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Fluororesin Products PURE PROCESS Series



Fluororesin Products

Pure Process Series

Among various plastic materials, fluororesin exhibits particularly superior chemical resistance, heat resistance, low friction, electrical insulation, low tackiness, weather resistance, and other features. This superior material is fabricated using micro-machining technology for PTFE products, and Koganei's independently developed injection molding method for PFA products, all under Koganei's rigorous quality control. These products are used in the semiconductor, liquid crystal, and other electronics sectors, as well as in chemicals, food products, medical equipment, chemical plants, and a wide variety of other industrial sectors.

Fluororesin Valve Series



- Compact series line-up suitable for control of small chemical flows now offers even more variety.
- In addition to diverse piping specifications and valve functions, the line-up offers a wide selection of options, such as automatic flow adjustment.
 - Air operated valves
 - Suck back valves
 - Air operated valves with suck back
 - Solenoid valve
 - Check valve
 - Drain valves



Fluororesin H Series Fittings



Simple construction eliminates the need for dedicated tools. Ease of operation during piping is boosted dramatically.

 Tapered seal type offers superior pressure resistance, sealing ability, and heat resistance.

- Straight type
- Elbow type
- T type
- Reducing type

Page 🕢

Fluororesin Tube Series



- Size variations for the field-proven fluororesin tube have expanded.
- The high-grade HG tube and NE tube that demonstrates effectiveness against anti-static charges, have been added to the line-up.
 - PFA tubes
 - PFA-HG tubes
 - PFA-NE tubes
 - BT tubes
 - RPL tubes

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 Before selecting and using products, please read all the Safety Precautions carefully to ensure proper product use. The Safety Precautions shown below are to help you use the product safely and correctly, and to prevent injury or damage to you, other people, and assets beforehand.

Follow the Safety Precautions for: ISO4414 (Pneumatic fluid power—Recommendations for the application of equipment to transmission and control systems), JIS B 8370 (Pneumatic system regulations).

The directions are ranked according to degree of potential danger or damage: "DANGER!", "WARNING!", "CAUTION!" and "ATTENTION!"

 ,
Expresses situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.
While there is little chance of injury, this content refers to points that should be observed for appropriate use of the product.

This product was designed and manufactured as parts for use in General Industrial Machinery.

- In the selection and handling of equipment, the system designer or other person with fully adequate knowledge and experience should always read the Safety Precautions, Catalog, User's Manual and other literature before commencing operation. Making mistakes in handling is dangerous.
- After reading the Instruction Manual, Catalog, etc., always place them where they can be easily available for reference to users of this product.
- If transferring or lending the product to another person, always attach the Instruction Manual, Catalog, etc., to the product where they are easily visible, to ensure that the new user can use the product safely and properly.
- The danger, warning, and caution items listed under these "Safety Precautions" do not cover all possible cases. Read the Catalog and User's Manual carefully, and always keep safety first.

<u> D</u>ANGER

- Do not use for the purposes listed below:
 - 1. Medical equipment related to maintenance or management of human lives or bodies.
 - 2. Mechanical devices or equipment designed for the purpose of moving or transporting people.
 - 3. Critical safety components in mechanical devices.

This product has not been planned or designed for purposes that require advanced stages of safety. It could cause injury to human life.

- Do not use solenoid valves in locations with or near dangerous substances such as flammable or ignitable substances. The products are not explosion-proof. They could ignite or burst into flames.
- Do not allow flammable gases or ignitable chemicals to flow the solenoid valves. Moreover, do not use the solenoid valve in atmospheres containing flammable gases. There is a chance of explosion or ignition.
- Persons who use a pacemaker, etc., should keep a distance of at least one meter [3.28ft.] away from the solenoid valve. There is a possibility that the pacemaker will malfunction due to the strong magnet built into the solenoid valve.
- Do not use any media other than those shown in the specifications table. Use of non-specified media could lead to early shutdown of function or a sudden drop in performance, and result in a reduced operating life. Media leakage on the outside of the product could pose a risk to human life.
- When using chemicals, always check compatibility with the structural materials of the product before use. Use of incompatible media could lead to early shutdown of function or a sudden drop in performance, and result in a reduced operating life. Fluid leakage on the outside of the product could pose a risk to human life.
- When attaching the product, always ensure that it is securely mounted in place. Dropping or falling the product or improper operation could result in injury.
- While the product is in operation, avoid touching it with your hands or otherwise approaching too close. In addition, do not make any adjustments to the interior or to the attached mechanisms (manual override, connecting and disconnecting of wiring connectors, disconnection or connection of piping

tubes or plugs, or adjustment of mounting locations) while in operation. The chemicals could leak out, possibly resulting in injury.

- Do not splash water on the product. Spraying it with water, washing it, or using it underwater could result in malfunction of the product leading to injury, electric shocks, fires, etc.
- Never attempt to remodel the product. It could result in abnormal operation leading to injury, electric shocks, fires, etc.
- Never attempt inappropriate disassembly, assembly or repair of the product relating to basic construction, or to its performance or to functions. It could result in injury, electric shocks, fires, etc.

<u> WARNING</u>

- Do not use the product in excess of its specification range. Such use could result in product breakdowns, function stop or damage or drastically reduce the operating life.
- Before supplying chemicals, gases, or pilot air to the product, and before beginning operation, check that the piping is connected correctly. Careless supply of chemicals, gases, or pilot air could result in chemicals, etc. flowing to an unintended location or leaking out, and causing injury.
- For repairs, inspections, maintenance, replacement, or any other operations related to the product (particularly when the media used are chemicals), check that the chemicals have been completely drained from inside of the equipment, and that pilot air has been shut off and pressure inside the piping completely released. Neglecting this check could lead to leaks of chemicals, etc., that could cause injury.
- When installing a fluororesin fitting, always perform a leak test before supplying chemicals or gases through it, to check that there are no leaks, and then start passing the media. Neglecting this check could lead to leaks of chemicals, etc., that could cause injury.
- Do not pull on tubes that are connected to the fittings. The tube(s) could pull out, leaking chemicals or gases.
- When using fittings and tubes, always use compatible screw sizes and tube sizes. Use of incompatible sizes could lead to leaks or disconnections.
- Always check the Catalog etc. to ensure that solenoid valve

wiring and piping is installed correctly. Errors in wiring and piping could lead to abnormal operation.

- Do not use the solenoid valves or the wiring to control them, at locations close to power lines where large electrical currents are flowing, or in locations subject to strong magnetic fields or power surges. Such applications could lead to unintended operation.
- Do not install solenoid valves inside control panels. Heat inside the control panels could cause leakage on the piping or other areas.
- When energizing the solenoid valve for long periods, provide heat radiation measures to ensure that ambient temperature of the solenoid valve always remain within the specified temperature range. When energizing the unit for long periods, consult us.
- The solenoid valve could generate surge voltage and electromagnetic waves when the switch is turned off, affecting the operations of surrounding equipment. Use solenoids with surge suppression, or take countermeasures in the electrical circuits for surges or electromagnetic waves.
- Always shut off the power when performing wiring work. Leaving the power on could result in electric shocks.
- After completing wiring work, always check to ensure that no wiring connection errors exist before turning on the power.
- Apply the specified voltage to the solenoid. Using the wrong voltage level will prevent the solenoid from performing its function, and could lead to breakage or burning damage of the product itself.
- Avoid scratching the solenoid valve lead wires. Letting the lead wires be subject to scratching, excessive bending, pulling, rolling up, or being placed under heavy objects or squeezed between two objects, may result in current leaks or defective continuity that lead to fires, electric shocks, or abnormal operation.
- Do not touch terminals and miscellaneous switches, etc., while the solenoid valve is powered on. There is a possibility of electric shocks and abnormal operation.
- Design devices so as to ensure safety even when equipment shuts down due to emergency stops, power outages, or other system problems, to prevent damage to the devices or personal injury.
- In the first operation after the equipment has been idle for 48 hours or more, or has been in storage, there is a possibility that contacting parts have been sticked, resulting in equipment operation delays or sudden movements. For these first operations, always run a test operation before use to confirm that the movement is normal.
- In low frequency use (more than 30 days between uses), there is a possibility that contacting parts have been sticked, resulting in equipment operation delays or sudden movements that could lead to personal injury. Run a test operation at least once every 30 days to confirm that movement is normal.
- Do not sit on the product, place your foot on it, or place other objects on it. Accidents such as falling and tripping over could result in injury. Dropping the product may result in injury, or also damage or break the product resulting in abnormal or erratic operation, or runaway, etc.
- Do not allow the product to be thrown into fire. The product could explode and/or release toxic gases.

- Do not use in locations that are subject to direct sunlight (ultraviolet rays), in locations with high temperatures or high humidity, in locations subject to dust, salt, or iron powder, or when the media or ambient atmosphere include components that are incompatible with the product structural materials. It could lead to early shutdown of function or a sudden degradation of performance, and result in a reduced operating life. For the material, see the Major Parts and Materials.
- When mounting the product, leave room for adequate working space around it. Failure to ensure adequate working space will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- For installing or transporting heavy products, use a lift, supporting tool, or several people, to provide firm support, and proceed with due caution to ensure personal safety.

