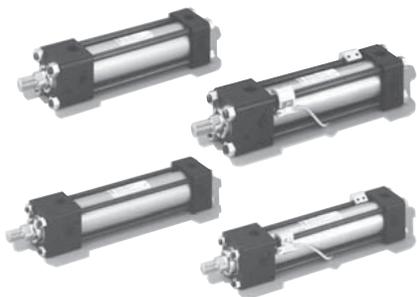General Hydraulic Cylinders

160H-1

16 MPa double acting hydraulic cylinders with dimensions conforming to ISO standard

- Conforming to ISO 6020-2/JIS B8367-2 standard.   Note 1)
- The adoption of floating cushion realizes smooth startup.   Note 2)
- Switch Set Cylinders with bores from 32 mm to 160 mm are standardized.
- Lighter and more compact as compared to 140H-8 Series.
- High-performance cushion provided as a standard feature.
- Seals in sliding parts conform to ISO standards.

Standard Specifications

Type	Standard type, Switch Set
Nominal pressure	16 MPa
Maximum allowable pressure	20 MPa
Proof test pressure	24 MPa
Minimum operating pressure	Rod side: Rod A 0.6 MPa or less Cap side: 0.3 MPa or less Rod B 0.45 MPa or less
Working speed range Note 3)	ϕ32 to ϕ63 : 8 to 400mm/s ϕ80 to ϕ125 : 8 to 300mm/s ϕ140 to ϕ160 : 8 to 200mm/s
Working temperature range (ambient/fluid temperature)	Standard type : −10 to +80℃ Note 4) Switch Set AX type WR/WS type : −10 to +70℃ (No freezing)
Structure of cushioning	Metal fitting system
Adaptable fluid	Petroleum-based fluid (When using another fluid, refer to the table of fluid adaptability.)
Tolerance for thread	JIS 6g/6H
Port thread	Rc(JIS B 0203)・G(ISO 1179-1) Note 5)
Tolerance of stroke	0 to 100mm$^{+0.8}_{0}$ 101 to 250mm$^{+1.0}_{0}$ 251 to 630mm$^{+1.25}_{0}$ 631 to 1000mm$^{+1.4}_{0}$ 1001 to 1600mm$^{+1.6}_{0}$ 1601 to 2000mm$^{+1.8}_{0}$
Mounting style	SD・LA・EA・EB・FA・FE・FB・CA・CB・TA・TC

Accessories	● Rod eye (T-end)
	● Rod clevis (Y-end) with pin
	● Lock nut
	● Boots: Nylon tarpaulin (standard)
	           Chloroprene (semi-standard)
	           Conex (semi-standard) Note 6)

● Mounting styles SD, FA, FE and FB are not specified in JIS nor ISO standards.

Terminologies

Nominal pressure
Pressure given to a cylinder for convenience of naming.
It is not always the same as the working pressure (rated pressure) that guarantees performance under the specified conditions.

Maximum allowable pressure
The maximum allowable pressure generated in a cylinder (surge pressure, etc.)

Proof test pressure
Test pressure against which a cylinder can withstand without unreliable performance at the return to nominal pressure.

Minimum operating pressure
The minimum pressure that a cylinder placed horizontally without a load can work.
● The hydraulic pressure generated in a cylinder due to the inertia of load must be lower than the maximum allowable pressure.
● In case that the lock nut is attached to the piston rod end thread part, increase the thread length (dimension A).

Note 1) The cylinders with a bore of 140 mm and double rod cylinders are not specified in JIS nor ISO standards.
Rod series B and port Rc conform to JIS B 8367-2 (not included in ISO 6020-2).

Note 2) A floating cushion is not provided for the rod side of rod A.

Note 3) The minimum working range of the combined seal type cylinders (seal code: 8) is 1 mm/s.
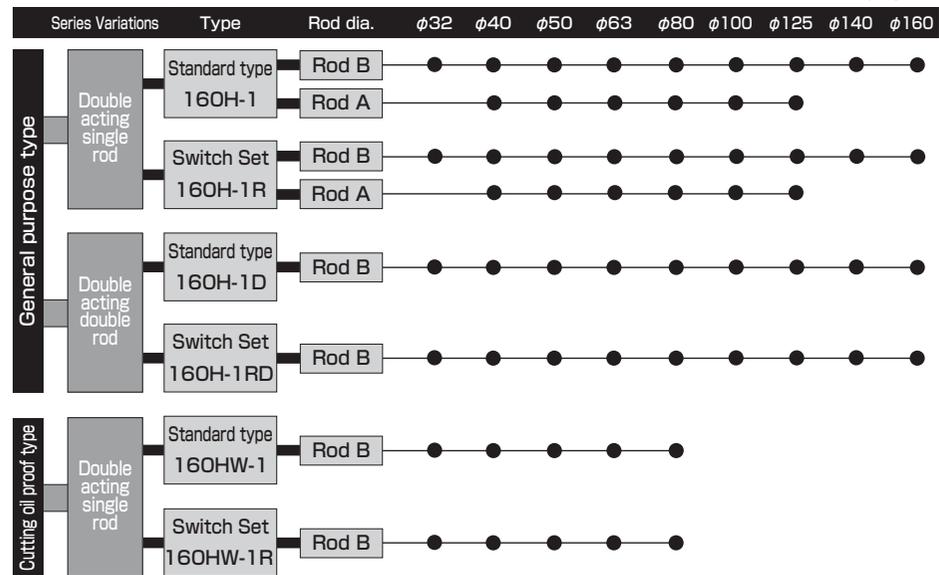
Note 4) The standard type cylinders can be used up to the working temperature range shown in the selection materials by using seal material [6], HNBR.

Note 5) The 32 mm bore cylinder of G thread type has a spacer.

Note 6) Conex, material of the boots, is the registered trademark of Teijin Limited.
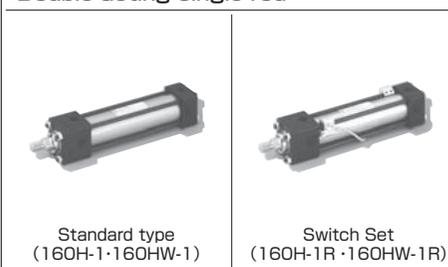
Product Lineup
Unit: mm

Series Variations		Type	Rod dia.	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125	ϕ140	ϕ160
General purpose type	Double acting single rod	Standard type **160H-1**	Rod B	●	●	●	●	●	●	●	●	●
			Rod A		●	●	●	●	●	●		●
		Switch Set **160H-1R**	Rod B	●	●	●	●	●	●	●	●	●
			Rod A		●	●	●	●	●	●		●
	Double acting double rod	Standard type **160H-1D**	Rod B	●	●	●	●	●	●	●		●
		Switch Set **160H-1RD**	Rod B	●	●	●	●	●	●	●		●
Cutting oil proof type	Double acting single rod	Standard type **160HW-1**	Rod B	●	●	●	●	●				
		Switch Set **160HW-1R**	Rod B	●	●	●	●	●				

Notes) ● When using a sensor, use a Switch Set Cylinder.
● No sensor can be mounted onto the standard type cylinder.

Double acting single rod		Double acting double rod	
Standard type (160H-1・160HW-1)	Switch Set (160H-1R ・160HW-1R)	Standard type(160H-1D)	Switch Set(160H-1RD)

Standard Stroke Range   Unit: mm

Bore	Stroke
ϕ32	1200
ϕ40・ϕ50	1600
ϕ63	1800
ϕ80 to ϕ160	2000

● The above strokes indicate the maximum available strokes for the standard type. Contact us for longer strokes.
● For the rod buckling, check with the buckling chart in the selection materials.

Cushion Stroke Length   Unit: mm

Bore	Cushion ring length L	Cushion ring parallel part length ℓ
ϕ32	21	6
ϕ40 to ϕ80	25	6
ϕ100・ϕ125	25	6
ϕ140・ϕ160	30	8

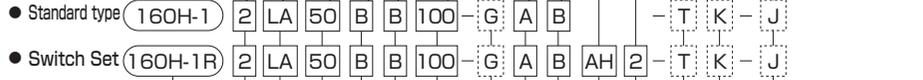● The cushion stroke lengths in case of cylinders used up to the stroke end.
● In the case that a cylinder is not used up to the stroke end, and it is stopped 5 mm or more before the stroke end, the cushioning effect will be weakened. In such a case, consult us.
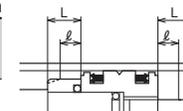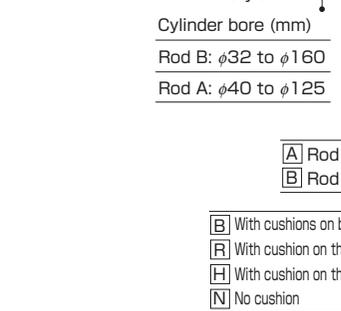
● How to order

General Purpose Type

The item enclosed by broken line needs not to be entered, if unnecessary. ▢ Semi-standard specification

Type ❶ / Seal material ❷ / Mounting style ❸ / Cylinder bore ❹ / Rod type ❺ / Cushioning ❻ / Stroke ❼ / Port type ❽ / Port position ❾ / Cushion valve position ❿ / Sensor symbol ⓫ / Sensor quantity ⓬ / Rod end attachment ⓭ / Lock nut ⓮ / Boots ⓯

● Standard type 160H-1 │ 2 │ LA │ 50 │ B │ B │ 100 │─│ G │ A │ B │ │ │─│ T │ K │─│ J

● Switch Set 160H-1R │ 2 │ LA │ 50 │ B │ B │ 100 │─│ G │ A │ B │ AH │ 2 │─│ T │ K │─│ J
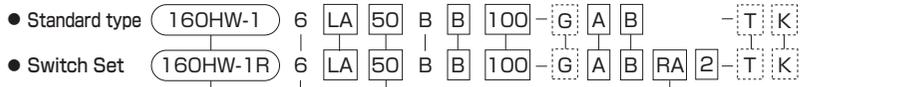
Double acting single rod
160H-1 : Standard type
160H-1R : Switch Set

Double acting double rod
160H-1D : Standard type
160H-1RD : Switch Set

1	Nitrile rubber
2	Urethane rubber
6	HNBR
8	Combined seal

● For seal structure, refer to the selection materials at the beginning of this catalog.

Mounting style

Cylinder bore (mm)

| Rod B: φ32 to φ160 |
| Rod A: φ40 to φ125 |

| A | Rod A |
| B | Rod B |

B	With cushions on both ends
R	With cushion on the rod side
H	With cushion on the cap side
N	No cushion

Cylinder stroke (mm)

Port position (A, B, C, D)

Cushion valve position (A, B, C, D, O)

| None | Rc thread |
| G | G thread |

Sensor symbol
Note) Select applicable sensors out of the Sensor List.

❗ Note on ordering Switch Set
● When no sensor is required, specify 0 for the sensor symbol ⓫ and the sensor quantity ⓬.

Sensor quantity (1, 2, to n)

| T | Rod eye (T-end) |
| Y | Rod clevis (Y-end) |

| K | Long thread with lock nut |
● For the thread length, refer to "Thread length of rod end with lock nut" in "Rod End Attachment."

J	Nylon tarpaulin
JN	Chloroprene
JK	Conex

Cutting Oil Proof Type

● Standard type 160HW-1 │ 6 │ LA │ 50 │ B │ B │ 100 │─│ G │ A │ B │ │─│ T │ K

● Switch Set 160HW-1R │ 6 │ LA │ 50 │ B │ B │ 100 │─│ G │ A │ B │ RA │ 2 │─│ T │ K

Double acting single rod
160HW-1 : Standard type
160HW-1R : Switch Set

Cylinder bore (mm)
φ32・φ40・φ50・φ63・φ80

HNBR

Reed Sensor:
5	WR505(Rear wiring, w/ 5 m cord)
7	WR505F(Rear wiring, w/ 5 m cord/flexible tube attached)
6	WR515(Rear wiring, w/ 5 m cord)

Solid state sensor:
RA	AX205W(Rear wiring, w/ 5 m cord)
RB	AZ205W(Upper wiring, w/ 5 m cord)
2	WS215-1(Rear wiring, w/ 5 m cord)
4	WS215-1F(Rear wiring, w/ 5 m cord/flexible tube attached)
3	WS225-1(Rear wiring, w/ 5 m cord)

Sensor List

Type	Sensor symbol		Load voltage range	Load current range	Maximum switching capacity	Protective circuit	Indicating lamp	Wiring method	Cord length	Applicable load
Reed sensor	AF	AX101CE	DC:5 to 30V AC:5 to 120V	DC:5 to 40mA AC:5 to 20mA	DC:1.5W AC:2VA	None	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	1.5m	Small relay, programmable controller
	AG	AX105CE							5m	
	AH	AX111CE				Provided			1.5m	
	AJ	AX115CE							5m	
	AE	AX125CE	DC: 30V or less AC: 120V or less	DC: 40mA or less AD: 20mA or less		None	None		5m	
	AK	AX11ACE	AC:5 to 120V	5 to 20mA	2VA	Provided	LED (Lights in red when sensing)	4-pin connector type Rear wiring	0.5m	
	AL	AX11BCE	DC:5 to 30V	5 to 40mA	1.5W				0.5m	
	AP	AZ101CE	DC:5 to 30V AC:5 to 120V	DC:5 to 40mA AC:5 to 20mA	DC:1.5W AC:2VA	None	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. φ4mm Upper wiring	1.5m	
	AR	AZ105CE							5m	
	AS	AZ111CE				Provided			1.5m	
	AT	AZ115CE							5m	
	AN	AZ125CE	DC: 30V or less AC: 120V or less	DC: 40mA or less AD: 20mA or less		None	None		5m	
	AU	AZ11ACE	AC:5 to 120V	5 to 20mA	2VA	Provided	LED (Lights in red when sensing)	4-pin connector type Upper wiring	0.5m	
	AW	AZ11BCE	DC:5 to 30V	5 to 40mA	1.5W				0.5m	
	AM	AX135CE	AC/DC：90 to 240V	5 to 300mA	B contact output	Provided	LED (Lights in red when not sensing)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	5m	
	AY	AZ135CE						0.3mm², 2-core, outer dia. φ4mm Upper wiring	5m	
	5	WR505	DC:5 to 50V AC:5 to 120V	DC:3 to 40mA AC:3 to 20mA	DC:1.5W AC:2VA	None	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	5m	
	7	WR505F							5m	
	6	WR515							5m	
Solid state sensor	BE	AX201CE-1	DC:5 to 30V	5 to 40mA	—	Provided	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	1.5m	Small relay, programmable controller
	BF	AX205CE-1							5m	
	CE	AX211CE-1					LED (2-LED type in red/green)		1.5m	
	CF	AX215CE-1							5m	
	CH	AX21CCE-1						4-pin connector type Rear wiring	0.5m	
	CJ	AX21DCE-1							1m	
	BM	AZ201CE-1					LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. φ4mm Upper wiring	1.5m	
	BN	AZ205CE-1							5m	
	CM	AZ211CE-1					LED (2-LED type in red/green)		1.5m	
	CN	AZ215CE-1							5m	
Cutting oil proof type	RA	AX205WCE	DC:5 to 30V	5 to 40mA	—	Provided	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	5m	
	RB	AZ205WCE						0.3mm², 2-core, outer dia. φ4mm Upper wiring	5m	
	RE	AX215WCE		5 to 20mA			LED (2-LED type in red/green)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	5m	
	RF	AZ215WCE						0.3mm², 2-core, outer dia. φ4mm Upper wiring	5m	
Solid state sensor	2	WS215-1	DC:10 to 30V	5 to 20mA	—	Provided	LED (2-LED type in red/green)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	5m	
	4	WS215-1F							5m	
	3	WS225-1							5m	
Solid state sensor	CT	AX211CE-1	DC:5 to 30V	5 to 40mA	—	Provided	LED (2-LED type in red/green)	0.3mm², 2-core, outer dia. φ4mm Rear wiring	1.5m	
	CU	AX215CE-1							5m	
	CV	AX21BCE-1						4-pin connector type Rear wiring	0.5m	
	CW	AZ211CE-1						0.3mm², 2-core, outer dia. φ4mm Upper wiring	1.5m	
	CX	AZ215CE-1							5m	
	CY	AZ21BCE-1						4-pin connector type Upper wiring	0.5m	

Notes) ● For the sensors without a protective circuit, be sure to provide a protective circuit (SK-100) with the load when using any induction load (relay, etc.).
● The output logic of AX and AZ135CE is B contact. When the piston is detected, Reed sensor turns off (the lamp turns on).
● For the details of sensors, be sure to read the sensor specifications at the end of this catalog.
● We recommend AND Unit (AU series) for multiple sensors connected in series. For details, refer to AND Unit at the end of this catalog.

