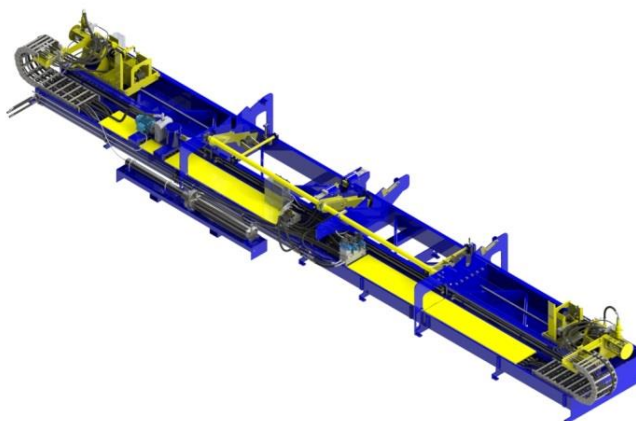


HUB CITY
IRON WORKS

HYDROSTATIC TESTING UNIT

Operation and Maintenance Manual

HTM-2000



Hub City Iron Works
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Customer: _____
Location: _____
Job #: _____
Local Rep: _____
Rep Phone # _____
Document # _____

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Service

Call: 337.334.6969

Email: servicerequest@hubcityironworks.com

Spare Parts

Call: 337.334.6969

Visit: www.hubcityironworks.com

Sales

Call: 337.334.6969

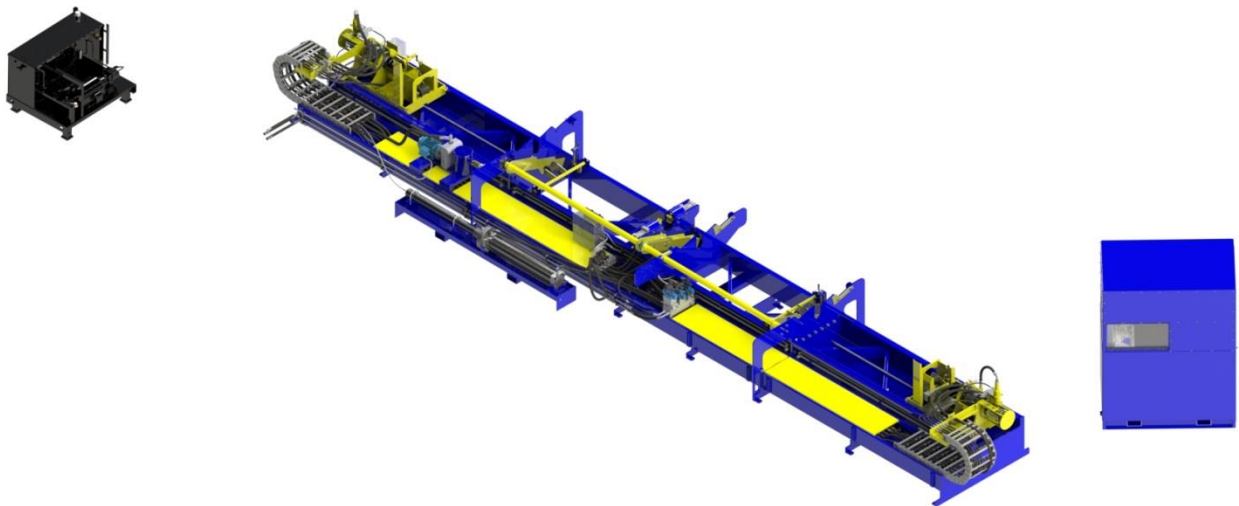
Email: sales@hubcityironworks.com

Introduction

HTM -2000 SEMIAUTOMATIC HYDROTEST MACHINE

Hub City Iron Works' Hydrostatic Testing Unit is a safety oriented product used to pressure test tubing and premium connections up to 20,000 PSI in order to meet API standards. The unit utilizes test plugs with motorized rotation allowing for appropriate torque application, ultimately enabling high quality and consistent test operations. The HTM-2000 is an excellent choice for safely testing tubing and premium connections.

- Pressurizes tubing and premium connections up to 20,000 psi in accordance with API test standards
- Controlled by a single operator within a safety cage featuring a door operated safety switch
- Control station is PLC controlled to minimize human error.
- Test cycle for a joint of tubing can be as quick as two minutes
- Automated loading and off-loading of pipe
- Pipe lock-down mechanism to secure pipe during testing
- Water is recycled after each test
- Robust construction for demanding oilfield use with moving parts painted "safety yellow"



Safety

Hub City has provided operating procedures and safety information to ensure the wellbeing of both the operator and the equipment.

This operating manual contains important safety information - please read it thoroughly.

Safety Features Include:

- Mechanically active components are painted safety yellow.
- Low oil level indicator protects machinery in the case of a hydraulic line rupture.
- Low voltage operator interface (24vdc).
- Equipment safety labels.
- Operator safety cage with door activated switch



Machine Specifications

Standard Features

- Operator controlled loading and unloading of pipe.
- Hydraulic power supply
- Range 2 pipe standard
- Safety cage for operator only

Specifications

- Standard capacity (others available at customer request)
 - 2-3/8" 8RD
 - 2-3/8" MS6
 - 2-7/8" 8RD
 - 2-7/8" MS6
 - 3-1/2" 8RD
 - 3-1/2" MS6
 - 4-1/2" MS6
- Test module
 - Length 46' 6"
 - Width 7' 6"
 - Height 42"
 - Ship Weight 18,000lbs
- Hydraulic Power supply
 - Length 6'7"
 - Width 6'6"
 - Height 3'4"
 - Weight 5000lbs
- Operator Cage
 - Length 7'
 - Width 4' 2.5"
 - Height 6'4"
 - Weight 3000lbs

Pipe Plant Requirements

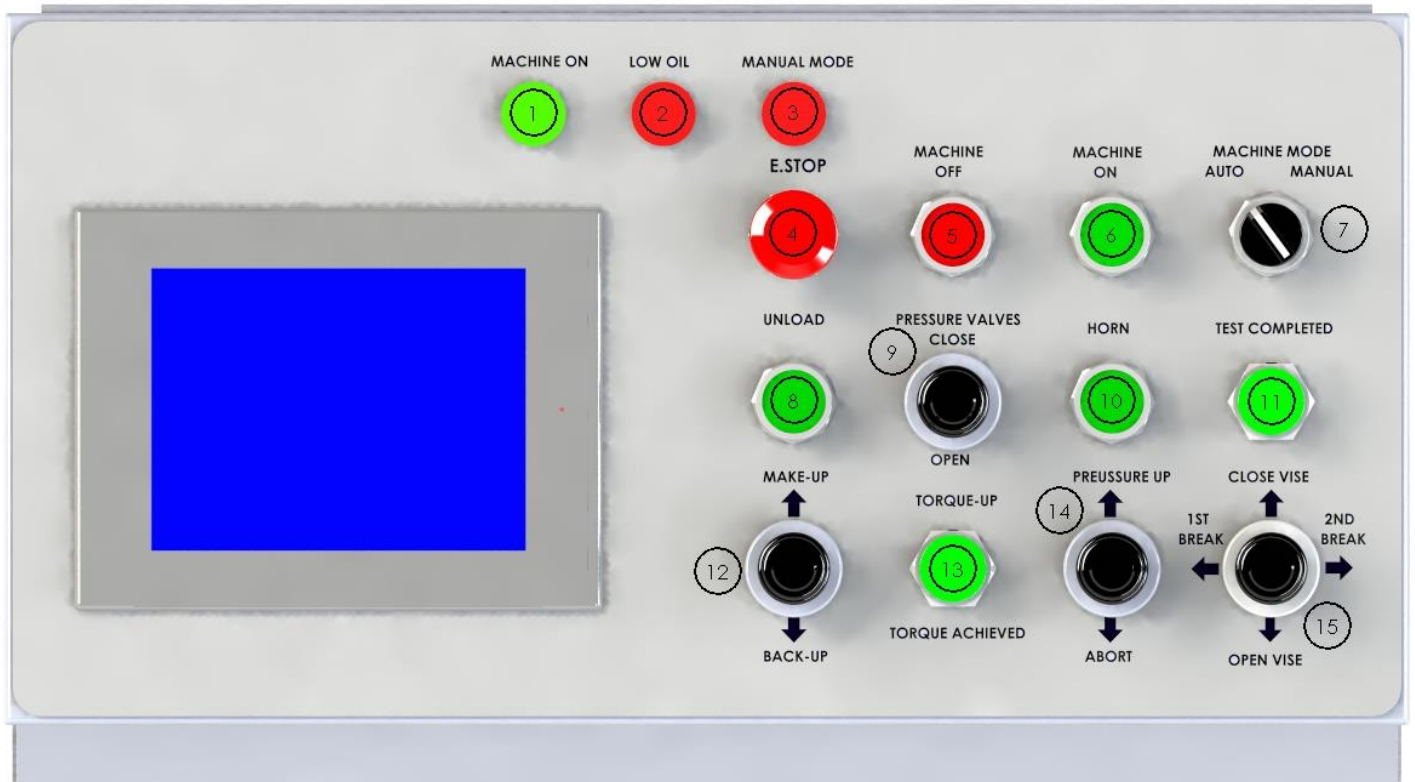
- Electrical 230/480V, 3 Phase, 60 Hz 48 Kilowatts
(Others available upon request)
- Rack height 42"

Machine Setup

1. A site inspection by Hub City personnel is required prior to installation. Failure to do so can lead to prolonged installation times.
2. It is required that a Hub City representative be present during the installation and initial operation of the machine.
3. Machine is to be installed on flat and level concrete. A foundation study by a qualified civil engineer is recommended to protect personnel and equipment. It is recommended that a fresh water source is located nearby. It is also recommended that a cover be built over all equipment to protect the machine and operator from the elements.
4. Machine is to be leveled on both axes using shims or epoxy grout and also squared off to pipe rack as required. Maximum test module's out of level to be 1/2 inch per 50-1/2 feet along the length of the machine. Maximum test modules' out of level to be 1/8 inch per 10 feet along width of the machine. Maximum allowable frame twist or soft foot is 1/8 inch.
5. Drill and install concrete anchors into slab according to bolt pattern print.
6. Torque down bolts as required.
7. Install power supply according to general layout drawing. Hydraulic power supply is to be leveled and anchored to foundation.
8. Install Operator safety cage according to general layout drawing. Tester module should be in visible range of Operator cage so that an operator can identify any problems with leakage or other defects. Operator cage to be level and anchored to foundation.
9. Hydraulics to be installed and tested by a qualified technician. See page 33 for hydraulic schematics
10. Electrical to be installed and tested by a qualified technician. See pages 26-32 for electrical schematics.
11. A Factory acceptance test that is performed or witnessed by a Hub City representative is required during commissioning.

