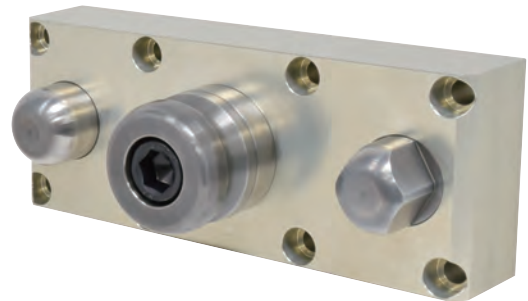


# **New** Pallet Gripper

## Simplify Fixture Setup with Robot

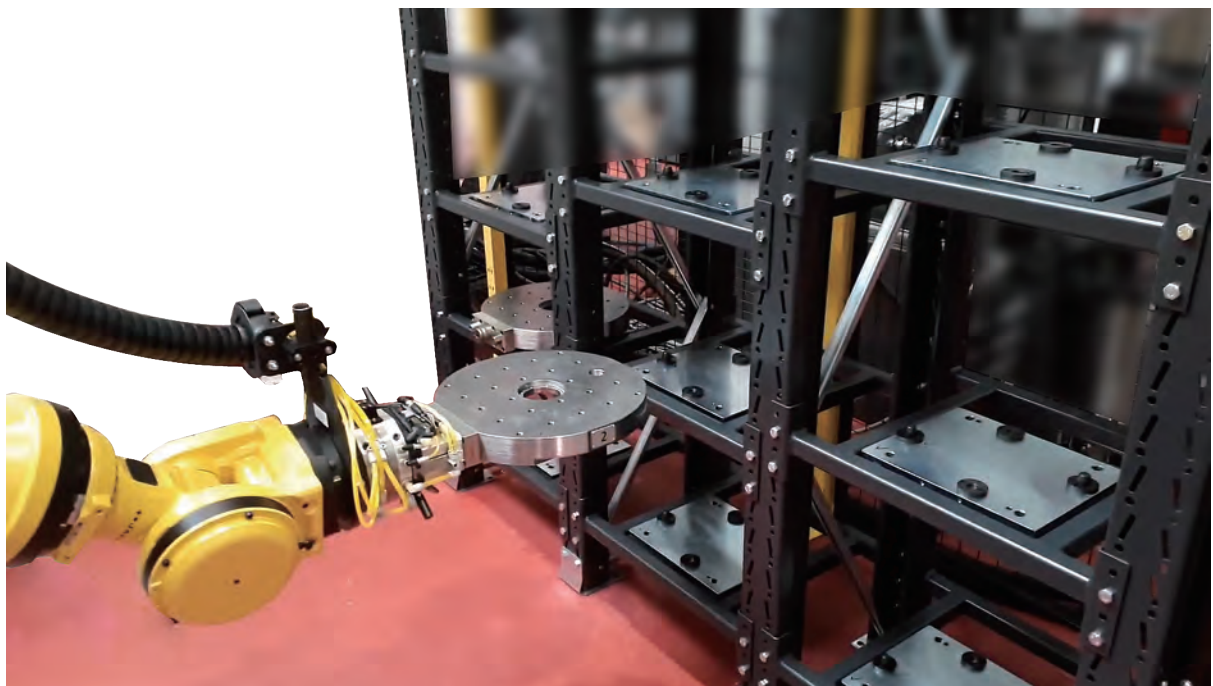


Master Cylinder



Tool Adapter

model  
**WVA**

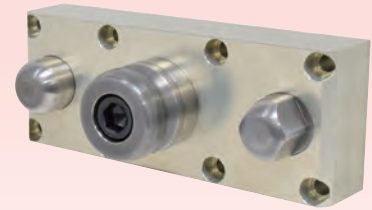
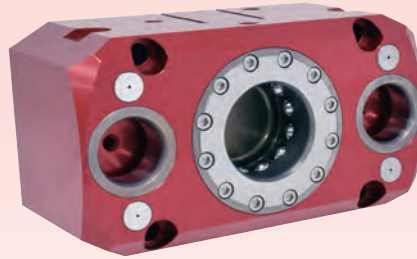


Pallet-Transfer Automation Example using Articulated Robot

For Factory Automation

# Pallet Gripper

Model **WVA**

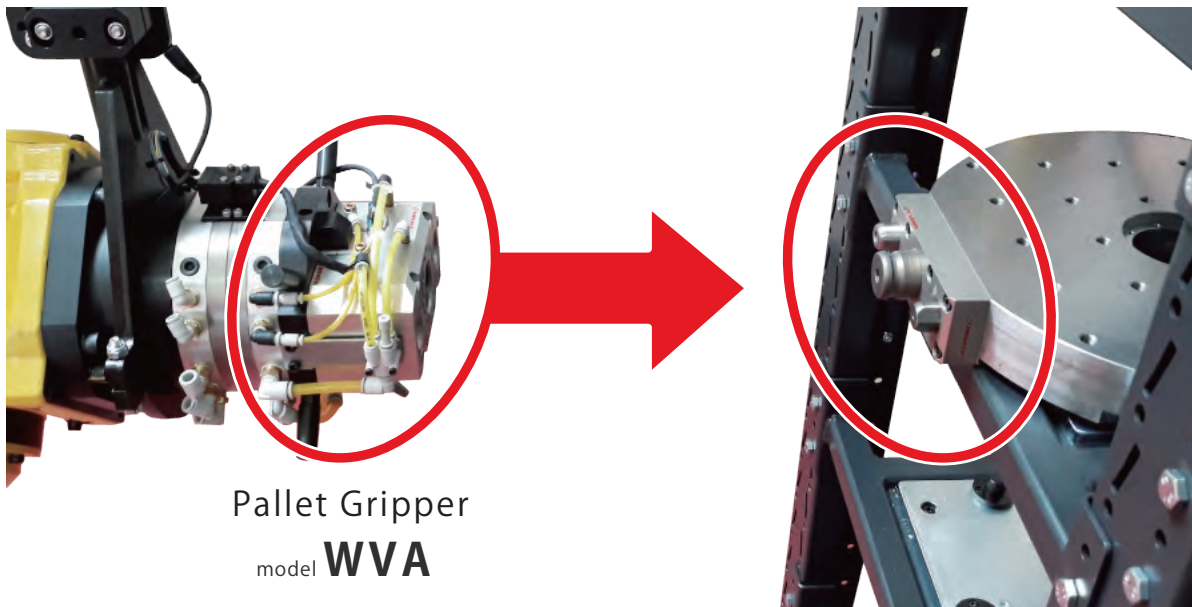


This product has restrictions on the country of use.  
This product is intended for use in Japan, Asia and North/Central/South America.  
WVA□-M cannot be used in Europe. Please select the model WVB□-M for use in Europe.

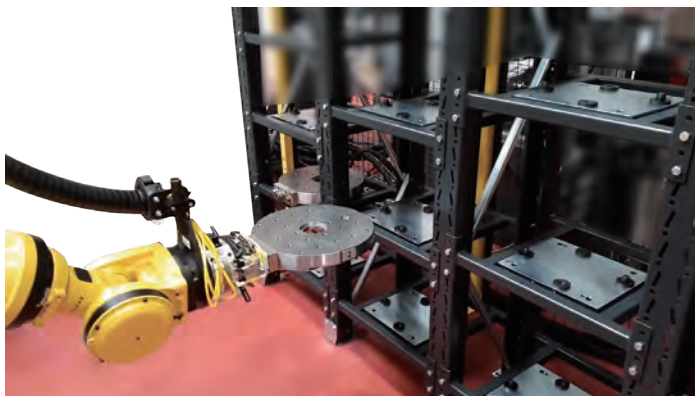
Moment-Resistible Pallet Gripper is suitable for pallet transfer.  
Side approaching enables to save space for fixture stock. **PAT. P.**

