



To Use This Product Safely

Be sure to read this before use.
For general pneumatic components precautions, see Intro 27 for details.

Individual Precautions : F.R.L. unit (modular design)

Design / Selection

1. Common

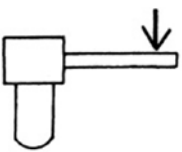
Warning

- This product is designed for industrial use. Do not use for medical purposes, or in any equipment or circuit that concerns human life.
- Air Filters, lubricator, Drain Separators plastic bowl, lubricator drip window, and pressure gauge lens. Material is polycarbonate. It cannot be used in environments containing synthetic oil, organic solvents, chemicals, cutting oil, screw locking agent, leakage detection solutions, or hot water, etc., or where these substances may come in contact with the product. Refer to P. 543 for details on plastic bowl chemical resistance.

Piping Load Torque

Do not apply piping load or torque to the body and piping parts.

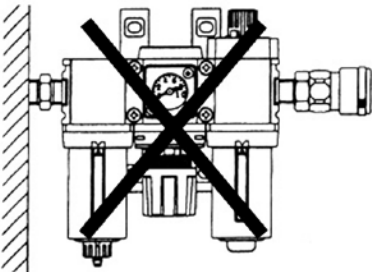
Series Name	1000-W	2000-W	3000-W	4000-W	6000-W	8000-W
Maximum Torque N·m	15	15	50	50	100	100



With the 1000-W Series in particular, application of a torque of 30 N·m or more on the piping is "hazardous" as the piping could be damaged. Use the product within the specified torque, even when using the pipe adaptor.

Avoid the manner of piping shown below.

Avoid cantilever fixed piping, as excessive force can easily cause damage. With the 1000-W Series in particular, application of a torque of 30 N·m or more on the piping is "hazardous" as the piping could be damaged. Use the product within the specified torque, even when using the pipe adaptor.



- Each product has an O-link groove for modular connection on its OUT side. Select piping that can be sealed at or below the O-link groove diameter.

Series Name	1000-W	2000-W	3000-W	4000-W	6000-W	8000-W
Groove Diameter	ø17.6	ø25.4	ø25.4	ø25.4	ø41.2	ø41.2

CAUTION

- High moisture levels
Install the air dryer and drain separator before the air filter. If there is a lot of moisture from the compressor, hot and highly humid air could shorten the device's life or result in corrosion.
- Dry air
Rubber parts for the regulator could deteriorate quickly, so use of a fluoro rubber valve assembly is recommended. Contact CKD when required.
- Water-lubricated compressor circuit
Be careful not to mix chlorine-based substances into the compressed air.
- Use the auto-drain under the Operating conditions below. It may cause malfunction.
NO auto-drain (exhaust when not pressurized) : For "F" and "FF"
 - Use a compressor with a capacity of 0.75 kw {90 l/min [ANR]} or more.
 - Set the Operating pressure to 0.1 MPa or more. (Until 0.1 MPa is reached, air is purged together with the initial drainage.)NC auto-drain (no exhaust when not pressurized) : For "F1", "FF1"
 - A compressor with a capacity of 0.75 kw or less can also be used.
 - Set the Operating pressure to 0.15 MPa or more. For 1000 Series NC auto-drain
 - Set the Operating flow rate to less than or equal to the max. Operating flow rate.
 - Avoid use of this in places with high vibration, such as where a compressor is installed, because air could leak from the drain outlet when the float vibrates.
 - Avoid drain overflow. It will cause operation faults.

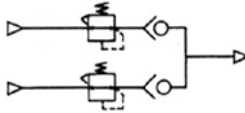
2. Regulator, filter/regulator

Warning

- Output pressure exceeding the Regulators' set pressure could result in damage or faulty operation of the secondary side devices. Be sure to install a safety device.
- The Regulators cannot process residual pressure (release secondary pressure) when the primary pressure is released. Use a regulator with a check valve when residual pressure must be processed. If the product is not equipped with a check valve, residual pressure may or may not be possible.
- As the Regulators may not always be usable when used with a secondary side sealed circuit or balance circuit, consult with CKD.

CAUTION

- Vibrations may occur depending on the usage and piping conditions.
Lower the primary pressure if vibrations occur. Select the proper size as pulsation can occur easily if the flow rate is extremely small in respect to the max. flow rate.
- The setting range for the Regulators' secondary pressure should be within 85% of that of the primary side. Otherwise, the pressure drop may increase.
- When using Regulators in parallel as below, do not use the OUT side as a closed circuit. If a closed circuit is required, install a check valve on the OUT side of each regulator.



