

# Applications manual

For GWH 345 ESR and GWH 450 ESR tankless water heaters



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## **1 Introduction**

The Applications Manual is intended to present some of the most common applications of the Bosch GWH 345 ESR and GWH 450 ESR tankless water heaters. Application drawings are shown with both piping and corresponding electrical schematics where applicable. Auxiliary equipment depicted does not necessarily represent any one manufacturer or specific model number. There are a wide variety of techniques, practices and piping strategies possible when installing water heating appliances. It is the responsibility of the installing contractor to determine the most suitable arrangement for the application.



**All drawings are conceptual in nature and does not address all design, installation or safety considerations. Additional safety and/or auxiliary equipment may be needed. Drawings are for reference use by officials, designers and licensed installers. It is expected that installers have adequate knowledge of accepted industry practices for the equipment, procedures, and applications involved. It is the responsibility of the installer to ensure that the installation is in accordance with local building codes.**

Although this manual covers many common applications for our products, system possibilities are virtually endless. Should you encounter an application that is not covered in this manual or have any questions regarding any of its content, we encourage you to contact your local sales representative or us directly at Bosch Thermotechnology.

This is not a substitute for any of the product's installation manuals. All specifications subject to change.

**Installation must conform with local codes or, in the absence of local codes, the National Fuel Gas Code ANSI Z 223.1/NFPA 54. In Canada: Installation must conform with CGA B149.(1,2) INSTALLATION CODES and/or local installation codes.**

## 2 Bosch Water Heating Models

### 2.1 Bosch GWH 345 ESR

#### Features:

- Specifically designed for recirculating applications
- Electronic ignition and built in power vent
- GWH 345 ESR thermal efficiency of 82%
- Vents vertically or horizontally with 3" stainless steel (AL29-4C)
- Direct vent room-sealed combustion
- Computerized temperature control – ensures temperature stability
- Model GWH 345 ESR N for natural gas (NG) supply
- Model GWH 345 ESR L for liquid propane (LP) supply
- 10-year warranty on heat exchanger

#### GWH 345 ESR Technical Specifications

Gas input	32,000 - 95,000 Btu/h
Maximum flow rates	3.5gpm @ 45°F rise
Thermal Efficiency	82%
Dimensions	27.5" h x 15.75" w x 11.75" d
Weight	47 lbs.
Modulating gas valve	yes
Ignition	Electronic

#### GWH 345 ESR Installation Specifications

Gas connection	¾" Male NPT
Water connections	¾" Male NPT
NG gas pressure	Minimum: 5.5" W.C. Maximum: 14" W.C.
LP gas pressure	Minimum: 11" W.C. Maximum: 14" W.C.
Electrical supply	120VAC - plugs in
Venting	3" stainless steel (AL29-4C) direct vent room-sealed combustion

#### GWH 450 ESR Installation Clearances

Top (A)	12"
Front (B)	1"
Back	0"
Sides	1"
Floor (C)	12"

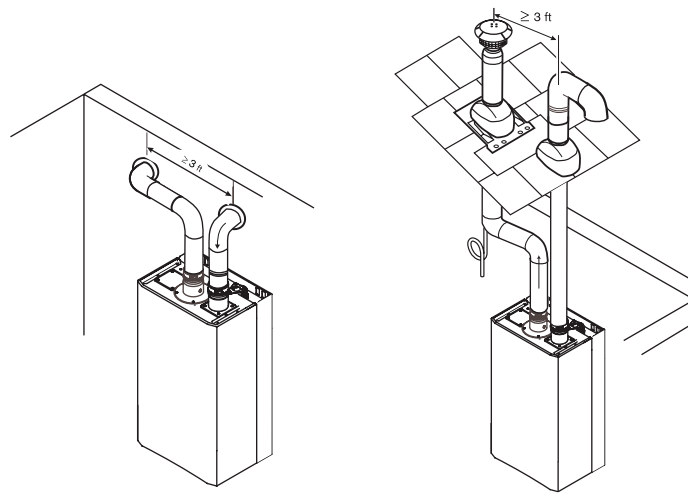
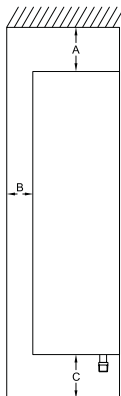


Fig. 1 Venting configurations

#### Installation guidelines:

##### Venting:

- Must be 3" or 4" AL29-4C sealed stainless steel vent pipe.
- Slope horizontal runs up to termination ¼" per foot. The horizontal section between last elbow and termination must slope down to the termination ¼" per foot.
- Do not combination vent with any other appliance.
- **Always install an external condensate drain except when terminating horizontally with less than 3 feet of pipe.**
- See manual for vent terminator clearances.

##### Gas piping:

- Heater will not function properly without adequate supply gas pressure.
- Any appliance connector should be ¾" minimum diameter.

##### Plumbing:

- Install the included pressure relief valve and pipe to suitable drain.
- Minimum piping diameter is ¾".
- Do not solder directly to the bottom of the unit.
- Use unions to facilitate easy future maintenance.
- Use full port ball valves or isolation valves.
- Partially fill condensate drain tube loop with water prior to start up.

## 2.2 Bosch GWH 450 ESR

### Features:

- ▶ Specifically designed for recirculating applications
- ▶ Electronic ignition and built in power vent
- ▶ GWH 450 ESR thermal efficiency of 81%
- ▶ Vents vertically or horizontally with 3" stainless steel (AL29-4C)
- ▶ Direct vent room-sealed combustion
- ▶ Computerized temperature control – ensures temperature stability
- ▶ Model GWH 450 ESR N for natural gas (NG) supply
- ▶ Model GWH 450 ESR L for liquid propane (LP) supply
- ▶ 10-year warranty on heat exchanger

### GWH 450 ESR Technical Specifications

Gas input	45,000 - 120,000 Btu/h
Maximum flow rates	4.5gpm @ 45°F rise
Thermal Efficiency	81%
Dimensions	27.5" h x 15.75" w x 11.75" d
Weight	47 lbs.
Modulating gas valve	yes
Ignition	Electronic

### GWH 450 ESR Installation Specifications

Gas connection	¾" Male NPT
Water connections	¾" Male NPT
NG gas pressure	Minimum: 5.5" W.C. Maximum: 14" W.C.
LP gas pressure	Minimum: 11" W.C. Maximum: 14" W.C.
Electrical supply	120VAC - plugs in
Venting	3" stainless steel (AL29-4C) direct vent room-sealed combustion

### GWH 450 ESR Installation Clearances

Top (A)	12"
Front (B)	1"
Back	0"
Sides	1"
Floor (C)	12"

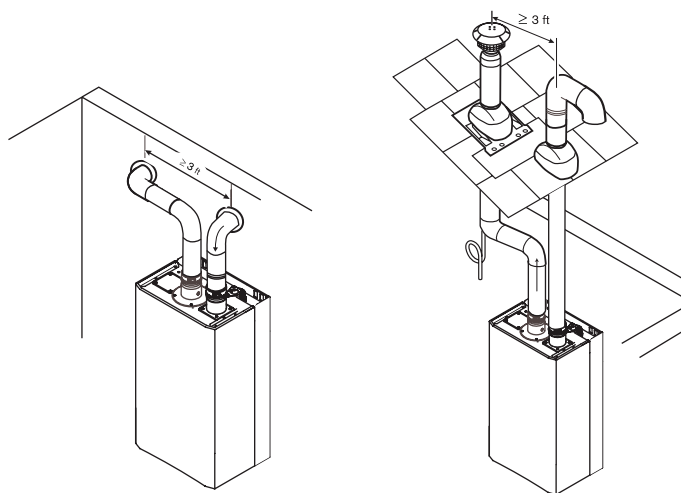
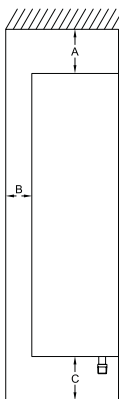


Fig. 1 Venting configurations

### Installation guidelines:

#### Venting:

- ▶ Must be 3" or 4" AL29-4C sealed stainless steel vent pipe.
- ▶ Slope horizontal runs up to termination ¼" per foot. The horizontal section between last elbow and termination must slope down to the termination ¼" per foot.
- ▶ Do not combination vent with any other appliance.
- ▶ **Always install an external condensate drain except when terminating horizontally with less than 3 feet of pipe.**
- ▶ See manual for vent terminator clearances.

#### Gas piping:

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- ▶ Minimum piping diameter is ¾".
- ▶ Do not solder directly to the bottom of the unit.
- ▶ Use unions to facilitate easy future maintenance.
- ▶ Use full port ball valves or isolation valves.
- ▶ Partially fill condensate drain tube loop with water prior to start up.