## Simplify Fixture Setup with Robot

### Side-Approaching Pallet Gripper



Pallet Gripper  
model **WVA**

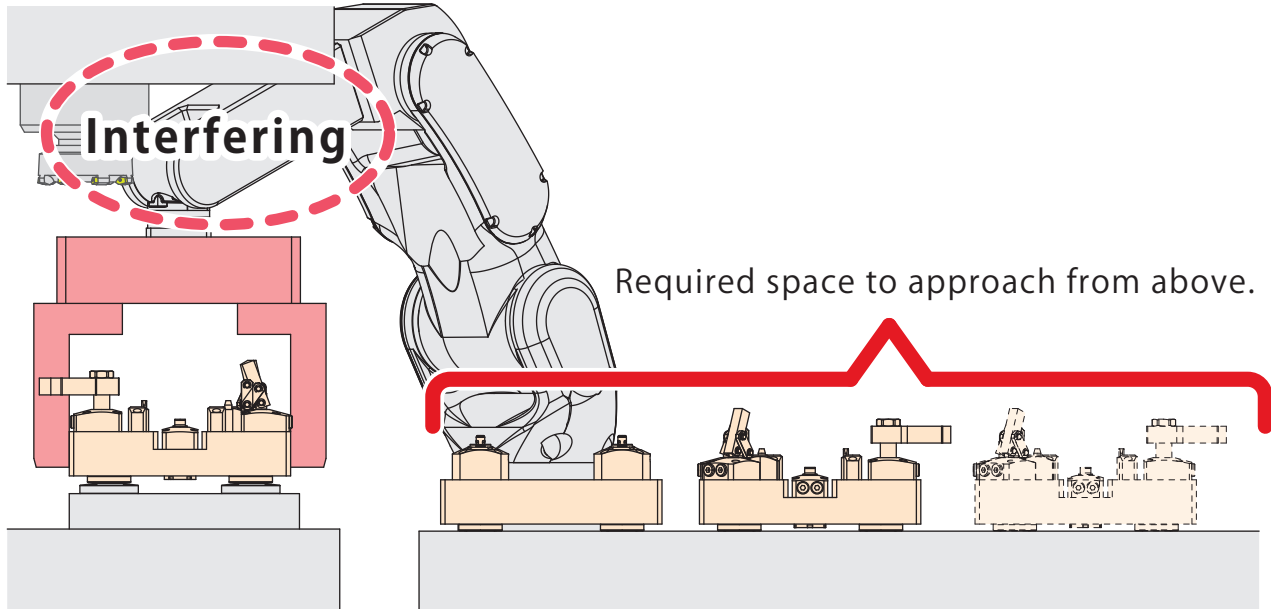


Pallet-Transfer Automation  
with Articulated Robot

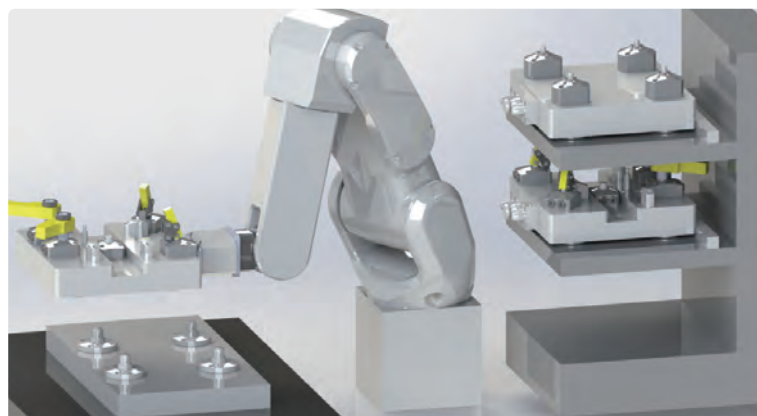
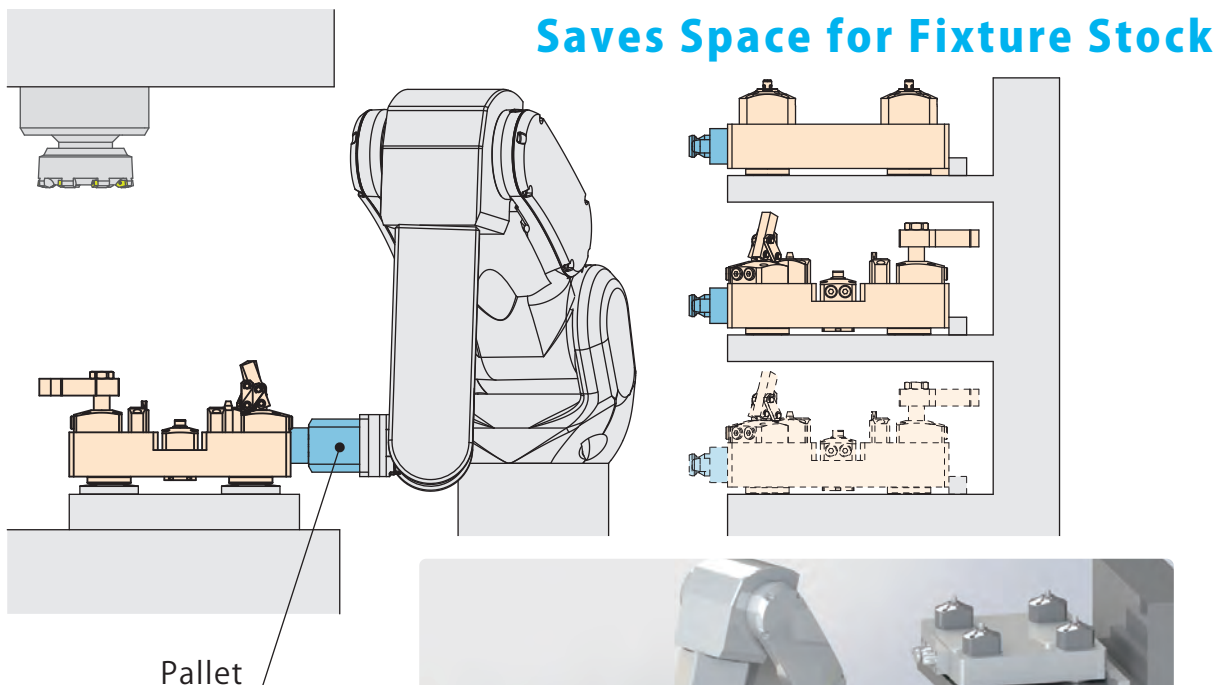
※ WVA in the picture is under development.  
The color of the actual master cylinder is red.

# Easy to Transfer into a Narrow Space

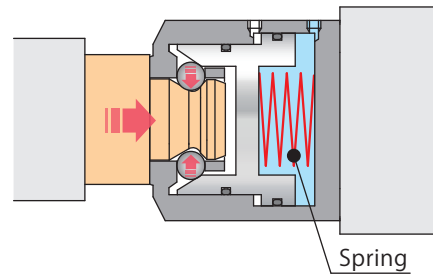
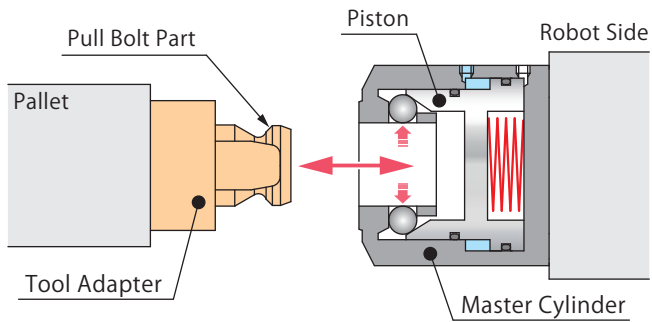
## Previous Method



## Pallet Gripper



● **Action Description** ※ This is a simplified drawing. The actual part components may be different.



**When Loading/Unloading (Released)**

Release Air Pressure  ON  
 Lock Air Pressure  OFF

Release action : The piston moves backward and the steel balls are set inside so that the tool adapter can be attached/detached.

**When Transferring (Locked)**

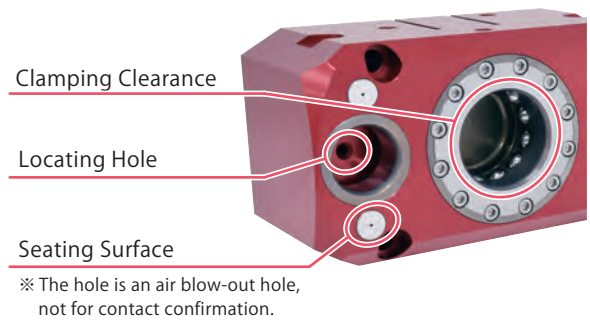
Release Air Pressure  OFF  
 Lock Air Pressure  ON

Lock action : The piston moves forward with lock air pressure and built-in spring, and pulls in the pull bolt of the tool adapter via the steel balls.

Self-locking function with spring prevents a workpiece fall even when air pressure drops to 0MPa in case of a power failure.  
 ※ Usually it should be connected with spring force and lock air pressure.

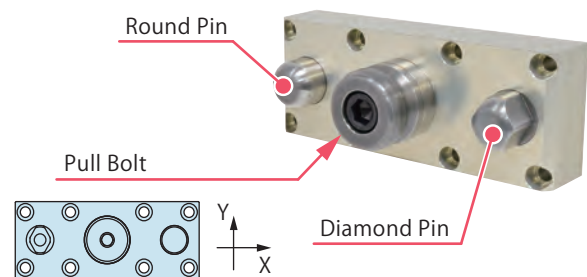
● **Air Blow Function**

By supplying air pressure to the air blow port, the air is released from the clamping clearance, the locating hole and the seating surface to prevent cutting chips and coolant from entering into the product, and to clean the seating surface.