Controls

Standard HTM-2000 Controls



(Standard Control Layout – Specific Control Locations May Change)

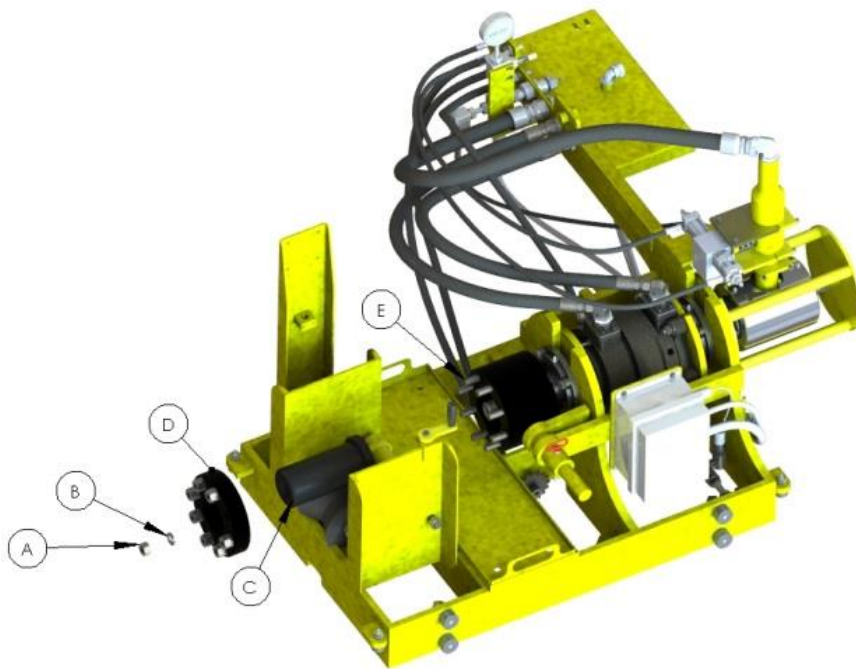
	<u>Function</u>	<u>Description</u>
1	Machine On Light	Indicates machine is powered on
2	Low Oil Light	Indicates a low oil state. Power down machine and refill.
3	Manual Mode Light	Indicates machine is in manual mode
4	E. Stop	Emergency stop button
5	Machine Off Button	Turns machine off
6	Machine On Button	Turns machine on
7	Machine Mode Switch	Toggles machine between Auto and Manual mode
8	Load / Unload Button	Loads / Unloads test pieces
9	Pressure Valves Close	Closes pressure valves
10	Horn	Sounds horn
11	Test Complete Light	Indicates test is complete
12	Make-Up / Back-Up	Make-Up: Makes up test piece Back-Up: Breaks out test piece
13	Torque-Up / Torque Achieved	Torque-Up: Torques up work piece Torque Achieved: Indicates torque has been attained
14	Pressure Up / Abort	Brings test piece up to test pressure or aborts test
15	Close/Open Joystick	Close Vise: Closes vice on work piece Open Vise: Opens vice on work piece 1 st Break: Hi torque initial break out, carts don't move 2 nd Break: Hi speed low torque to complete breakout operation

Process Setup

Follow the Process Setup procedure each time a new pipe size or type is to be tested. Failure to do so can damage the test piece, the equipment or cause bodily injury.

Changing Test Plug

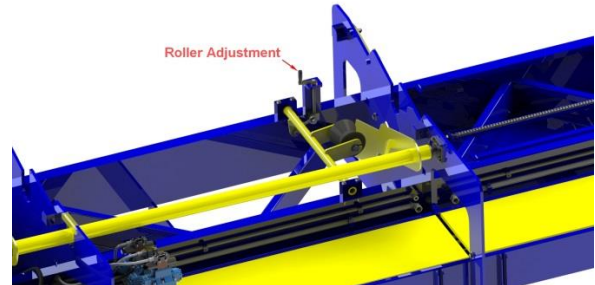
1. When loading the first pipe, or changing pipe sizes or connections, the test plugs(C) need to be changed accordingly.
2. Lock out/Tag out machine to prevent bodily harm.
3. Inspect test plugs to insure that the correct plug is installed or is being installed to test the upcoming connections
4. Inspect test plugs to ensure that there is no unacceptable damage according to API specifications. Damage to the test plugs can damage the pipe connections. It can also cause bodily injury or death
5. Remove the eight hex nuts (A) and washers (B) holding the outer flange (D) of the mandrel.
6. Remove the outer flange.
7. Remove the test plug and store appropriately. Remove O-ring.
8. Replace O-ring.
9. Install new test plug and matching flange.
10. Inspect studs and nuts for damage and wear.
11. Apply anti-seize compound to the studs (E) to prevent thread galling and corrosion.
12. Install selected test plug. Reinstall flange and hex nuts.
13. Torque hex nuts between 320 and 430 foot pounds.



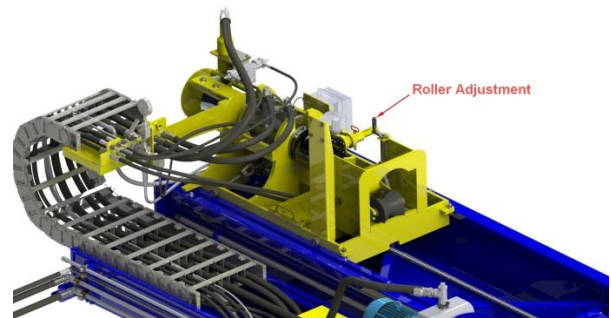
V Roller adjustment

The V roller pipe supports are designed to support the test piece at an elevation that allows the test plugs to mate with the box or pin without damaging the connections.

1. Clear rollers of test pipe. Raise center V rollers so that pipe rests above centerline. Lower both car V rollers until they bottom out.
2. Load first test piece into machine. Bring in cars so that test plugs are in close proximity to each end of pipe. Pipe may need to be bumped over to the center of machine. Pipe upset must be between the roller and the test plug.
3. Adjust the center rollers until the pipe is on or slightly below center line of test plugs.
4. Manually adjust the car V rollers until the test piece is in line with the test plugs.



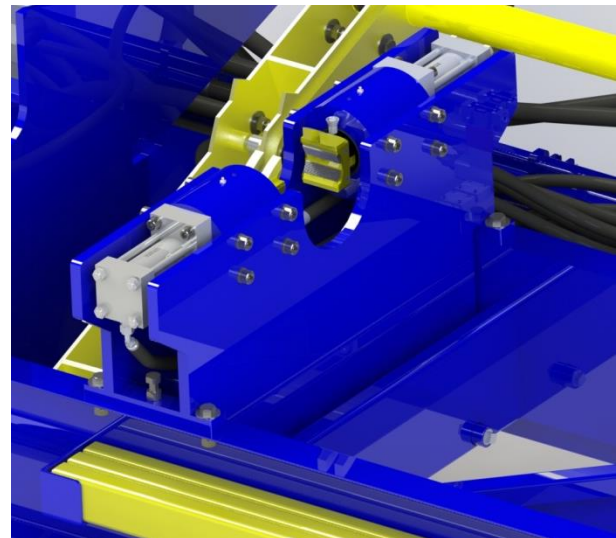
Center V roller adjustment



Car V roller adjustment

Pipe Vise adjustment

1. Clear all pipe from load racks.
2. **Vise is factory set and should require little to no adjustment throughout its use.**
3. The HTM-2000 comes equipped with a die that handles tubulars from 2-3/8" to 4-1/2".
4. Die holders can be removed by pressing the button on the top of the stainless half inch pin and pulling up simultaneously.
5. After removing die assembly, remove the 2 screws holding the end plate.
6. Replace die.
7. Reinstall by assembling parts in the reverse order that they were removed.



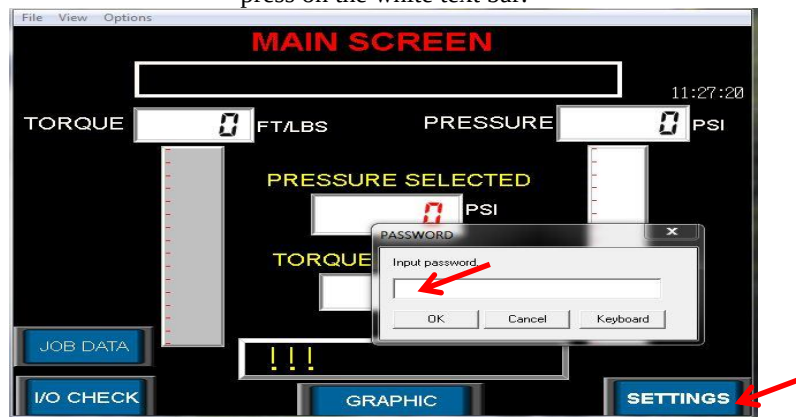
Rack adjustment

1. Pipe diameter tab may need adjustment for pipes of different diameter. Loosen bolts on load plates. Move plates as required so that load arms grab only one pipe at a time. Tighten bolts as required. Test pipe should come into contact with all three load plates

Startup

1. Before starting, ensure that all daily maintenance is completed.
2. Load pipe onto pipe rack.
3. Remove thread protectors. Visually inspect threads for damage.
4. **Blow compressed air through each test piece to remove any debris in test piece. Failure to do so will cause damage to the machine's seals and prevent it from holding pressure.**
5. Apply pipe dope to threads.
6. Enter test cage and close door.
7. Follow the menu options to select pipe size, grade, connection type, torque, pressure and test time. (See below for detailed menu instructions)

To select pipe, press the “SETTINGS” key, then press on the white text bar.



Enter the correct Password using the keypad.
Press “ENTER”, then “OK”



Press "PIPE SELECT".

PRESSURE AND TORQUE SETUP

Test Pressure: 0 PSI

Test Torque: 0 FT-LBF

Test Time: 0 SEC

Press the desired pipe to be tested

SCREEN SELECT PIPE

2-3/8" TUBING PH-6	3-1/2" TUBING PH-6
2-3/8" TUBING 8-RD	3-1/2" TUBING 8-RD
2-7/8" TUBING PH-6	4-1/2" TUBING PH-6
2-7/8" TUBING 8 RD	

Press "YES" to confirm the Pipe selected

SCREEN SELECT PIPE

2-3/8" TUBING PH-6	3-1/2" TUBING PH-6
2-3/8" TUBING 8-RD	3-1/2" TUBING 8-RD
2-7/8" TUBING PH-6	4-1/2" TUBING PH-6
2-7/8" TU	

4-1/2" TUBING PH-6 IS CORRECT?

Press “DONE”, then press “YES”



Process

1. Sound horn by pressing the horn button, if available, (Control #10) to warn nearby personnel. Be sure all personnel are a safe distance away from machine before proceeding.



