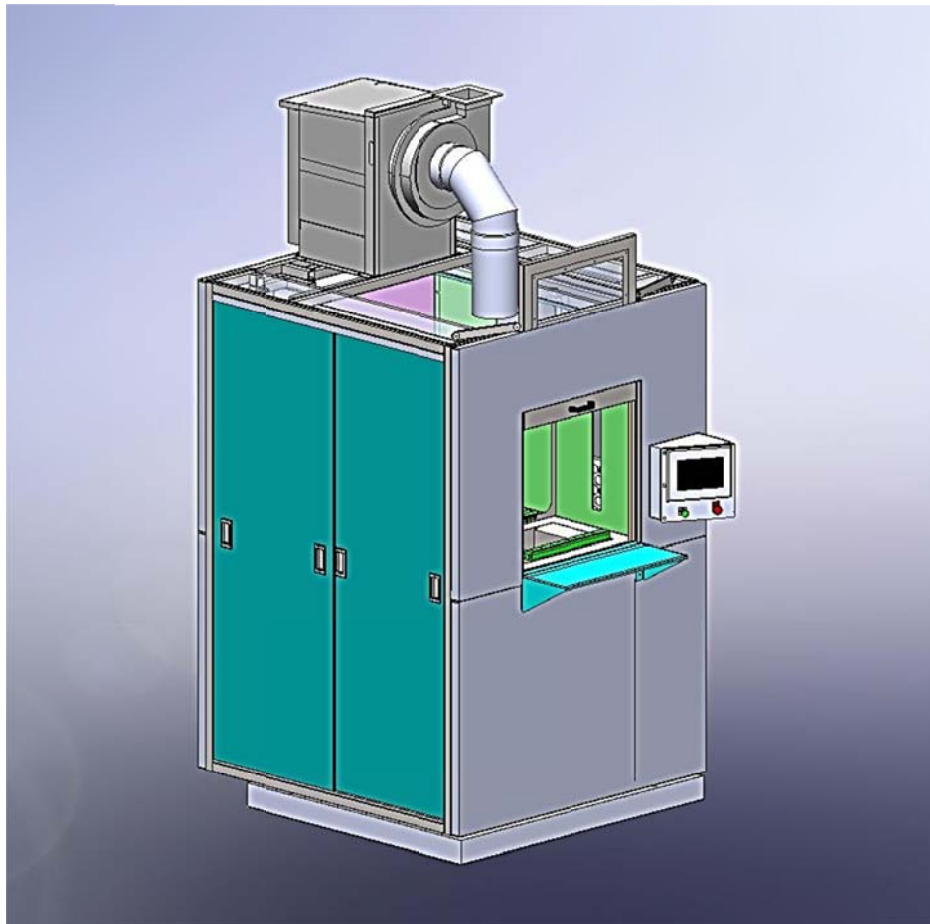


Miraclean®

Aqueous Cleaning Systems

“Cube” Ultrasonic Cleaning Line
M80653



MADE EXCLUSIVELY FOR

SANDVIK

Congratulations on your purchase of a MIRACLEAN® “Cube” Ultrasonic Cleaning Line. This unit was custom built with care for your particular needs. We pride ourselves on our quality work and our unit's performance. Please contact us for any technical support, spare parts, or comments. Your input is always important to us.



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General Information

Safety Requirements:



ALWAYS

- Use correct utilities as described on the **MIRACLEAN® M80653 Specifications**, page 2.
- Ensure machine is operated and maintained by trained personnel.
- Use caution and appropriate Personal Protective Equipment when working with or around the machine, normal operation involves exposure to Caustic cleaner and liquid temperatures as high as 170° F (76.7° C).
- Dispose of used aqueous cleaning chemistry appropriately, according to local regulations.
- Use machine in a well-ventilated area, and/or provide powered ventilation where applicable to reduce/eliminate steam evaporation and fume build-up.
- Keep panels closed and/or locked (where applicable) at all times except when servicing machine.
- Use caution when attempting to access behind the locked and/or sliding panels for valve adjustments, etc... Incorrect adjustments may alter the proper function of the machine and may void the warranty. Pinch-points may exist, and process piping and components may be hot to the touch.
- Implement and follow proper point-of-operation safeguarding where necessary, based on OSHA machinery directive and/or local directives.
- Observe the **Preventative Maintenance Schedule**, page 17. If a problem arises with one or more of the components, first check this manual for information related to the component, and if further assistance is required please call our technical support line at (716) 763-4343.
- Follow all safety requirements (lockout/tagout, etc.) when servicing this machine.

NEVER

- Operate this machine outside of its intended parameters, as described within this manual.
- Allow machine to operate unattended.
- Use solvents or flammable chemicals in this machine.
- Use chemicals or cleaning agents not reviewed/approved by **MIRACLEAN®**, as this may void the warranty and/or damage the machine.
- Attempt to run any of the pumps dry, tamper with any of the machine's components, or alter any of the machine's mechanical or electrical design in any way without **MIRACLEAN®** involvement, as this may void the warranty and/or damage the machine.

General Information

MIRACLEAN® M80653 Specifications:

SERIAL NUMBER:	M80653
MANUFACTURING DATE:	10/2011
AGENCY APPROVALS:	NONE
MAIN VOLTAGE:	480 VAC 3-PHASE
FULL LOAD AMPS:	20 AMPS
FREQUENCY:	60 HERTZ
CIRCUIT BREAKER AMPERAGE RATING:	25 AMPS
SHORT CIRCUIT RATING:	5 KA
LARGEST MOTOR:	.5 HP
CONTROL VOLTAGE:	120 VAC/24 VDC
MAIN ELECTRICAL ENCLOSURE RATING:	NEMA 4/12
ELECTRICAL DRAWING:	M80653-ES
TANK AND PIPING MATERIALS OF CONSTRUCTION:	304/316 STAINLESS STEEL

OTHER UTILITY REQUIREMENTS:

CLEAN, DRY, OIL-FREE COMPRESSED AIR:	75 PEAK SCFM @ 80 PSI, 23 AVE. SCFM
VACUUM EXHAUST:	400 CFM @ 2" (wg) SP
DEIONIZED (DI) WATER:	2-3 GPM FLOW RATE @ 40 - 80 PSI
MAX CLEAN AND RINSE TANK TEMPERATURE:	170° F (76.7° C)
DRAIN:	CLEAN AND RINSE TANKS
CLEAN LIQUID FILTER (X-110-A):	30" 10 MICRON POLY CORE, POLY WOUND

MIRACLEAN® M80653 is an automatically operated system with a manual operating option. It is designed to clean parts using caustic based cleaning chemistry, ultrasonic impingement, and rinsing via deionized water.

