

ENERFLEX

ENERFLEX LTD.

ENGINE DRIVE RECIPROCATING COMPRESSOR

**ALLEN BRADLEY COMPACTLOGIX PLC
CONTROL PANEL**

OPERATOR MANUAL

31971 – 31972

**Revision 0
2012-10-09**

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1. CONTROL SYSTEM OVERVIEW

The Enerflex standard reciprocating compressor control panel automates many aspects of the compressor package including:

- Equipment protection through shutdown logic. The control system will shutdown the unit if the operating parameters go outside the preset limits. The cause of a shutdown is displayed.
- Automated start sequence: checks permissive-to-start conditions, pre-lubes the unit and sequences the crank, ignition and fuel gas.
- Automatic capacity control of the unit by manipulating engine speed.
- Manual control through HMI operations.
- Instrument calibration.
- Real-time and historical trending.

The panel is based on Allen Bradley CompactLogix PLC equipment. The system incorporates analog and digital input and output modules to monitor and control the compression equipment and process. The control hardware is housed in a NEMA 4 steel enclosure, and carries CSA C/US Class I Div 2 Group C & D approval. The standard power supply is 24 VDC with current draw up to 10 A.

The human-machine interface (HMI) is an Allen Bradley PanelView+ 1000 color touch screen mounted in the door of the PLC cabinet. The operator uses the HMI to view process data, start and stop the compressor and update control parameters. Access to critical control parameters is password protected.

The CompactLogix PLC processor (1769-L32E) supports Ethernet and serial RS232 communication. The communication link from the PLC to the HMI is Ethernet via an Ethernet switch located in the panel. The Ethernet switch allows connection to a plant-wide Ethernet system and provides a programming interface. If PLC-HMI communication is lost, the compressor will function safely but the operator will not have control from the HMI.

2. SHUTDOWN AND ALARM CONDITIONS

The most important function of the control system is to protect the equipment by stopping the engine/compressor if conditions are outside safe operating limits. Discrete switches, analog values from transmitters, thermocouples or analog values calculated in the PLC can initiate a shutdown. Analog values are compared against pre-determined limits to determine if a shutdown is required. When a shutdown occurs, the cause of the shutdown is displayed on the HMI (first-out shutdown). Any activated shutdown is displayed in red on the annunciator page. The shutdown will return to green if the shutdown condition is cleared and the reset button is pushed.

Shutdowns are divided into four classes as follows:

- Class A: Shutdown must be clear before the unit can start.
- Class B: Shutdown will be bypassed for 120 seconds following start-up. The compressor can start without the “B” shutdown clear or healthy. The compressor will shutdown if any “B” shutdown is active after the time delay. This allows time for operating conditions to stabilize before arming the shutdown.
- Class b: Same as Class B, but time delay is 20 seconds.
- Class C: Shutdown does not activate until compressor is running.

The control panel is equipped with an emergency shutdown (ESD) pushbutton. The ESD button will disable all equipment on the package forcing the equipment to its fail state. The end user can wire other ESD devices or systems in series with the compressor ESD string. Other shutdowns will disable some or all of the equipment on the package, depending on the severity of the shutdown. The cause and effect relationship of each shutdown is given in the shutdown key.

Alarms are events that are not severe enough to cause a shutdown. However, the information may be of interest to an operator so the alarm is displayed on the HMI.

3. COMPRESSOR START, RUN AND STOP SEQUENCES

The current operating state is displayed on the start-up page. Ensure all setpoints and transmitters are correct before starting the compressor.

- If the message on the top of the screen indicates “Shutdowns Active”, press the RESET button on the touch screen. If all the Class-A shutdowns are clear, the message on the touch screen will indicate “Ready to Start”. If any Class-A shutdowns are not clear, the panel will not reset. Determine the cause by viewing the SHUTDOWN STATUS screens. The condition must be corrected before proceeding.
- Ensure automated controls are in auto.
- Ensure the manual bypass valve is open.
- Press the “START” button to initiate the auto-start sequence.
- If the suction pressure is above the maximum start suction pressure setpoint, the operator needs to open the manual blowdown valve until the suction pressure drops below the setpoint.
- The control panel enables the pre-lube pumps until the engine and compressor oil pressure startup setpoints and minimum pre-lube times are satisfied.
- The unit will crank, purge, enable ignition and then enable fuel gas. The engine should start and the crank will be disabled.
- If the engine does not start within the allowed engine crank-on time, the unit will pause before repeating the sequence. If the engine does not start within the maximum allowed crank attempts, then a crank failure shutdown is generated and displayed. The operator must reset the unit before the sequence can be restarted.
- The engine should speed-up to idle and begin the warm-up step. The system is warm when the engine jacket water temperature exceeds its warm-up setpoint and the compressor oil temperature exceeds its warm-up setpoint.
- The engine will speed up to the minimum load speed. At this point the compressor is ready-to-load.
- The compressor will go “on-line” if the compressor is ready-to-load and auto-load is enabled. The compressor will begin to load.
- Close the manual bypass valve.
- The process control functions take control of the speed when the compressor is “on-line”.
- The operator initiates the normal stop sequence by pressing the “STOP” button on the start-up page on the HMI. The compressor unloads and the engine slows to idle for a pre-determined cool-down time.
- Open the manual bypass valve before the engine speed drops below minimum load speed.
- In an emergency, press the ESD button to stop the equipment immediately and force all devices to the fail state.

4. COMPRESSOR CONTROL DESCRIPTION

Process control maximizes the output of the unit while keeping the operating pressures, temperatures and speed within safe limits to prevent a shutdown.

4.1. Compressor Capacity Control

Compressor capacity is controlled by two master PID loops. The two master controllers are suction and discharge pressure. The lower controller output becomes the capacity control setpoint. The user enters the limits ('Load Min' and 'Load Max') from the HMI.

Capacity control is active when the unit run state is "on-line" and "Auto-load ON".

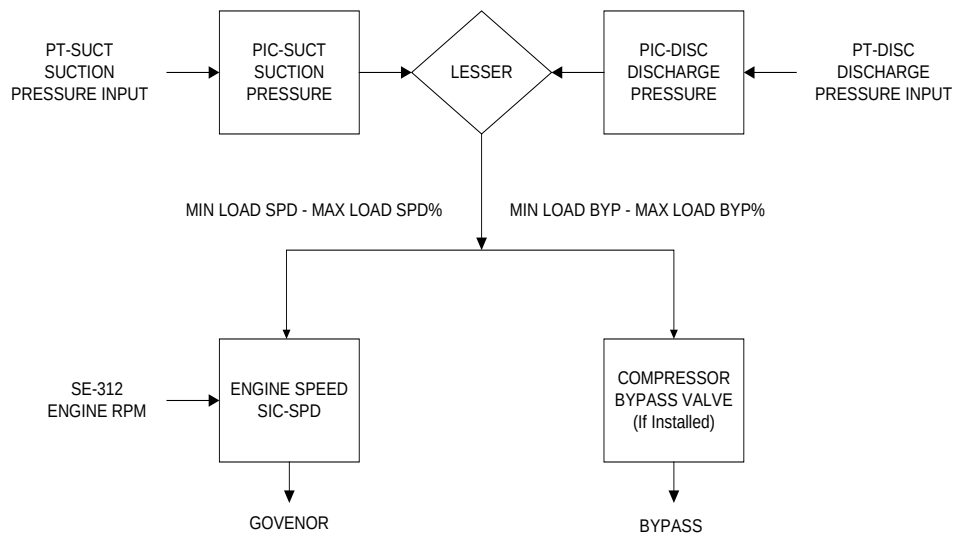


Fig. 1 Compressor capacity control diagram

4.2. Engine Speed Control

The control system monitors engine speed and sends a signal to the governor or engine controller to vary the engine speed. The engine speed setpoint depends on the run state and operating conditions. Engine speed is maintained at idle during the following conditions:

- Start-up
- Warm-up
- Cool-down

The control system ramps the speed to the “Minimum Load Speed” when the engine and compressor warm-up temperature setpoints are met. The minimum load speed depends on the engine and the application. The run state changes to “On-Line” and capacity control takes over after the engine reaches “Minimum Load Speed”.

Capacity control adjusts the engine speed between minimum and maximum load speed as necessary to maintain operating conditions.

Engine speed control is actuated by a 4-20 mA signal from the PLC to the engine governor via an I-P converter.

The operator can place engine speed control in manual to force a desired speed.

During a normal stop sequence, the engine slows to idle speed and continues to run for a configurable cool-down period.

4.3. PID Tuning

The proportional/integral/derivative (PID) equation is a popular method to control a process in the face of varying external conditions. The compressor application uses PID control to maintain suction and discharge pressures at desirable levels. The required pressure is called the setpoint (SP). The actual pressure is called the process variable (PV). The difference between the setpoint and the process variable is the error (E). The output of the PID equation is the control variable (CV), which is used to manipulate a valve or other mechanism to affect the process conditions.

The calculation is performed every 100 ms (dt). The control variable is calculated from three terms: proportional, integral and derivative. The proportional term is a value directly proportional to the error in the system. The integral term works to reduce the error in the system. The longer the error exists in the system and the greater the error, the greater the effect of the integral term. The derivative term looks at how quickly process conditions are changing. The faster the conditions change, the greater the effect on the derivative term. The three factors K_c , T_i , and T_d are adjusted to vary the respective effect of the proportional, integral and derivative terms. K_c is the controller gain and its value affects all three terms. This is the dependent form of the equation (ISA Standard). T_i is the integral time in minutes. T_d is the derivative time in minutes.

Tune the PID equation by making adjustments the parameters K_c , T_i , and T_d . When the gain is increased, the controller will react more quickly when an error is introduced to the system. However if the gain is too high, the controller will oscillate and it will not be able to maintain the process at the desired setpoint. If the gain is gradually increased until the controller is oscillates, reduce the gain by $\frac{1}{2}$ before continuing with tuning. The integral time T_i should be set close to the natural period of the system. This is the time between peaks when the controller is oscillating. Increase the integral time constant to reduce the speed at which the controller works away at the system error. The derivative time T_d can be set at 0 and increased by small increments (0.01) if necessary. When changing the tuning parameters, make small changes (such as 0.1 for gain and integral) and monitor the effect on the process. Note that a change to K_c affects all three terms. Simulate changes to the process by changing the setpoint by a realistic amount.

5. HUMAN MACHINE INTERFACE (HMI)

The human machine interface (HMI) or operator interface for the control system is a PanelView+ 1000 touch screen installed in the door of the control enclosure. The HMI enables the operator to monitor the unit, enter operating setpoints and force manual conditions.

5.1. Main Menu

The main screen is the starting point for the operator to access all other screens. Buttons found on the bottom edge allow for easy navigation to other screens.

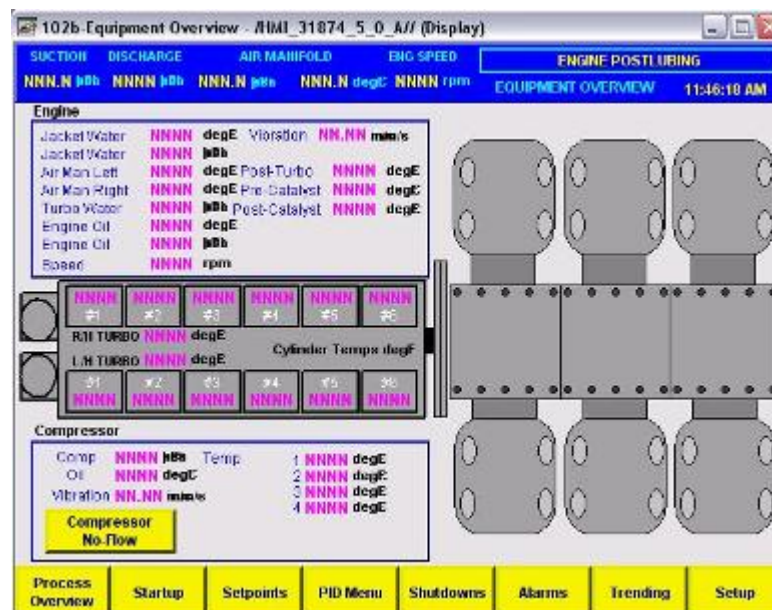
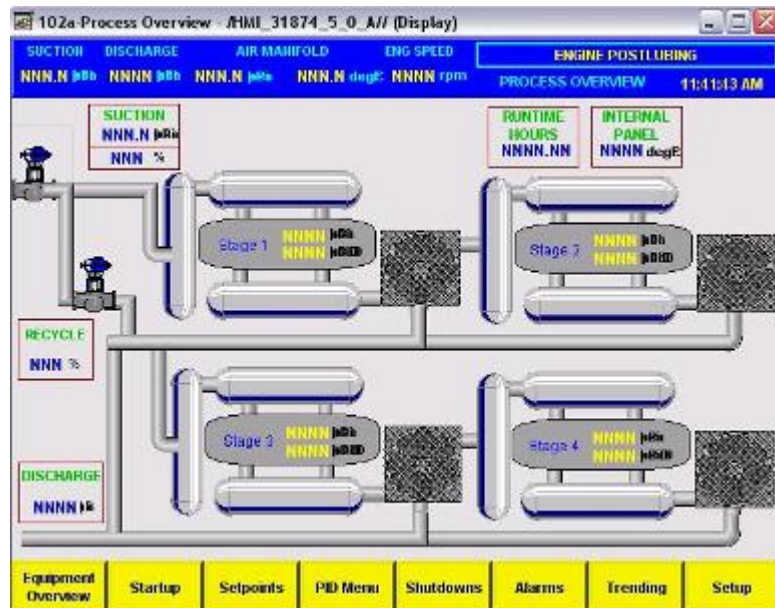


5.2. Operating Information

Three main screens display the current operating data. Analog values found in the process can be viewed on either the 'Compressor Overview' or one of the 'Setpoints' screens.

5.2.1. Process and Equipment Overviews

The process overview screen displays the most critical operating data for the compressor and control valves, while the Equipment overview displays the operating data for the engine.



5.2.2. Setpoints

All current transmitter values and alarm and shutdown setpoints can be found on the ‘Setpoints’ screens. These screens allow the user to view shutdown setpoints.

SUCTION	DISCHARGE	AIR MANIFOLD	ENG SPEED	COMPRESSOR SHUTDOWN		
1.8 psi	-50 psi	52.5 psi	69.8 degF 795 rpm	COMP SETPOINTS #1	3:17:06 PM	
DESCRIPTION	UNIT	ACTUAL	ALARM		SHUTDOWN	
			L	H	LL	HH
Stage 1 Suction Pressure	psi	1.8	5.0	105.0	3.0	107.0
Stage 1 Discharge Pressure	psi	0		50		75
Stage 2 Discharge Pressure	psi	2		50		75
Stage 3 Discharge Pressure	psi	-1		50		75
Stage 4 Discharge Pressure	psi	-50		50		75
Stage 1 Differential Pressure	psiD	0		75		100
Stage 2 Differential Pressure	psiD	2		75		100
Stage 3 Differential Pressure	psiD	0		75		100
Stage 4 Differential Pressure	psiD	0		75		100
Compressor Oil Pressure	psi	370.1	25.0	Start Perm 10.0	30.0	
Overview Startup PID Menu Shutdowns Alarms Trending Setup Next						

5.3. Alarms and Shutdowns

The HMI is set up to display a first-out shutdown. This shutdown will appear as a banner and must be acknowledged. All other shutdown status information can be found on the 'Shutdown Status' pages accessible from most other screens.

5.3.1. Shutdown Status

Shutdown status information can be found on the 'Shutdown Status' pages accessible from most other screens.

SUCTION	DISCHARGE	AIR MANIFOLD	ENG SPEED	COMPRESSOR SHUTDOWN	
1.8 psi	-50 psi	-52.5 psi	69.8 degF	795 rpm	SHUTDOWNS #1 3:20:12 PM
STAGE 1 SUCTION PRESSURE LOW SHUTDOWN	STAGE 1 DISCHARGE PRESSURE HIGH SHUTDOWN	STAGE 2 DISCHARGE PRESSURE HIGH SHUTDOWN	STAGE 3 DISCHARGE PRESSURE HIGH SHUTDOWN	STAGE 4 DISCHARGE PRESSURE HIGH SHUTDOWN	
STAGE 1 SUCTION PRESSURE HIGH SHUTDOWN	STAGE 1 DISCHARGE PRESSURE TX OUT OF RANGE	STAGE 2 DISCHARGE PRESSURE TX OUT OF RANGE	STAGE 3 DISCHARGE PRESSURE TX OUT OF RANGE	STAGE 4 DISCHARGE PRESSURE TX OUT OF RANGE	
STAGE 1 SUCTION PRESSURE TX OUT OF RANGE	STAGE 1 DIFFERENTIAL PRESSURE HIGH SHUTDOWN	STAGE 2 DIFFERENTIAL PRESSURE HIGH SHUTDOWN	STAGE 3 DIFFERENTIAL PRESSURE HIGH SHUTDOWN	STAGE 4 DIFFERENTIAL PRESSURE HIGH SHUTDOWN	
COMPRESSOR OIL PRESSURE LOW SHUTDOWN	COMPRESSOR OIL PRESSURE TX OUT OF RANGE	ENGINE OIL PRESSURE LOW SHUTDOWN	ENGINE OIL PRESSURE TX OUT OF RANGE		
					RESET
Overview	Startup	Setpoints	PID Menu	Alarms	Trending
Setup	Next				

5.3.2. Alarm History

The operator can view past alarms on the Alarm History page. This page logs the occurrence of alarm conditions and displays them in a chronological order. First-out alarms are displayed on a separate screen.

