STRINGENT STANDARDS

- ASME Section IV “H” Code
- UL Subject 834
- NEC/NFPA Article 424-G
- ASME Safety Code CSD-1

STANDARD FEATURES AND ACCESSORIES

- ASME National Board Registered Pressure Vessel (150 PSI / 250°F)
- Heavy Duty Steel Boiler Vessel Housing
- Four Inch Fiberglass Insulation
- Three Inch NPT Inlet and Outlet
- ASME Safety Relief Valve
- Pressure Gauge w/ Cock
- Drain Valve
- Incoloy-Sheathed Elements
- Construction per NEC & UL, with UL Label
- Electronic Digital Temperature Readout (except 1 and 2 step models)
- Integral Electric Control Panel with Key-Locked Door
- Internal Branch Circuit Fusing
- Magnetic Contactors rated 500,000 Cycles
- Main Supply Circuit Lugs
- 120 Volt Fused Control Transformer
- On/Off Switch w/ Pilot Light
- Manual Limit Toggle Switches (one per step)
- Status Pilot Light for each Stage/Step
- Probe-type Low Water Cut-Off
  Note: Manual Reset, Test & Pilot Light Provided
- Two Adjustable High Limit Cutouts:
  (1) Auto Reset (1) Manual Reset
  Note: Manual Reset provided only on units > 2 stages
- Automatic Temperature Control via:
  On-Off Temperature Switches (1 & 2 step units)
  Electronic Multi Stage Control (3 & 4 step units)
  Proportional Progressive Sequence Step Control
  (units > 4 steps)

DESIGN ADVANTAGES

Compact Benefits

Ideal for new boiler applications or to RETROFIT existing installations, because it fits through many existing doorways with ease.

- Available in ratings from 15 KW to 720 KW
- Requires less square footage floor space, and does not require horizontal clearance for element removal.
- Heavy duty/ 16 gauge cabinet and flanged steel base provides greater structural strength.
- All electrical components are UL listed or recognized.
- Optional features and trim available to meet any custom design criteria.
- Individual flanged U-tube design heating element shortens down time for element replacement.

Compact Engineering Features

- Meets CSD-1 requirements
- Small foot print saves in building construction cost.
- Close temperature control because control sensor is located in the outlet pipe.
- Individual immersion heating elements are 2 1/2” square flanged for ease of replacement.
  The elements are made of a highly corrosion resistant Incoloy sheath, and nickel-chromium resistance wire packed in magnesium oxide powder in a U-tube design.
- No horizontal removal clearance required.
- Vertical design of boiler allows for easier installation in existing or new piping systems.
**OPTIONAL EQUIPMENT AND ACCESSORIES**

- Non-Fused Disconnect or Non-Auto Breaker
- Fused Disconnect or Automatic Breaker
- Shunt Trip Circuit Interrupter
- Ground Fault Detection System
- Ammeter (1 or 3 phase)
- Voltmeter (1 or 3 phase)
- Watt-hour Meter
- Time Clock (24 hour or 7 day)
- Alarm Buzzer with Silencing Switch
- Safety Door Interlock
- Low Temperature Switch/Alarm
- Remote Reset of Setpoint (to Accommodate BAS Analog Reset Signal)
- Stainless Steel Construction (210°F max) for Deionized water

Contact Factory for Many Other Options to Meet Your Specific Requirements.

**DIMENSIONAL DATA**

1. Temperature Limit, Auto Reset
2. Temperature Limit, Manual Reset
4. Pilot Lights, Amber (Steps “ON”)
5. PB Switches (Low Water Cutoff “Test”/ “Reset”)
6. Toggle Switch (Control Power)
7. Pilot Light, Amber (Control Power “ON”)
8. Pilot Light, Red (Low Water)
9. Temperature Setpoint / Control / Readout
10. Safety Relief Valve
11. Temperature and Pressure Gauges
12. Drain Valve