This machine utilizes:

- Pumps with liquid filtration
- Heaters
- Air knives
- Ultrasonic transducers
- Pneumatic cylinder agitation
- Easy to use Touchscreen Control Panel interface

IP Addresses:

- PLC: 192.168.1.10
- HMI: 192.168.1.20
- Modem: 192.168.1.30-33

This machine is designed for use with:

- Alkaline based cleaning chemistry in Clean Tank only
- Properly Trained Personnel
- Clean, Dry, Oil-Free Compressed Air
- Deionized water in all wet tanks

Setup

Unit Assembly and Utility Connections:

- Refer to **MIRACLEAN® M80653 Specifications**, page 2, for Utility Requirements.
 1. Unwrap *MIRACLEAN®* Unit M80653 and unpack all separate parts.
 2. Place Containment Tray(s) in place.
 3. Carefully place machine into containment tray(s).
 4. Level machine by adjusting unit leveling feet.
 5. Verify that valves HV-160-SYS, and HV-161-SYS.
 6. Place the Supplied, Hartzell Exhaust Fan, M-420-SYS, into place on top of the system. Bolt down, and install the supplied 7" PVC Tubing to connect the Blower's Input to the System Exhaust Output. Connect appropriate building exhaust to the unit's supplied 7 ¾" x 8 ¼" Square Flange exhaust output. Have a qualified electrician connect the M-420-SYS 480 VAC Power Lines to the M-420-SYS Motor's Electrical Box.
 7. Connect Sump Pump Assembly's 1" Union to the "Cube" System's Drain 1" Union Output. Connect "SUMP PUMP AIR" ¼" Tubing to the Sump Pump, M-010-SYS. Have a qualified electrician connect LSH-180-SYS and LSN-190-SYS M12 Connector Cables to the LSH-180-SYS and LSN-190-SYS Level Sensor on the Sump Pump Assembly.
 8. Take off packaging zip ties that hold the Load Door Counterweights, and place each weight into the PVC Tube Housing.
 9. Cut any WHITE packaging zip ties, and place System's WaterBug, YX-080-SYS, into the Containment Tray.
 10. Connect appropriate building drain plumbing to Sump Pump's 1" NPT Connection.
 11. Connect compressed air to the supplied ¾" NPT stainless steel input connection.
 12. Connect 36 kW Instant Water Heater's 1" NPT male output connection to *MIRACLEAN®* M80653 Deionized Water input connection, using appropriate plumbing.
 13. Have qualified electrician route and connect power supply to the unit's Main Electrical Enclosure, following all applicable national, state, and local codes. Perform a 3 phase motor rotation examination where applicable (perform test during Initial Start Up. See Initial Start Up, on page 4).
 14. Remove protective plastic from Dress-Off Panels, then place them in the unit by inserting their top ends into the tracks first, then lift and push the bottoms into place.

Setup

Initial Start Up:

- Complete all portions of the Unit Assembly and Utilities Connections prior to moving on to this section.
- Chemistry for the CLEAN Tank should be added by trained, qualified personnel.
- Please refer to **Valve Schedule**, on pg. 5 for valve comments and recommended settings.
 1. Power up the *MIRACLEAN*® M80653 system via the Main Rotary Disconnect located on the front of the Main Electrical Enclosure.
 2. Verify power to the 36 kW Water Heater.
 3. On the Touchscreen Control Panel, enter the “CONTROL CENTER” screen by pressing the “CONTROL CENTER” link on the “MAIN” screen. In the “CONTROL CENTER” screen, press the “SET ALL CTROLS TO OFF” Select Box and verify all Controls are “OFF”.
 4. Perform a 3 phase motor rotation examination on Exhaust Blower Motor, M-420-SYS. In the “CONTROL CENTER” screen Enable the Exhaust Blower Motor, with the “EXHAUST” Select Box.
 5. Return to “MAIN SCREEN” via “MAIN SCREEN” link.
 6. Refer to **Valve Schedule** and set all VALVES as recommended for Normal Operation.
 7. Press the MASTER START Pushbutton.
 8. Using the CLEAN Tank MANUAL WATER FEED Valve, HV-160-A, fill the CLEAN Tank about half way, then turn off the MANUAL WATER FEED Valve, HV-160-A.
 9. Manually add appropriate amount of CLEAN Tank chemistry (tank capacity for chemistry measurement purposes = 31.3 gallons). When all Auto Operation Processes are turned on in a later section, the CLEAN Tank will finish filling.
 10. Fill RINSE Tank via MANUAL WATER FEED Valve, until water reaches weir level in the RINSE Tank.
 11. Set Pressure Switch to appropriate settings so that machine’s alarm will activate in case of too little air pressure.
 - SET = 80 PSI
 - RESET = 85 PSI
 12. Please refer to **Valve Schedule**, pg. 5, to complete valve settings.

