



Pneumatic components (sensors) Safety Precautions

Be sure to read this section before use.
For general pneumatic components precautions, refer to Intro 17 for details.

Product-specific cautions: Cutting tool breakage detection switch TLPS Series

Installation / Selection

WARNING

Use the product in the range of conditions specified for the product. Contact CKD when using the product outside specifications or for special applications.

Use of the product outside the specifications range may result in insufficient performance, and its safety cannot be guaranteed.

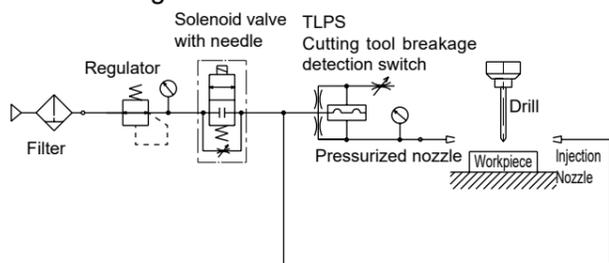
Confirm before use that the product will withstand the working environment.

- This product cannot be used in environments where functional obstacles could occur.
- The main materials of this product are aluminum and resin. Do not use in atmospheres where corrosive gases are generated. Such environments include high temperatures, chemical atmospheres, where chemical liquids, vibration, moisture, water dripping, coolant, or gas is present; where ozone is generated; chemical plants, semiconductor pre-processing, outdoors, etc.
- Compressed air quality must satisfy JIS1.4.1, "oilless clean dry air."

Understand compressed air features before designing a pneumatic circuit.

This product has a small orifice, so to prevent the entry of foreign matter, use clean air with the recommended circuit shown below (Fig. 1).

Fig. 1 Recommended circuit



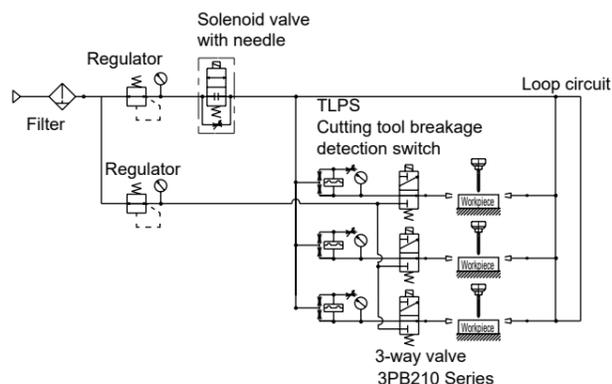
CAUTION

The entry of compressor oil and tarry substances may obstruct the flow of air and result in problems. Regularly inspect the compressor and discharge drainage.

Keep the air flow constant so coolant and oil do not flow back from the detection nozzle, or use a solenoid valve with needle and let in a small amount of air from the bypass as shown in the recommended circuit (Fig. 1).

Swarf and grinder chips, etc., could clog the nozzle. Increasing the supply pressure to blow these out will have no effect. Provide a 3-way valve on the pressurized nozzle as shown below (Fig. 2). The orifice for the 3-way valve should be $\phi 2.5$ mm or larger.

Fig. 2 With air blow used by several applications



Select an output format (NPN, PNP) matching the input unit of the programmable controller being used.

Operation may be disabled if a capacitance load such as an AC/DC buzzer is connected to the load. Turn power OFF and restart in this case. A protection circuit is provided to prevent damage from incorrect wiring or overcurrent. A relay must be used when connecting a capacitance load.

Precautions for TLPS

- Use a $\phi 4$ bore and $\phi 6$ outer diameter pipe. When using 3, 4, or 5 nozzles in a row, try to keep the jet flow of each nozzle as even as possible. For branching, use outer diameter $\phi 8$ and inner diameter $\phi 6$ in this pipe as shown in Fig. 2, and form a loop circuit.
- Signals for the cutting tool breakage detection switch are shown below.

| Drill Status | Drill present | Without drill |
|--------------|---------------|---------------|
| Air stop | OFF | OFF |
| Air supply | OFF | ON |

When using the recommended circuit (Fig. 1) having a solenoid valve with needle, a small amount of air is supplied constantly. Even if the solenoid valve with needle is OFF, the cutting tool breakage detection switch may activate depending on the air supply.

The recommended supply pressure when using the standard detecting nozzle is 100 kPa. Contact CKD on the detecting nozzle shape and air circuit when a width larger than the standard nozzle detection width of 32 mm is required.

Air flows only during detection
Let air flow for at least two seconds. After the solenoid valve is released, wait at least 1 second for the state to stabilize before retrieving signals. The remaining 1 second acts as judgment time, and the signal turns OFF when the drill is normal.

Continuously flowing air
Response time differs with the pipe length and supply pressure, but is approx. 0.2 secs (Page 203). As a reference, the judgment time should be set to 0.5 seconds.

Observe the following items when installing:

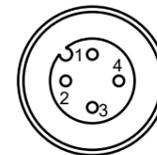
- Install this product so the detection port faces downward.
- Install this product at a position higher than the seating surface to prevent coolant from entering.
- Provide enough space for adjustment, monitoring, and maintenance.
- Use rust-resistant material such as nylon tubes or stainless steel pipes for piping material.
- When installing this product on a device, check that no load is applied to the device.
- When using steel pipes, securely fix the pipe to prevent excessive bending force from being applied to the connection.
- When welding near this product, cover it to prevent spatter from coming in contact.
- When housing this product in a box, provide an exhaust port so atmospheric pressure is maintained in the box.

