

Bitzer HS Screw Compressors

ASEH
TEJARAT ASIA

2 / List of Contents

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2. HS Screw Family
3. HS Screw piping
4. Oil in HS Compressors
5. Protection Devices for HS
6. HS Screw in Bitzer Software



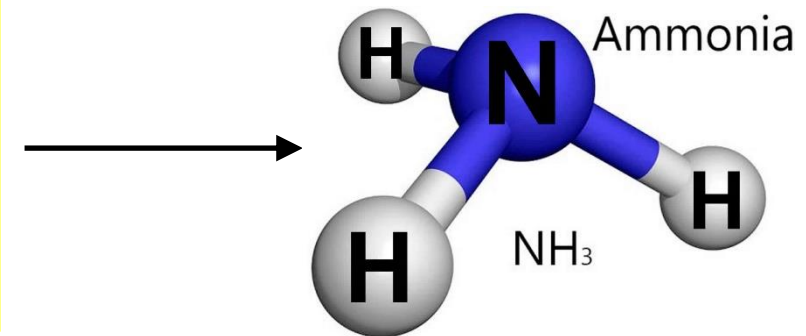
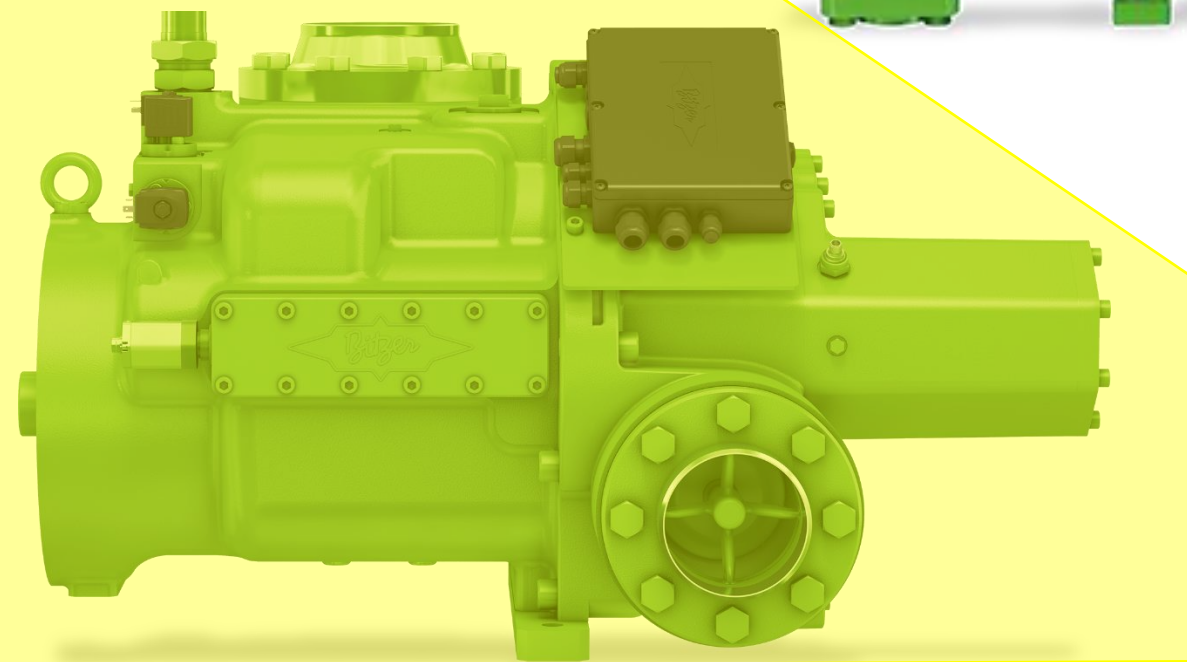
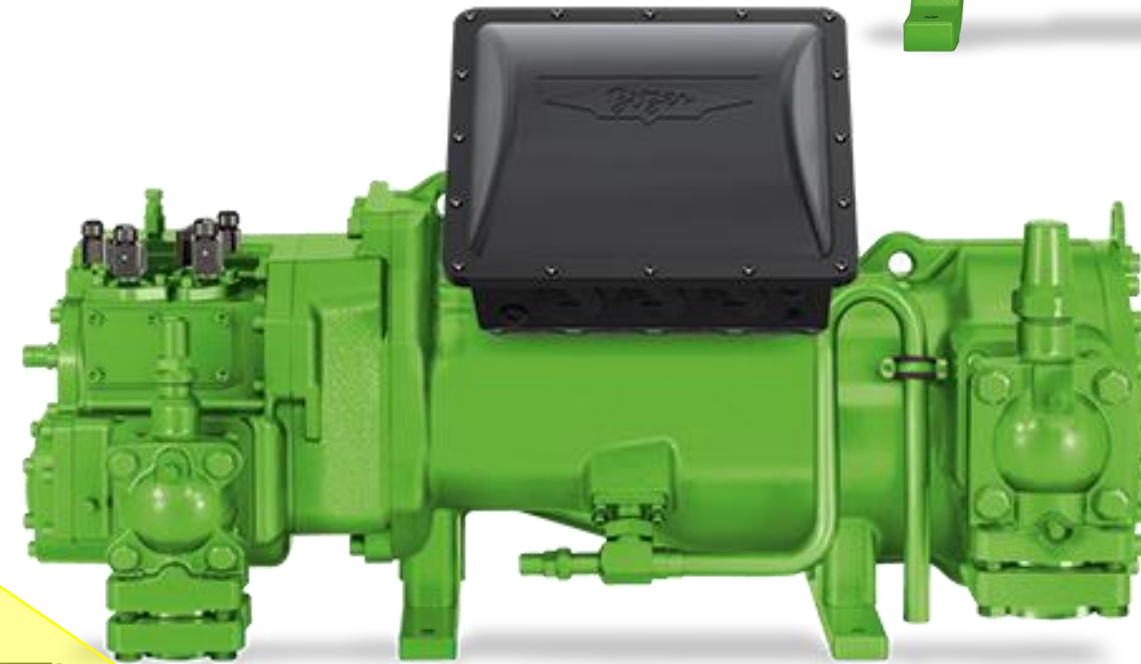
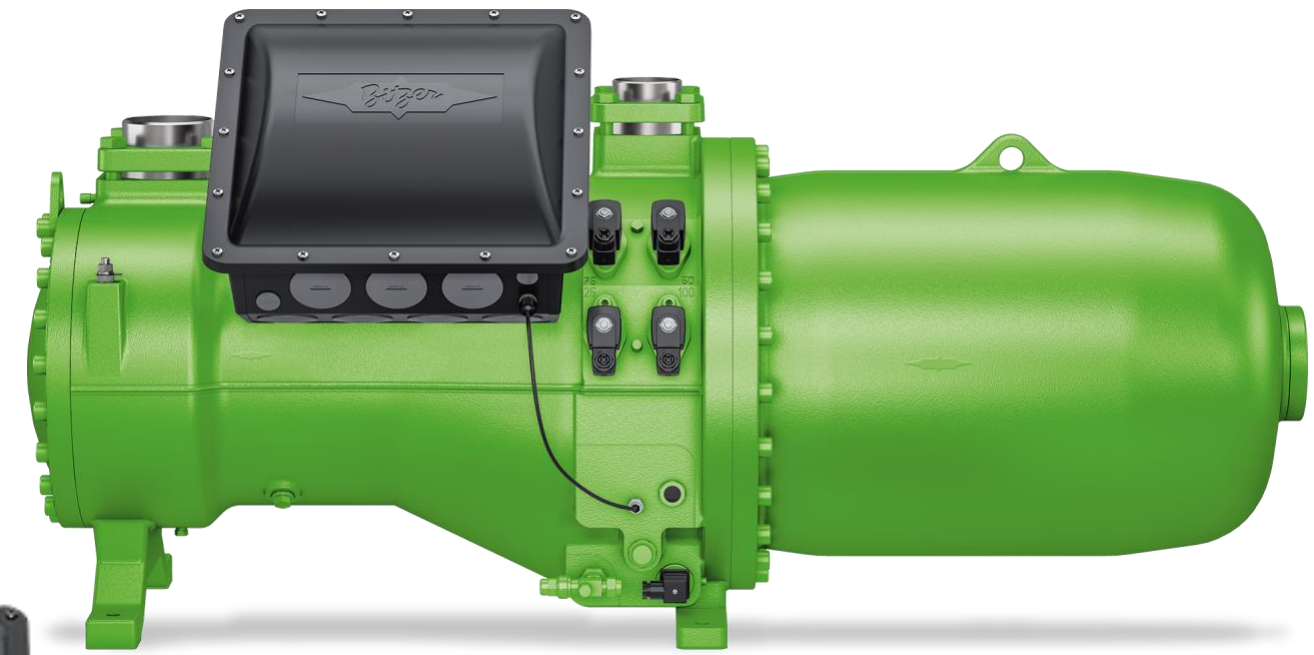
/ 1.Introduction to HS Screw Compressor Series

4 / Bitzer Screw Series

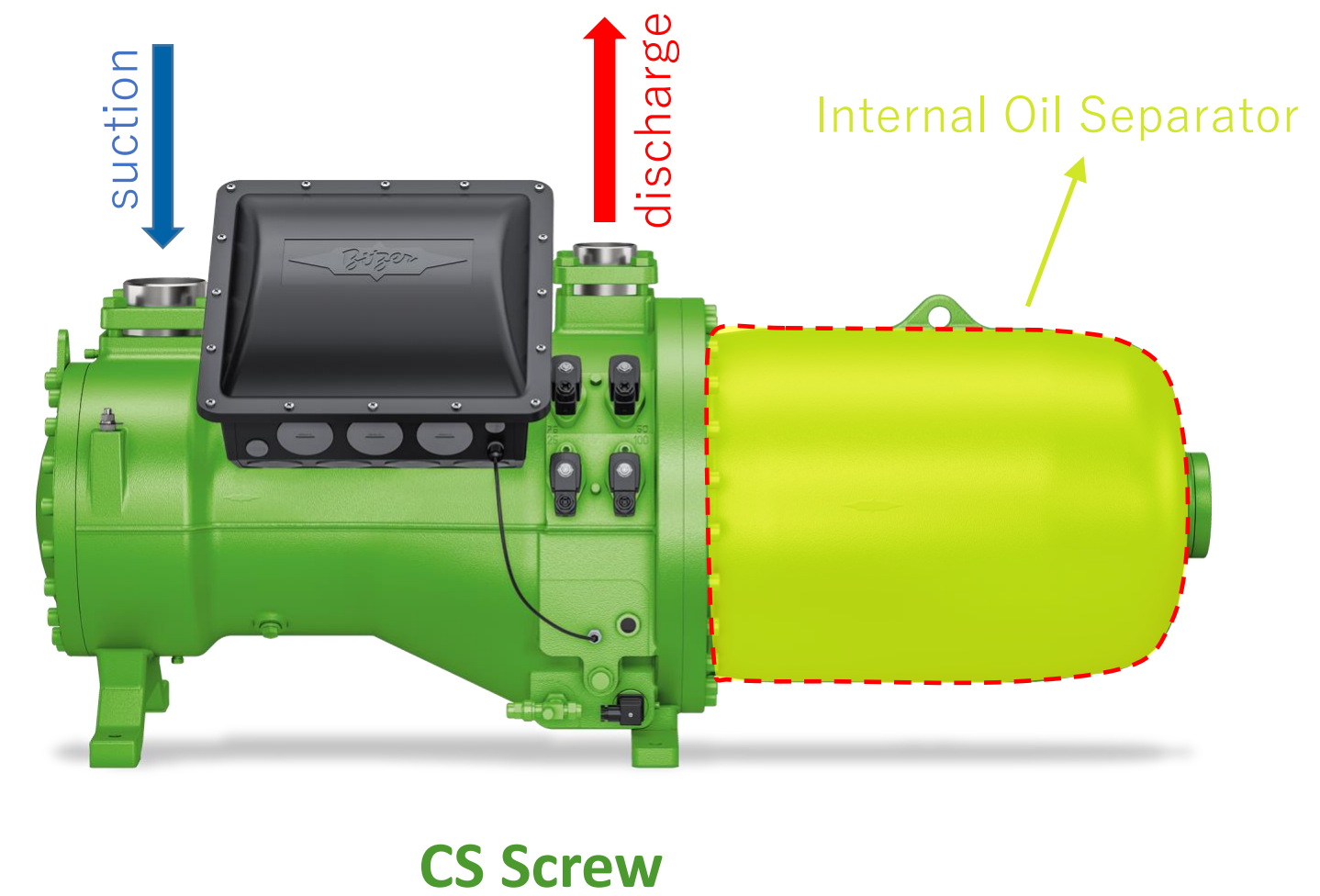
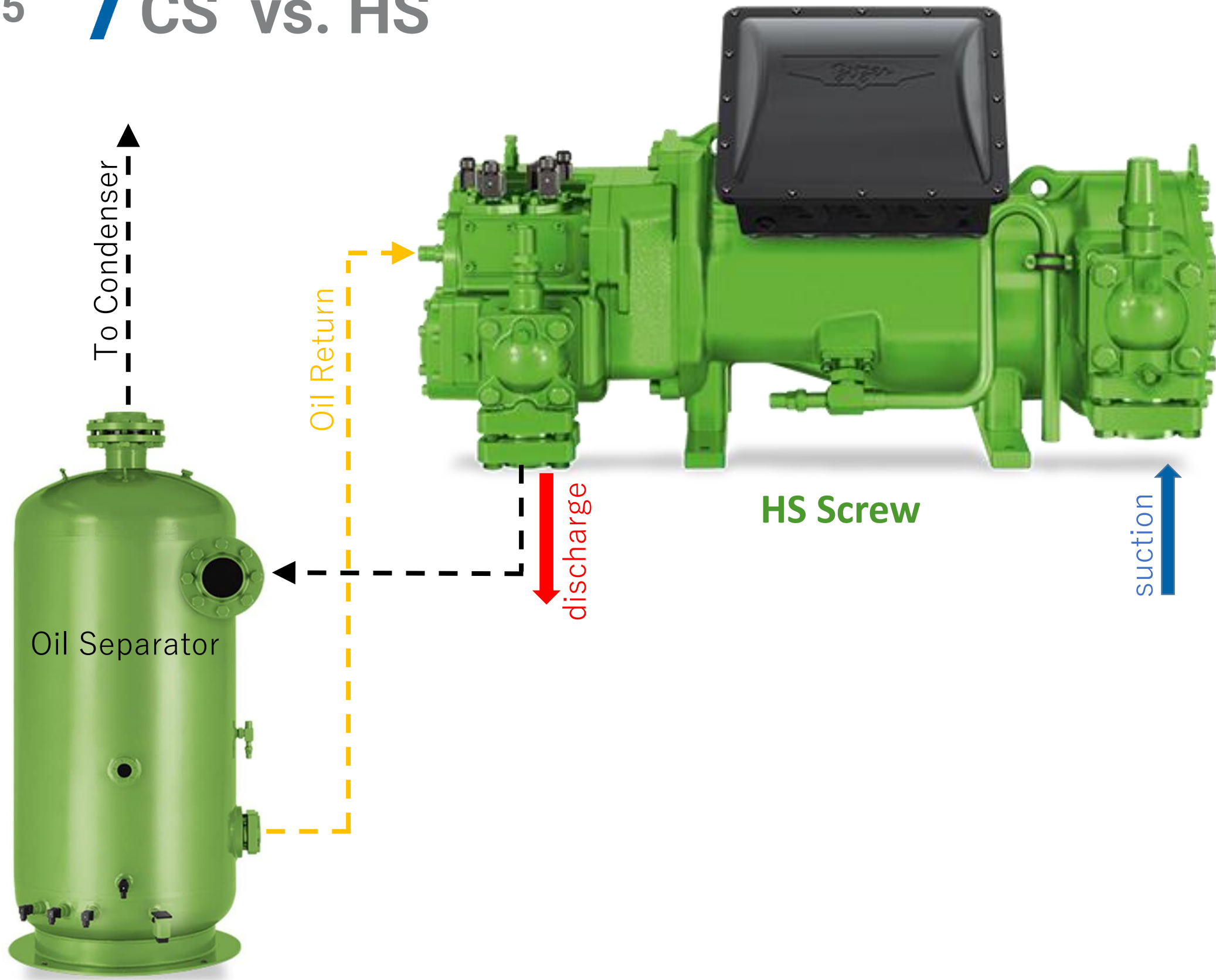
1. CS Screw Compressor

2. HS Screw Compressor

3. OS Screw Compressor

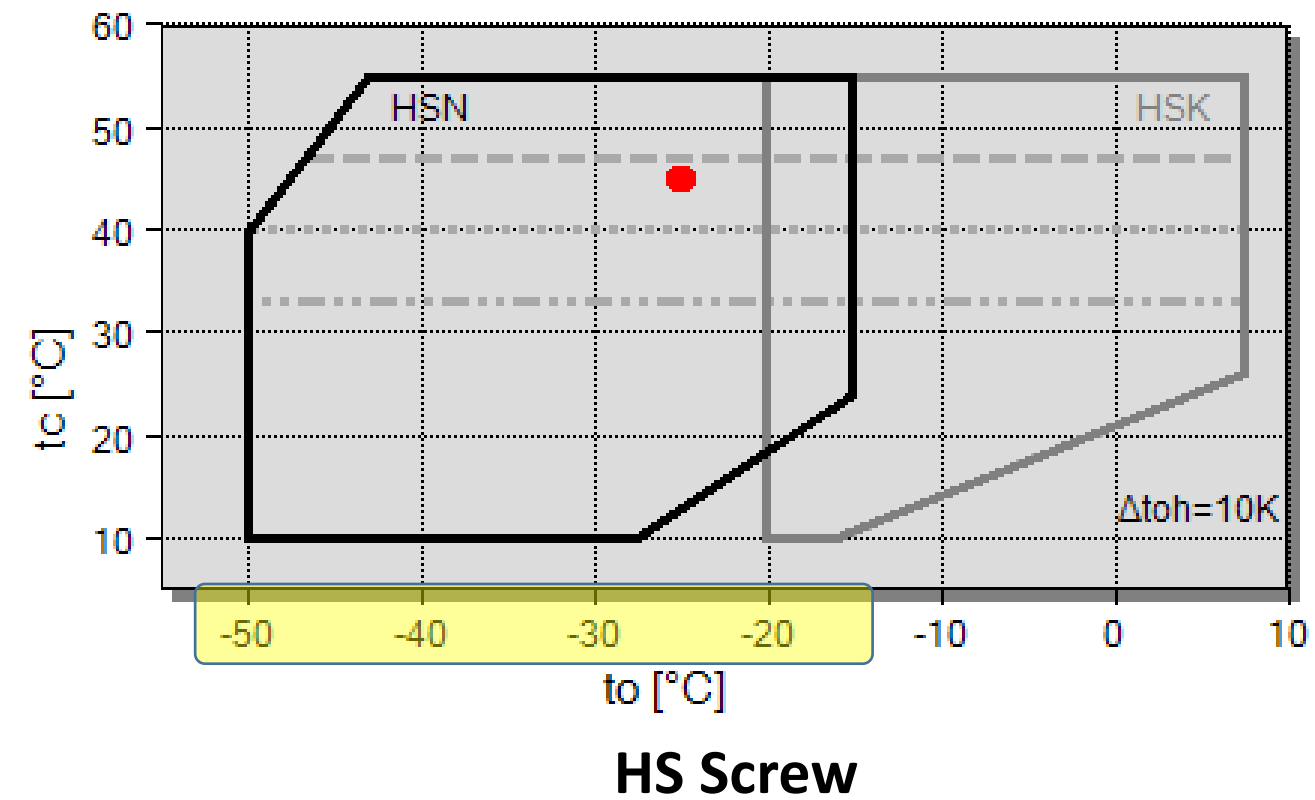
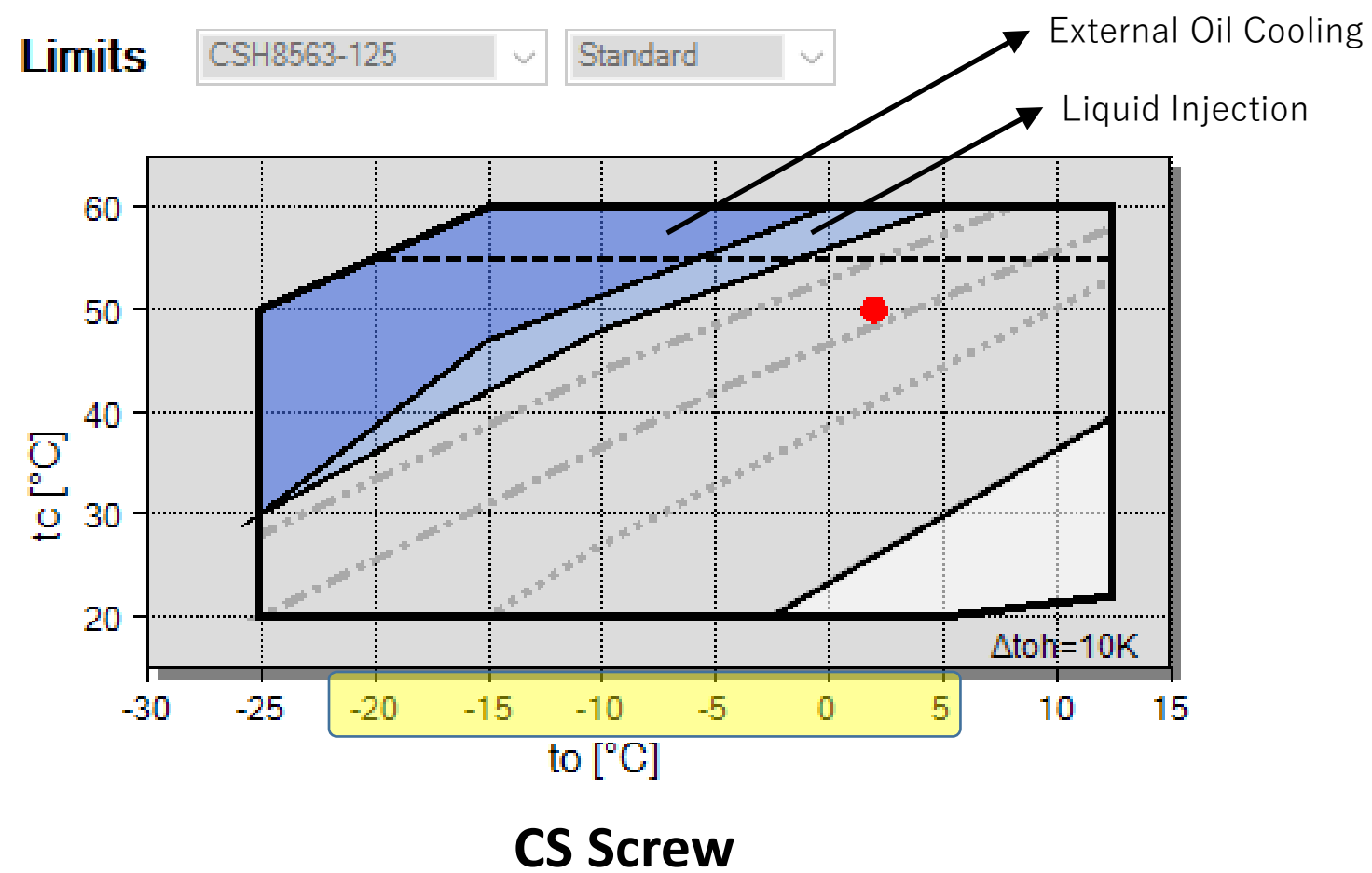


