FLO-RITE-TEMP® FRT53540 & FRT535DW40

INSTANTANEOUS WATER HEATER with THE BRAIN® MODEL DRV40

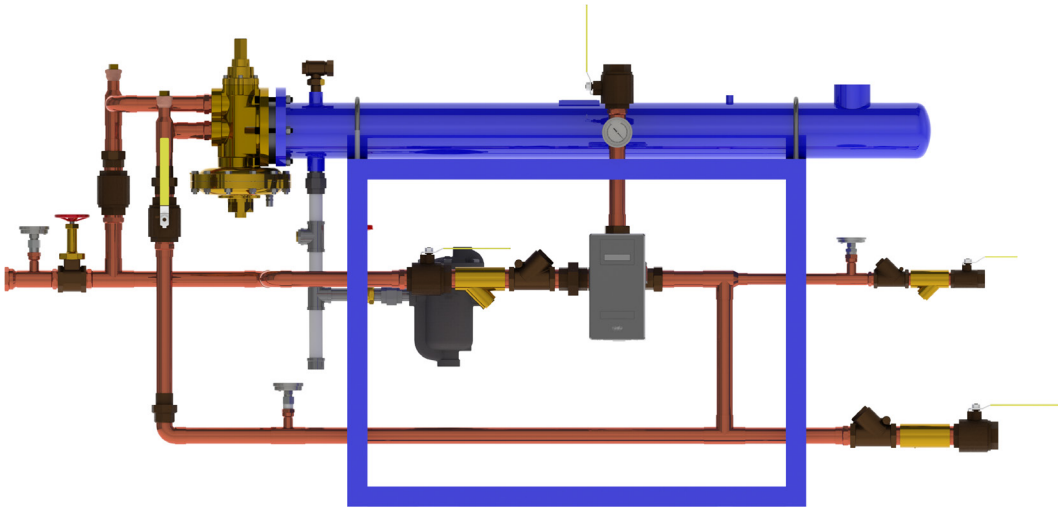
Flo-Rite-Temp® Pre-Piped for Digital Control of Recirculating Hot Water Systems is a packaged water heating solution inclusive of a shell and tube heat exchanger fitted with an integral control valve for water heating and system temperature control.

The feed forward design instantly determines downstream hot water demand and directs cold water through the heat exchanger. Water is heated above legionella survival temperatures with constant pressure steam and then blended with a proportional amount of cold water to set point temperature.

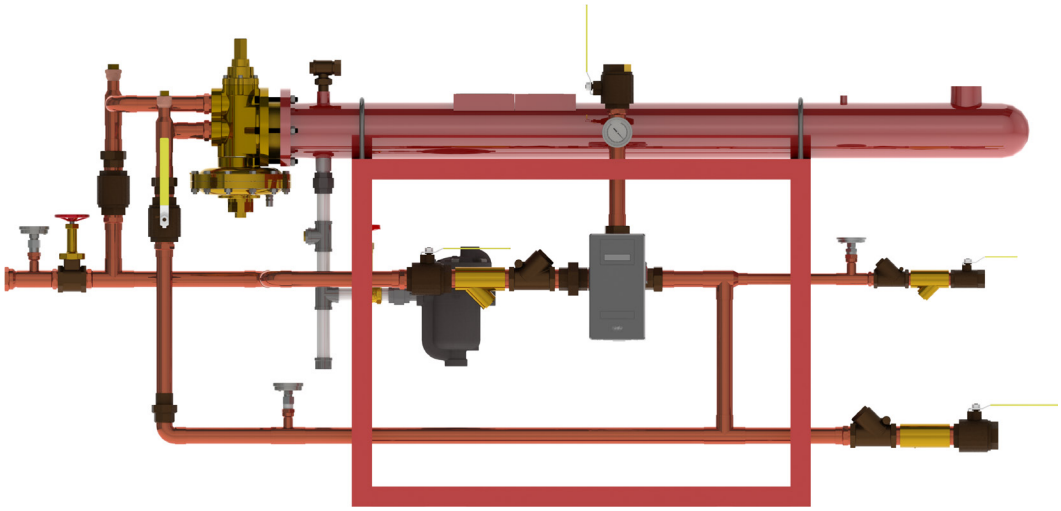
Engineered exclusively for continuously recirculated hot water systems, Flo-Rite-Temp® includes The Brain® Digital Recirculation Valve to improve system performance and safety by delivering a consistent pre-set temperature to the points of use.

