Fisher™ Yarway™ AT-18/28, AT-38/48 and TempLow 4300 Insertion Style Desuperheater

Fisher Yarway AT-18/28, AT-38/48, and TempLow 4300 Desuperheaters can be used in many applications to efficiently reduce the temperature of superheated steam to the desired set point. These desuperheaters are of insertion style with angle body design and integrated spray water control. General applications are:

- Cooling of process steam or gas
- Boiler superheater attemperator
- Boiler reheater attemperator
- Auxiliary steam desuperheating (e.g. steam let down stations)

The Fisher Yarway AT-18/28, Yarway AT-38/48, and Yarway TempLow 4300 Desuperheaters regulate the amount of injection water by varying the number of open injection spray nozzles. This enables the water pressure at the nozzles to remain constant, independent of the number of injection nozzles in operation. This results in a near uniform spray over the entire operating range. Control of nozzle opening is achieved by the positioning of a piston which is operated directly by an actuator mounted on the valve, so a separate spraywater control valve is not required.

- Yarway AT-18/28—The Yarway Heavy Duty A.T.-Temp Desuperheater with forged body construction is specially designed for use on medium to high-pressure steam applications. The design is adaptable to various boiler codes and material specifications. The piston and stem are nitrided to give long life and galling resistance. Piston rings are specially hardened and subsequently nitrided and are provided with a special liquid tight slot. These rings offer running properties and enable controllable C_V (K_V) values as low as 0.005 C_V (0.0043 K_V).

YARWAY AT-18/28

YARWAY TEMPLOW 4300

YARWAY AT-38/48

Specifications

Available Types

Forged Design: Yarway AT-18/Yarway AT-28,
Fabricated Design: Yarway AT-38/Yarway AT-48,
Cast Design: Yarway TempLow 4300 series

Common Characteristics: ■ Desuperheaters with ASME flange connections are designed according to ASME B16.34 – Valves Flanged, Threaded, and Welding End ■ Desuperheaters with EN flange connections are designed in accordance with EN12516 – Industrial Valves-Shell Design Strength

Body Style and Flow Direction

Angle Body and Flow Down Configurations(1) and Valve Size: See table 1

End Connections Styles(1,2)

See table 1

Maximum Inlet Pressure and Temperature(1)(2

Consistent with ASME B16.34 and EN1092-1, unless limited by maximum pressure drop or material temperature capabilities

Maximum Pressure Drop(1)

Delta Pressure:

Min delta pressure depends on nozzle selection (1 or 2 bar)

1 to 59 Bar: A to D_X nozzles in S41000 stainless steel
2 to 59 Bar: E to K nozzles in S41000 stainless steel
60 to 100 Bar: Alloy 6 material nozzle
Delta pressure limitation: 100 Bar(3)

Shutoff Classifications per ANSI/FCI 70-2 and IEC 60534-4

Standard: Class V

Flow Coefficients

Yarway AT-18/28, Yarway AT-38/48: See table 6
Yarway 4300 TempLow: See table 7

Packing Arrangements

Single Graphite

Approximate Weight

See table 3

Nozzle Material Selection

See table 5

Material Temperature Capabilities(1)

See table 6

Maximum Water Flow Capacity in Continuous Service

Yarway AT-18 and AT-38: 25 m^3/hr (110GPM)
Yarway AT-28 and AT-48: 50 m^3/hr (220GPM)
Yarway TempLow 4300: 25 m^3/hr (110GPM)

1. Do not exceed the pressure or temperature limits in this bulletin, nor any applicable code or standard limitations.
2. EN (or other valve body material) ratings and end connections can usually be supplied; consult your Emerson sales office.
3. Consult your Emerson sales office for additional product options when maximum pressure drop exceeds 100 bar.

- **Yarway AT-38/48**—The standard Duty A.T.-Temp Desuperheater is developed for use on low to medium pressure applications. The fabricated construction makes it easily adaptable to meet various boiler codes and material specifications. The unit can also be used as a liquid into gas injector for which high grade alloy such as stainless steel is often used. The vital trim components are similar to those used in Yarway AT-18/28 heavy duty A.T.-temp Desuperheaters.
- **Yarway TempLow 4300 Series**—This type is used for one-on-one replacements of existing TempLow installations. The cast body Yarway TempLow 4300 mounts through a 3-inch flange in the steam line, and is available in a wide variety of characteristics. Water pressure 3.5 to 100 bar (50 to 1450 psi) above steam pressure is employed to generate thin-film, conical sprays which are injected into the steam flow through a series of vortex spray nozzles. The fine spray evaporates rapidly in the steam, thereby minimizing the tendency for spray water to accumulate in the line.

Features

- Multiple Nozzle Capacity Ranges—Yarway A.T. Temp and TempLow 4300 desuperheaters may be equipped with a variety of spray heads. The uniform body threading accepts spray cylinder heads with a wide range of C_V (K_V) values. Many standard configurations are available including several equally sized spray nozzles or a number of characterized combinations. Yarway A.T. Temp desuperheaters can also be customized to specific system requirements.

- Precision Control of Temperature—These desuperheaters yield fine atomization resulting in rapid water evaporation to minimize the accumulation of water in the line. Control within 6°C (10°F) of saturation is possible. Repeatable accuracy to +-1% of the range of the temperature controller.

- High Water Turndown Capacity—The Yarway A.T Temp and Yarway TempLow 4300 desuperheaters can achieve greater than 50:1 water turndown capacity.

- Low Maintenance—Stainless steel trim components reduce or eliminate corrosion problems. Base nozzles are hardened stainless steel to minimize wear, with Alloy 6 and N07718 materials available in the A.T. Temp desuperheaters. Alloy 6 or available 17% chrome seats for long life shut-off.

- Easy Installation—Installation in straight, vertical or horizontal pipes. Minimal headroom is required for mounting. No atomizing steam is required.

- Adjustable to Changing Needs—Spray cylinders unscrew from probe for easy capacity changes without changing stem/disk or seat. Pressure drop is taken across the nozzles rather than the seating surface provides longer trim life. Actual performance depends on the application and may exceed the design characteristics.

- Long Service Life—The Yarway A.T.-Temp and Yarway TempLow 4300 have separate shutoff and water control surfaces. The primary disk seat opens, then is followed by a no flow deadband, and then a lower disk edge uncovers the water inlet orifices. This feature helps protect The Yarway A.T.-Temp and Yarway TempLow 4300 from low flow seat erosion, ensuring all applications, especially those with high turndown needs, get a longer tight shutoff service life. Additionally, all spray nozzles are brazed into position for permanent retention.

- Integral Spray Water Control Valve—Yarway A.T. Temp and TempLow desuperheaters include spray water flow control trim with Class V shutoff as standard. These valves have separate shutoff and water flow control edges to protect the seating surface. All pressure drop is taken across the spray nozzle itself with no pressure reduction stage inside the body.

