Vacuum Plumbing Parts

NW (KF) Flexible Tubes

Both Sides Weld-On Vacuum Pipes

Related Products: For O-Ring of large diameter, refer to **P.1429**.

Standard



Compact



Connected with Stainless Steel Pipe



JIS Flanged



RoHS

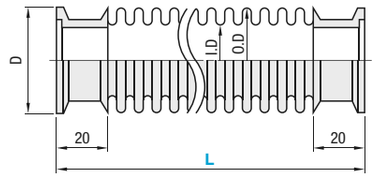
Type	Material	Standards	Operating Pressure	Allowable Leak Amount	Max. Operating Temp.
FRNW	EN 1.4301 Equiv.	ISO2861/1-1974 Compliant with JISB8365: 1988.	0.1MPa~-0.1MPa	1×10^{-9} Torr-ℓ/sec or lower	200°C
FRNFR					
FRNFC					
FRNFS	*				

* Flexible Tube: EN 1.4404 Equiv. Fitting: EN 1.4301 Equiv.

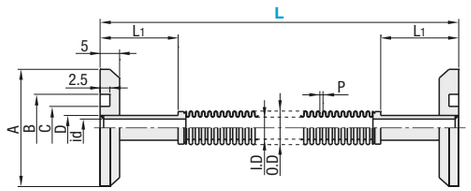
Features

These vacuum pipes are for auxiliary exhaust system of High Vacuum System or rough vacuum fitting of an Ultrahigh Vacuum System. The flexibility of the tube enables it to absorb the vibration from vacuum pumps and vacuum system to weaken the swing of vacuum fittings. Distance adjustment is available due to its flexibility of length.

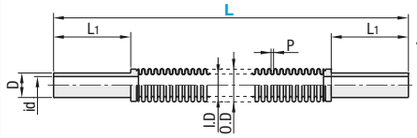
FRNW (Standard)



FRNFC (Compact)

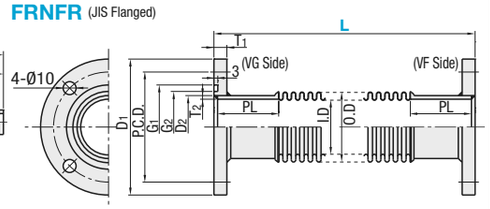


FRNFS (Connected with Stainless Steel Pipe)



For details of stainless steel pipe fittings, see **P.1297~1300**

FRNFR (JIS Flanged)



How to Connect

- Flanged connection at one side VG and the other side VF. Both ends fixed flange.

Applicable O-Ring Specifications

No.	O-Ring Size	Material
20	V34	NBR/Viton
25	V40	NBR/Viton
40	V55	NBR/Viton
50	V70	NBR/Viton

Part Number Type	No.	L 50mm Increment	I.D	O.D	D	Min. Bending Radius (mm)	Unit Price 1 ~ 4 pc(s). L100, 150	L200, 250	L300~2000 Unit Price	L300~2000 Additional Tube Price /50mm
FRNW	10	100~2000	12.5	16.5	30	40				
	16		21.5	28.5	30	50				
	25		26.5	36.5	40	70				
	40		41.5	54	55	100				
	50		50.5	65	75	160				

When L≥300: Total Price = Unit Price + [(Specified L Dimension -300) / 50] x Tube Price/50mm

Part Number Type	No.	L 50mm Increment	A	B	C	D	I.D	O.D	P	id	L1	Min. Bending Radius (mm)	Unit Price 1 ~ 4 pc(s). L100, 150	L200, 250	L300~1000 Unit Price	L300~1000 Additional Tube Price /50mm
FRNFC	16	100~1000	30	17.2	11	6.35	5.5	8.5	1.6	4.5	20	30				
	25		40	26.2	20	9.52	10	13.5	2.5	7	25	25				
	40		55	41.2	35	12.7	12.5	16.5	2.8	10	30	40				

When L≥300: Total Price = Unit Price + [(Specified L Dimension -300) / 50] x Tube Price/50mm

