Digital Intelligence
- Thinks for itself and talks to the building
- PDA programmable
- Engineered exclusively for Recirculating Hot Water Systems

Digital Safety & Hygiene
- Programmable system safety alerts
- Shuts off upon inlet supply failure
- Shuts off Hot Water upon power failure & “out of temperature range” mode.
- Promotes compliance with OSHA & CDC Legionella Guidelines.

Digital Stability and Control
- Typical System Temperature Control +/-2F
- Controls system “temperature creep”
- 0-150 GPM “Out of the Box” Solution

Digital Connectivity
- BAS & LAN interface capability
- Integral Serial Data Ports
- BacNet, Lonworks compatible (BrainScan™)
- Web-Enabled (BrainScan™)
Digital Water Temperature Control - Digital features a Digital Recirculating Valve (DRV) and Digital Mixing Centers specifically designed for use in a pumped recirculating hot water system.

“Out of the Box” Solution
Model DRV 80 is a single installer/operator programmable “out of the box” solution for systems which experience diverse user draw-off between 0 to 150 GPM. Model DRV 80 includes a recirculation system return manifold assembly.

"Plug and Play“ Solution
Model DRV 80R is a single installer/operator programmable "Plug and Play” solution for systems which experience diverse user draw-off between 0 to 150 GPM. Model DRV 80R includes a recirculation system return manifold assembly.

"Packaged“ Solutions
Model DRV 80 based Digital Mixing Center (DMC). Model DMC 1 features a single DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 150 GPM.

Model DMC 2 features two DRV 80s plumbed in parallel, pre-piped, pressure tested with system accessory items as above for systems which experience diverse user draw-off from 0 to 300 GPM.

Remote Control, System Monitoring, System Interrogation and Data Logging
Model DRV 80 and Armstrong Packaged Assemblies which feature Model DRV 80 (DRV 80R, DMC1, DMC2 etc) are provided as standard with an integral Mixed Outlet Water sensor and Remote Set Point Adjustment capability for “plug and play” system communication via PC, LAN or resident Building Automation System.

Model DRV 80 offers an integral relay point for connection to a selected accessory component such as a pump on/off switch, to activate/deactivate a solenoid or to enable an audible alarm etc. on systems which experience diverse user draw-off for 0 to 150 GPM.

Model DRV 80 is supplied as standard with integral Hot Water & Cold Water/System Return Water sensors and a serial connection data port which enables communication to third party system hardware via an accessory component called BrainScan™.

BrainScan™
BrainScan™ is an optionally selected external network adapter console from Armstrong complete with custom tailored software. BrainScan connects to the integral serial connection data port on DRV 80 and enables a direct onward connection to Building Automation Systems which utilize LONWORKS & BACNET protocols, a communication capability with other Building Automation Systems which connect via an RS485 port, an Ethernet port for web access OR an RS422 port for connection to an optionally available Wi-Fi/modem module.

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure Drop (psi)</th>
<th>Minimum System Draw-Off</th>
<th>Maximum Flow @9'/sec.</th>
<th>C_V</th>
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<td>314</td>
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</tbody>
</table>

Recirculation Systems - Digital (gpm)

System Layout - Legend -
- Recirculation Pump
- Check Valve
- Stop Valve
- Isolation Valve
- Sink
- Shower

Armstrong Hot Water Group, 221 Armstrong Blvd., Three Rivers, MI 49093 – USA Phone: (269) 279-3602 Fax: (269) 279-3130 www.armstronginternational.com
**Digital**

**The Brain™ DRV80**

DRV 80 is a fully digital recirculation valve (DRV) for “point of source” or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system.

Model DRV 80 is a single installer/operator programmable “out of the box” solution for systems which experience diverse user draw-off between 0 to 150 GPM.

**Operational Specifications**

The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within +/−2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Maintain a consistent system “idling” temperature and control temperature creep without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1st level high/low temp alarm display
- Programmable temperature error level for safety shutdown

**Technical Specifications**

- 100-240 V Power supply (12 VAC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO
- Error Relay: Activated in alarm or error mode
- Serial Connection Data Port*
- Optional External Network Adapter*
- Stainless Steel Construction
- 3” NPT Connections (optional 2” adapter)
- ASSE 1017 and CSA B125 Certified

For a fully detailed certified drawing, refer to CD# 2060.

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**Recirculation Systems - Digital (gpm)**

<table>
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<th>Model</th>
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<th>Minimum System Draw-Off</th>
<th>Maximum Flow @9'/sec.</th>
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All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.
Water Temperature Control - Recirculation Systems

Digital

DRV80R
DRV 80R is a fully digital recirculation valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system

Model DRV 80R is a single installer/operator programmable "Plug and Play" solution for systems which experience diverse user draw-off between 0 to 150 GPM and includes a recirculation system return manifold assembly.