Figure 1. Yarway AT-18/28

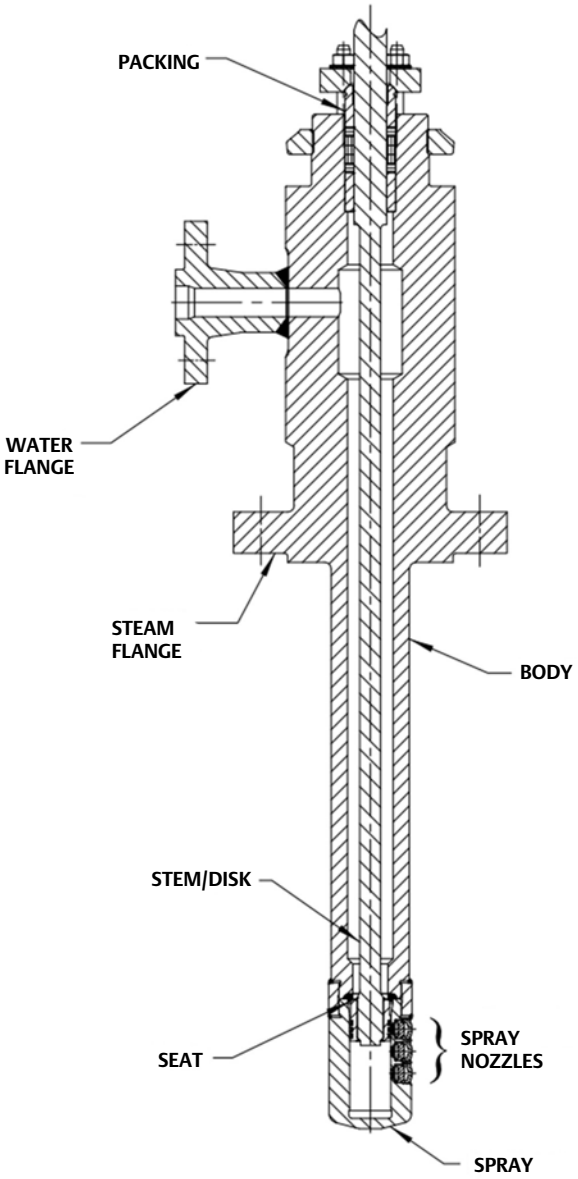


Figure 2. Yarway AT-38/48

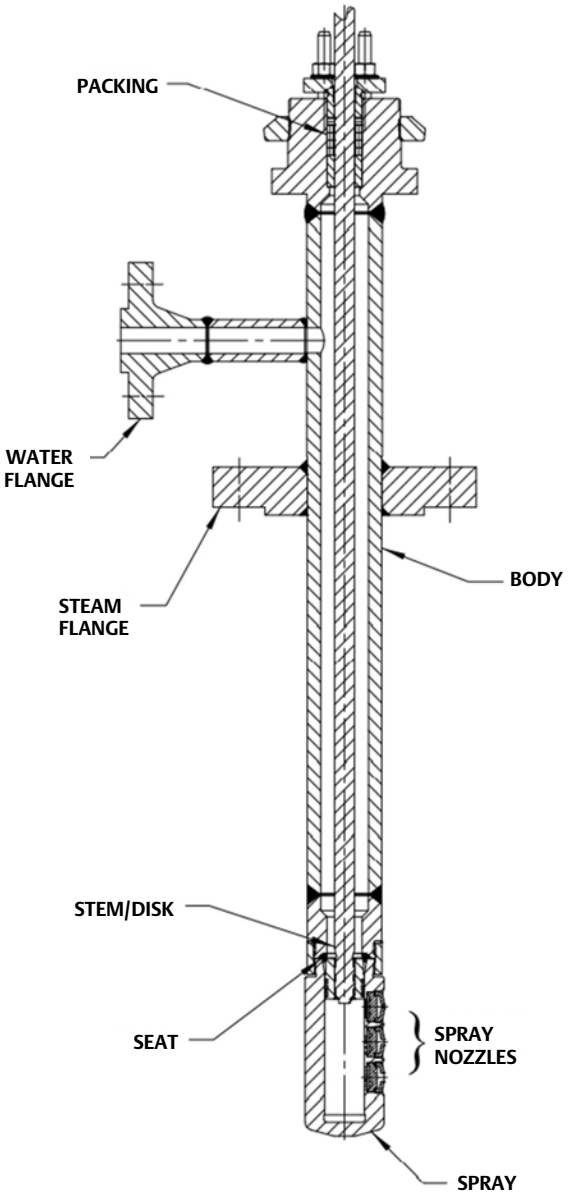


Figure 3. Yarway TempLow 4300

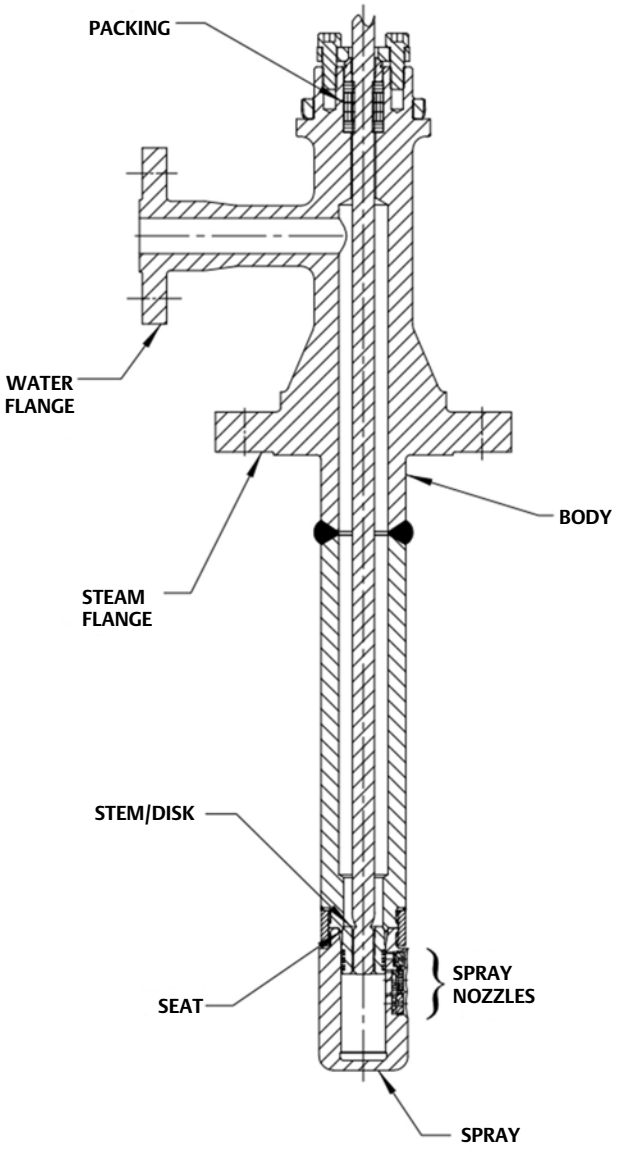


Table 1. Yarway Available Valve Connections

TYPE	STEAM FLANGE SIZE			WATER FLANGE SIZE(1)			STEAM PIPE SIZE
	NPS	ASME B16.5 Ratings	Connection(2)	NPS	ASME B16.5 Ratings	Connection(2)	NPS
AT-18	3	CL600-2500	RF, RTJ	1, 1-1/2, 2	CL600-2500	RF, RTJ	6-48
AT-28	4	CL600-2500	RF, RTJ	1-1/2, 2, 3	CL600-2500	RF, RTJ	8-48
AT-38	3	CL150-1500	RF, RTJ	1, 1-1/2, 2	CL150-1500	RF, RTJ	6-48
AT-48	4	CL150-1500	RF, RTJ	1-1/2, 2, 3	CL150-1500	RF, RTJ	8-48
TempLow 4300	3	CL150-1500	RF, RTJ	1	CL150-1500	RF, RTJ	6- 16
	DN	EN1092-1 Ratings	Connection(2)	DN	EN1092-1 Ratings	Connection(2)	DN
AT-18	80	PN100-400	Type B1, B2 (RF)	25, 40, 50	PN100-400	Type B1, B2 (RF)	150-1200
AT-28	100	PN100-400	Type B1, B2 (RF)	40, 50, 80	PN100-400	Type B1, B2 (RF)	200-1200
AT-38	80	PN10-250	Type B1, B2 (RF)	25, 40, 50	PN10-250	Type B1, B2 (RF)	150-1200
AT-48	100	PN10-250	Type B1, B2 (RF)	40, 50, 80	PN10-250	Type B1, B2 (RF)	200-1200

1. Water flange class rating must be equal or greater to the body flange class rating.
2. End connection style abbreviations: RF-Raised Face, RTJ-Ring Type Joint.

Table 2. Yarway AT and Templow 4300 Shell Temperature

TYPE(3)	BODY FLANGE MATERIAL(1)	OPERATING TEMPERATURE	
		°C	°F
AT-38/48	SA105	-29 to 427	-20 to 800
	F11	-29 to 538	-20 to 1000
	304 SST		
	316 SST		
	SA105/1.0460(2)	-29 to 427	-20 to 800
	1.7335	-29 to 538	-20 to 1000
AT-18/28	F22	-29 to 593	-20 to 1100
	F91		
	F347H		
	1.7383		
	1.4903		
	1.4550		
TempLow 4300	WC6	-29 to 538	-20 to 1000

1. For availability of materials other than those listed, consult your Emerson sales office.
2. SA105 / 1.0460 material is available for PED.
3. CL150 terminates at 538°C (1000°F).

Table 3. Yarway AT and Templow 4300 Weights

TYPE	ASME PRESSURE RATING	WEIGHT	
		kg	lb
AT-18	CL600	50	110
	CL900	64	140
	CL1500	68	150
	CL2500	88	195
	PN100/160	52	115
	PN250	60	135
	PN320	70	155
	PN400	84	190
AT-28	CL600	80	180
	CL900	88	195
	CL1500	106	235
	CL2500	144	315
	PN100/160	80	180
	PN250	96	210
	PN320	120	265
	PN400	152	335
AT-38	CL150	28	60
	CL300	30	65
	CL600	32	70
	CL900	44	95
	CL1500	50	110
	PN10/16	26	60
	PN25/40	28	60
	PN63	32	70
	PN100	34	75
	PN160	36	80
	PN250	44	95
AT-48	CL150	46	105
	CL300	52	115
	CL600	60	130
	CL900	70	155
	CL1500	74	165
	PN10/16	44	95
