35MPa

Double Acting

New

Hydraulic Double Acting Work Support

Shorter Cycle Time • Back Pressure Resistant

Model TND

KOSMEK

Harmony in Innovation

Hydraulic
Double Acting Work Support

Model TND

Shorter Cycle Time • Back Pressure Resistant

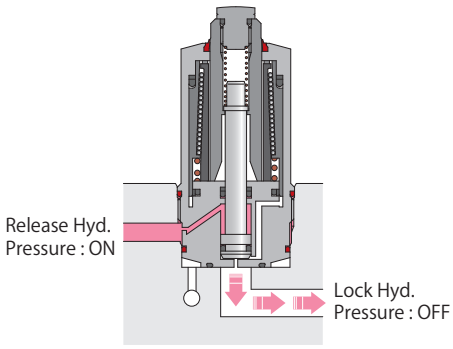
Pioneer and leading innovator of hydraulic work support collet technology. PAT.

Introducing New Double Acting Work Support

Features of Double Acting Work Support

- **For Shorter Cycle Time**

  Compared to single acting work support, double acting work support is able to control release action with hydraulic pressure, allowing for shorter cycle time.

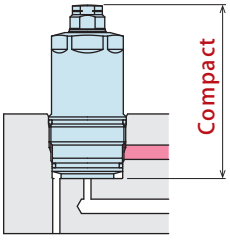


- **For Automation Systems**

  Ensuring release action with hydraulic pressure, it is suitable for automation systems. Also it can be used even for environment where back pressure likely occurs.

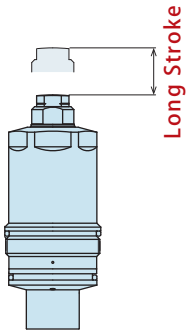
- **Compact Body**

  Double acting, yet compact.



- **Long Stroke Model Available**

  Offering the standard stroke model and the long stroke model.
  For application standardization.



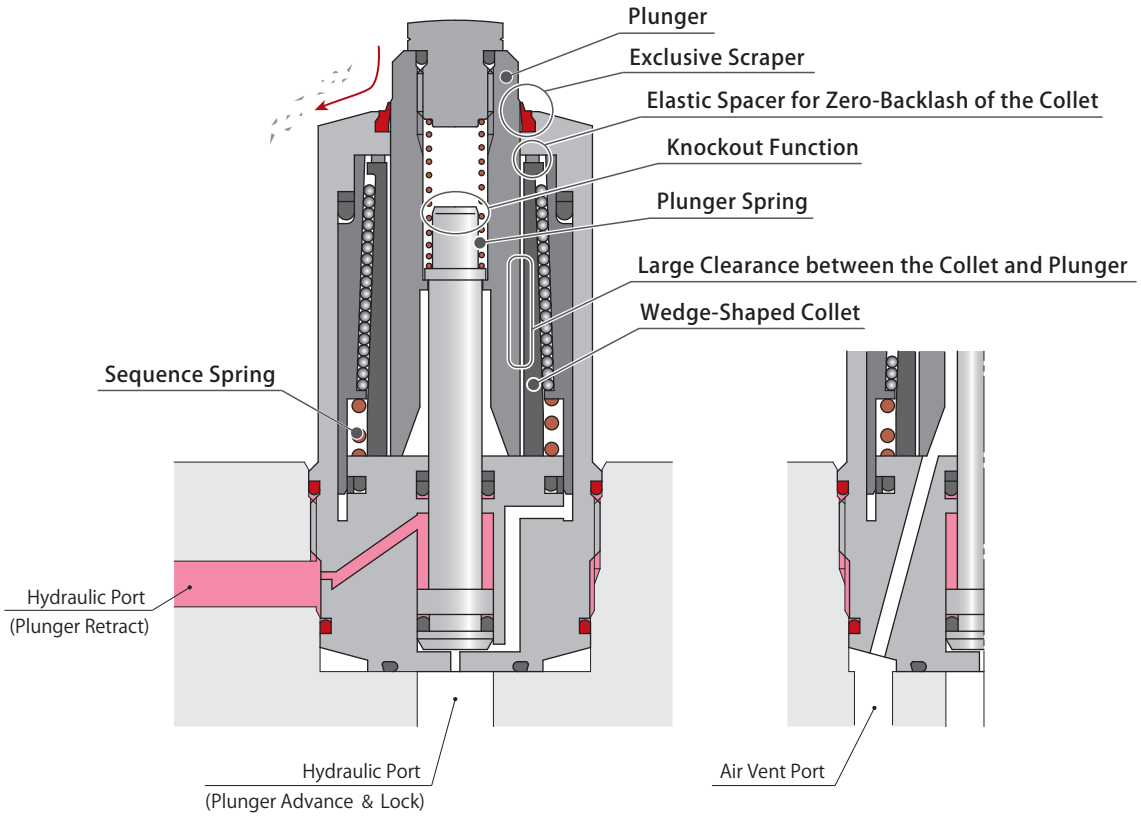
• **Standard Stroke Model**

Model No.		TND0603-□	TND1003-□	TND1603-□
Plunger Stroke	mm	8	10	12

• **Long Stroke Model**

Model No.		TND0603-Q	TND1003-Q	TND1603-Q
Plunger Stroke	mm	16	20	24

Cross Section



Ensuring powerful support and smooth action.

KOSMEK was the first to develop the collet design in 1996.
Compared with the traditional sleeve design, it ensures powerful gripping force via a wedge effect.
In addition, a larger gap between collet and plunger is designed to prevent sticking and allow smoother action.
The load applied to the workpiece is soft with only plunger spring force.

Concrete Workpiece Touch

As the collet gripping the plunger is always pressed downwards by “elastic spacer” , it helps prevent tilting when locked and the clearance with the workpiece.

Certain Sequence Action

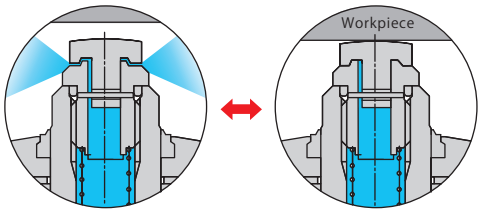
As it is equipped with a powerful sequencing spring, the action sequences as such;
Plunger goes up→ workpiece touches→ collet locks. This is carried out via one hydraulic circuit system.

Superior Environmental Durability NEW

The work support can be used in various environments withthe exclusive scraper to prevent the accumulation of dustsuch as cutting chips and the knockout function to release adherence after a long-time machine stop.

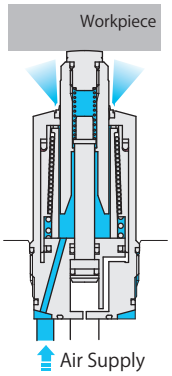
Air Sensing Option

Enables plunger advance action confirmation.
Suitable for automation.

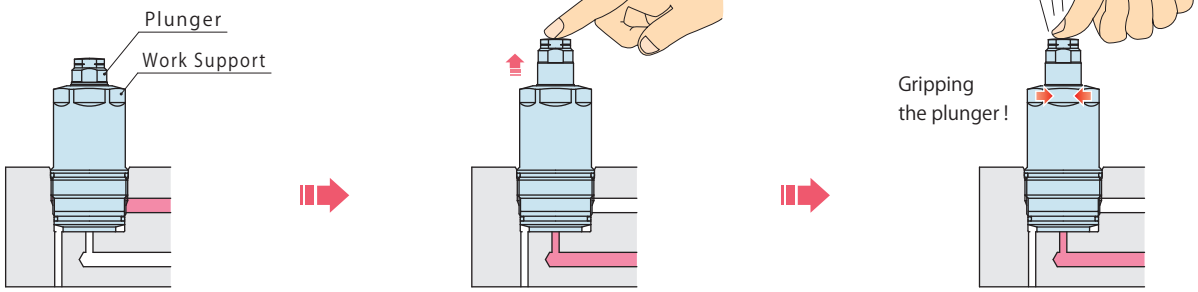


Sensing OPEN (OFF)　　Sensing CLOSE (ON)

Air Purging Possible



Action Description

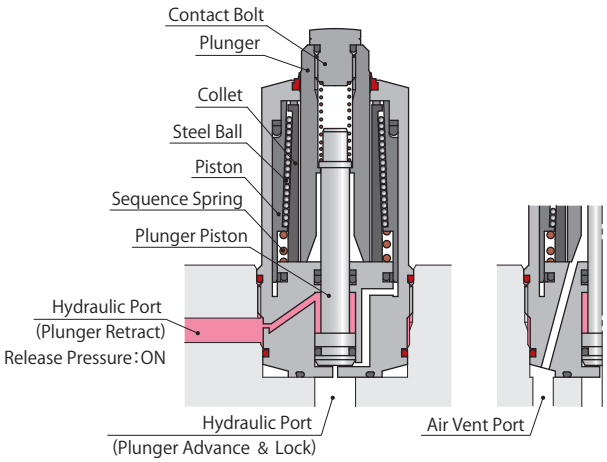


Release Hyd. Pressure : ON
Lock Hyd. Pressure : OFF
The state of plunger down.

Release Hyd. Pressure : OFF
Lock Hyd. Pressure : ON
Plunger rises with lock pressure and stops after touching workpiece.

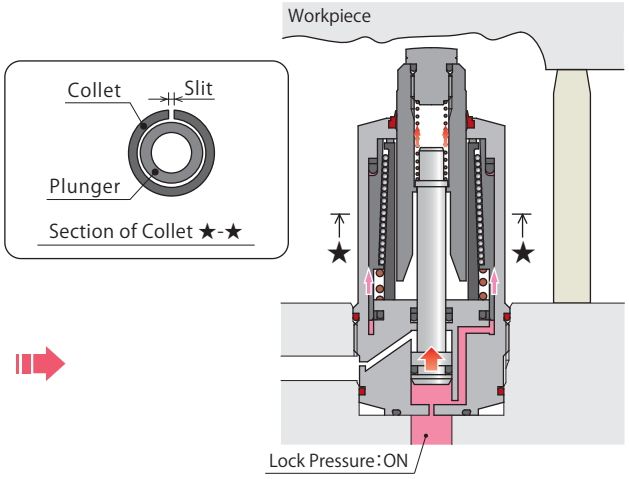
Release Hyd. Pressure : OFF
Lock Hyd. Pressure : ON
Once it is in the stopped position where it touches the workpiece, the plunger doesn't go down even if pressed from above.

Internal Action Description



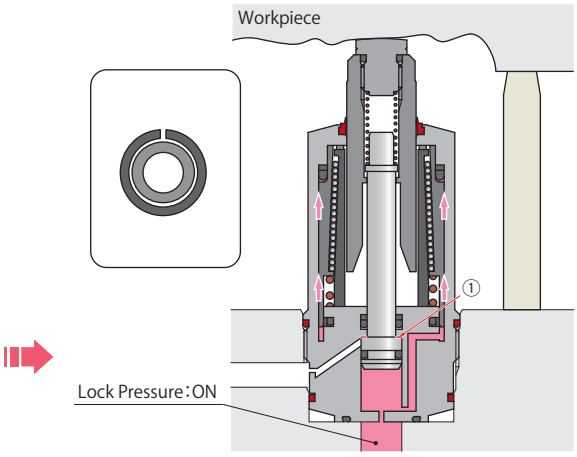
At Released

Plunger is lowered by release pressure.