- Always post an "operations in progress" sign for installations, adjustments, or other operations, to avoid accidental supply of chemicals, gases, pilot air, or electrical power, etc. Accidental supplying of chemicals, gases, pilot air, or electrical power, etc., could result in injury to operators due to sudden movement of the product, or to electrical shocks.
- Do not bring floppy disks or magnetic media, etc., within one meter [3.28ft.] of the product. There is the possibility that the data on the floppy disks will be destroyed due to the magnetism of the magnet.
- Do not use the solenoid valve in locations subject to large electrical currents or magnetic fields. It could result in erratic operation.
- If leakage current is occurring in the control circuit, there is a possibility of the product performing an unintended operation. Take measures against leakage current in the control circuit, to ensure that the leakage current value does not exceed the allowed range in the product specifications.
- Do not block the product's breathing holes. Pressure changes occur due to changes in volume during operation. Blocking the breathing holes destroys the pressure balance, and could cause failure of the intended operation, equipment damage, or personal injury.

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or User's Manual, or in applications where safety is an important requirement, such as in an airplane facility, combustion equipment, leisure equipment, safety equipment and other places where human life or assets may be greatly affected, take adequate safety precautions such as application with enough margins for ratings and performance or fail-safe measures. Be sure to consult us with such applications.
- The properties of fluororesin products mean that they may sometimes not be used with certain acid, alkaline or toxic fluids due to penetration or permeation. For use in such applications, consult us.
- Always check the Catalog and other reference materials for product wiring and piping.
- Use protective covers, etc., to ensure that the operating parts of mechanical devices, etc., are isolated and do not come into direct contact with human bodies.
- When handling the product, wear protective gloves, safety glasses, safety boots, etc. to keep safety.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste.
- Fluororesin products can show deterioration in performance or function as operating span lengthens. Perform daily inspections of fluororesin products, to check that they satisfy the required functions for the system, and to prevent accidents.
- For inquiries about the product, consult your nearest Koganei sales office or Koganei overseas department. The address and telephone number is shown on the back cover of this catalog.



- Always observe the following items.
 - When using this product in fluid system or pneumatic systems for pilot, always use genuine KOGANEI parts or compatible parts (recommended parts). When conducting maintenance and repairs, always use
 - genuine KOGANEI parts or compatible parts (recommended parts). Always observe the required methods and procedure.
 - 2. Never attempt inappropriate disassembly or assembly of the product relating to basic construction, or to its performance or to functions.

Koganei cannot be responsible if these items are not properly observed.



Note: The pressure difference ΔP in the graph shows the pressure difference between the primary (upstream) gauge pressure P1 and secondary (downstream) gauge pressure P2.

 $\Delta P = P1 - P2$ (MPa)

Flow rate equation (in the equation, pressures Ph and Pl show absolute pressure)

$$Q = 45.62 Cv \frac{\sqrt{Ph - Pl}}{\sqrt{G}}$$

Q: Flow rate ℓ /min

- Ph: Primary (upstream) absolute pressure (Mpa)
- Pl: Secondary (downstream) absolute pressure (Mpa)
- *G*: Specific gravity (for water, this equals 1)

$$Q' = 0.1338 Cv \frac{\sqrt{Ph' - Pl'}}{\sqrt{G}}$$

- *Q*': Flow rate ft³/min. *Cv*: Flow rate coefficient
- *Ph*': Primary (upstream) absolute pressure (psi.)
- *Pl* : Secondary (downstream) absolute pressure (psi.)
- *G*: Specific gravity (for water, this equals 1)

How to use the graph

When there is no diagram for the valve flow rate coefficient (Cv) in the above graph: Multiply the Cv of the valve being used to the flow rate at Cv = 1 read out from the graph to calculate the flow. Example: At Cv = 1, value read out from the graph: $Q=20 \ \ell/min \ [0.706ft^3/min.]$ for the desired pressure difference When flow rate coefficient for the valve being used is Cv = 0.31Seeking flow rate $=Q \times Cv = 20 \times 0.31 = 6.2 \ \ell/min \ [0.219ft_3/min.]$



$$Q = 2056 \, \text{CvPh} \, \frac{1}{\sqrt{G}}$$

$$Q = 2056 CvPh \frac{1}{\sqrt{G}}$$

$$2=2056 CvPh \frac{1}{\sqrt{G}}$$

Ph: Primary (upstream) absolute pressure (Mpa)

Pl: Secondary (downstream) absolute pressure (Mpa) G: Specific gravity (conversion specific gravity, when air is 1)

1) When Pl' / Ph' >0.5283

$$Q'=1.0Cv \frac{\sqrt{(Ph'-Pl')Pl'}}{\sqrt{G}}$$

2) When Pl' / Ph' ≦0.5283

Q': Flow rate ft.3/min. (ANR)

Cv: Flow rate coefficient

$$Q'=0.5CvPh'\frac{1}{\sqrt{G}}$$

Ph': Primary (upstream) absolute pressure (psi.)

Pl: Secondary (downstream) absolute pressure (psi.)

G: Specific gravity (conversion specific gravity, when air is 1)

Fluororesin H Series Fittings

Koganei has developed these high-quality, highperformance fittings using various technologies and know-how gained over the years through our manufacturing of pneumatic systems equipment.

Features

In chemical resistance...

The main body is made of PTFE, while the union nut is made of PFA injection material (some models are PTFE), for superior chemical resistance, making it the optimum choice for use in semiconductors, liquid crystals, biotechnology, medical products, etc. industries.

In shape and performance...

The simple construction, consisting of just the fitting main body and a union nut, is an extremely compact unit that ensures compactness and high performance alongside special seal surface shapes.

In heating resistance...

Sealing performance never degrades even after completion of heating cycles ranging from 150°C [302°F] back down to room temperature, ensuring stable, worry-free performance.

In sealing performance...

Uses a special sealing construction to achieve high sealing performance.



Specifications

Seal type: Tapered seal type

Continuous operating temperature: -15° ~ $+150^{\circ}$ C [5° ~ 302° F] Materials: Body—PTFE

: Union nut

Diameter: 12mm [0.472in.] or less — PFA Diameter: 16mm [0.630in.] or more — PTFE

Recommended operating temperatures and pressure ranges





Caution

The numerical values at left are based on Koganei test results. Note that conditions may vary from practical applications. For this reason, careful evaluation before use is recommended.



In pressure proofing...

High pressure proof under continuous operating pressure of 1MPa [145psi.] at room-temperature (for a diameter of 10mm or less).

During mounting...

Obtains the specified performance merely by inserting a tube into the nut set in the fitting until it rests against the inside of the fitting body, and then tightening the nut.



Applicable Tube Materials

PTFE, PFA, FEP, and other fluororesin tubes

Applicable Tube Sizes/Tolerances

Fitting	oi70	Tube size	Outer diam	eter mm [in.]	Thick	mess mm [in.]
Filling	size	Outer dia .X Inner dia.	Basic dimension	Tolerance	Basic dimension	Tolerance
	3	3×2	3.0 [0.118]		0.5 [0.020]	±0.10 [±0.0039]
	4	4×2	4.0 [0.157]		1.0 [0.039]	±0.10 [±0.0039]
	4	4×3	4.0 [0.157]		0.5 [0.020]	±0.10 [±0.0039]
	6	6×3	6.0 [0.236]		1.5 [0.059]	±0.20 [±0.0079]
	0	6×4	6.0 [0.236]	±0.20	1.0 [0.039]	±0.10 [±0.0039]
	0	8×5	8.0 [0.315]	[±0.0079]	1.5 [0.059]	±0.20 [±0.0079]
	0	8×6	8.0 [0.315]		1.0 [0.039]	±0.10 [±0.0039]
100 100	10	10×7	10.0 [0.394]		1.5 [0.059]	±0.20 [±0.0079]
mm	10	10×8	10.0 [0.394]		1.0 [0.039]	±0.10 [±0.0039]
	10	12×9	12.0 [0.472]		1.5 [0.059]	±0.20 [±0.0079]
1	12	12×10	12.0 [0.472]	±0.30	1.0 [0.039]	±0.10 [±0.0039]
	16	16×13	16.0 [0.630]	[±0.0118]	1.5 [0.059]	±0.15 [±0.0059]
	10	16×14	16.0 [0.630]		1.0 [0.039]	±0.10 [±0.0039]
	10	19×16	19.0 [0.748]		1.5 [0.059]	±0.15 [±0.0059]
	13	19×17	19.0 [0.748]	±0.40	1.0 [0.039]	±0.10 [±0.0039]
	25	25×22	25.0 [0.984]	[±0.0157]	1.5 [0.059]	±0.15 [±0.0059]
	25	25×23	25.0 [0.984]		1.0 [0.039]	±0.10 [±0.0039]
	1/8	3.17×1.59	3.17 [0.1248]		0.79 [0.0311]	土0.15 [土0.0059]
	1/0	3.17×2.17	3.17 [0.1248]		0.5 [0.020]	±0.06 [±0.0024]
		6.35×3.17	6.35 [0.2500]	+0.00	1.59 [0.0626]	
	1/4	6.35×3.96	6.35 [0.2500]	 [±0.0079]	1.2 [0.047]	
Inch		6.35×4.35	6.35 [0.2500]		1.0 [0.039]	±0.20 [±0.0079]
mon	3/8	9.52×6.35	9.52 [0.3748]		1.59 [0.0626]	
	5/0	9.52×7.52	9.52 [0.3748]		1.0 [0.039]	
	1/2	12.7×9.52	12.7 [0.5000]	±0.30	1.59 [0.0626]	+0.30[+0.0118]
	1/2	12.7×10.7	12.7 [0.5000]	[±0.0118]	1.0 [0.039]	
	3/4	19.05×15.88	19.05 [0.7500]	±0.40	1.59 [0.0626]	+0.40[+0.0157]
	4/4	25.40×22.22	25.40 [1.0000]	[±0.0157]	1.59 [0.0626]	<u>-0.40[-0.0157]</u>

Warning

- This product is a fluororesin product. To maintain its performance and ensure safe use, strictly observe the following precautions:
- 1. Do not use for any purposes other than those listed in the catalog, etc.
- 2. Never use in contact with human tissue or fluids, etc.
- 3. Never ingest (accidental swallowing, etc.) products into the human body.
- 4. Do not use at temperatures in excess of the maximum operating temperature specified in the catalog.
- 5. Processing at temperatures above the maximum operating temperature can generate cracked fluorine gases. For this reason, always provide sufficient ventilation, and take measures to avoid inhaling the cracked gas.
- When discarding, use the processes detailed in the waste management and public cleaning law. 6.
- Do not incinerate the discarded product. If, however, incineration must be performed, always do it at an incineration facility equipped with neutralizing agents and other suitable disposal equipment.

