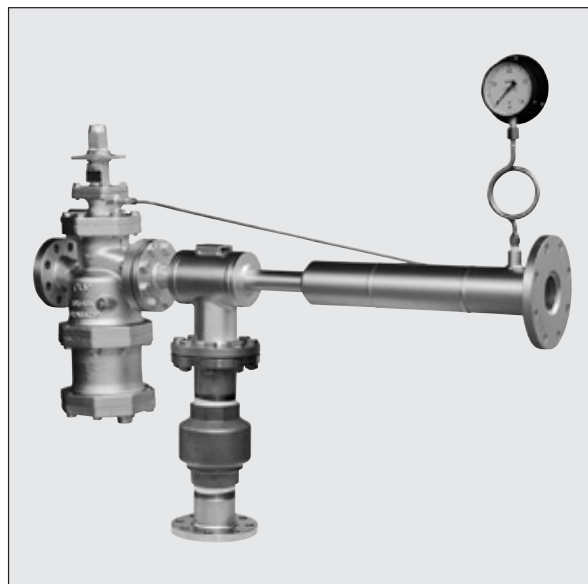# TLV® / STEAM COMPRESSOR

MODEL **SC**

STEAM COMPRESSOR THAT RECOVERS LOW PRESSURE STEAM AT HIGHER PRESSURE FOR REUSE

Features

Maximizes steam utilization by recovering excess low pressure steam at a higher pressure resulting in reduced energy costs and CO_2 emissions.

1. Reuses energy from excess steam by increasing it to low/medium pressure.
2. No electricity required, so suitable for explosion-proof areas (with COS pressure control valve).
3. Condensate recovery tank unnecessary with optional condensate recovery package: condensate is first reduced to atmospheric pressure, then repressurized to mid-pressure steam for reuse.
4. Employs a new, independently-designed high efficiency ejector.
5. Pressure control valve has a built-in separator and steam trap, maintaining dry motive steam, thereby ensuring high long-term efficiency and stable discharge pressure.

Specifications

Model*		Steam Compressor Unit								High-capacity Steam Compressor		
		SC1-1	SC1-2	SC1-3	SC2-1	SC2-2	SC2-3	SC7-1	SC7-3	SC14	SC21	SC31
Pressure Control Valve		COS	CV-COS	CV10	COS	CV-COS	CV10	COS	CV10	—		
Connection	Motive Inlet	25 mm			50 mm			80 mm		100 mm	150 mm	200 mm
	Discharge Outlet	80 mm			100 mm			150 mm		200 mm	250 mm	300 mm
	Suction Inlet	80 mm						100 mm		150 mm	200 mm	250 mm
Max. Operating Pressure (MPaG) PMO		1.6	2.0		1.6	1.0	2.0	1.6	2.0	2.0		
Motive Steam Pressure Range (MPaG)		0.6-1.6	0.6-2.0		0.6-1.6	0.6-1.0	0.6-2.0	0.6-1.6	0.6-2.0	0.6-2.0		
Max. Operating Temperature (°C) TMO		220										
Maximum Steam Suction Capacity		See "Model Selection and Performance Graphs" on pages 3 and 4.										
Discharge Steam Pressure (Attainable Pressure) (MPaG)	Maximum	Contact TLV**										
	Minimum	0.1	0.05		0.1	0.05		0.1	0.05	Contact TLV**		
Suction Steam Pressure Range		Atmospheric pressure or higher***										
Applicable Fluid		Steam										

* Products exceeding specifications shown above may be able to be supplied depending on conditions.   1 MPa = 10.197 kg/cm²
** Depends on conditions such as the pressure and volume of motive steam and suction steam. See "Model Selection and Performance Graphs" on pages 3 and 4 for an approximate figure.   *** Contact TLV for cases at or lower than atmospheric pressure.

PRESSURE SHELL DESIGN CONDITIONS (**NOT** OPERATING CONDITIONS):
Maximum Allowable Pressure (MPaG) PMA: Steam Compressor Unit: 1.6 (COS/CV-COS), 2.0 (CV10);
                    High-capacity Steam Compressor: 2.0
Maximum Allowable Temperature (°C) TMA: 220

⚠ **CAUTION** To avoid abnormal operation, accidents or serious injury, DO NOT use this product outside of the specification range. Local regulations may restrict the use of this product to below the conditions quoted.