Operational Specifications
The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

• Accurate control of blended water drawn from the system at a point of use typically within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
• Operational water pressure of 10 -150 psig
• Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
• Automatic shutoff of hot water flow upon cold water inlet supply failure
• Automatic shutoff of hot water flow in the event of a power failure
• Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
• System shall not require a temperature activated pump shut-off device (aquatstat).
• Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
• Ability to thermally disinfect at recommended temperatures
• Programmable 1st level hi/lo temp alarm display
• Programmable temperature error level for safety shutdown

Technical Specifications
• 100-240 V Power supply (12 V AC output)
• 2 x 4-20 mA current loop interfaces:
  Input:  Setpoint Selection
  Output:  Measured Blend Temperature
• Relay output: 24V DC/240 V AC SPCO
• Serial Connection Data Port*
• Optional External Network Adapter*
• Stainless Steel Construction
• 3" NPT Connections (optional 2" adapter)
• Recirculation system return manifold assembly.
  2" System Return Check Valve
  1" Return to Heater Line Check
  2" Return to Heater Line Ball Flow Indicator
  3" CW inlet Check Valve
• ASSE 1017 and CSA B125 Certified

For a fully detailed certified drawing, refer to CD# 2061.

Recirculation Systems - Digital (gpm)

<table>
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<tr>
<th>Model</th>
<th>Pressure Drop (psi)</th>
<th>Minimum System Draw-Off</th>
<th>Maximum Flow @9'/sec.</th>
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</tr>
</tbody>
</table>

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.
Digital

DMC1
Model DMC 1 features a single DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 150 GPM.

DRV 80 "The Big Brain" is a fully digital recirculating valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system.

Model DMC 1 is a single installer/operator programmable "packaged solution" for systems which experience diverse user draw-off between 0 to 150 GPM.

Operational Specifications
The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Maintain a consistent system "idling" temperature and control Temperature Creep without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1st level hi/lo temp alarm display
- Programmable temperature error level for safety shutdown

Technical Specifications
- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO
  - Error Relay: Activated in alarm or error mode
- Serial Connection Data Port*
- Optional External Network Adapter*
- Stainless Steel Construction

DMC 1
Supplied as a pre-plumbed, pressure-tested and mounted to an enameled steel frame comprising:

- 1 ea: DRV 80 Digital Recirculation System Controller
- 3" inlet/outlet piping with flanged connections
- System isolation valves,
- Inlet strainers
- Mixed return flow indicator
- Check valves
- Thermometers

For a fully detailed certified drawing, refer to CD# 2062.

DMC 12
As above with 1/6 hp system circulating pump.

For a fully detailed certified drawing, refer to CD# 2063.
**Digital**

**DMC2**

Model DMC 2 features two "parallel" DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 300 GPM.

Each DRV 80 "The Big Brain" is a fully digital recirculating valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system.

Model DMC 1 is a single installer/operator programmable "packaged solution" for systems which experience diverse user draw-off between 0 to 150 GPM.

**Operational Specifications**

The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Maintain a consistent system "idling" temperature and control Temperature Creep without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1st level hi/lo temp alarm display
- Programmable temperature error level for safety shutdown

**Technical Specifications**

- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO
- Error Relay: Activated in alarm or error mode
- Serial Connection Data Port*
- Optional External Network Adapter*
- Stainless Steel Construction

**DMC 2**

Supplied as a pre-plumbed, pressure-tested and mounted to an enameled steel frame comprising:

- 2 ea: DRV 80 Digital Recirculation System Controllers
- 4" inlet/outlet piping with flanged connections
- System isolation valves
- Inlet strainers
- Mixed return flow indicator
- Check valves
- Thermometers

For a fully detailed certified drawing, refer to CD# 2070.

**DMC 22**

As above with 3/4 hp system circulating pump.

For a fully detailed certified drawing, refer to CD# 2071.
BrainScan™ - Hot Water System Monitoring

BrainScan™ is a Digital Hot Water Management System console optionally supplied with DRV80 Digital Recirculating Valves and DRV80 based Digital Mixing Centers.

BrainScan™ is factory configured to engage with either a Local Area Network (LAN), a third party Building Automation System (BAS) or an Internet Service Provider (ISP) to enable the DRV80’s integral monitoring features.

Standard BrainScan™ configurations include hardware and software options which include on screen system graphics which are compatible with most standard Building Automation System open protocols.

All of the standard alarm conditions and error messages available through the DRV80 are also available through BrainScan™. BrainScan™ is available in three (3) different configuration packages as described below:

**BrainScan™ 1**
Includes remote hot water supply, cold/recirculation water supply and blended water outlet temperature readings. Also gives the ability to remotely change blended water outlet temperature setpoint. Included with all BrainScan™ options is the valve/system graphic.

**BrainScan™ 2**
Provided as BrainScan™ 1 with hot water supply, cold water supply and blended water outlet pressure transmitters.

**BrainScan™ 3**
Provided as BrainScan™ 2 with blended water outlet and recirculation return flow meters. These can be used to calculate water usage.

**Technical Specifications**

- BrainScan™ utilizes the SoM-5282 System Module as the processing engine and uClinux as the operating system
- BrainScan™ accommodates a socket for a protocol translator module that is capable of communicating with BacNet, Lonworks FFT as well as a modem and wi-fi module
- Standard ethernet port available to bring system on to the internet via a secured HTTP network server
- System displays “real time” values as well as stored data to be downloaded by the facility into their preferred program
- Data storage and exporting is done via XML formatted files, written every 15 minutes
- Editor accessible via telnet allowing user maintenance and assignment of user privileges which consist of “Read Only” or “Read and Configure”
BrainScan™ is a Digital Hot Water Management System console optionally supplied with DRV80 Digital Recirculating Valves and DRV80 based Digital Mixing Centers.

BrainScan™ is factory configured to engage with:

- Building Automation System (Bacnet™, LonWorks™ FFT)
- Local Area Network
- Internet Service Provider