Setup

Valve Schedule:

- When running the machine please refer to this schedule for valve settings and comments. Some valve settings are based on user processes and should be set as required.
- Flow Valves (FV) - Valves that are used to control the flow rate of either air or liquid to a designated location. These valves should be set to safely satisfy their particular needs.
- Hand Valves (HV) - Valves that are used for manual filling a tank, and isolating plumbing for draining, or maintenance purposes.
- Pressure Switch (PS) - Alarm Sensing Switch
- Regulators (X) - Regulating Valves, should be set using the it's associated Pressure Gauge (PG)

<u>SYSTEM VALVES</u>	
<u>Valve Label</u>	<u>Setting/Comments</u>
FV-150-SYS SUMP PUMP THROTTLE SYSTEM (SYS)	Open (as required)
HV-160-SYS COMPRESSED AIR L.O./T.O. SYSTEM (SYS)	Normal Operation - Open Maintenance/Draining - Closed
HV-161-SYS MASTER WATER SHUT-OFF SYSTEM (SYS)	Normal Operation - Open Maintenance/Draining - Closed
HV-162-SYS SUMP PUMP ISOLATION SYSTEM (SYS)	Normal Operation - Open Pump Maintenance - Closed
PS-290-SYS PRESSURE SWITCH SYSTEM (SYS)	SET: 85 PSI RESET: 80 PSI
X-340-SYS PRESSURE REGULATOR SYSTEM (SYS)	80 - 100 PSI

<u>LIFT/TRANSFER MECHANISM (LT) VALVES</u>	
<u>Valve Label</u>	<u>Setting/Comments</u>
FV-220-LT TRAVEL THROTTLE (UP) LIFT/TRANSFER MECHANISM (LT)	Open (as required)
FV-221-LT "ANTI-BOUNCE" (DOWN) LIFT/TRANSFER MECHANISM (LT)	Initially Open 5 full turns. If jerking or bouncing occurs refer to Lift/Transfer Mechanism Speed Adjustment on pg.16

Setup

Valve Schedule Con't:

<u>LIFT/TRANSFER MECHANISM (LT) VALVES</u> <u>CON'T</u>	
<u>Valve Label</u>	<u>Setting/Comments</u>
FV-222-LT "ANTI-BOUNCE" (UP) LIFT/TRANSFER MECHANISM (LT)	Initially Open 5 full turns. If jerking or bouncing occurs refer to Lift/Transfer Mechanism Speed Adjustment on pg. 16
FV-223-LT TRAVEL THROTTLE (DOWN) LIFT/TRANSFER MECHANISM (LT)	Open (as required)
FV-224-LT TRAVEL THROTTLE (CLEAN) LIFT/TRANSFER MECHANISM (LT)	Open (as required)
FV-225-LT TRAVEL THROTTLE (RINSE) LIFT/TRANSFER MECHANISM (LT)	Open (as required)
<u>CLEAN STATION (A) VALVES</u>	
<u>Valve Label</u>	<u>Setting/Comments</u>
FV-150-A FRESH WATER SPRAY THROTTLE CLEAN STATION (A)	Open (as required)
FV-151-A AUTO WATER-FEED THROTTLE CLEAN STATION (A)	Open (as required)
FV-152-A SPARGER PUMP THROTTLE CLEAN STATION (A)	Open (as required)
FV-153-A SPARGER -> TANK THROTTLE CLEAN STATION (A)	Open (as required)
FV-154-A FILTER PUMP THROTTLE CLEAN STATION (A)	Open (as required)
FV-155-A FILTER -> TANK THROTTLE CLEAN STATION (A)	Open (as required) Filter Pump/Filter Maintenance - Closed
FV-156-A FILTER -> SPRAY THROTTLE CLEAN STATION (A)	Open (as required) Filter Pump/Filter Maintenance - Closed

Setup

Valve Schedule Con't:

<u>CLEAN STATION (A) VALVES</u> <u>CON'T</u>	
<u>Valve Label</u>	<u>Setting/Comments</u>
HV-160-A MANUAL WATER FEED CLEAN STATION (A)	Normal Operation - Closed Manual Tank Fill Up - Open
HV-161-A TANK DRAIN CLEAN STATION (A)	Normal Operation - Closed Draining - Open
HV-162-A WEIR DRAIN CLEAN STATION (A)	Normal Operation - Closed Draining - Open
HV-163-A SPARGER PUMP ISOLATION CLEAN STATION (A)	Normal Operation - Open Pump Maintenance - Closed
HV-164-A FILTER PUMP ISOLATION CLEAN STATION(A)	Normal Operation - Open Pump Maintenance - Closed
HV-165-A PUMP/FILTER ISOLATION CLEAN STATION (A)	Normal Operation - Open Filter Pump/Filter Maintenance - Closed
<u>RINSE STATION (B) VALVES</u>	
<u>Valve Label</u>	<u>Setting/Comments</u>
FV-150-B FRESH WATER SPRAY THROTTLE RINSE STATION (B)	Open (as required)
FV-151-B AUTO WATER-FEED THROTTLE RINSE STATION (B)	Open (as required)
HV-160-B MANUAL WATER FEED RINSE STATION (B)	Normal Operation - Closed Tank Fill Up - Open
HV-161-B TANK DRAIN RINSE STATION (B)	Normal Operation - Closed Draining - Open

Setup

Touchscreen Controls Setup:

- All instructions in this section will have to be completed by personnel with proper access rights, and will require a password.
- Important touchscreen control terminology.
 - “NAME” screen = Screen’s name.
 - “NAME” link = Link to screen, press to activate.
 - “TEXT” text = on screen text, used for description, cannot be pressed.
 - Entry Box(es) = Press to bring up on screen keypad for data entry.
 - “TEXT” indicator box = Indicates current value or measurement, cannot be pressed.
 - Select Box = Press to activate/deactivate an option, may change colors and text when activated/deactivated.
- To enter the “SETUP MENU” screen press the “SETUP MENU” link from the “MAIN SCREEN”.
- All timer times are set in seconds, and temperatures set in degrees Fahrenheit, °F.

Temperature Setpoints

- From the “SETUP MENU” screen press the “TEMPERATURE SETPOINTS” link to enter the “TEMPERATURE SETPOINTS” screen.
- Use the Entry Boxes labeled “CLEAN TEMPERATURE SETPOINT” and “RINSE TEMPERATURE SETPOINT” to set the desired tank temperatures.

Temperature Bias Setup

- From the “SETUP MENU” screen press the “TEMPERATURE BIAS” link to enter the “TEMPERATURE BIAS” screen.
- “CLEAN TEMP UNBIASED” and “RINSE TEMP UNBIASED” indicator boxes give the system’s temperature reading of the tanks.
- Using a separate device, measure the actual tank solution temperature.
- Using the “CLEAN TEMPERATURE BIAS” and “RINSE TEMPERATURE BIAS” Entry Box(es), enter a value between -5 to 5 degrees that makes the “CLEAN TEMP” and “RINSE TEMP” indicator box(es) match the measured tank temperatures.
- “CLEAN TEMP UNBIASED” + “CLEAN TEMPERATURE BIAS” = CLEAN TEMP
- “RINSE TEMP UNBIASED” + “RINSE TEMPERATURE BIAS” = RINSE TEMP

Alarm Setpoints

- From the “SETUP MENU” screen press the “ALARM SETPOINTS” link to enter the “ALARM SETPOINTS” screen.
- Use the Entry Boxes labeled “HIGH ALARM” and “LOW ALARM” to set the desired CLEAN and RINSE Tank High and Low Temperature Alarm Setpoints.