2. Hit “Machine On” (Control #6). This will turn on the hydraulic system. Let the machine run until the hydraulic oil comes up to temperature, normally five minutes. The hydraulic system will typically quieten once warmed up.
3. With the pipe on the rack, actuate the Load / Unload button (Control #8). This will load the pipe onto the machine and simultaneously unload the test piece currently on the machine.
4. Activate the Make-Up joystick (▲ Control #12) until both motors stop. You may be required to hit the Back-Up joystick (▼ Control #12) if threads do not engage properly.
5. Press and hold the Torque-Up button (Control #13). It will tighten the connections according to the size and connection type selected previously on the interface screen.
6. After torque is reached, the machine will automatically begin filling the test piece with water. All air must be allowed to escape. As all of the air exits, the water exiting the tube will become less turbulent and air will stop coming out. The pressure gauge on the control console needs to be at least 70 psi before continuing to the next step. It will also activate the safety clamp.
7. Actuate the Pressure-Up joystick (▲ Control #14). Keep the actuator engaged until peak pressure is reached. The tester will automatically stop at set pressure. Release the controller. If an issue occurs during the pressurization process, actuate the abort button to depressurize the test piece. The Test Complete Light (Item #11) will illuminate when test is completed. Tester will automatically depressurize once complete.
8. Close the vise by actuating the Close Vise joystick (▲ Control #15).
9. Push 1st Break joystick (◀ Control #15). High torque will be applied to remove the test plugs. Activate until both test mandrels break loose.
10. Push 2nd Break joystick (▶ Control #15). The carts will move away from the test piece and the test pieces will finish unthreading.
11. Push Open Vise (▼ Control #15) to open vise.
12. Actuate the Load/Unload Button (Control #8) again to repeat the process.

Preventative Maintenance Procedure

	Hydrotester Daily Preventative Maintenance							
Company: _____ Location: _____ Machine No.: _____ Week of: _____								
Instructions: Inspect each item at the start of each shift - initial next to block after task is complete For more detailed information consult operators manual.								
Day	Inspect control console (1) touch screen for loose wires and proper function (2) switches and joysticks for loose and/or broken wires	Inspect j-boxes (1) loose wires	Inspect load/unload arms (1) cracks, bent parts, and excessive wear (2) broken bearings or loose grease fittings (3) hydraulic cylinder and hoses for leaks	Inspect vise (1) cracks, bent parts, and excessive wear (2) pipe jaws for wear and missing parts (3) hydraulic cylinder and hoses for leaks	Inspect low car (1) frame for cracks or bent parts (2) pipe adjustment roller and bearing for wear and grease them (3) hoses and fittings for leaks (4) drive chain and sprockets for wear (5) rotary coupling for leaks (6) all other bearings for wear and grease them (7) Clean excess pipe dope off trays	Inspect high car (1) frame for cracks or bent parts (2) pipe adjustment roller and bearing for wear and grease them (3) hoses and fittings for leaks (4) drive chain and sprockets for wear (6) all other bearings for wear and grease them (7) Clean excess pipe dope off trays	Inspect power supply (1) all fittings and hoses for leaks (2) electrical panel for loose wires (3) low oil switch functions properly (4) Check oil levels in hydraulic reservoir (5) Check return filter pressure gauge while make-up motors & loaders are operating	Inspect Water System (1) all piping for leaks/cracks (2) Trough for debris. Clean at first sign of contamination (Critical to performance)
1								
2								
3								
4								
5								
6								
7								
Comments:								



Hydrotester Yearly Preventative Maintenance

Company: _____
Location: _____
Machine No.: _____
Week of: _____

Instructions:
Inspect each item at the start of each shift - initial next to block after task is complete
For more detailed information consult operators manual.

Year	Power Supply (1) Drain hydraulic reservoir & clean w/ suitable solvent. (2) Remove suction strainer & clean w/ solvent	Machine Alignment (1) Verify machine is aligned properly. Correct if necessary	Winterizing (1) Remove plug on water pump & strainer & drain water at night to prevent freezing (2) Antifreeze may be added to lower freezing point							

Comments:

Trouble shooting guide

Problem	Corrective Action
Tester fails to hold pressure	Attempt test on different pipe Check test plug for damage Check and replace rotary coupling seals(part # 13993, 13994) Inspect check valve O-ring on high side (part # 14076) Check rotary coupling shaft O-ring (part #13993) Check rotary coupling shaft for wear (part #13914) Inspect check valve O-rings on low side (part # 14076) Inspect intensifier seals(part #37230, 37421) Check and replace test plug/mandrel O-ring(part# 37249) <u><i>(Debris in system water is a major contributing factor to pressure loss and care should be taken to keep system water clean)</i></u>
Mandrels fail to make up	Check thread profile, if necessary recut threads
Machine fails to reach specified torque	Check system pressure Call service representative
Jaws fail to grip pipe	Check dies for wear, replace if necessary If dies are dirty, clean and reattempt
Clamp is denting pipe	Check system pressure Check wall thickness of pipe

Parts List

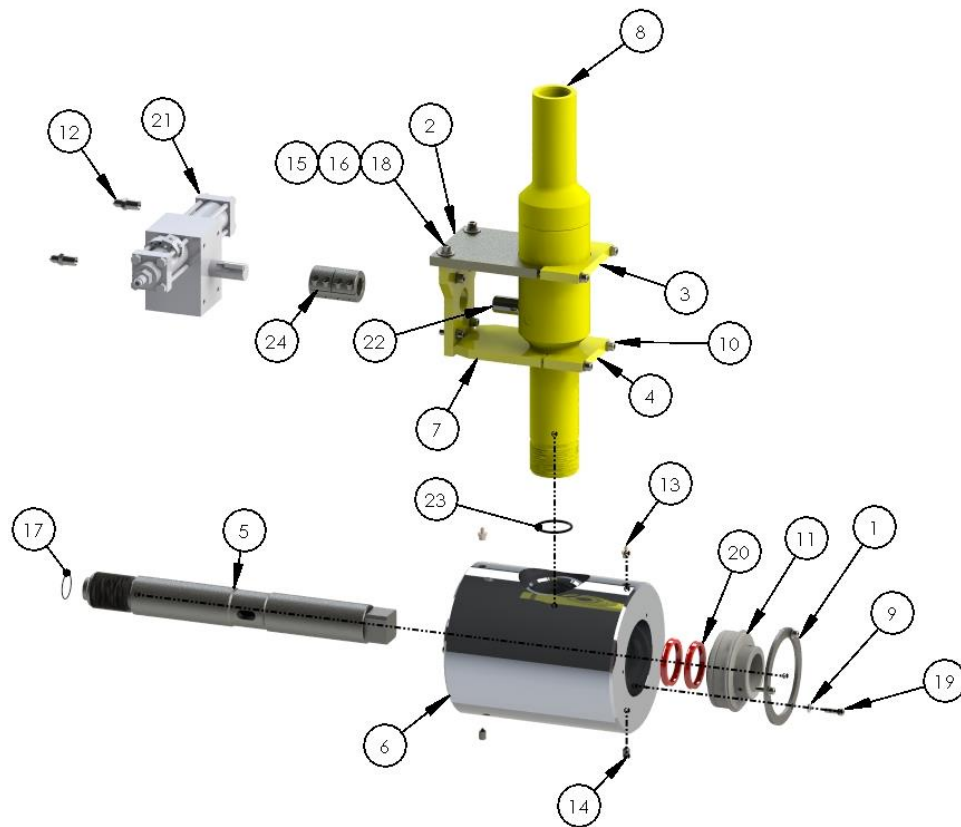
Recommended Spare Parts

LEVEL A		
Stocked on Location & KMI		
NAME	QTY	SAP#
Limit Switch Arms, LSZ52D	2	14113
Fuse, MDL-2 2A	10	17480
SEAL, POLY PACK	10	13993
RING, BACKUP	10	13994
ROCKET BODY/SEAT ORING	10	14075
ROCKET SEAL ORING	10	14076
RINEER / ROTARY SHAFT ORING	10	21380
CHECK VALVE SEAT	1	24139
ROCKET CAP	1	21147
ROCKET BODY	1	24137
FILL SIDE SPRING	1	24144
FLANGE/FLANGE ORING	30	29046
FLANGE /PLUG ORING.	30	37249
9.5 OD SML PLUG FLANGE	1	37268
9.5 OD LG OD PLUG FLANGE	1	24205
FLANGE ALL THREAD ROD	4	29133
RINEER MAIN BEARING	2	14598
CART LARGE CAM FOLLOWER	2	27201
CART SMALL CAM FOLLOWER	2	14601
INTENSIFIER BUSHING	2	29275
INTENSIFIER BACKUP RING	12	37230
INTENSIFIER SEAL	12	37241
DUMP SIDE CHECK BODY	1	21306
DUMP SIDE CHECK SEAT	1	24133
DUMP SIDE SWIVEL	1	22342
WISE DIES	*	
PIPE ROLLER RUBBER WHEEL	1	13630
RUBBER ROLLER BEARING	2	14599
TEST MANDRELS	*	
Level B		
0-3 days delivery		
NAME	QTY	SAP#
Pressure Transducer,GT1850 Series 4-20mA	1	24691
Load Cell,RDE900-3MTNTL-166 Output 4-20mA	1	24692
PLC, 40I/O CP1H	1	16823
PLC Expansion I/O Unit	1	16375
8 port Ethernet Switch(MOXA)	1	16479
Ethernet Device, CP1W-CIF41	1	15285
Amplifier,DRC1-A06 DinRail	1	24763

Power Supply, 480v/24vdc Power Supply 20A	1	24184
Contact, 24vdc coil ;25HP,50A	1	14974
Thermal Overload relay (22-26A)	1	17014
Thermal Overload relay(26-32A)	1	17022
Contact, 24vdc coil ; 15hp,32A	1	16444
Thermal Overload Relay(5-8A)	1	17024
Joystick, Two ways Joystick	1	17309
Joystick, 4 ways Joystick	1	17311
Relay, 8 pins 2 Pole 24vdc Coil	1	17001
Relay, 11 pins 3 Pole 24vdc Coil Relay	1	17002
Limit switch, adjust Lever, 5A 230vAC	1	17397
Limit switch, Plunger Actuated	1	17403
Relay ,24vdc 1PDT Phoenix	2	43849
8" Touchscreen Omron	1	17132
Breaker, 5A 1 Pole Breaker	1	14656
ROTARY COUPLING SHAFT	1	13914
ROTARY COUPLING SHAFT BEARING	2	15492
ROTARY COUPLING BODY	1	27508
ROTARY COUPLING END CAP	2	24211
RINEER MOTOR SHAFT	1	20862
INTENSIFIER FLANGE	1	24213
INTENSIFIER TUBE	1	24212
DUMP SIDE CHECK CYLINDER	1	15114
CART PIPE ROLLER	2	13630
LOAD CYLINDER	1	24125
LARGE VISE CYLINDER	1	24124
SMALL VISE CYLINDER	1	15113
V ROLLER RUBBER WHEEL SHAFT	2	42404
V ROLLER SHAFT LG	2	42403
GO3 VALVE	1	17604
G06 VALVE OPEN CENTER	1	28595
G06 VALVE P-T CENTER	1	28593
MODIFIED TAP BLOCK FOR G06 P-T VALVE	1	28602
Level C		
0-120 Day Delivery		
NAME	QTY	SAP#
RINEER MOTOR	1	16441
WATER PUMP ASSEMBLY	1	24734
INTENSIFIER CYLINDER	1	24126
HIGH VOLUME HYDRAULIC PUMP	1	22532
HIGH VOLUME HYDRAULIC MOTOR	1	16412
HIGH PRESSURE HYDRAULIC PUMP	1	22534
HIGH PRESSURE HYDRAULIC MOTOR	1	16414