● **Floating Function of Pull Bolt**

The pull bolt of the tool adapter is floatable. It allows misalignment in X direction and Y direction, prevents clamping load from applying to a robot and equipment, and simplifies teaching. Locating with the round pin and the diamond pin.



● **Action Confirmation with Cylinder Sensor**

Able to confirm the action of Pallet Gripper with Cylinder Sensor. Refer to P.14 for further information.



## Model No. Indication

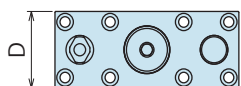
**WVA 004 0 - M**

1      2      3

This product has restrictions on the country of use.  
This product is intended for use in Japan, Asia and North/Central/South America.  
WVA□-M cannot be used in Europe.  
Please select the model WVB□-M for use in Europe.

### 1 Body Size

**003** : D=30 mm  
**004** : D=40 mm  
**006** : D=60 mm  
**008** : D=80 mm



Tool Adapter Side

### 3 Category

**M** : Master Cylinder ※ Cannot be used in some countries.

**T** : Tool Adapter

**M**: Master Cylinder

**T**: Tool Adapter



### 2 Design No.

**0** : Revision Number

## Specifications

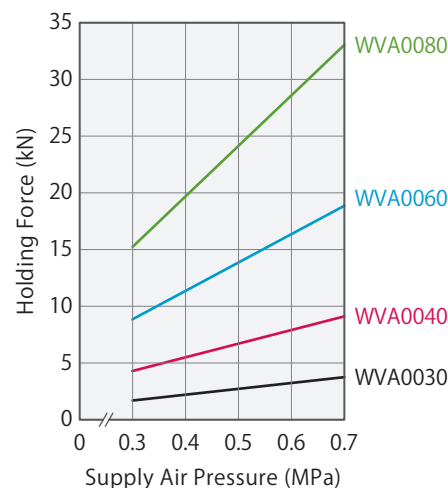
Model No.		WVA0030	WVA0040	WVA0060	WVA0080	
Holding Force		Refer to the following graph.				
Repeatability		±0.04		±0.05		
Cylinder Capacity	Lock Side	3.36	9.56	27.4	65.2	
	Release Side	0.74	3.90	9.9	23.5	
Allowable Static Moment	Bending	at 0.3MPa	25	86	265	610
		at 0.4MPa	33	110	340	788
		at 0.5MPa	41	134	415	966
		at 0.6MPa	49	158	491	1144
		at 0.7MPa	56	182	566	1322
	Twisting	75	250	800	1800	
Max. Operating Pressure		MPa 0.7				
Min. Operating Pressure		MPa 0.3				
Air Blow Pressure		MPa 0.2 ~ 0.3				
Withstanding Pressure		MPa 1.0				
Operating Temperature		°C 0 ~ 70				
Usable Fluid		Dry Air				
Product Weight	Master Cylinder	kg 0.4	0.92	2.9	6.0	
	Tool Adapter	kg 0.17	0.36	1.3	3.0	

## Holding Force

Model No.		WVA0030	WVA0040	WVA0060	WVA0080
Holding Force	at 0 MPa ※1	0.15	0.68	1.32	1.88
	at 0.3MPa	1.69	4.29	8.84	15.24
	at 0.4MPa	2.21	5.50	11.34	19.70
	at 0.5MPa	2.72	6.70	13.85	24.15
	at 0.6MPa	3.23	7.91	16.35	28.61
	at 0.7MPa	3.75	9.11	18.86	33.06

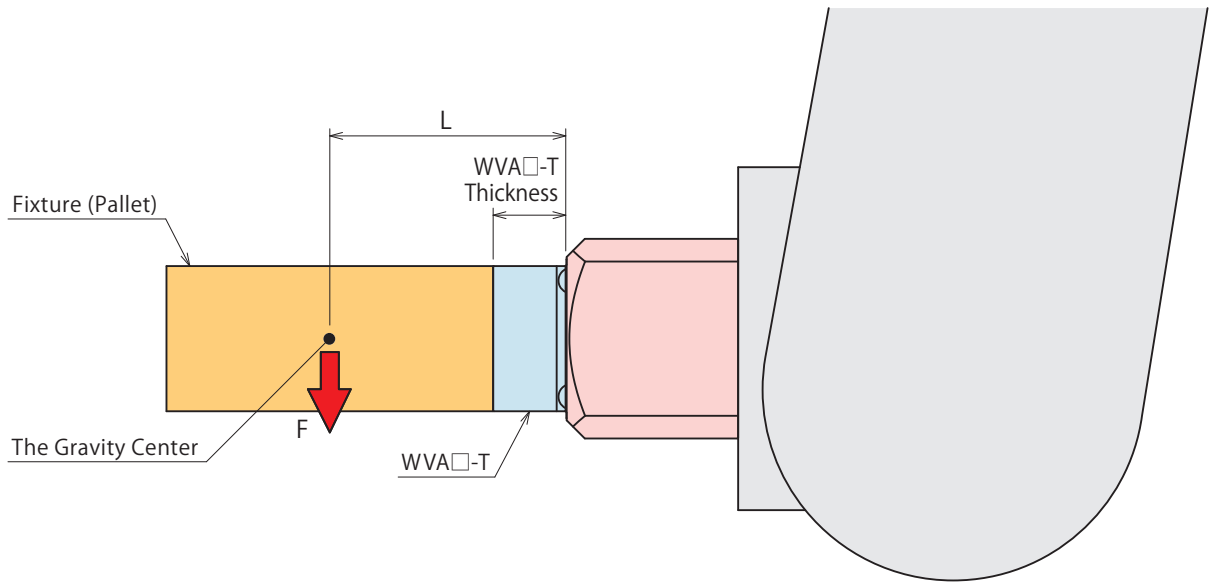
Note :

※1. It shows the holding force when air pressure drops to 0MPa after locking, and above number of holding force is just a reference value.





● Calculation Example of Bending Moment



The model and the air pressure should be determined so as not to exceed the allowable static moment.

Allowable Static Moment (Bending Moment)  $M (N \cdot m) > \text{Load } F (N) \times \text{The Gravity Center } L (m) \times S (\text{Safety Factor})$

**WVA Body Size, Pallet Size and Fixture Weight (Reference)**

(Reference in case of the following conditions ;

The Gravity Center : The Pallet Center, Pallet Material : Aluminum, Safety Factor = 2)

Model No.	Pallet Size	Fixture Weight	Bending Moment	Allowable Static Moment (Bending Moment at 0.5MPa)
<b>WVA0030</b>	□200mm	18kg	41N·m	41N·m
<b>WVA0040</b>	□300mm	40kg	134N·m	134N·m
<b>WVA0060</b>	□400mm	90kg	412N·m	415N·m
<b>WVA0080</b>	□500mm	165kg	955N·m	966N·m

※ The above is just a reference. Please calculate according to an actual fixture.

(Calculation Example : In case of WVA0040)

$$L (m) = (\text{Half Length of the Pallet } (\square 300) 150\text{mm} + \text{Dimension of WVA0040-T } 20\text{mm}) \times 0.001 = \boxed{0.17\text{m}}$$

$$\text{Load } F (N) = (\text{Fixture Weight } 40\text{kg} + \text{The Weight of WVA0040-T } 0.36\text{kg}) \times 9.8 = \boxed{395\text{ N}}$$

$$\text{Safety Factor } S = \boxed{2} \quad \text{※ Safety Factor = 2 is an example when considering the robot maximum increasing speed to be 2G.}$$

$$\begin{matrix} \text{Load } F (N) \\ \mathbf{395\text{ N}} \end{matrix} \times \begin{matrix} \text{Gravity Center } L (m) \\ \mathbf{0.17\text{ m}} \end{matrix} \times \begin{matrix} \text{Safety Factor } S \\ \mathbf{2} \end{matrix} = \begin{matrix} \text{Bending Moment} \\ \mathbf{134\text{ N} \cdot \text{m}} \end{matrix}$$