5 / CS vs. HS



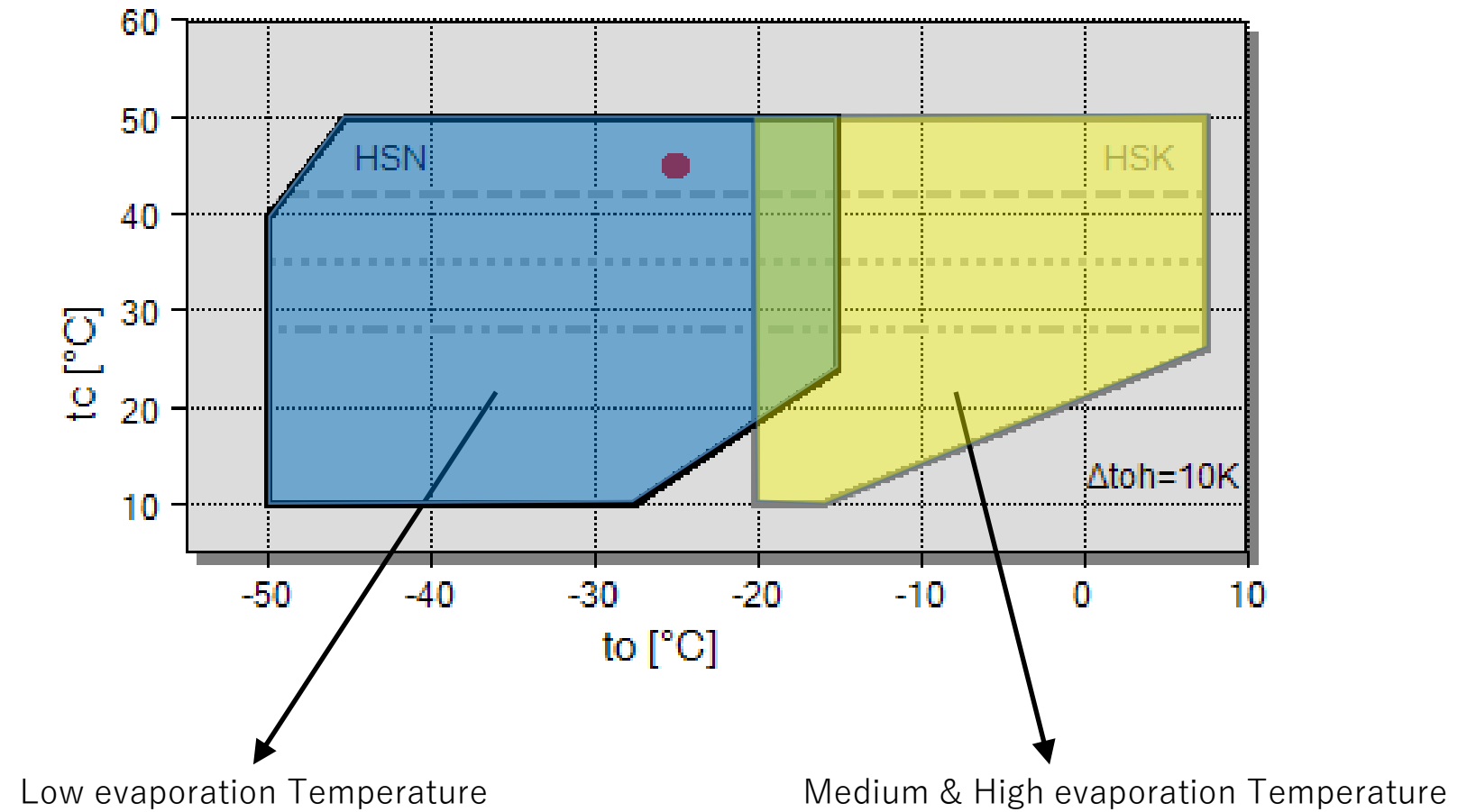
6 / CS vs. HS

- ❑ CS compressors are mainly developed for HVAC application.
- ❑ HS compressors are more versatile. (for long pipe runs, lower evaporation temperature)
- ❑ HS compressors are suitable for parallel compounds. (up to 6 compressors)



7 / HSK vs. HSN

HS compressors {
 HSK compressors
 HSN compressor



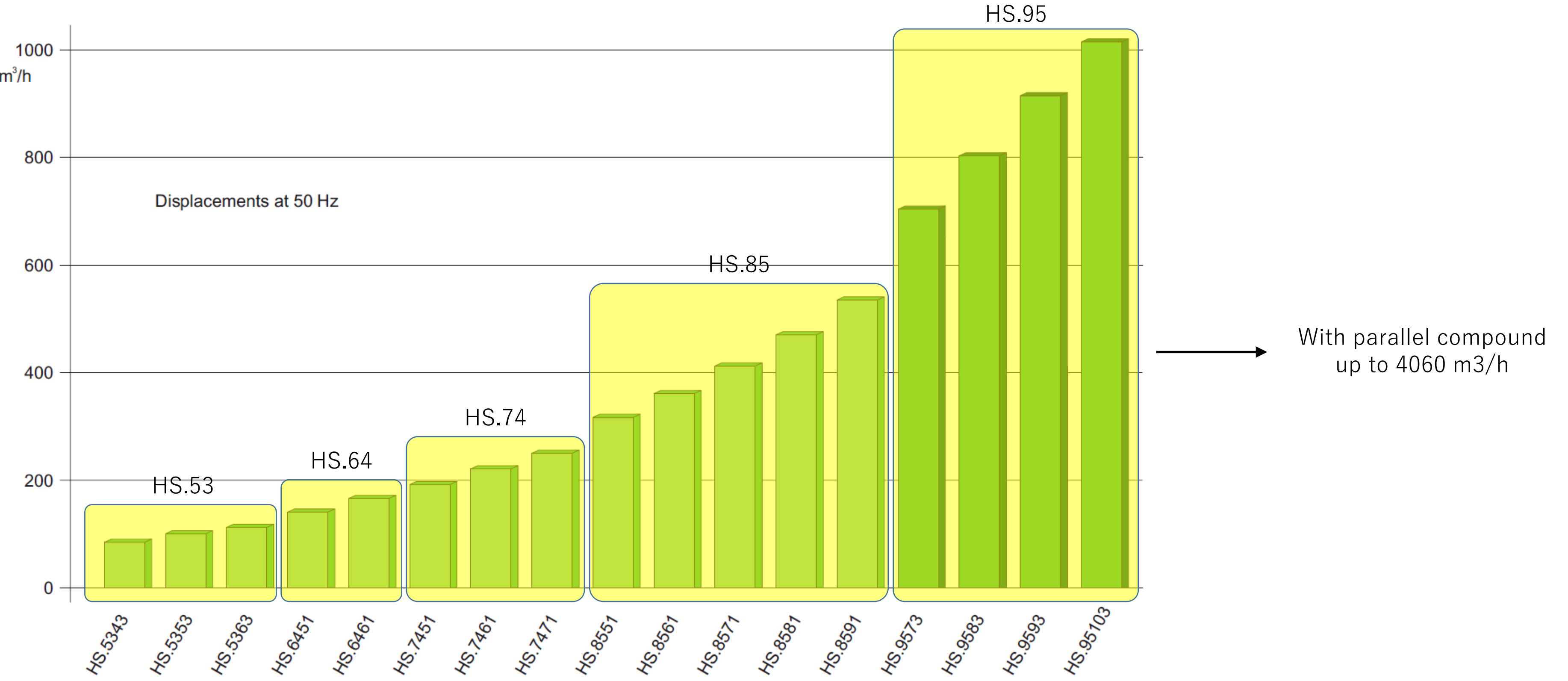
v_i : Volume Ratio

Size and geometry of discharge port determine v_i

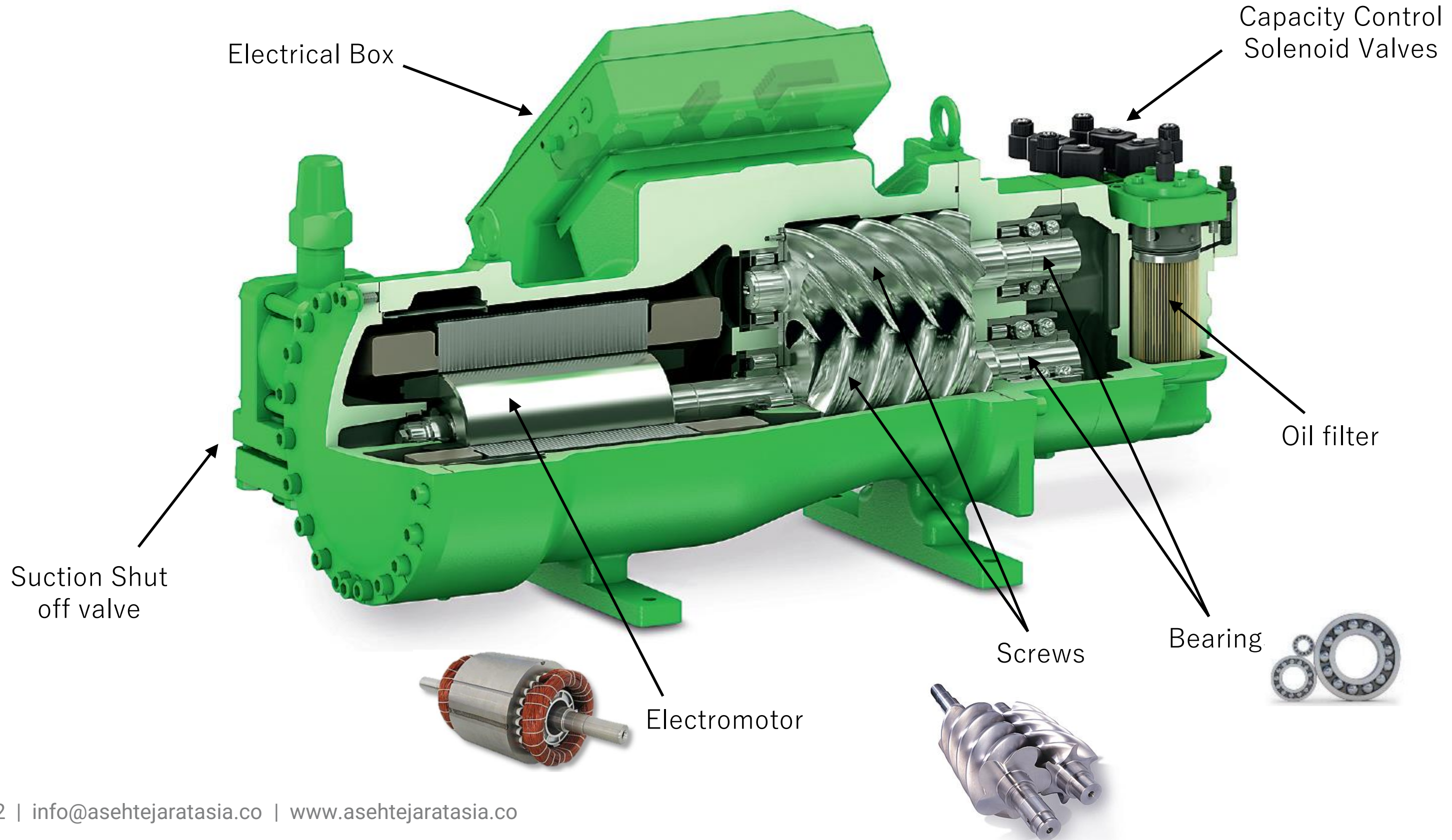
Volume ratio have a defined relationship with pressure ratio and mass flow.



8 / Compressor Range



HS.85 Screw

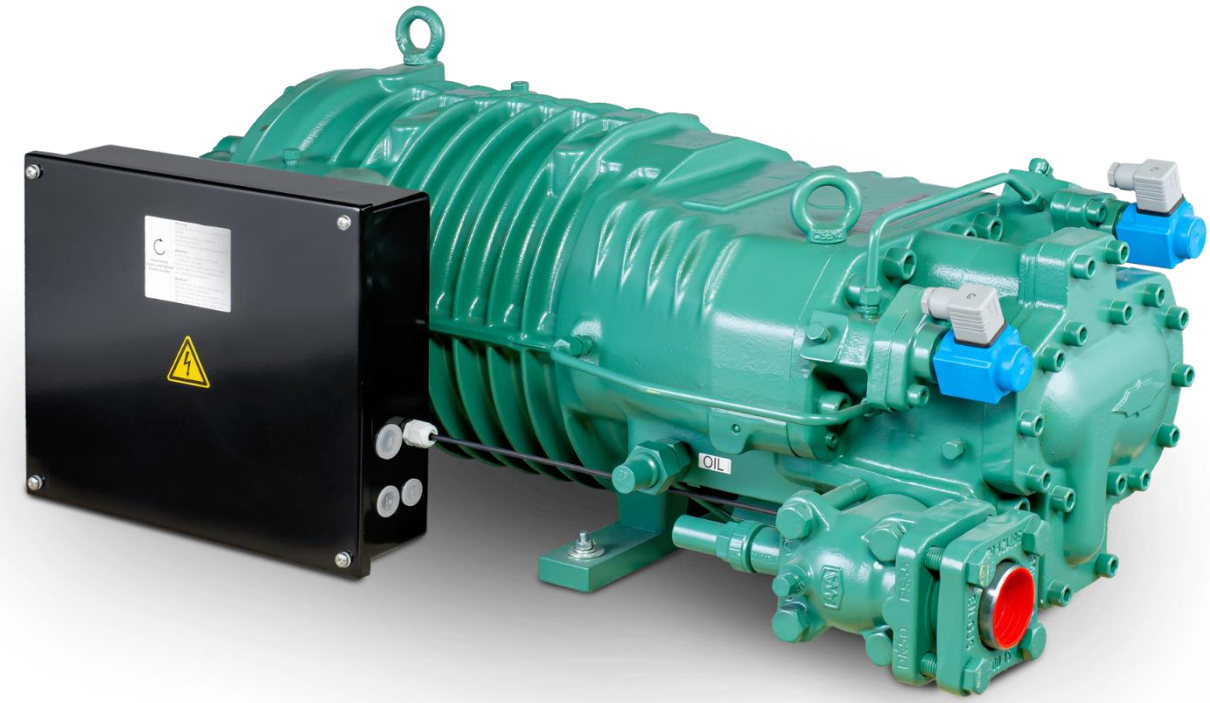
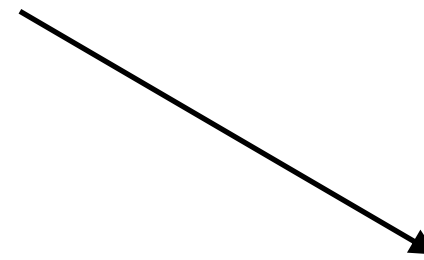
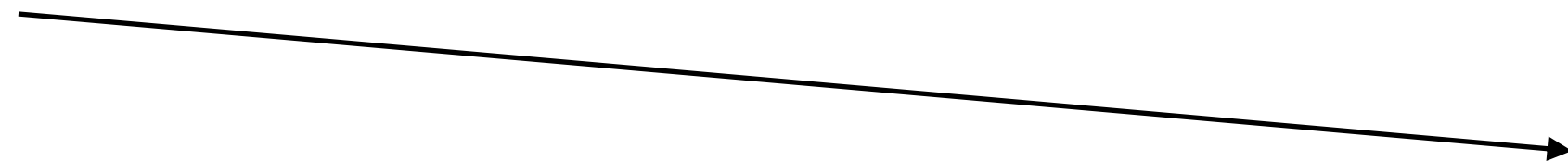
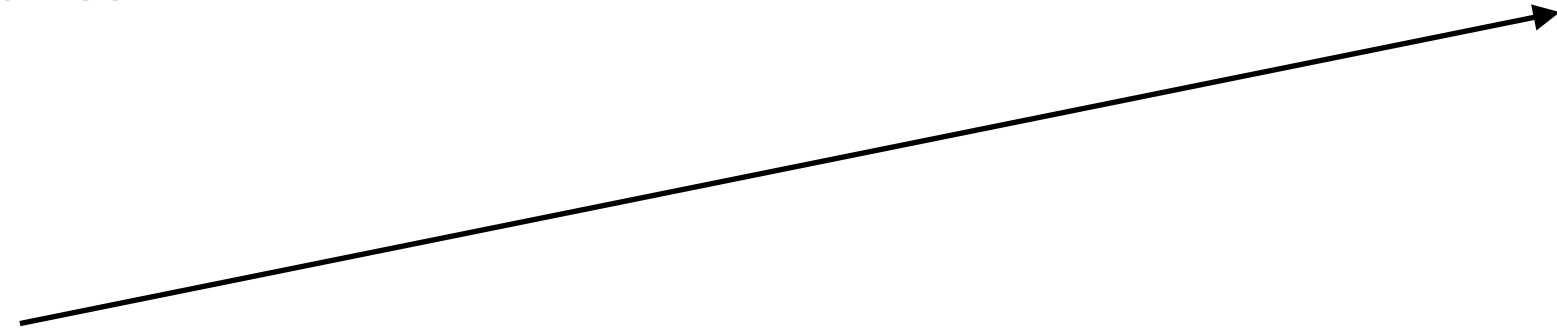
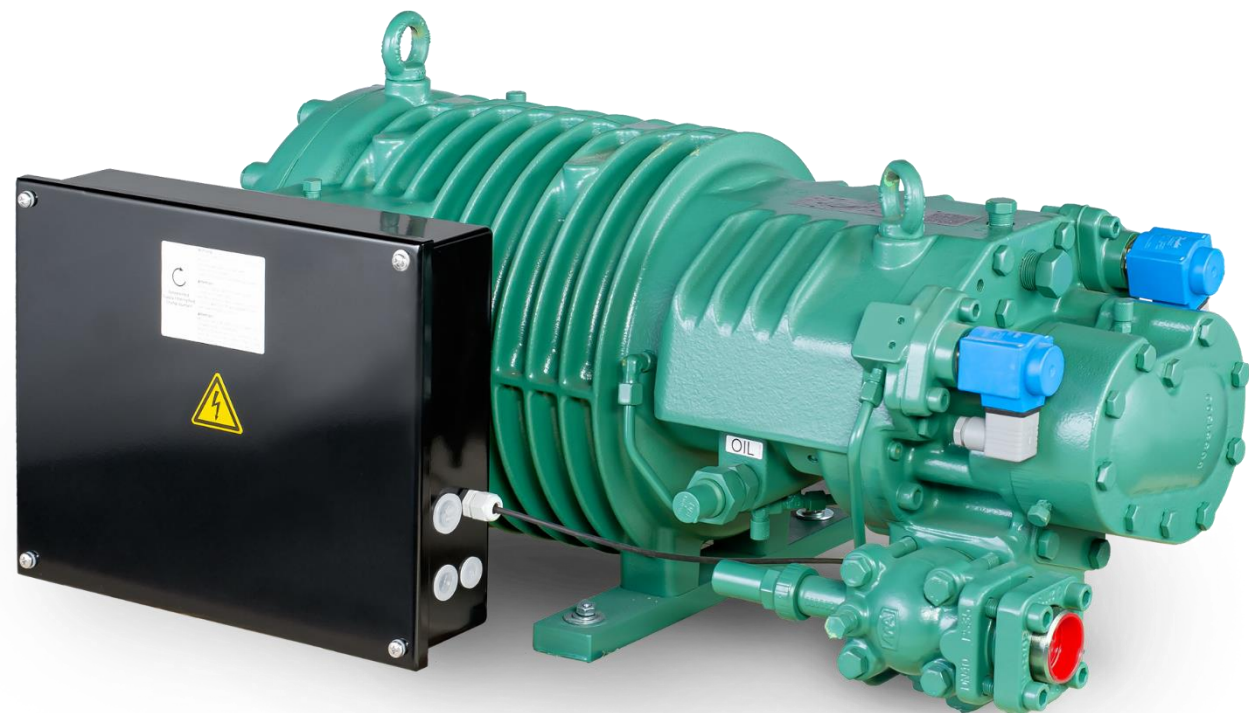