● **General purpose type**
AX type (rear wiring) AZ type (upper wiring)

● **Cutting oil proof type**
WR/WS type sensor

● When ordering the cutting oil proof type sensors, WR and WS types, please be carefully the following notification.

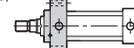| 5 | WR505 | The sensor and straight box connector (F-SB) are |
2	WS215-1	combined (the flexible tube (F-0.5: 4.8m) is required).
7	WR505F	The flexible tube (F-0.5: 4.8m) is attached to
4	WS215-1F	the sensor and straight box connector (F-SB).

General Hydraulic Cylinders 160H-1
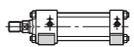
Mounting Style The codes in the < > marks below are names called in ISO 6020-2.

SD | SD style (basic style)

EA | EA style (rectangular rod cover) 〈ME5〉

FA | FA style (rod rectangular flange) (for rod B)
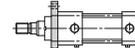
CA | CA style (cap eye) 〈MP3〉
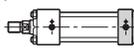
LA | LA style (side lugs) 〈MS2〉

EB | EB style (rectangular cap cover) 〈ME6〉
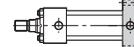
FE | FE style (rod rectangular flange) (for rod A)
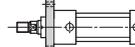
CB | CB style (cap clevis) 〈MP1〉
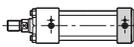
FB | FB style (cap rectangular flange)
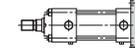
TA | TA style (rod trunnion) 〈MT1〉
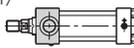
TC | TC style (intermediate trunnion) 〈MT4〉
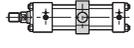
Note) SD, FA and FB styles are not included in ISO standards.

Adaptability of Fluid to Seal Material

Seal material	Adaptable fluid				
	Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	Water in oil fluid	Oil in water fluid
1 Nitrile rubber	○	○	×	○	○
2 Urethane rubber	◎	×	×	△	△
6 HNBR	○	◎	×	◎	◎
8 Combined seal	○	○	×	○	○

● ◎○: Applicable ×: Inapplicable
● Consult us before using the △-marked items.
● The ◎-marked items are recommended seal materials in case of giving the first priority to abrasion resistance.
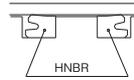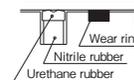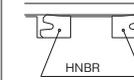● For the working temperature range, refer to the selection materials.

Cutting Oil Proof Type: Adaptability of cutting oil to seal material

Seal material	Nonaqueous cutting oil		Aqueous cutting oil
	Type 1	Type 2	
6 HNBR	○	×	○

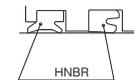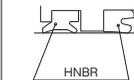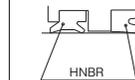○ : Applicable × : Inapplicable

For the working temperature range of seal materials, refer to the selection materials at the beginning of this catalog.

Seal Structure Table

Seal code	1	2	6	8
Type	Nitrile rubber	Urethane rubber	HNBR	Combined seal
Seal structure — Piston seal	HNBR	Wear ring / Nitrile rubber / Urethane rubber	HNBR	Urethane rubber / Nitrile rubber / Fluororesin
Seal structure — Rod seal and wiper ring	HNBR	Urethane rubber	HNBR	HNBR
Fixed part (O-ring, etc.)	Nitrile rubber	Nitrile rubber	HNBR	Nitrile rubber

Sensor Mountable Minimum Stroke Unit: mm

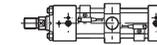| Bore mm \ Sensor type	Styles other than TC				TC style				
	with one sensor		with two sensors		with one sensor		with two sensors		
	AXtype	WRtype WStype	AXtype	WRtype WStype	AXtype	WRtype WStype	AXtype	WRtype	WStype
φ32	30	55(75)	30(40)	55(75)	60	85	115	165	170
φ40	25	50(75)	25	50(75)	60	80	115	165	170
φ50	25	50	25	50	65	90	125	175	180
φ63	25	50	25	50	65	95	125	180	180
φ80	20	50	25	50	75	100	135	190	190
φ100	20	—	25	—	90	—	150	—	—
φ125	20	—	25	—	90	—	160	—	—
φ140	20	—	25	—	95	—	170	—	—
φ160	20	—	25	—	110	—	185	—	—

Notes)
● For the TC style with one sensor, the cylinder strokes when the TC accessory is positioned at the place other than the center (as shown below) are shown in the table.
● For the minimum dimension PH of TC style for mounting sensor, refer to the dimensional drawings of TC type.
● For the TC style with two sensors, the cylinder strokes when the TC accessory is positioned in the center (as shown below) are shown in the table.
● The parenthesized values are the minimum strokes when the rod side detection sensor and the cap side detection sensor are mounted on the same surface.

★ Standard specifications
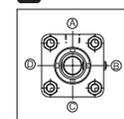
● With cushions on both ends
● Port position Ⓐ, cushion valve position Ⓑ

★ Port position and cushion valve position

● Standard: with cushions on both ends
  Standard port position and cushion valve position

Mounting style	Order symbol		Rod cover		Cap cover	
	Port position	Valve position	Port position	Valve position	Port position	Valve position
SD・LA・CA・CB・FA・FB・TC	A (B・C・D)	B (C・D・A)	A (B・C・D)	B (C・D・A)	A (B・C・D)	B (C・D・A)
EB	A	B	A	B	A	C
EA・TA	A	C	A	C	A	B

● The standard positions of port and cushion valve for styles other than EA, EB and TA are Ⓐ and Ⓑ, respectively. When modifying the positions, enter the symbol shown in the dimensional drawings.

● Specification of change in the positions of rod side port and cushion valve
 (Example)
 160H-1R 2CA50BB100− B A AH2
 Port position (A、B、C、D)
 Cushion valve position (A、B、C、D、O)

● Specification of change in the positions of cap side port and cushion valve
 (Example) 160H-1 2CA50BB100−AB−X PPC
 Rod side port and cushion valve positions
 Position specification : PC− BA
 Cap side port and cushion valve positions
 Symbol for specification of change in cap side port and cushion positions

● Order symbols and port and cushion valve positions shown above are applicable to EA, EB and TA styles. When changing any position, specify the position on the rod and cap sides.
 As for the TA style rod cover, neither port nor cushion valve can be provided on the Ⓑ or Ⓓ side.
 As for the EA style rod cover, cushion valves cannot be provided on the Ⓑ or Ⓓ side.
 As for the EB style rod cover, cushion valves cannot be provided on the Ⓑ or Ⓓ side.
● In case that the cushion is not equipped, the cushion valve position is "O".
● If the ports are located on the Ⓑ or Ⓓ side of the LA style cylinder and general piping joints are used, they may interfere with the cylinder mounting bolts.
● Air vents are located on the same side as the cushion valves.
 If the cylinder has no cushion, they are located on the Ⓑ side (or Ⓒ side in case of the EA or TA style rod cover).
● For the details of port, cushion valve and air vent positions, refer to Positions of ports, cushion valves and air vents.

HA 194

160H-1

16 MPa Double Acting
Hydraulic Cylinder

16 MPa Double Acting
Hydraulic Cylinder

160H-1

HA 195
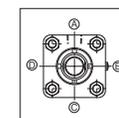
General Hydraulic Cylinders

160H-1

★ Port G thread type

● For the port G thread type, add "G" ahead of the port position symbol.
(Example)
160H-1 2CA50BB100− G A B

Port G thread type
Port position
Cushion valve position

● For 32 mm bore cylinders, the rod cover size is changed.
For details, contact us.

★ Notes on ordering cylinder with lock nut

The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end.
(Example)
160H-1 2LA50BB100−A B − K

Long thread with lock nut
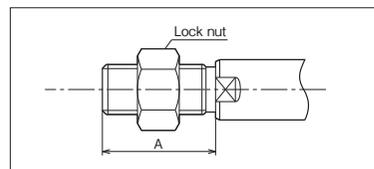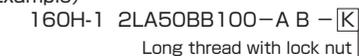
Dimension A without lock nut
A=28
↓
Dimension A of long thread with lock nut
A=40

Note)
When a lock nut is attached to the rod end, dimension A must be equal to or longer than that of the long thread with lock nut. For details, refer to "Thread length of rod end with lock nut" in "Rod End Attachment."

★ Delivery of rod end attachment (T-end or Y-end)

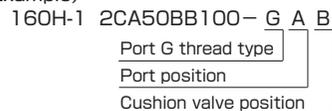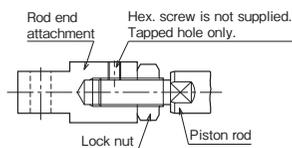A delivery method for a cylinder provided with a lock nut and a rod end attachment differs from that for a cylinder provided with a rod end attachment only (without a lock nut). For details, refer to the dimensional drawings of rod end attachments.

● When the lock nut and rod end attachment are additionally ordered

● When only the rod end attachment is additionally ordered (without lock nut)
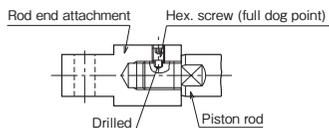
★ Semi-standard fabrication range

● With boots
● Change in TC accessory position (dimensional symbol: PH)
● Change in piston rod end (dimensional symbol: WF (W), A, KK)
● Plated cylinder tube (hard chrome plating thickness: 0.02 mm)

For details, contact us.

Weight Table

Unit: kg

Rod type	Bore (mm)	Basic weight (SD style)		Additional weight per mm of stroke		Mounting accessory weight										Rod end attachment weight		
		Single rod type	Double rod type	Single rod type	Double rod type	LA	EA	EB	FA	FE	FB	CA	CB	TA	TC	Rod eye (T-end)	Rod clevis (Y-end)	Lock nut
B	φ32	1.31	1.73	0.0062	0.0082	0.26	0.34	0.23	0.32	−	0.28	0.15	0.19	0.04	0.16	0.31	0.38	0.03
	φ40	2.94	3.59	0.0098	0.0127	0.32	1.02	0.81	0.93	−	0.88	0.26	0.32	0.08	0.45	0.38	0.54	0.03
	φ50	4.55	5.69	0.0146	0.0194	0.65	1.42	1.16	1.60	−	1.48	0.80	0.99	0.15	0.84	1.17	1.68	0.05
	φ63	6.63	8.18	0.0193	0.0272	1.18	1.66	1.43	2.47	−	2.29	0.96	1.15	0.31	1.54	1.25	1.86	0.09
	φ80	12.55	15.40	0.0316	0.0440	1.37	2.93	2.58	4.40	−	4.07	1.97	2.45	0.63	3.05	1.95	3.64	0.13
	φ100	17.93	21.88	0.0458	0.0650	1.98	3.76	3.41	6.05	−	5.56	3.99	4.99	1.23	4.31	5.30	7.97	0.23
	φ125	33.67	39.03	0.0738	0.1038	2.49	6.67	6.67	10.24	−	9.44	6.60	8.46	2.43	9.01	7.31	11.79	0.31
	φ140	43.36	50.39	0.0988	0.1380	2.87	8.23	8.23	14.15	−	13.07	8.44	10.89	3.48	12.25	9.98	15.64	0.38
	φ160	56.03	65.30	0.1181	0.1678	3.64	9.42	9.42	19.36	−	17.92	10.58	13.84	4.94	16.75	12.50	19.08	0.46
A	φ40	3.03	−	0.0116	−	0.32	1.02	0.81	−	1.43	0.88	0.26	0.32	0.08	0.45	0.50	0.62	0.05
	φ50	4.72	−	0.0177	−	0.65	1.42	1.16	−	2.28	1.48	0.80	0.99	0.15	0.84	1.25	1.86	0.09
	φ63	6.94	−	0.0238	−	1.18	1.66	1.43	−	3.50	2.29	0.96	1.15	0.31	1.54	1.66	2.08	0.13
	φ80	13.08	−	0.0384	−	1.37	2.93	2.58	−	5.43	4.07	1.97	2.45	0.63	3.05	2.98	3.98	0.23
	φ100	18.88	−	0.0566	−	1.98	3.76	3.41	−	7.90	5.56	3.99	4.99	1.23	4.31	6.78	9.25	0.31
	φ125	35.78	−	0.0934	−	2.49	6.67	6.67	−	14.95	9.44	6.60	8.46	2.43	9.01	10.28	13.77	0.46

Sensor Additional Weight

Unit: kg

Sensor / Bore (mm)	AX/AZ type			WR/WS type
	Cord length 1.5 m	Cord length 5 m	Connector type	
φ32 to φ63	0.05	0.13	0.04	
φ80 to φ140	0.07	0.15	0.06	0.5
φ160	0.09	0.17	0.08	

Calculation formula | Cylinder weight (kg)=basic weight+(cylinder stroke (mm)×additional weight per mm of stroke)+(sensor additional weight×sensor quantity)+mounting accessory weight+rod end attachment weight

Calculation example | 160H-1R, bore φ80, rod B, cylinder stroke 200 mm, LA style, 2 pcs of AX215
12.55＋(0.0316×200)＋1.37＋(0.15×2)＝20.54kg

General Hydraulic Cylinders

160H-1

Positions of ports, cushion valves and air vents (Rod B)

Symbols AV: Air vent
CV: Cushion valve

- For any mounting style, the cushion valve and air vent are positioned on the same surface. If the air vent position must be changed, consult us.
- For the detailed dimensions of the air vent position, contact us.
- Cylinders without cushion have no cushion valve. The air vent position depends on the mounting style.

Double acting single rod/SD, FA, FB, CA, CB and TC styles

- Basic form (Standard port and cushion valve positions: Ⓐ Ⓑ, order symbols [A] [B])

(φ32)   (φ40)   (φ50 to φ160)
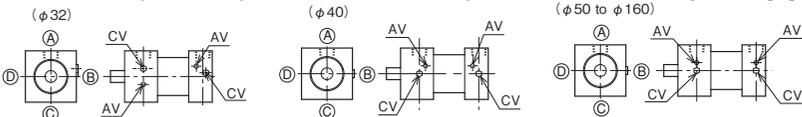
- Other port and cushion valve positions (bore φ50 to φ160)

(For cylinder with cushion)
- To change the cushion valve positions, turn them 90° from the basic form clockwise as viewed from the front of the rod.

(For cylinder without cushion)
- The air vent is located at the position turned 90° from the port position clockwise as viewed from the front of the rod.
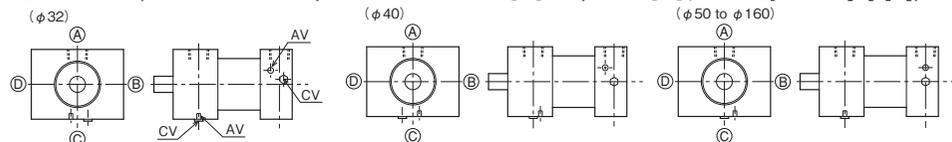
- To change the port and cushion valve positions on the rod and cap sides, specify the positions on the rod and cap sides, respectively.

