DXM2.5 ADVANCED COMMUNICATING CONTROLS

APPLICATION, OPERATION & MAINTENANCE MANUAL

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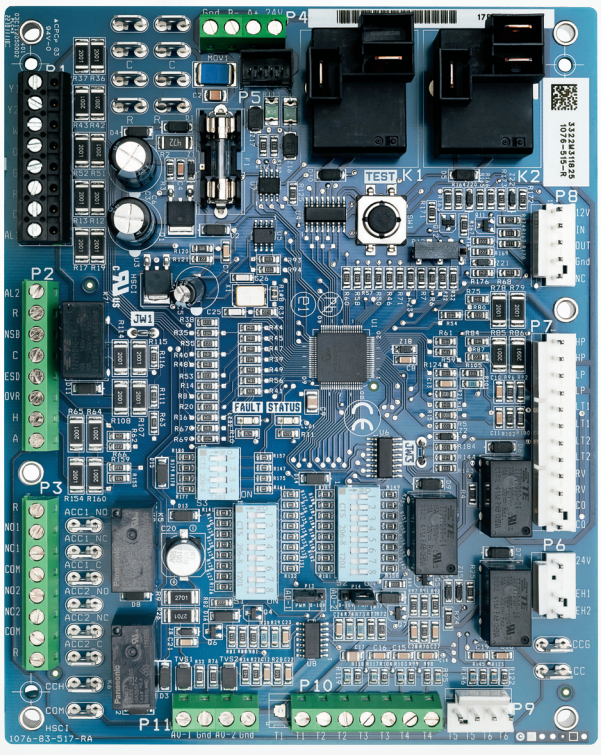
DXM2.5 Digital Heat Pump Controller



Models:
DXM2.5

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GENERAL INFORMATION

The DXM2.5 Advanced Communicating Controls is a robust, microprocessor-based heat-pump controller that is advanced and feature-laden for maximum-application flexibility. The DXM2.5 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 two configurable accessory relay outputs. The DXM2.5 can directly communicate and control a Constant Volume (CV) EC blower, internal variable-speed water pump, and modulating water valves. For on-board diagnostics, there are two LEDs 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 includes 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 DXM2.5 Advanced Communicating Controls:

- Operating Environment: -40°F to 176°F (-40°C to 80°C) and up to 95% relative humidity, non-condensing.
- Storage Environment: -40°F to 185°F (-40°C to 85°C) and up to 95% relative humidity, non-condensing.

POWER REQUIREMENTS

DXM2.5 power draw:

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

RELAY AND CONNECTION CONTACT RATINGS

The following relays are mounted on the DXM2.5:

- Compressor Relay: 40VA at 24VAC
- Compressor Speed Relay: 28VA at 24VAC
- Alarm Relay: 28VA at 24VAC
- Reversing Valve: 28VA at 24VAC
- Accessory Relay 1: 28VA at 24VAC
- Accessory Relay 2: 28VA at 24VAC
- Fan Enable / Loop Pump Relay: 1 HP at 240VAC
- Fan Speed / HWG Pump Relay: 1 HP at 240VAC
- Connection ratings on the DXM2.5:
  - ‘A’ terminal: 20VA at 24VAC. 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

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Overview

ADVANCED CONTROL FEATURES

- Direct control of EC 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
- Client/server thermostat control of up to three units

Legend and Glossary of Abbreviations

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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 EC	Electronic commutated constant torque blower motor
CV EC	Electronic commutated constant volume blower 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
RDS	Refrigerant Detection System
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

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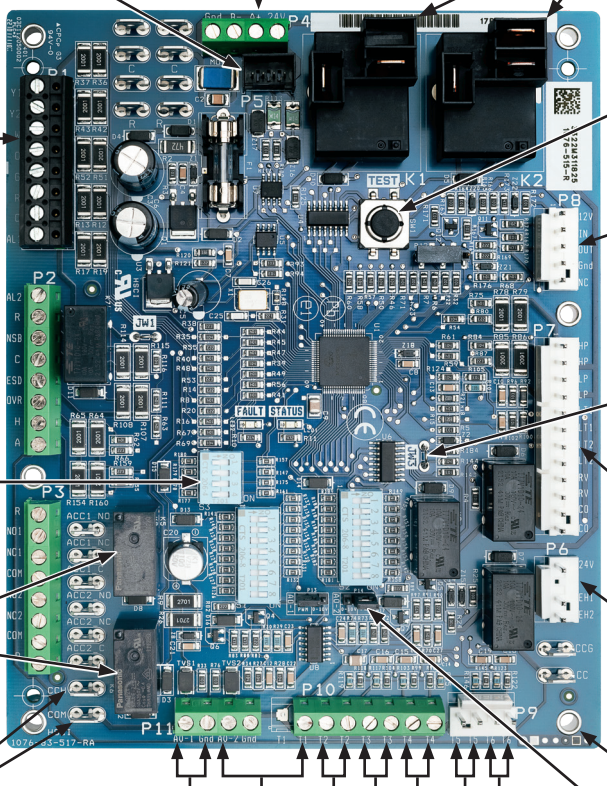
Layout and Connections



Service Tool Connection

Communicating Stat Connection

Relays for PSC Blower, CT EC Blower, Water Pump, Hot Water Pump, and HWG

Test Button to Speed up Time Delays

Conventional Stat Connection

Communicating CV EC Blower Connection

Water Coil Low Temp Limit Setting
JW3-LT1 jumper should be clipped for low temp (antifreeze) operation

