

# Ground Mount / Piping / Electrical Quick Reference

ECS Membrane Processor: PMC and ISD

Part: VST ECS-CS3-310 – Three Phase  
VST-ECS-CS3-110 – Single Phase

Executive Orders: VR-203  
VR-204

Version: 1.1

**NOTE:**

This document is a supplement to Executive Orders VR-203 and VR-204.

**ALWAYS** be sure to reference these Executive Orders in addition to this Quick Reference Guide.

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# Contents

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## Contents

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1	Equipment List.....	4
2	Mounting .....	6
2.1	Material List .....	6
2.2	Instructions .....	6
3	Plumbing .....	8
3.1	Material List .....	8
3.2	Instructions .....	9
3.3	Piping: General.....	11
3.4	Vapor Inlet and Vapor Return Connections: .....	11
3.5	Air Outlet Connections:.....	11
3.6	Order of installation for all connections: (1 through 5) .....	11
3.7	Flexible Connections .....	12
3.8	Locks .....	12
4	Single-Phase Electrical .....	13
4.1	Single Phase: Equipment List.....	13
4.2	Single-Phase: Material List.....	13
4.3	Key Executive Order Requirements: Single-Phase Electrical.....	14
4.4	Single-Phase Electrical Drawings.....	14
5	Three-Phase Electrical .....	19
5.1	Three Phase: Equipment List .....	19
5.2	Three-Phase: Material List.....	19
5.3	Key Executive Order Requirements: Three-Phase Electrical .....	20
5.4	Three-Phase Electrical Drawings .....	20

# Table of Figures

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Figure 1: ECS Ground Mount Foundation Installation Details .....	7
Figure 2: ECS Piping Diagram.....	9
Figure 3: How the Processor fits into the GDF layout .....	10
Figure 4: Single-phase required electrical components & conduit. Simplified schematic of figure 37 in IOM-14 VR-203 & 204.....	14
Figure 5: HC Sentry and HC Sensor Wiring Diagram. See figure 32 in IOM-14 VR-203 & 204.....	15
Figure 6: Single-phase electrical components inside the GDF electrical room. Simplified schematic of figure 38 in IOM-14 VR-203 & 204.....	16
Figure 7: Single-phase disconnect at the ECS unit. Simplified schematic of figure 39 in IOM-14 VR-203 & 204.....	17
Figure 8: Single-phase electrical inside the ECS Processor Cover. Simplified schematic of figure 40 in IOM-14 VR-203 & 204.....	18
Figure 9: Three-phase required electrical components & conduit. Simplified schematic of figure 41 in IOM-14 VR-203 & 204.....	20
Figure 10: Single-phase electrical components inside the GDF electrical room. Simplified schematic of figure 42 in IOM-14 VR-203 & 204.....	21
Figure 11: HC Sentry and HC Sensor Wiring Diagram. See figure 32 in IOM-14 VR-203 & 204.....	22
Figure 12: Three-phase electrical disconnect at the ECS unit. Simplified schematic of figure 43 in IOM-14 VR-203 & 204.....	23
Figure 13: Three-phase electrical inside the ECS processor cover. Simplified schematic of figure 44 in IOM-14 VR-203 & 204.....	24

# 1 Equipment List

<b>PMC Installation</b> Executive Order VR-203 VST Phase II EVR System  Exhibit 1 Equipment List	
Component	Manufacturer/ Model
Nozzle	VST Model VST-EVR-NB VST Model VST-EVR-NB-R (Rebuilt)
Coaxial Curb Hose	VST Model VDV-EVR Series
Coaxial Whip Hose	VST Model VSTA-EVR Series
Breakaway Coupling	VST Model VSTA-EVR-SBK
VST Membrane Processor	VST Model VST-ECS-CS3-XXX where XXX represents motor phase and HC Sensor -110 Single-Phase with HC Sensor -310 Three-Phase with HC Sensor
Pressure Management Control (PMC)	Veeder-Root TLS-350 Series
PMC Software Version Number	1.01 or 1.02
PMC Pressure Sensor (1 per GDF)	Veeder-Root 331946-001
Smart Sensor Interface Module (1 per GDF)	Veeder-Root 329356-004
Multiport Card (1 per GDF)	Veeder-Root 330586-018

**ISD Installation**  
 Executive Order VR-204  
 VST Phase II EVR System

**Exhibit 1**  
**Equipment List**

Component	Manufacturer/ Model
Nozzle	VST Model VST-EVR-NB VST Model VST-EVR-NB-R (Rebuilt)
Coaxial Curb Hose	VST Model VDV-EVR Series
Coaxial Whip Hose	VST Model VSTA-EVR Series
Breakaway Coupling	VST Model VSTA-EVR-SBK
VST Membrane Processor	VST Model VST-ECS-CS3-XXX where XXX represents motor phase and HC Sensor -110 Single-Phase with HC Sensor -310 Three-Phase with HC Sensor
Pressure Management Control (PMC)	Veeder-Root TLS-350 Series
TLS Console Veeder-Root TLS-350 Series, including but not limited to TLS-350, TLS-350 Plus, TLS-350R, Red Jacket ProMax, Gilbarco EMC consoles	Veeder-Root 8482XX-XXX, 8470XX-XXX, Promax 847097-XXX EMC PAO292011000X X = Any digit
ISD Software Version Number	1.01 or 1.02
Vapor Flow Meter (1 per Dispenser)	Veeder-Root 332374-XXX X = Any digit
Vapor Pressure Sensor (1 per GDF)	Veeder-Root 331946-001
Smart Sensor Interface Module (1 per GDF)	Veeder-Root 329356-004
Multiport Card (1 per GDF)	Veeder-Root 330586-018

## 2 Mounting

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### 2.1 Material List

30 feet	#4 Rebar reinforcement
2 cu yards	Concrete (See Section 2.2)
4 anchor bolts	HILTI KWIK BOLT, KB3 3/8" X 5" ,(item # 00282524) (non seismic application) -OR-
4 anchor bolts	KWIK TZ (KB-TZ) BOLT, KB-TZ 3/8" X 5", (item # 00304583) (Seismic application)
12 feet	2 x 6 wood for frame cut into two 2' x 6" and two 3' x 6" lengths
Misc.	Nails or screws for attaching the lumber

### 2.2 Instructions

- The ECS Unit mounting pad must be installed level

#### NON-SEISMIC APPLICATIONS:

- VST recommends using the HILTI KWIK BOLT, KB3 3/8" X 5" / item # 00282524 or an approved equal.

#### SEISMIC AND CRACKED CONCRETE APPLICATIONS:

- VST recommends using the HILTI KWIK TZ (KB-TZ) BOLT, KB-TZ 3/8" X 5", (item # 00304583) or approved equal.
- The soil must have the following capabilities:
  - ▶ Allowable bearing pressure: 1000 PSF
  - ▶ Lateral bearing: 150 PSF
  - ▶ Coefficient of sliding: 0.25

