

# 3-PIPE FSV-EX MF3 Series

Appearance												
kW	22.4	28.0	33.5	40.0	45.0	50.0	56.0	61.5	68.0	73.0		
Model name	U-8MF3R7	U-10MF3R7	U-12MF3R7	U-14MF3R7	U-16MF3R7	U-8MF3R7 U-10MF3R7	U-8MF3R7 U-12MF3R7	U-10MF3R7 U-12MF3R7	U-12MF3R7 U-12MF3R7	U-10MF3R7 U-16MF3R7		
Power supply	380/400/415V/3-phase/50Hz 380/400V/3-phase/60											
Capacity	Cooling	kW	22.4	28.0	33.5	40.0	45.0	50.0	56.0	61.5	68.0	73.0
		BTU/h	76,500	95,600	114,300	136,500	153,600	170,600	191,100	209,900	232,100	249,100
EER / COP	Cooling	W/W	4.87	4.49	3.91	3.70	3.49	4.67	4.24	4.16	3.89	3.82
		Heating	5.09	5.02	4.51	4.21	4.17	5.09	4.70	4.73	4.47	4.45
Dimensions	H x W x D	mm	1,842x1,180 x1,000	1,842x1,180 x1,000	1,842x1,180 x1,000	1,842x1,180 x1,000	1,842x1,180 x1,000	1,842x2,420 x1,000	1,842x2,420 x1,000	1,842x2,420 x1,000	1,842x2,420 x1,000	1,842x2,420 x1,000
		kg	264	265	289	337	337	529	553	553	578	602
Electrical ratings	Cooling	Running current A	7.52	10.4	13.9	18.2	21.3	17.7	21.3	24.2	28.3	31.5
		Power input kW	4.60	6.23	8.57	10.8	12.9	10.7	13.2	14.8	17.5	19.1
	Heating	Running current A	8.02	10.5	13.4	18.1	20.0	18.2	21.7	23.9	27.6	30.6
		Power input kW	4.91	6.27	8.32	10.7	12.0	11.0	13.4	14.6	17.1	18.3
Air flow rate	m³/h	12,600	13,200	13,920	13,920	13,920	25,800	26,520	27,120	27,840	27,120	
	L/s	3,500	3,667	3,867	3,867	3,867	7,167	7,367	7,533	7,733	7,533	
Refrigerant amount at shipment	kg	9.8	9.8	11.8	11.8	11.8	19.6	21.6	21.6	23.6	21.6	
Piping connections	Suction pipe	mm (inches)	Ø19.05 (Ø3/4)	Ø22.22 (Ø7/8)	Ø25.40 (Ø1)	Ø25.40 (Ø1)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø31.75 (Ø1-1/4)	
	Discharge pipe	mm (inches)	Ø15.88 (Ø5/8)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø22.22 (Ø7/8)	Ø22.22 (Ø7/8)	Ø22.22 (Ø7/8)	Ø22.22 (Ø7/8)	Ø25.40 (Ø1)	Ø25.40 (Ø1)	
	Liquid pipe	mm (inches)	Ø9.52 (Ø3/8)	Ø9.52 (Ø3/8)	Ø12.70 (Ø1/2)	Ø12.70 (Ø1/2)	Ø12.70 (Ø1/2)	Ø15.88 (Ø5/8)	Ø15.88 (Ø5/8)	Ø15.88 (Ø5/8)	Ø19.05 (Ø3/4)	
	Balance pipe	mm (inches)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	
Ambient temperature operating range												
Sound pressure level	Normal mode	dB (A)	54.0	57.0	60.0	61.0	62.0	59.0	61.0	62.0	63.0	63.5
	Silent mode	dB (A)	51.0	54.0	57.0	58.0	59.0	56.0	58.0	59.0	60.0	60.5

