CKD

Solenoid Fine Pinch Valve

HYN Series

INSTRUCTION MANUAL

SM-10875-A/6

- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

PREFACE

Thank you for purchasing CKD's **"HYN Series" solenoid fine pinch valve**.
This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product, which uses control valves such as solenoid valves, motor valves, and air operated valves, is intended for users who have basic knowledge about materials, fluids, piping, and electricity. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to control valves.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic or water control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370, JFPS 2008 (the latest edition of each standard), the High Pressure Gas Safety Act, the Industrial Safety and Health Act, other safety rules, organization standards, relevant laws and regulations

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

Thoroughly read and understand this Instruction Manual before using the product.

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

⚠ **DANGER**	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
⚠ **WARNING**	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
⚠ **CAUTION**	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

	Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠ WARNING

The product must be handled by a qualified person who has extensive knowledge and experience.

The product is designed and manufactured as a device or part for general industrial machinery.

Use the product within the specifications.

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

Do not handle the product or remove pipes and devices until confirming safety.

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

⚠ CAUTION

To export the product, follow the regulations and appropriate export procedures of the exporting county.

When exporting the product from Japan, use the tube recommended by CKD for the product to be assessed as "not applicable" according to the Export Trade Control Order of Japan.

If a tube other than that recommended by CKD is used, depending on the material, the product may be assessed as an "applicable" valve. To export such a valve, a permission from the Minister of Economy, Trade and Industry is required. (Refer to Article 2, paragraph 2, item (vii) in Ordinance of the Ministry Specifying Goods and Technologies Pursuant to Provisions of the Appended Table 1 of the Export Control Order and the Appended Table of the Foreign Exchange Order.)

Precautions on Product Disposal

⚠ CAUTION

When disposing of the product, comply with laws pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

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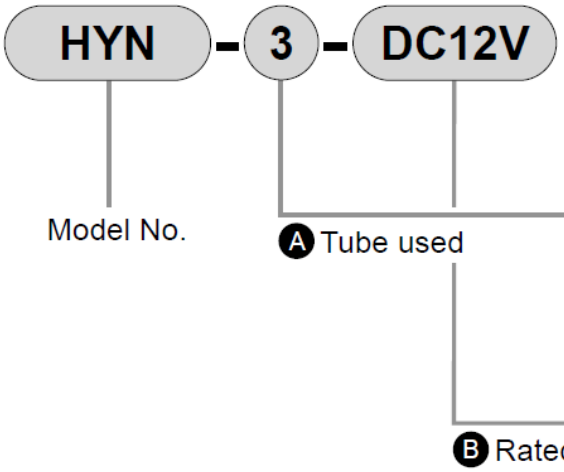
1. PRODUCT OVERVIEW

1.1 Model Number Indication



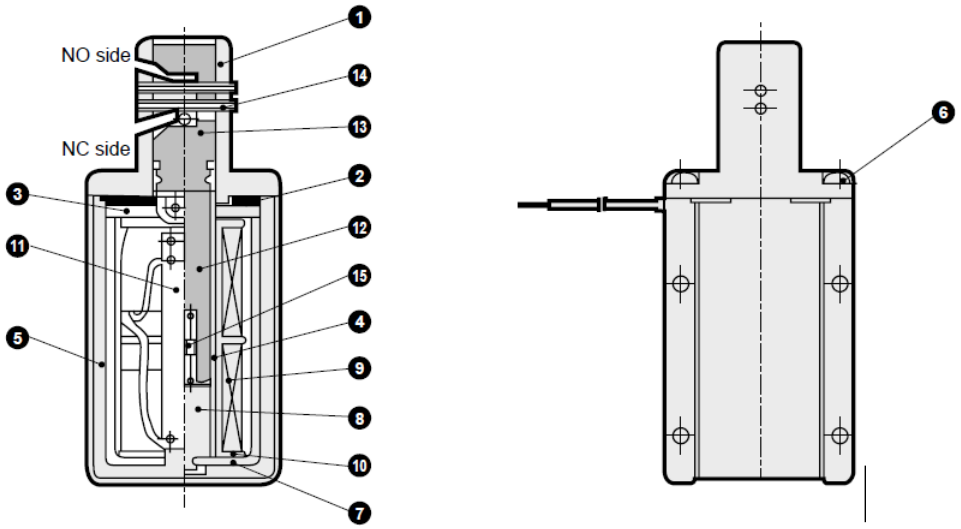
Code	Description
A Tube used	
3	ø3×ø1
5	ø5×ø3
8	ø8×ø6
B Rated voltage	
AC100V	100 VAC(50/60 Hz)
DC12V	12 VDC
DC24V	24 VDC

