Sensing Work lift cylinder

Double acting 7 MPa

model CNB



Pull sensor model model CNB02-15TB



Push, pull sensor model model CNB02-15TD



Compact model model CNB02-15TN



Push sensor model model CNB02-15TU

Double acting

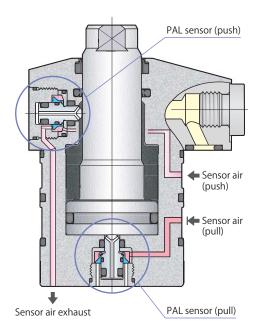
CNB - U

Push, pull sensor model D

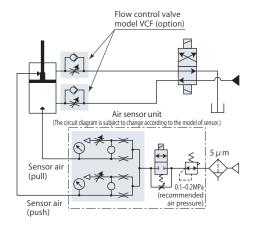
Work lift cylinder







Hydraulic and pneumatic circuit diagram

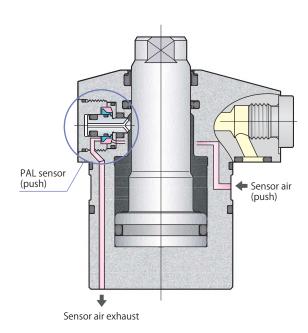


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Piping	page → 177
PAL sensor	page → 178
Dimensions	page → 182
Mounting details	page → 186

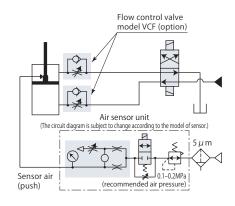
Push sensor model U

model CNB - U PAT.





Hydraulic and pneumatic circuit diagram

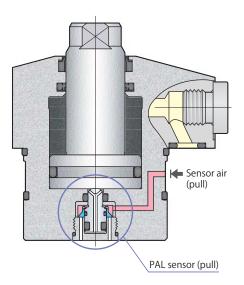


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PAL sensor	page → 189
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Sensing Work lift cylinder

Work lift cylinder



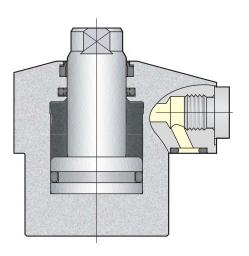


Compact model N

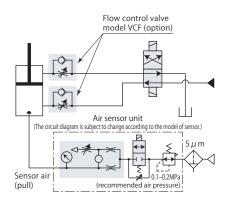
model CNB - N



No sensors available on compact model

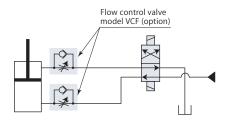


Hydraulic and pneumatic circuit diagram



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PAL sensor	page → 199
Dimensions	$page \to 202$
Mounting details	$page \to 206$

Hydraulic circuit diagram



Specifications	page → 176
Piping	page → 177
Dimensions	$page \rightarrow 210$
Mounting details	page → 214

Double

Specifications

Work lift cylinder

	Size	Stroke	Rod tip section shapes	
CNB	01 02 — 04	10 15 20 25 30 35 40 45	T: Female thread rod P: Pin rod	D: Push, pull sensor model U: Push sensor model B: Pull sensor model N: Compact model
			indicates made to order. Inc	uire for details about bottom piping specifications.

Rod tip section shapes





P: Pin rod

Model			CNB01	CNB02	CNB04	
Cylinder force	Push	kN	2.7	3.4	4.9	
(hydraulic pressure 7MPa)	Pull	kN	1.6	2.0	3.2	
Cylinder force	Push		F=0.38×P	F=0.49×P	F=0.71×P	
cálculation formula*1	Pull		F=0.23×P	F=0.29×P	F=0.45×P	
Cylinder inner diameter mm		22	25	30		
Rod diameter mm		mm	14	16	18	
Effective area	Push	cm ²	3.8	4.9	7.1	
Effective area	Pull	cm ²	2.3	2.9	4.5	
Max. oil flow rate L/min		L/min	0.8	1.0	1.6	
Recommended tightening torque of mounting screws*2 N·m			3.5	7	7	

- Pressure range: 1.5–7 MPa (model CNB-D, CNB-U, CNB-B), 0.5–7 MPa (model CNB-N)
- Proof pressure: 10.5 MPa

- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)
- *1:F=Cylinder force (kN), P=Hydraulic pressure (MPa)
- *2:ISO R898 class 12.9

Manifold piping and G port piping are available.

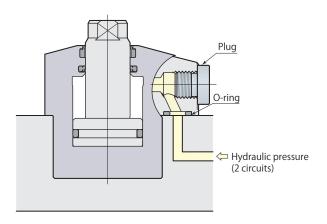
Work lift cylinder

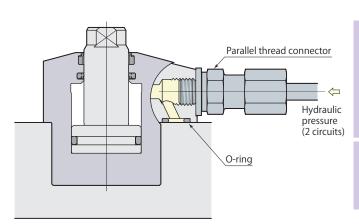
Manifold piping

When choosing manifold piping, a flow control valve (model VCF) and an air bleeding valve (model VCE) are mountable on the G ports of the cylinder.

G port piping

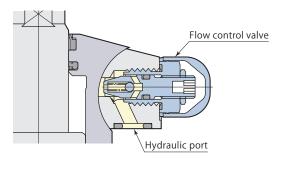
Remove plugs when choosing G port piping. (O-ring must be used.) Refer to page →220 for details on G port piping flareless fitting. The flow control valve and the air bleeding valve should be installed in the middle of oil path.





Flow control valve model VCF

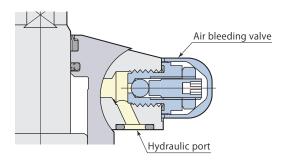
Page →216





Air bleeding valve model VCE

Page →218





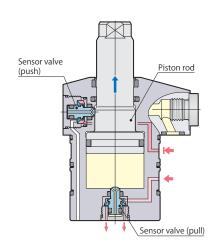
In case of mounting flow control valve model VCF on the G port of the cylinder, air bleeding valve should be installed in the piping to the cylinder. (VCE Mounting details. Refer to $page \rightarrow 218$)

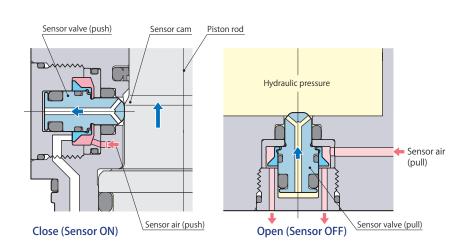
Double

acting

PAL sensor function and structure

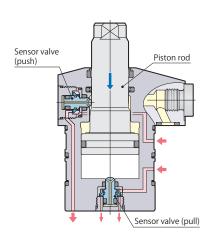
Push end detection

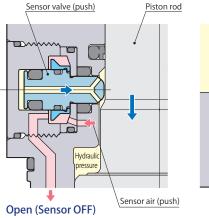


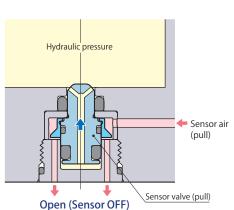


The sensor valve (push) is pushed down by the sensor cam and shuts off the sensor air flow when the piston rod reaches the push end position. The sensor valve (pull) is pushed up by the hydraulic force to open for air exhaust and detects the push end position.

In the middle of stroke





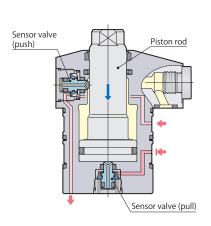


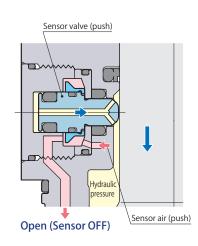
The sensor valve (push) is pushed up by the hydraulic force while piston rod strokes and exhausts the sensor air. The sensor valve (pull) is pushed up by the hydraulic force and exhausts the sensor air.

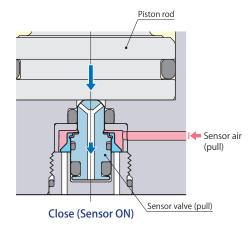
Double acting

PAL sensor function and structure

Pull end detection





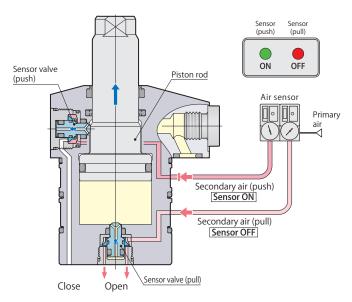


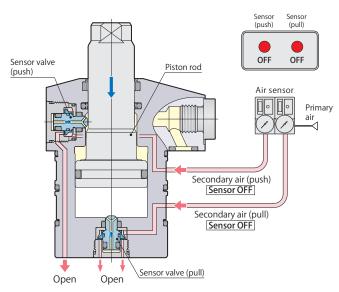
• The sensor valve (pull) is pushed down by the piston rod and shuts off the sensor air flow when the piston rod reaches the pull end position. The sensor valve (push) is pushed up by the hydraulic force to open for air exhaust and detects the pull end position.