User safety and overall system health is maintained by a series of programmable temperature alerts, onboard operational self-diagnostics, and a thermal disinfection option.

Flo-Rite-Temp® is available with single wall or double wall heat exchangers in four standard sizes, with parallel and redundant configurations available. Flo-Rite-Temp® can be customized to suit specific application needs.



Flo-Rite-Temp® FRT53540 Single Wall Instantaneous Water Heater



Flo-Rite-Temp® FRT535DW40 Double Wall Instantaneous Water Heater

FLO-RITE-TEMP® FRT53540 & FRT535DW40

TECHNICAL SPECIFICATIONS - SIZING

FRT53540 and FRT535DW40 Water and Steam Capacities - Imperial Units									
Inlet Temperature	Set Temperature	Hot Water Capacities in GPM				Steam Capacities in lb/hr			
		Steam Pressure				Steam Pressure			
		2 psig	5 psig	10 psig	15 psig	2 psig	5 psig	10 psig	15 psig
40°F	120°F	37	40	43	45	1,543	1,657	1,814	1,946
	130°F	32	34	37	39	1,472	1,587	1,743	1,876
	140°F	27	29	32	34	1,397	1,513	1,671	1,804
	160°F	20	22	24	26	1,235	1,355	1,517	1,652
	180°F	12	13	15	16	861	966	1,104	1,219
50°F	120°F	41	44	45	45	1,495	1,609	1,764	1,896
	130°F	34	37	40	45	1,425	1,539	1,695	1,827
	140°F	29	31	34	37	1,352	1,467	1,624	1,756
	160°F	21	23	25	28	1,194	1,313	1,473	1,607
	180°F	12	14	16	17	831	934	1,071	1,185
60°F	130°F	38	41	45	45	1,378	1,491	1,646	1,777
	140°F	32	34	38	40	1,307	1,421	1,576	1,708
	160°F	22	24	27	30	1,152	1,270	1,428	1,561
	180°F	13	14	16	18	800	902	1,037	1,150

FRT53540 and FRT535DW40 Water and Steam Capacities - Metric Units									
Inlet Temperature	Set Temperature	Hot Water Capacities in m^3				Steam Capacities in kg/hr			
		Steam Pressure				Steam Pressure			
		0.14 bar	0.35 bar	0.7 bar	1 bar	0.14 bar	0.35 bar	0.7 bar	1 bar
4°C	49°C	8.4	9.1	9.8	10.2	697	749	820	880
	54°C	7.3	7.7	8.4	8.8	665	717	788	848
	60°C	6.1	6.6	7.3	7.7	631	684	755	815
	71°C	4.5	5.0	5.5	5.9	558	612	686	747
	82°C	2.7	3.0	3.4	3.6	390	438	501	553
50°C	49°C	9.3	10.0	10.2	10.2	676	727	797	857
	54°C	7.7	8.4	9.1	9.8	644	696	766	826
	60°C	6.6	7.0	7.7	8.4	61 1	663	734	794
	71°C	4.7	5.2	5.7	6.4	540	593	665	726
	82°C	2.7	3.2	3.6	3.9	377	424	486	537
60°C	54°C	8.7	9.3	10.2	10.2	623	674	744	803
	60°C	7.3	7.7	8.6	9.1	591	642	712	772
	71°C	5.0	5.5	6.1	6.8	521	574	645	706
	82°C	3.0	3.2	3.6	4.1	363	409	470	522

