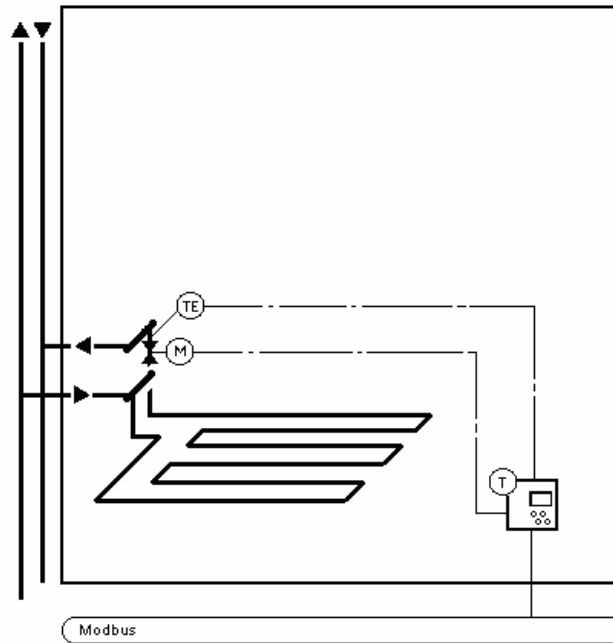


APPLICATION DIAGRAM

HLS 35 is a unique floor heating/cooling temperature controller. The controller can be configured to monitor return water/floor temperature for minimum temperature limit. The HLS35 controller can be used with 0-10 Vdc, 3-point, On/Off or Pulse Width Modulation actuators. LCD display with 3 touch sensitive buttons. Modbus communication build-in.

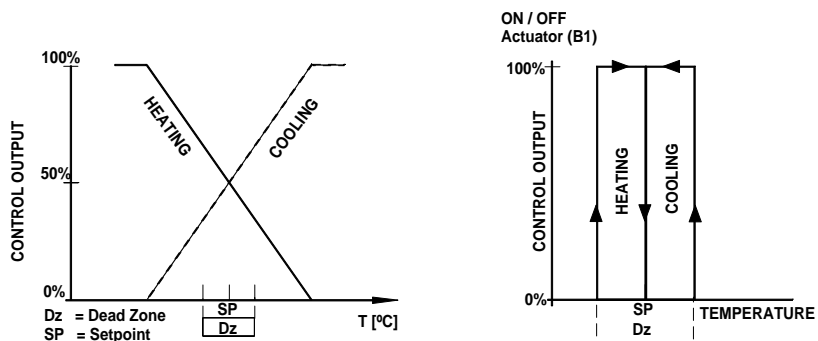


DAY/NIGHT MODE

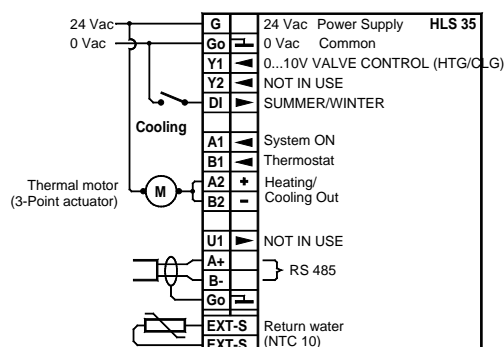
The unit can be switched between day and night modes via Modbus network. In the night mode the control outputs are off. When in DAY mode the controller operates the valve outputs according to the below diagram.

In the DAY mode the controller measures the room temperature controls the valve output based on the PI control logic. If a floor temperature sensor is fitted, the control output is limited based on the floor temperature and the floor setpoint.

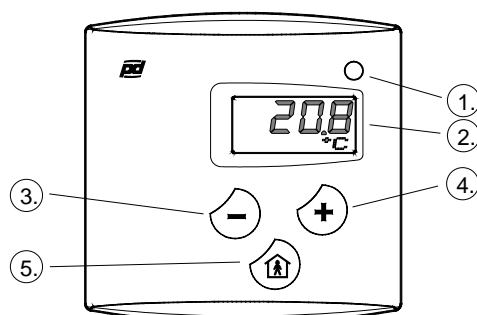
In the Night mode the controller controls the valve like in the Day mode but with Night Time Dead Zone or with thermostat mode.