Push end, Pull end detection signal

Push end detection

In the middle of stroke





The sensor may not work correctly when the cylinder is not pressurized by hydraulic force because the piston of the clamp moves under such environment. Keep supplying hydraulic force the cylinder all the times.

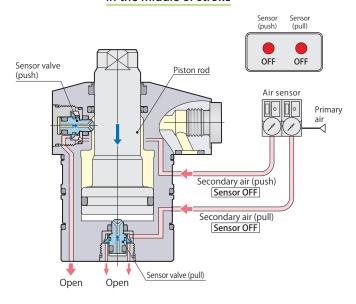
Sensor signal (push)	ON	Push end
Sensor signal (pull)	OFF	rusii eiiu

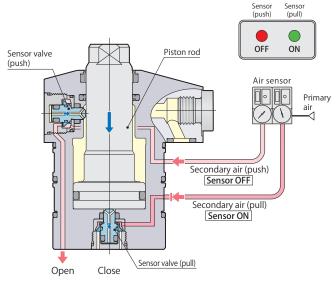
Sensor signal (push) OFF In the middle of stroke Sensor signal (pull) OFF

More than 1.5MPa hydraulic pressure is required to operate the sensor valve. To obtain OFF signal in the middle of the valve stroke, over 1.5MPa of back pressure should be produced by using a meter-out type of flow control valve.

In the middle of stroke

Pull end detection





The sensor may not work correctly when the cylinder is not pressurized by hydraulic force because the piston of the clamp moves under such environment. Keep supplying hydraulic force the cylinder all the times.

Sensor signal (push)	OFF	In the middle of
Sensor signal (pull)	OFF	stroke

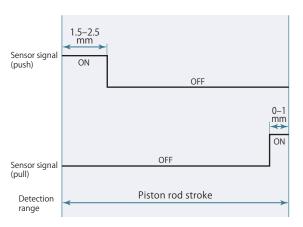
Sensor signal (push)	OFF	Pull end
Sensor signal (pull)	ON	Pullella

More than 1.5MPa hydraulic pressure is required to operate the sensor valve. To obtain OFF signal in the middle of the valve stroke, over 1.5MPa of back pressure should be produced by using a meter-out type of flow control valve.

Double

acting

Air sensor triggering point



CNB - D

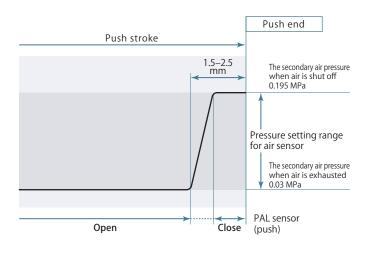
- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

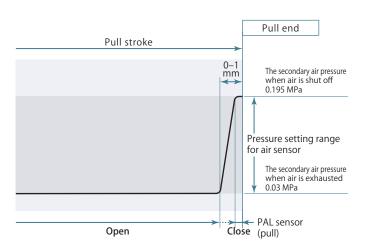
Air sensor unit recommended condition of use

Supplier andmodel	ISA3-F/G series manufactured by SMC
	GPS2-05, GPS3-E series manufactured by CKD
Air supply pressure	0.1–0.2 MPa
Inner diameter of piping	ø4 mm (ISA3-F:ø2.5 mm)
Overall piping length	5 m or less

- $lue{}$ Supply the dry and filtered air. Particulate size 5 μ m or less is recommended.
- Use a solenoid valve with needle for air sensor unit and control it supplying air all the time in order to eliminate intrusion of chips or coolant.
- There is a case that air sensing cannot be successfully made as designed when it is used out of the above usage. Contact Technical service center for more details.

Relation between sensor air pressure, PAL sensor and piston stroke



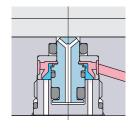


The diagram shown on the left indicates the relation between the PAL sensor, piston stroke, and secondary air pressure. (The pressure shown in the diagram is a reference based on the 0.2 MPa of primary air pressure for one piece of cylinder.)

Since the new PAL sensor works with less air-leakage compared to previous sensor valve,

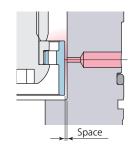
- Enhances the pressure setting range of the sensor which enables the sensor to set easily. (Ex. Pressure setting range 0.03–0.195 MPa in the diagram)
- Allows the use for a number of cylinders by one air sensor because of better pressure holding when air is shut off. (Maximum number of cylinders to be detected by one sensor is 10.)
- Allows to choose less air-consumed, i.e. small orifice diameter type, air sensor.
- Can create large differential-pressure when opening and closing the PAL sensor so that sensor primary pressure can be set as low as possible and reduce the consumption of air.

New PAL sensor



Poppet structure ensures superior sealing performance and can create large differential-pressure when the valve is opening and closing, and air leakage can be minimized.

Previous sensor valve

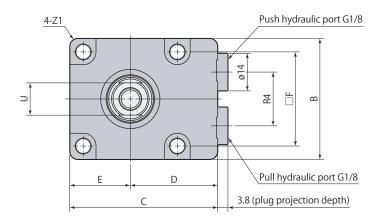


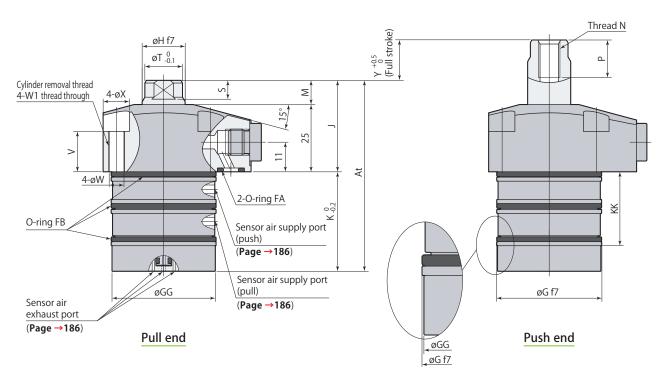
Air leaks easily due to a large space.

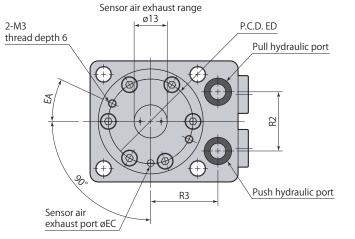
CNB - TD

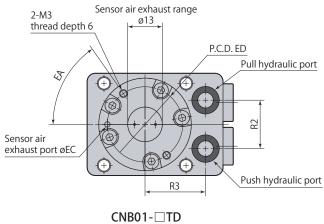
Dimensions

(Female thread rod)









Mounting screws are not included.

Model		CNB01	I-□TD	CNB02	2-□TD	CI	NB04- [□TD
Υ	(stroke)		10, 15,	20, 25, 30, 35, 40,		45, 50		
Cylinder capacity	Push	0.38	3×Y	0.49	Э×Y	0.71×Y		Υ
(cm³)	Pull	0.23	3×Y	0.29	Э×Y		0.45×	Υ
^		Y=10	Y=15-50	Y=10	Y=15-50	Y=10)	Y=15-50
A1	L	70	Y+55	71	Y+56	73.5	73.5 Y+58.5	
В		3	8	4	5		50	
С		5	0.5	5	5		60	
D		2	9	3	2.5		35	
Е		2	1.5	2	2.5		25	
F		3	0.5	3	5		40	
øG		3	5 -0.025 -0.050	3	9 -0.025 -0.050		47	-0.025 -0.050
øG	G	3	4.4	3	8.4		46.4	1
øH		1	4 ^{-0.016} -0.034	1	6 ^{-0.016} -0.034		18	-0.016 -0.034
J		3	3	3	4		35	
K		Y=10	Y=15-50	Y=10	Y=15-50	Y=10)	Y=15-50
K		37	Y+22	37	Y+22	38.5		Y+23.5
Kł	/	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	Y=10, 15	Y=20	Y=25-50
N	`	27.5	32.5	27.5	32.5	29	34	32.5
М			8		9			
N		M6	×1	M8×	(1.25	M8×1.25		25
Р		11		1	14		14	
R2	2	18		22			24	
R3	3	2	2.5	2	5		28	
R4	4	16.2		2	0		22	
S (width across	flats height)	6			7		8	
øT		12		1	4		16	
U (width ac	U (width across flats)		10		2		14	
V	·		17		5		15	
øW	1		4.5	5.5		5.5		5
W	′1	M5>	×0.8	M6×1		M6×1		1
øX			8	9.5			9.5	5
Z1			3		13		R5	
EA		5	5°	2	5°		20°	
øEC		2 2.5		2.5	3.3		3	
	ED		8		1.5		38	
O-ring FA (fluorocarbon hardness Hs90)		Р			7		P7	
O-ring FB (fluorocarb	on hardness Hs70)		8-026		8-028	-	AS568-0	
Flow control	Meter-in	VCF		VCF			VCF01	
valve*	Meter-out		015-0		01-0		VCF01	
Air bleedir	ng valve	VCE	01	VCE	01		VCE01	

 $[\]star$: Select the right model of VCF according to the size of the cylinder.

