IndiTech

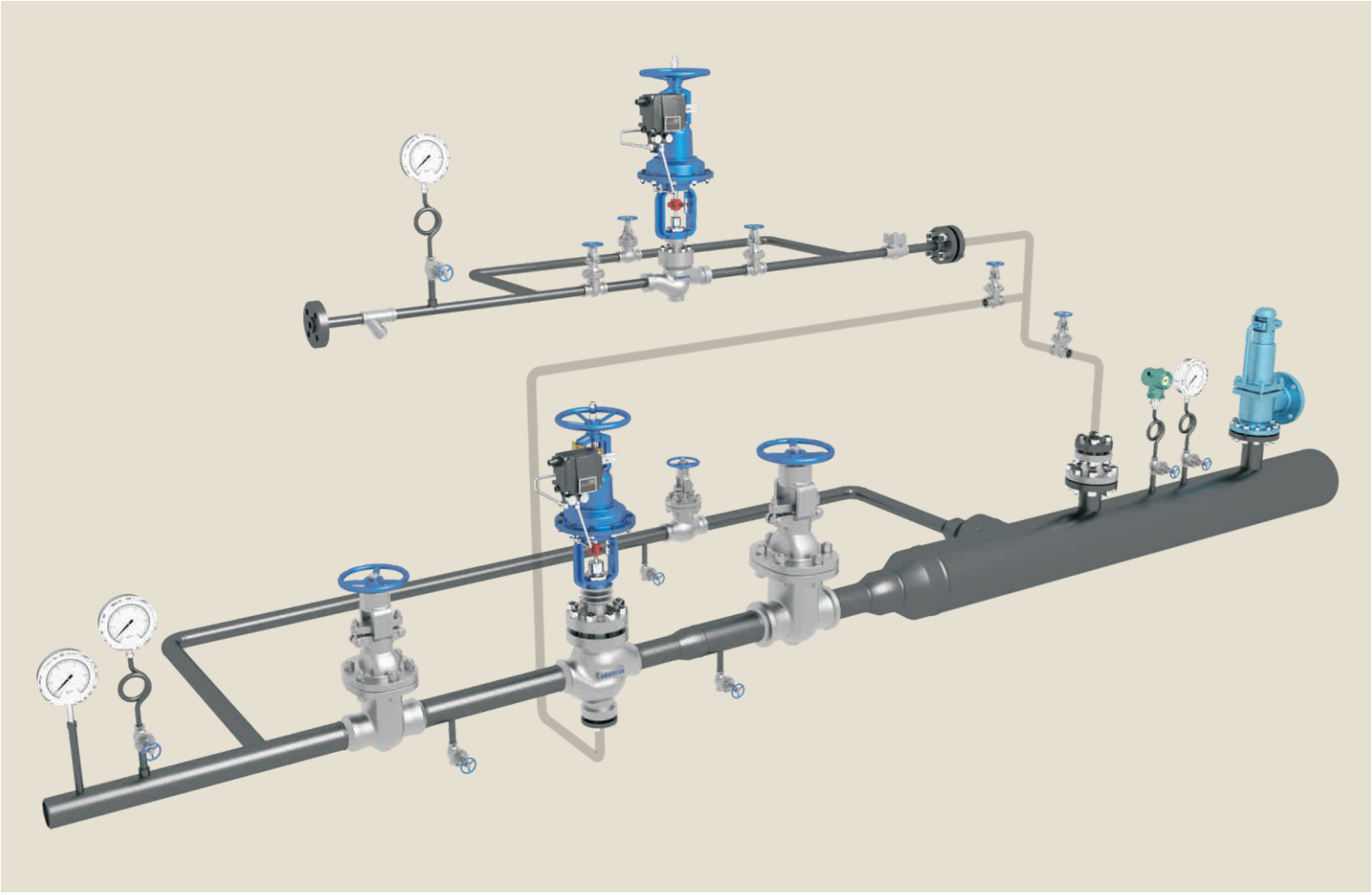
ISO 9001 QUALITY ASSURANCE

Pressure Reducing & Desuperheating (PRDS) Station

Pressure Reducing (PRS) Station

Desuperheating (DSH) Station

Ver. 1.1 (2016)



Pressure Reducing & Desuperheating (PRDS) Station

Modular Ready-to-Fit Steam Conditioning Solution!!!