Rotary Coupling w/ Valve

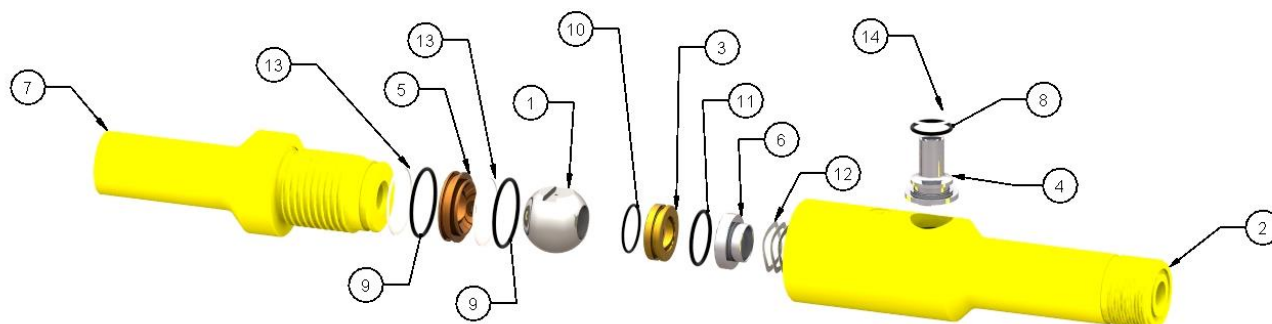
Revision: A



Item #	Part #	Description	Quantity
1	45433	RETAINING RING FOR BEARING	2
2	42626	VALVE BRACKET UPPER PLATE	1
3	42624	UPPER CLAMP BLOCK	1
4	42623	LOWER CLAMP BRACKET	1
5	13914	ROTARY COUPLING SHAFT	1
6	37710	8 in. ROTARY COUPLING BODY W/AUTOCLAVE	1
7	110-700-716-00	VALVE ACTUATOR BRACKET	1
8	110-701-104-00	HYDRO SAFETY VALVE	1
9	14138	WASHER, LOCK, .25"	6
10	14471	BOLT, SHCS, .3125" X 3" NC	4
11	15492	BEARING	2
12	15574	HYDRAULIC FITG	2
13	16086	GREASE ZERK	2
14	17158	SET SCREW	2
15	17657	WASHER, FLAT .3125"	2
16	17670	WASHER, LOCK, .3125"	10
17	21380	ORING, BUNA 026	1
18	23345	BOLT, SHCS, .3125" X 1" NC GR5	6
19	28240	BOLT, SHCS .25 - 20 x .75" NC	6
20	38136	ROTARY CPLG SEAL	4
21	38157	HYDRAULIC ACTUATOR	1
22	38785	KEY	2
23	42335	ORING, PTFE	1
24	42336	SHAFT COUPLING	1

Discharge Valve

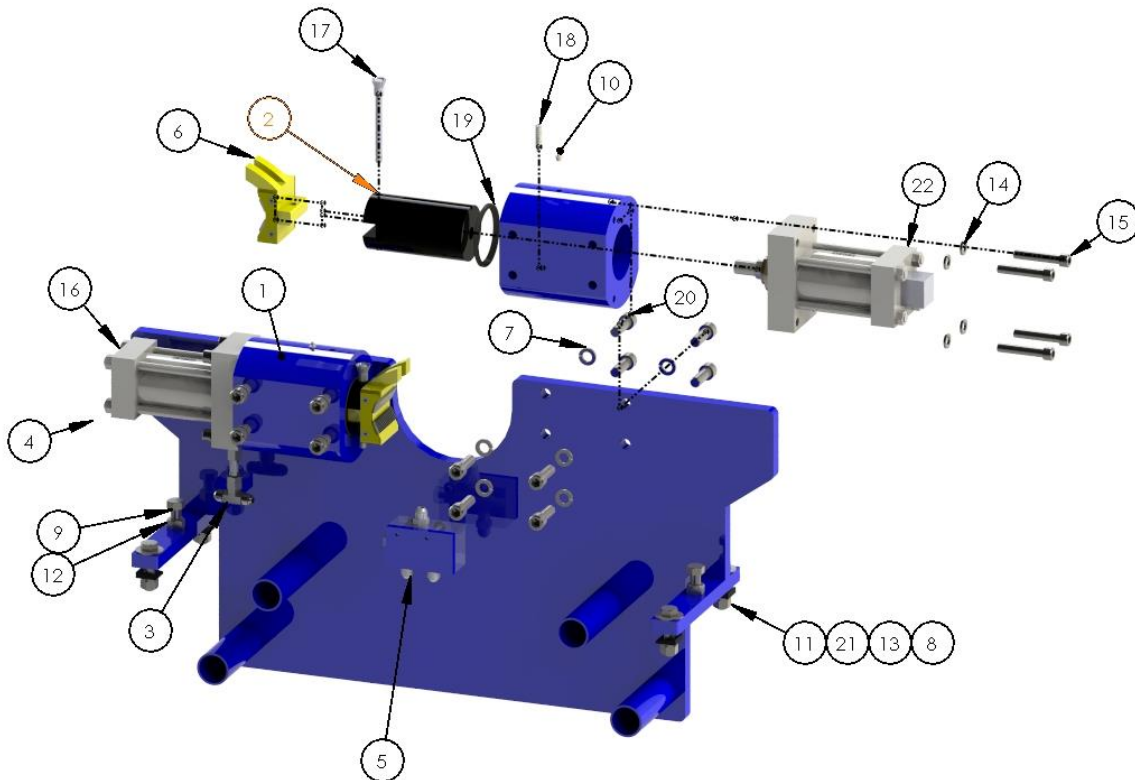
Revision: B



Item #	Part #	Description	Quantity
1	42509	BALL F/ HYDRO VALVE	1
2	42510	HYDRO VALVE BODY	1
3	42521	LOWER SEAT F/ HYDRO VALVE	1
4	42523	STEM, HYDRO VALVE	1
5	42524	UPPER SEAT F/ HYDRO VALVE	1
6	42526	SPRING SEAT	1
7	42527	TOP SUB, HYDRO VALVE	1
8	17077	ORING,70 DURO BUNA-N DASH #218	1
9	42297	ORING, BUNA 70 #228	2
10	42298	ORING, BUNA 70 #129	1
11	42299	ORING, BUNA 70 #224	1
12	42529	SPRING, WAVE 1.819 X 1.404 X .020	3
13	42530	BACKUP RING, BUNA-N AS678A-218	2
14	42531	BACKUP RING, BUNA-N AS568A-28	1

Clamp Assembly

Revision: C

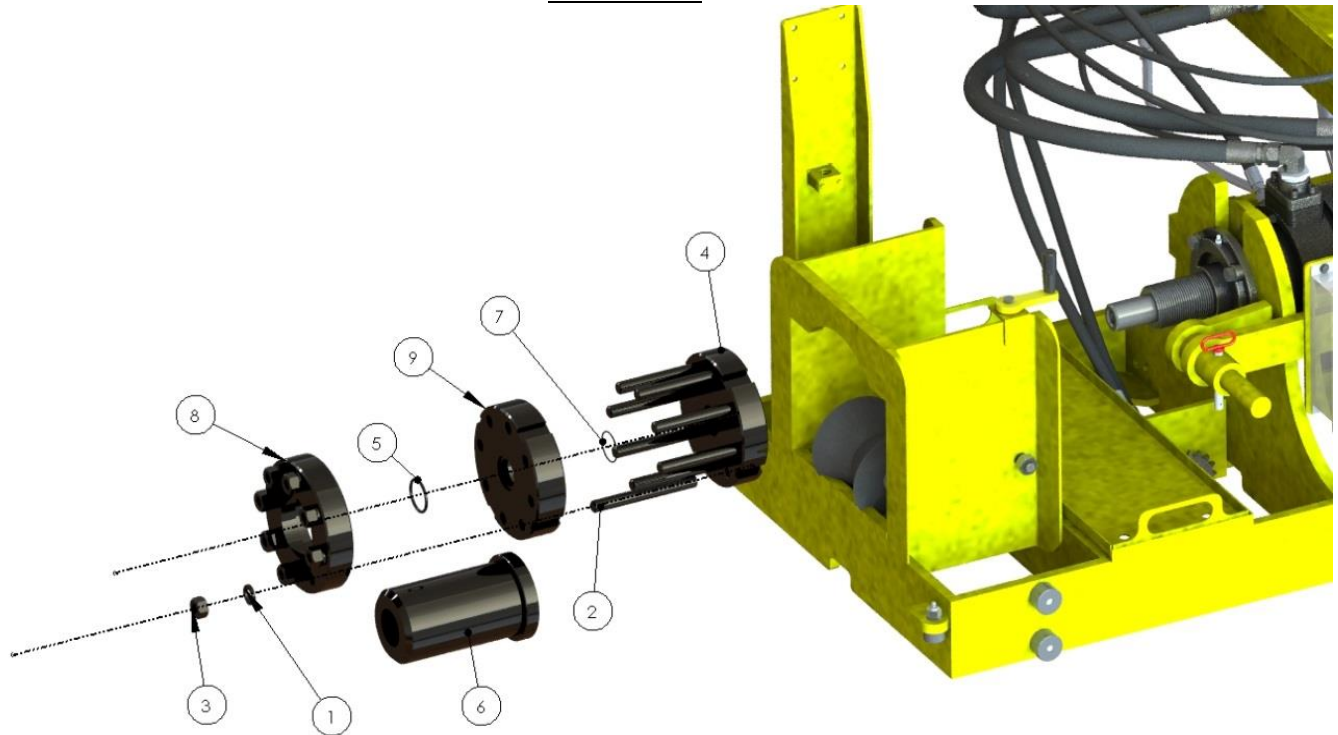


Note: Panel hidden for visibility

Item #	Part #	Description	Quantity
1	37708	CLAMP BORE HOLDER	2
2	37709	CLAMP INNER PUSH ROD	2
3	110-601-067-00	EXTENDED TEE	1
4	110-700-214-00	CLAMP (VISE) FAB ASSEM	1
5	110-701-021-00	FLOW DIVIDER ASSEMBLY	1
6	110-701-704-00	DIE HOLDER ASSEMBLY 3.65-5.765	2
7	14133	WASHER, LOCK, .75"	20
8	14319	BOLT, HHCS, .75" X 3" NC GR5	4
9	14404	BOLT, HHCS, .75" X 3" NF GR5	2
10	16086	GREASE ZERK, 1/8 NPT	2
11	16485	NUT, HEX, .75" NC	4
12	16496	NUT, HEX, .75" NF	2
13	17653	WASHER, FLAT, .75"	4
14	17674	WASHER, LOCK, .625"	8
15	28382	BOLT, SHCS, .625" X 3.50" NC GR8	8
16	37892	CYLINDER, 3 1/4 HHFHF4A	1
17	38195	92385A144, 1/2" x 4.5" quick release pin marine grd	2
18	38197	95289A646 1/2 x 2" dog set screw	2
19	38344	4IN ID WIPER SEAL 9403k82	2
20	38410	BOLT, SHCS, .75"-10 X 2.250" NC GR8	16
21	42012	SHIM, IRON LEVELING GAL. .75 SCREW	4
22	42357	CYL, 3.25HHFHF4AY, W/SWITCH POS 9	1