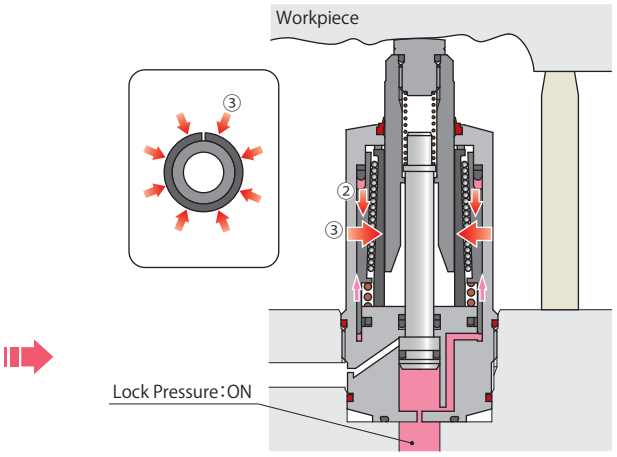
Plunger Rises

When release pressure is OFF and lock pressure is ON, the plunger piston rises up. With this action, the plunger rises up via the plunger spring.



Plunger Softly Contacts a Workpiece

After the plunger contacts any part of a workpiece such as its casting surface, hydraulic pressure thrust of the plunger piston stops at the action end shown as ① on above picture.



Locked State

② When the pressure rises more than the sequential spring force, the piston outside of the collet starts to press down.
③ Wedge-shaped collet powerfully grips the plunger via steel balls of taper surface inside the piston, and locking is completed.

Model No. Indication

TND 060 3 - L □ - □

1 2 3 4 5

1 Support Force

060： Support Force 7.1kN at 35MPa

100： Support Force 11.7kN at 35MPa

160： Support Force 16.3kN at 35MPa

2 Design No.

3 ： Revision Number

3 Plunger Spring Force

L ： Low Spring Force

H ： High Spring Force

Blank：For 5 Option **Q**

4 Plunger Action Confirmation

Blank： No Action Confirmation (Standard)

M ： Air Sensing Option

5 Option

Blank： Hydraulic Advance Model (Standard)

Q ： Hydraulic Advance Long Stroke Model

	● = Available Option		
4 Plunger Action Confirmation Symbol	M32×1.5	M38×1.5	M48×1.5
5 Option Symbol	TND0603	TND1003	TND1603
Blank	●	●	●
M	●	●	●
Q	●	●	●
M-Q	●	●	●

Specifications

Option 5 Blank

Model No.		TND0603-□	TND1003-□	TND1603-□
Support Force at 35MPa kN		7.1	11.7	16.3
Support Force (Calculation Formula) ※1 kN		0.24×P-1.18	0.39×P-1.95	0.54×P-2.72
Plunger Stroke mm		8	10	12
Effective Stroke mm		7.5	9.5	11.5
Cylinder Capacity cm³	Advance&Lock	0.6	1.1	1.3
	Retract	0.2	0.4	0.5
Plunger Spring Force ※2 N	L: Low Spring Force	4.7～7.8	5.8～9.7	8.3～14.6
	H: High Spring Force	6.2～11.0	7.8～13.5	10.1～22.0
Max. Operating Pressure MPa		35		
Min. Operating Pressure MPa		7		
Operating Temperature ℃		0～70		
Weight kg		0.25	0.4	0.9

Option 5 Q

Model No.		TND0603-Q	TND1003-Q	TND1603-Q
Support Force at 35MPa kN		7.1	11.7	16.3
Support Force (Calculation Formula) ※1 kN		0.24×P-1.18	0.39×P-1.95	0.54×P-2.72
Plunger Stroke mm		16	20	24
Effective Stroke mm		15.5	19.5	23.5
Cylinder Capacity cm³	Advance&Lock	1.0	1.9	2.3
	Retract	0.4	0.8	1.0
Plunger Spring Force ※2 N		6.2～12.9	7.8～20.4	10.1～24.8
Max. Operating Pressure MPa		35		
Min. Operating Pressure MPa		7		
Operating Temperature ℃		0～70		
Weight kg		0.3	0.45	1.0

Notes： ※1. P in the formula for support force indicates the hydraulic pressure (MPa).

※2. The plunger spring force indicates the spring design value. It may vary depending on sliding resistance of the plunger and characteristic of the spring , etc. Please read it as a reference value of workpiece contact force.

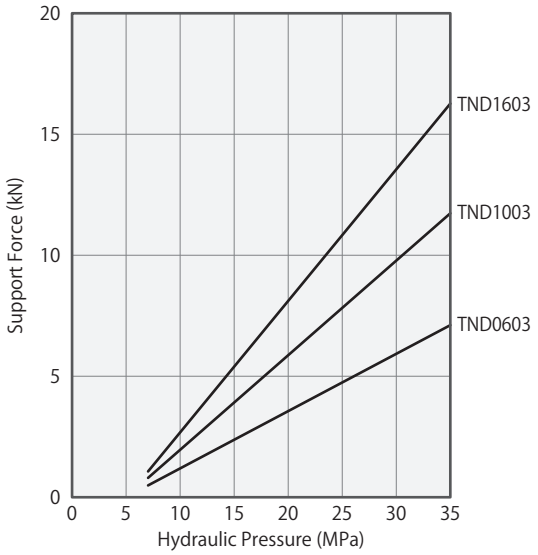
Performance Curve (TND-□ : Hydraulic Advance Model)

Applicable Model

TND 060 3 - L/H - Blank

1 Support Force　5 Option : Blank

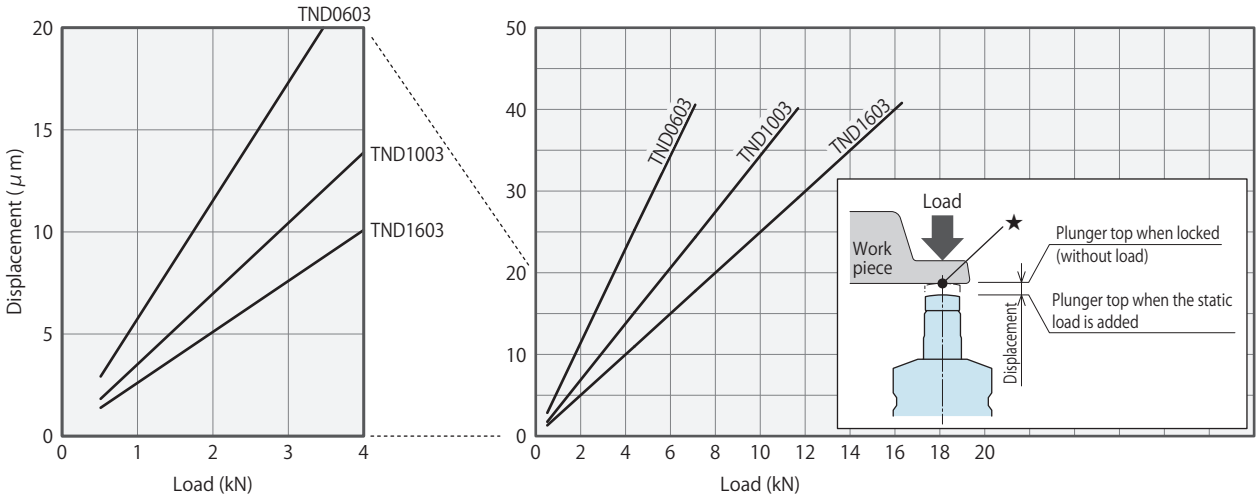
Support Force Graph ※ This graph shows the support force under static load condition.



Model No. / Hydraulic Pressure (MPa)	Support Force (kN) TND0603-□	TND1003-□	TND1603-□
35	7.1	11.7	16.3
32.5	6.5	10.7	14.9
30	5.9	9.8	13.6
27.5	5.3	8.8	12.2
25	4.7	7.8	10.9
22.5	4.1	6.8	9.5
20	3.6	5.9	8.1
17.5	3.0	4.9	6.8
15	2.4	3.9	5.4
12.5	1.8	2.9	4.1
10	1.2	2.0	2.7
7.5	0.6	1.0	1.4
Support Force Formula※1 kN	0.24×P-1.18	0.39×P-1.95	0.54×P-2.72

Note : ※1. P : Operating Hydraulic Pressure (MPa)

Load / Displacement Graph ※ This graph shows the static load displacement of a single work support at 35 MPa hydraulic pressure. (Not including the displacement of the workpiece side due to unevenness at ★ mark and surrounding clamps.)



Performance Curve (TND-Q : Hydraulic Advance Long Stroke Model)

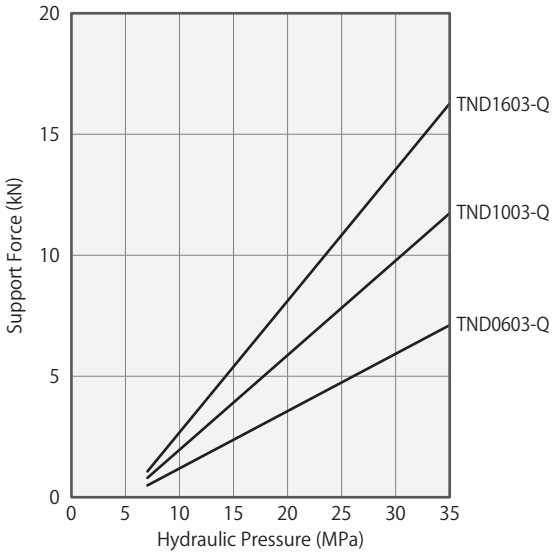
Applicable Model

TND 060 3 - Q

5 Option : Q

1 Support Force

Support Force Graph ※ This graph shows the support force under static load condition.

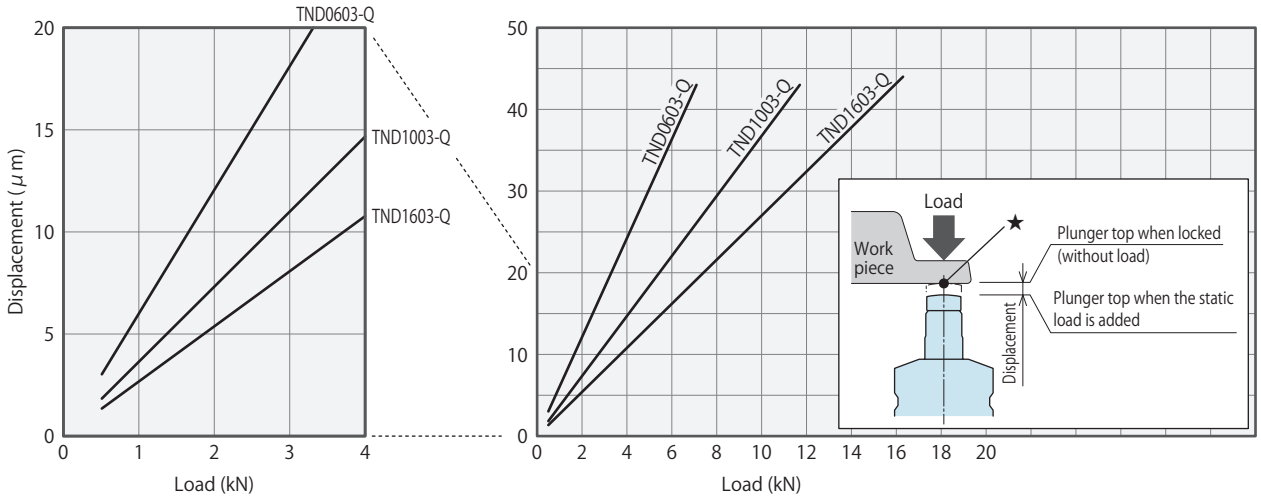


Model No.	Support Force (kN)		
Hydraulic Pressure (MPa)	TND0603-Q	TND1003-Q	TND1603-Q
35	7.1	11.7	16.3
32.5	6.5	10.7	14.9
30	5.9	9.8	13.6
27.5	5.3	8.8	12.2
25	4.7	7.8	10.9
22.5	4.1	6.8	9.5
20	3.6	5.9	8.1
17.5	3.0	4.9	6.8
15	2.4	3.9	5.4
12.5	1.8	2.9	4.1
10	1.2	2.0	2.7
7.5	0.6	1.0	1.4
Support Force Formula ※1 kN	0.24×P-1.18	0.39×P-1.95	0.54×P-2.72

Note : ※1. P : Operating Hydraulic Pressure (MPa)

Load / Displacement Graph

※ This graph shows the static load displacement of a single work support at 35 MPa hydraulic pressure.
(Not including the displacement of the workpiece side due to unevenness at ★ mark and surrounding clamps.)