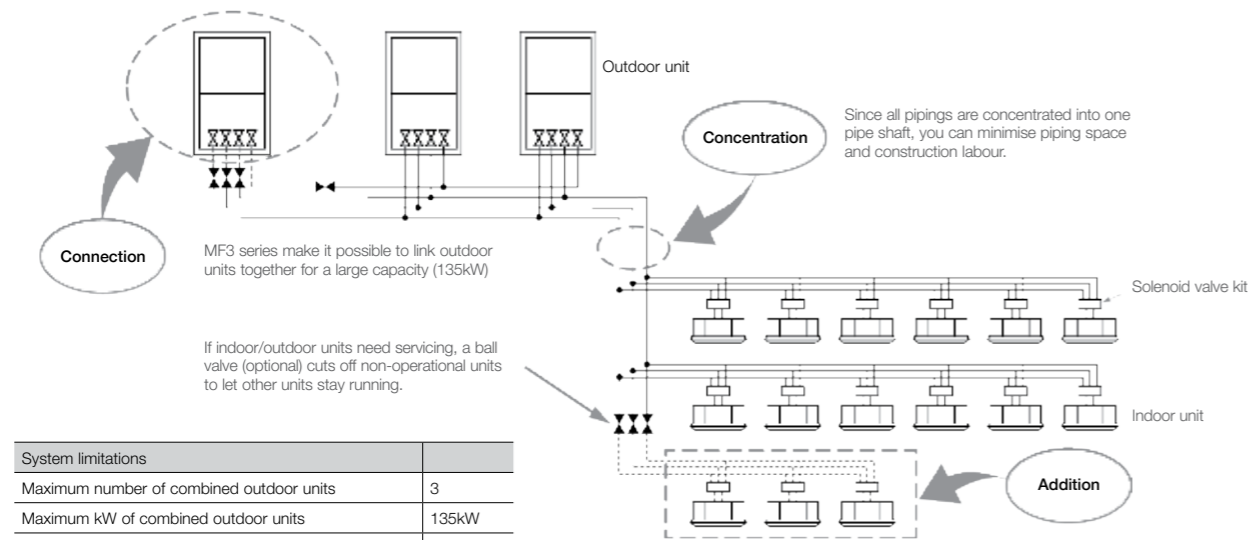
Appearance													
kW	78.5	85.0	90.0	96.0	101.0	107.0	113.0	118.0	124.0	130.0	135.0		
Model name	U-12MF3R8 U-16MF3R8	U-14MF3R7 U-16MF3R7	U-16MF3R7 U-16MF3R7	U-8MF3R7 U-10MF3R7 U-16MF3R7	U-8MF3R7 U-12MF3R7 U-16MF3R7	U-10MF3R7 U-12MF3R7 U-16MF3R7	U-8MF3R7 U-16MF3R7 U-16MF3R7	U-10MF3R7 U-16MF3R7 U-16MF3R7	U-12MF3R7 U-16MF3R7 U-16MF3R7	U-14MF3R7 U-16MF3R7 U-16MF3R7	U-16MF3R7 U-16MF3R7 U-16MF3R7		
Power supply	380/400/415V/3-phase/50Hz 380/400V/3-phase/60												
Capacity	Cooling	kW	78.5	85.0	90.0	96.0	101.0	107.0	113.0	118.0	124.0	130.0	135.0
		BTU/h	267,900	290,100	307,200	327,600	344,700	365,200	385,700	402,700	423,200	443,700	460,800
EER / COP	Cooling	W/W	3.65	3.59	3.49	4.00	3.87	3.84	3.69	3.69	3.58	3.55	3.49
		Heating	4.31	4.19	4.17	4.56	4.45	4.47	4.29	4.34	4.25	4.18	4.17
Dimensions	H x W x D	mm	1,842x2,420 x1,000	1,842x2,420 x1,000	1,842x2,420 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000	1,842x3,660 x1,000
		kg	626	674	674	866	890	891	938	939	963	1,011	1,011
Electrical ratings	Cooling	Running current A	35.1	39.6	42.6	39.6	42.6	46.1	50.5	52.8	56.5	61.1	63.9
		Power input kW	21.5	23.7	25.8	24.0	26.1	27.9	30.6	32.0	34.6	36.6	38.7
	Heating	Running current A	33.5	37.9	40.1	39.6	41.9	43.9	49.4	50.8	53.7	57.9	60.1
		Power input kW	20.3	22.7	24.0	23.7	25.4	26.6	29.6	30.4	32.5	34.7	36.0
Air flow rate	m³/h	27,840	27,840	27,840	39,720	40,440	41,040	40,440	41,040	41,760	41,760	41,760	
	L/s	7,733	7,733	7,733	11,033	11,233	11,400	11,233	11,400	11,600	11,600	11,600	
Refrigerant amount at shipment	kg	23.6	23.6	23.6	31.4	33.4	33.4	33.4	33.4	35.4	35.4	35.4	
Piping connections	Suction pipe	mm (inches)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø38.1 (Ø1-1/2)	Ø38.1 (Ø1-1/2)	Ø38.1 (Ø1-1/2)	Ø38.1 (Ø1-1/2)	Ø38.1 (Ø1-1/2)	Ø38.1 (Ø1-1/2)	Ø38.1 (Ø1-1/2)
	Discharge pipe	mm (inches)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø28.58 (Ø1-1/8)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)	Ø31.75 (Ø1-1/4)
	Liquid pipe	mm (inches)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)	Ø19.05 (Ø3/4)
	Balance pipe	mm (inches)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)	Ø6.35 (Ø1/4)
Ambient temperature operating range	Cooling/Dry: -10°C~+52°C (DB). Heating: -20°C~+18°C (WB) Simultaneous operation: -10°C~+24°C (DB)												
Sound pressure level	Normal mode	dB (A)	64.5	64.5	65.0	64.0	64.5	65.0	65.5	66.0	66.5	66.5	67.0
	Silent mode	dB (A)	61.5	61.5	62.0	61.0	61.5	62.0	62.5	63.0	63.5	63.5	64.0