/ 2.HS Screw Family

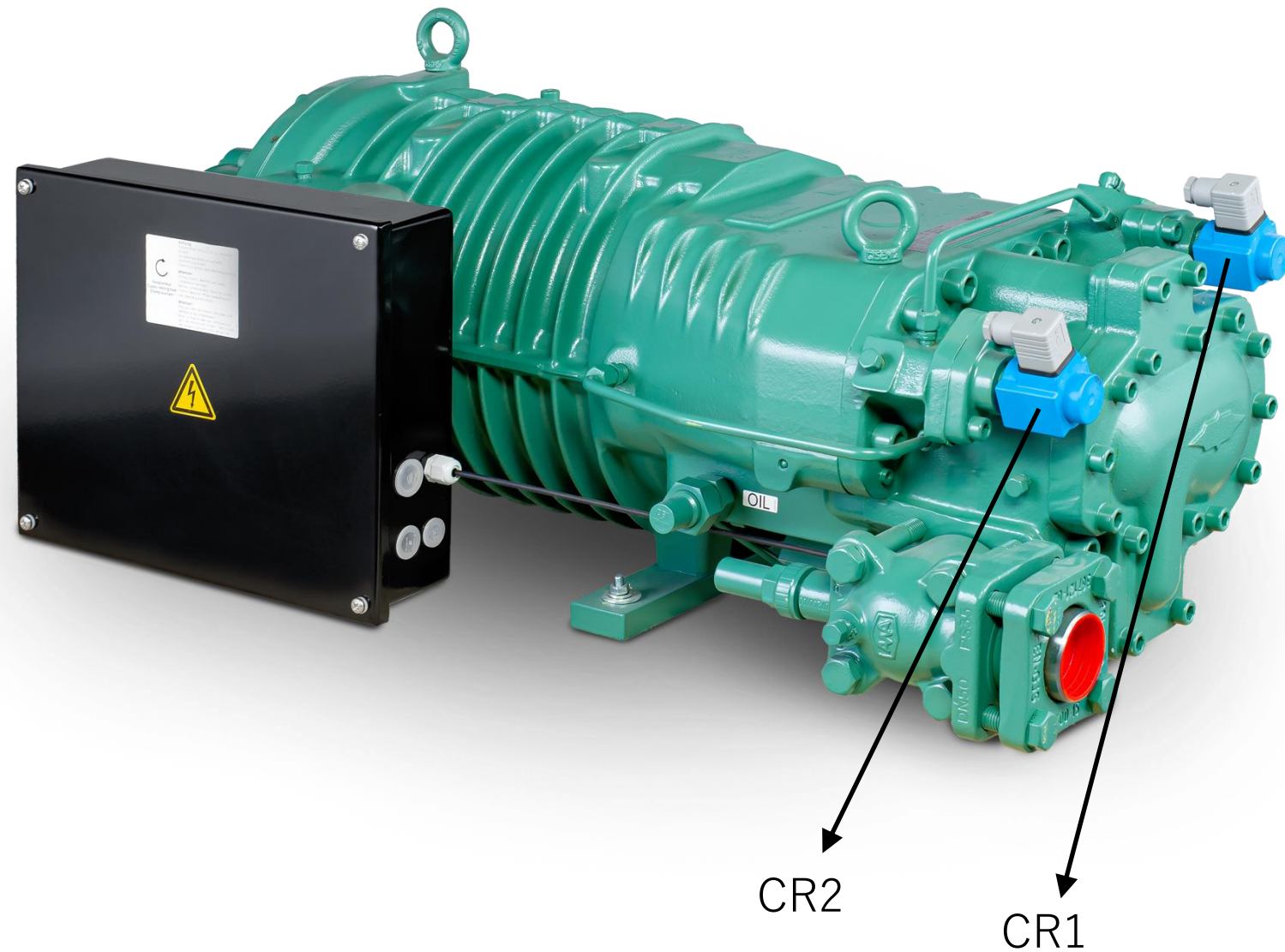
11 / Different HS compressors

Housing sizes:

- 1. HS.53
- 2. HS.64
- 3. HS.74
- 4. HS.85
- 5. HS.95



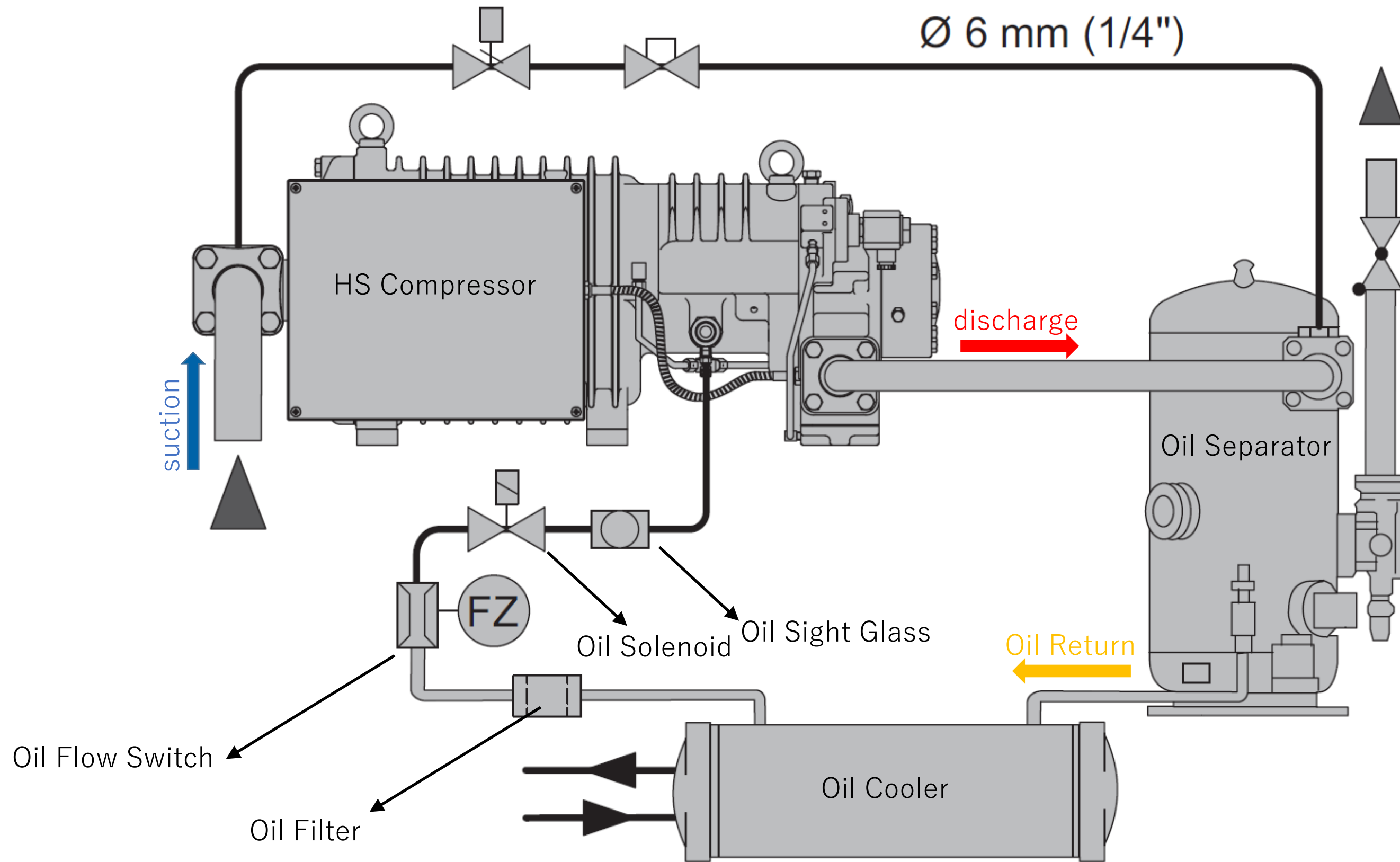
12 / Capacity Control in HS 53, 64, 74



Typen Types Types	Leistungsregelung Capacity control ① Régulation de puissance			Anlaufentlastung Start unloading Démarrage à vide
	Volllast / Full load / Pleine charge	Teillast / Part load / Charge partiel		
	(100%)	Stufe 1 (ca. 75%) Step 1 (approx. 75%) Etage 1 (env. 75%)	Stufe 2 (ca. 50%) Step 2 (approx. 50%) ② Etage 2 (env. 50%)	
HS.53	CR1 = ● CR2 = ●	CR1 = ○ CR2 = ●	CR1 = ○ CR2 = ○	CR1 = ○ CR2 = ○
HS.64	CR1 = ● CR2 = ●	CR1 = ○ CR2 = ●	CR1 = ○ CR2 = ○	CR1 = ○ CR2 = ○
HS.74	CR1 = ● CR2 = ●	CR1 = ● CR2 = ○	CR1 = ○ CR2 = ○	CR1 = ○ CR2 = ○

50% capacity can not be used during Economizer Operation

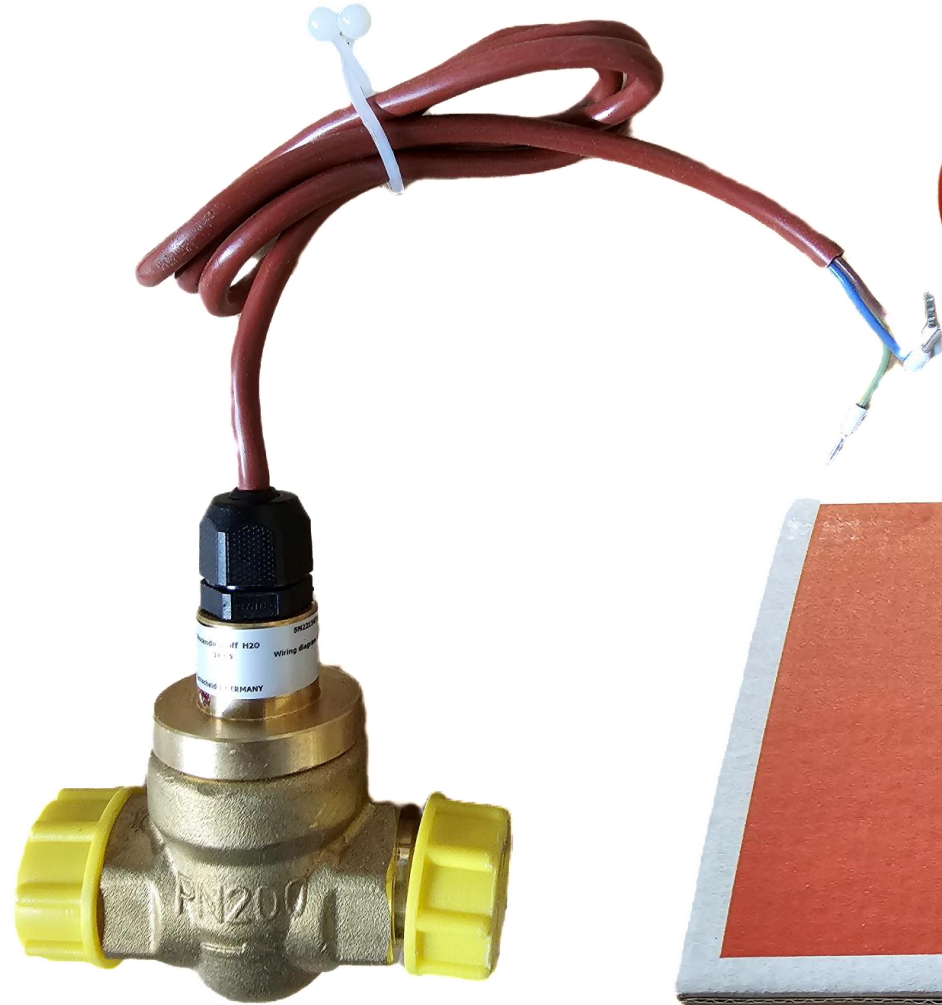
13 / Oil Return Line in HS 53, 64, 74



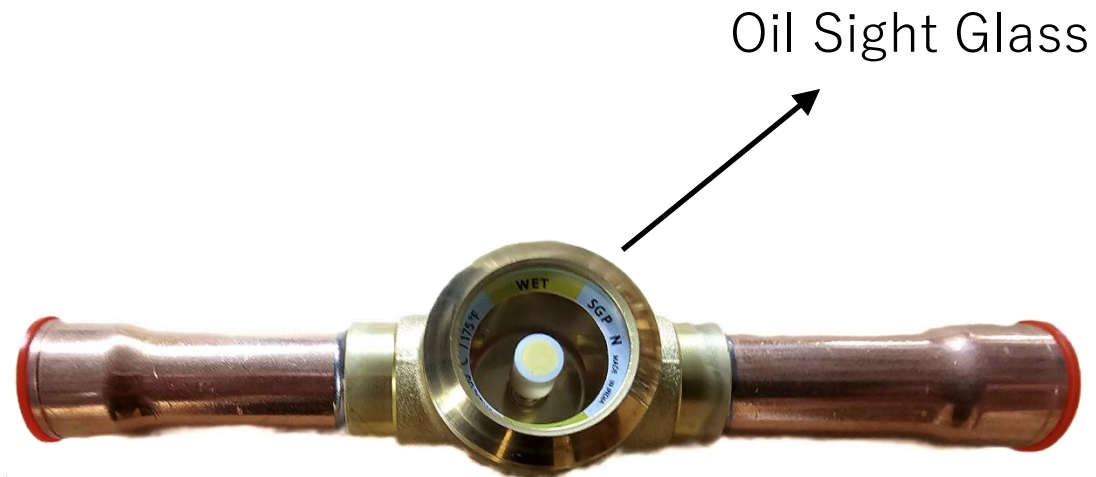
14 / Delivery Scope in HS 53, 64, 74



Oil Filter



Oil Flow Switch

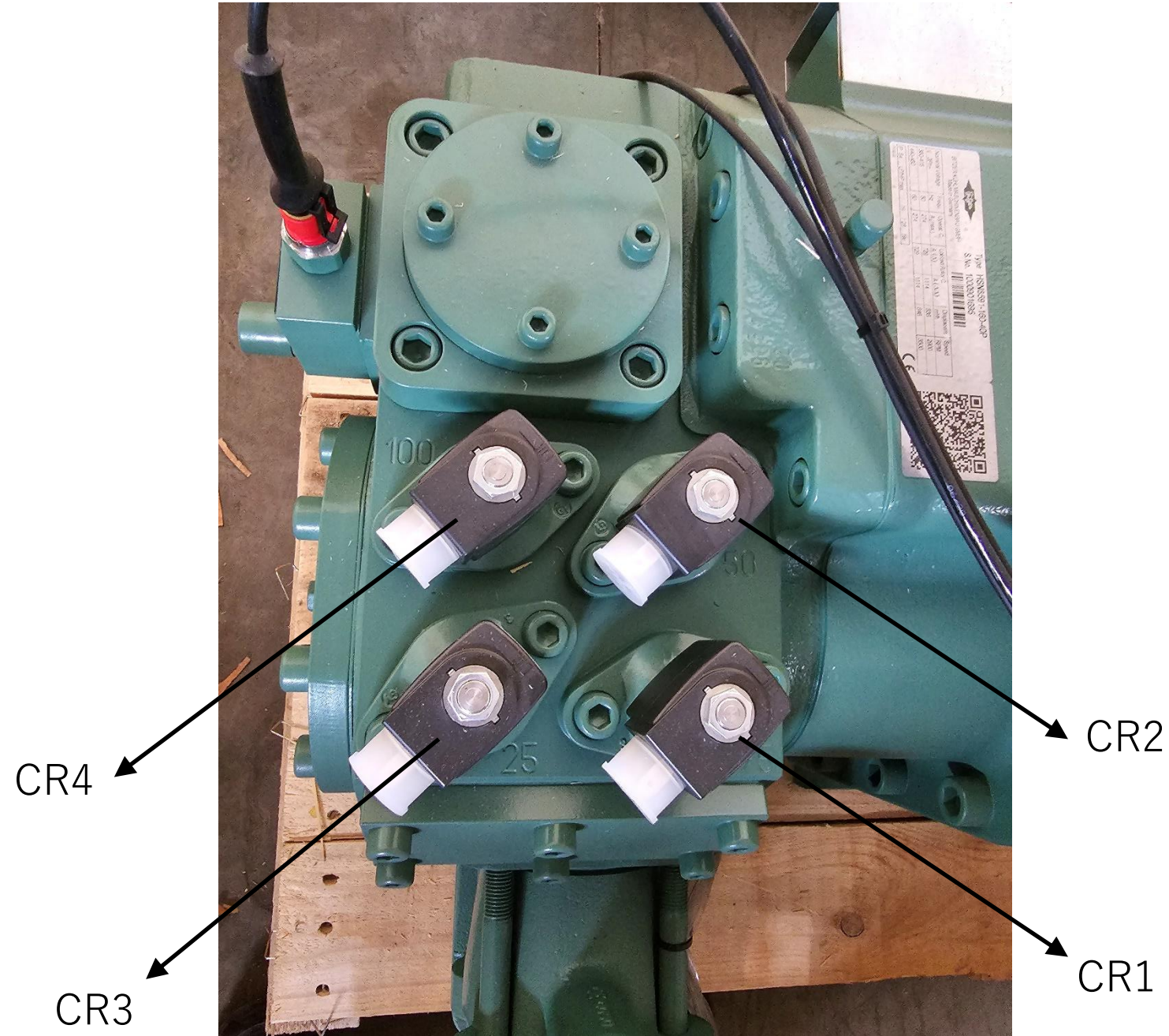


Oil Sight Glass



Oil Solenoid Valve

15 / Capacity Control in HS.85



4-step
Capacity Control

CR	1	2	3	4
Start / Stop	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
CAP 25% ①	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
CAP 50%	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
CAP 75%	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CAP 100%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

