Model 7170
Lost Circulation Material Apparatus
System Documentation

Rev A – May 2021
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S/N _____

CHANDLER ENGINEERING®

AMETEK®

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Table of Contents

General Information

Purpose and Use

The Model 7170 (CP632) Lost Circulation Material Apparatus (LCMA) is used to study the performance of lost circulation materials under elevated temperature and pressure conditions.

Description of System

The apparatus is comprised of several components:

- Chassis assembly
- Pressure vessel assembly
- Heating and cooling assembly
- Variable speed motor and internal impeller
- Magnetic drive assembly
- PID temperature control
- PID pressure control
- LVDT assembly for volume measurements
- Over-temperature safety circuit using redundant thermocouple
- Over pressure relief valves (2)
- Compatibility with 5270 data acquisition software

Where to find help

In the event of problems, the local sales representatives will be able to help or the personnel at Chandler Engineering can be contacted.

- Telephone: 918-250-7200
- FAX: 918-459-0165
- E-mail: chandler.sales@ametek.com
- Website: www.chandlereng.com

Section 1 – Installation

Unpacking the System

Remove the major system sub-assemblies from the shipping crates. Most of the sub-assemblies are heavy and large, suitable equipment is required to place these components in the lab space.

Make sure that no parts or tools are lost when discarding the packing materials.

After the system is removed from the shipping crates, the equipment and spare parts should be checked against the packing list to ensure that all parts have been received and none are damaged.

NOTE: File an insurance claim with your freight carrier if damage has occurred during shipping. Verify all parts shown on the enclosed packing list have been received. If items are missing, immediately notify Chandler Engineering.

Section 2 – Major Components

Figure 1 – Model 7170 LCMA Front View

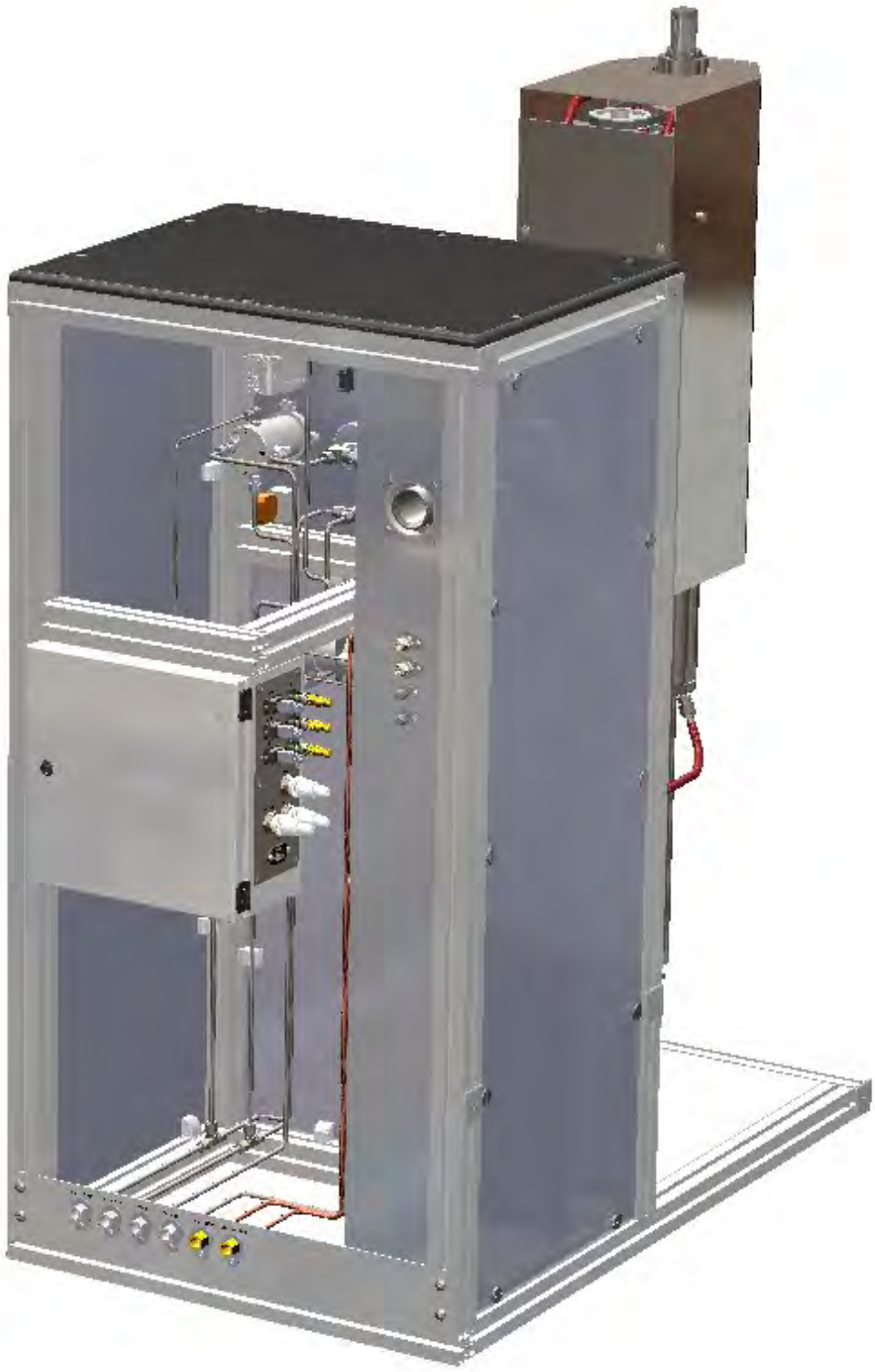


Figure 2 – Model 7170 LCMA Rear View

Figure 3 - Communication and Power Connections (remaining connections are used internally)

Figure 4 - Utility Connections

Power Requirements:

- Inputs: 208-230 VAC, 12A, 50/60Hz
- Contactors: separate contactors used with system power and heater

Communication Requirements:

- One Ethernet connection to a Windows computer running 5270 data acquisition software. Additional Ethernet connections (illustrated above) are used for the internal temperature and pressure controllers

Utility Requirements:

- Vessel Discharge: Gas/liquid discharge from vessel
- N2 Supply: Nitrogen (2500 psig)
- Vent: Air vent from internal pressure controller (I/P)
- Air Supply: Instrument air (80 – 120 psi)
- Coolant In: Inlet port for vessel cooling
- Coolant Out: Outlet port for vessel cooling

Front Panel:

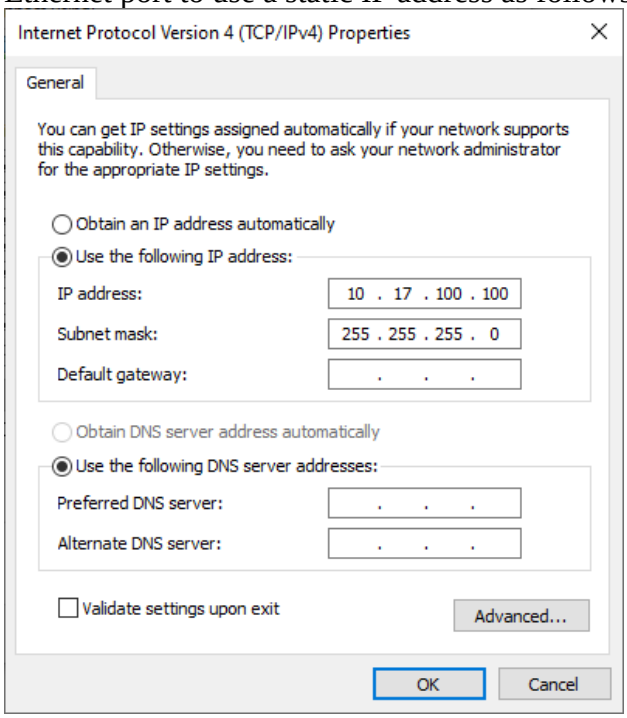
- Vessel Pressure: Pressure gauge indicating pressure within vessel
- Vessel Pressure Controller: PID controller for vessel pressure
- Over Temperature: Redundant over-temperature device
- Motor: Switch controlling the impeller motor
- Heater: Switch enabling/disabling the heater
- Vessel Temperature: PID controller for vessel pressure
- Receiver Pressure: Pressure gauge indicating pressure within receiver vessel
- Receiver Pressure Regulator: Manual regulator controlling pressure within receiver
- Cooling: Valve for On/Off control of vessel cooling
- Vessel Pressure Release: Valve for releasing pressure within pressure vessel
- N2 Supply: Valve for controlling the N2 supply to the vessel pressure controller

- Power: Main power On/Off

Section 3 – Software Configuration

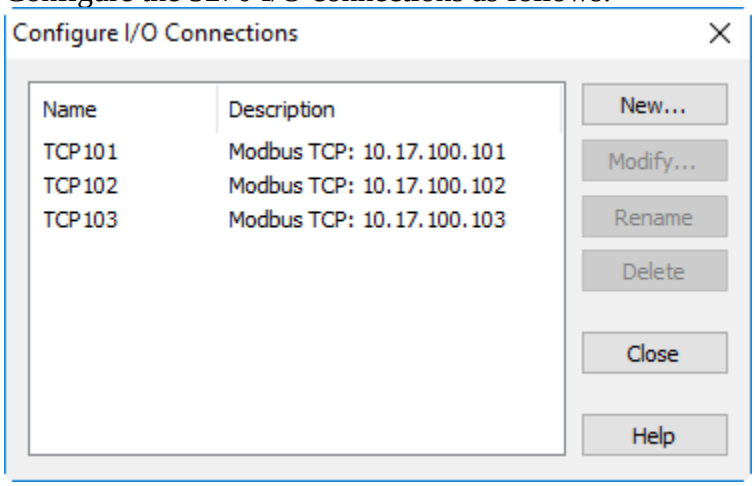
5270 Data Acquisition

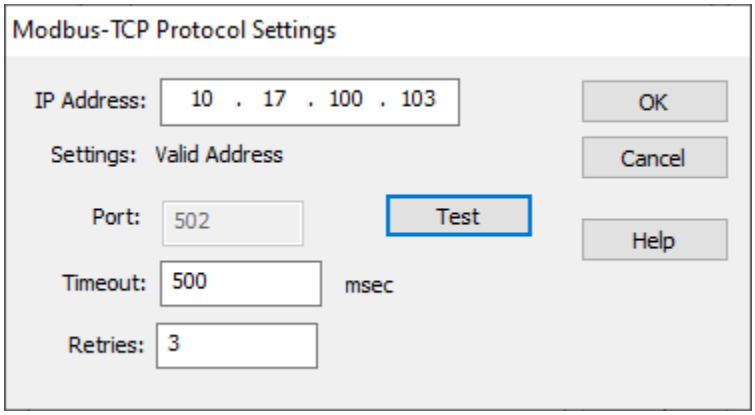
1. Connect a LAN cable between the computer and the Ethernet port on the electrical enclosure.
2. Using Windows Control Panel – Network Connections, configure the Ethernet port to use a static IP address as follows:



The IP address can be 10.17.100.xxx where xxx is anything except 0, 101, 102, 103 or 255.
If a different network configuration is required, please contact Chandler Engineering.

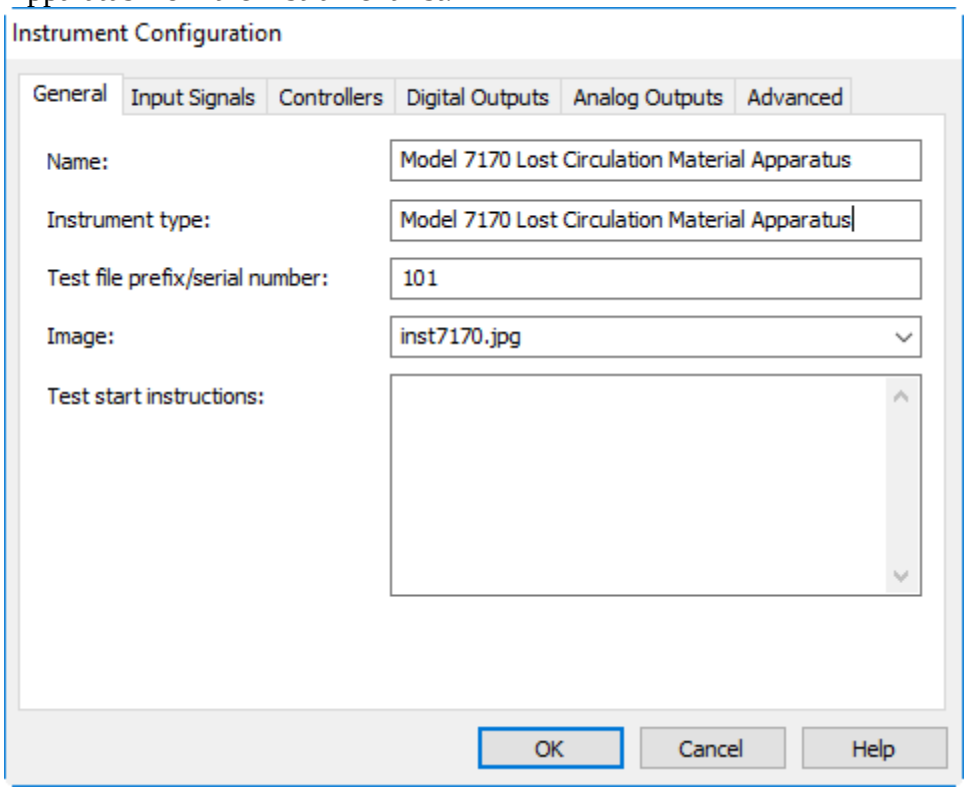
3. Start the 5270 software.
4. Configure the 5270 I/O connections as follows:



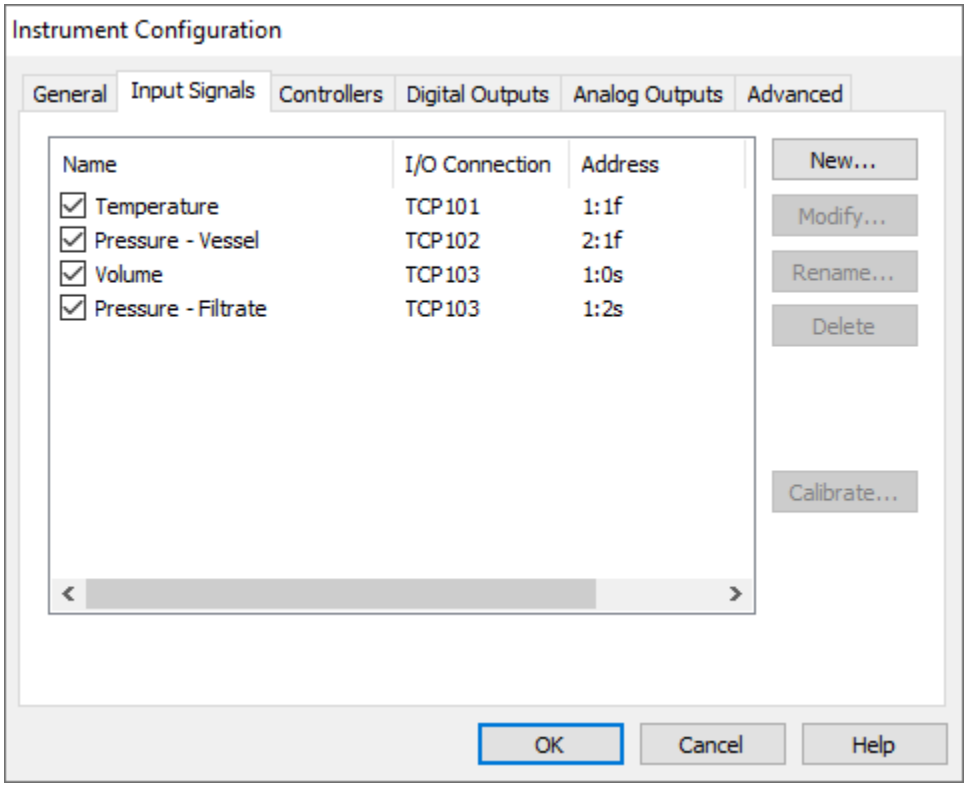


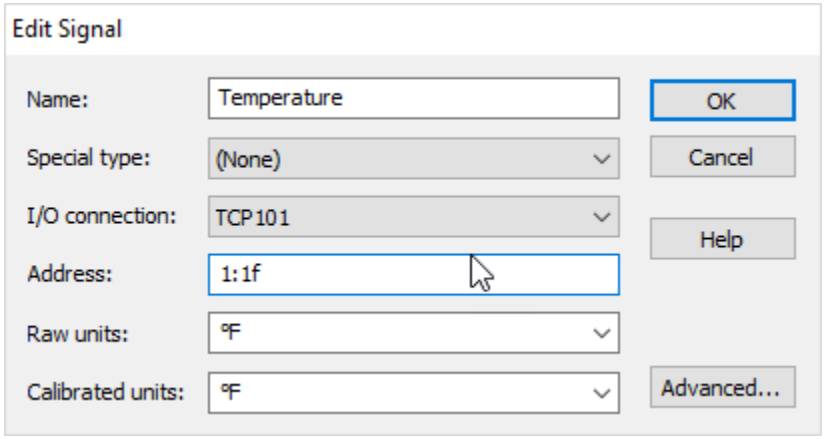
These are the default static IP addresses.

