

HOT GAS DEFROST PIPING DIAGRAMS

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1. INTRODUCTION

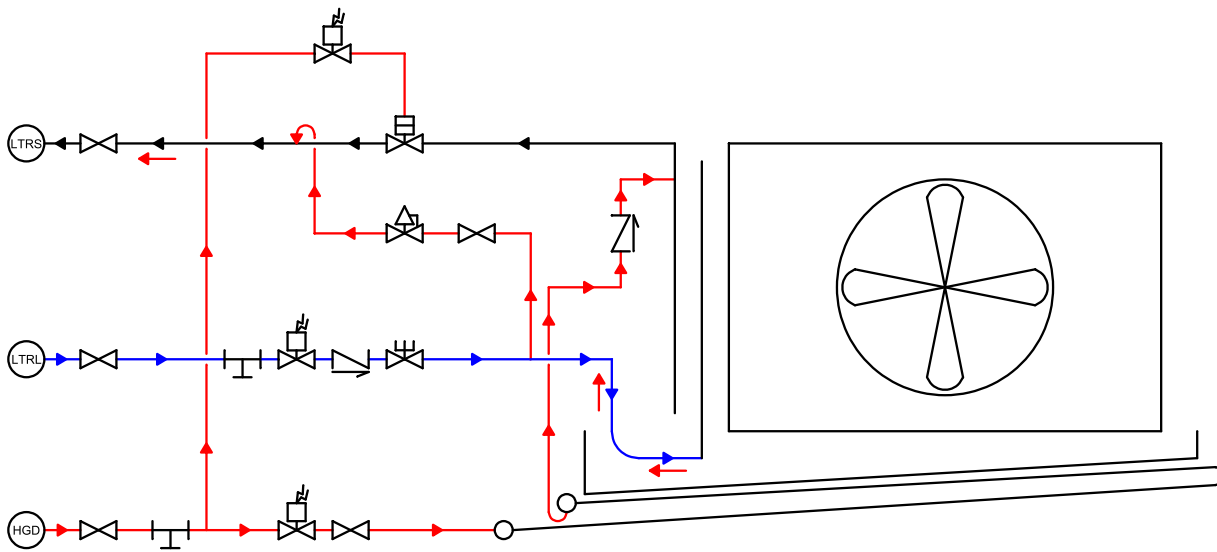
- 1.1. This document reviews standard hot gas defrost piping diagrams for recirculated, controlled pressure receiver (CPR), direct expansion and gravity flooded evaporator systems.