1.2 Specifications

Item	HYN-3		HYN-5		HYN-8	
	AC	DC	AC	DC	AC	DC
Working fluid	Water/pure water/chemical liquids (fluids that do not corrode wetted part materials)					
Working pressure MPa	0 to 0.05 (refer to the working pressure in the individual specifications.)					
Fluid temperature °C	5 (41°F) to 50 (122°F)					
Ambient temperature °C	0 (32°F) to 40 (104°F) (no freezing)					
Frequency Cycle/min.	60 or less					
Mounting orientation	Unrestricted (*1)					
Electrical specifications						
Rating	Continuous	Continuous	Intermittent (*2)	Continuous	Intermittent (*2)	Continuous
Rated voltage	100 V (50/60 Hz)	12 V 24 V	100 (50/60 Hz)	12 V 24 V	100 (50/60 Hz)	12 V 24 V
Voltage fluctuation range	±10%					
Leakage current mA	2 or less (*3)					

*1 : Avoid vertical mounting with the coil down to prevent fluid intrusion into the coil during abnormalities such as tube rupture.
*2 : When using intermittent rating, keep the max. continuous power ON time within 10 minutes and the DUTY ratio one half or less.
*3 : The leakage current from the control circuit must be equal to or less than the values shown in the table.
*4 : For tightening torque of the set screw, refer to the recommended tightening torque below.
Recommended tightening torque: HYN-3: 0.2 to 0.4 N·m, HYN-5, 8: 0.5 to 0.7 N·m
*5 : The performance may not be satisfied if a tube other than the recommended ones is used.
*6 : When starting and switching retention, noise is generated temporarily. Check the compatibility of the control circuit.
*7 : Solenoid valve has polarity. Connect the red lead wire to the plus (+) side.
*8 : After the solenoid valve is completely switched ON or OFF, set an interval of 0.5 seconds or more before switching it the next time.

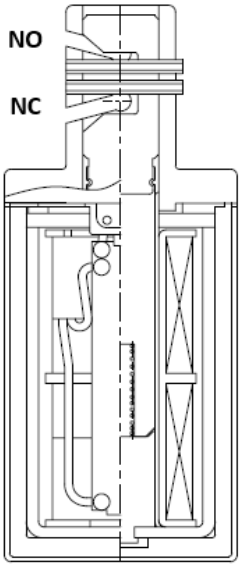
1.3 Internal Structure



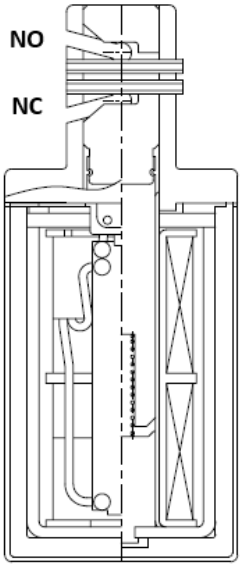
No.	Part name	Material		No.	Part name	Material	
1	Valve A	POM	Acetal resin	9	Coil	-	-
2	Packing	NBR	Nitrile rubber	10	Bobbin	PET	Polyethylene
3	Frame B	SPC	Steel	11	Wiring section assembly	-	-
4	Plunger guide	C2700	Copper	12	Plunger	SUS405	Stainless steel
5	Cover	PA	Polyamide	13	Valve B	POM	Polyacetal resin
6	Tapping screw	SUS304	Stainless steel	14	Spring pin	SUS420	Stainless steel
7	Frame A	SPC	Steel	15	Return spring	SUS304	Stainless steel
8	Stopper	SUS405	Stainless steel				

1.4 Description of Operation

- When the power is ON (Pulled position)
  The plunger is pulled to the core, squeezing the tube attached on the NO side (upper slot) , and stops the flow of the liquid in the tube. Also, it releases the tube attached on the NC side (lower slot) from being squeezed, and the liquid flows.



- When the power is OFF (Returned position)
  Recoiling force of the spring inside the plunger releases the tube attached on the NO side (upper slot) from being squeezed, and the liquid flows through the tube. Also, it squeezes the tube attached on the NC side (lower slot) , and stops the flow of the liquid.



2. INSTALLATION

2.1 Environment

⚠WARNING

Consult CKD about the specifications before using the product outside the designated specifications or for special applications.

Observe the following precautions since coils produce heat.

- Appropriate ventilation or heat dissipation measures must be considered if the product is installed in a control board or if the solenoid coil needs to be energized for a long period.
- Be careful when touching the valve since the coil temperature may rise depending on the surrounding temperature and energization time.

Do not use the product in the presence of corrosive gas or solvents.
Do not use the product in an environment where corrosive gases such as sulfur dioxide gas or solvents are present.

Do not use the product in a humid environment.
Condensation may occur due to a change in the temperature.

Do not use the product in an explosive gas environment.
For use in an explosive gas environment, select an explosion-proof solenoid valve.