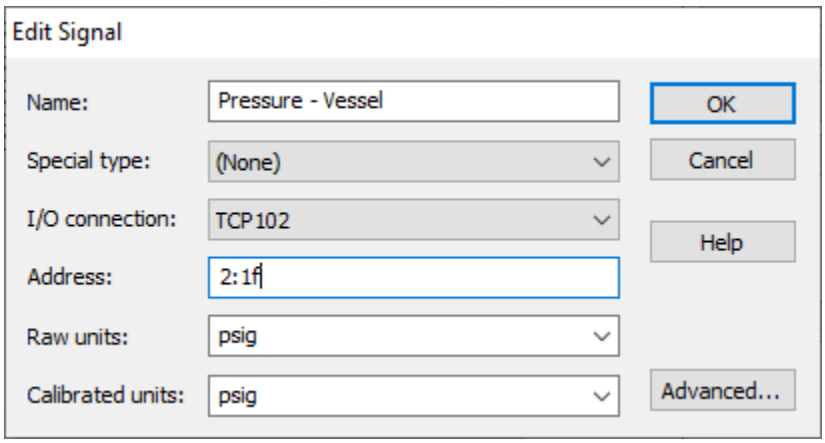
5. Create a new instrument. Select the Model 7170 Lost Circulation Material Apparatus from the instrument list.

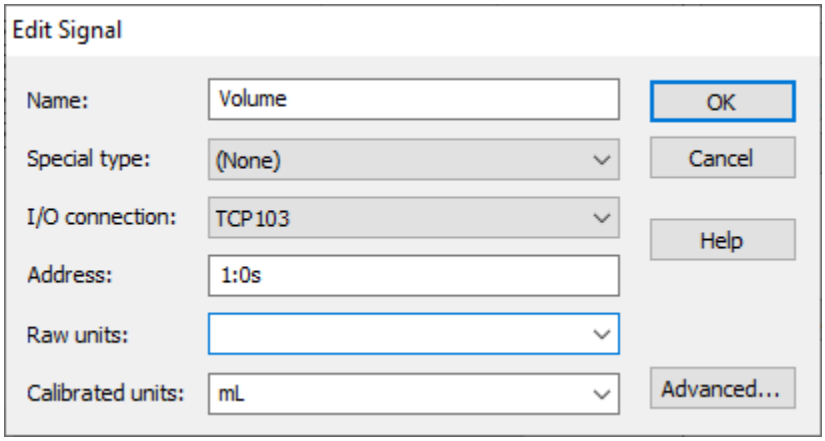


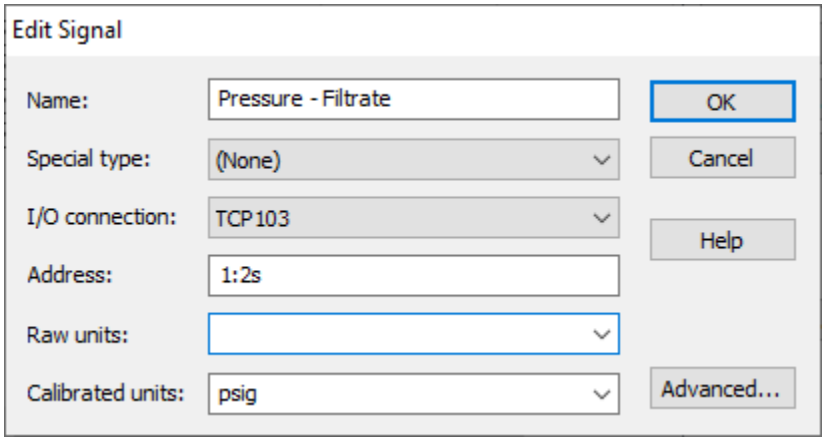
6. Configure the input signals as follows:

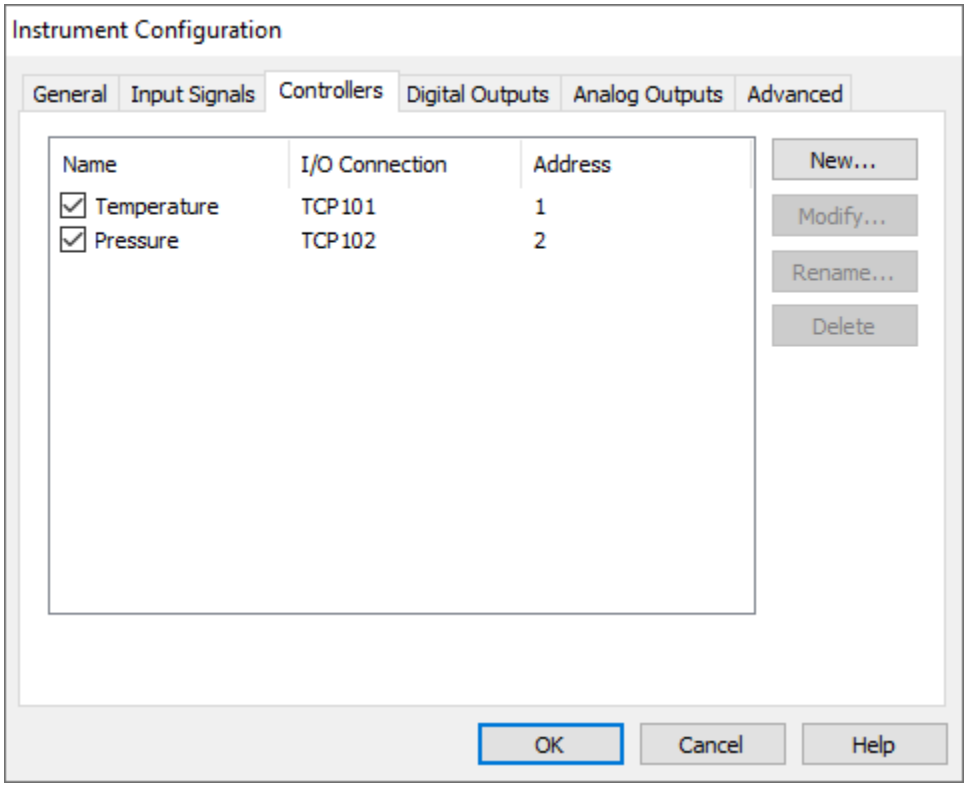

Instrument Configuration
General
Input Signals
Controllers
Digital Outputs
Analog Outputs
Advanced
Name
I/O Connection
Address
Temperature
TCP101
1:1f
Pressure - Vessel
TCP102
2:1f
Volume
TCP103
1:0s
Pressure - Filtrate
TCP103
1:2s
New...
Modify...
Rename...
Delete
Calibrate...
OK
Cancel
Help


Edit Signal
Name:
Temperature
Special type:
(None)
I/O connection:
TCP101
Address:
1:1f
Raw units:
°F
Calibrated units:
°F
OK
Cancel
Help
Advanced...


Edit Signal
Name:
Pressure - Vessel
Special type:
(None)
I/O connection:
TCP102
Address:
2:1f
Raw units:
psig
Calibrated units:
psig
OK
Cancel
Help
Advanced...

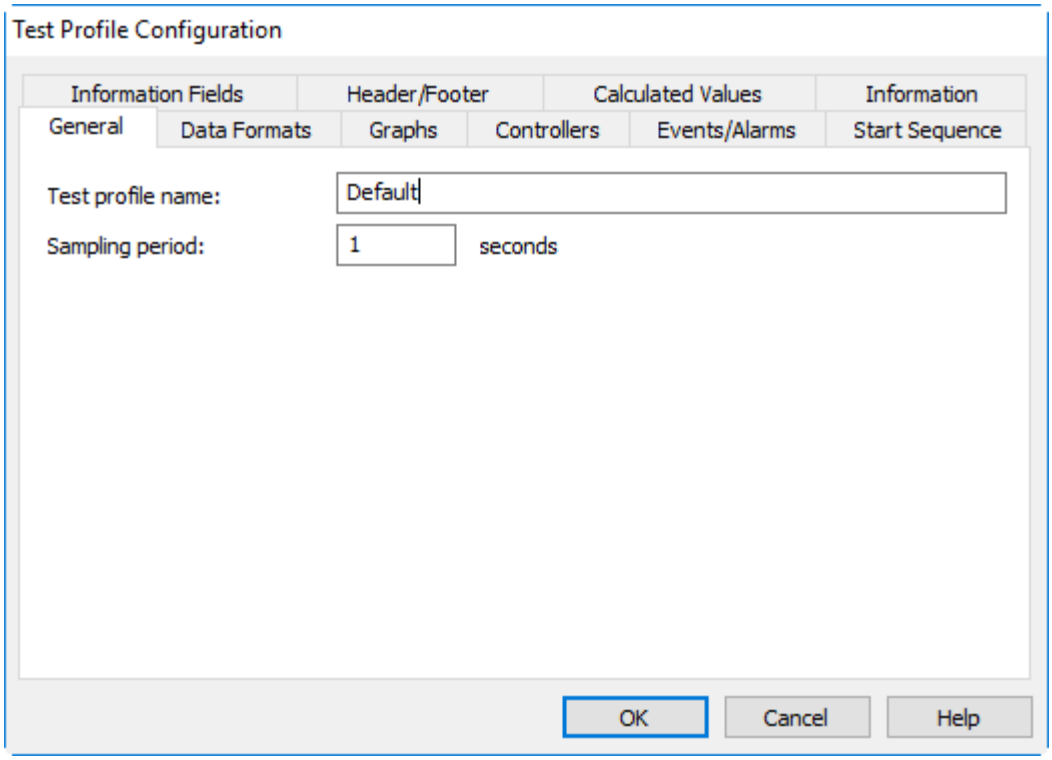


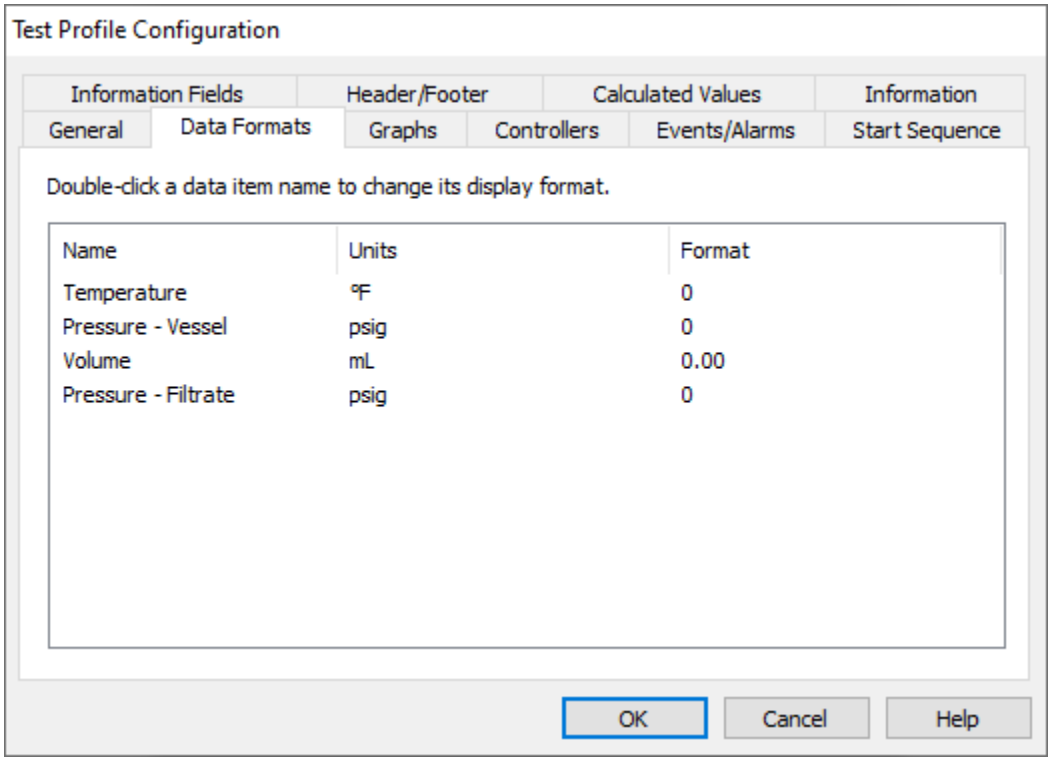


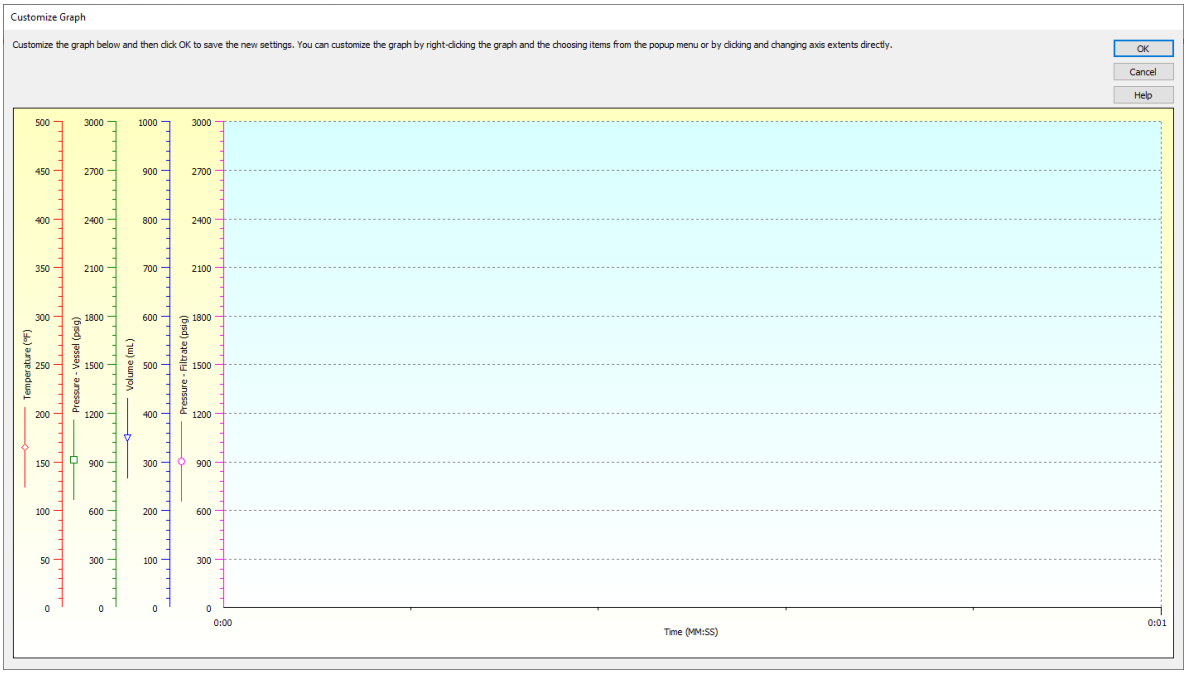


7. Configure the Model 7170 Lost Circulation Material Apparatus profile as

follows:


Test Profile Configuration
Information Fields
Header/Footer
Calculated Values
Information
General
Data Formats
Graphs
Controllers
Events/Alarms
Start Sequence
Test profile name:
Default
Sampling period:
1
seconds
OK
Cancel
Help


Test Profile Configuration
Information Fields
Header/Footer
Calculated Values
Information
General
Data Formats
Graphs
Controllers
Events/Alarms
Start Sequence
Double-click a data item name to change its display format.
Name
Units
Format
Temperature
°F
0
Pressure - Vessel
psig
0
Volume
mL
0.00
Pressure - Filtrate
psig
0
OK
Cancel
Help



8. The 5270 software acquires temperature, pressure values from the controllers via Ethernet. These signals are calibrated at the controller. There is no need to calibrate the signals using 5270 once the controllers are calibrated
    a. Vessel Temperature: K-type thermocouple, calibrated using a simulator or dry-block. Over-temperature thermocouple is J-type.
    b. Vessel Pressure: Transducer, 4-20 mA = 0-3000 psi, calibrated using a traceable pressure reference standard.
    c. Filtrate Pressure: Transducer, 4-20 mA = 0-3000 psi, calibrated using a traceable pressure reference standard.
9. The 5270 software acquires volume displacement values from the 6.00-inch LVDT as a proportional DC signal via data acquisition hardware. This signal is calibrated using 5270 as follows:
    a. Piston in the top position (closest to slot) = 0 mL
    b. Piston in the bottom position (away from slot) = 236.5 mL

Section 4 – Operational Details

General

1. The vessel assembly must be latched into place using the spring-loaded latch prior to inversion.
2. The head assembly is equipped with detents at 0°, 45°, 90°, 180°.
3. The sample temperature measurement is located within the wall of the pressure vessel.
4. The over-temperature measurement point is located on the external heater sleeve surrounding the pressure vessel. An over-temperature event disables the heater until reset by an operator.
5. The impeller rotates at 150 rpm. The apparatus should not be operated without the belt guard and other safety covers installed.

