APPLICATION GUIDE
FOR USE WITH

HEATING ONLY - 100, 125, 165
&
COMBI - 115, 150, 205

This manual has been prepared for use with the appropriate Installation, Operation and Maintenance Manual.
## TABLE OF CONTENTS

**Important Safety Information** .................................................................................. 3
**Labor Saving Piping Manifolds / Near Boiler Piping Connections** .......................... 4
**General Information - Hydronic Piping** .................................................................. 6
**General Information - Wiring** .................................................................................. 8

### Piping and Wiring Diagrams

#### Piping Legend

- 100, 125 W/Zone Circulators & DHW Tank - Piping Diagram ................................. 10
- 100, 125 W/Indirect Zone Circulators, DHW Tank W/Sensor - Wiring Diagram 11
- 100, 125 W/Indirect Zone Circulators & DHW Tank W/T-Stat - Wiring Diagram 12
- 100, 125 With Zone Valves & DHW Tank - Piping Diagram ................................. 13
- 100, 125 With Zone Valves, DHW Tank W/Sensor - Wiring Diagram .................. 14
- 100, 125 Zone Valves, DHW Tank W/T-Stat - Wiring Diagram ............................ 15
- 165 With Zone Circulators - Piping Diagram ...................................................... 16
- 165 Indirect Zone Circulators, DHW Tank W/ T-Stat - Wiring Diagram ............ 17
- 165 With Zone Valves - Piping Diagram ............................................................. 18
- 165 With Indirect Zone Valves, DHW Tank, Tank T-Stat - Wiring Diagram ....... 19
- 115, 150 & 205 With Zone Circulators - Piping Diagram ................................. 20
- 115, 150 & 205 With Zone Circulators - Wiring Diagram .................................... 21
- 115, 150 & 205 With Zone Valves - Piping Diagram .......................................... 22
- 115, 150 & 205 With Zone Valves - Wiring Diagram .......................................... 23
- External Buffer Tank - Piping Diagram ............................................................... 24
- External Buffer Tank - Wiring Diagram ............................................................... 25

#### Optional Equipment

- Chart 1 - 1k Ω Outdoor Air Sensor Data ............................................................... 29
- Chart 2 - 10k Ω Indirect Tank Sensor Data ......................................................... 29

#### Accessories

- Outdoor Temperature Sensor .............................................................................. 30
- Indirect Storage Tank Sensor & Thermostat ....................................................... 30

#### Wiring Diagrams

- Single Zone Circulator Wiring Using Argo AR822-I ............................................ 32
- 100 - Heat Only Wiring Diagram ...................................................................... 33
- 125 - Heat Only Wiring Diagram ...................................................................... 34
- 165 - Heat Only Wiring Diagram ...................................................................... 35
- 115 - Combi Wiring Diagram ........................................................................... 36
- 150 - Combi Wiring Diagram ........................................................................... 37
- 205 - Combi Wiring Diagram ........................................................................... 38

#### Altitude Effects On Boiler Performance ............................................................ 39

#### Application Table - Indirect Hot Water Tank Performance Chart ................. 40

#### LWCO Wiring Diagram...................................................................................... 41

#### Piping Diagram - LWCO Location .................................................................... 42

#### Low Water Cutoff - Detail ................................................................................ 43

#### Error Code Table ............................................................................................. 44

#### Troubleshooting Chart ...................................................................................... 45

#### Fault Solution Sections .................................................................................... 47

#### Parameter Change History .............................................................................. 51
1. **Become familiar with symbols identifying potential hazards.**

   ![Safety Alert Symbol]

   This is the safety alert symbol. Symbol alerts you to potential personal injury hazards. Obey all safety messages following this symbol to avoid possible injury or death.

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CAUTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</td>
</tr>
</tbody>
</table>

2. **General**

   Boiler installation shall be completed by qualified agency. See Installation, Operation & Maintenance Manual for additional information.

   ![Safety Alert Symbol]

   **WARNING**

   Fire, explosion, asphyxiation and electrical shock hazard. Improper installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

   ![Safety Alert Symbol]

   **WARNING**

   Fire, Explosion, Asphyxiation, Electrical shock hazard! Flooding will result in damages such as electrical problems, corrosion, inoperative parts, mold and other unforeseen issues which can occur over time. Any equipment determined by a professional as damaged by a flood, defined as excess of water or other liquid, shall be replaced. Failure to follow these directions will result in a Hazardous Situation.

3. **Installation shall conform to requirements of authority having jurisdiction or in absence of such requirements:**

   - **United States**
     - National Electrical Code, NFPA 70.
   - **Canada**
     - Natural Gas and Propane Installation Code, CAN/CSA B149.1.
     - Canadian Electrical Code, Part I, Safety Standard for Electrical Installations, CSA C22.1

4. **Where required by authority having jurisdiction, installation shall conform to Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.**

   Additional manual reset low water cutoff and/or high limit may be required.

5. **Requirements for Commonwealth of Massachusetts:**

   Boiler installation must conform to Commonwealth of Massachusetts code 248 CMR which includes but is not limited to:
   - Installation by licensed plumber or gas fitter.
**LEGEND**

<table>
<thead>
<tr>
<th></th>
<th><strong>100/125</strong></th>
<th><strong>165</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Pressure Gauge</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>Pressure Relief Valve</td>
<td>30.00 psi [2.11 bar]</td>
</tr>
<tr>
<td>C</td>
<td>Heating return connection</td>
<td>3/4” [22.2mm] 1” [25.4mm]</td>
</tr>
<tr>
<td>E</td>
<td>Gas shutoff connection</td>
<td>3/4” [22.2mm]</td>
</tr>
<tr>
<td>H</td>
<td>Drain connection for condensate</td>
<td>13/16” [21mm] ID Hose 3/4 NPT</td>
</tr>
<tr>
<td>I</td>
<td>Heating supply connection</td>
<td>3/4” [22.2mm] 1” [25.4mm]</td>
</tr>
<tr>
<td>J</td>
<td>Optional Indirect DHW connection</td>
<td>3/4” [22.2mm] na</td>
</tr>
</tbody>
</table>

**MANIFOLD 165**

1-1/2” Header
LABOR SAVING PIPING MANIFOLDS / NEAR BOILER PIPING CONNECTIONS

115 & 150 COMBI

205 COMBI

---

<table>
<thead>
<tr>
<th>LEGEND</th>
<th>115 &amp; 150</th>
<th>205</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Pressure Gauge</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>B Pressure Relief Valve</td>
<td>30.00 psi [2.11 bar]</td>
<td></td>
</tr>
<tr>
<td>C Heating return connection</td>
<td>3/4” [22.2mm]</td>
<td>1” [25.4mm]</td>
</tr>
<tr>
<td>D Cold DHW inlet tap</td>
<td>1/2” [15.9mm]</td>
<td>3/4” NPT</td>
</tr>
<tr>
<td>E Gas shutoff connection</td>
<td>3/4” [22.2mm]</td>
<td></td>
</tr>
<tr>
<td>F Cold DHW inlet tap</td>
<td>1/2” [15.9mm]</td>
<td>na</td>
</tr>
<tr>
<td>G DHW outlet</td>
<td>1/2” [15.9mm]</td>
<td>3/4” NPT</td>
</tr>
<tr>
<td>H Drain connection for condensate</td>
<td>13/16” [21mm] ID Hose</td>
<td>3/4 NPT</td>
</tr>
<tr>
<td>I Heating supply connection</td>
<td>3/4” [22.2mm]</td>
<td>1” [25.4mm]</td>
</tr>
<tr>
<td>J Manifold</td>
<td>1-1/4” [31.75 mm]</td>
<td>1-1/2” [38.1 mm]</td>
</tr>
<tr>
<td>K 5 gpm DHW flow restrictor (Factory installed) (205 only)</td>
<td>na</td>
<td>3/4” [22.2mm]</td>
</tr>
</tbody>
</table>
General Information:
Piping installation, materials, and joining methods shall conform to requirements of authority having jurisdiction or in absence of such requirements:
- **USA** - National Fuel Gas Code, ANSI Z223.1/NFPA 54
- **Canada** - Natural Gas and Propane Installation Code, CAN/CSA B149.1