⚠CAUTION

Use the product in an environment where it is not subject to radiant heat.

Do not paint the product or clean it with water or solvent.
The resin parts can become damaged and this may lead to a failure or malfunction.

- When using in a cold area, take proper measures against freezing.
- The product cannot be used outdoors. Protect the product by installing it inside a cover or a case.
- Do not use the product in an environment where the valve is subject to vibrations or inertia.

2.2 Unpacking

⚠CAUTION

Do not take the product out of the bubble wrap bag until just before mounting.
If the product is taken out of the bubble wrap bag, foreign matters may cause a failure or malfunction.

- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.

2.3 Mounting

⚠CAUTION

Thoroughly read and understand this Instruction Manual before mounting the product.

Hold the body firmly when handling and mounting the product.
Avoid holding the lead wire and hanging it. It may cause disconnection or conduction failure.

Check for leakage from the pipes after mounting the product and confirm that the product has been mounted properly.

- There is no restriction on the mounting orientation.
- Secure sufficient space for working safely during maintenance and troubleshooting.

2.4 Piping

⚠CAUTION

Secure the product when tightening or piping again.

Secure and support the pipes to prevent the valve from being subjected to pipe loads and vibrations directly.

■ Pipe cleaning

- Before piping, flush the pipes/tubes, solenoid valves, and connected devices to remove foreign matters.

■ Removal of foreign matters

- Dusts and foreign matters in the fluid and rust in the piping may cause an operation fault or leakage.

2.5 Wiring

⚠WARNING

Turn off the power before wiring.
An electric shock may occur.

Do not touch live parts with bare hands.
An electric shock may occur.

Thoroughly read and understand this Instruction Manual before working on electrical wiring.
The product must be handled by a person who understands the structure and operation principle of solenoid valve and has knowledge to secure the safety.

⚠CAUTION

Check the power supply voltage and the type of current (AC or DC) before supplying power.

Do not apply stress to the lead wires.
Make sure that the lead wires are slack and connect them so that they are not pulled.
Undue stress may cause such problems as disconnection of the lead wires or the contact terminals.

Make sure that the voltage drop on the solenoid does not exceed 10% of the rated voltage.
Voltage drop occurs when energizing solenoids at the same time or depending on the cable length.

2.5.1 How to wire the lead wires

This product uses lead wires as shown in the table below.
When pressure bonding (crimping), crimp under proper crimping conditions, and insulate properly.
DC-specification products have polarity. Connect the red wire to the plus (+) side.

Conductor size	Conductor cross-sectional area	Insulator outer diameter
AWG#26	Equivalent to 0.14 mm^2	φ1.32 mm

3. USAGE

⚠WARNING

Do not use the product as a valve for ensuring safety such as an emergency shut-off valve.
The product is not designed to be used as a valve for ensuring safety such as an emergency shut-off valve. If using the product for such a system, take appropriate measures in advance to secure safety.

Take necessary measures for preventing people and properties from being affected by a failure of the product.

Do not touch the coil and the actuator while the product is energized.
A burn injury may occur.

Do not touch electrical wiring connections (bare live parts) while the product is energized.
An electric shock may occur.

⚠CAUTION

Use the product within the specified pressure range.

Carry out a test operation before starting an operation if the product has been left unused for more than one month.

3.1 Checks to Make Before Use (Checks Made After Mounting)

⚠WARNING

Close the main cock and discharge the fluid in the tube before performing an appearance check.

Turn off the power before checking the power and insulation resistance.
Be careful not to get an electric shock while checking.

■ Appearance check

- Check that the valve is securely fixed to the mounting hole by pressing it by hand.
- Check that the threaded parts such as tapping screws are not loose.

■ Leakage check

- Pressurize the fluid to check for leakage from the piping connection.
- It is recommended to check for leakage by supplying compressed air and applying soapy water to see if bubbles form.

■ Electricity check

- Check the power supply voltage.
  The power supply voltage must be 24 VDC (average) with a ripple of 4.8 VP-P or less.
  (When using an average of 12 VDC, the ripple must be 2.4 VP-P or less.)
  If the product is used beyond the voltage fluctuation range, an operation fault or damage to the coil may occur.
- Check the withstanding noise voltages.
  If the product is used within a circuit that will cause a noise exceeding the below level, the transistor may be damaged to generate an overcurrent and burn the coil.

Rated voltage	Withstanding noise voltages (pulse width 1 μsec)
12 VDC	120 V
24 VDC	200 V
100 VAC	1000 V

- Check the insulation resistance.
  Measure the insulation resistance between a non-live metal part mounted to the solenoid valve and a bare live part such as a lead wire.
  Check that the insulation resistance is 100 MΩ or more with 1000 VDC megger.

