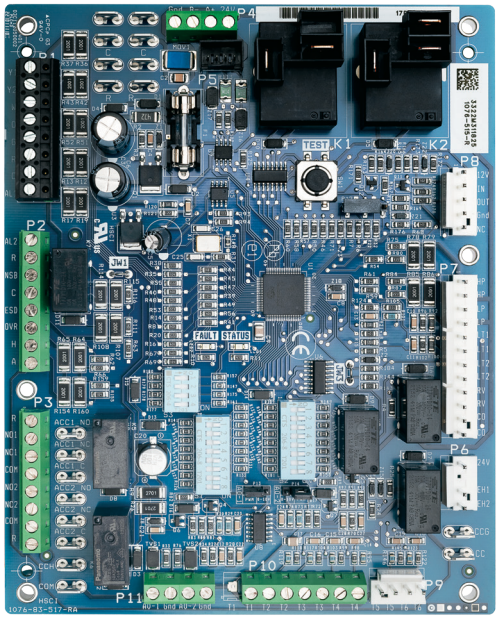
DXM2.5 Controls



DXM2.5 Digital Heat Pump Controller

Application, Operation & Maintenance

97B0142N01
Updated: February 22, 2024

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Overview

The DXM2.5 electronic control is a robust, microprocessor based heat pump controller that is advanced and feature-laden for maximum application flexibility. The DXM2.5 Control has relay outputs for Compressor, Compressor Speed, Reversing Valve, Alarm Relay, and two configurable relays for Fan, Fan Speed, HWG Pump, and Loop Pump, and 2 configurable accessory relay outputs. The DXM2.5 can directly communicate and control a Constant Volume (CV) ECM blower, internal variable speed water pump, and modulating water valves. For on-board diagnostics, there are two LED's to provide status indication.

There are inputs for safety pressure switches, low temperature protection thermistors, condensate overflow sensor, DIP switch selection inputs, thermostat inputs, night setback inputs, refrigeration detection sensor(s), and emergency shutdown input. Additional configurable temperature sensor inputs are available that may be used for hot water, compressor discharge, leaving air, leaving water, and entering water temperature sensors (except for TRL and Water-to-Water products, see product line submittals for details).

The DXM2.5 has an RS-485 communications port to interface with a communicating thermostat or other communicating controls and tools.

General Operating Parameters: The following are general operating parameters for the DXM2.5 Control:
- Operating Environment: -40°F to 176°F and up to 95% relative humidity, non-condensing.
- Storage Environment: -40°F to 185°F and up to 95% relative humidity, non-condensing.

Power Requirements: DXM2.5 only power draw:
- Normally 8 VA draw at 24 VAC
- Maximum 12 VA draw at 24 VAC. A dedicated 24 VAC, 50-60 Hz, 1Ph, 40 VA transformer minimum is required for typical WSHP application.

Relay and Connection Contact Ratings: The following relays are mounted on the DXM2.5 Control:
Compressor Relay: 40 VA at 24 VAC
- Compressor Speed Relay: 28 VA at 24 VAC
- Alarm Relay: 28 VA at 24 VAC
- Reversing Valve: 28 VA at 24 VAC
- Accessory Relay 1: 28 VA at 24 VAC
- Accessory Relay 2: 28 VA at 24 VAC
- Fan Enable / Loop Pump Relay: 1 HP at 240 VAC
- Fan Speed / HWG Pump Relay: 1 HP at 240 VAC
- Connection ratings on the DXM2.5 Control:
- 'A' terminal: 20 VA at 24 VAC. Larger solenoid valve draw should be controlled with accessory relays.

Grounding: The control board must be grounded from one of the C terminals.

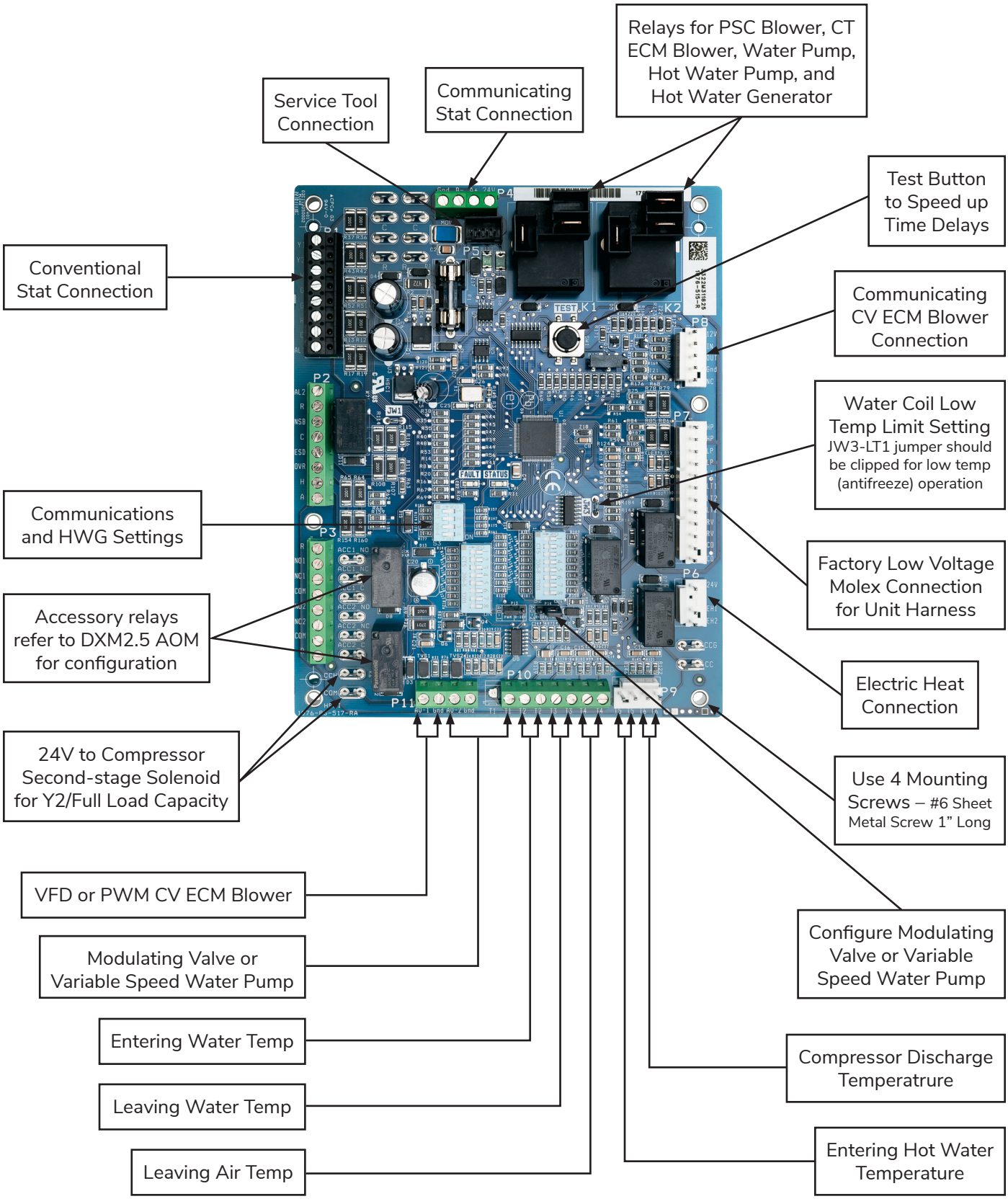
Basic Control Features:
- Single or two–stage compressor control
- Anti-short cycle protection
- High pressure cut-out
- Loss of charge cut-out
- Over and under voltage cut-outs
- Water coil low temperature cut-out
- Air coil low temperature cut-out
- Random start
- Status LED and Fault LED
- Reset lockout at unit or disconnect
- Condensate overflow sensor
- Refrigerant detection sensor
- Intelligent fault retry
- Test Mode
- Multiple blower configuration options
- Electric heat outputs
- Accessory water valve connection

Advanced Control Features:
- Direct control of ECM blower
- Intelligent hot water generator control
- Two accessory relays configurable for multiple applications
- Variable speed water pump output
- Modulating water valve output
- Night setback with override capability
- Emergency shutdown capability
- Removable thermostat connector for ease of installation and service
- Accepts conventional heat pump (Y,O) or heat/cool (Y,W) thermostat types
- RS–485 port to interface with a communicating thermostat or other communicating controls and tools
- Boilerless electric heat
- Configurable inputs and outputs for advanced functions
- Stores operating conditions history during last five faults and offers possible reasons for faults
- Master/Slave thermostat control of up to three units

Legend and Glossary of Abbreviations

Abbreviations	Descriptions
Btuh	Btu (British Thermal Unit) per hour
CDT	Compressor discharge temperature
CFM	Airflow, cubic feet per minute
COP	Coefficient of performance = Btuh output/Btuh input
CT ECM	Electronic commutated constant torque fan motor
CV ECM	Electronic commutated constant volume fan motor
DB	Dry bulb temperature, °F
EAT	Entering air temperature
EER	Energy efficient ratio = Btuh output/Watt input
ESP	External static pressure, inches w.g.
EWT	Entering water temperature
FPT	Female pipe thread
GPM	Water flow in U.S., gallons per minute
HC	Air heating capacity, Btuh
HE	Total heat of extraction, Btuh
HR	Total heat of rejection, Btuh
HWC	Hot water generator (desuperheater) capacity, MBtuh
kW	Total power unit input, kilowatts
LAT	Leaving air temperature, °F
LC	Latent cooling capacity, Btuh
LOC	Loss of charge
LWT	Leaving water temperature, °F
MBtuh	1,000 Btu per hour
MPT	Male pipe thread
MWV	Motorized water valve
PSC	Permanent split capacitor
SC	Sensible cooling capacity, Btuh
S/T	Sensible to total cooling ratio
TC	Total cooling capacity, Btuh
TD or delta T	Temperature differential
VFD	Variable frequency drive
WB	Wet bulb temperature, °F
WPD	Waterside pressure drop, psi or feet of head
WSE	Waterside economizer