SC1-1

COS shown

| No.	Description		Material	JIS	ASTM/AISI[1]
①	Ejector		Carbon Steel	S25C	AISI1025
②	Pressure Control Valve	COS	Cast Iron	FC250	A126 Cl.B
		CV-COS	Cast Iron	FC250	A126 Cl.B
		CV10	Cast Steel	—	A216 Gr.WCC
③	Check Valve[2), 3)]		Cast Stainless Steel	—	A351 Gr.CF8
④	Pressure Gauge[4]		—	—	—
⑤	Pressure Transmitter[5), 6)]		—	—	—

SC14/SC21/SC31

[1)] Equivalent [2)] Check Valve for SC1/SC2 has screwed-in flange [3)] SC7 comes with connecting bolts, nuts, and gaskets [4)] COS only [5)] CV-COS/CV10 only [6)] Shown on reverse

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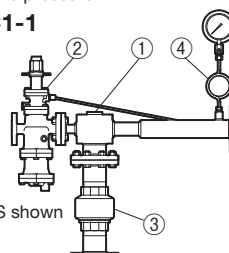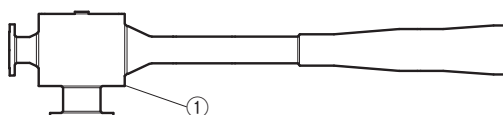
System Configuration (Steam Compressor Unit)

Steam Compressor Unit SC1/SC2/SC7		Examples of Connecting Equipment*

Pressure Control Valve

COS
Self-actuating Control Valve
- Built-in separator and steam trap
- No electric instrumentation required

CV-COS
Pneumatic Control Valve
- Built-in separator and steam trap
- High-precision control with no off-set

CV10
Pneumatic Control Valve
- High-precision control with no off-set

Non-electric Condensate Recovery Pump System Package
- Steam recovery at atmospheric pressure
- Explosion-proof areas

Flash Tank
- Pressurized flash steam recovery
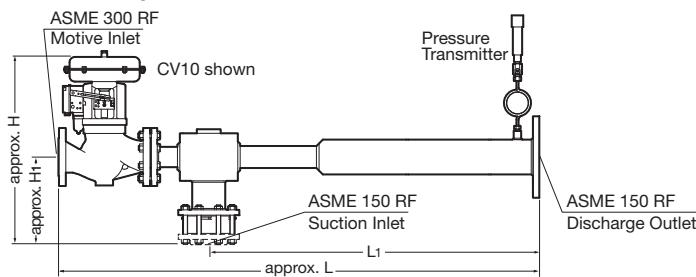
Condensate Recovery Pump
- High pressure condensate recovery

*Actual available products may differ from those shown. Contact TLV for details.
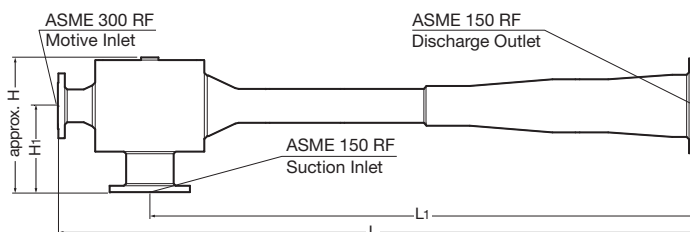
Dimensions

Steam Compressor Unit SC1-1

ASME 300 RF*
Motive Inlet

COS shown

approx. H
approx. H₁

Rc(PT)½
Condensate Outlet

ASME 150 RF
Suction Inlet

ASME 150 RF
Discharge Outlet

approx. L
L₁

Steam Compressor Unit SC7-3

ASME 300 RF
Motive Inlet

CV10 shown

Pressure Transmitter

approx. H
approx. H₁

ASME 150 RF
Suction Inlet

ASME 150 RF
Discharge Outlet

approx. L
L₁
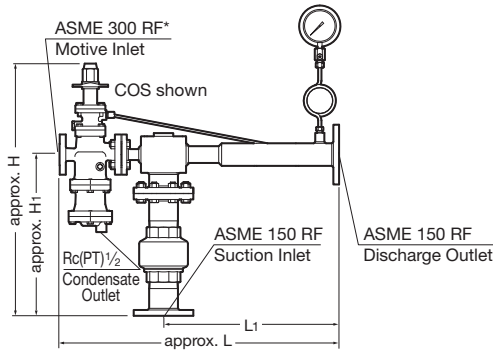
High-capacity Steam Compressor SC14/SC21/SC31