	PN25/40	46	100
	PN63	50	110
	PN100	56	125
	PN160	60	130
	PN250	70	155
Templow 4300	CL150	39	86
	CL300	43	95
	CL600	45	100
	CL900	53	116
	CL1500	60	132

Table 4. Yarway Standard Materials of Construction(1)

Type	Part Name	ASME Material	EN Material
Yarway AT-18/28	Spray Cylinder/Nozzle	S41000/S41000	1.4006/1.4006
		S41000/Alloy 6	1.4006/Alloy 6
		N07718/N07718 (CVD treated)	N07718/N07718 (CVD treated)
	Piston Ring	S43100 / Nitride	1.4057 / Nitride
	Piston	S43100 / Nitride	1.4057 / Nitride
	Fastener Ring	SA182 F11 Class 2	1.7335
		ALLOY 800H / Nitride	ALLOY 800H / Nitride
	Stem	S43100 / Nitride	1.4057 / Nitride
	Body/Seat	SA182 F22/Alloy 6 or 17% Cr	1.7383/Alloy 6 or 17% Cr
		SA182 F347H/Alloy 6 or 17% Cr	1.4550/Alloy 6 or 17% Cr
		SA182 F91/Alloy 6 or 17% Cr	1.4903/Alloy 6 or 17% Cr
	Water Flange	SA 182 F22	1.7383
		SA 182 F347H	1.4550
		SA 182 F91	1.4903
	Packing Box Ring	S43100 / Nitride	1.4057 / Nitride
	Nut, Hex	SA194 GR7 / ENC	SA194 GR7 / ENC
	Packing Set	Graphite K80/K80S	Graphite K80/K80S
	Stud Bolt	SA193 GR B16 / ENC	SA193 GR B16 / ENC
	Packing Follower	S43100 / Nitride	1.4057 / Nitride
	Flange, Packing	S30400	1.4301
	Nameplate	SST (304)	SST (1.4301)
	Yoke Locknut	SA105 / NCF	SA105 / NCF
	Securing Washer	Carbon Steel / Zinc Plated	Carbon Steel / Zinc Plated
Yarway AT-38/48	Spray Cylinder/Nozzle	S41000/S41000	1.4006/1.4006
		S41000/Alloy 6	1.4006/Alloy 6
	Piston Ring	S43100 / Nitride	1.4057 / Nitride
	Piston	S43100 / Nitride	1.4057 / Nitride
	Fastener Ring	SA182 F11 Class 2	1.4057 / Nitride
	Stem	S43100 / Nitride	1.4057 / Nitride
	Seat housing	SA 105/Alloy 6 or 17% Cr	1.0460/Alloy 6 or 17% Cr
		SA182 F11 Class 2/Alloy 6 or 17% Cr	1.7335/Alloy 6 or 17% Cr
	Body pipe	SA106 Grade B	1.0425
		SA335 P11	1.7335
	Water Flange	SA105	1.0460
		SA182 F11 Class 2	1.7335
	Adaptor	SA106 Grade B	1.0425
		SA335-P11	1.7335
	Packing Box Ring	S43100 / Nitride	1.4057 / Nitride
	Packing box	SA105	1.0460
		SA182 F11 Class2	1.7335
	Nut, Hex	SA194 GR7 / ENC	SA194 GR7 / ENC
	Packing Set	Graphite K80/K80S	Graphite K80/K80S
	Stud Bolt	SA193 GR B16 / ENC	SA193 GR B16 / ENC
	Packing Follower	S43100 / Nitride	1.4057 / Nitride
	Flange, Packing	S30400	1.4301
	Nameplate	SST(304)	SST(1.4301)
	Yoke Locknut	SA105 / NCF	SA105 / NCF
	Securing Washer	Carbon Steel / Zinc Plated	Carbon Steel / Zinc Plated
	Body flange	SA105	1.0460
		SA182 F11 Class2	1.7335

-continued-

Table 4. Yarway Standard Materials of Construction[1] (cont.)

