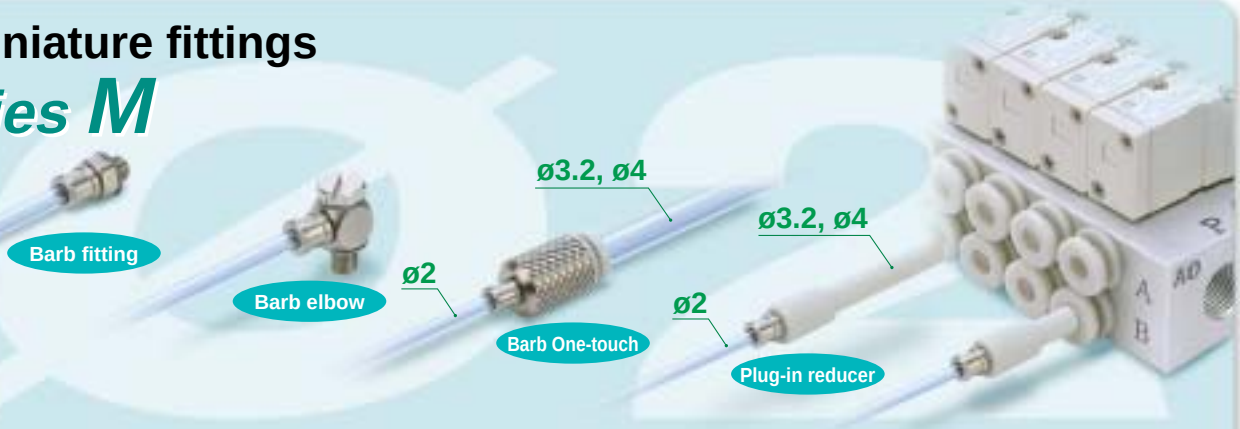
ø2 Piping Series

ø2 One-touch fittings
Series KJ

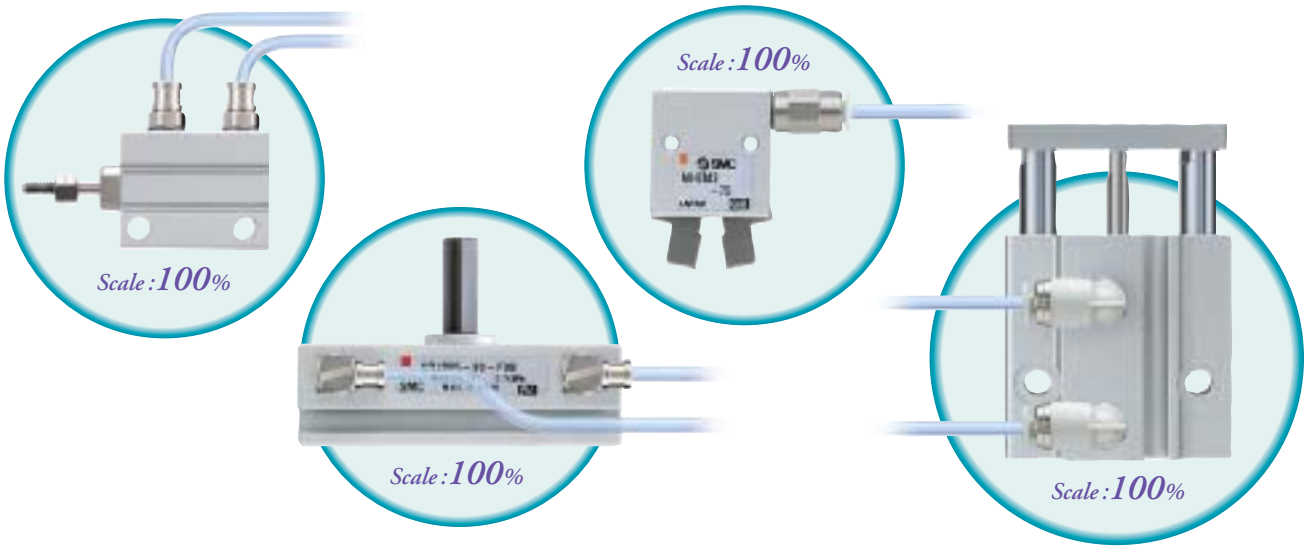
ø2 Miniature fittings
Series M



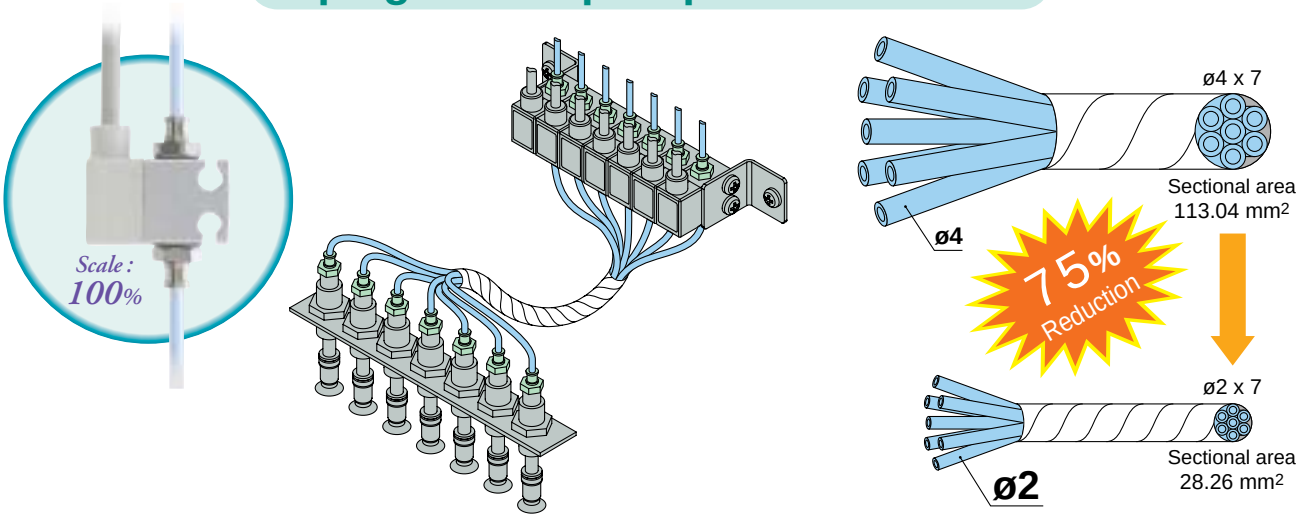
ø2 Polyurethane tubing
Series TU

Minimum bending radius: 4mm

Piping for compact actuator



Piping for compact pressure sensor



ø2 One-touch fittings Series KJ

ø2 Miniature fittings Series M

Minimum bending radius: 4 mm

ø2 Polyurethane tubing Series TU

One-touch Mini
Series KJ

Applicable tubing O.D. : ø2
Connection thread: M3
M5

Specifications

Applicable tubing material	Polyurethane
Applicable tubing O.D.	ø2
Fluid	Air, Water Note 1)
Maximum operating pressure	1 MPa
Operating vacuum pressure	–100 kPa
Proof pressure	3 MPa
Ambient and fluid temperature	–5 to 60°C, For water: 0 to 40°C (No freezing)
Copper-free (Standard)	Brass parts are all electroless nickle plated.

Note 1) Applicable for general industrial water.

How to Order

KJ H 02 – M3

Model

H	Male connector
	Straight union
	Different diameter straight
S	Hexagon socket head male connector
L	Male elbow
W	Extended male elbow