Communications and HWG Settings

Factory Low Voltage Molex Connection for Unit Harness

Accessory relays refer to DXM2.5 AOM for configuration

Electric Heat Connection

24V to Compressor Second-stage Solenoid for Y2/Full Load Capacity

Use 4 Mounting Screws – #6
Sheet Metal Screw
1" Long

VFD or PWM CV EC Blower

Configure Modulating Valve or Variable Speed Water Pump

Modulating Valve or Variable Speed Water Pump

Entering Water Temp

Compressor Discharge Temperature

Leaving Water Temp

Entering Hot Water Temperature

Leaving Air Temp

Physical Dimensions and Layout

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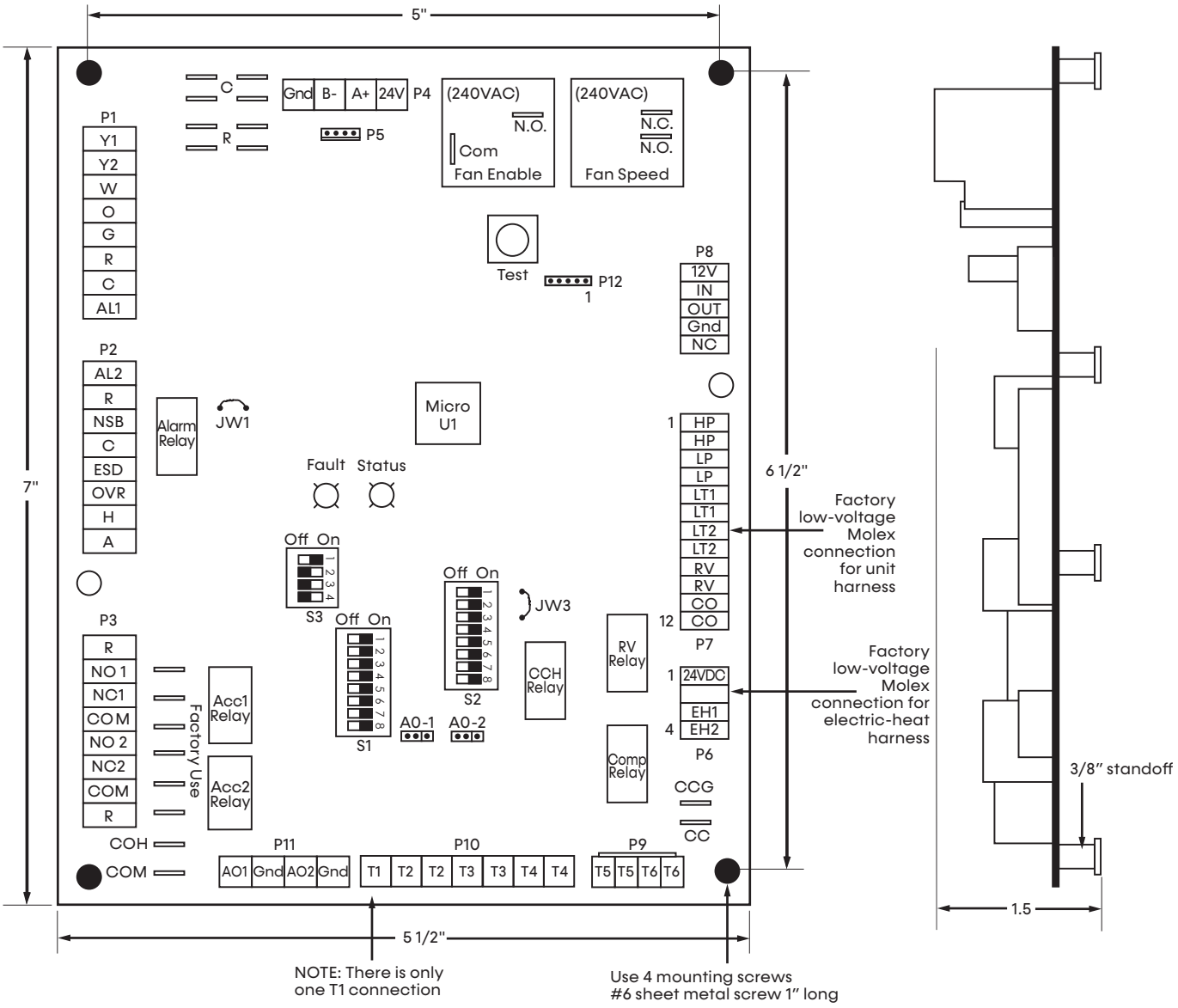

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Field-Selectable Inputs and Switches

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 button, the DXM2.5 enters a 30-minute Test mode period in which all time delays are sped up 15 times. Upon entering test mode, the Status and Fault LED displays change. The Status LED either flashes rapidly to indicate the control is in the Test mode, or displays a numeric flash code representing the current airflow if an EC blower is connected and operating. The Fault LED displays the most recent fault condition in memory. **NOTE: A flash code of 1 indicates there are no faults stored in memory.**

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

To exit Test mode, press the TEST button for 3 seconds. Alternatively, enter or exit Test mode by cycling the G input three times within 60 seconds.

During Test mode, the control monitors to detect if the LT1 and LT2 thermistors are connected and operating properly. If the control is in Test mode, the control locks out 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 slow flashes (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.

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 voids 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 (24VAC) 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 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. Select the Compressor Relay to engage with Stage-1 or Stage-2 call from the thermostat. This is used with dual-stage units (two compressors where two DXM2.5 are used) or with client/server applications. In client/server applications, each compressor and fan stages according to its appropriate DIP 1.2. If set to Stage 2, the compressor has a 3 second on-delay before energizing during a Stage 2 demand. If set for stage 2, the Alarm Relay does NOT cycle during test mode.