Agitation Stroke Timer

- On the “SYSTEM OPTIONS” screen use the Entry Box labeled “AGITATION STROKE TIMER” to enter the rise time allowed for the Agitator.

Set Password

- From the “SYSTEM OPTIONS” screen press the “SET PASSWORD” link to enter the “SET PASSWORD” screen.
- Press the Entry Box labeled “PASSWORD” and enter the desired password.

Setup

Automatic Operation Setup:

- From the "MAIN SCREEN" press the "PROGRAM" link to enter the Automatic Operation Programming screen.
- Setting up the Automatic Operation Program is a Step by Step process. The program can have up to 253 different steps. To add a step, press the Select Box(es) of the process(es) to be performed for that step. Then set the amount of time desired for the process to run for by using the "TIME" Entry Box, Lift/Transfer Mechanism movements don't require time entry. When this step is finalized press the "SAVE" Select Box, before adding the next step. Press the "+" Select Box to move up to the next step, and the "-" Select Box to go back to the previous step.
- To Delete a Step, press the "DELETE" Select Box.
- To Insert a Step, press the "INSERT" Select Box, this will double the next step. To change the Step to do the processes desired, press the "+" Select Box and make changes as necessary.
- *MIRACLEAN*[®] Suggested Cleaning Program on page 10.
 - SYSTEM & LIFT/TRANSFER MECHANISM Processes
 - "MOVE TO TOP" = moves the Lift/Transfer Mechanism to the Top Position.
 - "MOVE TO BOTTOM" = moves the Lift/Transfer Mechanism to the Bottom Position.
 - "MOVE UP TO MID HEIGHT" = moves the Lift/Transfer Mechanism from the Bottom Position to Mid Height.
 - "MOVE DOWN TO MID HEIGHT" = moves the Lift/Transfer Mechanism from the Top Position to Mid Height.
 - "MOVE TO CLEAN" = moves the Lift/Transfer Mechanism from the RINSE Station to the CLEAN Station. (This option only will work if the Lift/Transfer Mechanism is in the Top Position.)
 - "MOVE TO RINSE" = moves the Lift/Transfer Mechanism from the CLEAN Station to the RINSE Station. (This option only will work if the Lift/Transfer Mechanism is in the Top Position.)
 - "AGITATE" = agitates the basket for the desired process time entered.
 - CLEAN Processes
 - "SIDE 25 KHZ ULTRASONIC" = runs the SIDE 25 KHZ ULTRASONICS for the desired process time entered.
 - "BOTTOM 40 KHZ ULTRASONIC" = runs the BOTTOM 40 KHZ ULTRASONICS in the CLEAN Tank for the desired process time entered.
 - "FRESH SPRAY" = runs the FRESH WATER Spray for the desired process time entered.
 - "FILTER SPRAY" = runs the FILTER Spray for the desired process time entered.
 - "SPARGER PUMP" = runs the SPARGER Pump for the desired process time entered.
 - RINSE Processes
 - "BOTTOM 40 KHZ ULTRASONIC" (under the RINSE Tank options) = runs the BOTTOM 40 KHZ in the RINSE Tank for the desired process time entered.
 - "FRESH SPRAY" = runs the FRESH WATER Spray for the desired process time entered.
 - "AIRKNIFE" = runs the AIRKNIVES air blow off for the desired process time entered.

Setup

MIRACLEAN® Suggested Cleaning Program:

- Automatic Operation Program Setup instructions on page 9.

Step	Process(es)	Time
1	MOVE TO TOP	NA
2	MOVE TO CLEAN	NA
3	MOVE TO BOTTOM, FILTER SPRAY	NA
4	SIDE 25KHZ ULTRASONICS	120
5	SIDE 25KHZ ULTRASONICS, AGITATE, FILTER SPRAY, SPARGER PUMP	30
6	SIDE 25KHZ ULTRASONICS	120
7	SIDE 25KHZ ULTRASONICS, AGITATE, FILTER SPRAY, SPARGER PUMP	30
8	SIDE 25KHZ ULTRASONICS	120
9	SIDE 25KHZ ULTRASONICS, AGITATE, FILTER SPRAY, SPARGER PUMP	30
10	BOTTOM 40KHZ ULTRASONICS (for clean tank process)	120
11	BOTTOM 40KHZ ULTRASONICS (clean), AGITATE, FILTER SPRAY, SPARGER PUMP	30
12	BOTTOM 40KHZ ULTRASONICS (clean)	120
13	BOTTOM 40KHZ ULTRASONICS (clean), AGITATE, FILTER SPRAY, SPARGER PUMP	30
14	BOTTOM 40KHZ ULTRASONICS (clean)	120
15	BOTTOM 40KHZ ULTRASONICS (clean), AGITATE, FILTER SPRAY, SPARGER PUMP	30
16	MOVE TO TOP, FRESH SPRAY	NA
17	MOVE TO RINSE	NA
18	MOVE TO BOTTOM, FRESH SPRAY	NA
19	AGITATE, FRESH SPRAY	30
20	BOTTOM 40KHZ ULTRASONICS (for rinse tank process)	300
21	MOVE TO TOP, FRESH SPRAY	5
22	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
23	MOVE TO TOP, AIRKNIFE	5
24	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
25	MOVE TO TOP, AIRKNIFE	5
26	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
27	MOVE TO TOP, AIRKNIFE	5
28	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
29	MOVE TO TOP, AIRKNIFE	5
30	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
31	MOVE TO TOP, AIRKNIFE	5
32	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
33	MOVE TO TOP, AIRKNIFE	5
34	MOVE DOWN TO MID HEIGHT, AIRKNIFE	5
35	MOVE TO TOP, AIRKNIFE	5
36	(NO PROCESSES) *THIS STEP TELLS THE SYSTEM THE STEPS ARE COMPLETE	99

