



MCS-500 SERIES



INSTRUCTION & OPERATION MANUAL

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I. INTRODUCTION

CAUTION: **Disconnect power before servicing.**
 Only qualified technicians should service equipment.
 Follow all local and national codes.

A. UNPACKING AND INSTALLATION

The MCS 500 Series Material Conveying System is shipped complete and is fully programmed from the factory. After receipt of the unit, carefully inspect it for damage. Although the units are packaged securely, vibration and mishandling during transit can cause damage. All screws, bolts, and other connections should be checked to make sure they have not come loose in transit. Report any damage immediately to the shipping company.

B. INSTALLATION

The single most important activity performed to ensure satisfactory operation of a pneumatic conveying system is the actual installation of the equipment, with personal safety weighed at every decision point. All components should be located so that material lines and vacuum lines are as short as possible. Elbows or other changes in direction should be minimized. The material conveying lines should be horizontal and/ or vertical and as direct as possible with no slope. Care needs to be taken that all connections are vacuum tight. The customer, to provide a safe but secure installation, should properly support all rigid conveying tubing. It is generally recommended to use flexible hose and clamps to connect material pick up lances, vacuum chambers, etc, to material or vacuum lines. The flexible hose should only be as long as needed since excess hose will reduce the efficiency of the system. The hose should not sag. The conveying lines must be grounded to prevent “shocks” from static electricity that may be generated by some materials as they are conveyed. **THIS IS AN EXTREMELY IMPORTANT STEP.** All electronics are susceptible to some degree to electrostatic damage and, although as much protection as possible has been designed into the system, this cannot completely eliminate upsets due to electrostatic voltage being accidentally introduced into the electronic circuitry. Generally, grounding the case of the container from which the material is being conveyed (including the lines) to the same potential as the green wire ground of the conveying system eliminates most of this problem.

Rigid tubes and elbows should be square cut, round, and without burrs. The tube ends should butt together when installed, with the bolted coupler over the joint.

All national and local electrical, building, and safety codes need to be followed, proper grounding of all equipment is important. Check the electrical wiring schematic for wiring numbers and details. The following paragraphs describe installation of typical system components. Some of them are optional and may not be required for your system.

VACUUM POWER UNIT Locate the vacuum power unit so that access to the secondary filter element mounted to the unit is available. Secure to the floor or platform as necessary. Attach high voltage (check nameplate) to the motor starter located in the motor starter junction box mounted to the vacuum power unit FROM A FIELD-SUPPLIED DISCONNECT SWITCH or to the optional combination starter with integral fused disconnect switch. An electrical ground wire is also required. Attach two control voltage wires (normally 24VDC and common 0 VDC) to the motor starter coil from the main control panel. Also attach two control voltage wires (normally 24VDC and common 0 VDC) to the vacuum breaker solenoid from the main control box. When routing these wires, attempt to keep them away from the display panel components on the back of the control box door.

A clean, dry supply of 80-120 PSIG compressed air is connected to the pressure port on the vacuum breaker valve solenoid valve. When the vacuum breaker valve is energized, it allows ambient air to pass through the vacuum blower. This is done instead of simply shutting the pump down to prevent premature wearing of the pump and belt drive caused by constantly starting and stopping the pump. Eventually the pump will shut down completely (if not needed) when the search timer expires. Note that the default time programmed into the search timer of the system is 45 seconds when the system is first shipped to you. If the pump seems to be shutting down after an usually short or long period, check the programmed search timer value as described in Part A of Chapter 2 (II) titled PROGRAMMING THE MCS PANEL

Occasionally a blowback valve is used on the vacuum power unit instead of the vacuum breaker valve. This valve also allows the vacuum pump to run with ambient air (idle) instead of constantly starting and stopping with the pump eventually stopping after expiration of the search time. The valve also reverses the flow of the air back down the vacuum line to clean (blowback) the filter in the vacuum chamber. Two solenoid valves are wired to the main control panel (normally two 24-VDC signals and a common wire). Compressed air is also required as described for the normal vacuum breaker valve.

CYCLONE FILTER Locate the cyclone filter as close as possible to the vacuum power unit. Provide access for the material with catch pan or fine drum as necessary. Secure the cyclone filter to floor or platform. Attach vacuum lines from the conveying system to the cyclone inlet (tangential inlet on the side of the cyclone body). Attach the cyclone outlet (top duct) to the vacuum breaker valve inlet on the vacuum power unit.

