MICROVOID®

CS-41-FRPP-9FT
Wet Process Chemical Station

OPERATION & MAINTENANCE MANUAL

INSTALLATION SITE:
Australian National University

EQUIPMENT ID TAG / SERIAL #:
WB01 / 14807-1

Air Control, Inc.
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1.0 INTRODUCTION

Air Control, Inc. is pleased to have supplied you with a Microvoid® Model CS-41 Chemical Process Station. As one of the pioneers in the field of fume containment and wet processing, Air Control is committed to the manufacture of equipment exhibiting high standards of performance and workmanship. Our Customer Service department is prepared and eager to be of service to you should any problems occur in the use of this equipment.

2.0 WARRANTY

This unit has passed a thorough quality control test and is shipped free of visual defects. The unit (except for filters, lamps, and other consumables) is warranted to be free of defects in materials and workmanship for a period of (12) twelve months from the date of shipment. Liability is exclusively limited to repair or replacement of defective parts. Purchased, self-contained, sub-systems installed within the hood carry their own warranty periods, not covered by the hood manufacturer.

Note: Modifications or alterations to the unit may void the warranty.

3.0 THEORY OF OPERATION

Microvoid® Model CS-41 Chemical Process Station is designed for use in solvent environments. A variety of process tanks and sub-assemblies are available to facilitate specific processes.

Microvoid® Chemical Process Stations are designed to be connected to a facility exhaust system. Multiple adjustable exhaust ports within the hood allow for airflow balancing.

Electrical systems within the hoods are designed for safe operation in prescribed environments. All internal components are pre-wired to a single customer connection point.

All systems are pre-plumbed internally with customer connection points on the rear of the hood.

4.0 INSTALLATION

The unit is shipped on a skid. The hood can be lifted from the skid with a forklift. Forks should be open as wide as possible and position the forks beneath the station. Use extreme caution to avoid hitting the plumbing manifolds. Position the forks so they

are completely under the hood, engaging the front and rear rails of the frame. Blocking may be required to keep the station level. Lift the hood with the front and rear vertical edges on the forks. Handle the hood slowly and avoid uneven floor surfaces.

Set the hood in place. Level the hood as required by adjusting the leveling pads. Connect utilities as described on the Hood Drawing. Use compatible materials and observe pressure ratings for plumbing connections. Rated electrical voltage and amperage are listed on the electrical drawing and on the hoods data plate.

5.0 HOOD MATERIAL

This hood is manufactured of UL 94-V/0 polypropylene (FRPP). This material is suitable for use with most chemicals. Refer to standard chemical resistance charts or contact Air Control for specific chemical resistance data.

6.0 GENERAL MAINTENANCE & CLEANING

6.1 Exterior Maintenance:

Plastic and Stainless Steel hoods can be cleaned with filtered IPA and non-shedding cloths or an approved plastic cleaner for the specific material.

Note: Do not use isopropyl alcohol on the eye shield. The eye shield should only be cleaned with an approved plastic cleaner. Alcohol-based cleaners may damage the eye shield material. Do not use abrasive cleaners on any of the hood surfaces.

6.2 Replacement of LED Lamps:

LED lamps are installed over the work area in a sealed compartment behind the head casing. To access the lamps, reach over the electrical compartment. The box top panel, which is held in place with several retaining screws, can then be removed.

Note: Always turn the electrical power off prior to changing lamps.

Carefully remove the old lamps from the fixture and remove the lithogold sleeves. Be sure to dispose of the old lamps properly. Install the new lamps into the lithogold sleeves, and into the fixtures. Ensure that the lamp pins are securely in their socket. Restore electrical power and check new lamps for operation. Replace clear cover panel.

Note: Should the new lamps not work, refer to the electrical schematic for possible trouble shooting.

6.3 Manufacturer's recommended procedures:

All installed subassemblies should be maintained per manufacturer's recommended procedures. See accompanying manuals for manufacturer's recommendations.