T	Male branch tee
	Union tee
Y	Male run tee
U	Union "Y"
	Different diameter union "Y"
R	Plug-in reducer
E	Bulkhead union

Port size

M3	M3
M5	M5
00	Same diameter tubing
23 Note 1)	ø3.2
04 Note 1)	ø4

Note 1) Different diameter tubing O.D.

Applicable tubing O.D. ø2

∗) Plug: KJP– 02

Variation

Male connector
KJH

Hexagon socket head male connector
KJS

Straight union
KJH

Different diameter straight
KJH

Male elbow
KJL

Extended male elbow
KJW

Male branch tee
KJT

Union tee
KJT

Male run tee
KJY

Union "Y"
KJU

Different diameter union "Y"
KJU

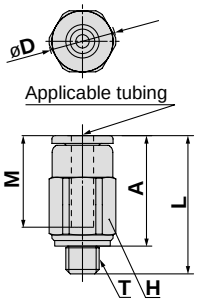
Plug-in reducer
KJR

Bulkhead union
KJE

Plug
KJP

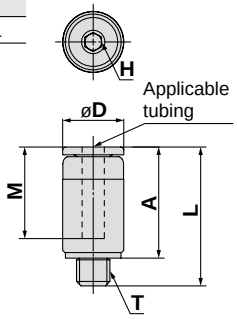
Male connector: KJH

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	øD	L	A	M	Effective area (mm^2)	Weight (g)
2	KJH02-M3	M3	5.5	6	12.5	10	8.8	0.9	1.1
	KJH02-M5	M5	7	7.8	11.7	8.7	8.8	0.9	1.9



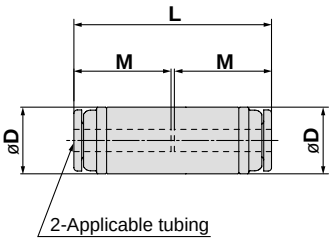
Hexagon socket head male connector: KJS

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	øD	L	A	M	Effective area (mm^2)	Weight (g)
2	KJS02-M3	M3	1.5	5.5	12.5	10	8.8	0.9	1.1