FLO-RITE-TEMP® FRT53540 & FRT535DW40

TECHNICAL SPECIFICATIONS

General			
Protection (DRV40 Valve)		NEMA 3S, IPX4	
Ambient Temperature		Minimum Ambient Temperature: 35°F (2°C)	Maximum Ambient Temperature: 122°F (50°C)
Ambient Humidity		95% Non-Condensing	
Installation Environment		Suitable for indoor use only	
Safety (DRV40 Valve)		Seven fail-safe cold triggers supported by integral self-diagnostics and a programmable over-temp limit	
Materials			
DRV40 Valve		Valve: Stainless Steel, Electronics Module: PC / ABS	
FRT Control Valve		Bronze	
Heat Exchanger Shell		Carbon steel, ASTM SA-106, Gr. B, ASME “U” stamped with Type 316 stainless steel two-pass head	
Heat Exchanger Tube Bundle	Single Wall	Admiralty brass tubes; 5/8” OD x 16 BWG wall	
	Double Wall	Copper tubes; 5/8” OD inner with 3/4” OD grooved outer	
Heat Exchanger Tube Sheets	Single Wall	Lead-free brass	
	Double Wall	Brass on water side; Steel on steam side	
Tube Bundle End Cap (Single Wall ONLY)		Lead-free brass	
Integral Supply Pipe Work		Lead-free brass / Type L copper	
Integral Valves and Fittings		Lead-free brass or bronze	
Condensate Piping		Cast iron and carbon steel	
Connections			
DRV40 Valve Connections		1-1/2” NPT Female Connections	
Water Side	Cold Water Inlet	1-1/2” NPT Connection	
	Recirc. Return Line	1” NPT Connection	
	Mixed Water Outlet	1-1/2” NPT Connection	
Steam Side	Steam Inlet	2-1/2” NPT Connection	
	Condensate Outlet	1” NPT Connections (Armstrong Steam Trap 813)	
Pressures			
Water Inlet Supply Pressures		Maximum Water Pressure: 150 psig (10 barg)	Minimum Pressure: 20 psig (1.5 barg)
Steam Inlet Supply Pressures		Maximum Allowable Steam Pressure: 150 psig (10 barg)	
		Maximum Operating Steam Pressure: 15 pisg (1 barg)	
Temperatures			
Cold Water Supply Temperature		Minimum Inlet Cold Supply Temperature: 34°F (1.1°C)	
Min. Recirculation Temperature Loss		1°F (≤ 1°C)	
Min. Continuous Recirculation Flow		5 GPM (19 LPM)	
Electrical			
Power Supply		120 - 240V AC - 50/60 Hz	
Control Circuit Fuse		3 A	
Supply Fuse / Circuit Breaker		Grounding required (Switched Type 3 Amp - no plug; 15 Amp Grounding-type receptacle - plug)	
Battery (DRV40 Valve)		Qty (2) CR - P2 6V	

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FLO-RITE-TEMP® FRT53540 & FRT535DW40

TECHNICAL SPECIFICATIONS

Configurable Settings		
Set Point Range	81°F to 158°F (27°C to 70°C)	
High Temperature Alert	Minimum of 2°F (1°C) above DRV set point	
High Temperature Error	5°F (2°C) above DRV set point	
Thermal Disinfection Temperature	Programmable range of 158°F to 185°F (70°C to 85°C)	
Thermal Disinfection Set-Up	Disinfection Duration: ≤ 100 minutes	Disinfection Cool Down Duration: ≤ 30 hours
Units of Measure	Degrees Fahrenheit (°F) or Degrees Celsius (°C)	
Connectivity		
Modbus RTU	RS-485 port for connection to building automation systems (BAS) operating on Modbus RTU protocol	
SAGE® Module	RS-485 port for connection to SAGE® module with Modbus TCP, BACnet TCP/IP, BACnet MSTP, or LonWorks protocessor *Note: Protocessors for other BAS protocols may be available upon request*	
SAGE® Subscription	Real-time monitoring, recording, and documentation dashboard for Armstrong Hot Water Systems	
Standards and Approvals		
ASSE 1017	Certified & Listed	
CSA B125.3-11	Compliant	
UL	Listed	
CE	Listed	

FLO-RITE-TEMP® FRT53540 & FRT535DW40

WRITTEN SPECIFICATIONS

Category: Steam to Water Heater with Shell and Tube Heat Exchanger

Type: Flo-Rite-Temp® for Digital Control of Recirculating Systems (with The Brain®)

Model: FRT53540 and FRT535DW40

Part 1 - GENERAL

1.0 Flo-Rite-Temp® FRT53540 and FRT535DW40 Overview

1.1 The assembly shall be pre-piped steam to water shell and tube heater with performance matched components and pressure-tested before delivery.