Mandrel Assembly

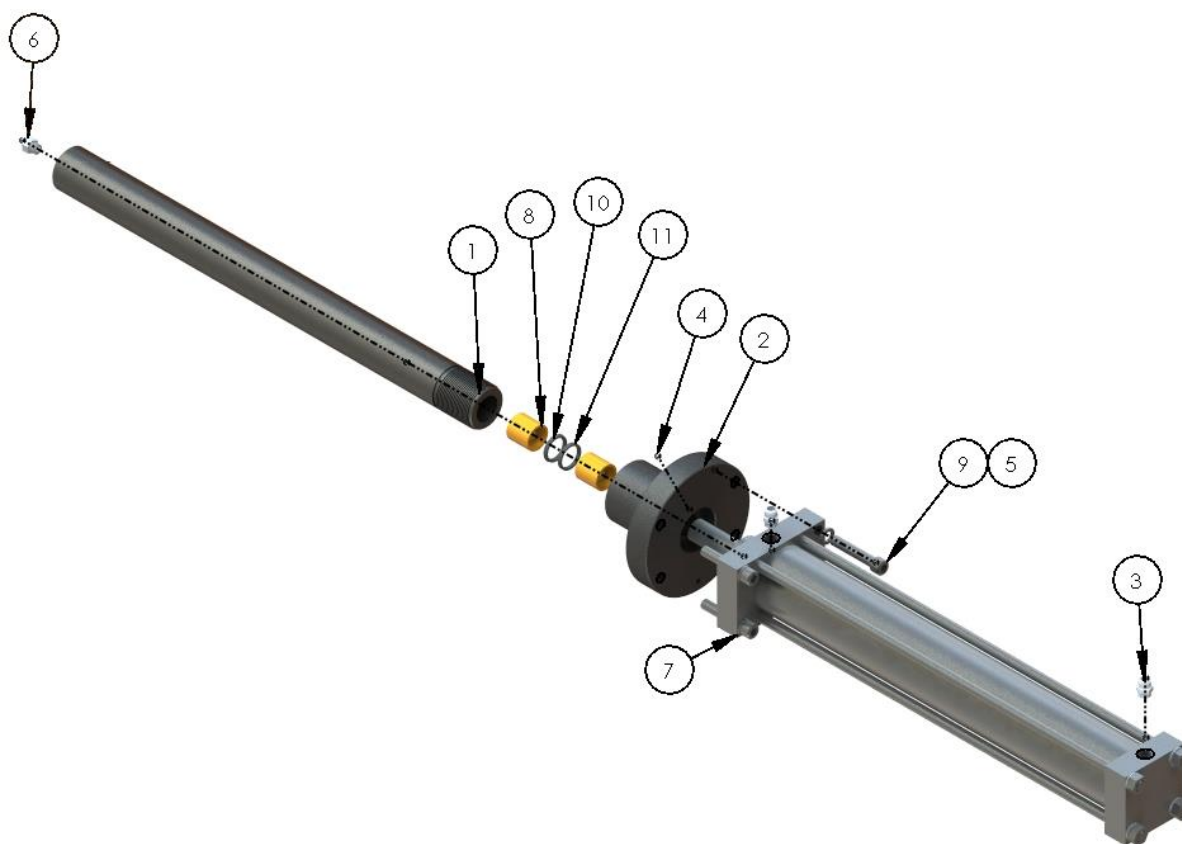
Revision: A



Item #	Part #	Description	Quantity
1	17677	WASHER, LOCK, .875"	8
2	29133	ATR 7/8"-9 x 8 IN LG.	8
3	16518	NUT, HEX, .875" NC	8
4	24954	LOCKING FLANGE	1
5	37249	MANDREL/TEST PLUG O-RING	1
6	24522	HYDRO TEST PLUG, 2-3/8" 8RD PIN 4.70#	
	24523	HYDRO TEST PLUG, 2-3/8" 8RD BOX 4.70#	
	24524	HYDRO TEST PLUG, 2-7/8" 8RD PIN 6.50#	
	24525	HYDRO TEST PLUG, 2-7/8" 8RD BOX 6.50#	
	24526	HYDRO TEST PLUG, 3-1/2" 8RD PIN 9.30#	
	24527	HYDRO TEST PLUG, 3-1/2" 8RD BOX 9.30#	
	24528	HYDRO TEST PLUG, 2-3/8" MS6 PIN 5.95#	
	24530	HYDRO TEST PLUG, 2-3/8" MS6 BOX 5.95#	
	24531	HYDRO TEST PLUG, 2-7/8" MS6 PIN 7.90#	
	24532	HYDRO TEST PLUG, 2-7/8" MS6 BOX 7.90#	
	24533	HYDRO TESTPLUG,3-1/2" MS6 PIN 12.95#	
	24534	HYDRO TESTPLUG,3-1/2" MS6 BOX 12.95#	
	24535	HYDRO TEST PLUG, 4-1/2" MS6 PIN 15.50#	
	24536	HYDRO TEST PLUG, 4-1/2" MS6 BOX 15.50#	
7	29046	MID MANDREL O-RING	1
8	24205	SMALL CLAMP FLANGE	1
	37268	LARGE CLAMP FLANGE	1
9	24204	DRIVE FLANGE	1

Intensifier Assembly

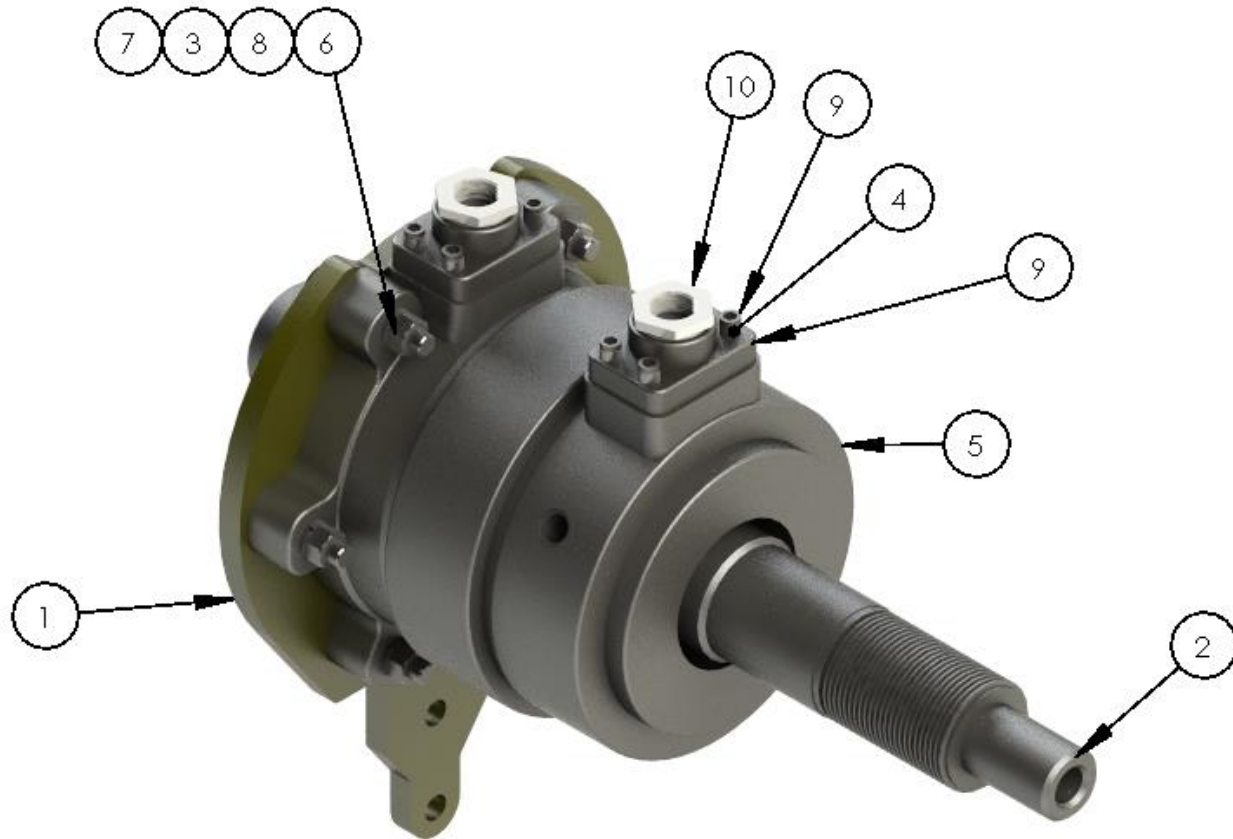
Revision: A



Item #	Part #	Description	Quantity
1	24212	INTENSIFIER CYLINDER w/AUTOCLAVE	1
2	24213	ADAPTER FLANGE 15 in. O.D. INTENSIFIER	1
3	15756	#16 MSAE O-RING X #16 MJIC ADAPTER	2
4	16087	GREASE ZERK, 3/8 UNF	2
5	17675	WASHER, LOCK, 1.125"	4
6	21978	ADAPTER, 9/16x1/4 MA9H4H 60K PSI	1
7	24126	SHEF. HYD. CYL.	1
8	29275	BUSHING	2
9	29309	BOLT, SHCS, 1.125" X 6" NF GR8	4
10	37230	SEAL	1
11	37241	RING, BACKUP	1