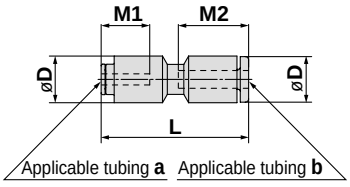
Straight union: KJH

Applicable tubing O.D. (mm)	Model	øD1	L	M	Effective area (mm^2)	Weight (g)
2	KJH02-00	6	17.8	8.8	0.8	1.0



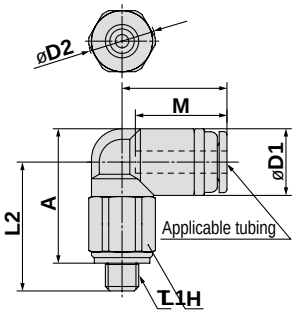
Different diameter straight: KJH

Applicable tubing O.D. (mm) a	Applicable tubing O.D. (mm) b	Model	øD	L	M1	M2	Effective area (mm^2)	Weight (g)
2	3.2	KJH02-23	8.4	26.6	8.8	12.7	0.9	2.4
	4	KJH02-04	9.3	26.6	8.8	12.7	0.9	3.2



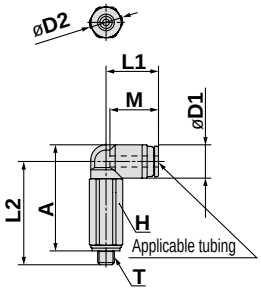
Male elbow: KJL

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	øD1	øD2	L1	L2	A	M	Effective area (mm^2)	Weight (g)
2	KJL02-M3	M3	5.5	6	6	9.5	11.6	12.1	8.8	0.8	1.4
	KJL02-M5	M5	7	6	7.8	9.5	12.1	12.1	8.8	0.8	2.4



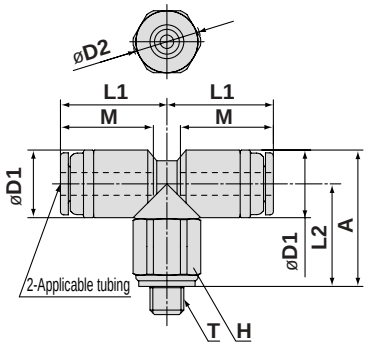
Extended male elbow: KJW

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	øD1	øD2	L1	L2	A	M	Effective area (mm²)	Weight (g)
2	KJW02-M3	M3	5.5	6	6	9.5	18.6	19.1	8.8	0.8	2.6
	KJW02-M5	M5	7	6	7.8	9.5	19.1	19.1	8.8	0.8	4.5



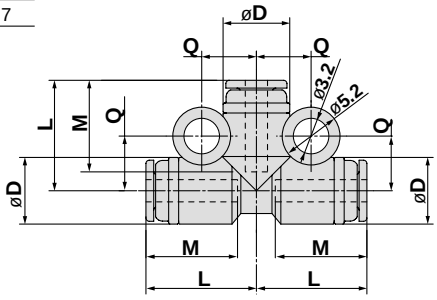
Male branch tee: KJT

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	øD1	øD2	L1	L2	A	M	Effective area (mm²)	Weight (g)
2	KJT02-M3	M3	5.5	6	6	9.5	11.6	12.1	8.8	1.1	1.8
	KJT02-M5	M5	7	6	7.8	9.5	12.1	12.1	8.8	1.1	2.8



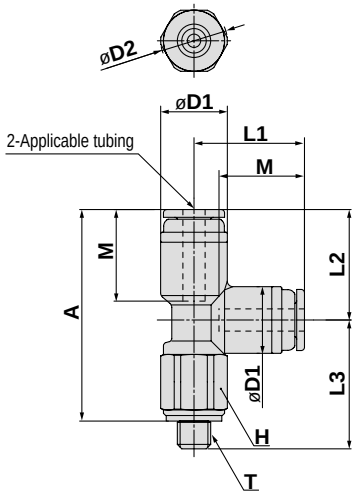
Union tee: KJT

Applicable tubing O.D. (mm)	Model	øD	L	Q	M	Effective area (mm²)	Weight (g)
2	KJT02-00	6	10	4.9	8.8	0.9	1.7



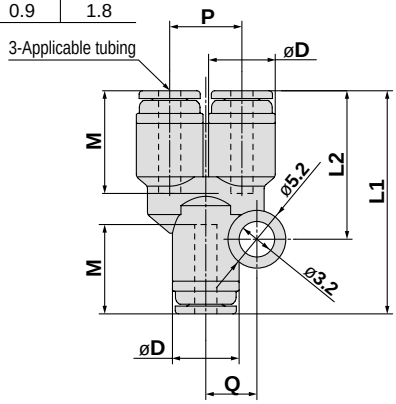
Male branch tee: KJY

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	øD1	øD2	L1	L2	L3	A	M	Effective area (mm²)	Weight (g)
2	KJY02-M3	M3	5.5	6	6	10	10	11.6	19.1	8.8	1.1	1.9
	KJY02-M5	M5	7	6	7.8	10	10	12.1	19.1	8.8	1.3	2.9