Manufacturer Requirements/Recommendations:

- **Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve.**
  Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.

- Use a water filter on potable incoming water supply line.

- Manufacturer recommends use of a magnetic dirt separator in the hydronic system where there are cast iron or steel components, or where the previous boiler was a cast iron heat exchanger. The abrasive, extremely fine sediment is difficult to remove and can deposit onto heat exchanger surfaces and accumulate in pump cavities causing reduced efficiency and premature wear.

- If the piping manifold is not used the ASME temperature and pressure relief valve and temperature and pressure gauge shall be installed to conform to requirements of the authority having jurisdiction. Refer to appropriate manufacturer instructions for installation requirements.

- If the piping manifold is not used, a primary / secondary piping arrangement is manufacturer required, unless using Buffer Tank. A maximum of 12 in of separation between the supply and return pipe (closely spaced tees) of the boiler shall be maintained. Limit combined supply and return pipe lengths to maximum linear lengths of 20 ft (6.1 m) between boiler and closely spaced tees, when minimum ¾ in NPT pipe size is used. Linear length may be increased if supply and return pipe size is increased to limit pressure drop.

- Manufacturer recommends installing a shutoff and purge valve to use during commissioning to ensure the boiler does not shut down due to over temperature. Do not install shutoff between boiler and LWCO or pressure relief valve.

**FOR YOUR SAFETY READ BEFORE OPERATING**

**DANGER**

Hot Water Can Scald!
Water heated to temperature for clothes washing, dish washing and other sanitizing needs can scald and cause permanent injury. Children, elderly, and infirmed or physically handicapped persons are more likely to be permanently injured by hot water. Never leave them unattended in bathtub or shower. Never allow small children to use a hot water tap or draw their own bath.

If anyone using hot water in the building fits the above description, or if state laws or local codes require certain water temperatures at hot water taps, you must take special precautions:

- Use lowest possible temperature setting.
- Install some type of tempering device, such as an automatic mixing valve, at hot water tap or water heater. Automatic mixing valve must be selected and installed according to manufacturer's recommendations and instructions.
- Water passing out of drain valves may be extremely hot. To avoid injury:
  - Make sure all connections are tight.
  - Direct water flow away from any person.

**WARNING**

Burn and scald hazard! Manufacturer requires installation of field supplied anti-scald valve. Failure to follow these instructions could result in death or serious injury.
### General Information - Hydronic Piping

<table>
<thead>
<tr>
<th>Water Temperature Setting</th>
<th>1st Degree Burn Exposure Time For An Adult</th>
<th>2nd and 3rd Degree Burn Exposure Time For An Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>120° F</td>
<td>1 minute</td>
<td>5 minutes</td>
</tr>
<tr>
<td>130° F</td>
<td>5 seconds</td>
<td>30 seconds</td>
</tr>
<tr>
<td>140° F</td>
<td>2 seconds</td>
<td>5 seconds</td>
</tr>
<tr>
<td>150° F</td>
<td>1 second</td>
<td>1.5 seconds</td>
</tr>
<tr>
<td>160° F</td>
<td>Instantaneous</td>
<td>0.5 seconds</td>
</tr>
</tbody>
</table>

**Note:** Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.

**Note:** Arrange piping to prevent water dripping onto boiler.

Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.

**Warning for Infants, Children, and Elderly:** Great care must be taken when exposing the aforementioned groups to warm or hot water as they can be badly burned in exposure times less than half of the time for an adult.

### Use of Indirect Water Heater (DHW) Heating Only Boiler:

**Note:** Sensors supplied with this boiler are proprietary to the manufacturer. Use of alternate sensors **will** diminish boiler performance.

- Use DHW sensor kit 550003189 to interface with boiler. Wire to M2 terminals #3 and #4. Exception: not applicable for the 165 model, use aquastat for indirect tank control.
- For heating only boilers with DHW outlet connection, see page 4, indirect water heater shall be piped utilizing the internal boiler pump. See pages 10 and 13.
- Locate tank as close to boiler as possible.
- See Indirect Tank Performance chart, page 40 of this manual.
- Change P03 on boiler for application as specified on the applicable wire diagram in this manual or Boiler Control Section 9 of Installation, Operation & Maintenance Manual supplied with the boiler.

### Use of Buffer Tank:

- If using internal boiler pump, manifold shall be cut for use as shown on page 24, increase pipe size to match Buffer tank connections as shown.
- Locate tank as close to boiler as possible.
**GENERAL INFORMATION - WIRING**

**Electrical Wiring Information:**

All field wiring shall conform to the authority having jurisdiction or, in the absence of such requirements to:

- **USA:** National Electrical Code, ANSI/NFPA 70,
- **Canada:** Canadian Electrical Code, Part I, CSA C22.1: Safety Standard for Electrical Installations.

Wiring diagrams shown in this manual utilize ARGO™ Controls, the optional use of an Indirect Domestic Hot Water Tank, and optional use of a H2O Buffer Tank.

Reference the zone control manufacturer instruction manual for control operation and priority setting of DHW zones.

---

**Note**

DO NOT use 120 V thermostat terminals (M1- #1 and #2).

**Note**

Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.

---

**BOILER CONTROL**

![Wiring Diagram of Boiler Control](image)

- **10k Ω** DHW Indirect Tank Sensor (125 Unit Only) or DHW Indirect Tank Aquastat (Heating Only Boilers)
- **1k Ω** Outdoor Reset Sensor
- **0-10 V Connection**
- **Zone Control End-Switch**
- **Open Therm**
- **G N L**
- **M1**
- **M2**
- **24 VAC**
- **SUPPLY Cord 120V/60HZ**

* Ground Sensors using terminal 4
Locate shut off valve after any field installed LWCO.
If adding an indirect tank with sensor to a Heating Only Boiler, change P03 from 08 to 05.
See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

Reference zone control manufacturer instructions for details on setting priority if necessary.
If adding an indirect tank with Thermostat to a Heating Only Boiler, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.
If adding an indirect tank with sensor to a Heating Only Boiler, change P03 from 08 to 05.
See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.
If adding an indirect tank with *Thermostat* to a *Heating Only Boiler*, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.
Locate shut off valve after any field installed LWCO.
If adding an indirect tank with **Thermostat** to a **Heating Only Boiler**, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

Reference zone control manufacturer instructions for details on setting priority if necessary.
165 WITH ZONE VALVES - PIPING DIAGRAM

1. Locate shut off valve after any field installed LWCO.

2. PN 240011430 REV. P [09/15/2021]
If adding an indirect tank with *Thermostat* to a *Heating Only Boiler*, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

Reference zone control manufacturer instructions for details on setting priority if necessary.
Locate shut-off valve after any field installed LWCO.
115, 150 & 205 WITH ZONE CIRCULATORS, ARGO UZ3 ZONE CONTROL
Locate shut off valve after any field installed LWCO.

