TDPR-01 CONTROLLER FOR CHILLED WATER SUPPLY TEMPERATURE RESET Vs DEW POINT TEMPERATURE OF AMBIENT AIR

1 CONTENTS

2 INTRODUCTION

In hydronic radiant cooling applications, whether through Infloor loops or radiant wall/ceiling panels, maintaining cooled surface temperature above dew point temperature of ambient air, is primordial for preventing condensation of water vapor contained in the ambient air. Condensation can cause physical damages to the cooled surface as well as posing a safety risk for cooled floors with human traffic.

TDPR-01 Controller measures both cooled surfaces temperatures (*via multiple temperature sensors*) as well as the dew point temperature of the ambient air and reset the supply temperature of the chilled water to maintain 5 degrees Fahrenheit (*2.78 degrees Celsius*) safety margin between cooled surface and ambient air dew point temperatures. TDPR-01 allows for measuring three different temperatures for three different surface having each a unique thermal resistance.

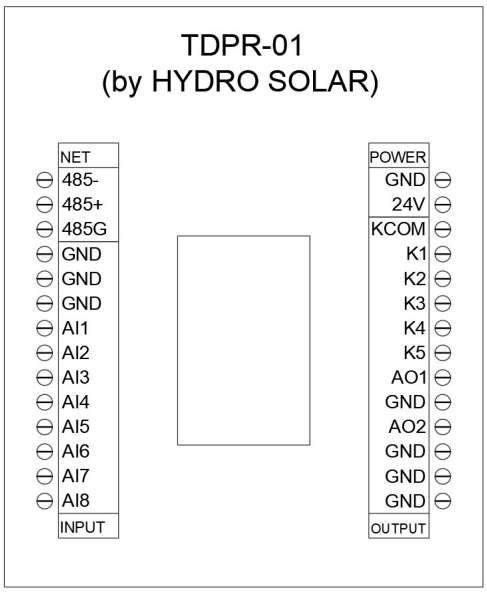
3 SPECIFICATIONS

TDPR-01 BACnet/Modbus programmable dew point temperature reset controller. There are five relays and two analog outputs as well as 8 universal inputs. These inputs and outputs are configured for measuring cooled floor/panel temperature as well as the dew point temperature of room ambient air. Supports BACnet MSTP and Modbus RTU for the RS485.

CHT:
Chilled Water
Supply Temperature
Set point

DPT:
Dew Point Temperature
of Ambient Air

DPR:
Dew Point Temperature
Reset On/OFF



3.1 APPROVALS

- Relay UL File No.: E169380
- Plastic Enclosure: PA66 UL 94 V0 file E56070
- PCB: FR-4 Epoxy Glass Cloth UL E479892
- Terminal Block: PA66 UL 94V-0

3.2 MODEL NUMBERS

- TDPR-01-06: Dew point temperature reset controller for Panels with radiant cooling hydronic pipes spaced at 6 inches (150mm) center to center.
- TDPR-01-09: Dew point temperature reset controller for Panels with radiant cooling hydronic pipes spaced at 9 inches (225mm) center to center.

- TDPR-01-12: Dew point temperature reset controller for Panels with radiant cooling hydronic pipes spaced at 12 inches (300mm) center to center.