Refer to each page for the details of options. ● Flow control valve page →216 ● Air bleeding valve page →218

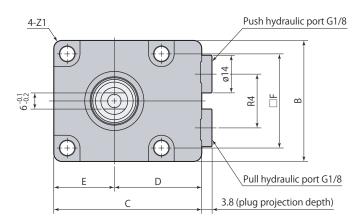
									kg
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□TD	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
CNB02-□TD	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0
CNB04-□TD	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3

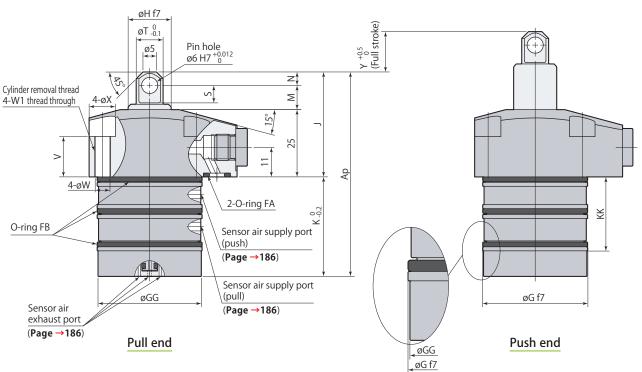
[●] CNB□-□TD (Push, pull sensor model, Female thread rod) stroke 25, 35, 45 mm are made to order.

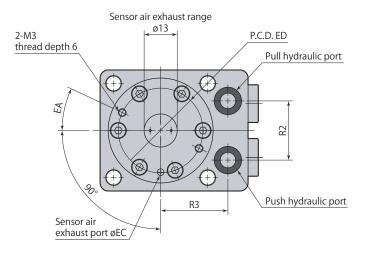
7MPa

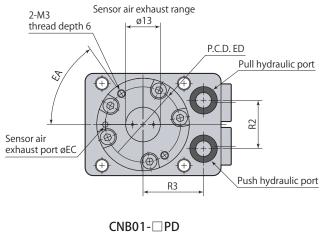
Dimensions

(Pin rod)









- Mounting screws are not included.
- Recommended material for pin:SCM435-H (HB269-331)

Mod	del	CNB01	I-□PD	CNRO	CNB02-□PD			mm CNB04-□PD		
	(stroke)	CITO	10, 15,	20, 25, 30, 35, 40,						
	Push	0.38	3×Y		9×Y	, 13,	0.71×Y			
Cylinder capacity (cm³)	Pull		3×Y		9×Y		0.45×			
	1 4	Y=10	Y=15-50	Y=10	Y=15-50	Y=1		Y=15-50		
А	νp	76	Y+61	76	Y+61	79		Y+64		
В		3	8	4	ļ5		50			
		5	0.5	5	55		60			
С)	2	9	3	32.5		35			
E		2	1.5	2	22.5		25			
F		3	0.5	3	35		40			
øG	1	3	5 ^{-0.025} _{-0.050}	3	39 ^{-0.025} _{-0.050}		47 -0	J.025 D.050		
øG	iG	3	4.4	3	38.4		46.4	+		
øH	1	1	4 ^{-0.016} _{-0.034}	1	6 ^{-0.016} _{-0.034}		18 -0).016 0.034		
J		3	9	3	19		40.5			
		Y=10	Y=15-50	Y=10	Y=15-50	Y=1	0 '	Y=15-50		
K		37	Y+22	37	Y+22	38.5	5	Y+23.5		
V	i.K	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	Y=10, 15	Y=20	Y=25-50		
IX.	IN	27.5	32.5	27.5	32.5	29	34	32.5		
	Λ		9		9		9.5	!		
N	I		5		5		6			
R	2	1	8	2	22		24			
R	3	2	2.5	2	25		28			
R	4	1	6.2	2	20		22			
S			6.5		6.5		7			
øΤ		1	0	1	0		12			
V	1	1	7		5		15			
øV	V		4.5		5.5		5.5			
V	V1	M5 >	< 0.8	M6	5×1		M6×1	l		
øX			8	_	9.5		9.5			
Z		R			3		R5			
	A		5°		25°	20°				
øE			2		2.5	3.3				
	D	2			31.5		38			
O-ring FA (fluorocar		P			27		P7	20		
O-ring FB (fluorocarl		AS56			8-028	1	AS568-0	130		
Flow control valve*	Meter-in	VCF		VCF			VCF01	0		
	Meter-out		015-0		01-0		VCF01	-0		
Air bleedi	ing vaive	VCE	UΙ	VCE	:UI	1	VCE01			

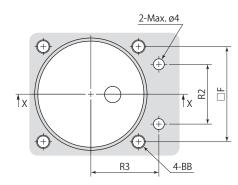
^{*:} Select the right model of VCF according to the size of the cylinder.

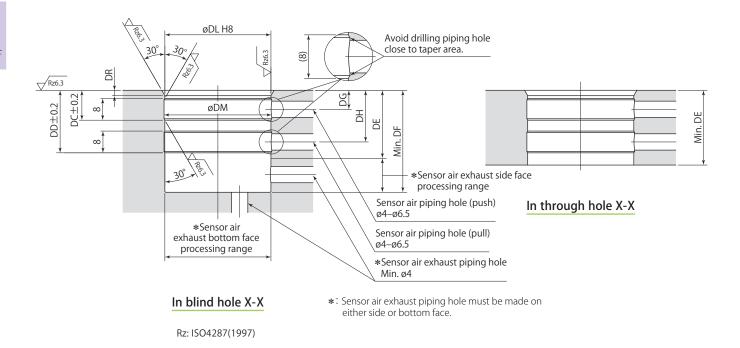
Refer to each page for the details of options. ● Flow control valve page →216 ● Air bleeding valve page →218

									kg
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□PD	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
CNB02-□PD	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0
CNB04-□PD	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3

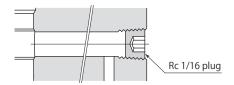
[●] CNB□-□PD (Push, pull sensor model, Pin rod) are made to order.

Mounting details





- Apply an appropriate amount of grease to the chamfer and the bore when mounting. Excessive grease may be a blockage in the air passage, causing malfunction of the sensor.
- The 30° taper machining must be provided to avoid the damage of the O-ring. Ensure that there are no interference on taper area when drilling the hole for sensor air.
- The sensor air piping hole can be used for a pilot hole of Rc 1/16 plug.



CNB - D

									mm	
Model	CNB01-□TD CNB01-□PD									
Stroke	10	15	20	25	30	35	40	45	50	
DC	11	11	16	16	16	16	16	16	16	
DD	23	23	28	28	28	28	28	28	28	
DE	27.5	27.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
DF	37.5	37.5	42.5	47.5	52.5	57.5	62.5	67.5	72.5	
DG	7	7	12	12	12	12	12	12	12	
DH	19	19	24	24	24	24	24	24	24	
øDL					35 +0.039					
øDM					35.6					
DR	2	2	1	1	1	1	1	1	1	
ВВ					M4					
F					30.5					
R2	18									
R3					22.5					

CNB02-□TD CNB02-□PD										
10	15	20	25	30	35	40	45	50		
11	11	16	16	16	16	16	16	16		
23	23	28	28	28	28	28	28	28		
27.5	27.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5		
37.5	37.5	42.5	47.5	52.5	57.5	62.5	67.5	72.5		
7	7	12	12	12	12	12	12	12		
19	19	24	24	24	24	24	24	24		
				39 +0.039						
				39.6						
2	2	1	1	1	1	1	1	1		
				M5						
				35						
				22						
				25						
	11 23 27.5 37.5 7 19	11 11 23 23 27.5 27.5 37.5 37.5 7 7 19 19	10 15 20 11 11 16 23 23 28 27.5 27.5 32.5 37.5 37.5 42.5 7 7 12 19 19 24	10 15 20 25 11 11 16 16 23 23 28 28 27.5 27.5 32.5 32.5 37.5 37.5 42.5 47.5 7 7 12 12 19 19 24 24	10 15 20 25 30 11 11 16 16 16 23 23 28 28 28 27.5 27.5 32.5 32.5 32.5 37.5 42.5 47.5 52.5 7 7 12 12 12 19 19 24 24 24 39 % 039 39.6 2 2 1 1 1 M5 35 22	10 15 20 25 30 35 11 11 16 16 16 16 23 23 28 28 28 28 27.5 27.5 32.5 32.5 32.5 32.5 37.5 42.5 47.5 52.5 57.5 7 7 12 12 12 12 19 19 24 24 24 24 39 **0**********************************	10 15 20 25 30 35 40 11 11 16 16 16 16 16 16 16 16 28 25 52.5 57.5 62.5 57.5 62.5 12 12 12 12 12 12	10 15 20 25 30 35 40 45 11 11 16 16 16 16 16 16 23 23 28 28 28 28 28 28 27.5 27.5 32.5 32.5 32.5 32.5 32.5 32.5 32.5 32.5 32.5 32.5 67.5 67.5 67.5 67.5 67.5 67.5 67.5 7 7 12 24		