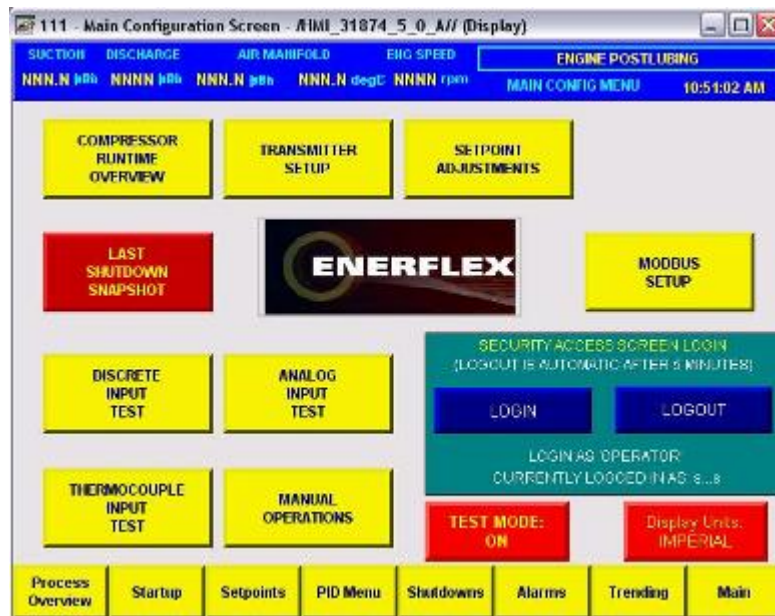
SUCTION	DISCHARGE	AIR MANIFOLD	ENG SPEED	COMPRESSOR SHUTDOWN	
1.8 psi	50 psi	52.5 psi	69.8 degf	795 rpm	ALARM HISTORY 3:21:58 PM
Alarm time Message					
3:11:22 PM July 9, 2008		THROW 4 PACKING VENT TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		THROW 3 PACKING VENT TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		THROW 2 PACKING VENT TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		THROW 1 PACKING VENT TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		ENGINE LEFT MANIFOLD TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		COOLER HIGH VIBRATION ALARM			
3:11:22 PM July 9, 2008		COMPRESSOR HIGH VIBRATION ALARM			
3:11:22 PM July 9, 2008		ENGINE JACKET WATER TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		ENGINE OIL TEMPERATURE HIGH ALARM			
3:11:22 PM July 9, 2008		THROW 4 PACKING VENT TEMP HIGH SHUTDOWN			
3:11:22 PM July 9, 2008		ENGINE OIL PRESSURE LOW ALARM			
3:11:22 PM July 9, 2008		STAGE 1 SUCTION PRESSURE LOW ALARM			
3:11:22 PM July 9, 2008		THROW 3 PACKING VENT TEMP HIGH SHUTDOWN			
3:11:22 PM July 9, 2008		THROW 2 PACKING VENT TEMP HIGH SHUTDOWN			
3:11:22 PM July 9, 2008		THROW 1 PACKING VENT TEMP HIGH SHUTDOWN			
3:11:22 PM July 9, 2008		MODBUS COMMUNICATION FAULT SHUTDOWN			
3:11:22 PM July 9, 2008		H2S DETECTION #2 OUT OF RANGE SHUTDOWN			
3:11:22 PM July 9, 2008		GAS DETECTION #2 OUT OF RANGE SHUTDOWN			
3:11:22 PM July 9, 2008		REMOTE HARD-WIRED SHUTDOWN			
3:11:22 PM July 9, 2008		FIRE DETECTION #2 OUT OF RANGE SHUTDOWN			
Ack Selected		Ack All		▼	▲
				▼	▲
Overview	Startup	Setpoints	PID Menu	Shutdowns	Firstout History
				Trending	Setup

5.4. Configuration Screens

The operator can adjust certain operating parameters from the configuration screen. The settings must be configured prior to running the unit. All configurations are password protected and require an operator to login.

5.4.1. Setup Menu

Use the “SETUP” button to access the main configuration menu.



5.4.2. Login Pop-up Screen

Press the LOGIN button to login as 'operator'. The following pop-up window appears that prompts for a user name and password.

The login pop-up screen has a black background with a blue border. It features two input fields: 'User (F2)' and 'Password (F3)'. To the right of the User field is a blue arrow button, and to the right of the Password field is an 'ESC' button. The title 'Login:' is centered at the top.

The PLC scales 4-20 mA input signals to engineering units based on the calibrated transmitter ranges. Use the transmitter setup and calibration screens to set the transmitter ranges.

SUCTION	DISCHARGE	AIR MANIFOLD	ENG SPEED	COMPRESSOR SHUTDOWN			
1.8 psi	50 psi	-52.5 psi	69.8 degF	795 rpm	XMTR SETUP #2		4:00:01 PM

TRANSMITTER DESCRIPTION	PRESSURE	CURRENT mA	POINT 1 INPUT	POINT 2 INPUT	CAL XMTR
Suction Pressure	1.8 psi	4.1	INPUT	INPUT	CAL
Stage 1 Discharge Pressure	0 psi	4.1	INPUT	INPUT	CAL
Stage 2 Discharge Pressure	2 psi	4.0	INPUT	INPUT	CAL
Stage 3 Discharge Pressure	-1 psi	4.0	INPUT	INPUT	CAL
Stage 4 Discharge Pressure	-50 psi	3.2	INPUT	INPUT	CAL
Compressor Oil Pressure	370.1 psi	9.9	INPUT	INPUT	CAL
Engine Left Manifold Pressure	-55.0 psi	3.2	INPUT	INPUT	CAL
Engine Right Manifold Pressure	-50.0 psi	3.2	INPUT	INPUT	CAL

Overview	Startup	Setpoints	PID Menu	Shutdowns	Tutorial	Back	Setup
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5.4.4. Input Test

Test screens allow a user to bypass shutdowns for a set time period to test the end device and/or PLC input without shutting down the unit. The bypass is timed so a user cannot leave the shutdown bypassed indefinitely. Use the RESET TIMER button to reset the bypass timer. RESET the shutdown before enabling it and before the bypass timer runs out. Access the test screens from the setup menu.

SUCTIONDISCHARGEAIR MANIFOLDENG SPEEDCOMPRESSOR SHUTDOWN

1.8 psi-50 psi-52.5 psi69.8 degF795 rpmANALOG TEST4:03:23 PM

DESCRIPTION	BYPASS SHUTDOWN	CURRENT VALUE	DESCRIPTION	BYPASS SHUTDOWN	CURRENT VALUE
Suction Pressure Shutdown	OFF	1.8	Engine Speed Shutdown	OFF	795
1st Stage Discharge Press High High Shutdown	OFF	0	Engine Vibration High High Shutdown	OFF	-0.05
2nd Stage Discharge Press High High Shutdown	OFF	2	Compressor Vibration High High Shutdown	OFF	1.21
3rd Stage Discharge Press High High Shutdown	OFF	-1	Cooler Vibration High High Shutdown	OFF	1.32
4th Stage Discharge Press High High Shutdown	OFF	-50	Fire Detection Shutdown	OFF	16.00
Compressor Oil Press Low Low Shutdown	OFF	370	Gas Detection Shutdown	OFF	-5.00
Engine Oil Pressure Low Low Shutdown	OFF	71			
Manifold Right Pressure High High Shutdown	OFF	-50.0			
Manifold Left Pressure High High Shutdown	OFF	-55.0			
			Bypass Time Remaining 300 sec RESET		

Overview

Startup

Setpoints

PID Menu

Shutdowns

Alarms

Trending

Next

5.4.5. Alarm and Shutdown Setpoints

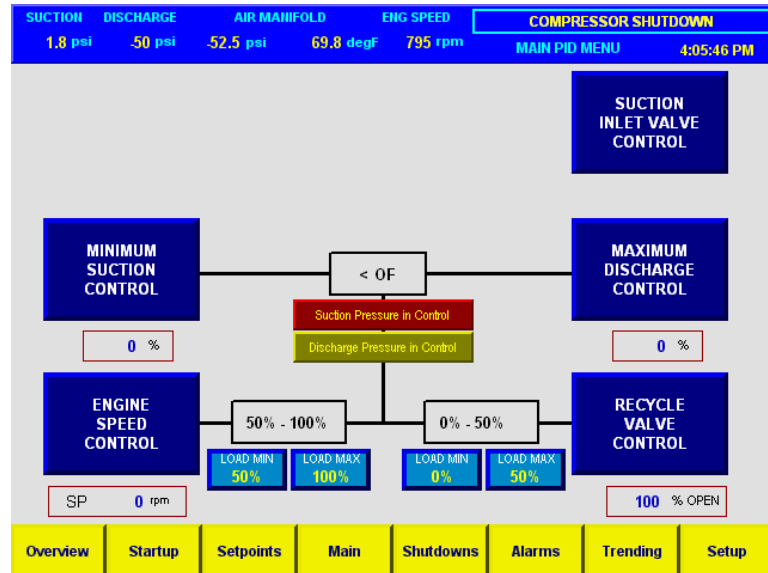
Use the setpoint configuration screens to enter the shutdown setpoints. Some setpoints are protected in the PLC. If a value is entered outside the permissible range the entered value will not be accepted for safety reasons.

SUCTION		DISCHARGE		AIR MANIFOLD		ENG SPEED		COMPRESSOR SHUTDOWN	
1.8 psi		50 psi		52.5 psi		69.8 degF		795 rpm	
						COMP SETPOINT ADJ #1		4:02:48 PM	
DESCRIPTION	UNIT	ACTUAL	ALARM		SHUTDOWN				
			L	H	LL	HH			
Stage 1 Suction Pressure	psi	1.8	5.0	105.0	3.0	107.0			
Stage 1 Discharge Pressure	psi	0		50		75			
Stage 2 Discharge Pressure	psi	2		50		75			
Stage 3 Discharge Pressure	psi	-1		50		75			
Stage 4 Discharge Pressure	psi	-50		50		75			
Stage 1 Differential Pressure	psiD	0		75		100			
Stage 2 Differential Pressure	psiD	2		75		100			
Stage 3 Differential Pressure	psiD	0		75		100			
Stage 4 Differential Pressure	psiD	0		75		100			
Compressor Oil Pressure	psi	370.1	25	Start Perm 10.0	30				
Overview	Startup	PID Menu	Shutdowns	Alarms	Trending	Setup	Next		

5.5. Control Screens

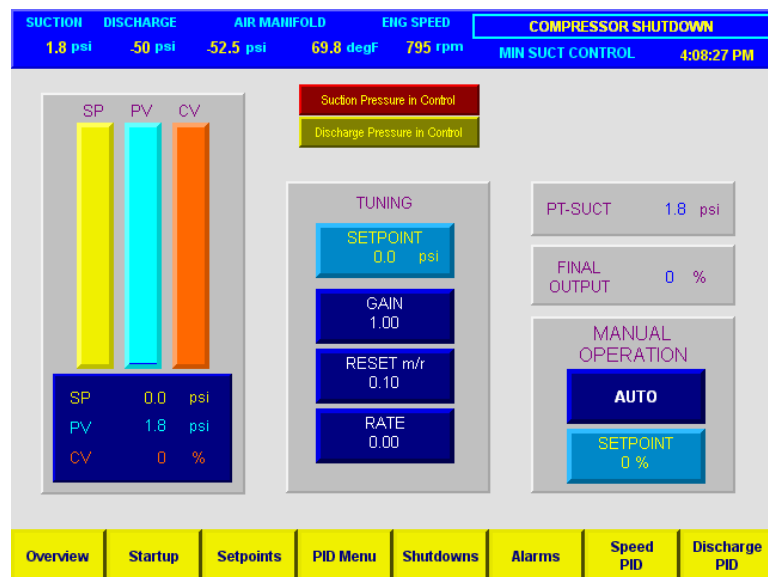
5.5.1. PID Menu

The PID overview screen provides a graphic of the main control configuration and current operating conditions. It allows navigation to individual control screens.



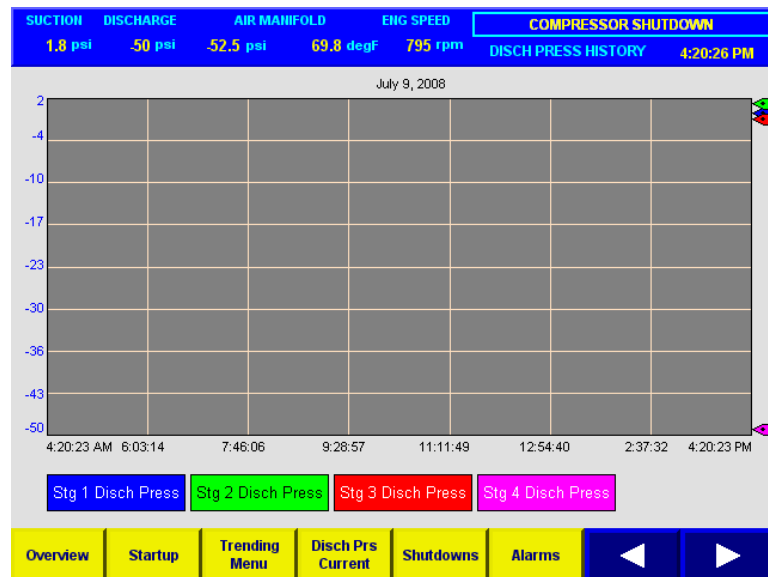
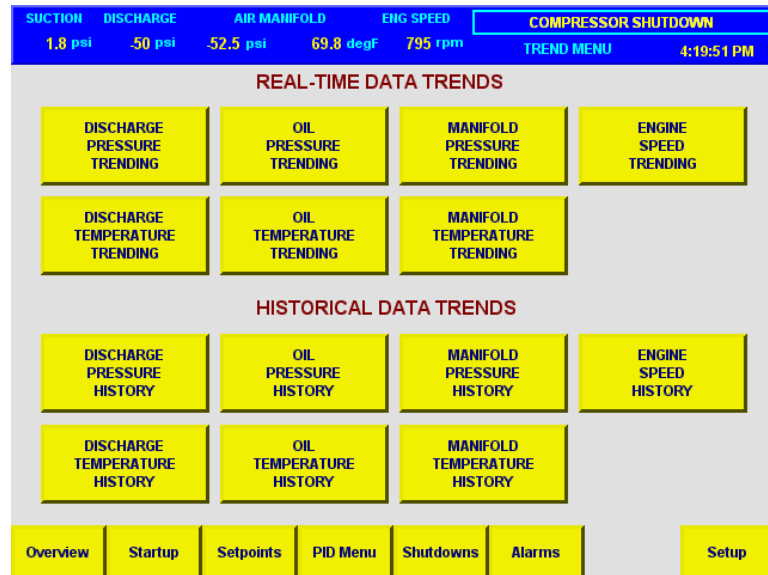
5.5.2. PID Parameter Screens

The operator can adjust setpoints and tuning parameters for the individual PID controllers. Adjust the gain (proportional), reset (integral), and rate (derivative) constants to tune the controller to react to process changes.



5.6. Data Trending screens

The HMI includes screens for real time and historical operating graphs. These screens are accessible via the 'Trending' button. The operator can access the individual trend screens from the trend menu screen. Each display is a graph of the selected variable over time. The real-time trends trace a line while the screen is displayed. These are useful for tuning PID controls. The historical trends access data stored on a CompactFlash card in the HMI.



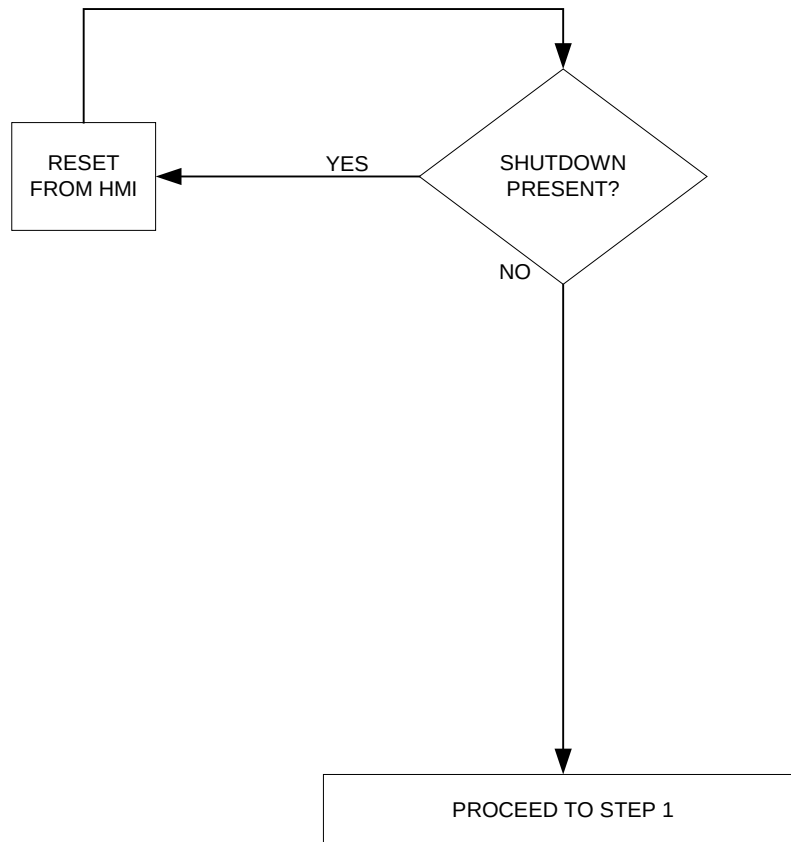
5.7. Compressor Start and Stop Screen

The compressor start/stop screen displays all information required to start the compressor. The operator can enable the start sequence and monitor its progress from this screen. The major sequence steps are listed along the left side of the screen. Most steps have sub-steps listed to the right of the major step. A step displays in green when it's complete.