Precautions for Product Handling

To avoid deteriorating the performance of this product, read and understand the precautions listed below before use:

- 1. All technical data in this catalog (items expressing product capabilities) are values obtained in actual testing, or are reference values, and are not intended to be guaranteed values.
- Careful investigation of the planned usage is recommended before use.
- 2. Careful investigation is particularly necessary for fluids that are strongly acidic, alkaline, or toxic. For such uses, consult us.
- Due to properties of the material, there is a risk of repeated loads, excessive concentrated loads, or bending loads, having an effect on 3. durability. For such uses, perform careful investigation before use.
- While self-lubrication is a property of fluororesins, abrasive action is also progressive.
- For application in locations where repeated wear occurs, periodic replacement of the product is recommended.
- Due to fluororesin characteristics, the fluid can penetrate or permeate the material, depending on the operating environment.
- In addition, because of the risk of product hardening or changes in dimensions, perform careful investigation before use.
- Some products can be manufactured at specifications not listed in this catalog. In these cases, the products are available within a certain reasonable range of cost and delivery deadlines.
- 7. If some detail is not clear in the above items or elsewhere, consult us.

Handling Instructions and Precautions



Mounting

Tube installing procedure

- 1. Cutting tubes
 - Use a tube cutter, and cut at right angles to the length direction.
- 2. Inserting tubes
 - With the union nut set into the fitting body, insert the tube into the nut.
 - Insert the tube until it reaches the shoulder at the back of the fitting body.
- 3. Tightening the union nut
 - · Lightly finger tighten the union nut.
 - Use a wrench or other tool to tighten the union nut, and tighten until the control gap a is within the "Control gap a dimensions at the time of initial tightening" range.
 - % See the "Control gap a dimensions at the time of initial tightening" table below.
 - When tightening fittings for tube outer diameter sizes of 19 and 25 (3/4, 4/4), manually push the union nut toward the fitting body while tightening.
 - * Tightening without pushing down on the union nut could result in crushed screw threads on the fitting body.

Control gap a dimensions at the time of initial tightening

	mm		Inch
Fitting size	Control gap a* mm [in.]	Fitting size	Control gap a* mm [in.]
3	2.0~1.5 [0.079~0.059]	1/8	2.0~1.5 [0.079~0.059]
4	2.0~1.5 [0.079~0.059]	1/4	2.6~2.1 [0.102~0.083]
6	2.6~2.1 [0.102~0.083]	3/8	2.6~2.1 [0.102~0.083]
8	2.6~2.1 [0.102~0.083]	1/2	2.6~2.1 [0.102~0.083]
10	2.6~2.1 [0.102~0.083]	3/4	3.0~2.5 [0.118~0.098]
12	2.6~2.1 [0.102~0.083]	4/4	3.0~2.5 [0.118~0.098]
16	3.0~2.5 [0.118~0.098]		
19	3.0~2.5 [0.118~0.098]	I he control ga of initial tighte	ap a dimension at the time
25	3.0~2.5 [0.118~0.098]	the point whe	ere the main body threads



the point where the main body threads disappear.

(1) Further tightening is acceptable only in the cases where the nut may become loosened and leakage may occur, due to stress relaxation characteristics of the plastic, and to operating conditions

2 Tighten about 1/4 extra turn.

③ The upper limit of further tightening is about from 1/2 to 3/4 extra turns.

Reuse of product

Since the sealing function of the fitting will be degraded after one use, product reuse cannot obtain the same level of sealing performance as a new product.

Since the sealing performance degradation compared with a new product will vary depending on the application conditions and the amount of time used, perform a careful investigation before reuse.





- •To order, make a selection on the dimensions table, and enter the model code.
- ** All connecting thread sizes are available in NPT thread specifications and G thread (PF thread) specifications. Be sure to enter "N" or "F" before the connecting thread size number. "N" for NPT thread, and "F" for G thread.

Example: F-H-MC-6-<u>N1</u> Example: F-H-MC-6-<u>F1</u>

Dimensions (mm)

F-H-MC—-M6 (-EP)

Male connector M6 thread



Model	Tube outer dia.	φB	С	D	Е	L Before	_1 After	L2	L3	φd
mm	mm	mm				tightening	tightening			
F-H-MC-3-M6(-EP)	3	3.5	13	13	4.5	26.5	23.5	22.5	8	2
F-H-MC-4-M6(-EP)	4	4.5	13	13	4.5	28.5	25.5	23.5	9	2
F-H-MC-6-M6(-EP)	6	6.5	14	14	4.5	31.5	28.1	26.5	11.4	2

F-H-MC

Male connector



Mo	odel	Tube or	uter dia.	Α	φ	В	_			L	_1				
mm	Inch	mm	Inch	R size	, mm	Inch	С	D	E	Before tightening	After tightening	L ₂	L ₃	φd	
F-H-MC-3-1	F-H-MC-1/8-1			1/8					9	28	25	24			
F-H-MC-3-2	F-H-MC-1/8-2	3	1/8	1/4	3.5	3.7	13	13	13	32	29	28	8	2	
F-H-MC-4-1				1/8					9	31	28	26			
F-H-MC-4-2	1 —	4	_	1/4	4.5	_	13	13	13	35	32	30	9	3	
F-H-MC-6-1	F-H-MC-1/4-1			1/8				14	9	33	29.6	28			
F-H-MC-6-2	F-H-MC-1/4-2		4/4	1/4	<u>с</u> г	~ ~		14	13	37	33.6	32	0.4		
F-H-MC-6-3	F-H-MC-1/4-3	6	1/4	3/8	6.5	6.9	14	19	13	37	33.6	32	9.4	4	
F-H-MC-6-4	F-H-MC-1/4-4			1/2				22	17	41	37.6	36			
F-H-MC-8-1			_	1/8				14	9	35	31.6	30		4	
F-H-MC-8-2		8		1/4	0 5		17	14	13	39	35.6	34	0.4	6	
F-H-MC-8-3		0		3/8	0.0			19	13	39	35.6	34	9.4	6	
F-H-MC-8-4				1/2				22	17	43	39.6	38		6	
F-H-MC-10-2	F-H-MC-3/8-2			1/4				17	13	43	39.1	36.5		6	
F-H-MC-10-3	F-H-MC-3/8-3	10	3/8	3/8	10.5	10	19	19	13	43	39.1	36.5	9.4	8	
F-H-MC-10-4	F-H-MC-3/8-4			1/2				22	17	47	43.1	40.5		8	
F-H-MC-12-2	F-H-MC-1/2-2			1/4				19	13	45	41.1	38.5		6	
F-H-MC-12-3	F-H-MC-1/2-3	12	1/2	3/8	12.5	13.2	22	19	13	45	41.1	38.5	9.4	8	
F-H-MC-12-4	F-H-MC-1/2-4			1/2				22	17	49	45.1	42.5		10	
F-H-MC-16-4				1/2				24	17	52.5	47.5	44.5		12	
F-H-MC-16-6		16	—	3/4	16.5	—	30	30	17	55	50	47 11	14		
F-H-MC-16-8				1				36	19	59	54	51		14	
F-H-MC-19-4	F-H-MC-3/4-4			1/2				30	17	58.5	51.5	48.5		12	
F-H-MC-19-6	F-H-MC-3/4-6	19	3/4	3/4	19.5	19.5	36	30	17	61	54	51	13	16	
F-H-MC-19-8	F-H-MC-3/4-8			1			50	3	36	19	65	58	55		16
F-H-MC-25-8	F-H-MC-4/4-8	25 1	1	25.5	25.9	46	36	19	68	61	58	13	22		

