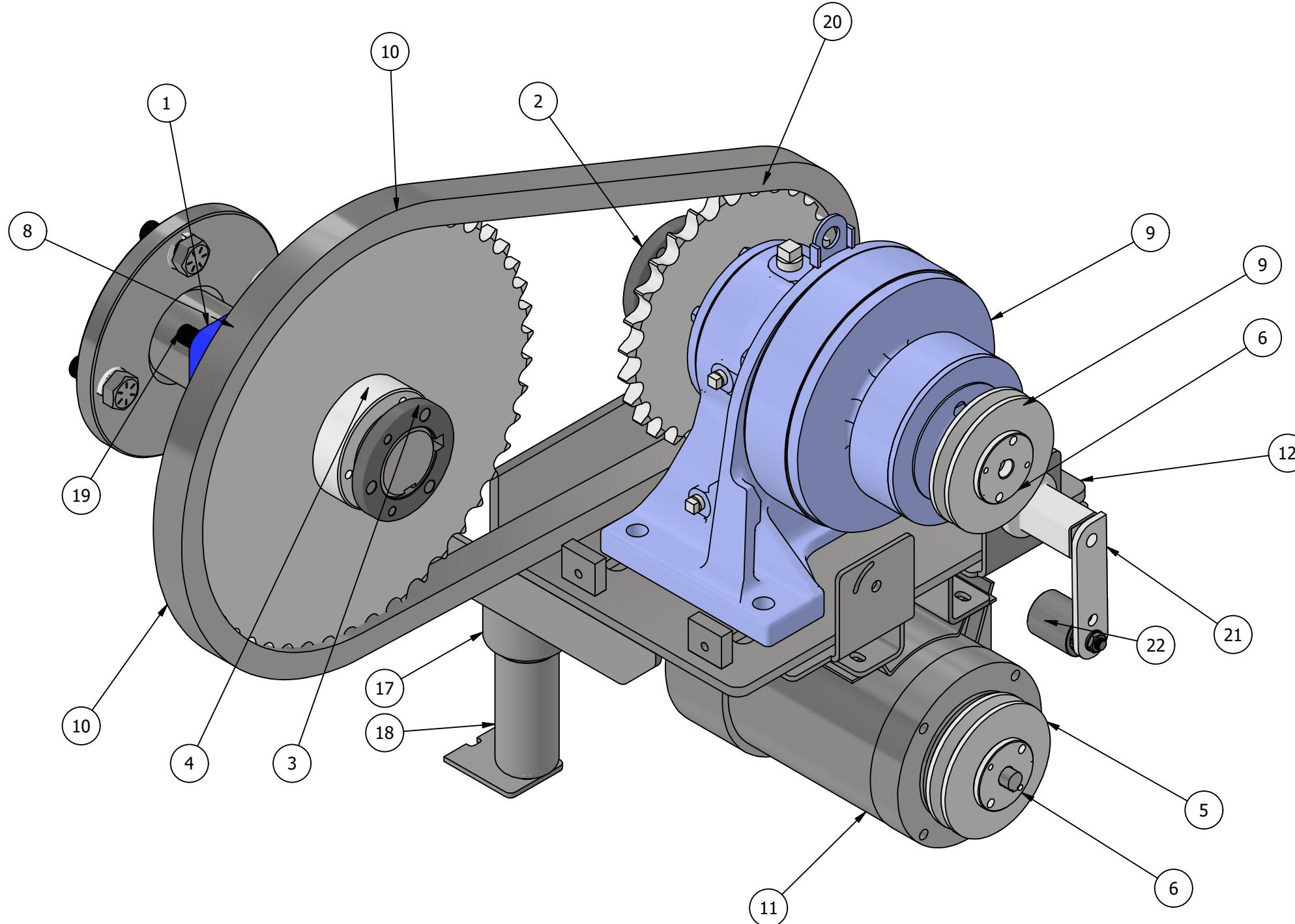
DESCRIPTION: 4X8 CU CHILLER LH

MATERIAL:

