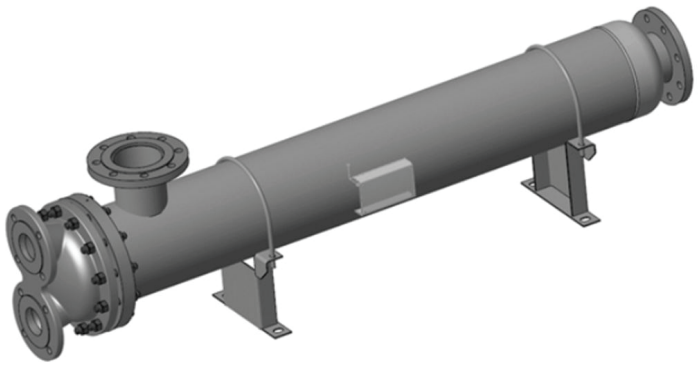
Local regulations may restrict the use of this product to below the conditions quoted.
In the interests of development and improvement of the product, we reserve the right to change the specification without notice. © Copyright 2021

U-tube bundle type shell and tube heat exchangers UPI, UPC and UPF

Description

The heat exchangers with removable “U" type tube bundle are among the most common units installed in hot-water plants and in industrial processes, due to the low-cost of manufacturing and solidity. The design of these heat exchangers make them particularly suitable for applications with saturated, superheated steam or diathermic oil as primary fluid.
The primary fluid is always fed on the tube side. Mounted on a single carbon steel tube sheet, the U-tube bundle can be removed once the head is disassembled. The standard design includes 16 bar as design pressure with PN16 flanges; the tube bundle can be made of 316L stainless steel (UPI series), copper (UPC series) and carbon steel (UPF series).



The shell is made of carbon steel and the vent and exhaust connections are integrated in the coupling flange, while the rear side connection can be lateral or, on request, axial. Special versions may be built on request (materials, design conditions, dimensions other than the standard). The U-tube models design uses up-to-date technological and production methods, most advanced calculation systems (thermodynamic calculation, vibration analysis) and all the acquired research knowledge. The design and construction are in accordance with the European standard EN 13445 and 2014/68/EU - Pressure Equipment Directive (PED) for pressure systems and with the marking when required. The products have been specifically designed for use on steam, air or water which are in Group 2 of the above mentioned Pressure Equipment Directive. Spirax Sarco should be contacted to confirm the suitability of the product for use on alternative fluids and applications. Assembling of “U" series heat exchangers is made in Spirax Sarco factory in Via per Cinisello, 18, in Nova Milanese, Italy.

PED categorisation of standard U-tube type heat exchangers

Shell Ø"	Heat exchanger (diathermic oil or hot water as primary fluid)					Heat exchanger (steam or superheated water as primary fluid)					Generator (steam, diathermic oil or superheated water as primary fluid)				
	Nominal length					Nominal length					Nominal length				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
5"	No CE marking Art. 3 comma 3 2014/68/UE Directive					SEP	Cat. I	Cat. II			Cat. II	Cat. III	Cat. III		
6"							Cat. I	Cat. I				Cat. III	Cat. III		
8"							Cat. II	Cat. II				Cat. III	Cat. III		
10"							Cat. II	Cat. II	Cat. II			Cat. III	Cat. III	Cat. III	
12"								Cat. II	Cat. II	Cat. II			Cat. III	Cat. III	

Definitions used in Directive 2014/68/EU (PED):

Heat exchangers = Pressure equipment used for producing hot water* at T ≤ 110°C in cold water circuit

Generators = Pressure equipment suitable for producing steam or superheated steam** at T > 110°C in both circuits

*Hot water = Liquid in Group 2 (non-hazardous) with steam saturation pressure ≤ 0.5 bar g at maximum temperature

**Superheated steam = Fluid in Group 2 (gases, liquefied gases, dissolved gases, liquids) with steam saturation pressure > 0.5 bar g at maximum temperature

Design conditions

TMA – Maximum operating temperature	
Shell side	110 °C
Tube side	204.4 °C (300 °C*)
PMA – Maximum operating pressure	
Shell side	16 bar g
Tube side	16 bar g (6 bar g*)
Cold hydraulic test pressure	
Shell side	23 bar g
Tube side	23 bar g