- Other port and cushion valve positions (bore φ32, φ40)
  In the basic form, the cushion valve and air vent positions of cylinders with bores of 32 and 40 mm are different from those of cylinders with bores of 50 to 160 mm. To change the cushion valve position, turn it 90° clockwise as viewed from the front of the rod in the same manner as for cylinders with bores of 50 to 160 mm. The air vent positions are the same as the above, even when the cylinder has no cushion.

Double acting single rod/EA style

- Basic form (Port and cushion positions: Rod side Ⓐ Ⓒ Cap side Ⓐ Ⓑ, order symbols [A] [C])

(φ32)   (φ40)   (φ50 to φ160)

EA style cylinders with port and cushion valve positions different from the basic form are made to order. When ordering them, specify the positions. The air vents positions are the same as the above, even when the cylinder has no cushion.

Double acting single rod/EB style

- Basic form (Port and cushion positions: Rod side Ⓐ Ⓑ Cap side Ⓐ Ⓒ, order symbols [A] [B])

(φ32)   (φ40)   (φ50 to φ160)

EA style cylinders with port and cushion valve positions different from the basic form are made to order. When ordering them, specify the positions. The air vents positions are the same as the above, even when the cylinder has no cushion.

Double acting single rod/LA style

- Basic form (Standard port and cushion valve positions: Ⓐ Ⓑ, order symbols [A] [B])

(φ32)   (φ40, φ50)   (φ63)   (φ80 to φ160)

- Other port and cushion valve positions (bore φ80 to φ160)

(For cylinder with cushion)
- Port position A or C: Port position on axis line (without offset)
  Port position B or D: Port position with upward offset of following distance from axis center
  φ32, φ40 ············ 5.5 mm
  φ50 ····················· 6.5 mm
  φ63, φ80 ············ 12 mm
  φ100 ···················· 15 mm
  φ125 to φ160 ······ 0
- Change of cushion valve position (figures shown left)
  Position A: Same as the cushion valve position A of the SD style
  Position B: Basic form
  Position C: Turn position B 90° clockwise as viewed from the front of the rod
  Position D: Line-symmetric with respect to position B
- The cushion valves on B or D are offset upward to prevent interference with the mounting bolts.

(For cylinder without cushion)
- When the port is on A: The air vent is on B.
  When the port is on B, C or D: The air vent is on A.
  (If you need to change the position, consult us.)

- Other port and cushion valve positions (bore φ32 to φ63)
  In the basic form, the cushion valve and air vent positions of cylinders with bores of 32 and 63 mm are different from those of cylinders with bores of 80 to 160 mm. To change the cushion valve position, turn it 90° clockwise as viewed from the front of the rod in the same manner as for cylinders with bores of 80 to 160 mm. The air vent positions are the same as the above, even when the cylinder has no cushion.

Double acting single rod/TA style

- Standard port and cushion valve positions: Ⓐ Ⓒ, order symbols [A] [C]

(With cushion)   (without cushion)
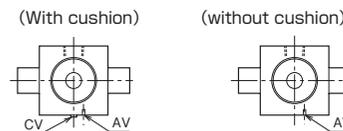
- The port can be positioned only on A.
- The cushion valve and air vent are positioned on the side opposite to the port position.
- On the cap side, the port and cushion are positioned on Ⓐ and Ⓑ.

Double acting double rod

(With cushion)

The port and valve positions are same as those of double acting single rod cylinder.

AV on cap side   AV on rod side
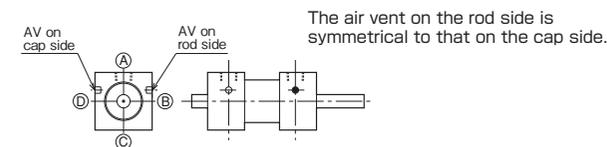
The air vent on the rod side is symmetrical to that on the cap side.

HA 198

160H-1

16 MPa Double Acting
Hydraulic Cylinder

16 MPa Double Acting
Hydraulic Cylinder

160H-1

HA 199

General Hydraulic Cylinders

160H-1

General Hydraulic Cylinders

160H-1

Positions of ports, cushion valves and air vents (Rod A)

Symbols AV: Air vent
CV: Cushion valve

Double acting single rod/SD, FE, FB, CA, CB and TC styles

● Basic form (Standard port and cushion valve positions: Ⓐ Ⓑ, order symbols [A] [B])

CV   AV

The positions on the cap side
are the same as on the rod B.

CV

AV on rod side
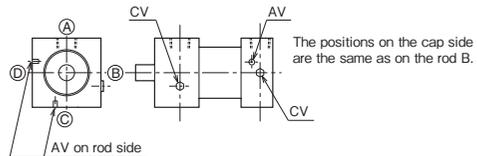
● Other port and cushion valve positions (rod side)

Turn the port and cushion valve positions 90° from the basic form clockwise as viewed
from the front of the rod.
The positions on the cap side are the same as on the rod B (one air vent).
When the cylinder has no cushion, an air vent is provided at the cushion valve position
(3 places).

Double acting single rod/EA style

● Basic form (Standard port and cushion valve positions: Ⓐ Ⓒ, order symbols [A] [C])

The positions on the cap side
are the same as on the rod B.

AV on rod side   AV on rod side   CV
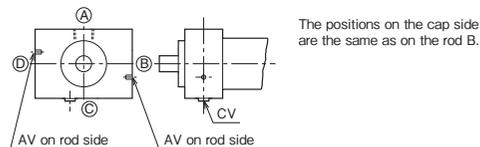
● Other port and cushion valve positions (rod side)

Turn the port and cushion valve positions 90° from the basic form clockwise as viewed
from the front of the rod.
The positions on the cap side are the same as on the rod B (one air vent).
When the cylinder has no cushion, an air vent is provided at the cushion valve position
(3 places).

● The positions for the EB style are the same as on the rod B.

Double acting single rod/LA style

● Basic form (Standard port and cushion valve positions: Ⓐ Ⓑ, order symbols [A] [B])

(φ 40 to φ 125)

CV

The positions on the cap side
are the same as on the rod B.

AV on rod side
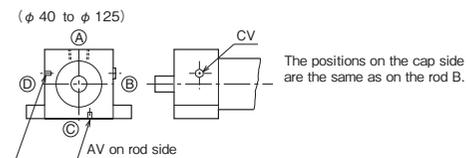
● Other port and cushion valve positions (rod side)

According to the following combination of the cushion valve and port positions.
The air vents are positioned on two sides other than the port and cushion valve sides.
However, the port and cushion valve cannot be positioned on the same side.

Cushion valve on side A

Cushion valve on side B

Cushion valve on side D

Cushion valve on side C

Ⓐ Port A

Port D Ⓓ   Ⓑ Port B

Ⓒ Port C

Example (Port and cushion valve positions: Ⓑ Ⓒ)
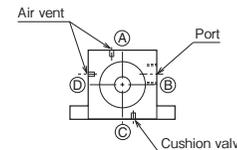
Air vent

Port

Cushion valve

Double acting single rod/TA style

Standard port and cushion valve positions: Ⓐ Ⓒ, order symbols [A] [C]
The cushion valve and air vent are positioned on the same side opposite to the port.

General Hydraulic Cylinders

160H-1

SD

160H-1 /TRH1 Bore A. B CAD/DATA is available.

160H-1 | 2 | SD | Bore | B | B | Stroke | — | A | B

Drill hole for rod dia. of φ90
2-φ12
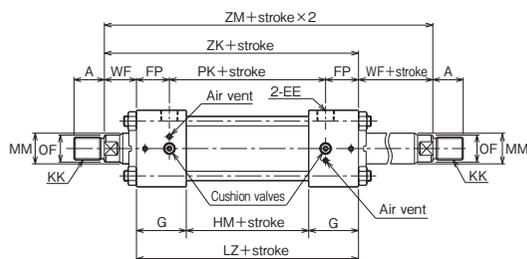
Port G thread type

- The positions of cushion valves and air vents depend on the cylinder bore.
- The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
- When using the SD style, be sure to see "4. Mounting" in "Precautions for use" at the beginning of this catalog.
- On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
- If you want to change the rod protrusion length, specify dimension WF.
- For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

Double acting double rod (rod B)

- The distance between the covers of the double rod cylinder is longer than that of the single rod cylinder by 10 mm.

160H-1 /TRH1 Bore K

With Boots

	Standard		Semi-standard
		Standard	Semi-standard
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.

Dimension WF
Rod B

Nylon tarpaulin
Chloroprene
$\left(\begin{array}{ll} φ32 \cdot φ40 & 1/3 \quad stroke+X \\ φ50 & 1/3.5 \; stroke+X \\ φ63 \; to \; φ100 & 1/4 \quad stroke+X \\ φ125 \; to \; φ160 & 1/5 \quad stroke+X \end{array}\right)$

Conex
$\left(\begin{array}{ll} φ32 & 1/2 \quad stroke+X \\ φ40 \cdot φ50 & 1/2.5 \; stroke+X \\ φ63 \; to \; φ100 & 1/3 \quad stroke+X \\ φ125 \; to \; φ160 & 1/3.5 \; stroke+X \end{array}\right)$

Rod A

Nylon tarpaulin
Chloroprene
$\left(\begin{array}{ll} φ40 & 1/3.5 \; stroke+X \\ φ50 \; to \; φ80 & 1/4 \quad stroke+X \\ φ100 \cdot φ125 & 1/5 \quad stroke+X \end{array}\right)$

Conex
$\left(\begin{array}{ll} φ40 & 1/2.5 \; stroke+X \\ φ50 \; to \; φ80 & 1/3 \quad stroke+X \\ φ100 \cdot φ125 & 1/3.5 \; stroke+X \end{array}\right)$

- If the calculated WF has a fractional part, round it up.

Dimensional Table

Symbol Bore	Rod B								Rod A						
	A	B		KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type														
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

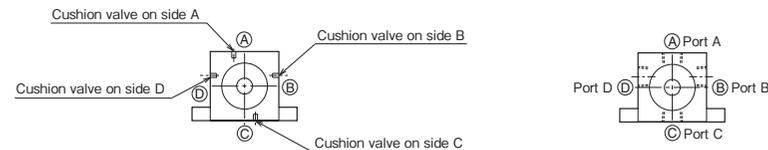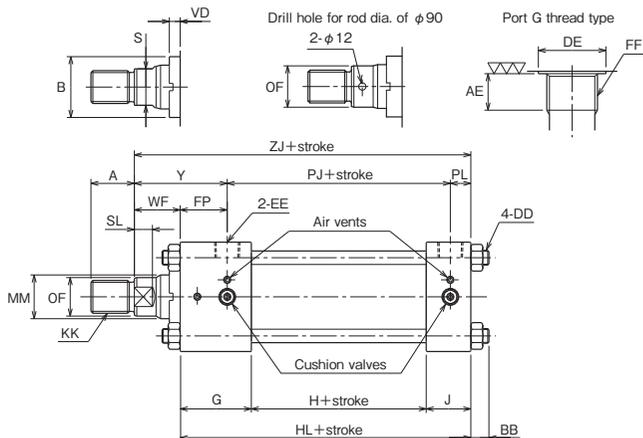| Symbol Bore	AA	AE	BB	DD	DE	E	EE	FF	FP	G	H
φ32	47	12	7	M6×1	φ21.5	□45	Rc1/4	G1/4	35	49	28
φ40	59	12	9	M8×1	φ25.5	□62	Rc3/8	G3/8	37	54	39
φ50	74	14	13	M12×1.25	φ30	□75	Rc1/2	G1/2	42	60	38
φ63	91	14	13	M12×1.25	φ30	□90	Rc1/2	G1/2	39	59	40
φ80	117	16	16	M16×1.5	φ36.9	□114	Rc3/4	G3/4	46	70	45
φ100	137	16	16	M16×1.5	φ36.9	□130	Rc3/4	G3/4	47	74	47
φ125	178	18	21	M22×1.5	φ46.1	□165	Rc1	G1	51	82	55
φ140	200	18	22	M24×1.5	φ46.1	□185	Rc1	G1	51	82	62
φ160	219	18	25	M27×2	φ46.1	□205	Rc1	G1	54	87	64

Symbol Bore	HL	HM	J	LZ	PJ	PK	PL	TG	WF	Y	ZJ	ZK	ZM
φ32	103	38	26	136	56	66	12	□33.2	25	60	128	161	186
φ40	128	49	35	157	73	83	18	□41.7	25	62	153	182	207
φ50	134	48	36	168	74	84	18	□52.3	25	67	159	193	218
φ63	136	50	37	168	80	90	17	□64.3	32	71	168	200	232
φ80	159	55	44	195	93	103	20	□82.7	31	77	190	226	257
φ100	168	57	47	205	101	111	20	□96.9	35	82	203	240	275
φ125	197	65	60	229	117	127	29	□125.9	35	86	232	264	299
φ140	203	72	59	236	124	134	28	□141.4	35	86	238	271	306
φ160	213	74	62	248	130	140	29	□154.9	32	86	245	280	312

- The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	—	64	77	80	82	94	102	—	—

LA

160H-1 | 2 | LA | Bore | B | B | Stroke | — | A | B
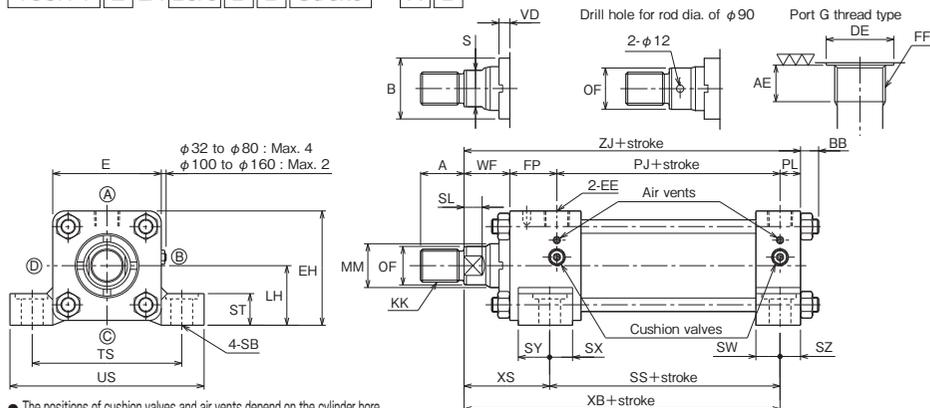
CAD/DATA is available.

φ32 to φ80 : Max. 4
φ100 to φ160 : Max. 2

● The positions of cushion valves and air vents depend on the cylinder bore.
● The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
● Notes on mounting bolts of cylinders with bores of 100 mm or more
Use bolts with hex. hole as the mounting bolts.
If hexagonal bolts are used, bolt heads may interfere with the cover and spot facing, causing mounting failure.
When using washers, it is recommended to use disc springs for bolts with hex. hole.
Flat washers or spring washers may interfere with the cover and spot facing, causing mounting failure.
● When the cylinder bore is between 32 to 80 mm, hexagonal bolts, bolts with hex. hole and flat washers can be used.
● On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
● If you want to change the rod protrusion length, specify dimension WF.
● For dimensions not shown in these figures, refer to the SD style (basic style).
● For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.
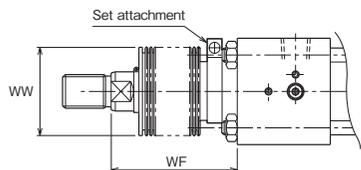
Double acting double rod (rod B)

● The distance between the covers of the double rod cylinder is longer than that of the single rod cylinder by 10 mm.

With Boots

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
● Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Limited.
● The boots have been mounted at our factory prior to delivery.