Observe the following items when wiring:

- When using a switching regulator for the power supply, ground the F.G. (frame ground).
- Avoid using in a transient state, continuing 1s after power is turned ON.
- Take special care to prevent load short-circuits or incorrect wiring. The protective circuit is activated. Turn power OFF to restart the product.
- Connector pins are arranged as shown in Fig. 3. Take special care to prevent incorrect wiring.

Brown → 24 VDC
Blue → 0 VDC
Black → signal, open collector

Fig. 3 Connector pin array (body side)



PIN array/lead wire color list

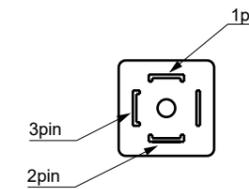
| PIN No. | Electrical connection option (-C1, -C3, -C5) lead wire color | Applications |
|---------|--|----------------|
| 1pin | Brown | Power supply + |
| 2pin | White | NC |
| 3pin | Blue | Power supply - |
| 4pin | Black | Output |

TLPS, MTLPS, UTLPS Series

Product-Specific Cautions

The assignment of the DIN terminal box terminal numbers is shown in Fig. 4.

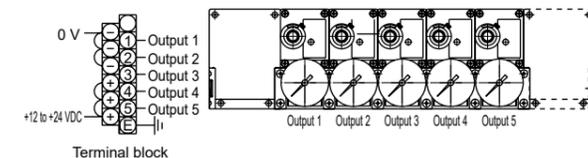
Fig. 4 DIN terminal box pin array (body side)



| PIN No. | Applications |
|---------|----------------|
| 1pin | Power supply + |
| 2pin | Power supply - |
| 3pin | Output |

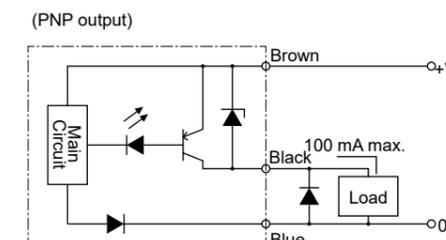
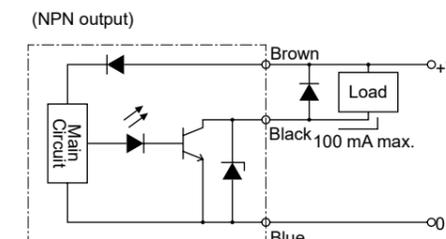
When using the common terminal box, power supply terminals are on the lower side of the gland. Signal wire terminals are on the upper row. This product is wired as shown in Fig. 5.

Fig. 5 Terminal box layout



- When using a load with a large rush current, such as a motor, the protection circuit will activate. In this case, use a relay.
- If there is a device (motor, welder) that generates a large surge near this product, insert a surge absorber, such as a varistor, at the source of the surge.
- If this product's lead wire is wired with the drive cable or power cable, it is affected by surge and noise deteriorating or damaging the sensor element in the switch. Use separate wiring.
- NPN output and PNP output contact confirmation switches are available. The lamp turns ON even if program controller compliance is incorrect, but signals are not retrieved. Wire the switch based on the output as shown in Fig. 6.

Fig. 6 Output circuit



Pressure switch

Electronic pressure switch

Contact Confirm Switch

For Coolant Pressure Switch

Ending

Pressure switch

Electronic pressure switch

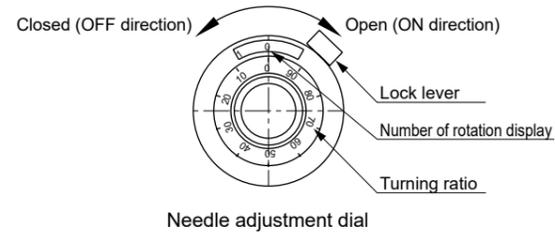
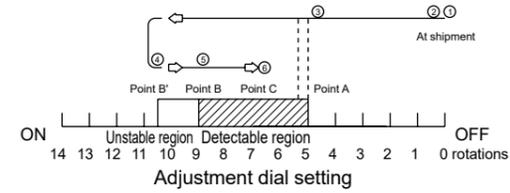
Contact Confirm Switch

For Coolant Pressure Switch

Ending

■ Adjustment sequence

1. When this product is shipped from CKD, the adjustment dial is set to display 0 rotations as the number of rotations, and rotation angle 0.
2. Supply air. The indicator lamp turns OFF.
3. Turn the value of the knob rotation of the adjustment needle in the direction in which it increases (open) in the no drill state, and obtain the switching point A for OFF→ON.
4. Insert the drill tip of 1 mm between the nozzles (turns OFF) and turn it in the direction in which the value rises (open) to obtain the switching point B' for OFF→ON. Point B' may not be found if more than 1 mm of the end of the nozzle, or a nozzle other than the standard nozzle is used. In this case, turn the dial half a turn (50 scale) from point A, and set that point as setting point C.
5. Turn the motor in the direction in which the rotation speed decreases (closed), and obtain switch point B for ON→OFF. The adjusting range is found by counting the number of rotations from point A to point B.
6. Rotate the adjustment needle in the closed direction, and set to the middle point between point A and point B. This position is point C. If point C is near point B, the signal turns ON easily and response time is short. However, it will take time to return. Stable detection is possible by setting adjustment point C between point A and point B.
7. Lock the dial after adjusting.



Do not turn the dial with force at extremities of the rotation. The dial can be rotated up to 14 times.

■ One detection nozzle can be used for one of these product units.

MEMO

Pressure switch

Electronic pressure Switch

Contact Confirm Switch

For Coolant Pressure Switch

Pressure switch

Electronic pressure Switch

Contact Confirm Switch

For Coolant Pressure Switch

For precautions during mounting, installation, adjustment, use and maintenance, refer to the CKD Components Product Site (<https://www.ckd.co.jp/kiki/en/>) → "Model No. → Instruction Manual"