7.0 AIRFLOW MEASURMENT

The Model CS-41 will safely contain fumes with face velocities of 80 LFM (Linear Feet per Minute) or more. Most models have a hinged eyeshield leaving from 16-18" of fixed open access area. Place the eyeshield in the down position, leaving only the 16"-18" height open to airflow into the hood. Make sure the adjustable louvers at the rear of the deck are wide open.

Using a hot wire anemometer or Velgrid multi-point sensor, take a grid of several face measurements, with a reading every 6" horizontally and vertically across the open face area. The airflow should be 100 LFM, not to exceed 120 LFM. The hinged eyeshield is to be opened only to temporarily move apparatus in or out, but should be left in the down position for all wet station operations and testing.

The open face area of the CS-41 unit is taken as a vertical plane from the edge of the viewing shield straight down to the deck. For future ASHRAE 110 testing, the tracer gas canister is placed 6 inches back from this vertical plane.

Note: If the airflow is found to be less than 80 LFM, or greater than 120 LFM, consult building maintenance to adjust airflow to place it within the safe operating range of 80 – 120 LFM.

8.0 PROGRAMMABLE LOGIC CONTROLLER (PLC)

This hood is equipped with a programmable logic controller (PLC). The PLC controls the main electrical, pneumatic and timing functions of the components within the station. The Touch Screen (described below) is the user's communication link to the PLC.

The PLC is installed in the front of the electrical compartment. The controller has been pre-programmed and tested prior to shipment. Should problems arise in the operation of the PLC or should changes be required, contact Air Control, Inc. for assistance.

9.0 TOUCH SCREEN CONTROLLER (HMI)

The Touch Screen provides a means of controlling the functions of the process station. The Touch Screen also displays alarm conditions for the various systems in the process station. The Main Screen is shown below:

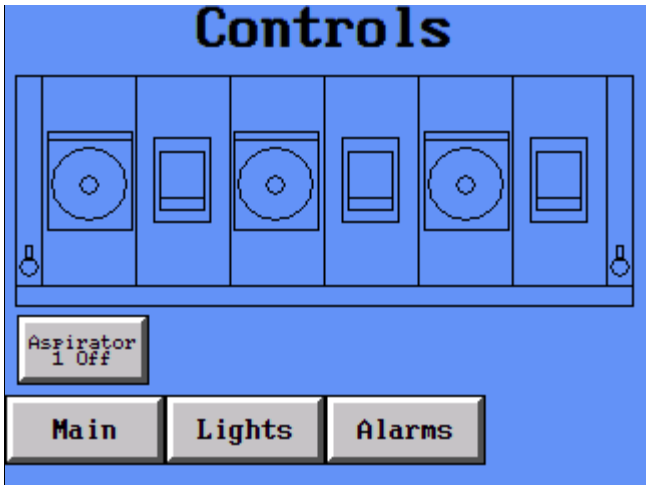
This screen is the first screen that comes up on the touchscreen controller when the hood is powered up. It lists the benches serial number, as well as the software revisions of the operating software.

Controls:
This button takes you to the Control Screen.

The various other screen images displayed on the touchscreen are found throughout this document.

10.0 CONTROLS SCREEN

The Controls Screen is shown below:



This screen is the primary operating screen of the hood. It also graphically displays the locations of the tanks and other support equipment.

Main:
This button takes the user back to the Main screen. The screen contains the contact information for Air Control, Inc. the software version for the PLC and HMI, and the serial # of the hood.

Lights:
This button turns on an off the fume hood lights.