※ The Displacement of TND-Q : Long Stroke Model is larger than that of TND : Standard Model.
※ Please contact us in case of TND-M-Q.

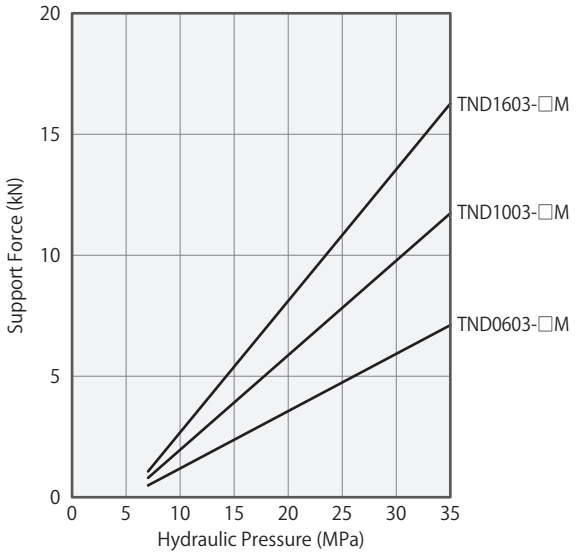
Performance Curve (TND-□M : Hydraulic Advance Air Sensing Model)

Applicable Model

TND 060 3 - L/H M- Blank

- 5 Option : Blank
- 4 Plunger Action Confirmation : M
- 1 Support Force

Support Force Graph ※ This graph shows the support force under static load condition.

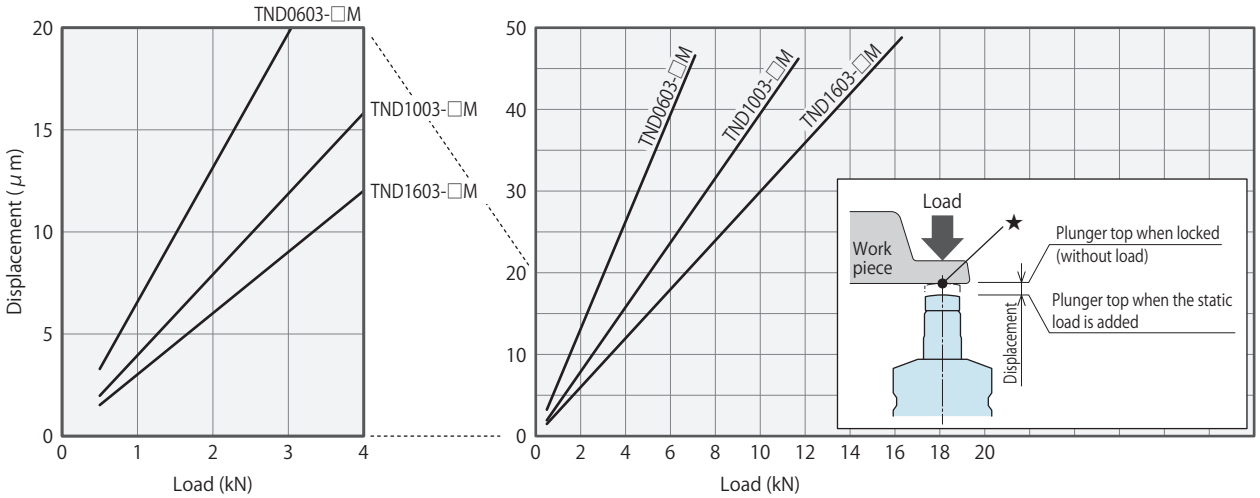


Model No. / Hydraulic Pressure (MPa)	Support Force (kN) TND0603-□M	TND1003-□M	TND1603-□M
35	7.1	11.7	16.3
32.5	6.5	10.7	14.9
30	5.9	9.8	13.6
27.5	5.3	8.8	12.2
25	4.7	7.8	10.9
22.5	4.1	6.8	9.5
20	3.6	5.9	8.1
17.5	3.0	4.9	6.8
15	2.4	3.9	5.4
12.5	1.8	2.9	4.1
10	1.2	2.0	2.7
7.5	0.6	1.0	1.4
Support Force Formula※1 kN	0.24×P-1.18	0.39×P-1.95	0.54×P-2.72

Note : ※1. P : Operating Hydraulic Pressure (MPa)

Load / Displacement Graph

※ This graph shows the static load displacement of a single work support at 35 MPa hydraulic pressure.
(Not including the displacement of the workpiece side due to unevenness at ★ mark and surrounding clamps.)

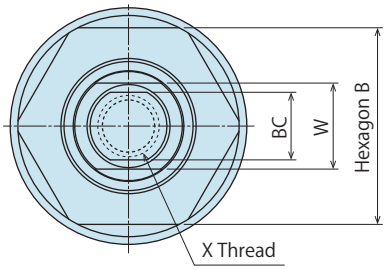


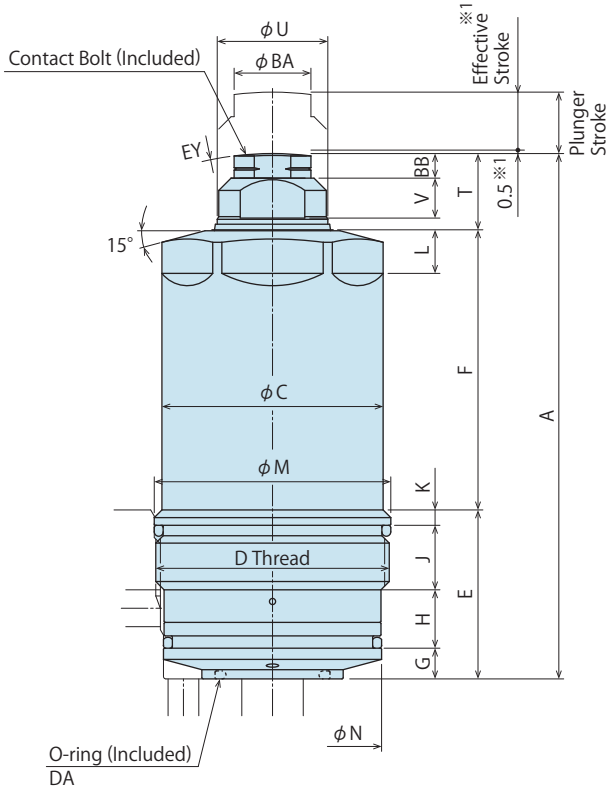
※ The Displacement of TND-M : Air Sensing Model is larger than that of TND : Standard Model.
※ Please contact us in case of TND-M-Q.

MEMO

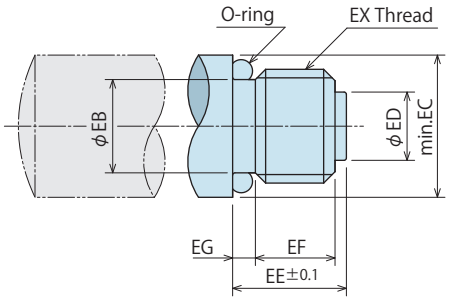
External Dimensions

※ This drawing shows the released state of TND-□ (before the plunger is lifted).





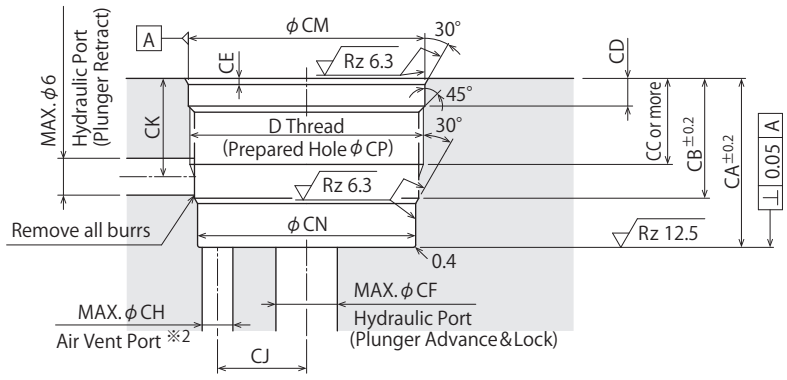
Contact Bolt Design Dimensions



Note :

※1. When the work support touches a workpiece within 0.5mm stroke from the plunger retract-end, a larger force than the plunger spring force will be applied to the workpiece. Please use the work support within the effective stroke range.

Machining Dimensions of Mounting Area



Note :

※2. Air vent port must be open to the atmosphere, and prevent coolant and chips from entering the air vent port. (Please refer to "Appropriate Measures for the Air Vent Port (P.21)".)

Model No. Indication (Format Example：TND0603-H, TND1603-L)

TND 060 3 – L H

1 Support Force
2 Design No.
3 Plunger Spring Force
4 Plunger Action Confirmation (Blank)
5 Option
Blank：Hydraulic Advance Model (Standard)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.	TND0603-□	TND1003-□	TND1603-□
Plunger Stroke	8	10	12
Effective Stroke	7.5	9.5	11.5
A	72.5	85.5	97
B	27	32	41
C	30	36	45
D (Nominal × Pitch)	M32 × 1.5	M38 × 1.5	M48 × 1.5
E	27	27.5	31.5
F	32.6	44.6	47.6
G	4.5	5	2.5
H	9.5	9.5	12
J	10.5	10.5	13
K	2.5	2.5	4
L	6.5	7	9
M	$32.5f7^{-0.025}_{-0.050}$	$38.5f7^{-0.025}_{-0.050}$	$49f7^{-0.025}_{-0.050}$
N	$29.5f7^{-0.020}_{-0.041}$	$35.5f7^{-0.025}_{-0.050}$	$45f7^{-0.025}_{-0.050}$
T	12.9	13.4	17.9
U	15	18	22
V	6	6.5	9
W	13	14	19
X (Nominal × Pitch × Depth)	M10 × 1.5 × 11	M10 × 1.5 × 11	M12 × 1.75 × 13
BA	12.5	12.5	16.5
BB	4	4	6
BC	11	11	14
CA	27	27.5	31.5
CB	19.5	19.5	23.5
CC	14	14	18
CD	4.5	4.5	7
CE	1	1	1.5
CF	10	10	12
CH	3	5	6
CJ	13	14.5	19
CK	16	16	20
CM	$32.5H8^{+0.039}_{0}$	$38.5H8^{+0.039}_{0}$	$49H8^{+0.039}_{0}$
CN	$29.5H8^{+0.033}_{0}$	$35.5H8^{+0.039}_{0}$	$45H8^{+0.039}_{0}$
CP	$30.5^{+0.17}_{-0.12}$	$36.5^{+0.17}_{-0.12}$	$46.5^{+0.17}_{-0.12}$
DA	AS568-015(90)	AS568-016(90)	AS568-017(90)
EY	SR50	SR50	SR80
Tightening Torque for Main Body※1	50 N·m	63 N·m	80 N·m

Note : ※1. The torque for mounting the body should be as indicated in the table above. Excessive torque will cause deformation of the body leading to operation failure. Also, with insufficient torque, O-ring will be damaged resulting in oil leakage.

Contact Bolt Design Dimensions

※ Reference for designing a contact bolt (attachment) by customer other than the included contact bolt.