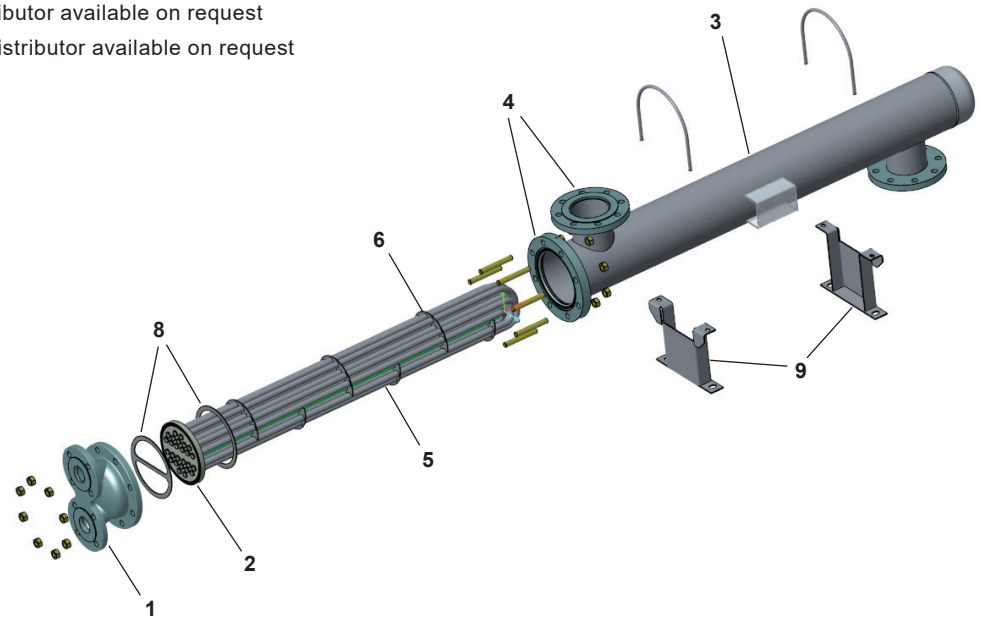
Notes:
1 - Hydraulic test pressure is 23 bar g (for both sides); this value is in accordance with the attachment 1 of PED Directive.
2 - On request, 6 bar g - 300 °C tube side version is available for operation with diathermic oil.

Materials

No.	Part	Material	Designation
1	Distributor (cast head *)	Cast iron (5", 6", 8" models) ** Carbon steel (10", 12" models)	EN GJL - 250 UNI EN 1561 – 1998 EN 10213-2 GP240GH
2	Tube sheet	Carbon steel	ASTM A 105
3	Shell/nozzles	Carbon steel	ASTM A106 Gr.B
4	Shell side flanges	Carbon steel	ASTM A 105
5	Tubes (and spacers)	316L stainless steel (mod. UPI models) Copper (mod. UPC) Carbon steel (mod. UPF)	ASTM A 249 Tp 316/316L EN12451 WDHP HS100 UNI EN10216 P235GH-TC1
6	Baffles	Stainless steel AISI 304 (UPI e UPF models) Brass (UPC models)	ASTM A 240 - 304 OTS 63
7	Tie rods	Carbon steel	UNI EN10025 Fe360
8	Gaskets	Reinforced graphite (with stainless steel)	
9	Support saddles (on request)	Carbon steel	
-	Insulation (on request)	Rock wool pad with 304 stainless steel cladding (th. 0.8 mm)	