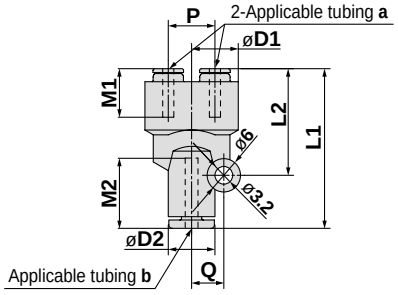
Union "Y": KJU

Applicable tubing O.D. (mm)	Model	øD	L1	L2	P	Q	M	Effective area (mm²)	Weight (g)
2	KJU02-00	6	20.1	13.4	6.5	4.6	8.8	0.9	1.8



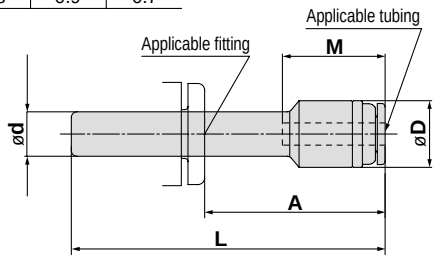
Different diameter union "Y": KJU

Applicable tubing O.D. (mm) a	Applicable tubing O.D. (mm) b	Model	øD1	øD2	L1	L2	P	Q	M1	M2	Effective area (mm²)	Weight (g)
2	3.2	KJU02-23	6	6	28.8	19.2	8.4	5.8	8.8	12.7	1.5	4.7
	4	KJU02-04	6	7.8	28.2	18.5	9.3	6.3	8.8	12.7	1.6	6.0



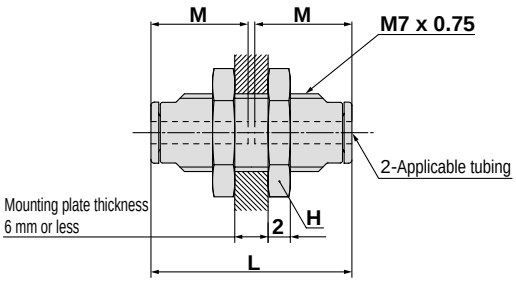
Plug-in reducer: KJR

Applicable tubing O.D. (mm)	Model	Applicable fitting size ød	øD	L	A	M	Effective area (mm²)	Weight (g)
2	KJR02-04	4	6	28.3	15.6	8.8	0.9	0.7



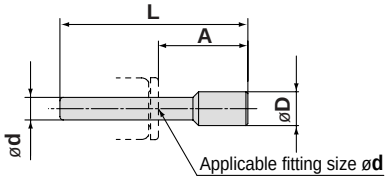
Bulkhead union: KJE

Applicable tubing O.D. (mm)	Model	T Connection thread	H (Width across flats)	L	Mounting hole	M	Effective area (mm²)	Weight (g)
2	KJE02-00	M7 x 0.75	9	18.1	8	8.8	0.8	3.7



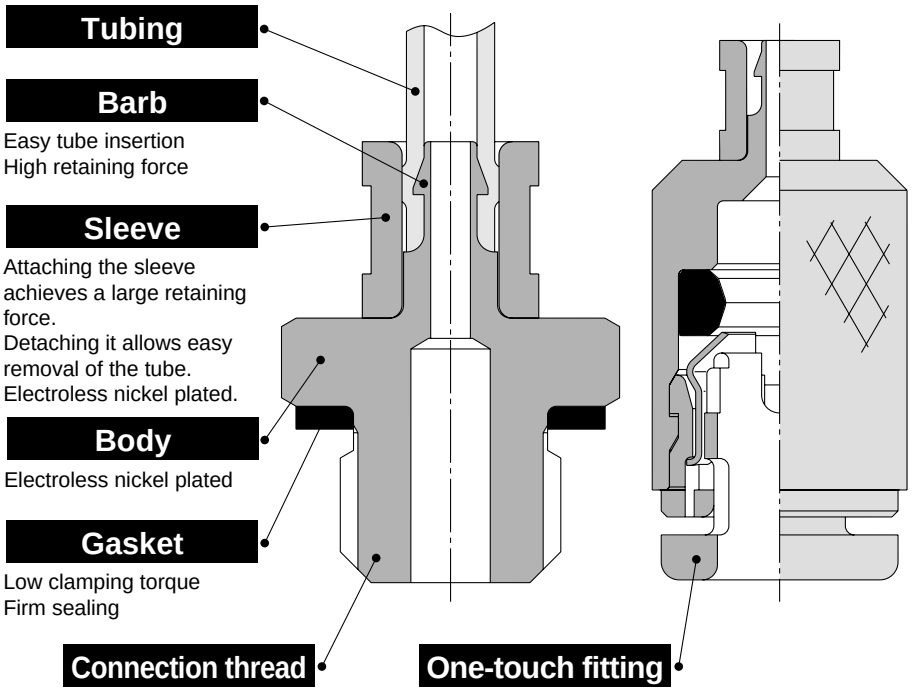
Plug: KJP

Applicable tubing O.D. (mm) ød	Model	øD	L	A	Weight (g)
2	KJP-02	3	17	8.2	0.1



Miniature Fittings
Series M

Applicable tubing O.D. x I.D. : ø2 x ø1.2
Connection thread : M3 / M5
One-touch fitting size : ø3.2 / ø4

