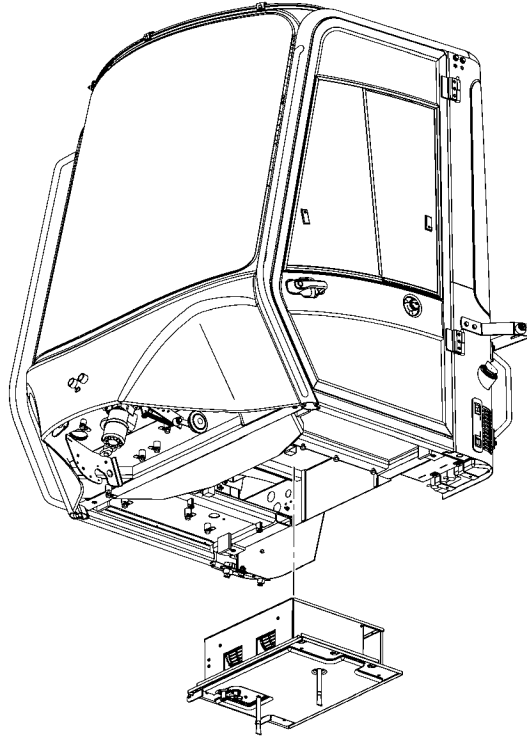


CAB HEATER/AIR CONDITIONING (BEFORE OCTOBER, 2017)



HYSTER

SAFETY PRECAUTIONS

MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the **WARNING** symbol and word are on orange background. The **CAUTION** symbol and word are on yellow background.

TABLE OF CONTENTS

Series Code / Model Designation Reference Table	1
Description and Operation	2
Heater System	2
General	2
Air Conditioning	4
General	4
Dryer	4
Compressor Lubrication	6
Control Systems, Sensors, and Switches	6
Climate Control	7
Description	7
Service Menu	7
Set Up	8
View 1 and View 2	8
Error List	8
Statistics	9
Exit	9
Temperature Sensors	9
Troubleshooting	9
Water Valve	10
Troubleshooting	10
Remove and Replace	11
Standard Heater Assembly	12
Access	12
Remove	12
Install	13
Standard Heater Parts	14
Heater Core	14
Remove	14
Install	15
Blower	15
Remove	15
Install	16
Water Valve	17
Remove	17
Install	17
Push/Pull Cable	18
Water Valve Cable	18
Remove	18
Install	18
Heater/Air Conditioner Assembly	19
Remove	19
Install	20
Heater/Air Conditioner Parts	21
Vent Door	21
Remove	21
Install	21
Heater Core	22
Remove	22
Install	23
Evaporator Core	23
Remove	23

TABLE OF CONTENTS (Continued)

Install	24
Blower	25
Remove	25
Install	26
Thermostat	26
Remove	26
Install	27
Water Valve	27
Remove	27
Install	28
Air Conditioning Technical Detail	29

This section is for the following models:

Series Code / Model Designation Reference Table

This section is for the following models:

Series Code	European Model	Americas Model
A236	H16.00-18.00XM/XMS-12	H400-450HD/HDS
A238	H16XM-9, H18XM-7.5, H16XM-12, H18XM-9	H360-36HD, H360-48HD
A917	H40.00-48.00XM-12, H36.00XMS-12	H800-1050HD/HDS
B214	H16.00-22.00XM-12EC	H400-500HD/HDS-EC
B222	RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH, RS46-38L IH, RS46-38LS IH	HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS
B236	H16XM-12, H18XM-12, H20XM-12, H22XM-12	H400HD, H450HD, H500HD, H550HD
B238	H16XM-9, H16XM-12, H18XM-7.5, H18XM-9	H360-36HD, H360-48HD
B917	H36XMS-12, H40XM-12, H44XM-12, H48XM-12	H800HD, H1050HD
C214	H16XM-12EC, H18XM-12EC, H22XM-12EC	H400HD-EC, H450HD-EC, H500HD-EC
C222	RS45-27CH, RS45-31CH, RS46-36CH, RS46-41L CH, RS46-41S CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-38L IH, RS46-38S IH, RS46-38LS IH	RS45-27, RS45-31, RS46-36, RS46-41L, RS46-41S, RS46-41LS
C227	N/A	HR45-27, HR45-31, HR45-40S, HR45-36L, HR45-40LS, HR45-45LSX
C236	H18-20XM-9, H18-20XMS-9	H400HD, H450HD, H400HDS, H450HDS
C917	H40XM-12, H44XM-12, H48XM-12, H36XMS-12, H40XMS-12, H44XMS-12, H48XMS-12	H800HDS, H900HDS, H970HDS, H1050HDS
D214	H18XM-12EC, H22XM-12EC, H23XM-12EC	H450HD-EC, H500HD-EC
D222	RS45-27CH, RS45-31CH, RS46-36CH, RS46-41L CH, RS46-41S CH, RS46-41LS CH, RS46-33IH, RS46-38L IH, RS46-38S IH, RS46-38LS IH	RS45-27CH, RS45-31CH, RS46-36CH, RS46-41L CH, RS46-41S CH, RS46-41LS CH
E117	H40.00XM-16CH, H44.00XM-16CH, H48.00XM-16CH, H50.00XM-16CH, H52.00XM-16CH	H880HD, H970HD, H1050HD-CH, H1150HD-CH