Part Number Type	No.	L 50mm Increment	D	I.D	O.D	P	id	L1	Min. Bending Radius (mm)	Unit Price 1 ~ 4 pc(s). L100, 150	L200, 250	L300~1000 Unit Price	L300~1000 Additional Tube Price /50mm
FRNFS	16	100~1000	6.35	5.5	8.5	1.6	4.5	20	30				
	25		9.52	10	13.5	2.5	7	25	25				
	40		12.7	12.5	16.5	2.8	10	30	40				

When L≥300: Total Price = Unit Price + [(Specified L Dimension -300) / 50] x Tube Price/50mm

Part Number Type	No.	L 50mm Increment	I.D	O.D	D1	D2	T1	T2	G1	G2	P.C.D.	PL	Unit Price 1 ~ 4 pc(s). L100, 150	L200, 250	L300~1000 Unit Price	L300~1000 Additional Tube Price /50mm
FRNFR	20	100~1000	26.5	36	80	27.2	8	2.1	44	34	60	30				
	25	150~1000	33	44	90	34	8	2.8	50	40	70	50				
	40	150~1000	50.5	65	105	48.6	10	2.8	65	55	85	50				
	50	150~1000	66	86	120	60.5	10	2.8	80	70	100	50				

When L≥300: Total Price = Unit Price + [(Specified L Dimension -300) / 50] x Tube Price/50mm

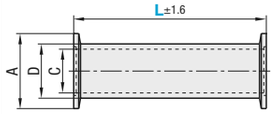
Ordering Example: Part Number - L → FRNW10 - 200

Both Sides NW Flanged



RoHS

Type: FRNRF | Material: EN 1.4301 Equiv.



Part Number Type	No.	L 10mm Increment	A	C	D	Unit Price 1 ~ 4 pc(s). Unit Price	L Pipe Price /100mm
FRNRF	10	110~1000	30	10	13.8		
	16		30	17.5	21.7		
	25		40	23	27.2		
	40		55	37.1	42.7		

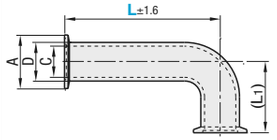
For the type with L dimension of 100mm, select FRNWN in **P.1375**.
<Price Calculation Example>: Price = Unit Price + L Pipe Price
For L pipe price, a charge is added for every 100mm of L dimension. 110 ~ 200: Round up to 200.

NW Flanged x Elbow



RoHS

Type: FRNRE | Material: EN 1.4301 Equiv.



Part Number Type	No.	L 10mm Increment	A	C	D	(L1)	Unit Price 1 ~ 4 pc(s). Unit Price	L Pipe Price /100mm
FRNRE	16	100~1000	30	17.5	21.7	58.1		
	25		40	23	27.2	58.1		
	40		55	37.1	42.7	67.6		

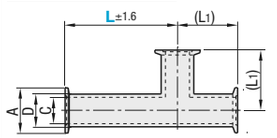
<Price Calculation Example>: Price = Unit Price + L Pipe Price
For L pipe price, a charge is added for every 100mm of L dimension. 110 ~ 200: Round up to 200.

NW Flanged x Tees



RoHS

Type: FRNRT | Material: EN 1.4301 Equiv.



Part Number Type	No.	L 10mm Increment	A	C	D	(L1)	Unit Price 1 ~ 4 pc(s). Unit Price	L Pipe Price /100mm
FRNRT	16	100~1000	30	17.5	21.7	45.4		
	25		40	23	27.2	48.6		
	40		55	37.1	42.7	67.6		

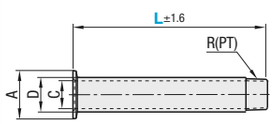
<Price Calculation Example>: Price = Unit Price + L Pipe Price
For L pipe price, a charge is added for every 100mm of L dimension. 110 ~ 200: Round up to 200.

NW Flanged x Threaded



RoHS

Type: FRNRFA | Material: EN 1.4301 Equiv.



Part Number Type	No.	L 10mm Increment	A	C	D	R(PT)	Unit Price 1 ~ 4 pc(s). Unit Price	L Pipe Price /100mm
FRNRFA	16	100~1000	30	7.1	10.5	1/8		
	25		40	9.4	13.8	1/4		
	40		55	12.7	17.3	3/8		

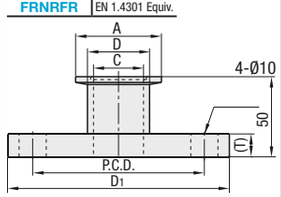
<Price Calculation Example>: Price = Unit Price + L Pipe Price
For L pipe price, a charge is added for every 100mm of L dimension. 110 ~ 200: Round up to 200.