3. Lubricator

Warning

- Do not use as lubrication for air motor or bearings. Lubrication may not be possible when used very frequently, such as in a press machine.

CAUTION

- If the Operating air quantity is low for the lubricator, oil may not drip. Check the min. air quantity required for dripping oil.

4. Pressure switch

CAUTION

- When using a pressure switch PPR or Digital Pressure Sensors PPX, avoid using it together with the lubricator. These are not splash-proof and so they may become inoperable if oil comes into contact with them.

5. Residual pressure exhaust valve

Warning

- Precautions for the residual pressure exhaust valve
 - The EXH port is dedicated for installation of the silencer. Tighten with a torque of 3N·m or less (manual tightening). Do not connect pipes where their loads or torque, etc., may be applied to the EXH port.
 - When the exhaust operation is incomplete due to air quality, manually operate the exhaust of the knob (turn → pull up).

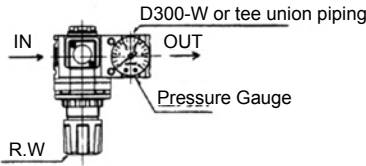
F.R.L. Unit (modular design)

Specific Precautions

6. Pressure gauge

CAUTION

- When using this unit for high volume air blowing, etc., install a pressure gauge as shown below so that the secondary pressure is measured accurately.



Regarding G45D

- The chemical resistance of the lens is shown below.
- Avoid using products in an atmosphere where chemicals are contained in compressed air or atmosphere, or where they could adhere to parts.
- Use in the above state could lead to lens damage.

Chemical resistance of lens

Type of Chemical	Classification of Chemical	Main Chemical Products	General Usage Examples	Lens
Inorganic Chemicals	Acid	Hydrochloric acid, sulfuric acid, hydrofluoric acid, phosphoric acid, chromic acid, etc.	Acid washing of metals, acidic degreasing solutions, coating treatment solutions, etc.	x
Organic Chemicals	Aromatic Hydrocarbons	Benzene, toluene, xylene, ethylbenzene, styrene, etc.	Contained in paint thinner (benzene, toluene, xylene)	x
	Alcohol	Methyl alcohol, ethyl alcohol, cyclohexanol, benzyl alcohol	Used as an antifreeze agent Leak detection agent	x
	Phenol	Carbolic acid, cresol, naphthol, etc.	Disinfectant solution	x
	Ketone	Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc.		x
	Carboxylic Acid	Formic acid, acetic acid, butyric acid, acrylic acid, oxalic acid, phthalic acid, etc.	Dyes/oxalic acid for aluminum processing, phthalic acid for paint base and leakage detection agents	x
	Oxyacid	Glycolic acid, lactic acid, malic acid, citric acid, tartaric acid		x
	Amine	Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc.	Additive for brake fluid	x

x : Not available (Lens will break.)

7. Flame-resistant Series

Warning

- The Regulators' diaphragm, check valve resin parts (inside aluminum plate), and silencer element are not made of flame-resistant materials. Avoid use in locations where spatter accumulates.

8. Oil-free Series

CAUTION

- Check the Operating circuit and Operating fluid.
Circulating fluids containing solids or non-specified fluids could cause malfunctions. Connect a filter to the product's primary side so that solid matter does not enter.
- Vibrations may occur depending on the usage and piping conditions.
Lower the primary pressure if vibrations occur. Select the proper size as pulsation can occur easily if the flow rate is extremely small in respect to the max. flow rate.
- Contact CKD if material restrictions apply (copper-based, silicon-based, halogen-based materials not permissible (fluorine, chlorine, oxalic based)).
An oxalic-acid-based cleaning agent is used to clean parts in some cases.
- If low-dust generation and cleanliness higher than the Oil-free Regulators are required, use the RC2000 Series Clean Regulators.
- Pressure and flow characteristics and relief start pressure may be less than the standard Regulators (R3000 Series, etc.).
Depending on use, such as when back pressure rises, the set pressure may increase 0.2 MPa. It is recommended to use a pressure gauge compatible with a set pressure of +0.2 MPa.