Field-Selectable Inputs and Switches

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- On = Stage 1, Off = Stage 2

DIP 1.3 – Thermostat Type (Heat/Cool): Provides the selection of thermostat type. Select either a Heat Pump or a Heat/Cool thermostat. When in Heat/Cool Mode, the Y1 is the input call for Cooling Stage 1, Y2 is the input call for Cooling Stage 2, W1 is the input call for Heating Stage 1, and O/W2 is the input call for Heating Stage 2. In Heat Pump mode, Y1 is the input call for Compressor Stage 1, Y2 is the input call for Compressor Stage 2, W1 is the 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 the selection of thermostat type. Select Heat pump thermostats with O output on with Cooling or B output on with Heating.

- 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 is adjusted for Cooling. In Normal Mode, the fan speed is 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 continuously outputs the last fault code of the controller. If set to **EH2 Normal**, then the EH2 operates 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, the compressor is used for heating while LT1 is above 50°F. Below 50°F the compressor is not used, and the control enters 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 Table 1 and Table 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 is adjusted during Cooling if the H input is active. In High fan mode, the fan operates 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 server or client device depending on the network configuration. In most configurations, the DXM2.5 operates as a server device.

- On = Communicating server device (default)
- Off = communicating client device

DIP 3.2 – HWG Test Mode: Provides forced operation of the HWG pump output, activating the HWG-pump output for up to 5 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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Safety Features

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 7-minute anti-short cycle protection for the compressor.

NOTE: The default anti-short cycle delay at power-up is 7 minutes.

Random Start: The control features a 5-80 second random start upon power up. The random-start delay is 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 disengage and the fan engages.

⚠ 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 four continuous hours, the control automatically turns off the compressor relay and waits the short-cycle protection time. All appropriate safeties are monitored during the off time. If all operation is normal and the compressor demand is still present, the control turns the compressor back on.

Fault Retry: In Fault Retry Mode, the Fault LED slow flashes to signal that the control is trying to recover from a fault input. The DXM2.5 stages off the outputs and then attempts to satisfy the thermostat call for compressor. Once the thermostat input calls are satisfied, the control operates as if no fault occurred. If three consecutive faults occur without satisfying the thermostat call for compressor, then the control enters Lockout mode. The last fault causing the lockout is 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 and there are no retries for LT1 and LT2 faults. The control is factory configured to enter lockout mode after the first LT1 or LT2 fault.

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)

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 – 1st Stage

All other DIP combinations are invalid

Fault Codes

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FAULT CODES

Lockout: In Lockout mode, the Fault LED fast flashes. The compressor relay is turned off immediately. The fan output is turned off after the current blower-off delay unless auxiliary heat is active. To soft reset Lockout mode, remove the call for compressor at the thermostat. Disconnect power to the control to hard reset Lockout mode. The fault code is 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 occurs during Lockout. For Emergency Heat, the fan and auxiliary heat outputs are activated.

Table 3: LED and Alarm Relay Output

DXM2.5 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
EC 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 EC connected or operating	–	Fast Flash	–
Test mode active with EC operating	–	Flashing EC 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
- EC 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

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Fault Codes

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 displays a fault code of 2 for a High Pressure fault.

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 is 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 displays a fault code of 3 for a Loss of Charge fault.

Fault Code 4 – Water Coil Low Temperature Cut-Out Limit (LT1): The control recognizes 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

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 displays a fault code of 4 for a LT1 fault.

Fault Code 5 – Air Coil Low Temperature Cut-Out (LT2): The control recognizes 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 displays a fault code of 5 for a LT2 fault.

Fault Code 6 – Condensate Overflow (CO): The Condensate Overflow sensor must sense overflow levels for 30-continuous seconds to be recognized as a CO fault. Condensate Overflow is monitored continuously during the compressor run cycle. When the Test mode is active, the Fault LED displays 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 18VAC to 31.5VAC. Over/Under Voltage Shutdown is self-resetting in that if the voltage comes back within range of 18.5VAC to 31VAC for at least 0.5 seconds, 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 closes. When the Test mode is active, the Fault LED displays 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 immediately triggers a UPS warning. The status LED remains 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, are not affected by UPS. The UPS condition cannot occur during a compressor off cycle. During a UPS warning, the Alarm Relay cycles on and off. The cycle rate is On for 5 seconds, Off for 25 seconds, On for 5 seconds, Off for 25 seconds, etc. When Test mode is active, the Fault LED displays a fault code of 8 for an UPS condition.

Fault Code 9 – Unit Performance Test-UPT/Swapped LT1 and 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 locks out, with Code 9, after 60 seconds if:

Fault Codes

Models: DXM2.5

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 displays a fault code of 9 for a Swapped Thermistor fault.

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

a. An EC blower fault is detected and the control locks out after 15 seconds of blower operation when the blower-feedback signal reads less than 100 RPM.

b. An EC blower fault is detected when the EC configuration is incorrect or incomplete. For this fault condition, the control continues to operate using default operating parameters.

When the Test mode is active, the Fault LED displays a fault code of 10 for an EC 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 Test mode is activated, the Fault LED displays a fault code of 11 for a Low Air Coil Pressure fault.

NOTE: Low Air Coil Pressure fault prevents the unit from operating in Cooling or Reheat modes, but heating operation operates normally.

Fault Code 12 – Low Air Temperature (Dedicated Dehumidification Mode Units Only): The control recognizes 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 Test mode is activated, the Fault LED displays a fault code of 12 for a Low Air Temperature fault.