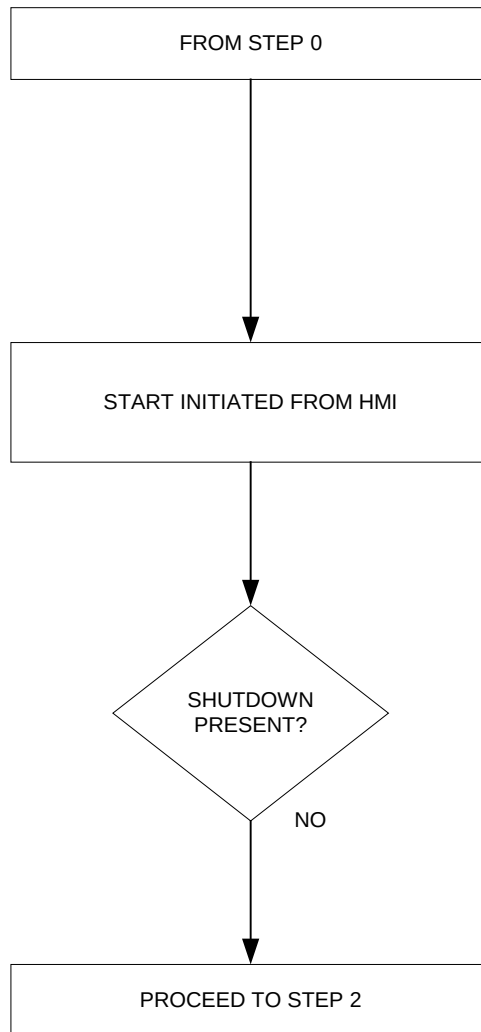
SUCTION	DISCHARGE	AIR MANIFOLD	ENG SPEED	ENGINE POSTLUBING
NNN.N μ Bar	NNNN μ Bar	NNN.N μ Bar	NNN.N degC	NNNN rpm
STARTUP				10:44:03 AM
START STOP RESET				
UNLOAD LOAD AUTOLOAD ON				
SHUTDOWNS ACTIVE				
READY TO START				
ENSURE MANUAL BYPASS VALVE IS CLOSED				
ADJUSTING PRESSURE				
SUCTION ### =< ### =< ###				
PRELUBE NOT REQ'D				
MIN PRELUBE TIME ### ENG OIL ##.# == ##.# COMP OIL ##.# == ##.#				
ENGINE CRANKING				
MAX CRANK TIME ### SPEED OK FUEL ON IGNITION CRANK				
ENGINE WARMUP				
JW TEMP ###.# == ###.# COMP OIL ###.# == ###.#				
COMPRESSOR ONLINE				
COOLDOWN				
MAX COOL TIME ### COOL AT IDLE TIME ###				
ENGINE POSTLUBING				
POSTLUBE TIME ###				
Manual Cnds				
Process Overview	Setpoints	PID Menu	Shutdowns	Alarms
Trending		Setup		