1.1.1 FRT53540 shall be of single wall construction with straight admiralty brass tubes expanded into naval brass tube sheets with a bolted end cover.

1.1.2 FRT535DW40 shall be of double wall construction with 5/8” copper inner tube, 3/4” ID grooved copper outer tube expanded into steel (steam side) and brass (water side) tube sheets.

Heat exchanger will be fixed on one end of the shell and free-floating on the opposite end designed and manufactured in accordance with ASME Code Section VIII.

2.0 Digital Recirculation Valve

2.1 Temperature controller (DRV) shall be digital using integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems. The DRV shall have a 2-line, 16-character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. DRV shall be compliant with ASSE Standard 1017 and CSA B125, UL listed, and so certified and identified.

2.2 DRV40 requires a minimum continuous recirculation of 5 GPM.

3.0 FRT53540 and FRT535DW40 Assembly

3.1 The assembly shall comprise of domestic side check valves, strainers, DRV, thermometers, ball valves, safety shut-off valve, and a shell and tube heat exchanger, pre-piped with Type L copper on a carbon steel frame with industrial grade enamel paint.

3.2 Complete assembly shall be lead-free compliant.

3.3 Steam pressure on the system to be no more than 15 psig. Designed to generate 41 GPM with a 40°F entering cold water temperature, a 140°F mixed water set point utilizing 15 psig at a maximum of 2,185 lbs/hr.

4.0 FRT53540 and FRT535DW40 shall have the following operational specifications:

4.1 + / - 2° F (1° C) water temperature control

4.2 1° F minimum mixed water outlet to recirculated return inlet differential (system temperature loss)

4.3 Automatic shutoff of hot water upon cold water inlet supply failure

4.4 Automatic shutoff of hot water flow in the event of a power failure

4.5 Programmable setpoint range of 81°F - 158° F (27°C - 70° C)

4.6 Programmable thermal disinfection mode

4.7 Programmable 1st level hi/lo temperature alert display

4.8 Programmable temperature error level for safety shutdown

4.9 LCD display that indicates set point temperature, delivered temperature, error codes and alarm conditions

4.10 Isolation valves and clean-in-place connections to chemically clean heat exchanger without disassembly

4.11 1/4” domestic side pressure relief pop-off valve with 165 psig (11.4 barg) crack pressure, self-seating

Continued on next page

FLO-RITE-TEMP® FRT53540 & FRT535DW40

WRITTEN SPECIFICATIONS

5.0 Water heater assembly shall have the following connectivity specifications:

5.1 MODBUS RS-485 port for connection to building automation system (BAS) operating on MODBUS RTU protocol

5.2 RS-485 port for connection to SAGE® module with MODBUS TCP, BACnet TCP/IP, BACnet MSTP, or LonWorks protocessor
Note: Protocessors for other BAS protocols available upon request

6.0 DRV shall be certified to ASSE 1017, UL listed, and conform to CSA B125.

7.0 Warranty

7.1 Water heater assembly shall have a 2-year warranty from date of installation, but not longer than 27 months from date of shipment.

7.2 DRV shall have a 5-year warranty on all components with the exception of batteries and O-rings.

FLO-RITE-TEMP® FRT53540 & FRT535DW40

CONNECTIVITY

The Brain® and SAGE®

SAGE® works seamlessly with The Brain® as it analyzes data to track behavior and performance as an integral component of a hot water system operation protocol which complies with a standard of care.

The Brain® and every derivative assembly is supplied with an integral RS-485 serial port. This port provides a direct connection to Building Automation Systems that operate on a **Modbus RTU** protocol.