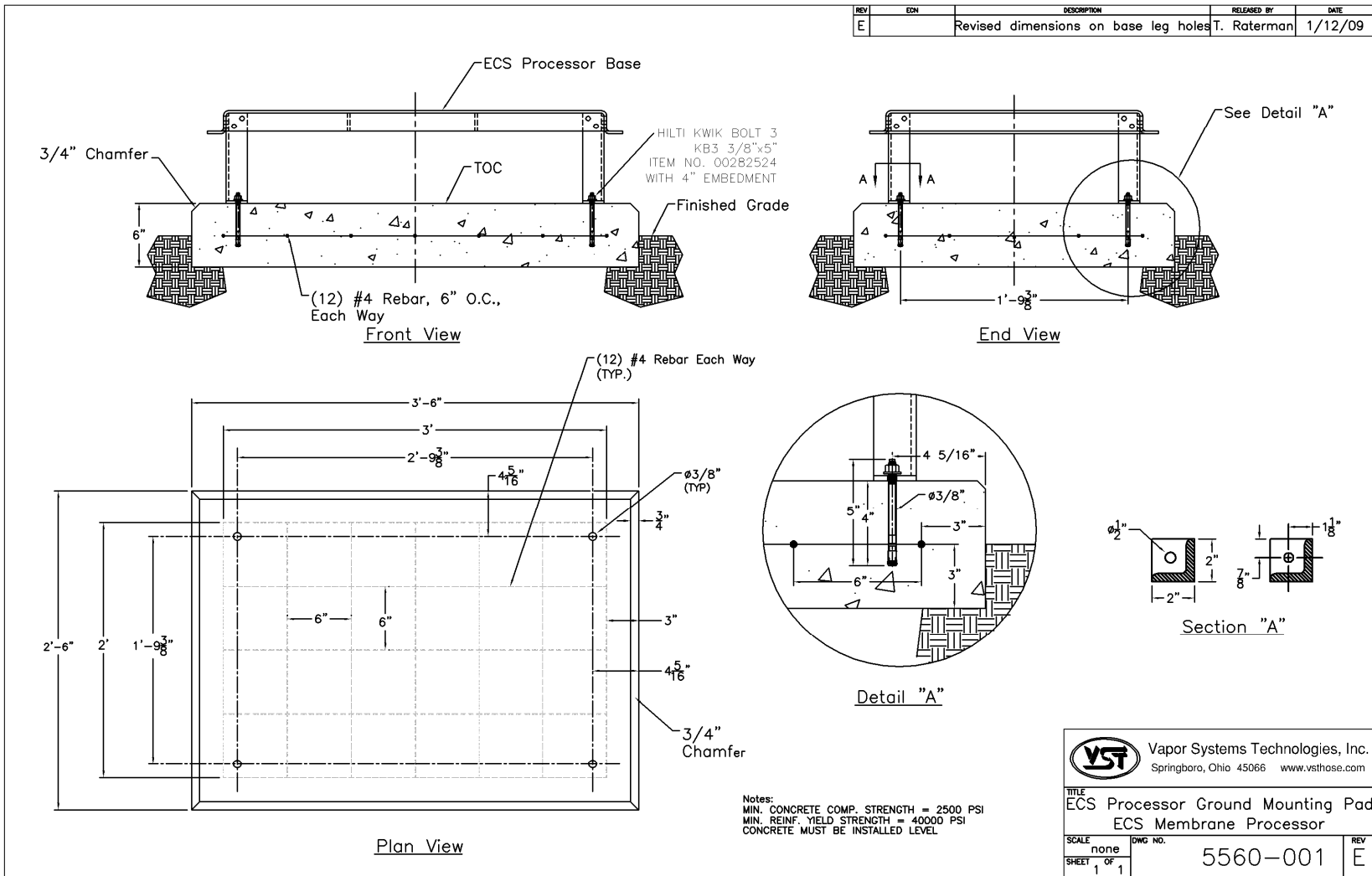


Figure 1: ECS Ground Mount Foundation Installation Details

### 3 Plumbing

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#### 3.1 Material List

Piping and Fittings from the ECS unit to the Vapor Inlet, Vapor Return, and the Air Outlet risers	
1 ea.	At lease 12' pipe for the new Air Outlet vent riser
1 ea.	P/V valve (Not part of the Phase I system) – Does not have to be EVR certified
3 ea.	Tees to connect to the vent risers
3 ea.	Tees with caps (next to the ECS Unit)
3 ea.	Unions (next to the ECS Unit)
3 ea.	Locking Ball Valves (next to the ECS Unit)
3 ea.	Locks for the locking ball valves
3 ea.	Flexible Connections (SEE SECTION 3.7 FOR CONDITIONS IF APPLICABLE)
Lot.	Pipe nipples at various lengths, sizes, and quantities for the piping assembly
Lot	Elbows a various lengths, sizes, and quantities for the piping assembly
SEE SECTION 3.4 AND 3.5 FOR PIPING AND FITTING SIZES	