Series Code	European Model	Americas Model
F008	H25-32XM-12, H28XM-16CH, H32XM-16CH, H25-32XMS-9	H550-700HD, H550-700HDS
F019, G019	H13.00-14.00XM, H16.00XM-6, H10.00-12.00XM-12EC	H300-330HD, H360HD, H360HD-EC
F117	H40.00-52.00XM-16CH	H1050HD-CH, H1150HD-CH
G007, H007	H8.00-12.00XM	H170-280HD
G008	H25-32XM-12, H25-30XMS-9	H550-700HD, H550-700HDS
G117	H40XM-16CH, H44XM-16CH, H48-16CH, G50-16CH, H52XM-16CH	H1050HD, H1150HD
H008	H25-32XM-12, H25-32XMS-9, H28-32XM-16CH H550-700HD,	H550-700HDS
H019	H13.0-16.0XM-6, H10.0-12.0XM-12EC	H300-360HD2, H360HD2-EC
H117	H40.00-52.00XM-16CH	H1050HD-16CH, H1150HD-16CH
J007	H8.0-12.0XM-6	H190-280HD2
J019	H13-16XM-6, H10-12XM-12EC	H300-360HD2, H360HD2-EC
K007	H8-12XM-6, H10XMS-6	H190-280HD2, H230HDS
K019	H13-16XM-6	H210-250-48HD2, H300-360HD2
K019EC	H6-7XM-12EC	H360HD2-EC
L007	H8-12XM-6	H190-280HD2, H250HD2

Description and Operation

HEATER SYSTEM

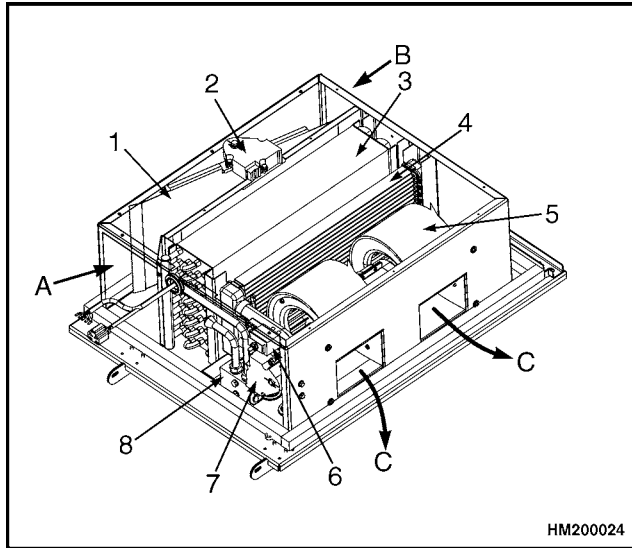
General

The MCC heater system, used after October 2008, can be identified by the absence of an air duct at the rear window. The Aurora heater system, used up to October 2008, does have this air duct. See **Cab Heater (Prior to Oct. 2008)** 0100SRM1458 for further information on the Aurora heater and air conditioning systems.

Lift trucks with a closed cab are equipped with a heater assembly which is installed on the underside of the cab. The main components of the heater assembly are the fan, heater core, vent door, and an evaporator for the optional air conditioning system. See Figure 1.

The vent door determines the percentage of fresh air and recirculated air that the fan pulls through the heater assembly. In heater assemblies without an air conditioner, the vent door is in a fixed position and allows for an air mixture of 85% fresh air and 15% recirculated air.

Cabs that are equipped with an air conditioner have an electrically controlled vent door that can be used to vary the percentage of recirculated air between 0 and 100 percent. The operator can select the position of the vent door by turning a knob on the dashboard. Cooling performance increases by reducing the percentage of incoming fresh air.



- A. RECIRCULATED AIR
 B. FRESH AIR ENTRY
 C. CAB AIR FLOW
1. VENT DOOR
 2. VENT DOOR ACTUATOR
 3. EVAPORATOR CORE
 4. HEATER CORE
 5. BLOWER
 6. THERMOSTAT
 7. WATER VALVE
 8. EXPANSION VALVE