STATION VALVES Locate conveniently to each station's vacuum chamber. Typically, the station valve is rigidly attached with bolted couplers to vacuum lines to the cyclone filter while running rigid tube or flex hose to the lid of the vacuum chamber. The station valve solenoid is wired to the main control panel (normally 24-VDC) supply and signal to the main control box. Ground the system as necessary. A clean, dry supply of 80-120 PSIG compressed air is connected to the pressure port on the station valve's solenoid valve.

SINGLE INLET VACUUM CHAMBER Secure the chamber to the hopper or surge bin as required. Orient the material inlet line and vacuum outlet line as required. Flex hose is normally used to connect the vacuum chamber to the supply line and station valve. Connect the material level switch wires to the main control box.

TWO INLET VACUUM CHAMBERS (PROPORTIONING) Secure the chamber to the hopper or surge bin as required. Orient the material inlets and vacuum outlets as required. Mount the proportioning control box in a convenient location. The supply voltage is obtained by paralleling to the station valve control wires (normally 24VDC and common 0 VDC). The off/on switch on the proportioning control box is wired in series the material level switch on the vacuum chamber so that the station can be de-activated at the main control panel or from the proportioning control box. The 24 VDC control signal from the proportioning control box is attached to the proportioning solenoid valve along with a neutral wire. Ground all components as necessary. Refer to the main control panel wiring schematic and proportioning control box wiring schematic for details.

A clean, dry supply of 80-120 PSIG compressed air is required to be connected to the air filter/regulator that is attached to the vacuum chamber to supply the proportioning solenoid valve. Adjust the filter/regulator to 80-120 PSIG compressed air blowback at the vacuum chamber.

COMPRESSES AIR BLOWBACK Some vacuum chambers (single and dual inlet) are provided with a compressed air blowback solenoid valve for cleaning the filter depending on the application. The pulse blowback solenoid valve is wired to the main control panel (24 VDC signal and common). A clean, dry air of 80-120 PSIG compressed air is required. Connect it to either the compressed air accumulator tank supplied on the large vacuum chamber or directly to the pulse blowback solenoid valve only that is supplied on small vacuum chamber.

WARNING: Do not operate this equipment unless it has been safely installed by qualified technicians who have followed all local and national codes. Do no operate until this instruction manual has been completely read and understood.

C. GENERAL DESCRIPTION -Novatec's MCS-500 Series Material Conveying System is a sophisticated industrial control system featuring an intelligent and easy to use Touch Screen Panel which contains a message display center to indicate operating status, and ON/OFF buttons for control of each station as well as individual pumps.

The basic engine, which controls the conveying system, is a state-of-the-art Programmable Controller, which communicates with the touch screen panel via a serial communication link. The user controls the system by entering commands and data at the touch screen then re-transmits it to be the PLC over the communication link.

D. STATION CAPACITY

The MCS-500 series systems are designed to control from one to eighty stations and up to four pumps.

II PROGRAMMING THE MCS PANEL

A. SYSTEM CONTROLS



The TP170 (touch panel) and S7-200 series PLC are both sophisticated Micro-controlled designs provided entirely by Siemens. Siemens is a name known world wide for it's electrical and electronic products. It is a standard controller with a custom program written by NOVATEC to make the MCS-500 the most dependable, flexible conveying system available.

The TP170 has 6 screens available for the control of the NOVATEC MCS-500.

DISPLAY:

Type	STN LCD/Blue mode
Active screen area (B x H) in mm	116 x 87 (5.7")
Resolution (pixels)	320 x 240
Monochrome	4-level
Back-lighting	CCFL tube
Half Brightness Life ¹⁾ approx. (h)	50,000