* Cylindrical distributor available on request

** Carbon steel distributor available on request

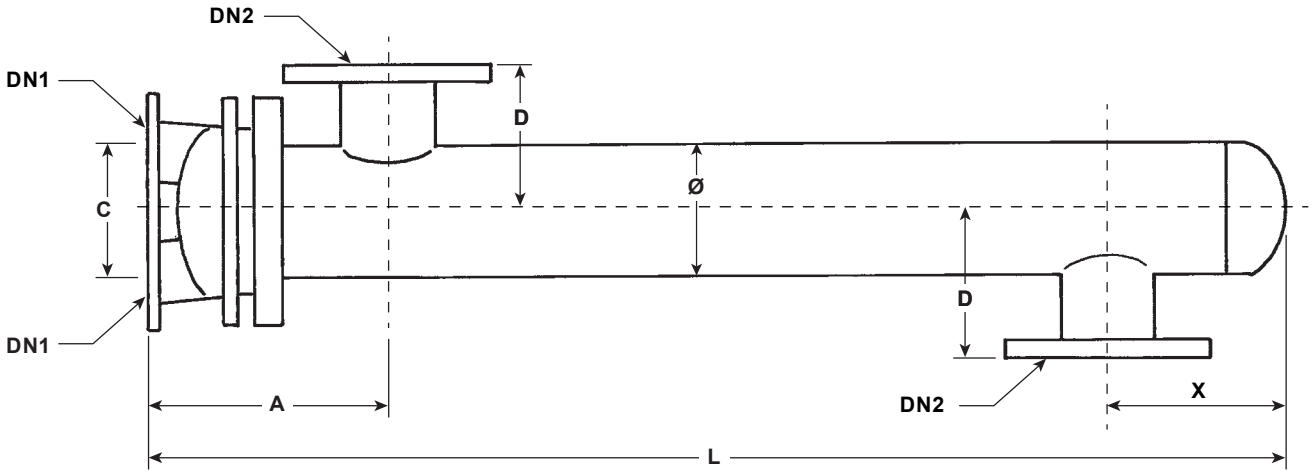


Dimensions

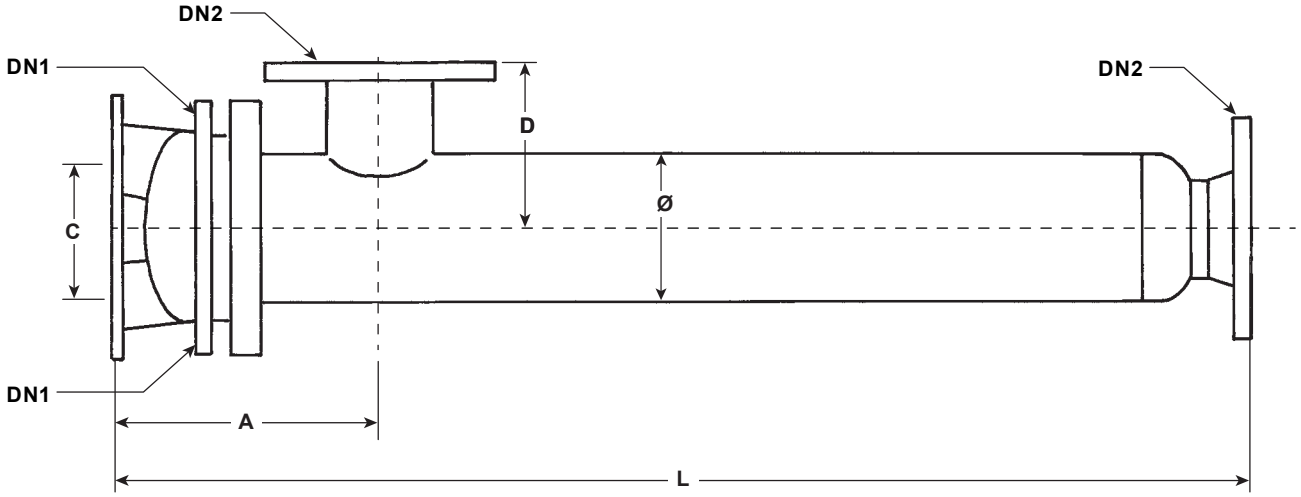
nom Ø	Øe (mm)	A	C	D	X	L per each nominal length lateral version					L per each nominal length axial version					Connections	
						1	2	3	4	5	1	2	3	4	5	DN1	DN2
5"	141.3	247	151	150	193	1132	1482	1982			1019	1369	1869			40	80
6"	168.3	268	166	175	221		1559	2059				1415	1916			50	100
8"	219.1	303	186	220	249		1632	2132				1464	1964			65	125
10"	273.0	342	201	270	289		1726	2226	2626			1550	2050	2448		80	150
12"	324.0	377	221	320	314			2301	2701	3201			2089	2497	2991	100	200

Note: DN1 and DN2 are EN1092-1 PN16 flanges.

Size (mm) Lateral version



Size (mm) Axial version



Product nomenclature

Available standard units are defined by the nomenclature; special versions can be designed to satisfy particular process conditions.