2. RECIRCULATED SYSTEMS

2.1. Figure 1: Bottom Feed, 3-Pipe, Vertical Headers

FIGURE 1

Recirculated Bottom Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

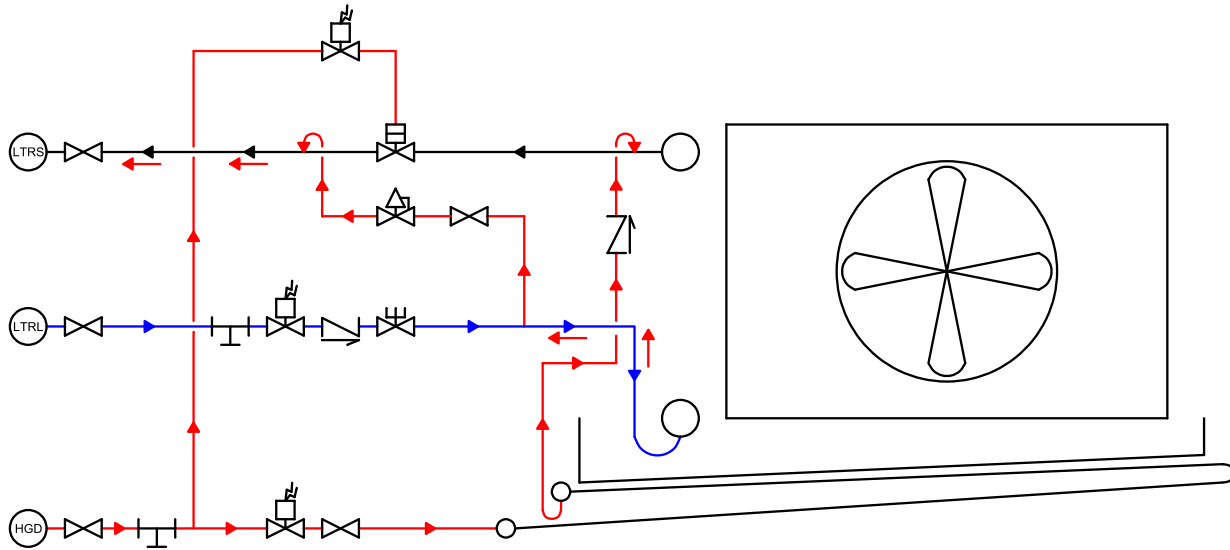















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

2.2. Figure 2: Bottom Feed, 3-Pipe, Horizontal Headers

FIGURE 2

Recirculated Bottom Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop

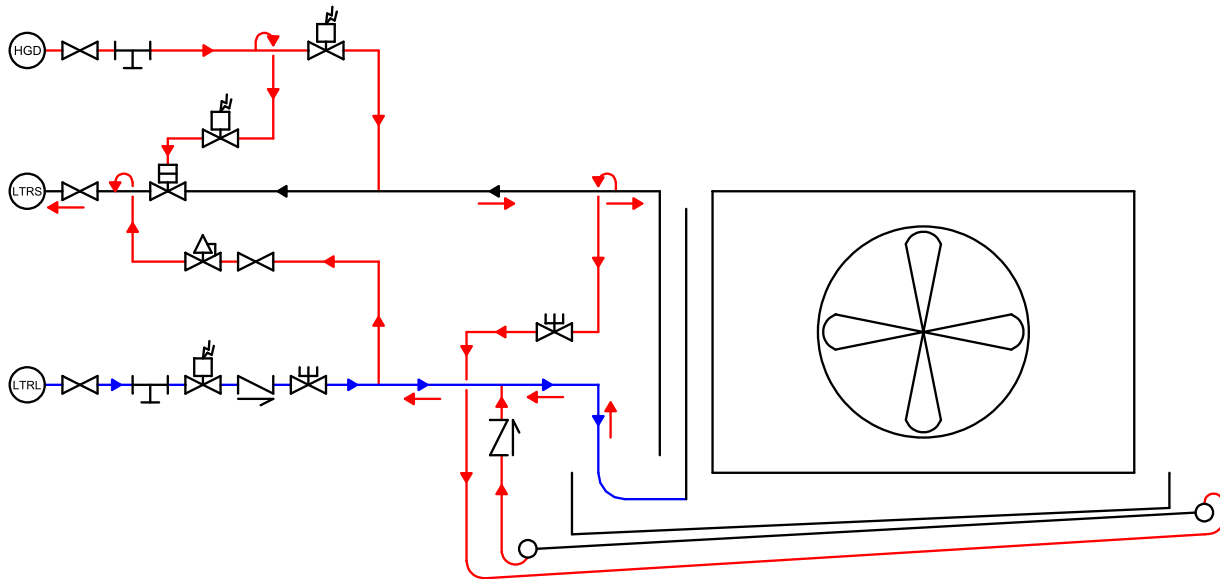















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

2.3. Figure 3: Bottom Feed, 2-Pipe, Vertical Headers

FIGURE 3

Recirculated Bottom Feed
2-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

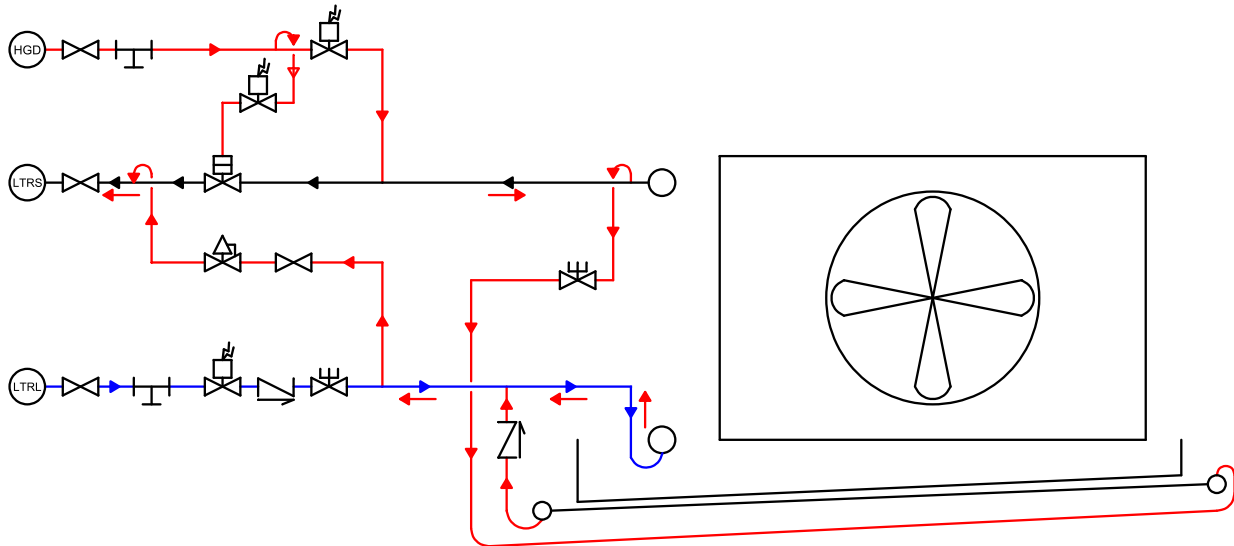















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	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

2.4. Figure 4: Bottom Feed, 2-Pipe, Horizontal Headers

FIGURE 4

Recirculated Bottom Feed
2-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop



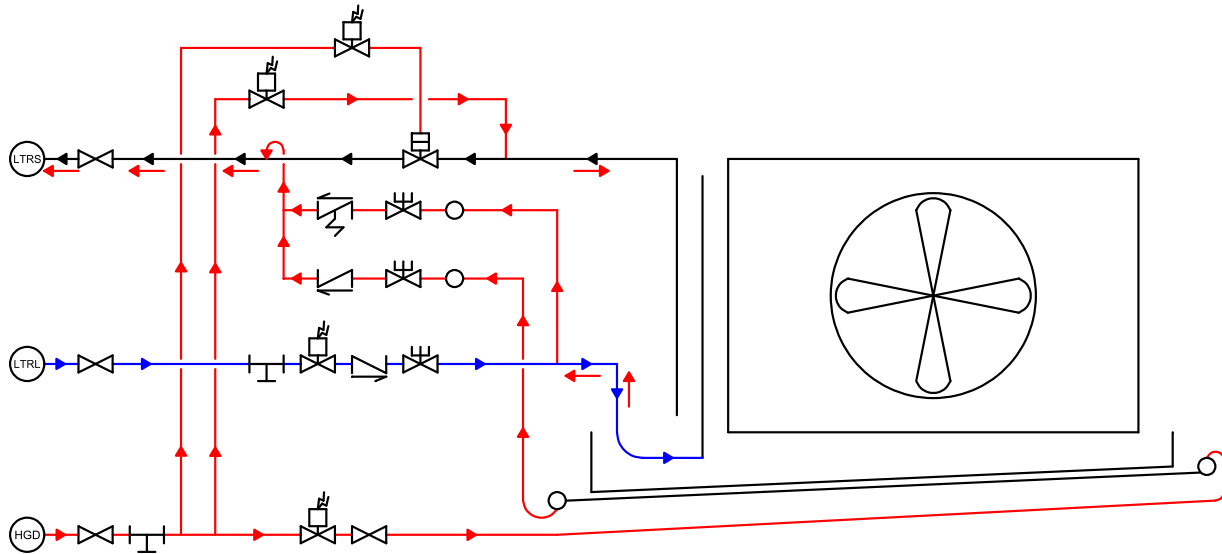
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	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		















NOTE: LIQUID OVERFEED ORIFICES ARE REQUIRED!

2.5. Figure 5: Bottom Feed, 4-Pipe, Vertical Headers

FIGURE 5

Recirculated Bottom Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

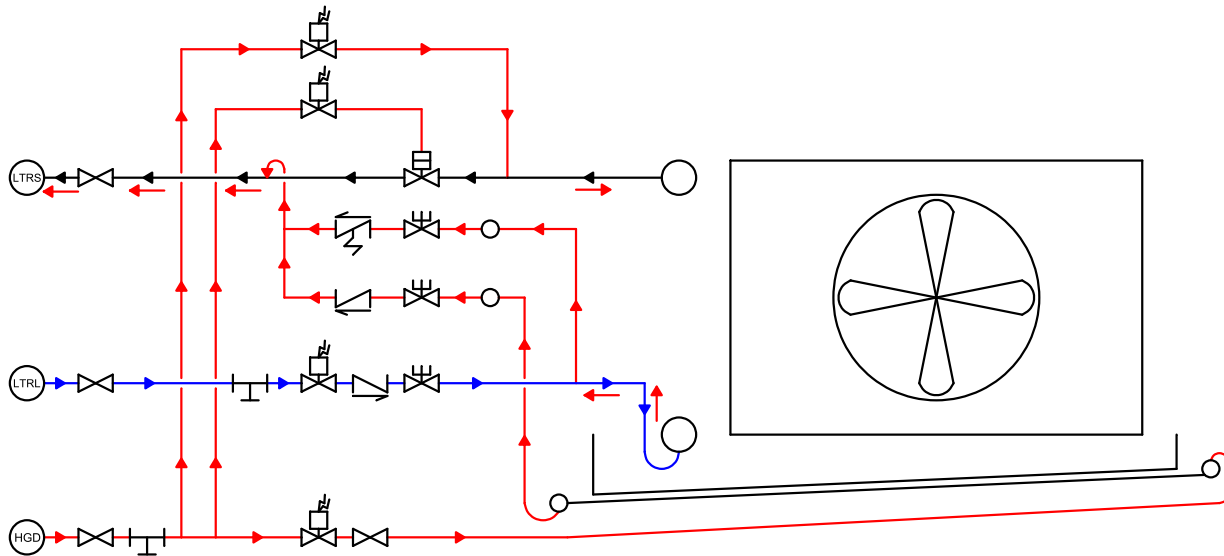
















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	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	SPRING LOADED CHECK VALVE		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		
	SIGHT GLASS		