MAGNETIC DIRT SEPARATOR

Shut off & Purge Valve

FROM SYSTEM

DHW COLD INLET

TEMPERED HOT WATER SUPPLY

Heating Load

Heating Load

PRIMARY PUMP

COLD WATER SUPPLY

PN 240011430 REV. P [09/15/2021]
Buffer Tank Piping

When installing low mass systems, additional water mass may be required to avoid short cycling by the boiler. In these applications it is recommended that a buffer tank be installed.

Buffer Tank on Central Heat Circuit Using Internal Boiler Circulator

**Note:**
- DHW piping not shown for clarity. Reference applicable sections of this manual for DHW piping details.
- Internal Boiler circulator used on Primary circuit.

![Graphical representation of Buffer Tank Piping](image)
Buffer Tank On Central Heat Circuit With Primary Pump and Supplied Manifold

NOTE: Acceptable primary pump locations: Either 1 or 2. For pump wiring see diagrams on pages 26-29.
Buffer Tank Pump Wiring

Controlling A Primary Pump On A Combi Boiler With Zone Valves, No Indirect Tank
Buffer Tank Pump Wiring

Controlling A Primary Pump On A Combi Boiler With Zone Pumps, Argo ARM 4P Zone Control and A822-II

To Zone Tstats

To Zone Pumps

120Vac power to control

Factory Installed Jumper Between L1 & 3

120Vac power to control

120Vac power to control
Buffer Tank Pump Wiring

Controlling A Primary Pump On A Combi Boiler With Zone Valves and Indirect Tank With Priority Argo UZ3 and AR22II Zone Controls

---

**Buffer Tank**

**Domestic Hot Water Tank**

**Zone Thermostats**

**Zone Valves**

**Digital LCD User Display**

**Fuse**

**Zone Module**

**Transformer**

**115 Vac**

**Primary Pump**

**DHW Pump**

**115 Vac Field Supplied Power Per NEC and Local Codes**

**Field Supplied Power Per NEC and Local Codes**

---

**Diagram Details:**

- **Buffer Tank:**
  - Label: Buffer Tank
  - Connections: Various connections to other components

- **Domestic Hot Water Tank:**
  - Label: Domestic Hot Water Tank
  - Connections: Connected to buffer tank

- **Zone Thermostats:**
  - Label: Zone Thermostats
  - Connections: Various connections to other components

- **Zone Valves:**
  - Label: Zone Valves
  - Connections: Various connections to other components

- **Digital LCD User Display:**
  - Label: Digital LCD User Display
  - Connections: Connected to zone module

- **Fuse:**
  - Label: Fuse
  - Connections: Connected to zone module

- **Zone Module:**
  - Label: Zone Module
  - Connections: Connected to zone valves

- **Transformer:**
  - Label: Transformer
  - Connections: Connected to 115 Vac

- **115 Vac:**
  - Label: 115 Vac
  - Connections: Connected to primary pump and DHW pump

- **Primary Pump:**
  - Label: Primary Pump
  - Connections: Connected to 115 Vac

- **DHW Pump:**
  - Label: DHW Pump
  - Connections: Connected to 115 Vac

- **115 Vac Field Supplied Power Per NEC and Local Codes:**
  - Label: 115 Vac Field Supplied Power Per NEC and Local Codes
  - Connections: Connected to primary pump and DHW pump

- **Field Supplied Power Per NEC and Local Codes:**
  - Label: Field Supplied Power Per NEC and Local Codes
  - Connections: Connected to primary pump and DHW pump

---

**Additional Notes:**

- **M2:**
  - Label: M2
  - Connections: Various connections to other components

- **AR822-II:**
  - Label: AR822-II
  - Connections: Various connections to other components

---

**Diagram Source:**

PN 240011430 REV. P [09/15/2021]
Optional Equipment

**IMPORTANT:** Sensors supplied with this boiler are proprietary to the manufacturer. Use of alternate market sensors \textbf{WILL} diminish boiler performance.

1. \textbf{1k} $\Omega$ Outdoor Air Sensor, if used.
   A. Boiler automatically recognizes sensor when used.
   B. See Chart 1 for sensor data. Sensor part number BD710487302V
   C. Locate outdoor sensor to protect against wind and direct sunlight. Mounting instructions provided with sensor.
   D. Maximum wire length is 100 ft (30m) for 22 ga. wire, or 150 ft (45m) for 18 ga. wire.
   E. Connect wires to M2 OUTDOOR SENSOR terminals 4 & 5. Wires are interchangeable. See Accessories.

2. \textbf{10k} $\Omega$ Sensor for Indirect DHW Tank (Heating Only Boiler, Exception: not applicable to the 165 model, use aquastat for indirect tank control.).
   A. See Chart 2 for sensor data.
   B. Connect wires to M2 terminals 3 & 4.