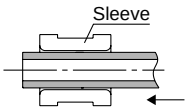


Tubing Connection and Removal

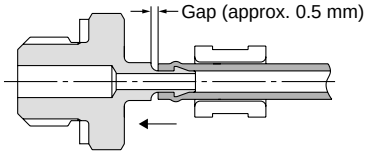
Installing tubing

1. Cut the tubing perpendicularly allowing additional length.

2. Insert the tubing into the sleeve.

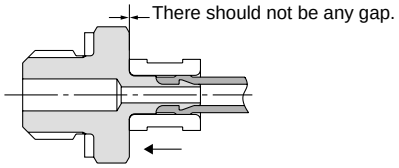


3. Insert the tubing slowly into the fittings. Make sure to secure a gap of approx. 0.5 mm between the tubing end and the barb end.



4. Insert the sleeve slowly. Make sure not to allow any gap between the sleeve end side and the body end side. (Please refer to the illustration below.)
If you feel any strong resistance and cannot push the sleeve completely to the end side, this may be due to jamming. Remove and repeat again by starting from step **1** making sure to secure a gap in the step **3**.

Note) When installing the tubing, the sleeve must be attached. Operation without attaching the sleeve may cause disconnection of the tubing.



Removing tubing

1. Withdraw the sleeve straight along the tubing. Use a tool such as long-nose pliers if it is difficult to pull out by hand.

2. Withdraw the tubing straight.

3. When reusing the tubing, cut off the previously installed portion of the tubing to avoid possible leakage and/or disconnection of the tubing.

Specifications

Applicable tubing material	Polyurethane
Applicable tubing (O.D. / I.D.)	ø2 / ø1.2
Max. operating pressure (at 20°C)	1 MPa
Port size	M3, M5, ø3.2, ø4
Thread	JIS B0209 Class 2 (Metric coarse thread)

How to Order

M – 5 AU – 2

Miniature fitting

Applicable tubing (O.D. / I.D.)

2	ø2 / ø1.2

Model

AU	Barb fitting	M3, M5
ALU	Barb elbow	M3
ALHU		M5
F	Barb One-touch	ø3.2, ø4
R	Plug-in reducer	

Port size

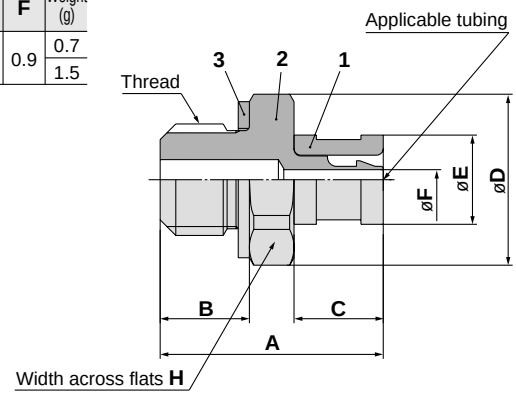
3	M3
5	M5
32	ø3.2
04	ø4

Barb fitting: M-3AU-2, M-5AU-2

Applicable tubing O.D. x I.D. (mm)	Thread	Model	H	A	B	C	D	E	F	Weight (g)
ø2 x ø1.2	M3	M-3AU-2	4.5	9	3	4	5	4	0.9	0.7
	M5	M-5AU-2	7	10	4		7.7			1.5

Component Parts

No.	Description	Material	Note
1	Sleeve	Brass	Electroless nickel plated
2	Barb fitting	Brass	Electroless nickel plated
3	Gasket	NBR, Stainless steel	–

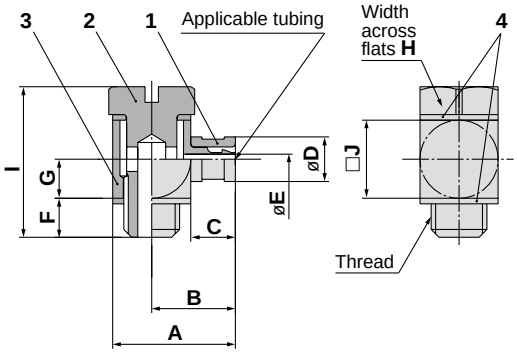


Barb elbow: M-3ALU-2, M-5ALHU-2

Applicable tubing O.D. x I.D. (mm)	Thread	Model	H	A	B	C	D	E	F	G	I	J	Weight (g)
ø2 x ø1.2	M3	M-3ALU-2	5	9	6.5	4	4	0.9	2.5	2.5	9.4	5	1.6
	M5	M-5ALHU-2	7	11	7.5				3	3.5	13.5	7	3.5