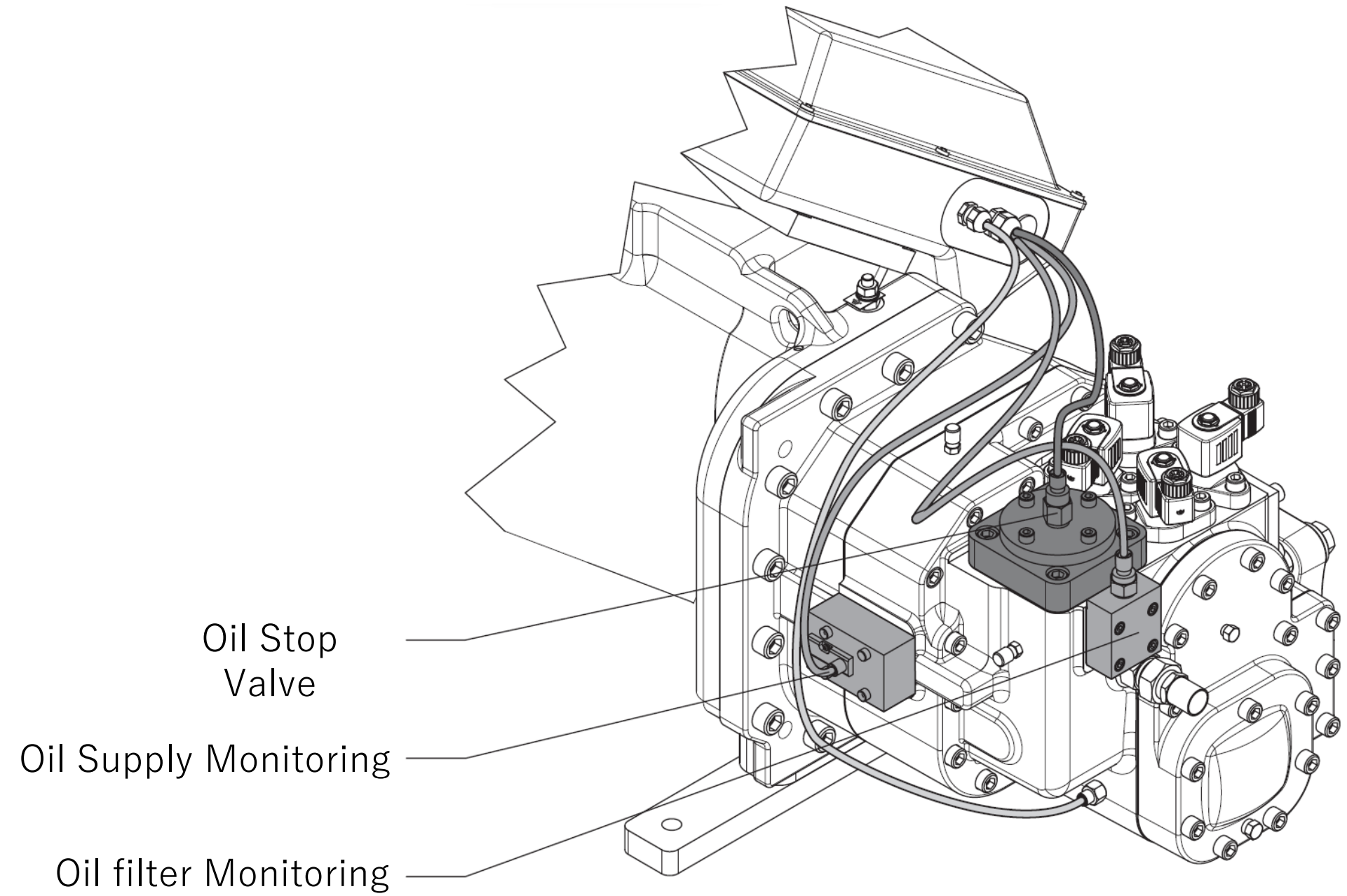
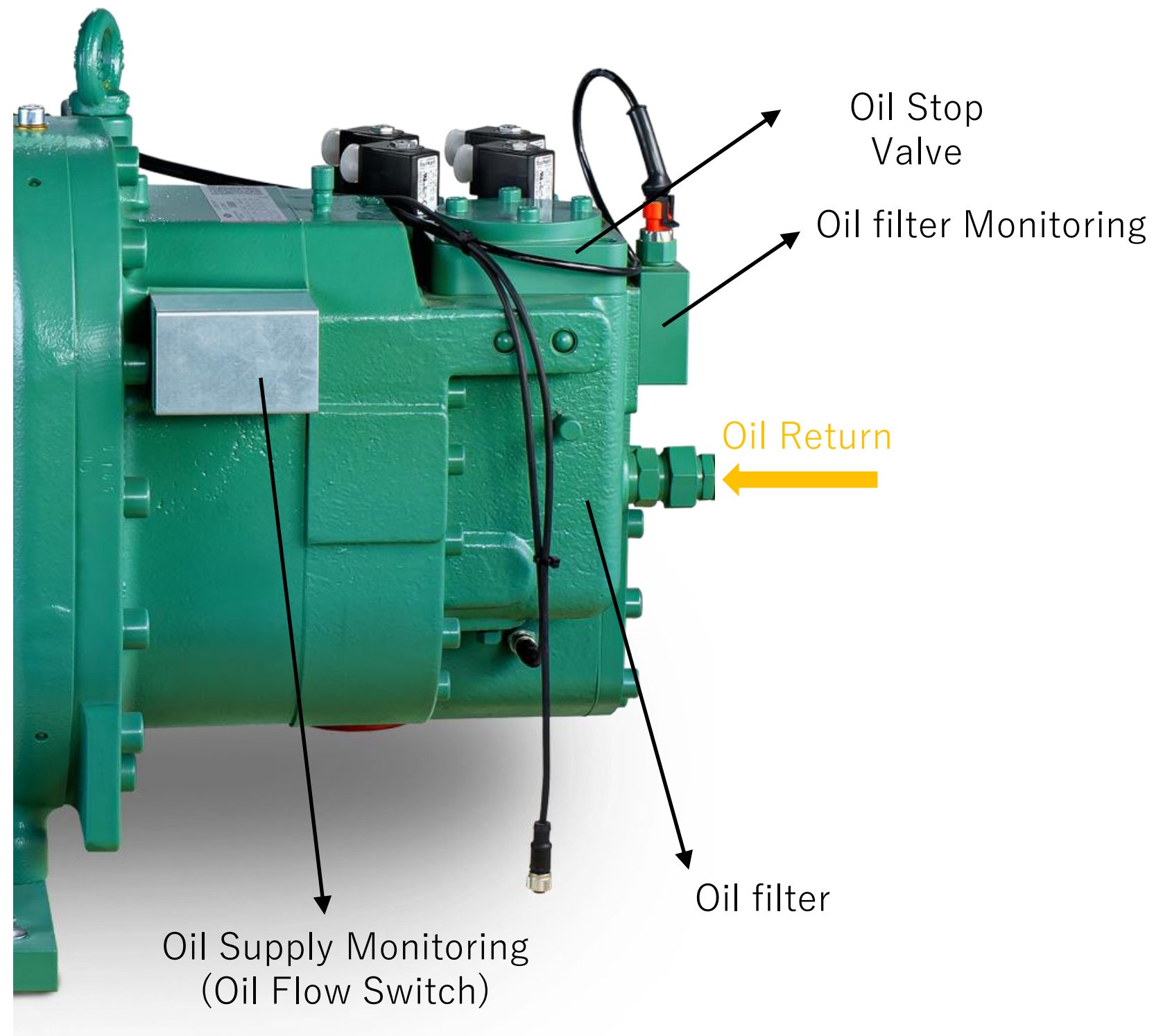
Stepless
Capacity Control
100% ... 50%

CR	1	2	3	4
Start / Stop	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
CAP ↑	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
CAP min 50% ↓	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
CAP ↔	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

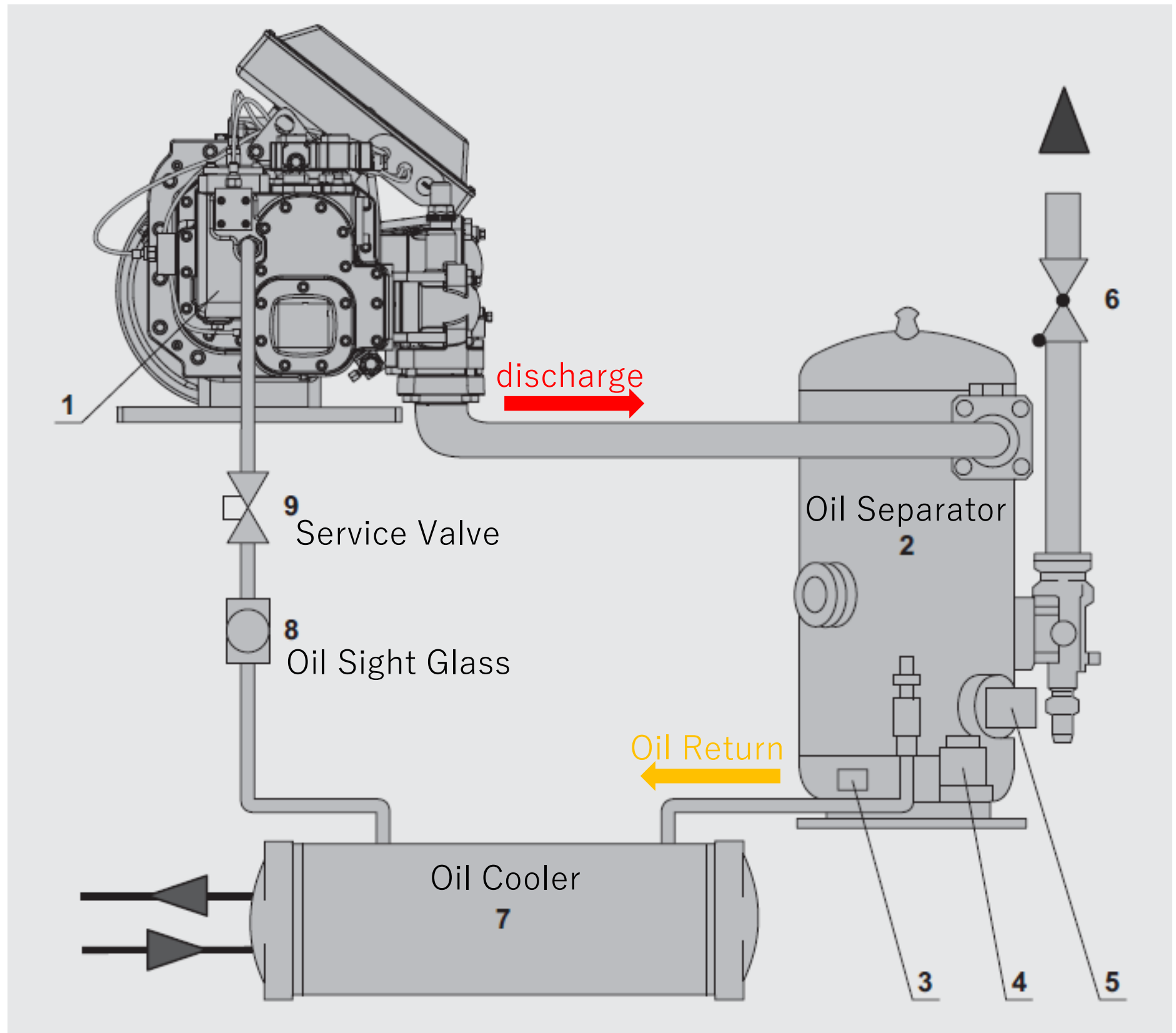
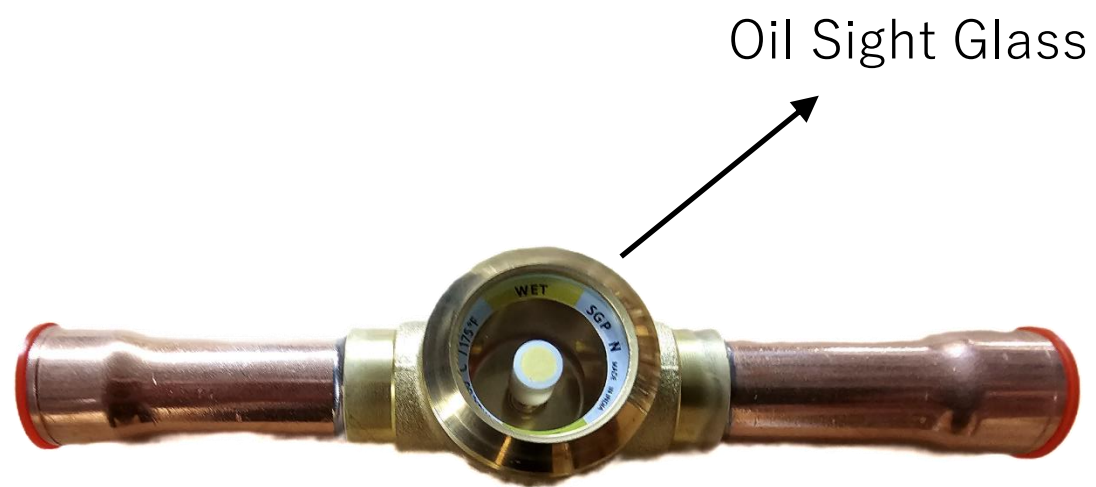
Stepless
Capacity Control
100% ... 25%

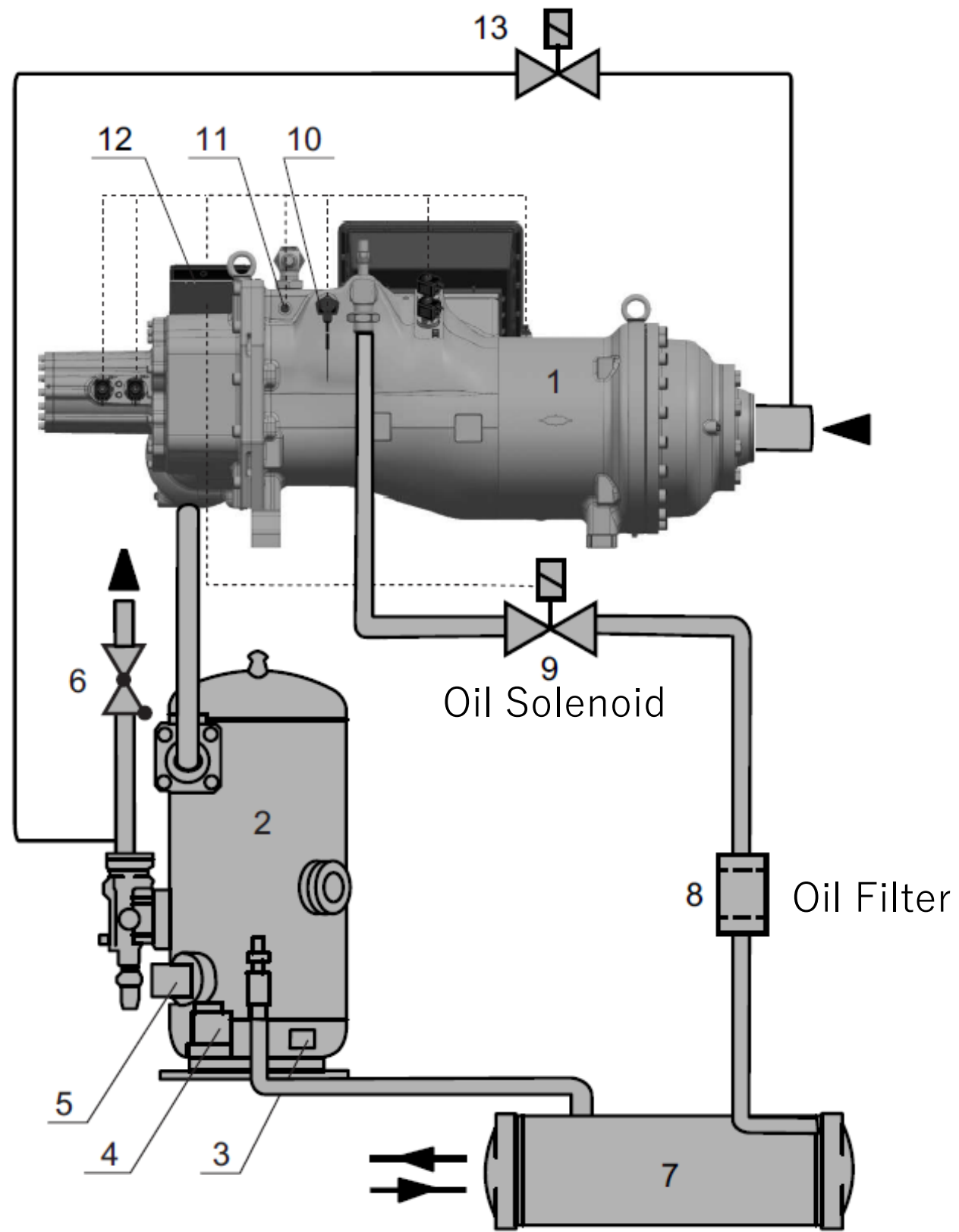
CR	1	2	3	4
Start / Stop	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
CAP ↑	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
CAP min 25% ↓	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
CAP ↔	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16 / Oil components implemented in Compressor