Introduction

Most modern boilers generate steam at high pressures & temperatures. High pressure steam has lesser volume than steam at atmospheric pressure, thereby translating into smaller boiler size & lower diameter of steam piping. Also, high temperature (superheated) steam has more energy, which translates into higher efficiency for power generating steam turbines.

On the other hand, all process industries use low pressure low temperature saturated steam, primarily due to the following reasons:

- Saturated steam has the highest heat transfer efficiency.
- Lower pressures & temperatures translate into thinner pipes, lighter flanges & less expensive materials thereby significantly reducing initial plant cost.

In any industry, steam is required at different locations, but the required steam pressure & temperature at each location varies according to the application. Therefore, high pressure superheated steam is generated at a central location (boiler), distributed to various locations in the plant through a steam piping network, and then reduced to the operating pressure & temperature just upstream of the usage points.

IndiTech PRDS station is a modular steam conditioning unit to reduce the steam pressure & temperature at the point of usage, and it can be directly installed into your existing steam network.

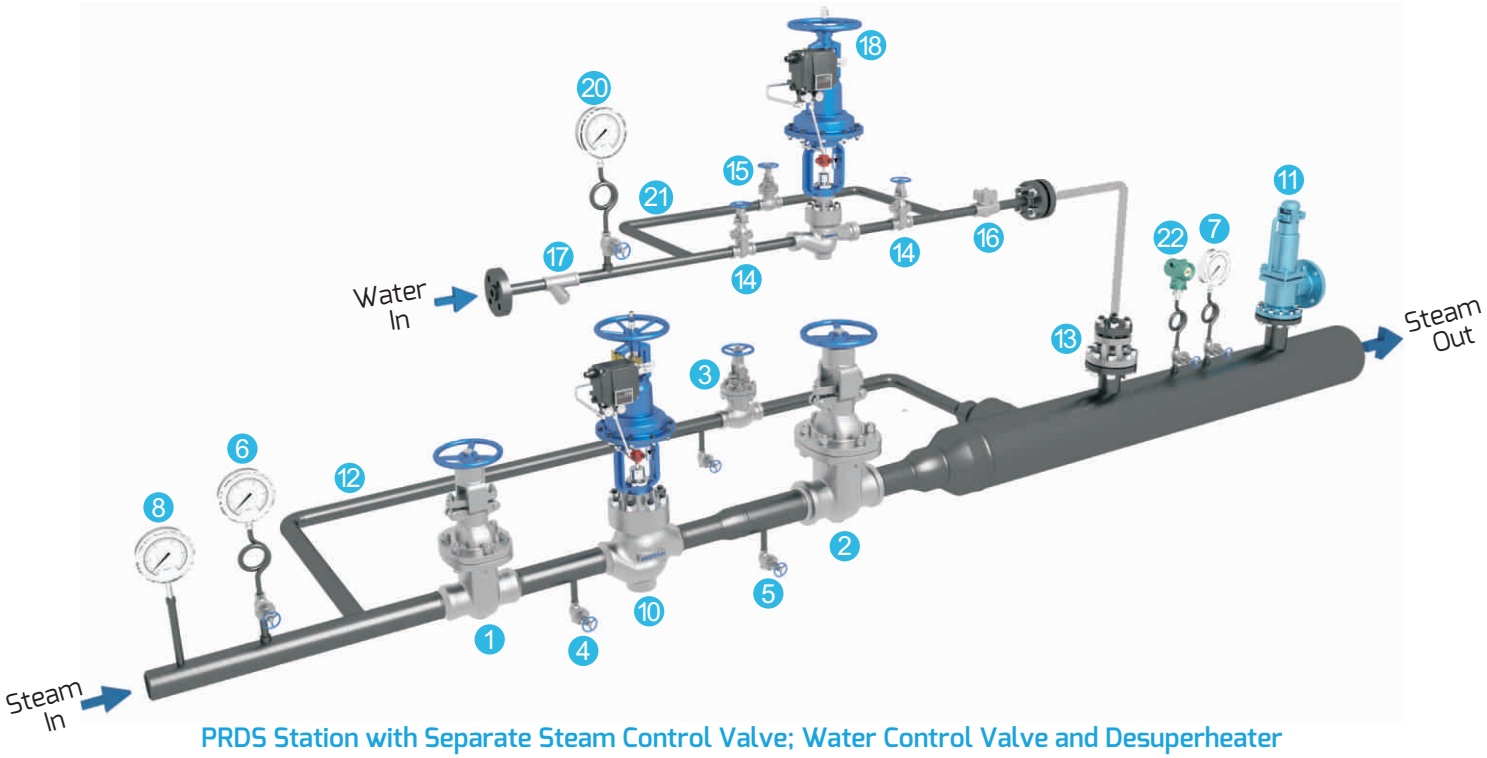
Some applications of PRDS stations are enumerated below:

1) PRDS for process heating / cooling applications in sugar, food, textile, paper etc. plants
2) Deaerator, Ejector PRDS for boiler
3) Turbine bypass PRDS

Technical Data

Inlet Pipe Size	1" to 24" NB
Outlet Pipe Size	1" NB and above
Pressure Rating	ANSI #150 to #2500
Design Standard	ASME B31.1 ASME B31.3
PRDS Station Configurations	Separate Steam Control Valve; Water Control Valve and Desuperheater Combined Steam Control Valve + Desuperheater; Separate Water Control Valve Combined Water Control Valve + Desuperheater; Separate Steam Control Valve
End Connections	Flanged Socket Weld Butt Weld
Valve Body Materials	A216 WCB / WCC; A105; A217 WC6 / WC9; A182 F11 / F22 / F91
Piping Materials	A106 Gr. B; A335 P11 / P22 / P91
Instrument Options	Pressure Transmitter Temperature Transmitter Pressure Gauge Temperature Gauge Flow Meter PID Controller Control Panel Junction Box

Pressure Reducing & Desuperheating (PRDS) Station



PRDS Station with Separate Steam Control Valve; Water Control Valve and Desuperheater

Standard Bill of Materials

1	Steam Inlet Isolation Valve	13	Desuperheater
2	Steam Outlet Isolation Valve	14	Water Inlet / Outlet Isolation Valve
3	Steam Bypass Valve	15	Water Bypass Valve
4	Stop Valve for Drain / Instruments (Inlet)	16	Non-Return Valve
5	Stop Valve for Drain / Instruments (Outlet)	17	Water Strainer
6	Steam Inlet Pressure Gauge	18	Water Flow Control Valve
7	Steam Outlet Pressure Gauge	20	Water Inlet Pressure Gauge
8	Steam Inlet Dial Thermometer	21	Water Piping
9	Steam Outlet Dial Thermometer (Loose Supply)	22	Pressure Transmitter
10	Steam Pressure Control Valve	23	Temperature Transmitter (Loose Supply)
11	Safety Valve	24	PID Controller - Optional (Loose Supply)
12	Steam Piping	25	Control Panel / Junction Box (Loose Supply)