6. STANDARD OPERATING SEQUENCE

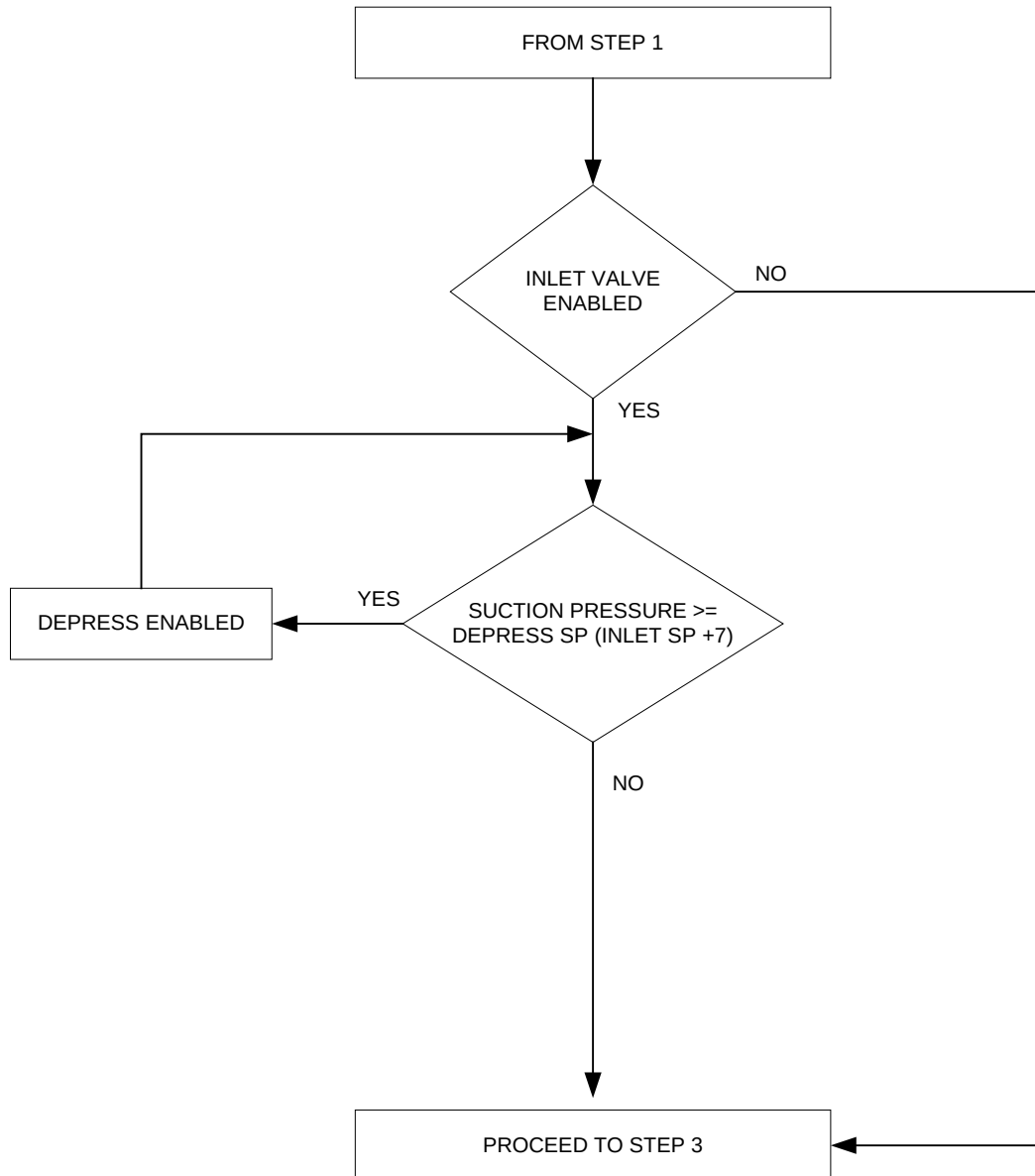
STEP 0: COMPRESSOR SHUTDOWN



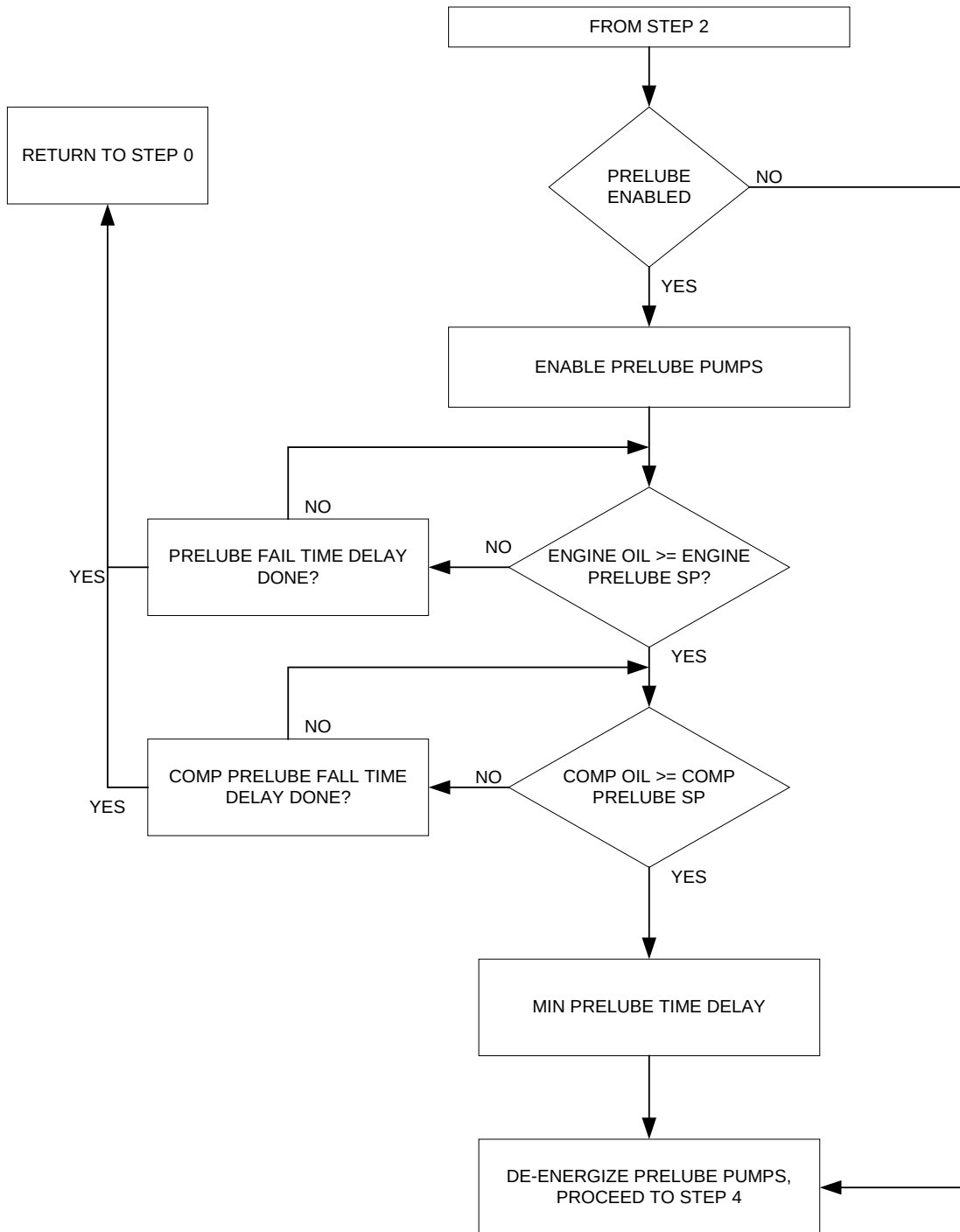
STEP 1: COMPRESSOR READY TO START



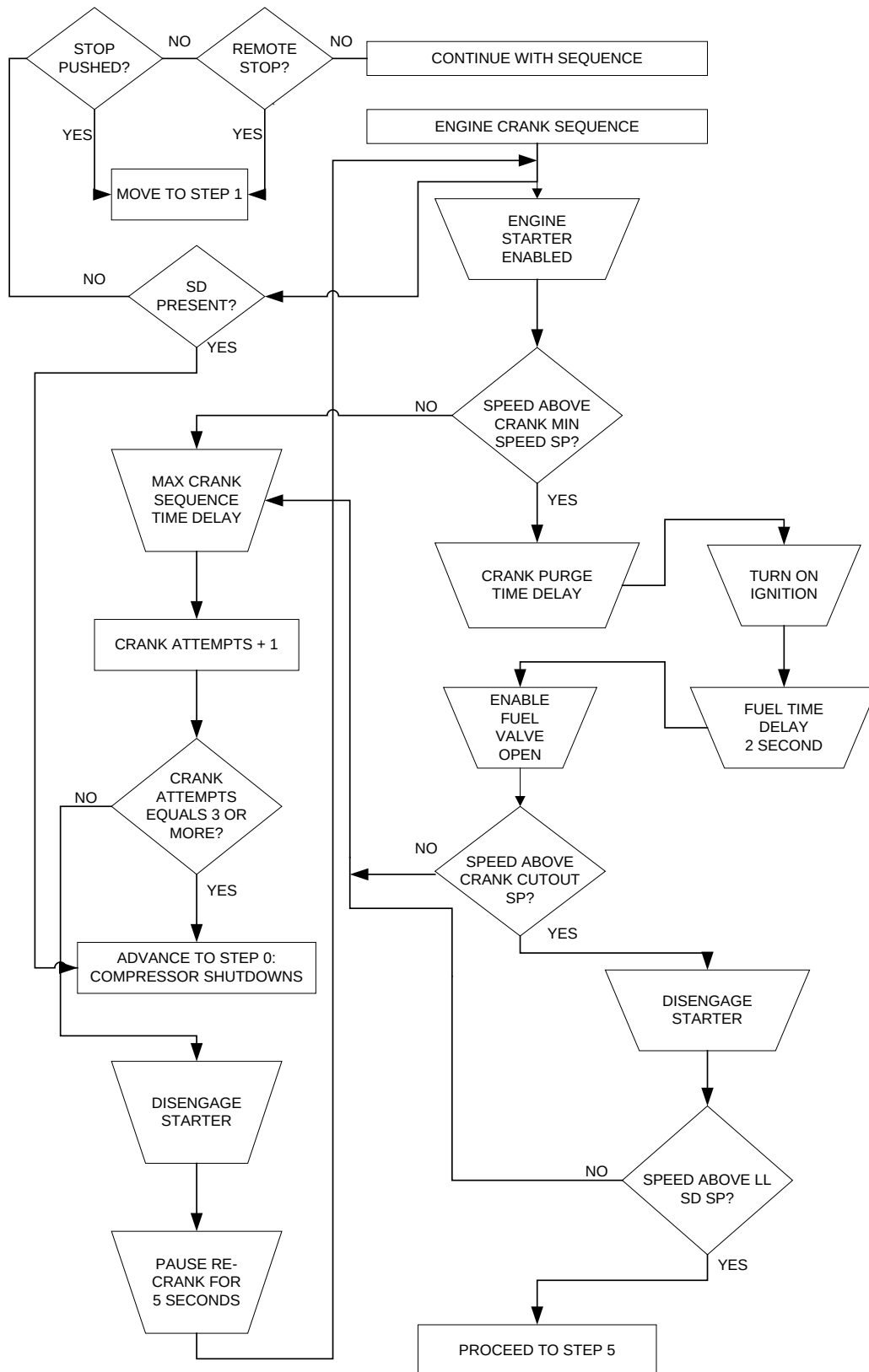
**STEP 2: DEPRESSURIZATION OF SUCTION FOR
START(IF REQUIRED)**



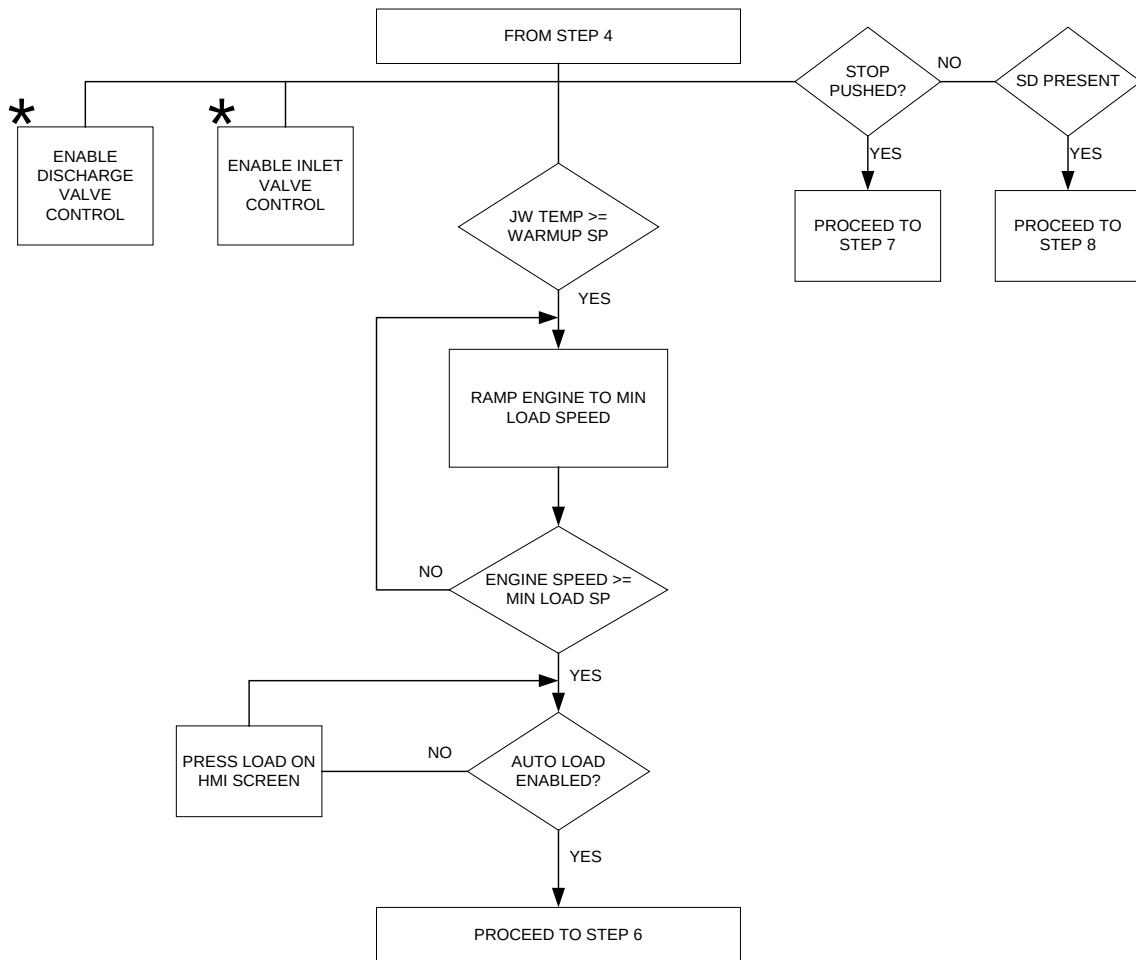
STEP 3: ENGINE/COMPRESSOR PRELUBE



STEP 4: ENGINE CRANKING

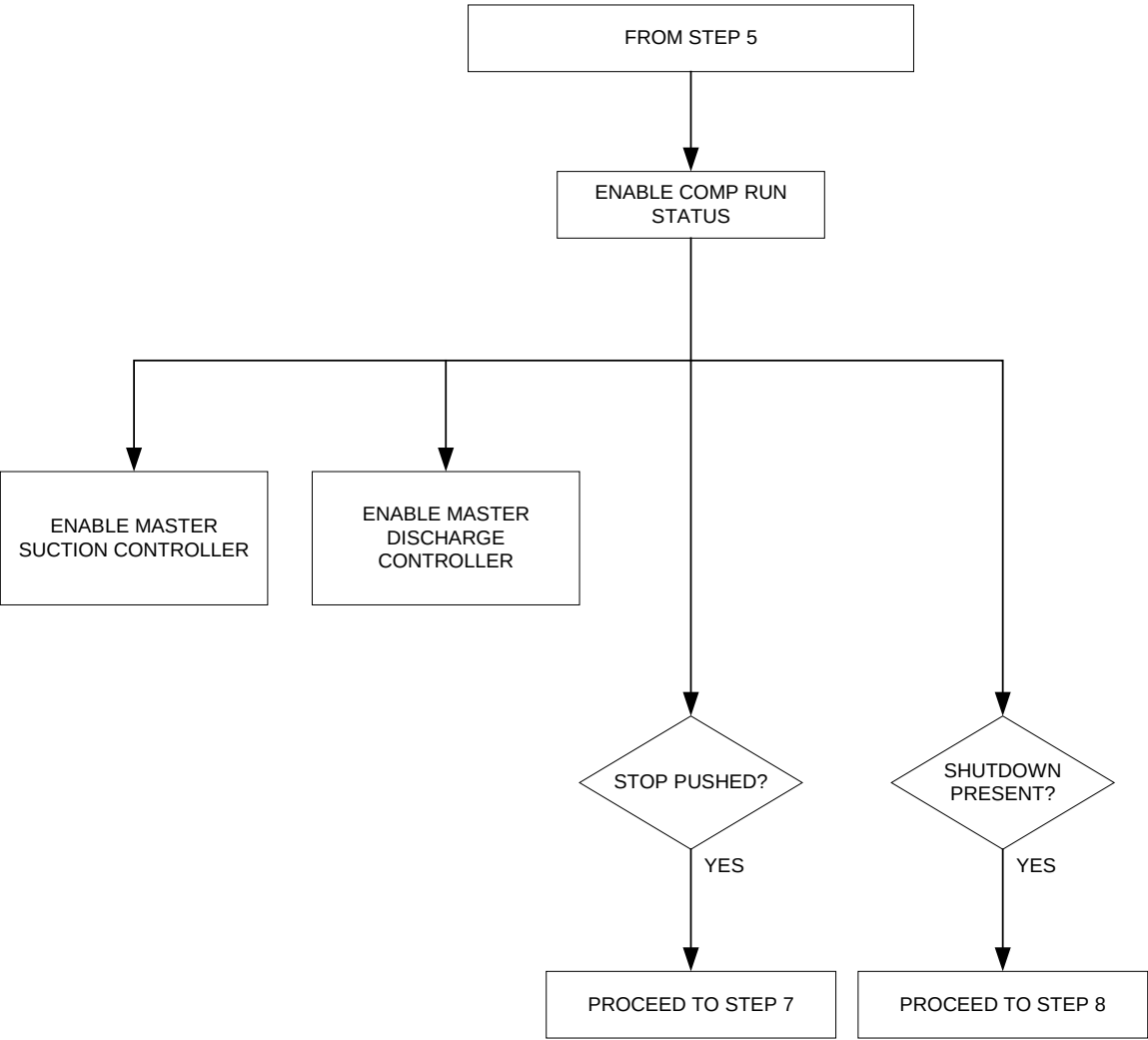


STEP 5: ENGINE WARMUP

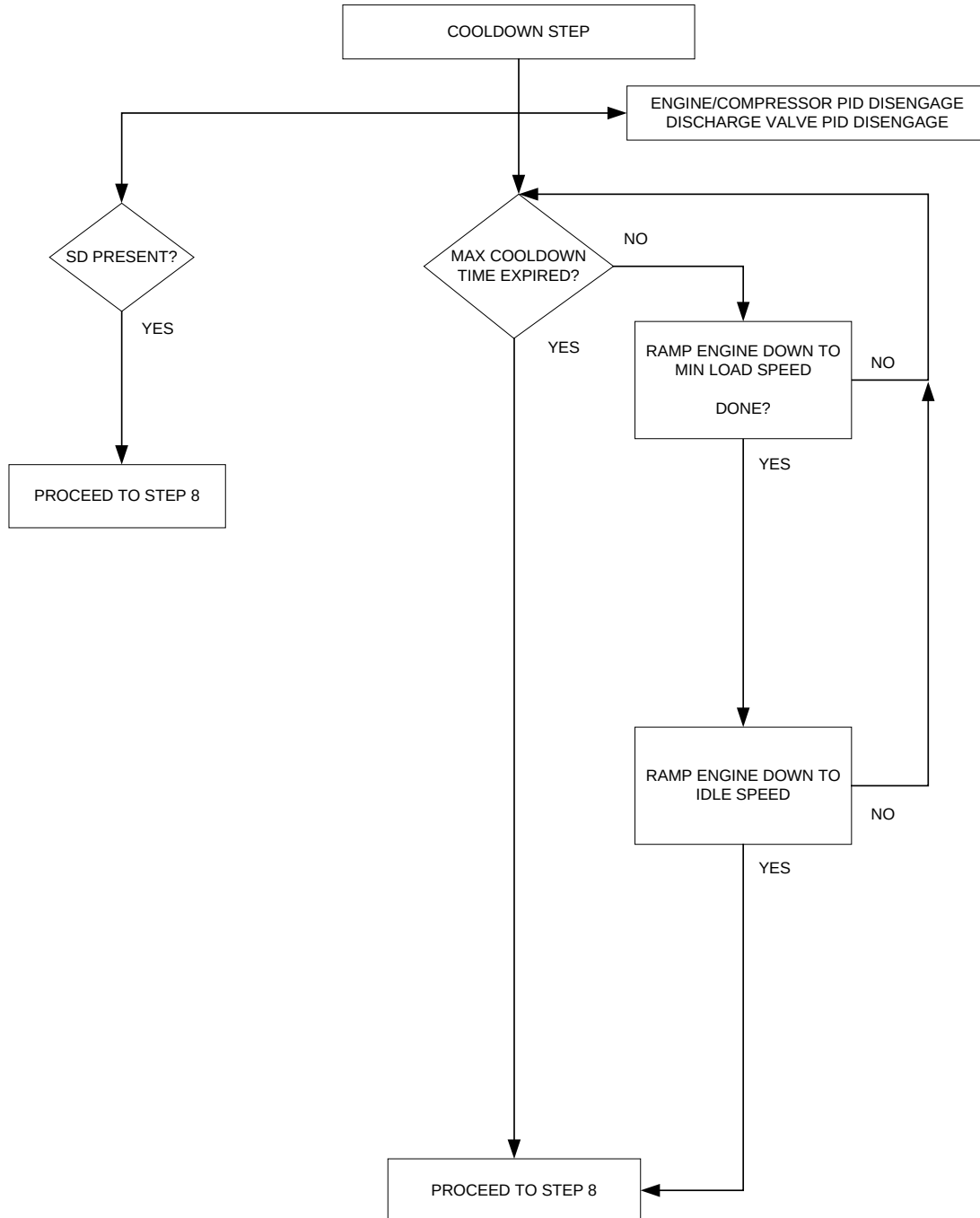


* IF INSTALLED

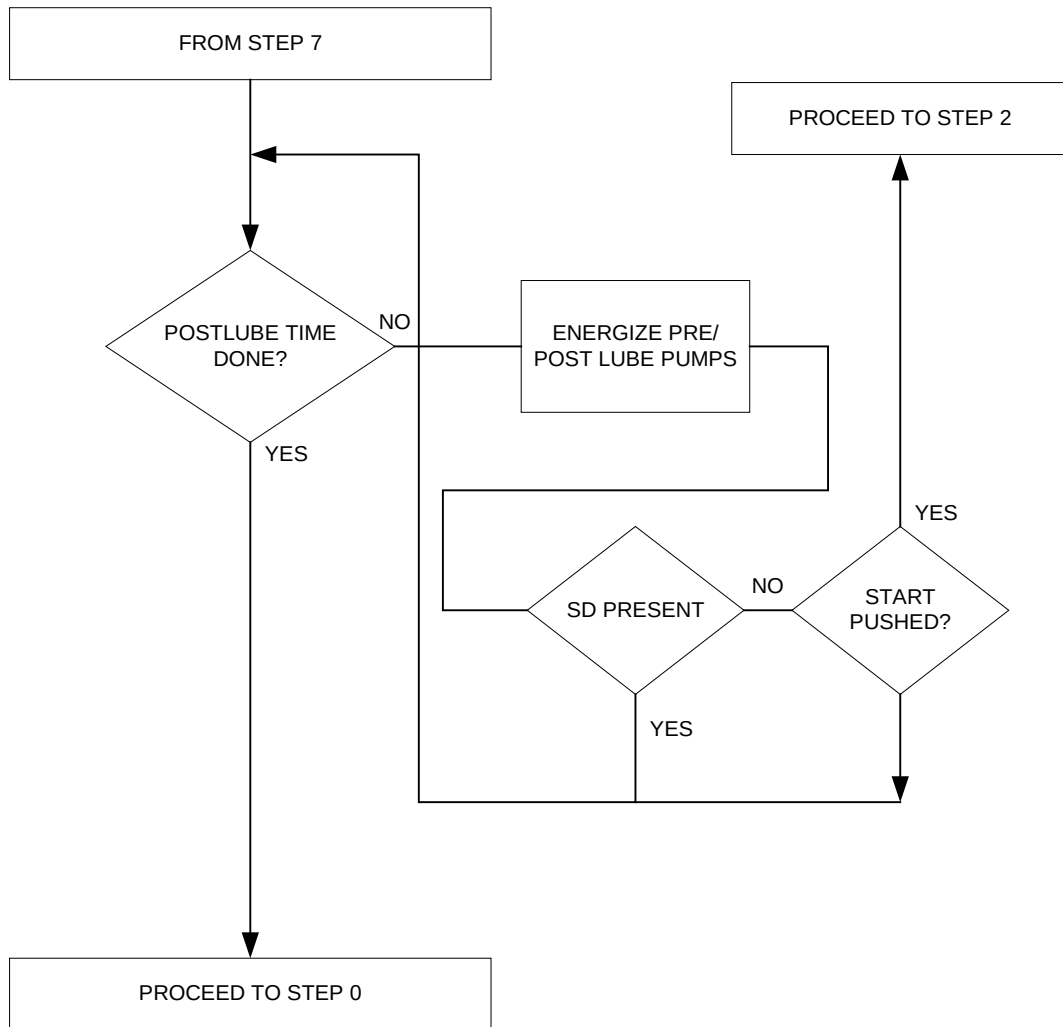
STEP 6: COMPRESSOR ONLINE



STEP 7: COOLDOWN



STEP 8: COMPRESSOR/ENGINE POSTLUBE



7. SPECIFICATIONS

Overall Specifications

Notes

PLC Cabinet	NEMA 4 steel panel w/locking handle Powder Coated Interior C/W 12 GA steel backpan	size: 48" x 30" x 10"
Operating Voltage	24 VDC	Customer supplied
Maximum Input Current	10 A – Control Panel	
Operating Temperature (Ambient)	0 - 50°C (32 – 122°F)	
Agency Approval	CSA C/US Class I, Div. 2 Group C and D	

PLC Specifications

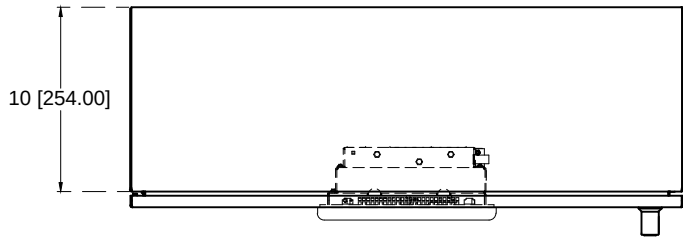
Processor	CompactLogix 5332 CPU 750KB memory AB # 1769-L32E CUL Class I, Div. 2	
Analog Modules	2 – Analog input modules - 8 channel AB #: 1769-IF8 1 – Analog output module - 4 channel AB #: 1769-OF4CI CUL Class I, Div. 2	
Digital Modules	1 – Digital input module - 16 channel AB #: 1769-IQ16 1 – Digital output module – 16 channel AB #: 1769-OB16 CUL Class I, Div. 2	
Temperature Input Modules	2 – Thermocouple 8 Channel Input Module AB #: 1769sc-IF8u CUL Class I, Div. 2	
Communication Protocols	DF1 serial communication Ethernet communication	Option: Modbus communication with 1761-NET-AIC (Required with Waukesha ESM.)
Power Supply	PLC power supply 19.2 to 32 VDC 6A AB #: 1769-PB4 CUL Class I, Div. 2	

HMI Specifications

Model	Allen Bradley PanelView+ 1000 Touch AB #: 2711P-T10C4D8 CUL Class I, Div. 2	
Input Power	Max. 2.9 Amps @ 24 VDC	
Communications Protocols	Ethernet, RS232-DF1	
Memory	CompactFlash Memory Card	

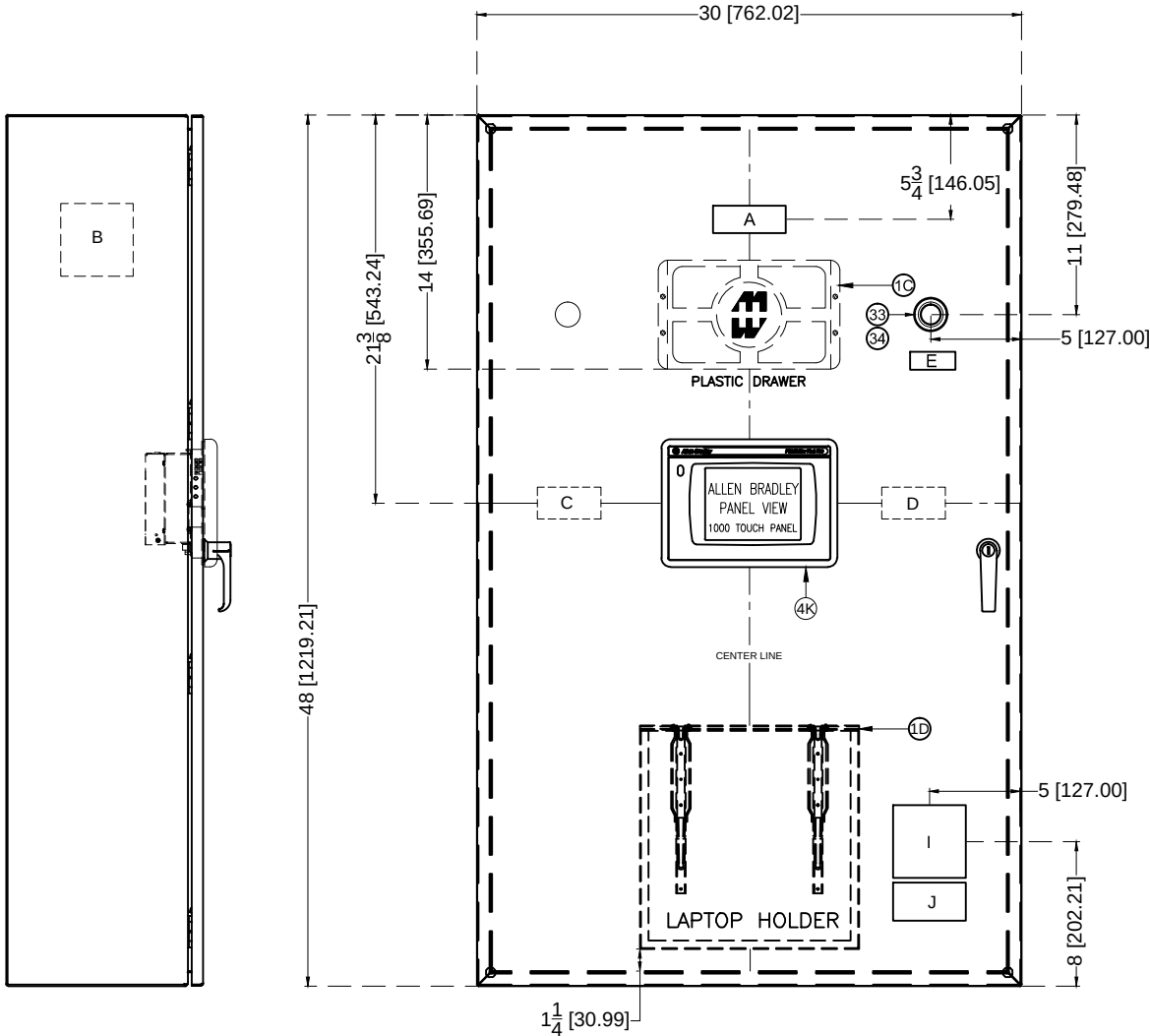
doc: 31971/31972-601-SD			Title SHUTDOWN Key				Revision: 1				Output Type		D	D	D	A	D		D			
ENERFLEX			Notes: 1. Class A shutdown/alarm, no start allowed until shutdown is cleared and reset. 2. Class B shutdown/alarm has a start-up bypass timer. Bypassed until compressor or related equipment is running for 2 minutes. 3. Calss b shutdown/alarm has a start-up bypass timer. Bypassed until compressor or related equipment is running for 20 seconds. 4. Class C shutdown/alarm functions are disabled until the unit is running. Class C functions are then individually monitored. When a Class C function becomes healthy, it is enabled, and will cause an alarm/shutdown if it then goes unhealthy.				LEGEND CL - Close OP - Open SD - Shutdown (Reset Required) ST - Start SP - Stop (No Reset Required) TD - Time Delay P - Permissive to Start/Open PB - Pushbutton EN - Energize DE - De-Energize X - Activate DX - De-Activate D - Digital A - Analog		Output Device Description		engine crank solenoid		engien fuel gas valve solenoid		compressor/engine pre-lube pumps solenoid		engine speed control		engine ignition shutdown control relay		compressor run status control relay	
JOB: 31971-31972																						
FOR: EOG RESOURCES EAST CHAPITA WELLS WAUKESHA F24GSI ARIEL JGJ/2-2 COMPRESSOR PACKAGE																						
			1As BuiltNov 15/2012WJ																			
			0Issued For ApprovalSep 21/2012WJ																			
			REV. DESCRIPTIONDATEBY																			
Input Type	Input Device tag	Units	Input Device Description				PLC Alarm/SD or Action Tag		Action Class (Notes)		Output Device Tag		UY-5102	UY-5103	UY-5104	PY-7101						
											P&ID		115-1	115-1	115-1	117-1						
											NOTE											
D		---	Emergency Shutdown (ESD Button on Local Panel or ESD from plant)						A		---				DE	DE	DE	Min	DE	DE		
A	AE-2151	mA	Fire Detection High High shutdown				AAHH-2151		A		112-1				DE	DE	DE	Min	DE	DE		
			Fire Detection Out of Range Shutdown				AAXX-2151		A		112-1				DE	DE	DE	Min	DE	DE		
A	AE-2152	%LEL	Gas Detection High High Shutdown				AAHH-2152		A		112-1				DE	DE	DE	Min	DE	DE		
			Gas Detection Out of Range Shutdown				AAXX-2152		A		112-1				DE	DE	DE	Min	DE	DE		
D	LSHH-1101	---	1st Stage Suction Scrubber High Level Shutdown Switch				LAHH-1101		A		111-1				DE	DE	EN	Min	TD-DE	DE		
D	LSHH-1201	---	2nd Stage Suction Scrubber High Level Shutdown Switch				LAHH-1201		A		111-2				DE	DE	EN	Min	TD-DE	DE		
D	LSHH-1301	---	3rd Stage Suction Scrubber High Level Shutdown Switch				LAHH-1301		A		111-3				DE	DE	EN	Min	TD-DE	DE		
D	LSLL-6101	---	Engien Jacket Water Low Level Shutdown Switch				LALL-6101		A		116-1				DE	DE	EN	Min	TD-DE	DE		
D	LSLL-6201	---	Auxiliary Water Low Level Shutdown Switch				LALL-6201		A		116-2				DE	DE	EN	Min	TD-DE	DE		
D	VS-2101	---	Compressor Vibration High Shutdown Switch				VAHH-2101		A		112-1				DE	DE	EN	Min	TD-DE	DE		
D	VS-2102	---	Compressor Engine Vibration High Shutdown Switch				VAHH-2102		A		112-1				DE	DE	EN	Min	TD-DE	DE		
D	VS-2103	---	Compressor Cooler Vibration High Shutdown Switch				VAHH-2103		A		112-1				DE	DE	EN	Min	TD-DE	DE		
D	LCSLL-3101	---	Compressor Oil level Low Shutdown Switch				LALL-3101		A		113-1				DE	DE	EN	Min	TD-DE	DE		
D	LCSLL-4101	---	Engine Oil level Low Shutdown Switch				LALL-4101		A		114-1				DE	DE	EN	Min	TD-DE	DE		
D	FSLL-3101	---	Compressor Lubricator No Flow Shutdown Switch (Throw 1 &3)				FALL-3101		B		113-1				DE	DE	EN	Min	TD-DE	DE		
D	FSLL-3102	---	Compressor Lubricator No Flow Shutdown Switch (Throw 2 &4)				FALL-3102		B		113-1				DE	DE	EN	Min	TD-DE	DE		
A	PT-1101	psig	1st Stage Suction Pressure Low Low Shutdown				PALL-1101		A		111-1				DE	DE	EN	Min	TD-DE	DE		
A			1st Stage Suction Pressure Out of Range Shutdown				PAXX-1101		A		111-1				DE	DE	EN	Min	TD-DE	DE		
A	PT-1102	psig	1st Stage Discharge Pressure High High Shutdown				PAHH-1102		A		111-1				DE	DE	EN	Min	TD-DE	DE		
			1st Stage Discharge Pressure Out of Range Shutdown				PAXX-1102		A		111-1				DE	DE	EN	Min	TD-DE	DE		
A	PT-1201	psig	2nd Stage Discharge Pressure High High Shutdown				PAHH-1201		A		111-2				DE	DE	EN	Min	TD-DE	DE		
			2nd Stage Discharge Pressure Out of Range Shutdown				PAXX-1201		A		111-2				DE	DE	EN	Min	TD-DE	DE		
A	PT-1301	psig	3rd Stage Discharge Pressure High High Shutdown				PAHH-1301		A		111-3				DE	DE	EN	Min	TD-DE	DE		
			3rd Stage Discharge Pressure Out of Range Shutdown				PAXX-1301		A		111-3				DE	DE	EN	Min	TD-DE	DE		
A	PT-3101	psig	Compressor Oil Pressure Low Low shutdown				PALL-3101		b		113-1				DE	DE	EN	Min	TD-DE	DE		
			Compressor Oil Pressure Out of Range Shutdown				PAXX-3101		A		113-1				DE	DE	EN	Min	TD-DE	DE		
A	PT-4101	psig	Engine Oil Pressure Low Low Shutdown				PALL-4101		b		114-1				DE	DE	EN	Min	TD-DE	DE		
			Engine Oil Pressure Out of Range				PAXX-4101		A		114-1				DE	DE	EN	Min	TD-DE	DE		
A	SE-2101	rpm	Engine Speed Low Low Shutdown				SALL-2101		C		112-1				DE	DE	EN	Min	TD-DE	DE		
		rpm	Engine Speed High High Shutdown				SAHH-2101		A		112-1				DE	DE	EN	Min	TD-DE	DE		
			Engine Speed Out of Range Shutdown				SAXX-2101		A		112-1				DE	DE	EN	Min	TD-DE	DE		
A		V	24Vdc Voltage low shutdown						A		-				DE	DE	EN	Min	TD-DE	DE		
A			24Vdc Voltage out of range shutdown						A		-				DE	DE	EN	Min	TD-DE	DE		
T/C	TE-1101	deg F	Compressor Discharge Throw #1 Temperature High High Shutdown				TAHH-1101		A		111-1				DE	DE	EN	Min	TD-DE	DE		

