Dry All®

Full Range of HVAC&R Line Products

Coil-in-Shell Heat Exchangers

What is a Coil-in-Shell Heat Exchanger?

A coil-in-shell heat exchanger, also known as a coil-in-shell condenser or a helical coil heat exchanger, is a type of heat exchanger that consists of a coiled tube or coil placed inside a shell. It is commonly used in various industrial and commercial applications for heat transfer between two fluids.

The coil, which is typically made of metal such as copper or stainless steel, is designed in a helical shape to maximize the surface area available for heat transfer. The shell, on the other hand, is a larger cylindrical vessel that surrounds the coil. The shell is usually made of a sturdy material like steel and is equipped with inlet and outlet connections for the two fluids involved in the heat exchange process.

Introduction

Introducing the Dry All Coil-in-Shell Heat Exchangers, engineered to excel in the toughest applications. Their compact size, with respect to the heat exchange area, sets them apart from standard solutions, delivering superior performance that HVAC&R system engineers and designers truly value. These exchangers offer robust and enduring solutions for system designers, ensuring long-lasting performance. With their adaptable design, they seamlessly integrate into various heat transfer systems.

Our Dry All Coil-In-Shell Heat Exchangers are meticulously crafted to optimize heat transfer efficiency and elevate overall performance. Their design and construction are specifically tailored to deliver exceptional results even in the harshest environments. Despite their compact form, these exchangers boast an impressive heat exchange area, guarantees utmost efficiency and effectiveness. Ideal for heating and cooling applications, they effortlessly provide outstanding performance. Dry All Coil-in-Shell Heat Exchangers strived to be the preferred choice, will rise to the challenge and surpass expectations.

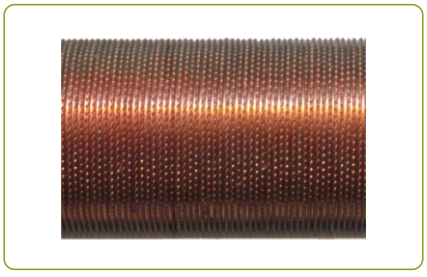
Key Features

a. **Construction:** Dry All Coil-in-shell heat exchangers consist of a shell that encloses a bundle of coiled tubes. The shell is typically made of a durable material such as stainless steel, while the coiled tubes are made of finned copper. The coil design allows for a compact and efficient heat transfer process.

b. **Design Advantage:** The coil-in-shell design offers several advantages. Firstly, it provides a large surface area for heat transfer, resulting in enhanced efficiency. Secondly, the coiled tubes promote turbulent flow, which further improves heat transfer rates. Lastly, the compact design makes it suitable for space-limited applications.

c. **Effective Heat Exchange in Condenser Mode :** It maximizes surface area of contact between the hot refrigerant and the cooling medium enhances the heat transfer efficiency. This is achieved through the unique design of condenser coil which ensures the thermal contact between the fluids.