NW Flanged x VF Flanged



RoHS

Type: FRNRFR | Material: EN 1.4301 Equiv.



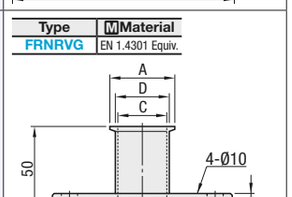
Part Number Type	No.	A	C	D	D1	(T)	P.C.D.	Unit Price 1 ~ 4 pc(s). Unit Price
FRNRFR	10	30	10	13.8	70	8	50	
	16	30	17.5	21.7	70	8	50	
	25	40	23	27.2	80	8	60	
	40	55	37.1	42.7	105	10	85	

NW Flanged x VG Flanged



RoHS

Type: FRNRVG | Material: EN 1.4301 Equiv.



Part Number Type	No.	A	C	D	D1	G1	G2	(T)	P.C.D	Applicable O-Ring Size	Unit Price 1 ~ 4 pc(s). Unit Price
FRNRVG	10	30	10	13.8	70	34	24	8	50	V24	
	16	30	17.5	21.7	70	34	24	8	50	V24	
	25	40	23	27.2	80	44	34	8	60	V34	
	40	55	37.1	42.7	105	65	55	10	85	V55	

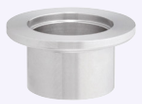
Ordering Example: Part Number - L → FRNRF25 - 300

Common Specifications

Max. Operation Temperature: 200°C
Surface Finish: Shot Blasted

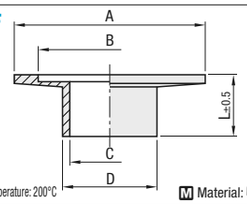
Fittings for Vacuum Plumbing
NW (KF) Flanged

■NW Flanged



RoHS

FRNWF



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A	B	C	D	L	Unit Price Qty. 1 ~ 10
FRNWF	10	30	12.2	10.0	13.8	20	
	16	30	17.2	17.5	21.7		
	25	40	26.2	23.0	27.2		
	40	55	41.2	37.1	42.7		
	50	75	52.2	54.9	60.5		

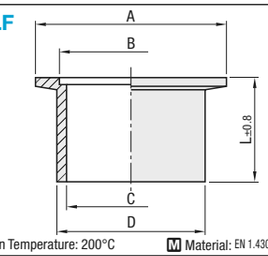
For orders larger than indicated quantity, please check with WOS.

■NW Long Flanged



RoHS

FRNWLF



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A	B	C	D	L	Unit Price Qty. 1 ~ 10
FRNWLF	10	30	12.2	10.0	13.8	50	
	16	30	17.2	17.5	21.7		
	25	40	26.2	23.0	27.2		
	40	55	41.2	37.1	42.7		
	50	75	52.2	54.9	60.5		

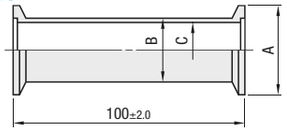
For orders larger than indicated quantity, please check with WOS.

■Nipple



RoHS

FRNWN



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A	B	C	Unit Price Qty. 1 ~ 10
FRNWN	10	30	13.8	10.0	
	16	30	21.7	17.5	
	25	40	27.2	23.0	
	40	55	42.7	37.1	
	50	75	60.5	54.9	

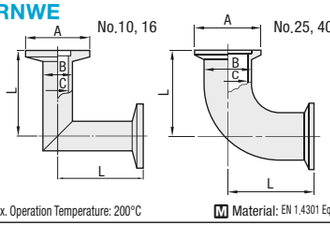
For orders larger than indicated quantity, please check with WOS.

■Elbow



RoHS

FRNWE



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A	B	C	L±2.0	Unit Price Qty. 1 ~ 10
FRNWE	10	30	13.8	10	40	
	16	30	21.7	16	40	
	25	40	27.2	23	50	
	40	55	42.7	37.1	65	
	50	75	60.5	54.9	80	

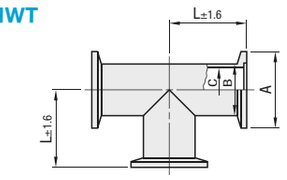
For orders larger than indicated quantity, please check with WOS.