2.6. Figure 6: Bottom Feed, 4-Pipe, Horizontal Headers

FIGURE 6

Recirculated Bottom Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop

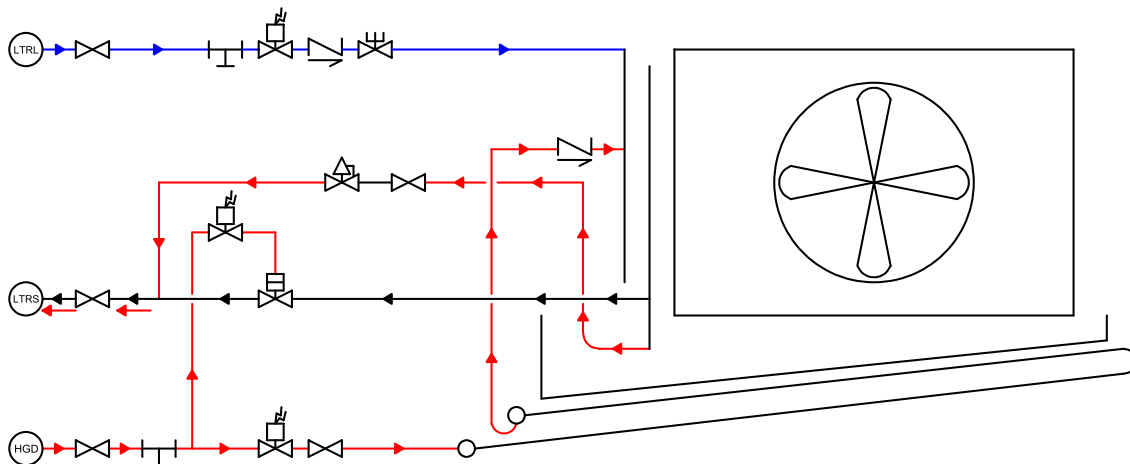















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	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	SPRING LOADED CHECK VALVE		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		
	SIGHT GLASS		

2.7. Figure 7: Top Feed, 3-Pipe, Vertical Headers

FIGURE 7

Recirculated Top Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

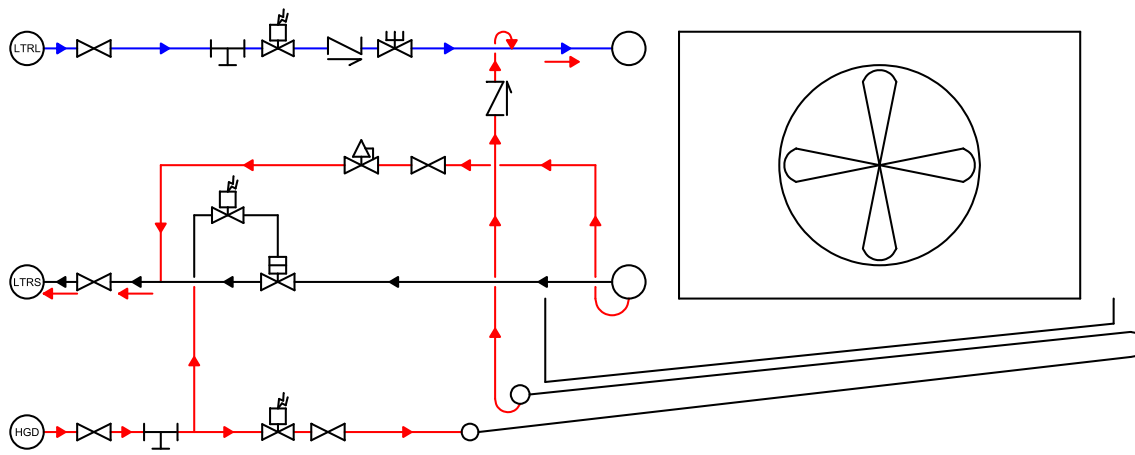















- | | | | |
|---|--------------------------------|---|-------------------------------|
|  | STRAINER |  | HOT GAS DEFROST SUPPLY |
|  | CHECK VALVE |  | LOW-TEMP RECIRCULATED SUCTION |
|  | GLOBE VALVE |  | LOW-TEMP RECIRCULATED LIQUID |
|  | SOLENOID VALVE |  | HOT GAS FLOW |
|  | DEFROST PRESSURE REGULATOR |  | SATURATED LIQUID FLOW |
|  | GAS POWERED SUCTION STOP VALVE |  | SATURATED LIQUID & VAPOR FLOW |
|  | HAND EXPANSION VALVE | | |