### 3.2 Instructions

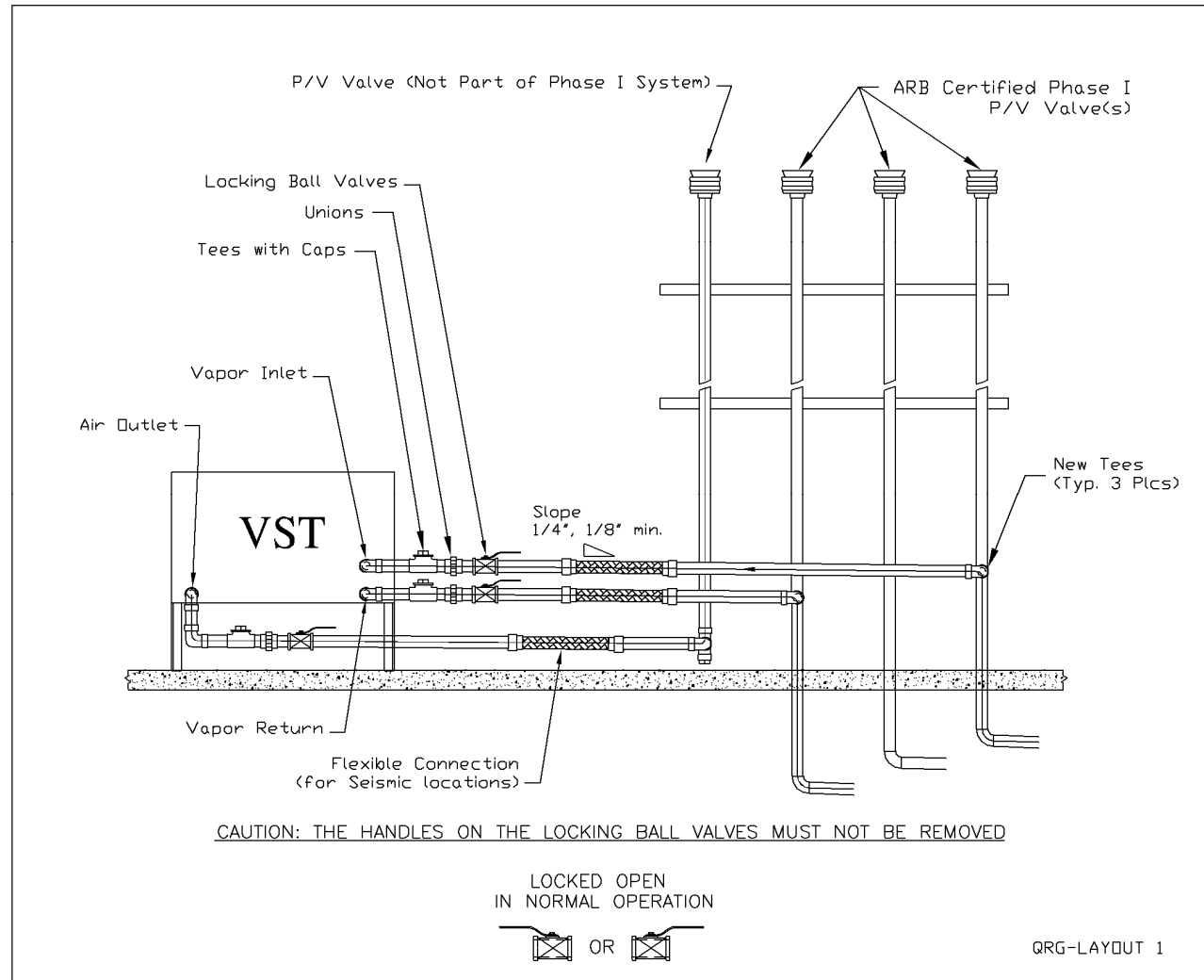


Figure 2: ECS Piping Diagram

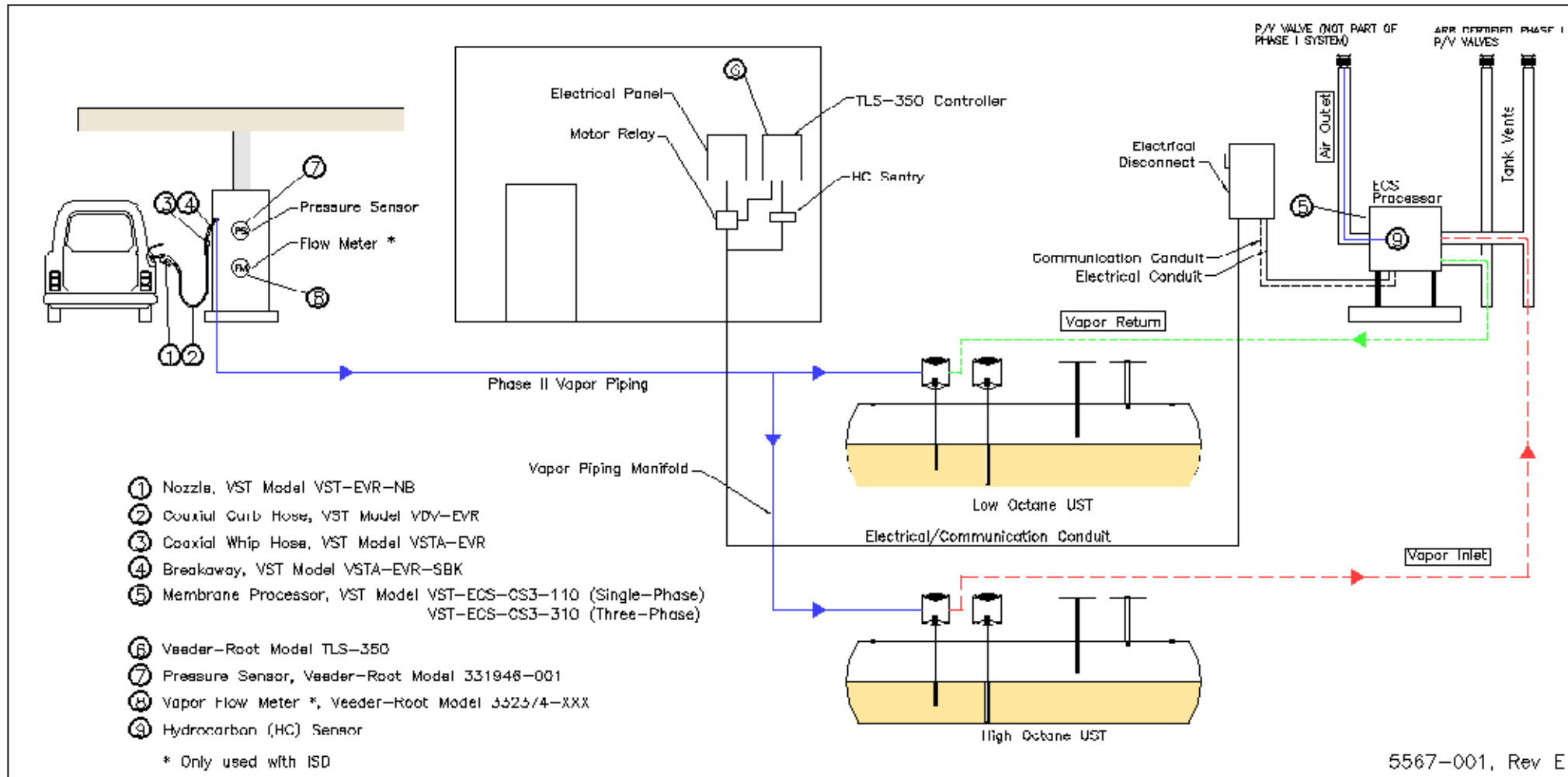


Figure 3: How the Processor fits into the GDF layout

### 3.3 Piping: General

- To minimize the installation cost and to maximize operating efficiency, locate the Processor adjacent to the existing vent risers.
- All vapor-piping connecting to the Processor must be sloped away from the Processor. VST recommends ¼" per foot slope. (VST requires a minimum of 1/8" per foot slope.)
- The Processor must be installed in accordance with the NFPA standards.
- VST recommends a minimum clearance of 18" around the Processor for maintenance and testing.
- A new air outlet vent riser connected to the Processor must be installed to release air to the atmosphere.
- The three ball valves on the Vapor Inlet, Vapor Return and Air Outlet must be lockable and locked in the open position under normal operating conditions.
- Verify all piping connections are leak tight, especially the unions.
- New tees must be installed on the existing vent risers for connecting the Vapor Inlet and Vapor Return lines.

### 3.4 Vapor Inlet and Vapor Return Connections:

- Install a minimum 1" galvanized pipe between the Processor and the vent riser(s) if the distance between the Processor and the vent riser is less than 10'.
  - ▶ If the distance between the Processor and vent risers is greater than 10', use a minimum 1 ½" diameter pipe.
- All piping must be properly supported.
- UL approved Flex Connectors may have to be installed.

### 3.5 Air Outlet Connections:

- A new vent riser must be installed for the Air Outlet to vent clean air to atmosphere.
- Install a minimum 1" galvanized pipe between the Processor and the vent riser.
- All piping must be properly supported.
- UL approved Flex Connectors may have to be installed.
- Be sure to follow the same height and location criteria for the additional vent riser that has been used for the existing vent pipes.
- The tee and the valve allow for isolation of the Processor from the vapor-piping system for maintenance and/or testing as needed.
- Install a new tee with a cap at the bottom of the new air outlet vent riser to provide for drainage.
- Install the new dedicated vent riser so that the discharge opening is a minimum of 12-feet above grade and a minimum of 1" diameter.
- A P/V valve (Not part of the Phase I system) must be installed on the air outlet vent riser to shield against rain and reduce noise.

### 3.6 Order of installation for all connections: (1 through 5)

1. Processor-(concrete pad if required)
2. 3 ea. - Tee (sized for the pipe diameter)
3. 3 ea. - Union (sized for the pipe diameter)
4. 3 ea. - Lockable Ball Valve (sized for the pipe diameter)
5. Flex connectors (if required)

#### Vent Riser

CAUTION: Take note that pipe connecting vent risers to the Processor MUST slope away from the Processor towards the vent risers. Recommended ¼" / Minimum 1/8" slope.

### 3.7 Flexible Connections

- Flexible connections between the Processor locking ball and the vent riser(s) are allowable if required by the local "Authority Having Jurisdiction" to meet seismic requirements.
- Should the flex connection be installed such that it is not supported, the slope of the flex connection from the Processor back to the vent riser(s) shall be greater than the 1/8" / foot slope required for the rest of the one-inch galvanized piping.
- The flexible connector must be UL approved for a service station above-ground application.
- The local contractor is responsible to provide all necessary galvanized piping, non-hardening UL-classified pipe joint compound and plumbing fittings.
- This requirement may apply for ground, rooftop, and canopy-mount locations.

### 3.8 Locks

- Keys: (SIX 6 total)

1 ea.	Heavy Duty for outside Electrical shut-off. (NEC requirement)
2 ea.	Heavy Duty for hasps on Processor cover. (Not required for a Fire Resistant Enclosure)
3 ea.	Heavy Duty – for each Processor Locking Ball Valve.

Keys stay with GDF manager.