Layout and Connections



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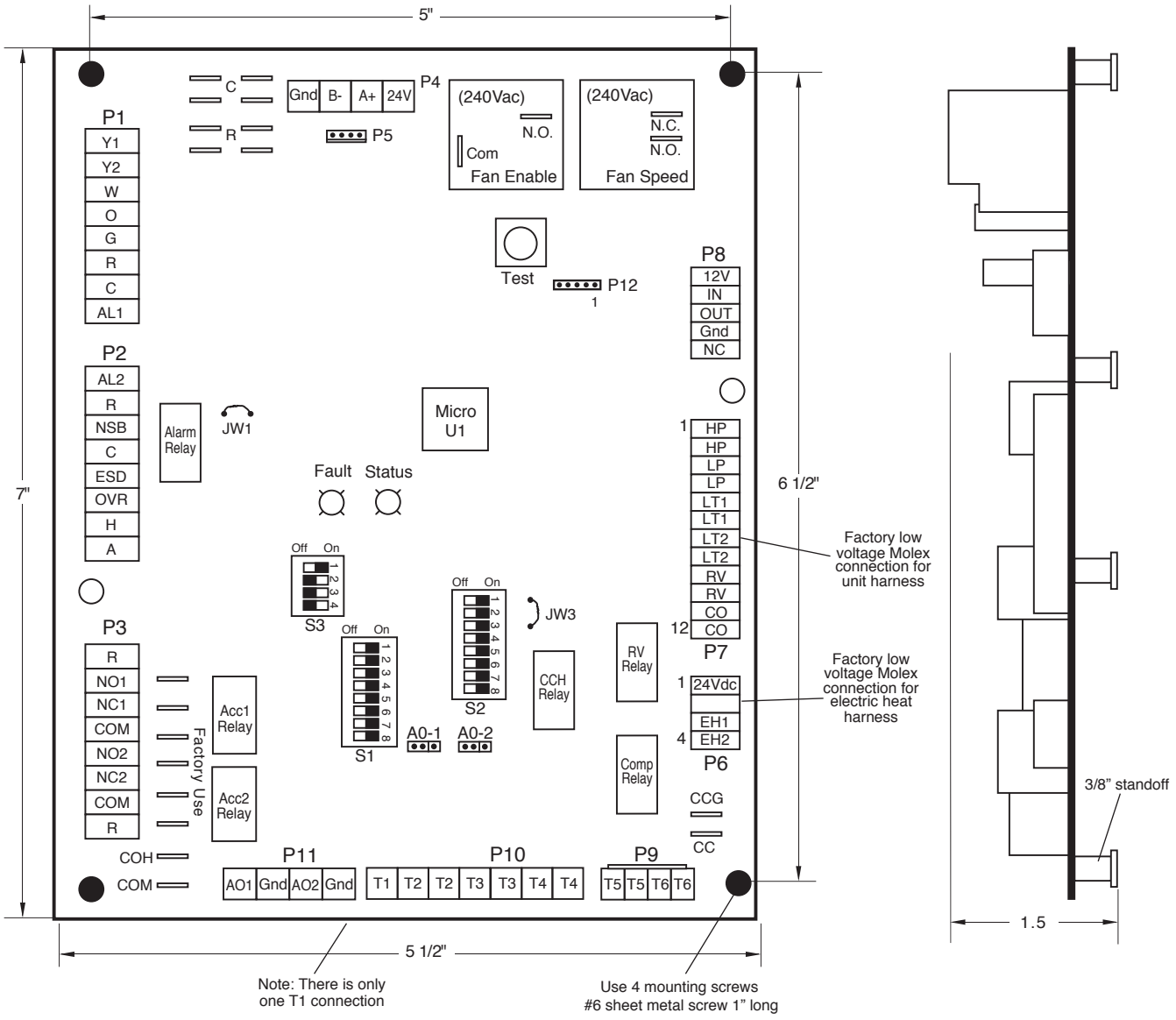
Physical Dimensions and Layout



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FIELD SELECTABLE INPUTS

Test Mode: Test mode allows the service technician to check the operation of the control in a timely manner. By **momentarily** pressing the TEST pushbutton, the DXM2.5 control enters a 20 minute test mode period in which all time delays are sped up 15 times. Upon entering test mode, the Status and Fault LED displays will change. The Status LED will either flash rapidly to indicate the control is in the test mode, or display a numeric flash code representing the current airflow if an ECM blower is connected and operating. The Fault LED will display the most recent fault condition in memory. NOTE: A flash code of 1 indicates there have been no faults stored in memory.

For diagnostic ease at conventional thermostats, the alarm relay will also cycle during test mode. The alarm relay will cycle on and off in sync with Fault LED to indicate a code representing the last fault, at the thermostat.

The test mode can be exited by pressing the TEST pushbutton for 3 seconds. The test mode can also be entered and exited by cycling the G input, three times within 60 seconds.

During test mode, the control monitors to see if the LT1 and LT2 thermistors are connected and operating properly. If the control is in test mode, the control will lockout, with Code 9, after 60 seconds if:

a) The compressor is On in Cooling Mode and the LT1 sensor is colder than the LT2 sensor. Or,

b) The compressor is On in Heating Mode and the LT2 sensor is colder than the LT1 sensor.

Retry Mode: If the control is attempting a retry of a fault, the Fault LED will slow flash (slow flash = one flash every 2 seconds) to indicate the control is in the process of retrying.

Field Configuration Options: NOTE: In the following field configuration options, jumper wires should be clipped ONLY when power is removed from the DXM2.5 control.

NOTE: Jumper 3 must not be clipped prior to adding antifreeze to the water loop. Antifreeze protection to 10°F required. Clipping JW3 without antifreeze may result in freeze damage and will void the unit warranty.

Water Coil Low Temperature Limit Setting: Jumper 3 (JW3-LT1 Low Temp) provides field selection of temperature limit setting for LT1 of 30°F or 10°F [-1°F or -12°C] (refrigerant temperature).

Not Clipped = 30°F. Clipped = 10°F.

Alarm Relay Setting: Jumper 1 (JW1-AL2 Dry) provides field selection of alarm function when Alarm Relay is energized.

Not Clipped = AL1 connected to R (24 VAC) with Alarm Relay active.

Clipped = Dry contact connection between AL1 and AL2 with Alarm Relay active.

JUMPERS (Set at Factory)

A0-2: Configure Modulating Valve or Variable-Speed Pump (vFlow® Models Only)

Set A0-2 jumper (see Figure on page 5) to “0 - 10v” if using Internal Modulating Motorized Valve or “PWM” if using Internal Variable-Speed Pump. This applies only to vFlow® units with Internal Speed Water Flow Control.

DIP SWITCHES

NOTE: In the following field configuration options, DIP switches should only be moved when power is removed from the DXM2.5 Control to ensure proper operation.

DIP Package #1 (S1): DIP Package #1 is 8 position and provides the following setup selections.

DIP 1.1 – Unit Performance Sentinel Disable: Provides field selection to disable the UPS feature.

On = Enabled. Off = Disabled.

DIP 1.2 – Compressor Relay Staging Operation: Provides selection of Compressor Relay staging operation. The Compressor Relay can be selected to turn on with Stage 1 or Stage 2 call from the thermostat. This is used with Dual Stage units (two compressors where two DXM2.5 Controls are being used) or with master/slave applications. In master/slave applications, each compressor and fan will stage according to its appropriate DIP 1.2. If set to stage 2, the compressor will have a 3 second on-delay before energizing during a Stage 2 demand. Also, if set for stage 2, the Alarm Relay will NOT cycle during test mode.

On = Stage 1. Off = Stage 2.

DIP 1.3 – Thermostat Type (Heat/Cool): Provides selection of thermostat type. Heat Pump or Heat/Cool thermostats can be selected. When in Heat/Cool Mode, Y1 is input call for Cooling Stage 1, Y2 is input call for Cooling Stage 2, W1 is input call for Heating Stage 1, and O/W2 is input call for Heating Stage 2. In Heat Pump Mode, Y1 is input call for Compressor Stage 1, Y2 is input

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call for Compressor Stage 2, W1 is input call for Heating Stage 3 or Emergency Heat, and O/W2 is the input call for RV (heating or cooling dependent upon DIP 1.4).

On = Heat Pump. Off = Heat/Cool.

DIP 1.4 – Thermostat Type (O/B): Provides selection of thermostat type. Heat pump thermostats with "O" output on with Cooling or "B" output on with Heating can be selected.

On = HP Stat with O output with cooling.

Off = HP Stat with B output with heating.

DIP 1.5 – Dehumidification Mode: Provides selection of normal or Dehumidification Fan Mode. In Dehumidification Mode, the fan speed will be adjusted for Cooling. In Normal Mode, the fan speed will be normal during Cooling.

On = Normal Fan Mode. Off = Dehumidification Mode.

DIP 1.6 – DDC Output at EH2: DIP Switch 1.6 provides selection for DDC operation. If set to DDC Output at EH2, the EH2 terminal will continuously output the last fault code of the controller. If set to EH2 normal, then the EH2 will operate as standard electric heat output.

On = EH2 Normal. Off = DDC Output at EH2.

DIP 1.7 – Boilerless Operation: Provides selection of Boilerless Operation. In Boilerless Mode, only the compressor is used for Heating Mode when LT1 is above the temperature specified by the setting of DIP 1.8. If DIP 1.8 is set for 50°F, then the compressor is used for heating while LT1 is above 50°F. Below 50°F, the compressor is not used and the control goes into Emergency Heat Mode, staging on EH1 and EH2 to provide heating.

On = normal. Off = Boilerless operation.

DIP 1.8 – Boilerless Changeover Temperature: Provides selection of boilerless changeover temperature setpoint.

On = 50°F. Off = 40°F.

DIP Package #2 (S2): DIP Package #2 is 8 position and provides the following setup selections.

DIP Package #2 (S2): A combination of dip switches 2.1, 2.2, 2.3, and 2.4, 2.5, 2.6 deliver configuration of ACC1 and ACC2 relay options respectively. See Tables 1 and 2 for description and functionality.

DIP 2.7 – Auto Dehumidification Fan Mode or High Fan Mode: Provides selection of Auto Dehumidification Fan Mode or High Fan Mode. In Auto Dehumidification Mode, the Fan Speed will be adjusted during Cooling IF the H input is active. In High Fan Mode, the Fan will operate on high speed when the H input is active.

On = Auto Dehumidification Mode (default).

Off = High Fan Mode.

DIP 2.8 – Factory Setting: Normal position is On. Do not change selection unless instructed to do so by the Factory.

DIP Package #3 (S3): DIP Package #3 is 4 position and provides the following setup selections.

DIP 3.1 – Communications Configuration: Provides selection of the DXM2.5 operation in a communicating system. The DXM2.5 may operate as a communicating master or slave device depending on the network configuration. In most configurations, the DXM2.5 will operate as a master device.

On = Communicating Master device (default).

Off = communicating Slave device.

DIP 3.2 – HWG Test Mode: Provides forced operation of the HWG pump output, activating the HWG pump output for up to five minutes.

On = HWG test mode. Off = Normal HWG mode (default).

DIP 3.3 – HWG Temperature: Provides the selection of the HWG operating setpoint.

On = 150°F [66°C]. Off = 125°F [52°C] (default).

DIP 3.4 – HWG Status: Provides HWG operation control.

On = HWG mode enabled.

Off = HWG mode disabled (default).