2.8. Figure 8: Top Feed, 3-Pipe, Horizontal Headers

FIGURE 8

Recirculated Top Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop

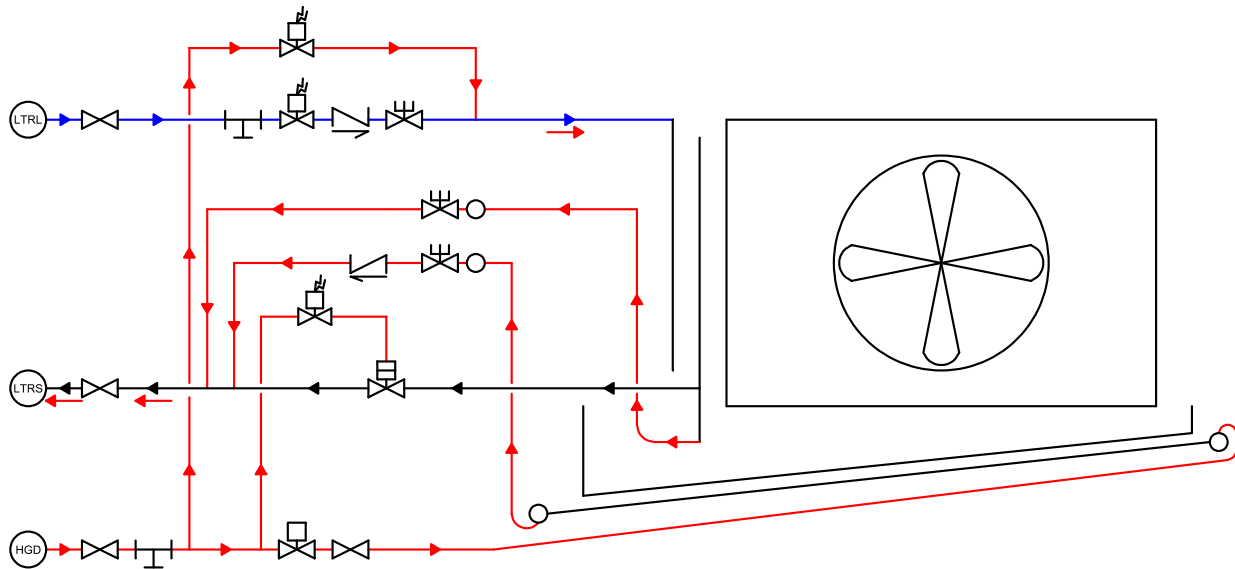















- | | | | |
|---|--------------------------------|---|-------------------------------|
|  | STRAINER |  | HOT GAS DEFROST SUPPLY |
|  | CHECK VALVE |  | LOW-TEMP RECIRCULATED SUCTION |
|  | GLOBE VALVE |  | LOW-TEMP RECIRCULATED LIQUID |
|  | SOLENOID VALVE |  | HOT GAS FLOW |
|  | DEFROST PRESSURE REGULATOR |  | SATURATED LIQUID FLOW |
|  | GAS POWERED SUCTION STOP VALVE |  | SATURATED LIQUID & VAPOR FLOW |
|  | HAND EXPANSION VALVE | | |

2.9. Figure 9: Top Feed, 4-Pipe, Vertical Headers

FIGURE 9

Recirculated Top Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

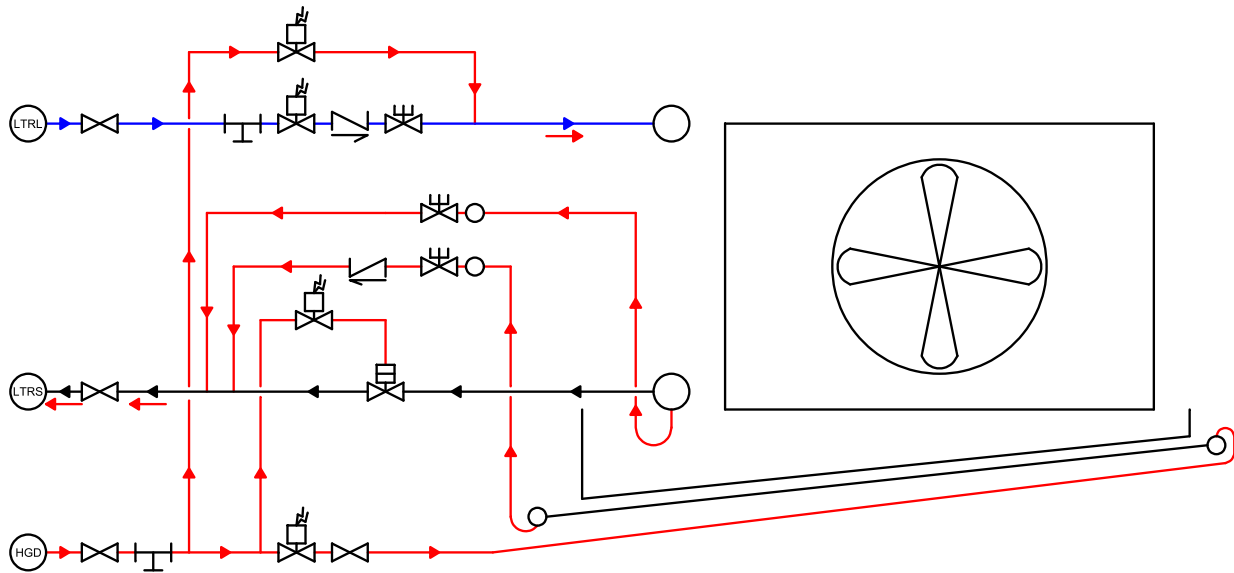















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	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID FLOW
	HAND EXPANSION VALVE		SATURATED LIQUID & VAPOR FLOW
	SIGHT GLASS		

2.10. Figure 10: Top Feed, 4-Pipe, Horizontal Headers

FIGURE 10

Recirculated Top Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop



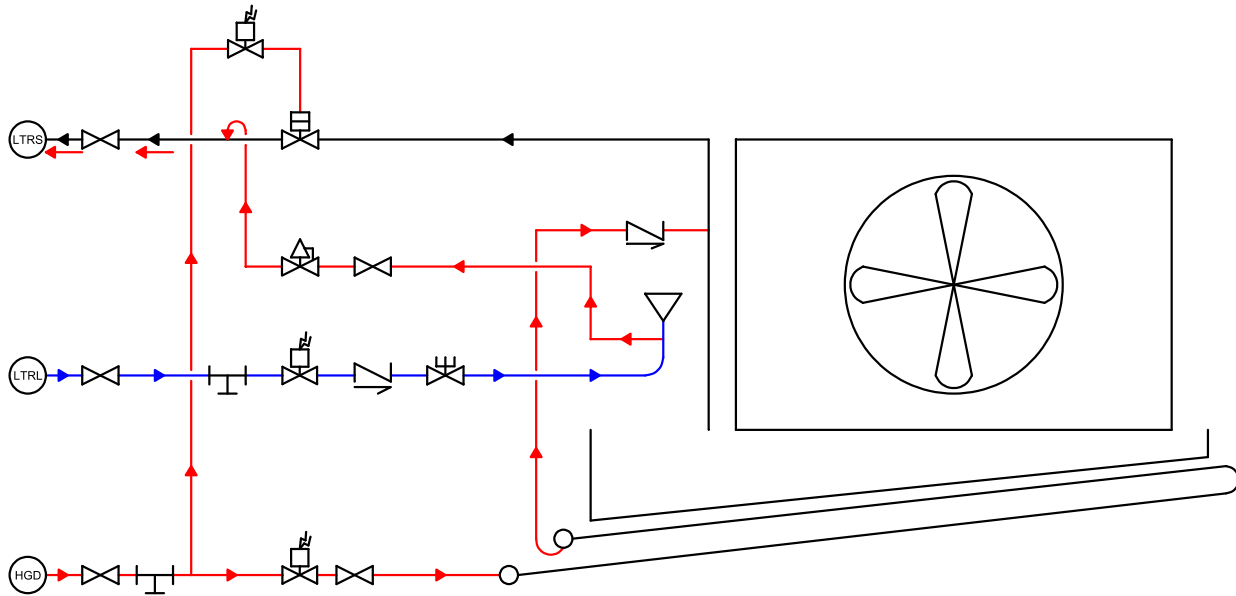
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	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID FLOW
	HAND EXPANSION VALVE		SATURATED LIQUID & VAPOR FLOW
	SIGHT GLASS		














3. CONTROLLED PRESSURE RECEIVER (CPR)

3.1. Figure 11: Bottom Feed, 3-Pipe, Vertical Headers

FIGURE 11

Controlled Pressure Receiver (CPR) Bottom Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