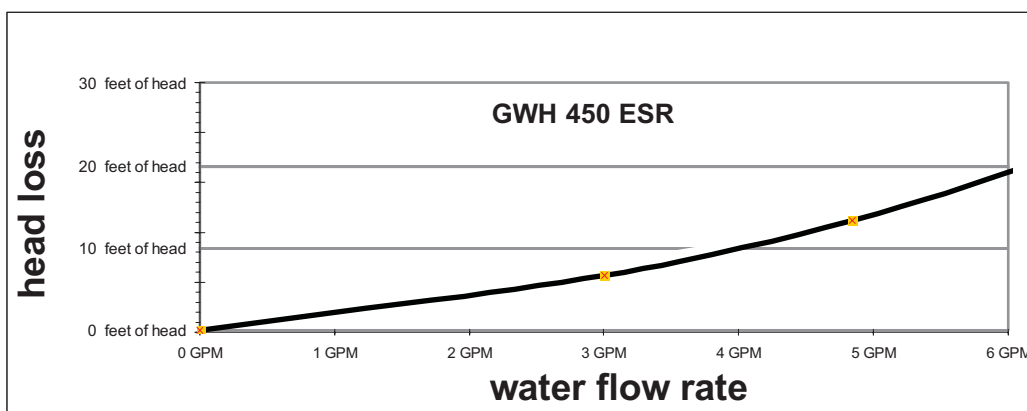
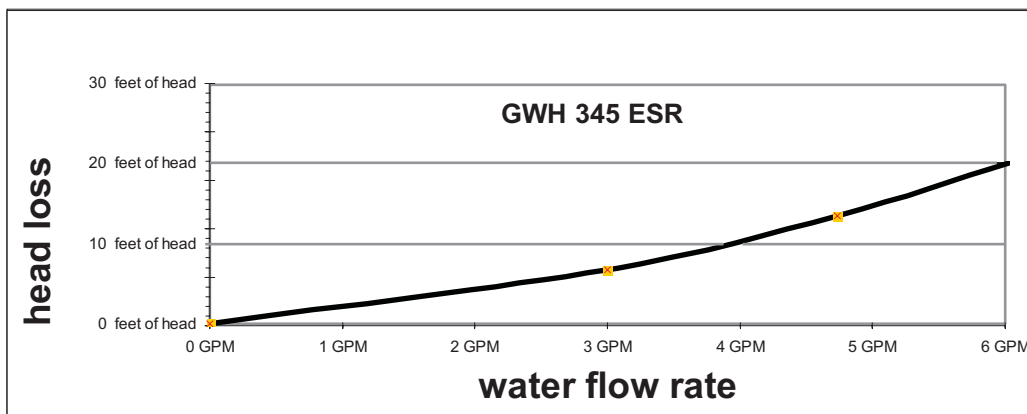
### 3 External storage tank loading applications

#### Introduction

This section outlines tank loading options for high volume water heating for large residential and light commercial applications including continuous flows and high volume demands of large home and commercial applications.

#### 3.1 GWH 345/450 ESR pressure drops and circulator guidelines

- ▶ The maximum amp draw for any circulator connected directly to the appliance must not exceed 1.5 amps
- ▶ Circulator should be sized by the professional plumbing contractor
- ▶ Bronze or stainless steel circulators are required for all open loop applications



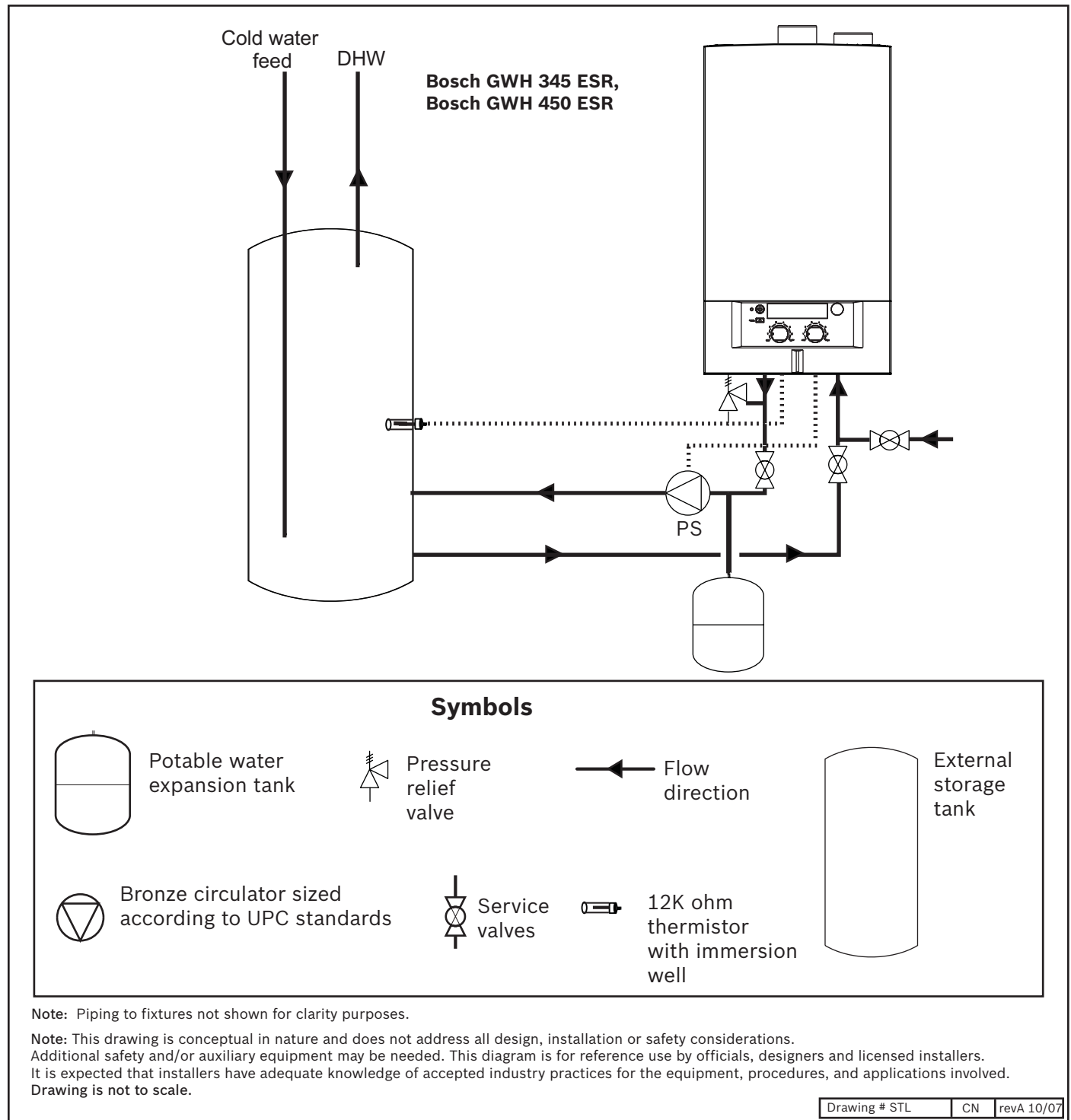
Pressure drop curves

Note : Flow above 6 GPM is not permitted.