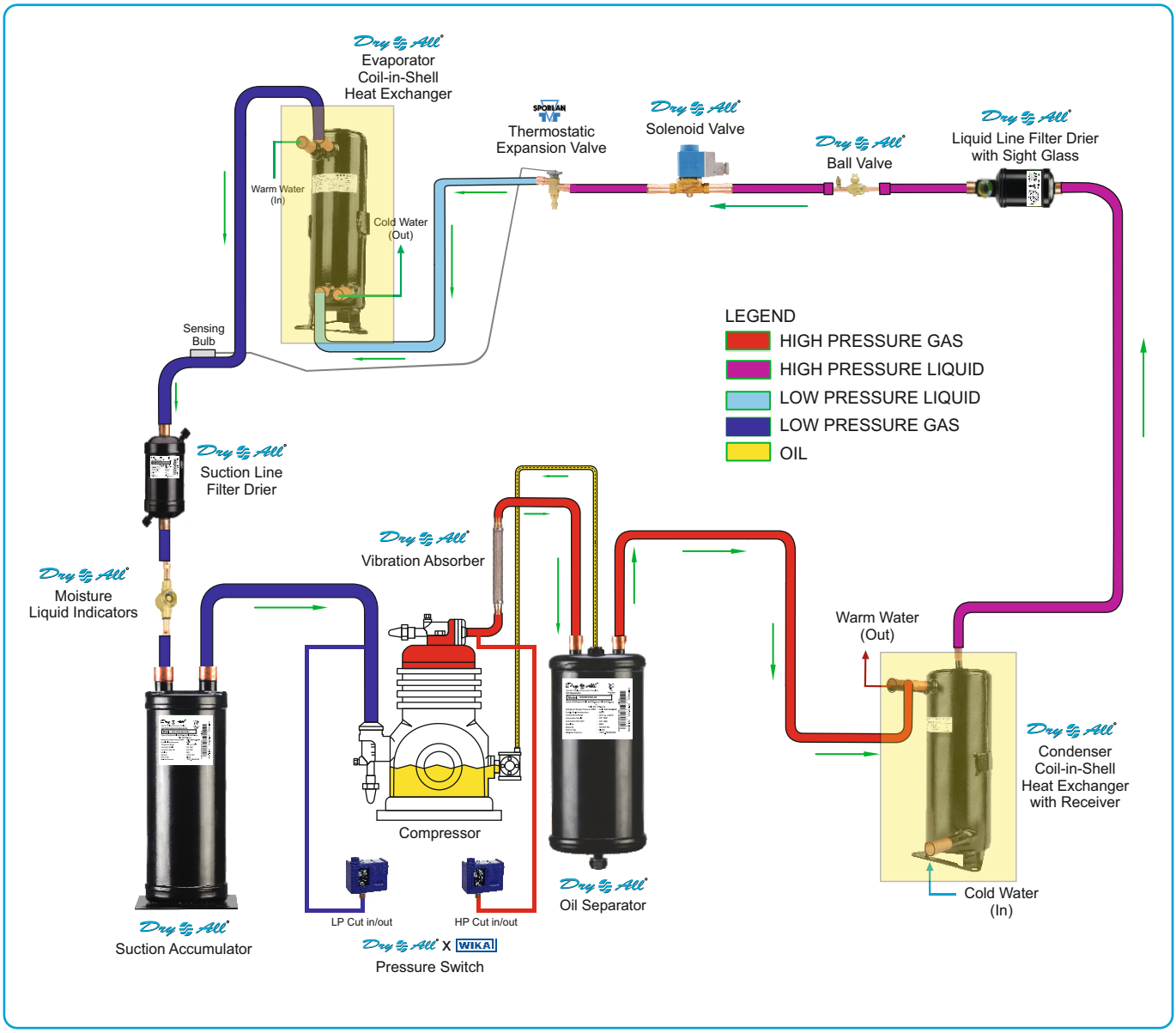
d. **Safety:** Dry All Coil-in-shell heat exchangers are designed with safety in mind. The construction materials, such as stainless steel, provide resistance against corrosion and high temperatures, ensuring long-term reliability. Additionally, the compact design minimizes the risk of leakage, and the tubes are typically equipped with appropriate safety measures, such as pressure relief valves, to prevent over-pressure situations. Overall, these features contribute to the safety and durability of the heat exchanger.
e. **Perfect for Heat Pump Applications :** Dry All Coil-in-Shell with Heat exchanger plays an important role in heating application in heat pump units. Receiver in Coil-in-Shell heat exchanger plays a specific role in overall functioning of the system.
f. **Built-in Receiver for Refrigerant Accumulation :** A built in receiver in heat exchanger functions as a storage vessels. as the refrigerant enters the receiver it typically contains a mixture of liquid and vapour phases. The receiver allow the heavier liquid refrigerant to settle at the bottom. further the liquid refrigerant is supplied to the expansion device.
g. **Streamlined Tubing & Optimum Space Utilization :** Streamlined Tubing & Optimum design enhances heat transfer efficiency by reducing pressure drop uniform flow. smooth inner surfaces minimizes flow resistance and turbulence, resulting in efficient heat transfer between two fluids. Streamlined Tubing & maximizing space utilization in heat exchanger design improves performance and reduces coast.
h. **Finned copper Tube:** Outer tube is high efficiency finned copper pipe, and heat exchange surface is 4 times that of smooth pipe. Fin on the external surface will increase the turbulence of water and refrigerant, which will increase the efficient of heat exchange.



Advantages

1. Space Saving: Coil-in- Shell having compact dimensions and vertical installation reduces the space required for installation.
2. High Efficiency: Higher heat transfer coefficient – finned copper tubes promote flow turbulence and thus intensify heat exchange.
3. Low Maintenance Costs: Finned tubes make the exchangers more resistant to fouling.
4. Wide Application: Wide range of temperature and pressure, flow velocity, and media makes it suitable for wide application.