Figure 1. Heater/Airco Assembly Components

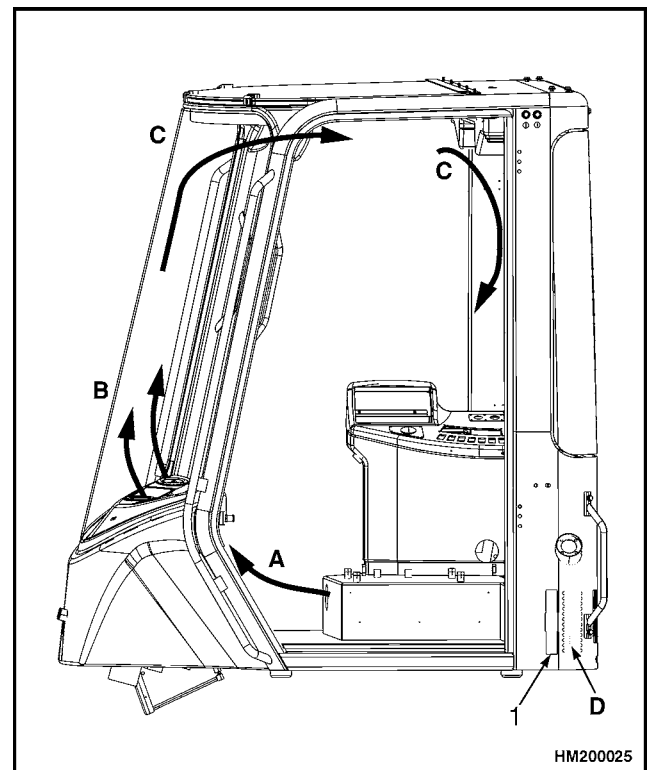
Recirculated air enters the heater assembly through the openings in the side console at the fuse cover. Fresh air enters the heater assembly through the cab air filter, which is located at the left rear corner of the cab. As the filter becomes restricted or clogged, the percentage of recirculated air will increase and the percentage of fresh air will decrease.

When fresh air content and fan speed is increased, positive air pressure is created in the cab, preventing dust from entering the cab. The air pressure escapes through the cab door posts and through openings in the pedal area and sliding window brush profiles.

When the fan is switched **ON**, air is pushed through channels in the cab floor to the air ducts at the front window. Cabs that are equipped with an air conditioner have three additional vents at the foot area that can be opened or closed. Cooling capacity is increased by opening the three vents.

When the three vents are open, air flow is less restricted, increased air volume passes through the evaporator, and the majority of the air no longer becomes warm in the air channels that lead to the front window. See Figure 2.

The heater consists of a heater core and a water valve. See Figure 1. The water valve controls the flow of heated coolant to the heater core. By varying the opening of the water valve, the desired amount of heat is transferred by the heater core to the air that enters the cab. The water valve opens proportionally to the selected position of the heat control knob. On standard units the knob and valve are connected mechanically, on units with an Air Conditioning system there is an electronic connection.



- A. OPTIONAL AIR VENT
 B. AIR TO FRONT WINDOW
 C. CAB AIR FLOW
 D. FRESH AIR ENTRY

1. CAB AIR FILTER

Figure 2. Ventilation

AIR CONDITIONING

General



CAUTION

Replacement, installation, and repairs to air conditioning units that require discharging and/or refilling of the refrigeration fluid may only be performed by a certified technician.

The air conditioning system consists of a compressor with an electromagnetic clutch, condenser, dryer, evaporator, and interconnected sensors and switches. See Figure 3.

The engine drives the compressor when the clutch at the compressor has been activated. Activation of the clutch is determined by several sensors and switches that are connected in series. The operator must switch **ON** the button for the air conditioning system and select one of the fan switch speeds. Refer to the electrical schematic SRM pertaining to each lift truck, for the schematic locations and interconnections of the sensors and switches.

The compressor compresses the refrigerant and continuously pumps the refrigerant through the air conditioning system. As the refrigerant is being compressed, the refrigerant temperature will rise. The absorbed heat is dissipated in the condenser, which is installed outside the cab. Fans at the condenser accelerate heat dissipation.

After the refrigerant passes through the condenser, the liquefied refrigerant passes through the dryer

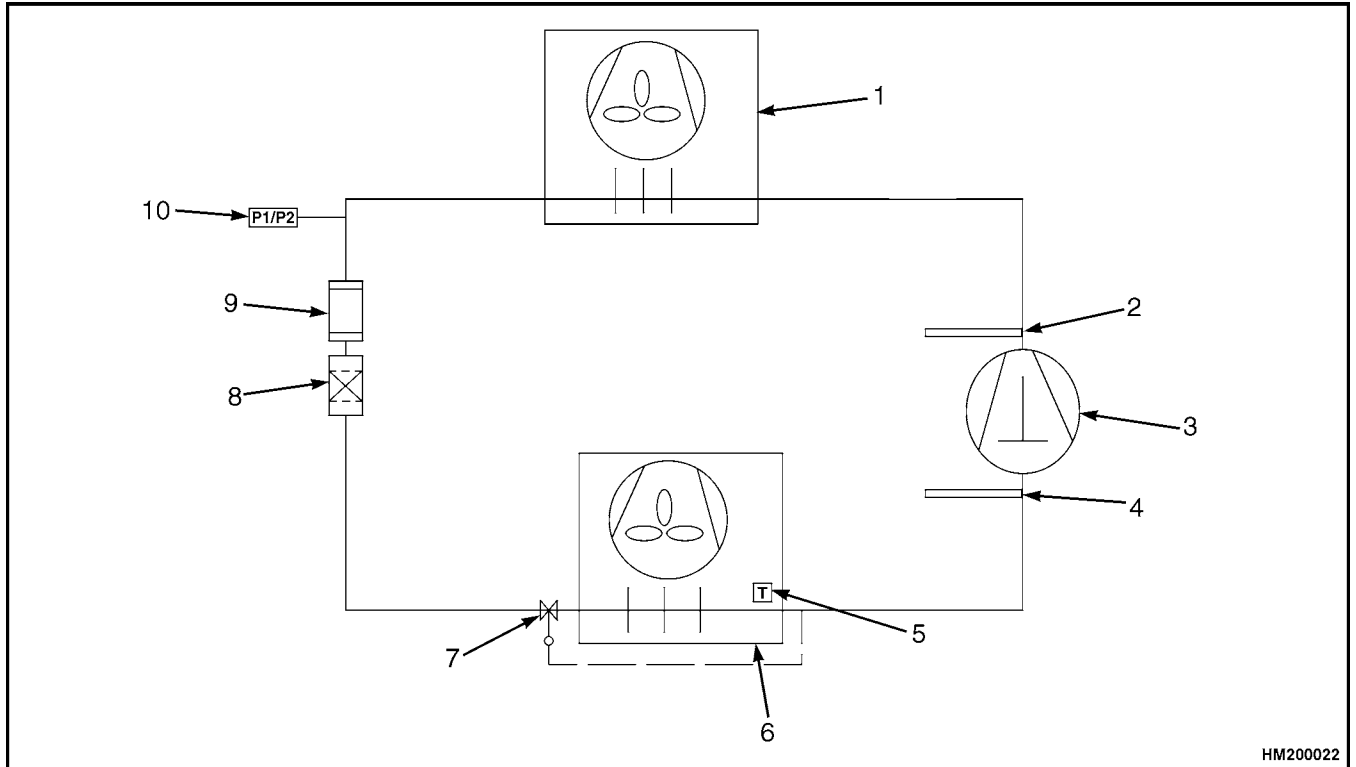
that also serves as a reservoir for the refrigerant. At the expansion valve, the refrigerant will expand in the evaporator, causing the temperature of the refrigerant to drop substantially. The expansion valve regulates the flow of the refrigerant, depending on the pressure difference between the dryer and the compressor inlet. A minimum pressure difference is necessary to open the valve. After leaving the evaporator, the refrigerant will reenter the compressor.