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TOP PANEL VIEW

LAMACOID DETAILS



LEFT PANEL VIEW

FRONT PANEL VIEW

ITEM	QTY	TYPE / COLOR	DIMENSIONS	DESCRIPTION
A	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	1"-1/2 X 5"	ENERFLEX UNIT # 31971-601
B	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	4" X 4"	ENERFLEX LTD. 10121 BARLOW TRAIL NE CALGARY - ALBERTA - CANADA UNIT: 31971-601 MODEL: AB COMPACT-LOGIX SERIAL: 31971-601 ELECTRICAL RATINGS: 24VDC/10AMP; 24VDC/10AMP; CLASS 1 DIV2 GR. C&D TEMP. CODE: T3 DATE: SEPT 2012; CSA
C	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	1"-3/4 X 3"-1/2	TORQUE PANELVIEW MOUNTING SCREWS TO 8 LB-IN
D	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	3" X 3"	REMOVING FLASHCARD WHILE APPLICATION IS RUNNING WILL CAUSE LOSS OF DATA LOGGING; TO RESUME DATA LOGGING RESTART APPLICATION
E	1	LAMACOID WHITE LETTERING ON RED BACKGROUND	1"-3/4 X 3"-1/2	EMERGENCY SHUTDOWN
F	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	3/4" X 1"-1/2	MAIN GROUND BAR
G	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	3/4" X 1"-1/2	INSTRUMENT GROUND BAR
I	1	LAMACOID WHITE LETTERING ON RED BACKGROUND	4"X4"	WARNING EXPLOSION HAZARD DON'T DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1 DIV 2
J	1	WHITE LETTERING ON RED BACKGROUND	2"X4"	NOTE: - MULTIPLE POWER SOURCES SUPPLIED TO THIS PANEL - ENSURE PANEL IS ISOLATED BEFORE OPENING

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: CONTROL PANEL LAYOUT		
DRAWN BY: R. TRASLAVINA		DATE: AUG 31, 2012		
CHKD. BY: I. CABRAL		SCALE: N/A		
APPR. BY: I. CABRAL		W.O. No: 31971		
CUST. PO No:		DWG. No: 31971-601		SHEET No: 1 of 13
				REV: 3

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BILL OF MATERIALS

31971-601					
ITEM	QTY	TYPE	CATALOG	MFG	DESCRIPTION
1A	1		SE1102047	HAMMOND	ENCLOSURE NEMA 4 ASSEMBLY, 48"X30"X10" STEEL
1B	1		EP4830	HAMMOND	BACKPLANE, 46" $\frac{1}{2}$ " X 28" $\frac{1}{8}$ "
1C	1		PKT99	HAMMOND	PLASTIC DRAWER
1D	1		FDS1212GY	HAMMOND	LAPTOP SHELF
1F	2		GASKET_EN	HAMMOND	GASKET TO AVOID VIBRATION ON THE CARDS
2	2	TS-35	514500000	WEIDMULLER	SLOTTED DIN RAIL (BY 6' LENGTH)
3	16	S2HS	641720000	WEIDMULLER	DIN RAIL SUPPORT, S2HS
4A	1		1769-L32E	AB	PROCESSOR COMPACT SERIES
4B	1		1769-IQ16	AB	PLC COMPACT SERIES DC INPUT MODULE
4D	1		1769-OB16	AB	PLC COMPACT SERIES DC OUTPUT MODULE
4E	1		1769-PB4	AB	PLC POWER SUPPLY, 24 VDC, 5 A
4F	2		1769-IF8	AB	PLC COMPACT SERIES ANALOG MODULE
4G	1		1769-OF4	AB	PLC COMPACT SERIES ANALOG MODULE
4I	1		1769-ECR	AB	1769 END CAP
4J	2		1769SC-IF8U	AB	PLC COMPACT SERIES ANALOG MODULE - UNIVERSAL
4K	1		2711P-T10C4D8	AB	PANEL VIEW + 1000, TOUCH PANEL, 24 VDC, VERSION 6
7	1	IE-SW-BL05-5TX	1240840000	WEIDMULLER	ETHERNET SWITCH, 5 PORTS
14	8	WDK 2.5/D1	1023400000	WEIDMULLER	TERMINAL WITH ELECTRONIC COMPONENT - WDK 2.5 1D A.1
24	4	WPE 4	1010100000	WEIDMULLER	STANDARD DESIGN PROTECTIVE CONDUCTOR TERMINAL - WPE 4
25	1	WPE 16	1010400000	WEIDMULLER	STANDARD DESIGN PROTECTIVE CONDUCTOR TERMINAL - WPE 16
31	1		7914760001	WEIDMULLER	SPARE FUSE BOX
33	1		800G-MPE	AB	RED MUSHROOM ESD ACTUATOR
34	1		800G-XLSN	AB	BLOCK CONTACT FOR PUSHBUTTON, NO/NC
35	1	CAT5e-1M	M45PATCH3BL	STARTECH	ETHERNET PATCH CABLE, 3 FT/1 M LONG
36	1	CAT5e-2M	M45PATCH6BL	STARTECH	ETHERNET PATCH CABLE, 6 FT/2 M LONG
49	2	WDU 6	1020200000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 6
51	17	WDU 4	1020100000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 4
52	44	WDK 2.5N	1041600000	WEIDMULLER	COMPACT-DESIGN TERMINAL BLOCK - WDK 2.5N
53	4	WDK 2.5V	1022300000	WEIDMULLER	DOUBLE TERMINALS, FEED THROUGH, COMMON CONNECTION
54	27	WEW 35 / 2	1061200000	WEIDMULLER	END BRACKET - WEW 35 / 2
56	2	WDU 2.5	1020000000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 2.5
57	2	WSI 25/1 10/38	1966020000	WEIDMULLER	FUSE TERMINAL WSI 25/1 10/38, DARK BEIGE WEMID, 600V, 12-8AWG, FOR D02 FUSE
58	24	WSI 6 LED	1011300000	WEIDMULLER	FUSE TERMINAL - WSI 6 LED
59	2	WDU 16	1020400000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 16
60	19		5603154	PHOENIX CANTACT	ELECTROMECHANICAL RELAY
61	2		LP-CC-10	BUSSMANN	FUSE - CLASS CC, 10A
62	3		S501-5-R	BUSSMANN	FUSE - 5 x 20mm FAST ACTING, CERAMIC TUBE, 5A
63	2		S501-4-R	BUSSMANN	FUSE - 5 x 20mm FAST ACTING, CERAMIC TUBE, 4A
65	8		S501-2-R	BUSSMANN	FUSE - 5 x 20mm FAST ACTING, CERAMIC TUBE, 2A
66	11		S501-1-R	BUSSMANN	FUSE - 5 x 20mm FAST ACTING, CERAMIC TUBE, 1A
67	1		C2WH6	PANDUIT	NARROW FINGER, SLOTTED WIRING COVER
68	2		C3WH6	PANDUIT	NARROW FINGER, SLOTTED WIRING COVER
69	1		F2X4WH6	PANDUIT	NARROW FINGER, SLOTTED WIRING DUCT
70	2		F3X4WH6	PANDUIT	NARROW FINGER, SLOTTED WIRING DUCT
72	1		N8020	ILSCO	GROUND BAR
75	2		TA-2i	ILSCO	GROUND LUG
76	1	MCR-F-UI-DC	2814605	PHOENIX CONTACT	UNIVERSAL FREQUENCY TRANSMITTER

SPARE FUSES		
QTY	RATING	FUSE TYPE
9	1 A	S501-1-R
7	2 A	S501-2-R
3	4 A	S501-4-R
2	5 A	S501-5-R
3	10 A	LP-CC-10

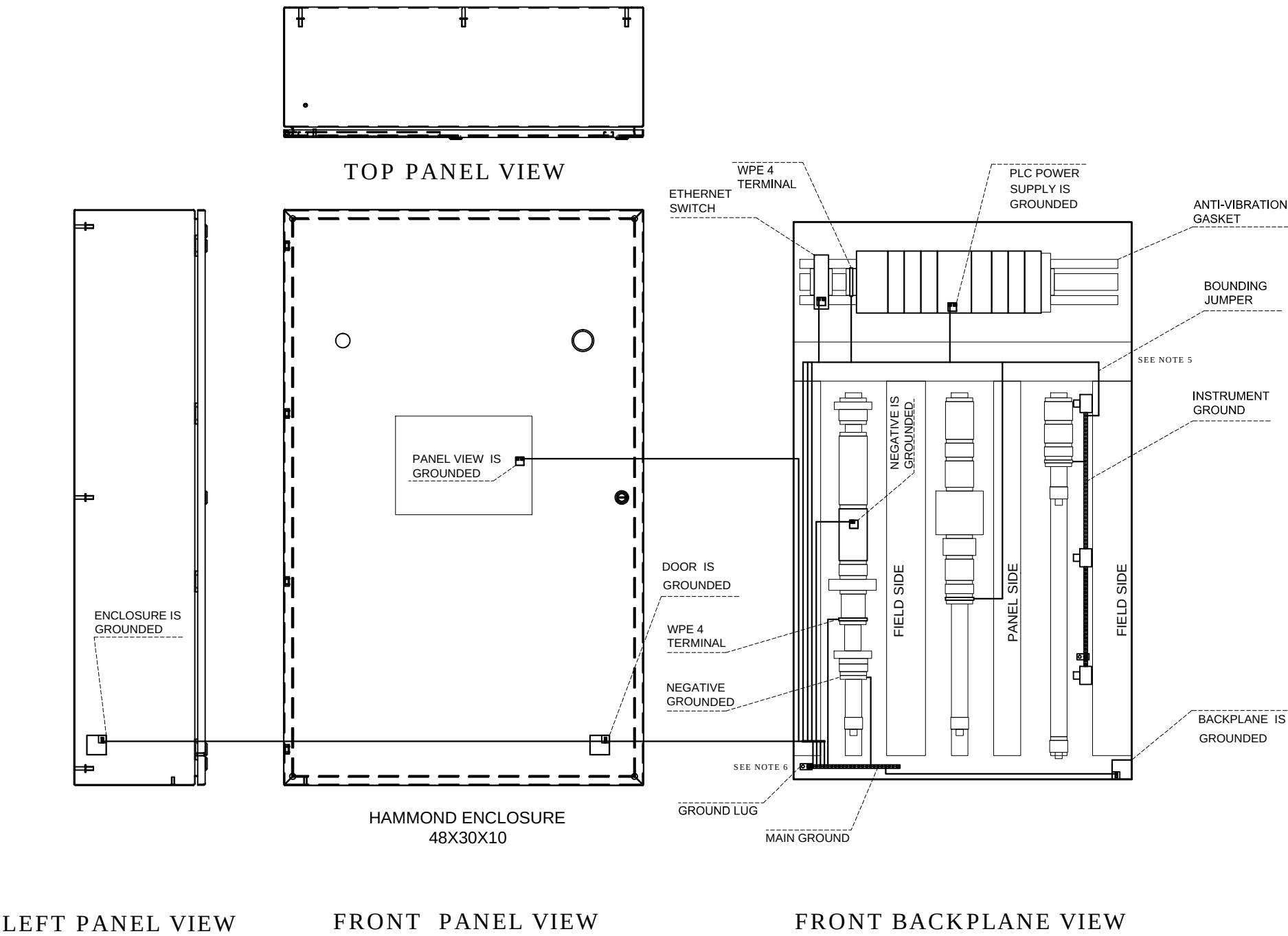
3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: BILL OF MATERIAL		
DRAWN BY: R.TRASLAVINA		DATE: AUG 31, 2012		
CHKD. BY: I. CABRAL		SCALE: N/A		
APPR. BY: I. CABRAL		W.O. No: 31971		
CUST. PO No:		DWG. No: 31971-601		SHEET No: 2 of 13
				REV: 3

3	AS BUILT	NOV 21, 2012	WJ	WJ	
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ	
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ	
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC	
REV.	DESCRIPTION	DATE	BY	APPR.	
			ENGINEER STAMP		
ENERFLEX		TITLE: BACKPLANE LAYOUT			
		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JG/J-4/3			
DRAWN BY: R. TRASLAVINA		DATE: AUG 31, 2012			
CHKD. BY: I. CABRAL		SCALE: N/A			
APPR. BY: I. CABRAL		W.O. No: 31971			
CUST. PO No:		DWG. No: 31971-601		SHEET No: 3 of 13	
				REV: 3	

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GROUNDING SYSTEM

COMPRESSOR CONTROL PANEL



NOTES:

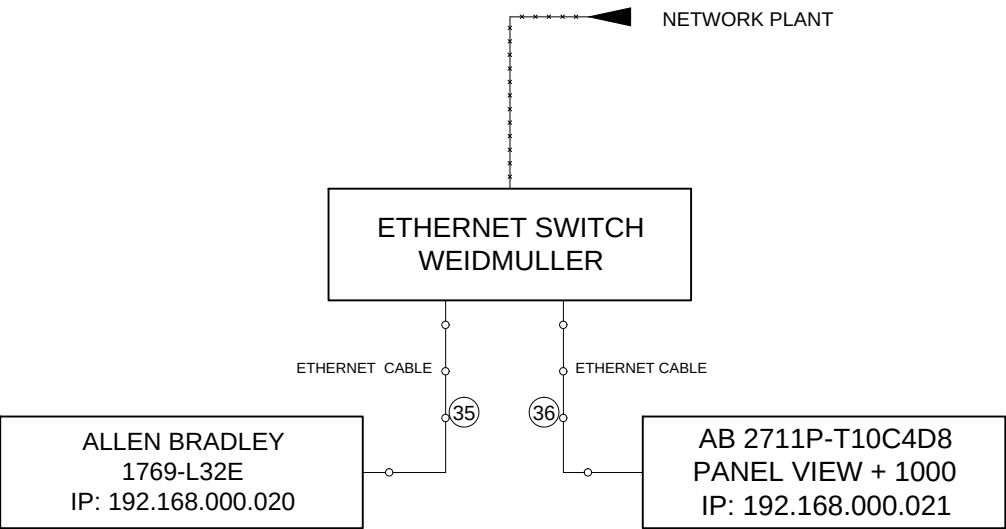
1. DOOR IS BONDING WITH (GREEN COLOR) 10 AWG WIRE PREVENTING STATIC VOLTAGE AND SUPPORTING MECHANICAL TENSION
2. DEVICES ARE GROUNDED SEPARATELY WITH (GREEN COLOR) 14 AWG WIRE
3. THE WALLS AND STRUCTURE OF THE HAMMOND ENCLOSURE ARE GROUNDED TO THE MAIN POTENTIAL GROUND BAR
4. THE DC NEGATIVE TERMINALS ARE JUMPED TO GROUNDING INCREASING SAFETY ON THE POWER DISTRIBUTION SYSTEM
5. MAIN AND INSTRUMENT GROUND BARS ARE BOUNDING TOGETHER; IF ISOLATION IS REQUIRED, REMOVE BOUNDING JUMPER
6. CONTROL PANEL MUST BE GROUNDED TO THE SKID THROUGH THE GROUND LUG (ILSCO TA-21) LOCATED ON THE TOP OF THE MAIN GROUND BAR WITH GREEN WIRE #2