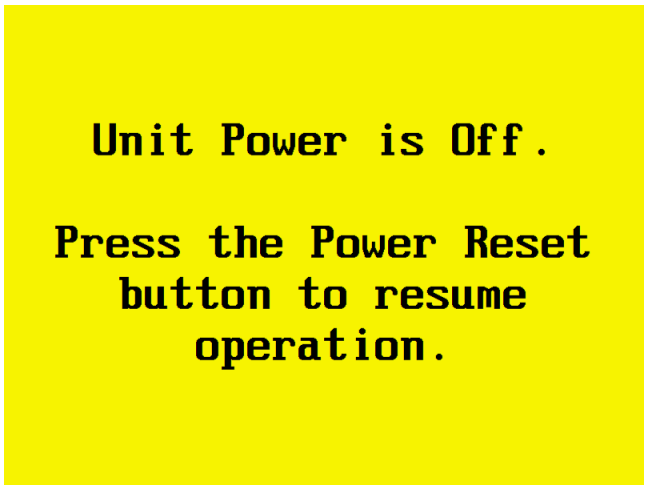
Alarms:
This button takes the user to the Active Alarm screen. The button will flash yellow to show that the bench has an active by silenced alarm.

Aspirator:
This button turns the aspirator on and off.

11.0 EMERGENCY POWER OFF PUSHBUTTON (STOP)

The red mushroom head pushbutton in the center of the electrical panel may be depressed for electrical shutdown. Upon activation, the power will be cut to the entire unit, HMI touchscreen included. The only indication of the EPO activation is that the EPO Engaged light will come on. Twist and pull the EPO pushbutton to un-do the EPO activation. This will cause the EPO Engaged light to go out. Press the Power On button on the fume hood control panel to re-start the bench.

If the Power On button is not pressed, once the touchscreen re-activates, the following screen will remind you to press the Power On button to restore power to the bench:



Digital controllers must be "powered-up" or reset after power outages.

12.0 LIGHTING (LED)

This hood is equipped with LED lighting shielded by lithogold UV filters. The lights are activated by a button on the touchscreen Controls screen.

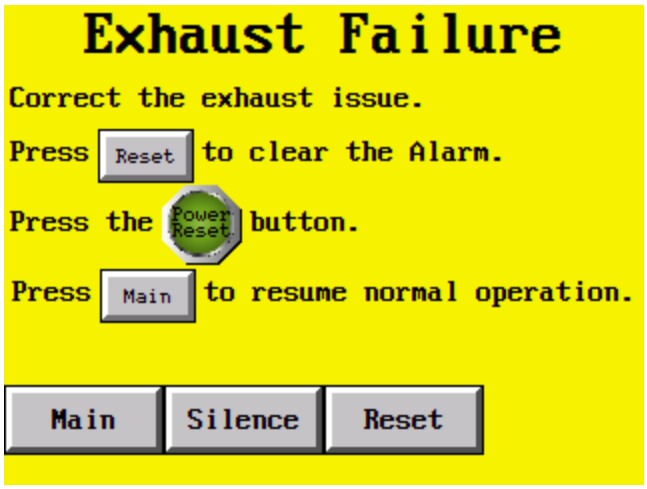
The lamps and fixture are accessed through a sealed panel on the underside of the head case.

(See the General Maintenance Section for replacement instructions.)

13.0 EXHAUST FAILURE ALARM AND PHOTOHELIC® GAUGE

The photo-helic® pressure gauge is located on the front head case control panel. This gauge monitors negative pressure in the fume hood's exhaust plenum. Normal reading is between 0.20 and 0.40 inch w.g., while operating the fume hood at 100-lfm face velocity.

The low-pressure set point hand on the face of the photo-helic gauge is used to initiate the exhaust failure alarm system. This system shuts down electrical power to the hood in the event of an exhaust failure or low exhaust flow. This will also cause the Exhaust Failure screen to display on the touchscreen, as shown below:



Main:
This button takes the user back to the Main screen after the Exhaust Failure alarm has been Silenced or Reset

Silence:
This button Silences the Exhaust Failure alarm.

Reset:
This button Resets the Exhaust Failure alarm.

The Silence button on the touch screen can silence this alarm condition; however, the condition must be corrected before the system can be reset. The low-pressure set point should typically be between 0.10 to 0.20 inches w.g.

14.0 EYE SHIELD

This hood is equipped with an eye shield constructed of clear C-PVC material. The eye shield should be left in a closed position while the hood is being used. Operators should look through the eye shield, not beneath it, for maximum splash protection.