## 3.2 Tank Loading diagrams

### 3.2.1 Single unit tank loading application plumbing diagram

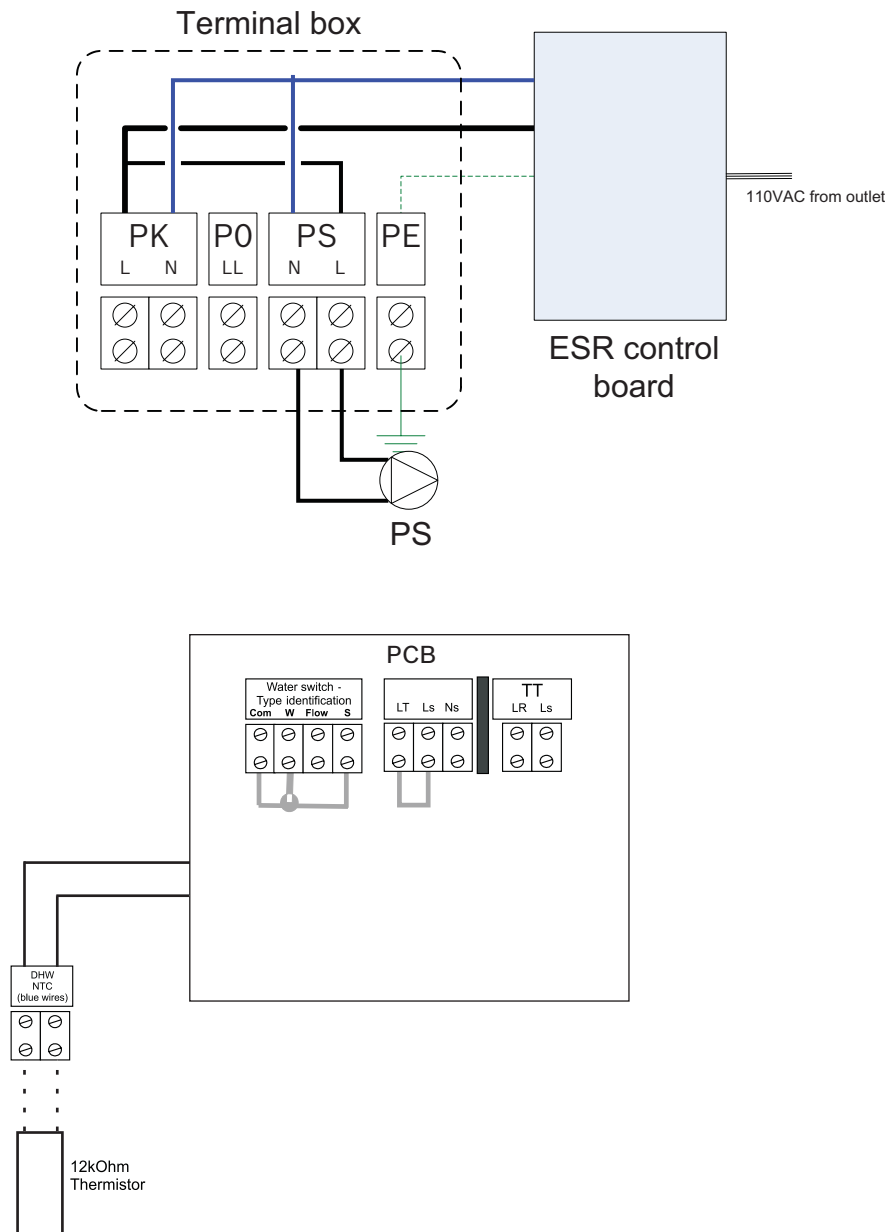
The GWH 345/450 ESR is specifically designed for this application





### 3.2.2 Single unit tank loading application electrical diagram

The following shows the appropriate electrical connections for plumbing diagram 3.2.1



**Single Unit Tank Loading  
Electrical Diagram**

**Note:** This drawing is conceptual in nature and does not address all design, installation or safety considerations. Additional safety and/or auxiliary equipment may be needed. This diagram is for reference use by officials, designers and licensed installers. It is expected that installers have adequate knowledge of accepted industry practices for the equipment, procedures, and applications involved. Drawing is not to scale.

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## 4 Open Loop Space Heating

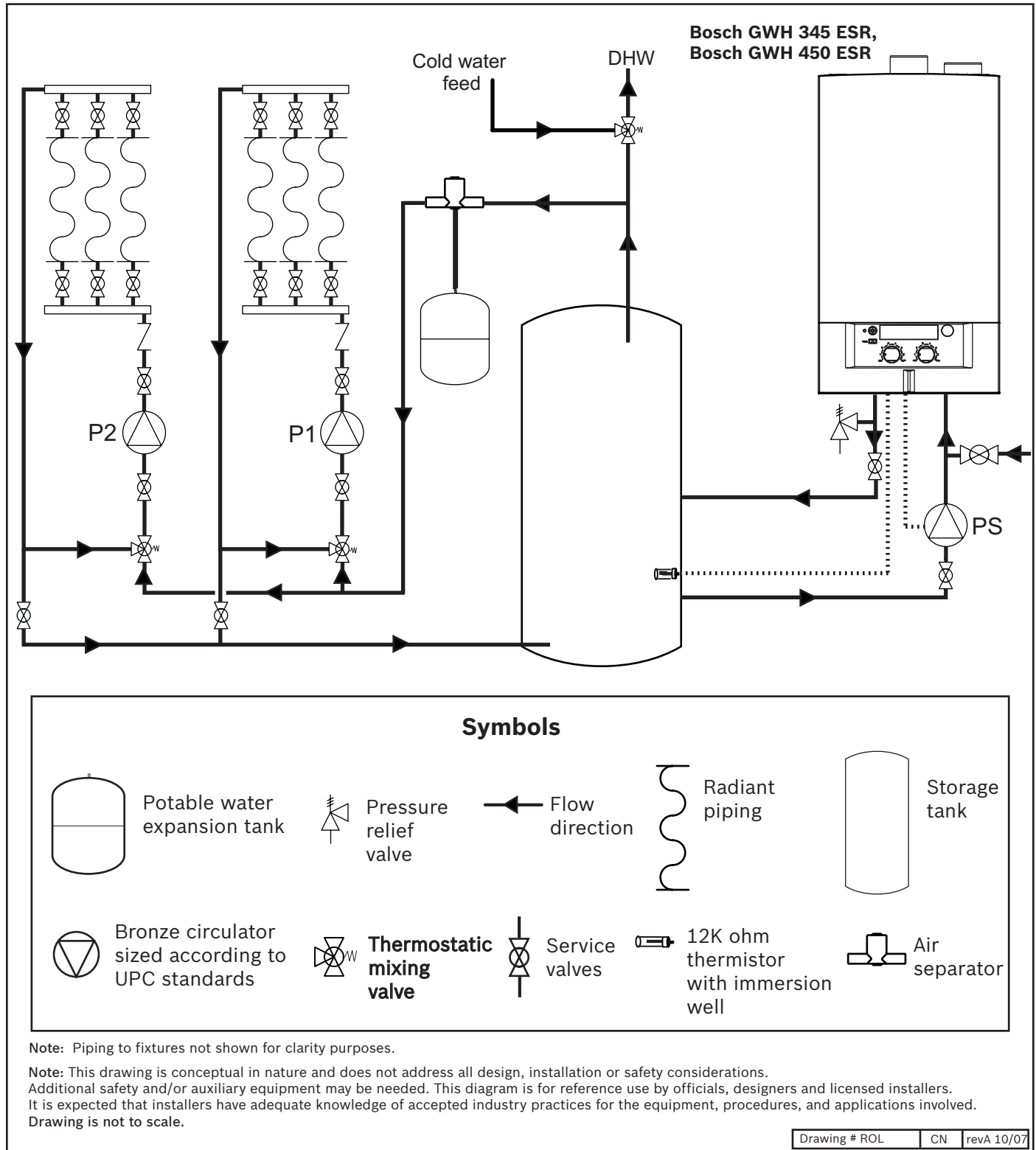
### Introduction

This section is designed to provide techniques for using a recirculating tankless water heater to heat domestic water and provide space heating in residential applications. As with all installations, check with the local authority having jurisdiction. Some jurisdictions may not allow these types of applications.