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: GROUNDING CONTROL SYSTEM		
		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JG/J4-3		
DRAWN BY: R. TRASLAVINA	DATE: AUG 31, 2012			
CHKD. BY: I. CABRAL	SCALE: N/A			
APPR. BY: I. CABRAL	W.O. No: 31971			
CUST. PO No:		DWG. No: 31971-601	SHEET No: 4 of 13	REV: 3

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COMMUNICATION SYSTEM

COMPRESSOR CONTROL PANEL

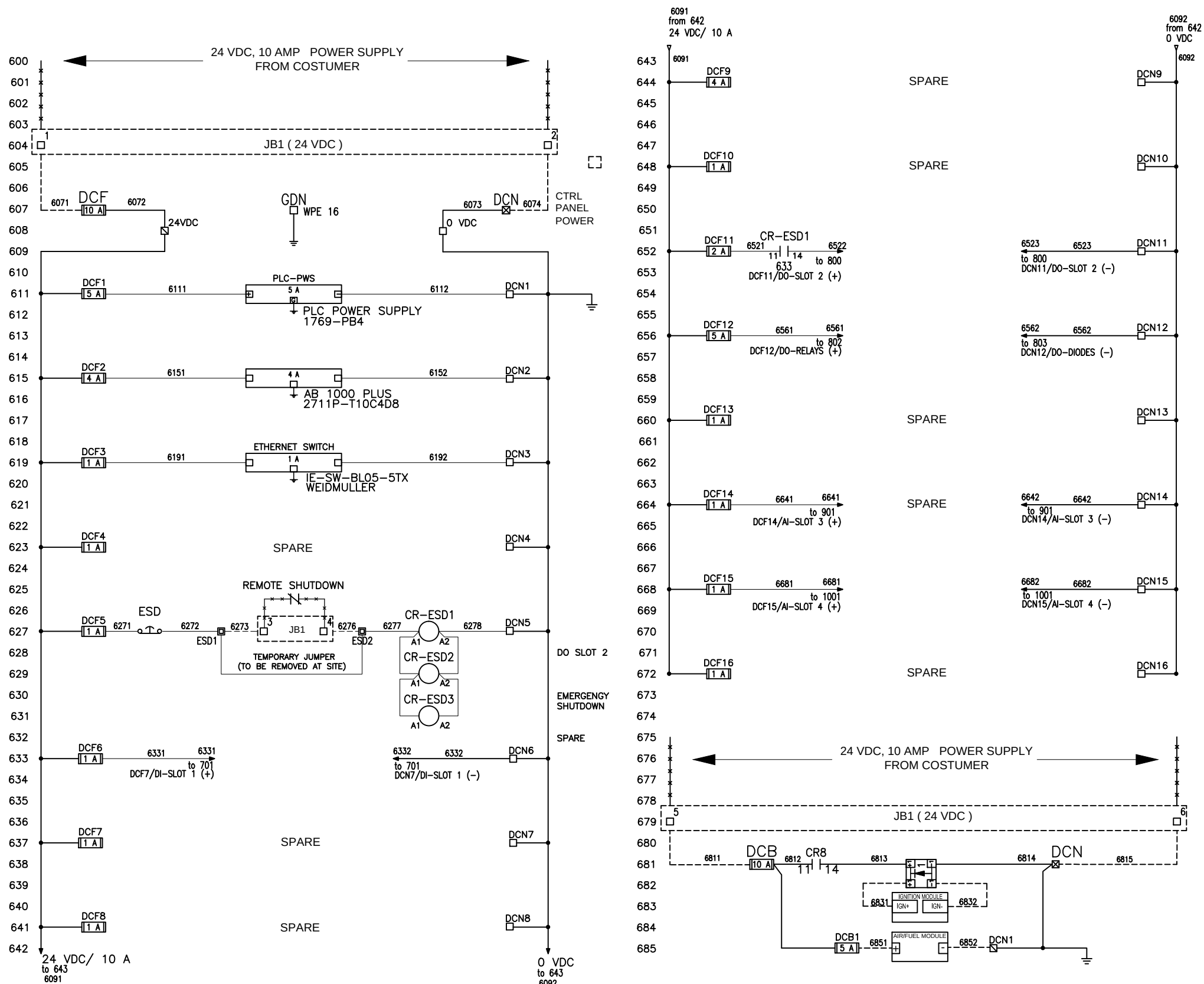


NOTES:

- COMMUNICATION WIRING BY ENERFLEX LTD.
- x-x-x-x-x- COMMUNICATION WIRING BY OTHERS

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
		TITLE: COMMUNICATION CONTROL SYSTEM		
		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JGJ/4-3		
DRAWN BY: R. TRASLAVINA		DATE: AUG 31, 2012		
CHKD. BY: I. CABRAL		SCALE: N/A		
APPR. BY: I. CABRAL		W.O. No: 31971		
CUST. PO No:		DWG. No: 31971-601		SHEET No: 5 of 13
				REV: 3

24 VDC POWER DISTRIBUTION



NOTES:

- CONTROL PANEL WIRING BY ENERFLEX LTD.
- SKID WIRING BY ENERFLEX LTD.
- WIRING BY OTHERS

PANEL WIRING

- DIGITAL SIGNAL WIRING TO BE #18 AWG, 300 V
- 105 DEG C RATED.
- 4 TO 20 mA WIRING TO #18 AWG, 300 V,
- 300V/ 105 DEG C RATED.
- POWER DISTRIBUTION WIRING TO #16 AWG, 300 V,
- CONTROL PANEL WIRING ENERFLEX COLOUR CODING :
- D/C POSITIVE - RED
- D/C NEGATIVE - BLACK
- A/C HOT - BLACK
- A/C NEUTRAL - WHITE
- DISCRETE - WHIT (+) / BLK (-)
- ANALOG - WHIT (+) / BLK (-)
- GROUND - GREEN

SKID WIRING

- DIGITAL SIGNAL WIRING TO BE #14 AWG, 300 V
- 4 to 20 mA ANALOG WIRING TO BE #18 AWG, 1 PAIR, SHIELDED, 300 V Belden or equivalent

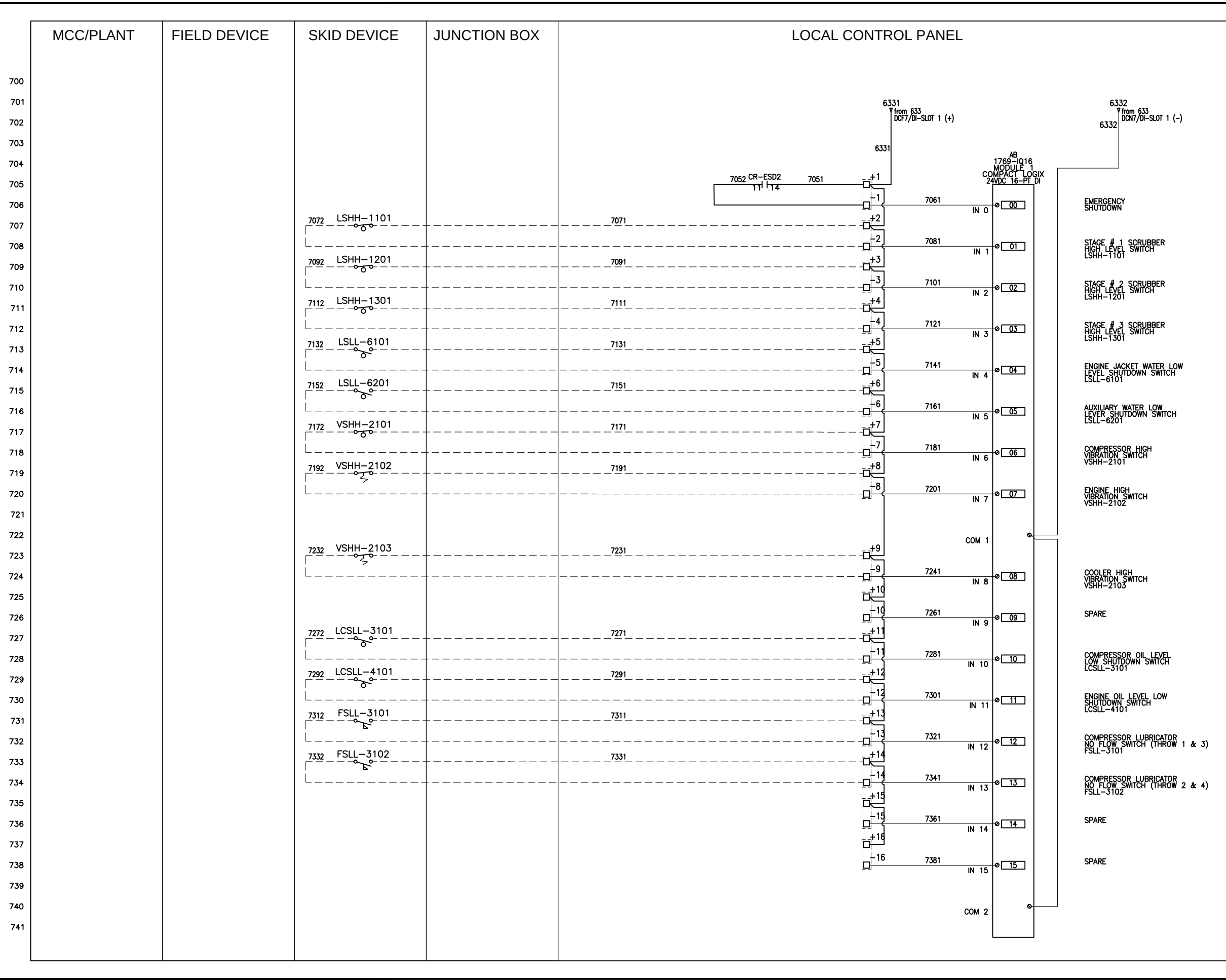
TERMINAL DESCRIPTION

-  WDU 16. FEED-THROUGH TERMINALS
 -  WDU 6. FEED-THROUGH TERMINALS
IN THE CONTROL PANEL
 -  WDU 4. FEED-THROUGH TERMINALS
IN THE CONTROL PANEL
 -  WDU 2.5 FEED-THROUGH TERMINALS
IN THE CONTROL PANEL
 -  FUSE TERMINALS IN THE CONTROL PANEL
 -  TERMINALS ON EQUIPMENT
 -  ITEM NUMBERS
 -  WDK 2.5/D/1. DOUBLE FEED-THROUGH TERMINALS
WITH DIODE
 -  TERMINALS TO BE WIRED IN JUNCTION BOX

NOTE: - FUSE TERMINAL DCF & DCB ARE WEIDMULLER WSI 25-1 10X38, 250 VAC

 - FUSE TERMINALS FROM DCF1 TO DCF16 ARE WSI 6LD, 10-36 VDC
 - FUSE TERMINALS FROM FDO1 TO FDO7 ARE WSI 6LD, 10-36 VDC

3	AS BUILT	NOV 21, 2012	WJ	WJ	
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ	
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ	
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC	
REV.	DESCRIPTION	DATE	BY	APPR.	
		ENGINEER STAMP			
		TITLE: DC POWER DISTRIBUTION			
		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JGJ/4-3			
DRAWN BY: R.TRASLAVINA	DATE: AUG 31, 2012				
CHKD. BY: I. CABRAL	SCALE: N/A				
APPR. BY: I. CABRAL	W.O. No: 31971				
CUST. PO No:	DWG. No:	SHEET No:	REV:		
	31971-601	6 of 13	3		



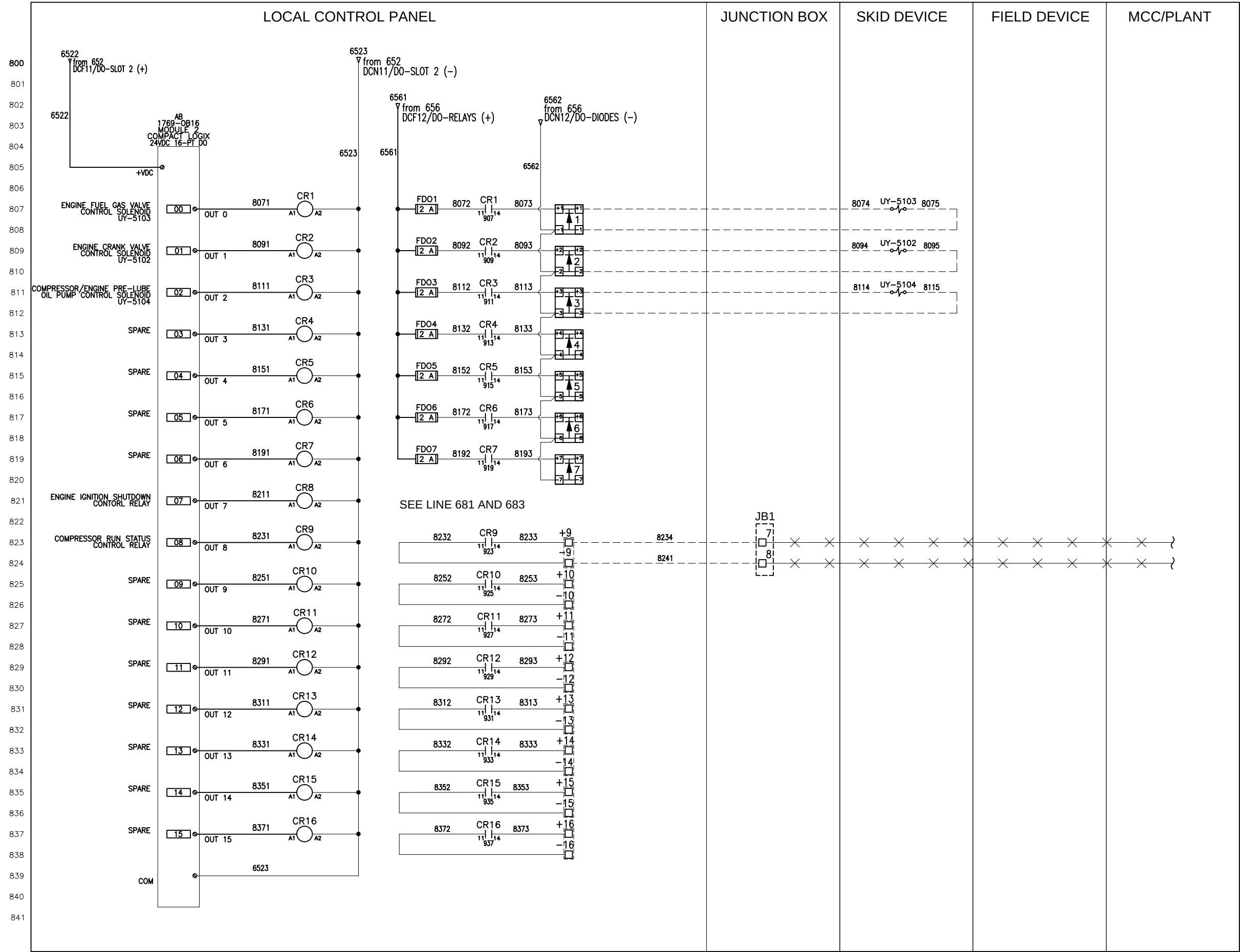
NOTES:



WDK 2.5N FEED TERMINALS FOR I/O SIGNALS - MULTILEVEL
TERMINALS,(UPPER AND LOW LEVEL)

3	AS BUILT	NOV 21, 2012	WJ	WJ	
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ	
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ	
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC	
REV.	DESCRIPTION	DATE	BY	APPR.	
		ENGINEER STAMP			
ENERFLEX		TITLE: DISCRETE INPUT - SLOT 1			
DRAWN BY: R.TRASLAVINA	DATE AUG 31, 2012	FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JGJ/4-3			
CHKD. BY: I. CABRAL	SCALE: N/A				
APPR. BY: I. CABRAL	W.O. No: 31971				
CUST. PO No:	DWG. No:	31971-601	SHEET No: 7 of 13	REV: 3	

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NOTES:



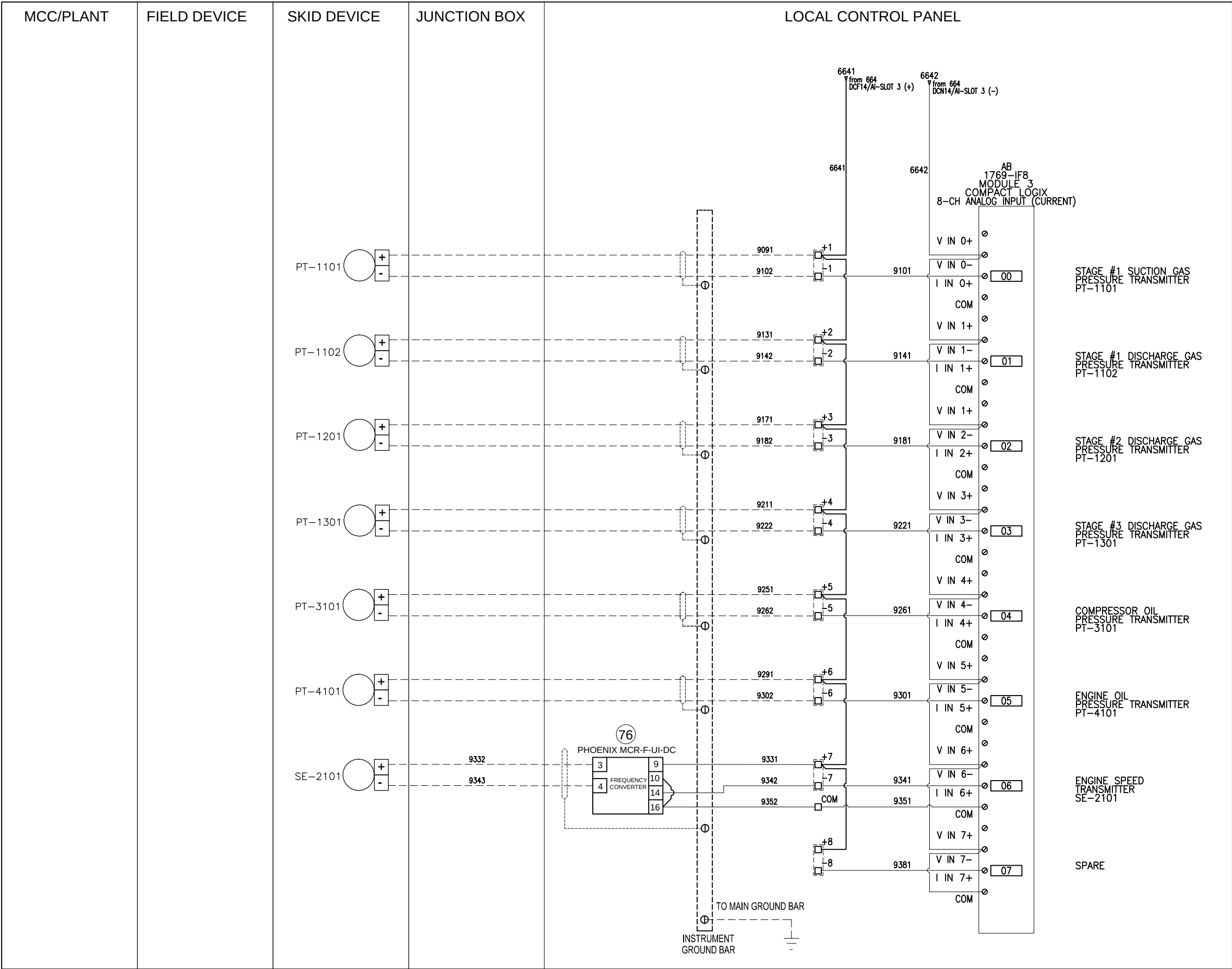
WDK 2.5/D1/1 FEED TERMINALS WITH DIODE FOR DO SIGNALS



WDK 2.5N FEED TERMINALS FOR I/O SIGNALS - MULTILEVEL TERMINALS,(UPPER AND LOW LEVEL)