**REMEMBER TO FILL OUT ALL WARRANTY CARDS AND FORMS TO SEND IN**

**READ THE FULL E.O. AND KNOW ALL REQUIREMENTS FOR INSTALLATION!**

## 4 Single-Phase Electrical

### 4.1 Single Phase: Equipment List

2-ea.	Contactor, 40 Amp, 3-pole, 600VAC Max., 120V coil voltage Square-D 8910DPA43V02 or equivalent
1-ea.	Metal enclosure with knockouts that will fit 2 relays (indoor) (12" x 12" x 6") Wegmann SC121206
1-ea.	Duplex Receptacle Outlet box, Metal, 110V Outlet (indoor)
1-ea.	Straight Blade Receptacle, Current Rating 20 Amps, Voltage Rating 125 Volts, Power Rating 1 HP, NEMA Configuration 5-20R, Type Duplex, Grade Construction
1-ea.	Lockable Disconnect Switch, 3 poles, Nema-3R, (Mount outside Near Processor) Square D-- PN # (H321NRB) or equivalent
1-ea.	Interlock Switch Square-D #EIK 1
1-ea.	Circuit Breaker – 2-Pole, 30 AMP, 115V/220V (Motor Power, Single-Phase)
1-ea.	Circuit Breaker 5 AMP or less 110V (Heat Trace Cable and dedicated outlet)
As req.	Rigid/Flexible Conduit for electrical room connections)

### 4.2 Single-Phase: Material List

#### Inside the Electrical Room:

Equipment	Part Number	Provided By
HC Sentry Unit with 24VDC Pwr supply	5015-001	VST
HC Sentry Interface Cable	5015-002	VST
Electrical Junction Box	12" x 12" x 6" NEMA 1	Contractor
110V Outlet & Box		Contractor
Contactor/Relay	Square-D #8910DPA43V02	Contractor
Terminal Block (OPTIONAL)		Contractor
Seal-Off	UL Listed for Class 1 Haz. Area	Contractor

#### At the ECS Unit:

Equipment	Part Number	Provided By
Safety Disconnect Switch, Fused	Square-D # H321NRB	Contractor
Interlock switch	Square-D # EIK 1	Contractor
Fuses, 2-each	Dual Element, Time Delayed 30 Amp	Contractor
Water Tight Proof Hub(s)	Square-D # B075 (3/4")	Contractor
HC Sensor cable	3-wire, 18 ga., shielded twisted pair cable	Contractor
Seal-Offs	UL Listed for Class 1 Haz. Area	Contractor

Note: All the electrical equipment inside the ECS unit has been provided for by VST

### 4.3 Key Executive Order Requirements: Single-Phase Electrical

1. High Voltage Power Wiring - All wiring to be TFFN or THHN with 600 V insulation.
2. Wiring the 208/230-460v or 115/230V power for the motors is a minimum 14 AWG:
3. HC Sensor Wire - The cable must be a minimum 3 conductor, 18 AWG, twisted pair with a shielded ground (Beldin or Equivalent)
4. When wiring Vacuum pump motor, wire for reverse rotation according to instructions on sticker.

### 4.4 Single-Phase Electrical Drawings

The one-line schematic below shows the electrical components, conduits, and number of wires for a single-phase unit. All the components shown are inside the GDF electrical room, except for the safety disconnect-switch and the ECS unit.

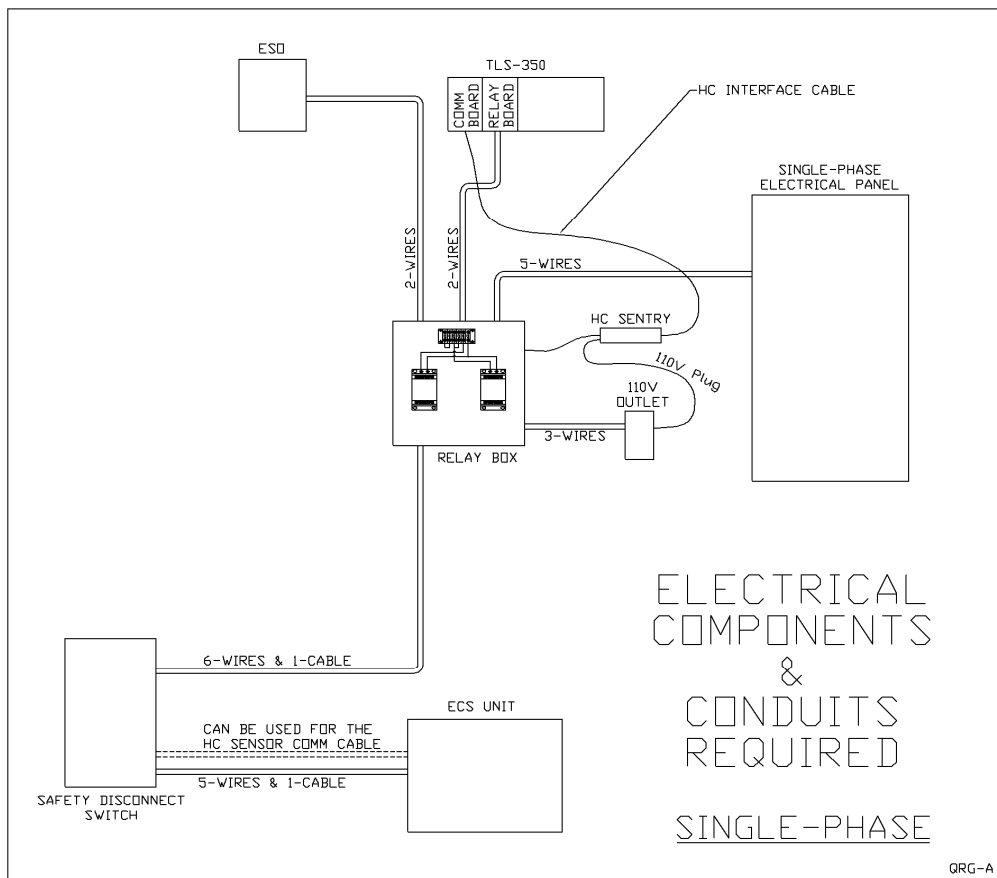
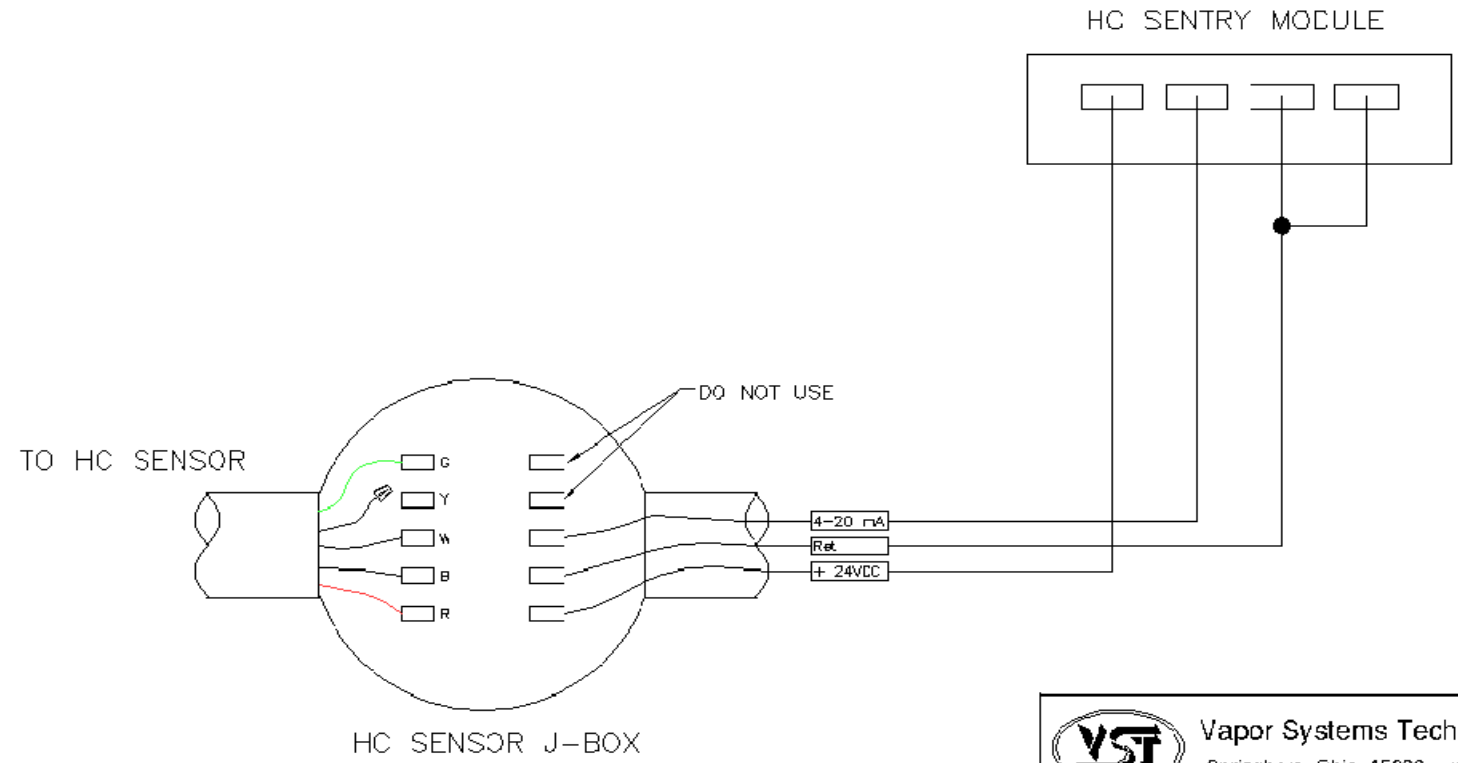