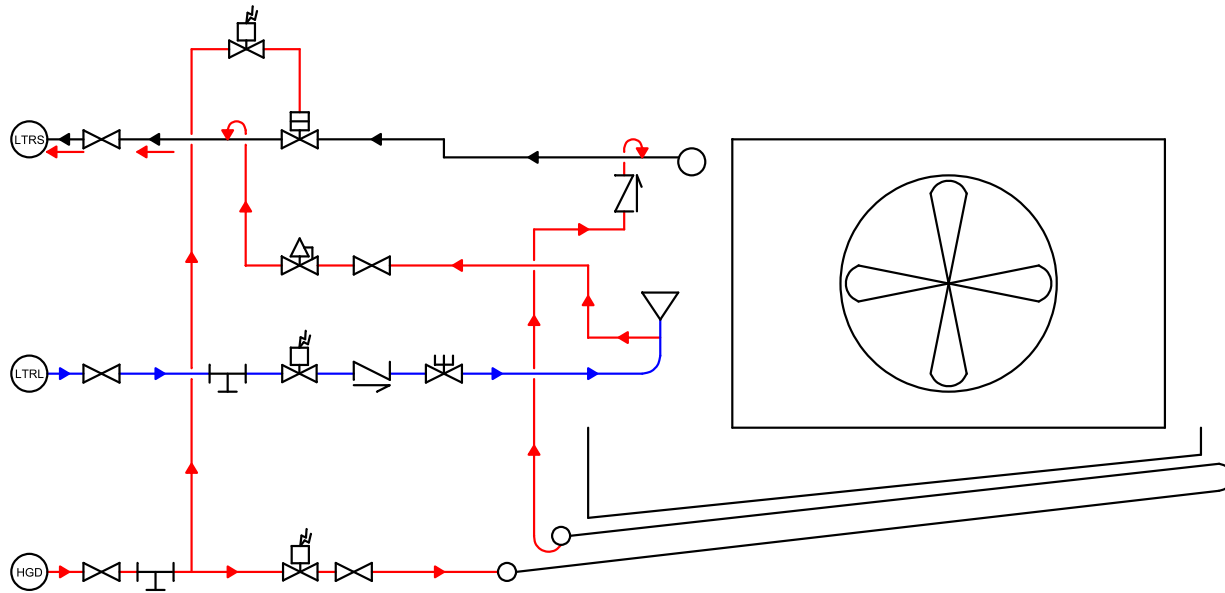















	STRAINER		HOT GAS DEFROST SUPPLY
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	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

3.2. Figure 12: Bottom Feed, 3-Pipe, Horizontal Headers

FIGURE 12

**Controlled Pressure Receiver (CPR) Bottom Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop**

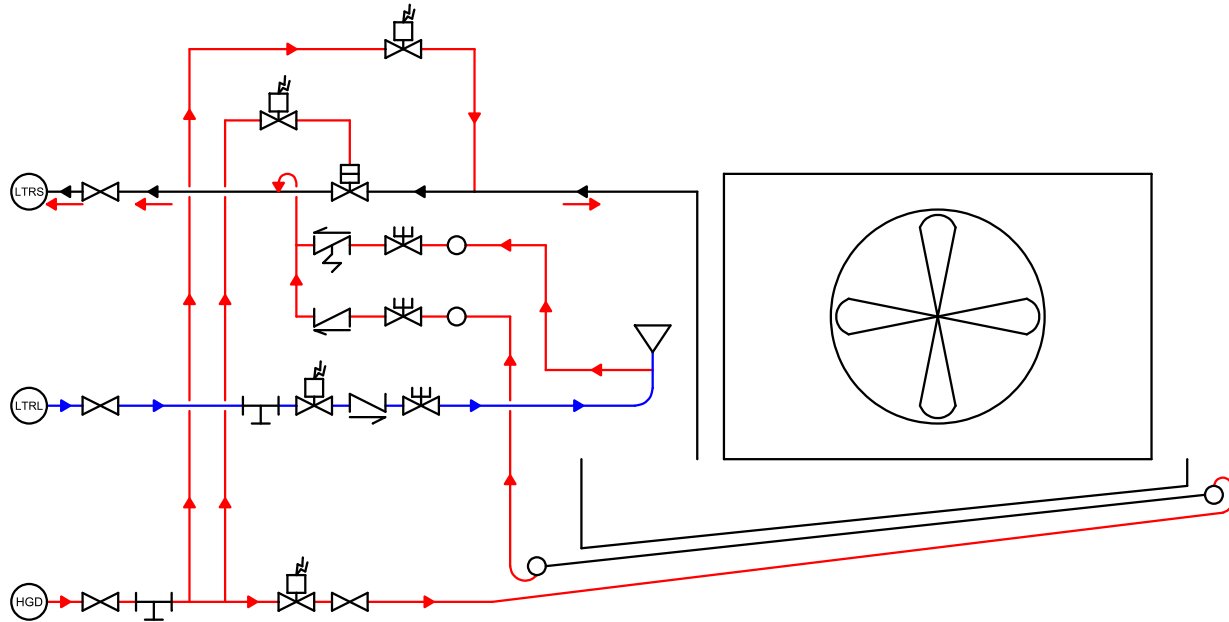
















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	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

3.3. Figure 13: Bottom Feed, 4-Pipe, Vertical Headers

FIGURE 13

**Controlled Pressure Receiver (CPR) Bottom Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop**

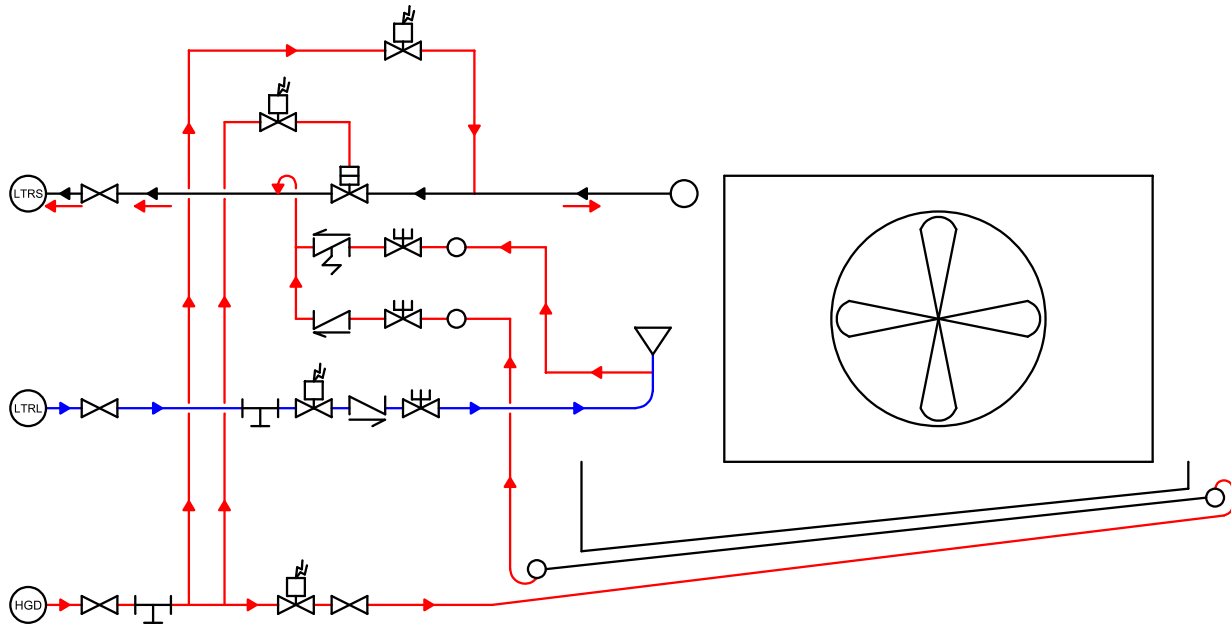
















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	SPRING LOADED CHECK VALVE		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		
	SIGHT GLASS		