### Chart 1 - 1k $\Omega$ Outdoor Air Sensor Data

<table>
<thead>
<tr>
<th>T [$^\circ$F]</th>
<th>R [Ohm]</th>
<th>T [$^\circ$F]</th>
<th>R [Ohm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4.0</td>
<td>7,578</td>
<td>53.6</td>
<td>1,690</td>
</tr>
<tr>
<td>-2.2</td>
<td>7,193</td>
<td>55.4</td>
<td>1,621</td>
</tr>
<tr>
<td>-0.4</td>
<td>6,831</td>
<td>57.2</td>
<td>1,555</td>
</tr>
<tr>
<td>1.4</td>
<td>6,489</td>
<td>59.0</td>
<td>1,492</td>
</tr>
<tr>
<td>3.2</td>
<td>6,166</td>
<td>60.8</td>
<td>1,433</td>
</tr>
<tr>
<td>5.0</td>
<td>5,861</td>
<td>62.6</td>
<td>1,375</td>
</tr>
<tr>
<td>6.8</td>
<td>5,574</td>
<td>64.4</td>
<td>1,321</td>
</tr>
<tr>
<td>8.6</td>
<td>5,303</td>
<td>66.2</td>
<td>1,268</td>
</tr>
<tr>
<td>10.4</td>
<td>5,046</td>
<td>68.0</td>
<td>1,218</td>
</tr>
<tr>
<td>12.2</td>
<td>4,804</td>
<td>69.8</td>
<td>1,170</td>
</tr>
<tr>
<td>14.0</td>
<td>4,574</td>
<td>71.6</td>
<td>1,125</td>
</tr>
<tr>
<td>15.8</td>
<td>4,358</td>
<td>73.4</td>
<td>1,081</td>
</tr>
<tr>
<td>17.6</td>
<td>4,152</td>
<td>75.2</td>
<td>1,040</td>
</tr>
<tr>
<td>19.4</td>
<td>3,958</td>
<td>77.0</td>
<td>1,000</td>
</tr>
<tr>
<td>21.2</td>
<td>3,774</td>
<td>78.8</td>
<td>962</td>
</tr>
<tr>
<td>23.0</td>
<td>3,600</td>
<td>80.6</td>
<td>926</td>
</tr>
<tr>
<td>24.8</td>
<td>3,435</td>
<td>82.4</td>
<td>892</td>
</tr>
<tr>
<td>26.6</td>
<td>3,279</td>
<td>84.2</td>
<td>858</td>
</tr>
<tr>
<td>28.4</td>
<td>3,131</td>
<td>86.0</td>
<td>827</td>
</tr>
<tr>
<td>30.2</td>
<td>2,990</td>
<td>87.8</td>
<td>796</td>
</tr>
<tr>
<td>32.0</td>
<td>2,857</td>
<td>89.6</td>
<td>767</td>
</tr>
<tr>
<td>33.8</td>
<td>2,730</td>
<td>91.4</td>
<td>740</td>
</tr>
<tr>
<td>35.6</td>
<td>2,610</td>
<td>93.2</td>
<td>713</td>
</tr>
<tr>
<td>37.4</td>
<td>2,496</td>
<td>95.0</td>
<td>687</td>
</tr>
<tr>
<td>39.2</td>
<td>2,387</td>
<td>96.8</td>
<td>663</td>
</tr>
<tr>
<td>41.0</td>
<td>2,284</td>
<td>98.6</td>
<td>640</td>
</tr>
<tr>
<td>42.8</td>
<td>2,186</td>
<td>100.4</td>
<td>617</td>
</tr>
<tr>
<td>44.6</td>
<td>2,093</td>
<td>102.2</td>
<td>595</td>
</tr>
<tr>
<td>46.4</td>
<td>2,004</td>
<td>100.4</td>
<td>617</td>
</tr>
<tr>
<td>48.2</td>
<td>1,920</td>
<td>102.2</td>
<td>595</td>
</tr>
<tr>
<td>50.0</td>
<td>1,840</td>
<td>104.0</td>
<td>575</td>
</tr>
<tr>
<td>51.8</td>
<td>1,763</td>
<td>106.0</td>
<td>556</td>
</tr>
</tbody>
</table>

### Chart 2 - 10k $\Omega$ Indirect Tank Sensor Data

<table>
<thead>
<tr>
<th>T [$^\circ$F]</th>
<th>R [Ohm]</th>
<th>T [$^\circ$F]</th>
<th>R [Ohm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>32,505</td>
<td>86.0</td>
<td>8,060</td>
</tr>
<tr>
<td>33.8</td>
<td>30,898</td>
<td>87.8</td>
<td>7,726</td>
</tr>
<tr>
<td>35.6</td>
<td>29,381</td>
<td>89.6</td>
<td>7,407</td>
</tr>
<tr>
<td>37.4</td>
<td>27,946</td>
<td>91.4</td>
<td>7,103</td>
</tr>
<tr>
<td>39.2</td>
<td>26,590</td>
<td>93.2</td>
<td>6,813</td>
</tr>
<tr>
<td>41.0</td>
<td>25,308</td>
<td>95.0</td>
<td>6,537</td>
</tr>
<tr>
<td>42.8</td>
<td>24,094</td>
<td>96.8</td>
<td>6,273</td>
</tr>
<tr>
<td>44.6</td>
<td>22,946</td>
<td>98.6</td>
<td>6,021</td>
</tr>
<tr>
<td>46.4</td>
<td>21,859</td>
<td>100.4</td>
<td>5,781</td>
</tr>
<tr>
<td>48.2</td>
<td>20,829</td>
<td>102.2</td>
<td>5,551</td>
</tr>
<tr>
<td>50.0</td>
<td>19,854</td>
<td>104.0</td>
<td>5,332</td>
</tr>
<tr>
<td>51.8</td>
<td>18,930</td>
<td>105.8</td>
<td>5,123</td>
</tr>
<tr>
<td>53.6</td>
<td>18,054</td>
<td>107.6</td>
<td>4,923</td>
</tr>
<tr>
<td>55.4</td>
<td>17,223</td>
<td>109.4</td>
<td>4,732</td>
</tr>
<tr>
<td>57.2</td>
<td>16,436</td>
<td>111.2</td>
<td>4,549</td>
</tr>
<tr>
<td>59.0</td>
<td>15,689</td>
<td>113.0</td>
<td>4,374</td>
</tr>
<tr>
<td>60.8</td>
<td>14,980</td>
<td>114.8</td>
<td>4,207</td>
</tr>
<tr>
<td>62.6</td>
<td>14,306</td>
<td>116.6</td>
<td>4,047</td>
</tr>
<tr>
<td>64.4</td>
<td>13,667</td>
<td>118.4</td>
<td>3,894</td>
</tr>
<tr>
<td>66.2</td>
<td>13,060</td>
<td>120.2</td>
<td>3,748</td>
</tr>
<tr>
<td>68.0</td>
<td>12,483</td>
<td>122.0</td>
<td>3,608</td>
</tr>
<tr>
<td>69.8</td>
<td>11,935</td>
<td>123.8</td>
<td>3,473</td>
</tr>
<tr>
<td>71.6</td>
<td>11,414</td>
<td>125.6</td>
<td>3,345</td>
</tr>
<tr>
<td>73.4</td>
<td>10,919</td>
<td>127.4</td>
<td>3,222</td>
</tr>
<tr>
<td>75.2</td>
<td>10,447</td>
<td>129.2</td>
<td>3,104</td>
</tr>
<tr>
<td>77.0</td>
<td>9,999</td>
<td>131.0</td>
<td>2,991</td>
</tr>
<tr>
<td>78.8</td>
<td>9,572</td>
<td>132.8</td>
<td>2,882</td>
</tr>
<tr>
<td>80.6</td>
<td>9,166</td>
<td>134.6</td>
<td>2,778</td>
</tr>
<tr>
<td>82.4</td>
<td>8,779</td>
<td>136.4</td>
<td>2,679</td>
</tr>
<tr>
<td>84.2</td>
<td>8,411</td>
<td>138.2</td>
<td>2,583</td>
</tr>
</tbody>
</table>
1. **1K Ohm (1K Ω) Outdoor Temperature Sensor Kit - BD710487302V**

- Use the Outdoor Sensor (OAS) Kit with Heating Only or Combi Boilers.
- Wire Control to boiler M2 terminal strip, terminals 4 and 5 as shown.
- Install/locate Control follow supplied instructions with sensor kit and Installation, Operation and Maintenance Manual (IOM).