The RS-485 port is also deployed for direct connection to an optionally supplied Building System (BS) Module.

SAGE® Options

SAGE® for Building Automation Systems (BAS) – BS Module available with BAS specific ProtoCessor cards for connection to systems which operate on **Modbus TCP**, **BACnet™ TCP/IP**, **BACnet™ MSTP**, or **LonWorks™** protocols.

SAGE® for Mobile Connectivity - Featuring smart hot water system dashboard monitoring, secure remote programming, multi-location view, temperature and system diagnostic alerts, with unlimited digital documentation and automated report generation.

Mobile connectivity may be enabled by a customer activated no-term subscription.

Optional Building System (BS) Module

Adding a suffix “BS” to The Brain® DRV (example: DRV25BS) will automatically add SAGE®, the supplemental hardware and software required to maximize the connectivity features of Armstrong digital technology.

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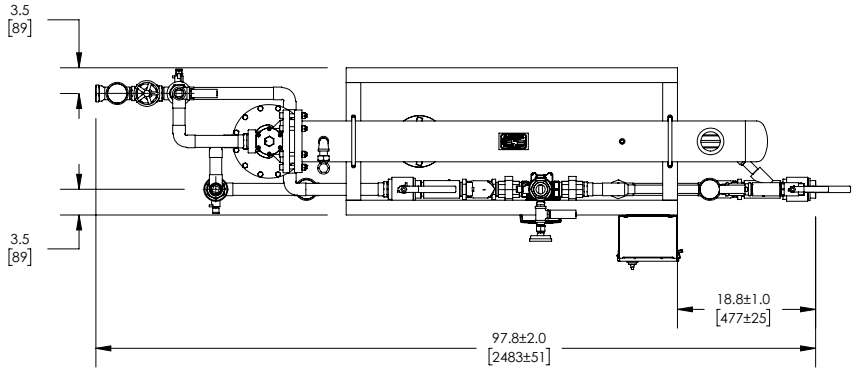
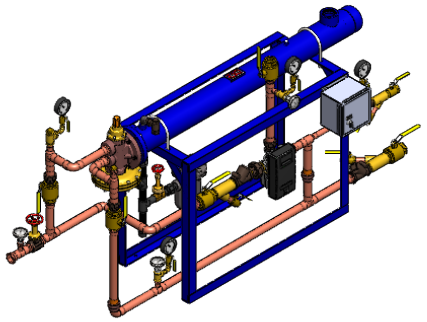
APPROVAL

BY:_____ DATE:_____

- ☐ APPROVED, PROCEED WITH FABRICATION
- ☐ APPROVED AS NOTED, PROCEED WITH FABRICATION IN ACCORDANCE WITH COMMENTS
- ☐ DISAPPROVED, DO NOT FABRICATE





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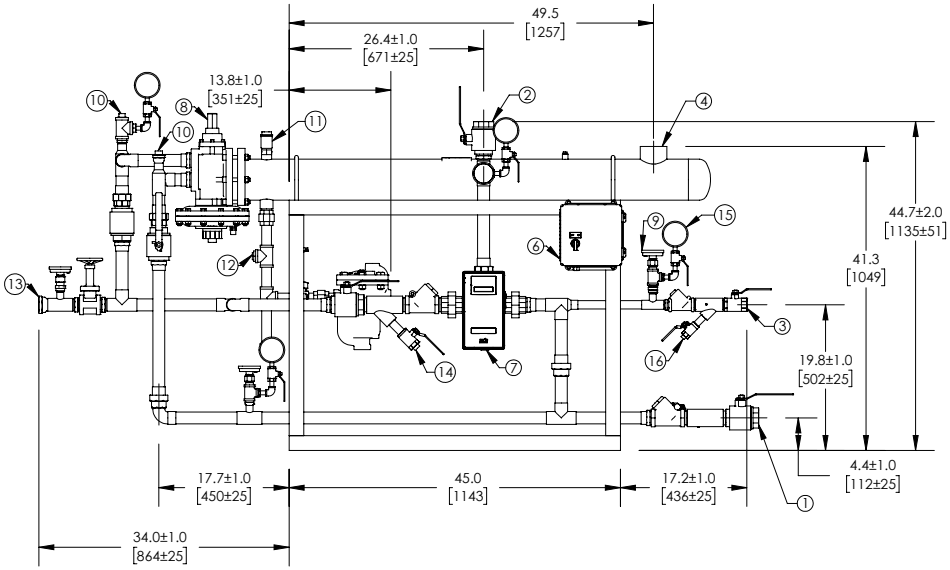