Pressure Vessel

1. Note that the fully-assembled vessel assembly is heavy, exceeding 50 lbm (est).
2. All components on the vessel are assembled hand-tight.
3. The drive belt, external magnetic drive rotor, and flexible tube connections must be removed before the vessel can be removed from the heating jacket.
4. The vessel assembly includes a receiver vessel that contains a piston. Liquid volume passing through the slot with a known differential pressure is measured using an LVDT to measures the piston displacement, calibrated to indicate displaced volume.
5. The vessel assembly is supplied with four slot inserts with the following width dimensions: 2000, 1500, 1000, 500 micro-meters, each with a 1.25in slot length
6. The pressure vessel assembly is equipped with four (3) pressure safety relief ports that are intended to verify that trapped pressure does not exist after a lost circulation material test. A hex allen wrench is used to remove and tighten the safety pressure relief ports located on the wall of the pressure vessel assembly.
7. The pressure vessel assembly is equipped with two (2) relief valves, one for each side of the piston, each with a 2100 psi set-point.

Head Assembly

1. The head assembly may be rotated clock-wise with detents at 0°, 45°, 90°, 180°.
2. The spring-loaded detent is disengaged using the button located behind the head assembly.
3. Note that the surfaces of the head assembly may be hot to touch during a test in progress.

Vessel Removal and Installation

1. The vessel may be removed from the heating/cooling sleeve using the following steps.
2. Cool the vessel assembly using coolant flow controlled by the coolant valve located on the front panel.

3. Verify that the pressure controller set-point is 0.00 psi and the N2 supply valve is closed.
4. Open the pressure release valve located on the front panel.
5. Turn the receiver pressure regulator fully counter-clockwise.
6. Rotate the head assembly to the 90° position (horizontal).
7. Remove the belt guard.
8. Remove the timing belt.
9. Disengage the vessel latch. Tighten the knob so that the latch remains open.
10. Remove the ¼-inch flexible tubes from the pressure vessel.
11. Remove the ¼-inch flexible tubes from the receiver vessel.
12. Disconnect the LVDT connector.
13. Disconnect the wall thermocouple.
14. Unscrew and remove the filtrate receiver assembly from the vessel.
15. Slide the vessel assembly, including the magnetic drive rotor, from the head assembly.
16. Mount the vessel in a suitable bench vise for disassembly.
17. Disassemble and clean the vessel assembly as needed to prepare for a new test. WARNING: If the plugs (top or filtrate) are difficult to turn, assume pressure is trapped internally, creating a potentially hazardous condition.
18. Reinstall the vessel assembly in the head assembly in reverse order, noting that the wall thermocouple port is oriented at the front of the assembly.

Front Panel

1. The vessel pressure controller is used to control pressure in the pressure vessel above the slotted insert. Once a set-point is provided, the controller operates a pressure regulator that introduces N2 to the vessel, pressurizing the sample through a port located in the top plug.
2. The vessel temperature controller is used to control the temperature of the sample in the pressure vessel.
3. The receiver pressure regulator is manually adjusted to apply N2 pressure below the piston in the receiver pressure vessel. This pressure must be greater than the vessel pressure to ensure that the piston is in the top position against the slot. The vessel and receiver pressure values are adjusted to create dP values across the slot.
4. The vessel pressure release valve is used to release all pressure from the pressure vessel after the pressure controller setpoint is set at 0 psi and the N2 supply valve is closed.
5. The N2 supply valve must be closed when the system is not in use to ensure that the vessel pressure is 0 psi.
6. The cooling valve is used to control the coolant to the coils surrounding the pressure vessel.
7. The over-temperature display indicates the heater temperature and the word “SAFE” when the temperature is less than the safety limit. The work “FAIL” will appear if the safety limit is exceeded.
8. The motor switch is used to turn the motor ON or OFF.
9. The heater switch is used to enable or disable the heater.
10. The power switch is used to turn the system ON or OFF.

Conducting a Test

1. Assemble the vessel while mounted in a suitable bench vise. Install the desired slot (2000, 1500, 1000, or 500 micrometer).
2. Rotate the head assembly to the 90° position (horizontal) to facilitate loading the vessel.
3. Slide the vessel into the head assembly, ensuring that the thermocouple port is oriented towards the front of the head assembly. Rotate the vessel until the vessel engages the anti-rotation flats, the top of the vessel will be flush with the top of the heater.
4. Install the receiver assembly.
5. Engage the latch to lock the vessel and receiver assembly.
6. Connect the flexible hoses to the bottom ports on the receiver.
7. Connect the LVDT cable.
8. Rotate the head assembly to the 0° position (vertical) with the receiver assembly oriented towards the bottom.
9. Using the Receiver Pressure regulator, apply 100 psi (estimated) to translate the internal piston until it is in contact with the slot, reducing the dead-volume between the slot and piston to zero.
10. Pour the desired volume of sample into the vessel.
11. Install the top plug assembly magnetic drive rotor.
12. Install the thermocouple.
13. Connect the flexible hoses to the top ports on the plug.
14. Apply the desired pressure to the receiver piston using the receiver pressure regulator.
15. Close the pressure release valve located on the front panel.
16. Open the N2 supply valve located on the front panel.
17. Using the Up/Down arrows on the pressure controller, enter the desired pressure setpoint. Note that this pressure should always be less than the pressure applied to the piston to ensure that the piston remains against the slot.
18. Turn ON the motor.
19. Turn ON the heater switch.
20. Using the Up/Down arrows on the temperature controller, enter the desired temperature setpoint.
21. Start the 5270 test to plot the results.
22. Once the vessel temperature and pressure are stable, use the filtrate pressure regulator to reduce the pressure below the piston within the filtrate receiver, creating the desired differential pressure across the slot.
23. Observe the LVDT displacement using the 5270 software. Material that blows through the slot will be evidenced by the piston displacement, calibrated in mL.

Ending a Test

1. Turn ON the cooling water. Allow the vessel to cool below 80°F.
2. Reduce the temperature and pressure setpoints using the UP/DOWN arrows on the controllers to 32°F and 0 psi respectively.
3. Turn OFF the motor switch.
4. Turn OFF the heater switch.
5. Close the N2 Supply valve.

6. Turn the Receiver Pressure regulator fully CCW to reduce the receiver pressure to 0 psi.
7. Open the Vessel Pressure Release valve.
8. Verify that all the gauges and pressure controller indicate 0 psi internal pressure.
9. Rotate the head assembly 90° to the horizontal position.
10. Remove the motor belt guard.
11. Remove the drive belt.
12. Remove the wall thermocouple.
13. Disconnect the flexible hoses at the top and bottom of the vessel assembly.
14. Disconnect the LVDT cable.
15. Disengage the vessel latch.
16. Unscrew the filtrate receiver assembly, noting that the vessel weight is approximately 10 lbm.
17. Slide the vessel assembly from the head assembly.
18. Disassemble and clean all components in preparation for the next test.

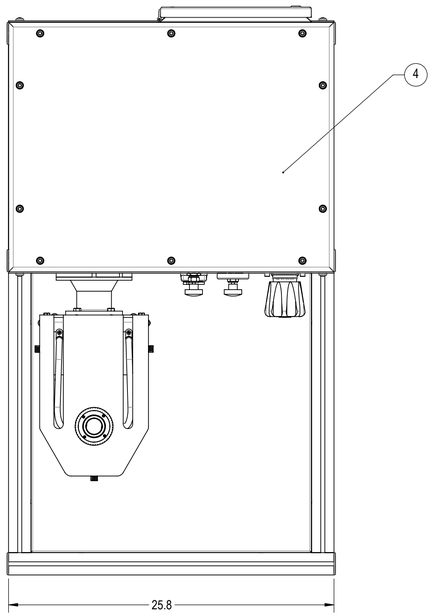
Section 5 – Replacement Parts

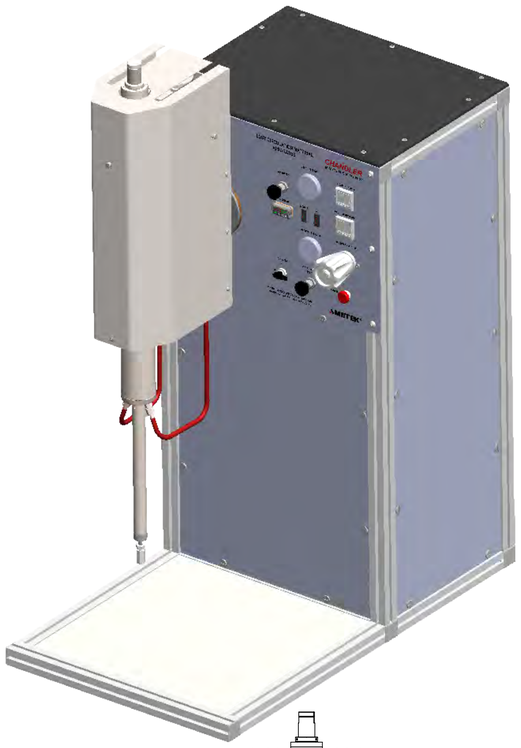
Part Number	Description

Section 6 – Drawings and Schematics

Drawing Number	Description
7170	LOST CIRCULATION MATERIAL APPARATUS
CP632-0004	WIRING DIAGRAM
CP632-0007	TUBING DIAGRAM
CP632-0008	PROC, TEST, LVDT ASSEMBLY
CP632-0030	VESSEL SUPPORT ASSEMBLY
CP632-0200	FRONT PANEL ASSEMBLY
CP632-0300	HEAD ASSEMBLY
CP632-0320	VESSEL ASSEMBLY
CP632-0400	ELECTRONICS ASSEMBLY
CP632-0402	DIN MODULE ASSEMBLY
CP632-0403	POWER MODULE ASSEMBLY
CP632-0404	CONNECTOR PANEL ASSEMBLY
CP632-0500	REAR PANEL ASSEMBLY

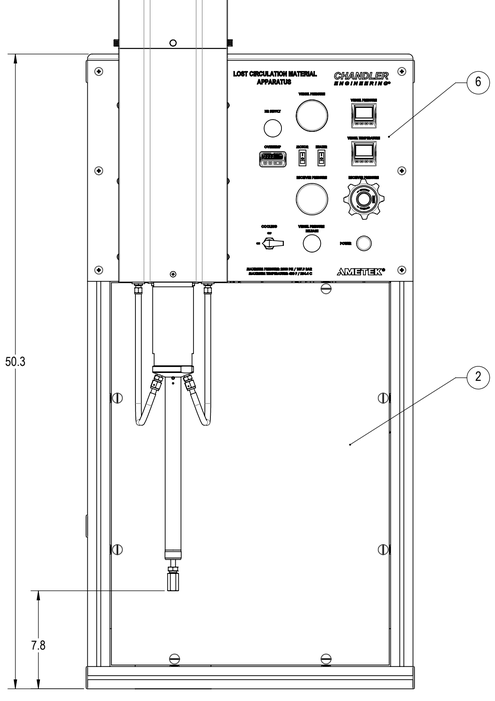
REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FROM CP632	05/13/2021	JJM

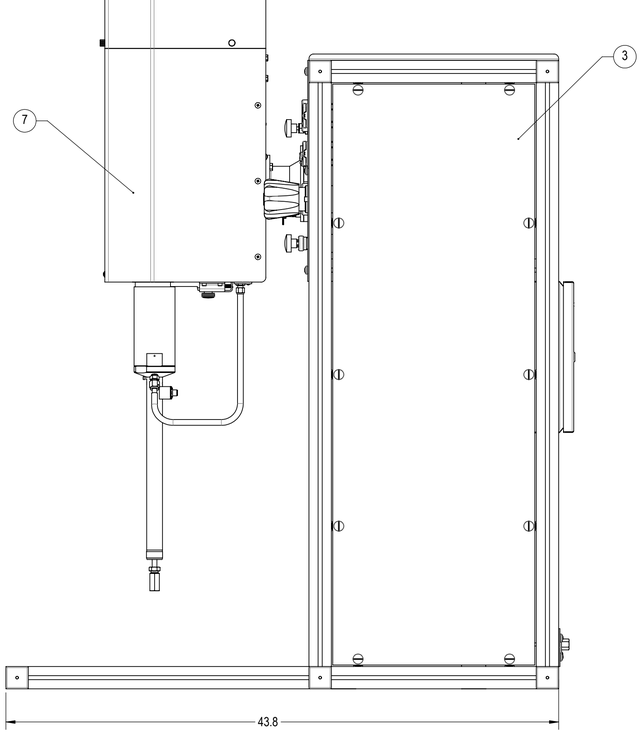


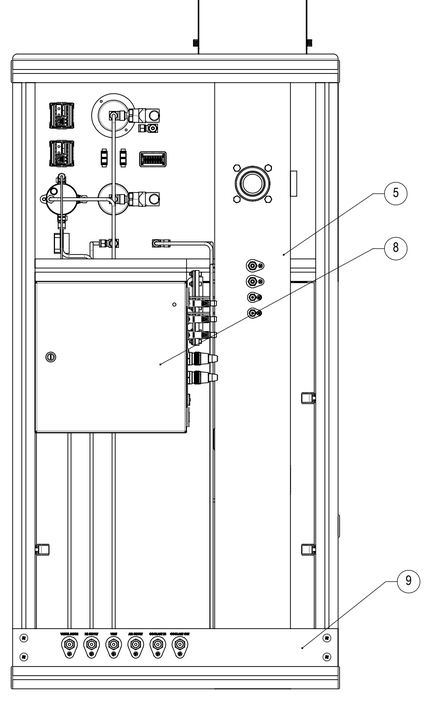


SPECIFICATIONS (REFER TO CP632 SPECIFICATION DOCUMENT)

- REDUNDANT OVER-PRESSURE PROTECTION (RELIEF VALVES)
- REDUNDANT OVER-TEMPERATURE PROTECTION
- PORTS (3) IN VESSEL WALL FOR TRAPPED PRESSURE RELEASE
- REMOVABLE PRESSURE VESSEL ASSEMBLY
- MAWP: 2000 PSI
- MAWT: 400 °F
- POWER: 208-230 VAC, 50 or 60 HZ
- WETTED MATERIALS: 316SS
- ELASTOMERS: FKM
- VESSEL PIVOTS WITH DETENTS AT 0 °, 90 °, 180 °
- TEMPERATURE CONTROL: PID CONTROLLER, WALL THERMOCOUPLE
- VESSEL PRESSURE: PID CONTROLLER
- FILTRATE BACKPRESSURE: MANUAL CONTROL
- FILTRATE VOLUME MEASUREMENT: LVDT (±3-inches)
- PISTON-STYLE FILTRATE RECEIVER
- MAGNETIC DRIVE - BELT DRIVEN
- FULLY COMPATIBLE WITH 5270 SOFTWARE (T, P, VOLUME)
- COMMUNICATION: ETHERNET







ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0020	FRAME ASSEMBLY	1	
2	CP632-0020-1	PANEL,FRONT	1	
3	CP632-0020-2	PANEL,SIDE	2	
4	CP632-0024	PANEL,TOP	1	
5	CP632-0030	SUPPORT ASSEMBLY,VESSEL	2	
6	CP632-0200	FRONT PANEL ASSEMBLY	1	
7	CP632-0300	HEAD ASSEMBLY	1	
8	CP632-0400	ELECTRONICS ASSEMBLY	1	
9	CP632-0500	REAR PANEL ASSEMBLY	1	
10	C17610	CONTROLLER,I/P,0-100 PSI,4-20mA	1	
11	C17609	REG,SS,VENTING,0-2500 PSI,DIAPH	1	
12	CP632-0022	PLATE,HEAD INDEXING	1	
13	CP632-0023	BRACKET,REGULATOR	1	
14	C03321	UNION,SS,BHD,1/4TX1/4T,SW	2	
15	188-13042	UNION,SS,1/8T X 1/8T,BHD,SW	2	
16	C08225	RETAINER,SS,1/2ID,BHD,SW	2	
17	C08132	RETAINER,SS,1/4T,BHD	2	
18	CP632-T11	TUBE 11	1	
19	CP632-T12	TUBE 12	1	
20	P-1488	CONN,SS,1/4MPT X 1/4T,SW	2	
21	CP632-T13	TUBE 13	1	
22	P-1772	ELBOW,SS,1/4TX1/4MP	2	
23	CP632-T14	TUBE 14	1	
24	CP632-T15	TUBE 15	1	
25	CP632-T16	TUBE 16	1	
26	CP632-T17	TUBE 17	1	
27	CP632-T18	TUBE 18	1	
28	CP632-T19	TUBE 19	1	
29	P-1942	TEE,UNION,SS,1/4T	2	
30	CP632-T20	TUBE 20	1	
31	CP632-T21	TUBE 21	1	
32	CP632-T22	TUBE 22	1	
33	CP632-T23	TUBE 23	1	
34	25-546	FTG TEE MR SWLOK SS-400-3-4TTM	1	
35	P-1944	REDUCER,SST,1/8Tx1/4OD SW	1	
36	CP632-T24	TUBE 24	1	
37	CP632-T25	TUBE 25	1	
38	CP632-T31	TUBE 31	1	
39	C13775	CAP,END,45X45,MINITEC	10	
40	C17614	SCREW,PHMS,SS,M8x1.25x20mm	20	
41	C17615	SCREW,HHMS,SS,M8x1.25x25mm	8	
42	C17617	NUT,PANEL,MINITEC 22.1260	28	
43	C15295	SCREW,PAN,16MM,MINITEC 21.1246	28	
44	C17612	KIT,CONNECTOR,C17610	1	
45	C17613	KIT,FILTER,C17610	1	
46	H-6015	SCREW,THMS,SS,6-32X0.375,PHIL	4	
47	C17630	SCREW,HHFL,SS,5/16-18 x 0.375	4	
48	C11492	SCREW,SHCS,SS,M8X25,ALLEN	10	
49	CP632-0025	PANEL,SUPPORT,TOP DECK	1	
50	70-197-1501	SCREW,SKHSS,SS,5/16-18X0.375,AL	1	
51	CP632-0035	COLLAR,MODIFIED	2	
52	CP632-0036	BLOCK,LIMIT	2	
53	C17653	SCREW,SHCS,SS,5/16-18X1.75	2	
54	70-198-2101	SCREW,SHCS,SS,5/16-18X0.500,AL	4	
55	CP632-0004	WIRING DIAGRAM	REF	
56	CP632-0007	TUBING DIAGRAM	REF	
57	CP632-ACCESS	ACCESSORIES, LCM APPARATUS	1	
58	CP632-SHIP	PROC,SHIPPING INSTRUCTIONS	REF	
59	CP632-0502	PANEL,REAR	1	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 5/13/2021
MFG: JDS 5/13/2021
ENGR: JJM 5/13/2021
TYPE:
STRUCT:

CHANDLER ENGINEERING
LOST CIRCULATION MATERIAL APPARATUS
PN: 7170
PROJ: Standard Products
REV A SIZE D
SHEET 1 OF 1

TITLE BLOCK REV 3

REVISIONS					
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS	
	A	ISSUED	2017-07-10	WJW	JS
	B	ECN T7836; CHANGED WIRE COLORS	2017-09-20	WJW	JS
	C	ECN T8023; ADDED CHASSIS GROUND	2018-03-08	WJW	JS
	D	ECN T8536; UPDATE TO CP632A	2019-06-04	WJW	JS
	E	ECN T8732; UPDATE TO AS BUILT	2019-10-18	WJW	JS

POWER DISTRIBUTION

REFERENCE CP632-0400

PS1
C17028
24VDC

CNT1
C15418

CNT2
C15418

B1
C16079
15A

HUB1
C16095

RCP1
70616-90
230VAC

B2
C15158
5A

RLY1
C11228
MOTOR

PLC1
C16025
750-352

IOM3
C11353

IOM2
C11907
750-472
AI 0-20

C09287
SSR1

C16893
SSR1
HEATER

TB1
C13969
L1

TB2
C13965
L2

TB3
C13970
GND

TB4
C13967
24VDC

TB5
C13968
24V RET

CHASSIS GROUND

POT
SUPPLIED WITH MOTOR CONTROLLER
SOLDER TO APPROPRIATE PINS

SET JUMPER TO 230V

PANEL CNTL
C11025

1: WHT; 24V TO POWER BUTTON
2: BRN; FROM POWER BUTTON
3: GRN; 24V TO MOTOR, HEATER/OVERTEMP
4: YLW; FROM HEATER/OVERTEMP
5: GRY; FROM MOTOR SWITCH
6: PNK; TEMP CTRL 1A
7: BLU; 24V RET TO POWER BUTTON
8: RED; TEMP CTRL 1B

MOTOR C15396
CONTROLLERS C15396
HEATER C15396

		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		CHANDLER ENGINEERING	
		TOLERANCES:			
		1 PLACE ±0.030			
		2 PLACE ±0.010			
NEXT ASSY	USED ON	3 PLACE ±0.005		TITLE	
APPLICATION		ANGLES ±1/2°		WIRING DIAGRAM	
		SURF. FINISH 63		LOST CIRCULATION TESTER	
BREAK SHARP EDGES, DEBURR		APPROVALS	DATE		

DRAWN:	WJW	7/6/17	
CHECKED:	WJW	7/6/17	
ENGR.:	WJW	7/6/17	

SIZE	S.O. NO.	DWG NO.	REV.
D		CP632-0004	E
SCALE: 1 = 1	TITLE BLOCK REV: 1.0	SHEET: 1 of 2	

DATA ACQUISITION

REFERENCE CP632-0400

BRN
YLW
GRY
RED

IOM3
C11353

DIP SWITCH SETTINGS

	S1	S2	JP1 OFF
1:	ON	OFF	
2:	OFF	OFF	
3:	ON	ON	
4:	ON	OFF	
5:	ON	OFF	
6:	OFF	OFF	
7:	OFF	OFF	
8:	OFF	ON	

RED 18

PLC1
C16025
750-352

IOM1
C11907
750-477
AI 0-10V

IOM2
C11907
750-472
AI 0-20

C10128

HUB1
C16095

ETHERNET C09712
ETHERNET C09712
ETHERNET C09712

FILTRATE PRESSURE C11028
C17642
WHT; SIGNAL; PT02.1
BRN; 0V; PT02.2

LVDT C11028
C17642
WHT; N/C
BRN; +EXC; YEL/RED
GRN; N/C
YLW; +EXC; YEL/BLK
GRY; GND; BLK
PNK; N/C
BLU; N/C
RED; B1; RED

PANEL WIRING

REFERENCE CP632-0200

PANEL CNTL
C17642

1: WHT; 24V TO POWER BUTTON
2: BRN; 24V FROM POWER BUTTON
3: GRN; 24V TO MOTOR, HEATER/OVERTEMP
4: YLW; FROM HEATER/OVERTEMP
5: GRY; FROM MOTOR SWITCH
6: PNK; TEMP CTRL 1A
7: BLU; 24V RET TO POWER BUTTON
8: RED; TEMP CTRL 1B

WHT 18
NC
WHT
BRN
BLU
YLW 18
RED 18

MOTOR
C16390
GRN
GRY

HEATER
C16390
GRN 18

OVERTEMP C16390
TL1
GRN 18
YLW
BLU 16
BRN 16
WALL TC.-
WALL TC.+
C13510

TEMPERATURE C17605
TC1
PNK
RED
BRN 16
BLU 16
C13510
VESSEL TC.+
VESSEL TC.-
C17619
ETHERNET

PRESSURE C17606
PC1
C17610.BLK
C17610.WHT
I/P CONTROLLER
PT01.2
PT01.1
BLK 18
YLW 18
RED 18
INSTALL RESISTOR
PROVIDED WITH C17606
C17619
ETHERNET

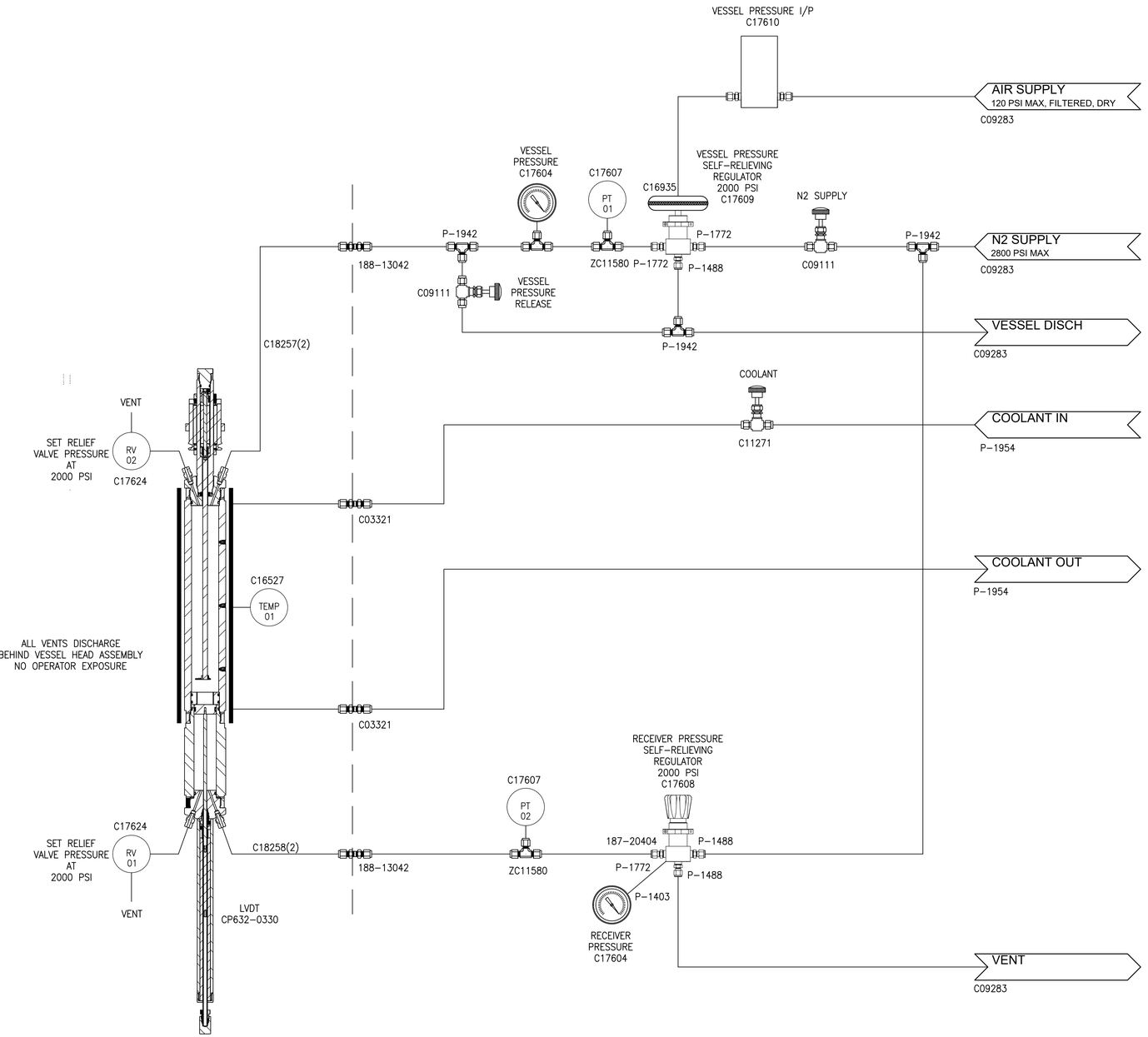
C09286
MOTOR

MOTOR
C17618

CONTROLLERS
C17618

		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		CHANDLER ENGINEERING	
		TOLERANCES: 1 PLACE ±0.030; 2 PLACE ±0.010; 3 PLACE ±0.005; ANGLES ±1/2°; SURF. FINISH 63		TITLE: WIRING DIAGRAM LOST CIRCULATION TESTER	
NEXT ASSY	USED ON				
APPLICATION					
BREAK SHARP EDGES, DEBURR		APPROVALS	DATE		
		DRAWN: WJW	7/6/17	SIZE: D	S.O. NO.:
		CHECKED: WJW	7/6/17	DWG NO.: CP632-0004	REV.: E
		ENGR.: WJW	7/6/17	SCALE: 1 = 1	TITLE BLOCK REV: 1.0
				SHEET: 2 OF 2	

REVISIONS					
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS	
	C	ECN T8613; UPDATED CONTENT PER CP632A	07/21/19	JJM	JJM



		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		CHANDLER ENGINEERING			
		TOLERANCES:					
		1 PLACE ±0.030 [.76]					
		2 PLACE ±0.010 [.25]					
NEXT ASSY	USED ON	3 PLACE ±0.005 [.127]		TITLE	TUBING DIAGRAM		
		ANGLES ±1/2°			LOST CIRCULATION APPARATUS		
APPLICATION		SURF. FINISH	32				
BREAK SHARP EDGES, DEBURR		APPROVALS	DATE				
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		CHECKED: JS	04/28/17				
		ENGR.: JJM	04/28/17	SCALE: N/A	TITLE BLOCK REV: 1.0	SHEET: 1 of 1	