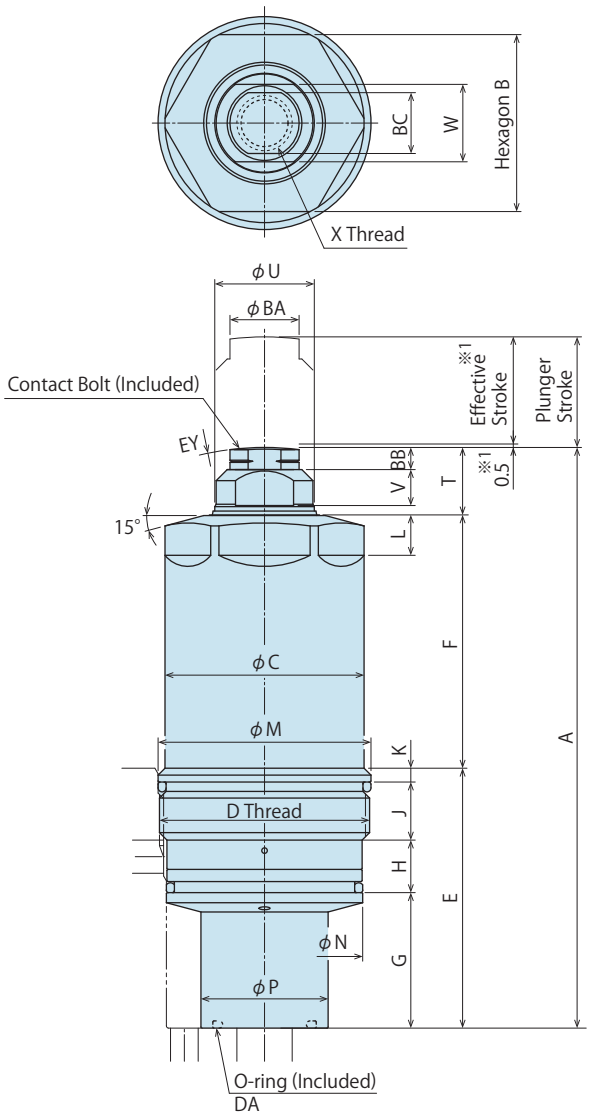
(mm)

Corresponding Product Model		TND0603-□	TND1003-□	TND1603-□
EB		7.4	7.4	9.4
EC		12.5	12.5	16.5
ED		6	6	7.5
EE		10	10	12
EF		7.3	7.3	8.7
EG		1.7	1.7	2.3
EX		M10 × 1.5	M10 × 1.5	M12 × 1.75
O-ring		AS568-010(70)	AS568-010(70)	AS568-012(70)
Contact Bolt Tightening Torque		16 N·m	16 N·m	40 N·m
Reference	Material	S45C		
	Quenching Hardness	HRC50-55		
	Surface Finishing	Alkaline Blackening		

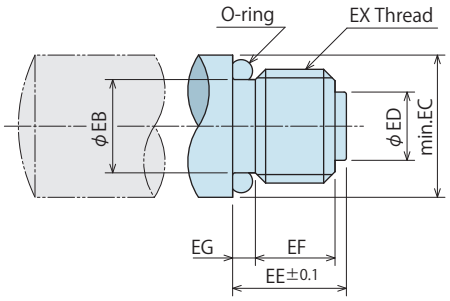
Notes : 1. It should be designed according to the mass of contact bolt and the plunger spring force.
2. If using a contact bolt with different dimensions than those shown above, spring force will be different from the values on the catalog, and the plunger spring will be damaged leading to malfunctions.

External Dimensions

※ This drawing shows the released state of TND-Q (before the plunger is lifted).



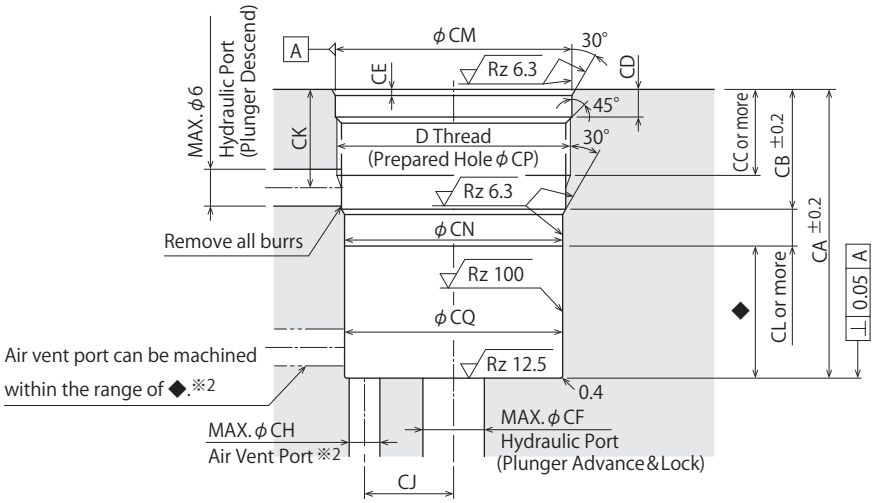
Contact Bolt Design Dimensions



Note :

※1. When the work support touches a workpiece within 0.5mm stroke from the plunger retract-end, a larger force than the plunger spring force will be applied to the workpiece. Please use the work support within the effective stroke range.

Machining Dimensions of Mounting Area



Note :

※2. Air vent port must be open to the atmosphere, and prevent coolant and chips from entering the air vent port. (Please refer to "Appropriate Measures for the Air Vent Port (P.21)".)

Model No. Indication (Format Example : TND0603-Q, TND1603-Q)

TND 060 3 – Q

1 Support Force
2 Design No.
3 Plunger Spring Force
4 Plunger Action Confirmation (Blank)
5 Option
Q : Hydraulic Advance Long Stroke Model

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.	TND0603-Q	TND1003-Q	TND1603-Q
Plunger Stroke	16	20	24
Effective Stroke	15.5	19.5	23.5
A	88.5	105	119.5
B	27	32	41
C	30	36	45
D (Nominal × Pitch)	M32 × 1.5	M38 × 1.5	M48 × 1.5
E	43	47	54
F	32.6	44.6	47.6
G	20.5	24.5	25
H	9.5	9.5	12
J	10.5	10.5	13
K	2.5	2.5	4
L	6.5	7	9
M	$32.5f7^{-0.025}_{-0.050}$	$38.5f7^{-0.025}_{-0.050}$	$49f7^{-0.025}_{-0.050}$
N	$29.5f7^{-0.020}_{-0.041}$	$35.5f7^{-0.025}_{-0.050}$	$45f7^{-0.025}_{-0.050}$
P	22	23	27
T	12.9	13.4	17.9
U	15	18	22
V	6	6.5	9
W	13	14	19
X (Nominal × Pitch × Depth)	M10 × 1.5 × 11	M10 × 1.5 × 11	M12 × 1.75 × 13
BA	12.5	12.5	16.5
BB	4	4	6
BC	11	11	14
CA	43	47	54
CB	19.5	19.5	23.5
CC	14	14	18
CD	4.5	4.5	7
CE	1	1	1.5
CF	10	10	12
CH	3	5	6
CJ	13	14.5	19
CK	16	16	20
CL	6	6	10
CM	$32.5H8^{+0.039}_{0}$	$38.5H8^{+0.039}_{0}$	$49H8^{+0.039}_{0}$
CN	$29.5H8^{+0.033}_{0}$	$35.5H8^{+0.039}_{0}$	$45H8^{+0.039}_{0}$
CP	$30.5^{+0.17}_{-0.12}$	$36.5^{+0.17}_{-0.12}$	$46.5^{+0.17}_{-0.12}$
CQ	$29.5^{0}_{-0.2}$	$35.5^{0}_{-0.2}$	$45^{0}_{-0.2}$
DA	AS568-015(90)	AS568-016(90)	AS568-017(90)
EY	SR50	SR50	SR80
Tightening Torque for Main Body※1	50 N·m	63 N·m	80 N·m

Note : ※1. The torque for mounting the body should be as indicated in the table above. Excessive torque will cause deformation of the body leading to operation failure. Also, with insufficient torque, O-ring will be damaged resulting in oil leakage.

Contact Bolt Design Dimensions

※ Reference for designing a contact bolt (attachment) by customer other than the included contact bolt.

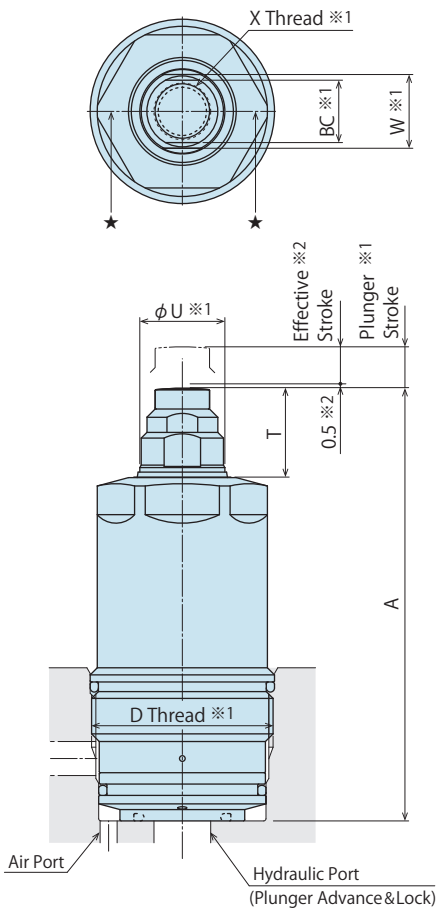
(mm)

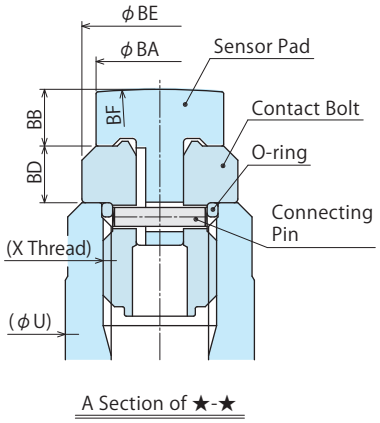
Corresponding Product Model		TND0603-Q	TND1003-Q	TND1603-Q
EB		7.4	7.4	9.4
EC		12.5	12.5	16.5
ED		6	6	7.5
EE		10	10	12
EF		7.3	7.3	8.7
EG		1.7	1.7	2.3
EX		M10 × 1.5	M10 × 1.5	M12 × 1.75
O-ring		AS568-010(70)	AS568-010(70)	AS568-012(70)
Contact Bolt Tightening Torque		16 N·m	16 N·m	40 N·m
Reference	Material	S45C		
	Quenching Hardness	HRC50-55		
	Surface Finishing	Alkaline Blackening		

Notes : 1. It should be designed according to the mass of contact bolt and the plunger spring force.
2. If using a contact bolt with different dimensions than those shown above, spring force will be different from the values on the catalog, and the plunger spring will be damaged leading to malfunctions.

External Dimensions

※ This drawing shows the released state of TND-□M (before the plunger is lifted).





Notes :

※1. Dimensions with ※1 are the same as TND Standard Model.

※2. When the work support touches a workpiece within short stroke range, 0.5mm from the plunger retract-end, a force which is larger than the workpiece contact force (Refer to P.17 workpiece contact force formula when using air catch sensor) will be applied to the workpiece.

1. Even if the contact bolt for TND standard model is exchanged with air sensing option, it does not work as air sensing option. An internal part must be changed with air sensing corresponding product.
2. Please refer to P.17, P.18 for Air Sensing Chart.