F-H-MCT

Male connector through



M	odel	Tube or	uter dia.	Α	φ	В	C	П	E	Boforo	_1Aftor		φ	d
mm	Inch	mm	Inch	R size	mm	Inch			L	tightening	tightening	L2	mm	Inch
F-H-MCT-3-1	F-H-MCT-1/8-1	2	1/0	1/8	0 E	27	10	13	9	28	25	24	2.0	2.4
F-H-MCT-3-2	F-H-MCT-1/8-2	3	1/0	1/4	3.5	3.7	13	14	13	32	29	28	3.2	3.4
F-H-MCT-4-1		4		1/8	45		10	13	9	31	28	26	4 1	_
F-H-MCT-4-2		4		1/4	4.5		13	14	13	35	32	30	4.1	
F-H-MCT-6-1	F-H-MCT-1/4-1			1/8				14	9	33	29.6	28		
F-H-MCT-6-2	F-H-MCT-1/4-2	6	1/4	1/4	65	60	1/	14	13	37	33.6	32	6	61
F-H-MCT-6-3	F-H-MCT-1/4-3	0	1/4	3/8	0.5	0.5	14	19	13	37	33.6	32		0.4
F-H-MCT-6-4	F-H-MCT-1/4-4			1/2				22	17	41	37.6	36		
F-H-MCT-8-1				1/8				14	9	35	31.6	30		
F-H-MCT-8-2		0		1/4	05		17	14	13	39	35.6	34	0	_
F-H-MCT-8-3		0		3/8	0.5		17	19	13	39	35.6	34	0	
F-H-MCT-8-4				1/2				22	17	43	39.6	38		
F-H-MCT-10-2	F-H-MCT-3/8-2			1/4				17	13	43	39.1	36.5		
F-H-MCT-10-3	F-H-MCT-3/8-3	10	3/8	3/8	10.5	10	19	19	13	43	39.1	36.5	10	9.4
F-H-MCT-10-4	F-H-MCT-3/8-4			1/2				22	17	47	43.1	40.5		
F-H-MCT-12-2	F-H-MCT-1/2-2			1/4				19	13	45	41.1	38.5		
F-H-MCT-12-3	F-H-MCT-1/2-3	12	1/2	3/8	12.5	13.2	22	19	13	45	41.1	38.5	12	12.7
F-H-MCT-12-4	F-H-MCT-1/2-4			1/2				22	17	49	45.1	42.5		
F-H-MCT-16-4				1/2				24	17	52.5	47.5	44.5		
F-H-MCT-16-6		16	—	3/4	16.5	—	30	30	17	55	50	47	16	—
F-H-MCT-16-8				1				36	19	59	54	51		
F-H-MCT-19-4	F-H-MCT-3/4-4			1/2				30	17	58.5	51.5	48.5		
F-H-MCT-19-6	F-H-MCT-3/4-6	19	3/4	3/4	19.5	19.5	36	30	17	61	54	51	19	19
F-H-MCT-19-8	F-H-MCT-3/4-8			1				36	19	65	58	55		
F-H-MCT-25-8	F-H-MCT-4/4-8	25	1	1	25.5	25.9	46	36	19	68	61	58	25	25.4

F-H-ME

Male elbow



Мо	del	Tube ou	uter dia.	Α	φ	В	0	D	E.	E	2	E	G	L	.1	La		ا م ا
mm	Inch	mm	Inch	R size	mm	Inch	C	U		Betore tightening	Atter tightening	F	G	Before tightening	Atter tightening	L2	L3	φu
F-H-ME-3-1	F-H-ME-1/8-1	2	1/0	1/8	2 5	27	12	11	16.5	19.5	16.5	9	11	25	22	21	0	0
F-H-ME-3-2	F-H-ME-1/8-2	3	1/0	1/4	3.5	3.7	15	15	20.5	21.5	18.5	13	15	29	26	25	0	2
F-H-ME-4-1		4		1/8	15		12	11	16.5	21.5	18.5	9	11	27	24	22	0	0
F-H-ME-4-2		4		1/4	4.5		15	15	20.5	23.5	20.5	13	15	31	28	26	9	3
F-H-ME-6-1	F-H-ME-1/4-1			1/8				14	17.5	26	22.6	9	14	33	29.6	28		
F-H-ME-6-2	F-H-ME-1/4-2	6	1//	1/4	65	60	14	14	21.5	26	22.6	13	14	33	29.6	28	0.4	4
F-H-ME-6-3	F-H-ME-1/4-3		1/4	3/8	0.5	0.9	14	19	21.5	28.5	25.1	13	19	38	34.6	33	9.4	4
F-H-ME-6-4	F-H-ME-1/4-4			1/2				22	25.5	30	26.6	17	22	41	37.6	36		
F-H-ME-8-1				1/8				14	18.5	27	23.6	9	14	34	30.6	29		4
F-H-ME-8-2	_	8	_	1/4	85	_	17	14	22.5	27	23.6	13	14	34	30.6	29	91	6
F-H-ME-8-3		0		3/8	0.5		17	19	22.5	29.5	26.1	13	19	39	35.6	34	9.4	6
F-H-ME-8-4				1/2				22	26.5	31	27.6	17	22	42	38.6	37		6
F-H-ME-10-2	F-H-ME-3/8-2			1/4				17	24	31	27.1	13	17	39.5	35.6	33		6
F-H-ME-10-3	F-H-ME-3/8-3	10	3/8	3/8	10.5	10	19	19	24	32	28.1	13	19	41.5	37.6	35	9.4	8
F-H-ME-10-4	F-H-ME-3/8-4			1/2				22	29	33.5	29.6	17	22	44.5	40.6	38		8
F-H-ME-12-2	F-H-ME-1/2-2			1/4				19	26	33	29.1	13	19	42.5	38.6	36		6
F-H-ME-12-3	F-H-ME-1/2-3	12	1/2	3/8	12.5	13.2	22	19	26	33	29.1	13	19	42.5	38.6	36	9.4	10
F-H-ME-12-4	F-H-ME-1/2-4			1/2				22	30	34.5	30.6	17	22	45.5	41.6	39		10
F-H-ME-16-4				1/2				24	35	40	35	17	24	52	47	44		12
F-H-ME-16-6	—	16	—	3/4	16.5	—	30	30	35	43	38	17	30	58	53	50	11	14
F-H-ME-16-8				1				36	37	46	41	19	36	64	59	56		14
F-H-ME-19-4	F-H-ME-3/4-4			1/2				30	38	47.5	40.5	17	27	61	54	51		12
F-H-ME-19-6	F-H-ME-3/4-6	19	3/4	3/4	19.5	19.5	36	30	38	49	42	17	30	64	57	54	13	16
F-H-ME-19-8	F-H-ME-3/4-8			1				36	40	52	45	19	36	70	63	60		16
F-H-ME-25-8	F-H-ME-4/4-8	25	1	1	25.5	25.9	46	36	46	55	48	19	36	73	66	63	13	22

F-H-MBT

Male branch tee



	Мо	del	Tube ou	uter dia.	A	ϕ	В	0		E	E	2	E	G	L	.1			4 d
	mm	Inch	mm	Inch	R size	mm	Inch	U			Before tightening	After tightening	1	u	Before tightening	After tightening	L2	L3	φu
s D	F-H-MBT-3-1	F-H-MBT-1/8-1	0	1 /0	1/8	25	27	10	11	16.5	19.5	16.5	9	11	39	33	31	0	
	F-H-MBT-3-2	F-H-MBT-1/8-2	3	1/0	1/4	3.5	3.7	13	14	20.5	21	18	13	14	42	36	34	0	2
	F-H-MBT-4-1		4		1/8	15		10	11	16.5	21.5	18.5	9	11	43	37	33	0	2
	F-H-MBT-4-2		4		1/4	4.5		13	14	20.5	23	20	13	14	46	40	36	9	3
	F-H-MBT-6-1	F-H-MBT-1/4-1			1/8				14	17.5	26	22.6	9	14	52	45.2	42		
	F-H-MBT-6-2	F-H-MBT-1/4-2	6	1//	1/4	65	60	14	14	21.5	26	22.6	13	14	52	45.2	42	01	4
1	F-H-MBT-6-3	F-H-MBT-1/4-3	0	1/4	3/8	0.5	0.5	14	19	21.5	28.5	25.1	13	19	57	50.2	47	9.4	4
	F-H-MBT-6-4	F-H-MBT-1/4-4			1/2				22	25.5	30	26.6	17	22	60	53.2	50		
	F-H-MBT-8-1				1/8				14	18.5	27	23.6	9	14	54	47.2	44		4
1	F-H-MBT-8-2		0		1/4	95		17	14	22.5	27	23.6	13	14	54	47.2	44	01	6
	F-H-MBT-8-3		0		3/8	0.5		17	19	22.5	29.5	26.1	13	19	59	52.2	49	9.4	6
	F-H-MBT-8-4				1/2				22	26.5	31	27.6	17	22	62	55.2	52		6
	F-H-MBT-10-2	F-H-MBT-3/8-2			1/4				17	24	31	27.1	13	17	62	54.2	49		6
	F-H-MBT-10-3	F-H-MBT-3/8-3	10	3/8	3/8	10.5	10	19	19	24	32	28.1	13	19	64	56.2	51	9.4	8
	F-H-MBT-10-4	F-H-MBT-3/8-4			1/2				22	29	33.5	29.6	17	22	67	59.2	54		8
	F-H-MBT-12-2	F-H-MBT-1/2-2			1/4				19	26	33	29.1	13	19	66	58.2	53		6
	F-H-MBT-12-3	F-H-MBT-1/2-3	12	1/2	3/8	12.5	13.2	22	19	26	33	29.1	13	19	66	58.2	53	9.4	8
	F-H-MBT-12-4	F-H-MBT-1/2-4			1/2				22	30	34.5	30.6	17	22	69	61.2	56		10
	F-H-MBT-16-4				1/2				24	35	40	35	17	24	80	70	64		12
	F-H-MBT-16-6	—	16	—	3/4	16.5		30	30	36	43	38	18	30	86	76	70	11	14
	F-H-MBT-16-8				1				36	37	46	41	19	36	92	82	76		14
	F-H-MBT-19-4	F-H-MBT-3/4-4			1/2				30	38	47.5	40.5	17	27	95	81	75		12
	F-H-MBT-19-6	F-H-MBT-3/4-6	19	3/4	3/4	19.5	19.5	36	30	39	49	42	18	30	98	84	78	13	16
	F-H-MBT-19-8	F-H-MBT-3/4-8			1				36	40	52	45	19	36	104	90	84		16
	F-H-MBT-25-8	F-H-MBT-4/4-8	25	1	1	25.5	25.9	46	36	47	55	48	20	36	110	96	90	13	22