NOTE: Low Air Temperature fault prevents the unit from operating in the cooling, reheat, or constant fan modes, but heating operation operates 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 result in an internal-flow center fault. When Test mode is active, the Fault LED displays 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 detects a refrigeration leak. In Refrigerant-Leak-Detection Mitigation mode, the Fault LED begins fast flashing. All outputs are turned off immediately and the fan output is 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 resumes normal operation 5 minutes after the RDS stops sensing a refrigeration leak. The fault code is stored in nonvolatile memory that is displayed by the Fault LED. When Test mode is active, the Fault LED displays a fault code of 15 for a RDS sensor fault. For additional information on RDS fault codes, see Table 4. For additional information on RDS Fault Codes, see Table 4 on page 14.

Emergency Shutdown – ESD: Enable ESD mode from an external common signal to terminal ESD. For WSHP rooftop products, ESD Mode is utilized when the ERV (Energy Recovery Ventilator) option is applied to a ST series rooftop unit to indicate an ERV fault. A contact closure at the ERV unit connects common to the ESD terminal, which shuts down the rooftop/ERV units. The green Status LED flashes code 3 when the unit is in ESD Mode. (See Thermostat Inputs section for details.)

Diagnostic Features: The green Status LED and red Fault LED on the DXM2.5 advise service personnel of the current status of the DXM2.5. The LEDs indicate the current operating status of the DXM2.5 and the LAST fault in memory. If there is no fault in memory and the fault display is selected, the Fault LED flashes Code 1. See Table 2 for a complete listing of codes.

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Refrigerant Detection System Fault Codes

The Refrigerant Detection System (RDS) monitors the status of the refrigerant sensor(s) in the unit. If refrigerant is detected above the maximum threshold, the control enables the unit blower, disables the compressor(s), and enables the pilot relay on the RDS control board.

If a fault event occurs, the following table provides guidance to diagnose the issue:

Table 4: RDS Fault Codes

Fault Code	Fault LED	Fault	Possible Causes
160	Flashing Code 2	Loss of RDS Control Communication	• Control wiring issue between the unit's control and the RDS • RDS board failure
161	Flashing Code 3	RDS Control Test Fault	The RDS control in Test mode
162	Flashing Code 4	Loss of RDS Sensor Communications	• Control wiring issue between the RDS and the sensor • RDS sensor failure - replace RDS sensor
163	Flashing Code 5	RDS Sensor Fault	RDS sensor failure - replace RDS sensor
164	Flashing Code 6	RDS Sensor Over Threshold	Leak in refrigerant system
170	N/A	Loss of 2nd Control Communications	• Control wiring issue between controls • 2nd control failure • Main control failure
171	N/A	Loss of 3rd Control Communications	• Control wiring issue between controls • 2rd control not properly addressed • 3rd control failure • Main DXM2.5 failure
172	N/A	Loss of AXM Control Communications	• Control wiring issue between controls • AXM control failure • DXM2.5 failure

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UNIT OPERATION DESCRIPTIONS

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

NOTE: The default anti-short cycle delay at power-up is 7 minutes.

Standby/Fan Only: In Standby Mode, the compressor is 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) are activated for low-speed operation, or constant-fan airflow. If there is demand for constant high-speed fan, the appropriate fan output(s) are activated for high-speed operation, or high-speed constant-fan airflow.

NOTE: DIP 1.5 (Dehum Fan Mode Select) has no effect on constant fan operation.

The RV relay does not directly track the input demands for RV. The DXM2.5 uses smart RV control. This ensures that the RV switches positions only if the thermostat calls 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 (DIP 1.2 = off), then the compressor and fan do not turn on until there is Stage 2 demand. The Compressor relay is turned off immediately when Heating Stage 1 demand is removed. The selected Fan output(s) turn off after the selected heating blower-off delay, then the control reverts to Standby mode. If there is a client/server or a dual compressor configuration, all compressor relays and related functions track with their associated DIP 1.2.

Heating Stage 2: In Heating Stage 2 mode, the selected fan output(s) and compressor relays remain enabled. The Compressor Speed relay is turned on, and multi–stage fan configurations immediately switch to the appropriate operating speed for Heating Stage 2. The Compressor Speed relay is turned off immediately when the Heating Stage 2 demand is removed, and multi-speed fan configurations immediately switch to the appropriate operating speed for Heating Stage 1, and the control reverts to Heating Stage 1 mode. If there is a client/server or a dual compressor configuration, all compressor relays and related functions track with their associated DIP 1.2.

Heating Stage 3: In Heating Stage 3 mode, the selected fan output, Compressor, and Compressor Speed relays remain on. The EH1 output turns on immediately, and if the control is operating an EC blower, the airflow changes to the appropriate Heating Stage 3 airflow. With continuing Heating Stage 3 demand, EH2 turns 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 is off (or turns 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 has a 30-second recognition time.

Emergency Heat: In Emergency Heat mode, the selected fan output is activated and EH1 is turned on immediately. With continuing Emergency Heat demand, EH2 turns on after 5 minutes. EH1 and EH2 are turned off immediately when the Emergency Heat demand is removed. The selected fan output turns 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 (DIP 1.2 = off), the compressor and fan does 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) turn off after the selected cooling blower-off delay, and the control then reverts to Standby mode. The RV relay remains on until there is a Heating demand. If there is a client/server or a dual compressor configuration, all compressor relays and related functions track with their associated DIP 1.2.

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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. If there is a client/server or a dual-compressor configuration, all compressor relays and related functions track with their associated DIP1.2.