Figure 4: Single-phase required electrical components & conduit. Simplified schematic of figure 37 in IOM-14 VR-203 & 204.

REV	ECU	DESCRIPTION	RELEASED BY	DATE
D		Added the Gnd to the Circuit	T. Raterman	3/2/09




 <b>Vapor Systems Technologies, Inc.</b> Springboro, Ohio 45066 www.vsthose.com		TITLE
		ECS Membrane Processor Hydrocarbon (HC) Sensor
SCALE	none	DWG NO.
SHEET	1 OF 1	5540-C01
		REV
		D

Figure 5: HC Sentry and HC Sensor Wiring Diagram. See figure 32 in IOM-14 VR-203 & 204.

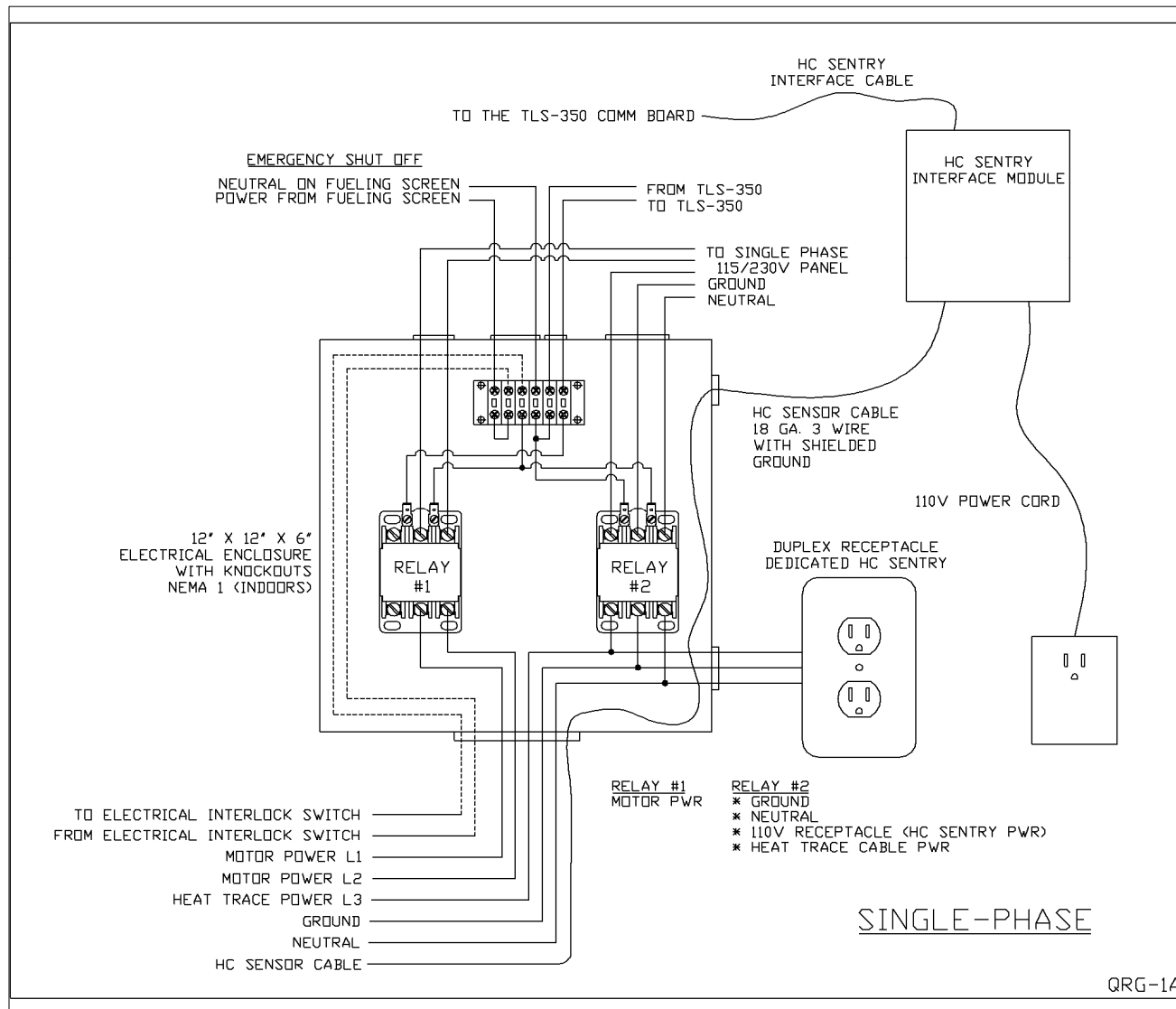
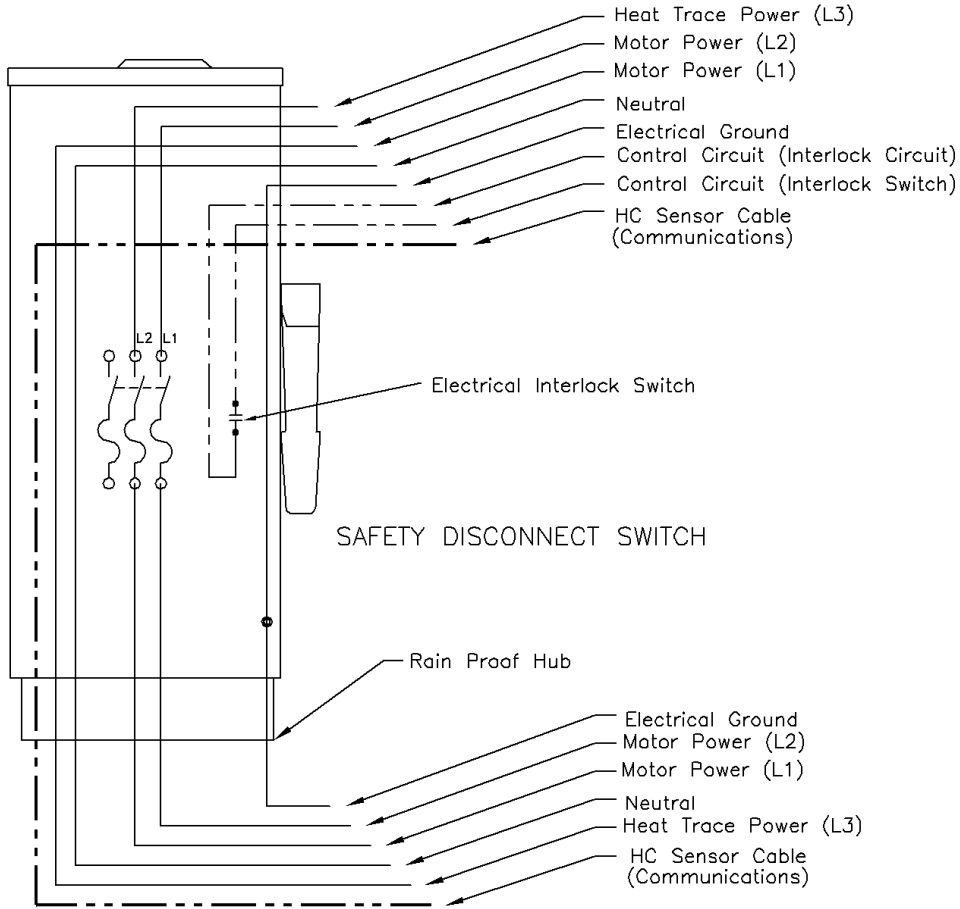


Figure 6: Single-phase electrical components inside the GDF electrical room. Simplified schematic of figure 38 in IOM-14 VR-203 & 204.