Refrigeration cycle with Coil-in-Shell Heat Exchangers

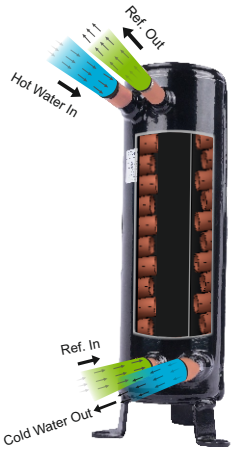


Applications

1. Pool Heating and Cooling
2. Fluid Heat Pumps
3. Food Processing Plants
4. Ice Machines
5. Domestic Hot Water
6. Heat recovery Discharge
7. Liquid Chilling Evaporators for Fresh Water
8. Brine Chilling Applications

Working of Coil in Shell Heat Exchangers

For Condenser



For Evaporator

For Condenser

Refrigerant vapour will enter from top of the Heat Exchanger, will condense down and will exit from bottom, while the Secondary fluid will enter from bottom of the Heat Exchanger & exit from top.

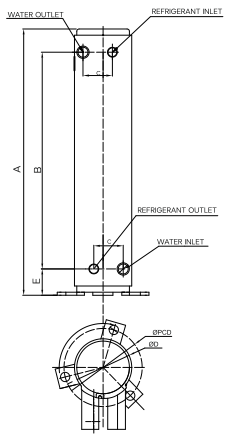
For Evaporator

Refrigerant will enter from the bottom of the Heat Exchanger, will evaporate up and will leave from top, while the Secondary fluid will enter from top of the Heat Exchanger & exit from bottom.

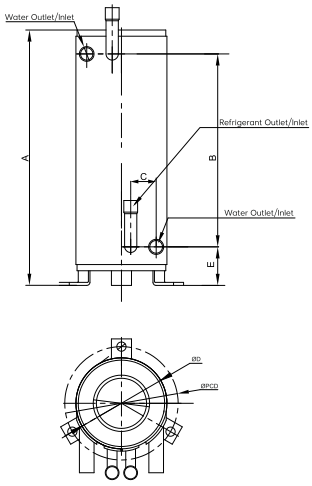
Basic Working

- Water enters the upper tube, while refrigerant liquid enters via the lower refrigerant tube and is forced to follow a long spiral flow path.
- The tight tolerance between the finned copper tubing and steel side walls creates a spiral flow path that is highly efficient in releasing heat from the water side.
- The coils in the shell are made of a finned copper tube. The enhanced surface of the finned copper tubing becomes highly efficient which eventually leads to rapid evaporation of the refrigerant at very low-pressure drop on the refrigerant side with no oil trapping
- As the liquid refrigerant absorbs heat from the water it begins to boil off exiting the heat exchangers as a vapour
- The water tubes cross over at the midpoint of the heat exchanger. The outside tube becomes the inside tube and the inside tube becomes the outside tube. This results in two tubes of exactly the same length with equal pressure drop and equal heat exchange
- The cooled water exits the two lower water tubes, ready for use in your application.

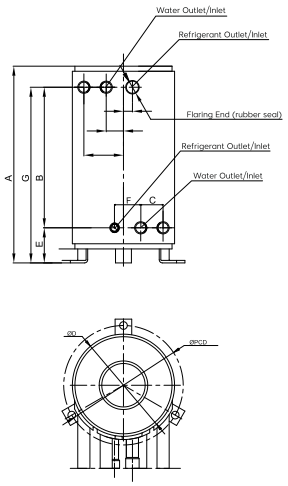
Image & Drawing



Drawing 1



Drawing 2



Drawing 3

Connection & Dimensional Table

S/N	Model No	Total Length A (mm)	Connection to Connection Length (B) (mm)	Side Connection Length C (mm)	Diameter D (mm)	Bottom to Bottom Connection Length E(mm)	Additional Side Connection Length F (mm)	ØPCD (mm)	Figure
1	DA-COSH-010	279	194	38	76	55	-	147	Drawing-1
2	DA-COSH-015	309	224				-		
3	DA-COSH-020	344	280			34	-		
4	DA-COSH-030	331	250	33	118	50	-	147	Drawing-2
5	DA-COSH-050	308	220	35	160	55	41	187	Drawing-3