Rineer Motor

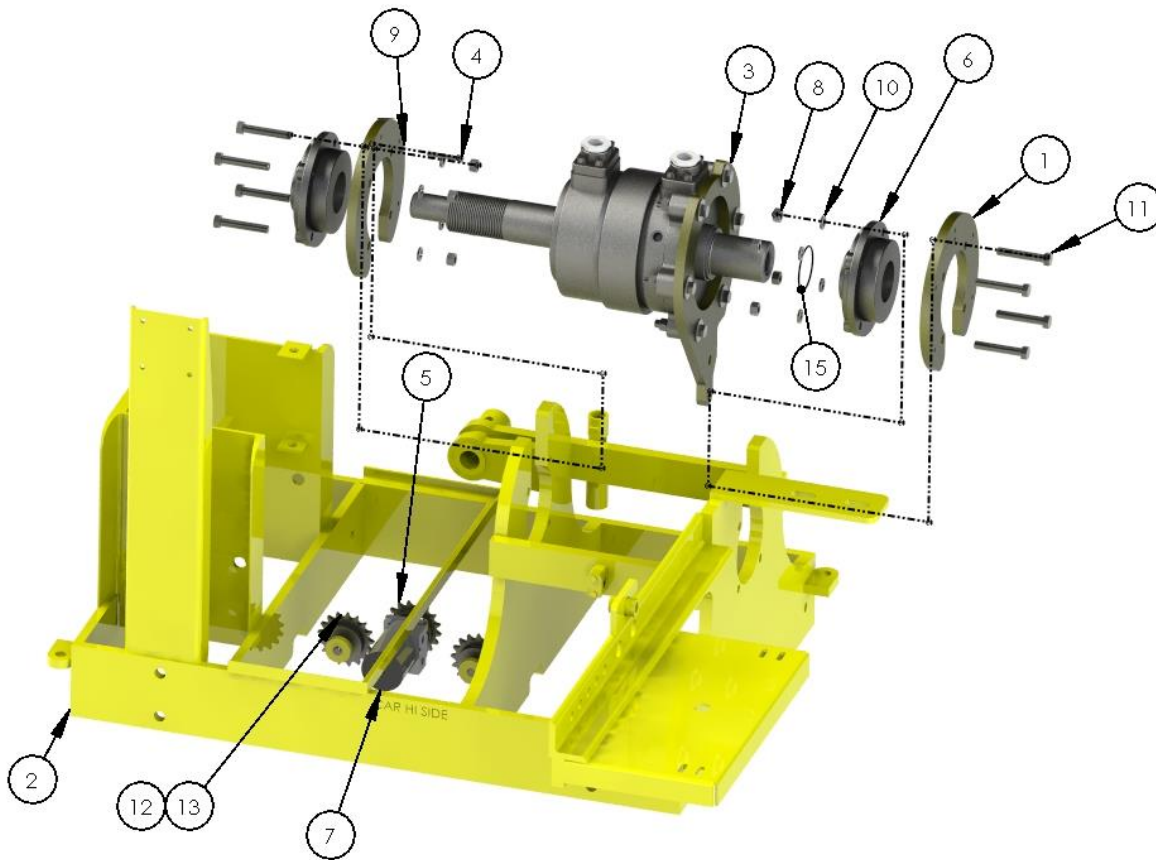
Revision: A



Item #	Part #	Description	Quantity
1	42582	CAR MOTOR TORQUE PLATE	1
2	20862	RINEER MOTOR SHAFT 4140 HT	1
3	14318	BOLT, HHCS, .625" X 3.50" NC GR5	6
4	14473	BOLT, SHCS .375" x 2" NC	8
5	16441	RINEER MOTOR HYDRO-TEST-UNIT	1
6	16484	NUT, HEX, .625" NC	6
7	17651	WASHER, FLAT, .625"	6
8	17674	WASHER, LOCK, .625"	6
9	21204	HARDWARE, MOUNTING FOR W43-24-24U	2
10	37066	1.5IN X 1IN 3M THRD BUSHING	2

Hi Car w/ Motors

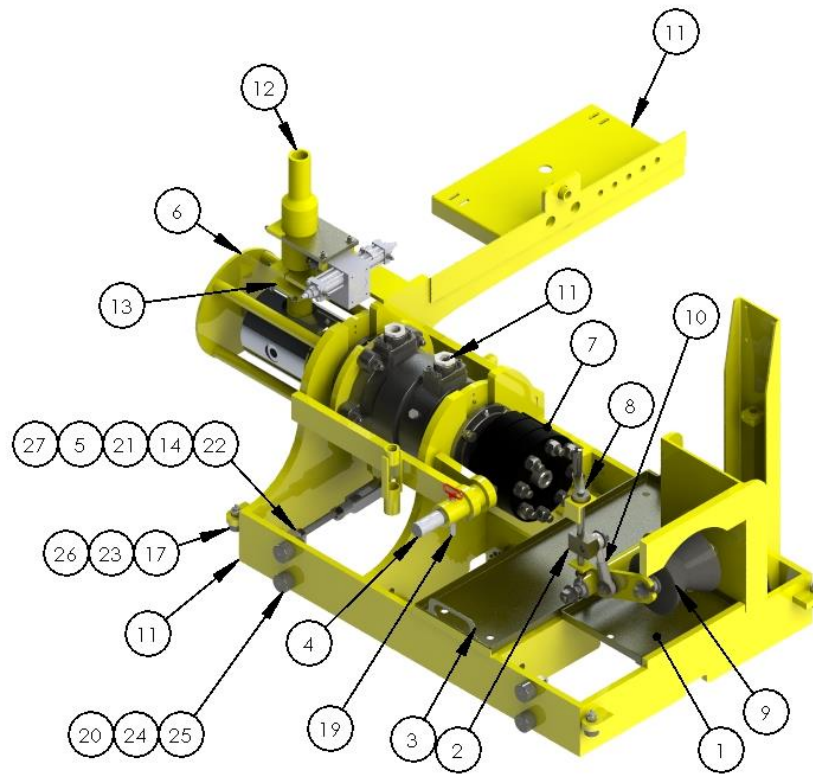
Revision: A



Item #	Part #	Description	Quantity
1	42618	CAR OILER & BEARING SUPPORT PLATE	2
2	110-700-130-00	DRIVE CAR HI SIDE FAB ASSEM.	1
3	110-701-659-00	RINEER MOTOR SUB ASSEMBLY	1
4	14330	BOLT, HHCS, .375" X 2.50" NC GR5	1
5	14514	SPROCKET, H6013 X 1 FINISHED BORE	1
6	14598	BEARING, MOUNT BALL, FLANGED	2
7	16391	CHARLYNN HYD MOTOR P/N - 101-2435009 (HT)	1
8	16484	NUT, HEX, .625" NC	8
9	16487	NUT, HEX, .375" NC	1
10	17674	WASHER, LOCK, .625"	8
11	21817	BOLT, HHCS, .625" X 3.75" NC GR8	8
12	27155	BOLT SHOULDER 1 x 1.5, 3/4-10, 90298A872	2
13	29114	SPROCKET IDLER, #60 R-CHAIN, HN60B17	2
14	36357	BOLT, FHSCS, .375" X 1" NC	4
15	36488	ORING, 70 DURO BUNA-N - #236	1