■Tees



RoHS

FRNWT



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A	B	C	L	Unit Price Qty. 1 ~ 10
FRNWT	10	30	13.8	10	40	
	16	30	21.7	16	40	
	25	40	27.2	23	50	
	40	55	42.7	37.1	65	
	50	75	60.5	54.9	80	

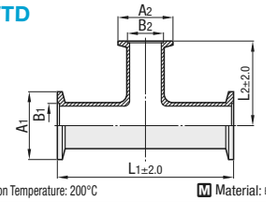
For orders larger than indicated quantity, please check with WOS.

■Reducing Tees



RoHS

FRNWTD



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A1	B1	L1	A2	B2	L2	Unit Price Qty. 1 ~ 4
FRNWTD	25-16	40	27.2	97.2	30	21.7	48.6	
	40-25	55	42.7	135.2	40	27.2	67.6	

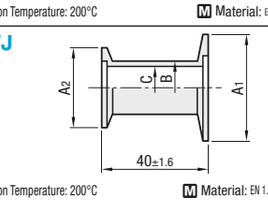
For orders larger than indicated quantity, please check with WOS.

■Reducer



RoHS

FRNWJ



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A1	A2	B	C	Unit Price Qty. 1 ~ 10
FRNWJ	25-10	40	30	13.8	10.0	
	25-16	40	30	21.7	17.5	
	40-16	55	30	21.7	17.5	
	40-25	55	40	27.2	23.0	
	50-25	75	40	27.2	23.0	

For orders larger than indicated quantity, please check with WOS.

Ordering Example　Part Number: FRNWF16

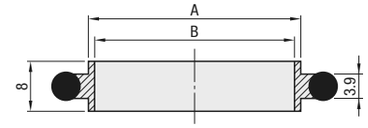
Fittings for Vacuum Plumbing
NW (KF) Flanged / JIS Flanged

■Center Rings



RoHS

FRNWCR



Max. Operation Temperature: 150°C　Material: Ring: EN 1.4301 Equiv. O-Ring: Fluororubber

Part Number Type	No.	A	B	Unit Price Qty. 1 ~ 10
FRNWCR	16	17	16	
	25	26	25	
	40	41	40	
	50	52	50	

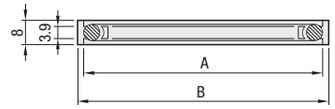
FRNWCR16 cannot be used in combination with Vacuum Plumbing No.10.
For orders larger than indicated quantity, please check with WOS.

■Center Rings - With Outer Ring



RoHS

FRNWR



Max. Operation Temperature: 150°C　Material: Ring: EN 1.4301 Equiv. O-Ring: Fluororubber

Part Number Type	No.	A	B	Unit Price Qty. 1 ~ 10
FRNWR	16	30	32	
	25	40	42	
	40	55	57	
	50	75	77	

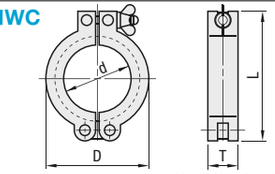
FRNWR can be commonly used for No.10 and 16.
For orders larger than indicated quantity, please check with WOS.
■**Features** Center rings prevent O-Rings from falling off and suppress deformation.

■Clamps



RoHS

FRNWC



Max. Operation Temperature: 200°C　Material: Main Body: Aluminum Thread: EN 1.4301 Equiv.

Part Number Type	No.	d	D	L	T	Unit Price Qty. 1 ~ 10
FRNWC	16	20	42	61	17	
	25	30	52	72	17	
	40	44	70	90	17	
	50	62	94	123	25	

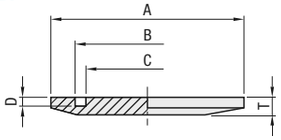
Commonly used for No.10 and 16.
For orders larger than indicated quantity, please check with WOS.