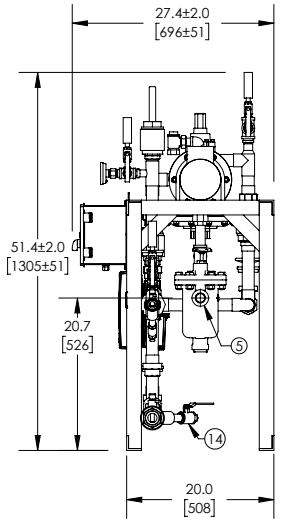

ITEM	DESCRIPTION	CONNECTION
1	COLD WATER INLET	1-1/2" NPT
2	MIXED WATER OUTLET	1-1/2" NPT
3	RECIRC WATER INLET	1" NPT
4	STEAM INLET	2-1/2" NPT
5	CONDENSATE OUTLET	1" NPT 813IB
6	ELECTRICAL PANEL	110 VAC @0.7A
7	DRV40	1-1/2" NPT
8	CONTROL VALVE	1-1/2 NPT
9	THERMOMETER(4)	1/2" NPT
10	CIP CONNECTION(2)	1" NPT
11	AIR VENT	3/4" NPT
12	VACUUM BREAKER	1/2" NPT
13	BYPASS TO DRAIN	1-1/2" NPT
14	BLOW DOWN(2)	3/4" NPT
15	PRESSURE GAUGE (4)	1/4" NPT
16	BLOWDOWN	1/2" NPT

	ITEM	MATERIAL
	PIPING	COPPER TYPE "L"
	EXCHANGER SHELL MATL.	CARBON STEEL
	EXCHANGER TUBE MATL.	ADMIRALTY BRASS

NOTE(S):

1. ALL DIMENSIONS +/-0.5 [13] UNLESS OTHERWISE SHOWN.
2. COMPLETE ASSEMBLY LEAD FREE COMPLIANT - THE WETTED SURFACE OF THIS PRODUCT CONTACTED BY CONSUMABLE WATER CONTAINS LESS THAN ONE QUARTER OF ONE PERCENT (0.25%) OF LEAD BY WEIGHT.
3. PACKAGE INCLUDES ALL REQUIRED INLET CHECK VALVES, ISOLATION VALVES, AND STRAINERS ON DOMESTIC SIDE.
4. DRV AND ELECTRICAL PANEL ARE PREWIRED TO PROVIDE A SINGLE ELECTRICAL LANDING POINT AT THE PANEL.