CONNECTION DIAGRAM WARNING:The electrical installation, device connection and commissioning can only be carried out by qualified professionals and according to the local wiring regulations!



USERINTERFACE



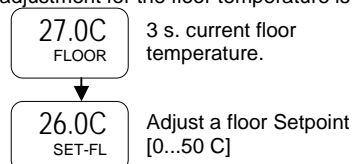
HLS35 controller display shows the current room temperature. The controller has 3 touch sensitive buttons.

1. LED for Heating / Cooling
2. Temperature display
3. Reduce Setpoint Button
4. Increase Setpoint Button
5. "Man in the House" Button

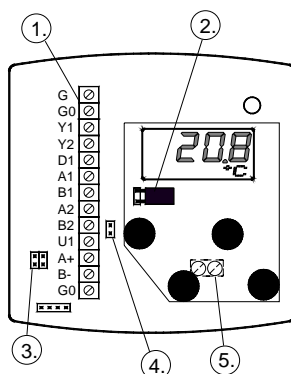
ADJUSTING DAY /FLOOR SETPOINT

Press + and - buttons to adjust the DAY setpoint. The maximum and minimum setpoint values are set in the configuration mode by the SETPOINT LIMITS parameter.

Setpoint adjustment for the floor temperature is done by -button



PROGRAMMING MODE



1. Wiring terminals.
2. Configuration mode jumper.
 - Set = User mode
 - Removed = Programming mode
3. Modbus enable jumpers.
 - Both on = on the bus
 - Both off = off the bus.
4. Bus termination (120 ohm).
5. Floor temperature sensor terminals.

LED INDICATION

The LED on the top right corner of the controller indicates the current operation mode:

- Amber: Heating valve is opening
- Green: Cooling valve is opening
- No light: Controller temperature in the dead-zone
- Flashing Amber: Error condition e.g. display disconnected

DAY EXTENSION

The controller can be overridden to DAY operation by pressing the "MAN IN THE HOUSE" occupancy button. When pressed the controller is overridden to DAY mode for the period of two hours. The extension time is adjustable between 1..480 minutes via Modbus network.

SYSTEM ON (OUTPUT B1)

Mode: Manual (0=OFF, 1=ON) Auto (=2)

If the B1 is in automatic control (Modbus register - set to 2), the triac out B1 is controlled based on the current setpoint and the controller mode i.e cooling or heating mode.

In the Cooling Mode:

Room temperature > setpoint + DZ/2 --> B1 is switched ON.




Room temperature < setpoint --> B1 is switched OFF.

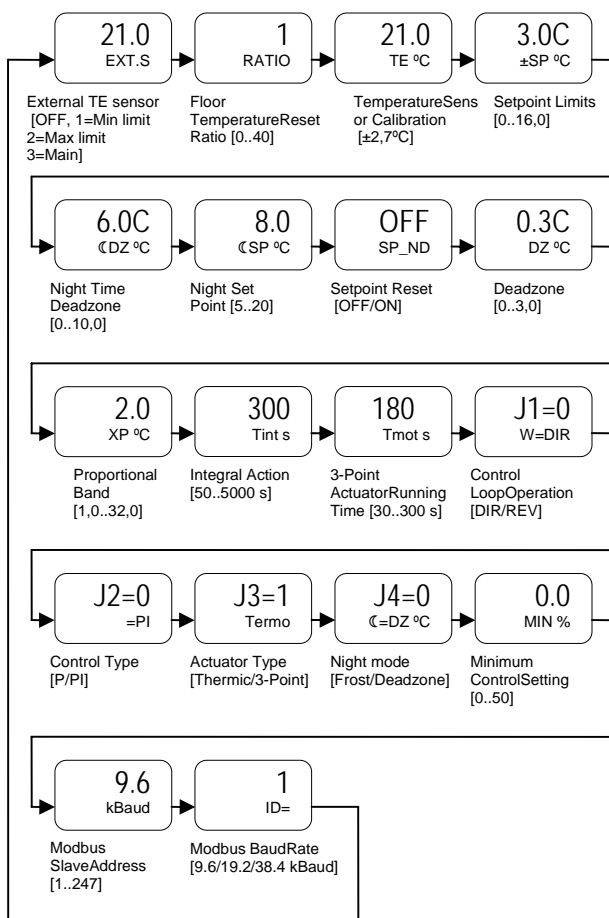
In the Heating Mode:

Room temperature < setpoint + DZ/2 --> B1 is switched ON.

Room temperature > setpoint --> B1 is switched OFF.

MENU

Push -button to proceed in the menu. Change values by  or -buttons. Parameters will be saved at the end.

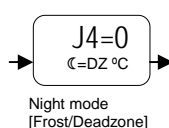


NIGHT TIME DEADZONE If the controller has been configured to the valve output based PI control logic, then this parameter is used to set the relaxed dead-zone.

NIGHT SETPOINT If the controller has been configured to operate in the Thermostat mode, then this parameter is used to set the night time heating setpoint (for frost protection).

SETPOINT RESET (SP_ND) When the controller returns to the DAY MODE from NIGHT, the controller DAY setpoint can return to the DAY setpoint programmed previous day, or the DAY SP can be reset to the SPnetwork Modbus Network Setpoint. If no network setpoint is available 21°C is used as default.

NIGHT MODE In the Night mode the controller controls the valve like in the Day mode but with Night Dead Zone [Deadzone] or with thermostat mode [Frost]



MINIMUM FLOOR TEMPERATURE LIMIT The controller has minimum floor temperature protection feature typically used in wet rooms to reduce the amount of condensation. If the floor temperature drops below the FLOOR SETPOINT, the room temperature setpoint is reset to compensate the condensation danger.

MAXIMUM FLOOR TEMPERATURE LIMIT The controller has maximum floor temperature protection feature typically used for protecting under floor heating components and floor materials. If the floor temperature raises upon the FLOOR SETPOINT, the room temperature setpoint is reset to compensate the material damages.

EXTERNAL TEMPERATURE SENSOR AS MAIN SENSOR There is a possibility to use external sensor as a main sensor. Note! Then MINIMUM / MAXIMUM FLOOR TEMPERATURE LIMIT is not available.

COMMUNICATIONS RS-485 Modbus RTU, 9600/19200/38400 bps, 8 data bits, parity none, 1 stop bit (up to 128 devices per segment)

HLS 35 VER.1.1

The controller supports the following Modbus registers and function codes.

Register	Parameter Description	Data Type	Value	Range
FUNCTION CODE 01 - READ COILS				
2	Overdrive mode	Bit0	On - Off	On - Off
3	NIGHT-mode	Bit1	On - Off	On - Off
4	SUMMER-mode	Bit1	On - Off	On - Off
5	SERVICE ALARM	Bit2	On - Off	On - Off
FUNCTION CODE 02 - READ DISCRETE INPUTS				
10002	SUMMER Active	Bit0	On - Off	On - Off
10003	Man in House (NIGHT mode to DAY-mode)	Bit1	On - Off	On - Off
10004	DAY EXTENSION (NIGHT mode to DAY-mode)	Bit2	On - Off	On - Off
FUNCTION CODE 03 - READ HOLDING REGISTERS				
40003	Coils 16 - 01	16 bit		
40004	Output (Overdrive by Network)	Signed 16	0...1000	0,0 ... 100,0 (%)
40005	Setpoint (Set by Network)	Signed 16	50...370	5,0 ... 37,0 (C)
40006	FLOOR Setpoint (Set by Network)	Signed 16	0...500	0,0 ... 50,0 (C)
40007	RATIO	Signed 16	0...20	0 ... 20
40008	XP	Signed 16	10...320	1,0 ... 32,0 (C)
40009	Tint	Signed 16	50...5000	50 ... 5000 (s)
40010	DAY EXTENSION period	Signed 16	1...480	1 ... 480 (min)
40011	Thermostat (B1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
40012	System ON (A1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
FUNCTION CODE 04 - READ INPUT REGISTERS				
30002	Discrete Inputs 16 - 01	16 bit		
30003	Coils 16 - 01	16 bit		
30004	Output (Set by Network)	Signed 16	0...1000	0,0 ... 100,0 (%)
30005	Setpoint by Network (Day value only)	Signed 16	50...370	5,0 ... 37,0 (C)
30006	FLOOR Setpoint by Network	Signed 16	0...500	0,0 ... 50,0 (C)
30007	RATIO	Signed 16	0...20	0 ... 20
30008	XP	Signed 16	10...320	1,0 ... 32,0 (C)
30009	Tint	Signed 16	50...5000	50 ... 5000 (s)
30010	DAY EXTENSION period	Signed 16	1...480	1 ... 480 (min)
30011	Thermostat (B1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
30012	System ON (A1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
30013	Temperature	Signed 16	-600...600	-60,0 ... 60,0 (C)
30014	FLOOR Temperature	Signed 16	-600...600	-60,0 ... 60,0 (C)
30015	Effective Setpoint	Signed 16	50...500	5,0 ... 50,0 (C)