GLOBAL REMARKS

Rated conditions:	Cooling	Heating
Indoor air temperature	27°C DB / 19°C WB	20°C DB
Outdoor air temperature	35°C DB	7°C DB / 6°C WB

These specifications are subject to change without notice.  
\* For mixed heating and cooling operation with an outdoor temperature in excess of 24°C DB, please use 50% or more of the horsepower of the outdoor unit for cooling operation.

## System example

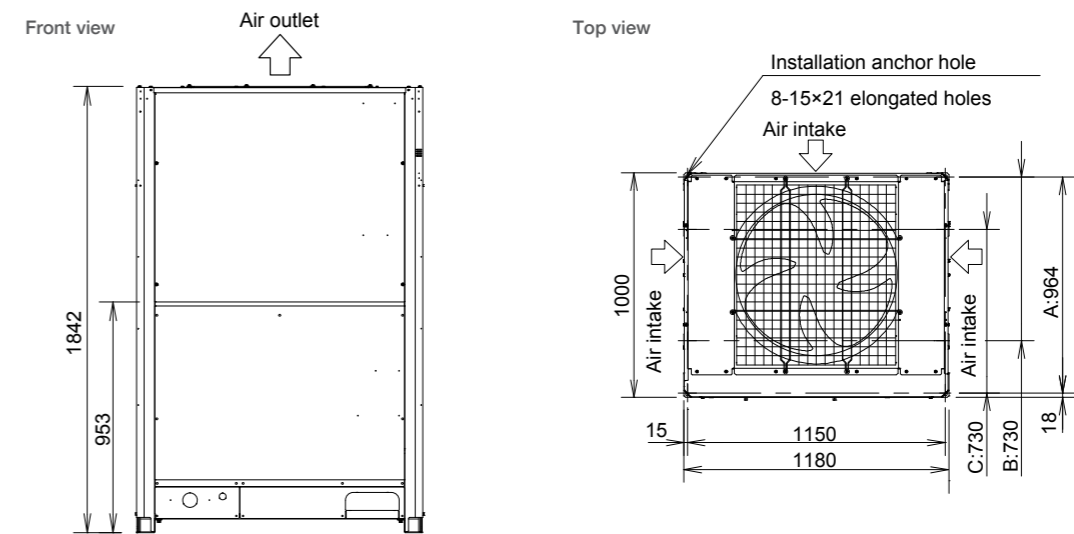


System limitations	
Maximum number of combined outdoor units	3
Maximum kW of combined outdoor units	135kW
Maximum number of connectable indoor units	52
Indoor/outdoor unit capacity ratio	50-150%
Maximum actual piping length	200m
Maximum level difference (when outdoor unit is lower)	50 (40)m
Maximum total piping length in one direction	500m

If your indoor capacity load changes in the future, it's easy to add on both indoor and outdoor units using the same pipings.

If the additional installment of outdoor and indoor units is expected, the size of refrigerant piping should be decided according to the total capacity after the addition.

## Dimensions



# Piping design

Select the installation location so that the length and size of refrigerant piping are within the allowable range shown in the figure below.

- Main piping length (maximum tubing size)  $LM = LA + LB \dots$
- Main distribution tubes  $LC - LH$  are selected according to the capacity after the distribution joint.
- The outdoor connection main piping (LO portion) is determined by the total capacity of the outdoor units that are connected to the pipe ends.
- Sizes of indoor unit connection piping  $\ell 1 - \ell 52$  are determined by the connection piping sizes on the indoor units.