Operation

Automatic Operation:

- All Setup instruction must be completed before Automatic Operation can be started.
- Auto Operation Setup instructions must be completed to run in Auto Operation. If instructions are not completed please refer to Automatic Operation Setup, on page 9.
 1. From the "MAIN SCREEN" enter the "CONTROL CENTER" screen, and press the "SET ALL CTRLS TO AUTO/ON" Select Box to put all controls into Auto.
 2. On the "MAIN SCREEN" press the "MAN/AUTO" Select Box, so that the switch is in the "AUTO" position.
 3. HOME the LIFT/TRANSFER MECHANISM by pressing the "START HOMING" Select Box, and wait for the "NOT HOMED/HOMING/HOME" indicator box to display "HOMED".
 4. Open up the LOAD STATION Door, and place the basket of soiled parts into the basket holder and close the LOAD STATION Door.
 5. Press the "START CYCLE" Select Box. The "CYCLE IDLE/CYCLE RUNNING" indicator box, should display "CYCLE RUNNING".
 6. When the "CYCLE IDLE/CYCLE RUNNING" indicator box displays "CYCLE IDLE", the Cleaning Cycle is completed and the basket of parts is ready to be removed from the system. Open the LOAD STATION Door, and remove the basket of clean parts.
 7. To turn Off Automatic Operation, on the "MAIN SCREEN" press the "MAN/AUTO" Select Box, so that the switch is in the "MAN" position.
 8. Enter the "CONTROL CENTER" screen, and press the "SET ALL CTRLS TO OFF" Select Box to turn OFF all Auto Controls.

Operation

Manual Operation:

- All Setup instruction must be completed before Manual Operation should be used.
- For information on Touchscreen Control Terminology refer to **Touchscreen Controls Setup**, on pg. 8.
 1. From the “MAIN” screen press the “CONTROL CENTER” link to enter the “CONTROL CENTER” screen.
 2. Verify that all controls are set to off, by pressing the “SET ALL CTRLS TO OFF” Select Box.
 3. The Indicator lights under the “CLEAN INPUTS” text and “RINSE INPUTS” text represents the CLEAN and RINSE Tank liquid level statuses. If there is a Low or High Level it will be indicated by the indicating button flashing.
 4. There are four Select Boxes that control the Lift/Transfer Mechanism movements. To operate, press and hold the Select Box to move the Lift/Transfer Mechanism to the desired location.
 - “TRANSFER TO CLEAN” = moves toward the CLEAN station. (Must be in the top position as indicated by “AT TOP” indicator light.)
 - “TRANSFER TO RINSE” = moves toward the RINSE station. (Must be in the top position as indicated by “AT TOP” indicator light.)
 - “LIFT DOWN” = moves down. (Must be at either the CLEAN or RINSE station as indicated by “AT CLEAN” or “AT RINSE” indicator boxes.)
 - “LIFT UP” = moves the mechanism up.
 5. Use the Select Box of the desired process, to turn it OFF or ON. Some Select Boxes have an AUTO option, this option is for AUTO OPERATION only.
 - CLEAN Tank Controls:
 - “CLEAN AUTOFILL” = CLEAN Tank WATER FEED “ON/OFF”
 - AUTOFILL will only run when the CLEAN OL, LSN-070-A, is not satisfied
 - “FRESH SPRAY” = CLEAN Tank FRESH WATER Spray “OFF/ON/AUTO”
 - “SPARGER PUMP” = CLEAN Tank SPARGER PUMP “OFF/ON/AUTO”
 - “SIDE U/S” = 25 KHZ U/S in the CLEAN Tank “OFF/ON/AUTO”
 - “CLEAN HEAT” = CLEAN Tank HEATER “ON/OFF”
 - “FILTER PUMP” = CLEAN Tank FILTER PUMP “OFF/ON/AUTO”
 - “FILTER SPRAY” = CLEAN CHEMISTRY Spray “OFF/ON/AUTO”
 - FILTER SPRAY will only run when the FILTER PUMP is enabled
 - CLEAN & RINSE Tank Controls:
 - “BOTTOM U/S” = 40 KHZ U/S “OFF/ON/AUTO”
 - “BOTTOM OUTPUT” = 40 KHZ U/S “RINSE/CLEAN” Selector
 - RINSE Tank Controls:
 - “RINSE HEAT” = RINSE Tank HEATER “ON/OFF”
 - “FRESH SPRAY” = RINSE Tank FRESH WATER Spray “OFF/ON/AUTO”
 - “RINSE AUTOFILL” = RINSE Tank WATER FEED “ON/OFF”
 - AUTOFILL will only run when the CLEAN OL, LSN-070-B, is not satisfied
 - “AIRKNIFE” = RINSE Tank AIRKNIVES “OFF/ON/AUTO”

Operation

Manual Operation:

- SYSTEM Controls:
 - "EXHAUST BLOWER" = SYSTEM EXHAUST BLOWER "OFF/ON"
 - "SUMP PUMP" = SYSTEM SUMP PUMP "OFF/ON/AUTO"

Maintenance

Alarm List:

- Refer to Alarm List when/if trying to troubleshoot any alarms that may arise. For additional information or troubleshooting assistance, please contact *MIRACLEAN*[®].
- Alarms will be displayed on the touchscreen control panel.

SYSTEM Alarms	Meaning	Fix
EMERGENCY STOP	Unit is in E-Stop mode.	Press MASTER START push button.
CONTAINMENT TRAY ALARM	Liquid is entering a containment tray located under the machine.	Find and fix the liquid source, then dry and rinse containment tray if needed.
ULTRASONIC ENCLOSURE HIGH TEMPERATURE ALARM	Ultrasonic enclosure has reached the high temperature limit. (Ultrasonics will not operate while this alarm exists.)	This alarm should fix itself, and then turn off. If not enclosure air-conditioner might not be operating properly.
EXHAUST BLOWER MOTOR OVERLOAD TRIPPED	Motor overload tripped.	Have qualified electrician inspect blower and main enclosure for the cause of the problem and repair.
BOTTOM SONICS (40 KHz) POWER LOW ALARM	Ultrasonic Generators are not providing and adequate amount of power.	Verify Generators power controls are turned up, contact <i>MIRACLEAN</i> for further assistance.
LOW AIR PRESSURE ALARM	The system is not receiving and adequate amount of compressed air.	Verify the Pressure Switch, PS-290-SYS is set properly, and that compressed air valve, HV-160-SYS is on.
DOOR OPEN/PANELS NOT IN PLACE	The Load Station Door, or the Rear Panels are not completely closed	Verify that the Load Station Door is shut, and that both the Rear Panels are shut properly
SUMP HIGH LEVEL ALARM	Solution is too high in SUMP Tank	Drain solution from tank, investigate cause of over-addition.