B. MAIN MENU

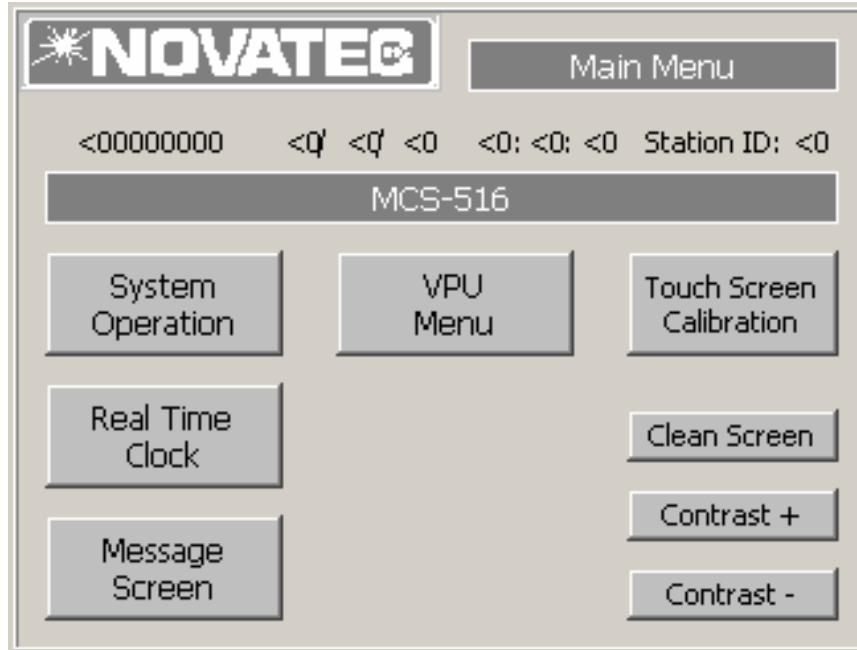


Figure 1, Main Menu screen

Figure 1 shows the Main Menu of the Novatouch control. The Novatouch has a touch screen interface. Touch any of the buttons to enter the parameters as described below.

C. SYSTEM OPERATION

Figure 2 illustrates a typical view of the System Operation Screen. Located directly below the square box with the station symbol are the station number and an on/off button, which is activated when you touch on the button.

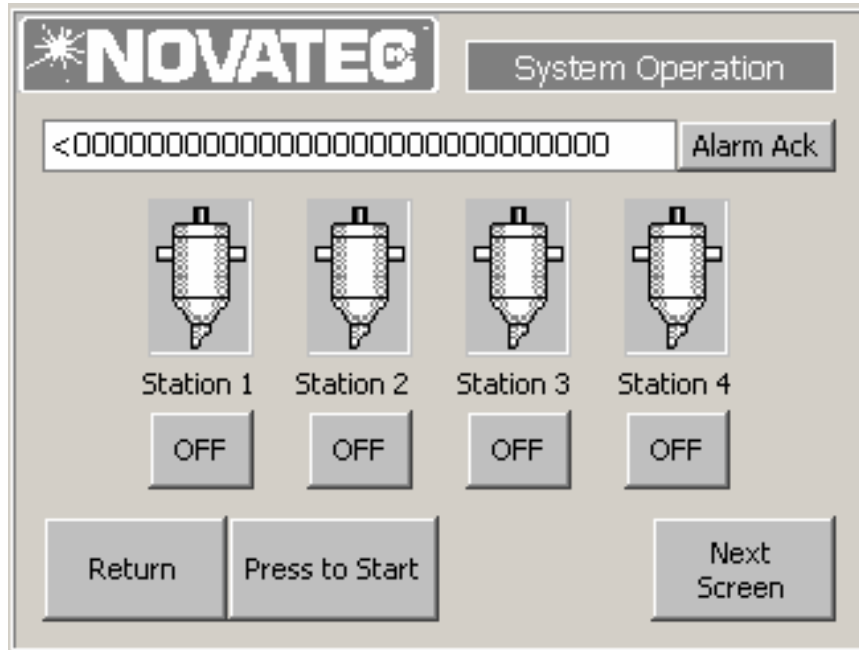


Figure 2, Typical System Operation Screen

This switch operates like a pushbutton switch. Touch it once and the station is enabled and will be loaded with material if that station's limit switch is activated (requesting material) Touch it again and the station is turned off.

When a station is being loaded with material, the station symbol will flash. During the "dump" phase of the station's operation, the station symbol will become dark. After the dump time has expired, the station symbol will return to normal.

D. LOADER MENU

Enter the Loader Menu by touching one of the vacuum chamber symbols in the System Operation screen (figure 2 above). The Loader Menu screen will appear (figure 3 below), and will display the information programmed for that particular station. To view parameters for a different station, return to the System Operation screen and touch the chamber symbol for the desired station.