F-H-MRT

Male run tee



M	odel	Tube or	uter dia.	A	φ	В	~		E	1	E	2	_	_		I	_1	.		
mm	Inch	mm	Inch	R size	mm	Inch	C	D	Before tightening	After tightening	Before tightening	After tightening	E3	F	G	Before tightening	After tightening	L2	L3	φa
F-H-MRT-3-1	F-H-MRT-1/8-1		1/0	1/8	2.5	2.7	10	11	21.5	18.5	01 5	10 5	17.5	9	15	38	35	34		0
F-H-MRT-3-2	F-H-MRT-1/8-2	3	1/0	1/4	3.5	3.7	13	14	21.5	18.5	21.5	18.5	17.5	13	15	42	39	38	°	2
F-H-MRT-4-1		4		1/8	4 5		10	11	23.5	20.5	00 F	00 E	18.5	9	15	40	37	35		2
F-H-MRT-4-2		4		1/4	4.5		13	14	25.5	22.5	23.5	20.5	20.5	13	15	44	41	39	9	3
F-H-MRT-6-1	F-H-MRT-1/4-1			1/8				14	26	22.6			21	9		45	41.6	40		
F-H-MRT-6-2	F-H-MRT-1/4-2	6	1/4	1/4	6.5	6.0	14	14	26	22.6	27.5	24.1	21	14	17	50	46.6	45	0.4	4
F-H-MRT-6-3	F-H-MRT-1/4-3	0	1/4	3/8	0.5	0.9	14	19	28.5	25.1			23.5	14	17	50	46.6	45	9.4	4
F-H-MRT-6-4	F-H-MRT-1/4-4			1/2				22	30	26.6	30	26.6	25	14		55	51.6	50		
F-H-MRT-8-1				1/8				14	27.5	24.1			22.5	9		48	44.6	43		4
F-H-MRT-8-2				1/4	0 5		17	14	27	23.6	20 F	26.1	22	13	10	52	48.6	47	0.4	6
F-H-MRT-8-3		0		3/8	0.5		17	19	29.5	26.1	29.5	20.1	24.5	13	19	52	48.6	47	9.4	6
F-H-MRT-8-4				1/2				22	31	27.6			26	17		56	52.6	51		6
F-H-MRT-10-2	F-H-MRT-3/8-2			1/4				17	31	27.1			24.5	13		57.5	53.6	51		6
F-H-MRT-10-3	F-H-MRT-3/8-3	10	3/8	3/8	10.5	10	19	19	32	28.1	33.5	29.6	25.5	13	22	57.5	53.6	51	9.4	8
F-H-MRT-10-4	F-H-MRT-3/8-4			1/2				22	33.5	29.6			27	17		61.5	57.6	55		8
F-H-MRT-12-2	F-H-MRT-1/2-2			1/4				19	33	29.1			26.5	13		62.5	58.6	56		6
F-H-MRT-12-3	F-H-MRT-1/2-3	12	1/2	3/8	12.5	13.2	22	19	33	29.1	36.5	32.6	26.5	13	26	62.5	58.6	56	9.4	8
F-H-MRT-12-4	F-H-MRT-1/2-4			1/2				22	34.5	30.6			28	17		66.5	62.6	60		10
F-H-MRT-16-4				1/2				24	40.5	35.5			32.5	17		81	76	73		12
F-H-MRT-16-6	_	16	—	3/4	16.5	—	30	30	43	38	47	42	35	18	36	82	77	74	11	14
F-H-MRT-16-8				1				36	46	41			38	20		84	79	76		14
F-H-MRT-19-4	F-H-MRT-3/4-4			1/2				30	49	42			39	17		93	86	83		12
F-H-MRT-19-6	F-H-MRT-3/4-6	19	3/4	3/4	19.5	19.5	36	30	49	42	55	48	39	18	42	94	87	84	13	16
F-H-MRT-19-8	F-H-MRT-3/4-8			1				36	52	45			42	19		95	88	85		16
F-H-MRT-25-8	F-H-MRT-4/4-8	25	1	1	25.5	25.9	46	36	55	48	64	57	45	19	54	110	103	100	13	22

F-H-FC

Female connector



	Mc	odel	Tube or	uter dia.	A	φ	В	C		Before	_1 After	10	1.0	4 d			
	mm	Inch	mm	Inch	R size	mm	Inch	0		tightening	tightening	L2	L3	φu			
	F-H-FC-3-1	F-H-FC-1/8-1	2	1/0	1/8	2.5	0.7	10	17	29	26	25	0	0			
	F-H-FC-3-2	F-H-FC-1/8-2	3	1/0	1/4	3.5	3.7	13	19	34	31	30	0	2			
	F-H-FC-4-1		4		1/8	15		12	17	32	29	27	0	2			
	F-H-FC-4-2		4		1/4	4.5		15	19	37	34	32	9	3			
	F-H-FC-6-1	F-H-FC-1/4-1			1/8				17	34	30.6	29					
	F-H-FC-6-2	F-H-FC-1/4-2	6	1/4	1/4	65	69	1/	19	38	34.6	33	Q 1	1			
	F-H-FC-6-3	F-H-FC-1/4-3	0	1/4	3/8	0.5	0.5	14	24	38	34.6	33	5.4	-			
	F-H-FC-6-4	F-H-FC-1/4-4			1/2				30	42	38.6	37					
	F-H-FC-8-1	_			1/8				17	35	31.6	30					
5	F-H-FC-8-2		8	_	1/4	85		17	19	40	36.6	35	Q /	6			
	F-H-FC-8-3		0	_	3/8	0.5		17	24	40	36.6	35	5.4				
	F-H-FC-8-4				1/2				30	44	40.6	39					
	F-H-FC-10-2	F-H-FC-3/8-2			1/4				19	41.5	37.6	35					
	F-H-FC-10-3	F-H-FC-3/8-3	10	3/8	3/8	10.5	10	19	24	41.5	37.6	35	9.4	8			
	F-H-FC-10-4	F-H-FC-3/8-4			1/2				30	45.5	41.6	39					
	F-H-FC-12-2	F-H-FC-1/2-2			1/4				19	43.5	39.6	37					
	F-H-FC-12-3	F-H-FC-1/2-3	12	1/2	3/8	12.5	13.2	22	24	43.5	39.6	37	9.4	10			
	F-H-FC-12-4	F-H-FC-1/2-4			1/2				30	48	44.1	41.5					
	F-H-FC-16-4	_			1/2				30	52	47	44					
	F-H-FC-16-6		16		3/4	16.5	—	30	41	56	51	48	11	14			
	F-H-FC-16-8		19 3/4		1				46	58	53	50					
	F-H-FC-19-4	F-H-FC-3/4-4			1/2				30	58	51	48					
	F-H-FC-19-6	F-H-FC-3/4-6		3/4	3/4	19.5	19.5	36	36	36	36	41	62	55	52	13	16
	F-H-FC-19-8	F-H-FC-3/4-8			1				46	64	57	54					
	F-H-FC-25-8	F-H-FC-4/4-8	25	1	1	25.5	25.9	46	46	67	60	57	13	22			