R410A optional distribution joint  
CZ-P680PH2 (for outdoor unit)  
CZ-P1350PH2 (for outdoor unit)  
CZ-P224BH2 (for indoor unit)  
CZ-P680BH2 (for indoor unit)  
CZ-P1350BH2 (for indoor unit)

Explanation of symbols:  
 Distribution joint (CZ: optional parts)  
 Ball valve (field supply)  
 T-joint (field supply)  
 Solidly welded shut (pinch weld)

\* Be sure to use special R410A distribution joints (CZ: optional parts) for outdoor unit connections and piping branches.

**Table 2 Ranges that Apply to Refrigerant piping Lengths and to Differences in Installation Heights**

## Ranges that apply to refrigerant piping lengths and to differences in installation heights

Item	Mark	Contents	Length (m)
Allowable piping length	L1	Maximum piping length	Actual length $\leq 200^{*2}$ Equivalent length $\leq 210^{*2}$
	$\Delta L (L2 - L4)$	Difference between maximum length and minimum length from the 1st distribution joint	$\leq 50^{*4}$
	LM	Maximum length of main piping (at maximum size) *Even after 1st distribution joint, LM is allowed if at maximum piping length.	$\leq 50^{*3}$
	$\ell 1, \ell 2 - \ell 52$	Maximum length of each distribution pipe	$\leq 50^{*5}$
	$L1 + \ell 1 + \ell 2 - \ell 51 + \ell A + \ell B + \ell F + \ell G + \ell H$	Total maximum piping length including length of each distribution pipe (only liquid tube)	$\leq 500$
	$\ell A, \ell B + \ell O, \ell C + \ell O$	Maximum piping length from outdoor's 1st distribution joint to each outdoor unit	$\leq 10$
Allowable elevation difference	H1	When outdoor unit is installed higher than indoor unit	$\leq 50$
	H2	When outdoor unit is installed lower than indoor unit	$\leq 40$
	H3	Maximum difference between indoor units	$\leq 15$
Allowable length of joint tubing	H3	Maximum difference between outdoor units	$\leq 4$
	L3	T-joint tubing (field-supply); Maximum piping length between the first T-joint and solidly welded-shut end point	$\leq 2$

- L = Length, H = Height
- The outdoor connection main piping (LO portion) is determined by the total capacity of the outdoor units that are connected to the pipe ends.
  - If the longest piping length (L1) exceeds 90m (equivalent length), increase the sizes of the main pipe (LM) by 1 rank for the suction pipe, discharge pipe and liquid pipe. Use a field supply reducer. Select the pipe size from the table of main piping sizes (Table 3) and from the table of refrigerant piping sizes (Table 8).
  - If the longest main piping length (LM) exceeds 50m, increase the main piping size at the portion before 50m by 1 rank for the suction pipe and discharge pipe. Use a field supply reducer. Determine the length less than the limitation of allowable maximum piping length. For the portion that exceeds 50 m, set based on the main piping size (LA) listed in Table 3.
  - If the piping length marked "L" (L2-L4) exceeds 40m, increase the piping size at the portion after the 1st distribution joint by 1 rank for the liquid pipe, suction pipe and discharge pipe. Refer to the Technical Data for the details.
  - If any of the piping length exceeds 30m, increase the size of the suction pipe, discharge pipe and liquid pipe by 1 rank.

## Necessary Amount of Additional Refrigerant Charge Per Outdoor Unit

U-8MF3R7	U-10MF3R7	U-12MF3R7	U-14MF3R7	U-16MF3R7
1.0kg	1.0kg	3.9kg	3.9kg	3.9kg

## System limitations

Maximum number of combined outdoor units	3
Maximum kW/HP of combined outdoor units	135kW (48HP)
Maximum number of connectable indoor units	52
Indoor/outdoor unit capacity ratio	50-150%

- \*1: In the case of 24 HP (Type 68.0kW) or smaller units, the number is limited by the total capacity of the connected indoor units.  
 \*2: Up to 3 units can be connected if the system has been extended.  
 \*3: It is strongly recommended that you choose the unit so the load can become between 50 and 130%.