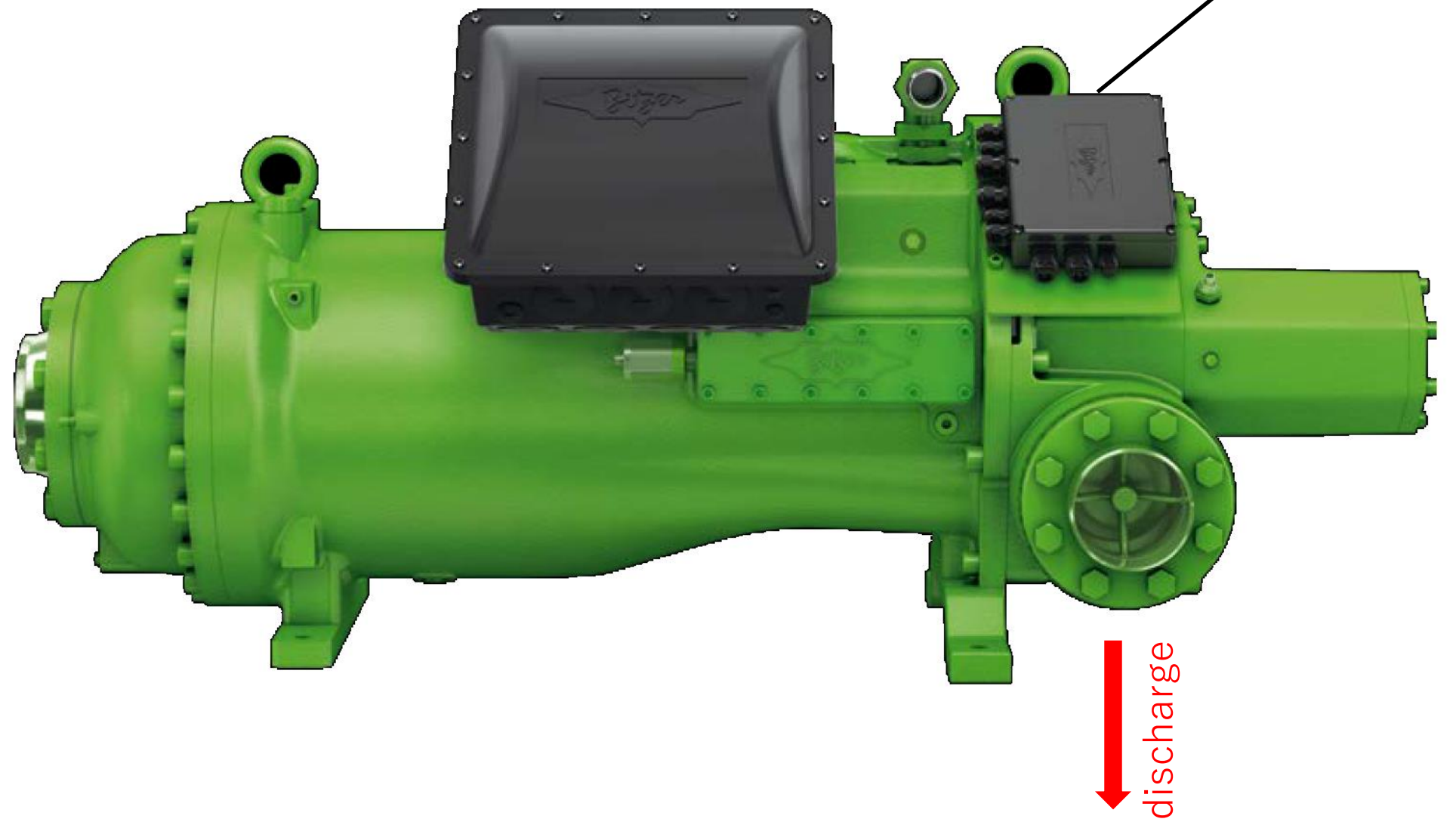


17 / Oil Return Line in HS.85





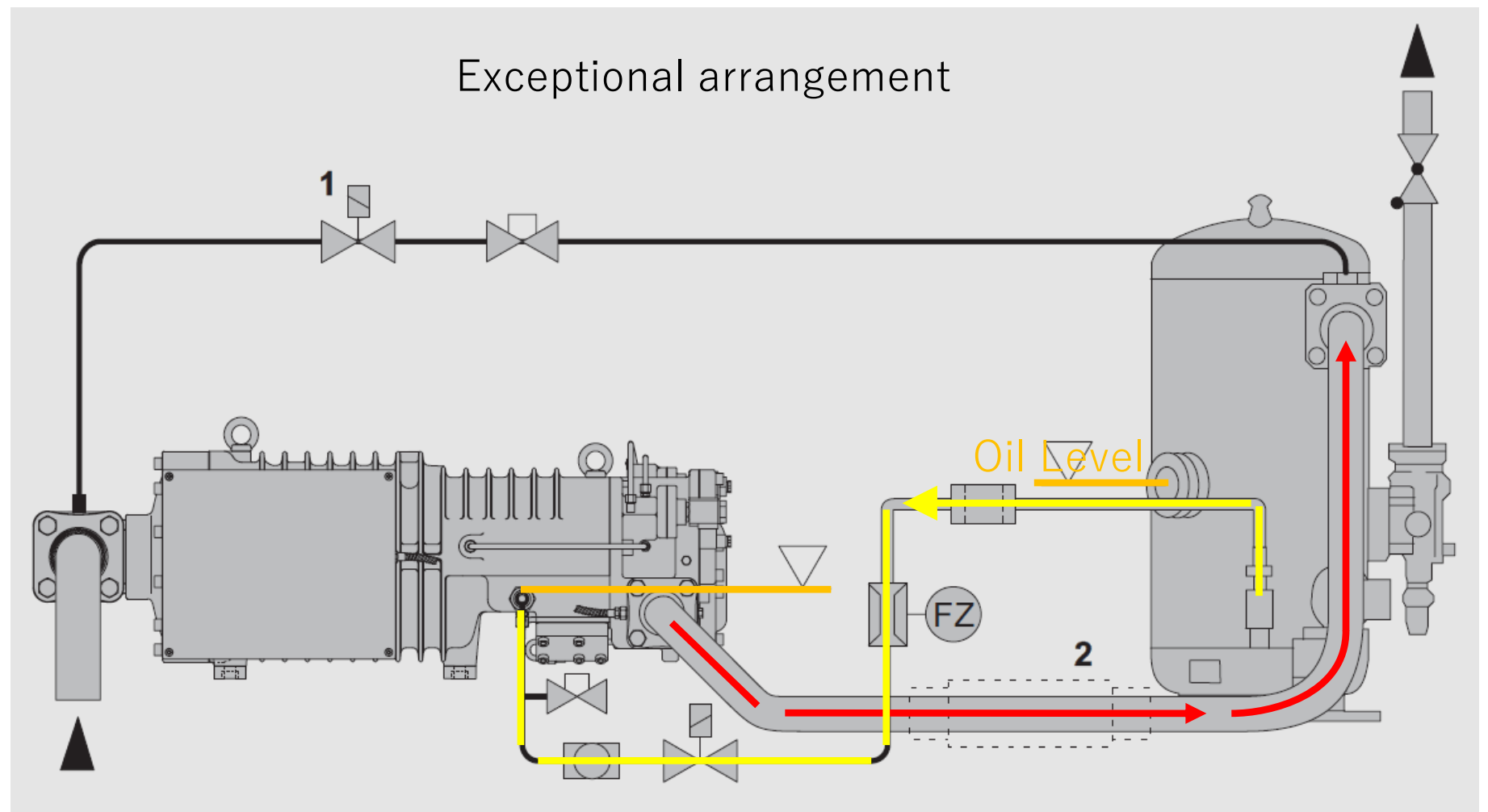
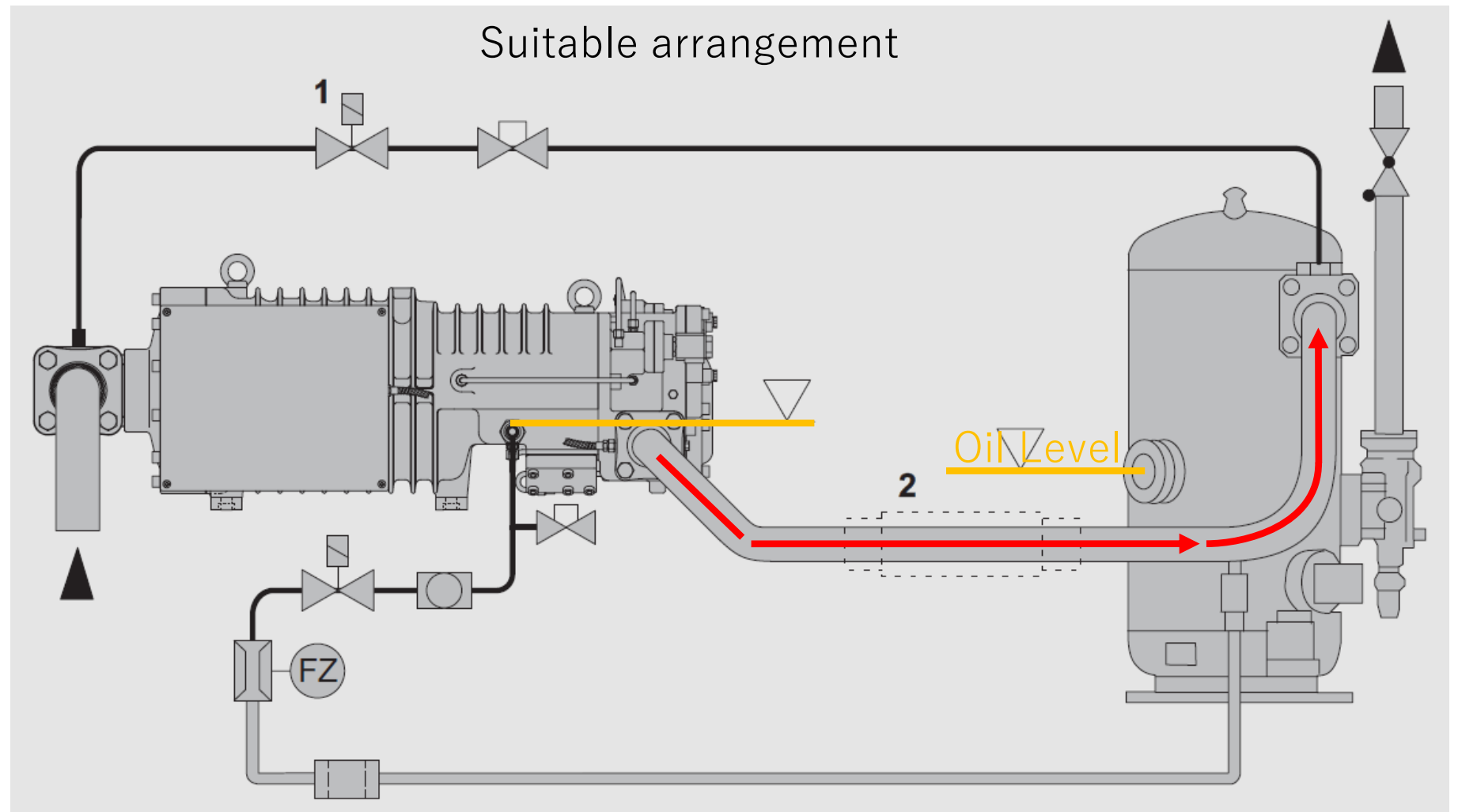
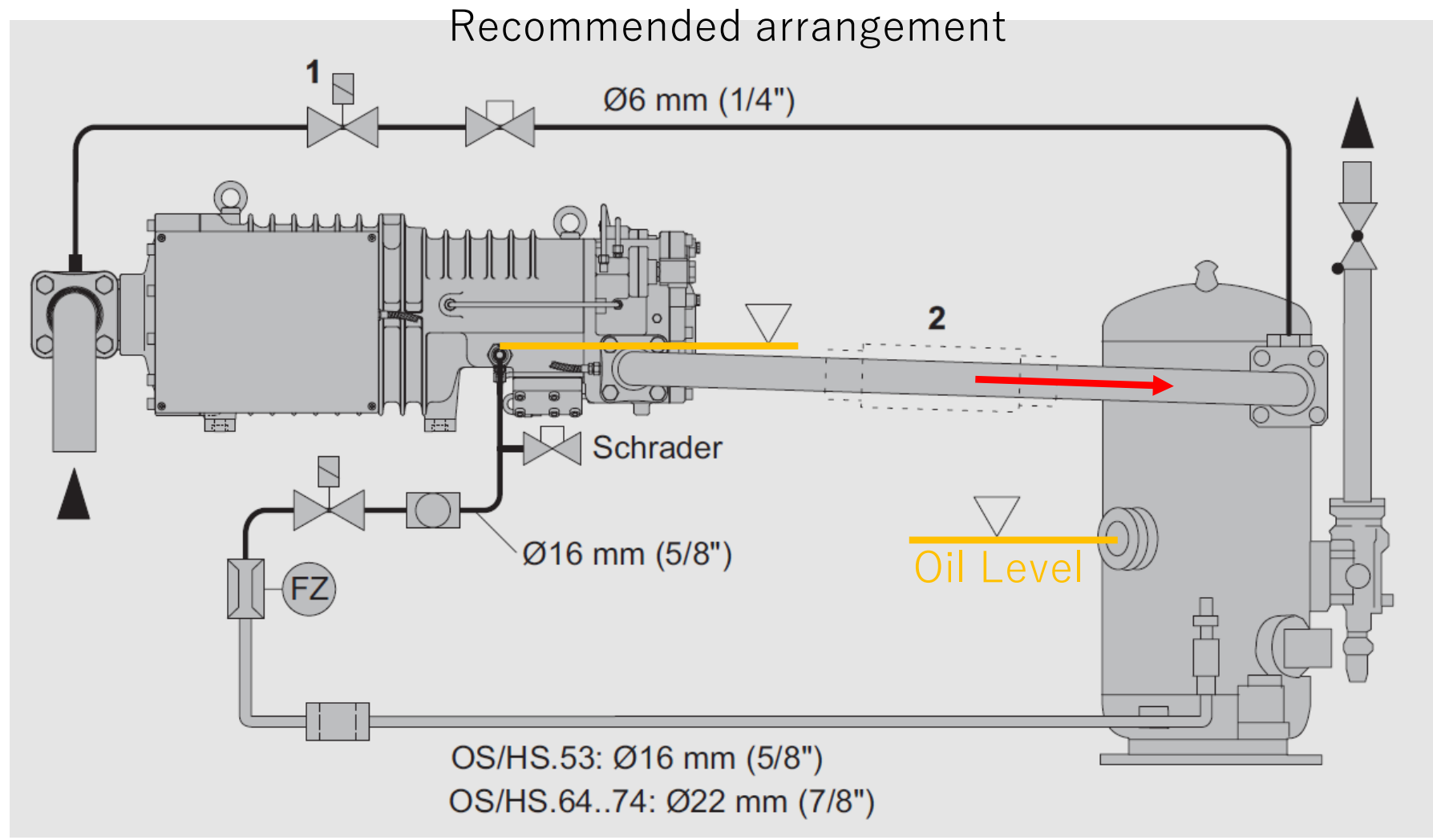
suction
→



- Stepless Capacity Control
- Variable v_i (volume Ratio)

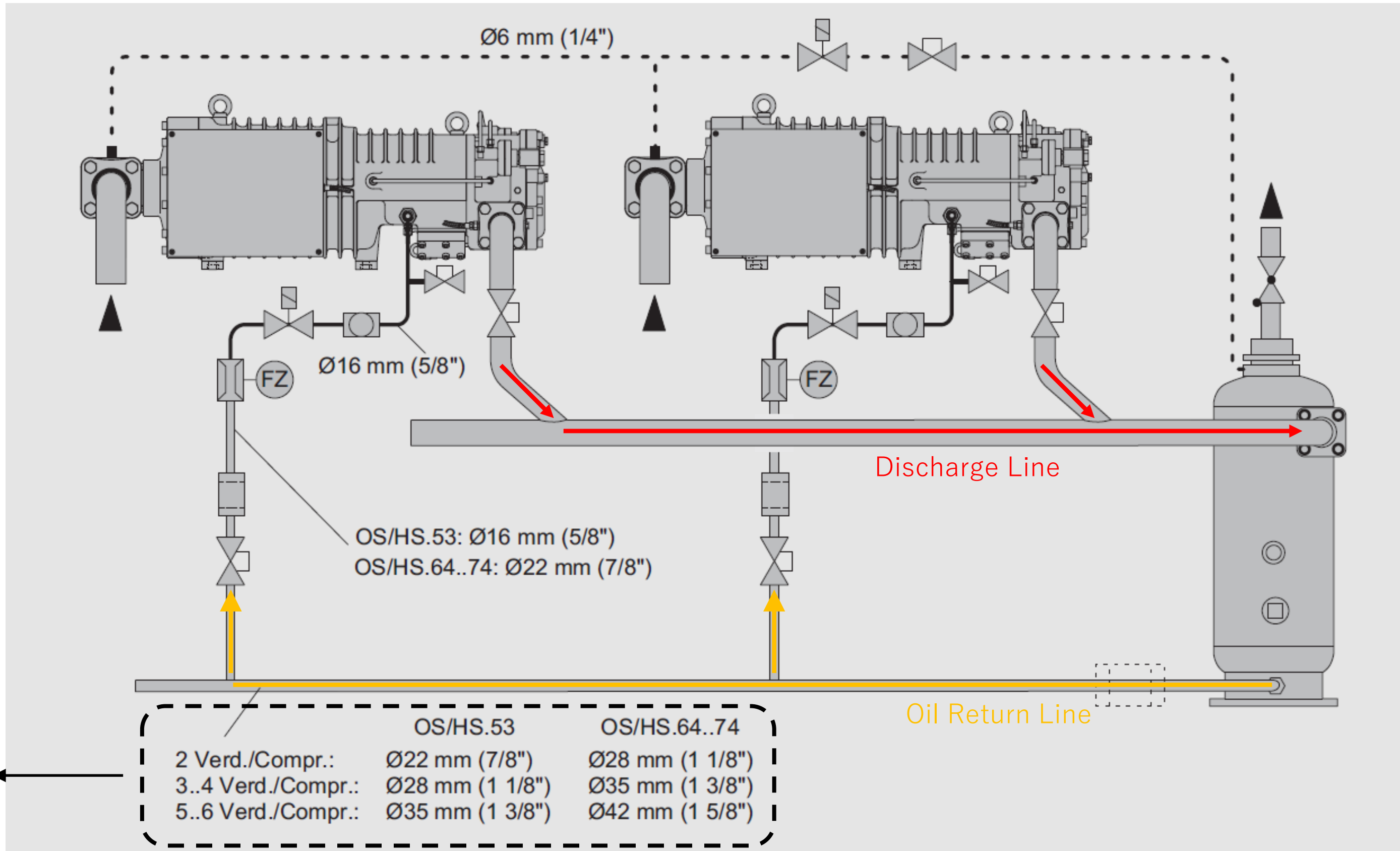
/ 3. HS compressors Piping

20 / Piping to Oil Separator



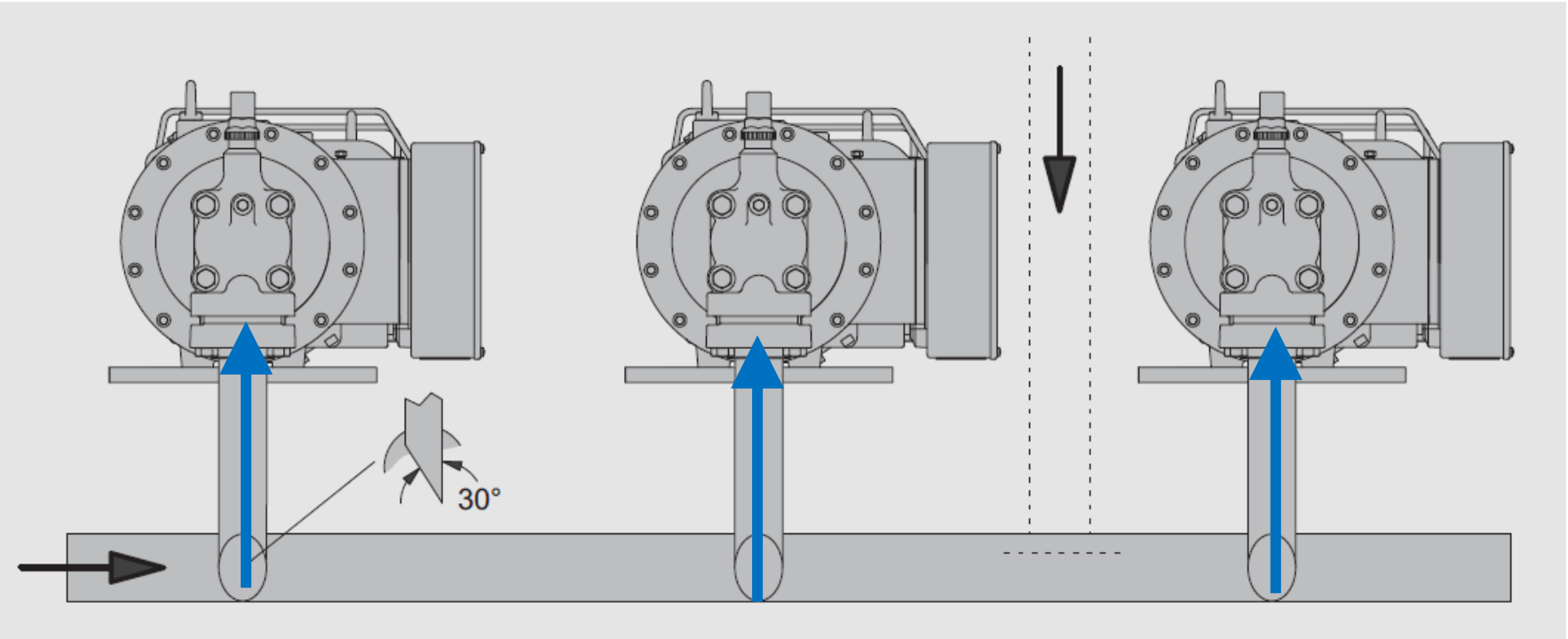
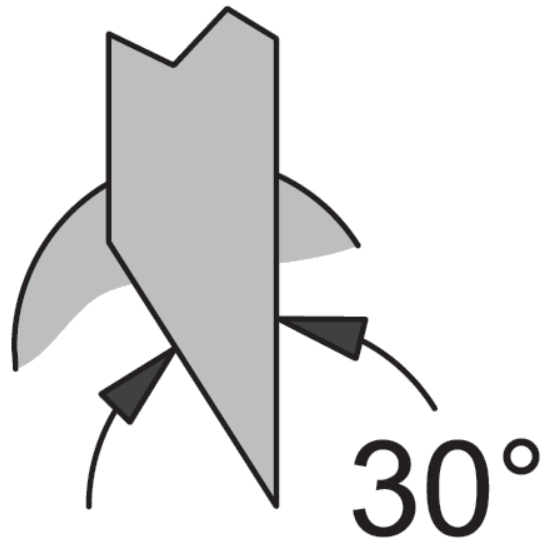
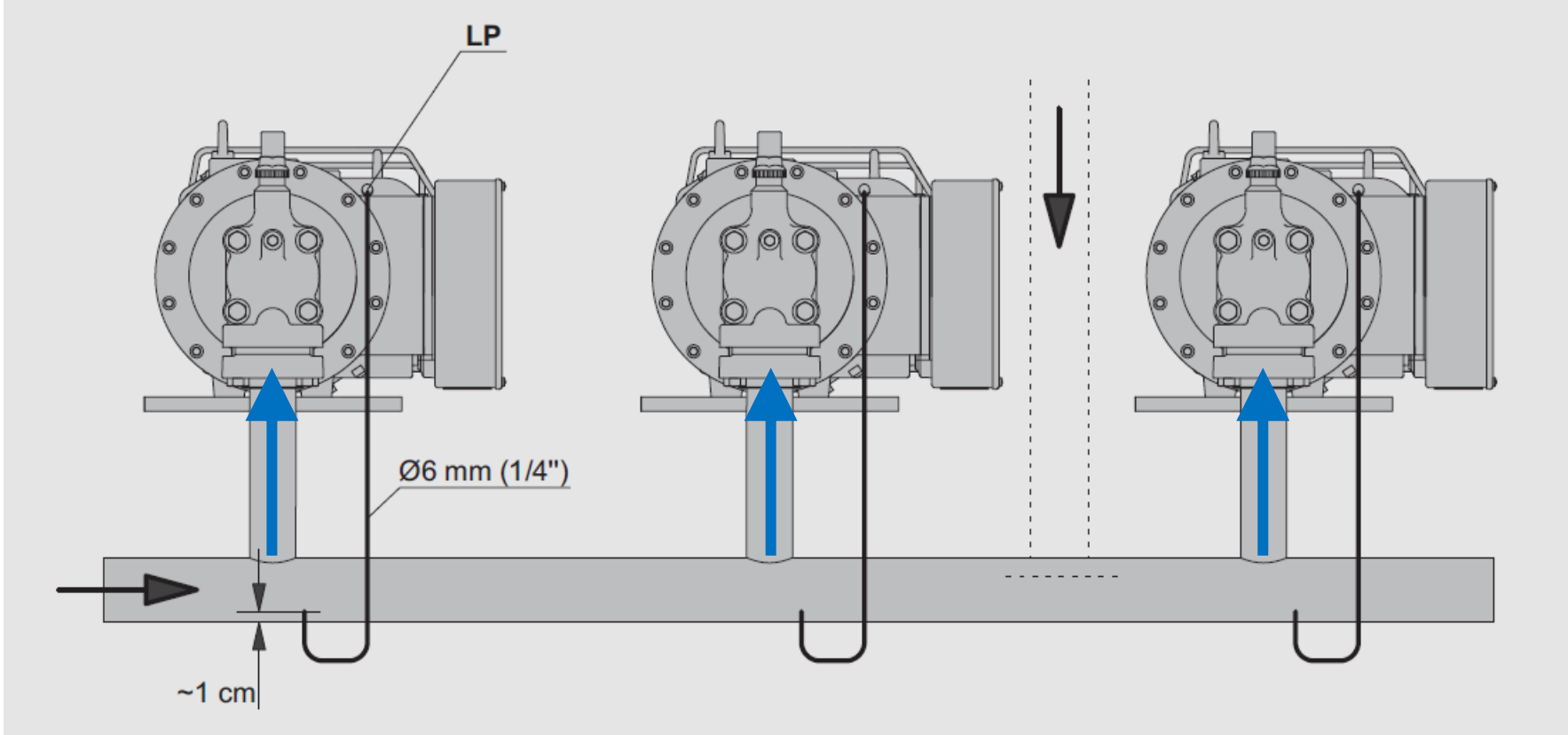
Not Allowable For Parallel Compound ←