■NW Blind Flanged



RoHS

FRNWBF

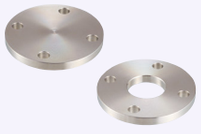


Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	A	B	C	D	T	Unit Price Qty. 1 ~ 10
FRNWBF	10	30	12.2	6.0	2.5	5	
	16	30	17.2	11.0			
	25	40	26.2	20.0			
	40	55	41.2	35.0			
	50	75	52.2	46.0			

For orders larger than indicated quantity, please check with WOS.

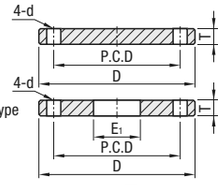
■JIS Flanged - VF Type



RoHS

FRVF
Blank Type

FRVFA
Hole Machined Type



Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	D	P.C.D	T	d	Hole Machined Type E1	Unit Price Qty. 1 ~ 4 FRVF	FRVFA
FRVF FRVFA	10A	70	50	8	10	17.8		
	20A	80	60	8	10	27.7		
	25A	90	70	8	10	34.4		
	40A	105	85	10	10	49.1		
	50A	120	100	10	10	61.1		

For orders larger than indicated quantity, please check with WOS.

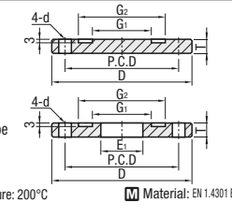
■JIS Flanged - VG Type



RoHS

FRVG
Blank Type

FRVGA
Hole Machined Type



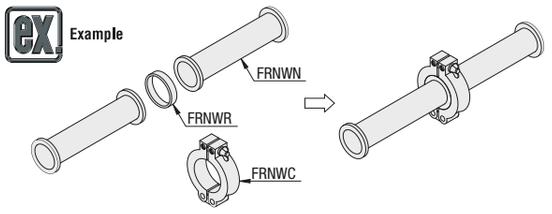
Max. Operation Temperature: 200°C　Material: EN 1.4301 Equiv.

Part Number Type	No.	D	P.C.D	T	d	G1	G2	Hole Machined Type E1	Applicable O-Ring Size	Unit Price Qty. 1 ~ 4 FRVG	FRVGA
FRVG FRVGA	10A	70	50	8	10	24	34	17.8	V24		
	20A	80	60	8	10	34	44	27.7	V34		
	25A	90	70	8	10	40	50	34.4	V40		
	40A	105	85	10	10	55	65	49.1	V55		
	50A	120	100	10	10	70	80	61.1	V70		

For orders larger than indicated quantity, please check with WOS.

Ordering Example　Part Number: FRNWC25

Example



■**Features**
These vacuum pipes are for auxiliary exhaust system of High Vacuum System or rough vacuum fitting of an Ultrahigh Vacuum System. The plumbing parts of NW (KF) Flanged Type enables frequent detachment without tools compliant with ISO or KF.

■**Specifications**
Dimensions and shapes are compliant with ISO2861/1-1974 -JISB8365: 1988.

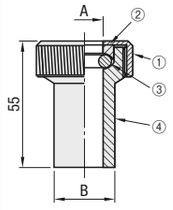
Fittings for Vacuum Plumbing
Gage Port / Adapter Fitting

■Gage Port - Single Unit / Welded

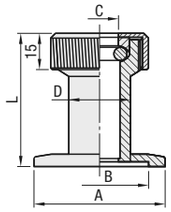


RoHS

FRGP



FRNGP



Gage Ports only

Part Number Type	Connection Diameter	A	B	Unit Price Qty. 1 ~ 4
FRGP	15	16	25	
	18	19	28	

For orders larger than indicated quantity, please check with WOS.

Welded

Part Number Type	No.	Flange A	Flange B	Gage Ports Connection Diameter	Gage Ports C	Gage Ports D	L	Unit Price Qty. 1 ~ 4
FRNGP	25-15	40	26.2	15	16	25	75	
	25-18			18	19	28		
	40-15	55	41.2	15	16	25	57	
	40-18			18	19	28		

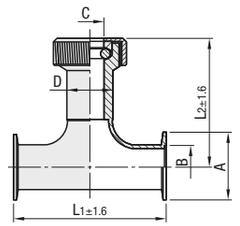
For orders larger than indicated quantity, please check with WOS.