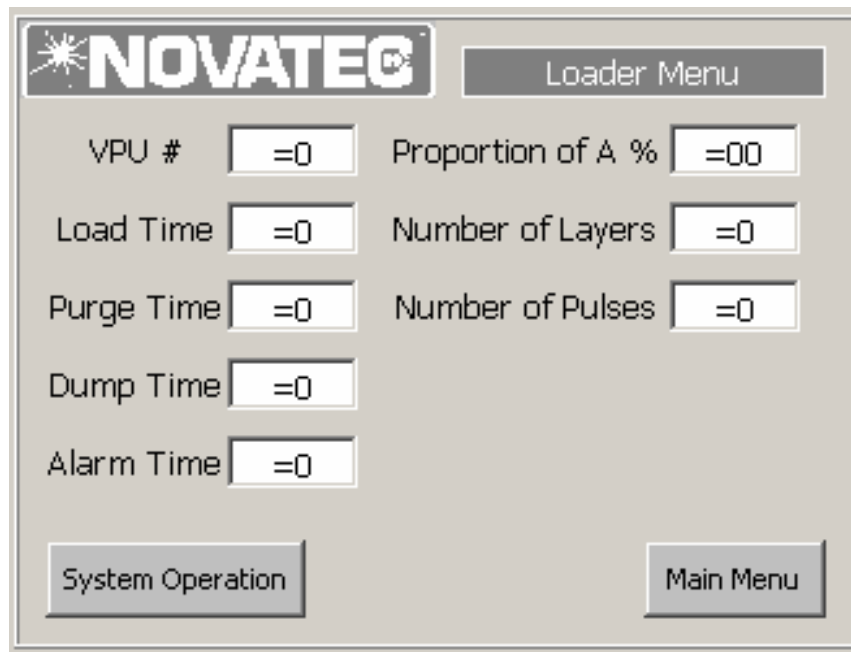


Figure 3, Loader Menu

VPU # - Before operating the system, you must assign a particular station to a specific pump. It is **ABSOLUTELY CRITICAL** that this operating system information matches the hardware configuration in the plant. A station can not be assigned to more than one pump. Assign each station to pump number 1,2 or 3.

Load Time – This is the amount of time in seconds that the station is loaded. Select a time that will fill the vacuum chamber but without overflowing.

Purge Time – (Optional) (Requires additional hardware) Amount of time in seconds to purge or clean the material line after loading.

Dump Time – This is the amount of time in seconds for the vacuum chamber to empty after loading.

Alarm Time – Or No Load time. This timer (in seconds) starts at the beginning of the dump time. If the dump flap is not held open by material exiting the chamber for this amount of time, the alarm is triggered indicating that the chamber was not full. The alarm time must be less than the dump time, or zero to disable.

Proportion of A % - (Optional) (Proportioning chambers required) (additional wiring required) For proportioning chambers, this parameter (in percent) controls the amount of material connected to the “A” inlet of the chamber. Example: if your Load Time is set at 10 seconds and Proportion of A% is set for 20, the chamber will load on the “A” side for 2 seconds and then switch to the “B” side for 8 seconds.

Number of Layers – (Optional) (Proportioning chambers required) The Numbers of Layers function can only be used with a proportioning vacuum chamber and is used for improved blending of two materials. In the example above, if the Number of Layers were set at 2, then side A would load for 1 second, side B would load for 4 seconds, side A would load for 1 second, side B would load for 4 seconds.

Number of Pulses – (Optional) (Blowback lids required on vacuum chambers) (additional wiring required). This numerical value controls the number of compressed air blowback pulses for filter cleaning. The duration of the pulse and interval between pulses has been preset. Blowback occurs during the dump time and the dump time may have to be increased to accommodate the number of pulses desired.