Type	Part Name	ASTM Material	EN Material
Yarway TempLow 4300	Body	WC6 F11	---
	Seat	Alloy 6	---
	Stem/disk	431 stainless steel	---
	Spray cylinder	410 stainless steel N07718	---
	Vortex nozzle	410 stainless steel N07718	---
	Fastener ring	A182 F11	---
	Piston ring	431 stainless steel	---
	Packing set	Single graphite	---
	Packing flange	304 stainless steel	---
	Packing follower	431 stainless steel	---
	Cap screw	A193 B16 steel	---
	Lock nut	Carbon steel	---
	Data plate	Stainless steel	---

1. For other materials contact your Emerson sales office.

Table 5. Yarway Nozzle Material Selection

MAX STEAM TEMPERATURE	STEAM / WATER TEMPERATURE DIFFERENCE	WATER PRESSURE DROP	
		Up to 60 bar (850 psi)	60 to 100 bar (850 to 1450 psi)
550°C (1022°F)	Up to 400°C (720°F)	410SST Body 410SST Nozzles	ASTM 410 Body Alloy 6 Nozzles
550°C (1022°F) - 593°C (1100°F)	Greater than 400°C (720°F)	N07718 Sprayhead Assembly	N07718 Sprayhead Assembly

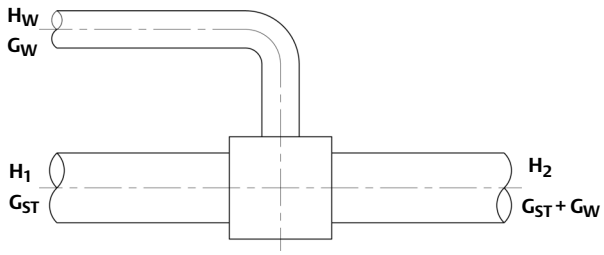
Principle of Operation

The A.T. Temp Desuperheater valve regulates the amount of the water flowing through injection nozzles. This enables the water pressure to remain constant, independently of the number of injection nozzles in operation. This results in an excellent and near uniform spray quality over the extreme range. Control of nozzle opening is achieved by the positioning of a piston which is operated directly by an actuator mounted onto the valve. Through this simple design, there is no separate water control valve necessary.

Superior Spray Nozzle and Multiple Nozzle Heads

In the Yarway AT-18/28, Yarway AT-38/48 and Yarway TempLow 4300 designs, Emerson has incorporated the latest technology in the spray nozzle design. The high quality surface finish minimize frictional losses, thereby ensuring that the total water to steam ΔP is available for atomization for the water. See figure 4.

Figure 4. Heat Balance Principle



SIZING FORMULA

Every desuperheater station is a mxing point where there is a heat and mass balance.
The universal formula is:

$G_W = G_{ST} (H_1 - H_2) : H_2 - H_W)$

In which:

G_W = Injection water mass
G_{ST} = Inlet steam mass
H_1 = Enthalpy of the inlet steam
H_2 = Enthalpy of outlet stem
H_W = Enthalpy of the injection water

This formula enables calculation of the quantity of water required to lower the inlet steam termperature to the set point temperature of the outlet steam

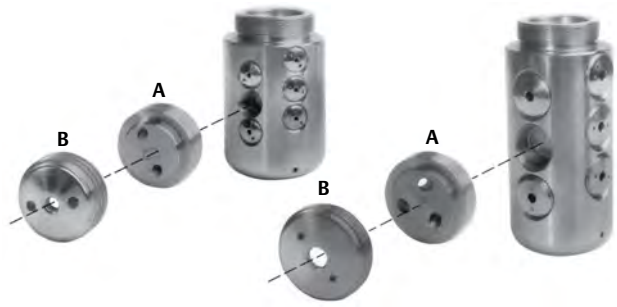
The AT-18/28/38/48 nozzle consists of two components, the orifices and the nozzle body. See figure 5. Each nozzle is served by individual feed holes in the cylinder wall. Water enters the chamber behind the orifice plate through these openings. The relatively large volume of this chamber ensures that water is proportioned evenly through each orifice. The ΔP across this orifice plate results in an increase in the fluid velocity. The water is subsequently rotated in the nozzle chamber before being emitted through the central hole of the end cap. The combination of splitting the feed flow, increasing velocity and rotating effect, ensures that the water is injected into the system in a fine symmetrical hollow cone spray.

The TempLow nozzle configuration works on a very similar way with the exception that the spray nozzle for a TempLow is constructed out of one piece. Where the water is flowing Axial in to the last swirl chamber before it leaves the orifice hole in the end cap for the AT-Temp nozzles this is done radially for the TempLow nozzles creating that same swirling effect by how these radial openings are machined.

Due to difference in $C_V(K_V)$ value, nozzle dimensions, and positioning in the sprayhead between the AT-Temp sprayheads and the TempLow 4300 sprayhead these are not interchangeable.

The nozzles are assembled with the spray cylinder and sealed by a vacuum brazing process. This maintains the integrity of these components even under the most extreme conditions and enables reliable operation over an extended period. Surface are finely machined to reduce frictional losses and internal contours are so designed as to optimize water swirl action, ensuring uniform and consistent droplet size.

Figure 5. Yarway Multi Variable Spray Head



Multiple variable spray head
A = Fixed swirlplate
B = Fixed end cap

The uniform body threading accepts spray cylinder heads with a wide range of C_V (K_V) values, see table 6. Standard configurations are with either six or nine equally sized spray nozzles but combinations are available, consult your Emerson sales office for more information.

Installation

Spray water must be injected in the direction of the steam flow. To facilitate installation of the water supply line, four different spray head positions are available in relation to the water connecting flange. See figure 8. Specification of this spray head orientation is required with the ordering data.

Emerson recommends a strainer with a mesh size of approximately 100 μ (400 μ upon request) in the water supply line to protect the A.T.-Temp Desuperheater from clogging.

System Parameters

Apart from the spray quality of the atomizer (primary atomization) there are other system parameters which influence the desuperheater stations performance. These are:

Inlet Steam Velocity

At high steam velocities, water droplets are easily disintegrated. This factor contributes to the overall atomization quality (secondary atomization). The minimum acceptable steam velocity varies as a function of the nozzle size and pipe diameter. For more information contact your Emerson sales office.

Distance to Sensor

The distance from the injection point to the temperature sensor should be 12 to 15 meters (39 to 49 feet). Shorter distances can be achieved but would need to be calculated. Contact your local Emerson sales office if less than the standard 12 m (39 ft) is needed.

Water to Steam Ratio

This ratio is determined by dividing G_W by G_{ST}. For system steam pressure below 15 bar (218 psi), this ratio should not exceed 10% for the normal operating conditions. Systems operating between 15 and 25 bar (218 and 363 psi) can have a ratio of up to 15%. For higher water percentage duties, contact your local Emerson sales office.

Steam Pressure

Steam pressure effects the secondary atomization. High pressure steam will break up the droplet created at primary atomization in to smaller droplets, enhancing quick evaporation without water fallout. This process is much less effective with steam pressures under 10 bar (145 psi). Therefore nozzle selection on low pressure applications is even more important.