### 4.1 External storage tank

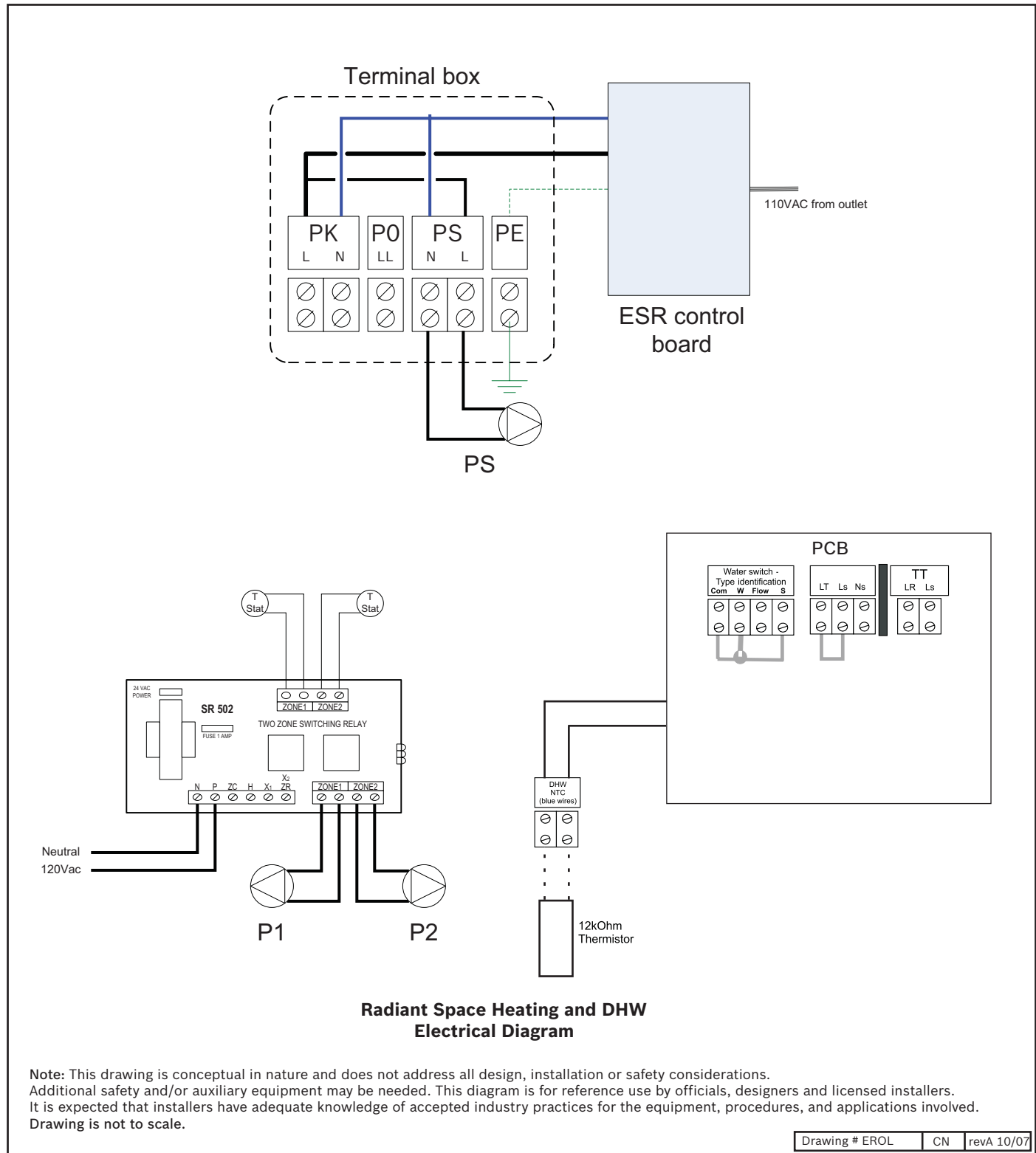
The appliances shown in this section are approved under ANSI Z21.10.3 and CSA 4.3 as circulating gas water heaters. Only open loop applications are approved under this standard.

#### 4.1.1 Radiant space heating and DHW plumbing diagram

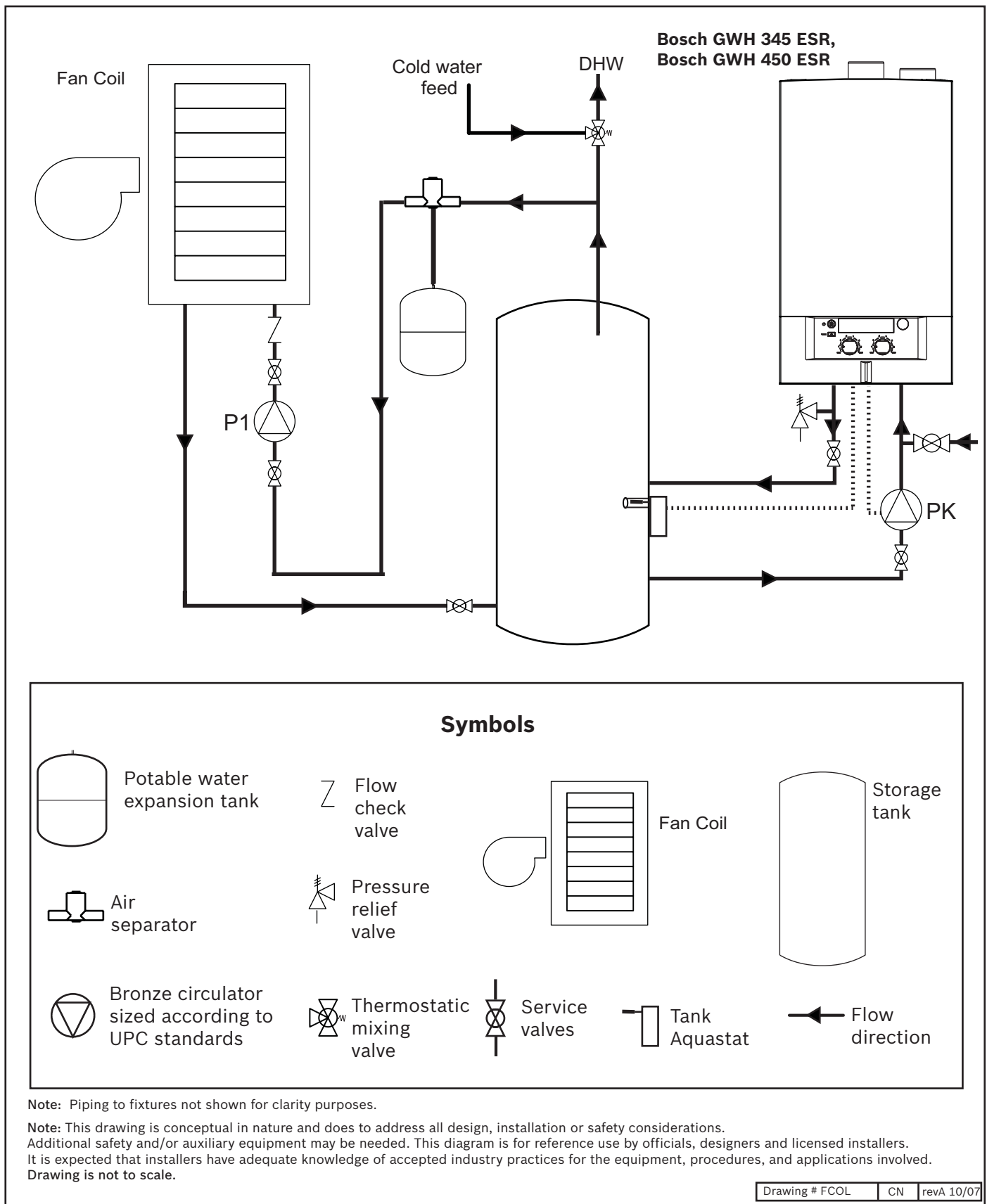


#### 4.1.1 Radiant space heating and DHW electrical diagram

The following shows the appropriate electrical connections for plumbing diagram 4.1.1