E. VPU MENU

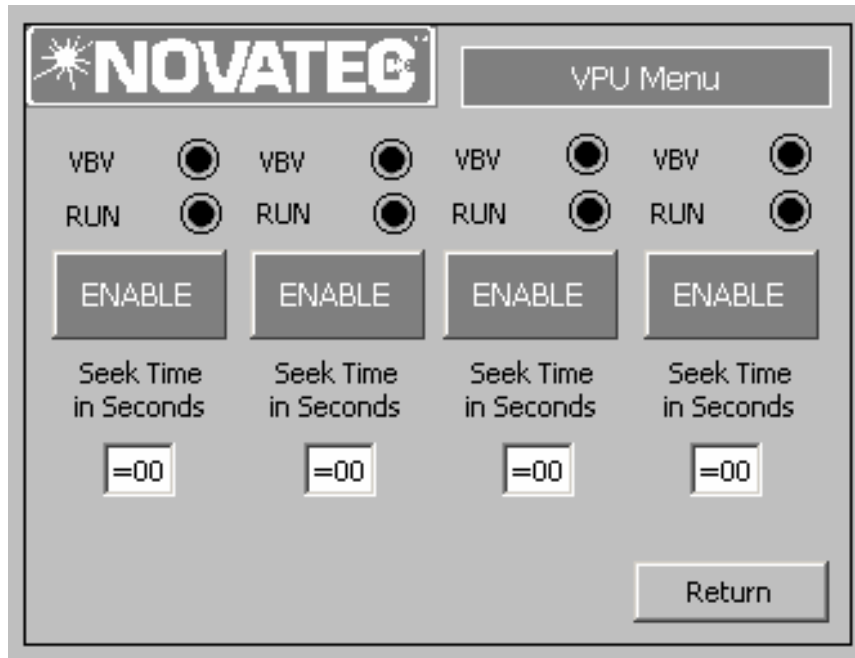


Figure 4, VPU Menu

The Search Time parameter informs the MCS system how long to actively search for a new station which needs material before shutting down the pump motor. This parameter can be anywhere from 0 to 255 seconds (normally set at 45 seconds).

F. REAL TIME CLOCK



Figure 5, Real Time Clock screen

The Real Time Clock (RTC) screen provides all of the necessary data inputs for the S7-200 real time clock. When the Display pad is depressed, the RTC data will be sent to the screen. To set the (RTC) depress the Program pad. The display will stop updating and the new information may be entered. Set the RTC back to Display and the display will return with the new settings and begin to update. ***This PLC has no option for Daylight Savings Time. It must be reset.***

G. MESSAGE SCREEN

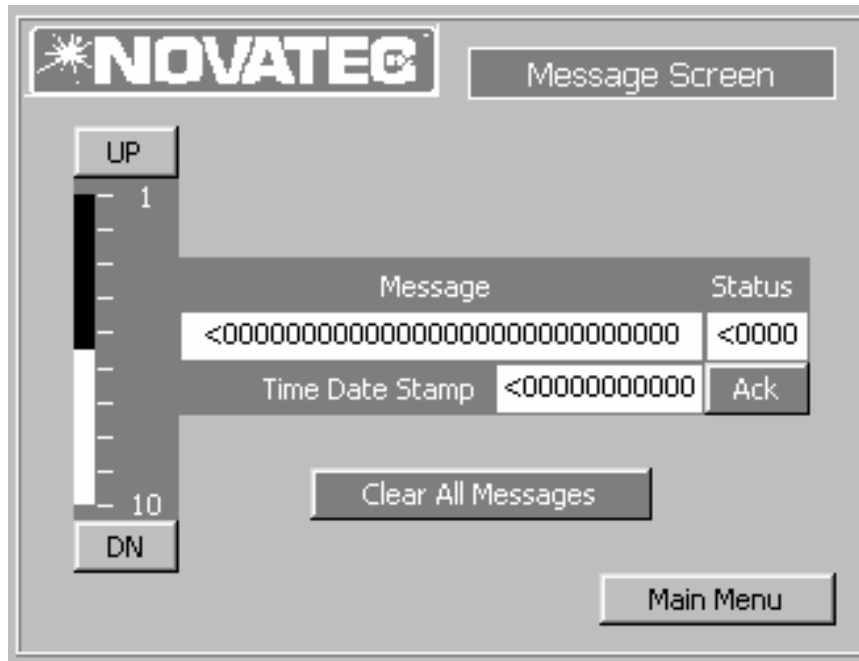


Figure 6, Message Screen

The Messages screen will contain the warning and error messages created by the system. The UP and DN pads will move the position of the message pointer. Messages will appear in the Message display in the order of occurrence. Press Ack to acknowledge the current message displayed. Pressing the Clear All Messages will remove all of the messages from the stack.

H. COMMUNICATIONS

Siemens offers three types of communications modules. The first communicates using both MPI (Multi-Point Interface) and Profibus DP Slave simultaneously. The second module offers Modbus RTU Slave, SMS Messaging Service Center (Cell Phone, Pager, Fax), 33.6 kbaud modem, and PPI (Peer to Peer communications). The third communicates via Industrial Ethernet (10/100mb). All of these units provide for direct connection to the PLC program via Siemens Micro/Win Programming Software. Contact Novatec Engineering to see which type of module or network would best serve your requirement.