Dimension WF
Rod B
Nylon tarpaulin
Chloroprene
$\begin{pmatrix} φ32 \cdot φ40 & 1/3 & \text{stroke}+X \\ φ50 & 1/3.5 & \text{stroke}+X \\ φ63 \text{ to } φ100 & 1/4 & \text{stroke}+X \\ φ125 \text{ to } φ160 & 1/5 & \text{stroke}+X \end{pmatrix}$

Conex
$\begin{pmatrix} φ32 & 1/2 & \text{stroke}+X \\ φ40 \cdot φ50 & 1/2.5 & \text{stroke}+X \\ φ63 \text{ to } φ100 & 1/3 & \text{stroke}+X \\ φ125 \text{ to } φ160 & 1/3.5 & \text{stroke}+X \end{pmatrix}$

Rod A
Nylon tarpaulin
Chloroprene
$\begin{pmatrix} φ40 & 1/3.5 & \text{stroke}+X \\ φ50 \text{ to } φ80 & 1/4 & \text{stroke}+X \\ φ100 \cdot φ125 & 1/5 & \text{stroke}+X \end{pmatrix}$

Conex
$\begin{pmatrix} φ40 & 1/2.5 & \text{stroke}+X \\ φ50 \text{ to } φ80 & 1/3 & \text{stroke}+X \\ φ100 \cdot φ125 & 1/3.5 & \text{stroke}+X \end{pmatrix}$

● If the calculated WF has a fractional part, round it up.

● Notes on LA style with ports on lateral side (Ⓑ or Ⓓ)

● The port G thread type is not the standard type. (When the cylinder bore is not less than 40 mm, the position on the Ⓐ or Ⓒ side is the same as that of the standard type.)
● The port position deviates from the cylinder center by dimension LE.
● Take into consideration the interference of the piping and fitting with the mounting bolts (including handling of tightening tools), referring to the table on the right.
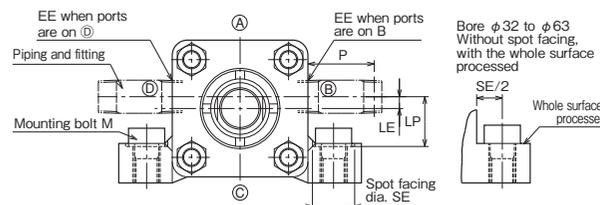
Symbol / Bore	Port EE	LE	LP	Mounting bolt M	Spot facing dia. SE	P Note 1
φ32	Rc 1/4	5.5	15	M8	18	20
φ40	Rc 3/8	5.5	24	M10	21	21
φ50	Rc 1/2	6.5	24.5	M12	27	26
φ63	Rc 1/2	12	30	M16	34	36
φ80	Rc 3/4	12	44	M16	31	36
φ100	Rc 3/4	15	47	M24	39	43
φ125	Rc 1	0	51	M24	39	45
φ140	Rc 1	0	55	M30	50	51
φ160	Rc 1	0	64	M30	50	57

Note 1) Dimension P must be determined in consideration of interference of the fitting with the mounting bolts.

● When the cylinder bore is between 32 to 80 mm, mounting with hexagonal bolts is recommended.
If bolts with hex. hole are used, they may not be mounted because the bolt heads and a tightening tool (allen wrench, etc.) may be in contact with the piping or fittings.
● When the cylinder bore is 100 mm or more, hexagonal bolts cannot be used (because their heads interfere with the cover and spot facing). In such a case, use bolts with hex. hole, and mount the cylinder by tightening nuts on the back of the mounting plate (refer to the drawing on the right).

Dimensional Table

Symbol		Rod B									Rod A							
	A	B		KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
Bore		Standard type	Cutting oil proof type														
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

Symbol / Bore	AE	BB	DE	E	EE	EH	FF	FP	LH	PJ	PK	PL	SB	SS	ST	SV	SW	SX	SY	SZ	TS	US	WF	XB	XS	ZJ
φ32	12	7	φ21.5	45	Rc1/4	44.5	G1/4	35	$22_{-0.084}^{0}$	56	66	12	φ9	73	12.5	96	16	29	20	10	63	84	25	118	45	128
φ40	12	9	φ25.5	62	Rc3/8	62	G3/8	37	$31_{-0.100}^{0}$	73	83	18	φ11	98	12.5	117	25	34	20	10	83	103	25	143	45	153
φ50	14	13	φ30	75	Rc1/2	74.5	G1/2	42	$37_{-0.100}^{0}$	74	84	18	φ14	92	19	110	23	31	29	13	102	127	25	146	54	159
φ63	14	13	φ30	90	Rc1/2	89	G1/2	39	$44_{-0.100}^{0}$	80	90	17	φ18	86	26	102	20	26	33	17	124	161	32	151	65	168
φ80	16	16	φ36.9	114	Rc3/4	114	G3/4	46	$57_{-0.120}^{0}$	93	103	20	φ18	105	26	121	27	30	34	17	149	186	31	173	68	190
φ100	16	16	φ36.9	130	Rc3/4	128	G3/4	47	$63_{-0.120}^{0}$	101	111	20	φ26	117	25	28	41	22	172	216	35	181	79	203
φ125	18	21	φ46.1	165	Rc1	164.5	G1	51	$82_{-0.140}^{0}$	117	127	29	φ26	131	32	141	38	35	42	28	210	254	35	210	79	232
φ140	18	22	φ46.1	185	Rc1	184.5	G1	51	$92_{-0.140}^{0}$	124	134	28	φ33	130	38	146	31	35	42	28	240	298	35	210	80	238
φ160	18	25	φ46.1	205	Rc1	203.5	G1	54	$101_{-0.140}^{0}$	130	140	29	φ33	130	38	140	33	28	49	29	260	318	32	216	86	245

● The tolerance of MM is f8.

With Boots

Bore	Symbol	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	—	64	77	80	82	94	102	—	—

General Hydraulic Cylinders

160H-1

EA

160H-1 2 EA Bore B B Stroke − A C

CAD/DATA is available.

160H-1/TRH1 Bore A. B

Drill hole for rod dia. of φ90

2-φ12

Port G thread type

- The positions of cushion valves and air vents depend on the cylinder bore.
- The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
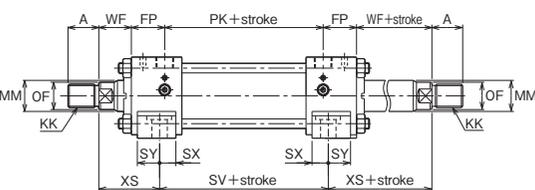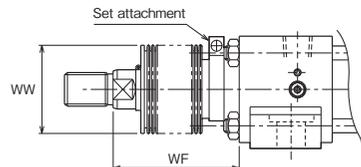- If the mounting plate is located on the cylinder tube side of the Switch Set Cylinder, take into consideration the interference of the sensor with the mounting plate.
- On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
- If you want to change the rod protrusion length, specify dimension WF.
- For dimensions not shown in these figures, refer to the SD style (basic style).
- For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

Double acting double rod (rod B)

- The distance between the covers of the double rod cylinder is longer than that of the single rod cylinder by 10 mm.

With Boots

160H-1/TRH1 Bore K

Dimension WF Rod B

Nylon tarpaulin Chloroprene

φ32・φ40	1/3 stroke+X
φ50	1/3.5 stroke+X
φ63 to φ100	1/4 stroke+X
φ125 to φ160	1/5 stroke+X

Conex

φ32	1/2 stroke+X
φ40・φ50	1/2.5 stroke+X
φ63 to φ100	1/3 stroke+X
φ125 to φ160	1/3.5 stroke+X

Note) Take into consideration the interference of the set attachment with the mounting plate.

Rod A

Nylon tarpaulin Chloroprene

φ40	1/3.5 stroke+X
φ50 to φ80	1/4 stroke+X
φ100・φ125	1/5 stroke+X

Conex

φ40	1/2.5 stroke+X
φ50 to φ80	1/3 stroke+X
φ100・φ125	1/3.5 stroke+X

	Standard		Semi-standard
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.

● If the calculated WF has a fractional part, round it up.

Dimensional Table

Symbol / Bore	Rod B											Rod A									
	A	B Standard type	B Cutting oil proof type	KK	MM	OF	RD	S	SL	VD	VE	A	B	KK	MM	OF	RD	S	SL	VD	VE
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	φ42 f8	14	10	10	20	−	−	−	−	−	−	−	−	−	−
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	φ62 f8	17	9	10	20	28	φ42 f9	M20×1.5	φ28	φ26	φ62 f8	22	11	9	19
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	φ74 f8	22	11	9	25	36	φ50 f9	M27×2	φ36	φ34	φ74 f8	30	14	9	25
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	φ82 f8	30	14	9	25	45	φ60 f9	M33×2	φ45	φ43	φ88 f8	38	17	8	24
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	φ92 f8	38	17	8	28	56	φ72 f9	M42×2	φ56	φ54	φ105 f8	50	21	8	28
φ100	56	φ72 f9	−	M42×2	φ56	φ54	φ105 f8	50	21	8	30	63	φ88 f9	M48×2	φ70	φ68	φ125 f8	60	24	6	28
φ125	63	φ88 f9	−	M48×2	φ70	φ68	φ125 f8	60	24	6	28	85	φ108 f9	M64×3	φ90	φ88	φ150 f8	−	Drill hole	5	27
φ140	75	φ98 f9	−	M56×2	φ80	φ78	φ140 f8	70	27	5	28	−	−	−	−	−	−	−	−	−	−
φ160	85	φ108 f9	−	M64×3	φ90	φ88	φ150 f8	−	Drill hole	5	30	−	−	−	−	−	−	−	−	−	−

Symbol / Bore	AE	BB	DE	E	EE	F	FB	FF	FG	HF	LL
φ32	12	7	φ21.5	45	Rc1/4	10	φ6.6	G1/4	39	93	54
φ40	12	9	φ25.5	62	Rc3/8	10	φ11	G3/8	44	118	74
φ50	14	13	φ30	75	Rc1/2	16	φ14	G1/2	44	118	74
φ63	14	13	φ30	90	Rc1/2	16	φ14	G1/2	43	120	77
φ80	16	16	φ36.9	114	Rc3/4	20	φ18	G3/4	50	139	89
φ100	16	16	φ36.9	130	Rc3/4	22	φ18	G3/4	52	146	94
φ125	18	21	φ46.1	165	Rc1	22	φ22	G1	60	175	115
φ140	18	22	φ46.1	185	Rc1	23	φ26	G1	59	180	121
φ160	18	25	φ46.1	205	Rc1	25	φ26	G1	62	188	126

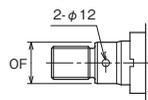| Symbol / Bore	PJ	PK	PL	R	TO	UO	WE	WF	Y	ZL	ZR
φ32	56	66	12	33	58	70	35	25	60	126	151
φ40	73	83	18	41	87	110	35	25	62	147	172
φ50	74	84	18	52	105	130	41	25	67	152	177
φ63	80	90	17	65	117	145	48	32	71	152	184
φ80	93	103	20	83	149	180	51	31	77	175	206
φ100	101	111	20	97	162	200	57	35	82	183	218
φ125	117	127	29	126	208	250	57	35	86	207	242
φ140	124	134	28	142	230	280	58	35	86	213	248
φ160	130	140	29	155	253	300	57	32	86	223	255

● The tolerance of MM is f8.

With Boots

Symbol / Bore		φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	−	φ50	φ71	φ80	φ100	φ100	φ140	−	−
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	−	64	77	80	82	94	102	−	−
BA	Rod B	φ34	φ40	φ46	φ55	φ65	φ77	φ92	φ103	φ112
	Rod A	−	φ46	φ55	φ65	φ77	φ92	φ112	−	−

EB

160H-1/TRH1 |Bore| A. B

CAD/DATA is available.

| 160H-1 | 2 | EB | Bore | B | B | Stroke | − | A | B |

Drill hole for rod dia. of φ90

2-φ12

Port G thread type

(Rod side) Max. 8   (Rod cover) E

(Cap side) Max. 8

- The positions of cushion valves and air vents depend on the cylinder bore.
- The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
- If the mounting plate is located on the cylinder tube side of the Switch Set Cylinder, take into consideration the interference of the sensor with the mounting plate.
- On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
- If you want to change the rod protrusion length, specify dimension WF.
- For dimensions not shown in these figures, refer to the SD style (basic style).
- For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.
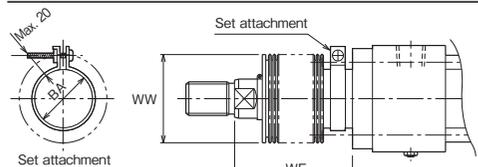
With Boots

160H-1/TRH1 |Bore| K

Set attachment

WW

WF

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.

Dimension W
Rod B

Nylon tarpaulin
Chloroprene

$$\begin{pmatrix} φ32 \cdot φ40 & 1/3 & stroke+X \\ φ50 & 1/3.5 & stroke+X \\ φ63\ to\ φ100 & 1/4 & stroke+X \\ φ125\ to\ φ160 & 1/5 & stroke+X \end{pmatrix}$$

Conex

$$\begin{pmatrix} φ32 & 1/2 & stroke+X \\ φ40 \cdot φ50 & 1/2.5 & stroke+X \\ φ63\ to\ φ100 & 1/3 & stroke+X \\ φ125\ to\ φ160 & 1/3.5 & stroke+X \end{pmatrix}$$

Rod A

Nylon tarpaulin
Chloroprene

$$\begin{pmatrix} φ40 & 1/3.5 & stroke+X \\ φ50\ to\ φ80 & 1/4 & stroke+X \\ φ100 \cdot φ125 & 1/5 & stroke+X \end{pmatrix}$$

Conex

$$\begin{pmatrix} φ40 & 1/2.5 & stroke+X \\ φ50\ to\ φ80 & 1/3 & stroke+X \\ φ100 \cdot φ125 & 1/3.5 & stroke+X \end{pmatrix}$$

- If the calculated WF has a fractional part, round it up.

Dimensional Table

Symbol Bore	Rod B								Rod A							
	A	B		KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type														
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	−	−	−	−	−	−	−	−
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	−	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	−	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	−	Drill hole	5
φ140	75	φ98 f9	−	M56×2	φ80	φ78	70	27	5	−	−	−	−	−	−	−	−
φ160	85	φ108 f9	−	M64×3	φ90	φ88	−	Drill hole	5	−	−	−	−	−	−	−	−

Symbol Bore	AE	DE	E	EE	FB	FF	FP	HB
φ32	12	φ21.5	45	Rc1/4	φ6.6	G1/4	35	102
φ40	12	φ25.5	62	Rc3/8	φ11	G3/8	37	118
φ50	14	φ30	75	Rc1/2	φ14	G1/2	42	123
φ63	14	φ30	90	Rc1/2	φ14	G1/2	39	131
φ80	16	φ36.9	114	Rc3/4	φ18	G3/4	46	146
φ100	16	φ36.9	130	Rc3/4	φ18	G3/4	47	156
φ125	18	φ46.1	165	Rc1	φ22	G1	51	172
φ140	18	φ46.1	185	Rc1	φ26	G1	51	179
φ160	18	φ46.1	205	Rc1	φ26	G1	54	183

Symbol Bore	J	PJ	PL	R	TO	UO	WF	ZJ
φ32	26	56	12	33	58	70	25	128
φ40	35	73	18	41	87	110	25	153
φ50	36	74	18	52	105	130	25	159
φ63	37	80	17	65	117	145	32	168
φ80	44	93	20	83	149	180	31	190
φ100	47	101	20	97	162	200	35	203
φ125	60	117	29	126	208	250	35	232
φ140	59	124	28	142	230	280	35	238
φ160	62	130	29	155	253	300	32	245

- The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	−	φ50	φ71	φ80	φ100	φ100	φ140	−	−
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	−	64	77	80	82	94	102	−	−

FA

160H-1/TRH1 Bore B is available. CAD/DATA

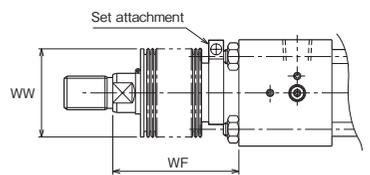160H-1 2 FA Bore B B Stroke − A B
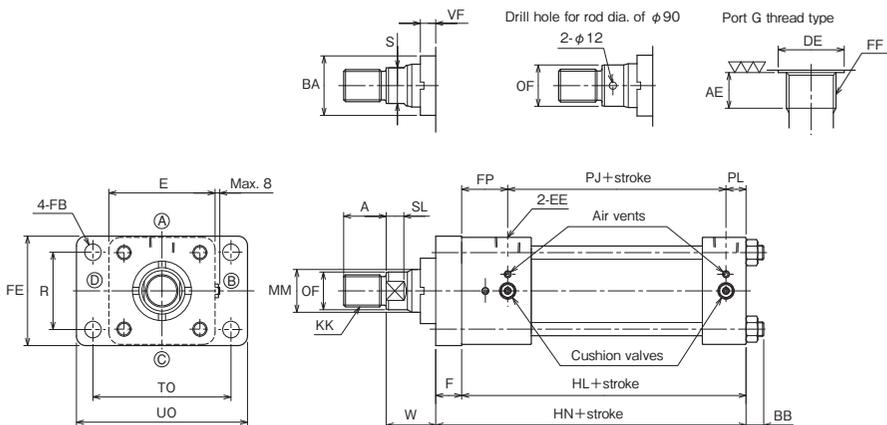
Drill hole for rod dia. of φ90
2-φ12

Port G thread type

4-FB

- The positions of cushion valves and air vents depend on the cylinder bore.
- The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
- If you want to change the rod protrusion length, specify dimension W.
- For dimensions not shown in these figures, refer to the SD style (basic style).
- For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

Double acting double rod (rod B)

- The distance between the covers of the double rod cylinder is longer than that of the single rod cylinder by 10 mm.