Note: Clean the eye shield with an approved plastic cleaner only. Alcohol based cleaners may damage the eye shield material.

15.0 CEE BAKE PLATES:

This station is equipped with three (3) CEE APOGEE wafer bake plates. These units are mounted between the spinners on the deck. These plates are installed in purged enclosures, to prevent the electronics from corrosion in use.

These wafer bake plates are equipped with a hinged lid, to maintain plate temperature, lift pins to locate and raise wafers to/from the plate, and a full color touchscreen controller running its own software.

(Please consult your CEE APOGEE bake plate manuals for proper operating/programming instructions.)

16.0 WESTAR PRO-SPIN SPINNERS W/ WASTE CONTAINER

This station is equipped with three (3) Westar Automation model Pro-Spin deck mounted spinners. The two 6e models on the sides can be used for up to a 6" wafer size, while the model 8 spinner in the middle can be used for up to an 8" wafer size. These spinners utilize separate full-color touchscreen controllers, and have vacuum chucks to attach wafers to the spindles.

These spinners are plumbed to the same 4 gallon waste carboy as the unit tub. This waste carboy is located in a pullout tray that has a 5 gallon containment capacity, in case the container should leak.

Note: This waste carboy has no level sensor, and so must be monitored to prevent overfilling.

(Please consult the included Westar Automation manuals for further operating instructions.)

17.0 NITROGEN BLOW OFF GUNS

This hood is equipped with two (2) nitrogen blow-off guns. These guns on either side of the work deck are mounted on coiled hoses, which extend to allow access to the entire work surface. Each gun has a PTFE membrane filter in its screw off tip. This filter should be changed on a preventative maintenance schedule.

18.0 WAFER HANDLING VACUUM WAND

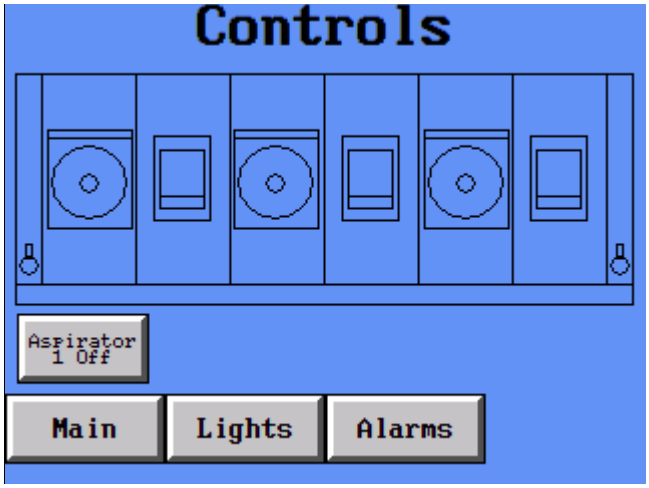
This hood is equipped with one (1) wafer handling wand. This wand in the center of the work deck is mounted on a retractable hose, which extends to allow access to the entire work surface.

This vacuum wand is operated by a button on the handle of the wand. Pressing this button down will activate the vacuum, and allow the wand to pick up silicon wafers safely. Releasing this button will stop the vacuum, allowing the placement of the silicon wafer where desired.

This wand is plumbed to the facility vacuum feed through a connection in the bottom of the hood.

19.0 LIQUID ASPIRATOR

This hood is equipped with one (1) liquid aspirator wand, mounted on the left side of the deck. This aspirator is turned on and off by a button on the Main Controls Screen, as shown below:



20.0 RECIRCULATING DI LOOP SYSTEM

This hood is equipped with a continuous flow DI Loop System. This system circulates DI water from a facility-supplied source to a restricted or low pressure DI return line.

Each component in the hood requiring DI water is connected to the DI supply manifold and to the DI return manifold. When components are in use DI return flow is minimal. When components are idle, DI return flow is continuous thus preventing stagnation and bacteria growth.

The DI plumbing consist of Teflon PFA tubing (.062 wall) connected to "flare" style fittings. This is an excellent combination for leak resistance and high purity.