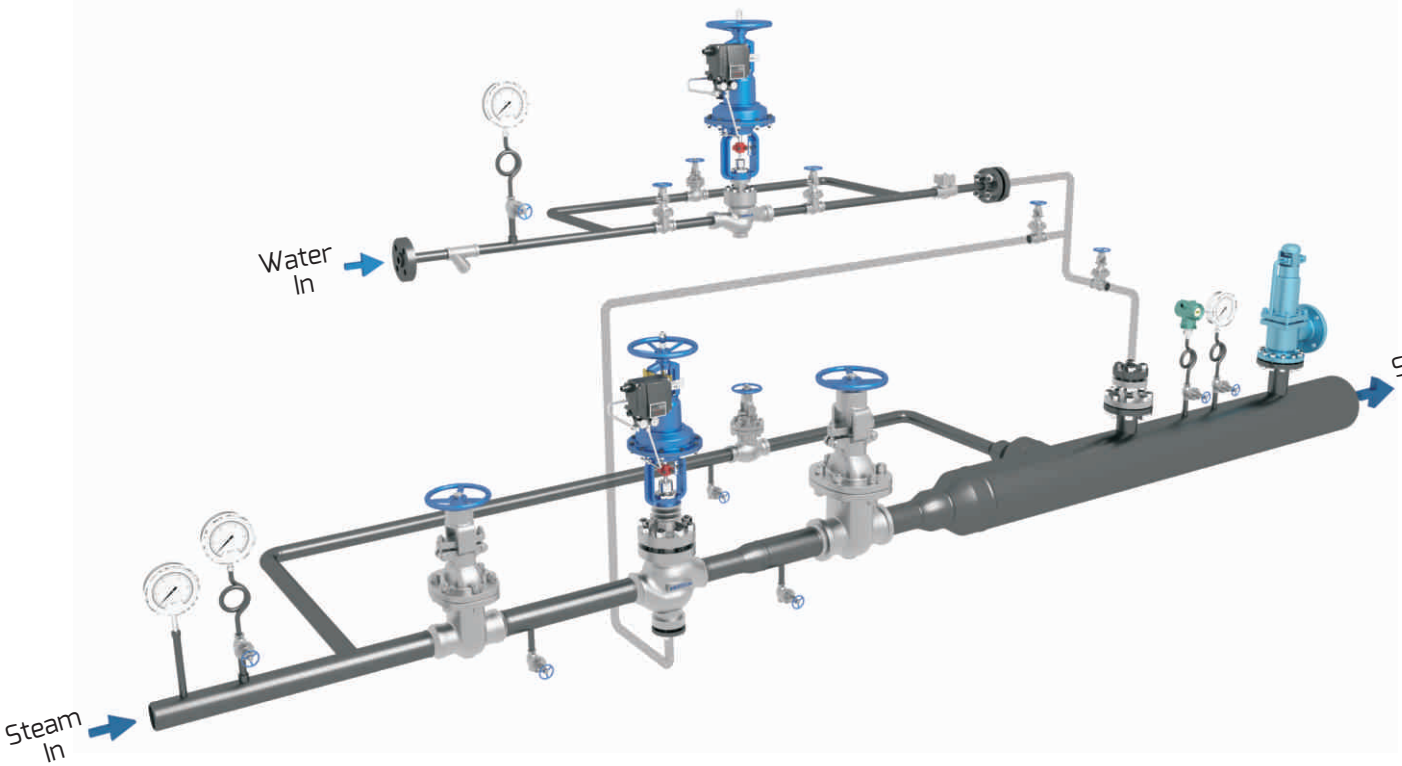
Note: Interconnecting pipe from water line to desuperheater is not a part of IndiTech's standard scope of supply, but can be supplied on request.