Level of Superheat in Outlet Temperature

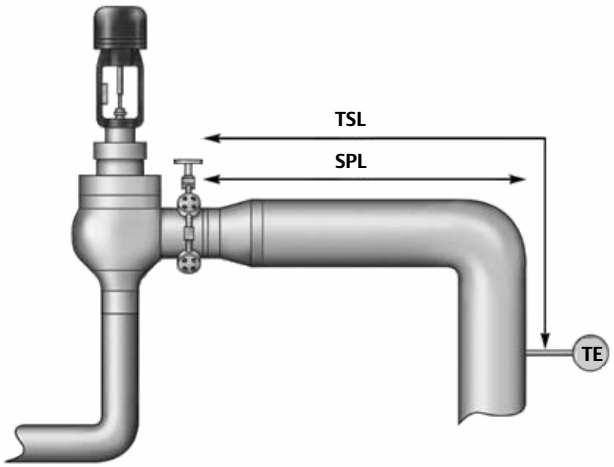
Atomized water in steam needs to evaporate as quickly as possible. This process is relying on the heat balance between water and steam. The closer you get to saturated steam temperatures, the less latent enthalpy the steam has to heat the water droplet. Also in these cases small initial droplet creation at primary atomization is even more important.

Water Temperature

Warmer water is best for fast desuperheating. While it may seem that cold water would improve quick cooling, cold water takes more time to reach the evaporation point, increasing risk of water fall out before evaporation. The process of evaporation takes the largest amount of energy out of the steam, resulting in the temperature reduction.

The combination of the above factors will influence the two most important paramaters customers are asking for: distance to first bend (required straight pipe run) and distance to temperature sensor (temperature sensor length) (see figure 6).

Figure 6. Application Schematic



KEY

SPL = Downstream Straight Pipe Length
TE = Temperature Sensor Element
TSL = Temperature Sensor Length

Required Straight Pipe Run

The distance from injection point to the first pipe bend is also a function of steam pressure, temperature and nozzle size. Experience has shown that in systems up to 25 bar (363 psi), 4 to 6 meters (13 to 20 ft) - is an acceptance distance, on lower pressures previous mentioned parameters would need review.

Control Systems

The injection water quantity is controlled as a function of the outlet steam temperature. The A.T. -Temp Desuperheater actuation is compatible with conventional control systems operated from temperature transmitters, temperature indicating controllers and positioners. Fully pneumatic or fully electric systems are compatible and also combinations of the two.

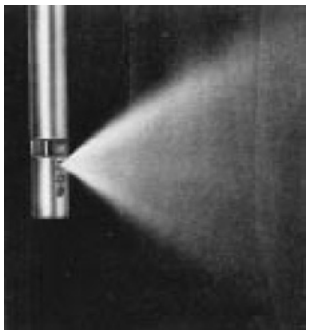
Yarway TempLow 4300

Desuperheating water, at a pressure of at least 3.5 bar (50 psi) above steam line pressure, enters the desuperheater through a NPS 1 flanged water connection. The water flows down through the water jacket to the seating area above the valve plug, where Class V tight water shut-off is achieved.

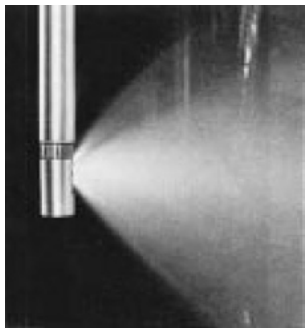
When a reduction in steam temperature is signaled by the steam temperature system, the actuator forces the plug/stem assembly of the desuperheater downward, progressively uncovering a series of multiple water inlet orifices which feed each vortex nozzle. As more desuperheating water is required, the disk moves further downward, bringing additional nozzles into operation.

There are multiple stages of water control to each nozzle, plus 6 to 21 vortex nozzles, which create a rotating mist of water droplets for rapid evaporation and fast response to a change in temperature control signal. Maximum water pressure is assured at the nozzles because no upstream water control valve is utilized. This also eliminates flashing/cavitation within the probe. Water flow is thus controlled at the point of the injection into the steam.

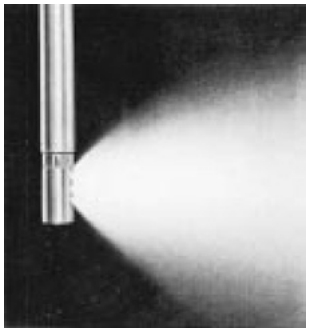
Figure 7. Yarway TempLow Spray Patterns



OPERATING AT 15%



OPERATING AT 50%



OPERATING AT 100%

Table 6. Yarway TempLow 4300 Standard Nozzle Sprayheads

Nozzle Type	Spray Configuration	Max Kv	Max Cv	Travel		Insertion Length		Probe Length		Min Pipe	
				mm	Inch	mm	Inch	mm	Inch	DN	NPS
1	AS6	0.078	0.090	45	1.78	360	14.17	437	17.2	150	6
2	AS9	0.117	0.135								
3	AO6	0.162	0.187								
4	AO9	0.243	0.281								
5	A6	0.258	0.298								
6	AO6A3	0.291	0.336								
7	AO12	0.324	0.375								
8	A9	0.387	0.447								
9	AO3A3B3	0.555	0.642	50	1.97						
10	B6	0.690	0.798	60	2.37	365	14.37				
11	A3B6	0.819	0.947	55	2.17						
12	B9	1.035	1.197	60	2.37						
13	AO2C4	1.254	1.450	70	2.76	370	14.57	468	18.43	200	8
14	A3B3C3	1.374	1.588	60	2.36	365	14.37	437	17.2	150	6
15	B6C3	1.590	1.838	65	2.56	370	14.57	468	18.43	200	8
16	C6	1.800	2.081	80	3.15	375	14.76				
17	AO3B3D3	1.806	2.088	65	2.56	370	14.57				
18	B3C6	2.145	2.480	70	2.76	370					
19	A3C3D3	2.409	2.785	70	2.76	370					
20	B3C3D3	2.625	3.035	75	2.96	375	14.76				
21	C9	2.700	3.121	80	3.15						
22	D6	2.760	3.191	85	3.35	380	14.96				
23	B3D6	3.105	3.590	75	2.96	375	14.76				
24	A3C3E3	3.369	3.895	70	2.76	370	14.57				
25	B6D6	3.450	3.988	95	3.75	385	15.16				
26	B3C3E3	3.585	4.145	75	2.95	375	14.76				
27	C3D6	3.660	4.231	85	3.35	380	14.96				
28	B3D3E3	4.065	4.699	80	3.15	375	14.76				
29	D9	4.140	4.786	85	3.35	380	14.96				
30	AO3B3D3E3	4.146	4.793	90	3.54			481	18.94		
31	A3B3D3E3	4.194	4.849					468	18.43		
32	A3C6E3	4.269	4.935	95	3.75	385	15.16	481	18.94	250	10
33	C3D3E3	4.620	5.341	85	3.35	380	14.96	468	18.43	200	8
34	E6	4.680	5.410	90	3.54						
35	D6E3	5.100	5.896	85	3.35						
36	D3E6	6.060	7.006	90	3.54						
37	E9	7.020	8.116								