■Nipples with Gauge Port



RoHS

FRNWGP



Part Number Type	No.	A	B	Connection Diameter	C	D	L1	L2	Unit Price Qty. 1 ~ 4
FRNWGP	25-15	40	26.2	15	16	25	97.2	83.6	
	25-18			18	19	28			
	40-15	55	41.2	15	16	25	135.2	102.6	
	40-18			18	19	28			

For orders larger than indicated quantity, please check with WOS.

Gage Port Specifications

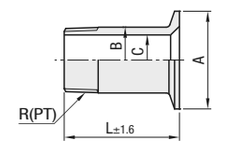
No.	Product Name	Material
①	Swaging Sleeve Nut	EN 1.4301 Equiv.
②	Collar	EN 1.4301 Equiv.
③	O-Ring	NBR
④	Sleeve	EN 1.4301 Equiv.
-	Flange	EN 1.4301 Equiv.
-	Nipple	EN 1.4301 Equiv.

■Male Adapter



RoHS

FRNFA



Part Number Type	No.	Nominal	R (PT)	A	B	C	L	Unit Price Qty. 1 ~ 10
FRNFA	16	1	1/8	30	10.5	7.1	50	
	25	1	1/8	40	10.5	7.1		
		2	1/4		13.8	9.4		
		3	3/8		17.3	12.7		
	40	2	1/4	55	13.8	9.4		
		3	3/8		17.3	12.7		
		4	1/2		21.7	16.1		
		6	3/4		27.2	21.4		

For orders larger than indicated quantity, please check with WOS.

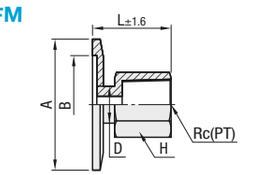
Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

■Female Adapter



RoHS

FRNFM



Part Number Type	No.	Nominal	Rc (PT)	A	B	L	H	D	Unit Price Qty. 1 ~ 10
FRNFM	16	2	1/4	30	17.2	26	17	13	
	25	2	1/4	40	26.2	27	17	13	
		3	3/8			27	21	16	
	40	2	1/4	55	41.2	27	17	13	
		3	3/8			28	21	16	
		4	1/2			34	26	20	

For orders larger than indicated quantity, please check with WOS.

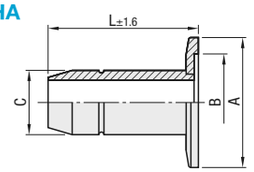
Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

■Hose Adapter



RoHS

FRNHA

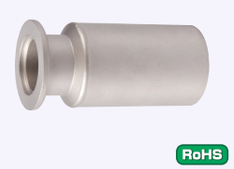


Part Number Type	No.	Applicable Hose I.D.	A	B	C	L	Unit Price Qty. 1 ~ 10
FRNHA	16	19	30	17.2	19	60	
	25	22	40	26.2	24	80	
	40	38	55	41.2	38	80	

For orders larger than indicated quantity, please check with WOS.

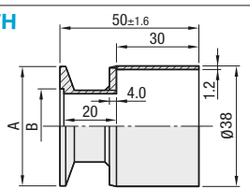
Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

■Duct Adapter



RoHS

FRNWH



Part Number Type	No.	Applicable Duct Nominal Dia.	A	B	Unit Price Qty. 1 ~ 4
FRNWH	16	38	30	17.2	
	25	38	40	26.2	

For orders larger than indicated quantity, please check with WOS.

Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

■Features: Connecting duct hoses to the exhaust port of vacuum pump prevents emission from being exhausted into air.
Suitable for use in clean room.

■Applicable Duct Hose

Product Name	Type	Nominal	Page
Lightweight	HOSEE□	38	P.1324
Flexible	HOSSD□		P.1324
Friction Resistant, Antistatic	HOSHD□		P.1324
Non-PVC	HOSCD□		P.1325
Non-PVC	HOSCE□		P.1325
Aluminum	HOAD		P.1326

Ordering Example

Part Number	-	Nominal
FRNWGP25-18		
FRNFM25	-	3

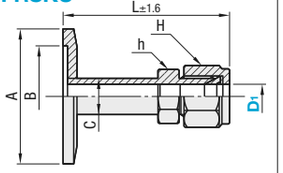
Fittings for Vacuum Plumbing
NW Flanged x Swaged Sleeve Fitting / NW x Stainless Steel Pipe