Dryer

The refrigerant functions as a coolant, and contains lubricant for the compressor. Because humidity affects the properties of the refrigerant and the lubricant, a dryer is installed to absorb the trapped humidity. The dryer also filters impurities in the refrigerant.

Normal refrigerant leakage is approximately 10% per year. To help prevent additional leakage through the compressor seals, the air conditioning system should be operated at least every two weeks for 15 minutes. The air conditioning system cannot be operated at temperatures below 0°C (32°F) because the anti-ice switch will prevent the compressor clutch from being activated.

The dryer, refrigerant, and lubricant must be replaced every three years. Contact a certified technician every three years to perform these repairs.



- | | |
|--------------------------------------|---------------------|
| 1. CONDENSER | 6. EVAPORATOR |
| 2. SERVICE CONNECTION, HIGH PRESSURE | 7. EXPANSION VALVE |
| 3. COMPRESSOR | 8. RESERVOIR |
| 4. SERVICE CONNECTION, LOW PRESSURE | 9. DRYER |
| 5. ANTI-ICE SENSOR | 10. PRESSURE SWITCH |

Figure 3. Refrigerant Cycle

Compressor Lubrication

The oil specification for the compressor is indicated on the nameplate of the compressor.

Most of the compressors used on Big Truck air conditioning systems use SP-15 oil.

Only exception is for the compressor as installed on the Cummins QSM-11 Tier-3 engines on series B/C222, E/F117 and A/B917.

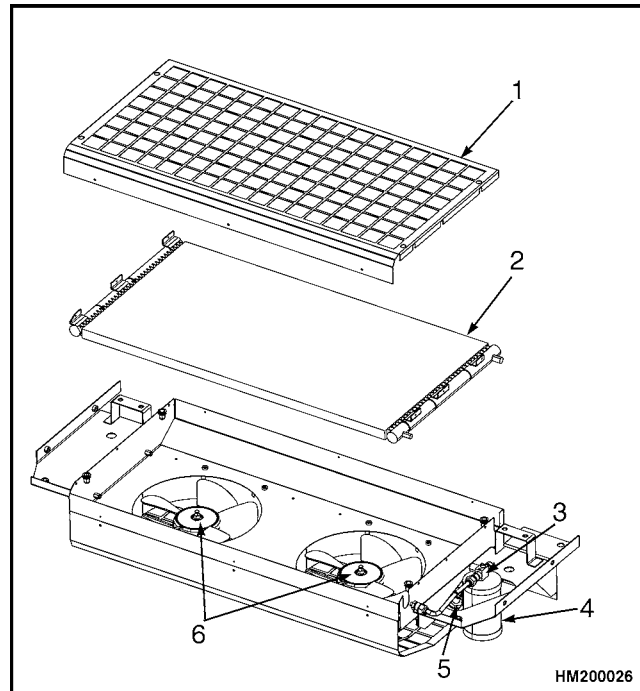
The compressor on QSM-11 engines requires ZXL 100PG oil.

Control Systems, Sensors, and Switches

The air conditioning system (A/C) is activated by pushing the A/C switch on the dashboard and selecting one of the fan speeds. A control light in the A/C switch will illuminate, and the fans on the condenser will turn. The anti-ice switch and the pressure switches must be closed before the clutch engages the compressor. If the anti-ice switch or one of the pressure switches is open, the clutch will disengage and the air conditioning system will not activate.