Table 7. Yarway AT-Temp Standard Nozzle Sprayheads

Type	Configuration	AT Models	Max C_v	Max K_v	Travel		Min Steam Pipe	
					mm	Inch	DN	NPS
1	6A	18, 38	0.0749	0.0648	55	2.17	150	6
2	4A-2B		0.1027	0.0888				
3	2A-3B-1C		0.1547	0.1338				
4	1A-2B-3C		0.2171	0.1878				
5	1A-2B-1C-2D		0.3105	0.2686				
6	1A-1B-2C-1D-1Dx		0.4302	0.3721				
7	1A-2B-3C-1D-1Dx-1D		0.6045	0.5229				
8	3B-1C-1D-1C-3Dx		0.8558	0.7403				
9	1C-2D-1Dx-2D-3Dx		1.2109	1.0474				
10	9Dx		1.7345	1.5003				
11	1B-1C-1D-1Dx-1E-1F	18, 38, 28, 48	1.1547	0.9988	90	3.54	200	8
12	1C-1D-1Dx-1E-2F		1.6000	1.3840				
13	1C-1D-1Dx-1E-2G		2.6606	2.3014				
14	1C-1D-1E-1F-1G-1H		3.4983	3.0260				
15	1D-1Dx-2F-1H-1K		5.0346	4.3549				
16	2D-1E-1G-1E-1F-1K-1H-1G		7.1034	6.1444				
17	1E-2Dx-1H-2F-3K		9.9268	8.5867				
18	1G-1F-1G-1K-2H-3K		14.5588	12.5934				
19	9K		20.1642	17.4420				

Ordering / Sizing Data

When ordering, specify the following information. Items 1 through 6 are required for desuperheater sizing.

1. Maximum, normal, and minimum steam flow rate (at minimum, more conditions are optional).
2. Steam pressure and temperature at the inlet and outlet.
3. Spraywater pressure and temperature.
4. Design conditions, if different from operating conditions.
5. Steam line size (and schedule).
6. Desuperheater steam connection size, type, and rating.
7. Spraywater connection size from table 8.
8. Face-to-face dimension (if replacing existing unit).
9. Water flange orientation. See figure 8.

Figure 8. Water Flange Positions

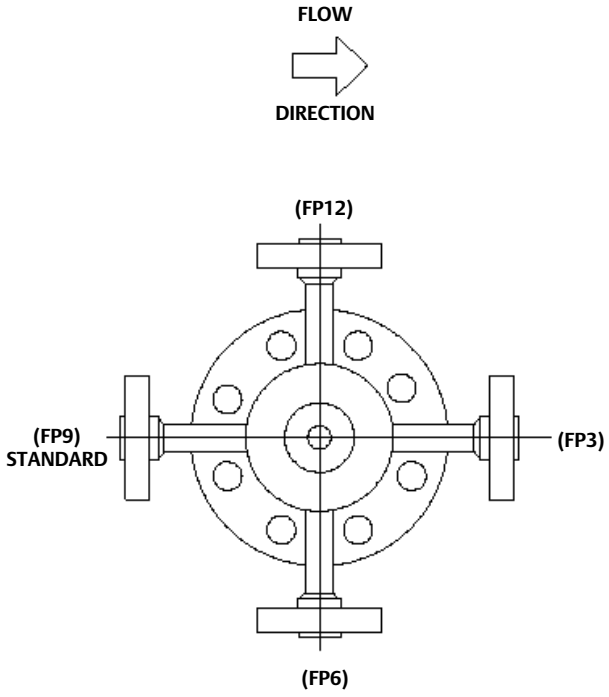


Table 8. Yarway A.T. Temp Desuperheater Installation Dimensions (see figure 9 and 10)(3)

TYPE / DIAMETER	AT-18		AT-28	AT-38	AT-48	TempLow 4300
	Qmax = 25 m^3/hr		Qmax = 50 m^3/hr	Qmax = 25 m^3/hr	Qmax = 50 m^3/hr	
	Standard Length for Steam Line Sizes up to NPS 12 (DN300)					
	VALVE TRAVEL, mm (Inch)					
A	55 mm (2.17 inch)(1)	380 (14.96)	- - -	380 (14.96)	- - -	See table 6 "A" and "B" dimensions
	90 mm (3.54 inch)(2)	399 (15.71)	399 (15.71)	399 (15.71)	399 (15.71)	
B	55 mm (2.17 inch)(1)	436 (17.17)	- - -	436 (17.17)	- - -	
	90 mm (3.54 inch)(2)	476 (18.74)	476 (18.74)	476 (18.74)	476 (18.74)	
	Optional Length for Steam Line Sizes up to NPS 14 (DN350) and Above					
A	55 mm (2.17 inch)(1)	580 (22.83)	- - -	580 (22.83)	- - -	See table 6 "A" and "B" dimensions
	90 mm (3.54 inch)(2)	599 (23.58)	599 (23.58)	599 (23.58)	599 (23.58)	
B	55 mm (2.17 inch)(1)	636 (25.04)	- - -	636 (25.04)	- - -	
	90 mm (3.54 inch)(2)	676 (26.61)	676 (26.61)	676 (26.61)	676 (26.61)	
C	All	200 (7.87)	250 (9.84)	200 (7.87)	200 (7.87)	155 (6.10)
D	All	290 (11.4)	340 (13.4)	290 (11.4)	380 (15.0)	236 mm
K	All	See table 9	See table 9	See table 9	See table 9	See table 9
L	All	See table 10	See table 10	See table 11	See table 11	See table 12
M	All	min. 68.0 (2.70)	min. 80.0 (3.15)	min. 68.0 (2.70)	min. 80.0 (3.15)	min. 68.0 (2.70)

1. 55 mm (2.1 inch) travel has a minimum pipeline diameter of 6 inches.
2. 90 mm (3.5 inch) travel has a minimum pipeline diameter of 8 inches.
3. Table reflects current standard dimensions, historic constructions might have different connection dimensions.

Table 9. "K" Installation Dimensions, Including Actuator Options

BODY TYPE	VALVE TRAVEL		YOKE BOSS SIZE (K)	ACTUATORS(1) mm (inch)							
				657C size 40i		657C size 46i		657C size 60i		657R size 70i / 657R-4-70i	
	mm	inch		E	G	E	G	E	G	E	G
AT-18	55	2.17	3-9/16	- - -	- - -	- - -	- - -	300 (11.8)	M16 x 2.00	300 (11.8)	M16 x 2.00
	90	3.54	3-9/16	- - -	- - -	- - -	- - -	300 (11.8)	M16 x 2.00	300 (11.8)	M16 x 2.00
AT-28	90	3.54	3-9/16	- - -	- - -	- - -	- - -	300 (11.8)	M16 x 2.00	300 (11.8)	M16 x 2.00
AT-38	55	2.17	2-13/16	220 (8.7)	1/2 - 20 UNF	220 (8.7)	1/2 - 20 UNF	- - -	- - -	- - -	- - -
			3-9/16	- - -	- - -	- - -	- - -	300 (11.8)	M16 x 2.00	300 (11.8)	M16 x 2.00
	90	3.54	2-13/16	- - -	- - -	220 (8.7)	1/2 - 20 UNF	- - -	- - -	- - -	- - -
			3-9/16	- - -	- - -	- - -	- - -	300 (11.8)	M16 x 2.00	300 (11.8)	M16 x 2.00
AT-48	90	3.54	3-9/16	- - -	- - -	- - -	- - -	300 (11.8)	M16 x 2.00	300 (11.8)	M16 x 2.00
TempLow 4300	45 to 85	1.78 to 3.35	2-13/16	180 (7.1)	1/2 - 20 UNF	190 (7.50)	1/2 - 20 UNF	- - -	- - -	- - -	- - -
	90 to 95	3.35 to 3.75	2-13/16	- - -	- - -	190 (7.50)	1/2 - 20 UNF	- - -	- - -	- - -	- - -

1. - - - indicates no option is available for this combination.