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
DRAWN BY: R.TRASLAVINA		DATE: AUG 31, 2012		
CHKD. BY: I. CABRAL		SCALE: N/A		
APPR. BY: I. CABRAL		W.O. No.: 31971		
CUST. PO No:		D/WG. No.: 31971-601		
		SHEET No: 8 of 13		REV: 3
		TITLE: DISCRETE OUTPUT - SLOT 2		
		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JG/J/4-3		

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NOTES:

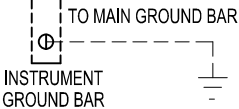


WDK 2.5N FEED TERMINALS FOR I/O SIGNALS



WDK 2.5V DOUBLE FEED THROUGH TERMINALS, COMMON CONNECTION

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: ANALOG INPUT- SLOT 3		
		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JGJ/4-3		
		DRAWN BY: R. TRASLAVINA		
		DATE: AUG 31, 2012		
CHKD. BY: I. CABRAL		SCALE: N/A		
APPR. BY: I. CABRAL		W.O. No: 31971		
CUST. PO No:		DWG. No: 31971-601		SHEET No: 9 of 13
				REV: 3



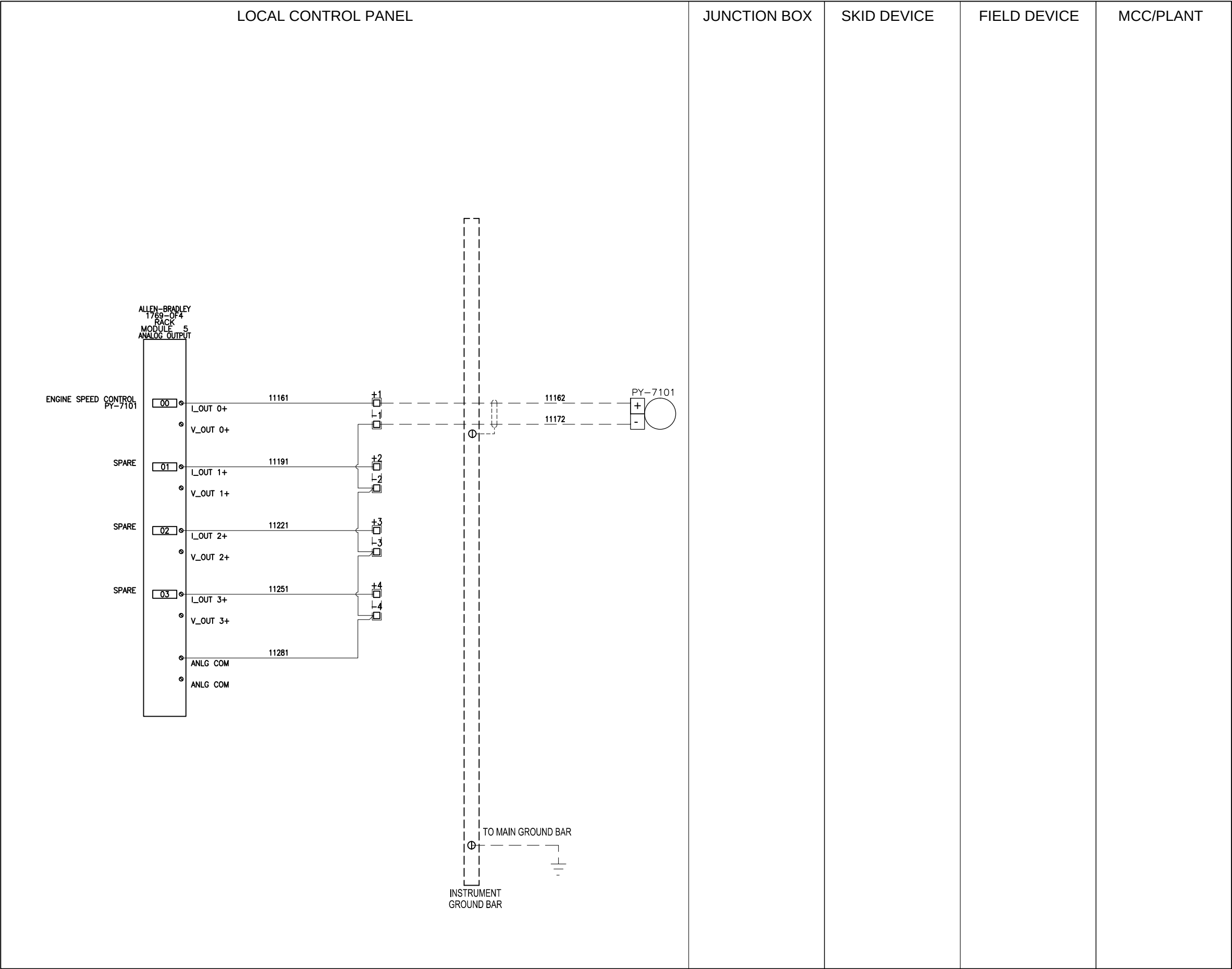
WDK 2.5N FEED TERMINALS FOR I/O SIGNALS - MULTILEVEL
TERMINALS,(UPPER AND LOW LEVEL)

WDK 2.5V DOUBLE FEED THROUGH TERMINALS, COMMON
CONNECTION

SHEET No:	REV:
10 of 13	3

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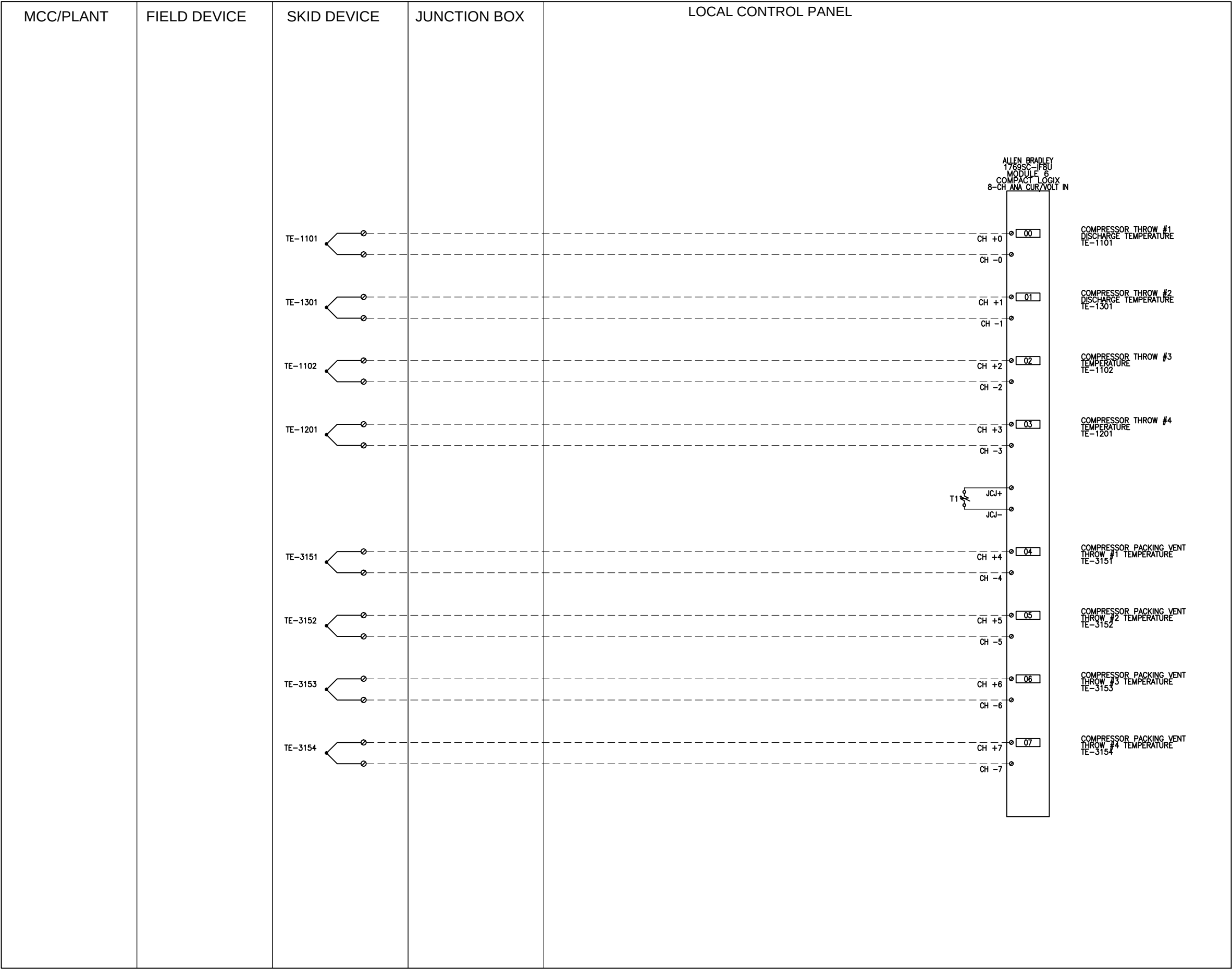
NOTES:

WDK 2.5N FEED TERMINALS FOR I/O SIGNALS - MULTILEVEL TERMINALS,(UPPER AND LOW LEVEL)

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
		TITLE: ANALOG OUTPUT - SLOT 5		
		FOR:		
		CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JGJ/4-3		
DRAWN BY: R. TRASLAVINA		DATE: AUG 31, 2012		
CHKD. BY: I. CABRAL		SCALE: N/A		
APPR. BY: I. CABRAL		W.O. No: 31971		
CUST. PO No:		DWG. No: 31971-601		SHEET No: 11 of 13
				REV: 3

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NOTES:

1. UNIVERSAL ANALOG INPUT CARD - CONFIGURATION :

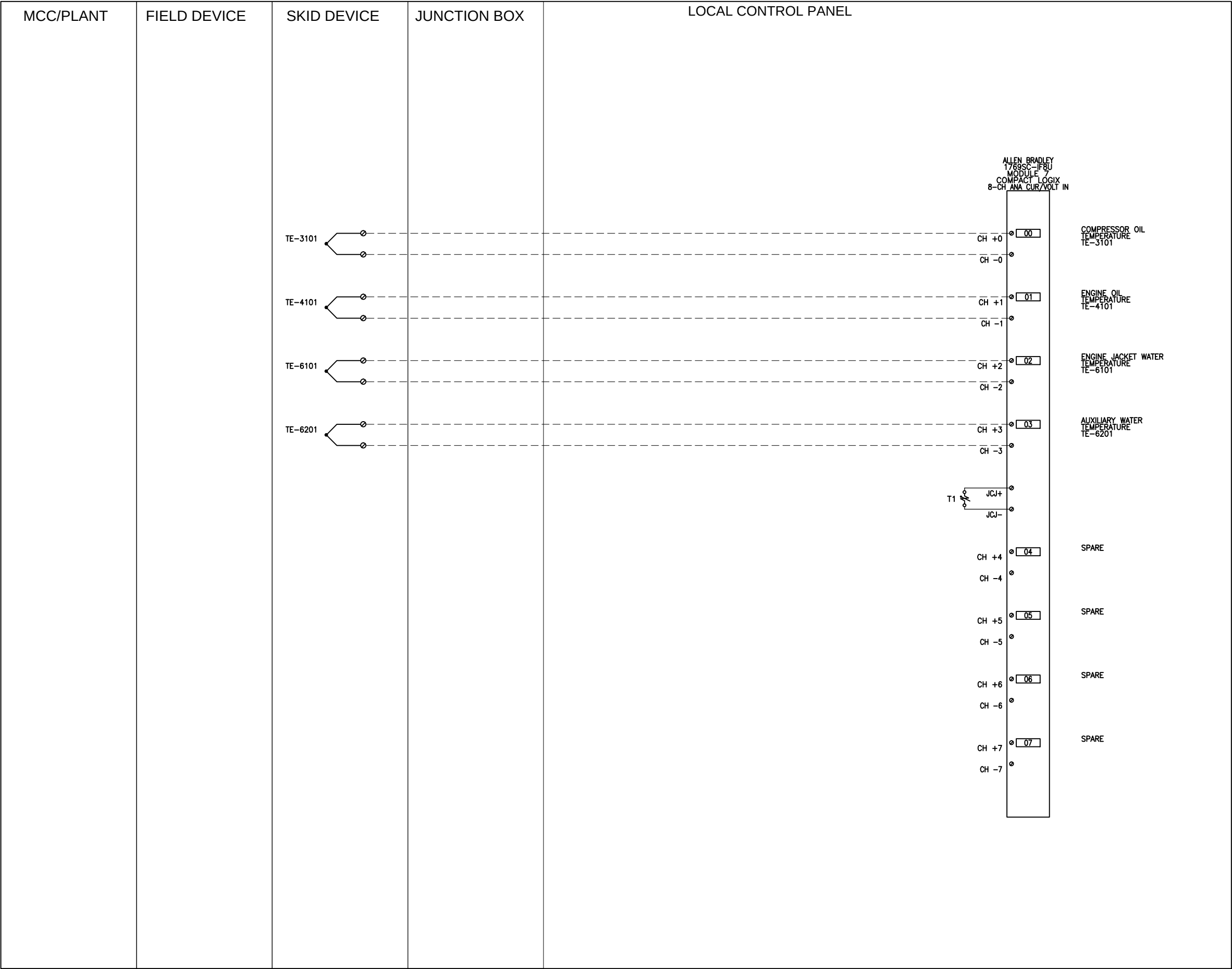
* (1-2) PINS : NON-CURRENT TYPE (OR VOLTAGE TYPE)
* (2-3) PINS : CURRENT TYPE

2. USE THERMOCOUPLE EXTENSION WIRE FOR ALL THERMOCOUPLES

3	AS BUILT	NOV 21, 2012	WJ	WJ	
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ	
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ	
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC	
REV.	DESCRIPTION	DATE	BY	APPR.	
		ENGINEER STAMP			
ENERFLEX		TITLE: THERMOCOUPLE INPUT - SLOT 6			
DRAWN BY: R. TRASLAVINA		DATE: AUG 31, 2012		FOR: CONTROL PANEL EOG RESOURCES CLARKS CREEK FACILITY H24GSI JGJ/4-3	
CHKD. BY: I. CABRAL		SCALE: N/A			
APPR. BY: I. CABRAL		W.O. No: 31971			
CUST. PO No:		DWG. No:			
		31971-601		SHEET No: 12 of 13	REV: 3

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NOTES:

1. UNIVERSAL ANALOG INPUT CARD - CONFIGURATION :

* (1-2) PINS : NON-CURRENT TYPE (OR VOLTAGE TYPE)

* (2-3) PINS : CURRENT TYPE

2. USE THERMOCOUPLE EXTENSION WIRE FOR ALL THERMOCOUPLES

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLTION	OCT 18, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		

ENERFLEX

DRAWN BY:

R. TRASLAVINA

CHKD. BY:

I. CABRAL

APPR. BY:

I. CABRAL

CUST. PO No:

DATE:

AUG 31, 2012

SCALE:

N/A

W.O. No:

31971

DWG. No:

31971-601

TITLE:

THERMOCOUPLE INPUT - SLOT 7

FOR:

CONTROL PANEL
EOG RESOURCES
CLARKS CREEK FACILITY
H24GSI JG/J4-3

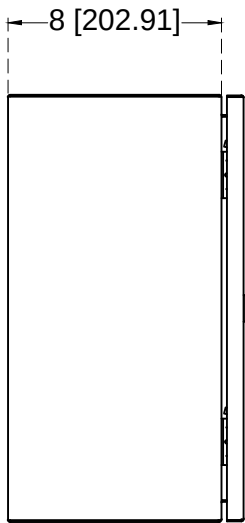
SHEET No:

13 of 13

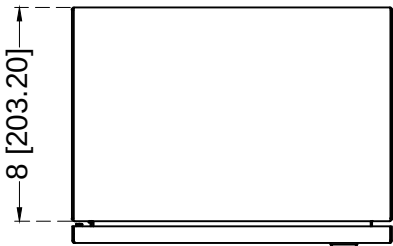
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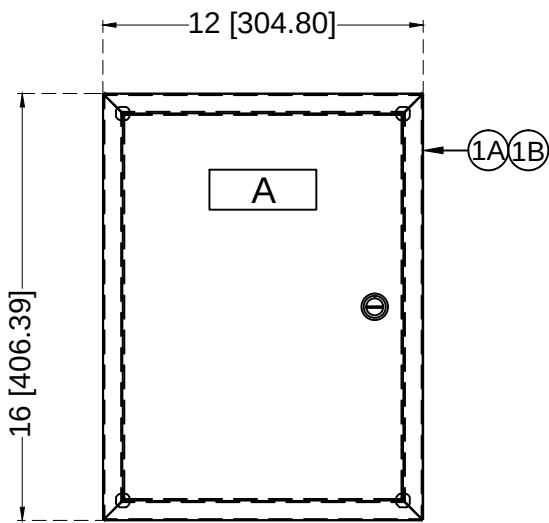
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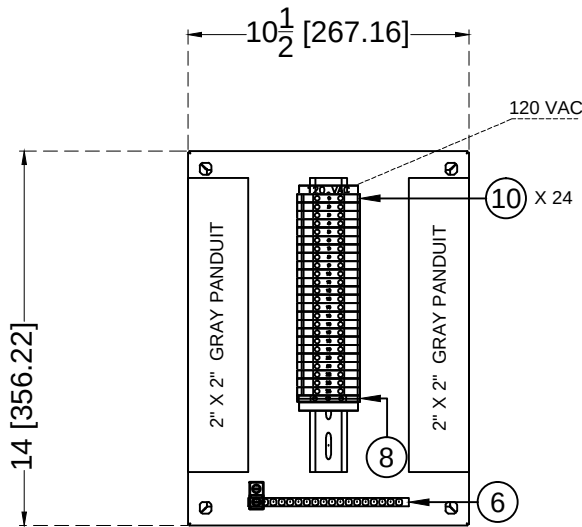
LEFT SIDE PANEL VIEW