Water in the air condensates on the evaporator. Normally, the condensed water drips on the bottom plate of the heater assembly and escapes through two hoses that open into the engine compartment. If the condensed water becomes ice, the air flow through the evaporator will be blocked, which will block the entire cab ventilation system. The anti-ice switch protects the evaporator against ice buildup by opening at -1°C (30.2°F), causing the clutch to disengage and allowing air to warm the evaporator. The anti-ice switch, which is inserted between the fins of the evaporator, will close when the temperature reaches 2.3°C (36.14°F). The anti-ice sensor is indicated by "T" on the electrical schematic.

The pressure switches are located at the dryer, and protect the system against pressures that are too low or too high. See Figure 4. If the system pressure drops below 2 bar (29 psi), the refrigerant level is too low for proper functioning of the system and proper lubrication of the compressor.



1. CONDENSER COVER
2. CONDENSER COIL
3. SIGHT GLASS
4. DRYER
5. PRESSURE SWITCH
6. FAN

Figure 4. Condenser

High system pressure is a recurrent situation. The evaporator valve has a limited flow capacity. The refrigerant flow generated by the compressor fluctuates with engine speed, and regularly exceeds the flow capacity of the evaporator valve. When the flow capacity of the evaporator valve is exceeded, the compressor will have raised system pressure to the maximum allowable level. The pressure switch will send a signal to disengage the compressor clutch, and the evaporator valve will continue to regulate refrigerant flow. Pressure will drop until the pressure switch is enabled, causing the clutch to reengage. System pressure will rise again until the maximum allowable level has been reached.



CAUTION

NEVER bypass the electric clutch of the air conditioning compressor. If the clutch does not receive a signal, there is either an insufficient amount of refrigerant, or the condenser or the evaporator is iced, and the pressure switch will not be enabled to protect the system against excessive pressure. If the clutch does not receive a signal, contact a certified and qualified air conditioning specialist. Bypassing the compressor will **ALWAYS** lead to system damage.

The pressure switch, as installed on the dryer, physically combines the high and low pressure switches and their electrical interconnection. The pressure switch is indicated by "P1" on the electrical schematic.

The pressure switch has an integrated third function called the medium pressure switch. The medium pressure switch changes the connection to the fans on the condenser, causing them to turn at a higher speed when pressure in the system has exceeded 16 bar (232 psi). At lower pressures, the fans are connected in series, causing them to turn at a lower speed. The medium pressure switch is indicated by "P2" on the electrical schematic.

CLIMATE CONTROL

Description

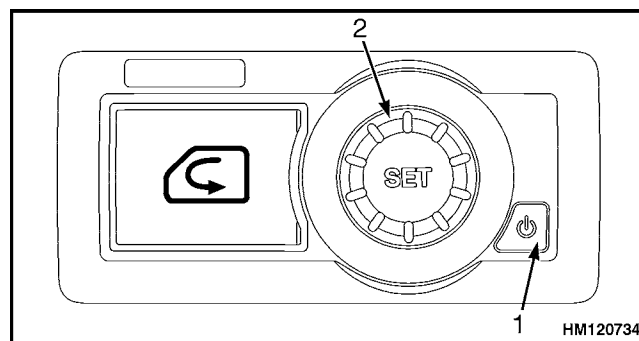
Functionality of the individual components of the normal air conditioning systems and the Climate Control system is the same. The difference is that for the Climate Control a controller sends the signals to the components instead of the manually operated knobs on the dashboard for the normal system. This Controller is part of the control unit on the dashboard that also has a display and a select button. The display provides information on mode, temperature, blower speed and fault conditions. An explanation of the normally available information and settings is in the **Operating Manual**.

The explanation for how to read information and apply settings for service purposes is described under Service Menu.

Service Menu

1. Push the Power Button to turn the HVAC unit ON. See Figure 5.
2. Pressing the Set Button scrolls the screen between:
 - Climate Control Mode Settings
 - Air Circulation Settings
 - Display Settings
3. Press the set button to scroll to the Air Circulation Settings.
4. Push and hold the Power Button, and turn the Set Button three clicks clockwise to enter one of the service menu selections:
 - Set Up (Not an option for Hyster Lift trucks)
 - View
 - Error List
 - Statistics
 - Exit

To scroll to a next service screen, turn the Set Button one click clockwise. Push the Set Button to enter the selected service screen. Turning the Set Button after the Exit screen further clockwise will bring you back to the Set Up screen. To leave the Service Menu scroll to Exit and push the Set Button.



1. POWER BUTTON
2. SET BUTTON

Figure 5. Climate Control

Set Up

The Set Up screen allows setting the date and the blower speed for an additional interior heater. An additional interior heater is not a standard option.

The date format is Month/Day/Year. To set the date, go to Set Up screen and push the Set Button until it flashes digital for "Month". Turn the Set Button until the correct month number appears and push the button to confirm. The digits for "Day" will now flash. Repeat the procedure to set "Day" and "Year". When finished, turn the knob to scroll to the Exit screen and push the button to leave the service menu.