UNDERGROUND ELECTRICAL  
FROM THE ELECTRICAL ROOM

Rigid conduit  
Can use either 1 or 2 conduits  
Electrical conduit (3/4"  $\phi$ )  
Communication conduit (3/4"  $\phi$ )



Rigid conduit  
Can use either 1 or 2 conduits  
Electrical conduit (3/4"  $\phi$ )  
Communication conduit (3/4"  $\phi$ )

TO THE ECS UNIT

SINGLE-PHASE

QRG-1B

Figure 7: Single-phase disconnect at the ECS unit. Simplified schematic of figure 39 in IOM-14 VR-203 & 204.

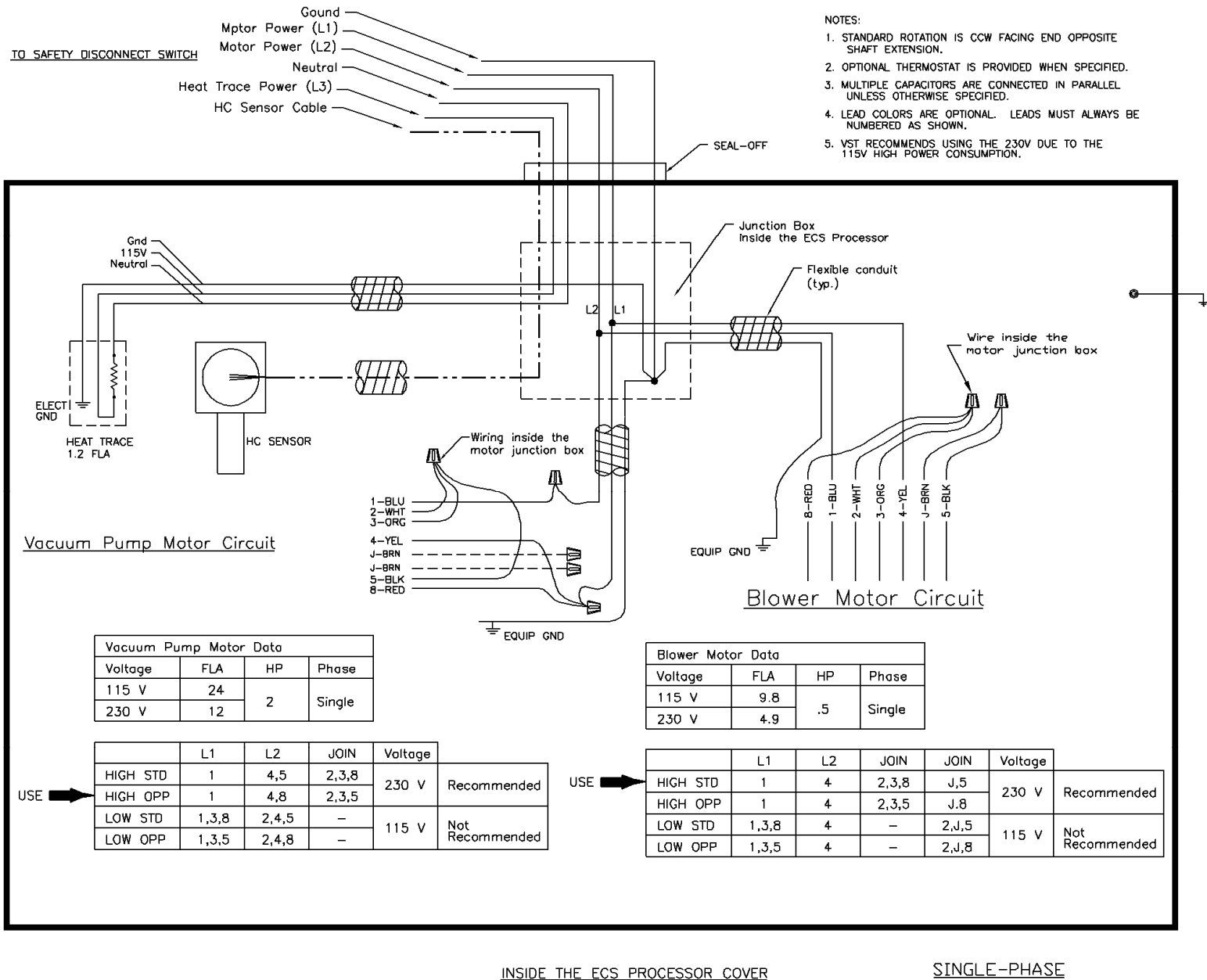


Figure 8: Single-phase electrical inside the ECS Processor Cover. Simplified schematic of figure 40 in IOM-14 VR-203 & 204.

## 5 Three-Phase Electrical

### 5.1 Three Phase: Equipment List

2-ea.	Contactors, 40 Amp, 3-pole, 600VAC Max., 120V coil voltage Square-D 8910DPA43V02 or equivalent
1-ea.	Metal enclosure that will fit 2 relays (indoor) (12" x 12" x 6")
1-ea.	Duplex Receptacle Outlet box, Metal, 110V Outlet (indoor)
1-ea.	Straight Blade Receptacle, Current Rating 20 Amps, Voltage Rating 125 Volts, Power Rating 1 HP, NEMA Configuration 5-20R, Type Duplex, Grade Construction
1-ea.	Lockable Disconnect Switch with 3 poles Nema-3 (Mount outside Near Processor) Square D-- PN # (H321NRB) or equivalent
1-ea.	Circuit Breaker – 3-Pole, 30 AMP, 115V/220V/430V (Motor Power, Three-Phase)
1-ea.	Circuit Breaker 5 AMP or less 110V (Heat Trace Cable and dedicated outlet)
As req.	Rigid/Flexible Conduit for electrical room connections)

### 5.2 Three-Phase: Material List

Inside the Electrical Room:

Equipment	Part Number	Provided By
HC Sentry Unit with 24VDC Pwr supply	5015-001	VST
HC Sentry Interface Cable	5015-002	VST
Electrical Junction Box	12" x 12" x 6" NEMA 1	Contractor
110V Outlet & Box		Contractor
Contactors/Relay	Square-D #8910DPA43V02	Contractor
Terminal Block (OPTIONAL)		Contractor
Seal-Off	UL Listed for Class 1 Haz. Area	Contractor

At the ECS Unit:

Equipment	Part Number	Provided By
Safety Disconnect Switch, Fused	Square-D # H321NRB	Contractor
Interlock switch	Square-D # EIK 1	Contractor
Fuses, 2-each	Dual Element, Time Delayed 30 Amp	Contractor
Water Tight Proof Hub(s)	Square-D # B075 (3/4")	Contractor
HC Sensor cable	3-wire, 18 ga., shielded twisted pair cable	VST-Contractor
Seal-Offs	UL Listed for Class 1 Haz. Area	Contractor

Note: All the electrical equipment inside the ECS unit has been provided for by VST

### 5.3 Key Executive Order Requirements: Three-Phase Electrical

1. High Voltage Power Wiring - All wiring to be TFFN or THHN with 600 V insulation.
2. Wiring the 208/230-460v or 115/230V power for the motors is a minimum 14 AWG:
3. HC Sensor Wire - The cable must be a minimum 3 conductor, 18 AWG, twisted pair with a shielded ground (Beldin or Equivalent)

### 5.4 Three-Phase Electrical Drawings

The one-line schematic below shows the electrical components, conduits, and number of wires for a three-phase unit. All the components shown are inside the GDF electrical room, except for the safety disconnect-switch and the ECS unit.