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Table 1: Accessory Relay 1 Configuration

DIP 2.1	DIP 2.2	DIP 2.3	ACC1 Relay Option
ON	ON	ON	Cycle with fan
OFF	ON	ON	Digital night setback
ON	OFF	ON	Water valve – Slow opening
ON	ON	OFF	Outside air damper
OFF	ON	OFF	Dedicated Dehumidification Mode option – Dehumidistat
OFF	OFF	OFF	Dedicated Dehumidification Mode option – Humidistat
OFF	OFF	ON	Hydronic Economizer – 1st Stage
ON	OFF	OFF	Hydronic Economizer – Both Stages

All other DIP combinations are invalid

Table 2: Accessory Relay 2 Configuration

DIP 2.4	DIP 2.5	DIP 2.6	ACC2 Relay Option
ON	ON	ON	Cycle with compressor
OFF	ON	ON	Digital night setback
ON	OFF	ON	Water valve – Slow opening
OFF	OFF	ON	Humidifier
ON	ON	OFF	Outside air damper
OFF	ON	OFF	Hydronic Economizer
OFF	ON	OFF	Hydronic Economizer – 1st Stage

All other DIP combinations are invalid

SAFETY FEATURES

The following safety features are provided to protect the compressor, heat exchangers, wiring and other components from damage caused by operation outside of design conditions.

Anti-Short Cycle Protection: The control features a 5 minute anti-short cycle protection for the compressor.

NOTE: The 5 minute anti-short cycle also occurs at power up.

Random Start: The control features a 5-80 second random start upon power up. The random start delay will be present after a control power up and after returning from Night Setback or Emergency Shutdown modes.

Refrigerant Leak Detection: If a refrigerant leak above the maximum threshold is detected or the control registers a fault with the refrigeration detection system, all outputs will turn off and the fan will turn on.

⚠ CAUTION! ⚠

CAUTION! Do not restart units without inspection and remedy of faulting condition. Equipment damage may occur.

Extended Compressor Operation Monitoring: If the compressor relay has been on for 4 continuous hours, then the control will automatically turn off the compressor relay and wait the short cycle protection time. All appropriate safeties will be monitored during the off time. If all operation is normal, and if the compressor demand is still present, the control will turn the compressor back on.

Fault Retry: In Fault Retry Mode, the Fault LED begins slow flashing to signal that the control is trying to recover from a fault input. The DXM2.5 Control will stage off the outputs and then "try again" to satisfy the thermostat call for compressor. Once the thermostat input calls are satisfied, the control will continue as if no fault occurred. If three consecutive faults occur without satisfying the thermostat call for compressor, then the control will go to Lockout Mode. The last fault causing the lockout will be stored in memory and is displayed at the Fault LED by entering the test mode.

NOTE: LT1 and LT2 faults are factory set for one try, so there will be no "retries" for LT1 and LT2 faults. The control is factory configured to enter lockout mode after first LT1 or LT2 fault.

FAULT CODES

Lockout: In Lockout Mode, the Fault LED will begin fast flashing. The compressor relay is turned off immediately. The fan output will be turned off after the current blower off delay unless auxiliary heat is active. The Lockout Mode can be "soft" reset via the thermostat by removing the call for compressor, or by a "hard" reset (disconnecting power to the control). The fault code will be stored in non-volatile memory that can be displayed by the Fault LED by entering the test mode, even if power was removed from the control.

Lockout with Emergency Heat: If the DXM2.5 is configured for Heat Pump thermostat mode (see DIP 1.3), the DXM2.5 is in Lockout Mode, and the W input becomes active, then Emergency Heat Mode will occur during Lockout. For Emergency Heat, the fan and auxiliary heat outputs will be activated.

Fault Code 2 – High Pressure Switch: When the High Pressure switch (HP) opens due to high refrigerant pressures, the compressor relay is de–energized immediately. The High Pressure fault recognition is immediate (does not delay for 30 continuous seconds before de–energizing the compressor). When the test mode is activated, the Fault LED will display a fault code of 2 for a High Pressure fault.

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Table 3: LED and Alarm Relay Output

DXM2.5 CONTROLLER FAULT CODES			
DXM2.5 Fault and Status LED Operation with Test Mode Not Active	**Fault LED (Red)**	**Status LED (Green)**	**Alarm Relay**
DXM2.5 is non-functional	Off	Off	Open
Normal operation - No active communications	On	On	Open
Normal operation - With active communications	Very Slow Flash	On	Open
Control is currently in fault retry mode	Slow Flash	–	Open
Control is currently locked out	Fast Flash	–	Closed
Control is currently in an over / under voltage condition	Slow Flash	–	Open (Closed after 15 Min)
Hot water mode active	–	Slow Flash	Open
(NSB) Night setback condition recognized	–	Flashing Code 2	–
(ESD) Emergency shutdown condition recognized	–	Flashing Code 3	–
Invalid thermostat input combination	–	Flashing Code 4	–
High hot water temperature lockout active	–	Flashing Code 5	–
Hot water mode sensor fault active	–	Flashing Code 6	–
DXM2.5 Fault LED and Status Operation with Test Mode Active	**Fault LED (Red)**	**Status LED (Green)**	**Alarm Relay**
No fault since power up in memory	Flashing Code 1	–	Cycling Code 1
High pressure fault in memory	Flashing Code 2	–	Cycling Code 2
Low pressure fault in memory	Flashing Code 3	–	Cycling Code 3
Low temperature protection 1 fault in memory	Flashing Code 4	–	Cycling Code 4
Low temperature protection 2 fault in memory	Flashing Code 5	–	Cycling Code 5
Condensate overflow fault in memory	Flashing Code 6	–	Cycling Code 6
Over / Under voltage shutdown in memory	Flashing Code 7	–	Cycling Code 7
UPS warning in memory	Flashing Code 8	–	Cycling Code 8
UPT fault in memory / swapped LT1 and LT2 thermistors	Flashing Code 9	–	Cycling Code 9
ECM airflow fault in memory	Flashing Code 10	–	Cycling Code 10
Low Air Coil Pressure Switch fault in memory	Flashing Code 11	-	Cycling Code 11
Low Air Temperature fault in memory	Flashing Code 12	-	Cycling Code 12
Internal Flow Center Faults in memory	Flashing Code 13	-	Cycling Code 13
RDS fault in memory	Flashing Code 15	-	Cycling Code 15
Test mode active with no ECM connected or operating	–	Fast Flash	–
Test mode active with ECM operating	–	Flashing ECM Airflow	–

– Fast Flash = 2 flashes every 1 second
– Slow Flash = 1 flash every 2 seconds
– Very Slow Flash = 1 flash every 5 seconds
– Numeric Codes = On pulse 1/3 second; Off pulse 1/3 second followed by a 10 second delay
– ECM Airflow = 1 flash per 100 CFM; On pulse 1/3 second; Off pulse 1/3 second followed by a 10 second delay
– Alarm Relay Open = alarm signal off; Alarm Relay Closed = alarm signal on

Fault Code 3 – Loss of Charge Switch: The Loss of Charge Switch (LP) must be open and remain open for 30 continuous seconds during a compressor "on" cycle to be recognized as a Loss of Charge fault. If the Loss of Charge switch is open for 30 seconds prior to compressor power up it will be considered a Loss of Charge fault. The Loss of Charge Switch input is bypassed for the initial 120 seconds of a compressor run cycle. When the test mode is active, the Fault LED will display a fault code of 3 for a Loss of Charge fault.

Fault Code 4 – Water Coil Low Temperature Cut-Out Limit (LT1): The control will recognize an LT1 fault, during a compressor run cycle if:

a) The LT1 thermistor temperature is below the selected low temperature protection limit setting for at least 50 seconds, AND

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b) The LT1 thermistor temperature is rising (getting warmer) at a rate LESS than 2°F every 30 seconds

The LT1 input is bypassed for the initial 120 seconds of a compressor run cycle. When the test mode is active, the Fault LED will display a fault code of 4 for a LT1 fault.

Fault Code 5 – Air Coil Low Temperature Cut-Out (LT2): The control will recognize an LT2 fault, during a compressor run cycle if:

a) The LT2 thermistor temperature is below the low temperature protection limit setting for at least 50 seconds, AND

b) The LT2 thermistor temperature is rising (getting warmer) at a rate LESS than 2°F every 30 seconds

The LT2 input is bypassed for the initial 120 seconds of a compressor run cycle. When the test mode is active, the Fault LED will display a fault code of 5 for a LT2 fault.

Fault Code 6 – Condensate Overflow: The Condensate Overflow sensor must sense overflow levels for 30 continuous seconds to be recognized as a CO fault. Condensate Overflow will be monitored continuously during the compressor run cycle. When the test mode is active, the Fault LED will display a fault code of 6 for a Condensate Overflow fault.

Fault Code 7 – Over/Under Voltage Shutdown: An Over/Under Voltage condition exists when the control voltage is outside the range of 18 VAC to 31.5 VAC. Over/Under Voltage Shutdown is self-resetting in that if the voltage comes back within range of 18.5 VAC to 31 VAC for at least 0.5 seconds, then normal operation is restored. This is not considered a fault or lockout. If the DXM2.5 is in over/under voltage shutdown for 15 minutes, the Alarm Relay will close. When the test mode is active, the Fault LED will display a fault code of 7 for an Over/Under Voltage Shutdown.

Fault Code 8 – Unit Performance Sentinel - UPS: The UPS feature warns when the heat pump is operating inefficiently. A UPS condition exists when:

a) In Heating Mode with compressor energized, if LT2 is greater than 125°F for 30 continuous seconds. Or

b) In Cooling Mode with compressor energized, if LT1 is greater than 125°F for 30 continuous seconds, OR LT2 is less than 40°F for 30 continuous seconds.

If a UPS condition occurs, the control will immediately go to UPS warning. The status LED will remain on as if the control is in Normal Mode. (see “LED and Alarm Relay Operation Table”). Outputs of the control, excluding Fault LED and Alarm Relay, will NOT be affected by UPS. The UPS condition cannot occur during a compressor off cycle. During UPS warning, the Alarm Relay will cycle on and off. The cycle rate will be On for 5 seconds, Off for 25 seconds, On for 5 seconds, Off for 25 seconds, etc. When the test mode is active, the Fault LED will display a fault code of 8 for an UPS condition.

Fault Code 9 – Unit Performance Test-UPT/Swapped LT1 & LT2 Thermistors: During test Mode, the control monitors to see if the LT1 and LT2 thermistors are connected and operating properly. If the control is in test mode, the control will lockout, with Code 9, after 60 seconds if:

a) The compressor is On in Cooling Mode and the LT1 sensor is colder than the LT2 sensor. Or,

b) The compressor is On in Heating Mode and the LT2 sensor is colder than the LT1 sensor.

When the test mode is active, the Fault LED will display a fault code of 9 for a Swapped Thermistor fault.

Fault Code 10 – ECM Blower Fault: When operating an ECM blower, there are two types of ECM Blower fault conditions that may be detected.

a) An ECM blower fault will be detected and the control will lockout after 15 seconds of blower operation with the blower feedback signal reading less than 100 RPM.

b) An ECM blower fault will be detected when the ECM configuration is incorrect or incomplete. For this fault condition, the control will continue to operate using default operating parameters.

When the test mode is active, the Fault LED will display a fault code of 10 for an ECM Blower fault.