ASME 300 RF
Motive Inlet

ASME 150 RF
Discharge Outlet

approx. H
H₁

ASME 150 RF
Suction Inlet

L₁
L

Steam Compressor Unit (mm)

Model	Size (ASME Class)			L	L₁	H	H₁	Weight (kg)
	Motive Inlet (300RF)	Discharge Outlet (150RF)	Suction Inlet (150RF)					
SC1-1	25	80	80	868	545	782	500	50
SC1-2						862		
SC1-3				873		785		35
SC2-1	50	100		1152	734	845	530	100
SC2-2						921		
SC2-3				1158		835		85
SC7-1	80	150	100	1724	1140	710	300	155
SC7-3				1659		645		130

*No ASME standard exists for cast iron; machined to fit steel flanges
Other standards available, but length and weight may vary

High-capacity Steam Compressor (mm)

Model	Size (ASME Class)			L	L₁	H	H₁	Weight (kg)
	Motive Inlet (300RF)	Discharge Outlet (150RF)	Suction Inlet (150RF)					
SC14	100	200	150	2220	1900	475	300	240
SC21	150	250	200	2600	2155	620	400	440
SC31	200	300	250	3000	2500	720	450	700

Model Selection Graphs

Steam Compressor Unit
SC1/SC2/SC7

① Motive Steam Pressure **0.9 MPaG**

P_3 = Discharge Steam Pressure (MPaG)

Suction Steam Capacity (kg/h) vs Suction Steam Pressure (MPaG)

SC7, SC2, SC1

① Motive Steam Pressure **0.9 MPaG**

P_3 = Discharge Steam Pressure (MPaG)

Suction Steam Capacity (kg/h) vs Suction Steam Pressure (MPaG)

SC31, SC21, SC14

② Motive Steam Pressure **1.2 MPaG**

P_3 = Discharge Steam Pressure (MPaG)

SC7, SC2, SC1

② Motive Steam Pressure **1.2 MPaG**

P_3 = Discharge Steam Pressure (MPaG)

SC31, SC21, SC14

③ Motive Steam Pressure **1.5 MPaG**

P_3 = Discharge Steam Pressure (MPaG)

SC7, SC2, SC1

③ Motive Steam Pressure **1.5 MPaG**

P_3 = Discharge Steam Pressure (MPaG)
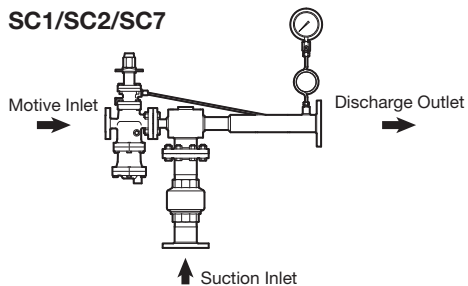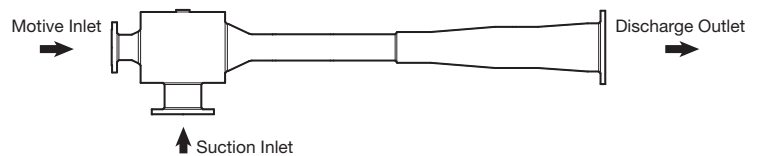
SC31, SC21, SC14

● Model Selection

Sample Selection Conditions

Motive Steam Pressure: 0.9 MPaG
Discharge Steam Pressure: 0.3 MPaG
Suction Steam Pressure: 0.1 MPaG
Suction Steam Capacity: 300 kg/h

SC1/SC2/SC7

Motive Inlet → → Discharge Outlet
↑ Suction Inlet

SC14/SC21/SC31

Motive Inlet → → Discharge Outlet
↑ Suction Inlet

Using Model Selection Graph ① for 0.9 MPaG motive steam pressure, point A represents the sample suction steam pressure and capacity conditions for the desired discharge steam pressure (P_3) of 0.3 MPaG.