View 1 and View 2

There are two View pages that show readings and actual setting of the HVAC unit. After leaving the previous service screen "Set Up", screen View 1 will appear. Push the button to scroll between screen View 1 and screen View 2 (see Figure 6).

Screen "View 1" displays below information:

- Scale - Selected temperature scale: Cel for Celsius or Fah for Fahrenheit.
- Setpoint - Selected (desired) interior temperature.
- Inside - Cab interior temperature as measured by the Inside Sensor.
- Outside - Cab exterior temperature as measured by the Outside Sensor.
- Deice - Temperature of the refrigerant leaving the evaporator coil.
- Coil - Temperature of the air at the blower.
- Heat - Flapper door position: Fresh or Recirc.

Screen "View 2" displays below information:

- AC - Indicates whether Air conditioning Mode is switched **ON** or **OFF**.
- Heater - Indicates whether Heating Mode is switched **ON** or **OFF**.
- Blower - Indicates the selected percentage of maximum blower speed.
- D Heat Fan - Indicates the selected blower speed percentage for an additional interior heater.

- Valve - Indicates the percentage of maximum heater valve opening that the controller sends out as a signal.
- Contrast - Indicates the contrast percentage of the display.
- Brightness - Indicates the brightness percentage of the display.

In case a temperature sensor is disconnected, the display will show "open". Comparison of the different values may provide an indication for a possible defect.

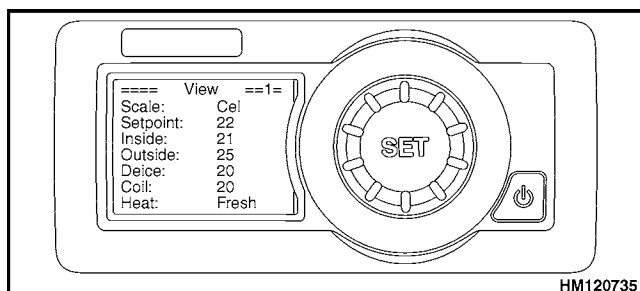
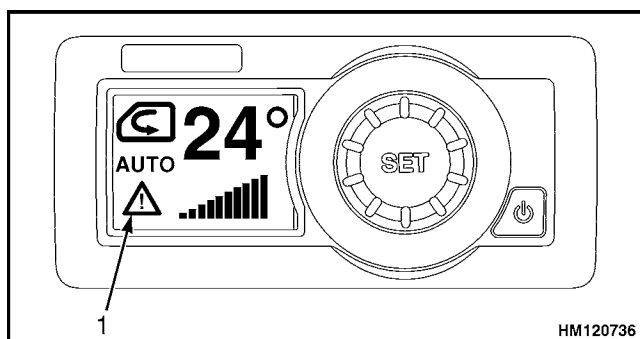


Figure 6. Climate Control View Display

Error List

The Main Display shows a warning sign in the left hand bottom corner of the Main Display if a fault occurs. See Figure 7.



1. WARNING SIGN

Figure 7. Climate Control Warning

The Error List page shows for each of the temperature sensors and for the water valve the number of occurrences that the connection was shortened or open since the last reset date. For the Water Valve there is an additional indication for the number of times that the Water Valve was stuck. See Figure 8.

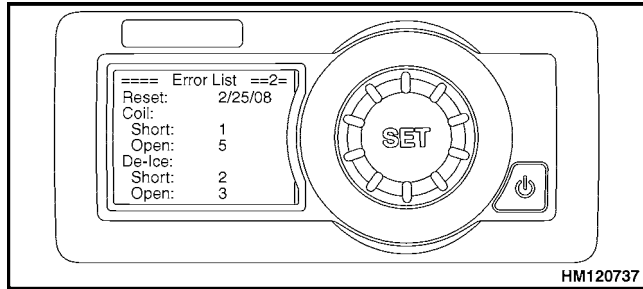


Figure 8. Climate Control Error Display

To further establish the cause of failure, see Temperature Sensors or Water Valve.

To reset the number of occurrences and the reset date, turn the Set Button one click in a counter clockwise direction and push the Set Button for a dialog box. When the dialog box is shown, press the Set Button once to reset all values.

Statistics

The Statistics page shows operating hours and cycle times since the last reset date. To reset the Statistics Page, go to the Error Page, turn the Set Button one click counter clockwise. A dialog box will appear. When the dialog box is shown, press the Set Button once to reset all values. See Figure 9.

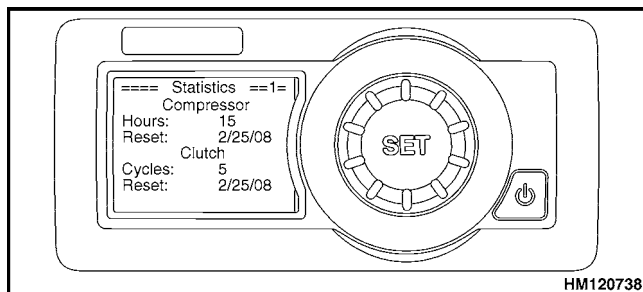


Figure 9. Climate Control Statistics Display

Exit

To leave the Service menu scroll to Exit and push the Set Button.