21 / Discharge & Oil Headers



Oil Header Sizing ←

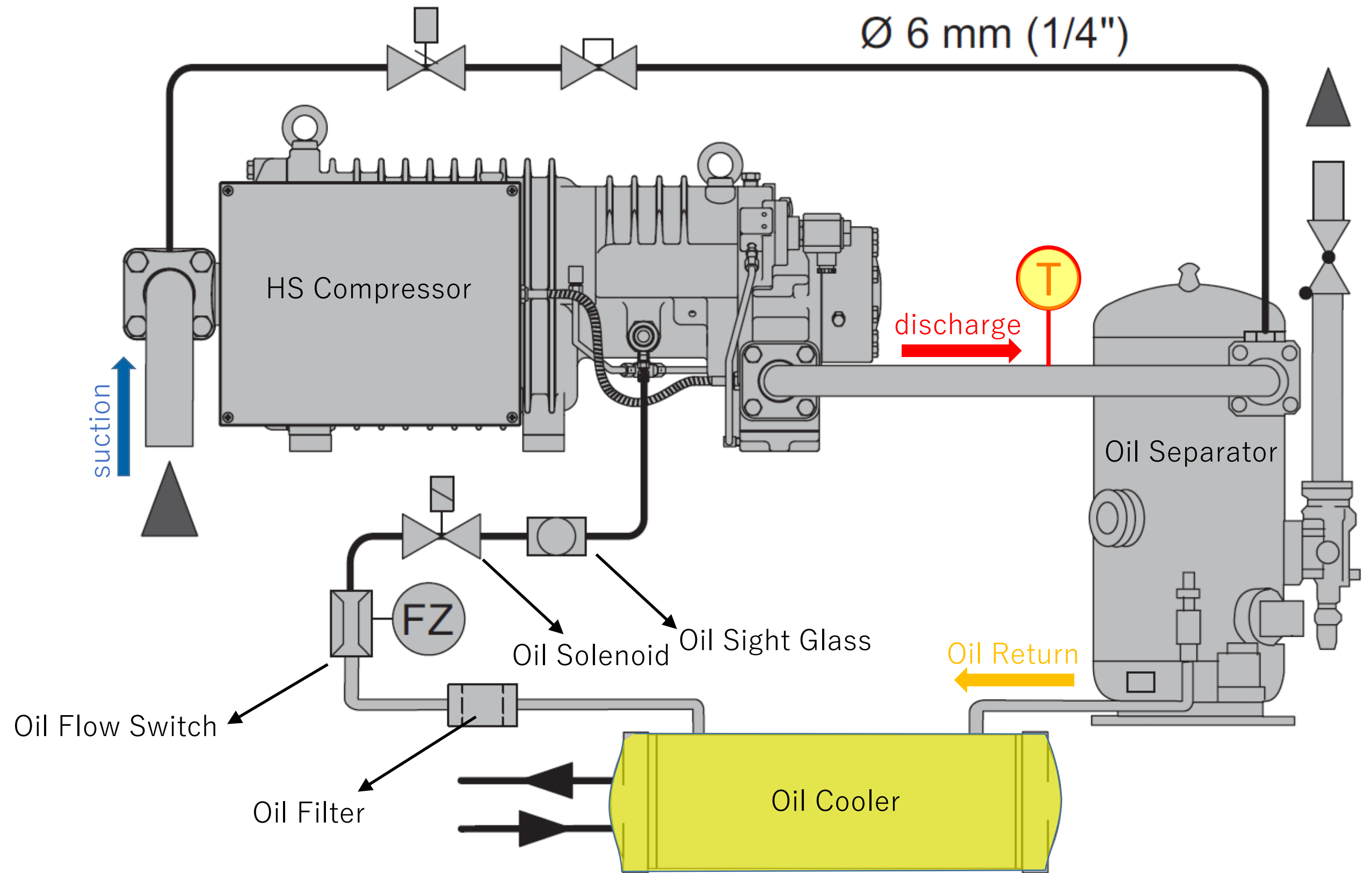
22 / Suction Header



23 / Oil Cooler

➤ Where to use the oil cooler ?

- ❑ Oil Cooler is mandatory where discharge temperature can exceed 80 C.



24 / Capacity of Oil Cooler

Based on most extreme possible condition

Discharge Gas Temperature with Oil Cooling

Parameter	Value
Compressor	HSN8561-110-40P
Capacity steps	100%
Cooling capacity	49.5 kW
Cooling capacity *	49.5 kW
Evaporator capacity	49.5 kW
Power input	87.0 kW
Current (400V)	143.9 A
Voltage range	380-415V
Condenser capacity	90.3 kW
COP/EER	0.57
COP/EER *	0.57
Mass flow LP	2215 kg/h
Mass flow HP	2215 kg/h
Operating mode	Standard
Liquid temp.	49.7 °C
Oil volume flow	2.80 m ³ /h
Cooling method	External
Oil cooler outlet	47.9 °C
Oil cooler load	46.2 kW
Discharge gas temp. w/o cooling	143.9 °C

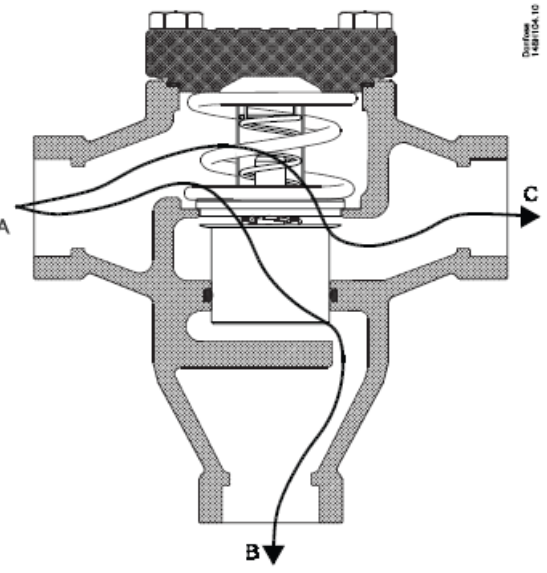
Oil cooler Capacity

Discharge Gas Temperature without Oil Cooling

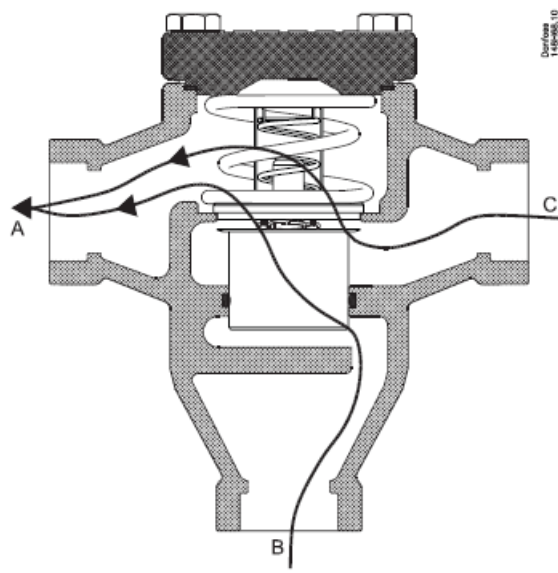
25 / Oil Regulating Valve

➤ Where to use the oil mixing valve ?

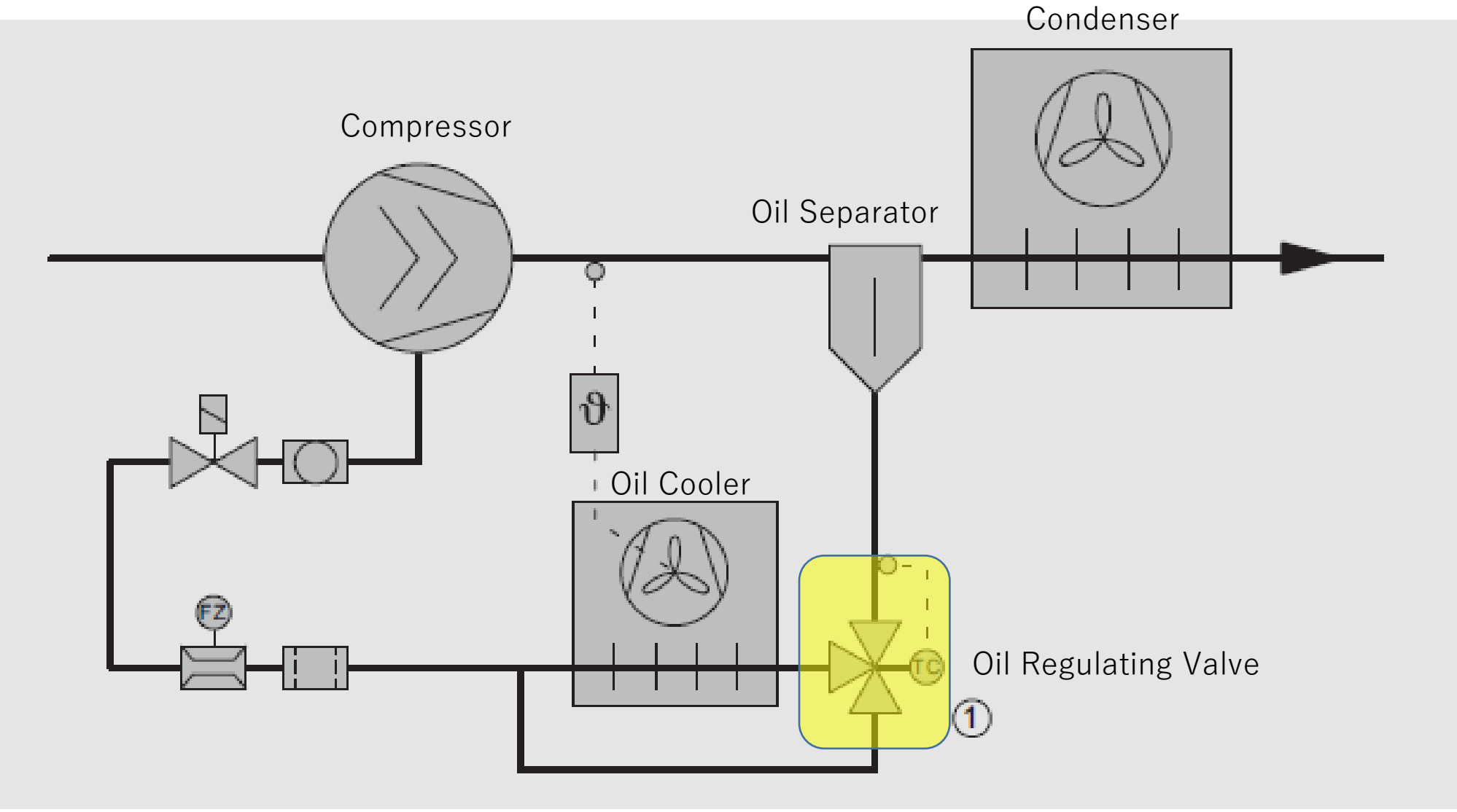
- 1. (Oil cooler + Oil line) volume > 25 (L)
- 2. Oil temperature can drop below 20 C in long standstills.



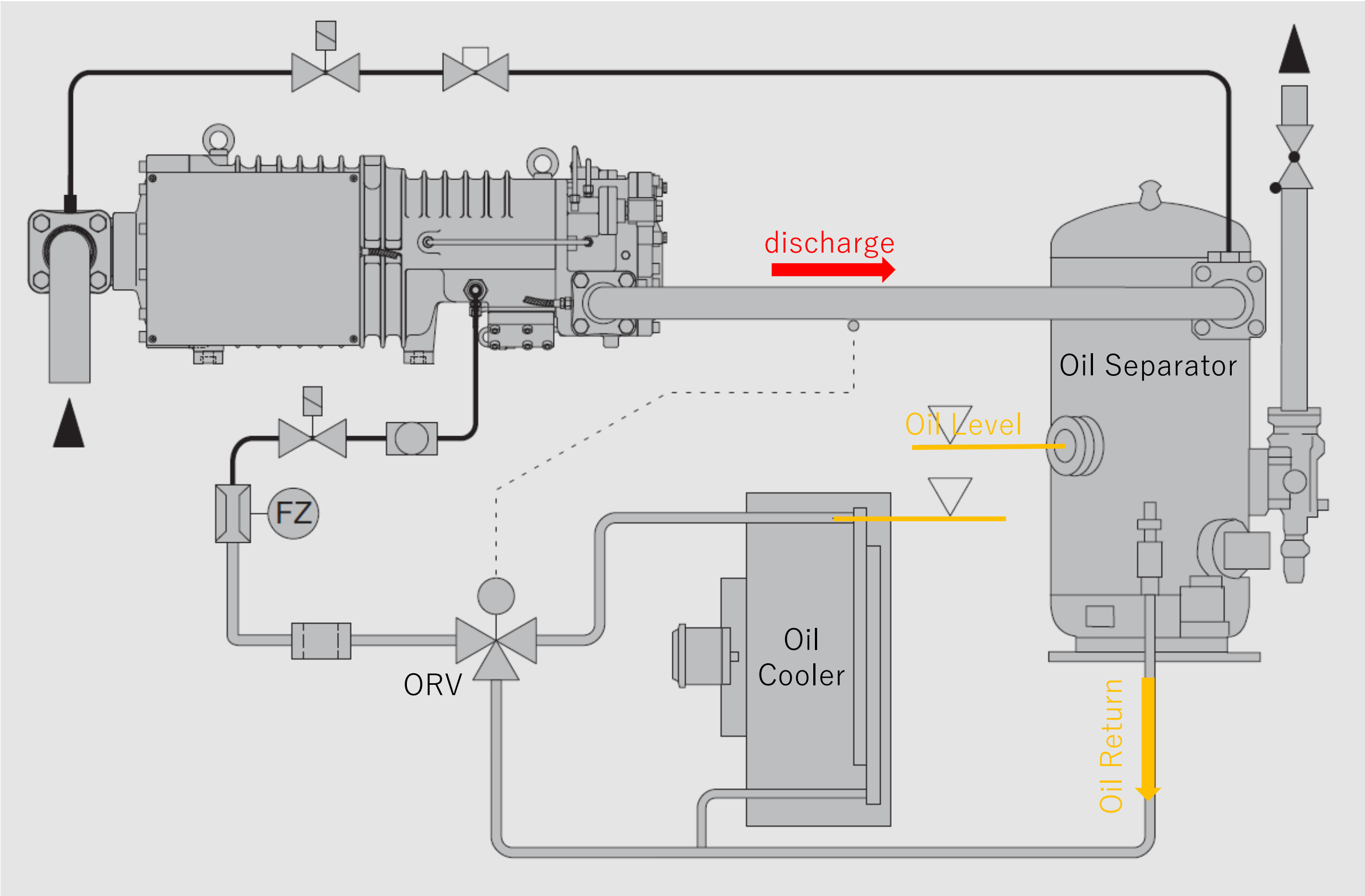
Diverting Operation



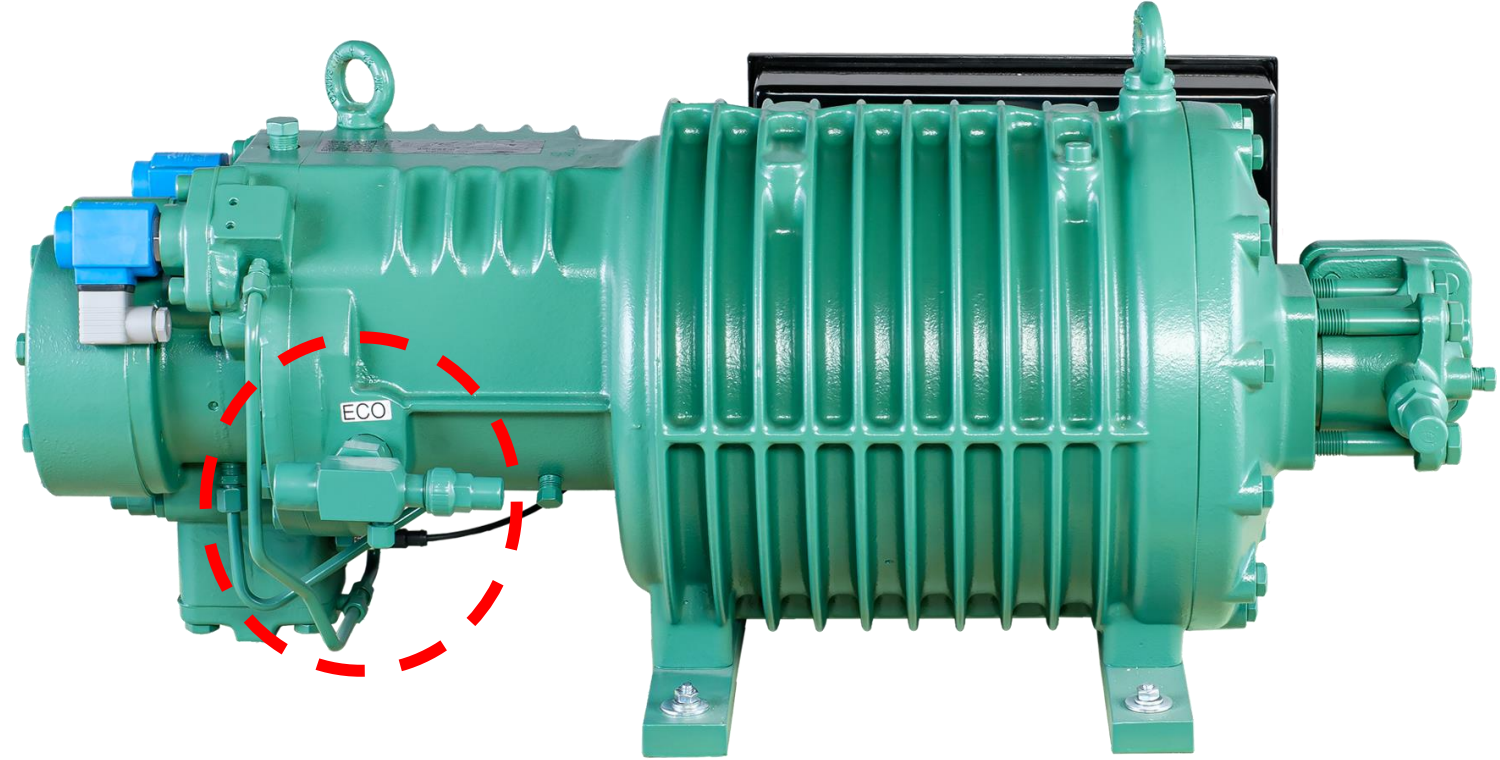
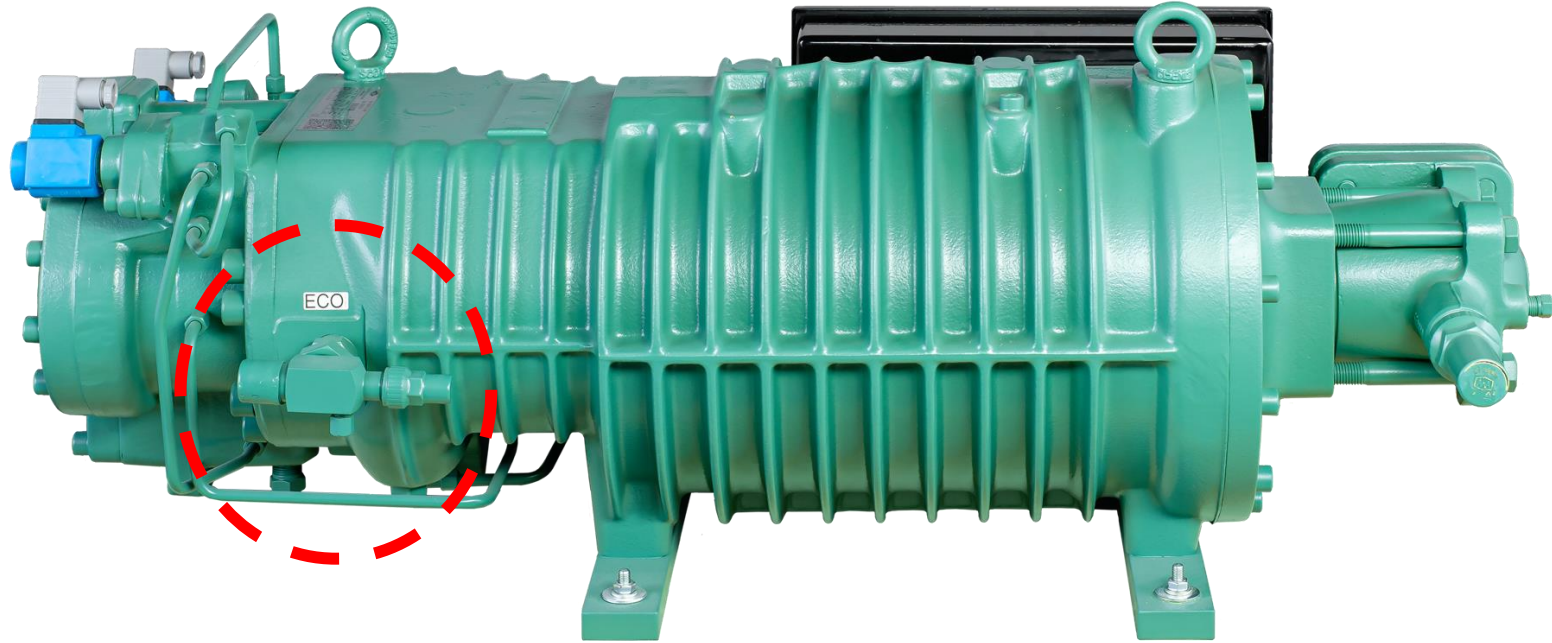
Mixing Operation