Hi Car Main Assembly

Revision: A

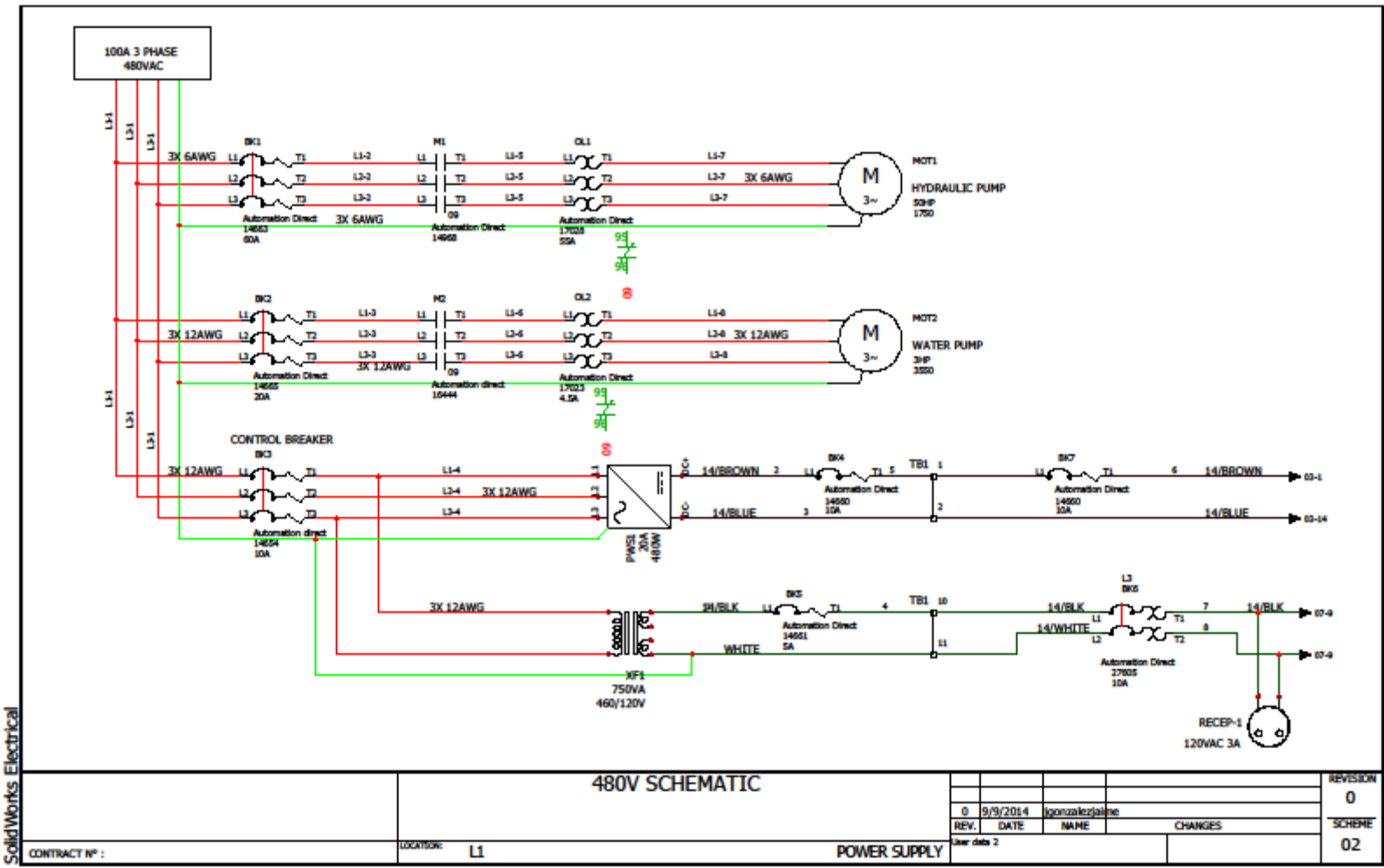


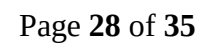
Note: Some items hidden for visibility

Item #	Part #	Description	Quantity
1	110-200-101-018	TRAY BASE PLATE -SMALL	1
2	42507	CAR ROLLER TIE ROD GUIDE	1
3	110-200-115-018	TRAY BASE PLATE -LARGE	1
4	42367	TORQUE PIN FOR COUPLING MAKEUP	1
5	26864	.75 ATR 10"LG NF	1
6	110-700-307-00	OILER - LO CAR FAB ASSEM.	1
7	110-701-052-00	FLANGE & LOCK FLANGE ASSEM	1
8	110-701-101-00	TVL CAR PIPE ROLLER JACK ASSEMBLY	1
9	110-701-102-00	V-ROLLER ASSEM HI & LO CARS	1
10	110-701-302-00	CAR ROLLER JACK TIE ROD ASSM.	1
11	110-701-662-00	HI CAR INSTALLED MOTORS	1
12	110-701-670-00	VALVE-COUPLING ASSEMBLY	1
13	110-701-721-00	VALVE SUPPORT BRACKET	1
14	14010	CLEVIS PIN , 0.75 DIA. X 3.00 IN. LG.	1
15	14132	BOLT, HHCS, .375" X 1" NC GR5	4
16	14145	WASHER, LOCK, .375"	4
17	14601	1.5 IN CAM FOLLOWER WHEEL (CCFE 1-1/2 SB)	4
18	15376	PIPE PLUG 0.50 IN. NPT HEX HEAD	1
19	16199	PIN HITCH, 0.625" x 4.0" w/LANYARD	1
20	16505	NUT, HEX, .875" NF	8
21	16508	NUT, HHEX, .75"-16 NF	2
22	17350	3/4" ROD EYE	1
23	17674	WASHER, LOCK, .625"	4
24	17677	WASHER, LOCK, .875"	8
25	27201	2.0 IN CAM FOLLOWER WHEEL (CCF 2 SB)	8
26	27368	NUT, HEX .625" NF	4
27	38215	6071K220 THREADED CLEVIS 6 1/16" 3/4"	1