Model	**UP**	=	U-tube bundle type shell and tube heat exchanger	**UP**
Tubes material	**I**	=	316L stainless steel	**I**
	C	=	Copper	
	F	=	Carbon steel	
Shell diameter	**5", 6", 8", 10", 12"**	=	Diameter in inches	**12**
Tube bundle nominal length	**1, 2, 3, 4, 5**	=	Nominal length	**5**
Connections type	**Empty***	=	UNI 2278/2229 PN16 flanges	**FE**
	FE	=	EN 1092-1 PN16 flanges	
	FA*	=	ASME B16.5 Class 150 flanges	
Mechanical code	**Empty***	=	VSR	**E**
	E	=	EN 13445	
	A*	=	ASME VIII Div. 1	
Baffles number	**P**	=	Few	**P**
	M	=	Many	
Connection on rear side of the shell	**L**	=	Lateral	**L**
	A	=	Axial	
PED category	**Empty**	=	No CE marking	**CII**
	CI	=	Category I	
	CII	=	Category II	
	CIII	=	Category III	

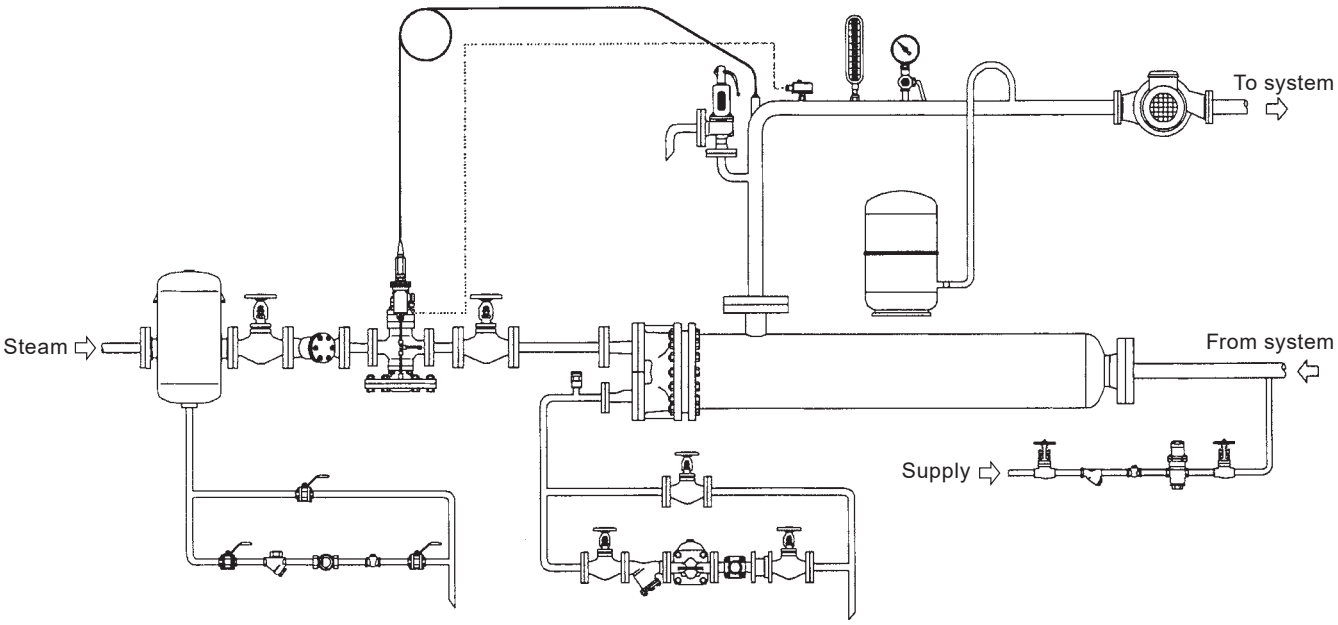
***Option not standard - available on request**