**COMPONENTS**

<table>
<thead>
<tr>
<th>PCW 1</th>
<th>PCW 2</th>
<th>PCW 3</th>
<th>PCW 4</th>
<th>PCW 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max KW @ 208V*/480V**</td>
<td>120/160</td>
<td>180/240</td>
<td>360/480</td>
<td>NA/600</td>
</tr>
<tr>
<td>Dimensions</td>
<td>52&quot; H x 20&quot; W x 30&quot; D</td>
<td>52&quot; H x 24&quot; W x 34&quot; D</td>
<td>52&quot; H x 28&quot; W x 38&quot; D</td>
<td>52&quot; H x 32&quot; W x 46&quot; D</td>
</tr>
<tr>
<td>Approx Ship Weight</td>
<td>600 lbs</td>
<td>800 lbs</td>
<td>1100 lbs</td>
<td>1800 lbs</td>
</tr>
<tr>
<td>Tank Size (dia/gal)</td>
<td>12”/22</td>
<td>16/36</td>
<td>20”/56</td>
<td>24”/80</td>
</tr>
<tr>
<td>Connection Size</td>
<td>3&quot; NPT</td>
<td>3&quot; NPT</td>
<td>3” NPT***</td>
<td>3” NPT***</td>
</tr>
<tr>
<td>Max Flow (gpm)</td>
<td>230</td>
<td>230</td>
<td>230***</td>
<td>230***</td>
</tr>
<tr>
<td>Drain Size (NPT)</td>
<td>3/4”</td>
<td>1”</td>
<td>1”</td>
<td>1 1/4”</td>
</tr>
</tbody>
</table>

* 3-phase (Note: PCW1 is also available in single phase)
** Height may increase on Model PCW5 depending on bottom head construction
*** 4” FLG connection (300 gpm max) is optional
Actual dimensions depend on options (eg. number of steps, disconnects, etc...)

**PHYSICAL DATA**

- Local/Remote Switch to Accommodate BAS Analog Control Signal
- PLC’s and Other Interface Provisions (Consult Factory)
- Outdoor Reset Control
- Flow Switch (Installed)
- High/Low Pressure Switches/Alarms
- Auxiliary Low Water Cut-off (Float or Probe type) (Auxiliary Probe type standard on units)
- Manual Reset Low Water Cut-off
- Temperature Gauge (3” / Installed)
- 4” Connection Size (PCW3 or PCW4)
- Proportional Step Control (for 3 or 4 Stage Models)
- Linear Sequence Step Control
- Non-Fused Disconnect or Non-Auto Breaker
- Fused Disconnect or Automatic Breaker
- Shunt Trip Circuit Interrupter
- Ground Fault Detection System
- Ammeter (1 or 3 phase)
- Voltmeter (1 or 3 phase)
- Watt-hour Meter
- Time Clock (24 hour or 7 day)
- Alarm Buzzer with Silencing Switch
- Safety Door Interlock
- Low Temperature Switch/Alarm
- Remote Reset of Setpoint (to Accommodate BAS Analog Reset Signal)
- Stainless Steel Construction (210°F max) for Deionized water

Contact Factory for Many Other Options to Meet Your Specific Requirements.