**Setting “Kt” Climate Curve:**

1. Boiler automatically recognizes OAS sensor when wired to M2 terminal block. Display changes to show current default “Kt” value (80). Note display value.
2. When operating in CH mode, boiler setpoint is determined by the Kt value selected and actual outside air temperature. Refer to applicable °F (or °C) chart, (pg. 30) for setpoint information.
3. Select Kt range which will satisfy the desired boiler delivery temperature based on outdoor temperature range expected for your location. For example: if you need 176°F water when the outside temperature is 20°F and colder, select 35 for your Kt setting.
4. To change “default” Kt value on boiler control use CH Heating buttons.
5. Restrict the upper limit of the Kt curve by using Parameter P16 to set the maximum boiler water temperature. P16 Default is 176°F.
3. When OAS is installed, pressing or buttons will no longer display boiler CH setpoint temperature. It now displays the Kt value which can range from 10 to 90.
4. When scrolling has stopped, boiler will automatically “SAVE” value as new Kt default value and automatically return to CH mode when no Kt adjustment activity is sensed. Kt values can be changed in +/- 1 point increments.
5. To return, to verify or change current Kt “default value, depress one of the CH setpoint adjustment buttons (once), or , while in any heating or standby mode. Adjust Kt value to obtain desired comfort level.

**Flow Temp**  
**Outside Temp**

---

**Note**

For temperatures below -40°F (-40°C), maximum heating flow temperature set point no longer increases and curves on the graph become horizontal. Boiler set point will override sensor setpoint.
2. 10k Ω Indirect Storage Tank Sensor Kit

Heating Only boiler can be electrically connected to Indirect Storage Tank.

Diagram of electrical connection of external indirect storage tank is shown below.

Connect DHW priority sensor to terminals 3 and 4 on terminal block M2. The element of the sensor must be inserted in the sensor well located on the indirect storage tank.

Verify the exchange capacity of the indirect boiler tank coil is appropriate for power of the heating only boiler. Adjust DHW temperature (+95°F...+140°F / +35°C...+60°C) by pressing buttons on boiler control panel.

Management of 0-10V Input

To activate the 0-10v function parameter 82 must be set to 3.

There must be at or above 3 V DC present for the control to recognize a call for heat.

When P78 = 1 the 0-10v input manages CH heating setpoint directly per chart below.

When P78 = 2 the 0-10v input manages CH heating input directly per chart below.

When P78 = 0 Disabled

### Table: 0-10V Input Setting

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Temp Setting</th>
<th>100/115 kW</th>
<th>100/115 MBH</th>
<th>125/150 kW</th>
<th>125/150 MBH</th>
<th>165/205 kW</th>
<th>165/205 MBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>25 / 77</td>
<td>4.9</td>
<td>16.6</td>
<td>6.4</td>
<td>22.0</td>
<td>8.6</td>
<td>29.5</td>
</tr>
<tr>
<td>4</td>
<td>32 / 90</td>
<td>8.4</td>
<td>28.9</td>
<td>10.7</td>
<td>36.5</td>
<td>14.4</td>
<td>49.0</td>
</tr>
<tr>
<td>5</td>
<td>40 / 104</td>
<td>12.0</td>
<td>40.8</td>
<td>14.9</td>
<td>51.0</td>
<td>19.9</td>
<td>68.0</td>
</tr>
<tr>
<td>6</td>
<td>49 / 120</td>
<td>15.4</td>
<td>52.4</td>
<td>19.2</td>
<td>65.5</td>
<td>25.5</td>
<td>87.0</td>
</tr>
<tr>
<td>7</td>
<td>57 / 135</td>
<td>18.5</td>
<td>63.1</td>
<td>23.4</td>
<td>80.0</td>
<td>31.1</td>
<td>106.0</td>
</tr>
<tr>
<td>8</td>
<td>65 / 149</td>
<td>22.2</td>
<td>75.7</td>
<td>27.7</td>
<td>94.5</td>
<td>36.6</td>
<td>125.0</td>
</tr>
<tr>
<td>9</td>
<td>73 / 163</td>
<td>25.3</td>
<td>86.2</td>
<td>31.9</td>
<td>109.0</td>
<td>42.5</td>
<td>145.0</td>
</tr>
<tr>
<td>10</td>
<td>80 / 176</td>
<td>27.4</td>
<td>93.6</td>
<td>36.9</td>
<td>125.0</td>
<td>48.1</td>
<td>164.0</td>
</tr>
</tbody>
</table>
Single Zone Circulator Wiring Using ARGO AR822-II

CIRCUIT ON

Factory Installed Jumper Between L1 & 3

120 VAC

L2

L1

CIRCUIT ON

Class 2 Terminals

Primary Terminals

THEROSTAT

ARGO AR822-II

TORQUE TERMINAL SCREWS 6 TO 7 INCH LBS

PN 240011430 REV. P [09/15/2021]
If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wire having the same specifications.

LEGEND - LEGENDE:
1 - Fuses 3.15 A
2 - Supply 120V - 60Hz - Alimentation
4 - Fan - Ventilator
6 - Safety Thermostat - Thermostat de Sécurité
7 - Water Pressure Switch - Pressostat Eau
9 - NTC return Sensor - Sonde retour NTC
10 - NTC flow sensor - Sonde NTC départ
11 - Remote User Interface or Open Therm
12 - Prov. for Outside Sensor
13 - Link 24V
14 - Flame Sensing Electrode - Electrode présence veilleuse
15 - Ignition Electrode - Electrode d'allumage
16 - Three Way Valve - Soupape Trois Voies
17 - Pump - Pompe
18 - Flue Safety Thermostat - Thermostat Fumées
19 - Link 0 - 10V
20 - Condensate sensor - Capteur de condensation
M1 - Main Power Terminal Board - Bornier d'alimentation
M2 - Accessories terminal Board - Bornier pour accessoires

WIRING DIAGRAM
SCHEMA DE CABLAGE
If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wire having the same specifications.

Bl = Blue - Bleu
Br = Brown - Brun
Bk = Black - Noir
R = Red - Rouge
G/Y = Green / Yellow - Vert / Jaune
W = White - Blanc
G = Green - Vert
Gr = Grey - Gris
lB = Light Blue - Celéste

MODEL 125 - Heat Only

125 - HEAT ONLY WIRING DIAGRAM

PN 240011430 REV. P [09/15/2021]
MODEL 165 - Heat Only
LEGEND - LEGENDE:
1-Fuses 3,15 A - Fusibles 3,15 A
2-Supply 120V - 60Hz - Alimentation
3-Fan - Ventilator
5-CH Water High Limit - Thermostat de Sécurité
6-Gas valve - Vanne a gaz
7-DHW Flow Switch - Commutateur départ ECS
8-Exchanger sensor - Sonde echangeur
9-Water Pressure Switch - Pressostat Eau
10-NTC return Sensor - Sonde NTC retour
11-NTC flow sensor - Sonde NTC départ
12-DHW Temperature Sensor - Sonde température ECS
13-Remote control - Commande à distance
14-Prov. for Outside Sensor - Pred. Sonde Exterieure
15-Link 24V - Joint 24V
16-Flame Sensing Electrode - Electrode présence veilleuse
17-Ignition Electrode - Electrode d'allumage
18-Three Way Valve - Soupape Trois Voies
19-Pump - Pompe
20-Flue Safety Thermostat - Thermostat Fumées
21-Link 0 - 10V - Joint 0 - 10V
22-Condensate sensor - Capteur de condensation
M1-Mains Power Terminal Board - Bornier d'alimentation
M2 -Accessories/Terminal Board - Bornier pour accessoires

WIRING DIAGRAM
If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wire having same specifications.
SCHEMA DE CABLAGE
Si un câble d'origine, tel qu'il est fourni avec l'appareil, doit être changé il doit être remplacé par un câble qui possède les mêmes caractéristiques.