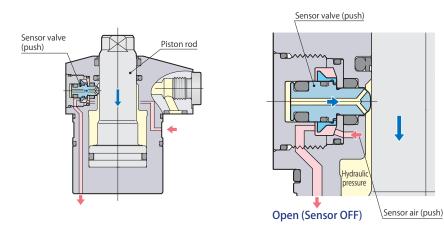
									mm
Model			(CNB04-□1	D CN	IB04-□PC)		
Stroke	10	15	20	25	30	35	40	45	50
DC	11	11	16	16	16	16	16	16	16
DD	23	23	28	28	28	28	28	28	28
DE	27.5	27.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
DF	39	39	44	49	54	59	64	69	74
DG	7	7	12	12	12	12	12	12	12
DH	19	19	24	24	24	24	24	24	24
øDL					47 +0.039				
øDM					47.6				
DR	2	2	1	1	1	1	1	1	1
ВВ					M5				
F	40								
R2	24								
R3					28				

Double

acting

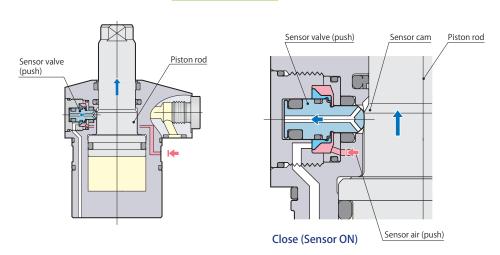
Push PAL sensor function and structure

In the middle of stroke



• The sensor valve (push) is pushed up by the hydraulic force and exhausts the sensor air while piston rod strokes.

Push end detection

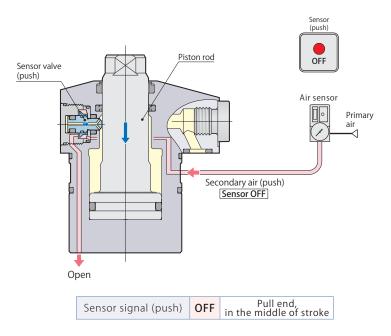


● The sensor valve (push) is pushed down by the sensor cam and shuts off the sensor air flow when the piston rod reaches the push end position, and detects the push end position.

CNB - U

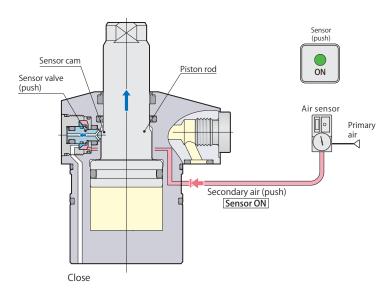
Push end detection signal

In the middle of stroke



More than 1.5MPa hydraulic pressure is required to operate the sensor valve. To obtain OFF signal in the middle of the valve stroke, over 1.5MPa of back pressure should be produced by using a meter-out type of flow control valve.

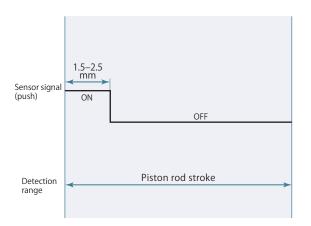
Push end detection



The sensor may not work correctly when the cylinder is not pressurized by hydraulic force because the piston of the clamp moves under such environment. Keep supplying hydraulic force the cylinder all the times.



Air sensor triggering point



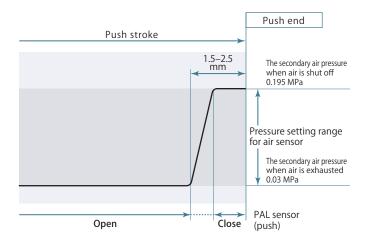
- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

Air sensor unit recommended condition of use

Supplier and model	ISA3-F/G series manufactured by SMC
	GPS2-05, GPS3-E series manufactured by CKD
Air supply pressure	0.1–0.2 MPa
Inner diameter of piping	ø4 mm (ISA3-F:ø2.5 mm)
Overall piping length	5 m or less

- $lue{}$ Supply the dry and filtered air. Particulate size 5 μ m or less is recommended.
- Use a solenoid valve with needle for air sensor unit and control it supplying air all the time in order to eliminate intrusion of chips or coolant.
- There is a case that air sensing cannot be successfully made as designed when it is used out of the above usage. Contact Technical service center for more details.

Relation between sensor air pressure, PAL sensor and piston stroke

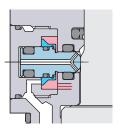


The diagram shown above indicates the relation between the PAL sensor, piston stroke, and secondary air pressure. (The pressure shown in the diagram is a reference based on the 0.2 MPa of primary air pressure for one piece of cylinder.)

Since the new PAL sensor works with less air-leakage compared to previous sensor valve,

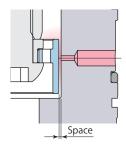
- Enhances the pressure setting range of the sensor which enables the sensor to set easily. (Ex. Pressure setting range 0.03-0.195 MPa in the diagram)
- Allows the use for a number of cylinders by one air sensor because of better pressure holding when air is shut off. (Maximum number of cylinders to be detected by one sensor is 10.)
- Allows to choose less air-consumed, i.e. small orifice diameter type, air sensor.
- Can create large differential-pressure when opening and closing the PAL sensor so that sensor primary pressure can be set as low as possible and reduce the consumption of air.

New PAL sensor



Poppet structure ensures superior sealing performance and can create large differential-pressure when the valve is opening and closing, and air leakage can be minimized.

Previous sensor valve

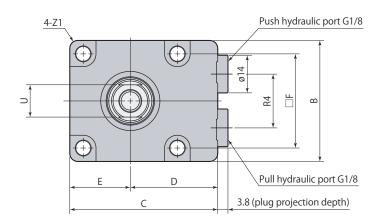


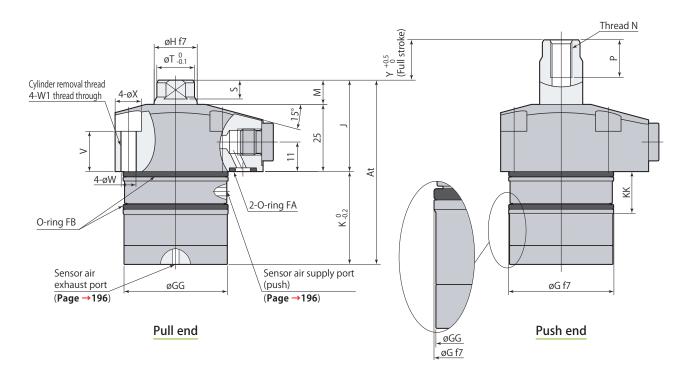
Air leaks easily due to a large space.

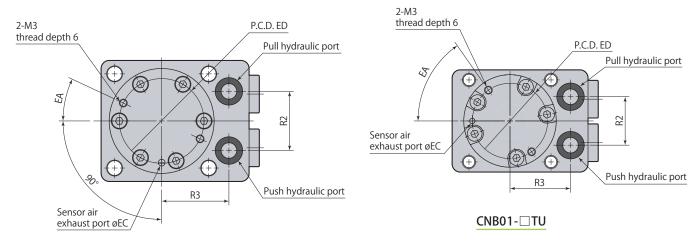
CNB - TU

Dimensions

(Female thread rod)







Mounting screws are not included.