■ Operation check

- Apply the rated voltage and pressurize the working fluid to check if the solenoid valve performs opening and closing movement properly.
  If the solenoid valve has a short energizing time, the solenoid valve opening / closing operation may not be able to follow.

3.2 Safety Instructions

- Make sure to insert the tube into the designated position.
- Use the recommended tube. If using a tube other than the recommended tube, the performance may not be satisfied.

Recommended silicon tube: Silascon® SA tube

Tube model No.	Tube size (O.D.) × (I.D.) × (length)
HYN-3-1-5000	ϕ3 × ϕ1 × 5 m
HYN-5-3-5000	ϕ5 × ϕ3 × 5 m
HYN-8-6-5000	ϕ8 × ϕ6 × 5 m

- Observe the working pressure, fluid temperature, and ambient temperature.
  If the tube is left attached for a long period, the tube can stick shut and may not open due to the nature of the tube and the characteristics of the working fluid. If the tube sticks shut and cannot be opened, replace the tube or take measures such as pressurizing the tube to open or manually unsticking the tube.
- When an abnormality is found, refer to "5 TROUBLESHOOTING".

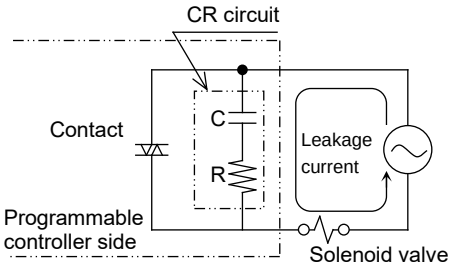
3.2.1 Electric circuit

⚠ CAUTION

Check for leakage currents from external control devices to prevent a malfunction.

When a programmable controller or a similar control device is used, a leakage current may prevent the valve from operating correctly even if the solenoid valve is de-energized.

When controlling solenoid valves using a programmable controller or a similar control device, make sure that the leakage current from the programmable controller output is as specified in the table below.



Rated voltage	Leakage current
12 VDC	2 mA or less
24 VDC	2 mA or less
100 VAC	2 mA or less

Take protective measures such as surge suppressor on the circuit side to protect against surge from the solenoid valve.

The surge suppressor limits the surge voltage generating from the solenoid valve, which can reach several hundred volts, to a low voltage level bearable for output contacts. However, this function may be insufficient for some output circuits and the voltage may cause breakage or malfunction of the product. Check the surge voltage limitation level of the solenoid valve to be used, the withstand voltage and circuit configuration of the output devices, and the reset delay time to determine serviceability.

As the product generates noise from incorporating electronic oscillator circuits, use noise countermeasures on the same power line.

4. MAINTENANCE AND INSPECTION

⚠WARNING

Thoroughly read and understand this Instruction Manual before maintenance and inspection.

4.1 Maintenance Parts

There are no maintenance parts for this product. If an abnormality such as leakage or failure is found while using the product, contact your nearest CKD sales office or distributor.

4.2 Periodic Inspection

- In order to use the product under optimum conditions, perform a periodic inspection every six months.
- For details on inspection, refer to "3.1 Checks to Make Before Use (Checks Made After Mounting)" in this Instruction Manual.
- Check that there are no dusts or foreign matters adhering to the inside of the tube.
- Make sure that the tube is securely attached.

4.3 Disassembling and Assembling

⚠WARNING

Do not disassemble or modify the product.
Disassembling the product will void the warranty.

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, check the table below for a possible solution.

Problem	Cause	Solution
Valve does not open. (NC side) Valve does not close. (NO side)	Valve is not energized.	Confirm wiring and fuse, then energize the valve.
	Voltage applied is lower than the allowable voltage range.	Confirm the power supply, and apply rated voltage.
	Fluid pressure is outside the specified pressure range.	Adjust the pressure.
	Flow path is clogged with foreign matters.	Replace the tube.
	Foreign matters are stuck in actuator.	Replace the product.
	Tube is stick shut.	Replace the tube.
Valve does not close. (NC side) Valve does not open. (NO side)	Electricity is not shut off.	Check for leak of electricity. Modify the circuit so electricity is completely shut off.
	Fluid pressure is outside the specified pressure range.	Adjust the pressure.
	Flow path is clogged with foreign matters.	Replace the tube.
	Foreign matters are stuck in actuator.	Replace the product.
	Tube is stick shut.	Replace the tube.
There is external leakage.	Tube is damaged or deformed.	Replace the tube.
There is internal leakage.	Fluid pressure is outside the specified pressure range.	Adjust the pressure.
	There are abrasions and scratches on tube.	Replace the tube.
	There are foreign matters caught inside tube.	Replace the tube.

If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by use or management that violates the "DANGER", "WARNING", and "CAUTION" precautions and other instructions stated in the catalog, the Specifications, or this Instruction Manual.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

6.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.