Bl= Blue - Bleu
Br= Brown - Brun
Blk= Black - Noir
Rd= Red - Rouge
G/Y= Green / Yellow - Vert /Jaune
W= White - Blanc
G= Green - Vert
Gy= Grey - Gris
L= Light Blue - Celeste
ALTITUDE EFFECTS ON BOILER PERFORMANCE

MODELS 100/115
CALCULATED EFFECTS OF HI-ALTITUDE ON BOILER PERFORMANCE

MODELS 125/150
CALCULATED EFFECTS OF HI-ALTITUDE ON BOILER PERFORMANCE

MODELS 165/205
CALCULATED EFFECTS OF HI-ALTITUDE ON BOILER PERFORMANCE
## APPLICATION TABLE - INDIRECT HOT WATER TANK PERFORMANCE CHART

### HEATING ONLY BOILERS 100, 125, 165

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. First Hour Rating</th>
<th>Continuous Rating</th>
<th>BOILER OUTPUT NEEDED FOR MAXIMUM PERFORMANCE (BTU/HR)</th>
<th>Boiler Water Flow Through Coil</th>
<th>Pressure Drop Through Coil (Ft. Water)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gal/Hr. @ 140 F 115 F</td>
<td>Gal/Hr @ 140 F 115 F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H20I30</td>
<td>176</td>
<td>233</td>
<td>149 206</td>
<td>112,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I40</td>
<td>193</td>
<td>254</td>
<td>157 218</td>
<td>118,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I40L</td>
<td>186</td>
<td>251</td>
<td>150 215</td>
<td>116,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I50</td>
<td>196</td>
<td>254</td>
<td>151 231</td>
<td>125,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I60</td>
<td>231</td>
<td>298</td>
<td>177 244</td>
<td>132,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I60L</td>
<td>211</td>
<td>272</td>
<td>157 218</td>
<td>118,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I80</td>
<td>241</td>
<td>306</td>
<td>169 234</td>
<td>127,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I115</td>
<td>291</td>
<td>363</td>
<td>188 260</td>
<td>141,000</td>
<td>14.0</td>
</tr>
</tbody>
</table>

### High Output Units 60HO, 80HO, and 115HO

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. First Hour Rating</th>
<th>Continuous Rating</th>
<th>BOILER OUTPUT NEEDED FOR MAXIMUM PERFORMANCE (BTU/HR)</th>
<th>Boiler Water Flow Through Coil</th>
<th>Pressure Drop Through Coil (Ft. Water)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gal/Hr. @ 140 F 115 F</td>
<td>Gal/Hr @ 140 F 115 F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H20I60HO</td>
<td>353</td>
<td>468</td>
<td>299 414</td>
<td>221,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I80HO</td>
<td>366</td>
<td>479</td>
<td>294 407</td>
<td>220,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I80HOC</td>
<td>386</td>
<td>507</td>
<td>314 435</td>
<td>236,000</td>
<td>21.0</td>
</tr>
<tr>
<td>H20I15HO</td>
<td>413</td>
<td>532</td>
<td>310 429</td>
<td>232,000</td>
<td>14.0</td>
</tr>
<tr>
<td>H20I115HOC</td>
<td>423</td>
<td>545</td>
<td>320 442</td>
<td>240,000</td>
<td>21.0</td>
</tr>
</tbody>
</table>

### Extra High Output Units 85XHO and 115XHO

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. First Hour Rating</th>
<th>Continuous Rating</th>
<th>BOILER OUTPUT NEEDED FOR MAXIMUM PERFORMANCE (BTU/HR)</th>
<th>Boiler Water Flow Through Coil</th>
<th>Pressure Drop Through Coil (Ft. Water)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gal/Hr. @ 140 F 115 F</td>
<td>Gal/Hr @ 140 F 115 F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H20I85XHOC</td>
<td>649</td>
<td>868</td>
<td>571 790</td>
<td>428,000</td>
<td>28.0</td>
</tr>
<tr>
<td>H20I115XHOC</td>
<td>674</td>
<td>893</td>
<td>571 790</td>
<td>428,000</td>
<td>28.0</td>
</tr>
</tbody>
</table>

**Notes:**

176 °F Boiler Supply Water Temperature, AHRI Conditions -50 °F Inlet Water @ 240 GPH Flow Rate.

PN 240011430 REV. P [09/15/2021]
Low Water Cut Off - Heating Only and Combi Boilers

These guidelines are supplied when necessary to install an additional Low Water Cut Off (LWCO), for sensing a low water level condition in a boiler, as required by the Authority Having Jurisdiction.

Follow LWCO manufacturer installation instructions for type of LWCO selected in addition to these instructions.

LWCO shall be 120V/60HZ control and dry contacts sized for load being connected. Wire control to boiler. See Figure below.

Connect LWCO device to the system ground. Ground Boiler in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code (NEC) or Canadian Electrical Code CEC.

**LWCO Wiring Diagram**

- Locate LWCO sensing device in the supply piping, above the minimum height of boiler. See Figure page 42, Piping Diagram.
- Position control in piping above boiler to assure proper boiler protection.
- For proper operation, sensing element of the LWCO control shall be positioned in the tee to sense the main water stream. Maintain minimum 1/4" spacing from pipe walls. Element shall NOT contact the rear, or side walls of the tee. See Figure page 43.
- Install an air vent using a tee to avoid nuisance shutdowns.
- Apply small amount of pipe sealant to threaded connections.
- Arrange piping to prevent water dripping onto boiler.
- DO NOT install water shutoff valve between boiler and LWCO sensing device.
Piping Diagram - LWCO Location

Arrange piping to prevent water dripping onto boiler.

Illustrations are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by authority having jurisdiction.

Note: DO NOT PLACE ISOLATION VALVE BEFORE TEE OR LWCO.

* Check Local Codes for Maximum Distance to Floor.

* To Drain

Note: Illustrations are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by authority having jurisdiction.