Night Low Limit (NLL) Staged Heating: In NLL Staged Heating Mode, the OVR input activates 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 immediately enters Heating Stage 1 Mode with an additional 30 minutes of NLL demand, the control enters Heating Stage 2 Mode. With an additional 30 minutes of NLL demand, the control enters 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 becomes a loop-pump relay and the K2 relay becomes 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 deactivated when the blower-speed relay is switched. For low-speed blower operation (Constant Fan, Heating 1, Cooling 1, Cooling 2 with Dehumidification), K1 is active and K2 is inactive. For high-speed blower operation (High Speed Constant Fan, Heating 2, Heating 3, Emergency Heat, Cooling 2), K1 and K2 are active.

c. **Constant Volume (CV) EC Communicating Blower:** If the DXM2.5 is configured for a CV EC blower, or a CV EC blower is detected, the DXM2.5 directly controls a CV EC blower through communiations using selected or default airflows for each operating mode. When operating a CV EC 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 operates as the blower relay, and the K2 relay becomes a HWG-pump relay.

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

f. **Constant Volume (CV) EC (PWM) Blower:** If the DXM2.5 is configured for a CV EC (PWM) blower, the DXM2.5 directly controls a CV EC (PWM) blower through PWM output signal using selected or default airflows for each operating mode. When operating a CV EC (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 is configured for VFD blower, the DXM2.5 directly controls 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 is set to **0VDC**. If configured for fixed-speed blower control, there are maximum and minimum operating speeds for each operating mode unique to each unit size.

Table 5: Thermostat Inputs with Resulting Demands

Thermostat Operating Modes												
Mode	Input[3]						Output					
	O	G	Y1	Y2[4]	W	H / DH	RV	Fan	Stage 1 H/C	Stage 2 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 and 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 and 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. The 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.

EC Blower Operation: When the DXM2.5 is configured to operate an EC blower, or an EC blower is connected to the DXM2.5, the EC blower is 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 and during a heating or cooling demand, the EC blower ramps up to the selected target airflow for the current operating mode. For the first 30 seconds of blower operation, the target airflow is 50% of the normal target airflow. For the next 90 seconds of blower operation, the target airflow is 75% of the normal target airflow. For Constant Fan, Emergency Heat, and Test-mode operation, the Soft-Start Ramping profile is bypassed, and the EC immediately ramps up to the normal target airflow.

c. **Blower-Off Delays:** For EC blower-off delays, the target airflow is 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 EC blower connected, the EC blower does not operate; an EC configuration warning is recognized while the unit is in standby, but an airflow fault is recognized if blower demand is present. Once the heat-pump family, unit size, and blower type are selected, the EC blower operates based on the airflow parameters for the current configuration for a compatible EC blower of any power level.

Hot Water Generator Operation: When the DXM2.5 is configured to operate a hot-water generator pump, the pump is 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)

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Internal Flow Center [IFC] Operation: When the DXM2.5 is configured to operate the variable-speed pump in the internal-flow controller, the pump is 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 is 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 is energized 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

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SPECIAL DXM2.5 APPLICATION NOTES AND 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 is on any time the Fan Enable relay or EC Blower is on.

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

Digital Night Setback: If an Accessory relay is configured for Digital NSB, the Accessory relay is 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 enters NLL Staged Heating Mode. NLL Staged Heating Mode then provides heating during the NSB period.

Water Valve/Slow Opening: If an accessory relay is configured for Water Valve/Slow Opening, the accessory relay is 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 normally turns on any time the Fan Enable relay is on. Following a return from NSB (NSB input no longer connected to Ground C) to Normal mode, the accessory relay does not turn on for 30 minutes even if the Fan Enable relay is on. After this 30-minute timer expires, the accessory relay turns on if the Fan Enable relay is on.

Humidifier: If accessory relay 2 is configured for a humidifier, the accessory relay is on any time the H input is active.

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

If accessory relay 1 is configured as a single-stage hydronic economizer, when first-stage cooling demand is present and the H input is active, the accessory relay is activated instead of the compressor output. All other heat-pump operating modes operate normally, and the accessory relay is disabled 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 and 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 Heating mode the reversing valve is de-energized. Almost any thermostat can activate the heat pump in heating or cooling modes. Reheat mode requires either a separate humidistat/dehumidistat or a thermostat with an integrated dehumidification function for activation. The DXM2.5 may be configured to work with either a humidistat or dehumidistat input to terminal "H" (DIP switch settings for the DXM2.5 are shown in table 2), or the manufacturer's communicating thermostat. Upon receiving the appropriate "H" input or communicated signal, the DXM2.5 activates the Cooling Mode and engages 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.

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Special DXM2.5 Application Notes

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

Y1: Y1 is the input for compressor stage 1 if DIP 1.3 = on. Y1 is the input for Cooling Stage 1 if DIP 1.3 = off.

Y2: Y2 is the input for compressor stage 2 if DIP 1.3 = on. Y2 is the input for Cooling Stage 2 if DIP 1.3 = off.

W: If Y1 and Y2 are active and DIP 1.3 = on, then W is the input for Heating Stage 3. If Y1 and Y2 are not active and DIP 1.3 = on, then W is the input for Emergency Heat. If DIP 1.3 = off, then W is the input for Heating Stage 1.

O: O is the input for Reversing Valve Relay if DIP 1.3 = on and DIP 1.4 = on. O is the input for Heating Stage 2 if DIP 1.3 = off. O is the input for "Heat Mode" if DIP 1.3 = on and DIP 1.4 = off; this means that the thermostat outputs a "B" call when in Heating Mode and does NOT have an "O" output. The DXM2.5 employs "Smart RV" control. This ensures that the RV only switches positions if the thermostat calls for a Heating or 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 24VAC, 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 is a random start timer when coming back from NSB Mode.

NOTE: The maximum number of DXM2.5 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 to 24VAC (minimum 1 second), then the OVR input is recognized as a Night Setback Override signal and the DXM2.5 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 24VAC, 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 is a random start timer when coming back from ESD.