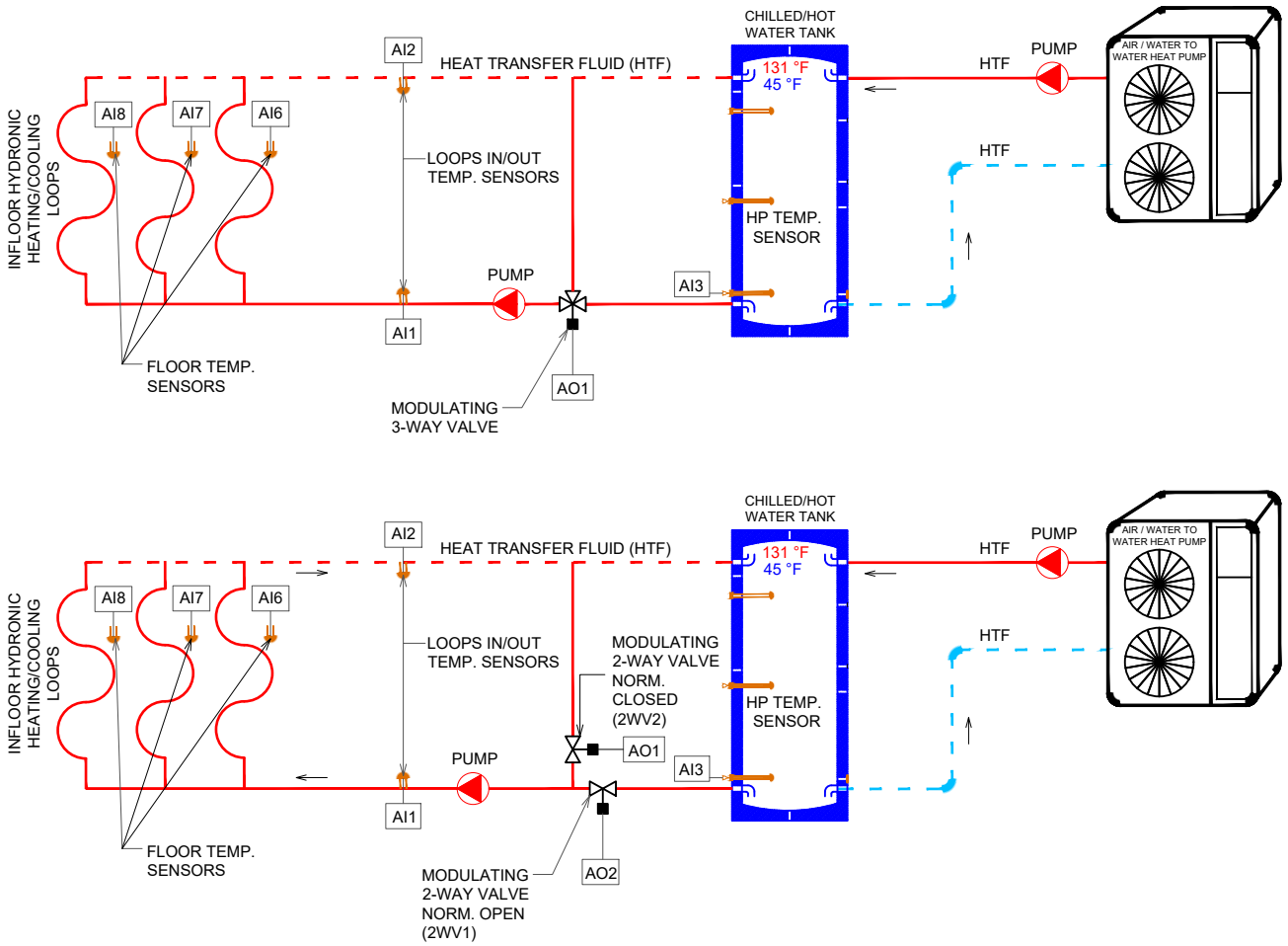
3.3 PROPERTIES

Outputs	5 relay outputs, 2 analog outputs 10V@100mA
8 Universal Inputs	10k therm, contacts, 4-20ma, 0-5V, 0-10V
Operating range	-30~70°C(-22~158°F) / 0 to 99% RH
Supply voltage	12~24VAC/DC ±20%, 50-60Hz
Power consumption	100mA at 12VDC
Relay contacts	5 relays, 2A @ 24VAC, UL File No.: E169380
Plastic Housing	Flammability rating UL 94 file E56070
Enclosure rating	IP31
Protocols	BACnet MSTP and Modbus RTU
Baud rate	9600, 19200, 38400, 57600, 115200
Temperature sensor	10K thermistor ±0.5°C