CHANDLER ENGINEERING
AMETEK

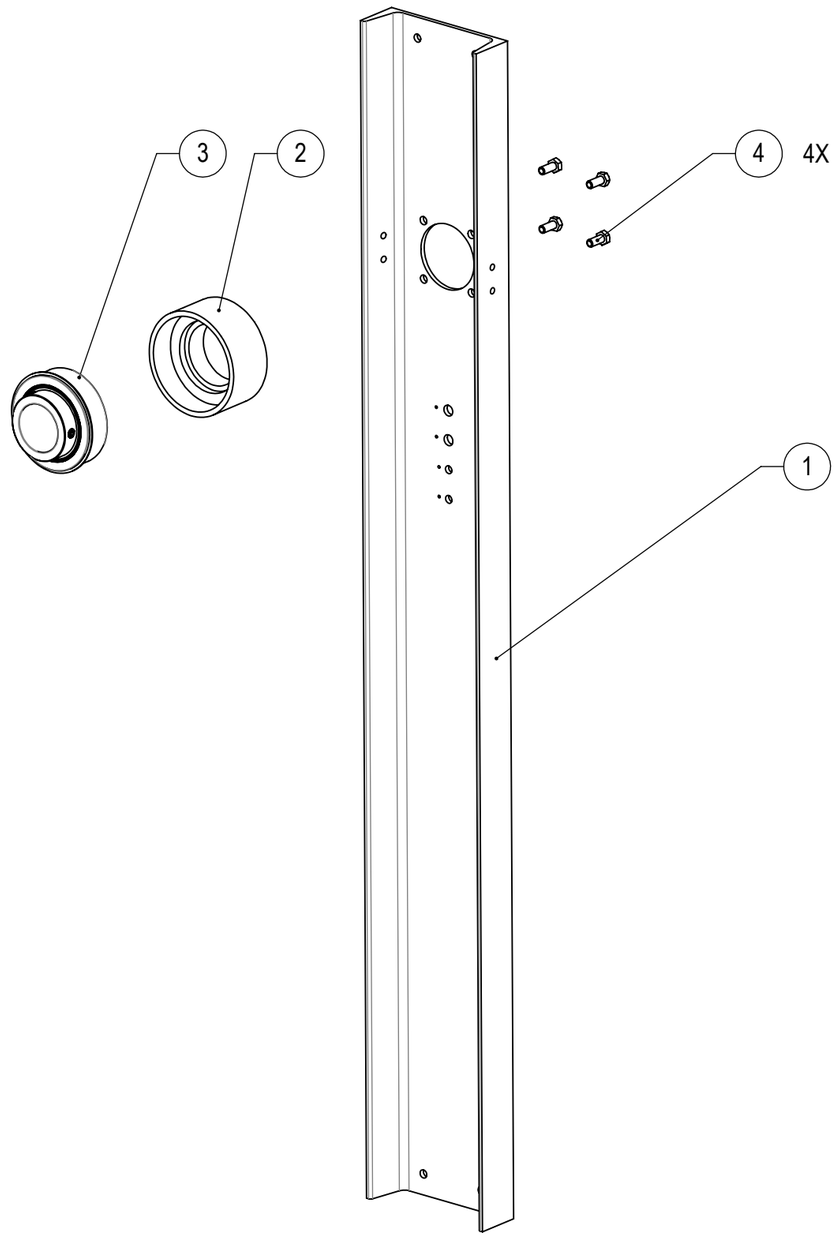
TITLE: PROC, TEST, LVDT ASSEMBLY
REF. NEXT ASSY: CP632-0330

REVISION HISTORY

Revision	Date	Revised By	Description	Checked By
E	05/09/18	JJM	ECN T8517	JS

1. Assemble the LVDT per drawing CP632-0330. Do not swage the top ferrule in place in case the LVDT coil must be removed to correct an internal wiring error.
2. Connect the LVDT cable to the CP632-0400 electronics assembly.
3. Apply power to the electronics assembly for use with testing the operation of the LVDT. Connect the electronics assembly to the computer.
4. Attach the LVDT assembly to the CP632-0320 vessel assembly, including attaching the internal rod to the PEEK piston. Tighten the ferrule fitting that attaches the tube to the end plug of the vessel assembly.
5. Translate the internal piston until it is against the slot insert to the minimum position (-3.00-inches). Enter a value of 0 using 5270. Translate the internal piston until it is against the end plug maximum position (+3.00-inches).
6. Once tested, swage the top ferrule in place per the procedure on the CP632-0330 drawing, install the top cap.
7. Bunker test the assembly at 3000 psi.

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/12/17	JJM
B	ECN T8738; UPDATED VIEWS	5/21/2019	JJM



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0031	BEAM,VESSEL SUPPORT	1	
2	CP632-0032	HUB,BEARING,VESSEL SUPPORT	1	
3	C17616	BEARING,COLLAR,2in SHAFT	1	
4	H-31-007	SCREW,HHMS,SS,5/16-18X0.750,HX	4	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17

TYPE:
STRUCT:

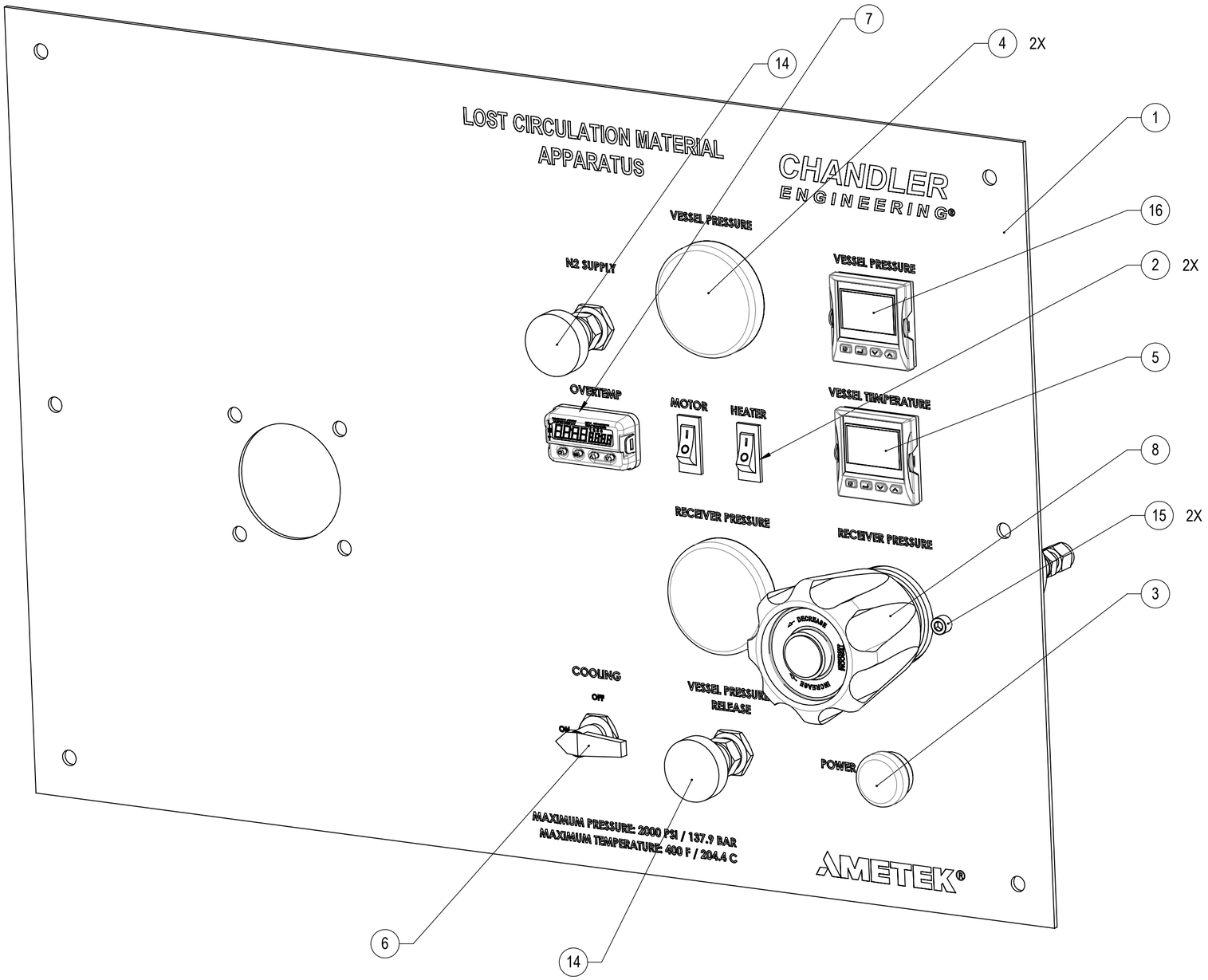
CHANDLER ENGINEERING

SUPPORT ASSEMBLY,VESSEL

PN: CP632-0030 | REV B | SIZE B
PROJ: CP632 | SHEET 1 OF 1

TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/12/17	JJM
B	ECN T8138; REPLACED C16907 W/ C11271	6/21/2018	JS
C	ECN T8517; CHANGES PER CP632A	5/7/2019	JJM



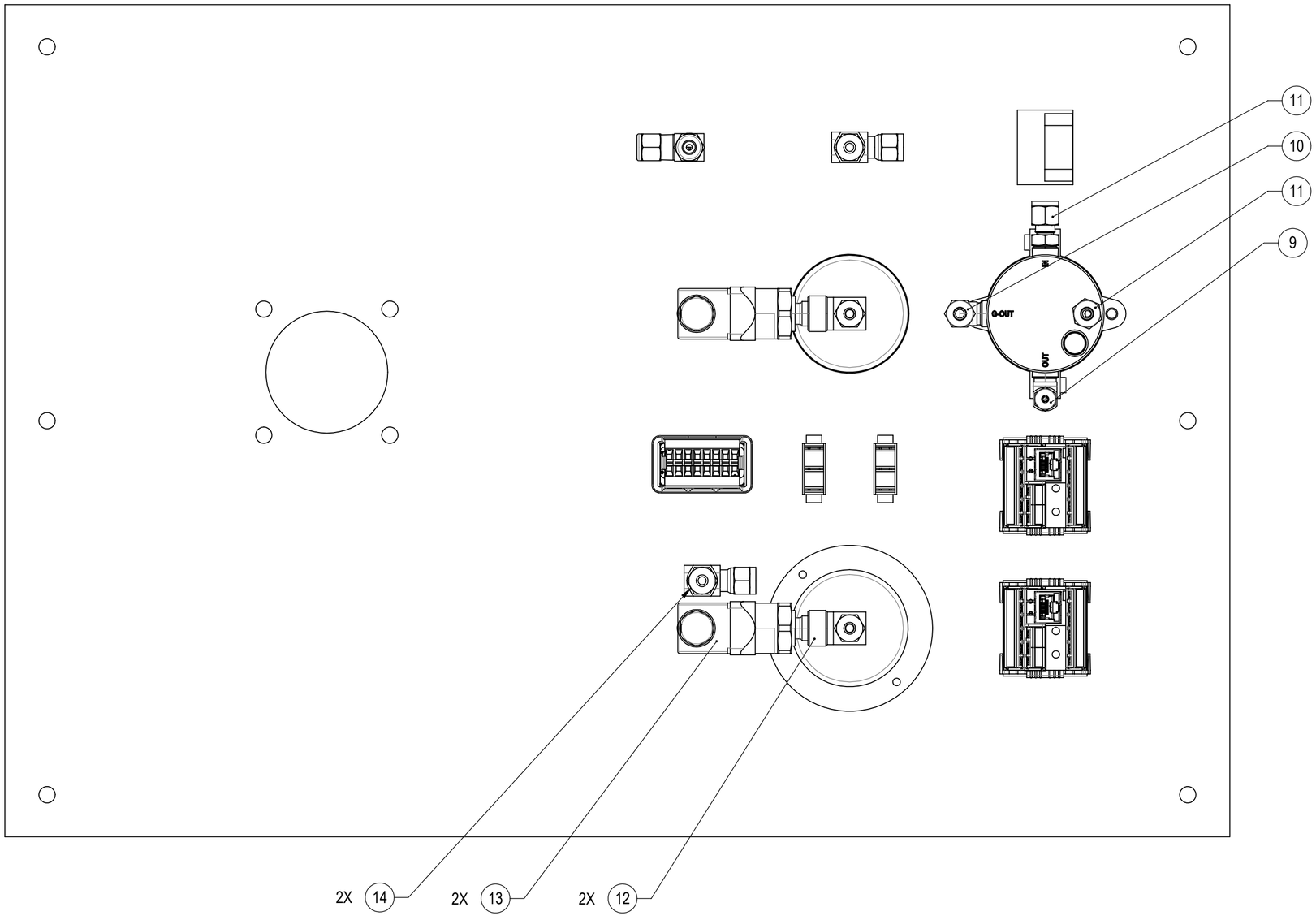
ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0201	PANEL,FRONT	1	
2	C12161	SWITCH,RCKR,PNL,SPST,10A,250V,0-1	2	
3	C15359	PUSHBUTTON,24VDC,RED,22MM	1	
4	C17604	GAUGE,PANEL,SS,3000PSI/KPA	2	
5	C17605	CONTROLLER,EUROTHERM,EPC3016,1/16DIN,1OP	1	
6	C11271	VALVE,BAL,SS,1/4T,2WY-STR	1	
7	C16390	CONTROLLER,LIMIT,EZ-ZONE,1/32	1	
8	C17608	REG,SS,VENTING,0-2500 PSI,SPRING	1	
9	187-20404	ELBOW,SS,1/8TX1/4MP	1	
10	P-1772	ELBOW,SS,1/4TX1/4MP	1	
11	P-1488	CONN,SS,1/4MPT X 1/4T,SW	2	
12	ZC11580	TEE,BRANCH,SS,1/4TX1/4TX1/4FP	2	
13	C17607	XDCR,PRESSURE,SS,0-3000PSI	2	
14	C09111	VALVE,NDL,SST,1/4TX1/4T ANG SW	2	
15	H-25-010	SCREW,SHCS,SS,1/4-20X0.500,ALN	2	
16	C17606	CONTROLLER,EUROTHERM,EPC3016,1/16DIN,DCOUT	1	
17	CP632-0202	RING,GAUGE MOUNTING	1	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

CHANDLER ENGINEERING
FRONT PANEL ASSEMBLY
PN: CP632-0200 REV C SIZE C
PROJ: CP632 SHEET 1 OF 2

TITLE BLOCK REV 3



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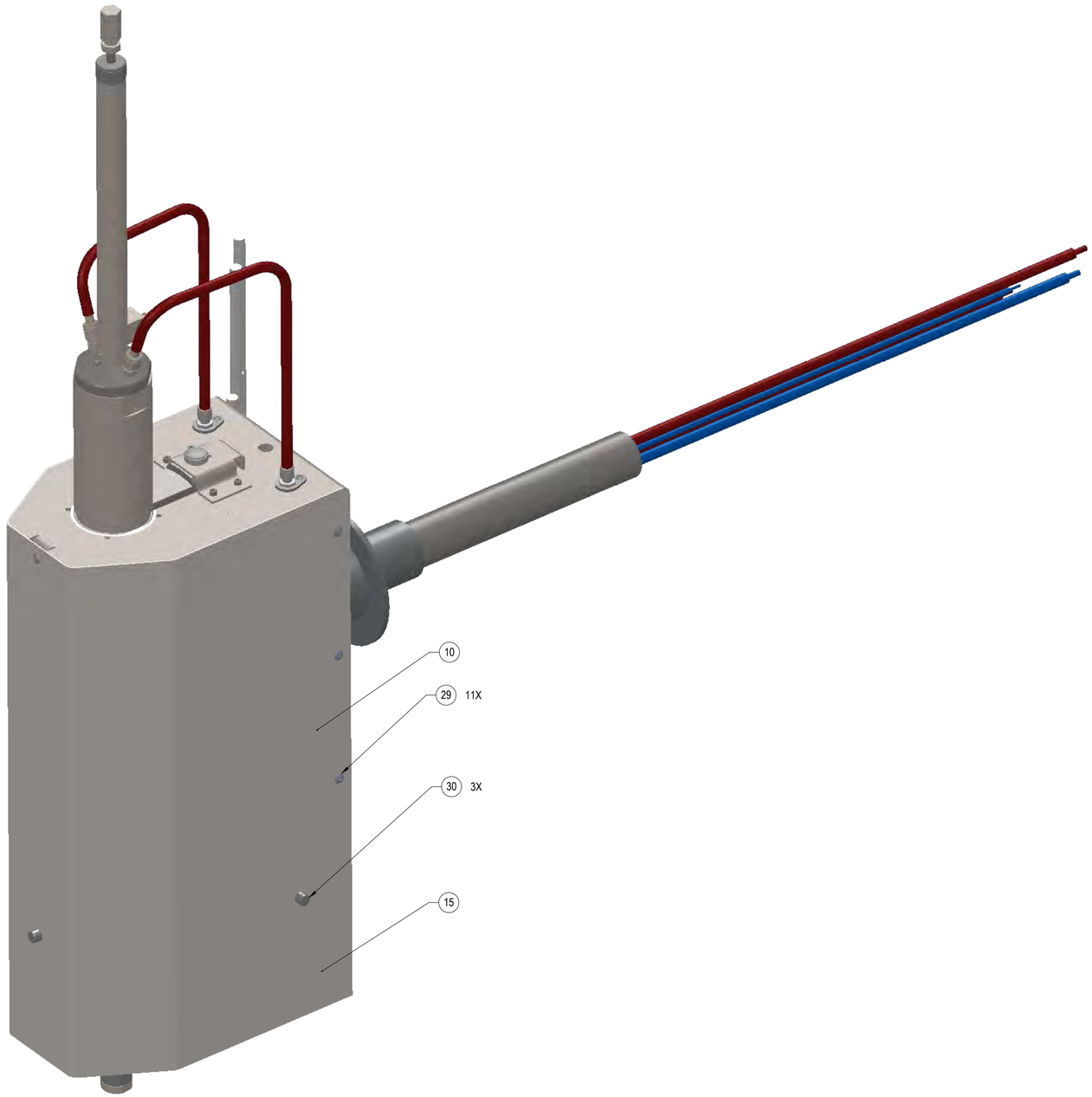
TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/12/17	JJM
B	ECN T7844; CORRECTED SOLID MODEL OF C17624 RELIEF VALVE	10/11/2017	JJM
C	ECN T7845; ADDED C17819 AND C17820 PULLEY AND BELT	10/13/2017	JJM
D	ECN T8517; CHANGES PER CP632A	5/7/2019	JJM