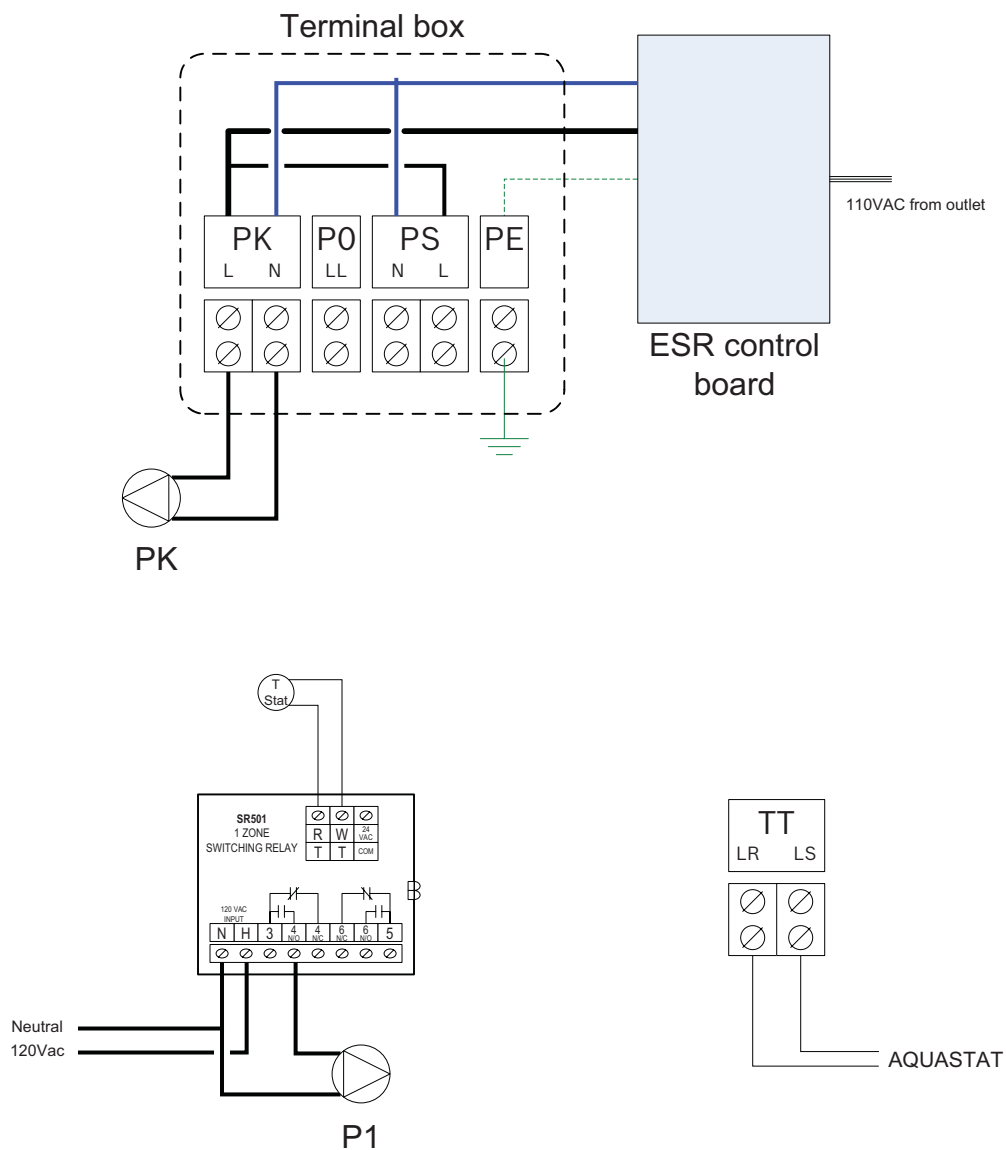


#### 4.1.2 Fan coil space heating and DHW plumbing diagram



#### 4.1.2 Fan Coil space heating and DHW electrical diagram

The following shows the appropriate electrical connections for plumbing diagram 4.1.2

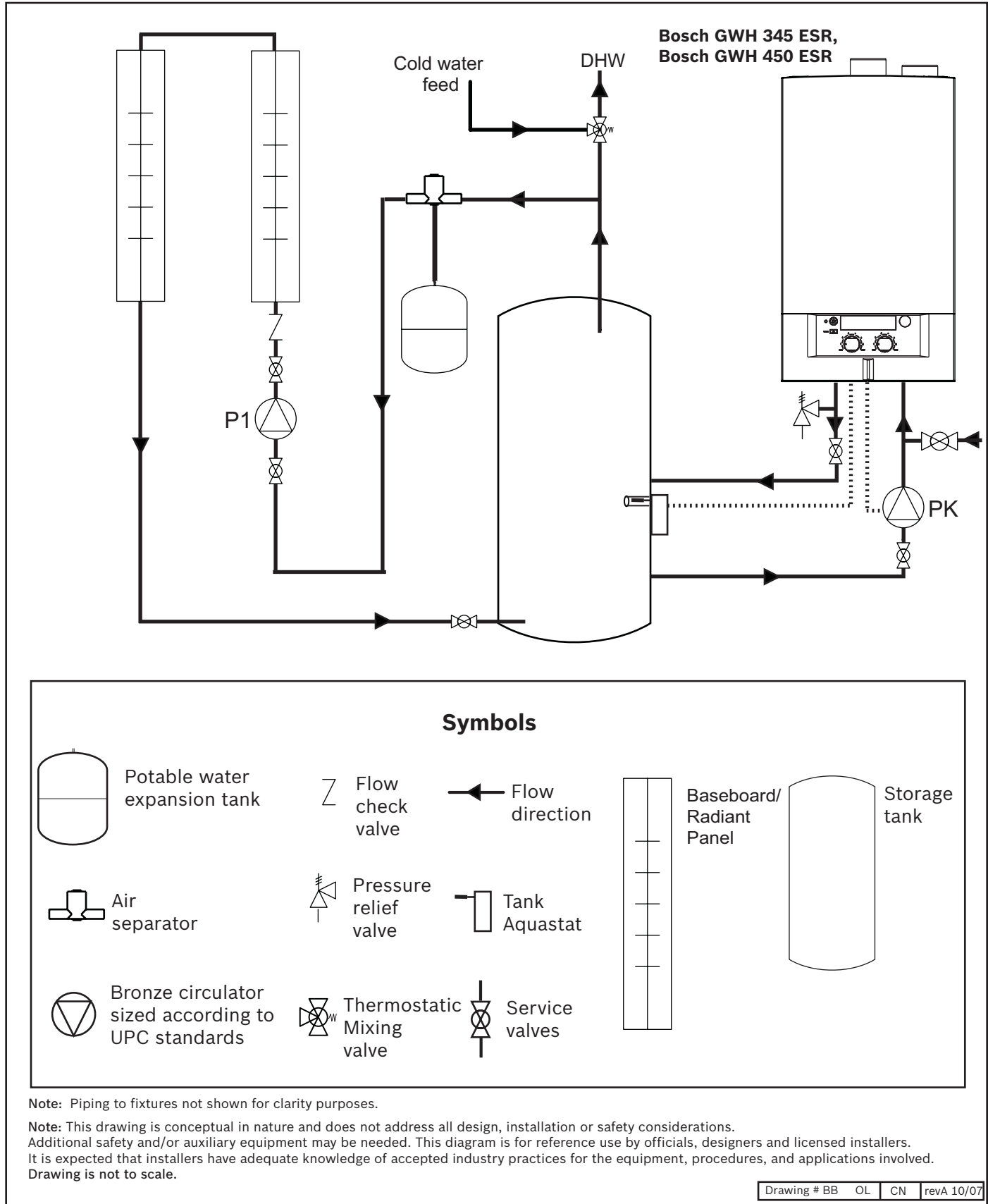


**Fan Coil Space Heating and DHW  
Electrical Diagram**

**Note:** This drawing is conceptual in nature and does not address all design, installation or safety considerations. Additional safety and/or auxiliary equipment may be needed. This diagram is for reference use by officials, designers and licensed installers. It is expected that installers have adequate knowledge of accepted industry practices for the equipment, procedures, and applications involved. Drawing is not to scale.

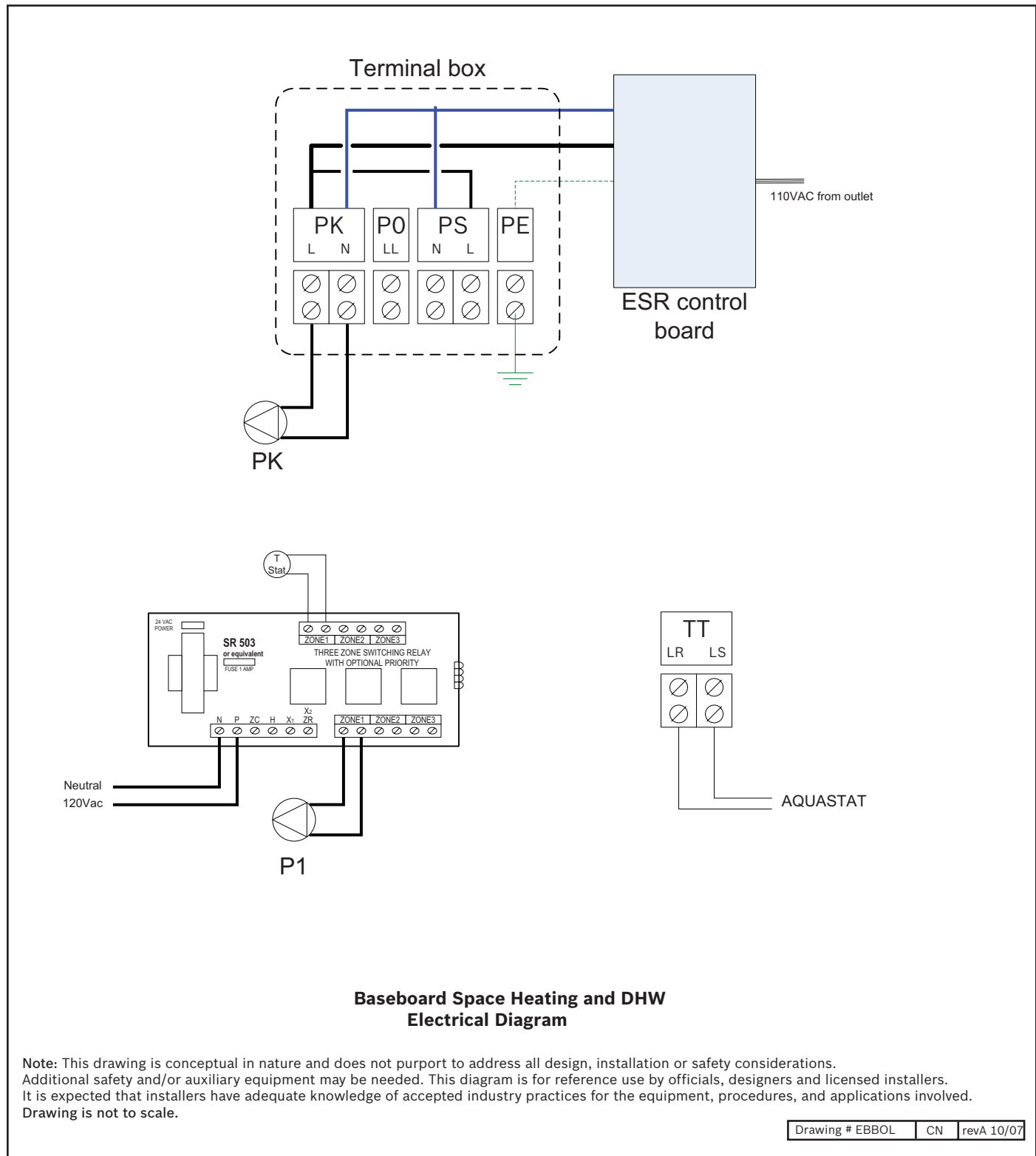
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#### 4.1.3 Baseboard/ Radiant Panel space heating and DHW plumbing diagram