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III. STANDARD DRAWING LIST

<u>DESCRIPTION</u>		<u>DRAWING NUMBER</u>
Vacuum Power Unit with VBV	2 HP	VH2-000D
	3 HP	VH3-000D
	5 HP	VH5-000D
	7 1/2HP	VH7.5-000D
	10 HP	VH10-000D
	15 HP	VH15-000D
	25HP	VH25-000D
Station Valve	1 1/2"	T80018C
	1 3/4"	T80108C
	2"	T80051C
	2 1/4"	T80031C
	2 1/2"	T80079C
	3"	T80178C
	4"	T80077C
Cyclone Filter	Floor Mounted	SK-377A
	Wall Mounted	SK-376A
	With Dump Valve	SK-476A
Vacuum Chamber, Single Inlet, Stainless Steel	1/8 CF	
	1/3 CF	
	1/2 CF	
	1 CF	
	2 CF	
	3 CF	
	5 CF	

IV. TYPICAL PARTS LIST

TYPICAL STATION VALVE PARTS LIST

1 ½ THRU 2 ½

Quantities Shown Per Assembly

<u>QTY</u>	<u>DESCRIPTION</u>	<u>P/N</u>
1	Solenoid Valve, 24 VDC	08238
1	Air Cylinder	50198
2	Washer, Polyurethane, 7/8" OD	01129
1	Seal, Polyurethane, 3" OD	02021
1	Disc, Stainless Steel, 3" OD	03382
1	Flag, Orange	02258
1	Gasket, Flange, 6" OD	04292

TYPICAL STATION VALVE PARTS LIST

3" THRU 4"

Quantities Shown Per Assembly

<u>QTY</u>	<u>DESCRIPTION</u>	<u>P/N</u>
1	Solenoid Valve, 24VDC	08238
1	Air Cylinder	03504
2	Washer, Polyurethane, 1 ¼" OD	03505
1	Seal Polyurethane, 4 ½" OD	02662
1	Disc, Stainless Steel, 4 ½" OD	03385
1	Flag, Orange	02258
1	Gasket, Flange, (3"), 8 " OD	04293
	(4"), 9 ¼" OD	04294

TYPICAL VACUUM CHAMBER PARTS LIST

Quantities Shown Per Assembly (Some components optional)

<u>QTY</u>	<u>DESCRIPTION</u>	<u>P/N</u>
1	Material Level Switch, (on dump valve, mercury)	50245
1	Dump Throat Gasket, Neoprene 3"	01695
	Neoprene 5"	50026
	Silicone 3"	02724
	Silicone 5"	02106
1	Material Inlet Seal, Neoprene 1 ½"	50069
	2"	01693
	2 ½"	01694
	3"	01695



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		4"	04675
	Silicone	1 ½"	02721
		2"	02722
		2 ½"	02723
		3"	02724
		4"	04676
1	Deflector Assembly, S/S	1 ½"	04505
		2"	04506
		2 ½"	04507
		3"	04508
		4"	04509
1	Filter Assembly, 20 Mesh S/S	6 ¾"	04556
		11 ½" OD	04557
		17 ½" OD	04552
		25 ½" OD	04549
2	Ring Clamp, Quick Release, S/S	6 7/8"	04078
		11 ½"	04557
		17 ½"	04552
		25 ½"	04553
1	Gasket Assembly	11 ½" OD	04753
		17 ½" OD	04754
		25 ½" OD	04755



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V. MCS-500 SERIES CONTROL PACKAGE PARTS LIST

Refer to the electrical drawing of your specific control. Parts may vary.

VI. MATERIAL SAFETY SUMMARY

Some components used by Novatec may contain mercury, a chemical listed in the EPA (Environmental Protection Agency) Title III chemical list, EPA identification number 7439-97-6. The components are typically (i) mercury switch and/or (ii) mercury relay switches. These devices are listed as “Articles” and as such are exempt from the “COMMUNITY RIGHT TO KNOW” per Title III.

Shipping requirements according to IATA (International Air Transport Authority) regulation 805 indicates that mercury switches and relays are exempt from the requirements of IATA regulation 805 providing that they are of the totally enclosed leak-proof type sealed in metal or plastic units. All devices used by NOVATEC meet these requirements, and as such require no special packing.

Check the parts list included with the instruction manual for the presence of devices containing mercury that may have supplies with your equipment from NOVATEC. Material Safety Data Sheets for these devices and other special precautions have been provided in this manual. This information should be reviewed if applicable.