3.4. Figure 14: Bottom Feed, 4-Pipe, Horizontal Headers

FIGURE 14

**Controlled Pressure Receiver (CPR) Bottom Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop**

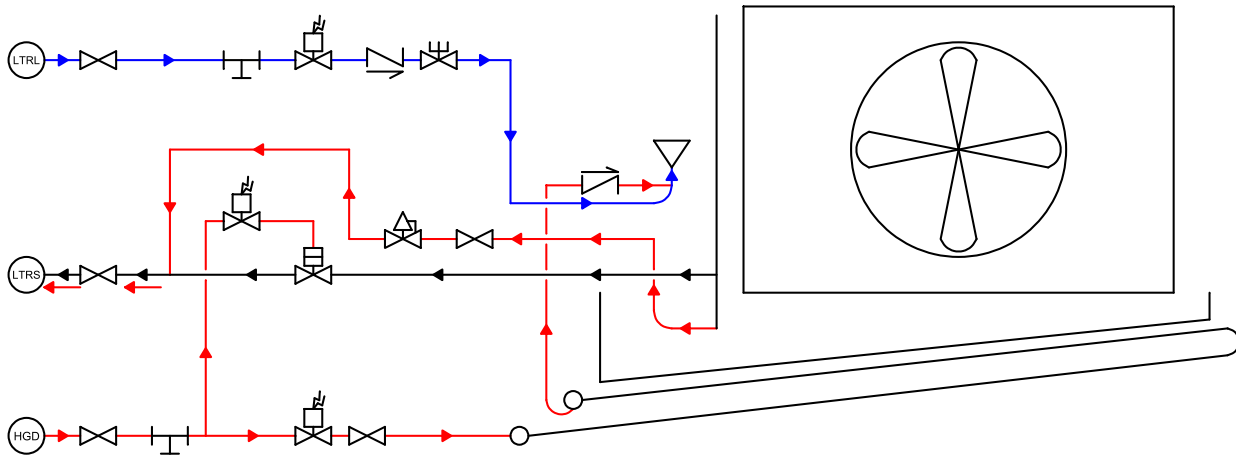















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	SPRING LOADED CHECK VALVE		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		
	SIGHT GLASS		

3.5. Figure 15: Top Feed, 3-Pipe, Vertical Headers

FIGURE 15

Controlled Pressure Receiver (CPR) Top Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

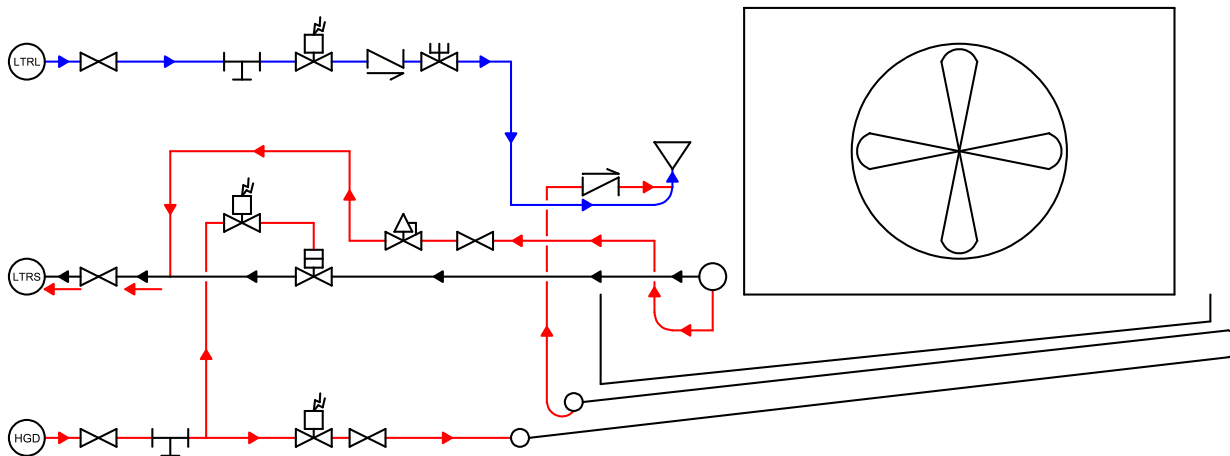















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

3.6. Figure 16: Top Feed, 3-Pipe, Horizontal Headers

FIGURE 16

**Controlled Pressure Receiver (CPR) Top Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop**

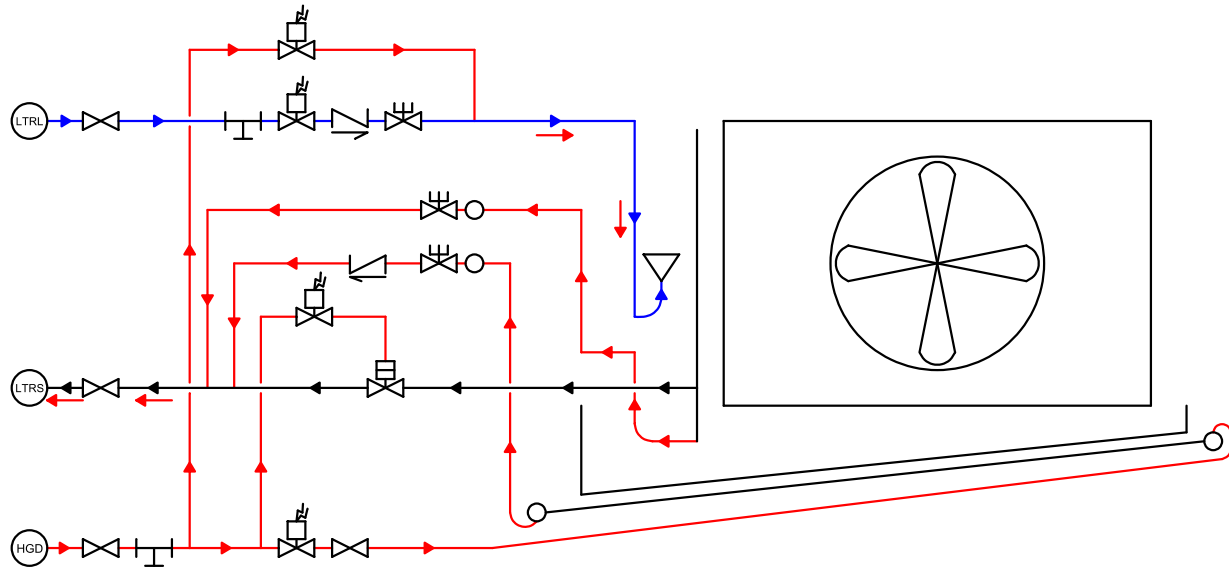















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	DEFROST PRESSURE REGULATOR		SATURATED LIQUID FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID & VAPOR FLOW
	HAND EXPANSION VALVE		