30016	Current Output	Signed 16	0,0 ... 100,0 (%)	0,0 ... 100,0 (%)
FUNCTION CODE 05 - WRITE SINGLE COIL				
2	Overdrive mode (Cooling and Heating outputs)	Bit0	On - Off	On - Off
3	NIGHT-mode	Bit1	On - Off	On - Off
4	SUMMER-mode	Bit1	On - Off	On - Off
5	SERVICE ALARM	Bit2	On - Off	On - Off
FUNCTION CODE 06 - WRITE SINGLE REGISTER				
40003	Coils 16-01	16 bit		
40004	Heating Output (Overdrive mode = "on")	Signed 16	0...1000	0,0 ... 100,0 (%)
40005	Setpoint by Network (DAY value only)	Signed 16	50...370	5,0 ... 37,0 (C)
40006	FLOOR Setpoint by Network	Signed 16	0...500	0,0 ... 50,0 (C)
40007	RATIO	Signed 16	0...20	0 ... 20
40008	XP	Signed 16	10...320	1,0 ... 32,0 (C)
40009	Tint	Signed 16	50...5000	50 ... 5000 (s)
40010	DAY EXTENSION period	Signed 16	1...480	1 ... 480 (min)
40011	Thermostat (B1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
40012	System ON (A1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
FUNCTION CODE 15 - WRITE MULTIPLE COILS				
2	Overdrive mode	Bit0	On - Off	On - Off
3	NIGHT-mode	Bit1	On - Off	On - Off
4	SUMMER-mode	Bit1	On - Off	On - Off
5	SERVICE ALARM	Bit2	On - Off	On - Off
FUNCTION CODE 16 - WRITE MULTIPLE REGISTERS				
40003	Coils 16-01	16 bit		
40004	Heating Output (Overdrive mode = "on")	Signed 16	0...1000	0,0 ... 100,0 (%)
40005	Setpoint by Network (DAY value only)	Signed 16	50...370	5,0 ... 37,0 (C)
40006	FLOOR Setpoint by Network	Signed 16	0...500	0,0 ... 50,0 (C)
40007	RATIO	Signed 16	0...20	0 ... 20
40008	XP	Signed 16	10...320	1,0 ... 32,0 (C)
40009	Tint	Signed 16	50...5000	50 ... 5000 (s)
40010	DAY EXTENSION period	Signed 16	1...480	1 ... 480 (min)
40011	Thermostat (B1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
40012	System ON (A1 Set by Network)	Signed 16	0 - 1 - 2 (2=Auto)	0 - 1 - 2 (2=Auto)
FUNCTION CODE 22 - MASK WRITE REGISTER				
40002	Coils 16 - 01	16 bit		AND 0 ... 0xFFFF OR 0 ... 0xFFFF