Fault Code 11 – Low Air Coil Pressure Switch (Dedicated Dehumidification Mode Units Only): When the Low Air Coil Pressure switch opens due to low refrigerant pressure in the cooling or reheat operating mode, the compressor relay is de–energized immediately. The Low Air Coil Pressure fault recognition is immediate (does not delay for 30 continuous seconds before de–energizing the compressor). When the test mode is activated, the Fault LED will display a fault code of 11 for a Low Air Coil Pressure fault. Note: Low Air Coil Pressure fault will keep the unit from operating in the cooling or reheat modes, but heating operation will still operate normally.

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Fault Code 12 – Low Air Temperature (Dedicated Dehumidification Mode Units Only): The control will recognize a Low Air Temperature fault, during cooling, reheat, or constant fan operation if the LAT thermistor temperature is below 35 degrees for 30 continuous seconds. When the test mode is activated, the Fault LED will display a fault code of 12 for a Low Air Temperature fault. NOTE: Low Air Temperature fault will keep the unit from operating in the cooling, reheat, or constant fan modes, but heating operation will still operate normally.

Fault Code 13 – Internal Flow Center Faults: When operating an internal flow center, the DXM2.5 monitors the pump feedback signal and may detect one of several pump faults. The control may detect locked rotor, low voltage, no flow, or bad pump sensor conditions that will result in an internal flow center fault. When the test mode is active, the Fault LED will display a fault code of 13 for any of these flow center faults.

Fault Code 15 – RDS Sensor Fault: A Refrigerant Detection System (RDS) sensor fault exists if the DXM2.5 loses communication with a refrigeration detection sensor, or a refrigeration detection sensor senses a refrigeration leak. In Refrigerant Leak Detection mitigation mode, the Fault LED will begin fast flashing. All outputs are turned off immediately and the fan output will be turned on for a minimum of 5 minutes. If communication with the sensor is re-established or the RDS stops sensing a refrigerant leak, the unit will resume normal operation 5 minutes after the RDS stops sensing a refrigeration leak. The fault code will be stored in nonvolatile memory that can be displayed by the Fault LED. When test mode is active, the Fault LED will display a fault code of 15 for a RDS sensor fault.

ESD: The ESD Mode can also be enabled from an external common signal to terminal ESD (see "Thermostat Inputs" section for details). For WSHP rooftop products, ESD (Emergency Shut Down) Mode is utilized when the ERV (Energy Recovery Ventilator) option is applied to an TRE series rooftop unit to indicate an ERV fault. A contact closure at the ERV unit will connect common to the ESD terminal, which will shut down the rooftop/ERV units. The green Status LED will flash code 3 when the unit is in ESD Mode.

Diagnostic Features: The green Status LED and red Fault LED on the DXM2.5 Control advise service personnel of the current status of the DXM2.5 Control. The LED's will indicate the current operating status of the DXM2.5, as well as the LAST fault in memory. If there is no fault in memory and the fault display is selected, the Fault LED will flash Code 1. See Table 3 for a complete listing of codes.

UNIT OPERATION DESCRIPTIONS

Power Up: The unit will not operate until all the inputs and safety controls are checked for normal conditions.

NOTE: The compressor will have a 5-minute anti-short cycle delay at power-up.

Standby/Fan Only: In Standby Mode, the compressor will be off. The selected fan output(s) and RV relay may be on if appropriate inputs are present. If there is demand for constant fan, the appropriate fan output(s) will be activated for low speed operation, or constant fan airflow. If there is demand for constant high speed fan, the appropriate fan output(s) will be activated for high speed operation, or high speed constant fan airflow.

NOTE: DIP1.5 (Dehum Fan Mode Select) has no effect upon constant fan operation.

The RV relay will not directly track the input demands for RV, the DXM2.5 Control will employ "smart RV" control. This ensures that the RV will only switch positions if the thermostat has called for a Heating/Cooling Mode change.

Heating Stage 1: In Heating Stage 1 Mode, the selected Fan output(s) and the Compressor relay are turned on immediately. If configured as Stage 2 (DIP1.2 = off), then the Compressor and Fan will not turn on until there is Stage 2 demand. The Compressor relay is turned off immediately when the Heating Stage 1 demand is removed. The selected Fan output(s) will turn off after the selected heating blower off delay, and the control then reverts to Standby Mode. If there is a Master/Slave situation or a Dual Compressor situation, all Compressor relays and related functions will track with their associated DIP1.2.

Heating Stage 2: In Heating Stage 2 Mode, the selected Fan output(s) and Compressor relays remain on. The Compressor Speed relay is turned on, and multi–stage fan configurations switch to the appropriate operating speed for Heating Stage 2 immediately. The Compressor Speed relay is turned off immediately when the Heating Stage 2 demand is removed, and multi–speed fan configurations switch to the appropriate operating speed for Heating Stage 1 immediately, and the control reverts to Heating Stage 1 Mode. For Master/Slave or Dual Compressor configurations, all Compressor relays and related functions will track with their associated DIP1.2.

Heating Stage 3: In Heating Stage 3 Mode, the selected Fan output, Compressor, and Compressor Speed relays will remain on. The EH1 output will turn on immediately, and if the control is operating an ECM Blower, the airflow will change to the appropriate Heating Stage 3 airflow.

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With continuing Heating Stage 3 demand, EH2 will turn on after 10 minutes. EH1 and EH2 are turned off immediately when the Heating Stage 3 demand is removed, and the control reverts to Heating Stage 2 Mode. During Heating Stage 3 Mode, EH2 will be off (or will turn off if already on) if LT1 is greater than 45°F AND LT2 is greater than 110°F (LT2 greater than 110°F includes the condition that LT2 is shorted). This condition will have a 30-second recognition time.

Emergency Heat: In Emergency Heat Mode, the selected fan output(s) will be activated at high speed or the appropriate airflow for Emergency Heat, and EH1 is turned on immediately. With continuing Emergency Heat demand, EH2 will turn on after 5 minutes. EH1 and EH2 are turned off immediately when the Emergency Heat demand is removed. The selected fan output(s) will turn off after the selected heating blower off delay and the control reverts to Standby Mode.

Cooling Stage 1: In Cooling Stage 1 Mode, the selected fan output(s), Compressor, and RV relays are turned on immediately. If configured as Stage 2 (DIP1.2 = off), then the compressor and fan will not turn on until there is Stage 2 demand. The Compressor relay is turned off immediately when the Cooling Stage 1 demand is removed. The selected Fan output(s) will turn off after the selected cooling blower off delay, and the control then reverts to Standby Mode. The RV relay will remain on until there is a Heating demand. If there is a Master/Slave situation or a Dual Compressor situation, all Compressor relays and related functions will track with their associated DIP1.2.

Cooling Stage 2: In Cooling Stage 2 Mode, the selected Fan output(s), Compressor, and RV relays remain on. The Compressor Speed relay is turned on, and multi–stage fan configurations switch to the appropriate operating speed for Cooling Stage 2 immediately. The Compressor Speed relay is turned off immediately when the Cooling Stage 2 demand is removed, and multi–speed fan configurations switch to the appropriate operating speed for Cooling Stage 1 immediately, and the control reverts to Cooling Stage 1 Mode. For Master/Slave situation or dual compressor configurations, all compressor relays and related functions will track with their associated DIP1.2.

Night Low Limit (NLL) Staged Heating: In NLL Staged Heating Mode, the OVR input becomes active and is recognized as a call for Heating (OVR is an alternate means of calling for Heating Mode). In NLL Staged Heating Mode, the control will immediately go into Heating Stage 1 Mode with an additional 30 minutes of NLL demand, the control will go into Heating Stage 2 Mode. With an additional 30 minutes of NLL demand, the control will go into Heating Stage 3 Mode.

Blower Configurations: The DXM2.5 may be configured to operate several different blowers and blower configurations. The configurations include:

a) No Blower: If the DXM2.5 is configured for no blower (split system compressor sections), the K1 relay will become a loop pump relay and the K2 relay will become a HWG pump relay.

b) 2 Speed PSC Blower: The default configuration of the DXM2.5 is to operate for a 2 Speed PSC blower, with the K1 relay operating as a blower enable relay, and the K2 relay operating as a blower speed relay. With this configuration, the blower enable relay is momentarily de-activated when the blower speed relay is switched. For low speed blower operation (Constant Fan, Heating 1, Cooling 1, Cooling 2 with Dehumidification), K1 will be active and K2 will be inactive. For high speed blower operation (High Speed Constant Fan, Heating 2, Heating 3, Emergency Heat, Cooling 2), K1 and K2 will be active.

c) Constant Volume (CV) ECM Communicating Blower: If the DXM2.5 is configured for a CV ECM blower, OR a CV ECM blower is detected, the DXM2.5 will directly control a CV ECM blower through communiations using selected or default airflows for each operating mode. When operating a CV ECM blower, the K1 relay becomes a loop pump relay active anytime the compressor relay is active, and the K2 relay becomes a HWG pump relay.

d) Single Speed PSC Blower: If the DXM2.5 is configured for a single speed PSC blower, the K1 relay will operate as the blower relay, and the K2 relay becomes a HWG pump relay.

e) 2 Speed Constant Torque (CT) ECM Blower: If the DXM2.5 is configured for a CT ECM blower, the K1 relay will operate as a blower enable relay, and the K2 relay will operate as a blower speed relay. The CT ECM configuration operates like the 2 Speed PSC, except the blower enable relay is not de-activated when the blower speed relay is switched.

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f) Constant Volume (CV) ECM (PWM) Blower: If the DXM2.5 is configured for a CV ECM (PWM) blower, the DXM2.5 will directly control a CV ECM (PWM) blower through PWM output signal using selected or default airflows for each operating mode. When operating a CV ECM (PWM) blower, the K1 relay becomes a loop pump relay active anytime the compressor relay is active, and the K2 relay becomes a HWG pump relay.

g) VFD Blower: If the DXM2.5 control is configured for VFD blower, the DXM2.5 will directly control a VFD to achieve a target Leaving Air Temperature (LAT) or at discrete speeds depending on the selected blower control mode. When operating a VFD, the K1 relay becomes the VFD enable relay. When the VFD is off, the output will be set to 0 VDC. If configured for fixed speed blower control, there are maximum and minimum operating speeds for each operating mode unique to each unit size.