3.7. Figure 17: Top Feed, 4-Pipe, Vertical Headers

FIGURE 17

**Controlled Pressure Receiver (CPR) Top Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop**

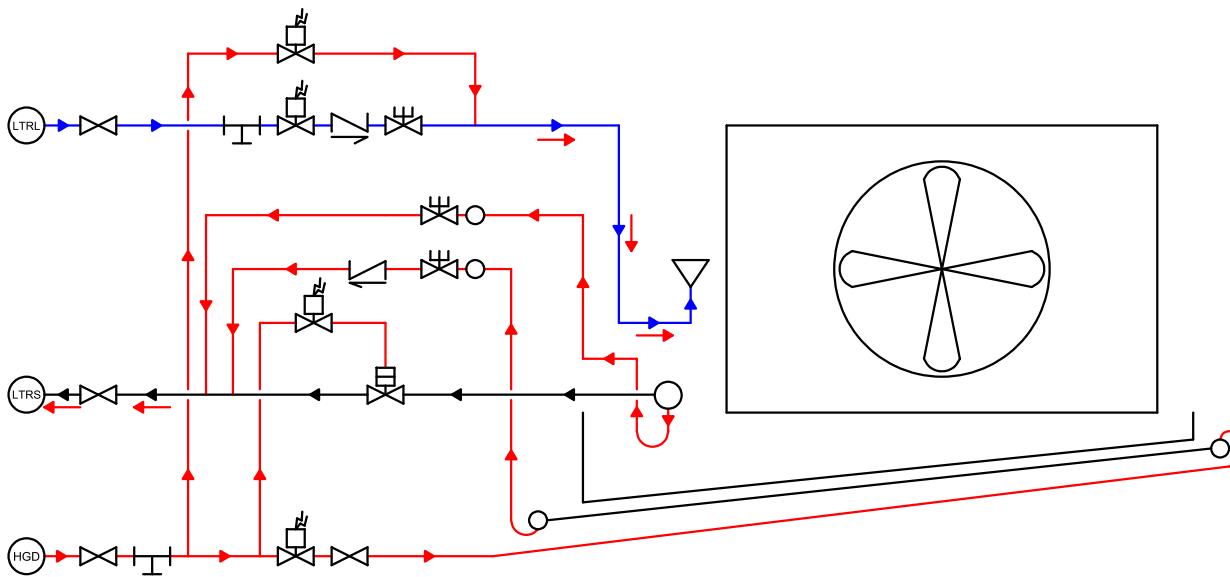


	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP RECIRCULATED SUCTION
	GLOBE VALVE		LOW-TEMP RECIRCULATED LIQUID
	SOLENOID VALVE		HOT GAS FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID FLOW
	HAND EXPANSION VALVE		SATURATED LIQUID & VAPOR FLOW
	SIGHT GLASS		

3.8. Figure 18: Top Feed, 4-Pipe, Horizontal Headers

FIGURE 18

**Controlled Pressure Receiver (CPR) Top Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop**



┌─┴─┐ STRAINER

▤ CHECK VALVE

⊗ GLOBE VALVE

⊠ SOLENOID VALVE

⊠ GAS POWERED SUCTION STOP VALVE

⊠ HAND EXPANSION VALVE

○ SIGHT GLASS

HGD HOT GAS DEFROST SUPPLY

LTRS LOW-TEMP RECIRCULATED SUCTION

LTRL LOW-TEMP RECIRCULATED LIQUID

→ HOT GAS FLOW

→ SATURATED LIQUID FLOW

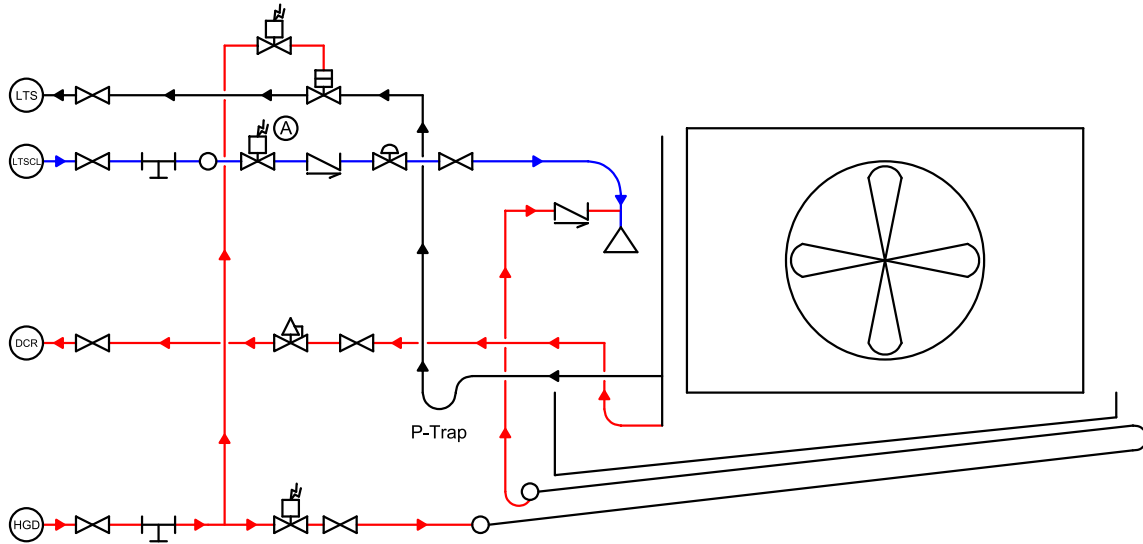
→ SATURATED LIQUID & VAPOR FLOW


















4. DIRECT EXPANSION (DX)

4.1. Figure 19: 3-Pipe, Separate Condensate Return, Vertical Header

FIGURE 19

Direct Expansion (DX)
3-Pipe Hot Gas Defrost
Separate Condensate Return
Vertical Header
2-Pass Pan Loop