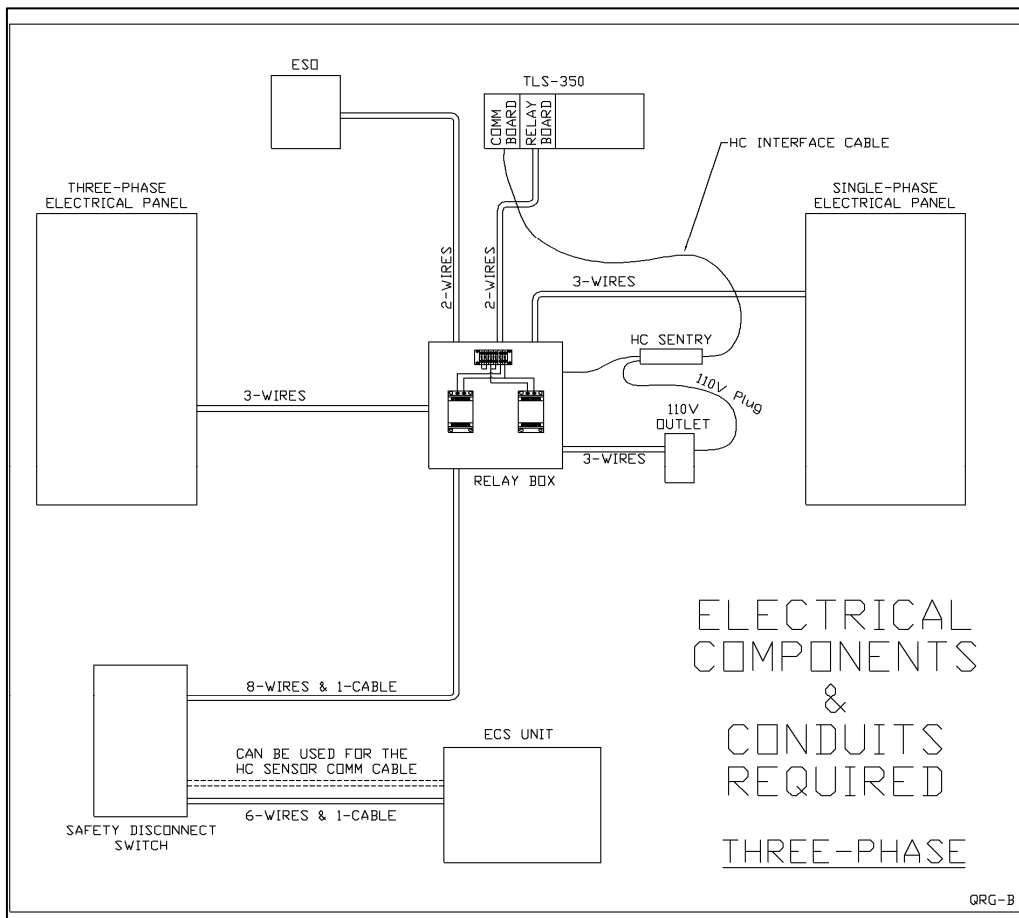


Figure 9:  
required

conduit. Simplified schematic of figure 41 in IOM-14 VR-203 & 204.

Three-phase  
electrical  
components &

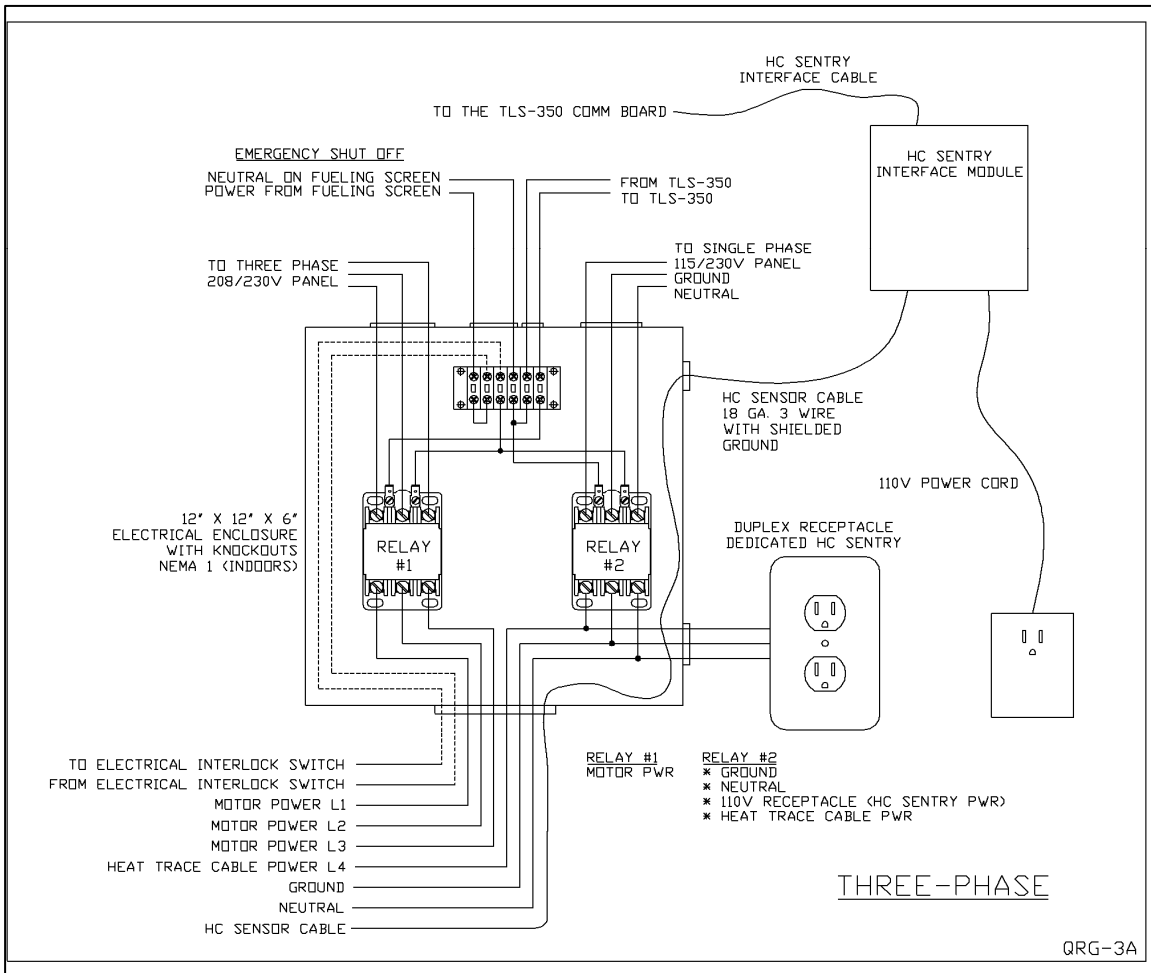


Figure 10: Single-phase electrical components inside the GDF electrical room.  
Simplified schematic of figure 42 in IOM-14 VR-203 & 204.