H: The H input function is determined by the setting of DIP 2.7, 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 DIP 2.7 = on then the H input is defined as Automatic Dehumidification Mode and is used as an automatic counterpart to DIP 1.5, meaning if H is connected to 24VAC then the selected fan outputs operate using dehumidification speeds and airflow settings for cooling. If H is not connected to 24VAC, then the selected fan outputs operate using normal speeds and airflow settings for cooling.

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Models: DXM2.5

If DIP 2.7 = 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 connected to 24VAC, then the selected fan outputs 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.

Table 6: 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 7: System Inputs with the Resulting Demand

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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Other Outputs

Electric Heat: Outputs EH1 and EH2 turn on whenever the DXM2.5 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. See Table 3: LED and Alarm Relay Output.

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 flashes Code 1. If the Fault type is "Primary" (HP, LP, LT1, LT2, or CO) then the Fault type is always retained in memory (Primary faults overwrite Secondary faults). If the Fault type is "Secondary" (Over/Under Voltage, UPS or Swapped LT1/LT2) then the Fault type is only retained if there are no "Primary" faults in memory. The Secondary Fault types does not overwrite the Primary fault memory. See Table 3: LED and Alarm Relay Output.

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 faults upon sensing impedance less than 100,000 Ohms for 30 continuous seconds. The recommended design uses a single wire terminated with a male ¼-inch quick connect located in the drain pan at desired trip level.

Upon a high condensate level, the water shorts 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 7. Table 8 shows the nominal resistance at any given temperature and can be used for field service reference. The sensor uses 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

Nominal Resistance per Temperature

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Table 9: Nominal Resistant per Temperature

Temp (°C)	Temp (°F)	Resistance (kOhm)	Temp (°C)	Temp (°F)	Resistance (kOhm)	Temp (°C)	Temp (°F)	Resistance (kOhm)	Temp (°C)	Temp (°F)	Resistance (kOhm)
-17.8	0.0	85.34	20.0	68.0	12.49	55.0	131.0	2.99	90.0	194.0	0.92
-17.5	0.5	84.00	21.0	69.8	11.94	56.0	132.8	2.88	91.0	195.8	0.89
-16.9	1.5	81.38	22.0	71.6	11.42	57.0	134.6	2.77	92.0	197.6	0.86
-12.0	10.4	61.70	23.0	73.4	10.92	58.0	136.4	2.67	93.0	199.4	0.84
-11.0	12.2	58.40	24.0	75.2	10.45	59.0	138.2	2.58	94.0	201.2	0.81
-10.0	14.0	55.30	25.0	77.0	10.00	60.0	140.0	2.49	95.0	203.0	0.79
-9.0	15.8	52.38	26.0	78.8	9.57	61.0	141.8	2.40	96.0	204.8	0.76
-8.0	17.6	49.64	27.0	80.6	9.16	62.0	143.6	2.32	97.0	206.6	0.74
-7.0	19.4	47.05	28.0	82.4	8.78	63.0	145.4	2.23	98.0	208.4	0.72
-6.0	21.2	44.61	29.0	84.2	8.41	64.0	147.2	2.16	99.0	210.2	0.70
-5.0	23.0	42.32	30.0	86.0	8.06	65.0	149.0	2.08	100.0	212.0	0.68
-4.0	24.8	40.15	31.0	87.8	7.72	66.0	150.8	2.01	101.0	213.8	0.66
-3.0	26.6	38.11	32.0	89.6	7.40	67.0	152.6	1.94	102.0	215.6	0.64
-2.0	28.4	36.18	33.0	91.4	7.10	68.0	154.4	1.88	103.0	217.4	0.62
-1.0	30.2	34.37	34.0	93.2	6.81	69.0	156.2	1.81	104.0	219.2	0.60
0.0	32.0	32.65	35.0	95.0	6.53	70.0	158.0	1.75	105.0	221.0	0.59
1.0	33.8	31.03	36.0	96.8	6.27	71.0	159.8	1.69	106.0	222.8	0.57
2.0	35.6	29.50	37.0	98.6	6.01	72.0	161.6	1.64	107.0	224.6	0.55
3.0	37.4	28.05	38.0	100.4	5.77	73.0	163.4	1.58	108.0	226.4	0.54
4.0	39.2	26.69	39.0	102.2	5.54	74.0	165.2	1.53	109.0	228.2	0.52
5.0	41.0	25.39	40.0	104.0	5.33	75.0	167.0	1.48	110.0	230.0	0.51
6.0	42.8	24.17	41.0	105.8	5.12	76.0	168.8	1.43	111.0	231.8	0.50
7.0	44.6	23.02	42.0	107.6	4.92	77.0	170.6	1.39	112.0	233.6	0.48
8.0	46.4	21.92	43.0	109.4	4.72	78.0	172.4	1.34	113.0	235.4	0.47
9.0	48.2	20.88	44.0	111.2	4.54	79.0	174.2	1.30	114.0	237.2	0.46
10.0	50.0	19.90	45.0	113.0	4.37	80.0	176.0	1.26	115.0	239.0	0.44
11.0	51.8	18.97	46.0	114.8	4.20	81.0	177.8	1.22	116.0	240.8	0.43
12.0	53.6	18.09	47.0	116.6	4.04	82.0	179.6	1.18	117.0	242.6	0.42
13.0	55.4	17.26	48.0	118.4	3.89	83.0	181.4	1.14	118.0	244.4	0.41
14.0	57.2	16.46	49.0	120.2	3.74	84.0	183.2	1.10	119.0	246.2	0.40
15.0	59.0	15.71	50.0	122.0	3.60	85.0	185.0	1.07	120.0	248.0	0.39
16.0	60.8	15.00	51.0	123.8	3.47	86.0	186.8	1.04	121.0	249.8	0.38
17.0	62.6	14.32	52.0	125.6	3.34	87.0	188.6	1.01	122.0	251.6	0.37
18.0	64.4	13.68	53.0	127.4	3.22	88.0	190.4	0.97	123.0	253.4	0.36
19.0	66.2	13.07	54.0	129.2	3.10	89.0	192.2	0.94			

Models:
DXM2.5

Basic Troubleshooting Information/Service and Application Notes

General Troubleshooting: Basic DXM2.5 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.