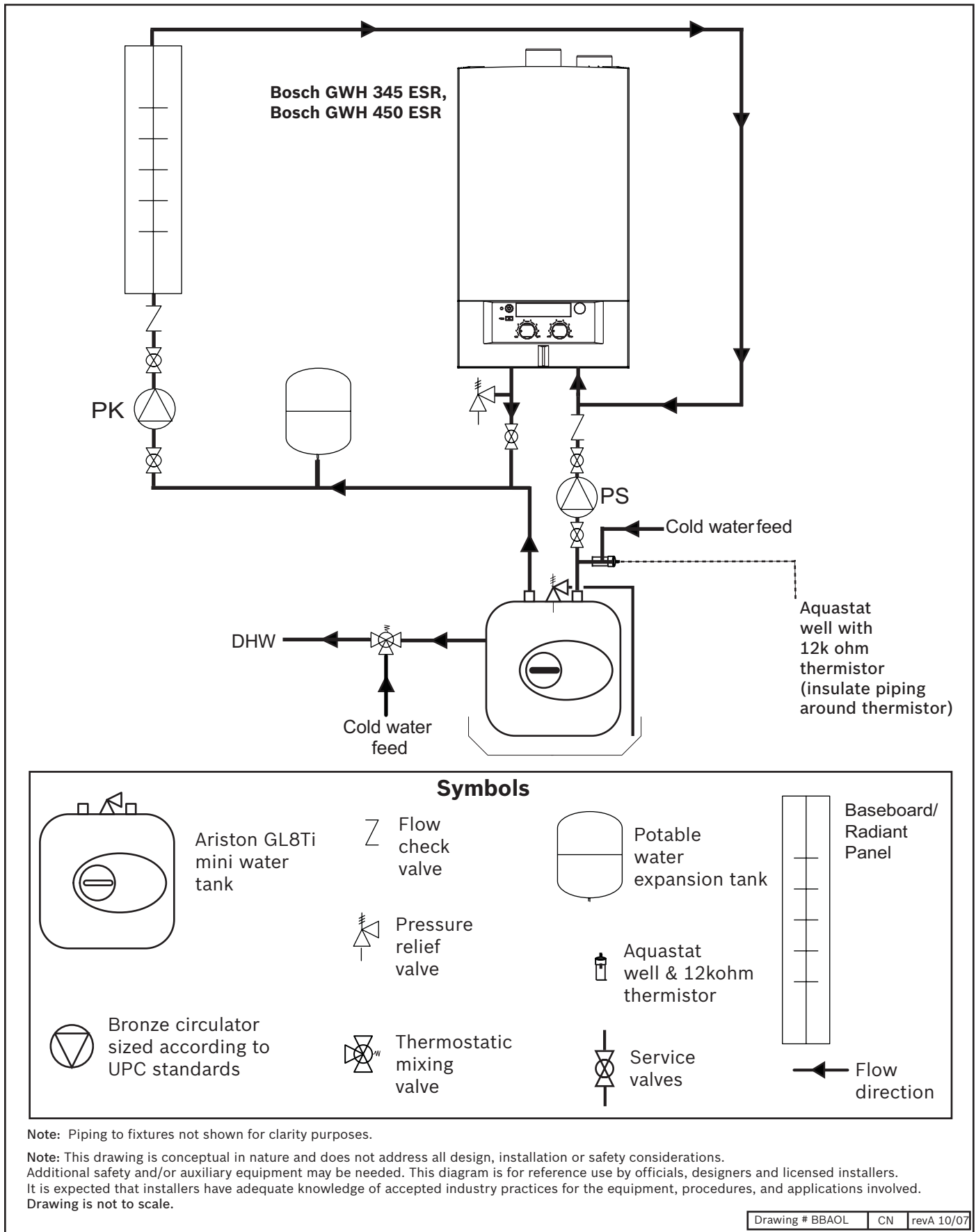


#### 4.1.3 Baseboard/Radiant Panel space heating and DHW electrical diagram

The following shows the appropriate electrical connections for plumbing diagram 4.1.3



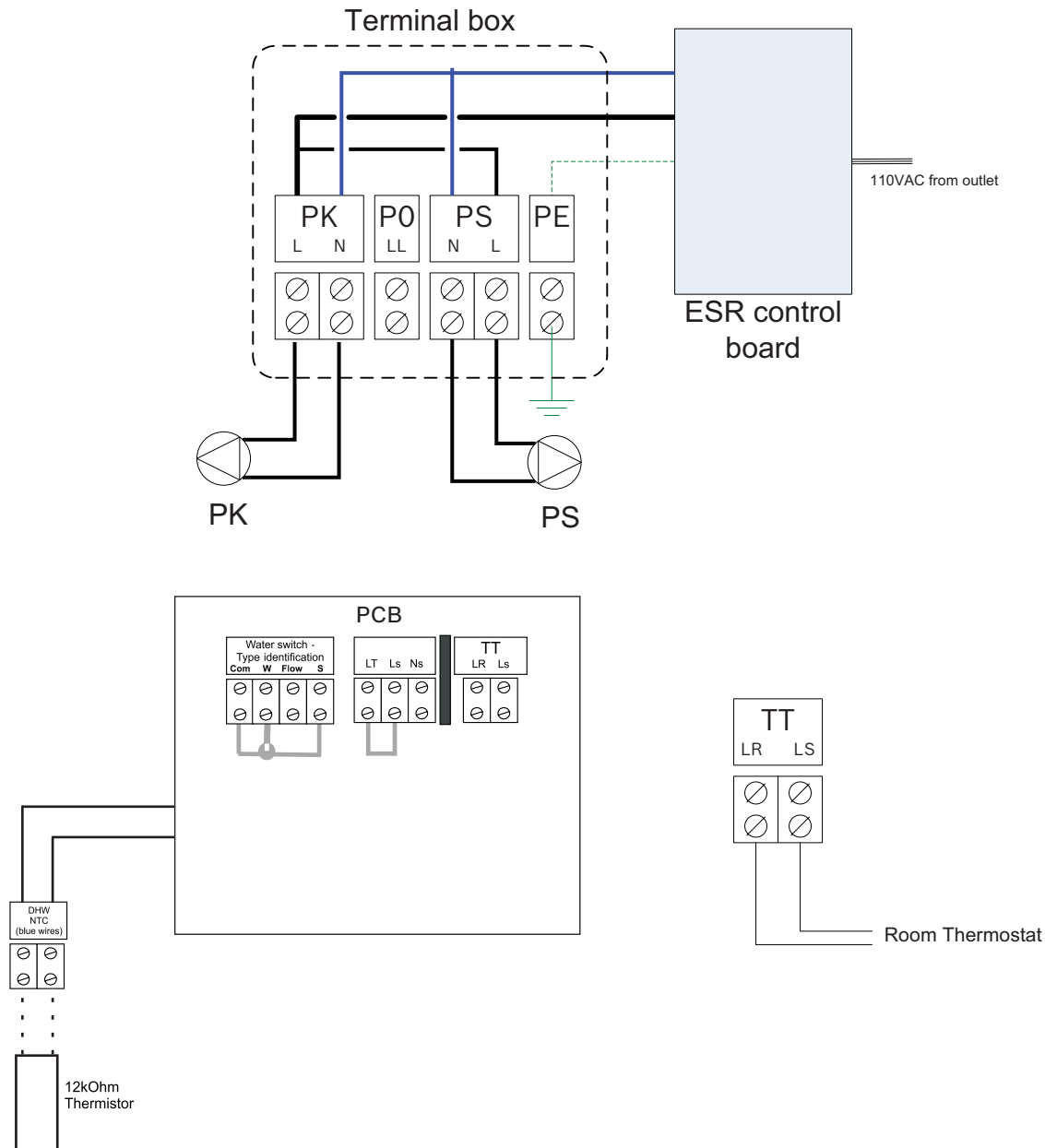
#### 4.1.4 Baseboard/ Radiant Panel space heating and DHW (with Ariston mini tank) plumbing diagram