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0301	VESSEL ENCLOSURE ASSEMBLY	1	
2	CP632-0301-1	BRACKET,CHASSIS	1	
3	CP632-0301-2	BRACKET,MOTOR SUPPORT	1	
4	CP632-0301-3	BRACKET,TUBE SUPPORT	1	
5	CP632-0301-4	BRACKET,SEPARATION	1	
6	CP632-0305	HEATER SLEEVE ASSEMBLY	1	
7	CP632-0320	VESSEL ASSEMBLY	1	
8	C17820	BELT,TIMING,XL,3/8in,110T	1	
9	C09286	MOTOR,GEAR,DC	1	
10	CP632-0301-5	COVER,TOP	1	
11	CP632-0312	LATCH ASSEMBLY,VESSEL	1	
12	CP632-0350	HEATER BLOCK ASSEMBLY	1	
13	C17244	SCREW,HHCS,SS,10-32X0.500,HEX	4	
14	C16626	SCREW,SHCS,SS,1/4-20x0.250	4	
15	CP632-0301-6	COVER,BOTTOM	1	
16	C03321	UNION,SS,BHD,1/4TX1/4T,SW	7	
17	C08132	RETAINER,SS,1/4T,BHD	8	
18	H-8032	SCREW,THMS,SS,8-32X0.250,PHIL	2	
19	CP632-0313	JACKET,INSULATION	1	
20	C17819	PULLEY,TIMING,XL,44T	1	
21	C13325	UN,SS,BH-RED,1/4TX1/8T	1	
22	CP632-0316	HUB,VESSEL SUPPORT	1	
23	CP632-0314	LATCH ASSEMBLY,ROTATION	1	
24	CP632-0315	COLLAR,RETAINING	1	
25	CP632-0317	SHAFT,VESSEL SUPPORT	1	
26	C17625	SCREW,HHMS,SS,5/16-18x1.25L,GR5	4	
27	C13587	SCREW,HHCS,SS,1/4-20X0.375	4	
28	H-6015	SCREW,THMS,SS,6-32X0.375,PHIL	8	
29	C11476	SCREW,THMS,SS,10-32X0.375,PHIL	11	
30	C17622	SCREW,THUMB,SS,10-32X1/2	3	
31	H-31-104	SCREW,SKHSS,SS,5/16-18X0.75	2	
32	C17624	VALVE,RLF,SS,HOKE,2001-3000 PSI	2	
33	CP632-T27	TUBE 27	1	
34	CP632-T30	TUBE 30	1	
35	C17623	CABLE,TC,J-TYPE,RETRACT	1	
36	C17593	HOSE,SS,PTFE,1/4T,48in	2	
37	C17592	HOSE,SS,PTFE,1/8T,48in	2	
38	CP632-0344	RING,LOCKING,VESSEL	1	
39	C18257	HOSE,SS,PTFE,1/4T,18in	2	
40	C18258	HOSE,SS,PTFE,1/4T,24in	2	

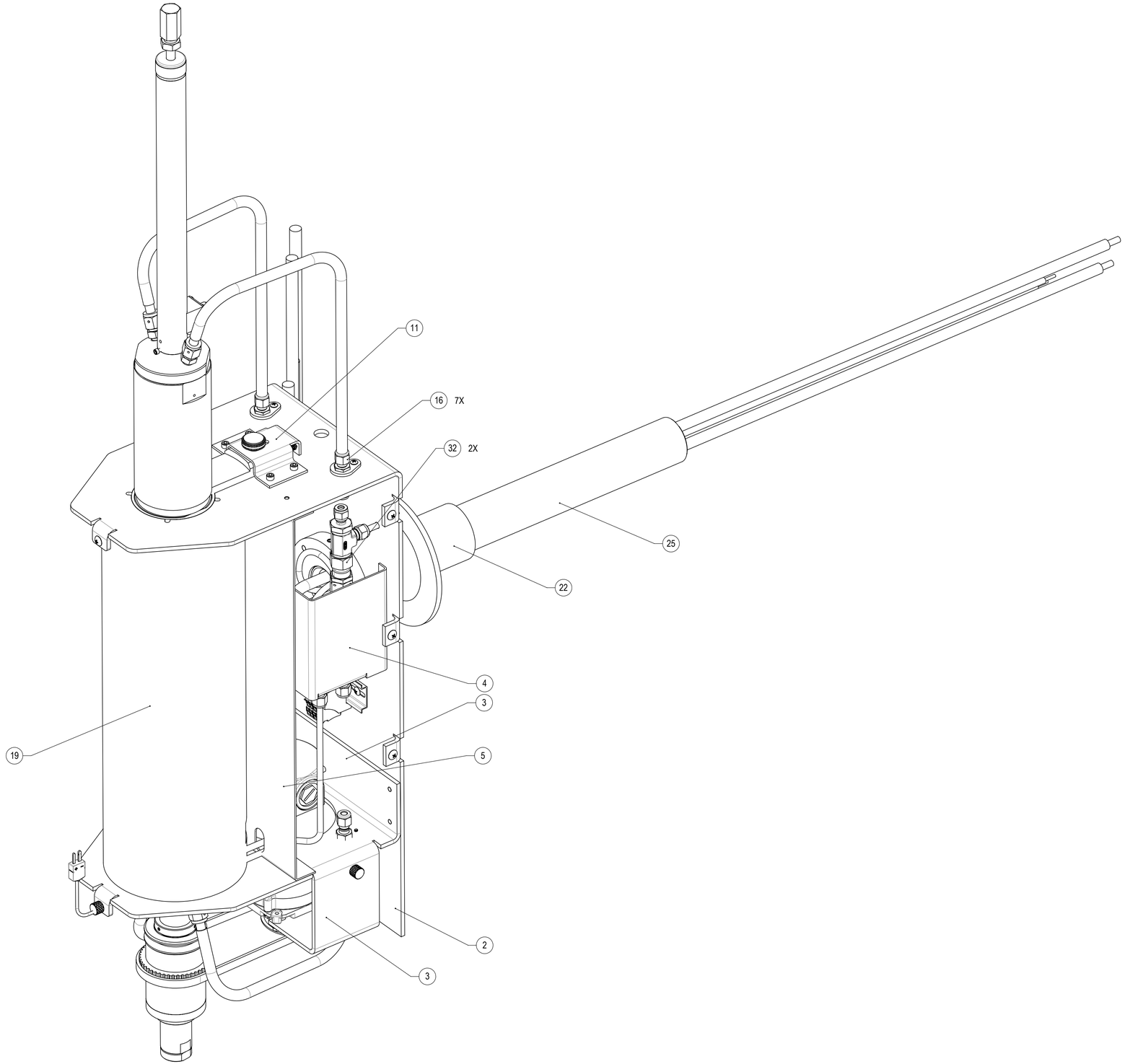
NOTES:
1. CHASSIS (CP632-0301) IS SUPPLIED FULLY ASSEMBLED, INCLUDING FASTENERS TO ENSURE GOOD COMPONENT FIT.
2. DISASSEMBLE CHASSIS AS NEEDED TO COMPLETE THE FINAL ASSEMBLY.
3. HEATER, MOTOR, THERMOCOUPLE WIRING IS NOT ILLUSTRATED. PROVIDE 4-FT EXCESS HEATER AND THERMOCOUPLE LENGTHS PAST THE END OF THE SUPPORT TUBE.

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/26/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

CHANDLER ENGINEERING
HEAD ASSEMBLY
PN: CP632-0300
PROJ: CP632
REV D
SIZE D
SHEET 1 OF 2

TITLE BLOCK REV 3



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0301-1	BRACKET,CHASSIS	1	
2	CP632-0301-2	BRACKET,MOTOR SUPPORT	1	
3	CP632-0301-3	BRACKET,TUBE SUPPORT	1	
4	CP632-0301-4	BRACKET,SEPARATION	1	
5	CP632-0301-5	COVER,TOP	1	
6	CP632-0301-6	COVER,BOTTOM	1	
7	CP632-0305	HEATER SLEEVE ASSEMBLY	1	
8	CP632-0320	VESSEL ASSEMBLY	1	
9	C09286	MOTOR,GEAR,DC	1	
10	CP632-0350	HEATER BLOCK ASSEMBLY	1	
11	H-8032	SCREW,THMS,SS,8-32X0.250,PHIL	2	
12	C16626	SCREW,SHCS,SS,1/4-20x0.250	4	
13	C03321	UNION,SS,BHD,1/4TX1/4T,SW	7	
14	C08132	RETAINER,SS,1/4T,BHD	8	
15	CP632-0313	JACKET,INSULATION	1	
16	C17820	BELT,TIMING,XL,3/8in,110T	1	
17	C13325	UN,SS,BH-RED,1/4TX1/8T	1	
18	CP632-0316	HUB,VESSEL SUPPORT	1	
19	CP632-0314	LATCH ASSEMBLY,ROTATION	1	
20	CP632-0315	COLLAR,RETAINING	1	
21	CP632-0317	SHAFT,VESSEL SUPPORT	1	
22	C17625	SCREW,HHMS,SS,5/16-18x1.25L,GR5	4	
23	C13587	SCREW,HHCS,SS,1/4-20X0.375	4	
24	H-6015	SCREW,THMS,SS,6-32X0.375,PHIL	8	
25	C17244	SCREW,HHCS,SS,10-32X0.500,HEX	4	
26	C11476	SCREW,THMS,SS,10-32X0.375,PHIL	11	
27	C17622	SCREW,THUMB,SS,10-32X1/2	3	
28	H-31-104	SCREW,SKHSS,SS,5/16-18X0.75	2	
29	CP632-T27	TUBE 27	1	
30	CP632-T30	TUBE 30	1	
31	C17623	CABLE,TC,J-TYPE,RETRACT	1	
32	C17593	HOSE,SS,PTFE,1/4T,48in	2	
33	C17592	HOSE,SS,PTFE,1/8T,48in	2	
34	CP632-0312	LATCH ASSEMBLY,VESSEL	1	
35	C17624	VALVE,RLF,SS,HOKE,2001-3000 PSI	2	
36	C17819	PULLEY,TIMING,XL,44T	1	
37	CP632-0344	RING,LOCKING,VESSEL	1	
38	C18257	HOSE,SS,PTFE,1/4T,18in	2	
39	C18258	HOSE,SS,PTFE,1/4T,24in	2	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

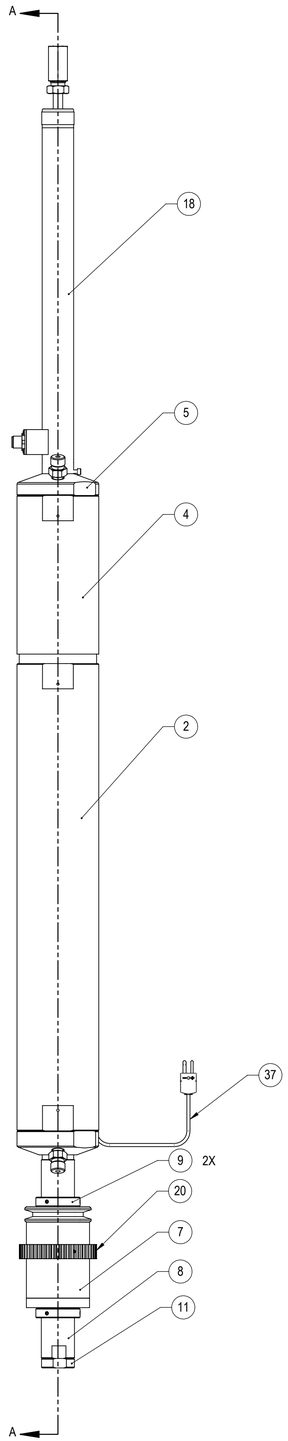
DRAWN: JIM 06-23-17
MFG: DLR 7/26/2017
ENGR: JIM 06-23-17
TYPE:
STRUCT:

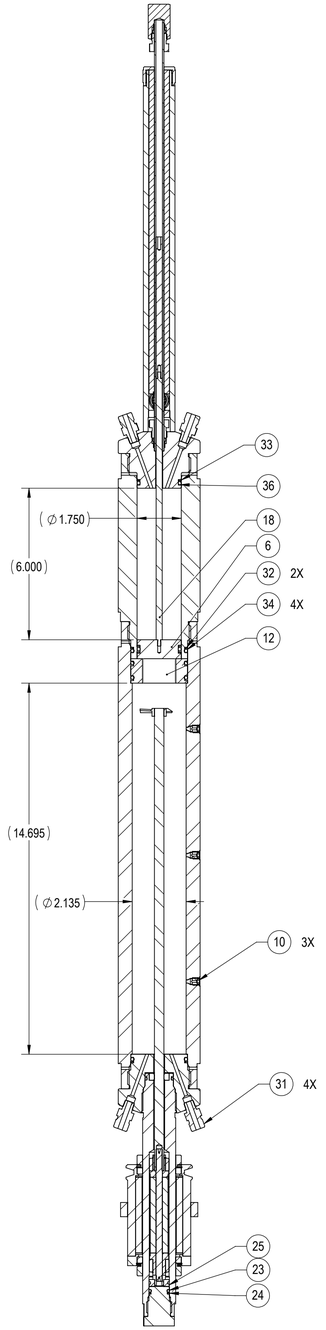
CHANDLER ENGINEERING
HEAD ASSEMBLY
PN: CP632-0300
PROJ: CP632
REV D | SIZE D
SHEET 2 OF 2

TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
B	ECN T7765; UPDATED ASSEMBLY DRAWING DUE TO CHANGE IN CP632-0321	8/10/2017	JJM
C	ECN T7815; UPDATE DRAWING	9/25/2017	JS
D	ECN T7831; UPDATE ASSEMBLY ILLUSTRATIONS	10/5/2017	JJM
E	ECN T8517; CHANGES PER CP632A	5/7/2019	JJM

SPECIFICATIONS:
MAXIMUM PRESSURE: 2000 PSI / 137.9 BAR
MAXIMUM TEMPERATURE: 400 °F / 204 °C
MATERIAL: 316SS
VESSEL VOLUME: 862 mL
RECEIVER VOLUME: 236 mL