## Additional refrigerant charge

Liquid piping size mm (inches)	Amount of refrigerant charge/m (g/m)
$\phi 6.35 (\phi 1/4)$	26
$\phi 9.52 (\phi 3/8)$	56
$\phi 12.7 (\phi 1/2)$	128
$\phi 15.88 (\phi 5/8)$	185
$\phi 19.05 (\phi 3/4)$	259
$\phi 22.22 (\phi 7/8)$	366

## Necessary Amount of Additional Refrigerant Charge per metre, According to Discharge Piping Size

Discharge piping size	mm	$\phi 12.7$	$\phi 15.88$	$\phi 19.05$	$\phi 22.22$	$\phi 25.4$	$\phi 28.58$	$\phi 31.75$	$\phi 38.1$
Additional amount	g/m	12	21	31	41	55	71	89	126

\*Additional refrigerant charge amount of discharge piping should be less than 9,000g.

## Refrigerant branch pipes

Remarks	Model name	Cooling capacity after distribution
For outdoor unit	1. CZ-P680PH2	68.0kW or less
	2. CZ-P1350PH2	118.0kW or less
For indoor unit	3. CZ-P224BH2	22.4kW or less
	4. CZ-P680BH2	68.0kW or less
	5. CZ-P1350BH2	118.0kW or less

## Refrigerant piping

Piping size mm (inches)			
Material O		1/2 H, H material	
Outer diameter	Wall thickness	Outer diameter	Wall thickness
$\phi 6.35 (\phi 1/4)$	t 0.8 mm	$\phi 22.22 (\phi 7/8)$	t 1.0 mm
$\phi 9.52 (\phi 3/8)$	t 0.8 mm	$\phi 25.4 (\phi 1)$	t 1.0 mm
$\phi 12.7 (\phi 1/2)$	t 0.8 mm	$\phi 28.58 (\phi 1-1/8)$	t 1.0 mm
$\phi 15.88 (\phi 5/8)$	t 1.0 mm	$\phi 31.75 (\phi 1-1/4)$	t 1.1 mm
$\phi 19.05 (\phi 3/4)$	t 1.0 mm	$\phi 38.1 (\phi 1-1/2)$	t 1.15 mm
		$\phi 41.28 (\phi 1-5/8)$	t 1.20 mm

Note: When pipe bending is to be performed, the bending radius shall be at least 4 times the outer diameter. Also, take sufficient care to prevent pipe collapse and damage at the time of bending.

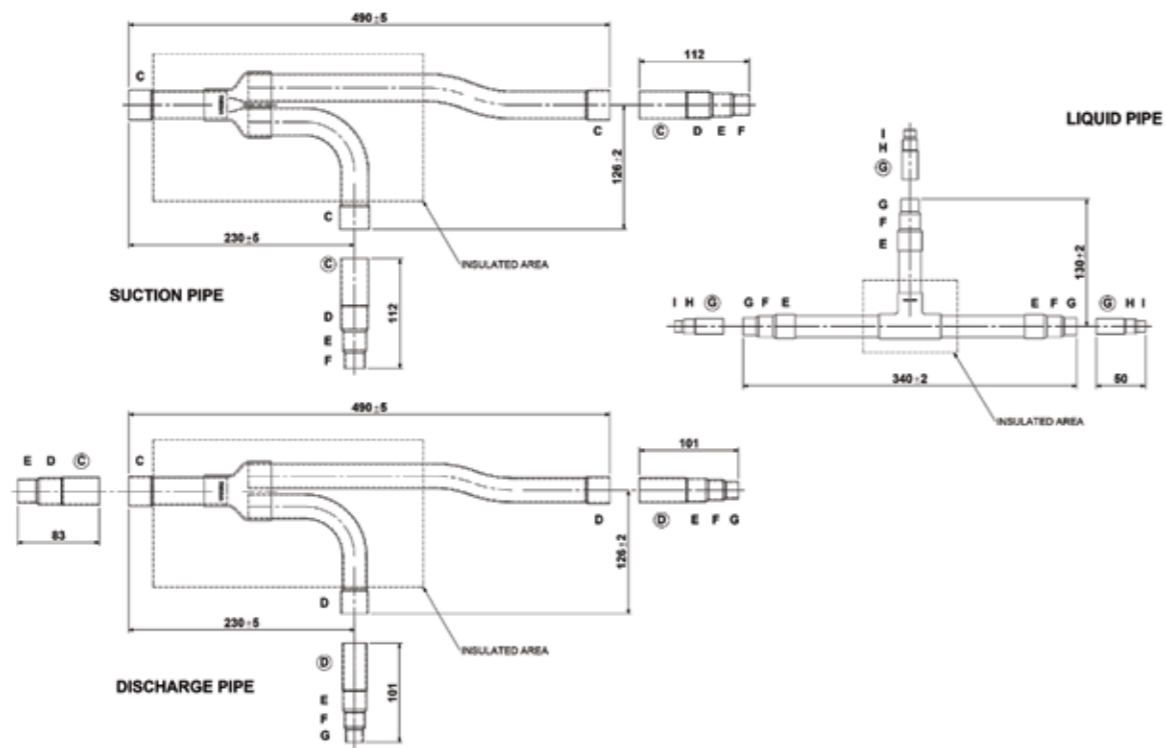
# Refrigerant Branch Pipes (accessories) for 3-PIPE MF3 Series