#### 4.1.4 Baseboard/Radiant Panel space heating and DHW (with Ariston mini tank) electrical diagram

The following shows the appropriate electrical connections for plumbing diagram 5.1.4

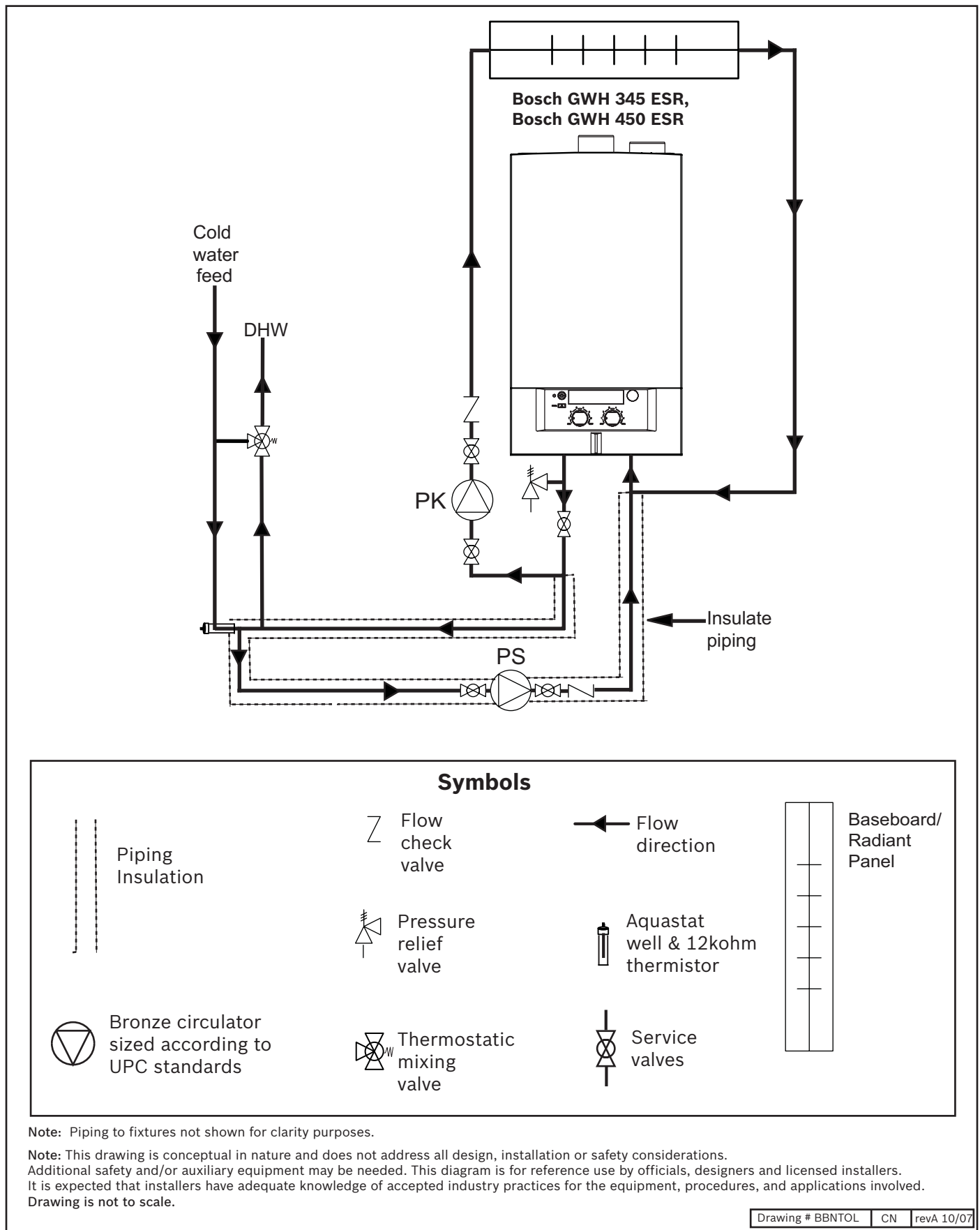


**Baseboard/Radiant Panel Space Heating and DHW (with Ariston mini tank)  
Electrical Diagram**

**Note:** This drawing is conceptual in nature and does not address all design, installation or safety considerations. Additional safety and/or auxiliary equipment may be needed. This diagram is for reference use by officials, designers and licensed installers. It is expected that installers have adequate knowledge of accepted industry practices for the equipment, procedures, and applications involved. Drawing is not to scale.

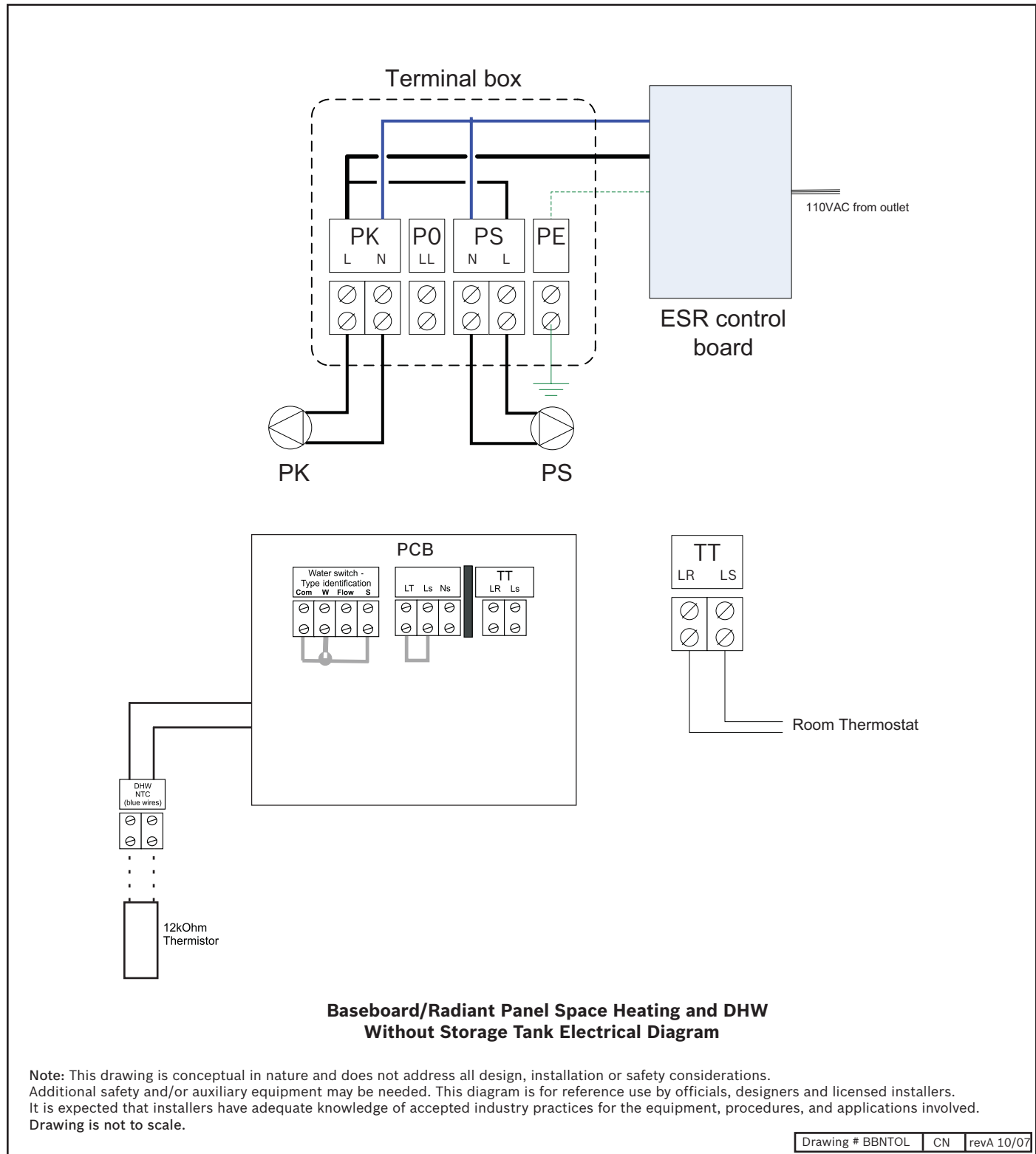
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#### 4.1.5 Baseboard / Radiant Panel space heating and DHW (without storage tank) plumbing diagram