CLEAN Alarms	Meaning	Fix
CLEAN HIGH LEVEL	Solution is too high in CLEAN Tank	Drain solution from tank, investigate cause of over-addition.
CLEAN TANK LOW LEVEL	Solution level low in CLEAN Tank.	Investigate low level sensor, and/or cause of auto-fill failure.
CLEAN WEIR LOW LEVEL	Solution level is low in CLEAN WEIR.	Investigate Weir's low level sensor, and/or cause of auto-fill failure.
CLEAN SIDE SONICS (25KHz) POWER LOW ALARM	Ultrasonic Generators are not providing and adequate amount of power.	Verify Generators power controls are turned up, contact <i>MIRACLEAN</i> for further assistance.
CLEAN TEMPERATURE ALARM	Tank temperature is outside the alarm setpoints.	Investigate cause of temperature being out of limit.



Maintenance

Alarm List Con't:

RINSE Alarms	Meaning	Fix
RINSE TANK HIGH LEVEL	Solution is too high in RINSE Tank.	Drain solution from tank, investigate cause of over-addition.
RINSE TANK LOW LEVEL	Solution level low in RINSE Tank.	Investigate low level sensor, and/or cause of auto-fill failure.
RINSE TEMPERATURE ALARM	Tank temperature is outside the alarm setpoints.	Investigate cause of temperature being out of limit.

Maintenance

System Draining:

- In the “CONTROL CENTER” screen on the Touchscreen Control Panel, disable all process functions to tanks prior to draining.
- Open drain Tank Drain Valve(s) specific to tank(s) being drained, until tank is fully drained.
 - HV-161-A - TANK DRAIN - CLEAN
 - HV-162-A - WEIR DRAIN - CLEAN
 - HV-161-B - TANK DRAIN - RINSE

Lift/Transfer Mechanism Speed Adjustment:

- Verify Rotary Disconnect is in OFF position, Unit's Compressed Air is off, and then lock out/tag out.
- Remove applicable Air Cylinder Guards.
- Open “ANTI-BOUNCE” valves 3 full turns.
 - FV-221-SYS - “ANTI-BOUNCE” (DOWN)
 - FV-222-SYS - “ANTI-BOUNCE” (UP)
- Turn the following knobs/valves clockwise to speed up and counterclockwise to slow down:
 - FV-220-SYS - TRAVEL THROTTLE (UP)
 - FV-223-SYS - TRAVEL THROTTLE (DOWN)
 - FV-224-SYS - TRAVEL THROTTLE (CLEAN)
 - FV-225-SYS - TRAVEL THROTTLE (RINSE)
- If jerks or bouncing occurs at the beginning of up or down travel, turn down slightly until jerks and bouncing stops.
 - FV-021-SYS - “ANTI-BOUNCE” (DOWN)
 - FV-022-SYS - “ANTI-BOUNCE” (UP)
- When Adjustments are complete return guards to respected locations.
- Power Unit up via Rotary Disconnect, turn Compressed Air on, and with manual controls verify adequate adjustments.

Maintenance

Preventive Maintenance Schedule:

Item	Action	Interval					
		As Needed	Weekly	Monthly	Quarterly	Semi-annually	Annually
Change Liquid Filter (X-110-A)	Remove used filters and replace with new. (Instructions in Preventive Maintenance Procedures Section.)	✓		✓			
Contactors/Terminals	Have qualified electrician verify all power wiring to contactors/relays and terminals are tight.				✓		
End of Travel Sensors	Verify Operation by manually moving the hoist to the end of travel, and verify End of Travel Indicator lights activate properly.					✓	
E-Stop Controls	Verify E-Stop halts system functions			✓			
General Plumbing	Inspect for looseness of fittings and leaks. Tighten as needed.		✓				
Inspect Agitator Rollers	Verify Rollers are tight			✓			
Misc. Components	Observe Maintenance Schedules found within component cutsheets provided	✓					
Motor Starters	Have qualified electrician test all manual overloads located in Main Enclosure					✓	
Tank Clean Out	Drain, Rinse, and Remove any remaining Residue			✓			
Rear Panel Filter Change Out	Remove soiled Rear Panel Filters, and replace with new.	✓					

Maintenance

Preventive Maintenance Procedures:

Liquid Filter (X-110-SYS) Changing Instructions

- Change the 30" CLEAN Tank filter (X-110-A) monthly or as needed based on maintenance experience. Extremely soiled parts will cause the filters to expire sooner.
- *MIRACLEAN*[®] recommends polypropylene core, polypropylene wound, 30", 10 micron filter for CLEAN Tank Filter (X-110-A). These filters, as well as other sizes and types, are available from *MIRACLEAN*[®].
 1. Verify the temperature of the solution is at or close to room temperature.
 2. Verify main power rotary disconnect switch is OFF (lockout recommended).
 3. If CLEAN Tank is full, close the following valve:
 - X-110-A - CLEAN TANK Filter
 - HV-165-A - FILTER PUMP/PUMP ISOLATION
 4. Loosen the filter housing top hex head bolt, and maintain control of the chamber housing as it will separate from the filter head as it loosens.
 5. Contain any spillage that occurs while loosening, and carefully dump and dispose of liquid contents when chamber fully separates.
 - **WARNING!!** CLEAN Tank filter chamber will contain the same chemical solution present in tank, and needs to be handled with the same precautions.
 6. Remove the old cartridge, and replace with new.
 7. Re-assemble housing, being careful not to over-tighten the hex bolt. Maintain a $\frac{1}{16}$ " gap between the filter housing and the filter head while tightening/compressing the O-ring via hex head bolt.
 8. Refer to **Valve Schedule**, page 5, for placing valves back to their respective positions.