- Set the primary pressure to 0.1 MPa or more than the set pressure. Pressure adjustment faults or leaks from the relief valve could result depending on use.
- When used in applications where the primary pressure is 0.7 MPa or more, keep the difference in primary and set pressure within 0.4 MPa.
Pulsation could occur if the difference in pressures is large or if secondary piping is large. If so, lower the primary side pressure or restrict the secondary line. If vibrations continue, contact CKD.
- When the primary pressure is released, the secondary pressure flows to the primary side.
If a problem occurs in another device due to the inflow of secondary side fluid to the primary side, provide a circuit to retain the pressure. When the product is left with the primary pressure released for long periods, return the set pressure to 0. Pulsation could occur if the bottom rubber is deformed.
- Do not use in locations where ultraviolet rays are directly irradiated.
- The set pressure changes from the initial set point due to the Operating environment and conditions, as well as aging of part materials. Check the pressure periodically and reset if it has changed.

About Chemical Resistance of Plastics

Warning

- The chemical resistance of plastic parts is shown below.
- Avoid using products in an atmosphere where chemicals are contained in compressed air or atmosphere, or where they could adhere to parts.
- Use in the above state could lead to bowl damage and accidents.
- Avoid using with these chemicals or in an atmosphere containing these chemicals.
- A metal bowl is available if these chemicals must be used.

Chemical resistance of plastic bowl/body

Use a metal bowl in an atmosphere containing the following chemicals.
Also, since some inspection liquids, sealants, and adhesives contain the following chemical components, please confirm when selecting.

Type of Chemical	Classification of Chemical	Main Chemical Products	General Usage Examples	Polycarbonate Bowl	Nylon Bowl	Nylon body
Inorganic Chemicals	Acid	Hydrochloric acid, sulfuric acid, hydrofluoric acid, phosphoric acid, chromic acid, etc.	Acid washing of metals, acidic degreasing solutions, coating treatment solutions, etc.	x	x	x
	Alkaline	Alkali substances such as caustic soda, caustic potash, calcium hydroxide, aqueous ammonia, and sodium carbonate	Alkaline degreasing solution for metals Water-soluble cutting fluid, leak detection agent	x	○	○
	Inorganic Salts	Sodium sulfide, sodium nitrate, potassium dichromate, sodium sulfate, etc.		x	○	○
Organic Chemicals	Aromatic Hydrocarbons	Benzene, toluene, xylene, ethylbenzene, styrene, etc.	Contained in paint thinner (benzene, toluene, xylene)	x	x	x
	Chlorinated Aliphatic Hydrocarbons	Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichlorethylene, perchlorethylene, carbon tetrachloride, etc.)	Organic solvent-based cleaning liquid for metals (trichlorethylene, perchlorethylene, carbon tetrachloride, etc.)	x	○	○
	Chlorinated Aromatic Hydrocarbons	Chlorobenzene, dichlorobenzene, hexachlorobenzene (B.H.C), etc.	Pesticides	x	○	○
	Petroleum Components	Solvent naphtha, gasoline, kerosene		x	○	○
	Alcohol	Methyl alcohol, ethyl alcohol, cyclohexanol, benzyl alcohol	Used as an antifreeze agent Leak detection agent	x	x	x
	Phenol	Carbolic acid, cresol, naphthol, etc.	Disinfectant solution	x	x	x
	Ether	Methyl ether, methyl ethyl ether, ethyl ether	Additive for brake fluid	x	○	○
	Ketone	Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc.		x	x	x
	Carboxylic Acid	Formic acid, acetic acid, butyric acid, acrylic acid, oxalic acid, phthalic acid, etc.	Dyes and oxalic acid are used as aluminum treatment agents, and phthalic acid is used as a base material for paints. Used as leakage detection agent	x	x	x
	Ester	Dimethyl phthalate (DMP), diethyl phthalate (DEP), dibutyl phthalate (DBP), dioctyl phthalate (DOP)	Lubricant, synthetic oil, rust preventing agent additives Used as plasticizer for synthetic resin	x	○	○
	Oxyacid	Glycolic acid, lactic acid, malic acid, citric acid, tartaric acid		x	x	x
	Nitro Compounds	Nitromethane, nitroethane, nitroethylene, nitrobenzene, etc.		x	○	○
	Amine	Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc.	Additive for brake fluid	x	x	x
	Nitriles	Acetonitrile, acrylonitrile, benzonitrile, acetoisotrile, etc.	Raw material for nitrile rubber	x	○	○

○ Mark : Usable X : Not available (Plastic will become damaged.)

For precautions regarding mounting, installation, adjustment, operation, and maintenance, please refer to the CKD Components Product Site(<https://www.ckd.co.jp/kiki/en/>) → 'model No.' → Instruction Manual.