PN 240011430 REV. P [09/15/2021]
Low Water Cutoff - Detail

**NO**

**NO**

**YES**
ERROR CODE TABLE

Note: When instructed press and hold "RESET" for between 1-3 seconds to reset the boiler.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E09</td>
<td>Gas Valve Connection Cable</td>
</tr>
<tr>
<td>E10</td>
<td>External Probe Fault</td>
</tr>
<tr>
<td>E12</td>
<td>Water Flow Switch Open</td>
</tr>
<tr>
<td>E13</td>
<td>Water Flow Switch Close</td>
</tr>
<tr>
<td>E15</td>
<td>Gas Valve Fault</td>
</tr>
<tr>
<td>E18</td>
<td>Water Refill Enabled</td>
</tr>
<tr>
<td>E19</td>
<td>Max Time Of Water Refill</td>
</tr>
<tr>
<td>E20</td>
<td>Central Heating Flow NTC Fault</td>
</tr>
<tr>
<td>E28</td>
<td>Flue NTC Fault</td>
</tr>
<tr>
<td>E40</td>
<td>Central Heating Return NTC Fault</td>
</tr>
<tr>
<td>E50</td>
<td>Hot Water NTC Fault (tank version)</td>
</tr>
<tr>
<td>E53</td>
<td>Obstruction on flue pipe-combustion off</td>
</tr>
<tr>
<td>E55</td>
<td>PCB to be set by the &quot;Calibration Function&quot;</td>
</tr>
<tr>
<td>E71</td>
<td>Fan parameter Out of range in auto calibration</td>
</tr>
<tr>
<td>E72</td>
<td>Combustion test out of range in auto calibration</td>
</tr>
<tr>
<td>E77</td>
<td>Current Out of range</td>
</tr>
<tr>
<td>E78</td>
<td>Minimum gas valve current</td>
</tr>
<tr>
<td>E79</td>
<td>Maximum gas valve current</td>
</tr>
<tr>
<td>E83-87</td>
<td>Communication error</td>
</tr>
<tr>
<td>E92</td>
<td>Combustion test alarm during auto-setting</td>
</tr>
<tr>
<td>E109</td>
<td>Pre-Circulation Fault</td>
</tr>
<tr>
<td>E110</td>
<td>Safety Thermostat Operated</td>
</tr>
<tr>
<td>E117</td>
<td>System Water Pressure To High</td>
</tr>
<tr>
<td>E118</td>
<td>System Water Pressure To Low</td>
</tr>
<tr>
<td>E125</td>
<td>Circulation Fault (Primary Circuit)</td>
</tr>
<tr>
<td>E128</td>
<td>Flame Failure</td>
</tr>
<tr>
<td>E129</td>
<td>Frequent loss of flame during ignition</td>
</tr>
<tr>
<td>E130</td>
<td>Flue NTC Operated</td>
</tr>
<tr>
<td>E133</td>
<td>Interruption of Gas Supply or Flame Failure</td>
</tr>
<tr>
<td>E134</td>
<td>Elapsed time Gas valve open without gas</td>
</tr>
<tr>
<td>E135</td>
<td>Interruption of gas supply (internal error)</td>
</tr>
<tr>
<td>E160</td>
<td>Fan or Fan Wiring Fault</td>
</tr>
<tr>
<td>E321</td>
<td>Domestic Hot Water NTC sensor fault</td>
</tr>
<tr>
<td>E384</td>
<td>False flame</td>
</tr>
<tr>
<td>E385</td>
<td>Under voltage</td>
</tr>
<tr>
<td>E53</td>
<td>Indicates possible obstruction in the flue duct.</td>
</tr>
<tr>
<td>E55</td>
<td>Indicates the PCB is not setting/calibrated.</td>
</tr>
<tr>
<td>E71, E72, E78 and E92</td>
<td>Indicates possible wrong calibration, a new calibration is needed.</td>
</tr>
<tr>
<td>E92</td>
<td>Indicates possible flue recirculation in the flue duct.</td>
</tr>
<tr>
<td>E83....87</td>
<td>Shows possible error of communication with thermostat. (Go to section P, page 47)</td>
</tr>
<tr>
<td>E110</td>
<td>Shows overheat of primary.</td>
</tr>
<tr>
<td>E117</td>
<td>is displayed when the primary water pressure is more than 43 psi.</td>
</tr>
<tr>
<td>E118</td>
<td>is displayed when the primary water pressure is less than 7.25 psi.</td>
</tr>
<tr>
<td>E125</td>
<td>is displayed in either of two (2) situations:</td>
</tr>
<tr>
<td>a)</td>
<td>If within a time between 15...30 seconds of the burner lighting the boiler temperature has not changed by 2°F.</td>
</tr>
<tr>
<td>b)</td>
<td>If within 10 minutes of the burner lighting the boiler temperature twice exceeds the selected temperature by 80°F.</td>
</tr>
<tr>
<td>E128</td>
<td>is displayed if there has been a flame failure during normal burner operation.</td>
</tr>
<tr>
<td>E133, E134, E135</td>
<td>Indicate the gas supply has been interrupted, ignition has failed or flame has not been detected.</td>
</tr>
</tbody>
</table>

Initial Fault Finding Checks

1. Check gas, water and electrical supplies are available at the boiler.
2. Electrical supply = 120V ~60 HZ
3. The preferred minimum gas pressure is 3.5” wc for Natural gas and 10” for LPG
   Perform electrical system checks, i.e. Ground Continuity, Resistance to Ground, Short Circuit and Polarity with a suitable meter.

NOTE: These checks must be repeated after any servicing or fault finding.

Ensure all external controls are calling for heat and check all external and internal fuses. Before any servicing or replacement of parts, ensure the gas and electrical supplies are isolated.

1. If a fault occurs on the boiler an error code may show on the facia display:

   E53 - Indicates possible obstruction in the flue duct.
   E55 - Indicates the PCB is not setting/calibrated.
   E71, E72, E78 and E92 - Indicates possible wrong calibration, a new calibration is needed.
   E92 - Indicates possible flue recirculation in the flue duct.
   E83.....87 - Shows possible error of communication with thermostat. (Go to section P, page 47)
   E110 - Shows overheat of primary.
   E117 - is displayed when the primary water pressure is more than 43 psi.
   E118 - is displayed when the primary water pressure is less than 7.25 psi.
   E125 - is displayed in either of two (2) situations:
   a) If within a time between 15...30 seconds of the burner lighting the boiler temperature has not changed by 2°F.
   b) If within 10 minutes of the burner lighting the boiler temperature twice exceeds the selected temperature by 80°F.
   In these instances poor primary circulation is indicated.
   E128 - is displayed if there has been a flame failure during normal burner operation.
   E133, E134, E135 - Indicate the gas supply has been interrupted, ignition has failed or flame has not been detected.

2. Pressing the ‘RESET’ button for 1-3 seconds when: E110, E125, E133, E134, E135, E09, E15, E128 and E384 - are displayed it is possible to relight the boiler.

3. If this does not have an effect, or error codes are displayed regularly further investigation is required.
Central Heating

Turn on mains power.
The display illuminates.

* Error 110 or 133 or 134 or 135 or 125 or 384 or 09 or 15 flashing

NO

YES

Press the 'Reset' button for between 1-3 seconds

NO

YES

If the E110 is still flashing. Go to section 'H'

Error 20, 28, 40, 50, 321 or 431 flashing

NO

YES

Go to section 'D', if E55 is displayed go to section N

Error 117 or 118 flashing

NO

YES

If m 09, m 15 and m 384 is flashing or re-occurs regularly check all PCB connections, if this has no effect replace the PCB.

Turn Central Heating thermostat to Maximum.
Pump runs.

YES

NO

Fan runs after 1 minute from the request

YES

NO

Fan runs at correct speed

YES

NO

Spark at ignition electrodes for up to 5 seconds and for 5 attempts.