Temperature Sensors

In addition to the normally present de-ice temperature sensor in the evaporator, there are three further temperature sensors that influence the reaction of the controller:

- Outside Temperature Sensor, which is located outside the cab under the condenser.
- Coil sensor, which is located behind the evaporator and heater coil, in the suctioned air flow of the blower fan.
- Inside Sensor, which is located in the side console, measures the cab interior temperature. Interior air flow past the sensor is through a tube that connects between suction side of the blower fan and inside sensor.

Troubleshooting

Disconnect the sensor for which an error has been indicated. Use an Ohm meter to measure its resistance. See Table 1 that provides an overview of the resistance value for different temperatures. The electrical properties of the four sensors are the same. When the sensor itself shows no defects, check continuity of the wiring harness. See Figure 10. The sensors are connected to the controller connector at the following pin numbers:

- Inside Sensor: Pin 14 and 32.
- Outside Sensor: Pin 4 and 33
- De-Ice Sensor: Pin 13 and 24
- Coil Sensor: Pin 12 and 34

Table 1. Sensor Resistance Values

°C	°F	k?
0	32	32,649
5	41	25,394
10	50	19,903
15	59	15,713
20	68	12,493
25	77	10,000
30	86	8,056

Water Valve

Fault indication "Valve Stuck" indicates a physical obstruction that prevents the valve from moving. The physical obstruction may have its cause at the outside or inside of the water valve. The components of the water valve are not serviced separately. Replace the water valve if there is no obvious problem that can be rectified.

Troubleshooting

When a fault for open or short circuit has been indicated, use a volt meter to measure the voltage over the different connections. Measures can be taken at either the connector of the water valve or at the controller connector. See Table 2. There are also two 15 amp fuses located in the wiring system check these if a fault for open or short circuit has been indicated. For location of these fuses see Figure 11.

Table 2. Water Valve Pin Outs

Water Valve	Controller	Value
Pin 8	Pin 31	ground
Pin 10	Pin 30	3.3 Volt
Pin 9	Pin 5	0.6 Volt when valve is closed. 2.2 Volt when valve is open.
Pin 6	Pin 18	12 Volt when the valve is closing. 0 Volt when opening or not moving.
Pin 5	Pin 19	12 Volt when the valve is opening. 0 Volt when closing or not moving.