F-H-FE

Female elbow



	Mc	del	Tube or	uter dia.	Α	þ	B				E	2	L	.1			
	mm	Inch	mm	Inch	R size	mm	Inch	С	D	E1	Before tightening	After tightening	Before tightening	After tightening	L2	L3	φd
_	F-H-FE-3-1	F-H-FE-1/8-1	0	1/0	1/8	0 E	0.7	10	17	17.5	22.5	19.5	31	28	27	0	0
D	F-H-FE-3-2	F-H-FE-1/8-2	3	1/0	1/4	3.5	3.7	13	19	19.5	23.5	20.5	33	30	29	0	2
	F-H-FE-4-1				1/8	4.5		10	17	17.5	24.5	21.5	33	30	28	0	_
	F-H-FE-4-2		4		1/4	4.5		13	19	19.5	25.5	22.5	35	32	30	9	3
	F-H-FE-6-1	F-H-FE-1/4-1			1/8				17	17.5	27.5	24.1	36	32.6	31		
	F-H-FE-6-2	F-H-FE-1/4-2	6	1/4	1/4	65	60	- 1	19	19.5	28.5	25.1	38	34.6	33	0.4	
	F-H-FE-6-3	F-H-FE-1/4-3	0	1/4	3/8	0.5	0.9	14	24	19.5	31	27.6	43	39.6	38	9.4	4
	F-H-FE-6-4	F-H-FE-1/4-4			1/2				30	24.5	34	30.6	49	45.6	44		
	F-H-FE-8-1				1/8				17	18.5	28.5	25.1	37	33.6	32		
	F-H-FE-8-2		0		1/4	0 5		17	19	20.5	29	25.6	38	34.6	33	0.4	6
	F-H-FE-8-3		0		3/8	0.5		17	24	20.5	31.5	28.1	43	39.6	38	9.4	0
	F-H-FE-8-4				1/2				30	25.5	35	31.6	50	46.6	45		
	F-H-FE-10-2	F-H-FE-3/8-2			1/4				19	21.5	32	28.1	41.5	37.6	35		
	F-H-FE-10-3	F-H-FE-3/8-3	10	3/8	3/8	10.5	10	19	24	21.5	34.5	30.6	46.5	42.6	40	9.4	8
	F-H-FE-10-4	F-H-FE-3/8-4			1/2				30	26.5	37.5	33.6	52.5	48.6	46		
	F-H-FE-12-2	F-H-FE-1/2-2			1/4				19	22.5	33	29.1	42.5	38.6	36		
	F-H-FE-12-3	F-H-FE-1/2-3	12	1/2	3/8	12.5	13.2	22	24	22.5	35.5	31.6	47.5	43.6	41	9.4	10
	F-H-FE-12-4	F-H-FE-1/2-4			1/2				24	27.5	38.5	34.6	53.5	49.6	47		
	F-H-FE-16-4				1/2				30	35	43	38	58	53	50		
	F-H-FE-16-6		16	—	3/4	16.5	—	30	41	39	48.5	43.5	69	64	61	11	14
	F-H-FE-16-8				1				46	41	51	46	74	69	66		
	F-H-FE-19-4	F-H-FE-3/4-4			1/2				30	37	49	42	64	57	54		
	F-H-FE-19-6	F-H-FE-3/4-6	19	3/4	3/4	19.5	19.5	36	41	41	54.5	47.5	75	68	65	13	16
	F-H-FE-19-8	F-H-FE-3/4-8			1				46	43	57	50	80	73	70		
	F-H-FE-25-8	F-H-FE-4/4-8	25	1	1	25.5	25.9	46	46	45	60	53	83	76	73	13	22

F-H-FBT

Female branch tee



Mc	del	Tube or	uter dia.	A	φ	В	~	_	_	E	2	~	L	.1			
mm	Inch	mm	Inch	R size	mm	Inch	C	D	E1	Before tightening	After tightening	G	Before tightening	After tightening	L2	L3	φα
F-H-FBT-3-1	F-H-FBT-1/8-1	2	1 /0	1/8	25	27	10	17	17.5	22.5	19.5	17	45	39	37	0	2
F-H-FBT-3-2	F-H-FBT-1/8-2	3	1/0	1/4	3.5	3.7	13	19	19.5	23.5	20.5	19	47	41	39	0	2
F-H-FBT-4-1		4		1/8	15		10	17	17.5	24.5	21.5	17	49	43	39	0	2
F-H-FBT-4-2		4		1/4	4.5		13	19	19.5	25.5	22.5	19	51	45	41	9	3
F-H-FBT-6-1	F-H-FBT-1/4-1			1/8				17	17.5	27.5	24.1	17	55	48.2	45		
F-H-FBT-6-2	F-H-FBT-1/4-2	6	1//	1/4	65	60	1/	17	19.5	28.5	25.1	19	57	50.2	47	0.1	
F-H-FBT-6-3	F-H-FBT-1/4-3	0	1/4	3/8	0.5	0.5	14	24	19.5	31	27.6	24	62	55.2	52	5.4	4
F-H-FBT-6-4	F-H-FBT-1/4-4			1/2				30	24.5	34	30.6	30	68	61.2	58		
F-H-FBT-8-1				1/8				17	18.5	28.5	25.1	17	57	50.2	47		
F-H-FBT-8-2		0		1/4	95		17	19	20.5	29.5	26.1	19	59	52.2	49	0.1	6
F-H-FBT-8-3				3/8	0.5		17	24	20.5	32	28.6	24	64	57.2	54	5.4	0
F-H-FBT-8-4				1/2				30	25.5	35	31.6	30	70	63.2	60		
F-H-FBT-10-2	F-H-FBT-3/8-2			1/4				19	21.5	32	28.1	19	64	56.2	51		Í -
F-H-FBT-10-3	F-H-FBT-3/8-3	10	3/8	3/8	10.5	10	19	24	21.5	34.5	30.6	24	69	61.2	56	9.4	8
F-H-FBT-10-4	F-H-FBT-3/8-4			1/2				30	26.5	37.5	33.6	30	75	67.2	62		
F-H-FBT-12-2	F-H-FBT-1/2-2			1/4				19	22.5	33	29.1	19	66	58.2	53		
F-H-FBT-12-3	F-H-FBT-1/2-3	12	1/2	3/8	12.5	13.2	22	24	22.5	35.5	31.6	24	71	63.2	58	9.4	10
F-H-FBT-12-4	F-H-FBT-1/2-4			1/2				30	27.5	38.5	34.6	30	77	69.2	64		
F-H-FBT-16-4				1/2				30	35	43	38	30	86	76	70		Í -
F-H-FBT-16-6		16	—	3/4	16.5	—	30	41	39	48.5	43.5	41	97	87	81	11	14
F-H-FBT-16-8				1				46	41	51	46	46	102	92	86		
F-H-FBT-19-4	F-H-FBT-3/4-4			1/2				30	37	49	42	30	98	84	78		
F-H-FBT-19-6	F-H-FBT-3/4-6	19	3/4	3/4	19.5	19.5	36	41	41	54.5	47.5	41	109	95	89	13	16
F-H-FBT-19-8	F-H-FBT-3/4-8			1				46	43	57	50	46	114	100	94		
F-H-FBT-25-8	F-H-FBT-4/4-8	25	1	1	25.5	25.9	46	46	45	60	53	46	120	106	100	13	22

F-H-FRT

Female run tee



Мо	del	Tube or	ıter dia	Δ	đ	B			F	1	E	2		L	.1			
mm	Inch	mm	Inch	R size	mm	Inch	С	D	Before tightening	After tiahtenina	Before tightening	After tiahtenina	Eз	Before tiahtenina	After tiahtenina	L2	Lз	φd
F-H-FRT-3-1	F-H-FRT-1/8-1			1/8				17	22.5	19.5		10.5	18.5	38	35	34		
F-H-FRT-3-2	F-H-FRT-1/8-2	3	1/8	1/4	3.5	3.7	13	19	23.5	20.5	21.5	18.5	19.5	40	37	36	8	2
F-H-FRT-4-1				1/8	4.5		4.0	17	24.5	21.5		00 F	19.5	41	38	36	•	•
F-H-FRT-4-2	_	4	_	1/4	4.5	_	13	19	25.5	22.5	23.5	20.5	20.5	43	40	38	9	3
F-H-FRT-6-1	F-H-FRT-1/4-1			1/8				17	27.5	24.1			22.5	45	41.6	40		
F-H-FRT-6-2	F-H-FRT-1/4-2	6	4 / 4	1/4	6 F	<u> </u>	4.4	19	28.5	25.1	07 5	04.4	23.5	46	42.6	41	0.4	4
F-H-FRT-6-3	F-H-FRT-1/4-3	ю	1/4	3/8	0.5	0.9	14	24	31	27.6	27.5	24.1	26	46	42.6	41	9.4	4
F-H-FRT-6-4	F-H-FRT-1/4-4			1/2				30	34	30.6			29	51	47.6	46		
F-H-FRT-8-1				1/8				17	28.5	25.1			23.5	48	44.6	43		
F-H-FRT-8-2		0		1/4	0 5		17	19	29.5	26.1	20 5	26 1	24.5	50	46.6	45	0.4	e
F-H-FRT-8-3		0		3/8	0.5		17	24	32	28.6	29.5	20.1	27	50	46.6	45	9.4	0
F-H-FRT-8-4				1/2				30	35	31.6			30	55	51.6	50		
F-H-FRT-10-2	F-H-FRT-3/8-2			1/4				19	32	28.1			25.5	54.5	50.6	48		
F-H-FRT-10-3	F-H-FRT-3/8-3	10	3/8	3/8	10.5	10	19	24	34.5	30.6	33.5	29.6	28	54.5	50.6	48	9.4	8
F-H-FRT-10-4	F-H-FRT-3/8-4			1/2				30	37.5	33.6			31	59.5	55.6	53		
F-H-FRT-12-2	F-H-FRT-1/2-2			1/4				19	33.5	29.6			27	59.5	55.6	53		
F-H-FRT-12-3	F-H-FRT-1/2-3	12	1/2	3/8	12.5	13.2	22	24	35.5	31.6	37	33.1	29	59.5	55.6	53	9.4	10
F-H-FRT-12-4	F-H-FRT-1/2-4			1/2				30	38.5	34.6			32	64.5	60.6	58		
F-H-FRT-16-4				1/2				30	43	38			35	79	74	71		
F-H-FRT-16-6	—	16	—	3/4	16.5	—	30	41	48.5	43.5	46	41	40.5	83	78	75	11	14
F-H-FRT-16-8				1				46	49	44			41	85	80	77		
F-H-FRT-19-4	F-H-FRT-3/4-4			1/2				30	49	42			39	88	81	78		
F-H-FRT-19-6	-H-FRT-3/4-6	19	3/4	3/4	19.5	19.5	36	41	54.5	47.5	55	48	44.5	92	85	82	13	16
F-H-FRT-19-8	F-H-FRT-3/4-8			1				46	57	50			47	94	87	84		
F-H-FRT-25-8	F-H-FRT-4/4-8	25	1	1	25.5	25.9	46	46	60	53	64	57	50	109	102	99	13	22