**CONTACT FACTORY FOR MANY OTHER OPTIONS TO MEET YOUR SPECIFIC REQUIREMENTS.**
CONVERSIONS/EQUATIONS

\[
\text{KW} = \text{GPH} \times \Delta T (\text{˚F}) = \frac{\text{LPH} \times \Delta T (\text{˚C})}{410} \\
\text{KW} = \frac{\text{GPM} \times \Delta T (\text{˚F})}{.146} \\
10\text{KW} = 1.02\text{ BHP} = 34\text{ Lbs Steam/H} = 34,120\text{ BTU/H} \\
\text{GPH} = \frac{\text{KW} \times 410}{\Delta T (\text{˚F})}\text{ Amps (3 phase)} = \frac{\text{KW} \times 1000}{\text{Volts} \times 1.732} \\
\text{GPH} = \frac{\text{BTU/H}}{8.33 \times \Delta T (\text{˚F})}\text{ Amps (1 phase)} = \frac{\text{KW} \times 1000}{\text{Volts}} \\
\text{BTU/H} = \frac{\text{KW} \times 3412}{\text{BTU/H} = \Delta T \times 500 \times \text{GPM}} \\
1\text{ gal water at 62˚F} = 8.34\text{ Lbs} \quad 1\text{ cu ft} = 7.48\text{ gallons} \\
1\text{ cu ft water at 62˚F} = 62.4\text{ Lbs} \quad 1\text{ ft water} = 0.435\text{ psi} \\
\text{Enthalpy of water} = \text{Temp (˚F) -32 BTU/LB} \\
\text{SATURATED STEAM: PRESSURE vs. TEMPERATURE} \\
0\text{ psig} = 0\text{ KPa} = 212˚F \quad 150\text{ psig} = 1034\text{ KPa} = 366˚F \\
8\text{ psig} = 55\text{ KPa} = 235˚F \quad 175\text{ psig} = 1207\text{ KPa} = 377˚F \\
15\text{ psig} = 103\text{ KPa} = 250˚F \quad 200\text{ psig} = 1379\text{ KPa} = 388˚F \\
30\text{ psig} = 207\text{ KPa} = 274˚F \quad 225\text{ psig} = 1551\text{ KPa} = 397˚F \\
50\text{ psig} = 345\text{ KPa} = 298˚F \quad 250\text{ psig} = 1724\text{ KPa} = 406˚F \\
80\text{ psig} = 552\text{ KPa} = 324˚F \quad 300\text{ psig} = 2068\text{ KPa} = 422˚F \\
100\text{ psig} = 690\text{ KPa} = 338˚F \quad 350\text{ psig} = 2413\text{ KPa} = 436˚F \\
125\text{ psig} = 862\text{ KPa} = 353˚F \quad 400\text{ psig} = 2758\text{ KPa} = 448˚F \\
\]

HOW TO SELECT A MODEL NUMBER

PCW 2 - 180 C - 480

Precision Compac
Water Vessel
Size KW Input Element
Designation Voltage

208 & 240 VOLT RATINGS*

* For lower KW ratings, please refer to the Precision “COMPAC” Boiler.

** Oversize control cabinets are supplied for these models at 208 & 240 volts.

## These models also available @ 380/415 volts derated by 25%

† These models have 108 wsi elements.

For complete model number, suffix boiler KW by element KW letter designation, wherein
A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts).
(eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)
### 480 VOLT RATINGS*

<table>
<thead>
<tr>
<th>Model Number*</th>
<th>Rating MBH&quot;</th>
<th>KW</th>
<th>Qty</th>
<th>KW</th>
<th>Circuits</th>
<th>Steps @ KW</th>
<th>Amps (480/3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCW1-005</td>
<td>75</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1085</td>
<td>18</td>
</tr>
<tr>
<td>PCW1-010</td>
<td>125</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1085</td>
<td>18</td>
</tr>
<tr>
<td>PCW1-015</td>
<td>150</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1085</td>
<td>18</td>
</tr>
<tr>
<td>PCW1-020</td>
<td>180</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1085</td>
<td>18</td>
</tr>
</tbody>
</table>

*From & At 212°F.*  
**These models may require 2 power panels (add 12" to "W" dim).  
† Models above 1040KW are also available in 40KW increments.

### 380 & 415 VOLT RATINGS*

<table>
<thead>
<tr>
<th>Model Number*</th>
<th>Rating MBH&quot;</th>
<th>KW</th>
<th>Qty</th>
<th>KW</th>
<th>Circuits</th>
<th>Steps @ KW</th>
<th>Amps (380/3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCW1-005</td>
<td>75</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1085</td>
<td>18</td>
</tr>
<tr>
<td>PCW1-010</td>
<td>125</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1085</td>
<td>18</td>
</tr>
<tr>
<td>PCW1-015</td>
<td>150</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1085</td>
<td>18</td>
</tr>
<tr>
<td>PCW1-020</td>
<td>180</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1085</td>
<td>18</td>
</tr>
</tbody>
</table>

*From & At 100°C.*  
**These models may require 2 power panels (add 12" to "W" dim).  
† Models above 840KW are also available in 30KW increments.