#### 4.1.5 Baseboard/Radiant Panel space heating and DHW (without storage tank) electrical diagram

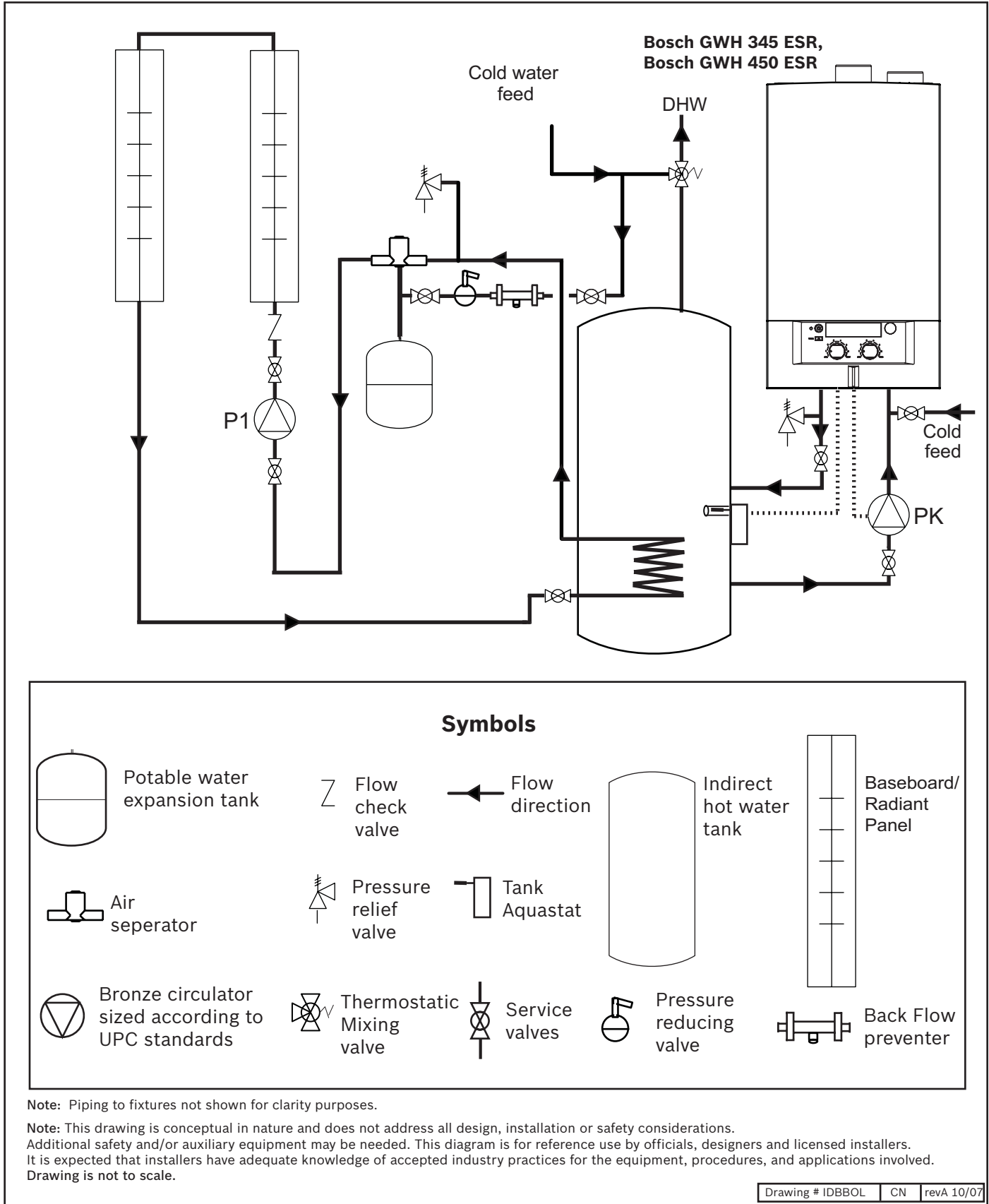
The following shows the appropriate electrical connections for plumbing diagram 4.1.5



## 4.2 Indirect Tank Applications

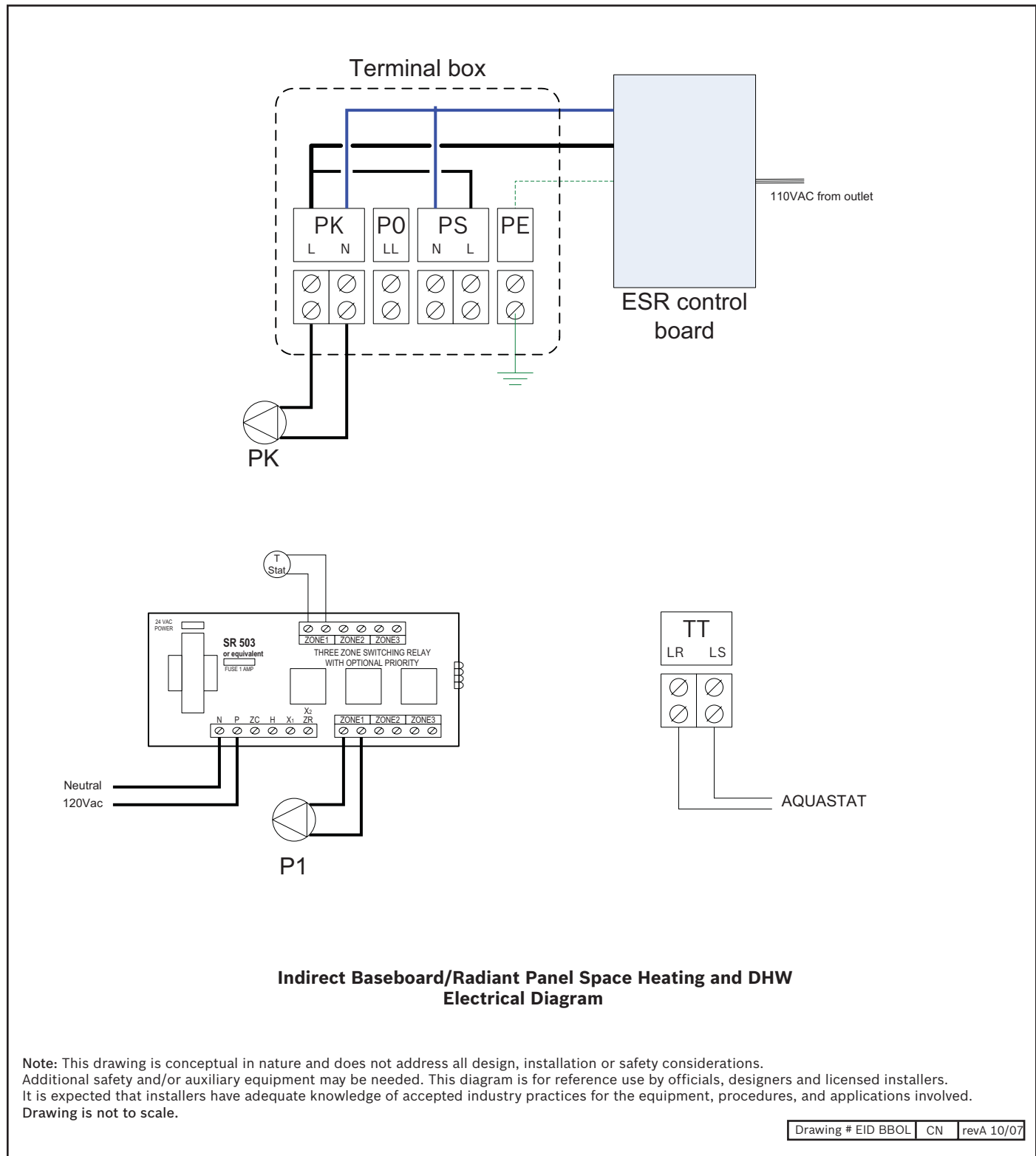
### 4.2.1 Indirect Baseboard/ Radiant Panel space heating and DHW plumbing diagram

Note: Not suitable for space heating applications requiring high water temperature.



#### 4.2.1 Baseboard/Radiant Panel space heating and DHW electrical diagram

The following shows the appropriate electrical connections for plumbing diagram 4.2.1







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