Component Parts

No.	Description	Material	Note
1	Sleeve	Brass	Electroless nickel plated
2	Stud	Brass	Electroless nickel plated
3	Barb elbow	Brass	Electroless nickel plated
4	Gasket	NBR, Stainless steel	–

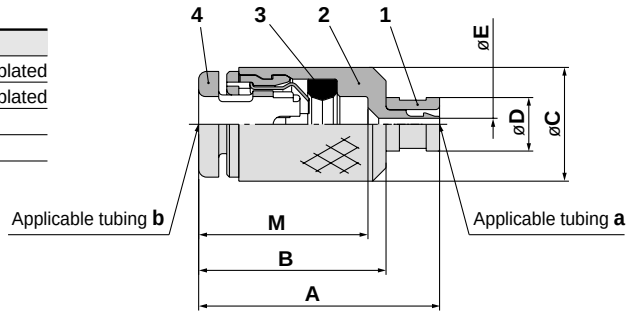


Barb One-touch: M-32F-2, M-04F-2

Applicable tubing (mm) a (O.D. x I.D.)	b (O.D.)	Model	A	B	C	D	E	M	Weight (g)
ø2 x ø1.2	ø3.2	M-32F-2	17.7	13.7	7.5	4	0.9	12.7	2.4
	ø4	M-04F-2	18	14	8.5				2.9

Component Parts

No.	Description	Material	Note
1	Sleeve	Brass	Electroless nickel plated
2	Body	Brass	Electroless nickel plated
3	Seal	NBR	–
4	Cassette	POM, Stainless steel	–

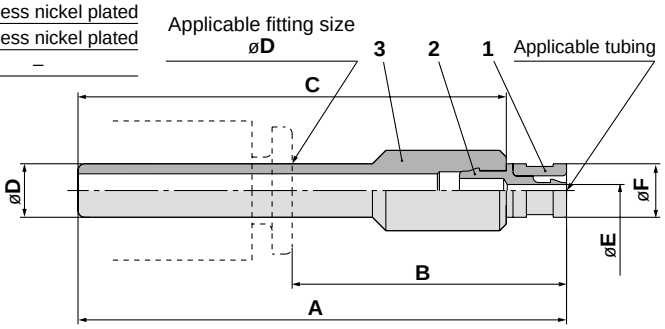


Plug-in reducer: M-32R-2, M-04R-2

Applicable tubing O.D. x I.D. (mm)	Fitting size øD	Model	A	B	C	E	F	Weight (g)
ø2 x ø1.2	ø3.2	M-32R-2	36	20.5	31.5	0.9	4	0.7
	ø4	M-04R-2	36.5		32			0.8

Component Parts

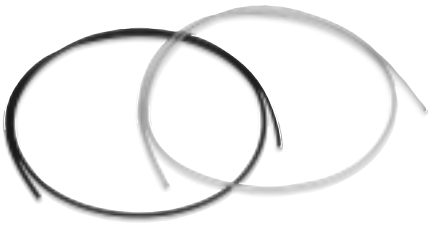
No.	Description	Material	Note
1	Sleeve	Brass	Electroless nickel plated
2	Studded body	Brass	Electroless nickel plated
3	Stem	PP	–



Polyurethane Tubing

Series TU

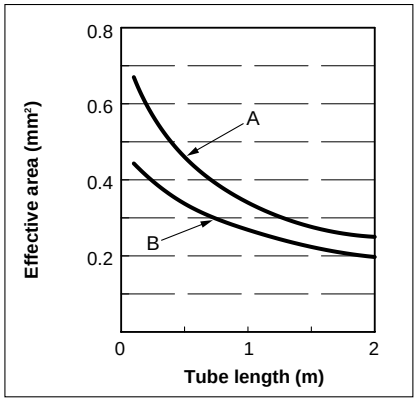
O.D. x I.D. : ø2 x ø1.2
Minimum bending radius : 4 mm



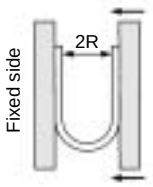
Specifications

Model	TU0212
O.D. x I.D. (mm)	2 x 1.2
Fluid	Air, Water
Max. operating pressure (at 20°C)	0.8 MPa
Burst prssure	Refer to pressure characteristics curve.
Min. bending radius (mm) Note)	4
Operating temperature	–20 to +60°C For water: 0 to 40°C (No freezing)
Material	Polyurethane
Colour	Black(B), White(W), Red(R), Blue(BU), Yellow(Y), Green(G), Clear(C)

Relation Between Tube Length and Effective Area

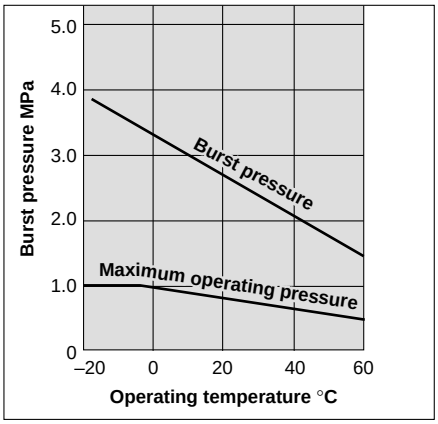


A : When the One-touch Mini (KJH02-M5) are connected to the ends of a straight tube.
B : When the miniature fittings (M-5AU-2) are connected to the ends of a straight tube.