YES

NO

Burner lights

YES

NO

Error 110 flashing

Go to section 'H'

Error 160 flashing

Go to section 'C'

Error 160 flashing

Go to section 'C'

Error 117 or 118 flashing

NO

YES

Ensure all controls and Programmers are calling for heat

NO

Ensure controls are set to demand and verify the contacts are closed

Go to section 'B'

Error E109 flashing

NO

YES

Burner output modulates to maintain the temperature set

NO

Check the Central Heating NTC sensor Go to section 'D'

NO

YES

BURNER goes out

NO

YES

Fan stops after 30 seconds

Operation sequence successful
Domestic hot water

Turn on mains power. The display illuminates NO

Error 110 or 133 or 134 or 135 or 125 or 384 or 09 or 15 flashing

Press the 'Reset' button for between 1-3 seconds

Error 20, 28, 40, 50, 321 or 431 flashing

Error 117 or 118 flashing

Open DHW tap fully. Pump runs.

Fan runs after up to 3 seconds

Fan runs at correct speed

Spark at ignition electrodes for up to 5 seconds and for 5 attempts.

Burner lights

Error E109 flashing

Error E110 flashing

3 way valve open to domestic hot water circuit

Burner output modulates to maintain the temperature set

Error E130 flashing

Burner goes out

If E53 is displayed go to section D

If E110 is still flashing. Go to section H

Go to section 'D', if E55 is displayed go to section N

Go to section 'A'

Go to section 'D', if E55 is displayed go to section N

Go to section 'I'

Go to section 'L'

Error E109 flashing

Error E110 flashing

Error 128 or E129 flashing (loss of flame 12 times) Go to section 'G'

Error 125 flashing after 1 minute

Error E125 flashing after 1 minute

Go to section 'J'

Go to section 'F'

Go to section 'E'

Go to section 'F'

Burner does not stay alight after 5 seconds

Error E133 flashing

Go to section 'E'

Burner output modulates to maintain the temperature set

Check the Central Heating NTC sensor

Go to section 'D'

Operation sequence successful

TROUBLESHOOTING CHART
Fault Finding Solutions Sections

A. Power supply 120V
   1. Main terminals L and N → Check electrical supply → Connection OK at connector x10
      NO → Yes
   2. Integrity of the fuse → Replace fuse
      NO → Yes
   3. PCB - X10 connector Mains terminals L & N → Check wiring
      NO → Yes

B. 120V at PCB - connector x13 pump terminals Blue to Brown (See Wiring Diagram)
   YES
   NO → Replace PCB

C. 120V between PCB - connector x13 pump terminal Blue and PCB - connector x11 pump terminal Black.
   YES
   NO → Replace PCB
   Check wiring
   Replace Pump

1. Fan connections correct at fan and PCB Connectors X11 & X23 See Wiring Diagram
   YES
   NO → Make connections

   Is there 120V AC at fan terminals connector X11 blue to brown. See Wiring Diagram
   YES → Fan jammed of faulty winding
   NO → Replace PCB
   YES → Replace fan
FAULT SOLUTION SECTIONS

D
Temperature sensor faulty.
Check correct location and wiring

YES

Temperature sensors faulty,
Cold resistance approximately
10kΩ @ 77° F (CH sensor)
20kΩ @ 77° F (Flue sensor)
(resistance reduces with increase in temp.)

NO Replace sensor

E
Gas at burner

NO Ensure gas is on and purged

Check wiring & PCB – X36 and X2 connector. See Wiring Diagram.

Check the resistance of the coils:
Pin 1 and 3 = 20 - 30 Ohm
Pin 2 and 4 = 60 - 70 Ohm

NO Replace gas valve

YES Replace PCB

F
1. Check and correct if necessary
   1. Inlet gas pressure
   2. Ignition electrode and lead
   3. Electrode connection
   4. Spark gap and position
   5. Continuity between burner and earth
   6. Condensate trap blocked

YES Check wiring, See Wiring Diagram

NO Replace PCB

2. Check and correct if necessary
   1. Proper operation of the condensate sensor
   2. Ground wires attached to condensate switch
   3. Flame sensing wires attached to condensate switch

Replace condensate sensor or wires

G
1. Check the gas supply pressure:
   For Natural Gas greater than 3.5" wc
   For LPG greater than 8" wc

2. Check and correct if necessary
   1. Flame sensing electrode position
   2. Flame sensing electrode and lead connections
   3. Recirculation of flue
   4. Calibration
   (CO2 values - see instructions)

 Replace flame sensing electrode or gas valve

3. Check and correct if necessary
   1. Proper operation of the condensate sensor
   2. Ground wires attached to condensate switch
   3. Flame sensing wires attached to condensate switch

Replace condensate sensor or wires
**FAULT SOLUTION SECTIONS**

### H
Overheat thermostat operated or faulty.
- Check for and correct any system faults (water circulation).
- Allow to cool. Continuity across thermostat terminals more than 1.5 ohm → Replace safety thermostat
- Check Flow, Return, sensors. See section 'D'
- Is E110 is still flashing → Replace PCB

### I
CH system pressure less than 7.25 psi or more than 43 psi.
- YES → Restore System Pressure
- NO
  - Check wiring and pcb connection at connector x22 is there approx. 5 V DC between the green and black terminals → Replace pressure sensor
  - NO → Replace PCB

### J
Ensure correct circulation of the pump
- YES → Go to section 'B'
- NO
  - Check flow temperature sensor connections and position. Sensors swapped. Cold resistance approximately.
    - 10kΩ @ 77° F (CH sensors) (resistance reduces with increase in temp.) → Replace sensor
  - NO → Replace sensor

### K
Is there 120V at:
- PCB connector x13 3 way valve terminals
  - Blue to Black central heating mode
  - Blue to Brown domestic hot water mode
  - See Wiring Diagram
  - 1 → Replace PCB
  - NO → Check 3 way valve cable.
  - YES
  - Motor, 3 way valve → Replace motor 3 way valve
Is main water filter and assembly clean and rotor free to move? YES
  PCB connector x22 Hall effect sensor terminals.
  Check the voltage is approximately 5 VDC between the Red and Blue wires. See Wiring Diagrams.
  NO
  Clean or Replace
  NO
  Replace PCB

With water running through DHW circuit, measure red and white wire for 2.8 VDC for flow triggering.
  YES
  Check DHW NTC sensor for proper OHM value
  NO
  Replace Hall Effect Sensor
  NO
  Replace DHW NTC sensor
  YES
  Replace PCB

Temperature sensors faulty.
Cold resistance approximately
10kΩ @ 77°F (CH sensor)
20kΩ @ 77°F (Flue sensor)
(resistance reduces with increase in temp.)
  NO
  Replace sensor

If pump is running the heat exchanger could be obstructed
  YES
  Replace heat exchanger

Performs the autocalibration function (see the Service manual)

Display blank
  YES
  Verify the position of the Service key

Check obstruction in the flue duct
  YES
  Remove the obstruction on the flue pipe
  NO
  Performs the calibration function (see the Service manual)

Check and correct if necessary
1. Proper operation of the condensate sensor
2. Ground wires attached to condensate switch
3. Flame sensing wires attached to condensate switch
  Replace condensate sensor or wires

Check the electrical connection between Ru and pcb
<table>
<thead>
<tr>
<th>Parameter ID</th>
<th>Changed From</th>
<th>Changed To</th>
<th>Date</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>