ECM Blower Operation: When the DXM2.5 is configured to operate an ECM Blower, or an ECM Blower is connected to the DXM2.5, the ECM blower will be directly controlled by the DXM2.5, with advanced operating features including:.

a) Airflow Settings: The DXM2.5 allows the target airflow for each operating mode to be selected individually, within the allowable operating range.

b) Soft Start Ramping: During the first 2 minutes of blower operation during a heating or cooling demand, the ECM blower will ramp up to the selected target airflow for the current operating mode. For the first 30 seconds of blower operation, the target airflow will be 50% of the normal target airflow. For the next 90 seconds of blower operation, the target airflow will be 75% of the normal target airflow. For Constant Fan, Emergency Heat, and test mode operation, the Soft Start Ramping profile is bypassed, and the ECM immediately ramps up to the normal target airflow.

c) Blower Off Delays: For ECM blower off delays, the target airflow will be adjusted to 50% of normal target airflow before the beginning of the blower off delay.

d) Default Blower Operation: If the DXM2.5 configuration is incorrect or incomplete with an ECM Blower connected, the ECM blower will not operate; an ECM configuration warning will be recognized while unit is in standby but an airflow fault will be recognized if blower demand is present. Once the

Table 4: Thermostat Inputs with Resulting Demands

Thermostat Operating Modes												
Mode	Input[3]						Output					
	O	G	Y1	Y2[4]	W	H / DH	RV	Fan	1st Stg H/C	2nd Stg H/C[4]	AUX	Reheat
No Demand	ON/OFF	OFF	OFF	OFF	OFF	OFF	ON/OFF	OFF	OFF	OFF	OFF	OFF
Fan Only	ON/OFF	ON	OFF	OFF	OFF	OFF	ON/OFF	ON	OFF	OFF	OFF	OFF
Cooling 1st Stage	ON	ON	ON	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
Cooling 2nd Stage	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	OFF	OFF
Cooling & Dehumidistat[1]	ON	ON	ON	ON/OFF	OFF	ON	ON	ON	ON	ON/OFF	OFF	OFF
Dehumidistat Only	ON/OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	OFF	ON
Heating 1st Stage	OFF	ON	ON	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
Heating 2nd Stage	OFF	ON	ON	ON	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
Heating 3rd Stage	OFF	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	OFF
Heating & Dehumidistat[2]	OFF	ON	ON	ON/OFF	ON/OFF	ON	OFF	ON	ON	ON/OFF	ON/OFF	OFF
Emergency Heat	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	OFF

[1] Cooling input takes priority over dehumidification input.
[2] DXM2.5 is programmed to ignore a dehumidification demand when the unit is in heating mode.
[3] Above inputs assume DIP 1.3 is in the heat pump position, and DIP 1.4 is in the O position. When 1.3 is in the heat/cool position, Y1 and Y2 are used for cooling inputs; W and O are used for heating inputs. When 1.4 is in the B position, the O column would be opposite logic.
[4] N/A for single stage units; Full load operation for dual capacity units.
[5] ON/OFF = Either ON or OFF; H/C = Either Heating or Cooling.

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heat pump family, unit size and blower type are selected, the ECM blower will operate based on the airflow parameters for the current configuration for a compatible ECM blower of any power level.

Hot Water Generator Operation: When the DXM2.5 is configured to operate a hot water generator pump, the pump will be directly controlled by the K2 relay, based on the S3 DIP switch settings and the T5 (hot water temperature) and T6 (compressor discharge temperature) inputs. Hot water generator operating features include:

a) HWG operating setpoint selection (S3–3)

b) Temperature offset verification for efficient HWG operation

c) HWG test mode (S3–2)

Internal Flow Center [IFC] Operation: When the DXM2.5 is configured to operate the variable speed pump in the internal flow controller, the pump will be directly controlled by the DXM2.5. For controlling the variable speed pump, the DXM2.5 monitors the entering water temperature, leaving water temperature, and pump feedback signal. The pump is controlled in the following way:

a) Maintain the appropriate temperature difference across the water coil (EWT–LWT for heating, LWT–EWT for cooling).

b) Maintain the leaving water temperature below the appropriate Maximum Heating LWT and above the Minimum Cooling LWT limits.

Proportional Valve Operation: When the DXM2.5 is configured to operate a proportional valve, the valve will be directly controlled by the DXM2.5. For controlling the proportional valve, the DXM2.5 monitors the entering water temperature and leaving water temperature. The proportional valve output will be eneergized 60 seconds before the compressor relay to establish flow before the compressor starts. The valve is controlled in the following way:

a) Maintain the appropriate temperature difference across the water coil (EWT–LWT for heating, LWT–EWT for cooling).

b) Maintain the leaving water temperature below the appropriate Maximum Heating LWT and above the Minimum Cooling LWT limits.

SPECIAL DXM2.5 APPLICATION NOTES/ ACCESSORY RELAYS

Generally the following applications are based upon configuring the accessory relays.

Cycle with Fan: If Accessory relay 1 is configured to "cycle with fan", Accessory relay 1 will be on any time the Fan Enable relay, or ECM Blower is on.

Cycle with Compressor: If Accessory relay 2 is configured to "cycle with compressor", Accessory relay 2 will be on any time the Compressor relay is on.

Digital Night Setback: If an Accessory relay is configured for Digital NSB, the Accessory relay will be on any time the NSB input is connected to Ground "C".

NOTE: If there are no Accessory relays configured for Digital NSB, and the DXM2.5 is not connected to a communicating thermostat configured for night setback, then the NSB and OVR inputs are automatically configured for "mechanical" operation. See Mechanical NSB operation below.

NOTE: Digital Night Setback feature requires a compatible thermostat. Contact the manufacturer for information on compatible thermostats.

Mechanical Night Setback: When the NSB input is connected to Ground "C", all thermostat inputs (G, Y1, Y2, W, and O) are ignored. A thermostat setback Heating call can then be connected to the OVR input. If the OVR input becomes active, then the DXM2.5 will enter NLL Staged Heating Mode. NLL Staged Heating Mode would then provide heating during the NSB period.

Water Valve/Slow Opening: If an Accessory relay is configured for Water Valve/Slow Opening, the accessory relay will be energized 60 seconds before the compressor relay to establish flow before the compressor starts.

Outside Air Damper: If an Accessory relay is configured for OAD, the Accessory relay will normally turn on any time the Fan Enable relay is on. But, following a return from NSB (NSB input no longer connected to Ground "C") to Normal Mode, the Accessory Relay will not turn on for 30 minutes even if the Fan Enable Relay is on. After this 30-minute timer expires, the Accessory Relay will turn on if the Fan Enable Relay is on.

Humidifier: If Accessory relay 2 is configured for a Humidifier, the Accessory relay will be on any time the H input is active.

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Hydronic Economizer: If Accessory relay 1 is configured to be used as a hydronic economizer, normal cooling operation will be modified.

If Accessory relay 1 is configured as a single stage hydronic economizer, when a first stage cooling demand is present and the H input is active, the accessory relay will be activated instead of the compressor output. All other heat pump operating modes will operate normally, and the accessory relay will be off in all other operating modes.

If Accessory relay 1 is configured as a hydronic economizer for both stages, when a first stage cooling demand is present and the H input is active, the accessory relay will be activated instead of the compressor output. When a second stage cooling demand is present with the H input active, the accessory relay will be activated in addition to the compressor output. All other heat pump operating modes will operate normally, and the accessory relay will be off in all other operating modes.

Dedicated Dehumidification Mode Operation: A heat pump equipped with the Dedicated Dehumidification Mode can operate in three modes, cooling, cooling with condenser water reheat (CWR), and heating. The cooling/heating modes are like any of our other WSHP. The reversing valve ("O" signal) is energized in cooling, along with the compressor contactor(s) and the selected blower outputs. In the Heating Mode the reversing valve is de-energized. Almost any thermostat will activate the heat pump in heating or cooling modes. The Reheat Mode requires either a separate humidistat/dehumidistat or a thermostat that has an integrated dehumidification function for activation. The DXM2.5 board may be configured to work with either a humidistat or dehumidistat input to terminal "H" (DIP switch settings for the DXM2.5 board are shown in table 2), or the manufacturer's communicating thermostat. Upon receiving the appropriate "H" input or communicated signal, the DXM2.5 board will activate the Cooling Mode a nd engage CWR. Table 5 shows the relationship between thermostat input signals and unit operation.

Units configured for Dedicated Dehumidification Mode operation use two additional fault sensors not present in other unit configurations. The OVR input is used to monitor a Low Air Coil Pressure switch, and the T4 input is used for a Leaving Air Temperature sensor, used for low temperature detection.

Thermostat Inputs: Table 5 shows the resulting demand from differing combinations of inputs.

Y1: Y1 is the input for compressor stage 1 if DIP1.3 = on. Y1 is the input for Cooling Stage 1 if DIP1.3 = off.

Y2: Y2 is the input for compressor stage 2 if DIP1.3 = on. Y2 is the input for Cooling Stage 2 if DIP1.3 = off.

W: If Y1 and Y2 are active and DIP1.3 = on, then W is the input for Heating Stage 3. If Y1 and Y2 are not active and DIP1.3 = on, then W is the input for Emergency Heat. If DIP1.3 = off, then W is the input for Heating Stage 1.

O: O is the input for Reversing Valve Relay if DIP1.3 = on and DIP1.4 = on. O is the input for Heating Stage 2 if DIP1.3 = off. O is the input for "Heat Mode" if DIP1.3 = on and DIP1.4 = off; this means that the thermostat outputs a "B" call when in Heating Mode and does NOT have an "O" output. The DXM2.5 Control will employ "Smart RV" control. This ensures that the RV will only switch positions if the thermostat has called for a Heating/Cooling Mode change.

G: G is the input for Constant Fan Operation.

NSB and Override: NSB is the input for Night Setback Mode. When Digital NSB is selected via the Accessory Relays DIP switch inputs and the NSB input is connected to Ground "C", then the appropriately configured Accessory Relay is turned on to signal the digital thermostat to go to Night Setback Setpoints. Stated differently, when configured for Digital NSB Mode, the Accessory Relay directly tracks the NSB input.

NOTE: Digital Night Setback feature requires a compatible thermostat. Contact the manufacturer for information on compatible thermostats.

When Digital NSB is NOT selected via the Accessory Relays DIP switch inputs and a communicating thermostat configured for night setback is not connected, when the NSB input is connected to Ground "C", then Y1, Y2, W, O, and G inputs are ignored. During this time period, if OVR is momentarily connected to 24 VAC, then Y1, Y2, W, O, and G are once again monitored for 2 hours. After the 2 hour override period, the DXM2.5 reverts back to ignoring Y1, Y2, W1, O, and G, assuming the NSB input is still connected to Ground "C". There will be a random start timer when coming back from NSB Mode.

NOTE: The maximum number of DXM2.5 controls with daisy-chained "NSB" terminals is 75. Also, the maximum total wire resistance of the "NSB" wiring is 500 Ohms.

OVR: OVR is the input for Night Setback Override or Night Low Limit Staged Heating input (NLL). When Digital NSB is NOT selected via the Accessory Relays DIP switch inputs and a communicating thermostat configured for night setback is not connected and NSB is connected to Ground "C", then if OVR is momentarily connected

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to 24 VAC (minimum 1 second) then the OVR input is recognized as a Night Setback Override signal and the DXM2.5 Control reverts from Night Setback and begins monitoring thermostat inputs for heating and cooling calls for a 2 hour override period. If NSB is connected to ground "C", then if OVR is continuously connected to 24 VAC, then the OVR input is recognized as a call for NLL Staged Heating and the control enters NLL Staged Heating.

NOTE: For Dedicated Dehumidification Mode units, the OVR input is used to monitor a Low Air Coil Pressure switch, and the normal functions of the OVR input are not available.

ESD: ESD is the input for Emergency Shutdown Mode. When the ESD input is connected to Ground "C", all inputs are ignored and all outputs are turned off. There will be a random start timer when coming back from ESD.