See the installation instructions packaged with the refrigerant branch pipes for the installation procedure.

Model name	capacity after refrigerant branch pipe	Remarks
1. CZ-P680PH2	68.0kW or less	For outdoor unit
2. CZ-P1350PH2	greater than 68.0kW and no more than 135.0kW	For outdoor unit
3. CZ-P224BH2	22.4kW or less	For indoor unit
4. CZ-P680BH2	greater than 22.4kW and no more than 68.0kW	For indoor unit
5. CZ-P1350BH2	greater than 68.0kW and no more than 135.0kW	For indoor unit

## 1. CZ-P680PH2

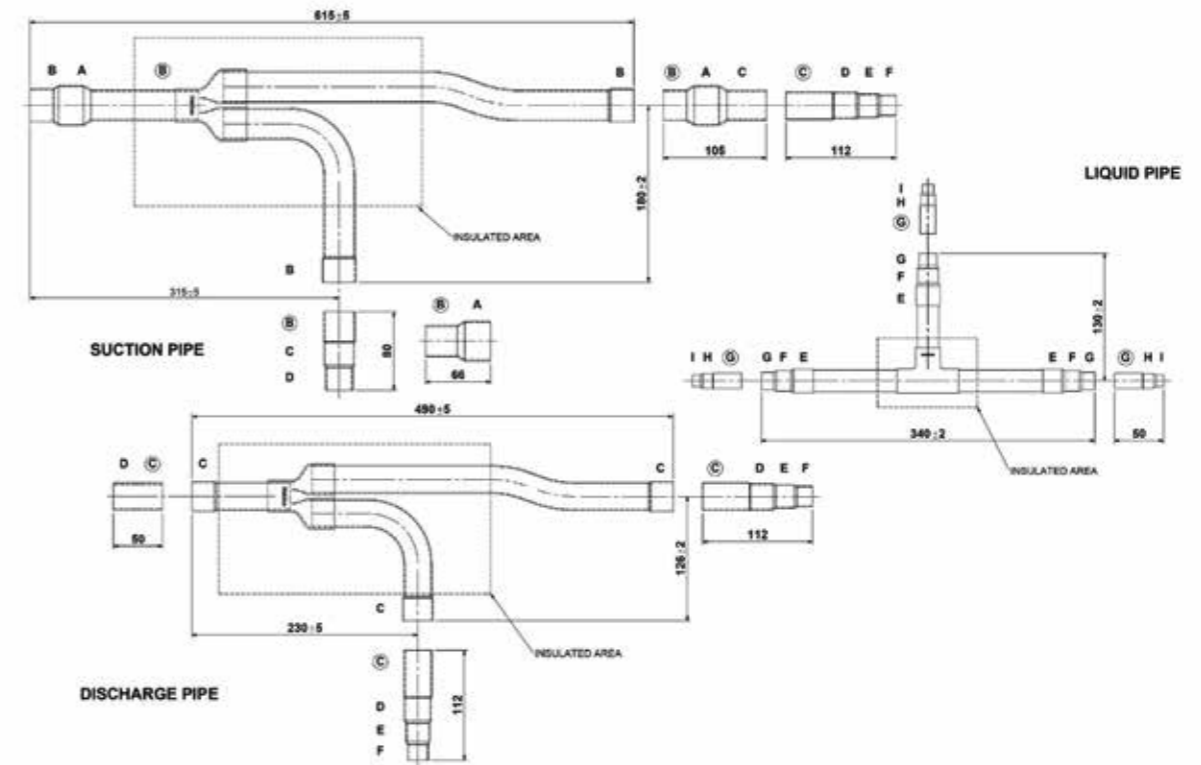
Use: For outdoor unit (Capacity after refrigerant branch pipe is 68.0kW or less.)