TOP PANEL VIEW



FRONT PANEL VIEW



BACKPLANE VIEW

BILL OF MATERIALS

ITEM	QTY	TYPE	CATALOG	MFG	DESCRIPTION
1A	1		EN4SD16128GY	HAMMOND	ENCLOSURE, STEEL/GREY, 16"x12"x8", NEMA 4
1B	1		EP1612	HAMMOND	INNER PANEL, 14.2" X 10.2"
2	1		F2X2LG6	PANDUIT	NARROW FINGER, SLOTTED WIRING DUCT, LIGHT GRAY
3	1		C2LG6	PANDUIT	SLOTTED WIRING COVER, LIGHT GRAY
4	1	TS-35	514500000	WEIDMULLER	ZINC/STEEL DIN RAIL
5	2	S2HS	641720000	WEIDMULLER	DIN RAIL SUPPORT
6	1		N8020	ILSCO	GROUNDING BAR
7	1	TA-2i	TA-2i	ILSCO	GROUNDING LUG
8	1	WPE 4	1010100000	WEIDMULLER	EARTH TERMINAL
9	2	WEW 35/2	1061200000	WEIDMULLER	END BRACKET - WEW 35/2
10	24	WDU 6	1020200000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 6
11	1		DPE-40-04-S3	REDAPT	BREATHER DRAINS, GF NYLON/UNPLATED/M20, ATEX/CSA

LAMACOID DETAILS

ITEM	QTY	TYPE / COLOR	DIMENSIONS	CONTENT
A	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	1"-1/2 X 4"	JB 2 (120 VAC)

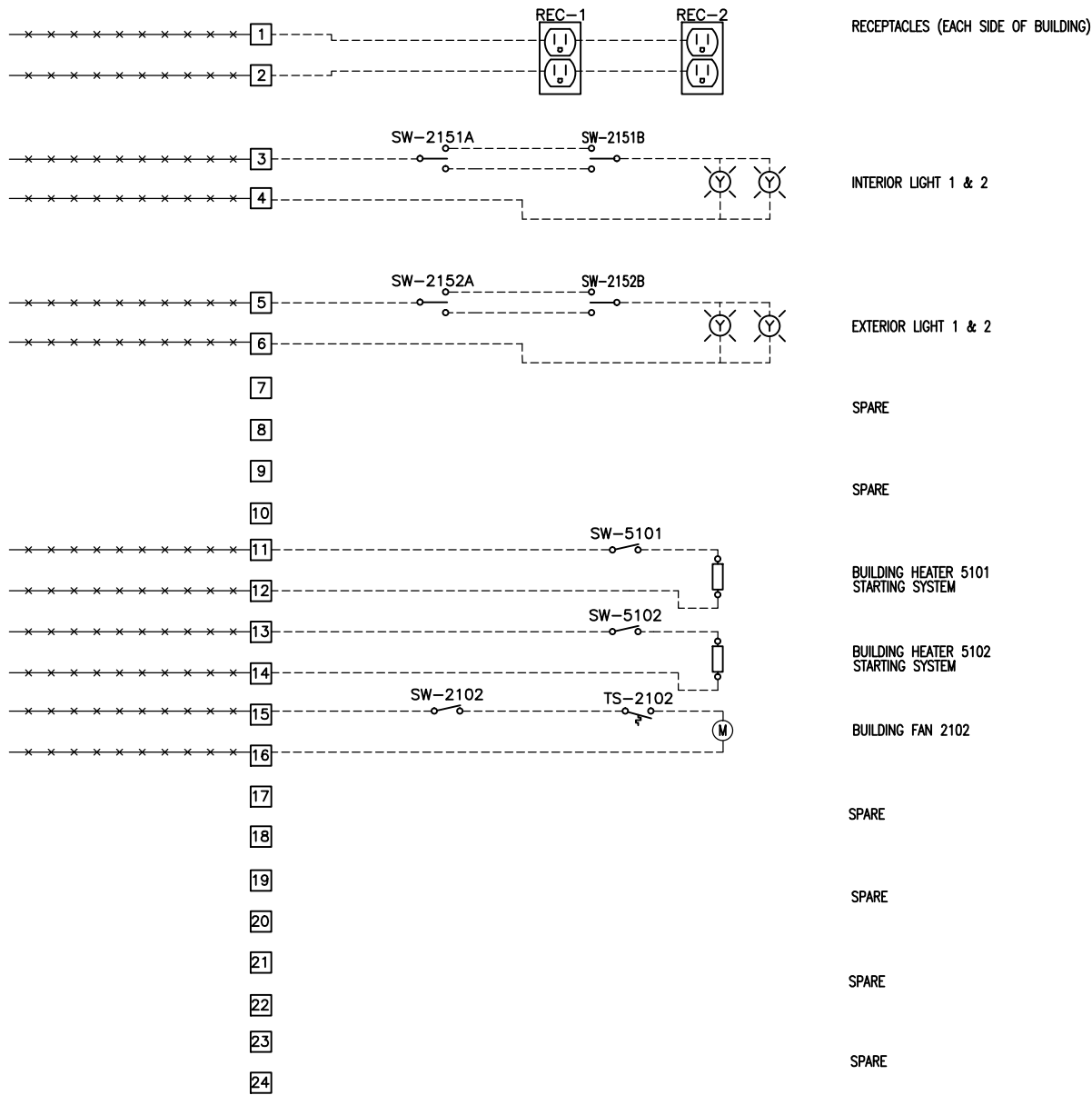
NOTES:

ALL CABLE, CONDUCT CONNECTIONS FROM
BOTTOM OF THE JB

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLATION	OCT 22, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: JB 2 - 120VAC JUNCTION BOX		
DRAWN BY: M. BOYKO		FOR: EOG RESOURCES EAST CHAPITA WELLS H24GSI JGJ2-2 COMPRESSOR PACKAGE		
DATE: AUG 15, 2012				
CHKD. BY: I. GARCES				
SCALE:				
APPR. BY: W. JIANG		REV: 3		
W.O. No: 31971				
CUST. PO No:		DWG. No: 31971-621		SHEET No: 1 of 2

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120 VAC TERMINALS

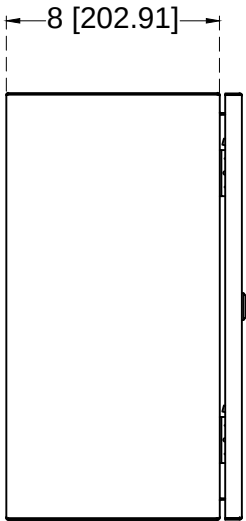


- CONTROL PANEL WIRING BY ENERFLEX LTD.
- - - SKID WIRING BY ENERFLEX LTD.
- ✕ WIRING BY OTHERS
- TERMINAL INTERCONNECTING STRIP
- DIGITAL SIGNAL WIRING TO BE 1-PAIR #14 AWG NO SHIELD 300V 105 DEG C RATED .
- 4 TO 20 MA ANALOG WIRING TO BE 1 PAIR #16 AWG SHIELDED 300V 105 DEG C RATED.
- WIRING COLOUR CODING :
- RED D/C POSITIVE (POWER DISTRIBUTION)
 - BLACK D/C NEGATIVE (POWER DISTRIBUTION)
 - BLACK A/C HOT (POWER DISTRIBUTION)
 - WHITE A/C NEUTRAL (POWER DISTRIBUTION)
 - GREENGROUND

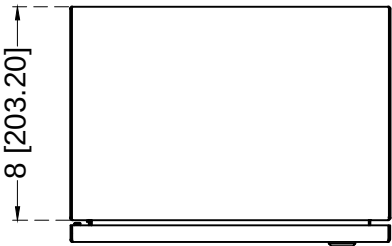
NOTE 1: TERMINALS ARE WEIDMULLER WDU 6

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLATION	OCT 22, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	RT	IC
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: JUNCTION BOX SCHEMATIC		
DRAWN BY: M. BOYKO		DATE: AUG 15, 2012		
CHKD. BY: I. GARCES		SCALE:		
APPR. BY: W. JIANG		W.D. No: 31971		
CUST. PO No:		DWG. No: 31971-621		
		SHEET No: 2 of 2		REV: 3

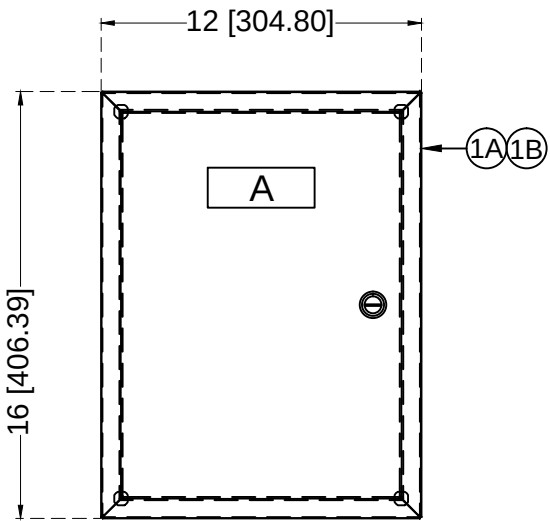
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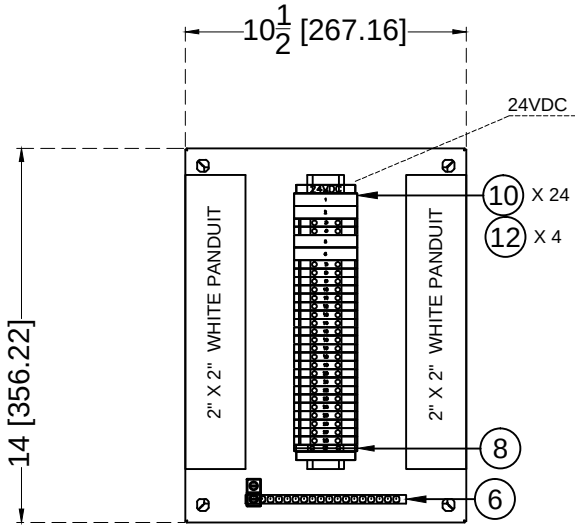
LEFT SIDE PANEL VIEW



TOP PANEL VIEW



FRONT PANEL VIEW



BACKPLANE VIEW

NOTES:

ALL CABLE, CONDUCT CONNECTIONS FROM
BOTTOM OF THE JB

BILL OF MATERIALS

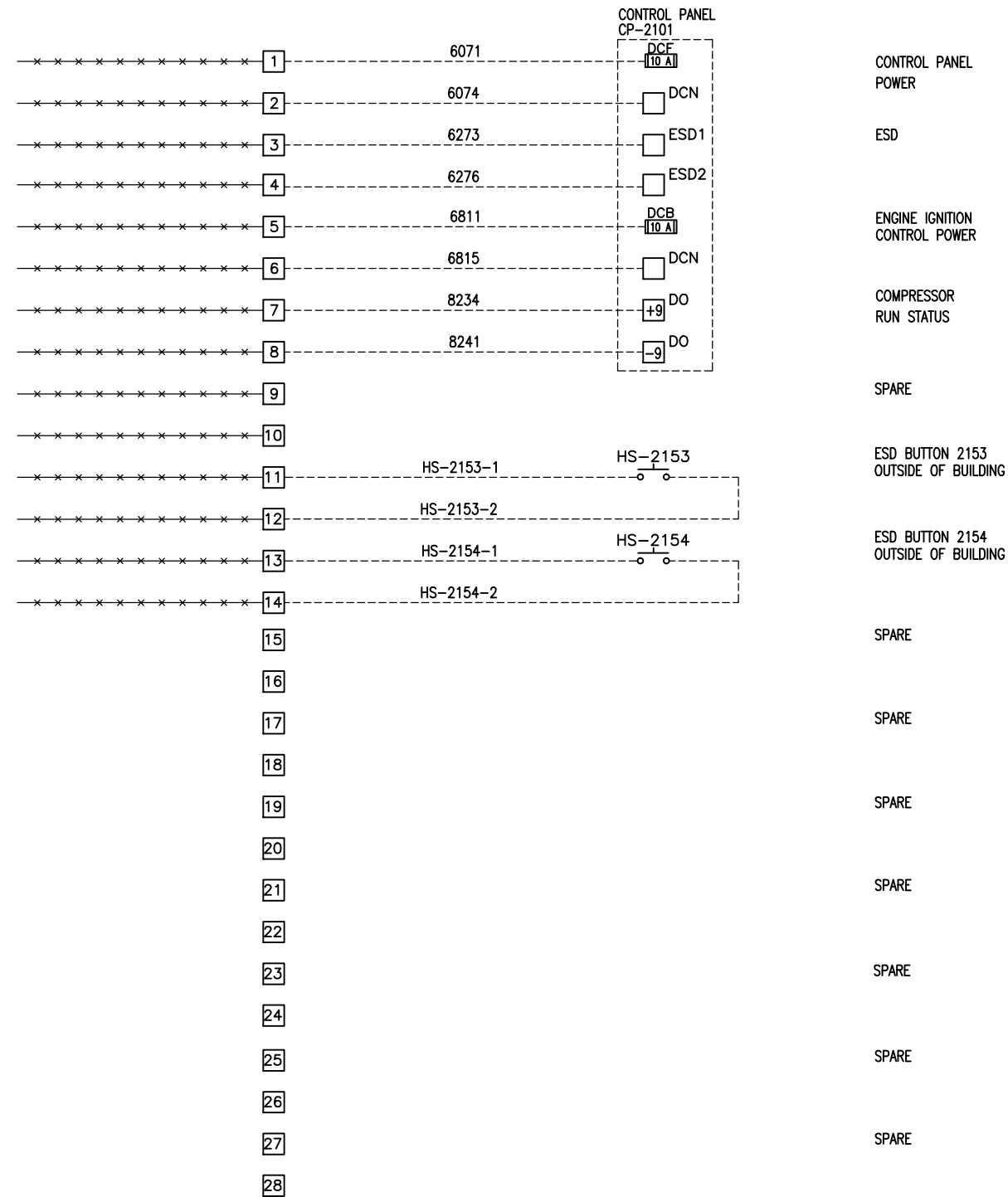
ITEM	QTY	TYPE	CATALOG	MFG	DESCRIPTION
1A	1		EN4SD16128GY	HAMMOND	ENCLOSURE, STEEL/GREY, 16"x12"x8", NEMA 4
1B	1		EP1612	HAMMOND	INNER PANEL, 14.2" X 10.2"
2	1		F2X2WH6	PANDUIT	NARROW FINGER, SLOTTED WIRING DUCT, WHITE, 2"x2"
3	1		C2WH6	PANDUIT	SLOTTED WIRING COVER, WHITE, 2" WIDE
4	1	TS-35	514500000	WEIDMULLER	ZINC/STEEL DIN RAIL
5	2	S2HS	641720000	WEIDMULLER	DIN RAIL SUPPORT
6	1		N8020	ILSCO	GROUNDING BAR
7	1	TA-2i	TA-2i	ILSCO	GROUNDING LUG
8	1	WPE 4	1010100000	WEIDMULLER	EARTH TERMINAL
9	2	WEW 35/2	1061200000	WEIDMULLER	END BRACKET - WEW 35/2
10	24	WDU 4	1020100000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 4
11	1		DPE-40-04-S3	REDAPT	BREATHER DRAINS, GF NYLON/UNPLATED/M20, ATEX/CSA
12	4	WDU 16	1020400000	WEIDMULLER	STANDARD DESIGN TERMINAL BLOCK - WDU 16

LAMACOID DETAILS

ITEM	QTY	TYPE / COLOR	DIMENSIONS	CONTENT
A	1	LAMACOID BLACK LETTERING ON WHITE BACKGROUND	1"-1/2 X 4"	JB 1 (24 VDC)

3	AS BUILT	NOV 21, 2012	WJ	WJ
2	ISSUED FOR INSTALLATION	OCT 22, 2012	WJ	WJ
1	ISSUED FOR CONSTRUCTION	SEP 19, 2012	WJ	WJ
A	ISSUED FOR APPROVAL	AUG 31, 2012	MB	WJ
REV.	DESCRIPTION	DATE	BY	APPR.
		ENGINEER STAMP		
ENERFLEX		TITLE: JB 1 - 24VDC JUNCTION BOX		
DRAWN BY: M. BOYKO		DATE: AUG 15, 2012		
CHKD. BY: I. GARCES		SCALE:		
APPR. BY: W. JIANG		W.O. No: 31971		
CUST. PO No:		DWG. No: 31971-622		SHEET No: 1 of 2
				REV: 3

24 VDC TERMINALS



_____	CONTROL PANEL WIRING BY ENERFLEX LTD.
— — —	SKID WIRING BY ENERFLEX LTD.
—X—	WIRING BY OTHERS
_____	TERMINAL INTERCONNECTING STRIP

- DIGITAL SIGNAL WIRING TO BE 1-PAIR #14 AWG NO SHIELD 300V 105 DEG C RATED .
- 4 TO 20 MA ANALOG WIRING TO BE 1 PAIR #16 AWG SHIELDED 300V 105 DEG C RATED.

WIRING COLOUR CODING :

- RED D/C POSITIVE (POWER DISTRIBUTION)
- BLACK D/C NEGATIVE (POWER DISTRIBUTION)
- GREEN GROUND
- WHITE D/C POSITIVE (DISCRETE/ANALOG CONTROL)
- BLACK D/C NEGATIVE (DISCRETE/ANALOG CONTROL)

NOTE : TERMINAL 1, 2, 5 AND 6 ARE WEIDMULLER WDU 16, CAT. 1020400000.
REST TERMINALS ARE WEIDMULLER WDU 4, CAT. 1020100000.

[illegible]