H: The H input function is determined by the setting of DIP2.7, assuming the control is not controlling an internal flow center or an accessory relay is not configured for Dedicated Dehumidification Mode or humidifier operation.

If DIP2.7 = on then the H input is defined as Automatic Dehumidification Mode and is used as an "automatic" counterpart to DIP1.5, meaning if H is connected to 24 VAC then the selected fan outputs will operate using dehumidification speeds and airflow settings for cooling. If H is not connected to 24 VAC then the selected fan outputs will operate using normal speeds and airflow settings for cooling.

If DIP2.7 = off then the H input is defined as High Speed Fan input and is used as an input to call for High Speed Fan. If the control is in normal operating modes such as Standby, Cooling or Heating AND the H input is

Table 5: System Inputs with the Resulting Demand

Table 5 describes demand changes with differing system input (ESD, NSB, OVR) and DIP input settings. Resulting Demand #1 is derived from Table 4.

Resulting Demand #1 (From Table 4)	System Inputs			NSB Type	Resulting Demand #2 (After ESD, NSB)
	ESD	NSB	OVR		
-	X	-	-	-	ESD
Invalid	-	-	-	-	Invalid
All (Excluding Invalid)	-	-	-	-	All (Excluding Invalid)
All (Excluding Invalid)	-	-	M	-	All (Excluding Invalid)
C1, C2	-	-	X	-	Invalid
OFF, F, H1, H2, or H3	-	-	X	-	NLL Staged Heating
EH	-	-	X	-	EH
All (Excluding Invalid)	-	X	-	Mechanical	Standby/OFF
All (Excluding Invalid)	-	X	M	Mechanical	All for 2 hours and then revert to Standby/OFF (Excluding Invalid)
C1, C2	-	X	X	Mechanical	Invalid
OFF, F, H1, H2, or H3	-	X	X	Mechanical	NLL Staged Heating
EH	-	X	X	Mechanical	EH
All (Excluding Invalid)	-	X	-	Digital / Comm	All (Excluding Invalid)
All (Excluding Invalid)	-	X	M	Digital / Comm	All (Excluding Invalid)
C1, C2	-	X	X	Digital / Comm	Invalid
OFF, F, H1, H2. or H3	-	X	X	Digital / Comm	NLL Staged Heating
EH	-	X	X	Digital / Comm	EH

"M" is momentary input
"X" is continuous input

Table 6: "H" Input with Resulting Demand Modes

Table 6 describes demand changes with "H" input and DIP 2.1-2.3, and 2.7 settings. Resulting Demand #2 is derived from Table 5.

Resulting Demand #2 (From Table 5)	H	Auto Dehum / F2 DIP 2.7	Resulting Demand # 3 (After DIP 2.1-2.3, 2.7 Logic)
Standby/OFF	X	Auto Dehum Mode	Standby/OFF with Auto
Dehum enabled			
Standby/OFF	X	High Fan Mode	F2
F1	X	Auto Dehum Mode	F1 with Auto Dehum enabled
F1	X	High Fan Mode	F2
C1	X	Auto Dehum Mode	C1 with fan destage
C1	X	High Fan Mode	*Cooling with High Fan
C2	X	Auto Dehum Mode	C2 with fan destage
C2	X	High Fan Mode	*Cooling with High Fan
H1	X	Auto Dehum Mode	H1
H1	X	High Fan Mode	Heating with High Fan
H2	X	-	H2
H3	X	-	H3
EH	X	-	EH
Invalid	-	-	Invalid

* = signifies that High Fan is locked on regardless of any Dehum demands

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connected to 24 VAC, then the selected fan outputs will operate using high speed, or high speed airflows (this operation is a high speed fan version of the G input).

NOTE: Units with internal flow centers or accessory relays configured for Dedicated Dehumidification Mode or humidifier operation operate differently from the above descriptions. For the Dedicated Dehumidification Mode configuration, the H input is either a humidistat or dehumidistat (see table 2) input to activate the Dedicated Dehumidification operating mode. For the humidifier configuration, the H input activates the humidifier output.

OTHER OUTPUTS

Electric Heat: Outputs EH1 and EH2 turn on whenever the DXM2.5 Control is in the following modes: Heating Stage 3, Emergency Heat, and Boilerless Operation.

Status LED: The Status LED is green. The Status LED indicates the operating status of the DXM2.5 Control. See Table 4: “LED and Alarm Relay Operation”.

Fault LED: The Fault LED is red. The Fault LED displays the current operating status of the control, or flashes the corresponding code for the last fault that has occurred if the test mode is active. If there is no fault in memory, then the Fault LED will flash Code 1. If the Fault type is “Primary” (HP, LP, LT1, LT2, or CO) then the Fault type will always be retained in memory (Primary faults will overwrite Secondary faults). If the Fault type is “Secondary” (Over/Under Voltage, UPS or Swapped LT1/LT2) then the Fault type will only be retained if there are no “Primary” faults in memory. The Secondary Fault types will not “overwrite” the Primary fault memory. See Table 4: “LED and Alarm Relay Operation”.

Communications: The DXM2.5 has a single RS-485 communications port that provides communication capabilities for communicating thermostats or connecting with other communicating controls.

Pressure Switches: All pressure switches are designed to be normally closed during normal operating conditions, and to open upon fault.

Condensate Sensor: The Condensate Sensor input will fault upon sensing impedance less than 100,000 Ohms for 30 continuous seconds. The recommended design uses a single wire terminated with a male 1/4” quick connect located in the drain pan at desired trip level. Upon a high condensate level the water will short between the air coil and the quick connect producing a resistance less than 100,000 Ohms. Since condensate is free of impurities, it has no conductivity. Only the impurities from the drain pan and coil dust or dirt create the conductance. A second ground wire with appropriate terminal to the drain pan can be used with the control to replace the air coil ground path. The Condensate Sensor can also essentially be any open contact that closes upon a fault condition.

Thermistor Temperature Sensors: The thermistors used with the DXM2.5 are NTC (negative temperature coefficient) type. Table 7 shows the replacement part numbers for the LT1 and LT2 thermistors. The sensors have a 1% tolerance and follow the characteristics shown in Table 8. Table 9 shows the nominal resistance at any given temperature and can be used for field service reference. The sensor will use a minimum of 24 AWG wire.

Table 8: 1% Sensor Calibration Points

Temp (°F)	Minimum Resistance (Ohm)	Maximum Resistance (Ohm)	Nominal Resistance (Ohm)
78.5	9523	9715	9619
77.5	9650	9843	9746
76.5	10035	10236	10135
75.5	10282	10489	10385
33.5	30975	31598	31285
32.5	31871	32512	32190
31.5	32653	33310	32980
30.5	33728	34406	34065
1.5	80624	82244	81430
0.5	83327	85002	84160
0.0	84564	86264	85410

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Table 9: Nominal Resistance at Various Temperatures

Temp (ºC)	Temp (ºF)	Resistance (kOhm)
-17.8	0.0	85.34
-17.5	0.5	84.00
-16.9	1.5	81.38
-12	10.4	61.70
-11	12.2	58.40
-10	14.0	55.30
-9	15.8	52.38
-8	17.6	49.64
-7	19.4	47.05
-6	21.2	44.61
-5	23.0	42.32
-4	24.8	40.15
-3	26.6	38.11
-2	28.4	36.18
-1	30.2	34.37
0	32.0	32.65
1	33.8	31.03
2	35.6	29.50
3	37.4	28.05
4	39.2	26.69
5	41.0	25.39
6	42.8	24.17
7	44.6	23.02
8	46.4	21.92
9	48.2	20.88
10	50.0	19.90
11	51.8	18.97
12	53.6	18.09
13	55.4	17.26
14	57.2	16.46
15	59.0	15.71
16	60.8	15.00
17	62.6	14.32
18	64.4	13.68
19	66.2	13.07
20	68.0	12.49
21	69.8	11.94
22	71.6	11.42
23	73.4	10.92
24	75.2	10.45
25	77.0	10.00
26	78.8	9.57
27	80.6	9.16
28	82.4	8.78
29	84.2	8.41
30	86.0	8.06
31	87.8	7.72
32	89.6	7.40
33	91.4	7.10
34	93.2	6.81
35	95.0	6.53
36	96.8	6.27
37	98.6	6.01
38	100.4	5.77
39	102.2	5.54
40	104.0	5.33
41	105.8	5.12
42	107.6	4.92
43	109.4	4.72
44	111.2	4.54
45	113.0	4.37
46	114.8	4.20
47	116.6	4.04
48	118.4	3.89
49	120.2	3.74
50	122.0	3.60
51	123.8	3.47
52	125.6	3.34
53	127.4	3.22
54	129.2	3.10
55	131.0	2.99
56	132.8	2.88
57	134.6	2.77
58	136.4	2.67
59	138.2	2.58
60	140.0	2.49
61	141.8	2.40
62	143.6	2.32
63	145.4	2.23
64	147.2	2.16
65	149.0	2.08
66	150.8	2.01
67	152.6	1.94
68	154.4	1.88
69	156.2	1.81
70	158.0	1.75
71	159.8	1.69
72	161.6	1.64
73	163.4	1.58
74	165.2	1.53
75	167.0	1.48
76	168.8	1.43
77	170.6	1.39
78	172.4	1.34
79	174.2	1.30
80	176.0	1.26
81	177.8	1.22
82	179.6	1.18
83	181.4	1.14
84	183.2	1.10
85	185.0	1.07
86	186.8	1.04
87	188.6	1.01
88	190.4	0.97
89	192.2	0.94
90	194.0	0.92
91	195.8	0.89
92	197.6	0.86
93	199.4	0.84
94	201.2	0.81
95	203.0	0.79
96	204.8	0.76
97	206.6	0.74
98	208.4	0.72
99	210.2	0.70
100	212.0	0.68
101	213.8	0.66
102	215.6	0.64
103	217.4	0.62
104	219.2	0.60
105	221.0	0.59
106	222.8	0.57
107	224.6	0.55
108	226.4	0.54
109	228.2	0.52
110	230.0	0.51
111	231.8	0.50
112	233.6	0.48
113	235.4	0.47
114	237.2	0.46
115	239.0	0.44
116	240.8	0.43
117	242.6	0.42
118	244.4	0.41
119	246.2	0.40
120	248.0	0.39
121	249.8	0.38
122	251.6	0.37
123	253.4	0.36

Basic Troubleshooting Information/ Service & Application Notes

General Troubleshooting: Basic DXM2.5 board troubleshooting in general is best summarized as simply verifying inputs and outputs. After this process has been verified, confidence in board operation is confirmed and the trouble must be elsewhere. Below are some general guidelines required for developing training materials and procedures when applying the DXM2.5 Control.

DXM2.5 Field Inputs: All conventional inputs are 24 VAC from the thermostat and can be verified using a voltmeter between C and Y1, Y2, W, O, and G.

Sensor Inputs: All sensor inputs are 'paired wires' connecting each component with the board. Therefore continuity on pressure switches can be checked at the board connector.