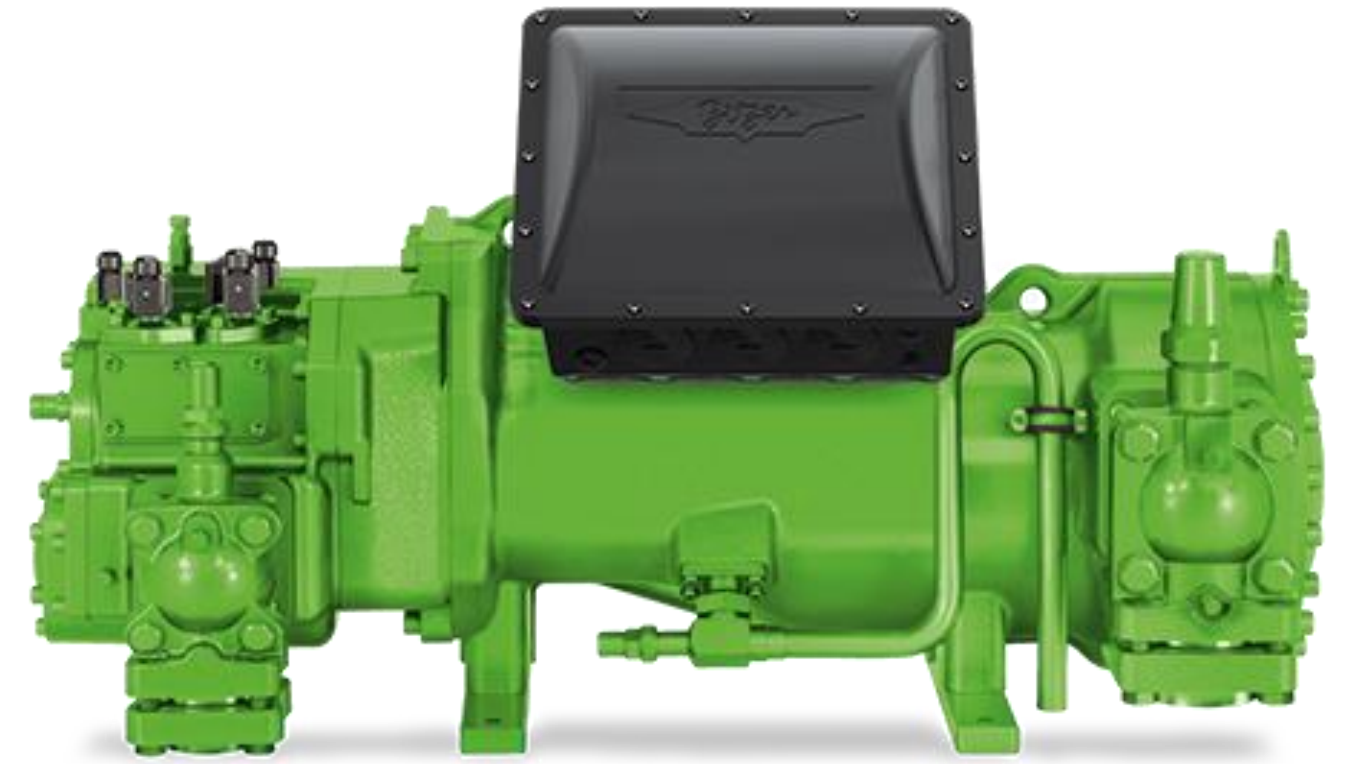
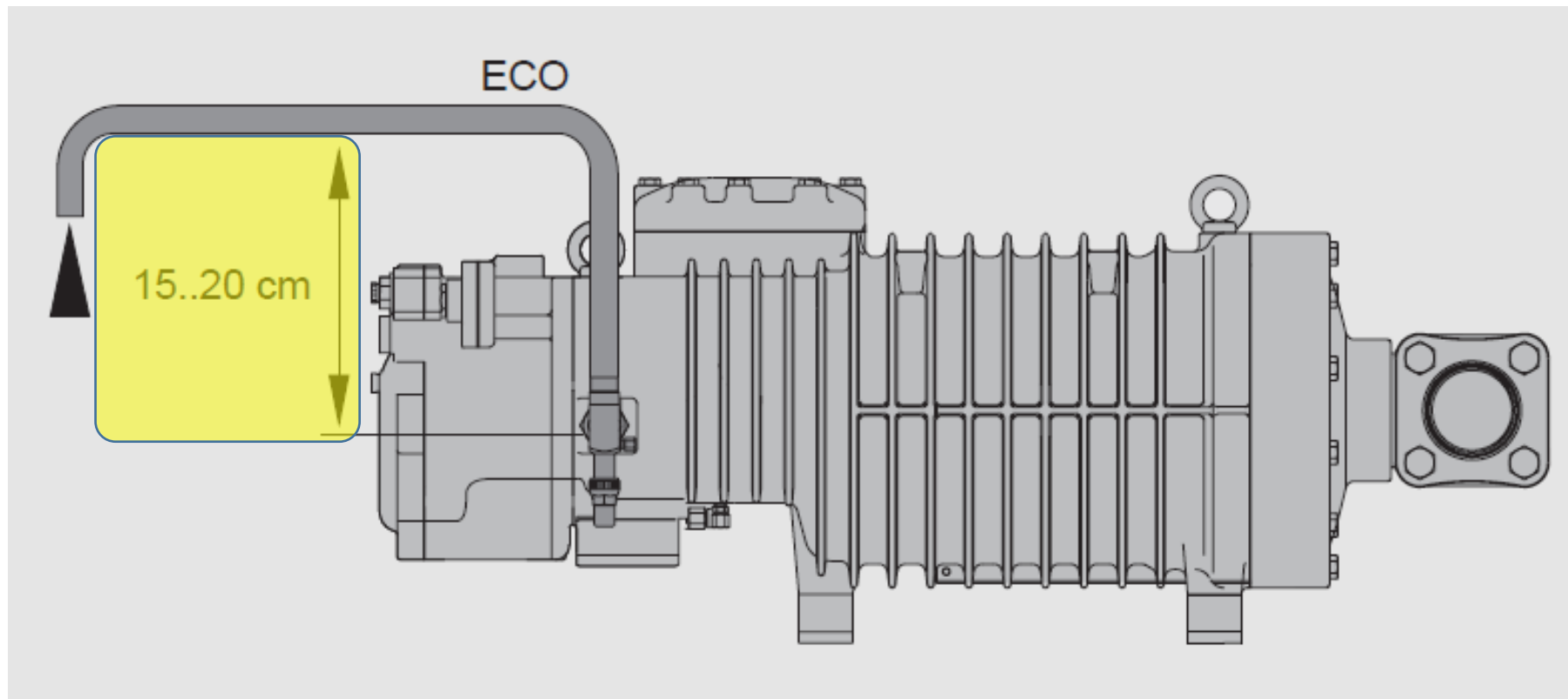
26 / Oil Cooler Placement



27 / Economizer Operation



28 / Economizer Piping

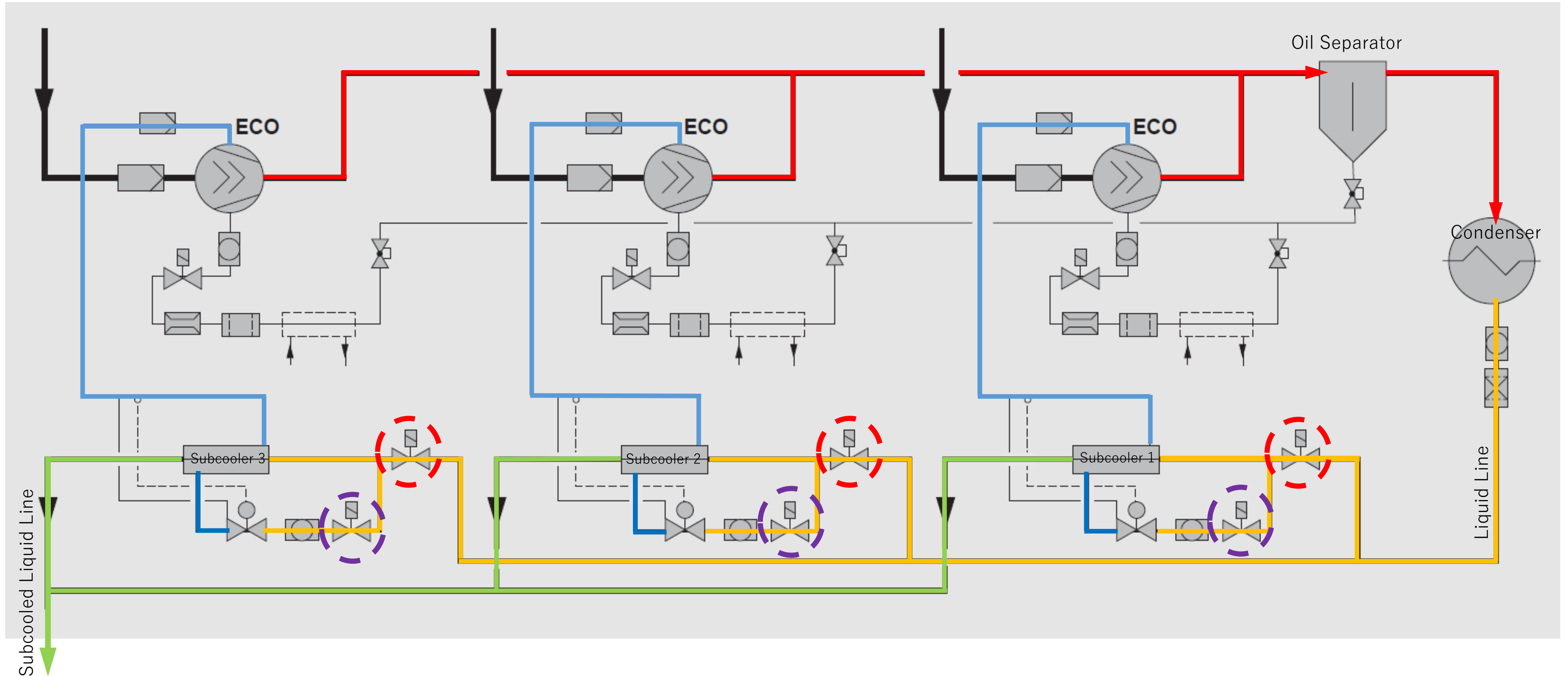


OS. 53.. Ø 18 mm (3/4")
OS./HS. 64..74 Ø 22 mm (7/8")

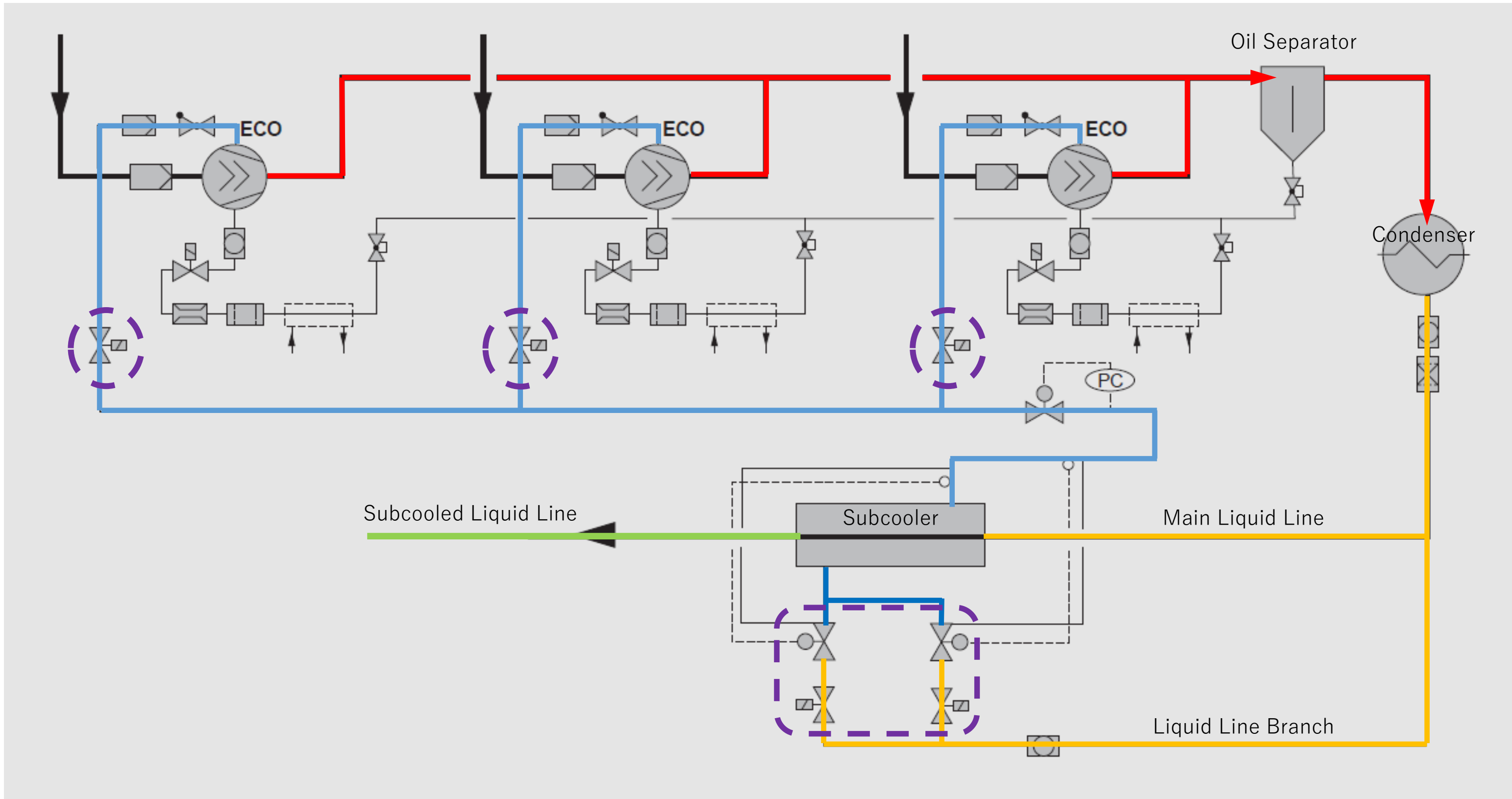
ECO piping Tube
In HS.85 Package



29 / Economizer in Parallel Compound – Separate Subcooler



30 / Economizer in Parallel Compound – Common Subcooler



/ 4. Oil in HS compressors

32 / Oil in HS

- In contrast to CS compressors, HS compressors are **delivered without oil charge**.
- Oil should be charged into the **oil separator** instead of compressor. (before evacuation)
- Bitzer recommend using its efficient oil separators (OA series)



OLC-D1 as Oil Level Switch



33 / OA Selection

Model	Max Oil Charge (L)	Total Volume (L)	Max No. of Compressors			
			HS.53	HS.64	HS.74	HS.85
OA1954	18	40	2	1	1	
OA4188	40	88	5	4	2	1
OA9111	90	228		6	5	3
OA14111	140	395			6	4
OA25112	250	655			6	6



Selection by Bitzer Software

34 / Oil Types

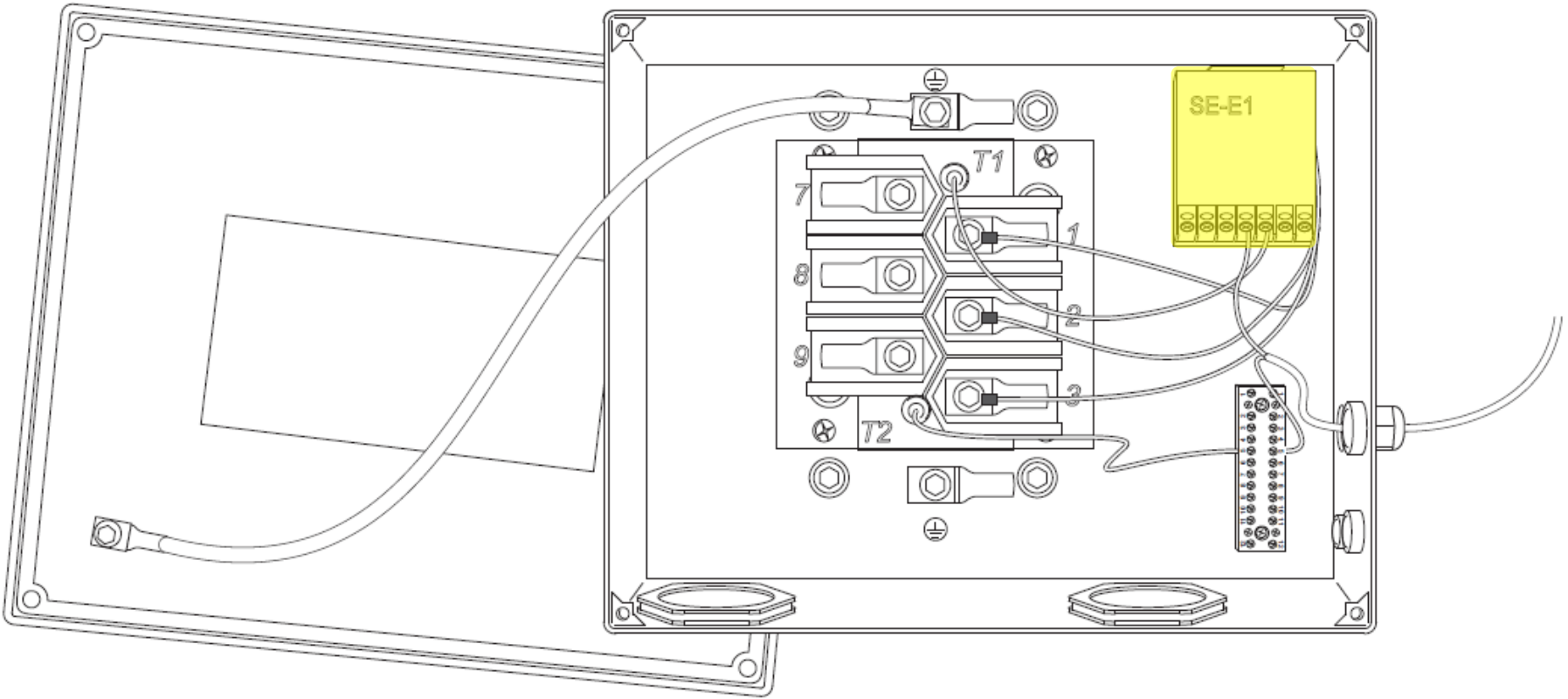
HS oils {
 BSE170 For HFC Refrigerants
 B150SH For R22
 B100



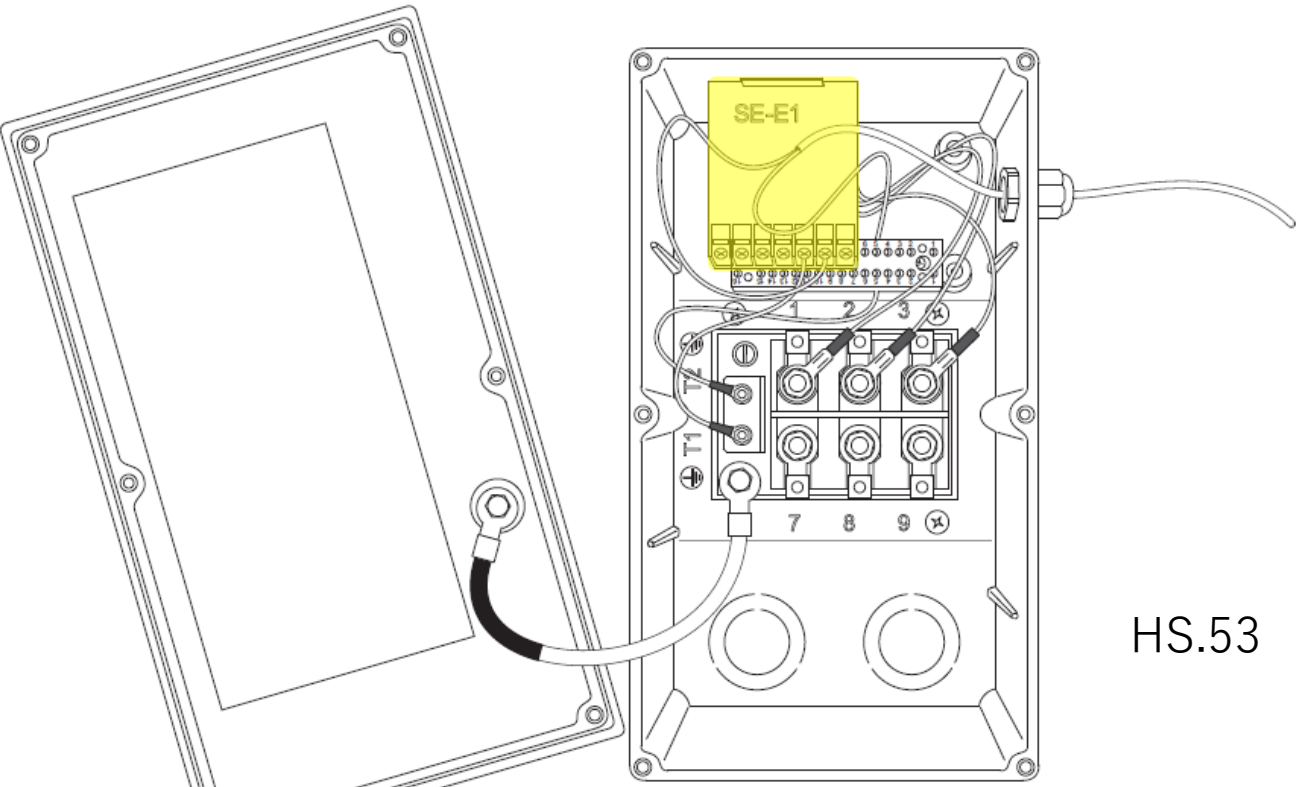
Oil type BITZER	Viscosity cSt/40°C	Refrigerant	Condensing °C	Evaporating °C	Discharge gas temp. °C	Oil injection temp. °C
BSE170	170	R134a	.. 70	+20 .. -20	~60 .. max. 100	max. 100
		R404A / R507A	.. 55	+7,5 .. -50		
		R407C	.. 60	+12,5 .. -20		
B100	100	R22	.. 45 (55)	-5 .. -50		max. 80
B150SH	150	R22	.. 60	+12,5 .. -40		max. 100