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

Test Mode: Test mode can be entered for 30 minutes by pressing the Test button. For diagnostic ease at a conventional thermostat, the Alarm Relay cycles during test mode. The Alarm Relay cycles 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 is listed under UL 873, and is CE listed under IEC 60730.

Configuration and Advance Troubleshooting Information

Models: DXM2.5

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 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 or 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 has set minimum and maximum airflow limits for each operating mode, based on the unit configuration that may not be changed.

Non-EC Configuration: If the DXM2.5 is not configured to control an ECM blower, the airflow selections are not 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 are 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 are 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 are available for the user to scroll through to select the appropriate value from **VS PUMP**, **MOD VALVE**, or **OTHER**.

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Configuration and Advance Troubleshooting Information

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 has set minimum and maximum delta T limits that may not be changed.

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 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 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 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 CLIENT/SERVER ADDRESSING

Multiple DXM2.5 may be controlled from a single communicating thermostat; up to three 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 normally, using the A+ and B- connections (daisy chain wiring so all DXM2.5 share the communication port).
2. Next, insure that DIP switch S3-1 is in the ON position for only the server DXM2.5, and S3-1 in the OFF position for all client DXM2.5s.
3. Apply power to the server unit and one (1) of the un-addressed client 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 of the client unit. After several seconds, the Fault and Status LEDs begin to flash, and the TEST button may be released. When both LEDs are flashing rapidly, the client has been assigned an address and is controlled by the same thermostat demand messages as the server DXM2.5.

Configuration and Advance Troubleshooting Information

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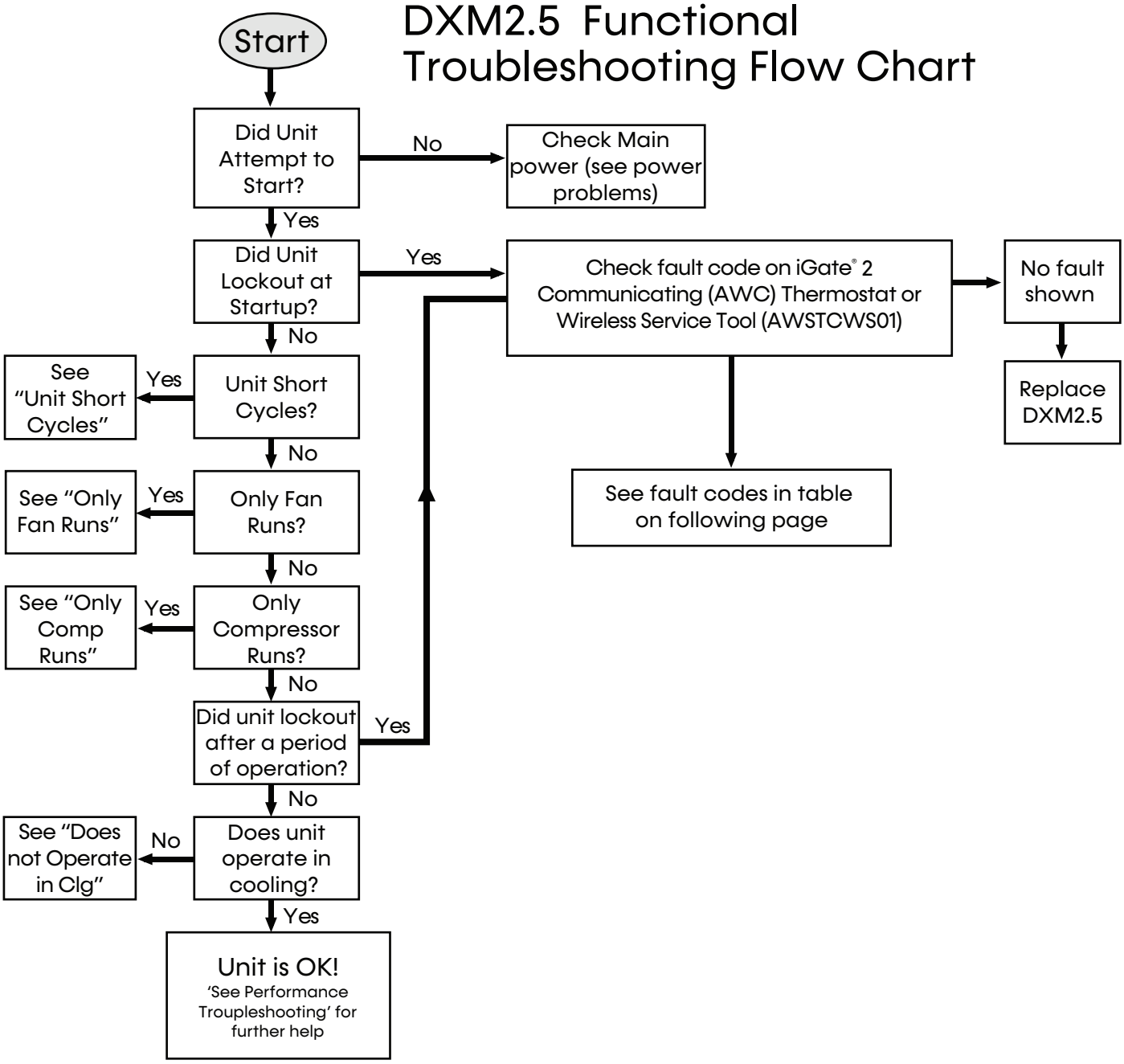
5. Repeat steps 3 and 4 for each additional unit to be added to the system (the server DXM2.5 unit and addressed clients should remain powered).