ENGINEER: jhill

CREATION DATE: 6/12/2024

TOLERANCE IF NOT
OTHERWISE STATED
+/- .063in

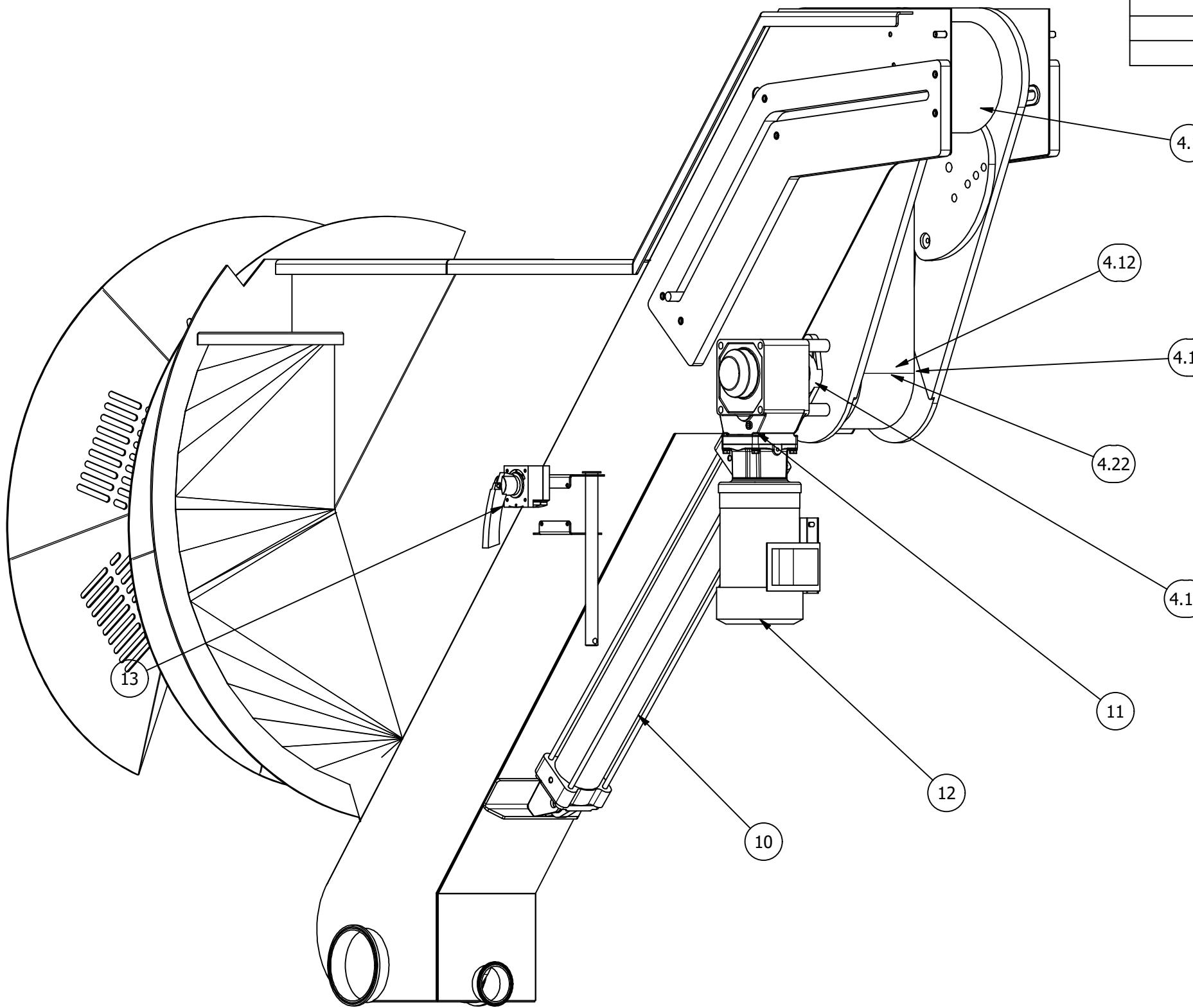


PARTS LIST				PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
11	1	101313	1 HP 56C SS Motor	1	1	101314	BEARING SQUARE 4 BOLT
12	1	503270	4' DRIVE MOUNT PLATE	2	1	101325	BUSHING Q1 X 1 7/8"
17	1	101316	TIMKEN LUBRICATOR MOTOR	3	1	101324	BUSHING Q1X2.5
18	1	101317	TIMKEN LUBRICATOR REFILL	4	1	102302	SPROCKET 80Q36
19	4	11581	HEX BOLT SS 5/8"-18X2"	5	2	101333	SHEAVE BK50HRM FHP
20	1	102206	SPROCKET 80Q28	6	2	101328	BUSHING H_5-8
21	1	102161	TENSIONER	8	1	501703	2.5" SHAFT SEAL BEARING
22	1	102162	Roller Tensioner	9	1	101320	GEARBOX CYCLO 1827:1
				10	1	101353	ROLLER CHAIN - 80

PART NUMBER: 501635-241007

DESCRIPTION:

JOB NUMBER:



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
4.1	1	503816	UNLOADER BELT
4.12	1	503916	DRIVE SHAFT
4.16	2	102085	FLANGE BEARING 2 BOLT
4.22	3	102103	1600 X 10 TOOTH
10	1	102079	PISTON PNEUMATIC 100MM X 800MM
11	1	102040	GEARBOX 20:1
12	1	101313	1 HP 56C SS Motor
13	1	102090	HAND LEVER VALVE PNEUMATIC



PHOENIX INNOVATIONS

4254 S. ARKANSAS AVE. RUSSELLVILLE, AR 72802

PART NO.
501635-241007

DESCRIPTION:

MATERIAL:

ENGINEER: jhill

CREATION DATE: 6/12/2024

TOLERANCE IF NOT OTHERWISE STATED
+/- 0.063in