Model No. Indication (Format Example : TND0603-LM, TND1603-HM)

TND 060 3 – L/H M

1 Support Force

2 Design No.

3 Plunger Spring Force

4 Plunger Action Confirmation
M : Air Sensing Option

5 Option
Blank : Hydraulic Advance Model (Standard)

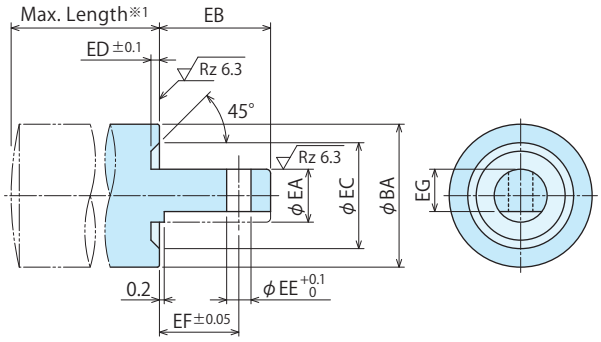
External Dimension List

(mm)

Model No.	TND0603-□M	TND1003-□M	TND1603-□M
Plunger Stroke※1	8	10	12
Effective Stroke	7.5	9.5	11.5
A	76.5	89.5	103
D (Nominal×Pitch)※1	M32 × 1.5	M38 × 1.5	M48 × 1.5
T	16.9	17.4	23.9
U※1	15	18	22
W※1	13	14	19
X (Nominal × Pitch × Depth)※1	M10 × 1.5 × 11	M10 × 1.5 × 11	M12 × 1.75 × 13
BA	10.5	10.5	13.5
BB	4	4	6
BC※1	11	11	14
BD	4	4	6
BE	12.5	12.5	16.5
BF	SR50	SR50	SR80
Connecting Pin (Diameter×Length)	ϕ1 × 7.8	ϕ1 × 7.8	ϕ2 × 9.8
O-ring	S8 (made by NOK)	S8 (made by NOK)	S10 (made by NOK)

Note : ※ 1 .Dimensions with ※1 are the same as TND Standard Model.

Sensor Pad Design Dimensions



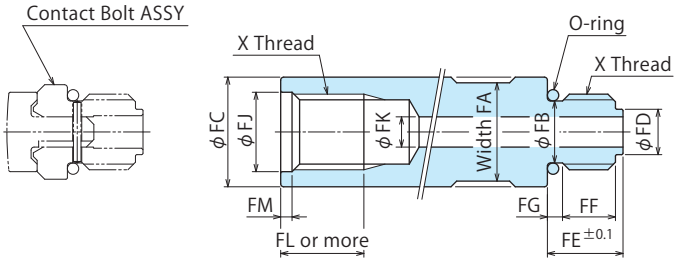
※ When replacing the sensor pad, please design it according to the sensor pad design dimensions.
※ When replacing the sensor pad, please be careful not to lose the connecting pin.

(mm)

Corresponding Model No.	TND0603-□M	TND1003-□M	TND1603-□M
EA	4g7 −0.004 −0.016	4g7 −0.004 −0.016	5g7 −0.004 −0.016
EB	7.5	7.5	10.5
EC	8.5	8.5	10
ED	0.8	0.8	0.8
EE	1.2	1.2	2.3
EF	5.3	5.3	7.5
EG	3.2	3.2	3.9
Max. Length ※1	max. 8	max. 8	max. 12

Note : ※ 1. Sensor response may decrease if the pad is longer than the maximum length.

Contact Bolt Adapter Design Dimensions



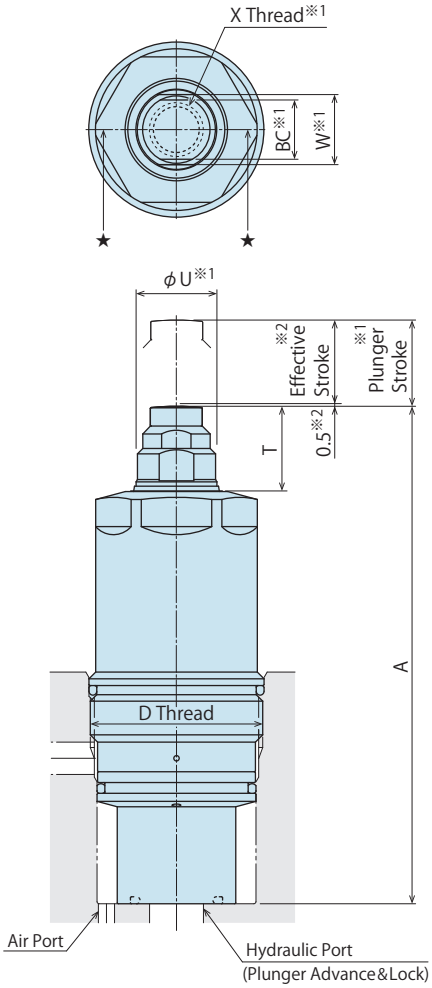
※ When a longer contact bolt is required, design it according to the contact bolt adapter design dimensions.

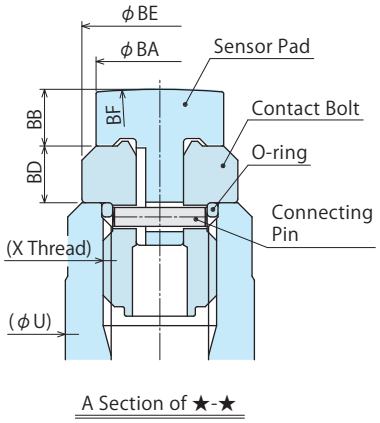
(mm)

Corresponding Model No.	TND0603-□M	TND1003-□M	TND1603-□M
FA	13	13	17
FB	8.2	8.2	10
FC	14.5	14.5	19.5
FD	6	6	7.5
FE	10	10	12
FF	7	7	8
FG	2	2	3
FJ	10.5	10.5	12.3
FK	4	4	5
FL	11	11	13
FM	1.5	1.5	1.5
X	M10	M10	M12
O-ring	S8 (made by NOK)	S8 (made by NOK)	S10 (made by NOK)
Contact Bolt ASSY	XLC-M10SP	XLC-M10SP	XLC-M12SP
Reference：Material	SCM435 Quenched and Tempered Material		
Reference：Surface Finishing	Nitriding		

External Dimensions

※ This drawing shows the released state of TND-M-Q (before the plunger is lifted).





Notes :

※1. Dimensions with ※1 are the same as TND-Q Long Stroke Model.

※2. When the work support touches a workpiece within short stroke range, 0.5mm from the plunger retract-end, a force which is larger than the workpiece contact force (Refer to P.17 workpiece contact force formula when using air catch sensor) will be applied to the workpiece.

1. Even if the contact bolt for TND-Q Long Stroke Model is exchanged with air sensing option, it does not work as air sensing option. An internal part must be changed with air sensing corresponding product.
2. Please refer to P.17, P.18 for Air Sensing Chart.

Model No. Indication (Format Example : TND0603-M-Q, TND1603-M-Q)

TND 060 3 – M – Q

1 2 4 5

1 Support Force

2 Design No.

3 Plunger Spring Force

4 Plunger Action Confirmation
M : Air Sensing Option

5 Option
Q : Hydraulic Advance Long Stroke Model

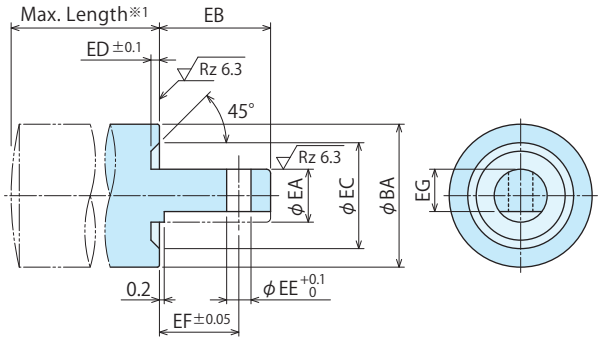
External Dimension List

(mm)

Model No.	TND0603-M-Q	TND1003-M-Q	TND1603-M-Q
Plunger Stroke※1	16	20	24
Effective Stroke	15.5	19.5	23.5
A	92.5	109	125.5
D (Nominal×Pitch)※1	M32 × 1.5	M38 × 1.5	M48 × 1.5
T	16.9	17.4	23.9
U※1	15	18	22
W※1	13	14	19
X (Nominal × Pitch × Depth)※1	M10 × 1.5 × 11	M10 × 1.5 × 11	M12 × 1.75 × 13
BA	10.5	10.5	13.5
BB	4	4	6
BC※1	11	11	14
BD	4	4	6
BE	12.5	12.5	16.5
BF	SR50	SR50	SR80
Connecting Pin (Diameter×Length)	ϕ1 × 7.8	ϕ1 × 7.8	ϕ2 × 9.8
O-ring	S8 (made by NOK)	S8 (made by NOK)	S10 (made by NOK)

Note : ※ 1 .Dimensions with ※1 are the same as TND-Q Long Stroke Model.

Sensor Pad Design Dimensions



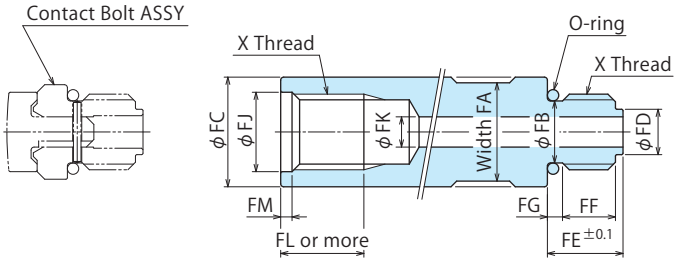
※ When replacing the sensor pad, please design it according to the sensor pad design dimensions.
※ When replacing the sensor pad, please be careful not to lose the connecting pin.

(mm)

Corresponding Model No.	TND0603-M-Q	TND1003-M-Q	TND1603-M-Q
EA	4g7 −0.004 −0.016	4g7 −0.004 −0.016	5g7 −0.004 −0.016
EB	7.5	7.5	10.5
EC	8.5	8.5	10
ED	0.8	0.8	0.8
EE	1.2	1.2	2.3
EF	5.3	5.3	7.5
EG	3.2	3.2	3.9
Max. Length ※1	max. 8	max. 8	max. 12

Note : ※ 1. Sensor response may decrease if the pad is longer than the maximum length.

Contact Bolt Adapter Design Dimensions



※ When a longer contact bolt is required, design it according to the contact bolt adapter design dimensions.

(mm)

Corresponding Model No.	TND0603-M-Q	TND1003-M-Q	TND1603-M-Q
FA	13	13	17
FB	8.2	8.2	10
FC	14.5	14.5	19.5
FD	6	6	7.5
FE	10	10	12
FF	7	7	8
FG	2	2	3
FJ	10.5	10.5	12.3
FK	4	4	5
FL	11	11	13
FM	1.5	1.5	1.5
X	M10	M10	M12
O-ring	S8 (made by NOK)	S8 (made by NOK)	S10 (made by NOK)
Contact Bolt ASSY	XLC-M10SP	XLC-M10SP	XLC-M12SP
Reference：Material	SCM435 Quenched and Tempered Material		
Reference：Surface Finishing	Nitriding		

Air Sensing Option (Plunger Action Confirmation･･･M：Air Sensing Option)

Plunger action is detected by the circuit at the vent port like the drawing below. This is done by detecting the differential pressure between P1 and P2 with air sensor.

Applicable Model

TND 060 3 - L/H **M** - Blank

4 Plunger Action Confirmation：M

- Workpieces even with rough, casting or forged surface can be accurately detected since the structure does not detect the workpiece surface directly.
- Detected with higher accuracy compared to a switch detection with a dog, etc.
- Designed to prevent coolant from entering into the sensing area.