SECTION A-A

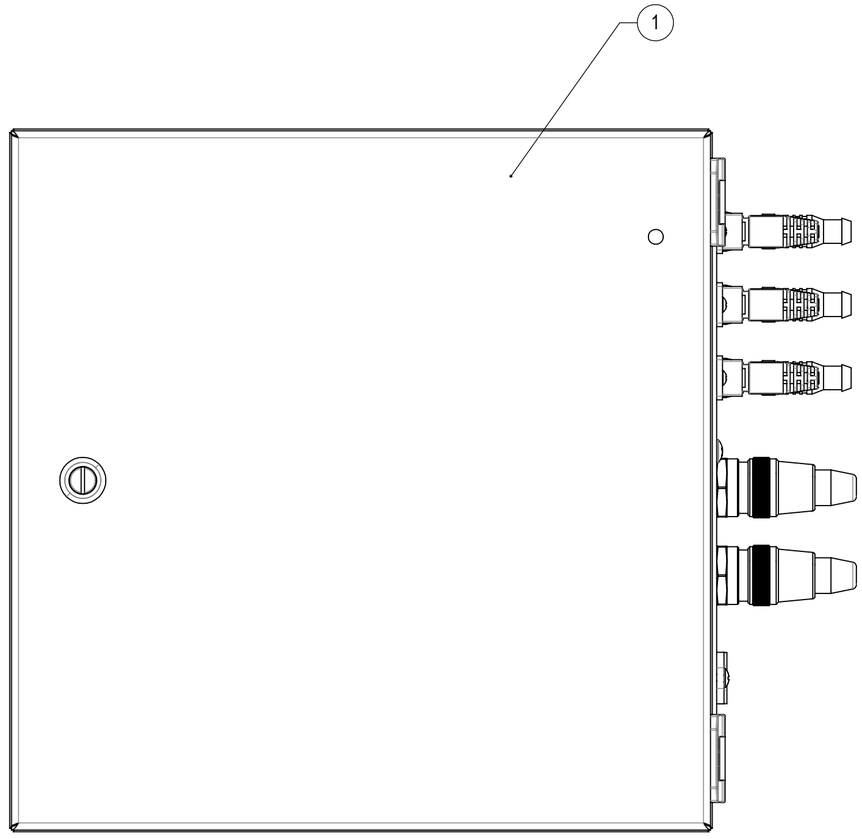
ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0340	VESSEL ASSEMBLY	1	
2	CP632-0340-1	VESSEL,SAMPLE	1	
3	CP632-0340-2	PLUG,VESSEL,SAMPLE	1	
4	CP632-0340-3	VESSEL,RECEIVER	1	
5	CP632-0340-4	PLUG,END,RECEIVER	1	
6	CP632-0340-5	PISTON,RECEIVER	1	
7	7750-0420	MAGNET ASSEMBLY,OUTER	1	
8	CP632-0340-6	HOUSING,MAGNETIC DRIVE	1	
9	7750-0428	RETAINER, HOUSING	2	
10	CP632-0340-8	PLUG,SIDE,VESSEL	3	
11	CP632-0340-7	PLUG,END,MAGNETIC DRIVE	1	
12	CP632-0100-2000	INSERT,SLOT,2000 MICRON	1	
13	CP632-0100-1000	INSERT,SLOT, 1000 MICRON	1	
14	CP632-0100-1500	INSERT,SLOT,1500 MICRON	1	
15	CP632-0100-500	INSERT,SLOT,500 MICRON	1	
16	7750-0416	BEARING, RULON	2	
17	P-3252	RING,RET,EXT,0.500,BASIC	2	
18	CP632-0330	LVDT ASSEMBLY	1	
19	H-8008	SCREW,SKHSS,SS,8-32X0.250,CUP	6	
20	CP632-0334	PULLEY,TIMING,MODIFIED	1	
21	H-6005	SCREW,SKHSS,SS,6-32X0.187,CUP	3	
22	C13046	ORING,VITON,AS119-75,BLACK	1	
23	P-3542	ORING,VITON,AS114-75	1	
24	C17597	RING,PARBAK,2-114,VITON 90D	1	
25	C17595	BEARING,THRUST,BALL,9x20x7	1	
26	CP632-0360	MAGNET ASSEMBLY MODIFICATION	1	
27	CP632-0321	SHAFT,DRIVE,IMPELLER	1	
28	CP632-0320-TEST	PROC,TEST,VESSEL	REF	
29	CP632-0338	SLEEVE,THRUST BEARING	1	
30	CP632-0339	BUSHING,SHAFT	1	
31	C16628	ADPTR,SS,1/4VCOX1/8NPT	4	
32	C18252	RING,PARBAK,2-226,VITON 90D	2	
33	C18254	RING,PARBAK,2-222,VITON 90D	3	
34	C11209	ORING,VITON,AS226-75D	4	
35	H-6034	SCREW,SHCS,SS,6-32X.500,ALLEN	1	
36	C10458	ORING,FLUOROCARBON,AS222-90	2	
37	C16527	TC,TYPE K,0.125X12,MINI CONN	1	
38	C18256	IMPELLER,SS,1.5in x 0.375in BORE	1	

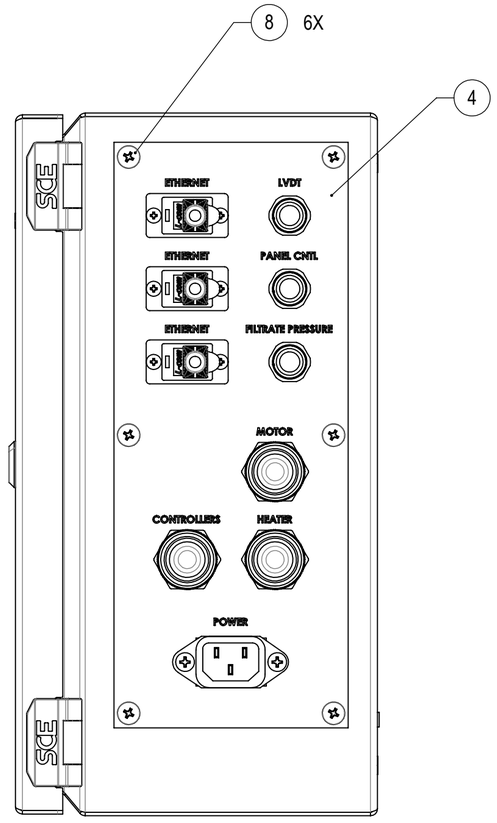
BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 07-20-17
MFG: DLR 7/26/2017
ENGR: JJM 07-20-17
TYPE:
STRUCT:

CHANDLER ENGINEERING
VESSEL ASSEMBLY
PN: CP632-0320
PROJ: CP632
REV E | SIZE D
SHEET 1 OF 1
TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/13/17	JJM
B	ECN T7838; UPDATE ILLUSTRATION	10/9/2017	JJM
C	ECN T7866; DELETED C10481	10/25/2017	JS
D	ECN T8057; ADDED C10128	4/13/2018	JS
E	ECN T8517; CHANGES PER CP632A	5/8/2019	JJM
F	ECN T8738; UPDATE VIEWS	10/29/19	JJM





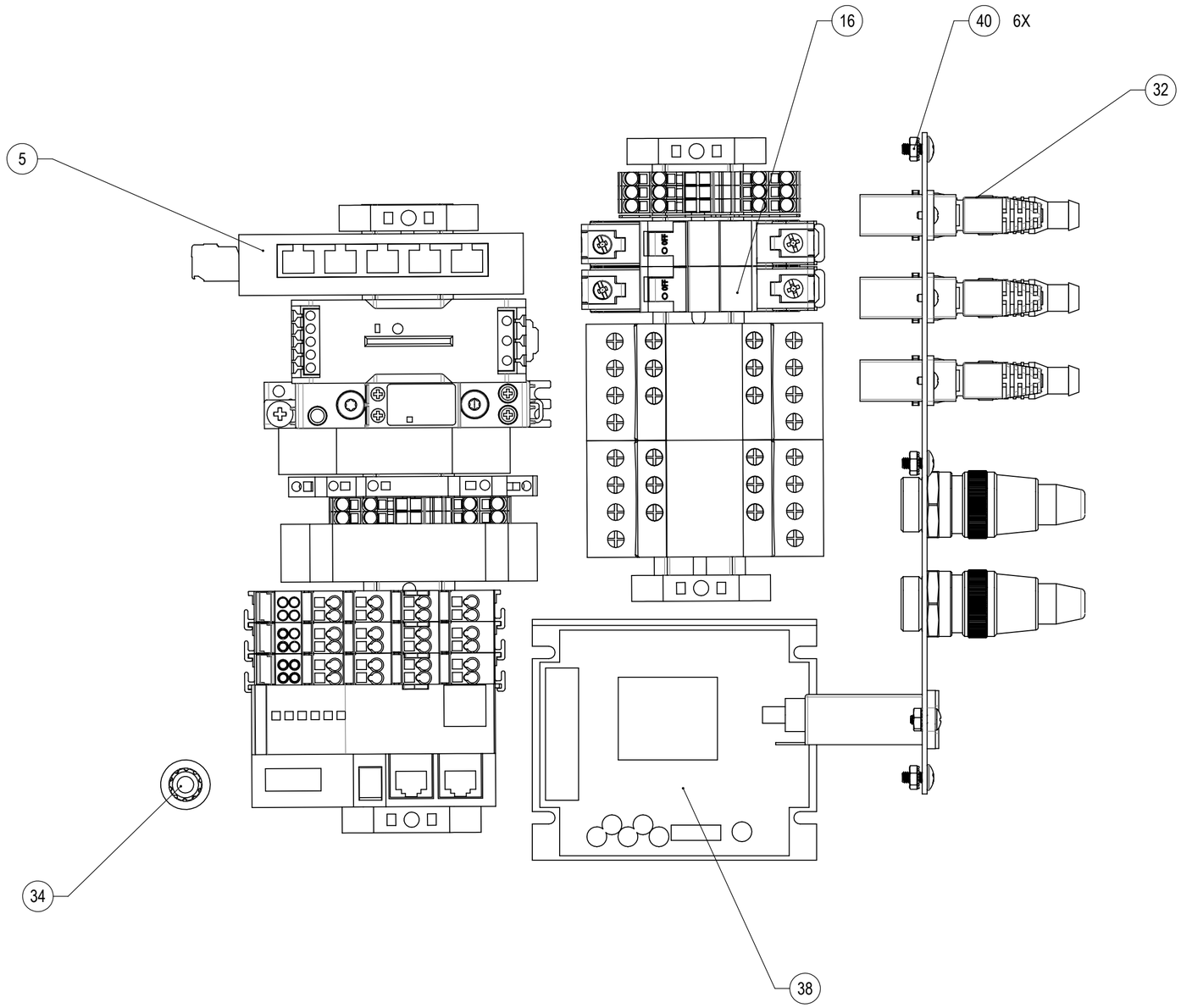
ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0401	ELECTRICAL ENCLOSURE	1	
2	CP632-0402	DIN MODULE ASSEMBLY	1	
3	CP632-0403	POWER MODULE ASSEMBLY	1	
4	CP632-0404	CONNECTOR PANEL ASSEMBLY	1	
5	17-0251	ELECTRICAL GROUND STUD ASSY	1	
6	C16370	CORD,PWR,230VAC,NEMA 6-15P	1	
7	C09287	CONTROLLER,DC CNTRL,MODEL 0865	1	
8	C12105	SCREW,THMS,SS,8-32X0.500,PHIL	6	
9	H-6041	NUT,KEPS,SS,8-32	6	
10	C10128	CABLE,CAT 5 PATCH BLUE 1FT	3	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

CHANDLER ENGINEERING
ELECTRONICS ASSEMBLY
PN: CP632-0400
PROJ: CP632
REV F
SIZE C
SHEET 1 OF 2

TITLE BLOCK REV 3



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0401	ELECTRICAL ENCLOSURE	1	
2	CP632-0402	DIN MODULE ASSEMBLY	1	
3	CP632-0403	POWER MODULE ASSEMBLY	1	
4	CP632-0404	CONNECTOR PANEL ASSEMBLY	1	
5	17-0251	ELECTRICAL GROUND STUD ASSY	1	
6	C16370	CORD,PWR,230VAC,NEMA 6-15P	1	
7	C09287	CONTROLLER,DC CNTRL,MODEL 0865	1	
8	C12105	SCREW,THMS,SS,8-32X0.500,PHIL	6	
9	H-6041	NUT,KEPS,SS,8-32	6	
10	C10128	CABLE,CAT 5 PATCH BLUE 1FT	3	

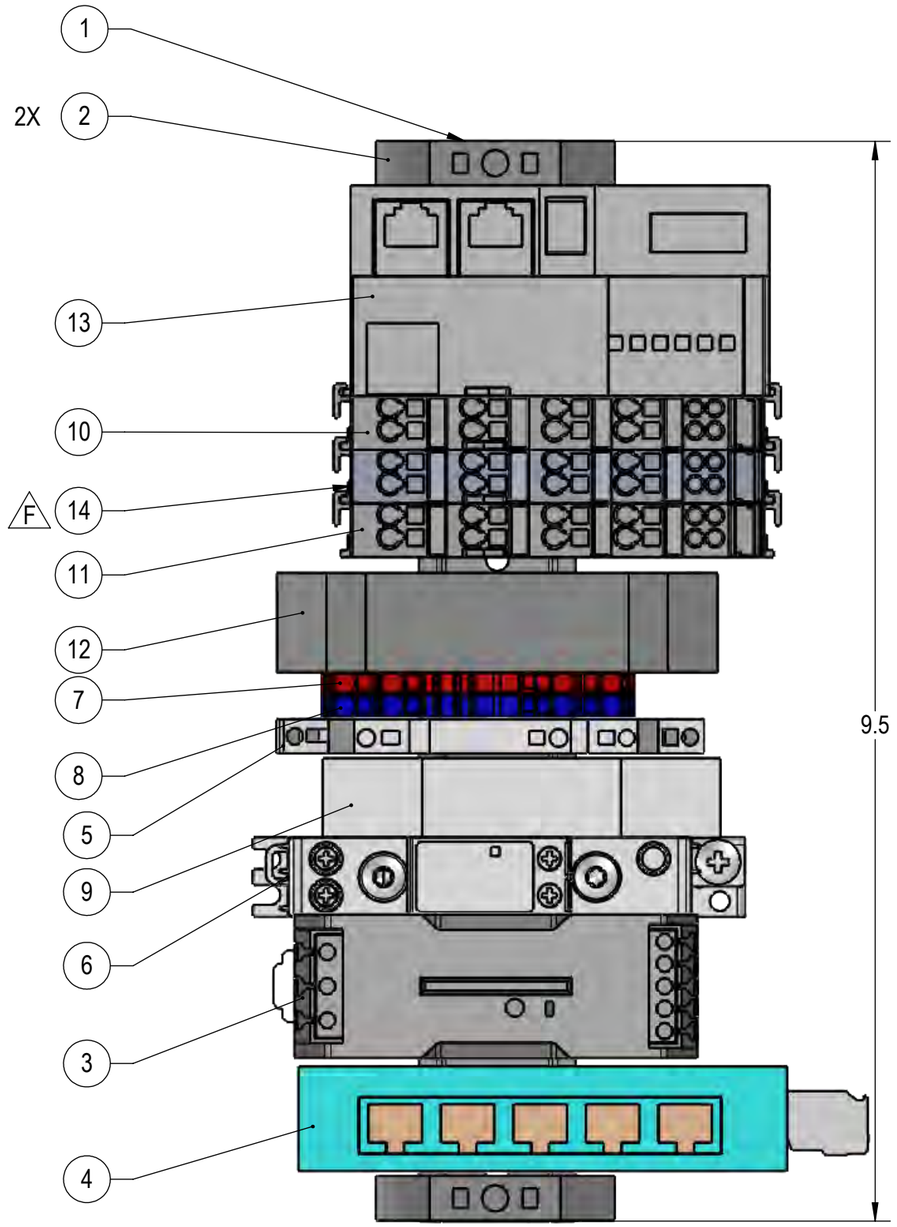
BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

CHANDLER ENGINEERING
ELECTRONICS ASSEMBLY
PN: CP632-0400
PROJ: CP632
REV F
SIZE C
SHEET 2 OF 2

TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/13/17	JJM
B	ECN T7866; ADDED C15158 BREAKER, REARRANGED COMPONENTS	10/13/2017	JJM
C	ECN T8201; REPLACED C17028 W/ C11579	8/2/2018	JS
D	ECN T8517; CHANGES PER CP632A	5/8/2019	JJM
E	ECN T8538; CHANGED WAGO MODULE TO C16025	5/21/2019	JJM
F	ECN T8738; ADDED QTY 1 ZC11929, LENGTHED DIN RAIL TO 9.5-IN	10/29/2019	JJM