Selection example	=	**UP**	**I**	**12**	**5**	**FE**	**E**	**P**	**L**	**CII**

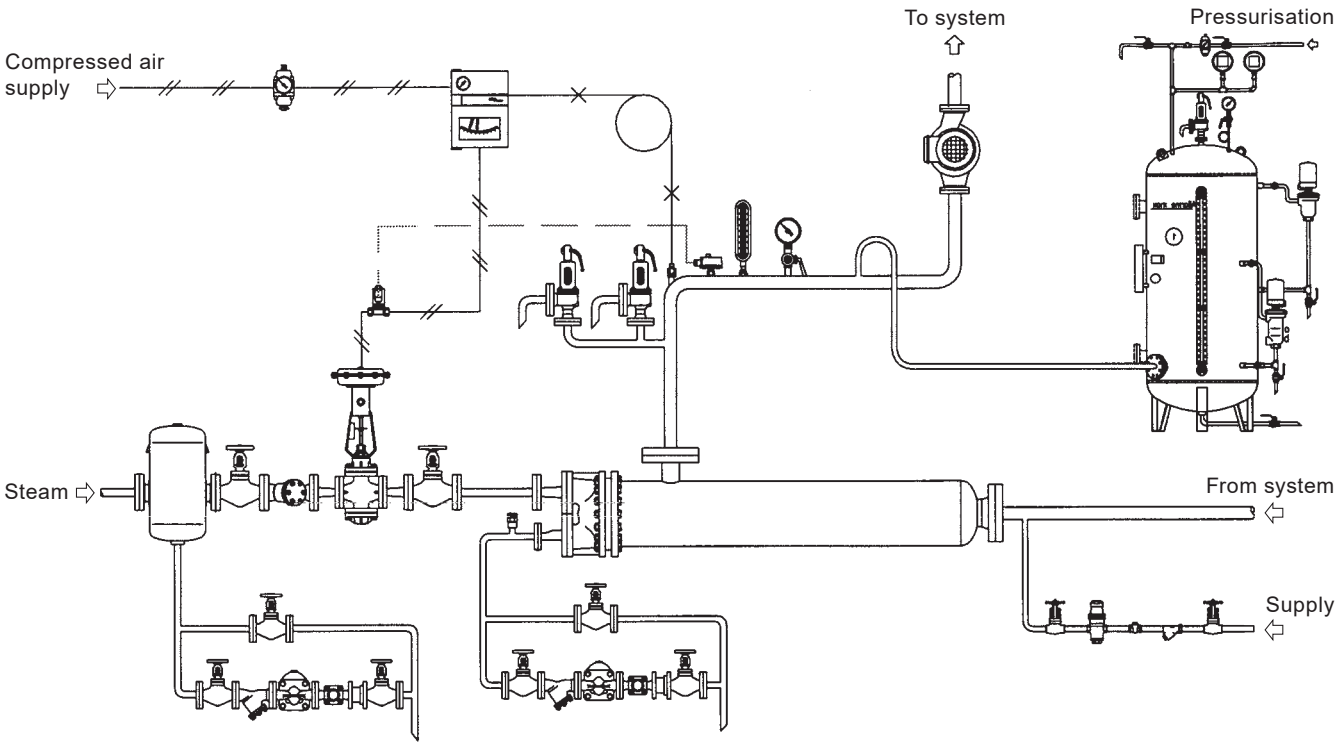
How to order

Contact your local Spirax Sarco office with your application details - We will provide the correct product selection and quotation for the heat exchanger that provides optimum performance for your application.