Structure Drawing

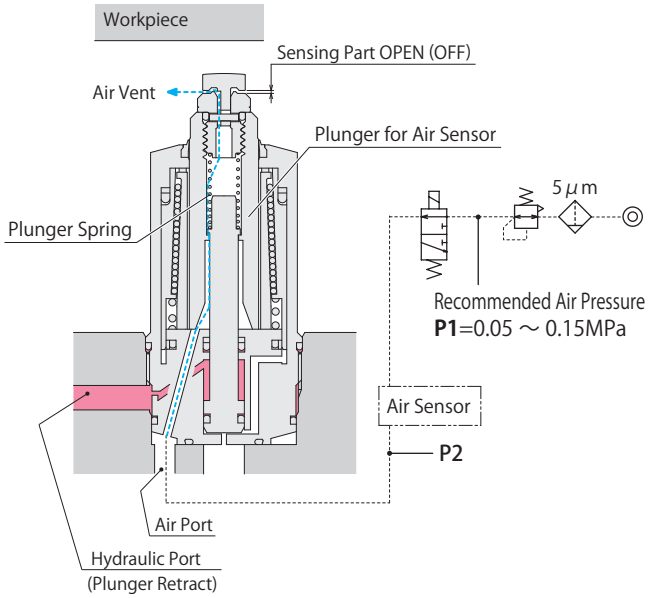
Recommended Operating Air Pressure：0.05 ~ 0.15MPa

Recommended Air Sensor

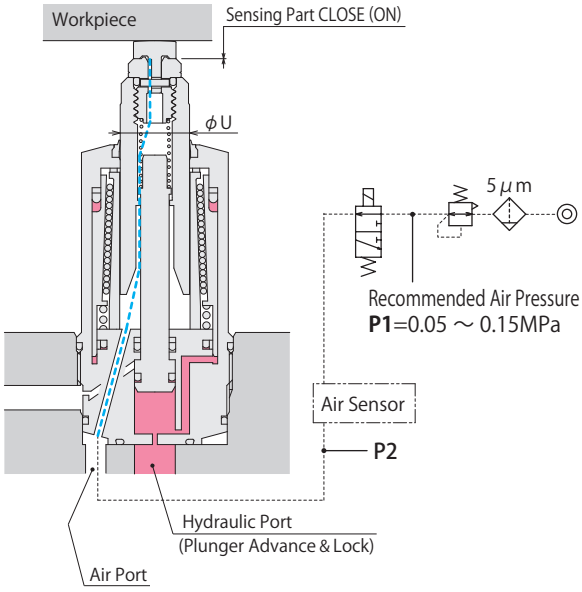
Manufacturer	SMC	CKD
Name	Air Catch Sensor	Gap Switch
Model No.	ISA3-G	GPS3-E

● The Number of Work Supports Connected per Air Sensor：1 ~ 4

TND Released State (Air Sensor OFF)



TND Plunger Extends・Contacts Workpiece (Air Sensor ON)



Workpiece Contact Force Formula when using Air Sensor ※1

Workpiece Contact Force (N) = Plunger Spring Force (N) + Supply Air Pressure (MPa) × U^2 (mm) × π ／ 4

Model No.		TND0603-□M-□	TND1003-□M-□	TND1603-□M-□
U	mm	15	18	22
Plunger ※2 Spring Force N	L ：Low Spring Force	4.7 ~ 7.8	5.8 ~ 9.7	8.3 ~ 14.6
	H ：High Spring Force	6.2 ~ 11.0	7.8 ~ 13.5	10.1 ~ 22.0
	Q ：Long Stroke	6.2 ~ 12.9	7.8 ~ 20.4	10.1 ~ 24.8

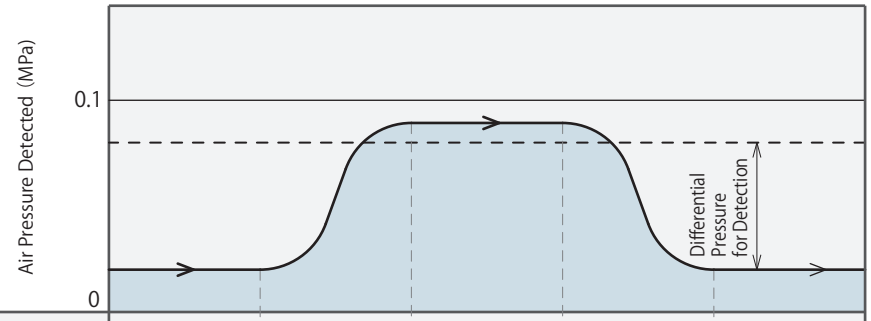
Notes：

※1. Please prepare a stopper if necessary when using light and/or thin workpiece. Otherwise it might be pushed up by work support.

※2. The plunger spring force indicates the spring design value.
It may vary depending on sliding resistance of the plunger and characteristic of the spring , etc. Please read it as a reference value of workpiece contact force.

Air Sensing Chart

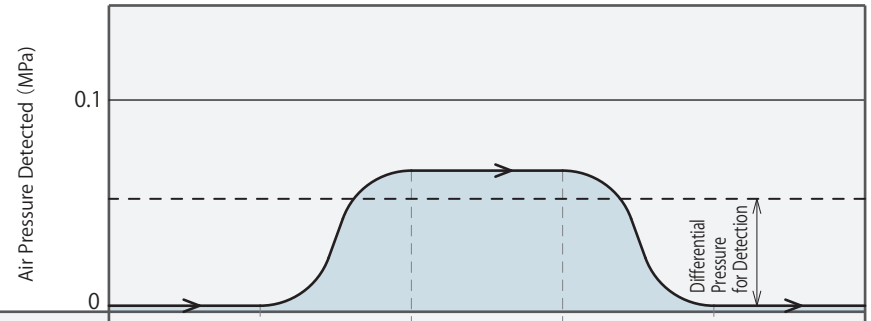
Connect one work support with one air sensor
Supply Pressure of Air Sensor P1=0.1MPa



Air Catch Sensor	OFF	OFF→ON	ON	ON→OFF	OFF
Hydraulic Valve	Hydraulic Pressure OFF	Hydraulic Pressure ON	Hydraulic Pressure ON	Hydraulic Pressure OFF	Hydraulic Pressure OFF
Work Support Action	Released State	Ascending Completed Locking State	Locking Completed	Releasing State Descending State	Releasing Completed

Note : 1. Depending on the usage condition, the detection differential pressure may be decreased by repeated action. Please contact us for overhaul when the detection differential pressure is decreased.

Connect four work supports with one air sensor
Supply Pressure of Air Sensor P1=0.1MPa



Air Catch Sensor	OFF	OFF→ON	ON	ON→OFF	OFF
Hydraulic Valve	Hydraulic Pressure OFF	Hydraulic Pressure ON	Hydraulic Pressure ON	Hydraulic Pressure OFF	Hydraulic Pressure OFF
Work Support Action	Released State	Ascending Completed Locking State	Locking Completed	Releasing State Descending State	Releasing Completed

Notes : 1. Depending on the usage condition, the detection differential pressure may be decreased by repeated action. Please contact us for overhaul when the detection differential pressure is decreased.
2. In order to carry out stabilized detection, the number of work supports connected per air sensor should be four or less.

Notes

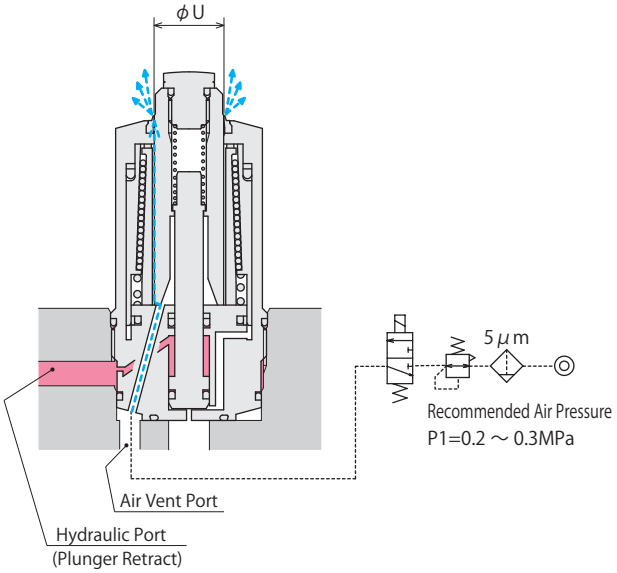
1. This specification is designed for confirming the plunger action of the work support. If it is used for confirming the close contact with the workpiece, other clamping (force) is necessary.
2. If the plunger goes up too fast, it may bounce back and locks itself. Resulting in a gap with the workpiece and possible damage to the internal parts due to the impact force. Set the plunger action time at 0.5-1.0 sec. to adjust the air supply with the flow control valve with check valve (meter-in), and make sure that there is no clearance with the workpiece for operation.
3. The sensor air port needs to have air supply at all the times. If it is used when the air supply is shut off, the coolant or cutting chips may contaminate the sensing area, leading to malfunctioning of the work support and breakage of the air sensor.
4. Even if the contact bolt for TND standard model is exchanged with air sensing option, it does not work as air sensing option. Internal part must be changed with air sensor corresponding product.
5. In certain circumstances it has been known for the plunger to move slower through continued use because of the airflow change in the circuit, turn the operating air supply off fully to reset the work support.

Air Purge Function

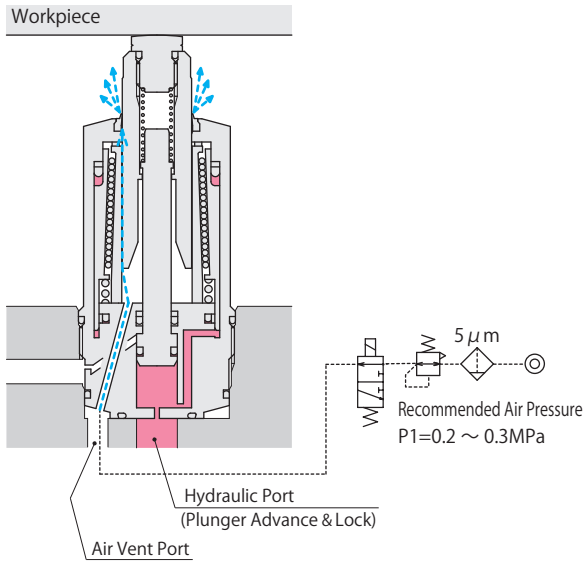
The special dust seal that features low friction and high sealing capabilities is used in TND. However, when using TND in worse condition, air purge function is available by providing the circuit to the air vent port like the drawing below.

Structure Drawing

TND Plunger Retracting and at Releasing State



TND Plunger Advancing and at Locking State



Workpiece Contact Force Formula when Using Air Purge Function ※1

Workpiece Contact Force (N) = Plunger Spring Force (N) + Supply Air Pressure (MPa) × U^2 (mm) × π ／ 4

Model No.		TND0603-□	TND1003-□	TND1603-□
U mm		15	18	22
Plunger Spring Force ※2 N	**L** : Low Spring Force	4.7~7.8	5.8~9.7	8.3~14.6
	H : High Spring Force	6.2~11.0	7.8~13.5	10.1~22.0

Model No.	TND0603-Q	TND1003-Q	TND1603-Q
U mm	15	18	22
Plunger Spring Force ※2 N	6.2~12.9	7.8~20.4	10.1~24.8

Notes :

※1. Please prepare a stopper if necessary when using light and/or thin workpiece. Otherwise it might be pushed up by work support.

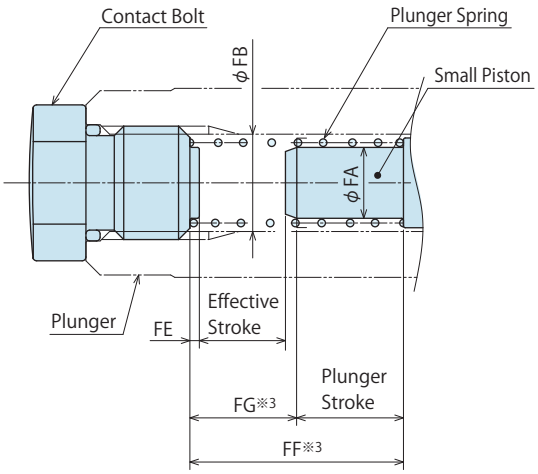
※2. The plunger spring force indicates the spring design value. It may vary depending on sliding resistance of the plunger and characteristic of the spring, etc. Please read it as a reference value of workpiece contact force.

Notes

1. If the plunger advances too fast, it may bounce back and locks itself resulting in a gap with the workpiece, and possible damage to the internal parts due to the impact. Set the plunger action time at 0.5-1.0 sec. to adjust the air supply with the flow control valve with check valve (meter-in), and make sure that there is no clearance with the workpiece for operation.
2. Air cannot be vented as the air supply pressure is too low because the cracking pressure at the dust seal lip is about 0.1MPa.