F-H-U

Union



Mc	odel	Tube ou	uter dia.	φ	В	C	П	Before	_1 Aftor			4 d
mm	Inch	mm	Inch	mm	Inch	0	D	tightening	tightening	L2	L3	φu
F-H-U-3	F-H-U-1/8	3	1/8	3.5	3.7	13	10	38	32	30	8	2
F-H-U-4	—	4	_	4.5	—	13	10	44	38	34	9	3
F-H-U-6	F-H-U-1/4	6	1/4	6.5	6.9	14	14	45	38.2	35	9.4	4
F-H-U-8	-H-U-6 F-H-U-1/4 -H-U-8 —		_	8.5	—	17	14	49	42.2	39	9.4	6
F-H-U-10	F-H-U-3/8	10	3/8	10.5	10	19	17	52.5	44.7	39.5	9.4	8
F-H-U-12	F-H-U-1/2	12	1/2	12.5	13.2	22	19	56.5	48.7	43.5	9.4	10
F-H-U-16	—	16	—	16.5	—	30	24	64	54	48	11	14
F-H-U-19	F-H-U-3/4	19	3/4	19.5	19.5	36	30	78	64	58	13	16
F-H-U-25	F-H-U-4/4	25	1	25.5	25.9	46	36	86	72	66	13	22

F-H-UE

Union elbow



	Mc	del	Tube or	uter dia.	φ	В	C	р	Before	After	G	Before	.1 After	12	13	٨d
n	mm	Inch	mm	Inch	mm	Inch	0		tightening	tightening	ч	tightening	tightening	L	L3	ψū
ร า	F-H-UE-3	F-H-UE-1/8	3	1/8	3.5	3.7	13	10	24	21	15	29	26	25	8	2
_	F-H-UE-4	—	4	—	4.5	—	13	10	23.5	20.5	12.5	28.5	25.5	23.5	9	3
	F-H-UE-6	F-H-UE-1/4	6	1/4	6.5	6.9	14	14	26.5	23.1	14	33	29.6	28	9.4	4
	F-H-UE-8	_	8	_	8.5		17	14	30	26.6	17	37	33.6	32	9.4	6
	F-H-UE-10	F-H-UE-3/8	10	3/8	10.5	10	19	17	33	29.1	19	41.5	37.6	35	9.4	8
	F-H-UE-12	F-H-UE-1/2	12	1/2	12.5	13.2	22	19	37	33.1	23	46.5	42.6	40	9.4	10
	F-H-UE-16	_	16	—	16.5		30	24	45	40	29.5	57.5	52.5	49.5	11	14
	F-H-UE-19	F-H-UE-3/4	19	3/4	19.5	19.5	36	30	55	48	36	70	63	60	13	16
	F-H-UE-25	F-H-UE-4/4	25	1	25.5	25.9	46	36	64	57	45	82	75	72	13	22

F-H-UT

Union tee



Mo	odel	Tube ou	uter dia.	φ	В	0	D	E	1	Ea	G	L	.1	1.	1.	/ d
mm	Inch	mm	Inch	mm	Inch	C	U	Before tightening	After tightening	⊑2	G	Before tightening	After tightening	∟2	∟3	φu
F-H-UT-3	F-H-UT-1/8	3	1/8	3.5	3.7	13	10	21.5	18.5	17.5	15	43	37	35	8	2
F-H-UT-4	—	4	—	4.5	—	13	10	23.5	20.5	18.5	15	47	41	37	9	3
F-H-UT-6	F-H-UT-1/4	6	1/4	6.5	6.9	14	14	26.5	23.1	21.5	15	53	46.2	43	9.4	4
F-H-UT-8	—	8	—	8.5	—	17	14	30	26.6	25	20	60	53.2	50	9.4	6
F-H-UT-10	F-H-UT-3/8	10	3/8	10.5	10	19	19	33	29.1	26.5	21	66	58.2	53	9.4	8
F-H-UT-12	F-H-UT-1/2	12	1/2	12.5	13.2	22	19	37	33.1	30.5	27	74	66.2	61	9.4	10
F-H-UT-16	_	16	—	16.5	—	30	24	45	40	37	34	90	80	74	11	14
F-H-UT-19	F-H-UT-3/4	19	3/4	19.5	19.5	36	30	54	47	44	40	108	94	88	13	16
F-H-UT-25	F-H-UT-4/4	25	1	25.5	25.9	46	36	64	57	54	54	128	114	108	13	22

F-H-PU

Panel union



Mc	del	Tube ou	uter dia.	φ	В	<u> </u>		Max. panel thickness	L	.1	1.0	E	.1		1.0	4.4
mm	Inch	mm	Inch	mm	Inch	C	U	Т	tightening	After tightening	L2	tightening	After tightening	U	L3	φu
F-H-PU-3	F-H-PU-1/8	3	1/8	3.5	3.7	13	13	7	49	43	41	31	25	M6	8	2
F-H-PU-4		4	—	4.5	—	13	13	7	51	47	43	32	28	M8	9	3
F-H-PU-6	F-H-PU-1/4	6	1/4	6.5	6.9	14	14	7	59	52.2	49	37	30.2	M11	9.4	4
F-H-PU-8	—	8	—	8.5		17	17	7	61	54.2	51	38	31.2	M13	9.4	6
F-H-PU-10	F-H-PU-3/8	10	3/8	10.5	10	19	19	6	66.8	59	53.8	41.4	33.6	M15	9.4	8
F-H-PU-12	F-H-PU-1/2	12	1/2	12.5	13.2	22	22	6	68.4	60.6	55.4	42.4	34.6	M17	9.4	10
F-H-PU-16	—	16	_	16.5	—	30	30	7	75.6	65.6	59.6	47.8	37.8	M23	11	14
F-H-PU-19	F-H-PU-3/4	19	3/4	19.5	19.5	36	36	7	90	76	70	56	42	M28	13	16
F-H-PU-25	F-H-PU-4/4	25	1	25.5	25.9	46	46	7	97.8	83.8	77.8	61	47	M34	13	22

F-H-RU

Reducing union



Model	Tube outer dia.	φ B1	φ B2	C ₁	C2	D	Before	_1 After	L2	La	L4	ød
mm	mm	mm	mm	0.	01	_	tightening	tightening				7 -
F-H-RU-3-6	3-6	3.5	6.5	13	14	14	40	33.6	31	8	9.4	2
F-H-RU-4-6	4-6	4.5	6.5	13	14	14	42	35.6	32	9	9.4	3
F-H-RU-6-8	6-8	6.5	8.5	14	17	14	48	41.2	38	9.4	9.4	4
F-H-RU-6-10	6-10	6.5	10.5	14	19	17	49	41.7	37.5	9.4	9.4	4
F-H-RU-8-10	8-10	8.5	10.5	17	19	17	50	42.7	38.5	9.4	9.4	6
F-H-RU-10-12	10-12	10.5	12.5	19	22	19	55.3	47.5	42.5	9.4	9.4	8
F-H-RU-12-16	12-16	12.5	16.5	22	30	24	60.5	51.6	45	9.4	11	10
F-H-RU-12-19	12-19	12.5	19.5	22	36	30	68.5	57.6	51	9.4	13	10
F-H-RU-16-19	16-19	16.5	19.5	30	36	30	72	60	54	11	13	14
F-H-RU-19-25	19-25	19.5	25.5	36	46	36	83	69	63	13	13	16

Model	Tube outer dia.	φ B1	φ B 2	C ₁	C.2	D	Before	_1 After	12	13		۶d
mm	Inch	Inch	Inch		02		tightening	tightening	62	20	+	φü
F-H-RU-1/8-1/4	1/8-1/4	3.7	6.9	13	14	14	40	33.6	31	8	9.4	2
F-H-RU-1/4-3/8	1/4-3/8	6.9	10	14	19	17	49	41.7	37.5	9.4	9.4	4
F-H-RU-3/8-1/2	3/8-1/2	10	13.2	19	22	19	55.3	47.5	42.5	9.4	9.4	8
F-H-RU-1/2-3/4	1/2-3/4	13.2	19.5	22	36	30	68.5	57.6	51	9.4	13	10
F-H-RU-3/4-4/4	3/4-4/4	19.5	25.9	36	46	36	83	69	63	13	13	16