S/N	Model No	Water Side		Refrigerant Side	
		Inlet OD (mm)	Outlet OD (mm)	Inlet OD (mm)	Outlet OD (mm)
1	DA-COSH-010	ϕ15.88	ϕ15.88	ϕ12.7	ϕ12.7
2	DA-COSH-015				
3	DA-COSH-020				
4	DA-COSH-030	ϕ19.05	ϕ19.05	ID ϕ16	ID ϕ16
5	DA-COSH-050	2 X ϕ19.05	2 X ϕ19.05	ϕ19.05	ϕ12.7

“Dry All” Coil-in-Shell Heat Exchangers are designed to deliver exceptional performance and efficiency, with a spiral flow path that maximizes heat transfer and a robust construction that ensures long-lasting durability.

Models Available with Capacity

S/N	Model No	Capacity as Condenser		Flow Rate	Capacity as Evaporator		Flow Rate	Water Side Pressure Drop (kPa)	Refrigerant Side Pressure Drop (kPa)	Heat Transfer area
		TR	kW	LPM	TR	kW	LPM			m^2
1	DA-COSH-010	1	3.5	10	0.71	2.5	7.1	25	50	0.105
2	DA-COSH-015	1.5	5.3	15	1.08	3.8	10.8	30	60	0.125
3	DA-COSH-020	2	7.0	20	1.42	5.0	14.2	30	60	0.155
4	DA-COSH-030	3	10.5	30	2.14	7.5	21.4	40	70	0.226
5	DA-COSH-050	5	17.6	50	3.56	12.5	35.6	50	80	0.4

Above Models are rated for below working conditions

Particulars	As Condenser	As Evaporator
Refrigerant	R410A	R410A
Condensing Temperature (if Condenser)	40°C	-
Evaporating Temperature (if Evaporator)	-	2°C
Water In Temperature	30°C	12°C
Water Out Temperature	35°C	7°C