 **MEMO**

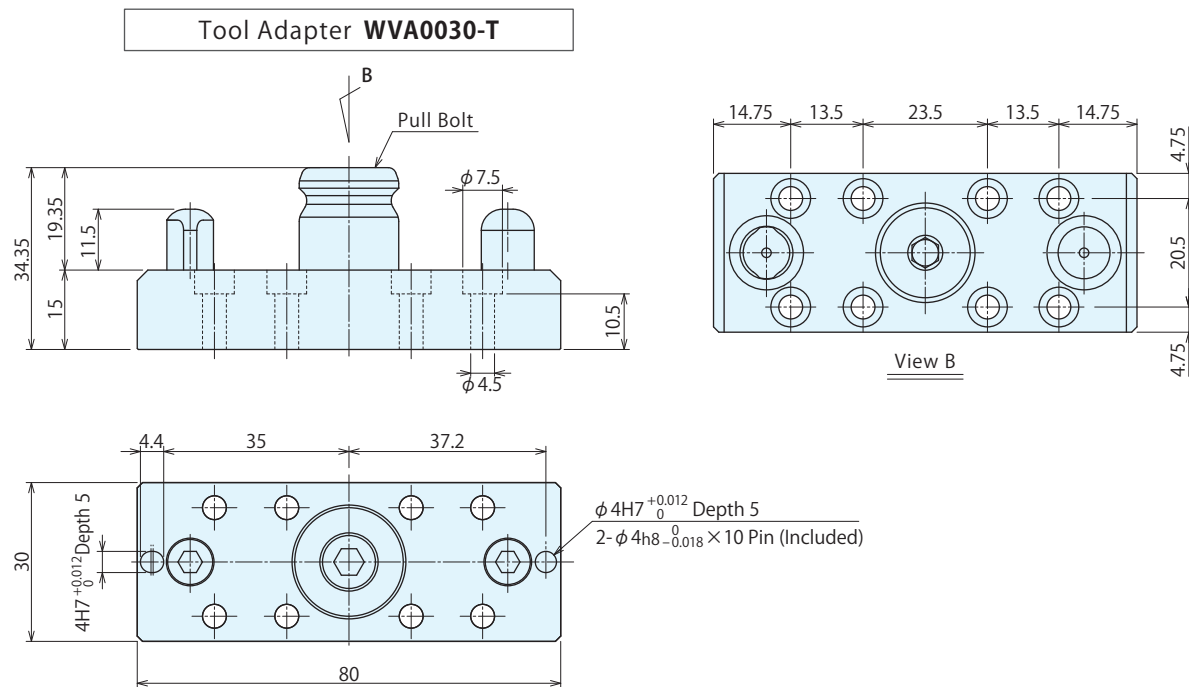
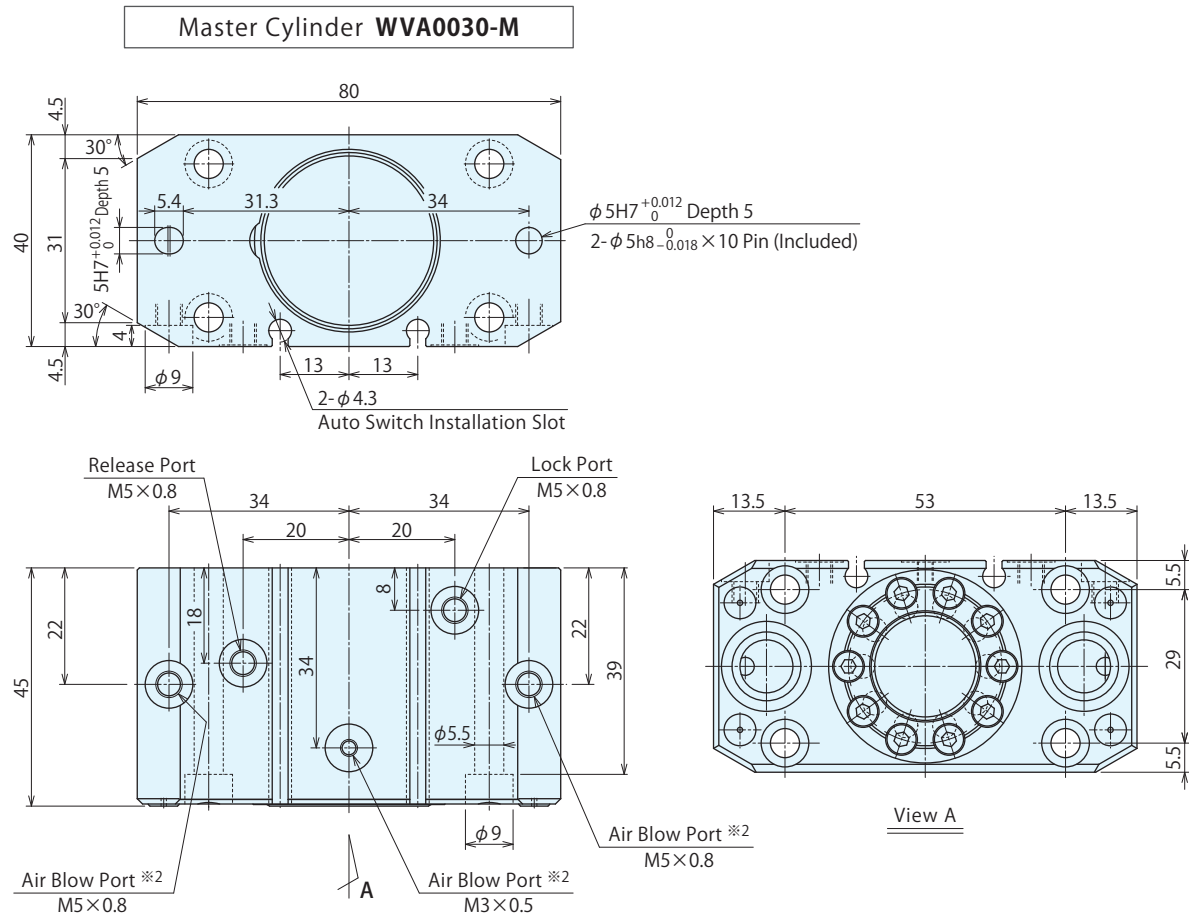
Pallet Gripper

WVA

High-Accuracy  
Cylinder Sensor

JES

External Dimensions : WVA0030

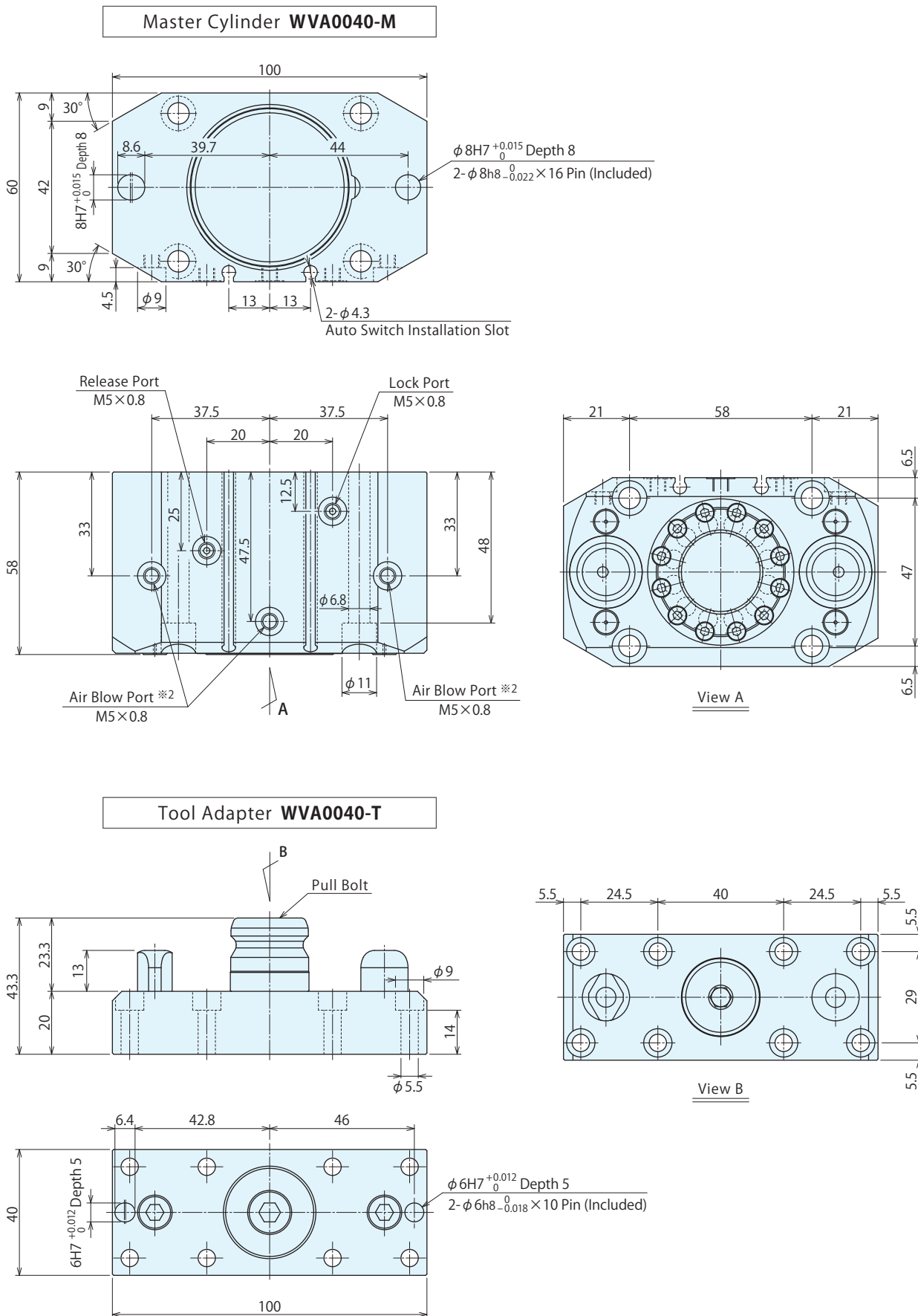


Notes :

1. Mounting bolts are not provided. Please prepare them separately.
- ※2. The master cylinder is equipped with air blow ports to prevent contamination and to clean the seating surface.  
When conducting air blow, connect an air circuit to all three air blow ports from outside. (Not connected internally.)