Mod	dal	CNB01		CNB02		CNB04	mm
		CIVIDO					F- 🗆 1 U
	(stroke)	0.38	10, 15,	20, 25, 3	· · ·	45, 50 0.71	∨ V
Cylinder capacity (cm³)	Pull	0.23		0.49		0.71	
A		Y+5					
В				Y+53.5 45		Y+57.5 50	
		38 50.5		5		6	
		2			2.5	3	
E			1.5		2.5	2	
F			0.5	3		4	
øG			5 -0.025 -0.050		9 ^{-0.025} _{-0.050}		7 ^{-0.025} _{-0.050}
øG			4.4		8.4		6.4
øH			4 -0.016		6 -0.016 -0.034		8 -0.016 -0.034
J		3.		3		3	
K		Y+1	8.5	Y+1	9.5	Y+2	22.5
		Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50
K	K	15.5	20.5	15.5	20.5	15.5	20.5
N	1	8			9	1	0
N	I	M6×1		M8×	1.25	M8×	1.25
Р		1	1	1-	4	1	4
R	2	1	8	2	2	2	4
R	3	22.5		25		2	8
R	4	16.2		20		22	
S (width acros	s flats height)		б	7		8	
øT		1.	2	14		16	
U (width ac	cross flats)	1	0	12		1	4
V		1	7	1.	5	1	5
øV	V	•	4.5		5.5		5.5
V	V1	M5 >	<0.8	M6	×1	M6	×1
øX			8		9.5		9.5
Z	1	R	3	R	3	R	5
E	A	5	5°	2	5°	2	0°
øE	С		2		2.5		3.3
E	D	2	8	3	1.5	3	8
O-ring FA (fluorocarl	bon hardness Hs90)	Р	7	Р	7	Р	7
O-ring FB (fluorocarl	oon hardness Hs70)	AS568	3-026	AS56	3-028	AS56	8-030
Flow control	Meter-in	VCF	01 <mark>S</mark>	VCF	01	VCF01	
valve*	Meter-out	VCF	01 <mark>S</mark> -O	VCF	01-0	VCF01-O	
Air bleedi	ng valve	VCE	01	VCE	01	VCE	01

^{*:} Select the right model of VCF according to the size of the cylinder.

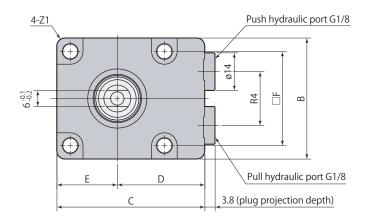
Refer to each page for the details of options. ● Flow control valve page →216 ● Air bleeding valve page →218

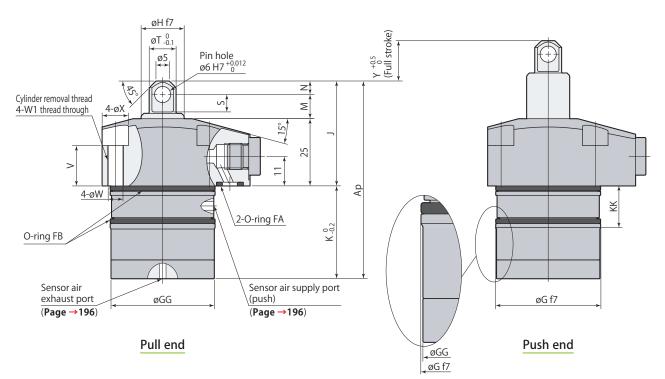
									kg
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□TU	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7
CNB02-□TU	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
CNB04-□TU	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3

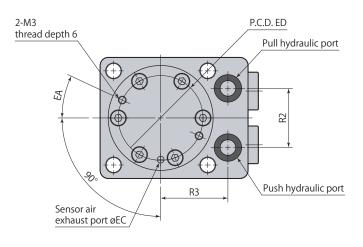
[●] CNB□-□TU (Push sensor model, Female thread rod) stroke 25, 35, 45 mm are made to order.

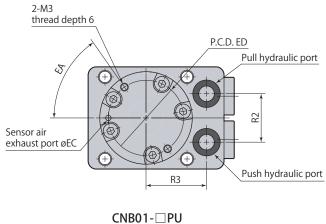
Dimensions

(Pin rod)









- Mounting screws are not included.
- Recommended material for pin:SCM435-H (HB269-331)

Mod	del	CNB01	l-□PU	CNBO	2-□PU	CNB04	
	(stroke)		10, 15,		30, 35, 40,		
Cylinder capacity	Push	0.38			9×Y		I × Y
(cm³)	Pull	0.23	З×Y	0.2	9×Y	0.45	5×Y
A	p	Y+5	57.5	Y+58.5		Y+63	
В		3	8		45	5	0
C		5	0.5		55	6	0
D)	2	9		32.5	3	5
E		2	1.5		22.5	2	5
F		3	0.5		35	4	0
øG		3	5 -0.025 -0.050		39 ^{-0.025} -0.050	4	7 -0.025
øG	iG	3	4.4		38.4	4	6.4
øH	l	1-	4 -0.016 -0.034		16 ^{-0.016} _{-0.034}	1	8 -0.016 -0.034
J		3	9		39	4	0.5
K		Y+1	8.5	Y+19.5		Y+22.5	
L/	K	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50
, ,	.N	15.5	20.5	15.5	20.5	15.5	20.5
N	1		9		9		9.5
N	I		5		5		6
R	2	1	8		22	2	4
R	3	22.5			25	2	8
R	4	1	6.2	20		22	
S			6.5	6.5		7	
øΤ		1	0	10		12	
V		1	7		15	1	5
øW	V		4.5		5.5		5.5
V	V1	M5>	< 0.8	M	5×1	M6	×1
øΧ			8		9.5		9.5
Z	1	R	3		R3	R	5
E	A	5	5°		25°	2	0°
øE	С	2			2.5		3.3
E	D	2	8		31.5	3	8
O-ring FA (fluorocark	bon hardness Hs90)	Р	7		P7	Р	7
O-ring FB (fluorocark	oon hardness Hs70)	AS56			58-028		8-030
Flow control	Meter-in	VCF	01 <mark>S</mark>	VC	F01	VCF01	
valve*	Meter-out	VCF	01 <mark>S</mark> -O	VC	F01-O	VCF	01-0
Air bleedi	ng valve	VCE	01	VC	E01	VCE01	

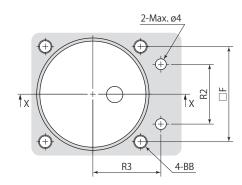
 $[\]star$: Select the right model of VCF according to the size of the cylinder.

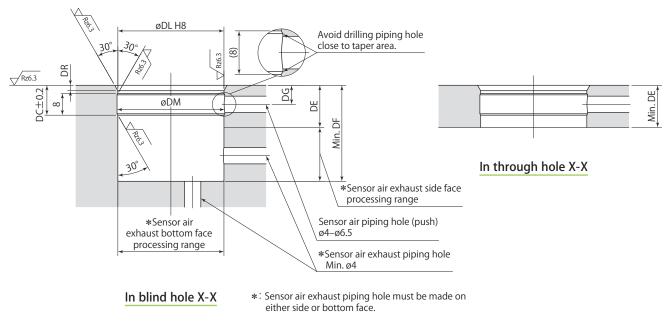
Refer to each page for the details of options. ● Flow control valve page →216 ● Air bleeding valve page →218

									kg
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□PU	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7
CNB02-□PU	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
CNB04-□PU	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3

[●] CNB□-□PU (Push sensor model, Pin rod) are made to order.

Mounting details

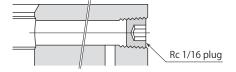




- Rz: ISO4287(1997)
- Apply an appropriate amount of grease to the chamfer and the bore when mounting. Excessive grease may be a blockage in the air passage, causing malfunction of
- The 30° taper machining must be provided to avoid the damage of the O-ring. Ensure that there are no interference on taper area when drilling the hole for sensor air.

the sensor.

• The sensor air piping hole can be used for a pilot hole of Rc 1/16 plug.



45

16

64

12

1

10

11

29

2

15.5

15

11

15.5

34

7

2

20

16

39

12

1

20.5

30

16

49

12

35 +0.039

35.6

1

M4

30.5

18

22.5

20.5

CNB01-□PU

35

16

54

12

20.5

40

16

59

12

1

20.5

CNB01-□TU

25

16

44

12

1

20.5

Model

Stroke DC

DE

DF

DG

øDL øDM

DR

ВВ

F

R2

R3

mm

Sensing Work lift cylinder
CNB-U Push sensor model

									mm		
Model		CNB02-□TU CNB02-□PU									
Stroke	10	15	20	25	30	35	40	45	50		
DC	11	11	16	16	16	16	16	16	16		
DE	15.5	15.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5		
DF	30	35	40	45	50	55	60	65	70		
DG	7	7	12	12	12	12	12	12	12		
øDL					39 +0.039						
øDM					39.6						
DR	2	2	1	1	1	1	1	1	1		
ВВ					M5						
F	35										
R2	22										
R3					25						

mm

Model	CNB04-□TU CNB04-□PU									
Stroke	10	15	20	25	30	35	40	45	50	
DC	11	11	16	16	16	16	16	16	16	
DE	15.5	15.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
DF	33	38	43	48	53	58	63	68	73	
DG	7	7	12	12	12	12	12	12	12	
øDL		47 ^{+0,039}								
øDM					47.6					
DR	2	2	1	1	1	1	1	1	1	
ВВ					M5					
F					40					
R2		24								
R3					28					

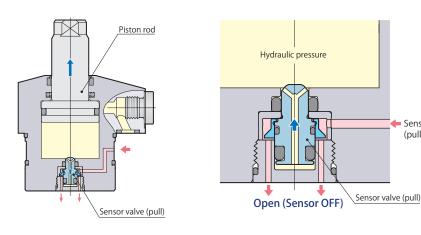
Sensor air (pull)

Double

acting

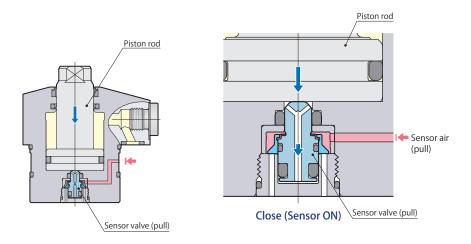
Pull PAL sensor function and structure

In the middle of stroke



● The sensor valve (pull) is pushed up by the hydraulic force and exhausts the sensor air while piston rod strokes.