All measurements are in mm. Size of connection points on each part shown are inside diameters of piping.

## 2. CZ-P1350PH2

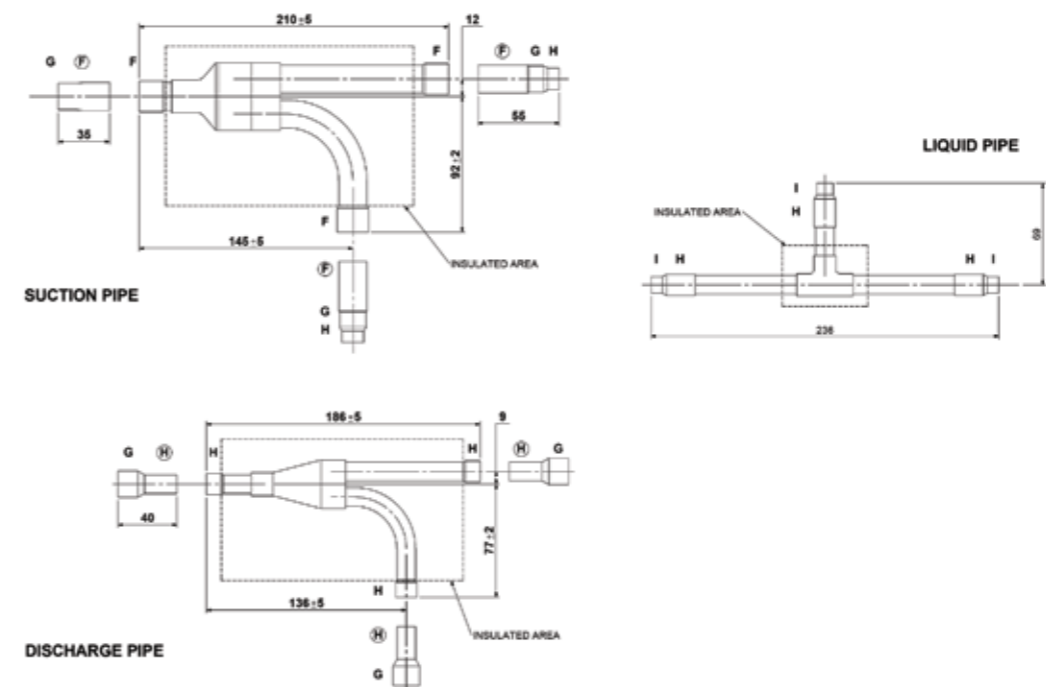
Use: For outdoor unit (Capacity after refrigerant branch pipe is greater than 68.0kW and no more than 135.0kW.)



All measurements are in mm. Size of connection points on each part shown are inside diameters of piping.

## 3. CZ-P224BH2

Use: For indoor unit (Capacity after refrigerant branch pipe is 22.4kW or less.)



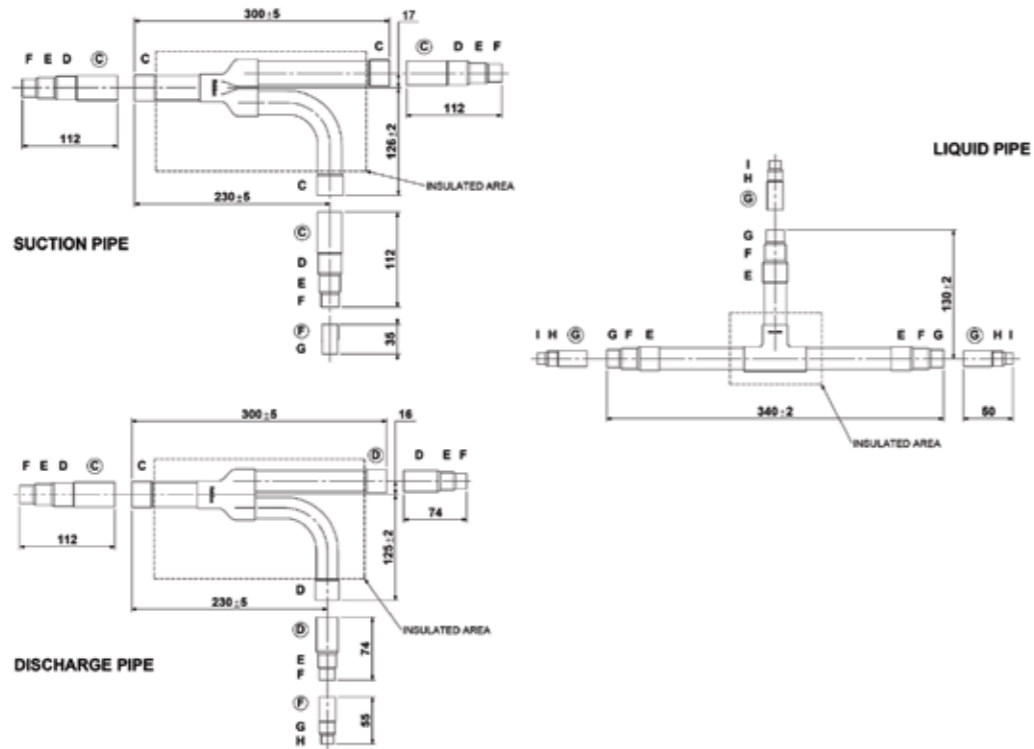
All measurements are in mm. Size of connection points on each part shown are inside diameters of piping.