DO NOT SCALE DRAWING
TOLERANCES UNLESS OTHERWISE SPECIFIED
DIMENSIONING ENGLISH [mm]
FRACTIONAL ± 1/64
ANGULAR: ± 2

		IN.	MM
DECIMAL	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

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FRT53540

	NAME	DATE	MATERIAL	
DRAWN	CFG	5/18/2015		SHEET 1 OF 1
RELEASED			CWF55983	REV C SALES

APPROVAL

BY:_____ DATE:_____

- ☐ APPROVED, PROCEED WITH FABRICATION
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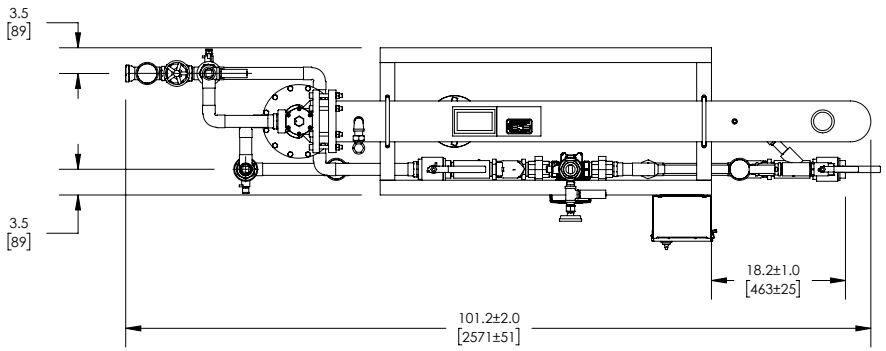

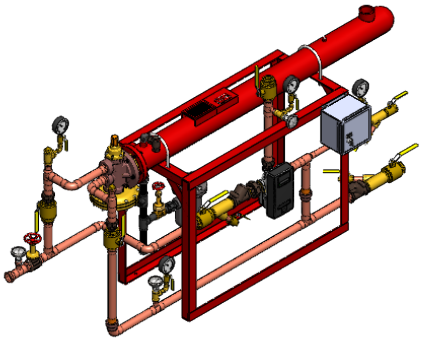

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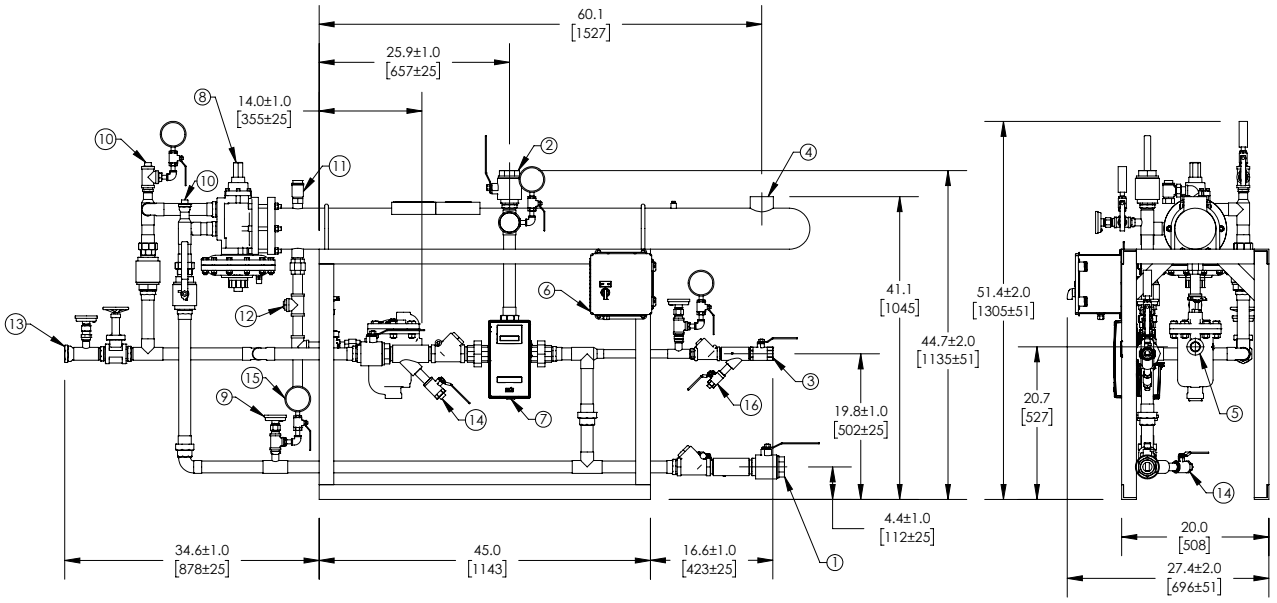

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DIMENSIONING ENGLISH [mm]
FRACTIONAL ± 1/64
ANGULAR: ± 2

DECIMAL		IN.	MM
	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

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FRT535DW40

	NAME	DATE	MATERIAL	SHEET 1 OF 1
DRAWN	CFG	5/18/2015		
RELEASED			CWF55983	REV C SALES