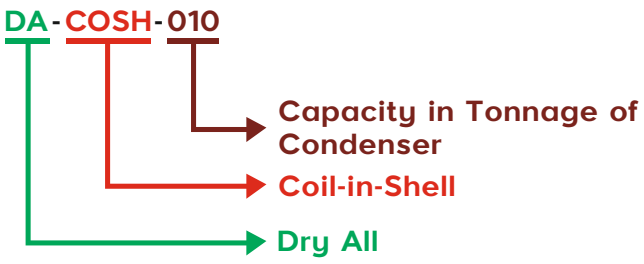
Maximum Working Pressure

1. Refrigerant Side: 45 Bar
2. Water Side: 15 Bar

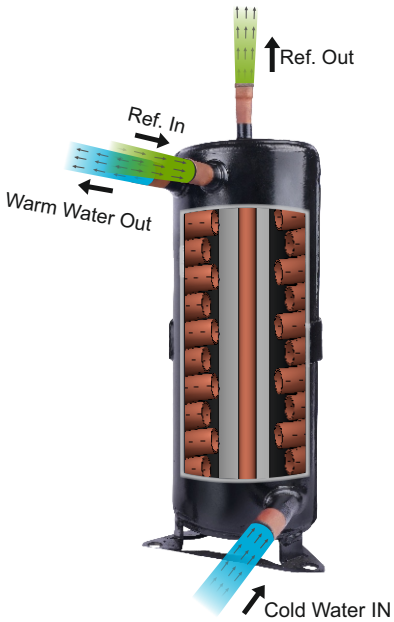
Working Temperature Range

1. Refrigerant Side: -10°C to + 100°C
2. Water Side: -10°C to + 120°C

Nomenclature



Working of Coil in Shell Heat Exchangers

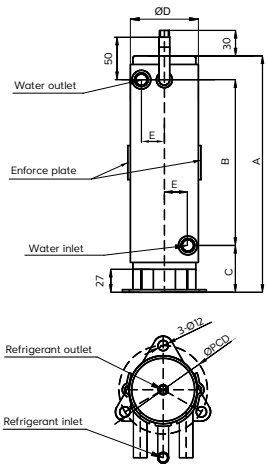


For Condenser

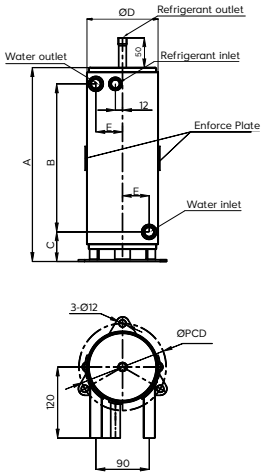
Basic Working

- Dry All coil in shell heat exchanger with receiver serves a crucial role in heating applications within heat pump units.
- High pressure high temperature superheated refrigerant from compressor enters the shell side of heat exchanger. Simultaneously, the cold water enters from bottom tube of heat exchanger and follows the spiral flow path of coil.
- The heat exchange takes place further between two fluids which leads to the condensation of high pressure low temperature liquid refrigerant. Also cold water turns warm.
- Condensed liquid refrigerant enters the inner shell of heat exchanger which acts as receiver tank.
- Subsequently, now condensed refrigerant exits through outlet port of inbuilt receiver towards the Dry All filter drier and then to the expansion device, similarly the warm water exits through the upper outlet tube.

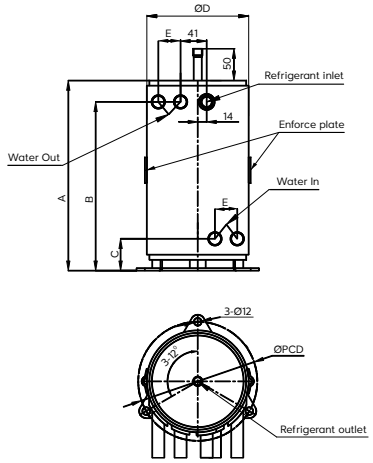
Image & Drawing



Drawing 1



Drawing 2



Drawing 3

Connection & Dimensional Table

S/N	Model No	A (mm)	B (mm)	C (mm)	ØD (mm)	E (mm)	ØPCD (mm)	Figure
1	DA-COSH010-L	278	194	55	80	27	104	Drawing 1
2	DA-COSH015-L	308	225	55	80	27	104	
3	DA-COSH020-L	363	280	55	80	27	104	
4	DA-COSH030-L	328	250	50	120	45	147	Drawing 2
5	DA-COSH050-L	298.5	265	50	160	35	187	Drawing 3

S/N	Model No	Water Side		Refrigerant Side	
		Inlet OD (mm)	Outlet OD (mm)	Inlet OD (mm)	Outlet ID (mm)
1	DA-COSH010-L	16	16	12.7	9.52
2	DA-COSH015-L	16	16	12.7	9.52
3	DA-COSH020-L	16	16	12.7	9.52
4	DA-COSH030-L	19.05	19.05	16	12.7
5	DA-COSH050-L	2 X 19.05	2 X 19.05	19.05	12.7

S/N	Model No	Capacity as Condenser		Flow Rate	Water Side Pressure Drop (kPa)	Refrigerant Side Pressure Drop (kPa)	Inner Shell Receiver Volume	Heat Transfer area
		TR	kW	LPM			Liter	m^2
1	DA-COSH-010-L	1	3.5	10	25	55	0.22	0.105
2	DA-COSH-015-L	1.5	5.3	15	30	65	0.24	0.125
3	DA-COSH-020-L	2	7.0	20	30	70	0.3	0.155
4	DA-COSH-030-L	3	10.5	30	40	70	1.02	0.226
5	DA-COSH-050-L	5	17.6	50	50	85	0.95	0.40

Above Models are rated for below working conditions

Particulars	As Condenser
Refrigerant	R410A
Condensing Temperature	40°C
Water Out Temperature	35°C
Water In Temperature	30°C

Maximum Working Pressure

1. Refrigerant Side: 45 Bar
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Working Temperature Range

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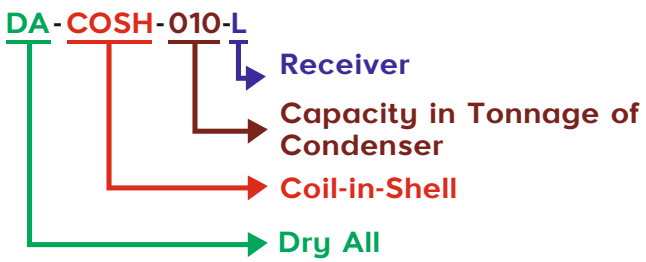
Nomenclature



Dry All Coil-in-Shell Heat Exchangers with Receiver are designed to deliver exceptional performance and efficiency, with a spiral flow path that maximizes heat transfer and a robust construction that ensures long-lasting durability.

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