Note) At a temperature of 20°C bend the tubing into a U shape. Then with one side fixed, gradually close the other side and measure 2R at the point where the tubing folds or flattens, etc.

Burst Pressure Characteristic Curve and Operating Pressure



⚠ Specific Product Precautions

**Be sure to read before handling.
Refer to back page 1 through to 3 for Safety Instructions and Precautions.**

⚠ Caution

1 Applicable for general industry water. Consult with SMC if using for other kinds of fluids. Surge pressure must be under the max. operating pressure. If exceeding that value, fitting may damaged and tubing may burst.

2 The value of the max. operating pressure is at a temperature of 20°C. Refer to the burst pressure characteristics curve for other temperatures. Avoid abnormal temperature rises which may burst the tubing.

3 The values of the min. bending radius is at a temperature of 20°C. Higher temperatures allows the tubing to bend more.

How to Order

TU0212 B – 20

Indication of tubing model

Colour indication

Symbol	Colour
B	Black
W	White
R	Red
BU	Blue
Y	Yellow
G	Green
C	Clear

Length per roll

Symbol	Length
20	20 m roll

Series KJ/M/TU
Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of **"Caution", "Warning"** or **"Danger"**. To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

⚠Caution : Operator error could result in injury or equipment damage.

⚠Warning : Operator error could result in serious injury or loss of life.

⚠Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems
Note 2) JIS B 8370: Pneumatic system axiom

⚠Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or maintenance of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven object have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

Fittings & Tubing/Common Precautions 1

Be sure to read before handling.

Selection

⚠ Warning

1. Confirm the specifications.

The products appearing in this catalogue are designed for use only in compressed air systems (including vacuum).

Do not use outside the specified ranges of pressure, temperature, etc., as this may cause damage or malfunction (Refer to specifications.)

Consult with SMC if fluids other than compressed air (including vacuum) are to be used.

Mounting

⚠ Warning

1. Read the instruction manual carefully.

The product should be mounted and operated with a good understanding of its contents. Also, keep the manual where it can be easily referred to at any time.

2. Ensure space for maintenance.

Ensure the necessary space for maintenance activities.

3. Strictly observe the tightening torque of the screw.

Tighten the screw at the recommended torque in installation.

Piping

⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

Air Supply

⚠ Warning

1. Types of fluid

This product is designed for use with compressed air. Consult with SMC if a different fluid is to be used.

2. When there is a large amount of drainage.

Compressed air containing a large amount of drainage can cause the malfunction of pneumatic equipment. An air dryer or Drain Catch should be installed upstream from filters.

3. Drain management

If air filter drains are not flushed regularly, the drainage will flow outlet side leading to the malfunction of pneumatic equipment.

In cases where the management of drain flushing will be difficult, the use of filters with automatic drains is recommended.

For details on the quality of compressed air mentioned above, refer to SMC's Best Pneumatics.

4. Types of air

Do not use compressed air containing chemicals, synthetic oil which includes organic solvents, salt, corrosive gases, etc., as this can cause damage or malfunction.

Operating Environment

⚠ Warning

1. Do not operate in locations having an atmosphere of corrosive gases, chemicals, sea water, fresh water or water vapor, or where there will be contact with the same.

2. In locations which receive direct sunlight, the sunlight should be blocked.

3. Do not operate in locations where vibration or impact occurs.

4. Do not operate in a location near a heat source or where radiated heat will be received.

Maintenance

⚠ Warning

1. Maintenance should be performed according to the procedure indicated in the instruction manual.

Improper handling can cause damage and malfunction of equipment and machinery.

2. Maintenance operations

Improper handling of compressed air is dangerous. Therefore, in addition to observing the product specifications, replacement of elements and other maintenance activities should be performed by personnel having sufficient knowledge and experience pertaining to pneumatic equipment.

3. Drain flushing

Drains such as the air filter should be flushed regularly.

4. Pre-maintenance inspection

When removing this product, turn off the electric power, and be certain to shut off the supply pressure and exhaust the compressed air in the system. Proceed only after confirming that all pressure has been released to the atmosphere.

5. Post maintenance inspection

After installation or repair, reconnect compressed air and electricity and conduct appropriate inspections to confirm proper operation. If there is an audible air leakage, or if the equipment does not operate properly, stop operation and confirm that the equipment is installed correctly.

6. Disassembly and modification prohibited

Do not disassemble or modify the unit.