With Boots

160H-1/TRH1 Bore K

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Note) Take into consideration the interference of the set attachment with the mounting plate.

Notes)
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.

Dimension WF Rod B

Nylon tarpaulin
Chloroprene

$$\begin{pmatrix} φ32 \cdot φ40 & 1/3 & \text{stroke}+X \\ φ50 & 1/3.5 & \text{stroke}+X \\ φ63 \text{ to } φ100 & 1/4 & \text{stroke}+X \\ φ125 \text{ to } φ160 & 1/5 & \text{stroke}+X \end{pmatrix}$$

Conex

$$\begin{pmatrix} φ32 & 1/2 & \text{stroke}+X \\ φ40 \cdot φ50 & 1/2.5 & \text{stroke}+X \\ φ63 \text{ to } φ100 & 1/3 & \text{stroke}+X \\ φ125 \text{ to } φ160 & 1/3.5 & \text{stroke}+X \end{pmatrix}$$

- If the calculated W has a fractional part, round it up.

Dimensional Table

Symbol Bore	Rod B								
	A	BA	KK	MM	OF	S	SL	VD	VF
φ32	18	φ34 f9	M14×1.5	φ18	φ17	14	10	10	13
φ40	22	φ40 f9	M16×1.5	φ22	φ21	17	9	10	13
φ50	28	φ46 f9	M20×1.5	φ28	φ26	22	11	9	13
φ63	36	φ55 f9	M27×2	φ36	φ34	30	14	9	13
φ80	45	φ65 f9	M33×2	φ45	φ43	38	17	8	13
φ100	56	φ77 f9	M42×2	φ56	φ54	50	21	8	13
φ125	63	φ92 f9	M48×2	φ70	φ68	60	24	6	13
φ140	75	φ103 f9	M56×2	φ80	φ78	70	27	5	13
φ160	85	φ112 f9	M64×3	φ90	φ88	−	Drill hole	5	13

Symbol Bore	AE	BB	DE	E	EE	F	FB	FE	FF	FP
φ32	12	7	φ21.5	□45	Rc1/4	11	φ6.6	47	G1/4	35
φ40	12	9	φ25.5	□62	Rc3/8	16	φ11	64	G3/8	37
φ50	14	13	φ30	□75	Rc1/2	19	φ14	77	G1/2	42
φ63	14	13	φ30	□90	Rc1/2	22	φ14	92	G1/2	39
φ80	16	16	φ36.9	□114	Rc3/4	25	φ18	116	G3/4	46
φ100	16	16	φ36.9	□130	Rc3/4	27	φ18	132	G3/4	47
φ125	18	21	φ46.1	□165	Rc1	29	φ22	167	G1	51
φ140	18	22	φ46.1	□185	Rc1	32	φ26	187	G1	51
φ160	18	25	φ46.1	□205	Rc1	37	φ26	207	G1	54

Symbol Bore	HL	HN	LZ	PJ	PK	PL	R	TO	UO	W	WF
φ32	103	114	136	56	66	12	33	58	70	35	25
φ40	128	144	157	73	83	18	41	87	110	35	25
φ50	134	153	168	74	84	18	52	105	130	41	25
φ63	136	158	168	80	90	17	65	117	145	48	32
φ80	159	184	195	93	103	20	83	149	180	51	31
φ100	168	195	205	101	111	20	97	162	200	57	35
φ125	197	226	229	117	127	29	126	208	250	57	35
φ140	203	235	236	124	134	28	142	230	280	58	35
φ160	213	250	248	130	140	29	155	253	300	57	32

- The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
X	Rod B	45	45	45	55	55	55	65	65	65
BA	Rod B	φ34	φ40	φ46	φ55	φ65	φ77	φ92	φ103	φ112

FE

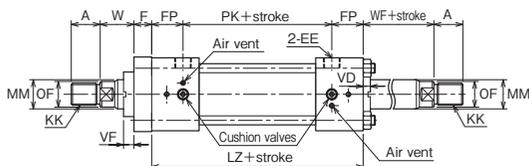160H-1 2 FE Bore A B Stroke — A B

Drill hole for rod dia. of φ90
2-φ12

Port G thread type

- The positions of cushion valves and air vents depend on the cylinder bore.
- The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
- On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
- If you want to change the rod protrusion length, specify dimension W.
- For dimensions not shown in these figures, refer to the SD style (basic style).
- For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.
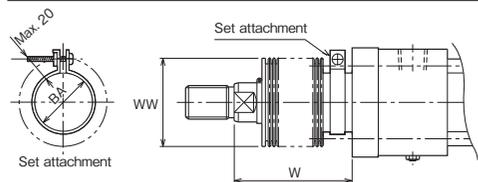
With Boots

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.

Note) Take into consideration the interference of the set attachment with the mounting plate.

Dimension W
Rod A

Nylon tarpaulin / Chloroprene
$$\begin{pmatrix} \phi40 & 1/3.5\ \text{stroke}+X \\ \phi50\ \text{to}\ \phi80 & 1/4\ \ \ \text{stroke}+X \\ \phi100\cdot\phi125 & 1/5\ \ \ \text{stroke}+X \end{pmatrix}$$

Conex
$$\begin{pmatrix} \phi40 & 1/2.5\ \text{stroke}+X \\ \phi50\ \text{to}\ \phi80 & 1/3\ \ \ \text{stroke}+X \\ \phi100\cdot\phi125 & 1/3.5\ \text{stroke}+X \end{pmatrix}$$

- If the calculated W has a fractional part, round it up.

Dimensional Table

Symbol / Bore	Rod A							
	A	BA	KK	MM	OF	S	SL	VF
φ40	28	φ46 f9	M20×1.5	φ28	φ26	22	11	13
φ50	36	φ55 f9	M27×2	φ36	φ34	30	14	13
φ63	45	φ65 f9	M33×2	φ45	φ43	38	17	13
φ80	56	φ77 f9	M42×2	φ56	φ54	50	21	13
φ100	63	φ92 f9	M48×2	φ70	φ68	60	24	13
φ125	85	φ112 f9	M64×3	φ90	φ88	—	Drill hole	13

Symbol / Bore	AE	BB	DE	E	EE	FY	FB	FE	FF
φ40	12	9	φ25.5	□62	Rc3/8	19	φ11	64	G3/8
φ50	14	13	φ30	□75	Rc1/2	22	φ14	77	G1/2
φ63	14	13	φ30	□90	Rc1/2	25	φ14	92	G1/2
φ80	16	16	φ36.9	□114	Rc3/4	27	φ18	116	G3/4
φ100	16	16	φ36.9	□130	Rc3/4	29	φ18	132	G3/4
φ125	18	21	φ46.1	□165	Rc1	37	φ22	167	G1

Symbol / Bore	FP	HL	HY	PJ	PL	R	TO	UO	W
φ40	37	128	147	73	18	41	87	110	35
φ50	42	134	156	74	18	52	105	130	41
φ63	39	136	161	80	17	65	117	145	48
φ80	46	159	186	93	20	83	149	180	51
φ100	47	168	197	101	20	97	162	200	57
φ125	51	197	234	117	29	126	208	250	57

- The tolerance of MM is f8.

With Boots

Symbol	Bore	φ40	φ50	φ63	φ80	φ100	φ125
WW	Rod A	φ50	φ71	φ80	φ100	φ100	φ140
X	Rod A	45	55	55	55	65	65
BA	Rod A	φ46	φ55	φ65	φ77	φ92	φ112

FB

CAD/DATA is available.
160H-1/TRH1 [Bore] A. B

160H-1 | 2 | FB | Bore | B | B | Stroke | − | A | B

Drill hole for rod dia. of φ90
2-φ12

Port G thread type

● The positions of cushion valves and air vents depend on the cylinder bore.
● The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
● On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
● If you want to change the rod protrusion length, specify dimension WF.
● For dimensions not shown in these figures, refer to the SD style (basic style).
● For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

With Boots

160H-1/TRH1 [Bore] K

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
● Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Limited.
● The boots have been mounted at our factory prior to delivery.

Dimension WF
Rod B
Nylon tarpaulin Chloroprene
$$\begin{pmatrix} \phi32 \cdot \phi40 & 1/3 & stroke+X \\ \phi50 & 1/3.5 & stroke+X \\ \phi63\ to\ \phi100 & 1/4 & stroke+X \\ \phi125\ to\ \phi160 & 1/5 & stroke+X \end{pmatrix}$$

Conex
$$\begin{pmatrix} \phi32 & 1/2 & stroke+X \\ \phi40 \cdot \phi50 & 1/2.5 & stroke+X \\ \phi63\ to\ \phi100 & 1/3 & stroke+X \\ \phi125\ to\ \phi160 & 1/3.5 & stroke+X \end{pmatrix}$$

Rod A
Nylon tarpaulin Chloroprene
$$\begin{pmatrix} \phi40 & 1/3.5 & stroke+X \\ \phi50\ to\ \phi80 & 1/4 & stroke+X \\ \phi100 \cdot \phi125 & 1/5 & stroke+X \end{pmatrix}$$

Conex
$$\begin{pmatrix} \phi40 & 1/2.5 & stroke+X \\ \phi50\ to\ \phi80 & 1/3 & stroke+X \\ \phi100 \cdot \phi125 & 1/3.5 & stroke+X \end{pmatrix}$$

● If the calculated WF has a fractional part, round it up.

Dimensional Table

Symbol Bore	Rod B								Rod A							
	A	B Standard type	B Cutting oil proof type	KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

Symbol Bore	AE	DE	E	EE	F	FB	FE	FF
φ32	12	φ21.5	□45	Rc1/4	11	φ6.6	47	G1/4
φ40	12	φ25.5	□62	Rc3/8	16	φ11	64	G3/8
φ50	14	φ30	□75	Rc1/2	19	φ14	77	G1/2
φ63	14	φ30	□90	Rc1/2	22	φ14	92	G1/2
φ80	16	φ36.9	□114	Rc3/4	25	φ18	116	G3/4
φ100	16	φ36.9	□130	Rc3/4	27	φ18	132	G3/4
φ125	18	φ46.1	□165	Rc1	29	φ22	167	G1
φ140	18	φ46.1	□185	Rc1	32	φ26	187	G1
φ160	18	φ46.1	□205	Rc1	37	φ26	207	G1

Symbol Bore	FP	HL	PJ	PL	R	TO	UO	WF	ZF
φ32	35	103	56	12	33	58	70	25	139
φ40	37	128	73	18	41	87	110	25	169
φ50	42	134	74	18	52	105	130	25	178
φ63	39	136	80	17	65	117	145	32	190
φ80	46	159	93	20	83	149	180	31	215
φ100	47	168	101	20	97	162	200	35	230
φ125	51	197	117	29	126	208	250	35	261
φ140	51	203	124	28	142	230	280	35	270
φ160	54	213	130	29	155	253	300	32	282

● The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	—	64	77	80	82	94	102	—	—

CA

160H-1 / TRH1 ☐Bore☐ A. B **CAD/DATA is available.**

| 160H-1 | 2 | CA | Bore | B | B | Stroke | − | A | B |
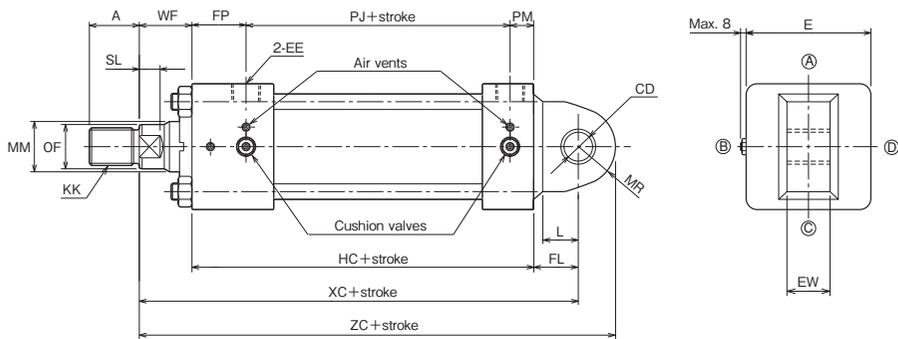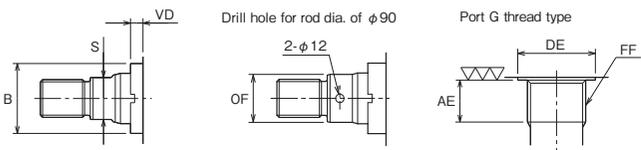
Drill hole for rod dia. of φ90
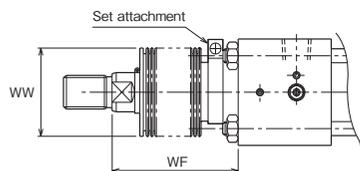
Port G thread type

● The positions of cushion valves and air vents depend on the cylinder bore.
● The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
● A bush (gray cast iron) has been press-fitted into the mounting hole (dimensional symbol: CD).
● On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
● If you want to change the rod protrusion length, specify dimension WF.
● For dimensions not shown in these figures, refer to the SD style (basic style).
● For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

● Bore φ32・φ40

With Boots

160H-1 / TRH1 ☐Bore☐ K

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
● Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Limited.
● The boots have been mounted at our factory prior to delivery.

Dimension WF

Rod B
Nylon tarpaulin
Chloroprene

φ32・φ40	1/3 stroke+X
φ50	1/3.5 stroke+X
φ63 to φ100	1/4 stroke+X
φ125 to φ160	1/5 stroke+X

Conex

φ32	1/2 stroke+X
φ40・φ50	1/2.5 stroke+X
φ63 to φ100	1/3 stroke+X
φ125 to φ160	1/3.5 stroke+X

Rod A
Nylon tarpaulin
Chloroprene

φ40	1/3.5 stroke+X
φ50 to φ80	1/4 stroke+X
φ100・φ125	1/5 stroke+X

Conex

φ40	1/2.5 stroke+X
φ50 to φ80	1/3 stroke+X
φ100・φ125	1/3.5 stroke+X

● If the calculated WF has a fractional part, round it up.