21.0 CIRCUIT BREAKERS

The unit is equipped with nine (9) circuit breakers which are located inside the rear electrical cabinet of the bench. These breakers protect the wiring in the fume hood from overcurrent situations. In the event of a tripped circuit breaker, please contact your facilities manager to determine the cause. Merely resetting the circuit breaker without determining the root cause may just cause the breaker to trip again once the

tripping activity is repeated.

Note: Feel free to contact Air Control for assistance in troubleshooting circuit breaker events.

22.0 CONTROL INTERFACE CONNECTOR

The hood is equipped with a control interface connector, located in the center of the hood control panels. This connector is sealed within a fume-tight cover and contains the Ethernet connector to connect a laptop to the fume hood controls. This connection is for programming and testing of the bench electronic controls by qualified personnel.

There is a second control interface connector, located on the back of the hood. This connector is also sealed within a fume-tight cover and contains the Ethernet connector to connect the hood to the internet. This connector is only for interfacing with the Air Control factory in North Carolina, U.S.A. Using this connector, connected to the internet, Air Control personnel can provide remote troubleshooting assistance.

23.0 SERVICE CONNECTIONS

NITROGEN:		1/2" FNPT, PP (70 PSI)
CDA:		1/2" FNPT, PP (80 PSI)
DI SUPPLY:		1/2" TEFLON FLARE (65 PSI MAX)
DI RETURN:		1/4" TEFLON FLARE
POTABLE WATER:		1/2" NPT, PP (70 PSI)
VACUUM:		1/2" FNPT, SS (24 IN. HG.)
TUB DRAIN:		1" NPT, PP, DRAIN TO CARBOY
EXHAUST:		12” PVC FLANGED PIPE STUB (1350 CFM AT .5 S.P. 100 LFM FACE VELOCITY, 18" OPENING)
ELECTRICAL:	PDB-1:	230 VAC, 1 Phase, 50 Hz, 39 FLA

24.0 ELECTRICAL REQUIRMENTS

Rated environmental conditions:

- Indoor use only.
- Use in altitudes up to 2,000 m
- Use environmental temperatures from 5°C to 40°C
- Use relative humidity from 80%RH @ 31°C; 50%RH @ 40°C
- Use Overvoltage Category II
- Pollution Degree 2

Protective Earthing:

Protective Earth Grounding (PE) is provided to the equipment by bonding a PE ground to the Grounding Terminal within the Main junction box located on the top of the equipment. It is marked with the Ground Terminal Symbol. 

Note: Protection provided by the equipment may be impaired if used in a manner not specified in the instructions

The electrical installer shall provide a disconnect switch(s) that meet IEC 60947-1 and IEC 60947-3, and does not interrupt the PROTECTIVE EARTH CONDUCTOR, or the electrical installer shall provide circuit breaker(s) used as a disconnect device(s) as required by local electrical regulation. This device shall be located where easily located and shall be marked as the disconnect device for the circuit(s) for the equipment.