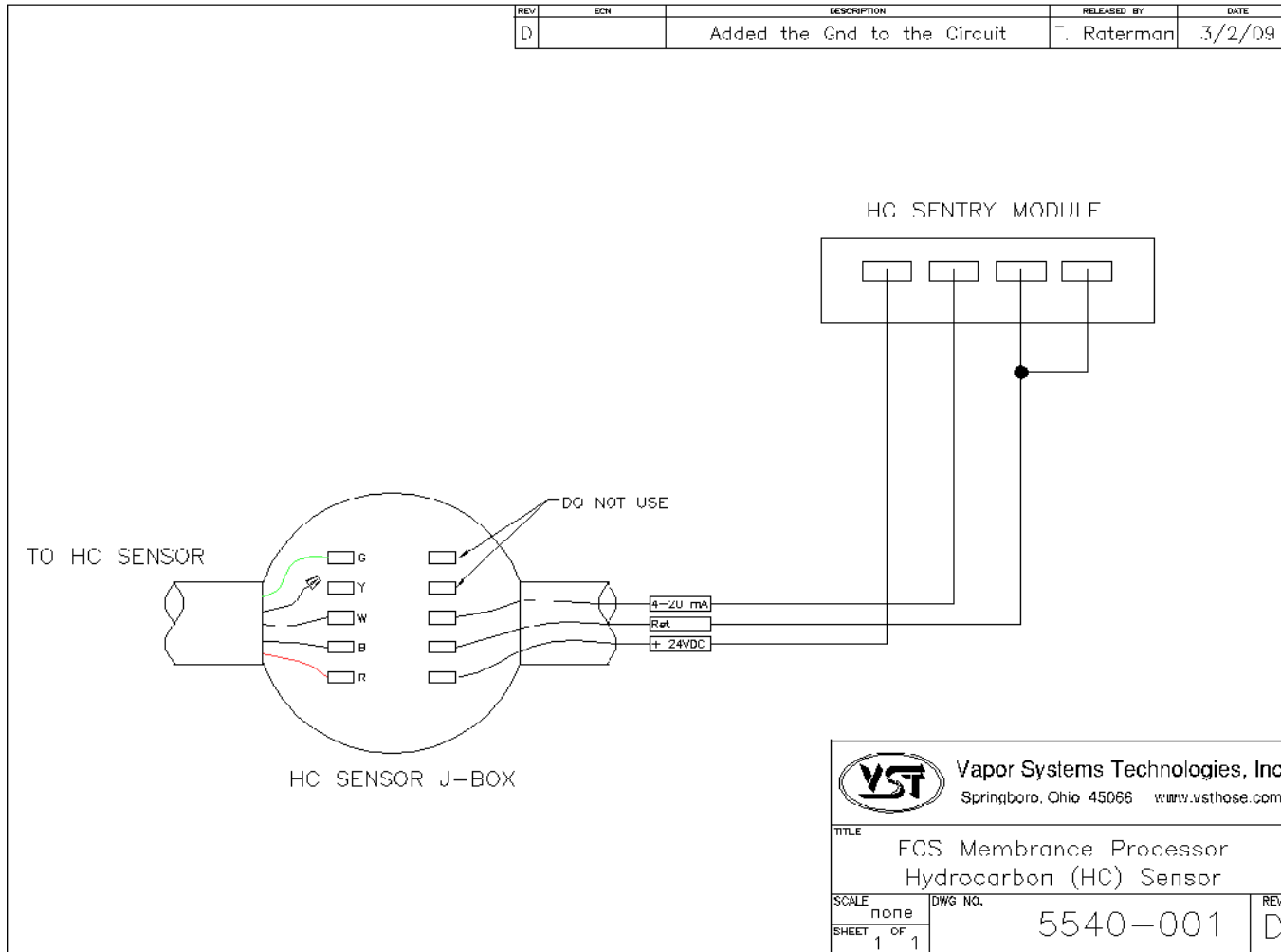
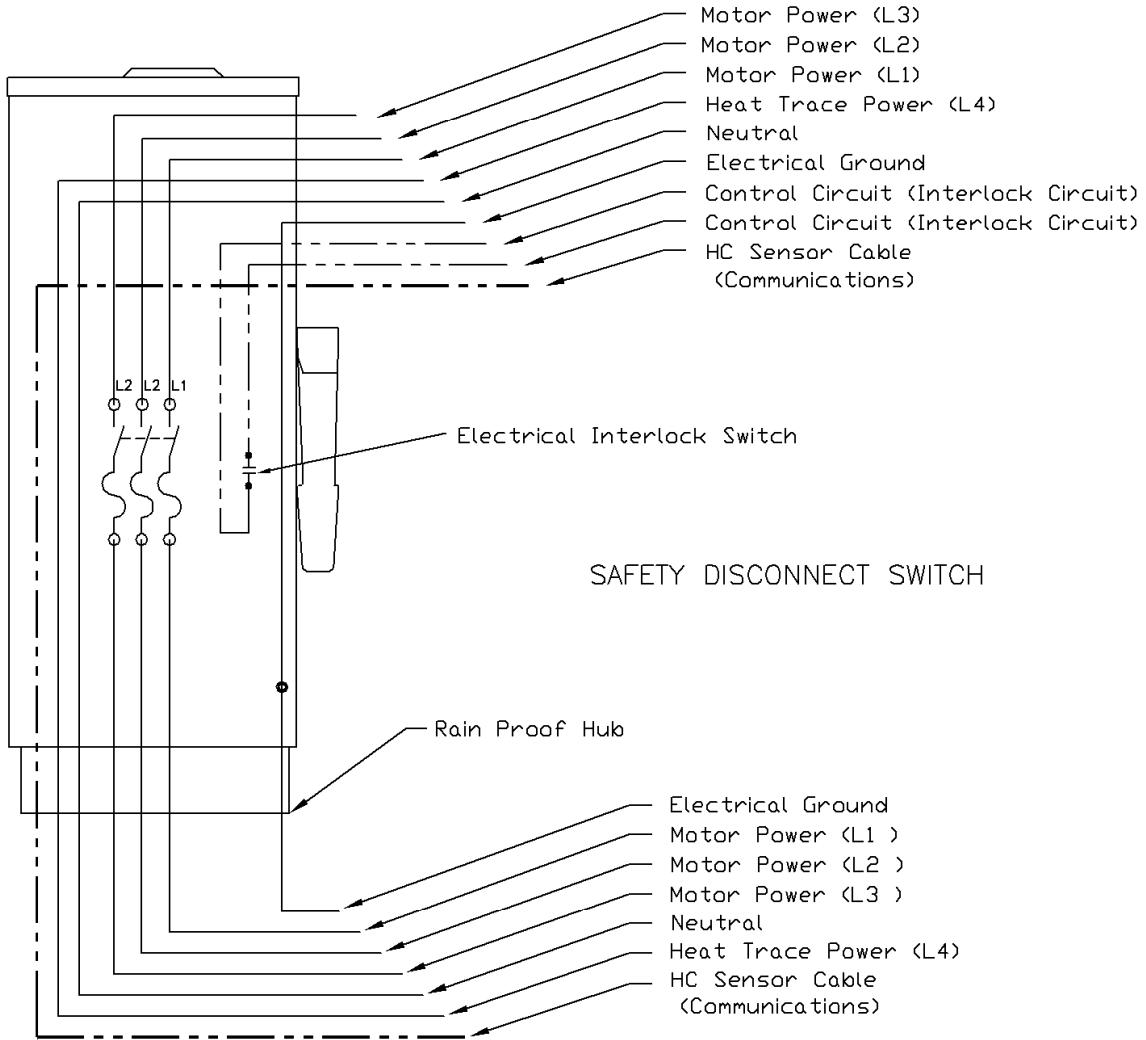


Figure 11: HC Sentry and HC Sensor Wiring Diagram. See figure 32 in IOM-14 VR-203 & 204.

## UNDERGROUND ELECTRICAL FROM THE ELECTRICAL ROOM

Rigid conduit  
Can use either 1 or 2 conduits  
Electrical conduit (3/4"  $\phi$ )  
Communication conduit (3/4"  $\phi$ )



Rigid conduit  
Can use either 1 or 2 conduits  
Electrical conduit (3/4"  $\phi$ )  
Communication conduit (3/4"  $\phi$ )

TO THE ECS UNIT

THREE-PHASE

QRG-3B

Figure 12: Three-phase electrical disconnect at the ECS unit. Simplified schematic of figure 43 in IOM-14 VR-203 & 204.