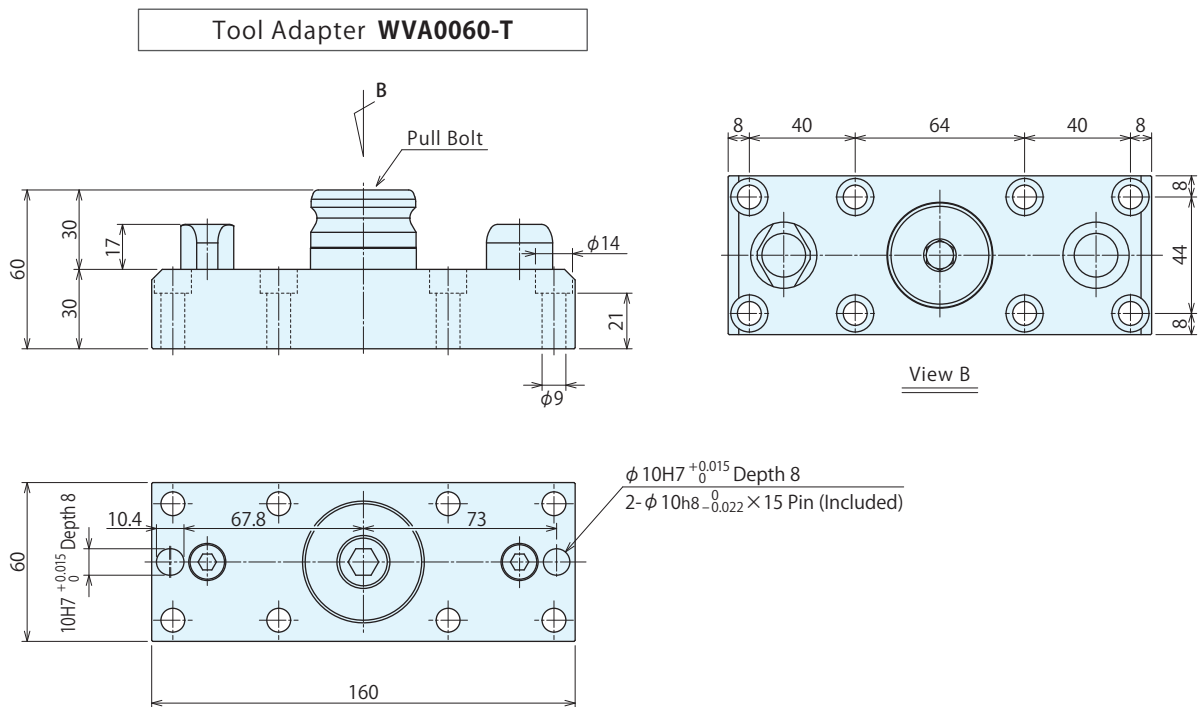
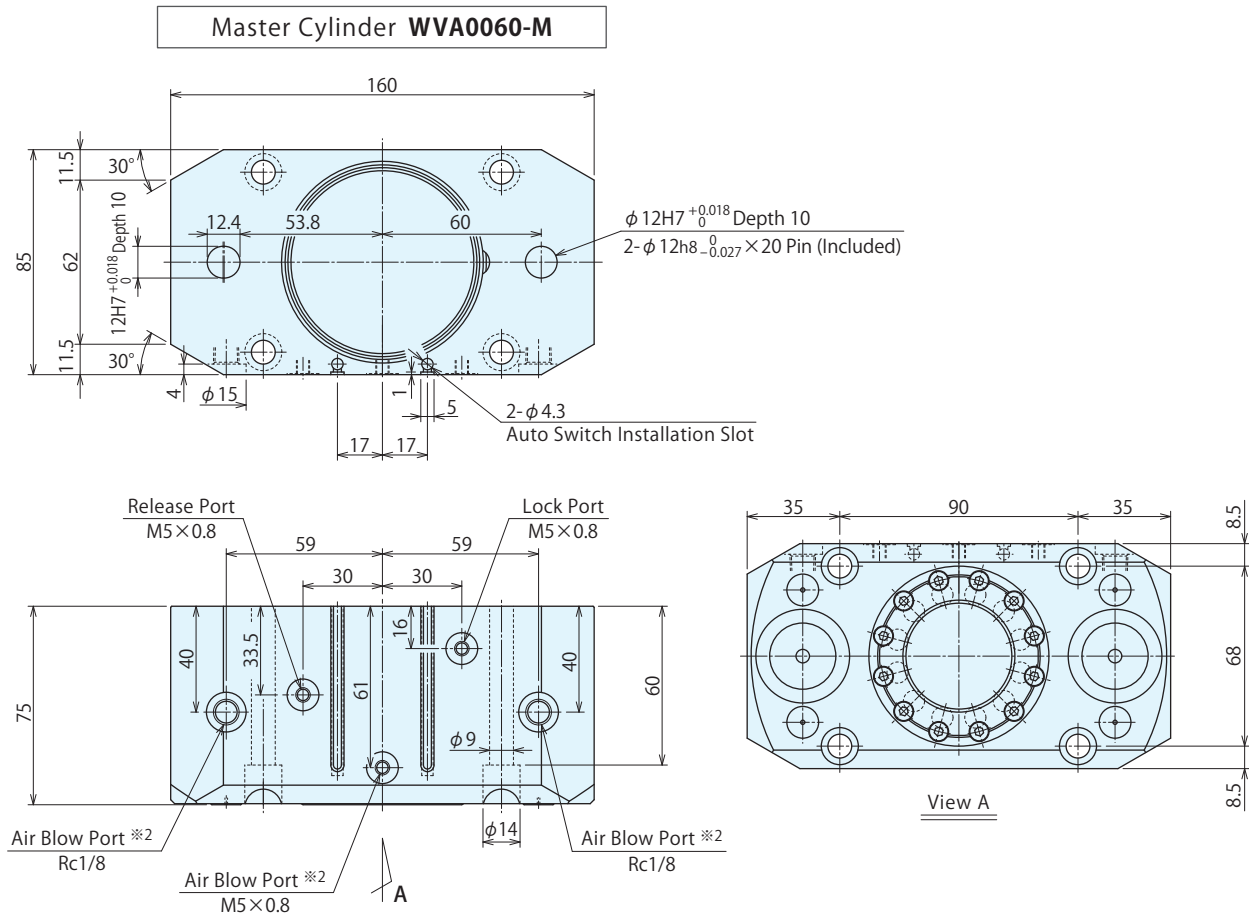
## External Dimensions : WVA0040



### Notes :

1. Mounting bolts are not provided. Please prepare them separately.
- ※2. The master cylinder is equipped with air blow ports to prevent contamination and to clean the seating surface.  
When conducting air blow, connect an air circuit to all three air blow ports from outside. (Not connected internally.)