In the 0.3 MPaG discharge steam pressure range, point A falls slightly below the SC2 line, therefore Model SC2 or SC7 should be chosen.

For suction steam capacities greater than that of SC31, contact TLV.

Performance Graphs

● Capacity Check (Motive Steam Quantity and Discharge Steam Quantity)

At 0.9 MPaG motive steam pressure, according to Performance Graph ①, the entrainment ratio is approximately 3.9*. The motive steam quantity and discharge steam quantity can be calculated using the formulas A) and B) below.

*Entrainment Ratio = Motive Steam Quantity (kg/h) / Suction Steam Quantity (kg/h)

If motive steam pressure is between those given in Performance Graphs ① - ③, calculate using the higher and lower pressure graphs and estimate using the mean entrainment ratio.

Sample Calculation (For motive steam pressure of 1.0 MPaG)
At 0.9 MPaG motive steam pressure, according to Performance Graph ①, the entrainment ratio is approximately 3.9. At 1.2 MPaG motive steam pressure, according to Performance Graph ②, the entrainment ratio is approximately 2.8.
The calculation in C) gives an approximate entrainment ratio of 3.5.

A) Motive steam quantity = Entrainment ratio × Suction steam quantity
$$= 3.9 \times 300 \text{ kg/h}$$
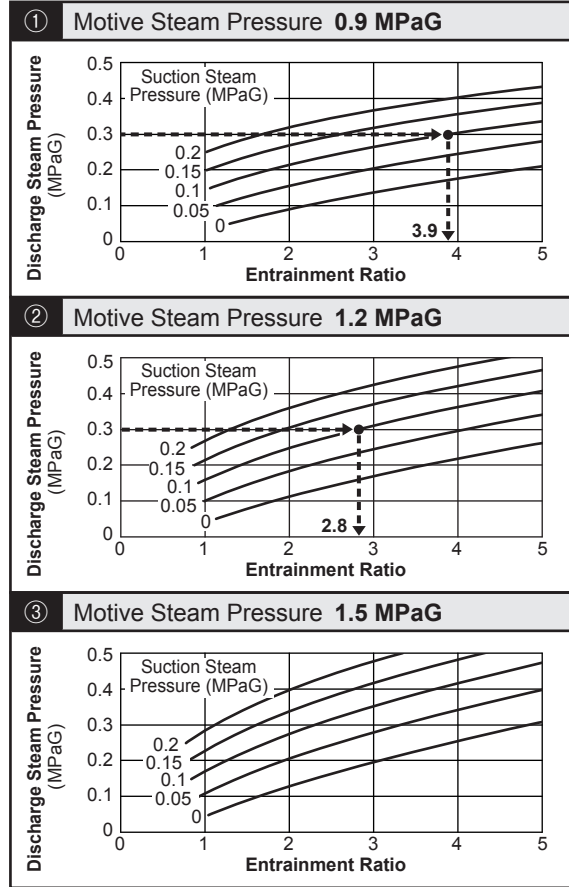$$= 1170 \text{ kg/h}$$

B) Discharge steam quantity = Motive steam quantity + Suction steam quantity
$$= 1170 \text{ kg/h} + 300 \text{ kg/h}$$
$$= 1470 \text{ kg/h}$$

C) Sample Calculation (For motive steam pressure of 1.0 MPaG)

$$3.9 - \frac{(1.0 - 0.9 \text{ MPaG})}{(1.2 - 0.9 \text{ MPaG})} \times (3.9 - 2.8) = 3.5$$

Performance Graphs

① Motive Steam Pressure **0.9 MPaG**

② Motive Steam Pressure **1.2 MPaG**

③ Motive Steam Pressure **1.5 MPaG**

NOTE: The type-selection and capacity values from the above procedures are only approximations.
Contact TLV for actual selection and performance data.