Plunger Spring Design Dimension

※Reference for designing a plunger spring by customer other than the included plunger spring.
※This drawing shows the released state.



(mm)

Corresponding Model No.	TND0603-□	TND1003-□	TND1603-□
FA	6	6	7.5
FB	8.5	8.5	10.3
FE	1	1	1
FF※3	17.6	19.6	22.6
FG※3	9.6	9.6	10.6
Plunger Stroke	8	10	12
Effective Stroke	7.5	9.5	11.5

(mm)

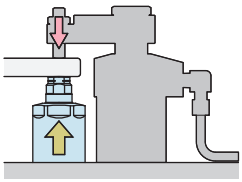
Corresponding Model No.	TND0603-Q	TND1003-Q	TND1603-Q
FA	6	6	7.5
FB	8.5	8.5	10.3
FE	1	1	1
FF※3	28.6	36.2	40.5
FG※3	12.6	16.2	16.5
Plunger Stroke	16	20	24
Effective Stroke	15.5	19.5	23.5

Note :
※3. When designing a spring, make sure that the spring set length is below FF dimension and the spring contact length is below FG dimension.

Cautions

Notes for Design

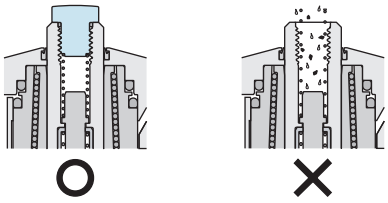
1) Check Specifications
- Please use each product according to the specifications.
- When using a work support opposite to the clamp, set the support force at more than 1.5 times the clamping force.



2) Notes for Circuit Design
- Please read "Notes on Hydraulic Cylinder Speed Control Circuit" on P.23 to assist with proper hydraulic circuit designing. Improper circuit design may lead to malfunctions and damages.

3) Install temporary stopper for workpiece if necessary.
- When multiple work supports are used for a light workpiece, the plunger spring force may be higher than the weight of the workpiece causing it to lift the workpiece.

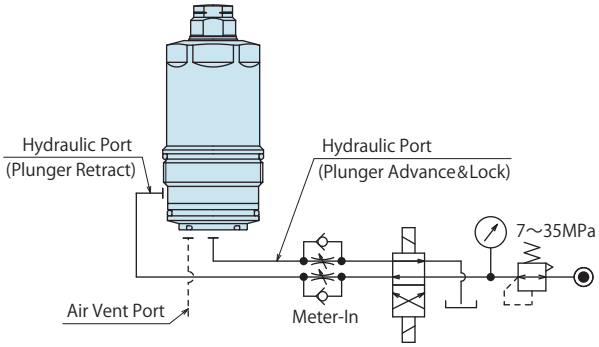
4) Contact bolt or attachment is required for the plunger.
- Always use contact bolt or attachment with the plunger. Plunger does not rise since plunger spring is free to move.
- You must set an O-ring at the attachment. With contact bolt or attachment removed, cutting fluid or other foreign material will get in easily, causing malfunction.



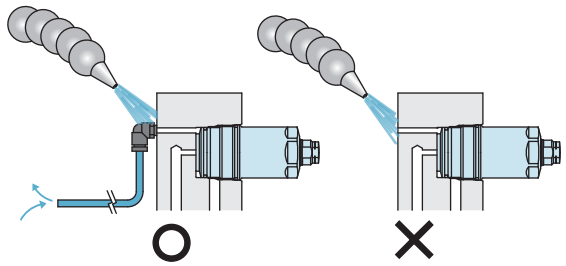
5) When using on a welding fixture, plunger surface should be protected.
- If spatter gets onto the sliding surface it may lead to a sliding failure and an insufficient support function.

6) For Using on a Lathe, High-Speed Tilting Table, and etc.
- When using in a cycle where the centrifugal force is acting,the work support should be in a locked state. Please contact us for further information.

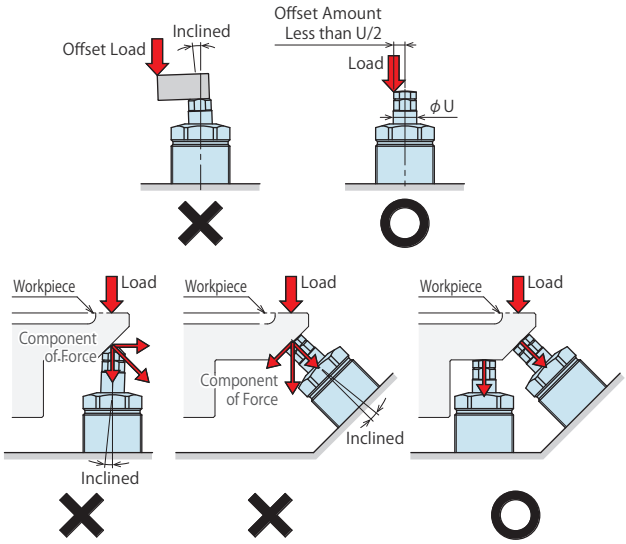
7) Adjust plunger operation time with fluid volume.
- A rough guideline for the full stroke is between 0.5 and 1 second.
- Use a flow control valve with a check valve (meter-in).
- In the case of meter-out circuit, the inner circuit pressure may increase during the cylinder action depending on fluid volume.
- If the plunger advances too fast, it may bounce back and locks itself resulting in a gap with the workpiece.



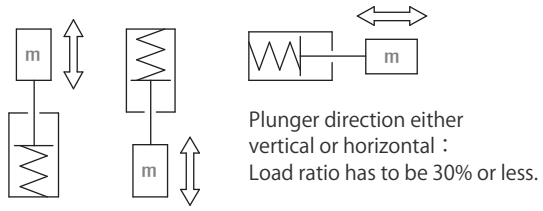
8) Appropriate Measures for Air Vent Port
- The work support, although only slightly, breathes like a single-acting cylinder. Consider the environment and avoid cutting fluid, coolant or any contaminants.
- If using it without air vent port, it will not function properly. Make sure it breathes without the influence of cutting chips or coolant.



9) Make sure that offset load and component of force do not affect the product.
- If using the product as illustrated below, the displacement against load will be increased. Also large load will damage the internal parts.



10) Keep the right weight when designing attachments.
- Make sure the weight of attachments is 30% or less of the plunger spring force.



- Ex.) In the case of TND0603-L with the plunger spring force 4.7-7.8N. The maximum mass of contact bolt = 4.7×0.3/9.807=0.14kg Since it may vary depending on sliding resistance of the plunger and characteristic of the spring, it is recommended to design the contact bolt as light as possible.
- The dimensions of the mounting thread area need to be processed according to the design dimensions for contact bolts as shown on respective product pages.
- The knockout function is used to release fixation of plunger spring and adherence after machine stop for a long time. Using an attachment with different thread part dimension leads to inappropriate spring force and effective stroke,causing damage and malfunctions.

Installation Notes

1) Check Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List.

2) Procedure before Piping

- The pipeline, piping connector and fixture circuits should be cleaned by thorough flushing.
- The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
- There is no filter provided with Kosmek's product except for a part of valves which prevents foreign materials and contaminants from getting into the circuit.

3) Applying Sealing Tape

- Wrap with tape 1 to 2 times following the screw direction.
- Pieces of the sealing tape can lead to oil leakage and malfunction.
- In order to prevent a foreign substance from going into the product during the piping work, it should be carefully cleaned before working.

4) Installation of the Product

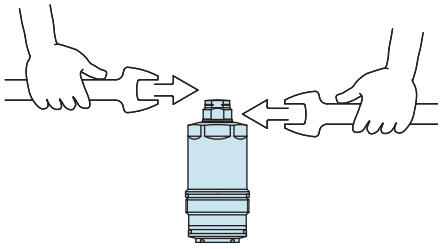
- For TND (Threaded Model), be careful not to damage the O-ring, and tighten them with the torque shown in the table below.

Model No.		Thread Size	Tightening Torque (N·m)
TND	**TND0603**	M32×1.5	50
	TND1003	M38×1.5	63
	TND1603	M48×1.5	80

- Apply an adequate amount of grease to the O-ring.
- If it is mounted under dry state, the O-ring may have twisting or be defective.
- If it is tightened with higher torque, it may lead to malfunction.

5) Replacement of Attachment

- Do not lose the plunger spring when the attachment (contact bolt) is removed.
- When mounting the attachment, stop the plunger with a spanner at edge and tighten it with torque as shown in the table below.

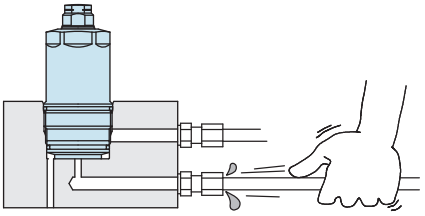


Model No.		Head Thread Size	Tightening Torque (N·m)
TND	**TND0603**	M10×1.5	16
	TND1003	M10×1.5	16
	TND1603	M12×1.75	40

6) Air Bleeding of the Hydraulic Circuit

- If the hydraulic circuit has excessive air, the action time may become very long. If air enters the circuit after connecting the hydraulic port or under the condition of no air in the oil tank, please perform the following steps.

① Reduce hydraulic pressure to less than 2MPa.
② Loosen the cap nut of pipe fitting closest to the clamp by one full turn.
③ Wiggle the pipeline to loosen the outlet of pipe fitting. Hydraulic fluid mixed with air comes out.



④ Tighten the cap nut after bleeding.
⑤ It is more effective to bleed air at the highest point inside the circuit or at the end of the circuit.
(Set an air bleeding valve at the highest point inside the circuit.)

7) Checking Looseness and Retightening

- At the beginning of the product installation, the bolt and nut may be tightened lightly. Check the looseness and re-tighten as required.

Hydraulic Fluid List

ISO Viscosity Grade ISO-VG-32

Maker	Anti-Wear Hydraulic Oil	Multi-Purpose Hydraulic Oil
Showa Shell Sekiyu	Tellus S2 M 32	Morlina S2 B 32
Idemitsu Kosan	Daphne Hydraulic Fluid 32	Daphne Super Multi Oil 32
JX Nippon Oil & Energy	Super Hyrando 32	Super Mulpus DX 32
Cosmo Oil	Cosmo Hydro AW32	Cosmo New Mighty Super 32
ExxonMobil	Mobil DTE 24	Mobil DTE 24 Light
Matsumura Oil	Hydol AW-32	
Castrol	Hyspin AWS 32	

Note As it may be difficult to purchase the products as shown in the table from overseas, please contact the respective manufacturer.

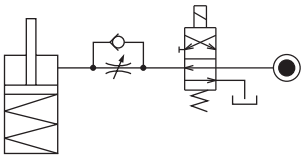
Cautions

Notes on Hydraulic Cylinder Speed Control Unit

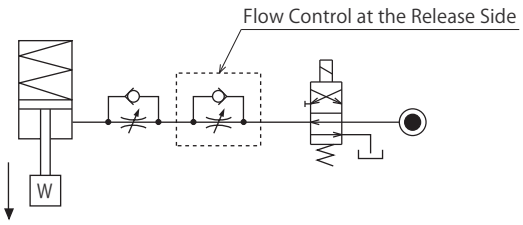
Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Flow Control Circuit for Single Acting Cylinder

For spring return single acting cylinders, restricting flow during release can extremely slow down or disrupt release action. The preferred method is to control the flow during the lock action using a valve that has free-flow in the release direction. It is also preferred to provide a flow control valve at each actuator.