25.0 PARTS LIST

Item	Qty	Part Number	Description	Manufacturer
1	5		1 3/8" WHITE POLYPRO KNOB	ALLEN MFG
2	8		MOLDED WHITE POLYPRO HINGES	ALLEN MFG
3	3	R55M-2GP	0-100 PSI REGULATOR W/ GAUGE & MOUNTING NUT	MASTER PNEUMATICS
4	1	R55M-2L30GP	0-30 PSI REGULATOR W/ GAUGE & MOUNTING NUT	MASTER PNEUMATICS
5	3		Apogee bake plate, flange mount, up to 200mm, 400C option, 230 vac 50 htz Australian plug (w/ AC control panel)	CEE
6	4	96-10-310-11	TYPE "A" NYLON LIFT OFF HINGE	SOUTHCO
7	8	96-10-320-11	TYPE "B" NYLON LIFT OFF HINGE	SOUTHCO
8	8	C6-20	FREE SWING PLASTIC HINGE	SOUTHCO
9	6	C6-26	110 DEG DETENT PLASTIC HINGE	SOUTHCO
10	12	E3-56-65	TOOL OPERATED PANEL LATCH	SOUTHCO
11	24	E3-56-75	TOOL OPERATED PANEL LATCH	SOUTHCO
12	4	L-270	270MM SS LID STAY	SUGATSUNE
13	1	RMA8-SSV	10-100 scfh flow meter	Dwyer Instr
14	6	450T-0820Z-17N-17PC	1/2"-13 LEVELING FEET W/ NYLON PAD	GABRIEL GLIDES
15	5	7830-005	1/2" NPT PP COUPLING	Chemtrol
16	1	7830-010	1" NPT PP COUPLING	Chemtrol
17	1	7839-130	1"x1/2" pp bushing	Chemtrol
18	1	SPM88N-1	1/2" PFA FLARE BULKHEAD UNION	Fit Line
19	2	ME8-8N-1	1/2" FLARE PFA MALE ELL	Fit Line
20	1	MCPM8-8N-1	1/2" FLARE PFA panel mount male connector	Fit Line
21	1	MCPM4-4N-1	1/4" pfa flare panel mount male connector	Fit Line
22	1	SPM44N-1	1/4" PFA FLARE BULKHEAD UNION	Fit Line
23	1	SU84N-1	1/2" x 1/4" pfa flare union	Fit Line
24	1	QV2-188-NC	1/2" pfa pneumatic valve	Furon
25	1	VWSET-E	vacuum wand set	H-Square
26	1	600407CVB	SI-15 natural polyethylene 4 gallon carboy	National Packaging
27	1	CAP FS70	RIEKE Caps	PipeLine Packaging
28	1	NG-250-PPR	1/4" GLOBE POLYPRO NEEDLE VALVE	MARQUEST SCIENTIFIC
29	1	5535K19	3/4" x 1/2"npt polypropylene quick connect stem	Banjo
30	1	5237T22	3/4" x 3/4" barb polypropylene quick connect body	Banjo

31	2	9148T133	1/4" x 15" PU coiled tubing	Freelin Wade
32	2	62165K83	24 vdc solenoid valve	SMC
33	1	62165K4	2 station solenoid base	SMC
34	3	KT-LED32T8-72GC-840-D	6' T8 LED tube 4000K color	Keystone
35	2	421-42-11	PFA N2 GUN	ENTEGRIS
36	2	ProSpin 6e+NPP-DM	150 mm Deck mount natural pp spin coater, controller with separate power pack, 230 vac, 50 htz Australian Plug	Westar Automation
37	1	ProSpin 8e+NPP-DM	200 mm Deck mount natural pp spin coater, controller with separate power pack, 230 vac, 50 htz Australian Plug	Westar Automation
38	3		6' T8 Resistguard UV sleeves	White Knight
39	3	SU201M-K10	10 AMP, 1 POLE, K CURVE, SU200 M, UL489, MINIATURE CIRCUIT BREAKER, PRO M COMPACT	ABB
40	2	SU201M-K2	2 AMP, 1 POLE, K CURVE, SU200 M, UL489, MINIATURE CIRCUIT BREAKER, PRO M COMPACT	ABB
41	4	SU201M-K5	5 AMP, 1 POLE, K CURVE, SU200 M, UL489, MINIATURE CIRCUIT BREAKER, PRO M COMPACT	ABB
42	7	1SVR405601R1000	24 VDC, PLUGGABLE PCB RELAY CR-P, 250V, 8A, w/DIODE AND LED - GREEN	ABB
43	7	1SVR405650R1000	STANDARD SOCKET CR-P	ABB
44	7	1SVR405654R1000	DIODE AND LED	ABB
45	1	1SFA611102R1102	MP3-11G, MOMENTARY, GREEN, ILLUMINATED EXTENDED PUSH BUTTON, BLACK PLASTIC BEZEL	ABB
46	1	1SFA611605R1100	MCBH-00, 3-POSITION HOLDER	ABB
47	1	1SFA611610R1001	MCB-10, SINGLE CONTACT BLOCK, NO	ABB
48	1	1SFA611621R1012	MLBL-01G, GREEN LED, 24 VAC/DC	ABB
49	2	HW9Z-KG3	Shroud, For 22mm E-Stop; 40mm button max	IDEC
50	1	SE-SL3001	Basic industrial VPN router, wired Internet connectivity, (5) Ethernet Gigabit (RJ45) port(s), iOS/Android with mobile VPN, 12-24 VDC required.	STRIDE
51	1	SC-E3-220VAC	IEC contactor, 65A, (3) N.O. power contact(s), 240 VAC (60Hz)/220 VAC (50Hz) coil voltage	FUJI
52	2	E22LLB2B	22 mm, twist-to-release, emergency stop, 1 N.C. contact(s), plastic base, plastic bezel, Operator: red, mushroom, 40 mm, round, plastic	EATON