Pull end detection

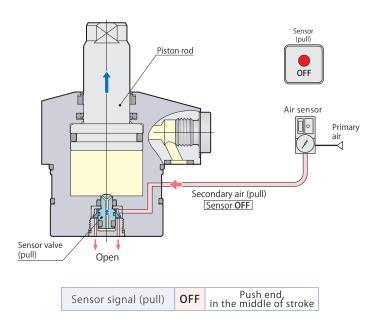


• The sensor valve (pull) is pushed down by the piston rod and shuts off the sensor air flow when the piston rod reaches the pull end position, and detects the pull end position.

CNB - B

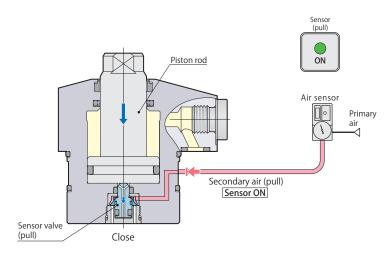
Pull end detection signal

In the middle of stroke

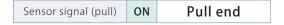


More than 1.5MPa hydraulic pressure is required to operate the sensor valve. To obtain OFF signal in the middle of the valve stroke, over 1.5MPa of back pressure should be produced by using a meter-out type of flow control valve.

Pull end detection



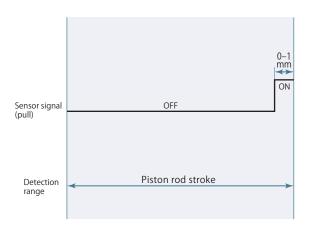
The sensor may not work correctly when the cylinder is not pressurized by hydraulic force because the piston of the clamp moves under such environment. Keep supplying hydraulic force the cylinder all the times.



Double

acting

Air sensor triggering point



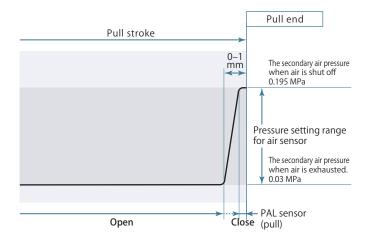
- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

Air sensor unit recommended condition of use

Supplier and model	ISA3-F/G series manufactured by SMC
	GPS2-05, GPS3-E series manufactured by CKD
Air supply pressure	0.1–0.2 MPa
Inner diameter of piping	ø4 mm (ISA3-F:ø2.5 mm)
Overall piping length	5 m or less

- $lue{}$ Supply the dry and filtered air. Particulate size 5 μ m or less is recommended.
- Use a solenoid valve with needle for air sensor unit and control it supplying air all the time in order to eliminate intrusion of chips or coolant.
- There is a case that air sensing cannot be successfully made as designed when it is used out of the above usage. Contact Technical service center for more details.

Relation between sensor air pressure, PAL sensor and piston stroke

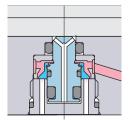


The diagram shown above indicates the relation between the PAL sensor, piston stroke, and secondary air pressure. (The pressure shown in the diagram is a reference based on the 0.2 MPa of primary air pressure for one piece of cylinder.)

Since the new PAL sensor works with less air-leakage compared to previous sensor valve,

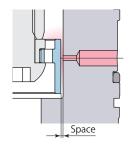
- Enhances the pressure setting range of the sensor which enables the sensor to set easily. (Ex. Pressure setting range 0.03-0.195 MPa in the diagram)
- Allows the use for a number of cylinders by one air sensor because of better pressure holding when air is shut off. (Maximum number of cylinders to be detected by one sensor is 10.)
- Allows to choose less air-consumed, i.e. small orifice diameter type, air sensor.
- Can create large differential-pressure when opening and closing the PAL sensor so that sensor primary pressure can be set as low as possible and reduce the consumption of air.

New PAL sensor



Poppet structure ensures superior sealing performance and can create large differential-pressure when the valve is opening and closing, and air leakage can be minimized.

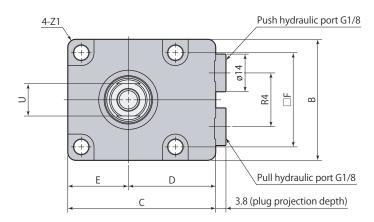
Previous sensor valve

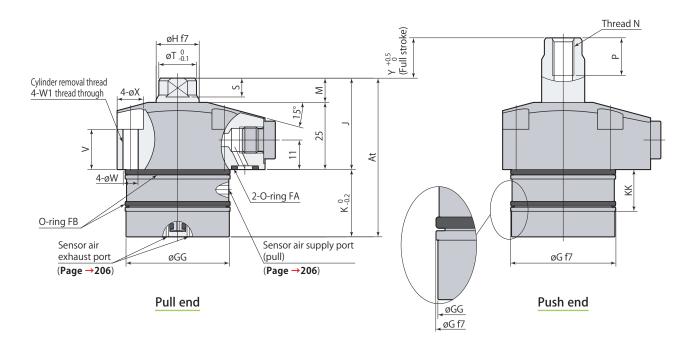


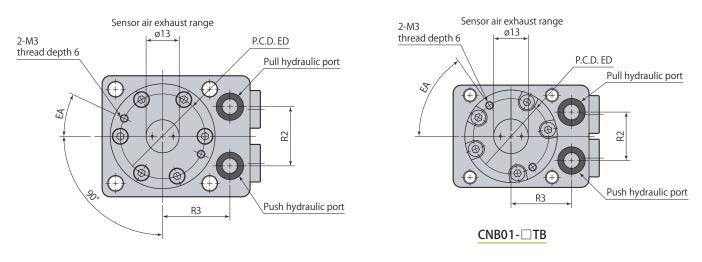
Air leaks easily due to a large space.

Dimensions

(Female thread rod)







Mounting screws are not included.

Work lit	pale thre
Sensing	FP
	_

							mm		
Мо	del	CNB0	1-□TB	CNB0	2-□TB	CNB04	CNB04-□TB		
Y	′ (stroke)		10, 15,	20, 25, 3	30, 35, 40,	45, 50			
Cylinder capacity	Push	0.38	3×Y	0.49×Y		0.71	×Y		
(cm³)	Pull	0.23	3×Y	0.29×Y		0.45	Σ×Υ		
Δ	Λt	Y=10	Y=15-50	Y=10	Y=15-50	Y=10	Y=15-50		
,		58 Y+43		59 Y+44		61.5	Y+46.5		
В	3	3	8	4	15	5	0		
	-	4	8	5	55	6	0		
[)	2	9	3	32.5	3	5		
E		1	9	2	22.5	2.	5		
F			0.5		35	4			
ØG		3	5 -0.025 -0.050	3	39 ^{-0.025} -0.050	4	7 -0.025 -0.050		
ØG	GG .		4.4		38.4		6.4		
øH	1	1	4 -0.016	1	16 -0.016	1	8 -0.016 -0.034		
J		3	I	3	34	3.	5		
K		Y=10	Y=15-50	Y=10	Y=15-50	Y=10	Y=15-50		
	-	25	Y+10	25	Y+10	26.5	Y+11.5		
K	(K	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50		
		15.5	20.5	15.5	20.5	15.5	20.5		
Λ	Λ		8		9	1	-		
N		M6×1			×1.25	M8×			
Р		1			14	1.			
	R2	1			22	2.			
	R3		2.5		25	2			
	2		6.2	2	20	2.			
S (width acros			6		7		8		
øT		1			14	1			
U (width a		1			12	1.			
V		1			15	1.			
ØV			4.5	NA (5.5		5.5		
	V1		× 0.8	IVIC	5×1	M6			
	øX		8		9.5		9.5		
	Z1 EA		3 5°		R3	R			
			5°		25°	20°			
	ban barda ass Us00)	2	7		31.5 P7	38 P7			
O-ring FA (fluorocarbon hardness Hs90) O-ring FB (fluorocarbon hardness Hs70)									
			8-026		58-028	AS568			
Flow control valve*	Meter-in	VCF		VCF	-01 -01-0	VCF01 VCF01-O			
	Meter-out		015-0						
Air bleed	ing valve	VCE	UI	VCE	-U I	VCE	UI		

^{*:} Select the right model of VCF according to the size of the cylinder.