Selection

⚠ Caution

1. Do not use in locations where the connected tubing will slide or rotate. This may result in damage of the fittings.
2. The tube bending radius in the vicinity of the fitting should be at least the minimum bending radius of the tubing. If bent more than the min. bending radius, tubing may fail or be crushed.
3. Do not use with fluids other than those shown in the applicable specifications. The tubing is applicable for air and general industrial water. Consult with SMC when using with other fluids.
4. When using water, the surge pressure should be lower than the maximum operating pressure. If the surge pressure exceeds the maximum operating pressure, it may cause damage to the fittings or tubing.

Fittings & Tubing/Common Precautions 2

Be sure to read before handling.

Mounting

⚠ Caution

1. Before mounting confirm the model and size, etc. Also, confirm that there are no blemishes, nicks or cracks in the product.
2. Mount so than the tubing and fittings are not subjected to twisting, pulling or moment loads, allowing sufficient leeway in the tubing length. Failure to consider this factor, can cause damage to the fittings and flattening, bursting or disconnection of the tubing.
3. All tubing is specified as immovable piping, except in the case of the coil tubing. For example, if tubing is used inside the cable carrier, any piping movement may result in increased frictional abrasion, tensile expansion, or tubing disconnection from the fittings. Please check carefully when piping.

   Also, avoid any applications in which an external force is applied to the fitting body. It may cause damage to the fittings.
4. Tightening of M3 and M5 screws
   1) After tightening by hand, the barb elbow type (M-3ALU-2, M-5ALHU-2) should be tightened an additional 1/3 rotation using an appropriate wrench.
   2) After tightening by hand, other types should be tightened by an additional 1/6 rotation using a suitable tool.

   Over tightening can cause air leakage due to damage to the threads and/or deformation of the gasket. Under tightening can cause loose threads and air leakage, etc.

Operating Environment

⚠ Warning

1. Do not use in locations where static electric charges will be a problem. Consult with SMC regarding use in this kind of environment.
2. Do not use in locations where spatter occurs.

   There is a danger of spatter causing a fire.
3. Do not use in environments where there is direct contact with liquids such as cutting oil, lubricating oil or coolant oil, etc. Contact SMC regarding use in environments where there will be direct contact with cutting oil, lubricating oil or coolant oil, etc.

Maintenance

⚠ Caution

1. Check for the following during regular maintenance, and replace components as necessary.
   a) Scratches, gouges, abrasion, corrosion
   b) Leakage
   c) Twisting, flattening or distortion of tubing
   d) Hardening, deterioration or softness of tubing
2. Do not repair or patch the replaced tubing or fittings for reuse.

Handling of One-touch Fittings

⚠ Caution

1. Tubing attachment/detachment for One-touch fittings
   1) Attaching of tubing
      1. Take a tubing having no flaws on its periphery and cut it off at a right angle. When cutting the tubing, use tubing cutters TK-1, 2 or 3. Do not use pinchers, nippers or scissors, etc. If cutting is done with tools other than tubing cutters, the tubing may be cut diagonally or become flattened, etc. This can make a secure installation impossible, and cause problems such as the tubing pulling out after installation or air leakage. Allow some extra length in the tubing.
      2. The polyurethane tubing with internal pressure expands its O.D. This may result in failure of reconnection to One-touch fittings. Examine the tubing and do not cut the tubing but reconnect to the One-touch fittings when its O.D. accuracy is +0.07 or larger in ø2, and +0.15 or larger in ø4. Make sure the tubing goes through the release bushing smoothly when reconnecting it to the One-touch fittings.
      3. Grasp the tubing and push it in slowly, inserting it securely all the way into the fitting.
      4. After inserting the tubing, pull on it lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, this can cause problems such as air leakage or the tubing pulling out.
   2) Detaching of tubing
      1. Push in the release bushing sufficiently. When doing this, push the collar evenly.
      2. Pull out the tubing while holding down the release bushing so that it does not come out. If the release bushing is not pressed down sufficiently, there will be increased bite on the tubing and it will become more difficult to pull it out.
      3. When the removed tubing is to be used again, cut off the portion which has been chewed before reusing it. If the chewed portion of the tubing is used as is, this can case trouble such as air leakage or difficulty in removing the tubing.

Precautions on Other Tubing Brand

⚠ Caution

1. Tubing O.D. ø3.2, ø4

   When using a brand of tubing other than SMC, be careful of the tolerance of the tube's O.D.

   1) Nylon tubing ≤ ±0.1 mm
   2) Soft nylon tubing ≤ ±0.1 mm
   3) Polyurethane tubing ≤ +0.15 mm
      ≤ –0.2 mm

   When the tolerance of the tube's O.D. is out of range mentioned above, do not use the tube. Because tubing cannot be connected, or it may cause air leakage or tubing to come out after installation.
2. Tubing O.D. ø2

   Tubing other than from SMC cannot be used. If other tubing is used, it may not connect, air leakage is likely to occur after piping, or the tubing is likely to detach.

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