Operation Principle

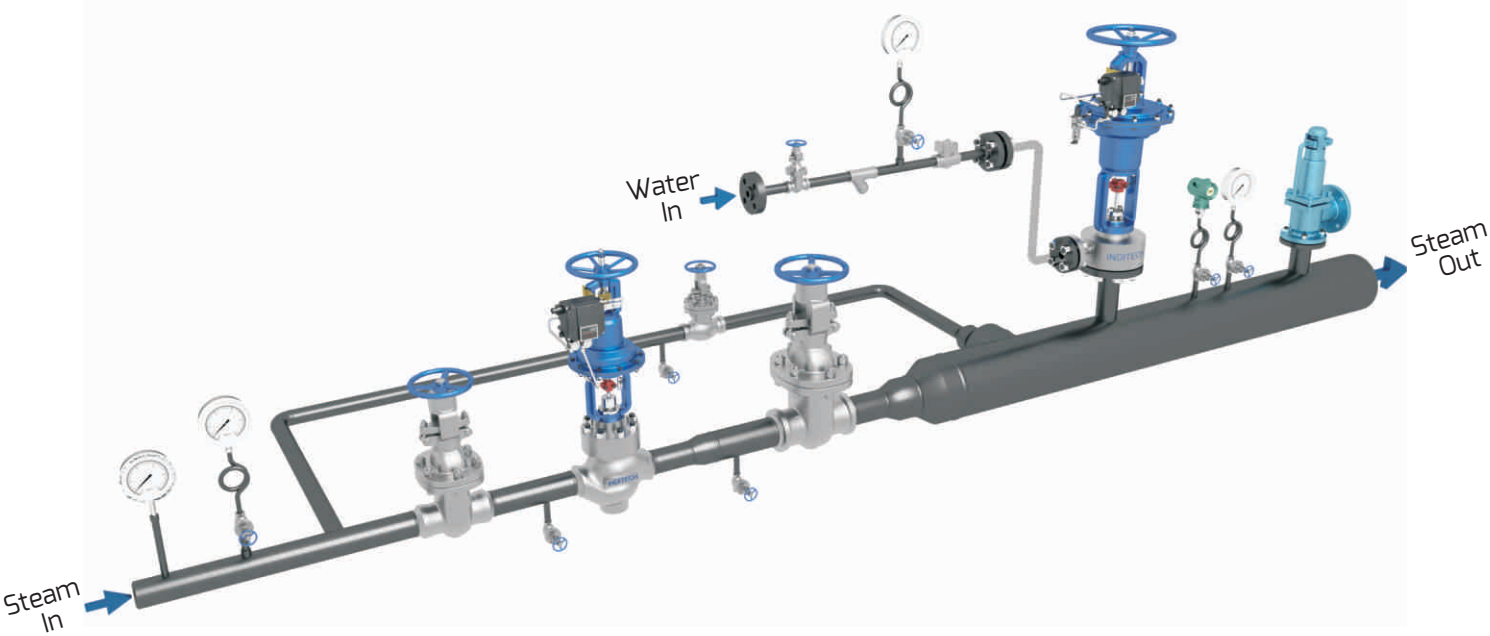
The high pressure high temperature steam enters the PRDS station as shown in the figure. The steam pressure control valve (10) reduces the pressure of the steam. The spray water enters the water line as shown in the figure. The water flow control valve (8) regulates the quantity of the spray water going into the spray nozzles. The desuperheater (3) lowers the temperature of the steam to the required outlet temperature by injecting atomized water in the form of a very fine mist into the steam flow. The pressure transmitter (22) and temperature transmitter (23) sense the outlet steam pressure and temperature respectively and give a proportional current signal as output to the PID controller (24). The PID controller (24) then compares the measured value with a set point, and generates an error signal, which is then given to the positioner of the steam pressure control valve (10) and water flow control valve (18).