53	2	E22B2	Cutler-Hammer contact block, replacement, (1) N.O. contact(s). For use with 22mm devices.	EATON
54	1	C0-16ND3	Discrete input module, 16-point, 24 VDC, sinking/sourcing, 4 isolated common(s), 4 point(s) per common.	AUTOMATION DIRECT
55	1	C0-16TD2	Discrete output module, 16-point, 12-24 VDC, sourcing, 2 isolated common(s), 8 point(s) per common, 0.1A/point.	AUTOMATION DIRECT
56	2	ZL-C0-CBL20-1P	PLC I/O cable, 20-position terminal block to pigtail, 3.2ft/1m cable length. For use with CLICK PLC modules.	AUTOMATION DIRECT
57	1	C2-01CPU	CLICK PLUS PLC, 24 VDC required, Ethernet, serial and microB-USB ports, no on-board I/O.	AUTOMATION DIRECT
58	1	C2-FILL	CLICK PLUS option slot cover.	AUTOMATION DIRECT
59	1	EA9-T6CL	HMI, 6in color TFT LCD, 320 x 240 pixel, QVGA, LED backlight, supports (3) serial, (1) Ethernet and (2) USB ports	AUTOMATION DIRECT
60	1	PSL-24-060	Switching power supply, 24 VDC (adjustable) output, 2.5A, 60W, 120/240 VAC or 125-375 VDC nominal input,, DIN rail, NEC Class 2.	RHINO
61	1	PB1043	Edison distribution block, UL Recognized, 3 pole, openings: 1 line side / 4 load side, 200kA SCCR	EDISON
62	1	3001MR	0-1" w.c Series 3000MR/3000MRS Photohelic Switch/Gage	DWYER
63	1	CH-V09-525-Q	Medium Loud Chime Tone; Single Shot Rate; Panel Mount with Volume Control Case and Quick Connect Blades Termination	FLOYD BELL
64	3	74110	AUSTRALIA / NEW ZEALAND 10 AMPERE-250 VOLTS OUTLET (AS/NZS 3112) TYPE I (AU1-10R), WALL BOX MOUNT, 2 POLE-3 WIRE GROUNDING (2P+E). WHITE.	INTERNATIONAL CONFIG
65	4	TRD695ABLK-10	Premium Cat6a Cable, RJ45 / RJ45, Black 10.0 ft	L-COM
66	2	WPBHC6110	Cat 6 IP67 RJ45 to 110 Bulkhead Panel Mount Coupler, Shielded, Feed-Thru, PoE+ with Dust Cap	L-COM
67	3	3113-4-00-57610	RED, LED, Pilot Light, 28 VDC, 3W	SOLICO
68	3	74210	AUSTRALIA / NEW ZEALAND 10 AMPERE-250 VOLTS OUTLET (AS/NZS 3112) TYPE I (AU1-10R), DUPLEX	INTERNATIONAL CONFIG

26.0 UNIT PRINTS

(Separate Documents)

27.0 QUALITY CONTROL

(Separate Documents)

28.0 COMPONENT MANUALS

(Separate Documents)