Dimensional Table

Symbol / Bore	Rod B								Rod A							
	A	B Standard type	B Cutting oil proof type	KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

Symbol / Bore	AE	CD	DE	E	EE	EW	FF	FL
φ32	12	φ12 H9	φ21.5	☐45	Rc1/4	$16_{-0.43}^{0}$	G1/4	19
φ40	12	φ14 H9	φ25.5	☐62	Rc3/8	$20_{-0.52}^{0}$	G3/8	19
φ50	14	φ20 H9	φ30	☐75	Rc1/2	$30_{-0.52}^{0}$	G1/2	33
φ63	14	φ20 H9	φ30	☐90	Rc1/2	$30_{-0.52}^{0}$	G1/2	33
φ80	16	φ28 H9	φ36.9	☐114	Rc3/4	$40_{-0.62}^{0}$	G3/4	41
φ100	16	φ36 H9	φ36.9	☐130	Rc3/4	$50_{-0.62}^{0}$	G3/4	56
φ125	18	φ45 H9	φ46.1	☐165	Rc1	$60_{-0.74}^{0}$	G1	62
φ140	18	φ50 H9	φ46.1	☐185	Rc1	$65_{-0.74}^{0}$	G1	65
φ160	18	φ56 H9	φ46.1	☐205	Rc1	$70_{-0.74}^{0}$	G1	68

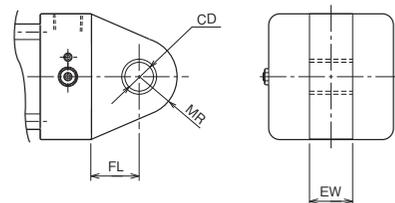| Symbol / Bore	FP	HC	L	MR	PJ	PM	WF	XC	ZC
φ32	35	103	—	R17	56	12	25	147	164
φ40	37	128	—	R17	73	18	25	172	189
φ50	42	133	30	R28	74	17	25	191	219
φ63	39	135	30	R28	80	16	32	200	228
φ80	46	157	35	R33	93	18	31	229	262
φ100	47	166	51	R49	101	18	35	257	306
φ125	51	192	54	R52	117	24	35	289	341
φ140	51	200	57	R55	124	25	35	300	355
φ160	54	208	60	R58	130	24	32	308	366

● The tolerance of MM is f8.

With Boots

Symbol / Bore		φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	—	64	77	80	82	94	102	—	—

General Hydraulic Cylinders

160H-1

CB

160H-1 | 2 | CB | Bore | B | B | Stroke | — | A | B

CAD/DATA is available.
160H-1/TRH1 Bore A. B

VD
S
B
MM OF
KK
A WF FP PJ+stroke PM
SL
2-EE
Air vents
CD
Cushion valves
HC+stroke
L
FL
XC+stroke
ZC+stroke

Drill hole for rod dia. of φ90
2-φ12
OF

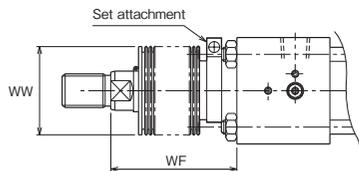Port G thread type
DE FF
AE

Max. 8 E
Ⓐ
With pin
Ⓑ Ⓓ
Ⓒ
CB
UB
MR

● The positions of cushion valves and air vents depend on the cylinder bore.
● The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
● On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
● If you want to change the rod protrusion length, specify dimension WF.
● For dimensions not shown in these figures, refer to the SD style (basic style).
● For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

● Bore φ32・φ40

CD
MR
FL
CB
UB

With Boots

160H-1/TRH1 Bore K

Set attachment
WW
WF

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
● Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Limited.
● The boots have been mounted at our factory prior to delivery.

Dimension WF

Rod B

Nylon tarpaulin
Chloroprene

$$\begin{pmatrix} φ32・φ40 & 1/3 & stroke+X \\ φ50 & 1/3.5 & stroke+X \\ φ63\ to\ φ100 & 1/4 & stroke+X \\ φ125\ to\ φ160 & 1/5 & stroke+X \end{pmatrix}$$

Conex

$$\begin{pmatrix} φ32 & 1/2 & stroke+X \\ φ40・φ50 & 1/2.5 & stroke+X \\ φ63\ to\ φ100 & 1/3 & stroke+X \\ φ125\ to\ φ160 & 1/3.5 & stroke+X \end{pmatrix}$$

Rod A

Nylon tarpaulin
Chloroprene

$$\begin{pmatrix} φ40 & 1/3.5 & stroke+X \\ φ50\ to\ φ80 & 1/4 & stroke+X \\ φ100・φ125 & 1/5 & stroke+X \end{pmatrix}$$

Conex

$$\begin{pmatrix} φ40 & 1/2.5 & stroke+X \\ φ50\ to\ φ80 & 1/3 & stroke+X \\ φ100・φ125 & 1/3.5 & stroke+X \end{pmatrix}$$

● If the calculated WF has a fractional part, round it up.

Dimensional Table

Symbol / Bore	Rod B								Rod A							
	A	B Standard type	B Cutting oil proof type	KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

Symbol / Bore	AE	CB	CD	DE	E	EE	FF	FL
φ32	12	$16^{+0.69}_{+0.29}$	φ12 H9/f8	φ21.5	□45	Rc1/4	G1/4	19
φ40	12	$20^{+0.70}_{+0.30}$	φ14 H9/f8	φ25.5	□62	Rc3/8	G3/8	19
φ50	14	$30^{+0.70}_{+0.30}$	φ20 H9/f8	φ30	□75	Rc1/2	G1/2	33
φ63	14	$30^{+0.70}_{+0.30}$	φ20 H9/f8	φ30	□90	Rc1/2	G1/2	33
φ80	16	$40^{+0.91}_{+0.31}$	φ28 H9/f8	φ36.9	□114	Rc3/4	G3/4	41
φ100	16	$50^{+0.92}_{+0.32}$	φ36 H9/f8	φ36.9	□130	Rc3/4	G3/4	56
φ125	18	$60^{+0.94}_{+0.34}$	φ45 H9/f8	φ46.1	□165	Rc1	G1	62
φ140	18	$65^{+0.94}_{+0.34}$	φ50 H9/f8	φ46.1	□185	Rc1	G1	65
φ160	18	$70^{+0.96}_{+0.36}$	φ56 H9/f8	φ46.1	□205	Rc1	G1	68

Symbol / Bore	FP	HC	L	MR	PJ	PM	UB	WF	XC	ZC
φ32	35	103	—	R17	56	12	32	25	147	164
φ40	37	128	—	R17	73	18	40	25	172	189
φ50	42	133	30	R28	74	17	60	25	191	219
φ63	39	135	30	R28	80	16	60	32	200	228
φ80	46	157	35	R33	93	18	80	31	229	262
φ100	47	166	50	R49	101	18	100	35	257	306
φ125	51	192	53	R52	117	24	120	35	289	341
φ140	51	200	56	R55	124	25	130	35	300	355
φ160	54	208	59	R58	130	24	140	32	308	366

● The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
WW	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
X	Rod A	—	64	77	80	82	94	102	—	—

TA

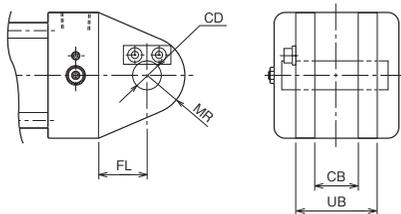CAD/DATA is available.
160H-1/TRH1 [Bore] A. B

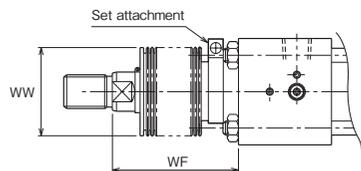160H-1 | 2 | TA | Bore | B | B | Stroke | − | A | B
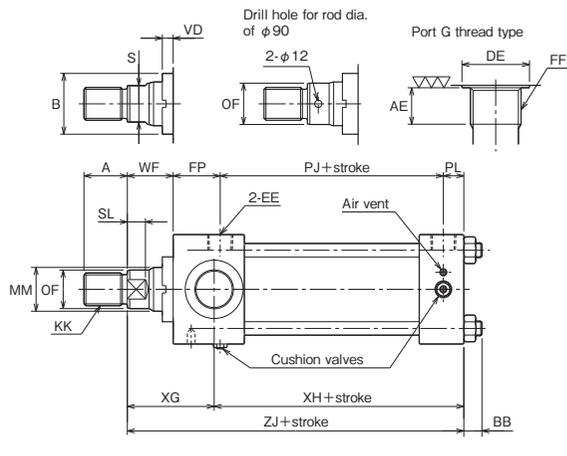
- The positions of cushion valves and air vents depend on the cylinder bore.
- The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
- If the stroke is short, take care that the cushion valve does not get into contact with the mounting bracket.
- If you want to change the rod protrusion length, specify dimension WF.
- For dimensions not shown in these figures, refer to the SD style (basic style).
- For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

Double acting double rod (rod B)

- The distance between the covers of the double rod cylinder is longer than that of the single rod cylinder by 10 mm.

With Boots

160H-1/TRH1 [Bore] K

Dimension WF

Rod B

Nylon tarpaulin / Chloroprene
$\begin{pmatrix} \phi32 \cdot \phi40 & 1/3 & \text{stroke+X} \\ \phi50 & 1/3.5 & \text{stroke+X} \\ \phi63 \text{ to } \phi100 & 1/4 & \text{stroke+X} \\ \phi125 \text{ to } \phi160 & 1/5 & \text{stroke+X} \end{pmatrix}$

Conex
$\begin{pmatrix} \phi32 & 1/2 & \text{stroke+X} \\ \phi40 \cdot \phi50 & 1/2.5 & \text{stroke+X} \\ \phi63 \text{ to } \phi100 & 1/3 & \text{stroke+X} \\ \phi125 \text{ to } \phi160 & 1/3.5 & \text{stroke+X} \end{pmatrix}$

Rod A

Nylon tarpaulin / Chloroprene
$\begin{pmatrix} \phi40 & 1/3.5 & \text{stroke+X} \\ \phi50 \text{ to } \phi80 & 1/4 & \text{stroke+X} \\ \phi100 \cdot \phi125 & 1/5 & \text{stroke+X} \end{pmatrix}$

Conex
$\begin{pmatrix} \phi40 & 1/2.5 & \text{stroke+X} \\ \phi50 \text{ to } \phi80 & 1/3 & \text{stroke+X} \\ \phi100 \cdot \phi125 & 1/3.5 & \text{stroke+X} \end{pmatrix}$

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.
- If the calculated WF has a fractional part, round it up.

Dimensional Table

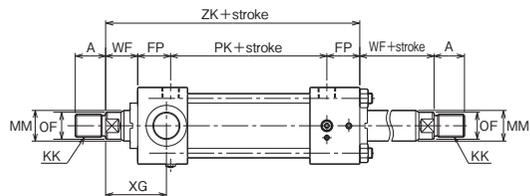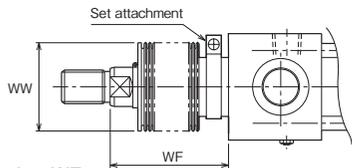	Symbol / Bore	A	B Standard type	B Cutting oil proof type	KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
		Rod B								Rod A							
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

Symbol / Bore	AE	BB	DE	E	EE	FF	FP	JR	PJ	PK
φ32	12	7	φ21.5	□45	Rc1/4	G1/4	35	R2	56	66
φ40	12	9	φ25.5	□62	Rc3/8	G3/8	37	R2	73	83
φ50	14	13	φ30	□75	Rc1/2	G1/2	42	R2.5	74	84
φ63	14	13	φ30	□90	Rc1/2	G1/2	39	R2.5	80	90
φ80	16	16	φ36.9	□114	Rc3/4	G3/4	46	R3	93	103
φ100	16	16	φ36.9	□130	Rc3/4	G3/4	47	R3	101	111
φ125	18	21	φ46.1	□165	Rc1	G1	51	R4	117	127
φ140	18	22	φ46.1	□185	Rc1	G1	51	R4	124	134
φ160	18	25	φ46.1	□205	Rc1	G1	54	R4	130	140

Symbol / Bore	PL	TC	TD	TL	UT	WF	XG	XH	ZJ	ZK
φ32	12	44 $_{-0.62}^{0}$	φ16 f8	12	68	25	54	74	128	161
φ40	18	63 $_{-0.74}^{0}$	φ20 f8	16	95	25	57	96	153	182
φ50	18	76 $_{-0.74}^{0}$	φ25 f8	20	116	25	64	95	159	193
φ63	17	89 $_{-0.87}^{0}$	φ32 f8	25	139	32	70	98	168	200
φ80	20	114 $_{-0.87}^{0}$	φ40 f8	32	178	31	76	114	190	226
φ100	20	127 $_{-1.00}^{0}$	φ50 f8	40	207	35	71	132	203	240
φ125	29	165 $_{-1.00}^{0}$	φ63 f8	50	265	35	75	157	232	264
φ140	28	184 $_{-1.15}^{0}$	φ70 f8	58	300	35	75	163	238	271
φ160	29	203 $_{-1.15}^{0}$	φ80 f8	63	329	32	75	170	245	280

- The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
WW	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
X	Rod A	—	64	77	80	82	94	102	—	—

General Hydraulic Cylinders

160H-1

TC

160H-1 2 TC Bore B B Stroke — A B
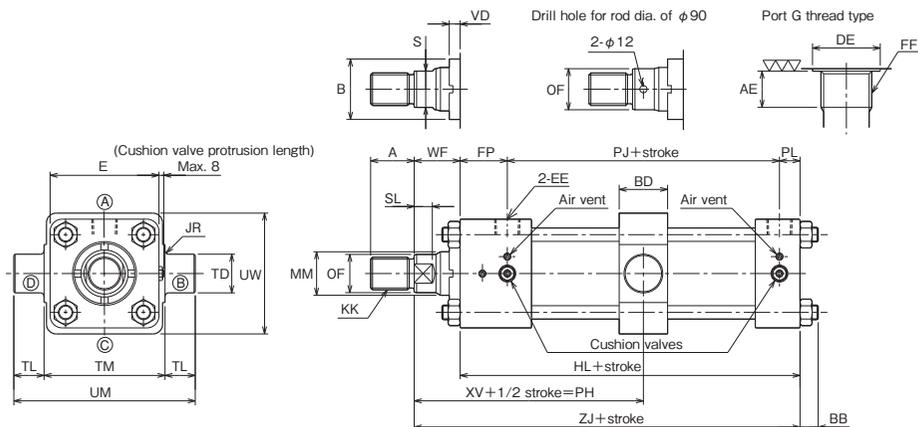
CAD/DATA is available.
160H-1/TRH1 Bore A. B

Drill hole for rod dia. of φ90

Port G thread type

(Cushion valve protrusion length) Max. 8

Double acting double rod (rod B)

● The positions of cushion valves and air vents depend on the cylinder bore.
● The rod end thread length (dimension A) is longer when a lock nut is attached to the rod end. Refer to "Thread length of rod end with lock nut" in "Rod End Attachment."
● If the stroke is short, take care that the cushion valve does not get into contact with the mounting bracket.
● On the rod side of the rod A, the air vents are positioned on two sides other than the port and cushion valve sides.
● If you want to change the rod protrusion length, specify dimension WF.
● For dimensions not shown in these figures, refer to the SD style (basic style).
● For the mounting of sensors, refer to the dimensional drawings of "Switch Set." All the contents other than "Sensor mounting dimensions" are the same.

● The distance between the covers of the double rod cylinder is longer than that of the single rod cylinder by 10 mm.

Minimum Stroke of TC Style

Bore	Stroke	Bore	Stroke	Bore	Stroke
φ32	10	φ63	10	φ125	25
φ40	10	φ80	10	φ140	25
φ50	10	φ100	25	φ160	35

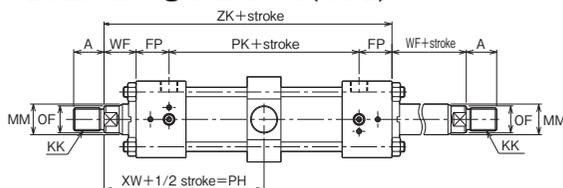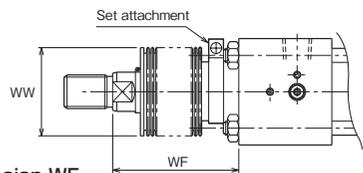● For the min. strokes of Switch Set Cylinders, refer to the model codes.