Pressure Reducing & Desuperheating (PRDS) Station

Alternate Configuations

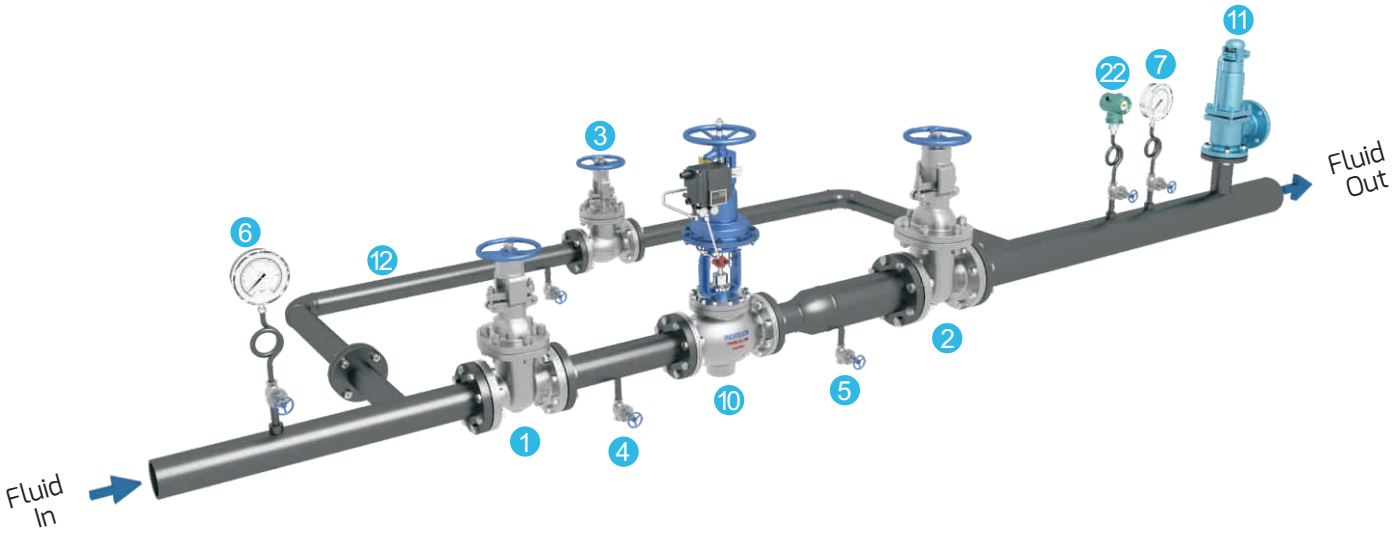


PRDS Station with Combined Steam Control Valve + Desuperheater



PRDS Station with Combined Water Control Valve + Desuperheater

Pressure Reducing (PRS) Station



PRS Station

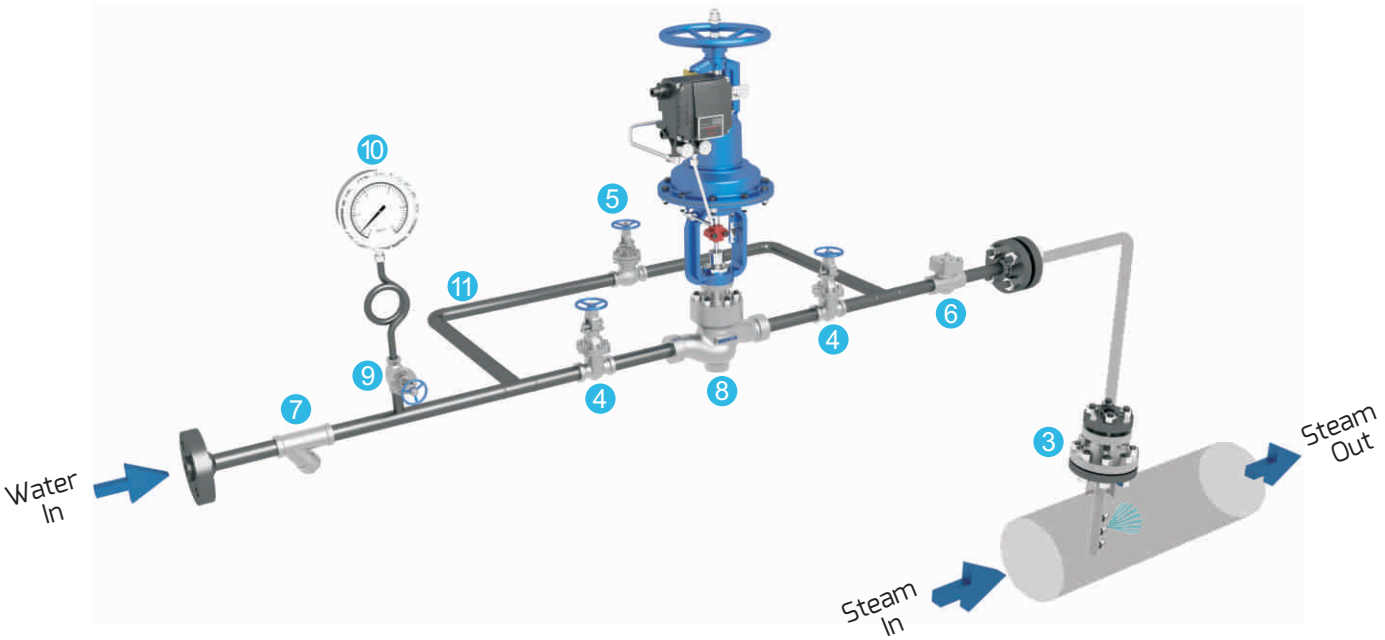
Standard Bill of Materials

1	Inlet Isolation Valve	10	Pressure Control Valve
2	Outlet Isolation Valve	11	Safety Valve
3	Bypass Valve	12	Piping
4	Stop Valve for Drain / Instruments (Inlet)	22	Pressure Transmitter
5	Stop Valve for Drain / Instruments (Outlet)	24	PID Controller - Optional (Loose Supply)
6	Inlet Pressure Gauge	25	Control Panel / Junction Box (Loose Supply)
7	Outlet Pressure Gauge		

Operation Principle

The high pressure fluid enters the PRS station as shown in the figure. The inlet pressure gauge (6) indicates the fluid inlet pressure. The pressure control valve (10) reduces the pressure of the fluid. The inlet isolation valve (1) along with the outlet isolation valve (2) is used to isolate the pressure control valve (10), whenever maintenance of the control valve is to be carried out. The bypass valve (3) allows fluid flow at reduced pressure to continue when the pressure control valve (10) is under maintenance or becomes inoperable. The pressure transmitter (22) senses the outlet pressure and gives a proportional current signal as output to the PID controller (24). The PID controller (24) then compares the measured value with a set point, and generates an error signal, which is then given to the positioner of the pressure control valve (10). The safety valve (11) opens and relieves excess pressure whenever the fluid pressure goes above a certain set value, and re-closes and prevents the further release of fluid after normal conditions have been restored.

Desuperheating (DSH) Station



DSH Station with Separate Water Control Valve and Desuperheater

Standard Bill of Materials

1	Steam Inlet Dial Thermometer (Loose Supply)	8	Water Flow Control Valve
2	Steam Outlet Dial Thermometer (Loose Supply)	9	Stop Valve for Instruments
3	Desuperheater	10	Water Inlet Pressure Gauge
4	Water Inlet / Outlet Isolation Valve	11	Water Piping
5	Water Bypass Valve	12	Temperature Transmitter (Loose Supply)
6	Non-Return Valve	13	PID Controller - Optional (Loose Supply)
7	Water Strainer	14	Control Panel / Junction Box (Loose Supply)