Table 10. Yarway AT-18/28 "L" Installation Dimensions (see figure 9)

BODY TYPE	PRESSURE RATING					
	WATER FLANGE SIZE, NPS	CL600	CL900	CL1500	CL2500	
		mm (Inch)				
AT-18	1	150 (5.91)	150 (5.91)	150 (5.91)	200 (7.87)	---
	-1/2		200 (7.87)	200 (7.87)	250 (9.84)	
	2		250 (9.84)	250 (9.84)		
	DN	PN 100	PN 160	PN 250	PN 320	PN 400
	25	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	200 (7.87)
	40				200 (7.87)	250 (9.84)
	50			200 (7.87)	250 (9.84)	
	NPS	CL600	CL900	CL1500	CL2500	
AT-28	1-1/2	150 (5.91)	200 (7.87)	200 (7.87)	200 (7.87)	---
	2				250 (9.84)	
	3	200 (7.87)		(11.8)	300 (11.8)	
	DN	PN 100	PN 160	PN 250	PN 320	PN 400
	40	150 (5.91)	150 (5.91)	150 (5.91)	200 (7.87)	200 (7.87)
	50			200 (7.87)		
	80	200 (7.87)	200 (7.87)		(11.8)	300 (11.81)

Table 11. Yarway AT-38/48 "L" Installation Dimensions (see figure 10)

BODY TYPE	PRESSURE RATING						
	WATER FLANGE SIZE, NPS	CL150	CL300	CL600	CL900	CL1500	
		mm (Inch)					
AT-38	1	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	---
	-1/2						
	2				200 (7.87)	200 (7.87)	
	DN	PN 10/16	PN 25/40	PN 63	PN 100	PN 160	PN 250
	25	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)
	40						
	50						
	NPS	CL150	CL300	CL600	CL900	CL1500	
AT-48	-1/2	150 (5.91)	150 (5.91)	150 (5.91)	200 (7.87)	200 (7.87)	---
	2				250 (9.84)	250 (9.84)	
	3	200 (7.87)	200 (7.87)	200 (7.87)			
	DN	PN 10/16	PN 25/40	PN 63	PN 100	PN 160	PN 250
	40	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)	---
	50						200 (7.87)
	80		200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	250 (9.84)

Table 12. Yarway TempLow "L" Installation Dimensions (see figure 11)

BODY TYPE	PRESSURE RATING					
	WATER FLANGE SIZE, NPS	CL150	CL300	CL600	CL900	CL1500
		mm (Inch)				
TempLow 4300	1	159 (6.26)	159 (6.26)	159 (6.26)	178 (7.0)	178 (7.0)