160H-1/TRH1 Bore K

With Boots

Dimension WF
Rod B
Nylon tarpaulin
Chloroprene

$\begin{pmatrix} φ32 \cdot φ40 & 1/3 & stroke+X \\ φ50 & 1/3.5 & stroke+X \\ φ63 \text{ to } φ100 & 1/4 & stroke+X \\ φ125 \text{ to } φ160 & 1/5 & stroke+X \end{pmatrix}$

Conex

$\begin{pmatrix} φ32 & 1/2 & stroke+X \\ φ40 \cdot φ50 & 1/2.5 & stroke+X \\ φ63 \text{ to } φ100 & 1/3 & stroke+X \\ φ125 \text{ to } φ160 & 1/3.5 & stroke+X \end{pmatrix}$

Rod A
Nylon tarpaulin
Chloroprene

$\begin{pmatrix} φ40 & 1/3.5 & stroke+X \\ φ50 \text{ to } φ80 & 1/4 & stroke+X \\ φ100 \cdot φ125 & 1/5 & stroke+X \end{pmatrix}$

Conex

$\begin{pmatrix} φ40 & 1/2.5 & stroke+X \\ φ50 \text{ to } φ80 & 1/3 & stroke+X \\ φ100 \cdot φ125 & 1/3.5 & stroke+X \end{pmatrix}$

● If the calculated WF has a fractional part, round it up.

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes)
● Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Limited.
● The boots have been mounted at our factory prior to delivery.

Dimensional Table

Symbol / Bore	Rod B								Rod A							
	A	B Standard type	B Cutting oil proof type	KK	MM	OF	S	SL	VD	A	B	KK	MM	OF	S	SL	VD
φ32	18	φ30 f9	φ34 f9	M14×1.5	φ18	φ17	14	10	10	—	—	—	—	—	—	—	—
φ40	22	φ34 f9	φ40 f9	M16×1.5	φ22	φ21	17	9	10	28	φ42 f9	M20×1.5	φ28	φ26	22	11	9
φ50	28	φ42 f9	φ46 f9	M20×1.5	φ28	φ26	22	11	9	36	φ50 f9	M27×2	φ36	φ34	30	14	9
φ63	36	φ50 f9	φ55 f9	M27×2	φ36	φ34	30	14	9	45	φ60 f9	M33×2	φ45	φ43	38	17	8
φ80	45	φ60 f9	φ65 f9	M33×2	φ45	φ43	38	17	8	56	φ72 f9	M42×2	φ56	φ54	50	21	8
φ100	56	φ72 f9	—	M42×2	φ56	φ54	50	21	8	63	φ88 f9	M48×2	φ70	φ68	60	24	6
φ125	63	φ88 f9	—	M48×2	φ70	φ68	60	24	6	85	φ108 f9	M64×3	φ90	φ88	—	Drill hole	5
φ140	75	φ98 f9	—	M56×2	φ80	φ78	70	27	5	—	—	—	—	—	—	—	—
φ160	85	φ108 f9	—	M64×3	φ90	φ88	—	Drill hole	5	—	—	—	—	—	—	—	—

Symbol / Bore	AE	BB	BD	DE	E	EE	FF	FP	HL	JR	Min. PH	PJ
φ32	12	7	30	φ21.5	□45	Rc1/4	G1/4	35	103	R2	89	56
φ40	12	9	30	φ25.5	□62	Rc3/8	G3/8	37	128	R2	94	73
φ50	14	13	40	φ30	□75	Rc1/2	G1/2	42	134	R2.5	105	74
φ63	14	13	43	φ30	□90	Rc1/2	G1/2	39	136	R2.5	112.5	80
φ80	16	16	53	φ36.9	□114	Rc3/4	G3/4	46	159	R3	127.5	93
φ100	16	16	68	φ36.9	□130	Rc3/4	G3/4	47	168	R3	144	101
φ125	18	21	73	φ46.1	□165	Rc1	G1	51	197	R4	154.5	117
φ140	18	22	83	φ46.1	□185	Rc1	G1	51	203	R4	159.5	124
φ160	18	25	98	φ46.1	□205	Rc1	G1	54	213	R4	168	130

Symbol / Bore	PK	PL	TD	TL	TM	UM	UW	WF	XV	XW	ZJ	ZK
φ32	66	12	φ16 f8	12	55 $_{-0.62}^{0}$	79	55	25	88	93	128	161
φ40	83	18	φ20 f8	16	76 $_{-0.74}^{0}$	108	76	25	98.5	103.5	153	182
φ50	84	18	φ25 f8	20	89 $_{-0.87}^{0}$	129	89	25	104	109	159	193
φ63	90	17	φ32 f8	25	100 $_{-0.87}^{0}$	150	100	32	111	116	168	200
φ80	103	20	φ40 f8	32	127 $_{-1.00}^{0}$	191	127	31	123.5	128.5	190	226
φ100	111	20	φ50 f8	40	140 $_{-1.00}^{0}$	220	140	35	132.5	137.5	203	240
φ125	127	29	φ63 f8	50	178 $_{-1.00}^{0}$	278	178	35	144.5	149.5	232	264
φ140	134	28	φ70 f8	58	200 $_{-1.00}^{0}$	316	200	35	148	153	238	271
φ160	140	29	φ80 f8	63	215 $_{-1.15}^{0}$	341	215	32	151	156	245	280

● The tolerance of MM is f8.

With Boots

Symbol	Bore	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160
WW	Rod B	φ40	φ50	φ50	φ71	φ80	φ100	φ100	φ125	φ140
	Rod A	—	φ50	φ71	φ80	φ100	φ100	φ140	—	—
X	Rod B	56	61	64	77	80	82	94	97	102
	Rod A	—	64	77	80	82	94	102	—	—

HA 222

160H-1

16 MPa Double Acting Hydraulic Cylinder

Unit: mm

16 MPa Double Acting Hydraulic Cylinder

Unit: mm

160H-1

HA 223

General Hydraulic Cylinders

160H-1

General Hydraulic Cylinders

160H-1

Switch Set

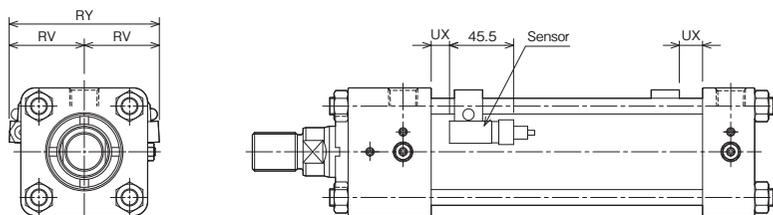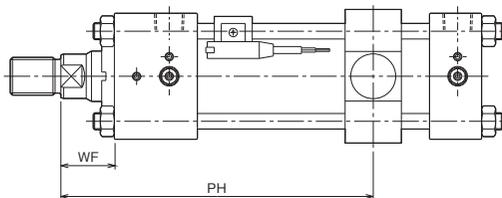| 160H-1R | 2 | SD | Bore | B | B | Stroke | − | A | B | Sensor symbol | Sensor quantity |

AX/AZ type (Reed sensor/Solid state sensor)
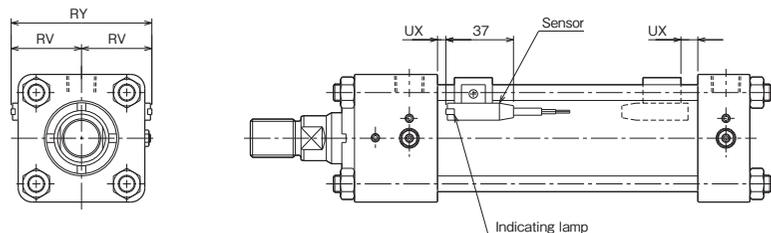
WR type (Reed sensor), WS type (Solid state sensor/2-wire 2-LED type) (Cutting oil proof type)

Minimum dimension PH of Switch Set Cylinder 160H-1R

- The minimum dimension PH of a Switch Set Cylinder is the dimension obtained when the sensor is mounted on the rod side and the trunnion is moved toward the rod side as far as possible.

When boots are provided, dimension W changes. In such a case, specify dimension PH.

Dimensional Table

Symbol / Bore	RV AX type	RV WR type WS type	RY AX type	RY WR type WS type	UX AX type	UX AX＊W	UX WR type	UX AX type	Minimum dimension PH AX type	Minimum dimension PH WR type	Minimum dimension PH AX type
φ32	33	39	66	78	4(9)	4(9)	2	4	150(155)	174	176
φ40	38	43	76	86	11(16)	11(16)	8	10	160(165)	185	187
φ50	45	48	90	96	10(15)	10(15)	7	9	170(175)	195	197
φ63	50	53	100	106	11(16)	11(16)	8	10	178.5(183.5)	204	206
φ80	60	63	120	126	13(18)	13(18)	11	13	195.5(200.5)	221	223
φ100	68	−	136	−	14(19)	14(19)	−	−	212(217)	−	−
φ125	83	−	166	−	19(24)	19(24)	−	−	227.5(232.5)	−	−
φ140	92	−	182	−	21(26)	20(25)	−	−	234.5(239.5)	−	−
φ160	99	−	200	−	22(27)	22(27)	−	−	245(250)	−	−

Notes)
- The figures on the previous page show the AX type sensor (rear wiring). As for the AZ type sensor (upper wiring), take into consideration the bending radius of the cord.
- Dimension UX indicates the appropriate sensor position for detection of stroke end.
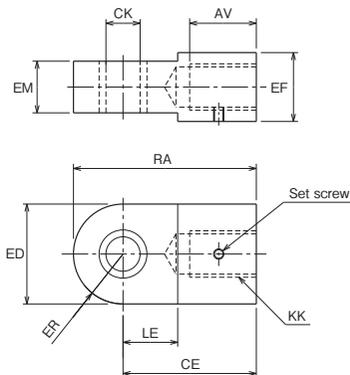- The parenthesized values apply to double rod cylinders.

Operating Range and Hysteresis

Bore (mm)	Reed sensor AX1＊＊ Operating range	Reed sensor AX1＊＊ Hysteresis	Reed sensor WR type Operating range	Reed sensor WR type Hysteresis	Solid state sensor AX2＊＊ Operating range	Solid state sensor AX2＊＊ Hysteresis	Solid state sensor AX＊＊ Operating range	Solid state sensor AX＊＊ Hysteresis	Solid state sensor WS type Operating range	Solid state sensor WS type Hysteresis
φ32	4 to 14	2 or less	5 to 10	2 or less	3 to 8	1 or less	9 to 12	2 or less	6 to 16	2 or less
φ40	4 to 14	2 or less	5 to 10	2 or less	3 to 8	1 or less	11 to 17	2 or less	11 to 17	2 or less
φ50	4 to 14	2 or less	6 to 12	2 or less	3 to 8	1 or less	11 to 17	2 or less	11 to 17	2 or less
φ63	4 to 14	2 or less	6 to 12	2 or less	3 to 8	1 or less	11 to 17	2 or less	11 to 17	2 or less
φ80	4 to 14	2 or less	6 to 12	2 or less	3 to 8	1 or less	11 to 17	2 or less	11 to 17	2 or less
φ100	11 to 18	2 or less	−	−	4 to 10	1 or less	17 to 21	2 or less	−	−
φ125	5 to 15	2 or less	−	−	4 to 10	1 or less	17 to 21	2 or less	−	−
φ140	11 to 20	2 or less	−	−	6 to 13	1 or less	18 to 24	3 or less	−	−
φ160	11 to 20	2 or less	−	−	6 to 13	1 or less	18 to 24	3 or less	−	−

Rod End Attachment

160H-1/TRH1 [Bore]K   CAD/DATA is available.

● Rod eye (T-end)

● Rod clevis (Y-end)

Bore φ32 to φ63

Bore φ80 to φ160

φ32, φ40: Bolt with hex. hole
φ50, φ63: Hexagonal bolt
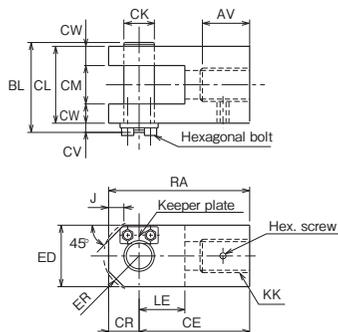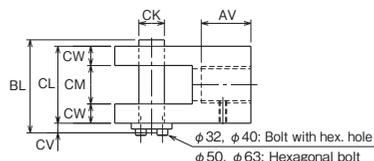
● Delivery of rod end attachment (T-end or Y-end)

① When the lock nut and rod end attachment are additionally ordered
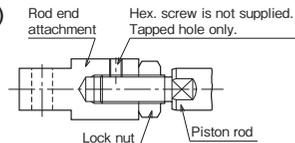The rod end attachment and lock nut are temporarily assembled to the piston rod for delivery. Since the lock nut is not tightened, tighten it after adjusting the position of the rod end attachment.
No hex. screw is supplied.

Rod end attachment / Hex. screw is not supplied. Tapped hole only. / Lock nut / Piston rod

② When only the rod end attachment is additionally ordered (without lock nut)
The rod end attachment is tightened to the piston rod, and a drill hole is made on the piston rod for delivery.
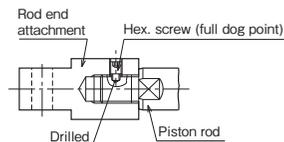
If the drill hole is unnecessary, give us such instructions.