■NW Flanged x Swaged Sleeve Fitting



RoHS

FRSKU



Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

Part Number Type	No.	Applicable Tube O.D. D1	A	B	C	D	L	Opposite Side Main Body h	Opposite Side Nut H	Unit Price Qty. 1 ~ 4
FRSKU	16	4	30	17.2	6	4	43.8	14	14	
	25	6	40	26.2	8	6	43.9	14	14	
		6.35	40	26.2	9.53	6.35	48.9	14	14	
	40	6.35	55	41.2	9.53	6.35	48.9	14	14	
		8	55	41.2	10	8	49.8	14	16	

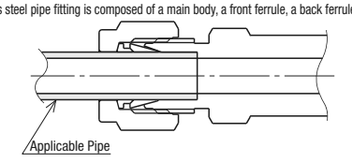
For orders larger than indicated quantity, please check with WOS.

Ordering Example

Part Number	-	D1
FRSKU25	-	6

■Features and Structure of Fittings

A stainless steel pipe fitting is composed of a main body, a front ferrule, a back ferrule and a nut.



Components Figure

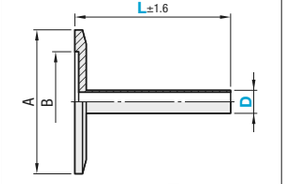
[Specifications of Applicable Pipes]
・Pipe Type: Stainless Steel Pipe
Stainless Steel Pipe compliant with EN 1.4301 Equiv. or EN 1.4401 Equiv. prescribed on JIS G3459 Stainless Steel Pipes for Piping.
・O.D. Tolerance: ±0.05mm
・Pipe Surface Hardness: HV190 or lower (HRB90 or less)
・Conditions of Pipe Surface: Avoid using pipes with defects such as surface roughness and scratches.

■NW Flanged x Stainless Steel Pipe - Single Nozzle



RoHS

Type L Fixed	Type L Configurable	Material
FRNWBA	FRNWBAL	EN 1.4301 Equiv.



Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

Part Number Type	No.	Stainless Steel Pipe O.D. D Selection	L Fixed	L 5mm Increment	A	B	Unit Price Qty. 1 ~ 4 L Fixed	Unit Price Qty. 1 ~ 4 L Configurable
FRNWBA (L Fixed) FRNWBAL (L Configurable)	16	6 6.35 8 9.53	75	30~100	30	17.2		
	25	6 6.35 8 9.53 10	75	30~100	40	26.2		
	40	6.35 8 9.53 10	75	30~100	55	41.2		

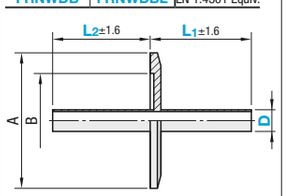
For orders larger than indicated quantity, please check with WOS.

■NW Flanged x Stainless Steel Pipe - Double Nozzle



RoHS

Type L Fixed	Type L Configurable	Material
FRNWDB	FRNWDBL	EN 1.4301 Equiv.



Max. Operation Temperature: 200°C Material: EN 1.4301 Equiv.

Part Number Type	No.	Stainless Steel Pipe O.D. D Selection	Fixed L1	Fixed L2	Configurable 5mm Increment L1	Configurable 5mm Increment L2	A	B	Unit Price Qty. 1 ~ 4 L Fixed	Unit Price Qty. 1 ~ 4 L Configurable
FRNWDB (L Fixed) FRNWDBL (L Configurable)	16	6 6.35 8 9.53	75	75	30~100	30~100	30	17.2		
	25	6 6.35 8 9.53 10	75	75	30~100	30~100	40	26.2		
	40	6.35 8 9.53 10	75	75	30~100	30~100	55	41.2		

Welding may cause small deformations.
For orders larger than indicated quantity, please check with WOS.

Ordering Example

Part Number	-	D	-	L	-	L1	-	L2
FRNWBA25	-	9.53						
FRNWBAL40	-	8	-	100				
FRNWDBL16	-	8			-	50	-	50

Stainless Steel Pipe
JIS G 3459
Surface Finish: Shot Blasted

D	Thickness on One Pipe Side
6	1
6.35(1/4 inch)	1
8	1
9.53(3/8 inch)	1
10	1

Example