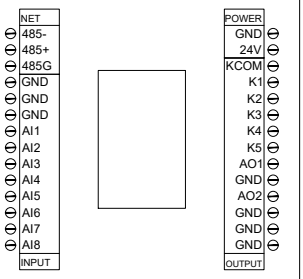
4 SEQUENCE OF CONTROL

1. Dew Point temperature reset is turned OFF when DPR value is switched to OFF by operator.
    a. Modulating 2 Way Valve 2WV1 is opened and 2WV2 is closed.
2. Dew Point temperature reset is operational when DPR value is selected ON by operator.
    a. Cooled Floor or Panel Temperature is measured by temperature sensors connected to AI6, 7 or 8. For hydronic radiant Infloor cooling, this controller allows for measuring three types of flooring finishes with three temperature sensors: bare concrete floor (*Thermal Resistance R value = 0*), Ceramic Floor (*R value = 0.4(IP)*) and hardwood floor (*R value = 1 (IP)*).
    b. Controller calculates radiant surface temperature based on floor thermal resistance and maintain the coldest surface at 5°F (2.78°C) above the dew point temperature of ambient air.
    c. Controller measures the supply and return temperature of the chilled water (or chilled fluid) and modulates the opening and closing of either the 3-way valve by-pass or modulating 2-way valves (2WV1 and 2WV2) to maintain cooled surface temperature at 5°F (2.78°C) above the ambient air's dew point temperature.
    d. Option: Controller can measure the temperature of the thermal storage tank. When temperature in the tank is above 20°C (68°F), dew point temperature reset is automatically turned OFF by the controller. Both 3 Way Valves bypass or 2-way valves (2WV1 and 2WV2) return to the normally opened and normally closed position.
3. This controller is not a zone dry bulb temperature controller. It neither manages the operation of the circulation pump, nor it controls the opening or closing of zones valves.

5 SCHEMATICS AND CONTROL WIRING DIAGRAM



TDPR-01
(by HYDRO SOLAR)



ID	TYPE	SENSOR / SIGNAL TYPE	DESCRIPTION
AI1	ANALOG INPUT	NTC 10KΩ - TYPE 2	CHILLED WATER SUPPLY TEMPERATURE °C
AI2	ANALOG INPUT	NTC 10KΩ - TYPE 2	CHILLED WATER RETURN TEMPERATURE °C
AI3	ANALOG INPUT	NTC 10KΩ - TYPE 2	OPTIONAL TANK TEMPERATURE °C
AI4	ANALOG INPUT	SPARE	NOT USED
AI5	DIGITAL INPUT	DRY CONTACT	COOLING DEMAND / CLOSED DEMAND / OPEN NO DEMAND
AI6	ANALOG INPUT	NTC 10KΩ - TYPE 2	FLOOR TEMPERATURE SENSOR FOR BARE CONRETE FLOOR WITH 0 R VALUE
AI7	ANALOG INPUT	NTC 10KΩ - TYPE 2	FLOOR TEMPERATURE SENSOR FOR CERAMIC TILES FLOOR WITH 0.4 R VALUE
AI8	ANALOG INPUT	NTC 10KΩ - TYPE 2	FLOOR TEMPERATURE SENSOR FOR HARDWOOD FLOOR WITH 1.0 R VALUE
K1	DIGITAL OUTPUT	24V RELAY	PROOF OF CHILLED WATER TEMPERATURE RESET Vs DEW POINT TEMPERATURE OF AMBIENT AIR / CLOSED DEW POINT RESET IS ON
K2	DIGITAL OUTPUT	24V RELAY	NOT USED
K3	DIGITAL OUTPUT	24V RELAY	NOT USED
K4	DIGITAL OUTPUT	24V RELAY	NOT USED
K5	DIGITAL OUTPUT	24V RELAY	NOT USED
AO1	ANALOG OUTPUT	2-10V OR 0-10V	MODULATING 3 WAY VALVE FOR MIXING CHILLED WATER RETURN WITH SUPPLY / OR MODULATING 2 WAY VALVE AT THE MIXING BYPASS
AO2	ANALOG OUTPUT	2-10V OR 0-10V	MODULATING 2 WAY VALVE AT THE EXIT OF THE CHILLED WATER TANK

TDPR-01	CHILLED WATER TEMP. RESET Vs AMBIENT AIR DEW POINT TEMP.			Article No./Reference	
Designed by DAPHNE_GARNEAU	Checked by ROGER_ABDO	Approved by - date RA-202210/03	File name TRCHWDPA1FS13WAYNCOM0001	Date 2022/03/01	Scale NTS

CHW_DP_TEMP_REST

DWG.NO.:TRCHWDPA1FS13WAYNCOM0001	REVISION 0	Sheet 1