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

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

DXM2.5 Functional Troubleshooting Flow Chart



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Functional Troubleshooting

⚠ 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 24VAC between R and C on DXM2.5.
				Check primary/secondary voltage on transformer.
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 airflow 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.
LP/LOC Fault Code 3 Low Pressure / Loss of Charge	X	X	Insufficient charge	Check for refrigerant leaks.
	X		Compressor pump down at startup	Check charge and startup water flow.
LT1 Fault Code 4 Water coil low-temperature limit	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 temperature limit setting (30°F vs 10°F [-1°C vs -2°C])	Clip JW3 jumper for antifreeze (10°F [-12°C]) 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 Air coil low-temperature limit		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 temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Normal airside applications will require 30°F [-1°C] only.
	X	X	Bad thermistor	Check temp and impedance correlation per chart.
Condensate Fault Code 6	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 Airflow	Find and eliminate restriction. Increase return duct and/or grille size.

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Fault	Htg	Clg	Possible Cause	Solution
Over/Under Voltage Code 7 (Auto resetting)	X	X	Under Voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size.
				Check compressor starting. Need hard start kit?
				Check 24VAC and unit transformer. Tap for correct power supply voltage.
	X	X	Over Voltage	Check power supply voltage and 24VAC before and during operation.
				Check 24VAC and unit transformer. Tap for correct power supply voltage.
Unit Performance Sentinel Code 8	X		Heating mode LT2>125°F [52°C]	Check for poor airflow or overcharged unit.
		X	Cooling Mode LT1>125°F [52°C] OR LT2< 40°F [4°C])	Check for poor water flow or airflow.
Swapped Thermistor Code 9	X	X	LT1 and LT2 swapped	Reverse position of thermistors
Low Water Flow Code 13	X	X	Reduced or no water flow	Check pump or valve operation setting.
				Check water flow and adjust to proper flow rate.
				Clogged Y strainer, replace mesh.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X	X	Bad flow switch	Confirm applied flow to looks vs minimum flow siwtch setpoint on label.
Leaving Water Temperature Low Code 14	X		Reduced or no water flow in heating	Check pump or valve operation setting.
				Check water flow and adjust to proper flow rate.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X		Improper temperature limit setting (30°F vs 15°F [-1°C vs -9°C]	Clip JW3 jumper for antifreeze (15°F [-9°C]) use.
	X		Water temperature out of range	Bring water temperature within design parameters.
	X	X	Bad thermistor	Check temperature impedence correlation per chart.
Refrigerant and RDS Code 15	X	X	Refrigerant Leak	Check refrigerant charge. If the charge is low, identify and repair the leak.
			Faulty RDS sensor	Check refrigerant charge. If the charge is not low, replace the RDS sensor.
No Fault Code Shown	X	X	No compressor operation	See "Only Fan Runs".
	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 30 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 heat pump. Jumper Y and R for compressor operation in test mode.

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Fault	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.
	X	X		Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for line voltage across BR contacts.
	X	X		Check fan power enable relay operation (if present).
	X	X	Fan motor	Check for line voltage at motor. Check capacitor.
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24VAC on RV coil and at DXM2.5.
		X		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	Check for 'O' RV setup not 'B'.
		X	Thermostat wiring	Check O wiring at heat pump. Jumper O and R for RV coil 'click'.
		X		Put thermostat in cooling mode. Check 24VAC on O (check between C and O); check for 24VAC on W (check between W and C). There should be voltage on O, but not on W. If voltage is present on W, thermostat may be bad or wired incorrectly.

Performance Troubleshooting

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Symptom	Htg	Clg	Possible Cause	Solution
Insufficient capacity/ Not cooling or heating	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 and 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 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 airflow 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 temperature 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'

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Performance Troubleshooting

Symptom	Htg	Clg	Possible Cause	Solution
High humidity		X	Too high of airflow	Check fan motor speed selection and airflow chart.
		X	Unit oversized	Recheck loads and sizing. Check sensible cooling load and heat pump capacity.
Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation.
	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 for line voltage at motor. Check capacitor.
	X	X	Thermostat wiring	Check thermostat wiring at DXM2.5. Put in Test Mode and then jumper Y1 and W1 to R to give call for fan, compressor and electric heat.
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24VAC 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	Check for "O' RV setup, not "B".
		X	Thermostat wiring	Check O wiring at heat pump. DXM2.5 requires call for compressor. You should hear a "click" sound from the reversing valve.
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 10V 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	Section	Description
08/05/25	Safety Features	Updated Accessory Relay 1 and 2 Configuration tables
	Special DXM2.5 Application Notes	Updated accessory relay content for hydronic economizers
02/05/25	Refrigerant Detection System Fault Codes	Added RDS LED flash codes
01/06/25	All	Updated verbiage for client/server configurations throughout
12/16/24	Refrigerant Detection System Fault Codes	Added content concerning RDS fault codes
12/11/24	Layout and Connections	Corrected verbiage
09/12/24	Safety Features	Updated anti-short cycle period from 5 minutes to 7 minutes
7/24/24	Basic Troubleshooting Information/ Service and Application Notes	Updated Test mode duration from 20 to 30 minutes
06/19/24	All	Updated document design
2/22/24	Overview, Safety Features	Updated Accessory Relay 2 DIP switch configurations, Added support for RDS Sensor
1/12/24	Other Outputs	Updated Alarm Relay output options
10/18/22	All	First Published

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