Applications and typical installations

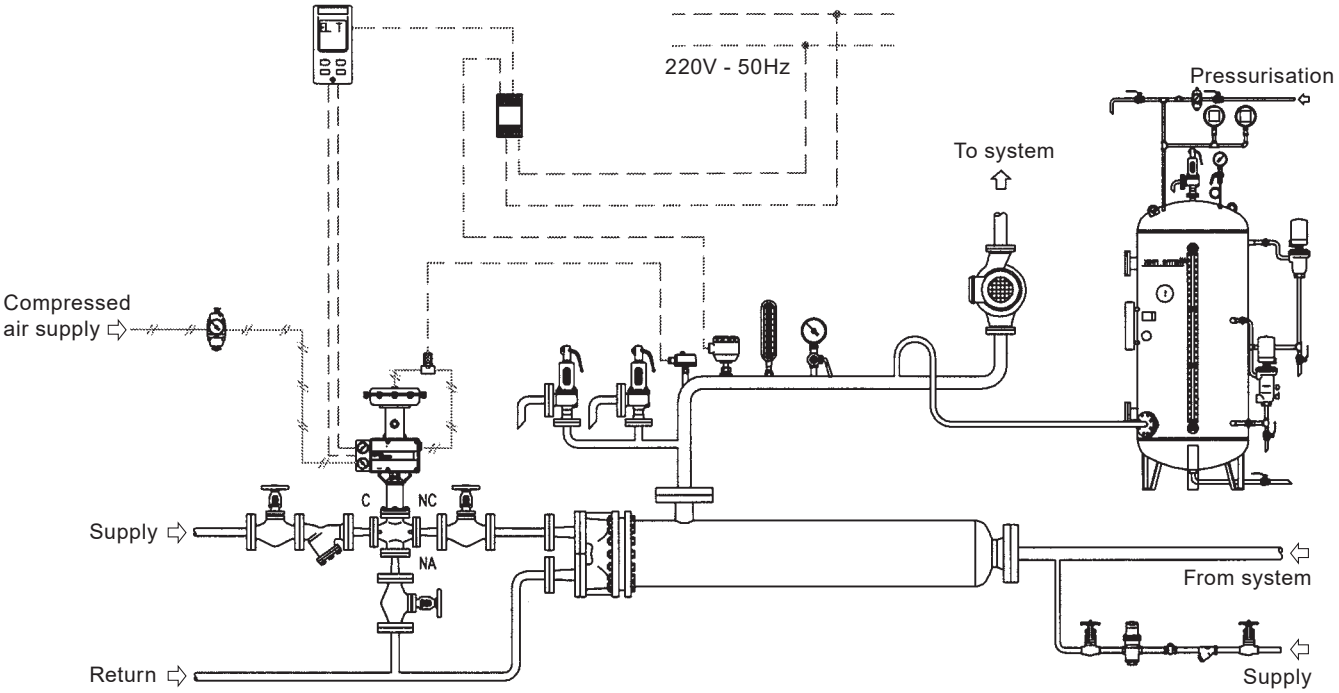


Standard diagram for heating system with hot water of small/medium capacity, with self-regulation and steam as primary fluid. All applicable safety requirements must be met.



Standard diagram for heating system with steam on primary side and superheated water on the secondary side. Pneumatic control and expansion system. All applicable safety requirements must be met.

Applications and typical installations (continued)



Standard diagram for large size heating system with large volume on the scondary side, with expansion system. Primary fluid superheated water (or diathermic oil) with electric/pneumatic control. All safety requirements must be met.

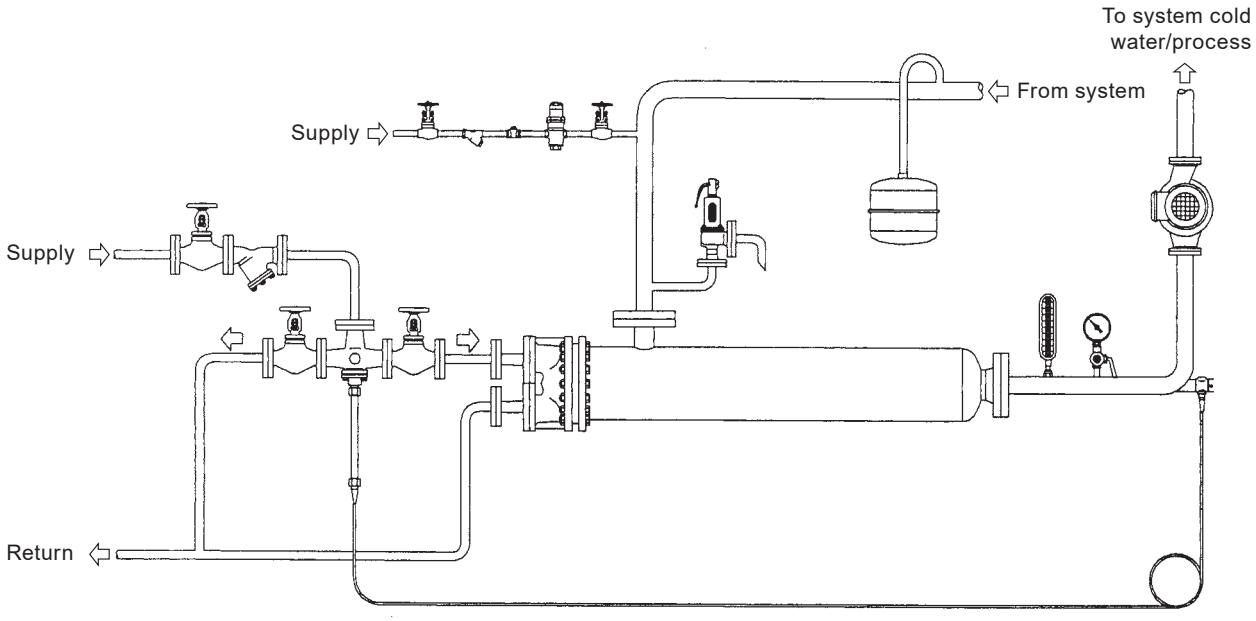


Diagram of process water/conditioning water cooling system with direct-acting regulation.