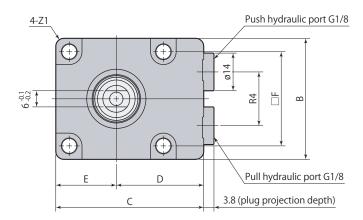
Refer to each page for the details of options. ● Flow control valve page →216 ● Air bleeding valve page →218

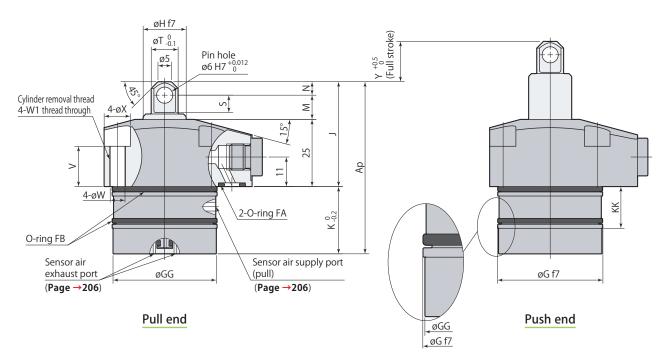
									kg
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□TB	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
CNB02-□TB	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
CNB04-□TB	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1

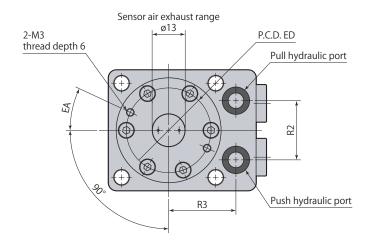
[●] CNB□-□TB (Pull sensor model, Female thread rod) stroke 25, 35, 45 mm are made to order.

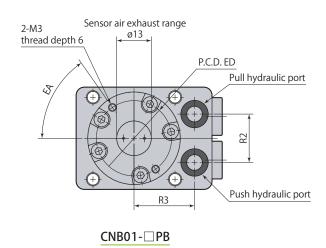
Dimensions

(Pin rod)









- Mounting screws are not included.
- Recommended material for pin:SCM435-H (HB269-331)

Double acting

							mm	
Мо	del	CNB01	I-□PB	CNB02	2-□PB	CNB04-□PB		
Y	(stroke)		10, 15,	20, 25, 3	0, 35, 40,	45, 50		
Cylinder capacity	Push	0.38	3×Y	0.49	Э×Y	0.71	×Y	
(cm³)	Pull	0.23	3×Y	0.29	Э×Y	0.45×Y		
А	ιp	Y=10	Y=15-50	Y=10	Y=15-50	Y=10	Y=15-50	
	. P	64	Y+49	64	Y+49	67	Y+52	
В		3	8	4	5	5	0	
		4	8	5	5	6	0	
)	2	9	3	2.5	3	5	
E		1	9	2	2.5	2	5	
F		3	0.5	3	5	4	0	
øG	1	3	5 ^{-0.025} _{-0.050}	3	9 -0.025 -0.050	4	7 ^{-0.025} -0.050	
øG	iG	3	4.4	3	8.4	4	6.4	
øF	l	1	4 -0.016 -0.034	1	6 ^{-0.016} -0.034	1	8 -0.016 -0.034	
J		3	9	3	9	4	0.5	
K		Y=10	Y=15-50	Y=10	Y=15-50	Y=10	Y=15-50	
	•	25	Y+10	25	Y+10	26.5	Y+11.5	
V	i.K	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	Y=10, 15	Y=20-50	
IX.	IN	15.5	20.5	15.5	20.5	15.5	20.5	
	1		9		9		9.5	
٨	I		5		5		6	
R	2	1	8	2	2	2	4	
R	3	2	2.5	2	5	2	8	
R	4	1	6.2	2	0	2	2	
S			6.5		6.5		7	
øΤ		1	0	1	0	1	2	
V	,	1	7	1	5	1	5	
øV	V		4.5		5.5		5.5	
V	V1	M5 >	<0.8	M6	×1	M6	×1	
øX			8		9.5		9.5	
Z	[1	R	3	R	3	R5		
E	A	5	5°	2	5°	20°		
E	D	2	8	3	1.5	38		
O-ring FA (fluorocar	bon hardness Hs90)	Р	7	Р	7	P7		
O-ring FB (fluorocarbon hardness Hs70)		AS56	8-026	AS56	8-028	AS568-030		
Flow control	Meter-in	VCF	01 S	VCF	01	VCF01		
valve*	Meter-out	VCF	01 <mark>S</mark> -O	VCF	01-O	VCF01-O		
Air bleedi	ing valve	VCE	01	VCE	01	VCE	01	

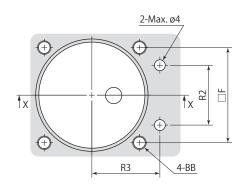
^{*:} Select the right model of VCF according to the size of the cylinder.

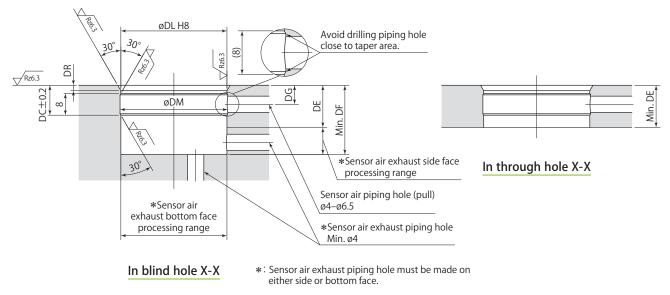
Refer to each page for the details of options. \bullet Flow control valve **page** \rightarrow **216** \bullet Air bleeding valve **page** \rightarrow **218**

									kg
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□PB	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
CNB02-□PB	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
CNB04-□PB	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1

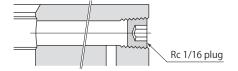
[●] CNB□-□PB (Pull sensor model, Pin rod) are made to order.

Mounting details





- Rz: ISO4287(1997)
- Apply an appropriate amount of grease to the chamfer and the bore when mounting. Excessive grease may be a blockage in the air passage, causing malfunction of the sensor.
- The 30° taper machining must be provided to avoid the damage of the O-ring. Ensure that there are no interference on taper area when drilling the hole for sensor air.
- The sensor air piping hole can be used for a pilot hole of Rc 1/16 plug.



									mm	
Model	CNB01-□TB CNB01-□PB									
Stroke	10	15	20	25	30	35	40	45	50	
DC	11	11	16	16	16	16	16	16	16	
DE	15.5	15.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
DF	25.5	25.5	30.5	35.5	40.5	45.5	50.5	55.5	60.5	
DG	7	7	12	12	12	12	12	12	12	
øDL					35 ^{+0.039}					
øDM					35.6					
DR	2	2	1	1	1	1	1	1	1	
ВВ					M4					
F					30.5					
R2	18									
R3					22.5					

mm

Model	CNB02-□TB CNB02-□PB								
Stroke	10	15	20	25	30	35	40	45	50
DC	11	11	16	16	16	16	16	16	16
DE	15.5	15.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
DF	25.5	25.5	30.5	35.5	40.5	45.5	50.5	55.5	60.5
DG	7	7	12	12	12	12	12	12	12
øDL					39 +0.039 0				
øDM					39.6				
DR	2	2	1	1	1	1	1	1	1
ВВ					M5				
F					35				
R2	22								
R3					25				

mm

Model		CNB04-□TB CNB04-□PB									
Stroke	10	15	20	25	30	35	40	45	50		
DC	11	11	16	16	16	16	16	16	16		
DE	15.5	15.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5		
DF	27	27	32	37	42	47	52	57	62		
DG	7	7	12	12	12	12	12	12	12		
øDL		47 +0.039									
øDM					47.6						
DR	2	2	1	1	1	1	1	1	1		
ВВ					M5						
F					40						
R2		24									
R3					28						

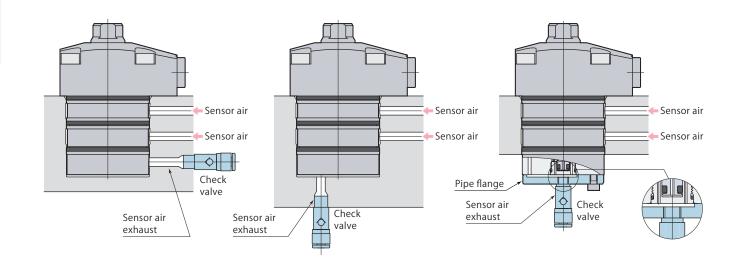
Caution for piping

Refer to the diagram shown below for the sensor air exhaust port.