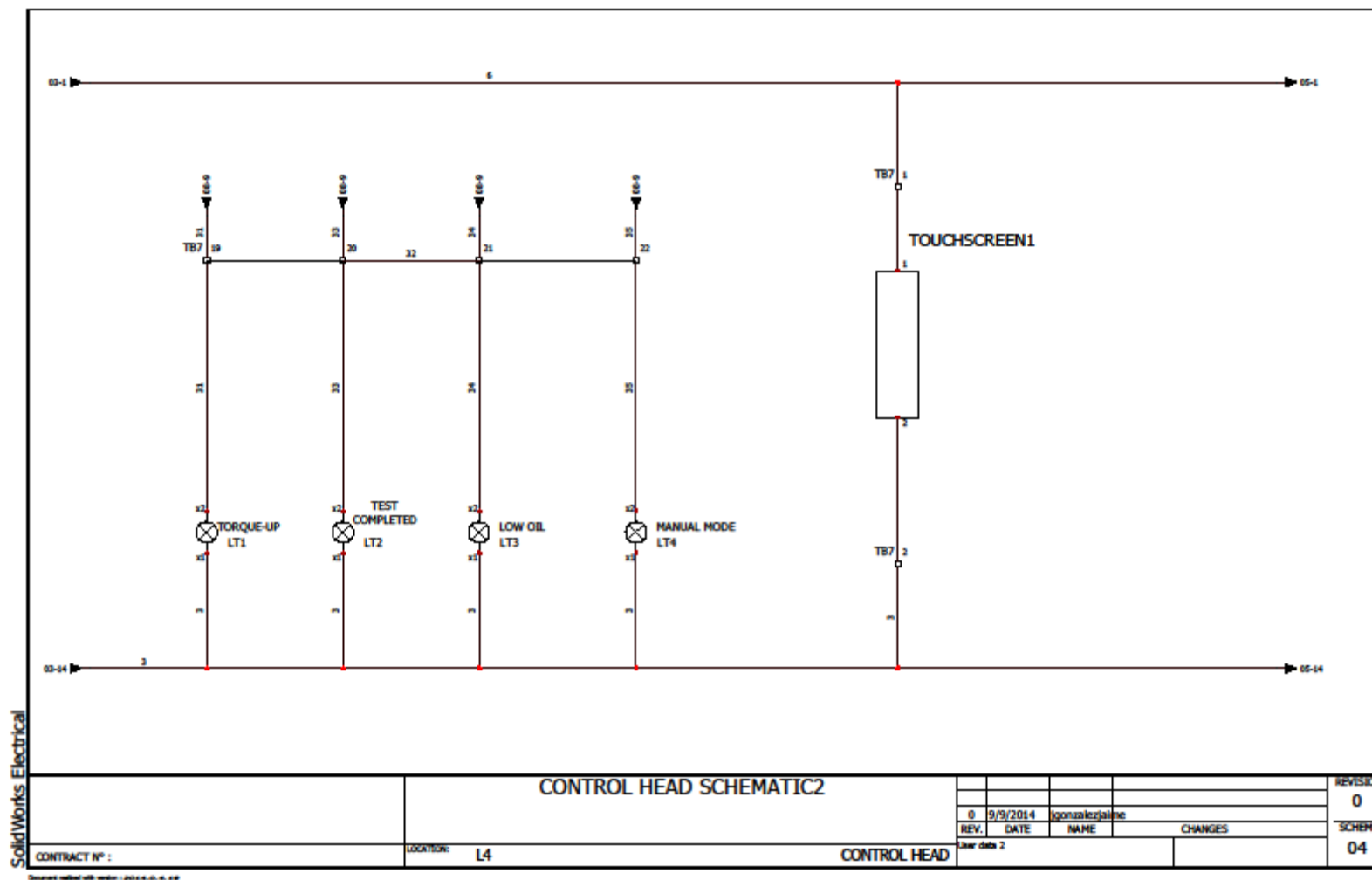
Schematics

480V Electrical Schematic

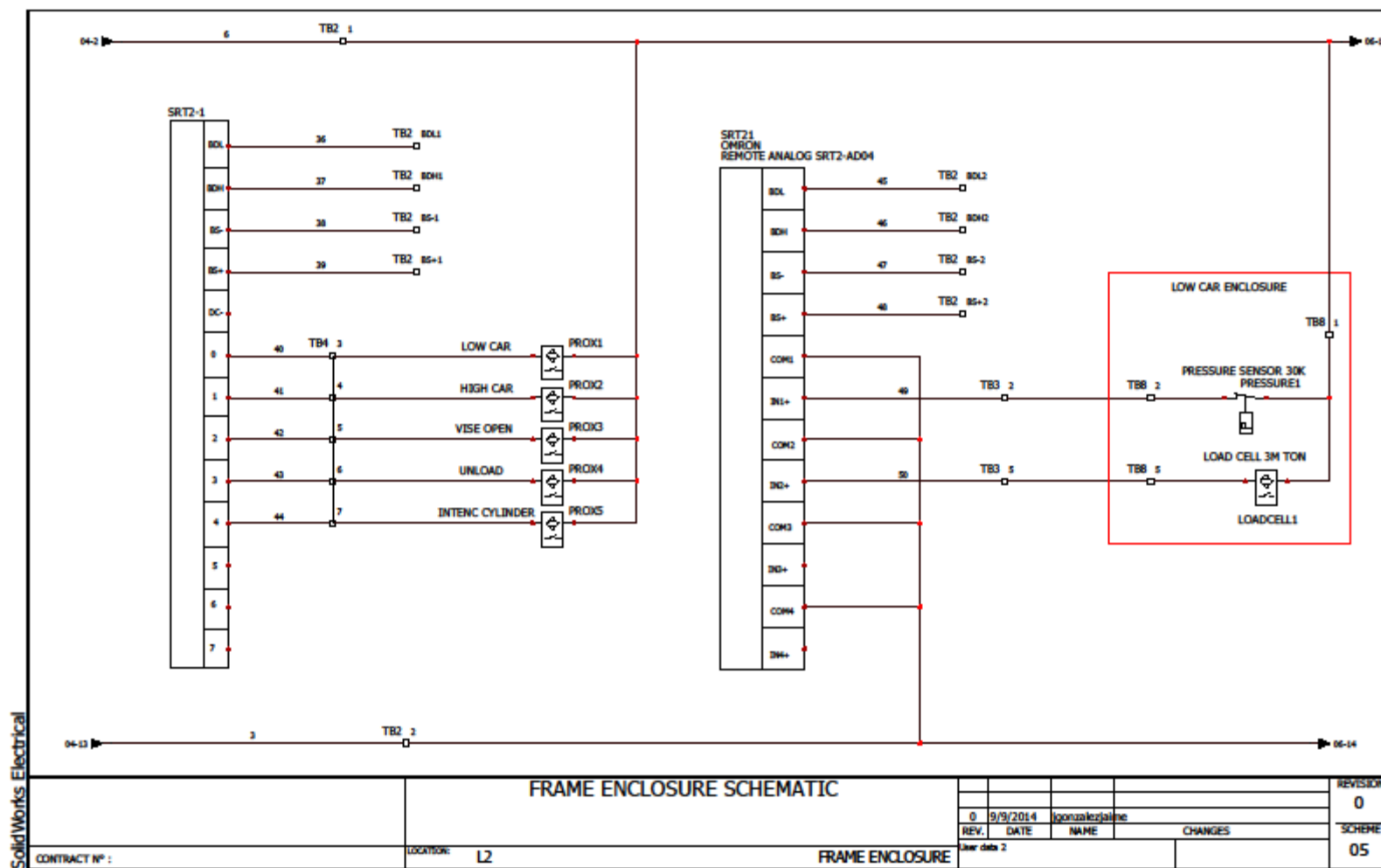




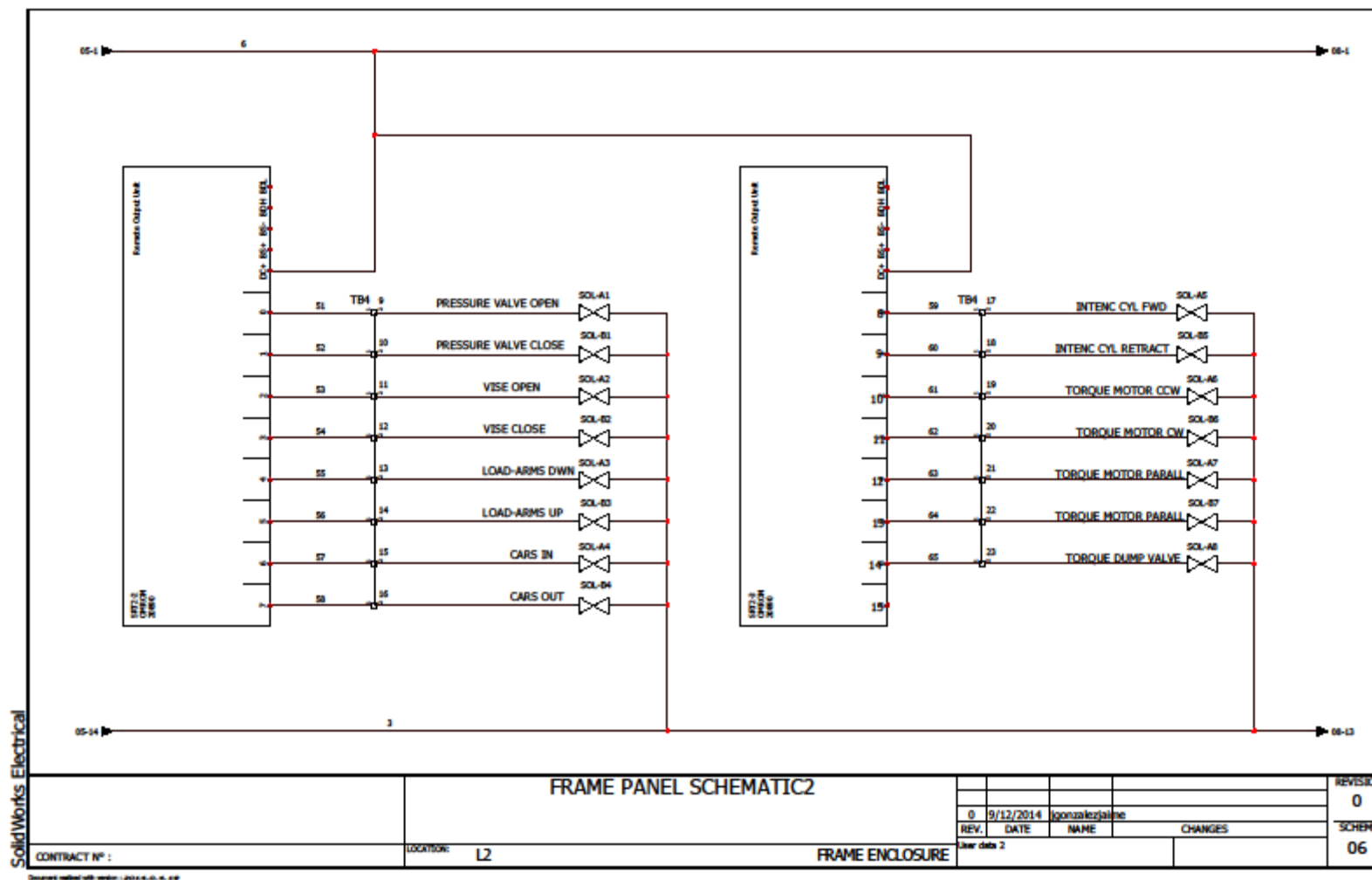
Control Head Schematic #2



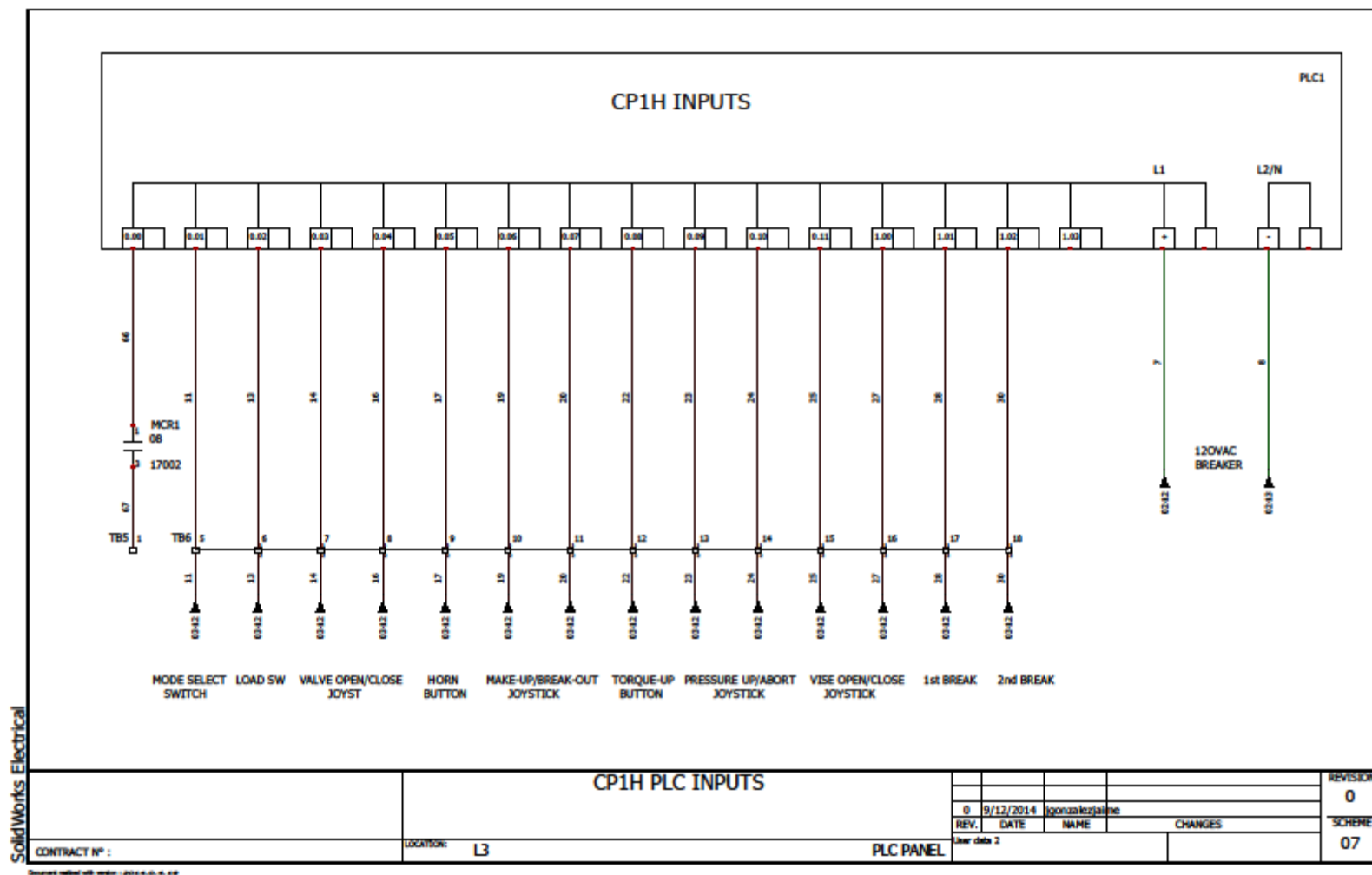
Frame Enclosure Schematic #1

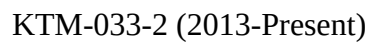


Frame Enclosure Schematic #2

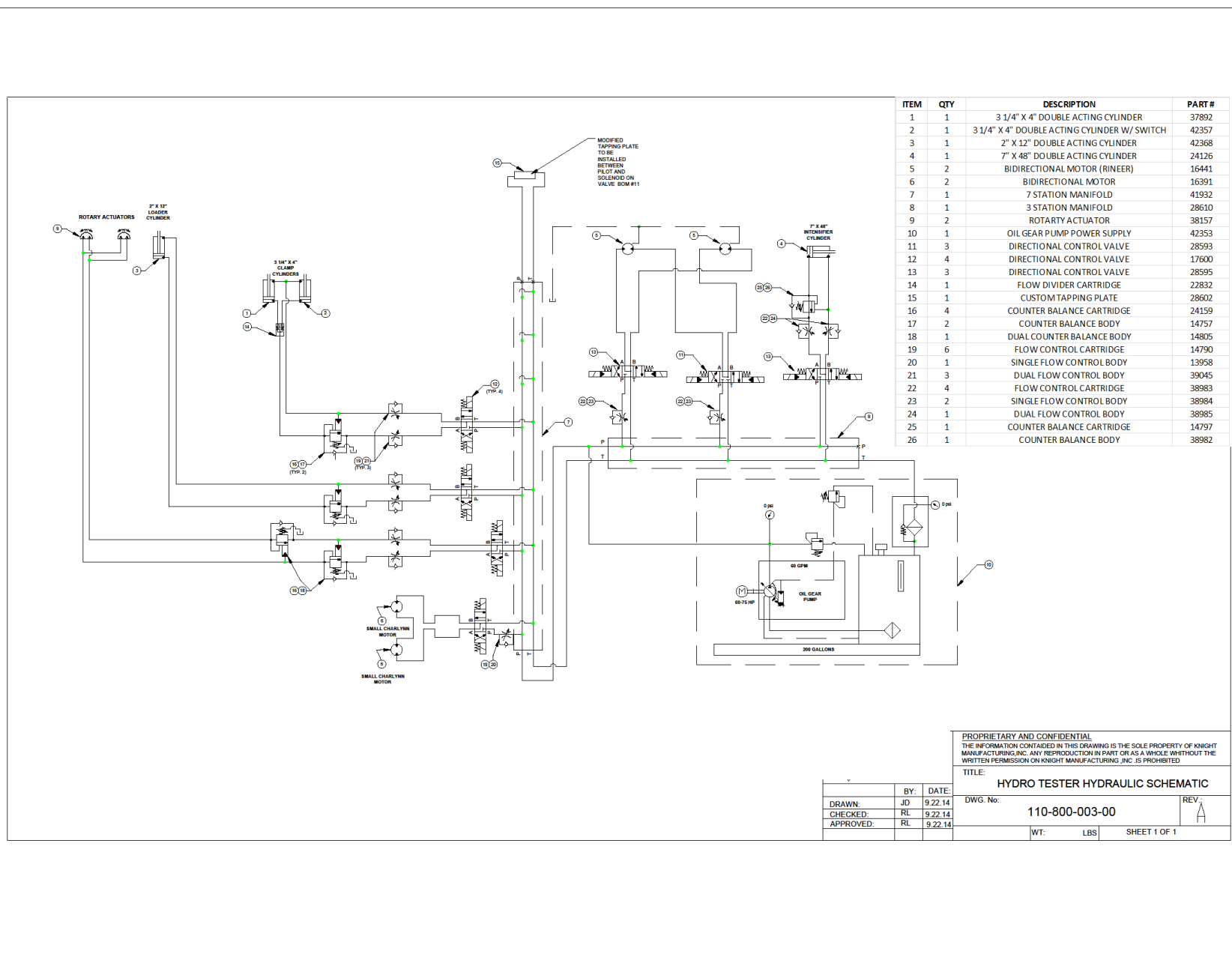


PLC Inputs





Hydraulic Schematic



HTM-2000 Equipment Layout