# Refrigerant Branch Pipes (accessories) for 3-PIPE MF3 Series

## 4. CZ-P680BH2

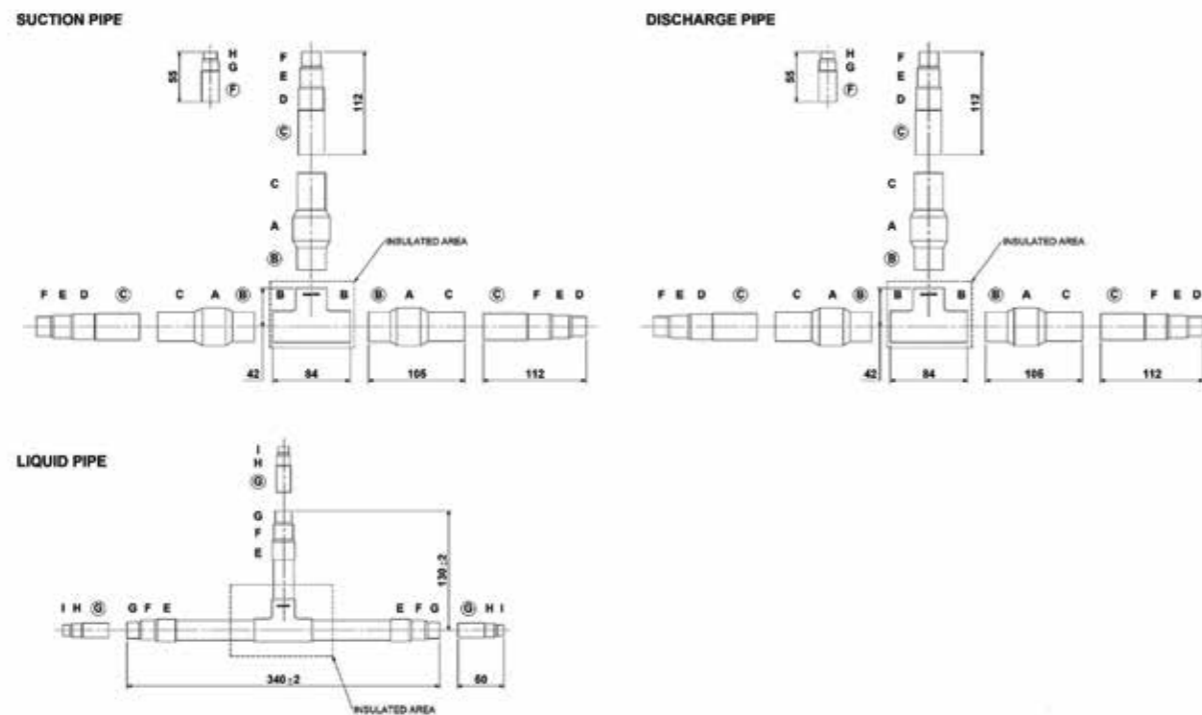
Use: For indoor unit (Capacity after refrigerant branch pipe is greater than 22.4kW and no more than 68.0kW.)



All measurements are in mm. Size of connection points on each part shown are inside diameters of piping.

## 5. CZ-P1350BH2

Use: For indoor unit (Capacity after refrigerant branch pipe is greater than 68.0kW and no more than 135.0kW.)



All measurements are in mm. Size of connection points on each part shown are inside diameters of piping.