Mounting in blind hole (Sensor air exhaust: side face)

CNB - U

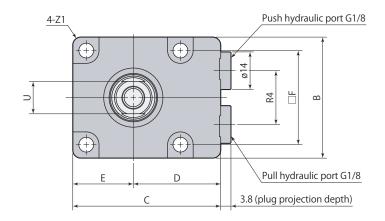
Mounting in blind hole (Sensor air exhaust: bottom face) Mounting in through hole

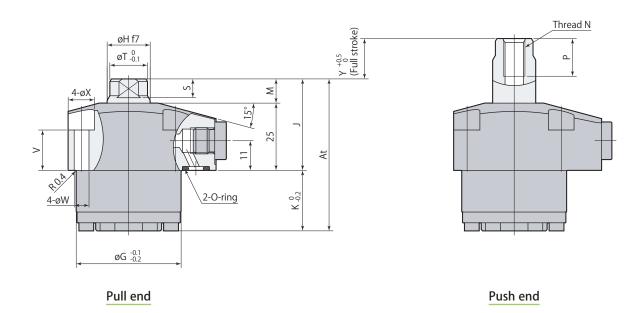


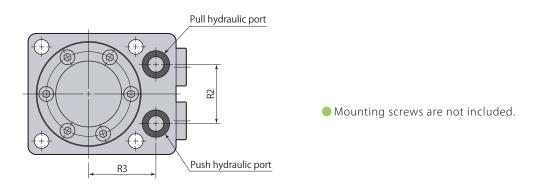
- Use a check valve with cracking pressure of 0.005 MPa or less if there is a risk of metal chips or coolant intrusion. Recommended check valve: AKH or AKB series manufactured by SMC.
- Furnish the piping by means of the pipe flange when mounting in a through hole. The flange is mountable with M3 threads at the bottom of the cylinder. Be sure to provide an opening not to cover the exhaust port. See the sketch shown above.

Dimensions

(Female thread rod)







				mm		
Mod	del	CNB01-□TN	CNB02-□TN	CNB04-□TN		
Y	(stroke)	10, 15,	20, 25, 30, 35, 40,	45, 50		
Cylinder capacity	Push	0.38×Y	0.49×Y	0.71×Y		
(cm³)	Pull	0.23×Y	0.29×Y	0.45×Y		
A	t	Y+39.5	Y+41.5	Y+45.5		
В		38	45	50		
С		48	55	60		
D		29	32.5	35		
E		19	22.5	25		
F		30.5	35	40		
øG		35	39	47		
øH		14 -0.016	16 -0.016	18 -0.016		
J		33	34	35		
K		Y+6.5	Y+7.5	Y+10.5		
M		8	9	10		
N		M6×1	M8×1.25	M8×1.25		
Р		11	14	14		
R2	2	18	22	24		
R:	3	22.5	25	28		
R4	4	16.2	20	22		
S (width across	flats height)	6	7	8		
øT		12	14	16		
U (width ac	ross flats)	10	12	14		
V		17	15	15		
øW	1	4.5	5.5	5.5		
øX		8	9.5	9.5		
Z	1	R3	R3	R5		
O-ring (fluorocarbo	n hardness Hs90)	P7	P7	P7		
Flow control	Meter-in	VCF01 <mark>S</mark>	VCF01	VCF01		
valve*	Meter-out	VCF01 <mark>S</mark> -O	VCF01-O	VCF01-O		
Air bleedi	ng valve	VCE01	VCE01	VCE01		

 $[\]star$: Select the right model of VCF according to the size of the cylinder.

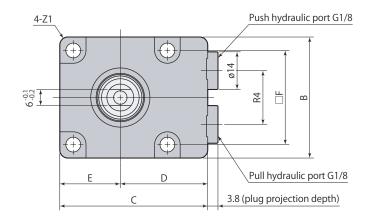
Refer to each page for the details of options. ● Flow control valve page →216 ● Air bleeding valve page →218

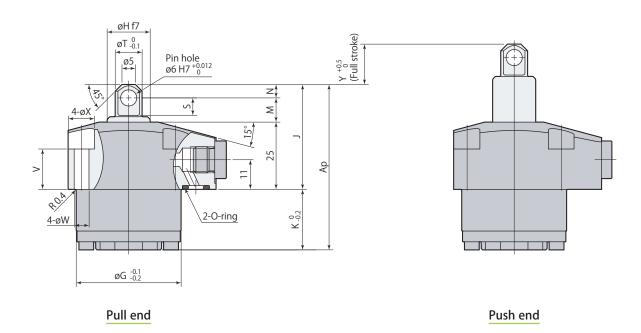
									кд
Stroke	10	15	20	25	30	35	40	45	50
CNB01-□TN	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6
CNB02-□TN	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8
CNB04-□TN	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1

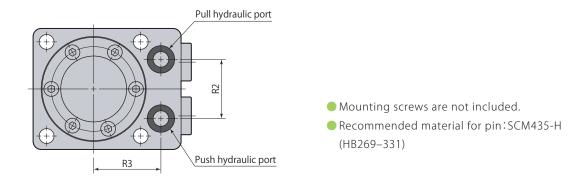
[●] CNB□-□TN (Compact model, Female thread rod) stroke 25, 35, 45 mm are made to order.

Dimensions

(Pin rod)







				mm		
Model		CNB01-□PN	CNB02-□PN	CNB04-□PN		
Y (stroke)		10, 15,	20, 25, 30, 35, 40,	45, 50		
Cylinder capacity	Push	0.38×Y	0.49×Y	0.71×Y		
(cm³)	Pull	0.23×Y	0.29×Y	0.45×Y		
A	р	Y+45.5	Y+46.5	Y+51		
В		38	45	50		
C		48	55	60		
D	1	29	32.5	35		
E		19	22.5	25		
F		30.5	35	40		
øG		35	39	47		
øH		14 -0.016	16 -0.016	18 -0.016		
J		39	39	40.5		
K		Y+6.5	Y+7.5	Y+10.5		
М		9	9	9.5		
N		5	5	6		
R	2	18	22	24		
R	3	22.5	25	28		
R	4	16.2	20	22		
S		6.5	6.5	7		
øΤ		10	10	12		
V		17	15	15		
øW		4.5	5.5	5.5		
øX		8	9.5	9.5		
Z1		R3	R3	R5		
O-ring (fluorocarbon hardness Hs90)		P7	P7	P7		
Flow control	Meter-in	VCF01S	VCF01	VCF01		
valve*	Meter-out	VCF01S-O	VCF01-O	VCF01-O		
Air bleeding valve		VCE01	VCE01	VCE01		

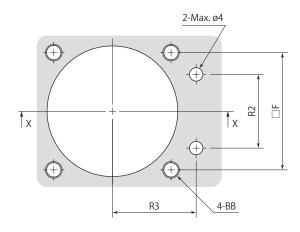
 $[\]star$: Select the right model of VCF according to the size of the cylinder.

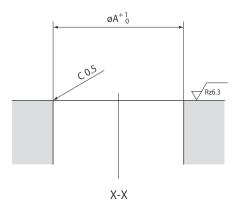
Refer to each page for the details of options. \bullet Flow control valve **page** \rightarrow **216** \bullet Air bleeding valve **page** \rightarrow **218**

Stroke	10	15	20	25	30	35	40	45	50
CNB01-□PN	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6
CNB02-□PN	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8
CNB04-□PN	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1

[●] CNB□-□PN (Compact model, Pin rod) are made to order.

Mounting details





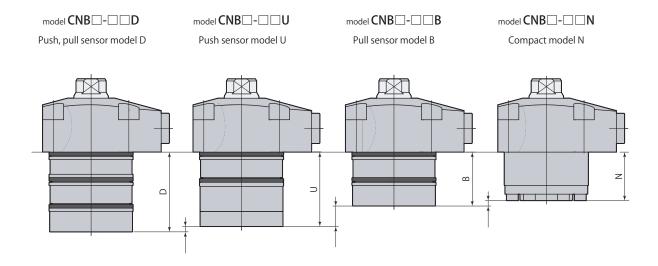
Rz: ISO4287(1997)

mm

NA I	CNB01-□TN	CNB02-□TN	CNB04-□TN	
Model	CNB01-□PN	CNB02-□PN	CNB04-□PN	
øA	35	39	47	
F	30.5	35	40	
R2	18	22	24	
R3	22.5	25	28	
ВВ	M4	M5	M5	

CNB - U

Comparison dimensional



					<u> </u>	
Model	CNB01-□		CNB02-□		CNB04-□	
Y (stroke)		10, 15,	20, 25, 3	0, 35, 40,	45, 50	
_	Y=10	Y=15-50	Y=10	Y=15-50	Y=10	Y=15-50
D	37	Y+22	37	Y+22	38.5	Y+23.5
U	Y+18.5		Y+19.5		Y+22.5	
	Y=10	Y=15-50	Y=10	Y=15-50	Y=10	Y=15-50
В	25	Y+10	25	Y+10	26.5	Y+11.5
N	Y+6.5		Y+7.5		Y+10.5	