Tank Clean Out

- Drain the tanks completely (follow instructions in **System Draining**, page 16), and rinse out any accumulating sludge/debris on or around the heaters and ultrasonic transducers, where applicable as needed. This procedure is very important as it greatly lengthens the life of both the ultrasonic transducers and heaters.

Agitator Roller Inspection

- Verify Rotary Disconnect is in OFF position, Unit's Compressed Air is off, and then lock out/tag out.
- Remove the guards/panels surrounding the agitator assemblies and verify all rollers are tight.
- When Adjustments are complete return guards to respected locations, before powering up.

Miscellaneous Maintenance and Inspection

- Review all the manufacturer's component manuals contained within Section 3, and service as recommended.

Rear Panel Filter Change Out

- Remove rear panels, slide out the soiled filters, and replace with new.

Maintenance

Parts List:

- Parts are matched to the Piping and Instrument Diagram tag number to a *MIRACLEAN*[®]. The tag number can also be found on the part's attached label. **Piping and Instrument Diagram** is located in Section 2 - Engineering Drawings.
- After matching the part tag number with a *MIRACLEAN*[®] part number, please contact us for further assistance in replacing your part.
- Please refer to **Parts and Service** on pg. 23, for information on *MIRACLEAN*[®] policy on part replacement.

SYSTEM Parts	
Label	<i>MIRACLEAN</i> [®] Part Number
CV-001-SYS S-001-SYS	H2B-UC-PC/S3F-6W
M-010-SYS	H2C-VP-E1SP6X669
CV-050-SYS S-050-SYS	H2H-WI-E28-6-0000
X-070-SYS PG-260-SYS X-340-SYS	H2H-WI-B28-06-FKG0
YX-080-SYS	H3C-WB-WB1040
FV-150-SYS	H2H-LE-7915 56 14
HV-160-SYS	H2H-WI-V28-06-0000
HV-161-SYS	H2I-S-B1-06C
HV-162-SYS	H2I-S-B1-08C
LSH-180-SYS	H3C-EH-FTL20-3325
LSN-190-SYS	H3C-EH-FTL20-3325
PS-290-SYS	H3C-IF-PK6224
ZS-330-SYS	H3C-C3-CPS-N30TMS-ZCP10
ZS-331-SYS	H3C-MC-7076K25
ZS-332-SYS	H3C-MC-7076K25
CV-350-SYS S-350-SYS	H2H-MAC-55B-11-PI-501JD
M-420-SYS	H4H-HA-A42-0-12-F100FGFCF3

LIFT/TRANSFER MECHANISM Parts	
Label	<i>MIRACLEAN</i> [®] Part Number
FV-220-LT	H2B-MS-80168042
FV-221-LT	H2B-MS-80168042
FV-222-LT	H2B-MS-80168042
FV-223-LT	H2B-MS-80168042
FV-224-LT	H2B-MS-80168042
FV-225-LT	H2B-MS-80168042
X-240-LT	H4H-BI-MRS-5028.5-DXP
X-241-LT	H4H-NU-MCI400022A6DA2



Maintenance

Parts List Con't:

LIFT/TRANSFER MECHANISM Parts Con't	
Label	MIRACLEAN® Part Number
ZS-330-LT	H3C-BI-MRS.-.087-BLQCX-50
ZS-331-LT	H3C-BI-MRS.-.087-BLQCX-50
ZS-332-LT	H3C-BI-MRS.-.087-BLQCX-50
ZS-333-LT	H3C-C3-CPS-N30TMS-ZCP10
ZS-334-LT	H3C-C3-CPS-N30TMS-ZCP10
S-350-LT S-351-LT	H2H=MA-825C-PM-111JD-552=0358
S-352-LT S-353-LT	H2H=MA-825C-PM-111JD-552=0358

CLEAN STATION Parts	
Label	MIRACLEAN® Part Number
CV-001-A S-001-A	H2B-UC-PC/S3F-6W
CV-002-A S-002-A	H2B-UC-PC/S3F-6W
CV-003-A S-003-A	H2B-UC-PC/S3F-6W
M-010-A	H2C-VP-E5SP6X669
M-011-A	H2C-VP-E1SP6X669
X-110-A	H2D-fos-906-316-E
FV-150-A	H2I-S-B1-06C
FV-151-A	H2I-S-B1-04C
FV-152-A	H2H-LE-7915 56 14
FV-153-A	H2I-S-B1-04C
FV-154-A	H2H-LE-7915 56 14
FV-155-A	H2I-S-B1-06C
FV-156-A	H2I-S-B1-06C
HV-160-A	H2I-S-B1-04C
HV-161-A	H2B-S-B3-08S-40
HV-162-A	H2I-S-B1-06C
HV-163-A	H2I-S-B1-04C
HV-164-A	H2I-S-B1-06C
HV-165-A	H2I-S-B1-06C
HTR-170-A	H4E-PT-2T6417-3-S
LSH-180-A	H3C-EH-FTL20-3325
LSN-190-A	H3C-EH-FTL20-3325
LSL-200-A	H3C-EH-FTL20-3325
LSL-201-A	H3C-EH-FTL20-3325
PG-260-A	H2J-MC-9880T101
PG-261-A	H2J-MC-9880T101



Maintenance

Parts List Con't:

CLEAN STATION Parts Con't	
Label	MIRACLEAN® Part Number
CV-350-A S-350-A	H2B-AS-EF8210G037 120/60
CV-351-A S-351-A	H2H-MAC-55B-11-PI-501JD
CV-352-A S-352-A	H2H-MAC-55B-11-PI-501JD
TE-360-A	H3C-PY-RBF185L484-01(1/2)-00-C
UST-400-A	D0830100927
UST-401-A	D0830100927
UST-402-A	D0827101539
UST-403-A	D0827101539