The thermistor resistance should be measured with the connector removed so that only the impedance of the thermistor is measured. If desired, this reading can be compared to the chart shown in the thermistor section of this manual based upon the actual temperature of the thermistor clip. An ice bath can be used to check calibration of a thermistor if needed.

DXM2.5 Outputs: The compressor relay is 24 VAC and can be verified using a voltmeter. The Alarm Relay can either be 24 VAC as shipped or dry contacts (measure continuity during fault) for use with DDC by clipping the JW1 jumper. Electric heat outputs are 24 VDC and require a voltmeter set for DC to verify operation. When troubleshooting, measure from 24 VDC terminal to EH1 or EH2 terminals.

Test Mode: Test mode can be entered for 20 minutes by pressing the Test button. For Diagnostic ease at a conventional thermostat, the Alarm Relay will also cycle during test mode.The Alarm Relay will cycle on and off in sync with the Fault LED to indicate a code representing the last fault, at the thermostat. Test mode can also be entered and exited by cycling the G input, three times within 60 seconds.

DXM2.5 Thermostat Details

Anticipation Leakage Current: Maximum leakage current for "Y1" is 50 mA and for "W" is 20 mA. Triacs can be used if leakage current is less than above. Thermostats with anticipators can be used if anticipation current is less than that specified above.

Thermostat Signals:

- "Y1", "Y2", "W", "O", and "G" have a 1 second recognition time when being activated or being removed.
- "R" and "C" are from the transformer.
- "AL1" and "AL2" originate from the Alarm Relay.
- "A" is paralleled with the compressor output for use with well water solenoid valves.

Safety Listing: The DXM2.5 Control is listed under UL 873, and is CE listed under IEC 60730.

Configuration and Advance Troubleshooting Information

GENERAL

To properly configure and troubleshoot advanced control features, and to aid in troubleshooting basic control features, a communicating thermostat or diagnostic tool with similar capabilities should be used.

SYSTEM CONFIGURATION

All factory installed DXM2.5 controls have their basic configuration parameters set as part of the factory manufacturing and test process. The System Configuration option under the communicating thermostat Installer menu provides the installer with the ability to adjust ECM target airflows for each operating mode, set control options, setup the loop configuration and parameters, and configure field replacement controls.

NOTE: A communicating thermostat or a Configuration/ Diagnostic tool must be used to perform the configurations described below. There is no other method to configure these settings.

Airflow Selection: The Airflow Selection menu allows the installer to adjust the ECM target airflow for each control operating mode, as well as independently set the heating and cooling blower off delays.

ECM Airflows: Independent airflow selections may be made for each stage of heating operation, each stage of cooling operation with and without dehumidification, as well as constant fan operation. The DXM2.5 control has set minimum and maximum airflow limits for each operating mode, based on the unit configuration that may not be changed.

Non-ECM Configuration: If the DXM2.5 is not configured to control an ECM blower, the airflow selections will not be available on the Airflow Selection menu.

Heating / Cooling Off Delays: The heating and cooling mode blower off delay times may be independently adjusted by the user. Each delay time may be set between 0 and 255 seconds.

Option Selection: The Option Selection menu allows the installer to set selected control options.

LT2 Setpoint: The LT2 setpoint should be set to ANTI-FREEZE ONLY when the unit is configured as a water-to-water unit with antifreeze in the load side loop. For ALL other unit configurations, the LT2 setpoint should be set to WATER.

Motorized Valve: The Motorized Valve option should be set to ON when a motorized water valve with end switch wired to the DXM2.5 Y1 is used with a communicating thermostat. For all other system configurations, the Motorized Valve option should be set to OFF.

Unit Configuration: Selections under the Unit Configuration menu are normally set at the factory as a normal part of the manufacturing and test process. This menu allows the configuration to be modified for special applications, or to configure field replacement controls. The Unit Configuration menu provides the ability to select the Heat Pump Family, Unit Size, Blower Type, and Loop Type. The Heat Pump Family, Unit Size, and Blower Type are needed to properly operate any particular unit configuration, especially those with ECM blowers.

Heat Pump Family: When replacing a control in the field, the Heat Pump Family value must be set for proper blower and loop operation. The valid unit family values are available for the user to scroll through to select the proper value.

Heat Pump Size: When replacing a control in the field, the Heat Pump Size value must be set for proper blower operation. After a Heat Pump Family has been selected, the valid Heat Pump Size values will be available for the user to scroll through to select the proper value.

Blower Type: When replacing a control in the field, the Blower Type value must be set for proper operation. The valid Blower Type values will be available for the user to scroll through to select the appropriate value from No Blower, ECM Blower, or PSC configurations.

Loop Configuration: When replacing a control in the field, the Loop Configuration value must be set for proper operation. The valid Loop Configuration values will be available for the user to scroll through to select the appropriate value from VS PUMP, MOD VALVE, or OTHER.

Loop Configuration: The Loop Configuration menu allows the installer to set the operating parameters for either an internal flow center, or a proportional water valve, depending on the unit configuration.

Heating Delta T: The Heating Delta T option allows the target delta T (EWT – LWT) value selection for operating in the heating mode. The DXM2.5 control has set minimum and maximum delta T limits that may not be changed.

Configuration and Advance Troubleshooting Information

Cooling Delta T: The Cooling Delta T option allows the target delta T (LWT – EWT) value selection for operating in the cooling mode. The DXM2.5 control has set minimum and maximum delta T limits that may not be changed.

SERVICE MODE

The Service Mode provides the installer with several functions for troubleshooting, including Manual Operation, Control Diagnostics, Control Configuration, and Fault History.

Manual Operation: The Manual Operation mode allows the installer to bypass normal thermostat timings and operating modes, to directly activate the thermostat inputs to the DXM2.5, activate the DXM2.5 Test mode, and directly control the ECM blower, internal flow center, and proportional valve.

Control Diagnostics: The Control Diagnostics menus allow the installer to see the current status of all DXM2.5 control switch inputs, values of all temperature sensor inputs, control voltage, ECM blower, internal flow center, and proportional valve operating status and parameters.

DIP switch Configuration: The DIP switch Configuration menu allows the installer to easily see the current DXM2.5 control configuration.

Fault History: In addition to the fault code, the DXM2.5 stores the status of all control inputs and outputs when a fault condition is detected. The fault history covering the last five lockout conditions is stored and may be retrieved from the DXM2.5. After a specific fault in the fault history is selected, the operating mode and time when the fault occurred are displayed, with options to select specific control status values when the lockout occurred.

Fault Temp Conditions: This option displays the DXM2.5 temperature and voltage values when the lockout occurred.

Fault Flow Conditions: This option displays the DXM2.5 ECM blower, pump, and valve operating parameters when the lockout occurred.

Fault I/O Conditions: This option displays the status of the DXM2.5 physical and communicated inputs and the relay outputs when the lockout occurred.

Fault Configuration Conditions: This option displays the status of the DXM2.5 option selections when the lockout occurred.

Fault Possible Causes: This option displays a list of potential causes of the stored fault.

Clear Fault History: The Clear Fault History option allows the fault history stored in the non-volatile memory of the DXM2.5 to be cleared.

DXM2.5 MASTER/SLAVE ADDRESSING

Multiple DXM2.5 controls may be controlled from a single communicating thermostat; up to 3 controls may be controlled from the same thermostat.

When configuring multiple units for control by the same thermostat, before applying power:

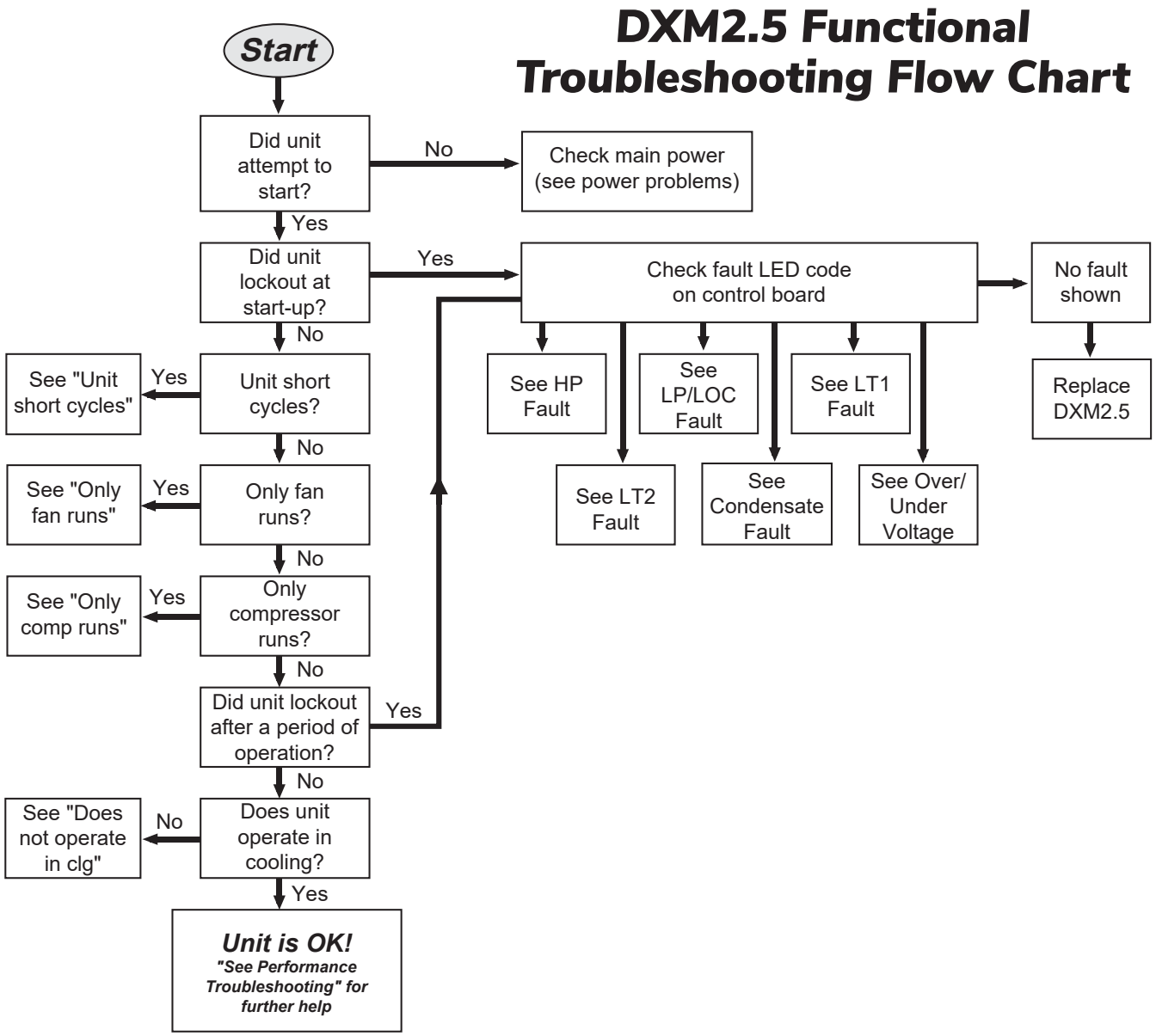
1. Connect the thermostat to each DXM2.5 control normally, using the A+ & B- connections (daisy chain wiring so all DXM2.5 controls share the communication port).
2. Next, insure that DIP switch S3-1 is in the ON position for only the master DXM2.5, and S3-1 in the OFF position for all slave DXM2.5 controls.
3. Apply power to the master unit and one (1) of the un-addressed slave units that is to be controlled by the same thermostat.
4. After applying unit power, press and hold the TEST button on the DXM2.5 control of the slave unit. After several seconds, the Fault and Status LEDs will begin to flash, and the TEST button may be released. When both LEDs are flashing rapidly, the slave has been assigned an address and will be controlled by the same thermostat demand messages as the master DXM2.5 control.
5. Repeat steps 3 and 4 for each additional unit to be added to the system (the master DXM2.5 unit and addressed slaves should remain powered).