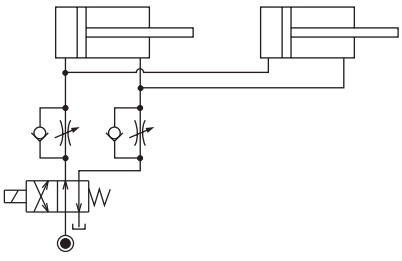
Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)



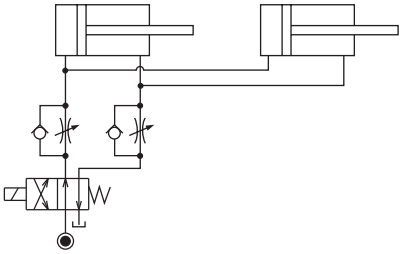
Flow Control Circuit for Double Acting Cylinder

Flow control circuit for double acting cylinder (except LKE/TLA/TMA/TND) should have meter-out circuits for both the lock and release sides. Meter-in control can have adverse effect by presence of air in the system. However, in the case of controlling LKE, TMA, TLA and TND, both lock side and release side should be meter-in circuit. For TMA, TLA and TND, if meter-out circuit is used, abnormal high pressure is created, which causes oil leakage and damage.

【Meter-out Circuit】(Except LKE/TLA/TMA/TND)

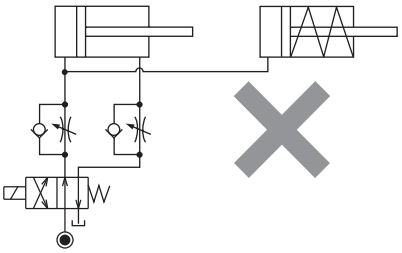


【Meter-in Circuit】(LKE/TLA/TMA/TND must be controlled with meter-in.)



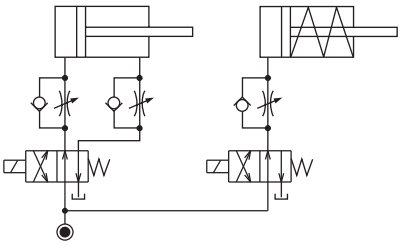
In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

① Single acting components should not be used in the same flow control circuit as the double acting components. The release action of the single acting cylinders may become erratic or very slow.

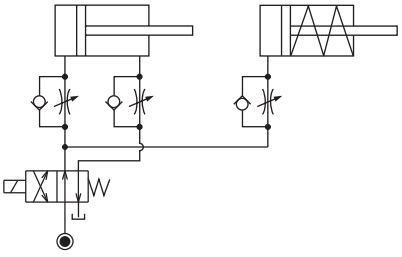


Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.

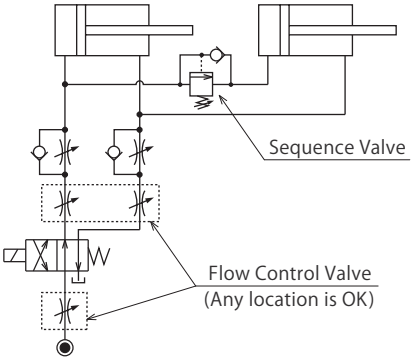
○ Separate the control circuit.



○ Reduce the influence of double acting cylinder control unit. However, due to the back pressure in tank line, single action cylinder is activated after double action cylinder works.



② In the case of meter-out circuit, the inner circuit pressure may increase during the cylinder action because of the fluid supply. The increase of the inner circuit pressure can be prevented by reducing the supplied fluid beforehand via the flow control valve. Especially when using sequence valve or pressure switches for clamping detection. If the back pressure is more than the set pressure then the system will not work as it is designed to.



Notes on Handling

1) It should be handled by qualified personnel.
- The hydraulic machine and air compressor should be handled and maintained by qualified personnel.

2) Do not handle or remove the machine unless the safety protocols are ensured.
① The machine and equipment can only be inspected or prepared when it is confirmed that the preventive devices are in place.
② Before the product is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
③ After stopping the product, do not remove until the temperature cools down.
④ Make sure there is no abnormality in the bolts and respective parts before restarting the machine or equipment.

3) Do not touch a plunger while work support is working. Otherwise, your hands may be injured due to clinching.

4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

Warranty

1) Warranty Period
- The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.

2) Warranty Scope
- If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense.
  Defects or failures caused by the following are not covered.

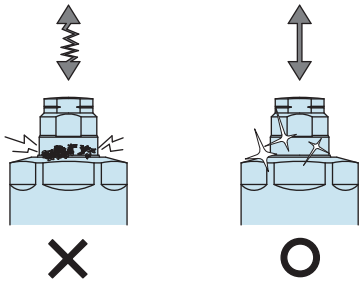
① If the stipulated maintenance and inspection are not carried out.
② If the product is used while it is not suitable for use based on the operator's judgment, resulting in defect.
③ If it is used or handled in inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
④ If the defect is caused by reasons other than our responsibility.
⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
⑥ Other caused by natural disasters or calamities not attributable to our company.
⑦ Parts or replacement expenses due to parts consumption and deterioration.
(Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.

Maintenance and Inspection

1) Removal of the Product and Shut-off of Pressure Source
- Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
- Make sure there is no abnormality in the bolts and respective parts before restarting.

2) Regularly clean the area around the piston rod and plunger.
- If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning, fluid leakage and air leaks.



3) If disconnecting by couplers on a regular basis, air bleeding should be carried out daily to avoid air mixed in the circuit.

4) Regularly tighten piping, attachment and work support to ensure proper use.

5) Make sure the hydraulic fluid has not deteriorated.

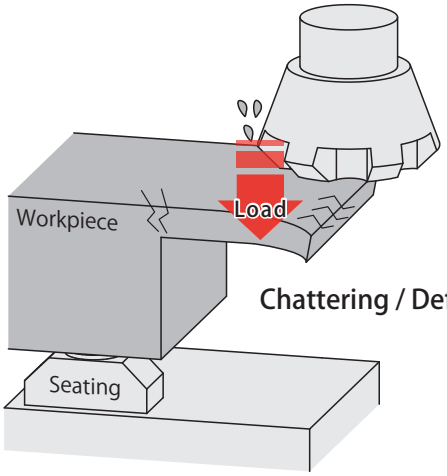
6) Make sure there is smooth action and no abnormal noise.
- Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

7) The products should be stored in the cool and dark place without direct sunshine or moisture.

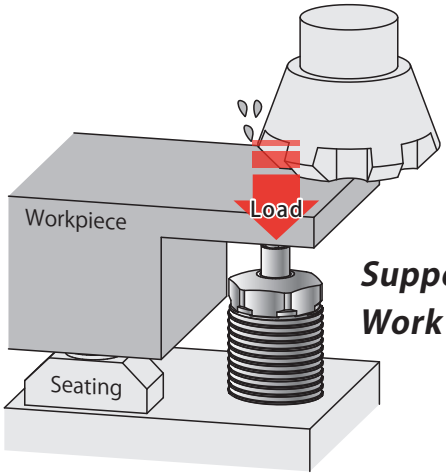
8) Please contact us for overhaul and repair.

A Wide Variety of Kosmek Work Supports

Work support eliminates chattering while machining and prevents deformation by the cutting load.

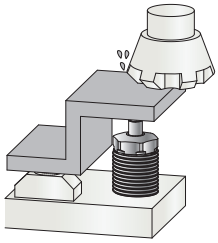


< Without Work Support >

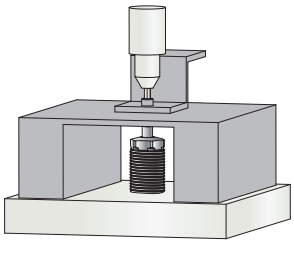


< With Work Support >

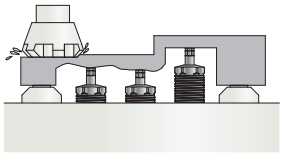
Application Examples



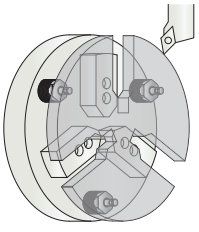
To avoid chattering during machining of thin-walled sections



To back up the screw fastener machine and a nut-runner



Workpiece with different heights

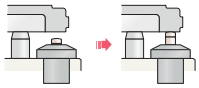
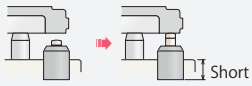
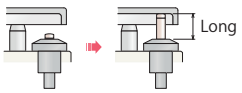
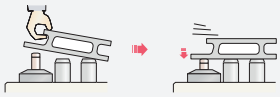
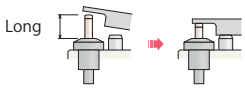
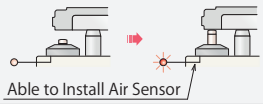
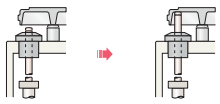


To avoid the radial chatter on lathe machining

Kosmek Work Clamping Systems Complete Catalog

Please find further information on our compete catalog.
You can order it from our website (http://www.kosmek.co.jp/english/).

Work Support Line-up

		 Model LD	 Model LC	 Model TNC	 Model TC	 Model WNC
Classification		Low Pressure Single Acting External Thread	Low Pressure Single Acting Top Flange	High Pressure Single Acting External Thread	High Pressure Single Acting Top Flange	Air Pressure Single Acting External Thread
Operating Pressure Range		2.5～7MPa	2.5～7MPa	7～35MPa	7～25MPa	0.25～0.7MPa
Standard Hydraulic Advance Model		○	○	○	○	Air Advance Model ○
Options	Hydraulic Advance Short Model 	○	–	–	–	Air Advance Model ○
Options	Hydraulic Advance Long Stroke Model 	○	○	○	○	Air Advance Model ○
Options	Spring Advance Model Spring Advance Short Model 	○	○	○	○	○
Options	Spring Advance Long Stroke Model 	○	○	○	○	○
Options	Air Sensing Option 	○	○	○	○	○
Options	Rodless Hollow Model 	–	○	–	○	○ Model WNA
Accessories	Manifold Block 	–	LZ-MP	–	LZ-MP	–
Accessories	Piping Block 	LZ-S/SQ DZ-C/R	–	TNZ-S/SQ	–	LZ-S/WNZ-SQ DZ-C/R
Accessories	Speed Control Valve Plug 	–	BZL、BZX、JZG	–	BZT、BZX、JZG	–
Accessories	Air Vent 	–	XLC-VENT	–	XLC-VENT	–

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HEAD OFFICE 1-5, 2-chome, Murotani, Nishi-ku, Kobe-city, Hyogo, Japan 651-2241
TEL.+81-78-991-5162 FAX.+81-78-991-8787

United States of America SUBSIDIARY
KOSMEK (USA) LTD.
650 Springer Drive, Lombard, IL 60148 USA
TEL. +1-630-620-7650 FAX. +1-630-620-9015

MEXICO REPRESENTATIVE OFFICE
KOSMEK USA Mexico Office
Av. Santa Fe 103, Int. 59, col. Santa Fe Juriquilla, Queretaro, QRO, 76230, Mexico TEL. +52-1-55-3044-9983

EUROPE SUBSIDIARY
KOSMEK EUROPE GmbH
Schleppeplatz 2 9020 Klagenfurt am Wörthersee Austria
TEL. +43-463-287587 FAX. +43-463-287587-20

CHINA SUBSIDIARY
KOSMEK (CHINA) LTD.
Room601, RIVERSIDE PYRAMID No.55, Lane21, Pusan Rd, Pudong Shanghai 200125, China TEL. +86-21-54253000

INDIA BRANCH OFFICE
KOSMEK LTD. - INDIA
4A/Old No:649, Ground Floor, 4th D cross, MM Layout, Kavalbyrasandra, RT Nagar, Bangalore -560032 India TEL.+91-9880561695

THAILAND REPRESENTATIVE OFFICE
KOSMEK Thailand Representation Office
67 Soi 58, RAMA 9 Rd., Phatthanakan, Suanluang, Bangkok 10250, Thailand
TEL. +66-2-300-5132 FAX. +66-2-300-5133

- For Further Information on Unlisted Specifications and Sizes, Please call us.
- Specifications in this Leaflet are Subject to Change without Notice.

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