RINSE STATION Parts	
Label	MIRACLEAN® Part Number
CV-001-B S-001-B	H2B-UC-PC/S3F-6W
FV-150-B	H2I-S-B1-06C
FV-151-B	H2I-S-B1-04C
HV-160-B	H2I-S-B1-04C
HV-161-B	H2B-S-B3-08S-40
HTR-170-B	H4E-PT-2T4.5412-3-S
LSH-180-B	H3C-EH-FTL20-3325
LSN-190-B	H3C-EH-FTL20-3325
LSL-200-B	H3C-EH-FTL20-3325
CV-350-B S-350-B	H2B-AS-EF8210G037 120/60
CV-351-B S-351-B	H2H-MAC-56C-17-501JD
TE-360-B	H3C-PY-RBF185L484-01(1/2)-00-C
UST-400-B	D0830100927
UST-401-B	D0830100927

Rear Panel Filters - H5H-MC-2209K55



Warranty

Standard Warranty:

- Manufacturer warrants that all Products meet Manufacturers production and quality assurance specifications before being released for distribution. Manufacturer further warrants that:
 - (a) All Products shall be free from defects in material and workmanship for a period of one (1) year from the date of shipment,
 - (b) All ultrasonic generators shall be free from defects in material and workmanship for an additional one (1) year period (for a total of two (2) years) from the date of shipment; and
 - (c) The bonding of transducers shall be free from defects in material and workmanship for a period of ten (10) years from the date of shipment.
- Manufacturer shall replace or repair, at its option, any Product or item covered by this warranty which is determined by Manufacturer, upon examination, to be defective in workmanship or material within the applicable warranty period, provided that such Product or item has been properly installed, maintained, lubricated and serviced within the limits of normal usage as specified by Manufacturer and properly used under recommended operating conditions. **SUCH REPAIR OR REPLACEMENT SHALL BE THE EXCLUSIVE REMEDY AVAILABLE IN CONNECTION WITH THIS WARRANTY.**
- This warranty shall not apply to:
 - (a) Cavitation erosion of tank and bonded transducer surfaces, which is a normal occurrence and develops over time in the operation of ultrasonic cleaning equipment;
 - (b) Any Product or component which has been misused, altered or modified; or
 - (c) Expendable items such as fuses, bulbs, or similar parts having a useful life inherently shorter than twelve (12) months.
- Any components of the Products, which are not manufactured by Manufacturer, are sold subject to the respective manufacturer's conditions of sale, and Customer shall be entitled to such benefits as Manufacturer may receive under any contract with such manufacturer or under any warranty given by such manufacturer, provided such benefits are transferable. Manufacturer shall have no liability to Customer in the event any such manufacturer fails to honor any such warranty or to meet any liability that may arise by reason of any defect in such components or parts.
- Any action for breach of this warranty or other action related to the sale of the Products must be commenced within one (1) year after such cause of action arises.
- Any and all production or performance specifications supplied by Manufacturer are strictly estimates based upon Manufacturers analysis of the material or parts to be processed, interpretation of tolerance and accuracy requirements, assumptions of facilities available and operator skill. **NO SUCH PRODUCTION OR PERFORMANCE ESTIMATES SHALL CONSTITUTE A WARRANTY OR GUARANTEE OF PRODUCTION OR PERFORMANCE RESULTS.**
- This warranty is limited to the original purchaser and is non-transferable.
- No warranties expressed or implied have been made other than those stated herein.

Warranty

Parts & Service Policy:

- Parts found by the customer to be defective during warranty period will be replaced by *MIRACLEAN*®. *MIRACLEAN*® requests verbal involvement in the troubleshooting process prior to any parts being deemed defective. Parts mutually deemed defective must be returned to *MIRACLEAN*® for evaluation. Replacement parts may be provided to the customer by *MIRACLEAN*® without prior receipt of the defective part, to eliminate or reduce machine downtime. Warranty coverage is contingent on *MIRACLEAN*® confirmation of failure. Parts deemed defective in error, and/or considered non-functional due to abuse and/or negligence will receive a written evaluation, which will be provided to the customer. Charges may then apply for the replacement part previously provided, and/or for repair of the part(s).
- Warranty periods for *MIRACLEAN*® Ultrasonic components may vary, but all are warranted for 1-year minimum. See specific Ultrasonic manuals and/or project proposal information for specific warranty duration and details, as they pertain to specific *MIRACLEAN*® machine integration(s), where applicable.
- *MIRACLEAN*® warranty includes unlimited verbal technical support and/or programming adjustments via dial-in modem (where applicable) on issues that are mutually considered program 'bug' fixes.
- On-site troubleshooting, general maintenance, and servicing by *MIRACLEAN*® is not included in this warranty, unless otherwise agreed upon prior to equipment sale. On-site servicing and troubleshooting is available during the warranty period at discounted rates. See the *MIRACLEAN*® Service Rates section for rate information.
- Post warranty period, verbal technical support will remain unlimited. Program/status examination via modem dial-in will be limited to 1 hr. per issue. Additional program evaluation and/or changes are available at standard *MIRACLEAN*® technician rates. See the *MIRACLEAN*® Service Rates section for rate information.

Warranty

+Service Rates:

Standard:

Engineering/Programming:	\$114/hr.
Engineering Travel Time:	\$55/hr.
Service Technician:	\$82/hr.
Service Technician Travel:	\$40/hr.
Plus travel expenses	

Weekends/Holidays:

Engineering/Programming:	\$148/hr.
Engineering Travel Time:	\$72/hr.
Service Technician:	\$107/hr.
Service Technician Travel:	\$70/hr.
Plus travel expenses	

Machine Warranty Period*:

Service Technician:	\$35/hr.
Service Technician Travel:	\$35/hr.
Plus travel expenses	

Travel Expenses:

Mileage:	\$.58/mile
Board:	\$60/day/person
Room:	Not to exceed \$200/day
Airfare when (when applicable)	Pass thru charge
Rental Vehicle (when applicable)	Pass thru charge

* *MIRACLEAN*® warranty includes unlimited verbal technical support and/or programming adjustments via phone/dial-in modem (where applicable) on issues that are mutually considered program 'bug' fixes. Additional program evaluation and/or program adjustments/changes not mutually considered program bug fixes are available at the standard rates posted.

On-site troubleshooting, general maintenance, and servicing is not included in a standard warranty. On-site servicing is available during the warranty period at the discounted rates posted, plus travel expenses.

+ Prices subject to change without notice.