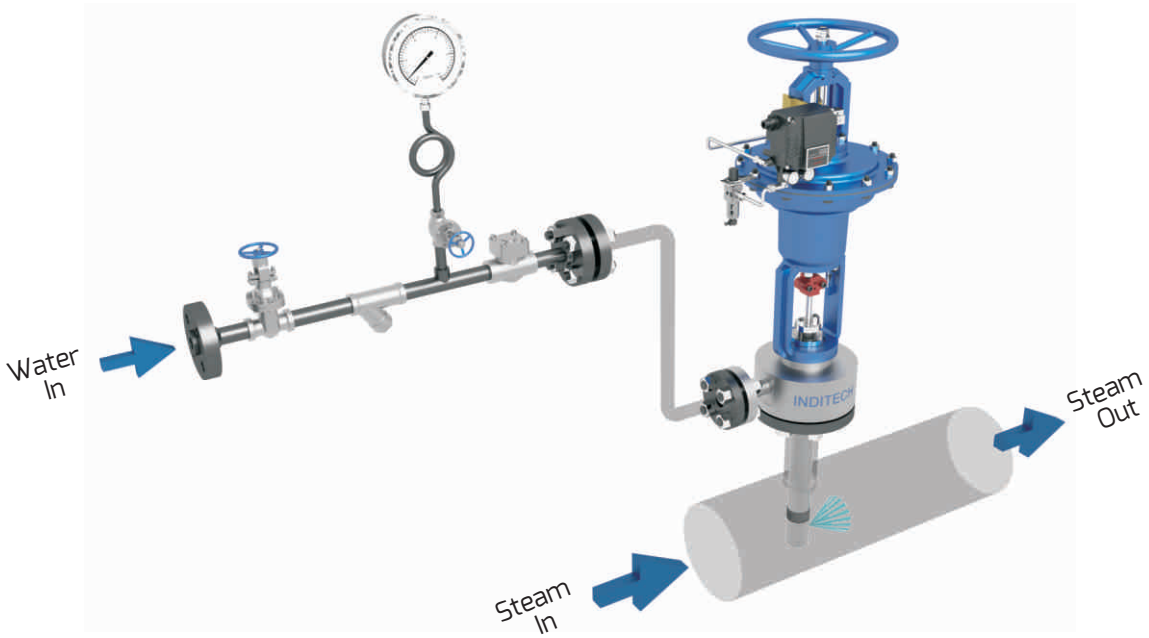
Note: Interconnecting pipe from water line to desuperheater; and steam line with mounting stub is not a part of IndiTech's standard scope of supply, but can be supplied on request.

Operation Principle

The spray water enters the DSH station as shown in the figure. The water strainer (7) at the inlet prevents entry of foreign particles into the water control valve & desuperheater spray nozzles. The water inlet pressure gauge (10) indicates the pressure of the spray water. The water flow control valve (8) regulates the quantity of the spray water going into the spray nozzles, depending on the steam load. The water inlet / outlet isolation valves (4) are used to isolate the water control valve (8), whenever maintenance of the control valve is to be carried out. The water bypass valve (5) allows spray water flow to continue whenever the water flow control valve (8) is under maintenance or becomes inoperable. The non-return valve (6) prevents back flow of steam into the water pipe line. The desuperheater (3) lowers the temperature of inlet high temperature steam to the required outlet temperature by injecting atomized water into the steam flow. This is achieved by means of spray nozzles that atomize water into a very fine mist. The temperature transmitter (12) senses the outlet steam temperature and gives a proportional current signal as output to the PID controller (13). The PID controller (13) then compares the measured value with a set point, and generates an error signal, which is then given to the positioner of the water flow control valve (8).

Desuperheating (DSH) Station

Alternate Configuration



DSH Station with Combined Water Control Valve + Desuperheater

Engineering Guidelines for PRDS and DSH Stations

- Controllable outlet steam temperature is saturation temperature + 7°C.
- The recommended minimum straight length after water injection is 4 meters.

NOTE: Inadequate straight pipe length can cause incomplete vaporization of water, thereby leading to water impingement on the downstream pipe. This may result in thermal shock & premature failure of equipment.

- For precise steam temperature measurement, the temperature sensor should be mounted at a minimum distance of 12 meters from the point of water injection.

NOTE: Inadequate distance between the desuperheater and the temperature sensor can cause erratic temperature measurement.

- It is recommended to install a steam trap module just upstream of the temperature sensor to remove any water carry-over.
- There should be no branching out from or into the steam line between the desuperheater and temperature sensor.
- Strainer with 40 mesh screen must be installed in the spray water line.

NOTE: Failure to provide strainer may result in clogging of the nozzles, thereby leading to poor process control.

- It is recommended to use clean and filtered boiler feed quality spray water.
- Ensure that the nozzles are oriented in the direction of the steam flow.
- Ensure that the nozzle is centered in the steam pipe. In case of multiple nozzles, ensure that the central nozzle coincides with the centerline of the steam pipe.

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IndiTech Products

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- PRDS Valves
- Blowdown Valves
- Desuperheaters
- PRDS, PRS & DSH Stations
- Lifting Ball Type Check Valves

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