NOTE: When using an AWC thermostat (applicable brands only), all system devices' diagnostic and configuration data is available via myUplink PRO portal/mobile app.

When using an ATC thermostat, each slave DXM2.5 control must be configured BEFORE connecting to the master, since only the master DXM2.5 can be accessed from the installer menu. However, the thermostat will allow the user to view diagnostic values and fault history from all addressed controls by selecting the serial number of the unit from the menu.

Functional Troubleshooting Flow Chart

Use the following troubleshooting flow chart to find appropriate troubleshooting strategies on the following pages for the DXM2.5 control and most water source heat pump applications.



Functional Troubleshooting

⚠ CAUTION! ⚠

CAUTION! Do not restart units without inspection and remedy of faulting condition. Equipment damage may occur.

Fault	Htg	Clg	Possible Cause	Solution
Main Power Problems	X	X	Green Status LED Off	Check line voltage circuit breaker and disconnect.
				Check for line voltage between L1 and L2 on the contactor.
				Check for 24 VAC between R and C on DXM2.5.
				Check primary/secondary voltage on transformer.
				Check the fuse continuity (remove from circuit and measure resistance).
HP Fault – Code 2 High Pressure		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting.
				Check water flow adjust to proper flow rate.
		X	Water temperature out of range in cooling	Bring water temp within design parameters.
	X		Reduced or no air flow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Dirty Air Coil - construction dust etc.
				Too high of external static? Check static vs. blower table.
	X		Air temperature out of range in heating	Bring return air temp within design parameters.
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs. typical operating condition table.
	X	X	Bad HP Switch	Check switch continuity and operation. Replace.
	X		Frozen water heat exchanger	Thaw heat exchanger.
	X	X	Bad HPWS Switch	Replace HPWS Switch.
LP/LOC Fault – Code 3 Low Pressure / Loss of Charge	X	X	Insufficient charge	Check for refrigerant leaks.
	X		Compressor pump down at start-up	Check charge and start-up water flow.
LT1 Fault – Code 4 Water Low Temperature	X		Reduced or no water flow in heating	Check pump operation or water valve operation/setting.
				Plugged strainer or filter? Clean or replace.
				Check water flow. Adjust to proper flow rate.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X		Improper low temperature setting (30°F vs. 10°F)	Clip LT1 jumper for antifreeze (10°F) use.
	X		Water temperature out of range	Bring water temp within design parameters.
	X	X	Bad thermistor	Check temp and impedance correlation per chart.
LT2 Fault – Code 5 Low Air Temperature		X	Reduced or no airflow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Air temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
		X	Improper low temperature setting (30°F vs. 10°F)	Normal airside applications will require 30°F only.
	X	X	Bad thermistor	Check temp and impedance correlation per chart.

Table continued on next page.

Functional Troubleshooting

Table continued from previous page.

Fault	Htg	Clg	Possible Cause	Solution
Condensate Fault – Code 6 High Condensate Level	X	X	Blocked drain	Check for blockage and clean drain.
	X	X	Improper trap	Check trap dimensions and location ahead of vent.
		X	Poor drainage	Check for piping slope away from unit.
				Check slope of unit toward outlet.
				Poor venting? Check vent location.
		X	Moisture on sensor	Check for moisture shorting to air coil.
	X	X	Plugged air filter	Replace air filter.
	X	X	Restricted return air flow	Find and eliminate restriction. Increase return duct and/or grille size.
Over/Under Voltage – Code 7 (Auto Resetting)	X	X	Under Voltage	Check power supply and 24 VAC voltage before and during operation.
				Check power supply wire size.
				Check compressor starting. Need hard start kit?
				Check 24 VAC and unit transformer tap for correct power supply voltage.
	X	X	Over Voltage	Check power supply voltage and 24 VAC before and during operation.
				Check 24 VAC and unit transformer tap for correct power supply voltage.
Unit Performance Sentinel – Code 8	X		Heating mode LT2>125°F	Check for poor airflow or overcharged unit.
		X	Cooling Mode LT1>125°F OR LT2< 40ºF	Check for poor water flow or airflow.
Unit Performance Test / Swapped Thermistor – Code 9	X	X	LT1 and LT2 swapped	Reverse position of thermistors.
ECM Fault – Code 10	X	X	Blower does not operate	Check blower line voltage.
				Check blower low voltage wiring.
	X	X	Blower operation with incorrect airflow	Wrong unit size selection.
				Wrong unit family selection.
				Wrong motor size.
				Incorrect blower selection.
Low Air Coil Pressure Fault (Dedicated Dehumidification Mode) – Code 11		X	Reduced or no airflow in cooling or Dedicated Dehumidification Mode	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Air temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
		X	Bad pressure switch	Check switch continuity and operation. Replace.
Low Air Coil Temperature Fault (Dedicated Dehumidification Mode) – Code 12		X	Reduced airflow in cooling, Dedicated Dehumidification Mode, or constant fan	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Air temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
		X	Bad thermistor	Check temp and impedance correlation per chart.

Table continued on next page.

Functional Troubleshooting

Table continued from previous page.

Fault	Htg	Clg	Possible Cause	Solution
IFC Fault – Code 13 Internal Flow Controller Fault	X	X	No pump output signal	Check DC voltage between A02 and GND. Should be between 0.5 and 10 VDC with pump active.
	X	X	Low pump voltage	Check line voltage to the pump.
	X	X	No pump feedback signal	Check DC voltage between T1 and GND. Voltage should be between 3 and 4 VDC with pump OFF and between 0 and 2 VDC with the pump ON.
	X	X	Bad pump RPM sensor	Replace pump if the line voltage and control signals are present at the pump and the pump does not operate.
ESD - ERV Fault (DXM2.5 Only) Green Status LED – Code 3	X	X	ERV unitl has fault (Rooftop units only)	Troubleshoot ERV unit fault.
No Fault Code Shown	X	X	No compressor operation	See "Only Fan Operates".
	X	X	Compressor overload	Check and replace if necessary.
	X	X	Control board	Reset power and check operation.
Unit Short Cycles	X	X	Dirty air filter	Check and clean air filter.
	X	X	Unit in "Test Mode"	Reset power or wait 20 minutes for auto exit.
	X	X	Unit selection	Unit may be oversized for space. Check sizing for actual load of space.
	X	X	Compressor overload	Check and replace if necessary
Only Fan Runs	X	X	Thermostat position	Ensure thermostat set for heating or cooling operation.
	X	X	Unit locked out	Check for lockout codes. Reset power.
	X	X	Compressor overload	Check compressor overload. Replace if necessary.
	X	X	Thermostat wiring	Check thermostat wiring at DXM2.5. Put in Test Mode and jumper Y1 and R to give call for compressor.

Performance Troubleshooting

Symptom	Htg	Clg	Possible Cause	Solution
Insufficient Capacity/ Not Cooling or Heating Properly	X	X	Dirty filter	Replace or clean.
	X		Reduced or no airflow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Reduced or no airflow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs. blower table.
	X	X	Leaky duct work	Check supply and return air temperatures at the unit and at distant duct registers. If significantly different, duct leaks are present.
	X	X	Low refrigerant charge	Check superheat and subcooling per chart.
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
		X	Defective reversing valve	Perform RV touch test.
	X	X	Thermostat improperly located	Check location and for air drafts behind stat.
	X	X	Unit undersized	Recheck loads & sizing. Check sensible cooling load and heat pump capacity.
	X	X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.
	X	X	Inlet water too hot or too cold	Check load, loop sizing, loop backfill, ground moisture.
High Head Pressure	X		Reduced or no airflow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and air flow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting.
				Check water flow. Adjust to proper flow rate.
		X	Inlet water too hot	Check load, loop sizing, loop backfill, ground moisture.
	X		Air temperature out of range in heating	Bring return air temperature within design parameters.
		X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.
	X	X	Unit overcharged	Check superheat and subcooling. Re-weigh in charge.
	X	X	Non-condensables in system	Vacuum system and re-weigh in charge.
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
Low Suction Pressure	X		Reduced water flow in heating	Check pump operation or water valve operation/setting.
				Plugged strainer or filter? Clean or replace.
				Check water flow. Adjust to proper flow rate.
	X		Water temperature out of range	Bring water temperature within design parameters.
		X	Reduced airflow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Air temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
	X	X	Insufficient charge	Check for refrigerant leaks.
Low Discharge Air Temperature in Heating	X		Too high of airflow	Check fan motor speed selection and airflow chart.
	X		Poor performance	See ‘Insufficient Capacity’.
High humidity		X	Too high of airflow	Check fan motor speed selection and airflow chart.
		X	Unit oversized	Recheck loads & sizing. Check sensible cooling load and heat pump capacity.

Table continued on next page.

Performance Troubleshooting

Table continued from previous page.

Symptom	Htg	Clg	Possible Cause	Solution
Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation.
				Check thermostat wiring at or DXM2.5. Put in Test Mode and then jumper Y1 and W1 to R to give call for fan, compressor, and electric heat.
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for line voltage across blower relay contacts.
				Check fan power. Enable relay operation (if present).
	X	X	Fan motor	Check line voltage at motor. Check capacitor.
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24 VAC on RV coil.
				If RV is stuck, run high pressure up by reducing water flow and, while operating, engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	For DXM2.5, check for "O" RV setup, not "B".
		X	Thermostat wiring	Check O wiring at heat pump. DXM2.5 requires call for compressor to get RV coil "Click".
Modulating Valve Troubleshooting	X	X	Improper output setting	Verify the AO-2 jumper is in the 0-10V position.
	X	X	No valve output signal	Check DC voltage between AO2 and GND. Should be O when valve is off and between 3.3V and 10 V when valve is on.
	X	X	No valve operation	Check voltage to the valve.
				Replace valve if voltage and control signals are present at the valve and it does not operate.

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Revision History

Date	Page #	Description
2/22/24	3, 9-12	Updated Accessory Relay 2 DIP switch configurations, Added support for RDS Sensor
1/12/24	20	Updated Alarm Relay output options
10/18/22	All	First Published

97B0142N01

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