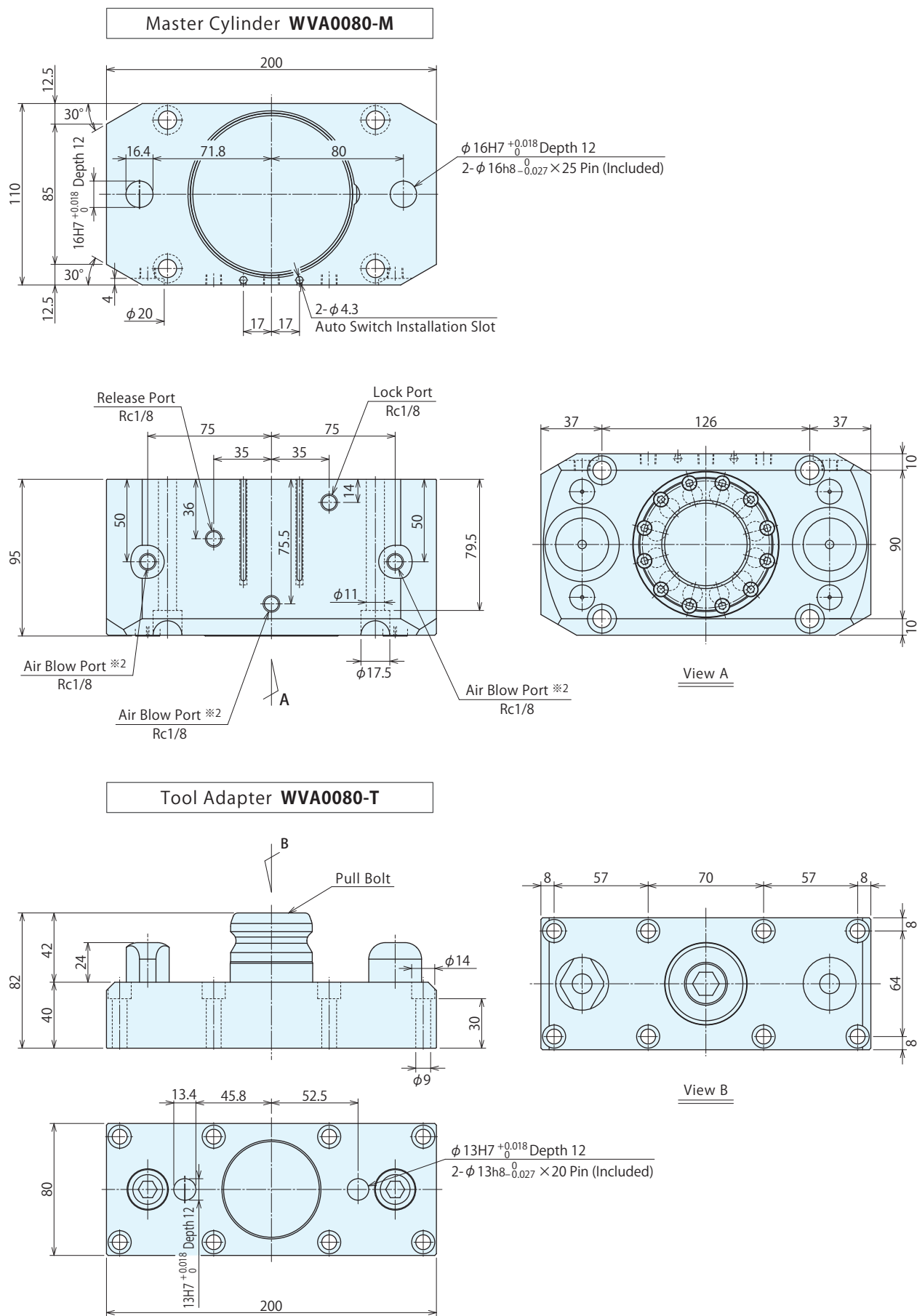
External Dimensions : WVA0060



Notes :

1. Mounting bolts are not provided. Please prepare them separately.
- $\times 2$ . The master cylinder is equipped with air blow ports to prevent contamination and to clean the seating surface.  
When conducting air blow, connect an air circuit to all three air blow ports from outside. (Not connected internally.)

## External Dimensions : WVA0080



### Notes :

1. Mounting bolts are not provided. Please prepare them separately.
- ※2. The master cylinder is equipped with air blow ports to prevent contamination and to clean the seating surface.  
When conducting air blow, connect an air circuit to all three air blow ports from outside. (Not connected internally.)

**Cautions**

● Notes for Design

1) Check Specifications

- Maximum Operating Pressure : 0.7MPa  
Minimum Operating Pressure : 0.3MPa  
Applying excessive load to the Pallet Gripper will cause deformation, seizure, air leakage and breakage of the product.

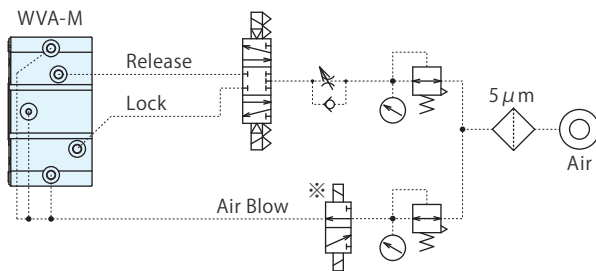
2) Do not apply impact to a workpiece or a pallet that is connected to the Pull Bolt.

- Applying impact to a pallet or others connected with the tool adapter will damage the product.

3) Air Pressure Circuit Reference

- WVA maintains the locked state to hold the tool adapter with the mechanical lock function (holding spring) even when air is cut off. However, for safety, when using a 2-position solenoid valve, make sure to select the solenoid valve for operating WVA that supplies air pressure to the lock port side when it is not magnetized. If air is supplied to the release port when the switch of solenoid valve is turned off, WVA may drop the tool adapter (pallet) and it is extremely dangerous.

Air Blow Function : Air is released from the seating surface, the locating hole and the clamping clearance to prevent cutting chips and coolant from entering into the Pallet Gripper and to clean the seating surface.



※ Cushioned by air before pallet gripper connection (locking) is completed.  
Make sure to turn OFF the air blow before connection is completed.

4) Please supply filtered clean dry air.

- Oil supply with a lubricator etc. is unnecessary.

5) Insertion of Pull Bolt

- Please insert the Pull Bolt to the end (to prevent clamping failure and damage to the Pull Bolt.)

6) Protective Cover Installation

- If the moving parts of the robot or robotic hand may endanger human life, please install the protection cover.

7) Fall Prevention Measures

- In case of accident such as detachment of a pallet, please prepare fall prevention measures for safety.

8) Connection and Transfer of Pallet Gripper

- Do not apply excessive moment on the Pallet Gripper during connection, detachment and transfer.  
Please select an appropriate size of the Pallet Gripper considering moment fully taken into consideration.  
During connection, do not fix a pallet of the tool adapter side on the tool stand, and make a margin (clearance).

9) For Use of Auto Switch

- In order to ensure stable detections, please use the 3-wire sensor of the high accuracy sensor for air cylinder "model JES0000-02□□" .

10) This product has restrictions on the country of use.

- This product is intended for use in Japan, Asia and North/Central/South America.

WVA□-M cannot be used in Europe.

(Please contact us for details about unsupported countries.)

Please select the model WVB□-M for use in Europe.

## ● Installation Notes

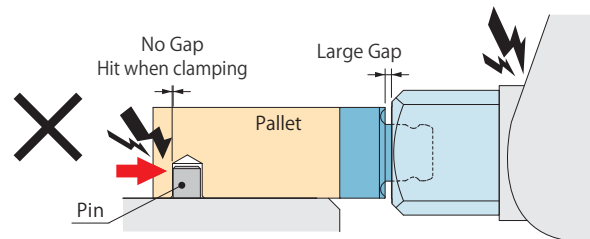
- 1) Check the fluid to use.
  - Please supply filtered clean dry air.  
(Please install a drain removing device.)
  - Oil supply with a lubricator, etc. is unnecessary.  
Oil supply with a lubricator may cause loss of the initial lubricant.  
The operation under low pressure and low speed may be unstable.  
(When using secondary lubricant, please supply lubricant continuously.)
- 2) Preparation for Piping
  - The pipes, piping connectors and fixture circuits should be cleaned and flushed thoroughly. The dust and cutting chips in the circuit can lead to fluid leakage and malfunction.
  - There is no filter provided with this product to prevent contamination in the air circuit.
- 3) Applying Sealing Tape
  - Wrap with tape 1 to 2 times following the screwing direction.  
In order to prevent contamination during the piping work, it should be carefully cleaned before working.  
Pieces of the sealing tape can lead to air leakage and malfunction.
- 4) Installation of the Master Cylinder and the Tool Adapter
  - Installation of the master cylinder : use four hexagonal socket bolts (with tensile strength of A2-70 or more) and tighten them with the following torque.
  - Installation of the tool adapter : use eight hexagonal socket bolts (with tensile strength of A2-70 or more) and tighten them with the following torque.

Model No.	Thread Size × Length	Tightening Torque (N · m)
<b>WVA0030-M</b>	M5×0.8×50 or more	6.3
<b>WVA0030-T</b>	M4×0.7×20 or more	3.2
<b>WVA0040-M</b>	M6×1×60 or more	10
<b>WVA0040-T</b>	M5×0.8×25 or more	6.3
<b>WVA0060-M</b>	M8×1.25×75 or more	20
<b>WVA0060-T</b>	M8×1.25×35 or more	20
<b>WVA0080-M</b>	M10×1.5×95 or more	40
<b>WVA0080-T</b>	M8×1.25×45 or more	20

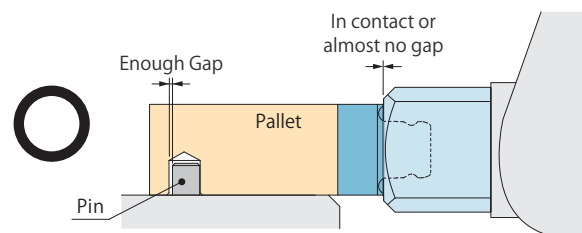
- Installation failure will cause air leakage, deformation and breakage of the gripper.