Model	Tube outer dia.	φ B1	φ B 2	C1	C2	D	L Before	.1 After	2	3	14	٨d
mm-inch	mm-inch	mm	Inch	0.	01		tightening	tightening				φ ~
F-H-RU-3-1/8	3-1/8	3.5	3.7	13	13	10	38	32	30	8	8	2
F-H-RU-4-1/8	4-1/8	4.5	3.7	13	13	10	42	36	33	9	8	3
F-H-RU-6-1/4	6-1/4	6.5	6.9	14	14	14	45	38.2	35	9.4	9.4	4
F-H-RU-8-1/4	8-1/4	8.5	6.9	17	14	14	48	41.2	38	9.4	9.4	4
F-H-RU-10-3/8	10-3/8	10.5	10	19	19	17	52.5	44.7	39.5	9.4	9.4	8
F-H-RU-12-1/2	12-1/2	12.5	13.2	22	22	19	56.5	48.7	43.5	9.4	9.4	10
F-H-RU-16-1/2	16-1/2	16.5	13.2	30	22	24	59.5	50.6	45	11	9.4	10
F-H-RU-19-3/4	19-3/4	19.5	19.5	36	36	30	78	64	58	13	13	16
F-H-RU-25-4/4	25-4/4	25.5	25.9	46	46	36	86	72	66	13	13	22

F-H-RUE L 1 Reducing union elbow Width across flats D L2 Gı L3 ¢d1 ¢₿1 g ŝ φd2 Е ° Nut width across flats C1 Еı Nut width across flats C2 φB2

Model	Tube outer dia.	φ B1	φ B2	<u> </u>	C a	D	Defere	.1			L	.4	Le		G	Ga	Defere	1	Poforo	E2	/ di	/ da
mm	mm	mm	mm	UI	02	U	tightening	tightening	L2	L3	tightening	tightening	L5	L6	Gi	G2	tightening	tightening	tightening	tightening	φ U1	φ u 2
F-H-RUE-3-6	3-6	3.5	6.5	13	14	14	29	26	25	8	33	29.6	28	9.4	15	14	24	21	26.5	23.1	2	4
F-H-RUE-4-6	4-6	4.5	6.5	13	14	14	28.5	25.5	23.5	9	33	29.6	28	9.4	12.5	14	23.5	20.5	26.5	23.1	3	4
F-H-RUE-6-8	6-8	6.5	8.5	14	17	14	33	29.6	28	9.4	37	33.6	32	9.4	14	17	26.5	23.1	30	26.6	4	6
F-H-RUE-6-10	6-10	6.5	10.5	14	19	17	33	29.6	28	9.4	41.5	37.6	35	9.4	14	19	26.5	23.1	33	29.1	4	8
F-H-RUE-8-10	8-10	8.5	10.5	17	19	17	37	33.6	32	9.4	41.5	37.6	35	9.4	17	19	30	26.6	33	29.1	6	8
F-H-RUE-10-12	10-12	10.5	12.5	19	22	19	41.5	37.6	35	9.4	46.5	42.6	40	9.4	19	23	33	29.1	37	33.1	8	10
F-H-RUE-12-16	12-16	12.5	16.5	22	30	24	46.5	42.6	40	9.4	57.5	52.5	49.5	11	23	29.5	37	33.1	45	40	10	14
F-H-RUE-12-19	12-19	12.5	19.5	22	36	30	46.5	42.6	40	9.4	70	63	60	13	23	36	37	33.1	55	48	10	16
F-H-RUE-16-19	16-19	16.5	19.5	30	36	30	57.5	52.5	49.5	11	70	63	60	13	29.5	36	45	40	55	48	14	16
F-H-RUE-19-25	19-25	19.5	25.5	36	46	36	70	63	60	13	82	75	72	13	36	45	55	48	64	57	16	22

Model	Tube outer dia	φ B1	φ B2	~			L	_1			L	.4				~	E	1	D (E2		(-1
Inch	Inch	Inch	Inch	C1	C2	D	Before tightening	After tightening	L2	L3	Before tightening	Atter tightening	L5	L6	G1	G2	Before tightening	After tightening	Before tightening	Atter tightening	φ d 1	φ α 2
F-H-RUE-1/8-1/4	1/8-1/4	3.7	6.9	13	14	14	29	26	25	8	33	29.6	28	9.4	15	14	24	21	26.5	23.1	2	4
F-H-RUE-1/4-3/8	1/4-3/8	6.9	10	14	19	17	33	29.6	28	9.4	41.5	37.6	35	9.4	14	19	26.5	23.1	33	29.1	4	8
F-H-RUE-3/8-1/2	3/8-1/2	10	13.2	19	22	19	41.5	37.6	35	9.4	46.5	42.6	40	9.4	19	23	33	29.1	37	33.1	8	10
F-H-RUE-1/2-3/4	1/2-3/4	13.2	19.5	22	36	30	46.5	42.6	40	9.4	70	63	60	13	23	36	37	33.1	55	48	10	16
F-H-RUE-3/4-4/4	3/4-4/4	19.5	25.9	36	46	36	70	63	60	13	82	75	72	13	36	45	55	48	64	57	16	22

Model	Tube	φ B1	φ B2			_	L	_1			L	4				-	E	1		E2		
mm-inch	mm-inch	, mm	Inch	C1	C2	D	Before tightening	After tightening	L2	L3	Before tightening	After tightening	L5	L6	Gı	G2	Before tightening	After tightening	Before tightening	After tightening	φ d 1	φ d 2
F-H-RUE-3-1/8	3-1/8	3.5	3.7	13	13	10	29	26	25	8	29	26	25	8	15	15	24	21	24	21	2	2
F-H-RUE-4-1/8	4-1/8	4.5	3.7	13	13	10	28.5	25.5	23.5	9	29	26	25	8	12.5	15	23.5	20.5	24	21	3	2
F-H-RUE-6-1/4	6-1/4	6.5	6.9	14	14	14	33	29.6	28	9.4	33	29.6	28	9.4	14	14	26.5	23.1	26.5	23.1	4	4
F-H-RUE-8-1/4	8-1/4	8.5	6.9	17	14	14	37	33.6	32	9.4	33	29.6	28	9.4	17	14	30	26.6	26.5	23.1	6	4
F-H-RUE-10-3/8	10-3/8	10.5	10	19	19	17	41.5	37.6	35	9.4	41.5	37.6	35	9.4	19	19	33	29.1	33	29.1	8	8
F-H-RUE-12-1/2	12-1/2	12.5	13.2	22	22	19	46.5	42.6	40	9.4	46.5	42.6	40	9.4	23	23	37	33.1	37	33.1	10	10
F-H-RUE-16-1/2	16-1/2	16.5	13.2	30	22	24	57.5	52.5	49.5	11	46.5	42.6	40	9.4	29.5	23	45	40	37	33.1	14	10
F-H-RUE-19-3/4	19-3/4	19.5	19.5	36	36	30	70	63	60	13	70	63	60	13	36	36	55	48	55	48	16	16
F-H-RUE-25-4/4	25-4/4	25.5	25.9	46	46	36	82	75	72	13	82	75	72	13	45	45	64	57	64	57	22	22

F-H-UN

Union nut





Ма	Tube ou	uter dia.	φ	В		0	Matoriale		
mm	Inch	mm	Inch	mm	mm Inch		U	Materials	
F-H-UN-3	F-H-UN-1/8	3	1/8	3.5	3.7	9	13		
F-H-UN-4	—	4	_	4.5	—	11	13		
F-H-UN-6	F-H-UN-1/4	6	1/4	6.5	6.9	13	14	DEA	
F-H-UN-8	_	8	_	8.5	—	14	17	FIA	
F-H-UN-10	F-H-UN-3/8	10	3/8	10.5	10	16	19		
F-H-UN-12	F-H-UN-1/2	12	1/2	12.5	13.2	17	22		
F-H-UN-16	_	16	_	16.5	—	20	30		
F-H-UN-19	F-H-UN-3/4	19	3/4	19.5	19.5	24	36	PTFE	
F-H-UN-25	F-H-UN-4/4	25	1	25.5	25.9	27	46		

F-H-K

Nipple



Model	A	B		C	4 d	
WOUEI	R size	R size	LI	U	φu	
F-H-K-1	1/8	1/8	24	13	5	
F-H-K-2	1/4	1/4	32	17	6	
F-H-K-3	3/8	3/8	32	19	8	
F-H-K-4	1/2	1/2	42	24	10	
F-H-K-6	3/4	3/4	48	30	16	
F-H-K-8	1	1	50	36	22	
F-H-K-1-2	1/8	1/4	28	17	5	
F-H-K-1-3	1/8	3/8	28	19	5	
F-H-K-1-4	1/8	1/2	34	24	5	
F-H-K-2-3	1/4	3/8	32	19	6	
F-H-K-2-4	1/4	1/2	38	24	6	
F-H-K-3-4	3/8	1/2	38	24	8	

F-H-PG

Plug



Madal	А	1	С	
Iviodei	R size	L1		
F-H-PG-1	1/8	17	13	
F-H-PG-2	1/4	23	17	
F-H-PG-3	3/8	26	19	
F-H-PG-4	1/2	30	24	
F-H-PG-6	3/4	32	30	
F-H-PG-8	1	33	36	

F-H-BT

Block off tube



mm							
Model	φD	<i>ø</i> d					
F-H-BT-6	6	4					
F-H-BT-8	8	6					
F-H-BT-10	10	8					
F-H-BT-12	12	10					
F-H-BT-16	16	14					
F-H-BT-19	19	17					
F-H-BT-25	25	23					

Inch							
Model	φD	<i>ø</i> d					
F-H-BT-1/8	3.18	2					
F-H-BT-1/4	6.35	4					
F-H-BT-3/8	9.53	7.5					
F-H-BT-1/2	12.7	10.5					
F-H-BT-3/4	19	17					
F-H-BT-4/4	25.4	22					

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