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	C07994	DIN RAIL,35MM	0.79	
2	C08226	STOP,END,DIN RAIL	2	
3	C11579	POWER SUPPLY,24VDC,2.5A,DIN	1	
4	C16095	SWITCH,ETHERNET,5 PORT 100BASE	1	
5	C11228	RELAY,SPDT,30V,5A,DIN RAIL	1	
6	C16893	RELAY,SPDT,24VAC/DC,DIN,20AMP	1	
7	C13967	BLOCK,TERM,DIN,2002,4 COND,RED	1	
8	C13968	BLOCK,TERM,DIN,2002,4 COND,BLU	1	
9	C15158	BREAKER,5A,TYPE D,DIN,1P	1	
10	C11907	MODULE,WAGO,0-20MA,2CH,16BIT	1	
11	C10998	MODULE,WAGO END,750-600	1	
12	C11353	MODULE,LVDT	1	
13	C16025	MODULE,WAGO,ETHERNET FIELDBUS	1	
14	ZC11929	MODULE,AN IN,WAGO 750-477	1	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

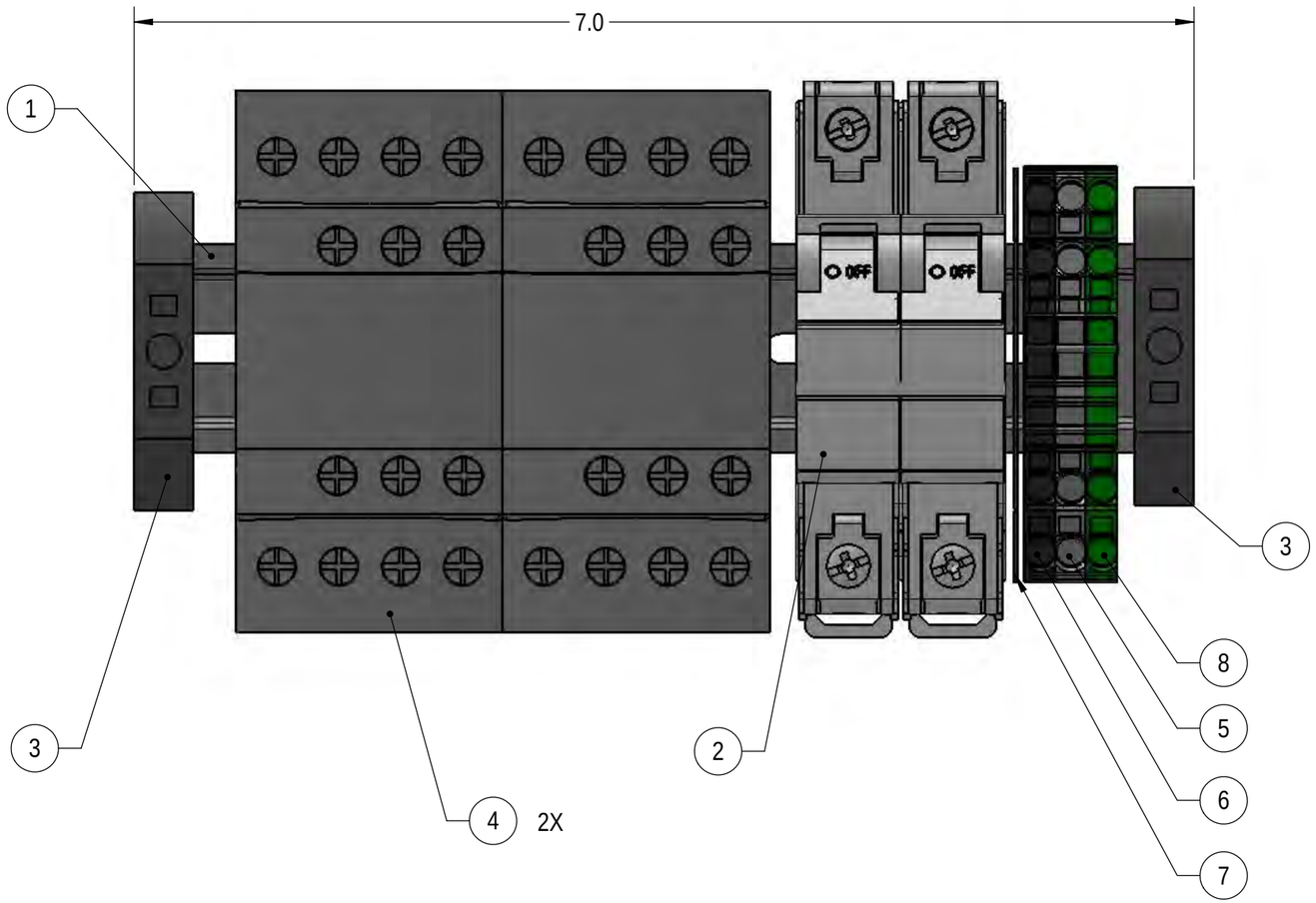
CHANDLER ENGINEERING

DIN MODULE ASSEMBLY

PN: CP632-0402 REV F SIZE B
PROJ: CP632 SHEET 1 OF 1

TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/13/17	JJM
B	ECN T7866; REARRANGED COMPONENTS ON DIN RAIL	10/13/2017	JJM



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	C07994	DIN RAIL,IDEC BAM-1000	0.58	
2	C16079	BREAKER,15A,TYPE D,DIN,2P	1	
3	C08226	STOP, END, DIN RAIL	2	
4	C17332	CONTACTOR,3PST,24VDC COIL,25A,DIN	2	
5	C13965	BLOCK,TERM,4 COND,GRAY WAGO 2002-1401	1	
6	C13969	TERMINAL BLOCK,4 COND,BLACK	1	
7	C13971	END PLATE,WAGO 2002-1492	1	
8	C13970	TERMINAL BLOCK,4 COND,G/Y	1	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

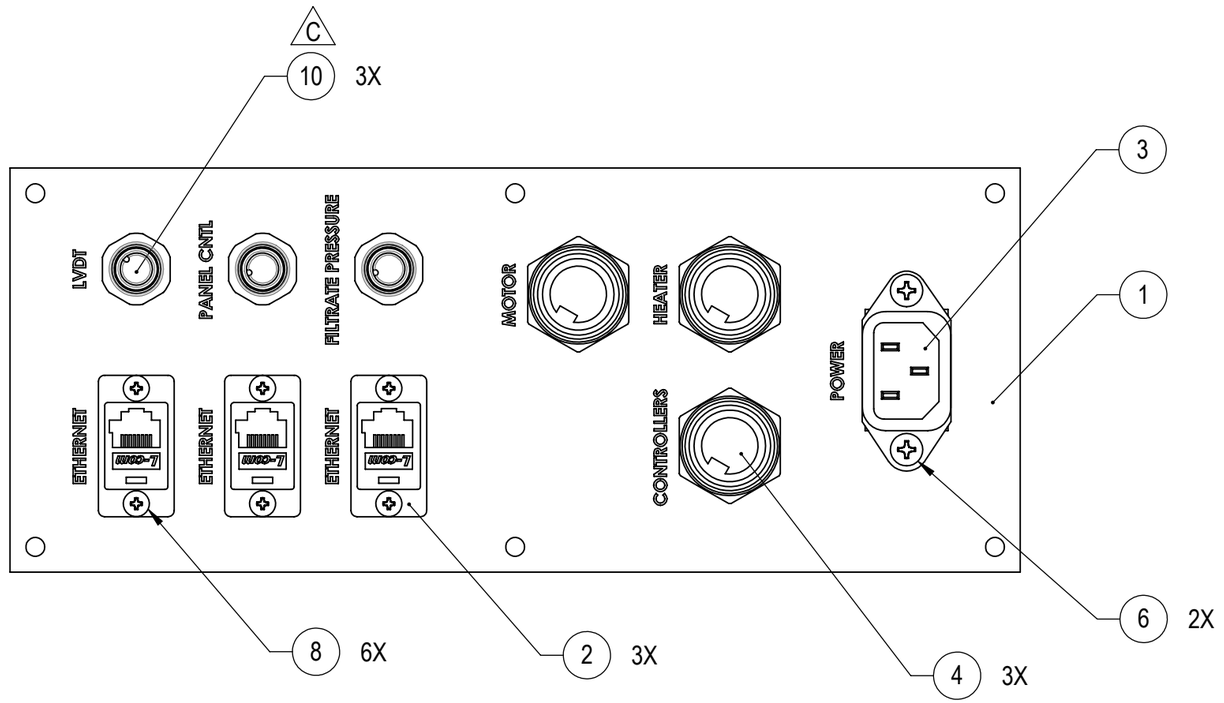
CHANDLER ENGINEERING

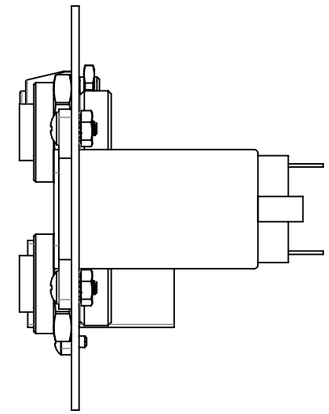
POWER MODULE ASSEMBLY

PN: CP632-0403 | REV B | SIZE B
PROJ: CP632 | SHEET 1 OF 1

TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/13/17	JJM
B	ECN T7801; REMOVED C17209	9/13/2017	JJM
C	ECN T7838; CHANGED LVDT CONN TO C11025	10/9/2017	JJM
D	ECN T8538; ADDED QTY 1 C11025 AND QTY 2 C17642	5/21/2019	JJM





ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0405	PANEL,SIDE	1	
2	C09712	CONN,BULKHEAD RJ45,BLACK PLSTC	3	
3	70616-90	MODULE,PWR ENTRY,250V,15A,FLTR	1	
4	C15396	RCPT,TURCK,RFK 30-2M/NPT, W/LN	3	
5	C17618	CABLE,TURCK RS 30-2M	3	
6	H-6015	SCREW,THMS,SS,6-32X0.375,PHIL	2	
7	H-6041	NUT,KEPS,SS,6-32	2	
8	C17001	SCREW,THMS,SS,4-40X0.250,PHIL	6	
9	C15491	CABLE,RJ45,CAT5E,W/BOOT,1' BLK	1	
10	C11025	RCPT,CONN,FEM,8PIN	3	
11	C10185	CABLE,ETHERNET,6FT,BLACK	3	
12	C17642	CABLE,8 COND,FEM,TURCK	3	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

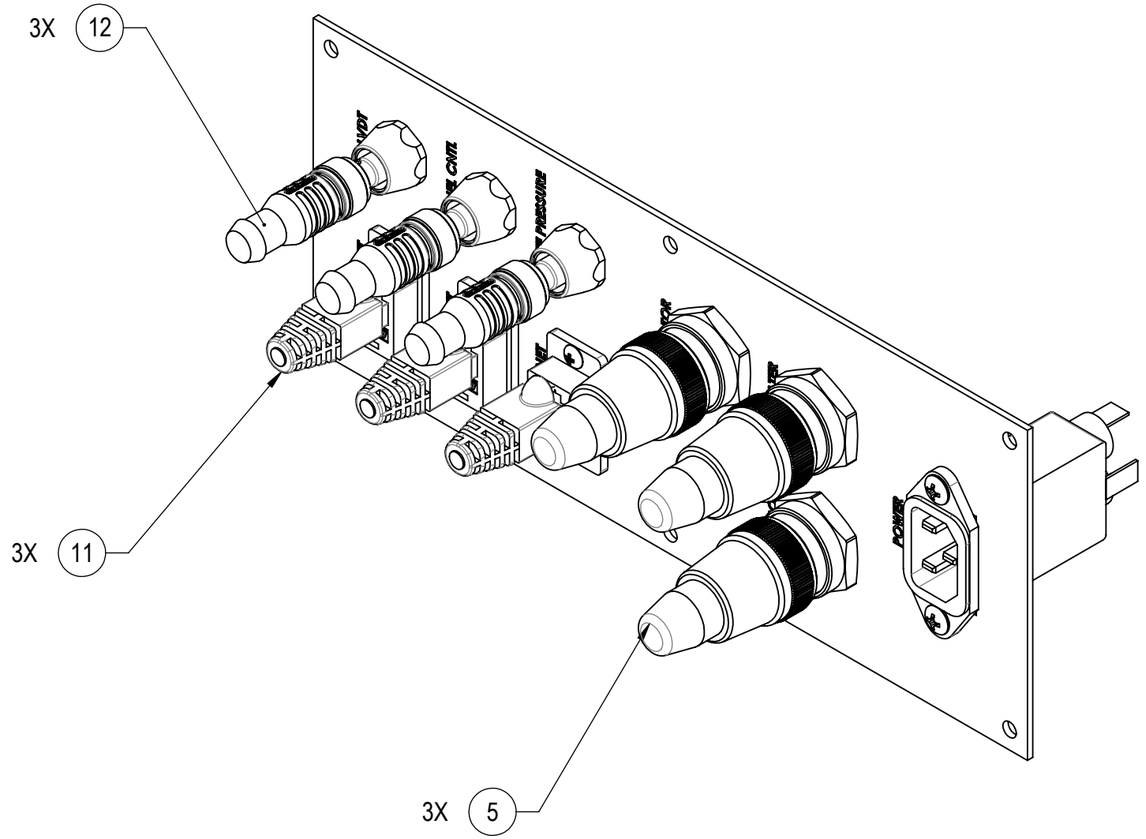
DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

CHANDLER ENGINEERING

CONNECTOR PANEL ASSEMBLY

PN: CP632-0404 | REV D | SIZE B
PROJ: CP632 | SHEET 1 OF 2

TITLE BLOCK REV 3



BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

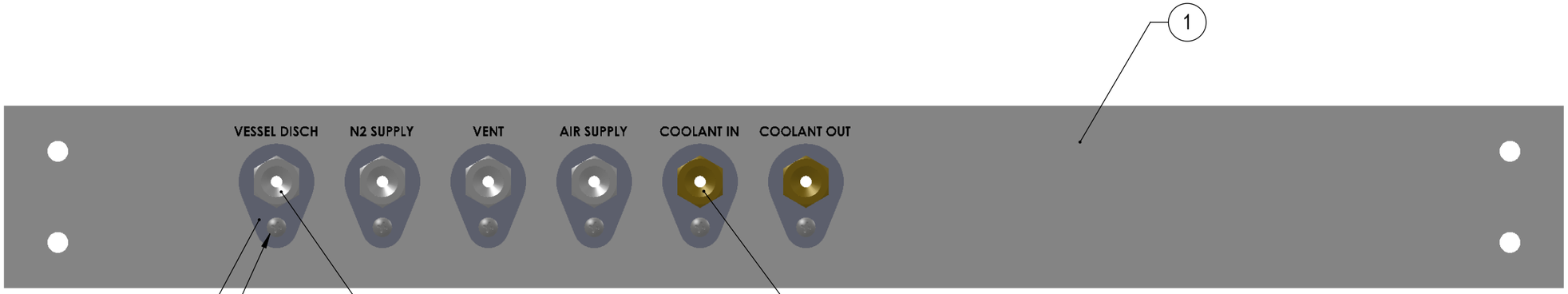
CHANDLER ENGINEERING

CONNECTOR PANEL ASSEMBLY

PN: CP632-0404 | REV D | SIZE B
PROJ: CP632 | SHEET 2 OF 2

TITLE BLOCK REV 3

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED	06/13/17	JJM



ITEM	PART NUMBER	DESCRIPTION	QTY	UoM
1	CP632-0501	PANEL,REAR	1	
2	C08268	RETAINER,SST,3/4ID,BHD,SW	6	
3	C09283	CONN,SS,1/4FPX1/4T,BHD,SW	4	
4	P-1954	FITTING, SWAGELOK, B-400-71-4	2	
5	H-6015	SCREW,THMS,SS,6-32X0.375,PHIL	6	

BREAK EDGES, DEBURR
UON DIMS ARE IN INCHES
1 PLC ±0.030 2 PLC ±0.010
3 PLC ±0.005 ANGL ±1/2°
SURFACE FINISH 63 RMS
THIRD ANGLE PROJECTION

DRAWN: JJM 06-23-17
MFG: DLR 7/25/2017
ENGR: JJM 06-23-17
TYPE:
STRUCT:

CHANDLER ENGINEERING

REAR PANEL ASSEMBLY

PN: CP632-0500 REV A SIZE B
PROJ: CP632 SHEET 1 OF 1

TITLE BLOCK REV 3