## 5) Allowable Offset while Clamping

- The gap between the seating surface of the Master Cylinder and the Tool Adapter should be 0.2mm or less when clamping. If operated when the gap is more than 0.2mm, clamping cannot be done due to interference with a locating pin of a stocker. Or, excessive load will be applied leading to damage of a robot and other equipment. Please insert the Pallet Gripper vertical to the Pull Bolt. After clamping, the Pull Bolt is pulled in and the tool adapter comes in contact with the seating surface.



When clamping, the pallet is pulled to the robot side and hits the pin due to the large gap on the seating surface. Excessive load will be applied to the product leading to damage to the robot and equipment.

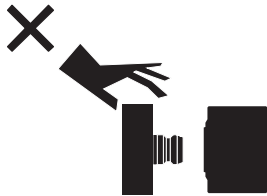


The pallet will not be pulled to the robot side or hit by the pin because there is no gap on the seating surface. Also, it is safe with the enough gap at the pin part.

## ● Cautions

### ● Notes on Handling

- 1) It should be operated by qualified personnel.
  - The hydraulic machine and air compressor should be operated and maintained by qualified personnel.
- 2) Do not operate or remove the product unless the safety protocols are ensured.
  - ① The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
  - ② Before removing the product, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
  - ③ After stopping the product, do not remove until the temperature drops.
  - ④ Make sure there is no trouble/issue in the bolts and respective parts before restarting the machine or equipment.
- 3) Do not touch the pallet gripper while it is working. Otherwise, your hands may be injured.



- 4) When a robot is in operation, make sure the safety of environment in case of a workpiece detachment.
- 5) Do not disassemble or modify.
  - If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.
  - Built-in spring is very strong and can be dangerous.

### ● Maintenance and Inspection

- 1) Removal of the Product and Shut-off of Pressure Source
  - Before removing the product, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
  - Make sure there is no trouble/issue in the bolts and respective parts before restarting.
- 2) Regularly clean the product.
  - Using the product contaminated with dirt causes insufficient gripping force and malfunction leading to damage of the product or detachment of a workpiece.
- 3) Regularly tighten pipes, mounting bolts and others to ensure proper use.
- 4) Make sure there is a smooth action without an irregular noise.
  - Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.
- 5) The products should be stored in the cool and dark place without direct sunshine or moisture.
- 6) Please contact us for overhaul and repair.
 

Built-in spring is very strong and can be dangerous.

### ● Warranty

- 1) Warranty Period
  - The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.
- 2) Warranty Scope
  - If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense. Defects or failures caused by the following are not covered.
    - ① If the stipulated maintenance and inspection are not carried out.
    - ② Failure caused by the use of the non-confirming state at the user's discretion.
    - ③ If it is used or operated in an inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
    - ④ If the defect is caused by reasons other than our responsibility.
    - ⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
    - ⑥ Other caused by natural disasters or calamities not attributable to our company.
    - ⑦ Parts or replacement expenses due to parts consumption and deterioration. (Such as rubber, plastic, seal material and some electric components.)

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



## ● Action Confirmation Method : Sensor for Air Cylinder

This product (model WVA) is able to detect the locking action and releasing action with Sensor for Air Cylinder (sold separately).

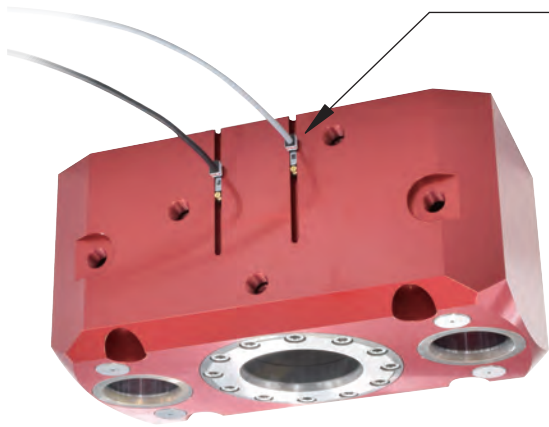
Pallet Gripper

WVA

High-Accuracy  
Cylinder Sensor

JES

### Sensor for Air Cylinder model **JES**



Due to the small stroke amount of the internal piston of Pallet Gripper (model WVA), we recommend the 3-wire sensor of the high-accuracy sensor for air cylinder (model JES0000-02□□) in order to ensure stable detections. JES is extremely compact.

Refer to P.15 for detailed specifications of JES.

Mounting position and direction of the sensor for air cylinder vary depending on the individual product differences and the magnetic flux change due to the surrounding environment. Please adjust the position of the actual product before use.

## Model No. Indication

**JES 000 0 - 02 L GN**

1                      2                      3



### 1 Design No.

0 : Revision Number

### 2 Shape

**Blank** : Straight  
**L** : L Shaped



### 3 Output Format • Detection Polarity

- GN** : NPN Output N-Pole Sensor (Cable Color: Black)
- GS** : NPN Output S-Pole Sensor (Cable Color: Gray)
- GPN** : PNP Output N-Pole Sensor (Cable Color: Black)
- GPS** : PNP Output S-Pole Sensor (Cable Color: Gray)

For detecting both lock and release actions, both the N-pole sensor and the S-pole sensor are required.

## Application Table

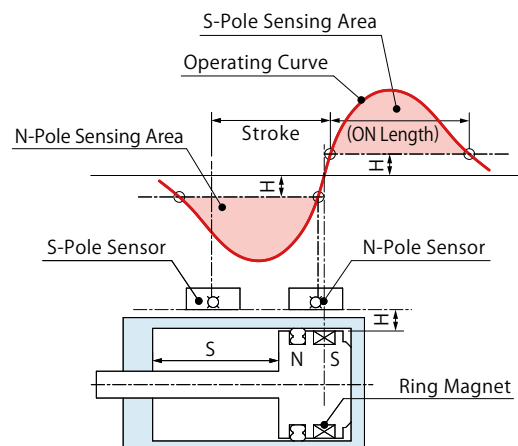
Model No.	JES0000-02G□	JES0000-02LG□
	JES0000-02GP□	JES0000-02LGP□
<b>WVA0030</b>	●	●
<b>WVA0040</b>	●	●
<b>WVA0060</b>	●	●
<b>WVA0080</b>	●	●

## Specifications

Model No.	JES0000-02G□	JES0000-02GP□
	JES0000-02LG□	JES0000-02LGP□
Wiring Method	3-Wire	
Applicable Load	Relay, Programmable Logic Controller (PLC)	
Voltage	DC 5 ~ 24V	
Output Specification	NPN (ON when in proximity)	PNP (ON when in proximity)
Output Current	20mA Max.	80mA Max.
Current Consumption	8mA Max.	8mA Max.
Response Speed	16 μsec or less	
Material	Case : GF Reinforced PBT Black Set Screw : Brass	
Indicator Light	Red	
Withstand Voltage	AC1000V (for 1 minute, Packaged Charging Part, b/w the case)	
Insulation Resistance	DC250V (20MΩ or more in Megohms, b/w the case)	
Operating Temperature Range	-20°C ~ +85°C (Make sure no condensation)	
Operating Humidity Range	20 ~ 95%RH	
Protection Grade	IP67	
Cable Length	1m	

## Performance Curve

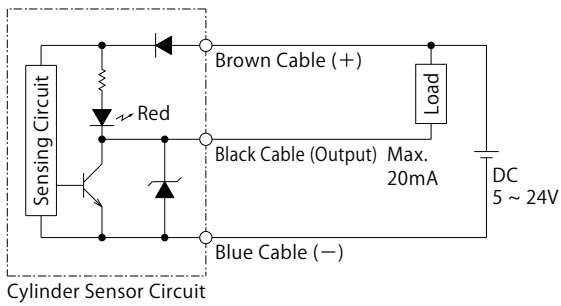
JES detects only the magnetic force that is vertical to the detection surface. The operating curve is shown below. Operating point is on the steep part of the operating curve, so even small stroke can be surely detected.