Rod end attachment / Hex. screw (full dog point) / Drilled / Piston rod

Dimensional Table/Rod eye (T-end)

Symbol Bore	Rod B						Rod A					
	Part code	AV	CE	EF	KK	RA	Set screw	Part code	AV	CE	EF	KK	RA	Part code
φ32	RTH-14-H	21	50	25	M14×1.5	67	M6	—	—	—	—	—	—	—
φ40	RTH-16-3-H	25	55	30	M16×1.5	72	M6	RTH-20-4-H	31	67	35	M20×1.5	84	M6
φ50	RTH-20-3-H	31	67	40	M20×1.5	96	M6	RTH-27-H	39	78	40	M27×2	107	M6
φ63	RTH-27-H	39	78	40	M27×2	107	M6	RTH-33-1-H	48	94	50	M33×2	123	M6
φ80	RTH-33-H	48	94	50	M33×2	128	M6	RTH-42-1-H	59	112	65	M42×2	146	M8
φ100	RTH-42-H	59	112	65	M42×2	162	M8	RTH-48-4-H	66	135	75	M48×2	185	M10
φ125	RTH-48-3-H	66	125	75	M48×2	178	M10	RTH-64-5-H	88	158	100	M64×3	211	M12
φ140	RTH-56-1-H	78	148	85	M56×2	204	M12	—	—	—	—	—	—	—
φ160	RTH-64-4-H	88	158	100	M64×3	217	M12	—	—	—	—	—	—	—

Symbol Bore	CK	ED	EM	ER	LE
φ32	φ12 H9	34	$16 -^0_{0.27}$	R17	19
φ40	φ14 H9	34	$20 -^0_{0.33}$	R17	19
φ50	φ20 H9	58	$30 -^0_{0.33}$	R29	32
φ63	φ20 H9	58	$30 -^0_{0.33}$	R29	32
φ80	φ28 H9	68	$40 -^0_{0.39}$	R34	39
φ100	φ36 H9	100	$50 -^0_{0.39}$	R50	54
φ125	φ45 H9	106	$60 -^0_{0.46}$	R53	57
φ140	φ50 H9	112	$65 -^0_{0.46}$	R56	63
φ160	φ56 H9	118	$70 -^0_{0.46}$	R59	63

Dimensional Table/Rod clevis (Y-end)

Symbol Bore	Rod B						Rod A					
	Part code	AV	CE	KK	RA	Set screw	Part code	AV	CE	KK	RA	Part code
φ32	RYH-14-H	21	50	M14×1.5	67	M6	—	—	—	—	—	—
φ40	RYH-16-3-H	25	55	M16×1.5	72	M6	RYH-20-4-H	31	67	M20×1.5	84	M6
φ50	RYH-20-3-H	31	67	M20×1.5	96	M6	RYH-27-H	39	78	M27×2	107	M6
φ63	RYH-27-H	39	78	M27×2	107	M6	RYH-33-1-H	48	94	M33×2	123	M6
φ80	RYH-33-H	48	94	M33×2	125	M6	RYH-42-1-H	59	112	M42×2	143	M8
φ100	RYH-42-H	58	112	M42×2	155	M8	RYH-48-4-H	66	135	M48×2	178	M10
φ125	RYH-48-3-H	68	125	M48×2	170	M10	RYH-64-5-H	101	158	M64×3	203	M12
φ140	RYH-56-1-H	85	148	M56×2	198	M12	—	—	—	—	—	—
φ160	RYH-64-4-H	95	158	M64×3	212	M12	—	—	—	—	—	—

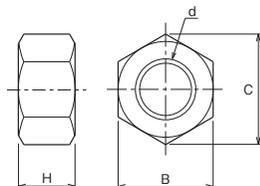| Symbol Bore	BL	CK	CL	CM	CR	CV	CW	ED	ER	J	LE
φ32	42	φ12 H9/f8	32	$16 +^{0.68}_{0.29}$	—	8	8	34	R17	—	19
φ40	50	φ14 H9/f8	40	$20 +^{0.70}_{0.30}$	—	8	10	34	R17	—	19
φ50	72	φ20 H9/f8	60	$30 +^{0.70}_{0.30}$	—	10	15	58	R29	—	32
φ63	72	φ20 H9/f8	60	$30 +^{0.70}_{0.30}$	—	10	15	58	R29	—	32
φ80	92	φ28 H9/f8	80	$40 +^{0.91}_{0.31}$	31	10	20	65	R33	22	39
φ100	115	φ36 H9/f8	100	$50 +^{0.92}_{0.32}$	43	13	25	90	R48	24	54
φ125	138	φ45 H9/f8	120	$60 +^{0.94}_{0.34}$	45	14	30	100	R51	28	57
φ140	152	φ50 H9/f8	130	$65 +^{0.94}_{0.34}$	50	18	32.5	100	R55	28	63
φ160	162	φ56 H9/f8	140	$70 +^{0.96}_{0.36}$	54	18	35	110	R59	33	63

General Hydraulic Cylinders 160H-1
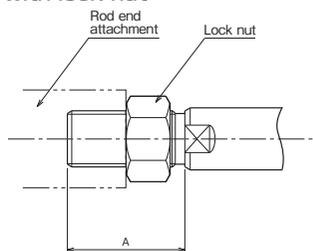
● Parallel pin
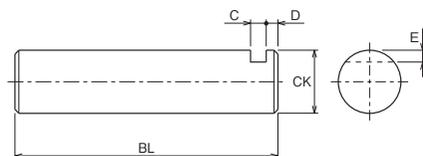
● Retainer
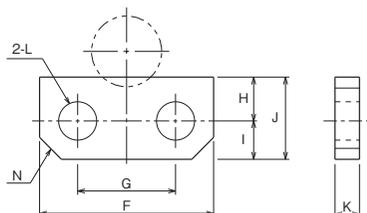
● Lock nut

● Thread length of rod end with lock nut

The standard fitting length of the rod end attachment and piston rod is about 80% of the thread diameter. When using a lock nut, it is necessary to increase the thread length (dimension A) as shown above.
If you order a cylinder with a lock nut (symbol: K), the thread length (dimension A) is as shown on the next page.

Dimensional Table/Parallel pin

Symbol / Bore	Rod A or B				
	BL	C	CK	D	E
φ32	42	4	φ12f8	4	2
φ40	50	4	φ14f8	4	2
φ50	72	5.5	φ20f8	4.5	3
φ63	72	5.5	φ20f8	4.5	3
φ80	92	5.5	φ28f8	4.5	4
φ100	115	7	φ36f8	6	5
φ125	138	7	φ45f8	7	5.5
φ140	152	10	φ50f8	8	7
φ160	162	10	φ56f8	8	7

Note) ● The rod A is used for cylinders with bores of 40 to 125 mm.

Dimensional Table/Retainer

Symbol / Bore	Rod A or B								Mounting bolt
	F	G	H	I	J	K	L	N	
φ32	19	10	5.5	5.5	11	3	φ5.5	C2.5	M5
φ40	19	10	5.5	5.5	11	3	φ5.5	C2.5	M5
φ50	32	17	8	8	16	4.5	φ6.6	C4	M6
φ63	32	17	8	8	16	4.5	φ6.6	C4	M6
φ80	38	23	7	8	15	4.5	φ6.6	C4	M6
φ100	44	24	11	11	22	6	φ9	C3	M8
φ125	60	32	15	13	28	6	φ11	C10	M10
φ140	65	41	15	15	30	9	φ13	C10	M12
φ160	65	41	15	15	30	9	φ13	C10	M12

Note) ● The rod A is used for cylinders with bores of 40 to 125 mm.

Dimensional Table/Lock nut

Symbol / Bore	Rod B					Rod A				
	Part code	B	C	d	H	Part code	B	C	d	H
φ32	LNH-14F-H	22	25.4	M14×1.5	11	—	—	—	—	—
φ40	LNH-16F-1-H	24	27.7	M16×1.5	13	LNH-20F-2-H	30	34.6	M20×1.5	16
φ50	LNH-20F-2-H	30	34.6	M20×1.5	16	LNH-27F-H	41	47.3	M27×2	22
φ63	LNH-27F-H	41	47.3	M27×2	22	LNH-33F-H	50	57.7	M33×2	26
φ80	LNH-33F-H	50	57.7	M33×2	26	LNH-42F-1-H	65	75	M42×2	34
φ100	LNH-42F-1-H	65	75	M42×2	34	LNH-48F-2-H	75	86.5	M48×2	38
φ125	LNH-48F-2-H	75	86.5	M48×2	38	LNH-64F-2-H	95	110	M64×3	51
φ140	LNH-56F-1-H	85	98.1	M56×2	45	—	—	—	—	—
φ160	LNH-64F-2-H	95	110	M64×3	51	—	—	—	—	—

Dimensional Table/Dimension A when lock nut is used (long thread)

Symbol / Bore	Rod B		Rod A	
	A	KK	A	KK
φ32	28	M14×1.5	—	—
φ40	32	M16×1.5	40	M20×1.5
φ50	40	M20×1.5	54	M27×2
φ63	54	M27×2	66	M33×2
φ80	66	M33×2	84	M42×2
φ100	84	M42×2	96	M48×2
φ125	96	M48×2	128	M64×3
φ140	112	M56×2	—	—
φ160	128	M64×3	—	—

General Hydraulic Cylinders 160H-1

Change of Rod End Shape Rod B (Consult us in case of rod A or the case that doesn't go for 'A01' or 'A00' below.)

■ You can specify the shape and dimension of the rod end as shown below using the semi-standard symbols and dimension symbols.
 (No need to specify the dimension symbol if you order a cylinder with the basic dimension. Specify only the semi-standard symbol.)

How to order | Series | Model number | — × | Semi-standard symbol | Dimension symbol (Specify only when the dimension differs from the basic dimension.)

Semi-standard symbol : **AO1**
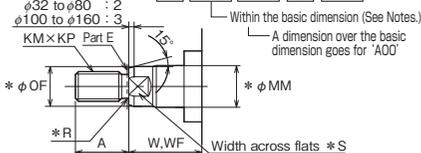
Applicable dimension symbols : A KM KP W WF

φ32 to φ80 : 2
φ100 to φ160 : 3

KM×KP Part E

* φ OF   * φ MM

*R   A   W,WF   Width across flats *S

Table of Basic Dimensions (=Standard dimensions of 160H-1)

Bore	A	KM	KP	*MM	*OF	*R	*S	W (FA)	WF (other than FA)
φ32	18	14	1.5	φ18	φ17	1	14	35	25
φ40	22	16	1.5	φ22	φ21	1.6	17	35	25
φ50	28	20	1.5	φ28	φ26	1.6	22	41	25
φ63	36	27	2	φ36	φ34	2	30	48	32
φ80	45	33	2	φ45	φ43	2	38	51	31
φ100	56	42	2	φ56	φ54	2	50	57	35
φ125	63	48	2	φ70	φ68	2	60	57	35
φ140	75	56	2	φ80	φ78	2	70	58	35
φ160	85	64	3	φ90	φ88	3	Drill hole	57	32

Semi-standard symbol : **AO0**

Applicable dimension symbols : A KM KP W WF

KM×KP   3

* φ MM

*R   A   W,WF   Width across flats *S
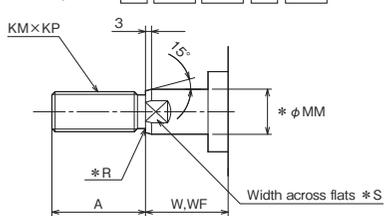
Table of Basic Dimensions

Bore	A	KM	KP	*MM	*R	*S	W (FA)	WF (other than FA)
φ32	25	16	1.5	φ18	1	14	35	25
φ40	30	20	1.5	φ22	1	19	35	25
φ50	35	24	1.5	φ28	1	24	41	25
φ63	45	30	1.5	φ36	1.6	30	48	32
φ80	60	39	1.5	φ45	1.6	41	51	31
φ100	75	48	1.5	φ56	1.6	50	57	35
φ125	95	64	2	φ70	2	65	57	35
φ140	110	72	2	φ80	2	75	58	35
φ160	120	80	2	φ90	2	Drill hole	57	32

● The *-marked dimensions are fixed.
● If it is necessary to change the fixed dimensions, consult us.

KM and KP need to be specified as a pair.

Within the basic dimension (See Notes.)
A dimension over the basic dimension goes for 'A00'

Usage
■To change the dimensions of the rod end shape of 160H-1

Notes
■When the dimensions are identical to the basic dimensions, the semi-standard symbol is unnecessary because the basic dimensions are the same as the standard dimensions.
■When a thread size larger than the basic dimension is specified, the part E will not have a contact area. Therefore, the rod end will have the shape of 'A00'.
In this case, the semi-standard symbol must be 'A00'. ('A01' cannot be used.)
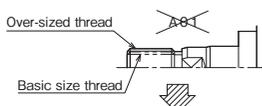
Over-sized thread   A01
Basic size thread
Use symbol A00 and specify the dimensions.

Examples
●Bore: 40 mm, rod B, rod end thread: M16×2, WF=80 mm
(Order) 160H-1 1CA40BB250-AB-X A01 KM-16, KP-2, WF-80
(Fabrication) Rod end shape A=22, KM=16, KP=2, WF=80, φMM=φ22, φOF=φ21, R=1.6, S=17
●Bore: 100 mm, rod B, rod end thread: M45×1.5 'A01' cannot be used. Refer to 'A00'.

Usage
■To specify a thread size larger than the basic dimension of 'A01'
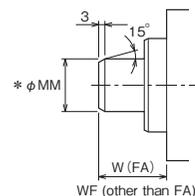■To conform to the rod end thread pitch of the rod B of TAIYO 70/140H-8

Notes
■The basic dimensions A, KM and KP of 'A00' differ from those of 'A01'. When using symbol 'A00' to specify a thread size larger than the basic dimension of 'A01', specify dimension A at the same time.

Examples
●Bore : 63 mm, rod B, with basic dimensions of 'A00'
(Order) 160H-1R 2FA63BB300-BC-X A00
(Fabrication) Rod end shape A=45, KM=30, KP=1.5, W=48, φMM=φ36, R=1.6, S=30
●Bore: 100 mm, rod B, rod end thread: M45×1.5, with other standard dimensions of 160H-1 (=basic dimensions of 'A01')
Since the thread is larger than the basic dimension of 'A01', the shape must be 'A00'.
(Order) 160H-1 2CB100BR500-AB-X A00 KM-45, KP-1.5, A-56
(Fabrication) Rod end shape A=56, KM=45, KP=1.5, WF=35, φMM=φ56, R=1.6, S=50
●Bore: 50 mm, rod B, shape: A00, rod end thread: M22×1.5, WF=100, with other basic dimensions of 'A01'
(Order) 160H-1 2CA50BB500-AB-X A00 KM-22, KP-1.5, WF-100
(Fabrication) Rod end shape A=35, KM=22, KP=1.5, WF=100, φMM=φ28, R=1, S=24
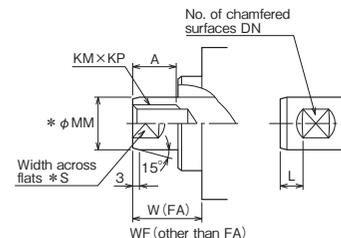

Rod B Special Rod End Shapes

A51

3   15°
* φ MM
W (FA)
WF (other than FA)

Table of Basic Dimensions

Bore	φMM	W (FA)	WF (other than FA)
φ32	φ18	35	25
φ40	φ22	35	25
φ50	φ28	41	25
φ63	φ36	48	32
φ80	φ45	51	31
φ100	φ56	57	35
φ125	φ70	57	35
φ140	φ80	58	35
φ160	φ90	57	32

A81

KM×KP   A
No. of chamfered surfaces DN
* φ MM
Width across flats *S   3   15°
W (FA)   L
WF (other than FA)

Table of Basic Dimensions

Bore	A	DN	KM	KP	L	*MM	*S	W (FA)	WF (other than FA)
φ32	15	2	M12	1.75	0	φ18	14	35	25
φ40	20	2	M16	2	0	φ22	19	35	25
φ50	24	2	M20	2.5	0	φ28	24	41	25
φ63	33	2	M27	3	0	φ36	30	48	32
φ80	36	2	M30	3.5	0	φ45	41	51	31
φ100	45	2	M39	4	0	φ56	50	57	35
φ125	58	2	M48	2	0	φ70	65	57	35
φ140		2			0	φ80	75	58	35

For the cylinders with a bore of 140 mm, basic dimensions have not been determined.
When ordering them, specify the dimensions in the blank fields.

A82

* Fitting (rod end split flange) is available.

N   DR   N   15°
15°
DM   DP
R1   A2   A1   W (FA)
V   WF (other than FA)
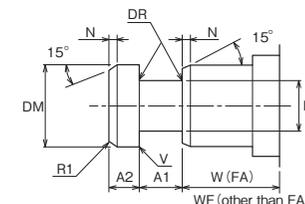
Table of Basic Dimensions

Bore	*A1 $^{+0.5}_{+0.3}$	*A2 $^{-0.2}_{-0.3}$	*DM	*DP $^{-0.2}_{-0.3}$	*DR	*MM	*N	*V	W (FA)	WF (other than FA)
φ32	12.5	12.5	φ18	φ13	1.0	φ18	3	C0.2	35	25
φ40	12.5	12.5	φ22	φ16	1.5	φ22	3	C0.2	35	25
φ50	12.5	12.5	φ28	φ21	1.5	φ28	3	C0.2	41	25
φ63	15	15	φ30	φ26	2.0	φ36	3	C0.2	48	32
φ80	15	15	φ45	φ31	2.0	φ45	3	C0.2	51	31
φ100	20	20	φ56	φ38	3.0	φ56	3	C0.2	57	35
φ125	25	25	φ70	φ49	3.5	φ70	3	R1	57	35
φ140	25	25	φ80	φ56	4.0	φ80	3	R1	58	35
φ160	30	30	φ90	φ60	5.0	φ90	6	R1	57	32

MM is the rod diameter.

● The *-marked dimensions are fixed.
● If it is necessary to change the fixed dimensions, consult us.