/ 5. Protection Devices for HS compressors

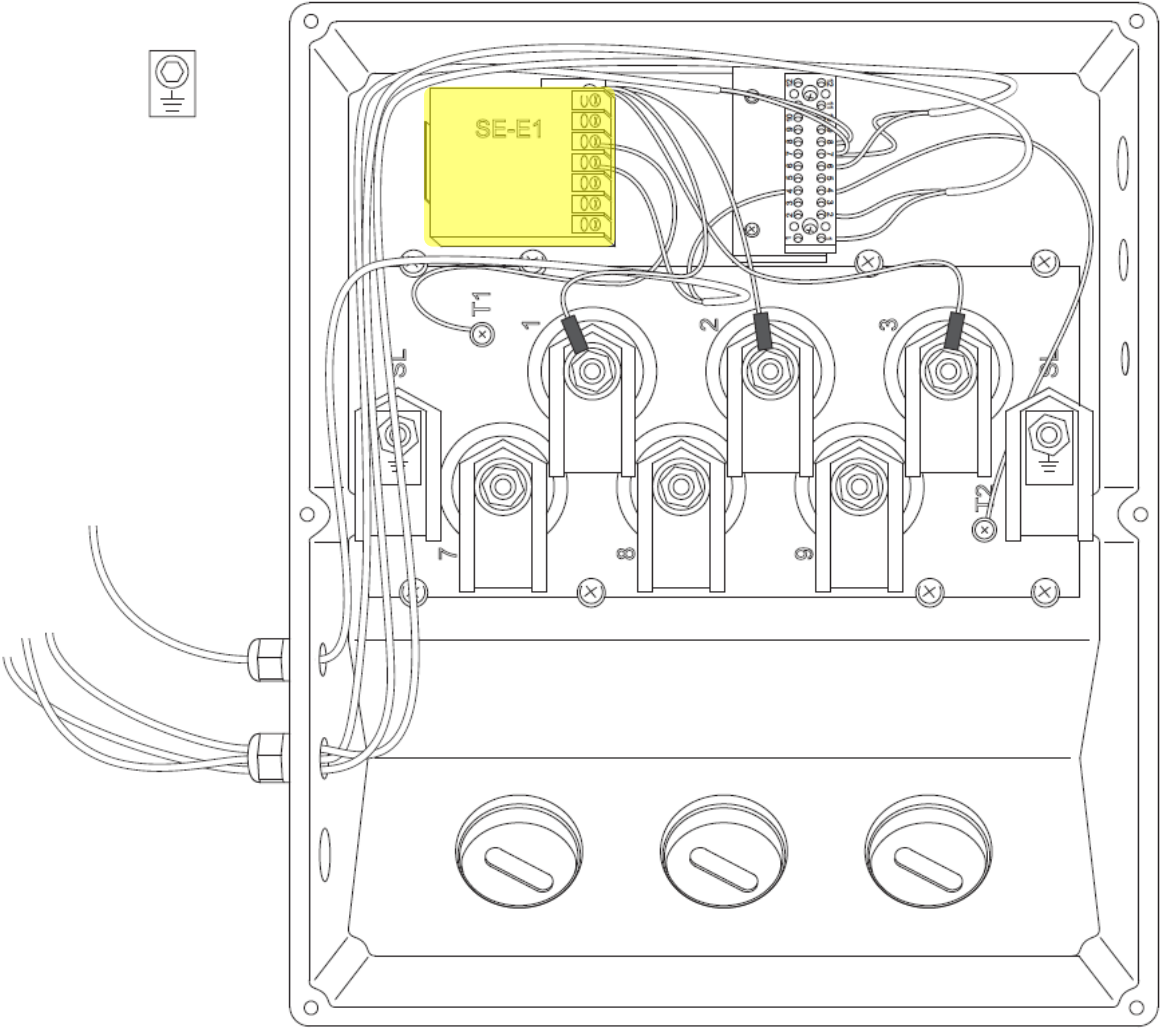
36 / Inside Terminal Box



HS.64 & HS.74



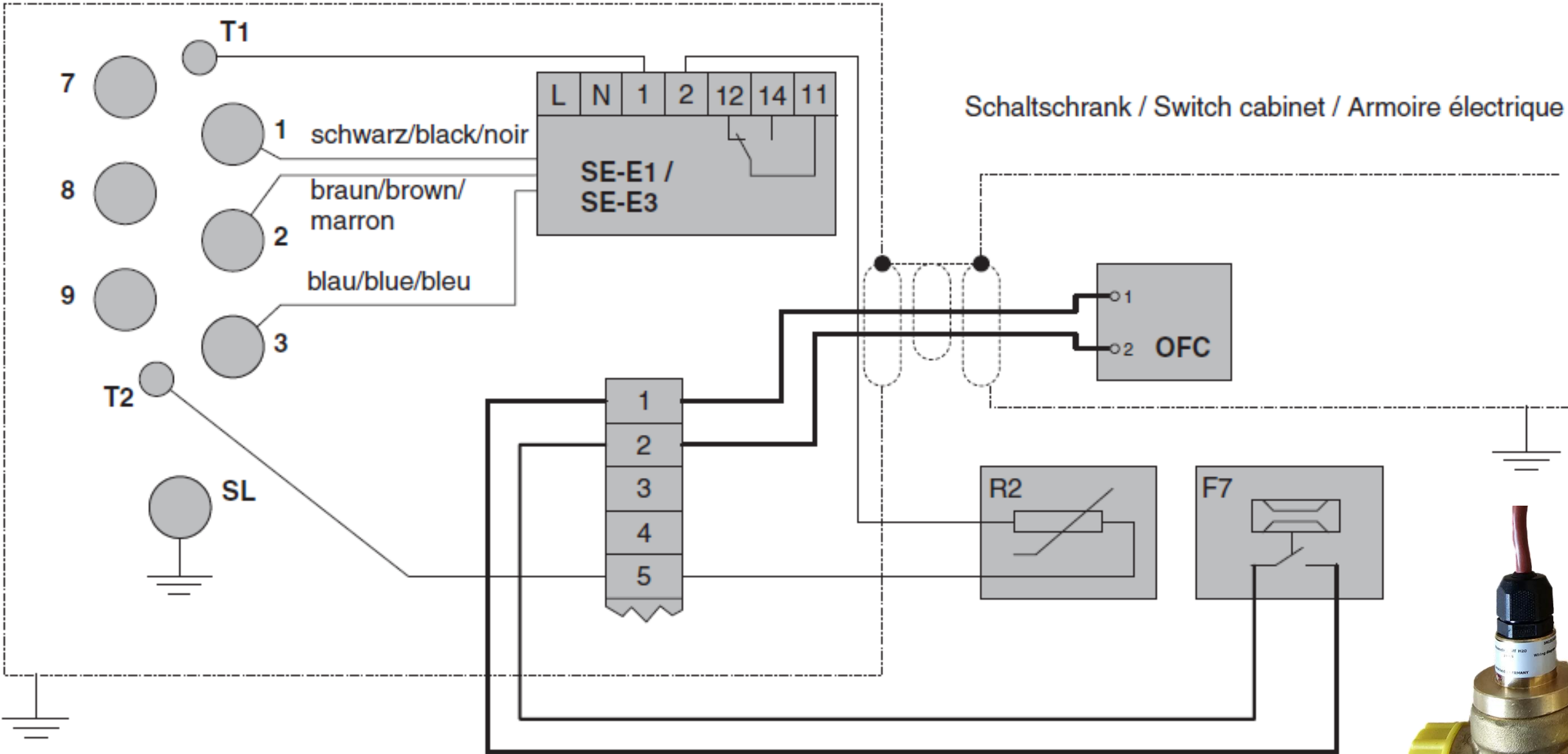
HS.53



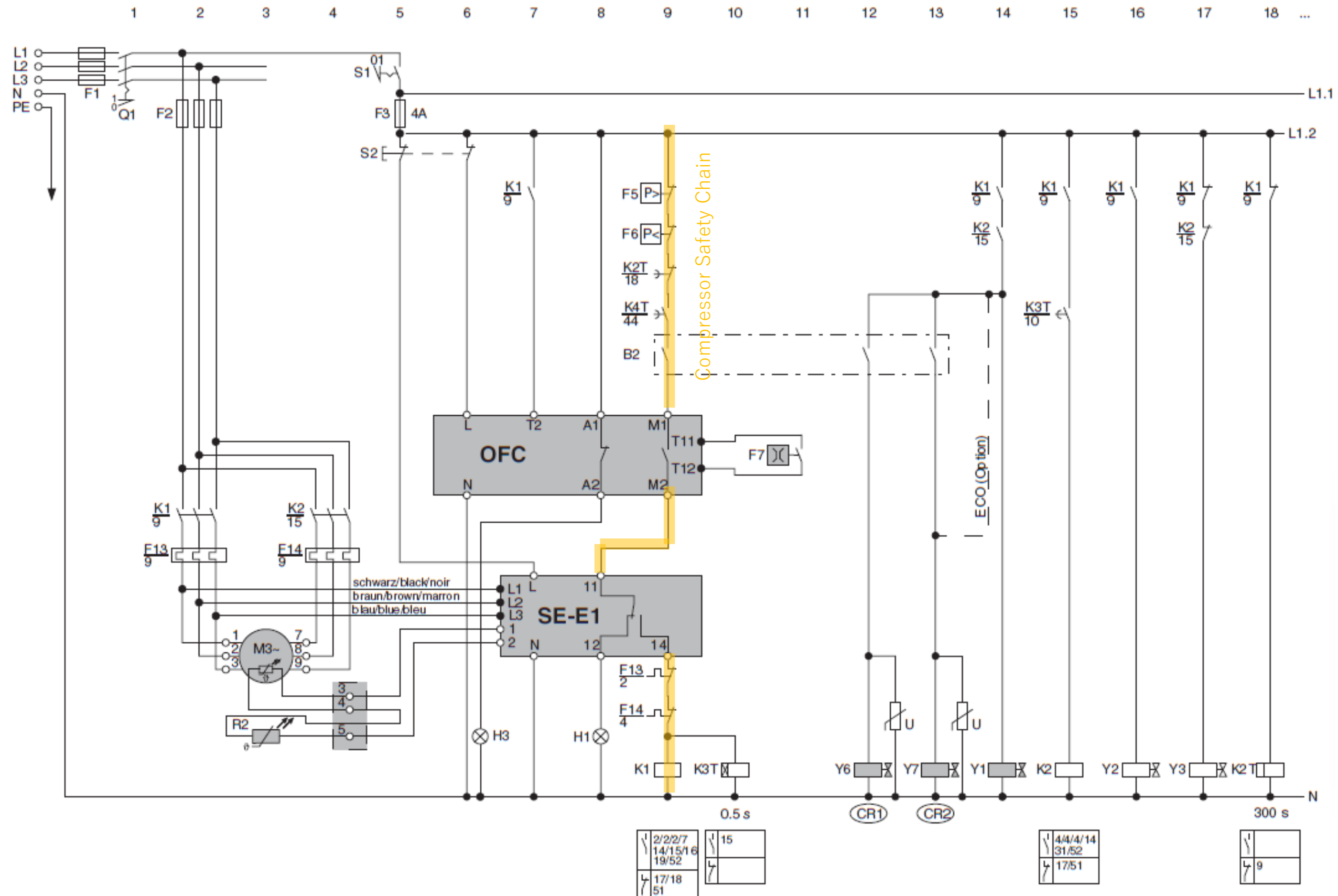
HS.85

37 / HS.53 & HS.64 & HS.74

Anschlusskasten / Terminal box / Boîte de raccordement

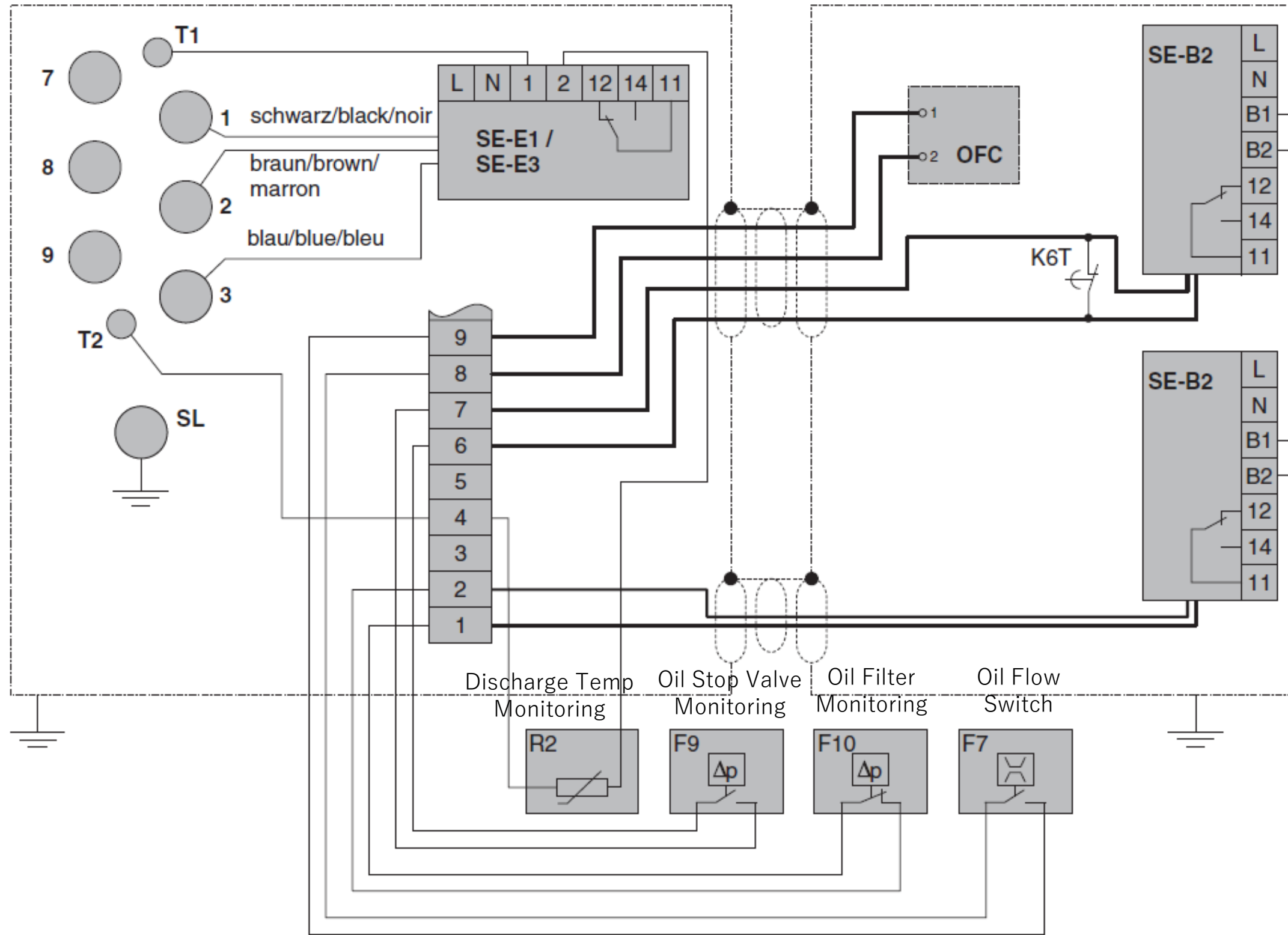


38 / Wiring Diagram For HS.53 & HS.64 & HS.74



Anschlusskasten / Terminal box / Boîte de raccordement

Schaltschrank / Switch cabinet / Armoire électrique



/ 6. HS compressors in Bitzer Software

41 / Compressor Selection - single

- 1
- 2
- 3

U.S.A.
English
SI

Semi-hermetic Screw Compressors HS

Series: all

Refrigerant: R404A

Reference temperature: Dew point temp.

Compressor selection

Cooling capacity: 100 kW

Compressor model

Operating point

Evaporating SST: -40 °C

Condensing SDT: 45 °C

Operating conditions

with Economiser

Liq. subc. (in condenser): 0 K

Auto. subcooling: []

Suct. gas superheat: 10 K

Useful superheat: 100 %

Additional cooling: Automatic

Max. discharge gas temp.: Auto

Capacity control: without

External FI: 0 Hz

Power supply: 50Hz, Standard (400V)

Show Overview

Result Limits Technical Data Dimensions Information Documentation Trainings

Additional cooling/ Limitations (see Limits!)
*According to EN12900 (10K suction gas superheat, liquid subcooling in Economiser with 5K temperature difference)

Compressor	HSN8571-125-40P	HSN8591-160-40P
Capacity steps	100%	100%
Cooling capacity	82.8 kW	102.5 kW
Cooling capacity *	85.2 kW	105.9 kW
Evaporator capacity	82.8 kW	102.5 kW
Power input	92.2 kW	122.7 kW
Current (400V)	154.5 A	202 A
Voltage range	380-415V	380-415V
Condenser capacity	144.8 kW	179.0 kW
COP/EER	0.90	0.84
COP/EER *	0.91	0.85
Mass flow LP	2080 kg/h	2687 kg/h
Mass flow HP	3272 kg/h	4046 kg/h
Operating mode	Economiser	Economiser
Liquid temp. (sc)	5.62 °C	9.76 °C
Mass flow ECO	1193 kg/h	1359 kg/h
sub cooler load	34.7 kW	40.4 kW
sat. ECO Temp.	-4.38 °C	-0.24 °C
ECO pressure	5.25 bar(a)	6.00 bar(a)
Oil volume flow	2.68 m³/h	4.20 m³/h
Cooling method	External	External
Oil cooler outlet	58.9 °C	58.6 °C
Oil cooler load	29.1 kW	46.3 kW
Discharge gas temp. w/o cooling	107.5 °C	115.6 °C

Cooling Capacity

Subcooler Capacity

Oil Cooler Capacity

42 / Compressor Selection - Parallel

1

2

A				
	Qe	Pe	EER	Ratio
	kW	kW	W/W	%
Total	193.8	299	0.65	-
HSN8591-160-40P	64.6	99.5	0.65	33.3
HSN8591-160-40P	64.6	99.5	0.65	33.3
HSN8591-160-40P	64.6	99.5	0.65	33.3

→ Total Capacity

43 / Oil Separator Selection

1

Oil cooler, air cooled	HSN8591-160	Auto	
<input type="checkbox"/>	HSN8591-160	Auto	
<input type="checkbox"/>	HSN8591-160	Auto	
<input checked="" type="checkbox"/> Oil separator, vertical	HSN8591-160	Auto	OA9111 2
<input checked="" type="checkbox"/>	HSN8591-160	Auto	
<input type="checkbox"/>	HSN8591-160	Auto	

2

Result Technical Data Dimensions Information Documentation Trainings

#1: Selection for direct expansion systems. Flooded systems require individual selection.

Compressor:	(all)
Recommendation:	OA9111
Selection:	OA9111
Recommended operating point:	A
Selected operating point:	A
Quantity:	1
Max. HP mass flow:	9834 kg/h
Mass flow load:	81.96 %
Max. oil volume flow:	13.50 m ³ /h
Oil volume flow load:	93.33 %

Oil Separator Model

Thank You!

Office: No 189, Qaedi St, North Saadi St, Tehran, Iran.

Factory: Kharazmi Industrial Town, Imam Reza Hwy, Semnan, Iran.

Phone: 75092 | info@asehtejaratasia.co | www.asehtejaratasia.co