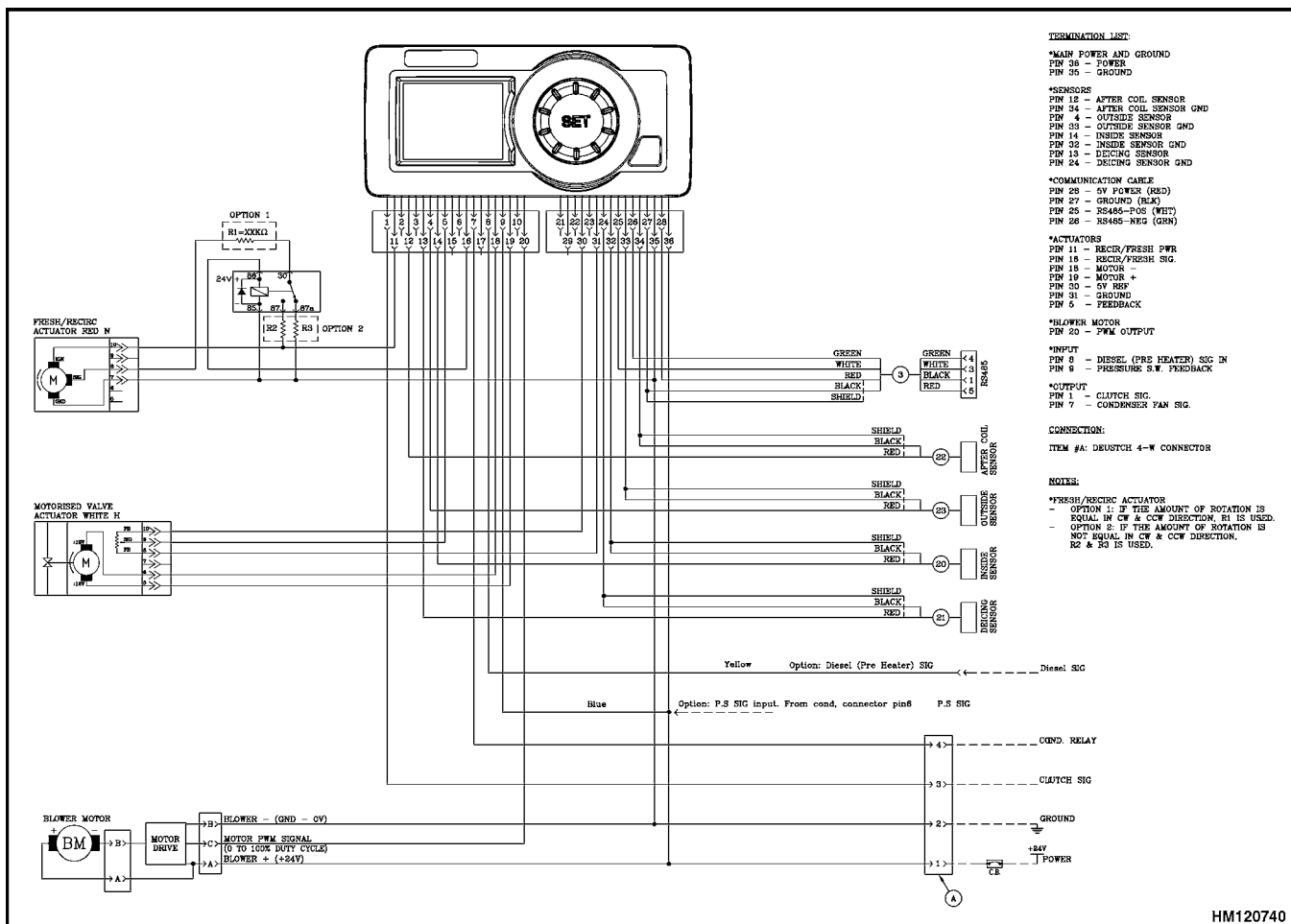
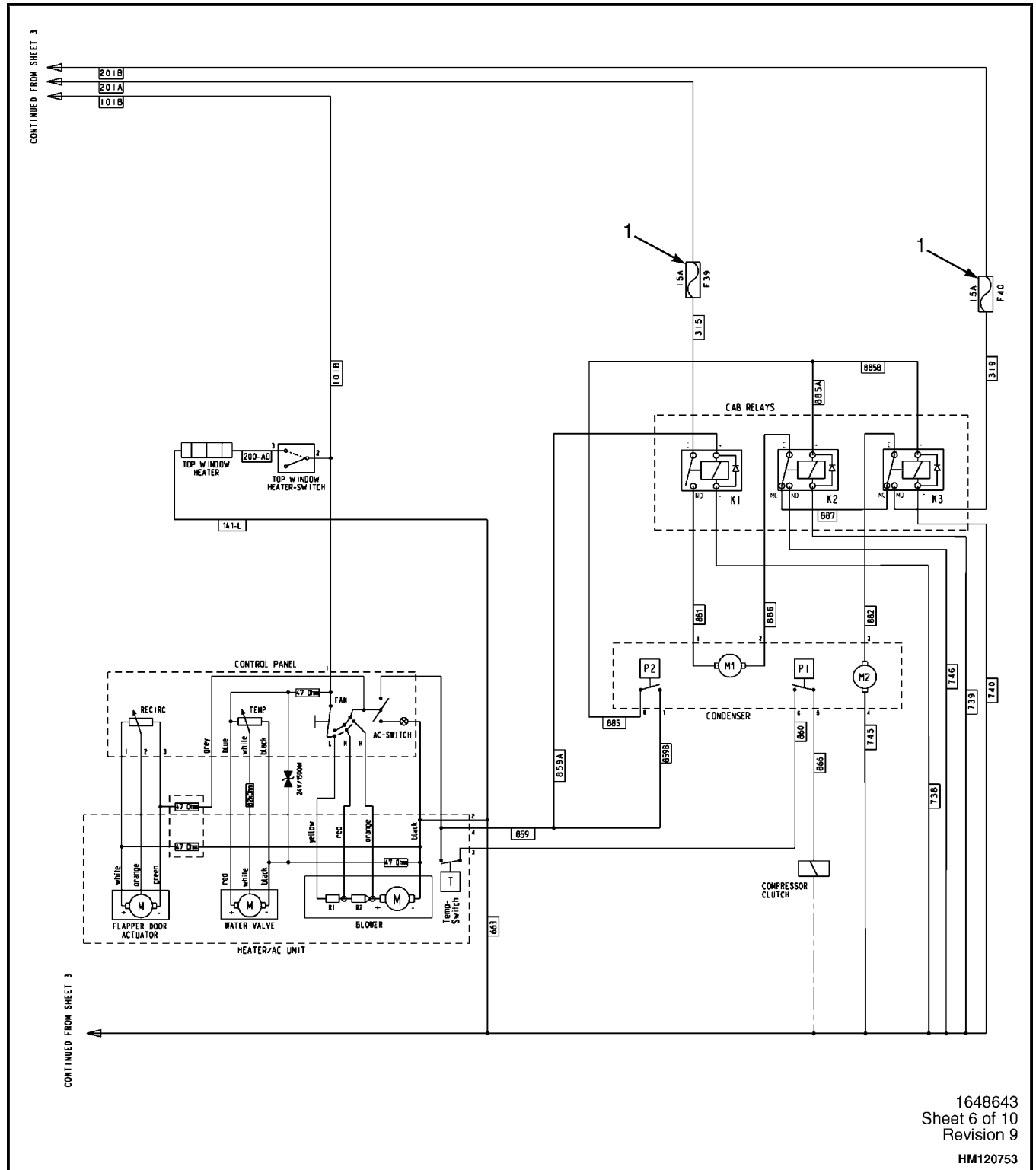


Figure 10. Climate Control Wiring Diagram



1. 15A FUSES

Figure 11. Standard A/C Wiring Diagram

1648643
 Sheet 6 of 10
 Revision 9
 HM120753

Thanks for your reading.

Please click here to download complete manual instantly.

And can also choose other manuals.

Feel free --->write to me with any questions.

Our service email:

manuals007@hotmail.com