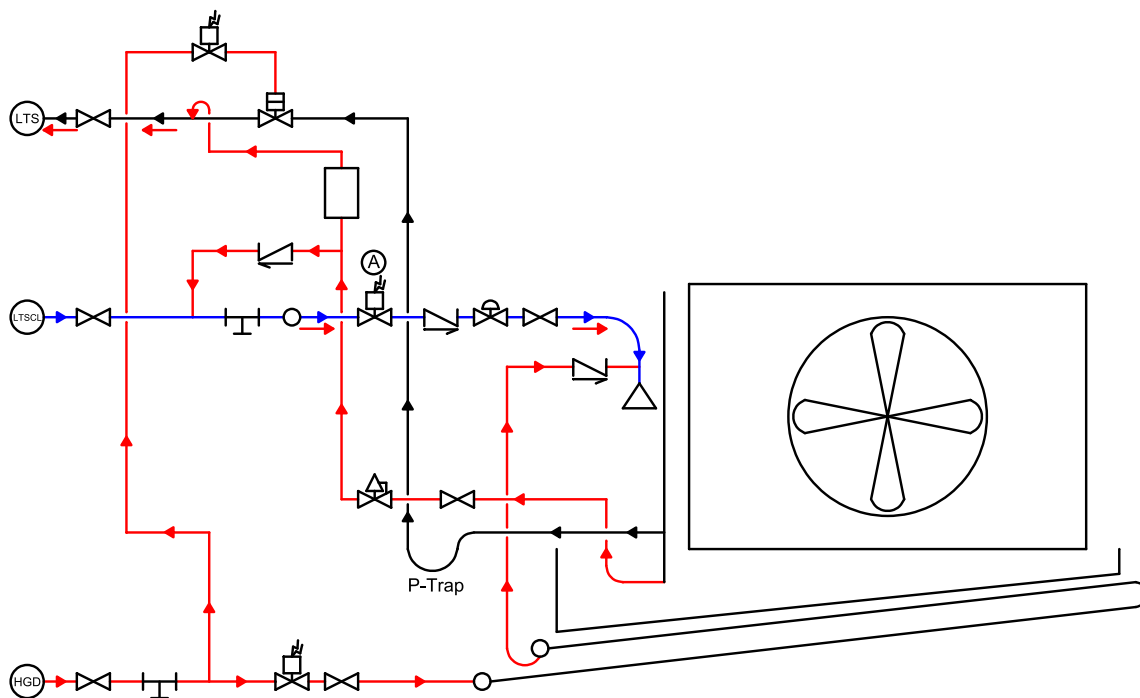



















	STRAINER		HOT GAS DEFROST SUPPLY
	CHECK VALVE		LOW-TEMP SUCTION
	GLOBE VALVE		LOW-TEMP SUB-COOLED LIQUID
	SOLENOID VALVE		DEFROST CONDENSATE RETURN
	DEFROST PRESSURE REGULATOR		HOT GAS FLOW
	GAS POWERED SUCTION STOP VALVE		SATURATED LIQUID FLOW
	HAND EXPANSION VALVE		SATURATED LIQUID & VAPOR FLOW
	ELECTRONIC EXPANSION VALVE		LIQUID LINE SOLENOID
	SIGHT GLASS		

4.2. Figure 20: 3-Pipe, Liquid Line Condensate Return, Vertical Headers

FIGURE 20

Direct Expansion (DX)
3-Pipe Hot Gas Defrost
Liquid Line Condensate Return
Vertical Header
2-Pass Pan Loop



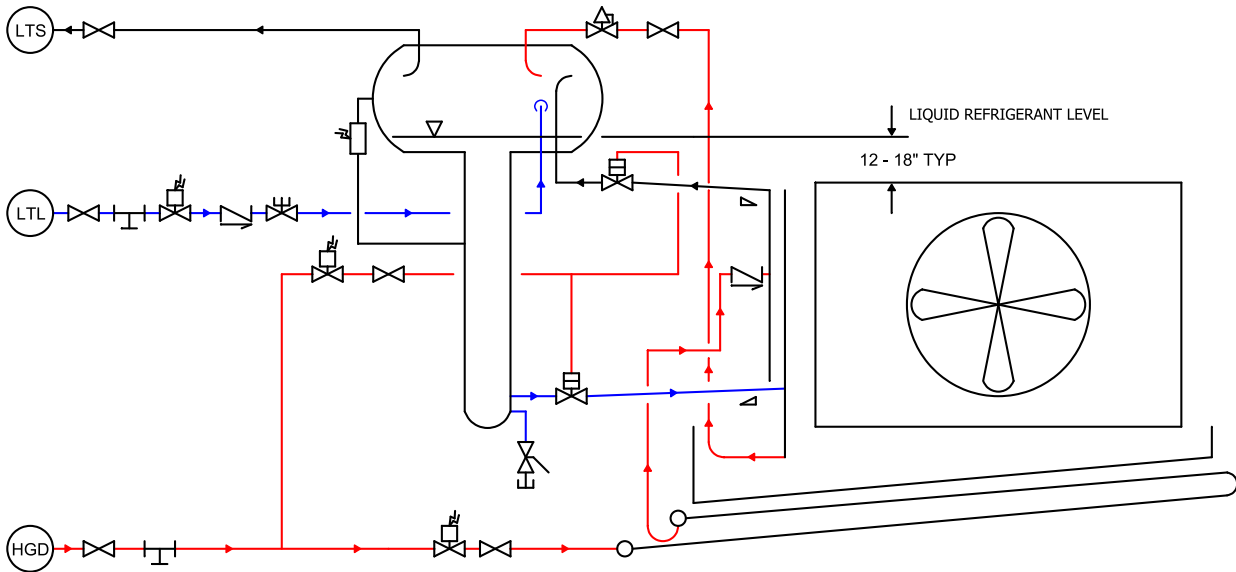
- | | | | |
|---|--------------------------------|---|-------------------------------|
|  | STRAINER |  | HOT GAS DEFROST SUPPLY |
|  | CHECK VALVE |  | LOW-TEMP SUCTION |
|  | GLOBE VALVE |  | LOW-TEMP SUB-COOLED LIQUID |
|  | SOLENOID VALVE |  | HOT GAS FLOW |
|  | DEFROST PRESSURE REGULATOR |  | SATURATED LIQUID FLOW |
|  | GAS POWERED SUCTION STOP VALVE |  | SATURATED LIQUID & VAPOR FLOW |
|  | HAND EXPANSION VALVE |  | LIQUID LINE SOLENOID |
|  | ELECTRONIC EXPANSION VALVE | | |
|  | SIGHT GLASS | | |
|  | AUTO GAS VENT | | |
















5. GRAVITY FLOODED

5.1. Figure 21: 3-Pipe, Vertical Headers

FIGURE 21

Gravity Flooded
3-Pipe Hot Gas Defrost
Vertical Header
2-Pass Pan Loop



- | | | | |
|---|--------------------------------|---|-------------------------------|
|  | STRAINER |  | HGD HOT GAS DEFROST SUPPLY |
|  | CHECK VALVE |  | LTS LOW-TEMP SUCTION |
|  | GLOBE VALVE |  | LTL LOW-TEMP LIQUID |
|  | SOLENOID VALVE |  | HOT GAS FLOW |
|  | DEFROST PRESSURE REGULATOR |  | SATURATED LIQUID FLOW |
|  | GAS POWERED SUCTION STOP VALVE |  | SATURATED LIQUID & VAPOR FLOW |
|  | HAND EXPANSION VALVE | | |
|  | DRAINER | | |
|  | LIQUID LEVEL SWITCH | | |

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