Figure 9. Yarway AT-18/28

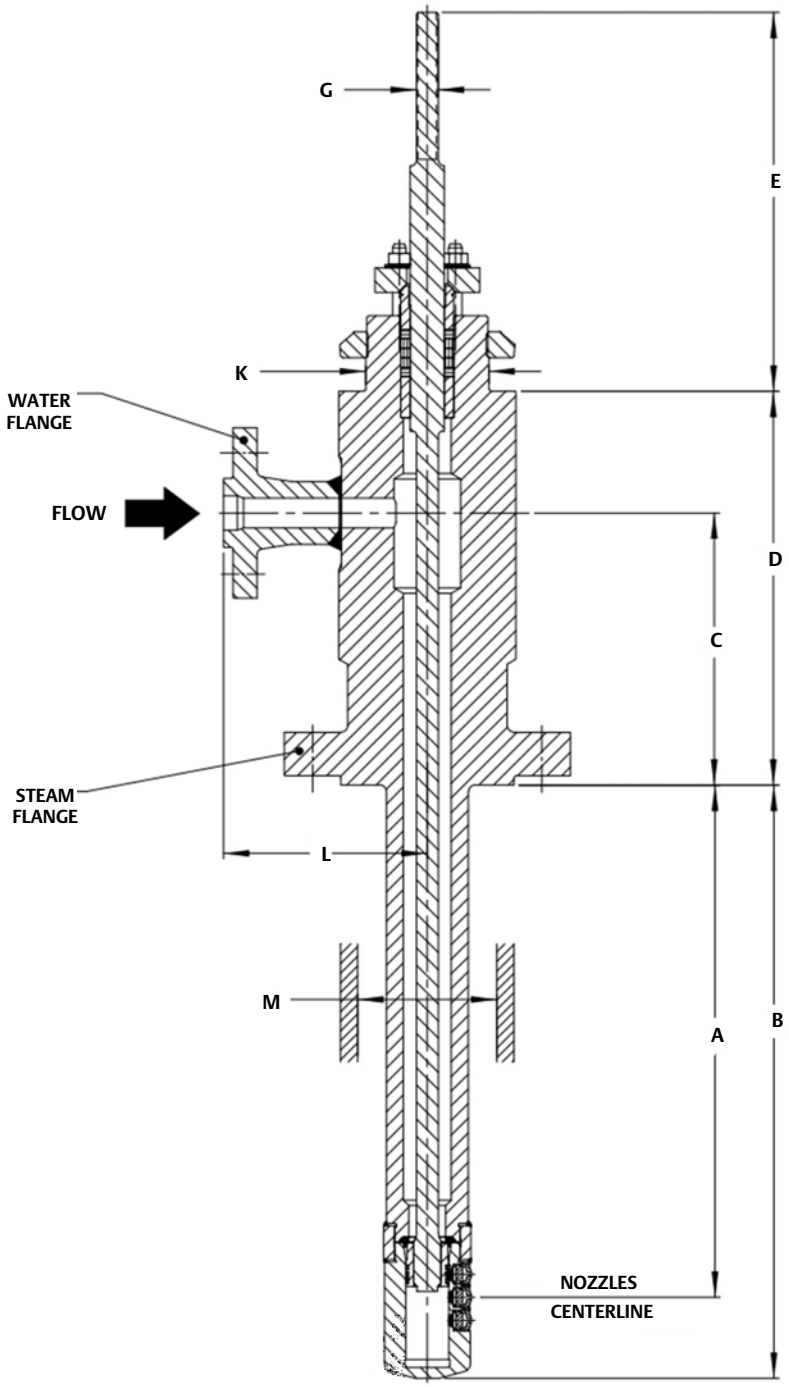


Figure 10. Yarway AT-38/48

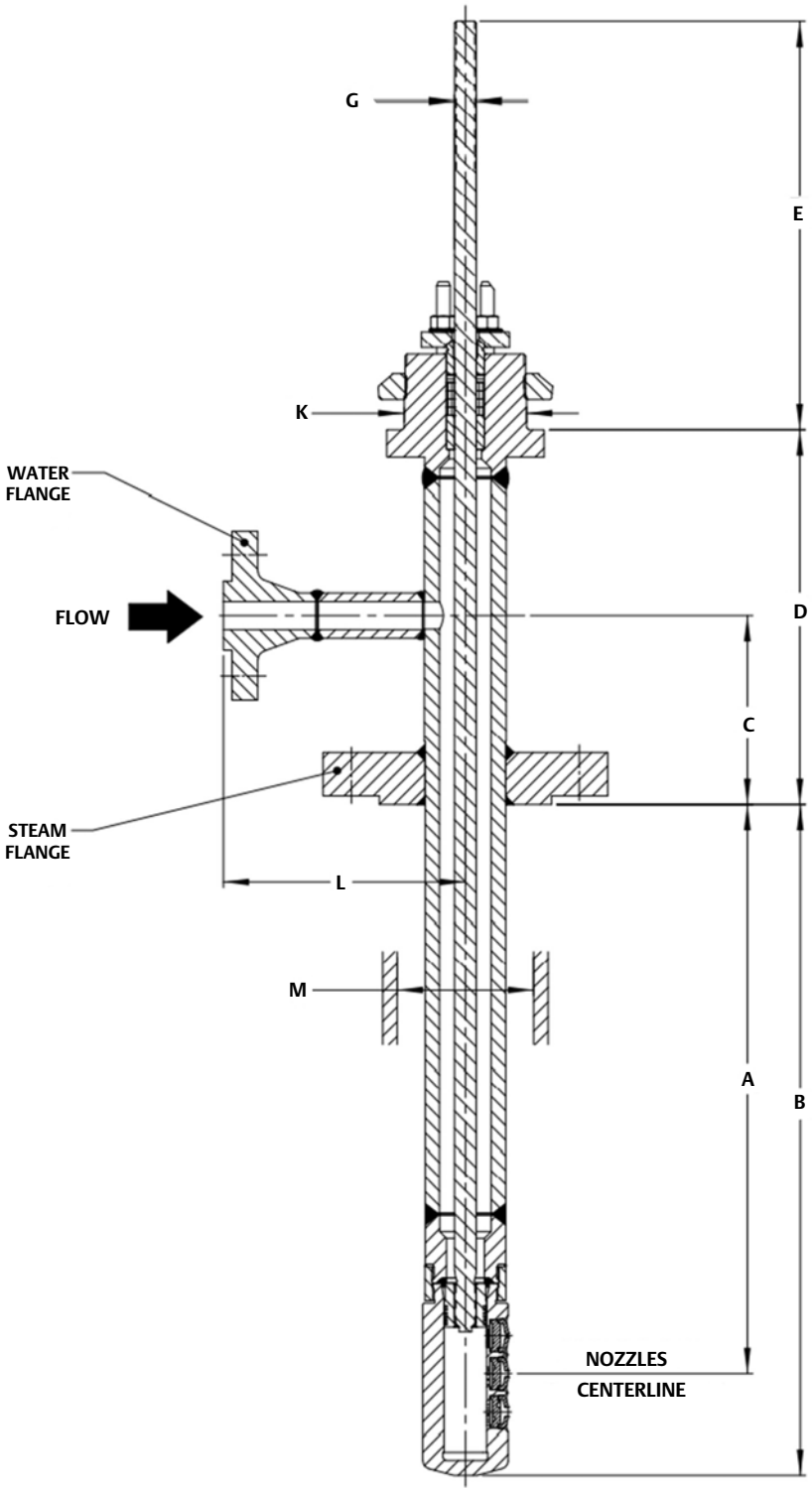
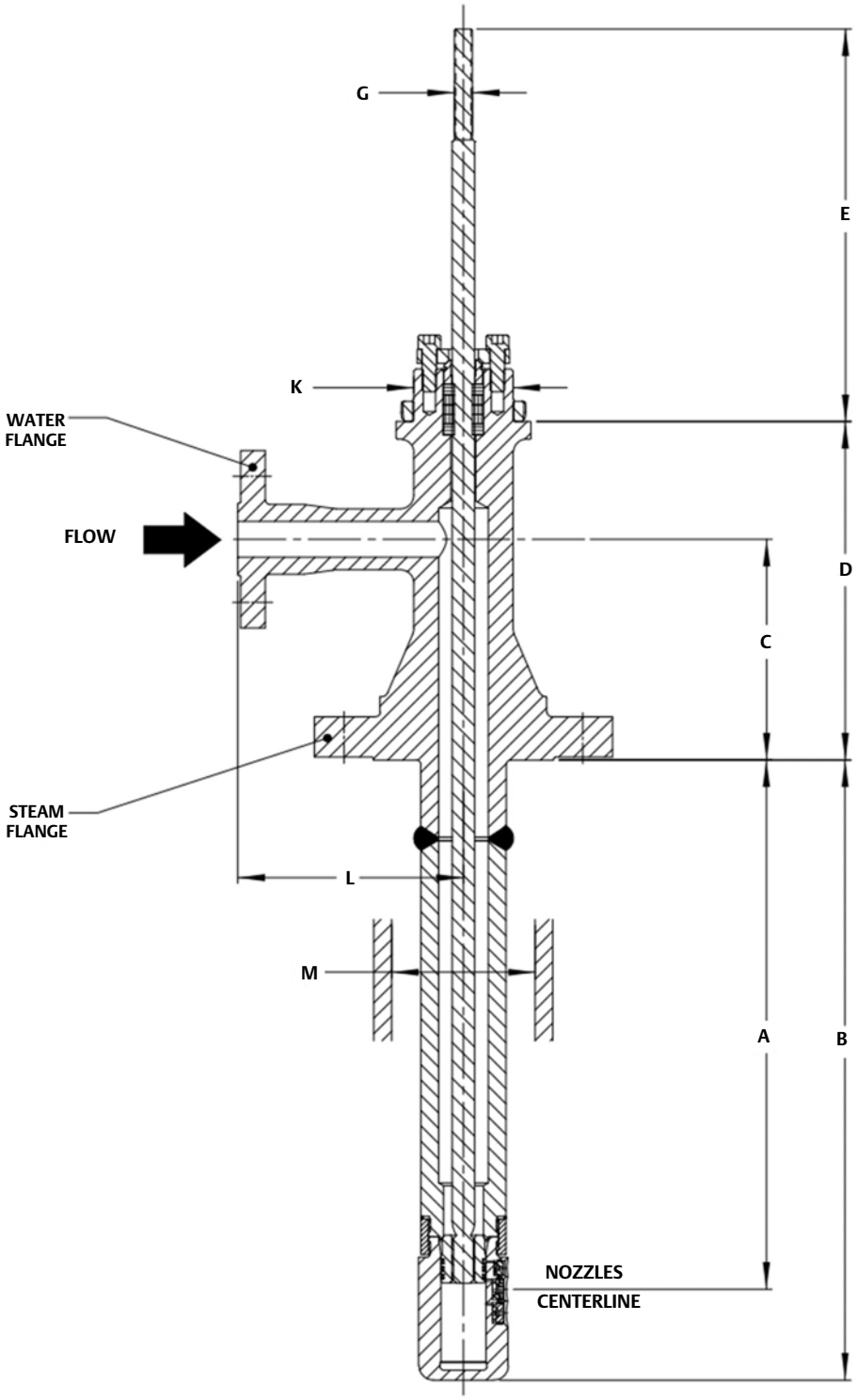


Figure 11. Yarway Templow 4300



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