● Electric Circuit Diagram

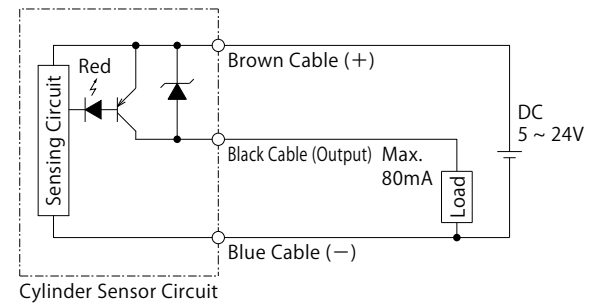
**NPN Output**

JES0000-02G□  
JES0000-02LG□

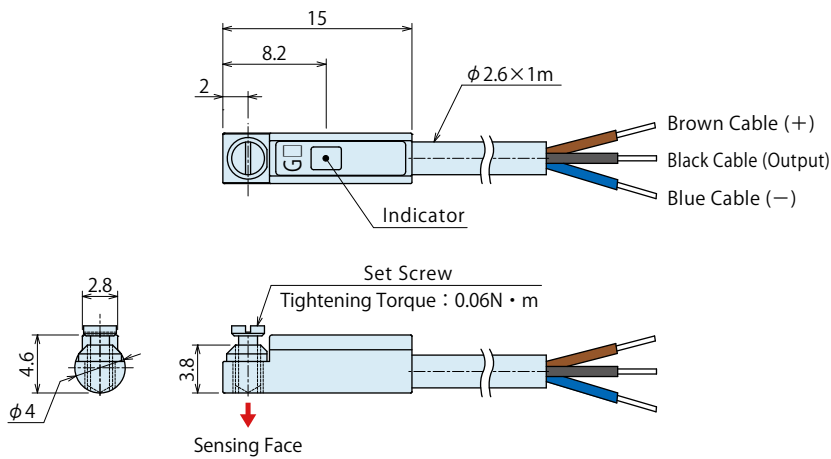


**PNP Output**

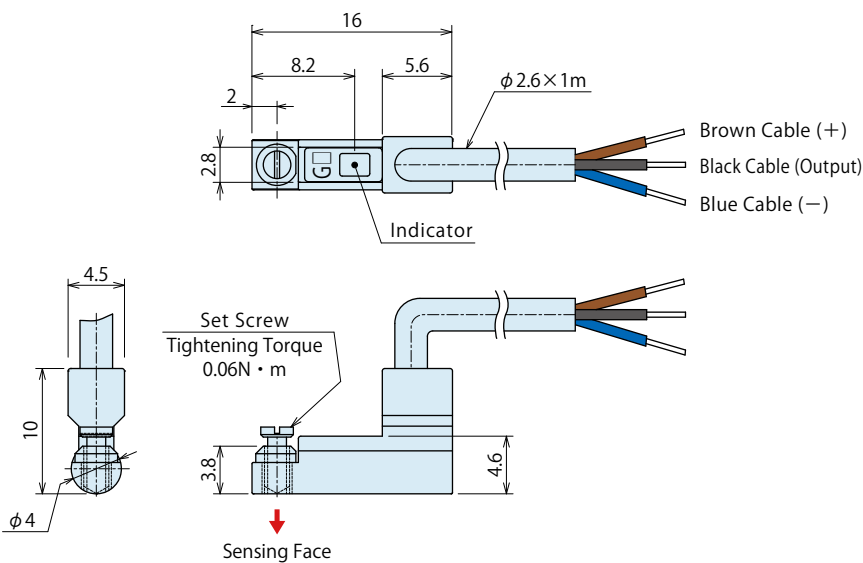
JES0000-02GP□  
JES0000-02LGP□



● External Dimensions (Straight) : JES0000-02G□, JES0000-02GP□



● External Dimensions (L Shaped) : JES0000-02LG□, JES0000-02LGP□



## Cautions

### ● Notes for Design

- 1) Check the Specifications
  - Please use each product according to the specifications. The product may be damaged or malfunction if used outside the range of load or specifications.
- 2) Notes on Use in the Interlock Circuit
  - When the sensor is used for an interlock signal that requires high reliability, please use a double interlock system by providing a mechanical protection function. Or by using another sensor together with the product. Also, please perform periodic maintenance and confirm proper operation.
- 3) Please avoid using loads that generate surge voltage.
  - If driving a relay, put a Zener diode in parallel for surge protection.

### ● Notes on Operating Environment

- 1) Never use the product in an atmosphere with explosive gases.
  - Sensor for Air Cylinder is not designed to prevent explosion. Do not use the product in an atmosphere with explosive gases since it may cause serious explosions.
- 2) The product may malfunction if an intense magnetic field is applied to a pole body.
- 3) Make sure to prepare shield measures when using in the following environments.
  - Where large current and/or strong magnetic field are generated.
  - Where noise occurs due to static electricity, etc.
  - Where magnetic powder or dust such as iron powder occurs or scatters.
- 4) Do not use the product in an environment where it is continuously exposed to coolant or chemical liquid.
  - Although IEC standard IP67 structure is satisfied, please avoid using sensors in an environment where continuously exposed to coolant or chemical liquid. This may cause insulation failure or malfunction.
- 5) Do not use the product in an environment with oil or chemicals.
  - If sensors are used in an environment with coolant or cleaning solvent, even in a short time, they may be adversely affected by improper insulation, malfunction due to swelling of potting resin and or hardening of electric cable.
- 6) Do not use the product in an environment with excessive vibrations or impacts.

### ● Installation Notes

- 1) Electric Wiring Reverse Connection Protection
  - Follow the electric circuit diagram on P.16 and make sure to connect electric circuits properly. Never connect the power reversely.
- 2) Tighten the cylinder sensor with appropriate tightening torque.
  - Use the set screw mounted on the sensor body and tighten it with the following torque.  
JES0000 : 0.06N · m
- 3) Wiring
  - Do not damage the cables. Damaged, forcibly bended, stretched, winded, load applied or pinched cables will cause fire, electric shock, and/or malfunction due to electric leakage and/or continuity failure.
  - Do not apply excessive stress on the cable port of the sensor.
  - Minimum bending radius of the cable port is R7.
  - If cables are to move, fix the middle of the cables so that no stress is applied to the cable port.
- 4) Mounting position of the sensor should be adjusted by checking actual operating state.

## ● Notes on Handling

- 1) It should be operated by qualified personnel.
  - The hydraulic machine and air compressor should be operated and maintained by qualified personnel.
- 2) Do not operate or remove the product unless the safety protocols are ensured.
  - ① The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
  - ② Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
  - ③ After stopping the product, do not remove until the temperature drops.
  - ④ Make sure there is no trouble/issue in the bolts and respective parts before restarting the machine or equipment.
- 3) Do not disassemble or modify.
  - If the equipment is taken apart or modified, the warranty will be voided even within the warranty period. Never modify the product as it contains a powerful magnet.
- 4) Keep more than one meter away from this product if you have a heart pacemaker, etc. It may be malfunctioned by strong magnetism.
- 5) This sensor is made by ASA Electronics Industry Co. Ltd. Please contact us or ASA Electronics Industry for further inquiries.

## ● Maintenance and Inspection

- 1) Removal of the Product and Shut-off of Pressure Source
  - Before removing the product, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
  - Make sure there is no abnormality in the bolts and respective parts before restarting.
- 2) Never touch terminals while the power is on.
  - Otherwise it will cause electric shock, malfunction and damage to the sensor for air cylinder.
- 3) Retightening of Set Screw
  - When mounting position of the sensor for air cylinder is shifted due to looseness of set screw, retighten it after adjusting the mounting position.
- 4) Check if the electric cable is damaged or not.
  - Damaged cables may cause insulation failure. Replace a sensor for air cylinder or repair the reed if the electric cable is damaged.
- 5) Product Storage
  - The products should be stored in the cool and dark place without direct sunshine or moisture.

## ● Warranty

- 1) Warranty Period
    - The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.
  - 2) Warranty Scope
    - If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense. Defects or failures caused by the following are not covered.
      - ① If the stipulated maintenance and inspection are not carried out.
      - ② Failure caused by the use of the non-confirming state at the user's discretion.
      - ③ If it is used or operated in an inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
      - ④ If the defect is caused by reasons other than our responsibility.
      - ⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
      - ⑥ Other caused by natural disasters or calamities not attributable to our company.
      - ⑦ Parts or replacement expenses due to parts consumption and deterioration. (Such as rubber, plastic, seal material and some electric components.)
- Damages excluding from direct result of a product defect shall be excluded from the warranty.

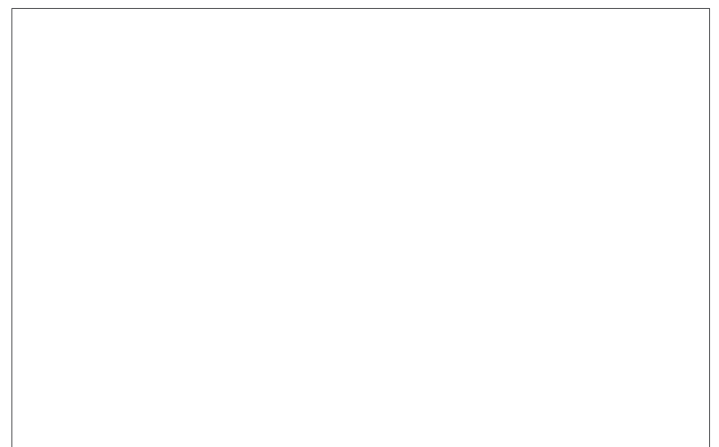


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- For Further Information on Unlisted Specifications and Sizes, Please call us.
- Specifications in this Leaflet are Subject to Change without Notice.