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*For complete model number, suffix boiler KW by element KW letter designation, wherein A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts).  
(eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)  
# Oversize control cabinets are supplied for these models at 208 & 240 volts.  
## These models also available @ 380/415 volts derated by 25%  
### These models have 108 wsi elements.
1. GENERAL
Furnish and install as shown on the plans electric hot water boilers, fabricated per these specifications, including all accessories and construction features as described herein. Boilers shall be completely factory assembled and pre-tested prior to shipment. Boilers shall be UL labeled and shall include an ASME Section IV pressure vessel which has been fabricated under inspection by an authorized inspector holding a National Board commission and subsequently stamped and National Board registered. Units shall also comply with CSD-1.

2. RATINGS
Boilers shall each be PRECISION Compac Model No. PCW-1,2,3,4 or 5 rated________ KW, designed and fabricated for a balanced 3-phase, 3-wire, delta load at _____ volts, 3-phase, ____ hertz. The boilers shall be designed for ______ GPM with a discharge temperature of ______°F with entering water at ______°F.

3. PRESSURE VESSEL
The pressure vessel and all trim shall be as set forth in the ASME Code, including ASME “HV” stamped safety relief valve sized as required. The vessel shall be provided with a threaded 3” (4” flanged) inlet and a threaded 3” (4” flanged) outlet, plus safety valve and drain nozzle as required. The pressure vessel shall be housed in a 16-gauge steel enclosure allowing 4 inches of insulation space around the vessel and filled with 4 inches of 3/4 pound-density fiberglass insulation. The electric panel and vessel shall be mounted on a common, structural steel base with overall dimensions of the unit not to exceed ___”D x ___”W x ___”H.

4. INTERNAL POWER DISTRIBUTION
The power distribution shall be through cable connection to mechanical lugs. Power shall be fed through current limiting fuses to magnetic contactors, and then to the heating element circuits. Contactors shall be 3-pole magnetic contactors tested by UL for 500,000 cycles at full load. The coil voltage shall be 120-volts. Internal wiring shall be in accordance with UL & NEC.

5. HEATING ELEMENTS
Elements shall be individually mounted in steel flanges. The flange size shall not exceed 2 1/2 inches square, with a maximum of three single-bend U-shaped element blades per flange. Element sheath material shall be Incoloy.

6. CONTROLS
The control circuit shall be 120-volt single-phase, one side grounded. Control voltage shall be provided by an integral control circuit transformer, fused on both legs of the primary, with a control circuit fuse on the ungrounded leg of the secondary. The controls shall include an ON/OFF switch, a manual limit switch and, indicator lights for each stage of heating, a low water cut-off, and one auto reset and one manual reset high limit temperature switches.

7. MANUFACTURER
Boilers shall be PRECISION Model PCW-1,2,3,4 or 5 or approved equivalent. Alternate bids shall indicate any deviations from these specifications, and shall state price additions or deductions for substitution of said alternates.
LIMITED WARRANTY

PRECISION warrants all electrical components (except pilot lights and fuses), pressure vessel and heating elements, if found defective in workmanship or material while under normal use and service within the first year of operation or until 18 months after shipment from PRECISION’S factory, whichever occurs first, after authorized return by purchaser to PRECISION (at purchaser’s expense) and after examination discloses to PRECISION’S reasonable satisfaction to be defective. The repair or replacement of defective parts will be made by PRECISION without charge. PRECISION will not be held responsible for any field charges in connection with the removal or replacement of allegedly defective parts, nor for incidental or consequential damages. This guarantee does not include damage resulting from unsuitable water.

CONTACT US FOR THESE QUALITY PRODUCTS

- Electric Storage Heaters 125 to 5500 Gallons
- Electrode High Voltage Boilers
- Thermal Storage Systems Space Heating & Domestic or Process Water; Electric, Gas or Steam Fired
- Boiler Feedwater Systems
- Pressure Vessels Water Storage Tanks Flash Tanks Blowdown Tanks
- Unfired Hot Water and Steam Generators
- Deaerators and Surge Tanks
- Steam Superheaters-Electric
- Circulation Heaters-Electric
- Gas or Oil-Fired Vertical Firetube Boilers and Water Heaters
- Gas or Oil-Fired WaterTube Boilers (Flextube Type)
- Chemical Bypass Feeders and Automatic Chemical Feed Systems

NOTE: In pursuing our policy of continuous development of products, PRECISION reserves the right to vary any detail in this bulletin without notice.